2018-2028 Rock Lake Management Plan

Rock Lake Improvement Association

Jefferson County Land & Water Conservation Department

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EXECUTIVE SUMMARY

A lake management plan provides a roadmap on policies and practices that help ensure a healthy lake and watershed. The plan is implemented by the lake community which can include citizens, lake associations, businesses, government agencies, and other organizations.

In 2016, the Rock Lake Improvement Association (RLIA), in collaboration with the Jefferson County Land and Water Conservation Department, received a grant from the Wisconsin Department of Natural Resources to update Rock Lake's management plan.

The RLIA formed an Advisory Committee of community members to review the latest data on the health of Rock Lake, and assist in crafting recommendations to improve and protect Rock Lake and its watershed. This Advisory Committee represented a variety of lake and watershed interests from fishing, to boating, shoreland areas, agriculture and more.

The previous Management Plan for Rock Lake was completed in 2006 and contained recommendations on a wide range of lake issues, from water quality to recreation. These recommendations were fully or partially implemented (34%), were ongoing actions implemented by various entities (36%), or were not implemented due to irrelevance or public or political will (17%). There also are some recommendations that could still be implemented (13%).

The updated Rock Lake Management Plan contains background on Rock Lake and its watershed, factors impacting the lake, and the Vision, Goals, and Recommendations of the plan. The Vision, Goals and Recommendation are contained below. The entire plan can be obtained at the RLIA website, www.rocklake.org, or at the L.D. Fargo Public Library in Lake Mills.

Vision of the Rock Lake Management Plan
Work in partnership with our community to protect and enhance water quality, habitat, and recreational assets in Rock Lake and its watershed for current and future generations.

Water Quality Goal: Improve the water quality of Rock Lake by reducing the summer average phosphorus level in Rock Lake by 20% by the year 2028.

- The current 8-year (2009-2016) average phosphorus is 17.7 µg/l. A 20% reduction will result in average phosphorus of 14 µg/l.
- Review this goal in 5 years (2022) to adjust as appropriate given the levels achieved and additional research into phosphorus loading to the lake.

<u>Agricultural Recommendations to Achieve Water Quality Goal</u>

- Install conservation practices on agricultural lands within the Rock Lake watershed to prevent soil erosion and protect water quality.

- Recommended practices include cover crops, reduced tillage including no-till, filter strips, and grassed waterways.

- Find an agriculture leader(s) in the Rock Lake watershed who is interested in forming a Rock Lake Producer-Led Watershed Protection Committee, in collaboration with either Rock Lake Improvement Association (RLIA) or Land and Water Conservation Department (LWCD) or both, to be eligible for funds to prevent and reduce runoff from farm fields.
- The LWCD should investigate areas identified in the EVAAL analysis to determine if erosion control practices are needed. If they are, then contact the landowners and provide available technical and financial assistance to control the erosion.
- Implement the 2014 "Miljala Channel Tributary Watershed" recommendations:
    1. Maintain the channel turbidity barrier until installed practices make it unnecessary.
    2. Continue to work with Daybreak Foods to ensure that chicken manure spreading on farm fields is done according to state standards.
    3. Implement a vegetated buffer on farm fields adjacent to the stream.
    4. Stabilize the stream banks in partnership with landowners along the stream.
    5. Once upstream practices are installed, pursue wetland restoration to trap sediment and associated phosphorus, and to improve wildlife habitat.
    6. Perform monitoring to document changes resulting from practice implementation.

<u>Residential Recommendations to Achieve Water Quality Goal</u>

- Increase the total length of shorelands that have native vegetation (trees, shrubs, flowers, grasses) and meet state standards from 28.3% in 2016 to 39% by 2023 and 50% by 2028. (This is a recommendation that will also aid in achieving the habitat goal.)
    - Review this goal after repeating the shoreland and shallows survey (in 2021 and 2026) to determine if it should be adjusted.
    - Actions could include: educate property owners about the importance of shoreline vegetation and financial support via Healthy Lakes grant, RLIA native plant sale, shoreland garden workshops, and garden tours among other ideas.
- The City and Town of Lake Mills should ensure that construction site erosion laws are enforced by either their building inspectors or other officials as required.
- The Town and City of Lake Mills should work together on a new composting area so citizens have more yard waste disposal options to reduce phosphorus pollution.
- Promote the use of stormwater management practices in the watershed including rain barrels and rain gardens.

<u>Streets Recommendations to Achieve Water Quality Goal</u>

- Continue to work with the Town and City of Lake Mills to reduce the delivery of pollutants from streets to lakes and streams (such as runoff from Cedar Lane into

the Miljala channel, sediment buildup in cutouts on Shorewood Hills Road, and updates to the storm drainage system on Lake Shore Road).

- The City of Lake Mills should find a location other than Veterans Lane for snow disposal which doesn't impact the lake. Otherwise, the City should pile the snow on Veterans Lane on the side of the road that is farthest from the Mill Pond.
- In the short term, the Town of Lake Mills should direct their contactor to not spread sand and salt together. Salt should be placed at stop signs, hills, and curves; sand should be placed on straight road stretches. After salt turns the snow to slush, the roads should be plowed again.
- In the long term, the Town of Lake Mills should modernize their approach to snow/ice removal to incorporate a brining system (or other system that is superior to the current situation).
    - The Town could investigate partnering with the City of Lake Mills or Jefferson County to obtain the equipment and/or personnel if local contractors cannot implement more modern systems of snow/ice removal.

Other Recommendations to Achieve Water Quality Goal

- Research the pros, cons, and mechanics of restoring Rock Creek to its natural channel by bypassing the man-made ditch downstream of County Highway A.

Water Quality Sampling Goal: Measure the health of lakes and streams in the Rock Lake Watershed with volunteers and applicable technologies to track trends and identify sources of pollutants.

Recommendations to Achieve Water Quality Sampling Goal

- Increase the number of water clarity measurements to at least every other week on Rock Lake by recruiting and training volunteers.
- The Land and Water Conservation Department and the Department of Natural Resources should take their phosphorous samples on different days in July and August so that there are 4 summer samples used to analyze the trends instead of 2 samples.
- Measure the dissolved oxygen profile at the deep hole biweekly rather than monthly in the summer to better document the amount of anoxic water and the depth when anoxia happens throughout the summer.
- Determine the level of internal phosphorus loading in Rock Lake by implementing a sampling regime of additional dissolved oxygen and phosphorus testing.
- Determine the costs and the protocols/equipment needed to measure the phosphorus loading that occurs from Marsh Lake to Rock Lake.
- Expand water quality monitoring at Rock Lake's inlets: add phosphorus at Hwy A; initiate temperature, dissolved oxygen, macroinvertebrates, and phosphorus at Cedar Lane; determine if the creeks at Shorewood Hills Road and Hope Lake Road can be monitored.
- Collect concurrent samples of both base stream flow and phosphorous levels from all the sampled input streams, where possible, on the same day. Storm event sampling should also be pursued at these sites.

- In Mud Lake, add water quality measurements (temperature/dissolved oxygen profiles, phosphorus, and chlorophyll) to the existing clarity measurements being taken by volunteers.

Habitat Goal: Achieve a diverse ecosystem in the water and on the land for native plants and animals to thrive.

Fish and Wildlife Recommendations to Achieve Habitat Goal

- Look for opportunities to increase fish and wildlife habitat in Rock Lake and its watershed including the fish sticks project at Tyranena Park.
- The nearshore fish survey should be performed in future years to monitor the trends in nongame fish populations. Future surveys should be performed using both seining and electrofishing gear.
- The Department of Natural Resources should add a boom shocking survey in Rock and Marsh Lakes that specifically targets smaller, rare fish species by using fine-mesh nets.
- Additional and more frequent nearshore fish sampling should be performed in Mud Lake because both rare and environmentally sensitive fish species have been documented there in 2007 and 2013. In addition, more sites should be added and both seining and electrofishing gear should be used.
- Additional fish surveys on Mud Lake should be performed. The carp population should be assessed as it may be negatively impacting the aquatic plants.
- Research whether fishing tournaments held on Rock Lake may be having a negative impact on the lake or the fish population.
- Continue to educate the public in the spring regarding Columnaris, a naturally occurring bacterium that can lead to fish kills.
- Research the feasibility of expanding frog and toad surveys to include other areas such as Mud Lake, Bean Lake, Korth Park, and Lost Lake.
- Continue to have volunteers perform the bat survey on Rock Lake each summer.

Aquatic Plant Recommendations to Achieve Habitat Goal

- Review the results of the 2017 aquatic plant survey and the 2018 bulrush survey to determine if actions should be added to this plan.
- Determine if the water milfoil near the outlet of the Miljala channel is native, Eurasian, or a hybrid (via genetic testing), and pursue a DNR permit to hand pull any Eurasian or Hybrid water milfoil.
- Aquatic plant surveys (including the bulrush survey) should be performed approximately every 5 years (starting in 2022) on Rock Lake, Marsh Lake, and the mill pond to keep track of community changes and the appearance or spread of invasive species.
- Aquatic plant surveys should be performed on Mud Lake (starting in 2018/2019) and done at a time when curly-leaf pondweed is growing.
- Continue to educate landowners about the value of native aquatic plants and removal laws (especially that permits are required in sensitive areas prior to any removal).

Invasive and Nuisance Species Recommendations to Achieve Habitat Goal

- Continue to implement the Clean Boats/Clean Water program at the City and Town of Lake Mills launches and expand coverage during waterfowl hunting season.
- Continue holding an annual environmental cleanup including invasive species control (garlic mustard) and garbage pick-up.
- Take action to reduce the Canada geese and sea gull population (including a geese count to inform management officials on the population).

Shoreland and Shallows Recommendation to Achieve Habitat Goal

- Perform the shoreland and shallows survey every 5 years (2021, 2026) to track changes.
- Investigate how to make it clear to boaters how to navigate through Korth Bay in order to protect the sensitive area. Navigational buoys could be placed in the "channel" that is known to local residents.

Mill Pond and Channel Recommendation to Achieve Habitat Goal

- The City of Lake Mills should hold a public comments session (separate from a City Council meeting) to review options proposed in the Mill Pond and Channel dredging feasibility study prior to the City Council making a final decision.

Lake Recreation Goal: Ensure a safe and healthy multipurpose recreational environment.

Water Recreation Recommendations to Achieve Lake Recreation Goal

- Perform a survey in the summer to determine boat congestion on the lake and if there is a potential safety hazard during busy weekends.
  - The survey could include: determining the number of boat trailers parked at the launches, and counting the number of boats on the lake. Surveys on multiple dates increases the likelihood of more meaningful data. Follow-up actions could include limiting parking spaces to prevent the over usage of the lake.
- Research if the Town of Lake Mills can adopt an ordinance to limit the total number of people on a watercraft and being towed to the total capacity of the watercraft.
- Share with the lake patrol the public survey results regarding which recreational rules respondents observed being violated. Recommend that the lake patrol increase education and perhaps citations on those violations.
- Research, with broader public input, the viability of simplifying the current Slow-No-Wake distance regulation for all motorized boats to 200 feet from shore.
- Educate lake residents regarding slow-no-wake rules including: definition of slow-no-wake, location of slow-no-wake areas, and distances in which motorized vehicles must operate at slow-no-wake speeds.
  - This could be achieved by sending a letter to all lake residents.
- Provide the recreational rules pamphlet to people obtaining season launch passes and continue to put the pamphlets at the launches.

Beach Water Quality Recommendations to Achieve Lake Recreation Goal

- The City of Lake Mills and Town of Lake Mills should follow the current DNR and EPA protocols on posting beach water advisories and closures.
- The day after a beach water sample exceeds an advisory or closure standard, the City of Lake Mills and/or Town of Lake Mills should take a beach water sample and pay the costs to overnight it to the State Lab of Hygiene in Madison.
- Review the status and enforcement of laws regarding dogs on public beaches and explore options to provide lake access at other areas to prevent them from polluting the beaches.

Sandy Beach Recommendations to Achieve Lake Recreation Goal

- Prior to making a final decision, the City of Lake Mills should hold a public comments session (separate from a City Council meeting) to review the proposal(s) for changes to the Sandy Beach and trailer park areas.
- Any development to the Sandy Beach and trailer park areas should include practices that result in no negative environmental and/or recreational impact to the lake (including water runoff, boat use & access, and recreational safety). Further, if no development is undertaken at Sandy Beach, the impacts to the lake of the current situation should be reviewed to identify practices that improve the impact that the park and its uses have to the lake.

Education Goal: Achieve a more knowledgeable and active public in regards to Rock Lake, the watershed, and the lake management plan.

Education Recommendations to Achieve Education Goal

- Expand education efforts to create a more knowledgeable public on lake and watershed issues, including efforts to train more citizen scientists.
  - The public survey results can be used to determine topics that could be covered.
  - Activities could include articles in the paper, internet and social media, direct mail, workshops, one topic talks, garden or conservation practice tours, and water tours.
- Continue to provide new and current lake shore property owners with information on the lake including zoning rules, recreational rules, and native shoreland gardens.
- Improve peace and tranquility by educating the public about light and noise pollution.

LAKE MANAGEMENT PLAN - PROCESS

The Rock Lake Improvement Association (RLIA) received a lake planning grant from the Department of Natural Resources (DNR) in 2016 to update the management plan for Rock Lake and it's watershed. The RLIA used a public process to develop the updated plan.

Project Partners

Throughout the 2 years of the project, the RLIA and its Planning and Advocacy Committee guided the planning process. They worked cooperatively with the Water Resources Management Specialist with the Jefferson County Land and Water Conservation Department (LWCD) to do this work. The Advisory Committee was composed of members of the public who represented different lake interests including: agriculture, environment, fishing, motorized recreation, non-motorized recreation, and shoreland residents. In addition, people were on the Advisory Committee representing the City of Lake Mills, the Joint Rock Lake Committee, Jefferson County, and the Town of Lake Mills.

The roles and responsibilities of the RLIA, the LWCD, and the Advisory Committee is listed below.

Rock Lake Improvement Association – Project Manager

- Responsible for the overall management of the project
- Responsible for meeting the grant requirements of the DNR
- Responsible for making final decisions on the direction of the project
- Role: oversee the entire project to make sure it is on track; consider the recommendations and views of the Advisory Committee, resource experts, and the public; finalize the recommendations and report; and communicate necessary information to the Department of Natural Resources

Jefferson County Land and Water Conservation Department – Project Facilitator

- Responsible for planning and implementing the project in partnership with RLIA
- Responsible for drafting the Rock Lake Management Plan
- Role: compile and analyze data on the lake, plan meetings, ensure public input into the process, present options and recommendations, communicate with resource experts, draft and finalize the final plan with the RLIA

Advisory Committee

- Responsible for considering and reaching consensus on recommendations that will be given to the RLIA for final consideration
- Responsible for communicating with the interests/groups they are representing, and the general public to get their input on ideas for recommendations
- Role: serve as the key committee for generating recommendations for the future management of Rock Lake by doing the following: read lake data provided; listen

to the views of experts; attend public meetings; and consider the data, the expert opinion, and the public input when formulating recommendations

Public Input

A crucial component of developing a lake management plan is ensuring that the public is informed of the project and has an opportunity to provide feedback. This was accomplished in many ways.

In June 2016, the Lake Mills Arts Alliance hosted a 2-week art show with the theme of "lake." As part of this show, the RLIA had a display with information about the lake and management plan as well as a box where people could insert cards with reasons why they love Rock Lake. The responses were added to the notes of the February 2017 public meeting. Patricia Cicero, the Water Resources Management Specialist with the Jefferson County Land and Water Conservation Department gave a talk entitled "Future Plans for Rock Lake" to inform those in attendance about the lake and the upcoming lake management planning process.

All of the meetings of the Advisory Committee were open to the public. Those in attendance could contribute to the meeting in two different ways: 1. A public comment item on each agenda. 2. Prior to decisions being made on specific topics, the meeting facilitator would ask the public in attendance if they had any input to provide.

In October 2016, the RLIA took part in the Lake Mills community event called Fall Fest. At this event, the RLIA had a display that provided information on the lake management plan process. In addition, the public could insert comment cards into a box to provide reasons why they love Rock Lake. The responses were added to the notes of the February 2017 public meeting.

On February 9, 2017, a public comments session was held. A total of 25 people were in attendance. At the meeting, the public was asked the following questions:

- What is your vision for the future of Rock Lake? What do you love about Rock Lake?
- What are your concerns for Rock Lake? What would you change?
- What are your ideas for positive change for Rock Lake and its watershed?

On October 19, 2017, a second public comments session was held. A total of 15 people were in attendance. This session included a presentation that explained the planning process and the draft vision, goals, and recommendations of the plan. The public was asked for their feedback.

The notes from the 2 public sessions are located in Appendix B.

The RLIA Planning and Advocacy Committee and the LWCD worked together to develop a public survey. Once questions were formulated, the survey was provided to the DNR Resource Sociologist for review. The review consisted of fine tuning the questions. Once the survey was finalized, it was mailed to property owners located in

both the Rock Lake Watershed and the City of Lake Mills. A postcard was sent to the recipients of the survey about a week after the initial mailing to remind people to complete the survey. The public was also encouraged to complete the survey through social media and a newspaper article in the Lake Mills Leader. A total of 2483 surveys were mailed and there were 593 surveys returned for a return rate of 23.8%.

The questions and results of the public survey are located in Appendix C.

Development of Lake Management Plan

The Advisory Committee met 10 times to review information on different topics and come to consensus on recommendations. The meeting dates and the topic at each meeting was as follows:

September 8, 2016 – Project Overview, Roles, Responsibilities, Ground Rules
October 20, 2016 – Overview of Lake and Watershed Quality
November 10, 2016 – Recreation and Structures in the Lake
December 8, 2016 – Nonpoint Source Pollution (Agricultural, Residential, Urban)
January 12, 2017 – Nonpoint Source Pollution (Agricultural, Residential, Urban)
March 9, 2017 – Shoreland Development, Shoreland and Shallows Survey
April 13, 2017 – Water Levels, Odor Issues, Sandy Beach Feasibility Study
May 11, 2017 – Millpond and Channel Study, Lake and Watershed Institutions
June 8, 2017 – Phosphorus and Plan to Reduce Phosphorus
September 14, 2017 – Finalizing Draft Recommendations

Prior to each meeting, the Advisory Committee received a written report on the issue(s) that they would discuss at the meeting. These reports then became the chapters in this report on each lake/watershed issues.

The Advisory Committee considered the input from the February public session and the public survey in their deliberations. Decisions on recommendations were made by consensus of the Advisory Committee. The draft recommendations developed by the Advisory Committee were reviewed by the RLIA Planning and Advocacy Committee. The RLIA Committee organized the recommendations under main goals and also added an overall vision for the future of Rock Lake. The draft vision, goals, and recommendations were finalized by the RLIA Board for the October 2017 public meeting. At the November 2017 RLIA Board meeting, the public comments were reviewed; some additional minor changes were made; and the vision, goals, and recommendations were finalized.

Lake Management Plan Amendments

The RLIA realized that new issues could emerge during the 10-year time-frame of the management plan. Therefore a process for amending the plan was developed.

When a new issue arises that could impact Rock Lake and its watershed, the Rock Lake Improvement Association will take the following steps:

- If the issue(s) will have a significant impact on Rock Lake or its watershed, then the RLIA will amend the management plan accordingly.
- The RLIA will decide if other people/groups/stakeholders (including the Advisory Committee and the Joint Rock Lake Committee) should be included in the process to amend the plan.
- The plan will be amended if consensus is reached by the RLIA Board with input from the identified stakeholders.

CHARACTERISTICS OF ROCK LAKE AND THE ROCK LAKE WATERSHED

Rock Lake is 1,371 acres in size with a watershed of 15.1 square miles. The watershed consists of land in the Town of Lake Mills and the City of Lake Mills (Map 1). Rock Lake is a natural glacial lake formed as a large compound depression in the ground moraine. Rock Lake is a drainage lake that flows to Rock Creek which flows into the Crawfish River which flows into the Rock River.

Land Cover

Map 2 displays the land cover in the Rock Lake watershed. Agriculture and agriculture-related cover is the main land cover in the watershed. The next dominant land cover is wetlands representing almost a quarter of the total watershed area. The majority of the land in wetlands consists of a large wetland complex that is south of Rock Lake.

Lakes in the Watershed

Besides Rock Lake, there are 3 other lakes within the watershed – Mud Lake, Perch Lake, and Bean Lake. The basic characteristics of each lake are detailed in Table 1. The southern basin of Rock Lake is known as Marsh Lake (210 acres).

Table 1. Lakes within the Rock Lake Watershed

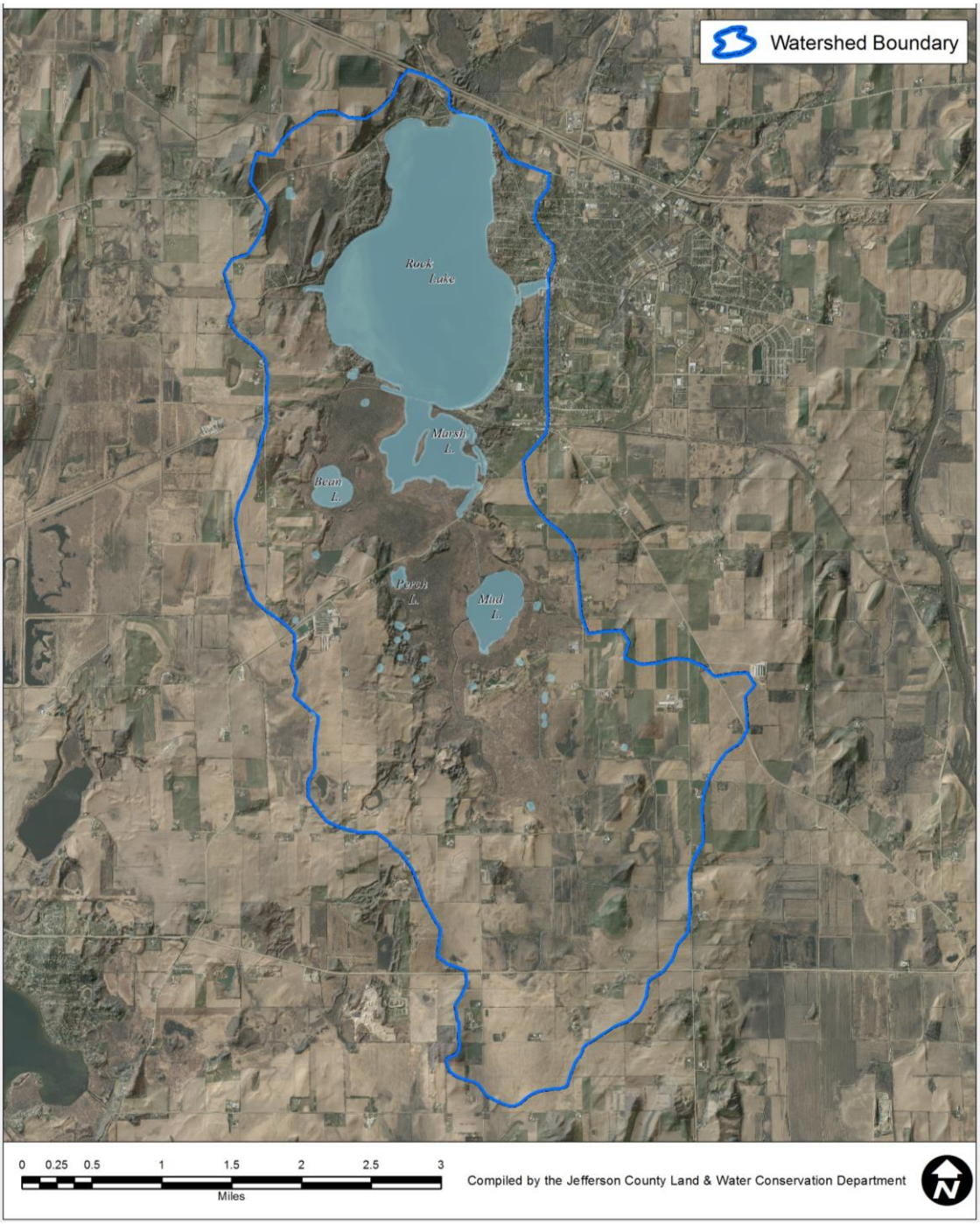
	Surface Area (acres)	Maximum Depth (feet)	Mean Depth (feet)	Shoreline Length (miles)
Bean Lake	33	6	*	0.87
Mud Lake	95	22	7.4	1.67
Perch Lake	5	7	*	0.46
Rock Lake	1,371	60	16	11.9

* The mean depths of Bean and Perch lakes have not been determined.

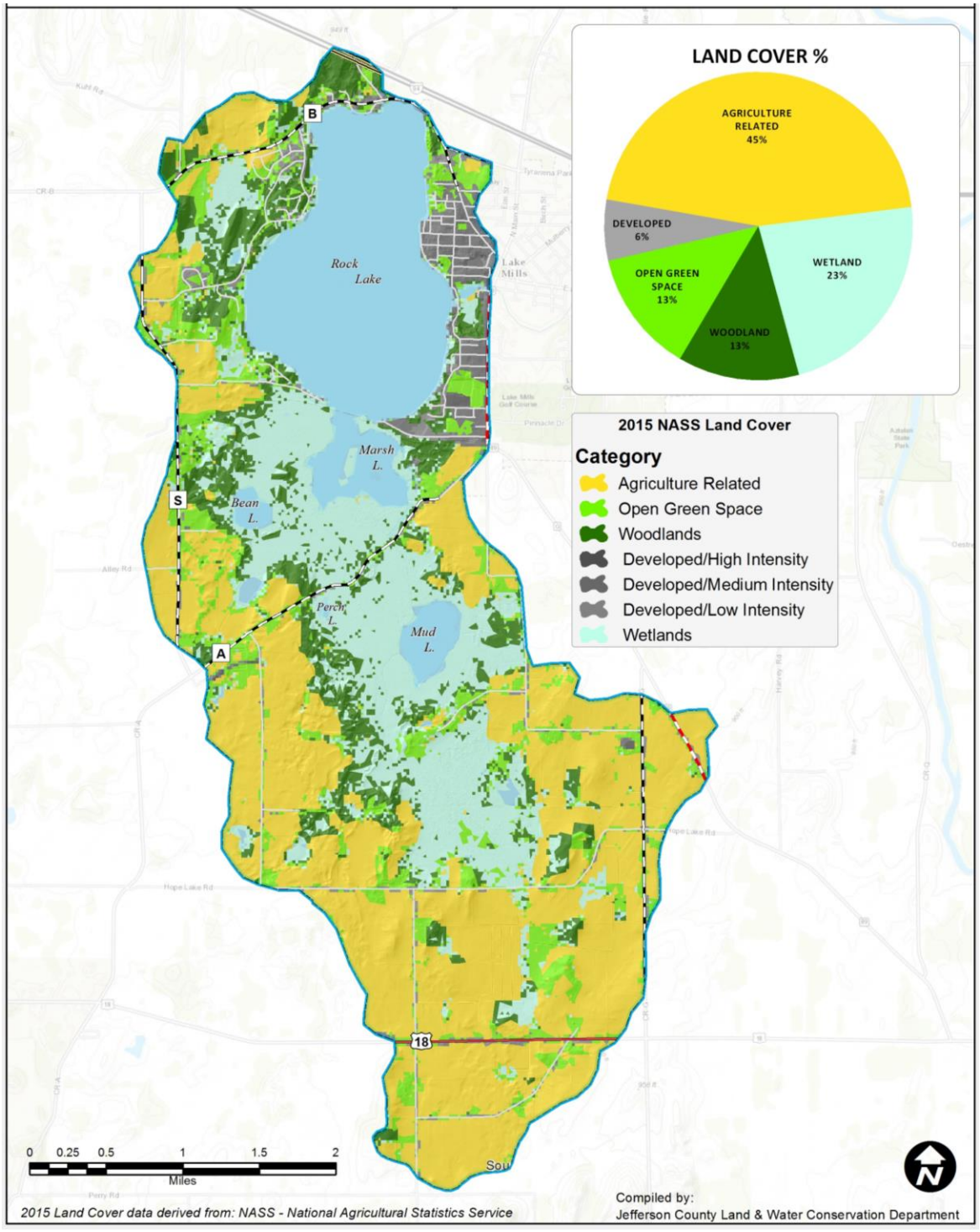
Rock Lake – Water Quality

Rock Lake is the only lake in the watershed that has had consistent, long-term water quality testing. The Department of Natural Resources samples the quality of Rock Lake as part of their Long-Term Trend (LTT) Lakes Studies. There are 63 LTT lakes throughout Wisconsin, and they were chosen to represent their lake class (Rock Lake is a drainage lake) in their region. As part of this program, Rock Lake is sampled annually during spring turnover and 3 times during the summer (July 15 – September 15). The sampling takes place at the deep hole and includes total phosphorus, water clarity, chlorophyll *a* and vertical profiles of dissolved oxygen, temperature, pH, and conductivity. Other parameters collected include alkalinity, color, nitrate, nitrite, and total Kjeldahl nitrogen.

Map 1. Rock Lake Watershed



Map 2. Land Cover in the Rock Lake Watershed



Since 1988, Rock Lake's water quality has also been sampled by citizens as part of the State's Citizen Lake Monitoring Network. They sample water clarity, vertical profiles of temperature and dissolved oxygen, and collect samples for analysis of total phosphorus and chlorophyll *a*. The sampling is done 2 weeks after the ice comes off the lake, and then monthly June through August, and sometimes September. Currently, this data is collected by a volunteer and the Jefferson County Land and Water Conservation Department.

Water Clarity

Water clarity is the measurement of how far light penetrates the water. It is important because it can impact the depth of plant growth, the amount of oxygen in the water, and the temperature of the water. In addition, the clarity of the water can affect recreational use and property values.

Water clarity is measured using a Secchi disc which is an 8-inch disc that is painted black and white. The disc is lowered into the water until it disappears from sight, then it is raised until it becomes visible – that depth is recorded as the water clarity reading. Many factors can impact the water clarity including wind and the amount of algae and sediment in the water.

Water clarity measurements can be different depending on the time of year. The standard in Wisconsin is to track the average of July and August Secchi depths over time to determine trends. While variations in water quality parameters such as clarity occur from year to year, long-term data indicate the trends in the resource. The long term trend (shown in Chart 1 as the line through the data) indicates that the water clarity is increasing over time. The presence of zebra mussels, found in the lake in 2005, has increased the clarity in the lake. Please note that there are many negatives associated with zebra mussels (please see the invasive species section below).

Chlorophyll *a*

Chlorophyll *a* is the photosynthetic pigment found in plants. It is a measure of the lake's algae biomass with higher concentrations indicating algal blooms. For most Wisconsin lakes, concentrations less than 7 µg/l indicate good water quality. Rock Lake's average summer (July-August) chlorophyll *a* concentrations from 1991 through 2017 are shown in Chart 2. The summer averages for Rock Lake are all under 7 µg/l. The trend line in the chart shows a decrease in chlorophyll *a* concentrations.

Total Phosphorus

Phosphorus is a nutrient that is called the "limiting nutrient" because it is found in lower concentrations in most Wisconsin lakes (including Rock Lake) as compared to nitrogen. Therefore, increases in phosphorus in the water will increase the amount of algae and plant growth. One pound of phosphorus delivered to a lake can produce up to 500 pounds of algae. Sources of phosphorus include runoff from farmland, animal lots, construction sites, lawns, and shoreline erosion.

Chart 1. Average Summer (July & August) Water Clarity in Rock Lake (please note that the clarity axis starts at 0 depth at the top of the chart)

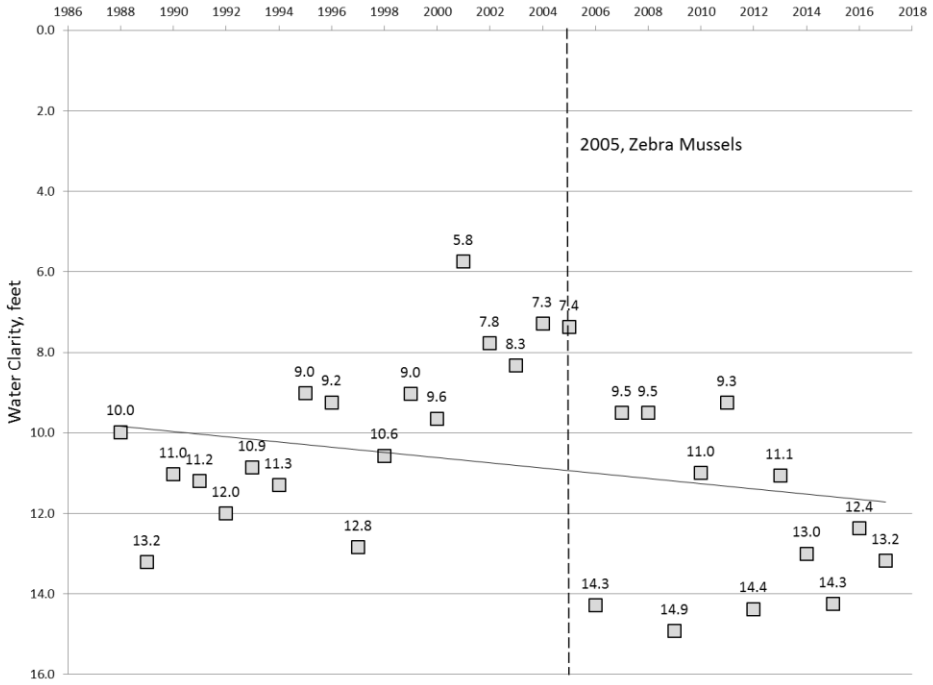
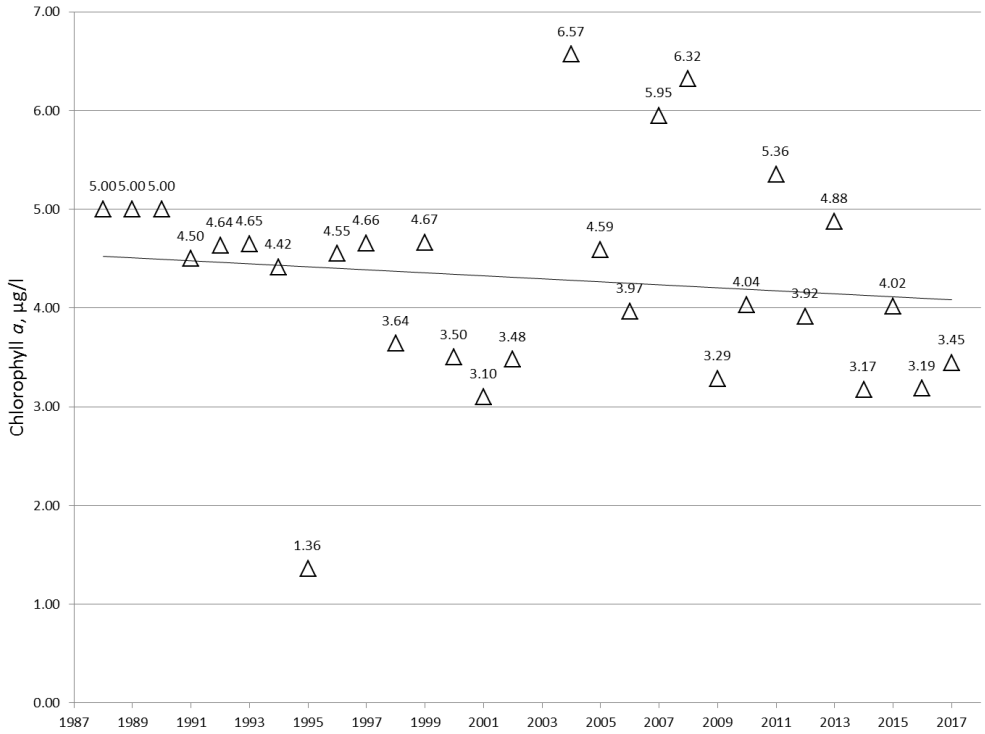


Chart 2. Average Summer (July & August) Chlorophyll *a* in Rock Lake



Phosphorus mostly is held in insoluble particles with calcium, iron, and aluminum. Rock Lake is a hard water lake that precipitates marl (or calcium carbonate) – often seen as a white substance in the sediment and white precipitate on plant leaves. By absorbing phosphorus in its particles, marl helps control algae growth in Rock Lake. Phosphorus is only released from particle form when the water is anoxic (has no oxygen). Anoxic conditions occur in the bottom waters of deep lakes during the summer when dead plant and animal matter use up the oxygen during decomposition.

Phosphorus Water Quality Standard for Lakes

Wisconsin now has a water quality standard for total phosphorus that is set forth in Administrative Code NR 102. This standard is established to protect both fish and aquatic life uses and recreational uses. For Rock Lake, the total phosphorus water quality standard is 30 µg/l.

In 2004, the average summer (July/August) total phosphorus was above this standard at 34 µg/l. However, that average consisted of only one sample in the two month time-frame of July and August. There was another date in which there was only 1 sample in the July and August timeframe (2008), and that year the phosphorus was on the higher level (25 µg/l). All other years have 2-5 samples (there were 11 in 1996) taken in July and August. High (or low) values that appear out of the ordinary may also indicate that the samples were contaminated during the sampling process and therefore are elevated over the true total phosphorus amount. It could also be the case that the phosphorus samples were done correctly, but the average summer total phosphorus amount might have been lower had there been more than one sample.

Phosphorus Trends in Rock Lake

Average summer phosphorus concentrations are shown in Chart 3. From 1988 through 1999 there was a very dedicated citizen doing the water quality sampling on the lake. He started training his replacements in 1999 and they did the sampling through 2005. Due to various factors, they were not able to consistently do the sampling. Since 2006, the LWCD has been taking the samples with citizens.

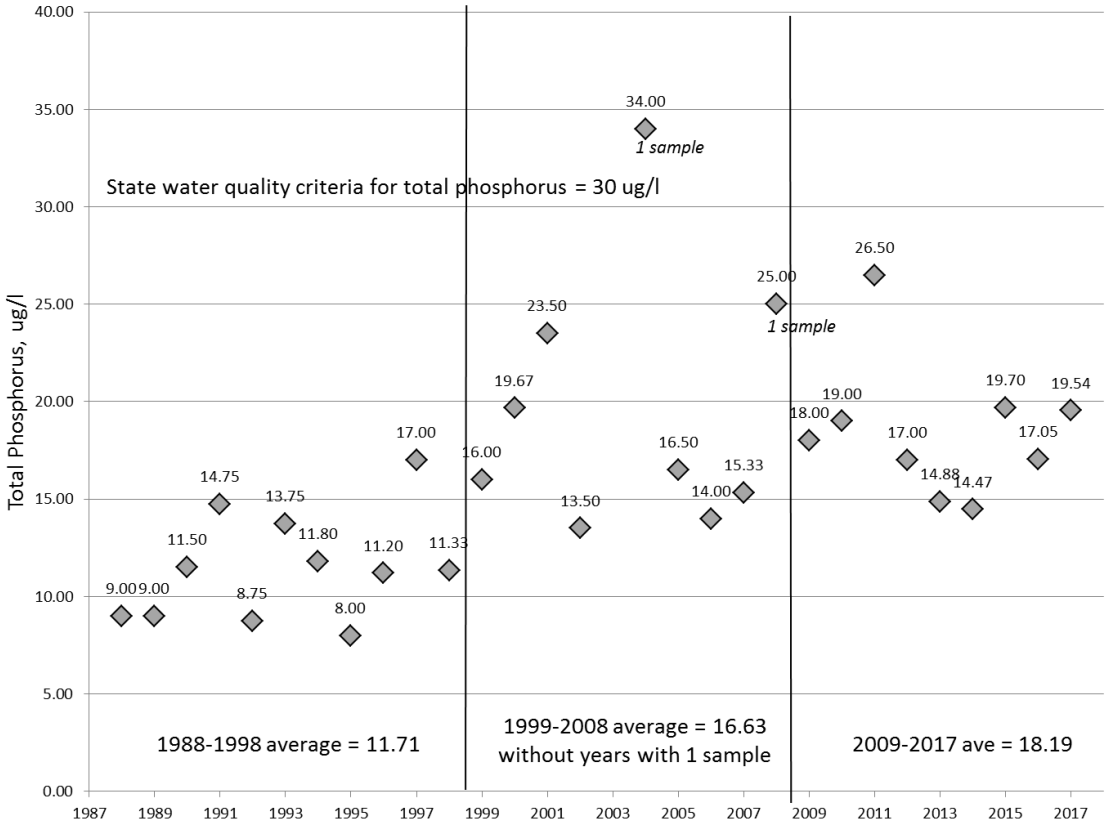
A linear trend line is not shown for this chart. Instead, the data is grouped into three date spreads because the data shows the following pattern:

- 1988-1998: the data is fairly consistent
- 1999-2008: the data is jumping around and is not consistent
- 2009-2015: the data if fairly consistent

The average summer (July-August) total phosphorus values for these three time frames are as follows:

- 1988-1998 = 11.71 µg/l total phosphorus
- 1999-2008 = 17.86 µg/l total phosphorus (16.63 µg/l without the 2004 and 2008 data)
- 2009-2016 = 18.21 µg/l total phosphorus

Chart 3. Average Summer (July & August) Total Phosphorus in Rock Lake



Phosphorus levels in a drainage lake can be increased due to increases in precipitation. Therefore, the amount of precipitation for each year was compared to the phosphorus results (Table 2). For the most part, years with above average precipitation for each timeframe had above average total phosphorus for the timeframe.

Another way to analyze phosphorus trends is to consider the running average every 5 years. To do this, the average was determined for the summer (July/August) data from 1988-1992, the next average was determined for the 1989-1993 timeframe, and so on. When this data is plotted on a graph (Chart 4), it shows that the phosphorus averages for 5 year groupings have been decreasing since the 2009-2013 grouping.

Table 2. Comparison of Precipitation and Total Phosphorus. Shaded areas indicate the precipitation or total phosphorus that is higher than average for the particular time-frame.

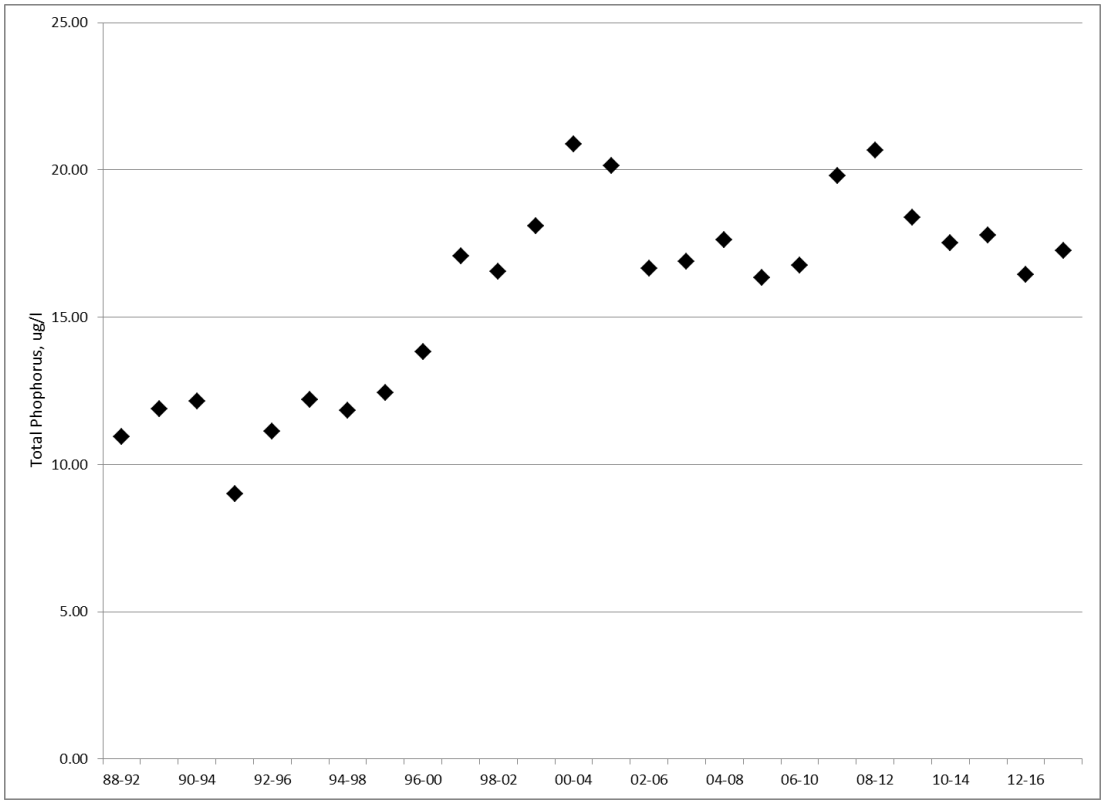
1988-1998 Timeframe		
	Total Precip	Ave TP
Total Ave*	33.31	11.71
1988	24.57	9.00
1989	23.39	9.00
1990	36.54	11.50
1991	39.09	14.75
1992	32.13	8.75
1993	43.34	13.75
1994	33.54	11.80
1995	33.58	8.00
1996	31.69	11.20
1997	28.64	17.00
1998	39.94	11.33

1999-2008 Timeframe		
	Total Precip	Ave TP
Total Ave*	35.79	17.86
1999	31.93	16.00
2000	40.34	19.67
2001	38.45	23.50
2002	26.19	13.50
2003	31.74	
2004	39.38	34.00
2005	24.7	16.50
2006	36.73	14.00
2007	44.41	15.33
2008	44.06	25.00

2009-2017 Timeframe		
	Total Precip	Ave TP
Total Ave*	37.47	18.19
2009	38.35	18.00
2010	37.86	19.00
2011	30.54	26.50
2012	26.36	17.00
2013	45.38	14.88
2014	35.31	14.47
2015	39.59	19.70
2016	45.56	17.05
2017	38.28	19.98

*Total Average = average of raw data, not the average of the averages in the table.

Chart 4. Five Year Running Averages of Total Phosphorus



Internal Phosphorus Loading

An important consideration with phosphorus in lakes is to determine if internal phosphorus loading is a source of phosphorus. At the bottom of lakes in the summer, decomposing algae and plant matter will consume the dissolved oxygen in the water. When there is no oxygen in the water (also called anoxic), then phosphorus attached to

particles in the bottom of the lake can be chemically changed into a more soluble form of phosphorus. The phosphorus released from the sediments is held in the bottom waters and only enters the upper waters during fall and spring "turnovers." During a "turnover" event, the lake's water fully mixes, and the phosphorus that had been contained in the bottom waters will mix with the surface water. That is why there can be fall and spring algal blooms in Rock Lake.

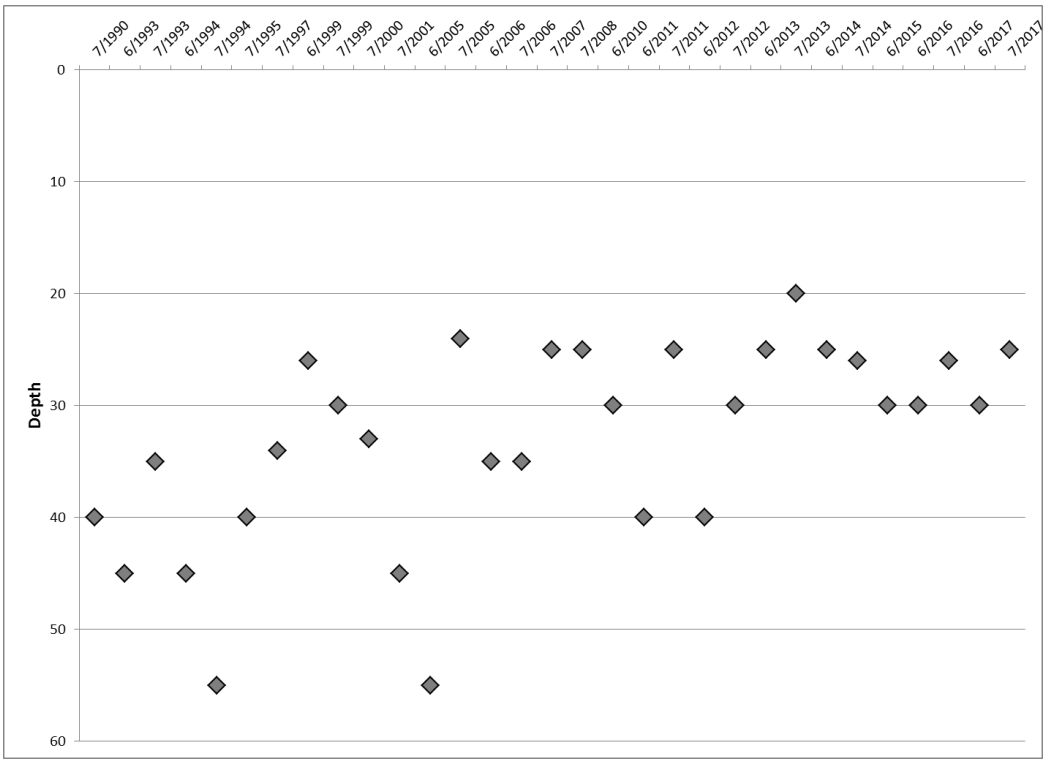
In the late 1990s, phosphorus release from the bottom sediments (also called internal phosphorus loading) in Rock Lake was determined to be low compared with more fertile lakes (Marshall 1997). For example, summer (July and August) phosphorus concentrations in the bottom waters of Rock Lake from 1986 through 1993 averaged 46 µg/l while concentrations in Lake Ripley, Jefferson County, and Fish Lake, Dane County, exceeded 200 µg/l and 300 µg/l respectively.

It is important to determine if the depth at which the water becomes anoxic has changed throughout the years. If the depth of the dissolved oxygen layer has gotten shallower, then internal phosphorus loading may be more of a concern than in the past. Chart 5 shows that the shallowest depth of dissolved oxygen less than 2 mg/l has gotten shallower throughout time. It is not known if these shallower depths are leading to more internal phosphorus loading. In order to determine the amount of internal phosphorus loading, the following steps should be taken:

- In late September or early October, measure the dissolved oxygen every 5 feet
- Where the dissolved oxygen is less than 2 mg/l, take a phosphorus sample every 3 feet starting at the bottom (be sure not to disturb the sediment).
- Determine mass phosphorus in the bottom of the lake (by calculating volume (liters) of each slice that has the same total phosphorus and multiplying by the total phosphorus result (mg/l))
- In the Spring during the turnover event, take about 3 total phosphorus samples
- Determine the Spring mass total phosphorus in the water.
- Take the fall total phosphorus mass and subtract the spring total phosphorus mass. The result is the internal loading amount for the lake.

If internal phosphorus loading is shown to be a large contributor to the phosphorus load to the lake, then one possible solution may be alum treatments. The pros and cons of this treatment would have to be pursued. If an alum treatment is the best alternative, then the treatment would likely last a long time because Rock Lake is a deep stratified lake that has a low sedimentation rate.

Chart 5. Shallowest Depth where the Dissolved Oxygen is less than 2 mg/l in June and July



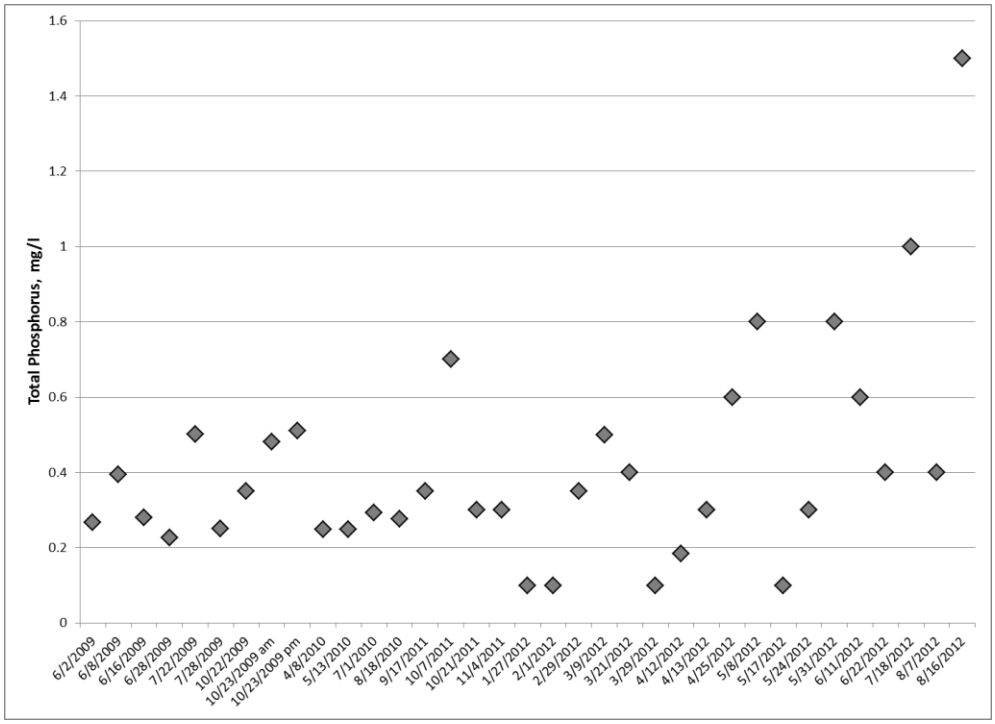
Phosphorus Inputs from Streams

There are 3 inlet streams to Rock Lake: Rock Creek that crosses County Highway A and flows into Marsh Lake, an unnamed stream that crosses Cedar Road and flows into a dredged navigation channel (Miljala channel), and an unnamed stream that crosses Shorewood Hills Road and enters Rock Lake.

The stream entering the Miljala channel has had the most phosphorus data collected. At the point before the stream enters the Cedar Lane road culvert, there have been 35 total phosphorus samples taken from June 2009 to August 2012. Of these samples, the minimum total phosphorus was 0.1 mg/l, the maximum was 1.5 mg/l (it is 1.0 if you take out that outlier); and the average was 0.41 mg/l. All of the data is shown on Chart 6.

The stream water quality standard for total phosphorus (Administrative Code NR 102) is 75 μg/l (0.075 mg/l). Out of the 35 samples on this unnamed stream, all were over this standard.

Chart 6. Total Phosphorus Concentrations on the Unnamed Stream entering Miljala Channel



To determine the phosphorus loading to the lake, you take the concentration of the total phosphorus and multiply it by the flow of the stream. Stream flow was determined using a flow meter on some dates in 2009 when the phosphorus was also sampled. The data and the calculated loading of total phosphorus to the lake are displayed in Table 3.

Table 3. Total Phosphorus Loading of the Unnamed Stream that Flows into the Miljala Channel

Date	Stream Flow (cfs)	TP (mg/l)	TP Loading (lbs/day)	TP Loading (lbs/yr)
6/2/2009	0.42	0.268	0.607	221.49
6/8/2009	0.5	0.394	1.062	387.65
6/28/2009	0.25	0.227	0.306	111.67
7/28/2009	0.14	0.251	0.189	69.15

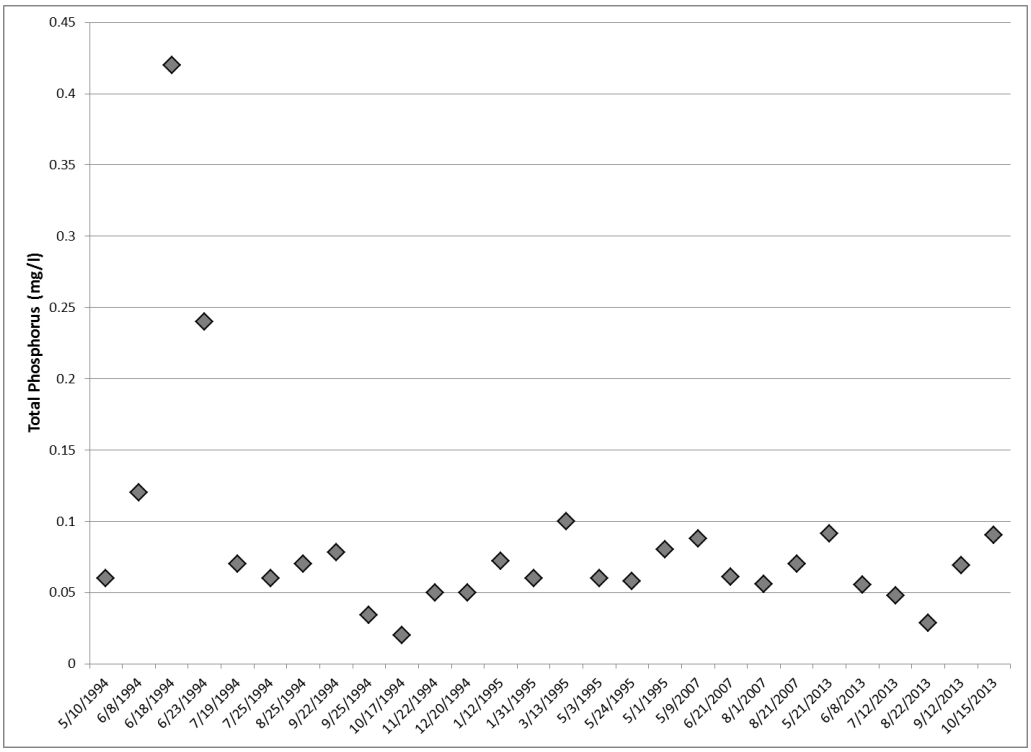
It is the case that both stream flow and the amount of phosphorus in the stream will vary depending on a number of factors.

Rock Creek has had 28 total phosphorus samples taken that were more spread out over time compared to the stream entering the Miljala channel. The dates of sampling were 1994, 1995, 2007, and 2013. Table 4 compares the data from all of these years to the most recent sampling in 2013. Chart 7 displays all of the data and shows that the phosphorus concentrations in Rock Creek have been fairly consistent (except for a few outliers in 1994).

Table 4. Rock Creek at County Highway A: Summary of Phosphorus Data

	All Years (mg/l)	2013 Only (mg/l)
Minimum TP	0.02	0.028
Maximum TP	0.42	0.091
Average TP	0.084	0.064
Number of Samples	28	6
Number Exceeding Standard	9	2

Chart 7. Total Phosphorus Concentrations for Rock Creek at CTH A



For Rock Creek, the dates in which there is both stream flow and total phosphorus results is from 1994 and 3013. Table 5 contains the flow, total phosphorus concentration, and calculated phosphorus loading.

Table 5. Total Phosphorus Loading of Rock Creek at County Highway A

Date	Flow (cfs)	TP (mg/l)	TP Loading (lbs/day)	TP Loading (lbs/yr)
5/10/1994	2.8	0.06	0.91	330.73
6/8/1994	0.1	0.12	0.06	23.62
6/18/1994	0.1	0.42	0.23	82.68
5/21/2013	4.8	0.0912	2.36	861.40
7/12/2013	2.98	0.0479	0.77	280.88
9/11/2013	4.25	0.0689	1.579	576.20

Trophic State

By determining a lake's trophic state, its water quality can be characterized as eutrophic, mesotrophic, or oligotrophic. These trophic states are based on water clarity, total phosphorus concentration, and chlorophyll *a* concentration.

Oligotrophic lakes are clear, deep, and free of weeds or large algae blooms. They contain low amounts of nutrients and therefore do not support large fish populations. However, they can develop a food chain capable of sustaining a desirable fishery of large game fish. Mesotrophic lakes have moderately clear water. They can have deep waters that are low in dissolved oxygen during the summer, and as a consequence, can limit cold water fish and release phosphorus from the bottom sediments. Eutrophic lakes are high in nutrients and support a large biomass that includes aquatic plant, or frequent algae blooms, or both. Rough fish are often common in eutrophic lakes. A natural aging process occurs in all lakes to shallower and more eutrophic lakes. It is important to point out that this aging process is accelerated by human activities (such as agriculture, existing and new development, fertilizers, storm drains, etc.) that increase sediment and nutrient delivery to our lakes.

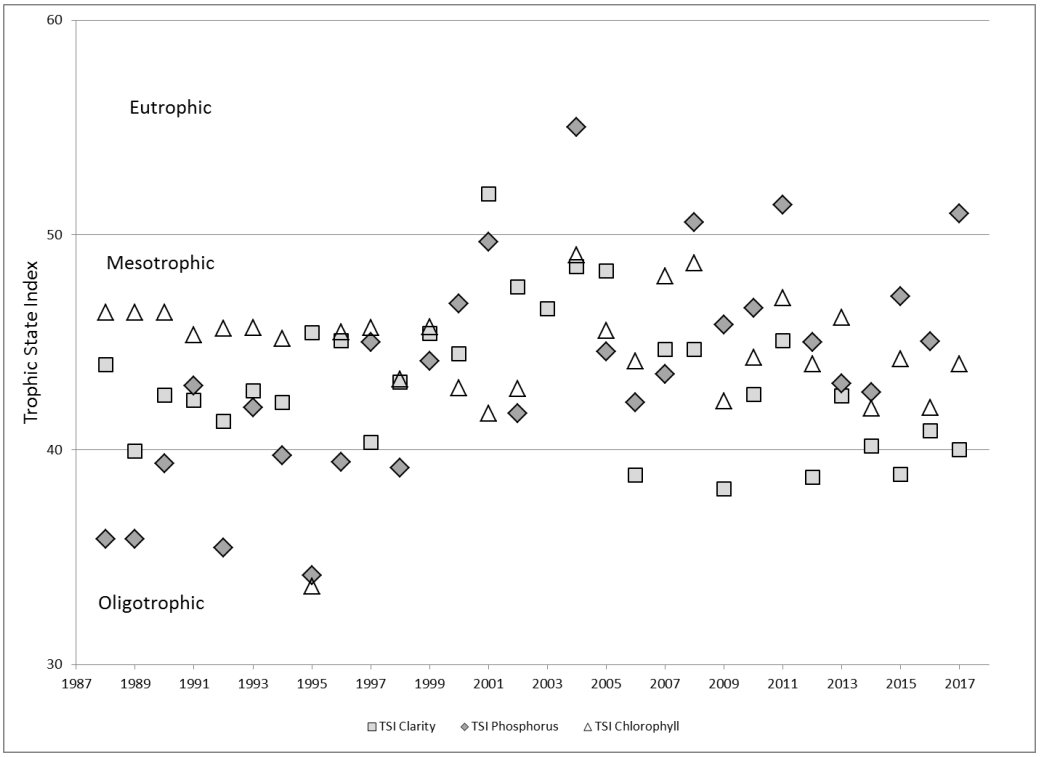
The Trophic State Index is determined using mathematical formulas that convert water clarity, total phosphorus, and chlorophyll *a* measurements into a TSI score on a scale of 0 to 110. Lakes that are less fertile have a low TSI. The scale is described in Table 6.

Table 6. Trophic State Index Scale Description

TSI Score	Description
TSI < 30	Classic oligotrophic: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.
TSI 30-40	Deeper lakes still oligotrophic, but bottom water of some shallower lakes will become oxygen-depleted during the summer.
TSI 40-50	Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.
TSI 50-60	Lakes becoming eutrophic: decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.
TSI 60-70	Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.
TSI 70-80	Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds but extent limited by light penetration (blue-green algae blocks sunlight).
TSI > 80	Algal scums, summer fish kills, few plants, rough fish dominant. Very poor water quality.

The Trophic State Index for Rock Lake over time is displayed in Chart 8. It represents average July and August measurements of water clarity, total phosphorus, and chlorophyll *a*. Rock Lake is characterized as a mesotrophic lake.

Chart 8. Trophic State Index for Rock Lake (Note: This chart does not contain the entire Trophic State Index scale.)



Water Quality Index

A water quality index was developed for Wisconsin lakes using data collected in July and August (Lillie and Mason 1983). Table 7 shows this index and contains the 2017 data on Rock Lake.

Table 7. Water Quality Index for Wisconsin Lakes with 2017 Rock Lake Data Indicated (adapted from Lillie and Mason 1983)

Water Quality Index	**Water Clarity (feet)**	**Chlorophyll a (µg/l)**	**Total Phosphorus (µg/l)**
Excellent	> 19.7	< 1	< 1
Very Good	9.8-19.7 **Rock Lake = 13.2**	1-5 **Rock Lake = 3.45**	1-10
Good	6.6-9.8	5-10	10-30 **Rock Lake = 20**
Fair	4.9-6.6	10-15	30-50
Poor	3.3-4.9	15-30	50-150
Very Poor	< 3.3	> 30	> 150

Nitrogen

Though phosphorus is the most important nutrient in Rock Lake for feeding plant and algae growth, nitrogen is also a factor. Sources of nitrogen include lawn and agricultural fertilizer, animal waste (including pets), and human waste from septic and wastewater treatment systems.

Lakes with nitrogen to phosphorus ratios of more than 15 to 1 are phosphorus-limited (algae growth is controlled by the amount of phosphorus). There are 3 July dates (in 2014, 2016, and 2017) with recent total nitrogen and total phosphorus data collected on the same day. In every instance, the ratio of nitrogen to phosphorus in Rock Lake was more than 42 to 1.

pH

Hydrogen ion concentrations are measured as pH. Over the years, measurements of Rock Lake's pH have all been on the alkaline side of neutrality (pH of 7). In July 2017, the pH in Rock Lake was 8.47. This is to be expected due to the presence of carbonate minerals in the geology of the watershed. Please see Table 8 for a comparison to other Wisconsin lakes.

Alkalinity and Hardness

Alkalinity and hardness in a lake are determined by the type of minerals in the soil and bedrock of the watershed, and the water's contact with these minerals. Alkalinity is a measure of carbonate and indicates the buffering or acid neutralizing capacity of water. Lakes with high alkalinity are more resistant to pH changes. The alkalinity of Rock Lake in July 2017 was 170 mg/l.

Hardness is a measure of calcium carbonate. Rock Lake's hardness was last measured in 1999 and was 210 mg/l as $CaCO_3$. Hard water lakes such as Rock Lake tend to produce more fish and aquatic plants than soft water lakes. They also can cause marl (calcium carbonate) to precipitate out of the water – which is typical of Rock Lake.

Please see Table 8 for a comparison to other Wisconsin lakes.

Specific Conductance

Specific conductance, or conductivity, is the measure of how well water conducts electricity via the amount of dissolved minerals in the water. The July 2017 conductivity in Rock Lake was 410 µS/cm. This falls in the typical range for Wisconsin lakes and is a reflection of the carbonate rocks found in the watershed. Please see Table 8 for a comparison to other Wisconsin lakes.

Chloride

In the southeast region of Wisconsin, chloride in lakes is over 10 mg/l due to the geology. Other sources of chloride include water softening salt and deicing road salt. Elevated levels (over 200 mg/l) can have negative impacts on aquatic life. The average levels found in Rock Lake between 2011 and 2013 were 18.5 mg/l. Please see Table 8 for a comparison to other Wisconsin lakes.

Table 8. Chemistry of Wisconsin Lakes and Rock Lake (credit from Paul McGinley, Lillie and Mason)

Parameter	Full Range for WI Lakes	Typical WI Lake Range	State Average	Rock Lake (2017)
Alkalinity (mg/l)	1 - 317	5.5 - 201.4	52	170
Chloride (mg/l)	<1 - 269	1 - 37	14	18.5
Conductivity (µS/cm)	13.65 - 841	26 - 526	229	410
Hardness (mg/l as $CaCO_3$)	max is 464	7 - 247	63	210
pH	4.3-9.6	6.5 – 8.4	7.2	8.47

Retention Time

The average length of time that it takes for a lake's total water volume to drain from the lake is called retention time. Rock Lake's retention time is 6.03 years. Retention times of natural lakes are commonly 1-10 years. Though nutrients can stay in the water longer with lakes with longer retention times, lakes with long retention times tend to contain lower levels of phosphorus.

Paleoecology

A 169 cm sediment core was taken in the deepest part of Rock Lake on February 20, 1996. Sediment cores provide a historic look at a lake's water quality. Individual sections of the core are dated to determine when sediments were deposited into the lake. Chemical properties, and plant and animal remains in the sediment are analyzed. Diatoms are a type of algae that are made of silica, a hard substance, and are present in the sediment core through time. Different types of diatoms have different silica structures and different water quality requirements. Therefore, the types of diatoms present in the lake through time can indicate different water quality regimes. Below is a summary of the sediment core findings:

1830-1840's – European settlement began in the Rock Lake watershed. The sediment core shows increases in aluminum indicating an increase in sedimentation due to establishment of farmland and associated soil erosion. Nutrient levels increased in the lake with more sedimentation causing an increase in algal production. An increase in algae in a marl lake like Rock Lake results in more calcium carbonate precipitated to the sediments; and this was the major cause of the increased sedimentation rate in the lake.

1870's – First significant decline in water clarity as indicated by a decline in the diatoms *Cyclotella michiganiana* and *Cyclotela* sp. 1. The first diatom was the most abundant and grows in the metalimnion of the lake and therefore needs good water clarity.
1880's – Development of moldboard plow increased soil erosion.
1880-1920 – Though soil erosion was increased with the moldboard plow, the sedimentation rate was near pre-settlement levels. This was the result of less calcium carbonate deposition perhaps as a result of decreased oxygen in the bottom waters. During anoxic conditions, the pH is lowered which results in the dissolution of precipitating calcium carbonate.
1880-1930 – The water clarity was good enough to allow good growth of the benthic diatom *Fragilaria*.
1930's – The sedimentation rate began to increase largely as a result of increased soil erosion as indicated by increased accumulation of aluminum. Diatom productivity began to increase, although nutrient input to the lake only increased slightly. *Cyclotella michiganiana* declines and is replaced by diatoms that typically grow in the surface waters and are indicative of somewhat higher nutrient levels.
After 1945 – Nutrient inputs greatly increased mostly due to large scale application of commercial fertilizers and increased mechanization of agriculture. With increasing nutrients, algal production continued to increase even though soil erosion was declining. The increase in the diatom *Cyclotella glomerata* is another indication of the increased nutrient levels in the lake. Algal productivity continued to increase until it peaked in the mid-1980's.
After 1985 – Nutrient levels appear to have declined slightly as indicated by the decline in diatom productivity as well as a reduction in nutrient delivery to the sediments. The diatoms also indicate a slight increase in water clarity between 1985 and 1995. This is occurring despite a continued increase in the lake's sedimentation rate. This increased sedimentation rate is the result of increasing delivery of soil particles to the lake as well as increased calcium carbonate precipitation.

Mud Lake – Water Quality

In 2007, the Jefferson County Land and Water Conservation Department obtained a grant to perform water quality, aquatic plant, and fish surveys on Mud Lake. From the water quality sampling, it was determined that Mud Lake is a eutrophic lake. In 2015 and 2017, the Department of Natural Resources also performed water quality sampling on Mud Lake. Please see Table 9 for the July and August averages of water clarity, chlorophyll a, and total phosphorus results. Please note that the total phosphorus measurements are greater than the Wisconsin water quality standard of 30 µg/l for drainage lakes.

It has been theorized that because Mud Lake is located upstream from Rock Lake, it acts as a sediment trap for Rock Lake. Therefore, less sediment is transported into Rock Lake than would otherwise because of the existence of Mud Lake. Over time, lakes that act as sediment traps reach their capacity and more sediment will be discharged from the lake. In turn, the water quality of Rock Lake would be affected.

Table 9. Average Summer (July & August) Water Quality Parameters in Mud Lake

Year	Water Clarity (ft)	Chlorophyll *a* (µg/l)	Total Phosphorus (µg/l)
1996	3.5	65.6	104
2007	2.2	29	58.5
2015	NA	34.9	79.3
2017	2	73.3	104.3

Bean, Mud, and Perch Lakes – Water Quality

Though there has not been any long-term data collection on Bean, Mud, and Perch Lakes, their physical characteristics can give some insight into the water quality of each lake.

Lake Type

Lakes are classified according to their water source and type of outflow. Both Rock Lake and Mud Lake are classified as drainage lakes. These types of lakes are fed by streams, groundwater, precipitation and runoff and are drained by a stream. Drainage lakes tend to be high in nutrients and the water quality for the most part is determined by activities in the watershed and the associated runoff. Bean and Perch Lakes are seepage lakes in that they are fed by precipitation, limited runoff, and groundwater, and they do not have a stream outlet. Seepage lakes tend to be acidic, and low in nutrients.

Watershed-to-Lake Ratio

The watershed-to-lake size ratio is used as a measure of the potential nutrient and pollutant loading to a lake from its watershed. Lakes with the larger watersheds will likely have more nutrient and pollutant loading from runoff than lakes with smaller watersheds. Runoff occurs when rainwater and snowmelt transport nutrients, sediment, and other pollutants to water. Lakes with watershed-to-lake size ratios greater than 10:1 more often experience water quality problems when compared to lakes with smaller ratios. The watershed-to-lake size ratios for the lakes are as follows: Bean Lake = 25:1, Mud Lake = 56:1, Perch Lake = 13:1, Rock Lake = 7:1.

Stratification

Thermal stratification occurs during the summer in lakes that are more than 20 feet deep. The stratification is characterized by three distinct horizontal layers based on temperature and water densities. The upper layer, called the epilimnion, is characterized by warmer, lighter surface water. The cold, dense bottom water is called the hypolimnion. Separating these two layers is the thermocline or metalimnion characterized by a temperature gradient.

Lakes that are deep enough to sustain their stratification in the summer typically have two times during the year where the lake water fully mixes: spring and fall. In the fall, the upper water will cool until it is similar to the temperature of the lower layer and

mixing will occur. Over the winter, another stratification occurs that is characterized by a water temperature under the ice at about 32 degrees and 39 degrees near the bottom of the lake. Mixing does not occur because the ice shields the water from the wind. In the spring when the ice melts, the temperature and density of the water is consistent which allows the water to mix.

Lake stratification is important because water quality and sustainable fisheries can be impacted by the extent of stratification. During the summer in stratified lakes, algae, plant debris, and other organic material will fall to the bottom of the lake and decay. If the lake produces too much of this organic material, then the decaying process can deplete the oxygen in the hypolimnion causing unsuitable conditions for fish. If the oxygen is totally depleted, then phosphorus bound to sediment particles can be released into the water. Then when the lake mixes in the fall, algae blooms can occur due to the increase of phosphorus.

If a lake does not overproduce algae and plant debris, then the cold waters of the hypolimnion can contain more oxygen than the epilimnion and benefit cold water fish.

By looking at the temperature and dissolved oxygen profiles for Rock Lake throughout the years at the deep part of the lake, it has been determine that Rock Lake is a dimictic lake. This means that the water column stratifies in the summer and winter and completely mixes two times during the year – in the spring and in the fall. The 2007 data (the only sampling year with temperature and dissolved oxygen profiles) from Mud Lake indicate that the lake is probably dimictic also.

A temperature profile has not been performed on the other 2 lakes in the watershed. Therefore, the degree to which these lakes stratify can be determined by the stratification factor:

$$\text{Stratification Factor} = \frac{\text{Maximum Depth(ft)} + 4.5}{\text{Log of surface area (acres)}}$$

Higher ratios indicate more stratification, with ratios of 13.5 and higher being more strongly stratified. Lake that are strongly stratified are more sensitive to additional nutrient inputs then lakes that do not sustain stratification. The stratification factors for the lakes are: Bean Lake = 6.9, Mud Lake = 13.4, Perch Lake = 16.5, and Rock Lake = 19.3. It seems unlikely that Perch Lake would sustain stratification throughout the summer because of its shallow depth (maximum 7 feet). Temperature profiles would have to be done to confirm the degree of stratification for Bean and Perch Lakes.

Lost Lake

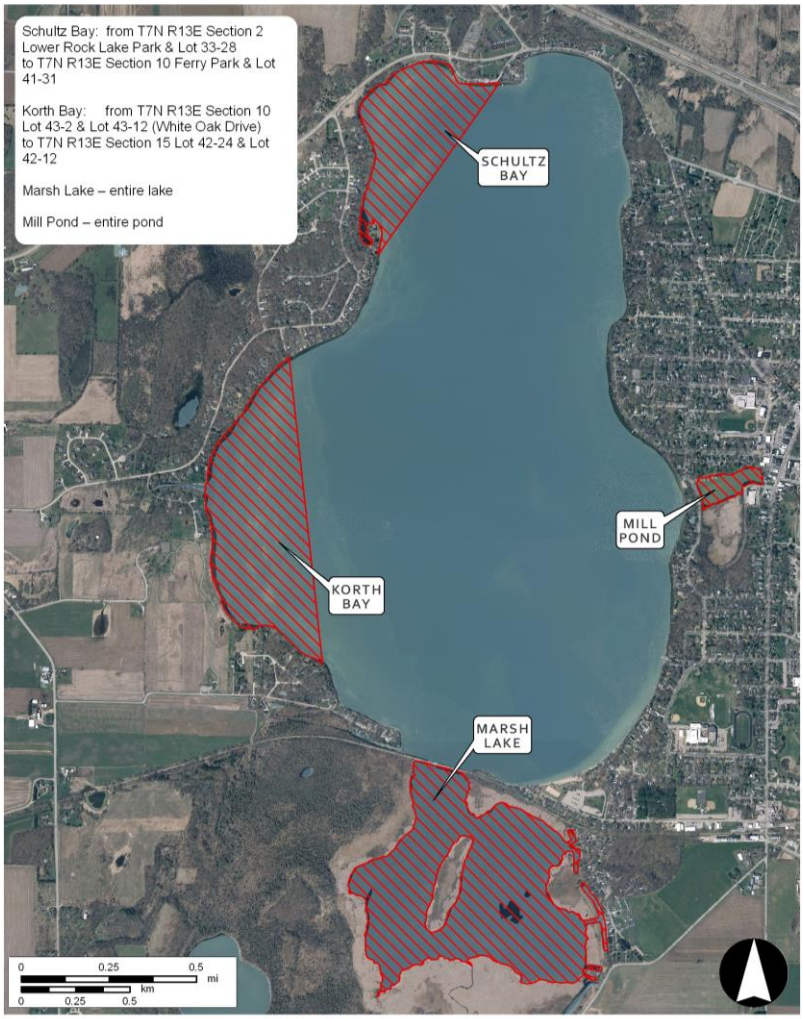
Lost Lake is located west of Shorewood Hills Road and just north of the stream that outlets adjacent to the Town's Miljala Shores Park. This lake is technically defined as an ephemeral wetland. Information on Lost Lake is contained in the section on Wetlands contained below.

DNR Designated Sensitive Areas

Defined in Wisconsin Administrative Code Chapter 107, Sensitive Areas are areas of aquatic vegetation identified by the Department of Natural Resources as offering critical or unique fish and wildlife habitat, including seasonal or life-stage requirements, or offering water quality or erosion control benefits to the body of water. There are 4 areas in Rock Lake that are designated by the DNR as sensitive areas: Korth Bay, Schultz Bay, Marsh Lake, and the Mill Pond. These areas are shown and legally described in Map 3.

The sensitive areas in Rock Lake are protected in various ways. Buoys have been placed to delineate their boundaries and to indicate that watercraft cannot travel faster than slow-no-wake speeds within those boundaries. DNR permits also may be necessary for certain activities located in sensitive areas. For instance, the manual removal of nuisance aquatic plants in front of a riparian's property requires a permit in sensitive areas. (Please see more information in the section on aquatic plants.)

Map 3. DNR Designated Sensitive Areas in Rock Lake



Fish

Over the years, 38 fish species have been identified in Rock Lake. This diverse fishery consists of popular panfish and gamefish species, as well as non-sport species. In Mud Lake, there have been 17 species of fish identified. Table 10 lists all the fish found in Rock Lake and Mud Lake and their importance to the lakes.

Bowfin (dogfish) and longnose gar are two fish in both Rock and Mud Lakes that are considered "living fossils." Both species have characteristics found in their 200 million year old relatives, including functional lungs. Besides their historic significance, these fish prey on carp and over populated panfish.

Carp and goldfish are the only non-native fish species in Rock Lake.

Table 10. Fish of Rock Lake (with fish found in Mud Lake denoted by +)

Fish Species	Importance
Rock bass – *Ambloplites rupestris*	incidental panfish catch
Bowfin+ – *Amia calva*	"living fossil", ecological balance
Goldfish* – *Carassius auratus*	escaped/released pet, destroys habitat
White sucker – *Catostomus commersoni*	gamefish food, major bait species
Common carp*+ – *Cyprinus carpio*	destroys habitat, under-utilized food
Lake chubsucker+ – *Erimyzon sucetta*	rare species, biodiversity
Grass pickerel – *Esox americanus*	biodiversity, ecological balance
Northern pike+ – *Esox lucius*	popular gamefish
Iowa darter+ – *Etheostoma exile*	gamefish food, biodiversity
Fantail darter – *Etheostoma flabellare*	gamefish food
Johnny darter+ - *Etheostoma nigrum*	gamefish food
Least darter – *Etheostoma microperca*	rare species, biodiversity
Banded killifish – *Fundulus diaphanous*	gamefish food, biodiversity
Blackstripe topminnow – *Fundulus notatus*	gamefish food, biodiversity
Black bullhead – *Ictalurus melas*	common sport fish
Yellow bullhead+ – *Ictalurus natalis*	common sport fish
Brown bullhead - *Ictalurus nebulosus*	common sport fish
Brook silverside+ – *Labidesthes sicculus*	gamefish food
Longnose gar+ – *Lepisosteus osseus*	"living fossil", ecological balance
Bluegill+ – *Lepomis macrochirus*	popular panfish
Pumkinseed sunfish+ – *Lepomis gibbosus*	popular panfish
Green sunfish – *Lepomis cyanellus*	incidental panfish catch
Smallmouth bass – *Micropterus dolomieui*	popular gamefish
Largemouth bass+ – *Micropterus salmoides*	popular gamefish
Golden shiner+ – *Notemigonus crysoleucas*	gamefish food
Slender madtom - Noturus exilis	Endangered species, biodiversity
Tadpole madtom – *Noturus gyrinus*	gamefish food
Pugnose shiner – *Notropis anogenus*	threatened species, biodiversity
Emerald shiner – *Notropis atherinoides*	gamefish food
Blackchin shiner+ – *Notropis heterodon*	gamefish food
Blacknose shiner – *Notropis heteroloepis*	gamefish food
Mimic shiner – *Notropis volucellus*	gamefish food

Fish Species	Importance
Yellow perch+ – *Perca flavescens*	popular panfish
Bluntnose minnow – *Pimephales notatus*	gamefish food
Fathead minnow – *Pimephales promelas*	gamefish food, major bait species
Black crappie+ – *Pomoxis nigromaculatus*	popular panfish
Walleye – *Stizostedion vitreum*	popular gamefish, compete with bass
Central mudminnow+ – *Umbra limi*	gamefish food

*nonnative species
+ found in Mud Lake

Rare Species

The Wisconsin Department of Natural Resources is responsible for identifying species that are rare in the state through the Natural Heritage Inventory program. Rare species are classified into three different categories:

- Endangered Species - any species whose continued existence as a viable component of the state's wild animals is in jeopardy on the basis of scientific evidence.
- Threatened Species - any species which appears likely, within the foreseeable future, on the basis of scientific evidence to become endangered.
- Special Concern Species - those species about which some problem of abundance or distribution is suspected but not yet proved. The main purpose of this category is to focus attention on certain species before they become threatened or endangered.

In a 2013 near-shore fish survey, an endangered fish species was documented in Rock Lake – the slender madtom. Since then, it has been found to be reproducing in the lake. It is considered critically imperiled in Wisconsin because of extreme rarity, making it especially vulnerable to extirpation from the state. The slender madtom is a unique find in Rock Lake because it has never been documented in a Wisconsin lake before. It prefers clear, moderate to swift currents of streams and wide rivers over bottoms of gravel and boulders interspersed with fine sand.

Rock Lake contains one Threatened Species (pugnose shiner), and three Special Concern species (banded killifish, lake chubsucker and least darter).

The rare species found in Rock Lake and Mud Lake are denoted in Table 11.

Table 11. Designations of Fish Species found in Rock and Mud Lakes

Species	Designation	Rock Lake	Mud Lake
Golden Shiner	tolerant	X	X
Pugnose Shiner	threatened intolerant	X	
Blackchin Shiner	intolerant	X	X
Blacknose Shiner	intolerant	X	
Bluntnose Minnow	tolerant	X	
Central Mudminnow	tolerant	X	X

Species	Designation	Rock Lake	Mud Lake
Yellow Bullhead	tolerant	X	X
Slender Madtom	Endangered intolerant	X	
Banded Killifish	Special Concern	X	
Rock Bass	intolerant	X	
Green sunfish	tolerant	X	
Smallmouth Bass	intolerant	X	
Iowa Darter	intolerant	X	X
Least Darter	Special Concern intolerant	X	
Lake Chubsucker	Special Concern	X	X

Environmental Sensitivity

There are some fish that can be classified in terms of how tolerant they are to environmental degradation such as poor water quality, siltation and increased turbidity, and reduced habitat heterogeneity (Lyons 1992). The classification given is either "tolerant" or "intolerant."

Noting that the classification of tolerant and intolerant species is somewhat subjective, Lyons provides the following criteria to classify a species as intolerant:

- A known high degree of sensitivity to poor water quality, siltation, increased turbidity, and reduced habitat heterogeneity.
- An observed major decline in distribution and abundance where there are severe environmental problems.
- Designation as intolerant in biotic indices used in central North America.

Lyons provides the following criteria to classify a species as tolerant:

- A known ability to survive poor water quality, particularly low dissolved oxygen, high levels of ammonia and other toxic substances, and high turbidity.
- An observed ability to persist in good numbers in Wisconsin streams with poor environmental quality.
- Designation as tolerant in biotic indices used in central North America.

The fish that have been found in the Mud and Rock Lakes that can be classified as either intolerant or tolerant to environmental degradation are noted in Table 11.

Fish Surveys

Comprehensive Fish Survey

Approximately every 5 years, a comprehensive fish survey is performed in Rock Lake. The last one was done in 2014. This survey consists of a variety of methods (fyke nets in April, electrofishing in May and June, and electrofishing in October) to sample the fish in the lake.

The following is a portion of the Summary and Management Recommendations section of the 2014 Comprehensive Fisheries Survey Report on Rock Lake:

> "The northern pike population in Rock Lake is self-sustained by natural reproduction and does not require supplemental stocking. Both male and female northern pike exhibit moderate growth rates, with females falling below the statewide and South Central Region average beginning at age 5. Northern pike growth rate for males in 2014 was below that of 2008. Female growth rate in 2014 was similar to 2008 but diverged from the 2008 average beginning at age 5. Effort should be directed at validating northern pike age estimates using progressive ageing methods such as anal fin rays to determine if the decline in growth rate is an error in ageing or an indication of reduced growth rate between sample years. Adult northern pike densities are estimated to be 2.6 fish per acre, consistent with a low-density northern pike fishery. The 26-inch minimum length appears to be sufficient in protecting enough males and females to facilitate natural reproduction. If northern pike growth rates are found to be declining, a more progressive regulation such as a slot limit should be considered. While Rock Lake produced northern pike over 40 inches, historically the lake has not had the sufficient growth rate needed to support a trophy northern pike fishery.
>
> The largemouth bass population in Rock Lake is self-sustained by natural reproduction and does not require supplemental stocking. In 2008, largemouth bass growth rate was consistent with the statewide average but was below the South Central Region average. However, sample size in 2008 was small (n=55 fish). While sample size increased in 2014 (n=88), growth rate declined to below both Statewide and South Central Region averages. Additional effort should be directed at validating largemouth bass age estimates using progressive ageing methods to determine if the decline in growth rate is an artifact of small sample size, an error in ageing between survey years or an indication of truly reduced growth rate.
>
> Overall, largemouth bass proportional stock density (PSD) values indicate a balanced population with recruitment of small fish into the population and a desirable amount of quality size bass (12-inch) present. However, PSD should continue to be monitored in comparison to bluegill PSD to ensure that largemouth bass population stocks do not become depleted resulting in low recruitment to stock size (8 inches) and the bluegill population does not trend towards sub-optimal PSD ranges. Changes in growth rate should continue to be monitored and if slow growth is documented, regulation options other than the current 14-inch minimum length, 5 fish daily bag limit should be explored. A slow growing population may not meet its potential under minimum length regulations as it may further reduce growth rates among sublegal-size largemouth bass.
>
> Recent bluegill PSD values from fall electrofishing are lower than those established for balanced populations. A balanced bluegill population typically displays PSD values between 40-60. Rock Lake bluegill PSD values from fall electrofishing have historically been below 40 in seven of the last ten years of fall electrofishing sampling. PSD values were above 40 and below 60 in only two of the last ten years, 2006 (51) and 2009 (46). Relative stock density of bluegill greater than the preferred length of 8

inches (RSD-P) indicate that very few fish in the 2014 comprehensive survey were over 8 inches in length. RSD-P of bluegill greater than 8-inches was 2 in SNI (9 in 2008), 2 in 2014 SE2 (1 in 2008) and 6 in FE (4 in 2008). The low PSD and RSD-P values indicate a lack of quality-size and preferred-size bluegill in Rock Lake. PSD should continue to be monitored in comparison to largemouth bass PSD to ensure that the bluegill population does not trend towards lower PSD values.

Bluegill growth rates in Rock Lake are below the statewide and South Central Region averages. Effort should be directed at validating bluegill age estimates using progressive ageing methods such as otoliths to determine if growth rate is truly slow. Due to the relatively slow growth, the bluegill population may not be able to withstand high intensity of exploitation without significantly reducing the percentage of quality-size fish in the population, hence the low PSD. The bluegill (age 1 through 4) in Rock Lake may be food limited and, therefore, minimum length limit regulations would probably not improve size structure. Rather imposition of a minimum-length limit would probably further reduce growth rates among sublegal bluegill. Efforts should be made to evaluate alternative solutions to regulating exploitation.

More information is needed to determine if the bluegill population size structure is indicative of the environmental conditions of the lake or the result of overharvest. A creel survey would help document exploitation, harvest and angler use. In addition, further study of the interaction between zebra mussel populations and food availability to small panfish is also warranted.

Rock Lake currently supports a low-density walleye population. Walleye were the dominant predator species in Rock Lake in the 1970's. At that time the walleye population was naturally reproducing and was thought to produce strong year classes each year (WDNR, 1977). Management of the population consisted of stocking small fingerlings at 50 per acre in June of alternate years. Annual fall electrofishing surveys did not indicate stronger year classes being established from stocking. However, both young-of-year (YOY) and adults were abundant at that time. By 1985 the walleye population was reproducing each year but producing modest year classes (WDNR1, 1985). Both YOY and adults were present in decent numbers. Population size using the Schumacher-Eschmeyer formula was estimated to be 2 fish per acre in 1980. By 1992 very few (7) adult walleye were present in fall electrofishing and no YOY walleye were sampled, despite stocking 250,000 fry that year (WDNR2, 1992). Population size using the Schumacher-Eschmeyer formula was estimated to be 0.7 fish per acre in 1994.

The Rock Lake walleye population is currently not meeting the established management goal for a stocked walleye fishery of 2 adults per acre. Population estimates conducted in 2014 and 2008 indicate a population size of 0.2 per acre and .06 per acre respectively. Consideration should be given to the costs associated with continued stocking of walleye in Rock Lake. Despite multiple stocking events over many years, Rock Lake may not achieve a management goal of 1 to 2 adult walleye per acre."

Fall Electrofishing

Fall electrofishing is conducted on an annual basis on Rock Lake. A large boomshocker boat is used in the fall to allow for collection of young-of-the-year (YOY) walleye and adult bass that are often under-sampled by other gear types. Fall electrofishing reports are posted on the Rock Lake Improvement Association website (www.rocklake.org).

Near-Shore Fish Surveys

Near-shore fish surveys have been implemented on Rock Lake in 1974, 2004, 2006, 2008, and 2013 (Cicero 2014). These surveys identify non-game species and juvenile gamefish that inhabit the shallow zones of the lake. For all of the surveys, small mesh seines (nets) were used. In 2013, the survey also included an electro-shocker which increased the number of species found. Future surveys will include both gear types. The results of the surveys are contained in Table 12.

Table 12. Near-Shore Fish Seining Data for Rock Lake

Species	May 1974	July 2004	May 2006	August 2008	July 2013**
Longnose Gar		3			1
Bowfin					2
Golden Shiner	1	1			69
Pugnose Shiner	2	40	3	11	
Emerald Shiner	1				
Blackchin Shiner		27	14		61
Blacknose Shiner	15				
Mimic Shiner	354*				
Bluntnose Minnow	144	23	30	156* (507)	1
Central Mudminnow					1
Black Bullhead		3			
Yellow Bullhead		1		1	7
Slender Madtom					5
Tadpole Madtom			1	1	
Banded Killifish	5				8
Blackstripe Topminnow	3				
Brook Silverside	36	97	1	398* (1040)	217
Northern Pike			1	0	1
Rock Bass	4	14	1	28	44
Pumpkinseed	16	1	32	19	9
Bluegill	102	484* (600)	160* (227)	528* (560)	1097

Species	May 1974	July 2004	May 2006	August 2008	July 2013**
Green sunfish				1	25
Smallmouth Bass	1	21	1	49	69
Largemouth Bass	9	185	35	323* (456)	243
Black Crappie		1	1	4	1
Fantail Darter					76
Iowa Darter	4	115	10	5	3
Johnny Darter					1
Least Darter	2	7	33		5
Yellow Perch	60	62		188	47
Total Species	17	17	14	14	23
Total Fish Collected	759*	1085* (1211)	323* (389)	1712* (2870)	1994
Total Rare Species	3	2	2	1	3
Total Intolerant Species	4	6	6	4	6
Total Tolerant Species	2	3	1	3	5

* In 1974, catch counts for a particular species at a particular site were truncated at 99. An asterisk indicates totals that include one or more truncated counts. For the other years, all captured fish were counted but for comparative purposes, totals have been calculated with counts truncated at 99, indicated by an asterisk. The actual 2004, 2006, and 2008 totals are given in parentheses.

** In 2013, two gear types were used: seining and shocking. Previous sampling efforts only included seining. The data is not shown as truncated due to the fact that there was extra effort.

Declines of intolerant species can reveal problems in lakes before gamefish growth rates and abundance are affected. Species such as least darters, pugnose shiners, blacknose shiners, Iowa darters, and banded killifish are sensitive to aquatic vegetation loss. The absence of blacknose shiners may reflect aquatic vegetation loss from the cumulative effects from numerous types of development – it was last found in a near-shore survey in 1974 and in the fall electro-shocking in 2009. The 8 banded killifish were only found in 2013 at one site that contained abundant submerged vegetation. Likewise, the least darters and Iowa darters were only found at sites that contained abundant aquatic vegetation. It is important to note that 2013 was the first year in which the pugnose shiner was not found in the survey. However, the fish was documented in Rock Lake during the 2014 fall electrofishing survey. The pugnose shiner is sensitive to turbidity, loss of aquatic plant habitat, and other water quality impairments (Lyons 2009, 1992).

Another way to analyze the data is to compare the number of rare and intolerant fish found at sites containing these species over the years. When looking at the average number of these species found per site, the data show that the number of rare and intolerant species found at sites containing these species is declining: an average of 2.6 fish in 2004, and an average of 1.7 fish in 2013.

Fish Stocking

One of the State's fish hatcheries is located in Lake Mills. This has been a benefit for Rock Lake not only because stocked fish are not transported long distances, but also because if the hatchery has excess fish, then they are released in Rock Lake. Rock Lake's fish stocking information is contained in Table 13.

Table 13. Fish Stocking in Rock Lake

Year	Species	Age Class	Number Stocked
1974	walleye	fingerling	105,000
1976	walleye	fingerling	137,280
1977	walleye	fry	3,000,000
1984	largemouth bass	fingerling	1,260
1987	largemouth bass	fingerling	1,170
1989	walleye	fingerling	7,800
1991	walleye	fingerling	50,032
1992	walleye	fry	240,100
1993	yellow perch	fingerling	1,495
	walleye	fingerling	231
1994	walleye	fingerling	76,200
	northern pike	fry	20,000
1995	walleye	fry	176,000
1996	walleye	fry	100,000
	walleye	fingerling	2,912
	yellow perch	fingerling	183
1997	walleye	small fingerling	59,176
	walleye	large fingerling	29,588
1998	walleye	small fingerling	11,340
	northern pike	fry	15,000
1999	walleye	small fingerling	122,351
	walleye	fry	87,400
	northern pike	fry	100,000
2000	walleye	small fingerling	33,217
	walleye	fry	372,000
2001	walleye	small fingerling	2,386
	walleye	large fingerling	11,463
2002	walleye	small fingerling	60,550
2003	walleye	small fingerling	70,362
2004	walleye	small fingerling	32,457
	walleye	fry	520,000
2005	walleye	fry	499,200
2006	walleye	fry	251,600
2007	walleye	fry	10,000
2009	walleye	small fingerling	68,550
2011	walleye	small fingerling	68,550

Year	Species	Age Class	Number Stocked
2013	walleye	small fingerling	57,706
2015	walleye	large fingerling	19,564

Fry average 0.2-0.6 inches in size, fingerlings average 3-6 inches in size, small fingerings average 1.33-3 inches in size, large fingerlings average 6.4-7.01 inches in size.

As both largemouth bass and smallmouth bass have been found to be naturally reproducing in Rock Lake, no stocking of these species is done. However, walleye is stocked because of the low survey catch rates and the low numbers of recruitment (the number of young fish that enter the population each year). Data showing the electrofishing catch rates for Rock Lake gamefish is located in Table 14. Please note that northern pike are not included because electrofishing is not an effective method for sampling this species.

Table 14. Fall Electrofishing Catch Rates (fish/hour) for Gamefish on Rock Lake

Species	2011	2012	2013	2014	2015	2016	10 year average
Largemouth bass	50/hr	31/hr	41/hr	37/hr	25/hr	23/hr	36/hr
Smallmouth bass	55/hr	21/hr	32/hr	15/hr	17/hr	21/hr	26/hr
Walleye	4/hr	6/hr	1/hr	5/hr	8/hr	12/hr	5/hr

As part of the Wisconsin Walleye Initiative, Rock Lake has been chosen to receive large fingerling walleyes. Fish surveys will be performed to determine if these larger stocking sizes will assist in increasing the walleye population in the lake. If surveys determine that the walleye population and sizes are not increasing, then Rock Lake will be taken out of the program.

Fish Kills

Typically in May and/or June, Rock Lake experiences fish kills. The cause of the fish kills is a naturally occurring bacteria called columnaris (*Flavobacterium columnare)*. Columnaris outbreaks typically occur in lakes and rivers when water temperatures reach 65-70^0 and rain events cause organic material to run into the water causing the bacteria to thrive and multiply. These conditions, combined with increases in spawning hormones which suppress fishes' immune systems make columnaris outbreaks more likely. The species that are affected include bluegills, crappies, yellow perch, and bullhead. Though it may be shocking to see a large number of dead fish, fishery biologists agree that columnaris will not have a detrimental impact on the overall fish population in the lake.

It is important to note that columnaris is not harmful to people. However, when disposing of dead and decaying fish, it is a good idea to wear gloves.

Fish Consumption Advisory

Fish, when prepared properly, provide a source of nutrition that is low in fat and high in protein. But fish can take in contaminants from their environment and these

contaminants will be transferred to people if ingested. Wisconsin issues fish consumption advice to reduce people's risk of exposure to these contaminants.

Polychlorinated biphenyls (PCBs) and mercury are the two primary contaminates that drive the fish consumption advisories. Health problems which can result from contaminants found in fish range from subtle effects that are hard to detect, to birth defects and cancer.

The fish consumption advisory for inland Wisconsin waters, including Rock Lake, is listed below.

Women of childbearing years, nursing mothers and all children under 15 may eat:
- 1 meal per week of bluegill, sunfish, crappies, yellow perch, or bullheads, and
- 1 meal per month of walleye, northern pike, bass, catfish, and all other species.
- Muskies should not be eaten by this group of people due to high mercury content.

Women beyond their childbearing years and men may eat:
- Unlimited amounts of bluegill, sunfish, crappies, yellow perch, or bullheads, and
- 1 meal per week of walleye, northern pike, bass, catfish, and all other species.
- 1 meal per month of musky.

Aquatic Plants

Aquatic plants are an essential part of a lake's ecosystem and vitality. In fact, 90% of a lake's ecosystem depends of what happens in the vegetated shallow areas. Some valuable characteristics of aquatic plants are the following:
- Aquatic plants create a thriving habitat supplying food, shade, and shelter for a large variety of aquatic and terrestrial animals.
- Fruits and tubers of aquatic plants provide food for mammals, waterfowl, insects and fish.
- Aquatic plants are essential to the spawning success of many fish species.
- Aquatic plants photosynthesize, creating oxygen for the animals that live in the shallow area.
- Aquatic plants filter runoff from uplands to protect lake water quality.
- Plant roots create networks that stabilize sediments at the water's edge where waves might otherwise erode the lakeshore.
- Submersed plants absorb phosphorus and nitrogen over their leaf surface and through their roots.
- Plants use nutrients, making them less available for nuisance algae.
- Native aquatic plants can limit growth of invasive plants.

Aquatic plant surveys in Rock Lake have been performed in 1990, 1991, 1996, 2001, 2010, and 2017. The 2010 and 2017 surveys both included Marsh Lake. The Millpond of Rock Lake was surveyed in 2017 and that data is being handled separately. Table 15 lists the aquatic plants found in Rock Lake as well as their ecological significance.

Table 15. Ecological Significance of Aquatic Plant Species Present in Rock Lake

Aquatic Plant	Ecological Significance[a]
Carex pseudocyperus, cypress-like sedge	Food source for marsh birds, shorebirds, upland game girds, and most waterfowl
Ceratophyllum demersum, coontail	Good shelter for young fish, supports insects valuable as food for fish and ducklings, and fruit eaten by waterfowl
Chara vulgaris, muskgrass	Excellent producer of fish food, especially for bluegill, smallmouth and largemouth bass; food for waterfowl; stabilizes bottom sediments; has softening effect on water by removing lime and carbon dioxide
Decondon verticillatus, swamp loosestrife	Seeds are food for waterfowl including black duck, mallard, blue-winged teal, green-winged teal and wood duck; source of food and cover for muskrats
Eleocharis erythropoda, bald spike rush	Food for waterfowl
Elodea canadensis, common waterweed	Shelter and support for insects valuable as fish food, food for muskrats and waterfowl
Heteranthera dubia, water star grass	Food and spawning habitat for fish
Isoetes sp., quillwort	Food for wildlife
Lemna minor, small duckweed	Food for fish and waterfowl
Lemna trisulca, forked duckweed	Food for fish and waterfowl
Myriophyllum sibericum, northern water milfoil	Shelter, valuable food producer for fish supporting many insects, roots provide nesting habitat for fish, leaves and fruit eaten by waterfowl
Myriophyllum spicatum, Eurasian water milfoil	Waterfowl eat fruit and leaves to a limited extent, habitat for insects but not as good as other plants
Myriophyllum hybrid of sibericum and spicatum	
Najas flexilis, bushy pondweed	Food for waterfowl, some marsh birds, and muskrats; cover for young largemouth bass, northern pike, small bluegills, and perch; food for fish
Najas guadalupensis, southern naiad	Excellent food for waterfowl
Najas marina, spiny naiad	Good food and shelter for fish and food for ducks
Nitella sp., stonewort	Good food and cover for fish, sometimes eaten by waterfowl
Nuphar variegata, spatterdock	Leaves, stems, and flowers are eaten by deer; roots eaten by beaver and porcupine; seeds eaten by waterfowl; leaves provide harbor to insects; shade and shelter for fish
Nymphaea odorata, white water lily	Shade and shelter for fish; seeds eaten by waterfowl; rootstocks and stalks eaten by muskrat; roots eaten by beaver, deer, moose, and porcupine
Potamogeton crispus, curly-leaf pondweed	Food, shelter, and shade for some fish, food for waterfowl, habitat for invertebrates
Potamogeton foliosus, leafy pondweed	Fruit can be a locally important food source for geese and a variety of ducks; food for muskrat, deer and beaver; habitat for invertebrates; cover for fish
Potamogeton friesii, Fries' pondweed	Food for ducks and geese; provides fish habitat
Potamogeton gramineus, variable pondweed	Cover for panfish, largemouth bass, and northern pike; bluegills nest near them and eat insects on leaves; supports insects valuable as food for fish and ducklings; fruit and tubers eaten by waterfowl

Aquatic Plant	Ecological Significance[a]
Potamogeton illinoensis, Illinois pondweed	Cover for panfish, largemouth bass, and northern pike; nesting grounds for bluegill; supports insects valuable as food for fish and ducklings; fruit eaten by ducks and geese
Potamogeton natans, floating-leaf pondweed	Food for waterfowl, fruit eaten by ducks and geese, shade and foraging opportunities for fish
Potamogeton nodosus, long-leaf pondweed	Good source of food for waterfowl; food and cover for fish
Potamogeton praelongus, white-stemmed pondweed	Food for ducks and geese
Potamogeton pusillus, small pondweed	Food for ducks and geese, food and shelter for fish
Potamogeton richardsonii, clasping-leaf pondweed	Cover for panfish, largemouth bass, and northern pike; bluegills nest near them and eat insects on leaves; supports insects valuable as food for fish, ducklings, and geese
Potamogeton zosteriformis, flat-stem pondweed	Some cover for bluegills, perch, and northern pike; food for waterfowl; supports insects valuable as food for fish and ducklings
Ranunculus aquatilis, white water crowfoot	Fruit and foliage eaten by waterfowl, habitat for invertebrates
Sagittaria latifolia, common arrowhead[b]	Tubers eaten by migrating waterfowl; seed eaten by ducks, geese, marsh birds, and shorebirds; shade and shelter for young fish
Schoenoplectus acutus, hardstem bulrush	Habitat for insects; shelter for young fish, especially northern pike; nutlets food for waterfowl, marsh birds, and upland birds; stems and rhizomes eaten by geese and muskrats; nesting material and cover for waterfowl, marsh birds, and muskrats
Schoenoplectus tabernaemontani, softstem bulrush	Habitat for insects and shelter for young fish; food, cover and nesting material for waterfowl, marsh birds, and upland birds; stems and rhizomes eaten by geese and muskrats
Sparganium eurycarpum, common bur-reed	Colonies help anchor sediment and provide nesting sites for waterfowl and shorebirds; fruit eaten by waterfowl; plant eaten by muskrat and deer
Spirodela polyrhiza, large duckweed	Food for waterfowl and fish
Stuckenia pectinata, sago pondweed	Most important pondweed for ducks, food and shelter for young fish, fruit and tubers are critical food for migrating waterfowl
Typha angustifolia, narrow-leaved cattail[b]	Supports insects; stalks and roots important food for muskrat and beaver; attracts marsh birds, wildfowl and songbirds; spawning grounds for sunfish; shelter for young fish; habitat for marsh birds
Typha latifolia, broad-leaved cattail[b]	Nesting habitat for marsh birds, spawning habitat and shelter for fish, habitat for invertebrates, shoots and rhizomes eaten by muskrats and geese
Utricularia vulgaris, common bladderwort	Good food and cover for fish
Vallisneria americana, wild celery	Good shade, shelter, and food for fish; supports insects; food for waterfowl, especially canvasback ducks, marsh birds, and shore birds
Wolfia spp., watermeal	Food for waterfowl, muskrat and fish

[a] Information obtained from "A Manual of Aquatic Plants" by Norman C. Fassett, "A Guide to Wisconsin Aquatic Plants" by Wisconsin Department of Natural Resources, and "Through the Looking Glass: A Guide to Aquatic Plants" by Wisconsin Lake Partnership.

[b] Present in the lake but not recorded in an aquatic plant survey.

A total of 27 aquatic plant species have been found in the Millpond as part of the 2017 point-intercept survey and boat survey, as well as the 2013 near-shore fish survey are as follows:

Ceratophyllum demersum, coontail
Chara vulgaris, muskgrass
Cicuta maculata, water hemlock (fruit occasionally eaten by marsh birds, it usually is considered of low importance to wildlife)
Decondon verticillatus, swamp loosestrife
Elodea canadensis, common waterweed
Heteranthera dubia, water star grass
Iris sp., iris (not blooming at time of survey)
Lemna minor, small duckweed
Myriophyllum spicatum, Eurasian water milfoil
Najas flexilis, bushy pondweed
Najas marina, spiny naiad
Nitella sp., stonewort
Nuphar variegata, spatterdock
Nymphaea odorata, white water lily
Potamogeton gramineus, variable pondweed
Potamogeton illinoensis, Illinois pondweed
Potamogeton praelongus, white-stemmed pondweed
Potamogeton zosteriformis, flat-stem pondweed
Sagittaria latifolia, common arrowhead
Schoenoplectus tabernaemontani, softstem bulrush
Sparganium eurycarpum, common bur-reed
Spirodela polyrhiza, large duckweed
Stuckenia pectinata, sago pondweed
Typha sp., cattail species
Utricularia vulgaris, common bladderwort
Vallisneria americana, wild celery
Wolfia spp., watermeal

The 2010 and 2017 surveys were done with the current state standard for aquatic plant sampling: the point-intercept method. The other surveys were done with the standard at the time: transect surveys. The point-intercept method provides more statistically rigorous results. The general data from the 2010 and 2017 surveys for Rock Lake is contained in Table 16 and for the Millpond is contained in Table 17.

Table 16. General Statistics from 2010 and 2017 Aquatic Plant Surveys on Rock Lake

	2010	**2017**
Total number of points sampled	863	548
Total number of points with vegetation	499	462
Maximum depth of plants	22.5 feet	29 feet
Average number of all species per site with vegetation	2.62	2.24
Average number of all species per site less than maximum depth of plants	2.4	1.92

	2010	2017
Average number of native species per site with vegetation	2.38	1.90
Average number of native species per site less than maximum depth of plants	2.16	1.57
Total number of species including points & visuals	34	30

Table 17. General Statistics from the 2017 Aquatic Plant Survey on the Millpond

	2017
Total number of points sampled	93
Total number of points with vegetation	93
Maximum depth of plants	4.5 feet
Average number of species per site with vegetation and shallower than maximum depth of plants	3.43
Average number of native species per site with vegetation and shallower than maximum depth of plants	2.74
Total number of species documented (points and visuals)	22

The Coefficient of Conservatism is a number on a scale from 0 to 10 that represents an estimated probability that a plant species is likely to occur in a lake unaltered from what is believed to be pre-settlement conditions. A Coefficient of 10 indicates the plant is almost certain to be found only in an un-degraded natural community, and a Coefficient of 0 indicates the probability is almost 0. Introduced plants were not part of the pre-settlement flora, so no coefficient is assigned to them. The data for the eco-region that includes Rock Lake is for 68 lakes: the Coefficient of Conservatism ranges from 2.12 to 6.87 with an average of 5.21. The Coefficient of Conservatism for Rock Lake was 5.72 in 2010 and 5.75 in 2017. The Coefficient of Conservatism for the Millpond is 5.4.

The floristic quality index (FQI) is used to assess a lake's quality using the aquatic plants that live in it. The floristic quality index is the average coefficient of conservatism multiplied by the square root of the number of plants in the lake. The FQI varies around Wisconsin but ranges from 3.0 to 44.6 with a median of 22.2. Generally, higher FQI numbers mean better lake quality. The FQI for Rock Lake was 28.6 in 2010 and 25.7 in 2017. The FQI for the Millpond is 20.9.

It is important to note that the 2010 and 2017 aquatic plant survey results show that Rock Lake is above average (when compared to other lakes in its eco-region) in terms of many quality indicators including depth of plant growth, the number of native species, the Coefficient of Conservatism, and the floristic quality index.

A statistical analysis, called Chi squared, can be done to compare the Rock Lake 2010 and 2017 data to determine if there are any statistically significant changes on a species level. This analysis revealed 6 species that had either increases or decreases in population compared to the 2010 data (Table 18). It is important to note however, that the changes may be related to a number of factors. Some plants have certain years that they thrive and some years that they do not thrive – and this could be related to spring and summer temperatures and other weather factors. The 2010 survey was done in

June and the 2017 survey was done in July. Some plants are early season plants and may die back in July – this is the case for curly-leaf pondweed. And finally, depending on the expertise of the sampling crew, some plants may have been misidentified.

Table 18. Statistically Significant Changes in Rock Lake Plants between the 2010 and 2017 Surveys

Species	Change between 2010 and 2017	Notes
Najas flexilis, bushy pondweed	+	
Najas guadalupensis, southern naiad	-	Expected because of timing of survey
Najas marina, spiny naiad	+	
Nymphaea odorata, white water lily	+	Perhaps because smaller boat was used in Marsh Lake
Nitella sp., stonewort	-	Misidentification? (could be mistaken for chara)
Potamogeton crispus, curly-leaf pondweed	-	Expected because of timing of survey
Potamogeton foliosus, leafy pondweed	-	Misidentification? (could be mistaken for other small pondweeds)
Potamogeton friesii, Fries' pondweed	-	
Potamogeton gramineus, variable pondweed	+	
Potamogeton praelongus, white-stemmed pondweed	+	
Potamogeton zosteriformis, flat-stem pondweed	+	
Stuckenia pectinata, sago pondweed	+	
Vallisneria americana, wild celery	+	

The frequency of occurrence (FOO) is a percentage which is the number of times that a plant is found divided by the total number of sites shallower than the maximum depth of plants. It gives an indication of the dominant plants in the population. Table 19 lists the FOO for each species found in the 2010 and 2017 Rock Lake surveys. Chart 9 displays the plants that have a FOO greater than 2% in Rock Lake. Chart 10 displays the FOO of plants found in the Millpond.

It is important to note that Chara, which is actually a native macro-algae, is the most dominate plant in Rock Lake in terms of its FOO. This plant can benefit water quality because it slows the movement of bottom sediments. It is also thought to prevent the establishment of dense stands of Eurasian water milfoil in some areas of Rock Lake due to its ability to cover the sediment.

Table 19. Frequency of Occurrence of Plants found in Rock Lake

Species	2010	2017
Chara sp., muskgrasses	56.59	49.54
Ceratophyllum demersum, Coontail	39.01	38.40
Stuckenia pectinata, Sago pondweed	24.36	29.87
Najas marina, Spiny naiad	16.12	18.55
Myriophyllum spicatum, Eurasian water milfoil	20.88	16.14
Potamogeton friesii, Fries' pondweed	23.44	7.05
Vallisneria americana, Water celery	4.40	6.86
Utricularia vulgaris, Common bladderwort	3.66	4.82
Potamogeton zosteriformis, Flat-stem pondweed	0.37	3.90
Potamogeton illinoensis, Illinois pondweed	3.11	3.34
Myriophyllum sibiricum, Northern watermilfoil	2.93	2.60
Nymphaea odorata, White water lily	0.73	2.23
Schoenoplectus acutus, Hardstem bulrush	2.38	2.23
Najas flexilis, Slender naiad	0.37	1.67
Potamogeton gramineus, Variable pondweed		1.48
Nuphar variegata, Spatterdock	1.47	0.74
Potamogeton praelongus, White-stem pondweed		0.74
Elodea canadensis, Canadian waterweed	1.1	0.37
Potamogeton natans, Floating-leaf pondweed		0.37
Potamogeton pusillus, Small pondweed	0.92	0.37
milfoil hybrid		0.37
Potamogeton crispus, Curly-leaf pondweed	3.11	0.19
Lemna minor, Small duckweed	0.37	0.19
Potamogeton richardsonii, Clasping-leaf pondweed	0.18	0.19
Freshwater sponge	1.1	0.19
Nitella sp.	3.85	
Potamogeton foliosus, Leafy pondweed	2.75	
Najas guadalupensis, Southern naiad	2.01	
Ranunculus aquatilis, White water crowfoot	0.37	
Lemna trisulca, Forked duckweed	0.18	
Potamogeton nodosus, Long-leaf pondweed	0.18	
Spirodela polyrhiza, Large duckweed	0.18	visual
Wolffia sp.	0.18	visual
Heteranthera dubia, Water stargrass	visual	visual
Polygonum amphibium, Water smartweed		visual
Sagittaria sp., Arrowhead		visual

Chart 9. Rock Lake Frequency of Occurrence at Sites less than the Maximum Depth of Plant Growth (only species greater than 2% FOO are shown)

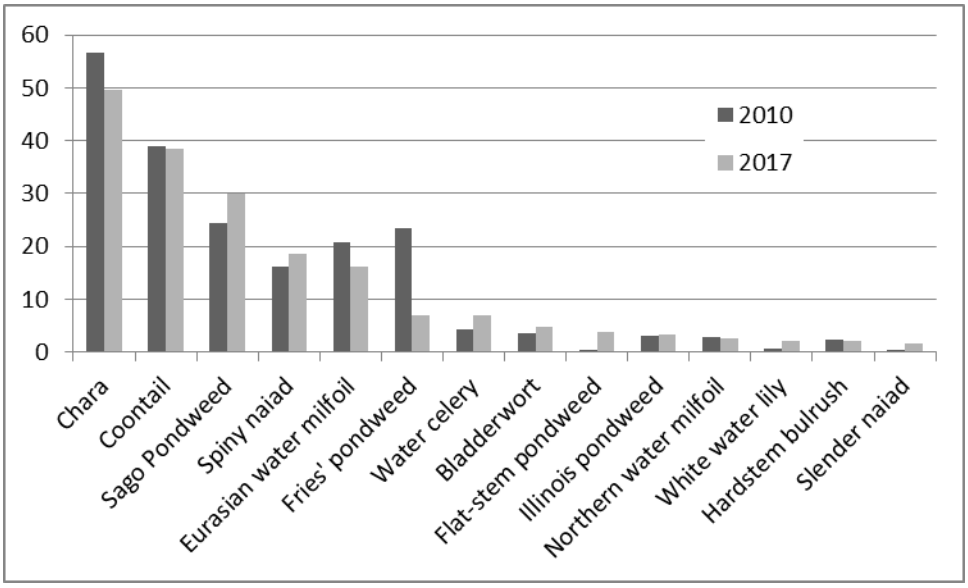
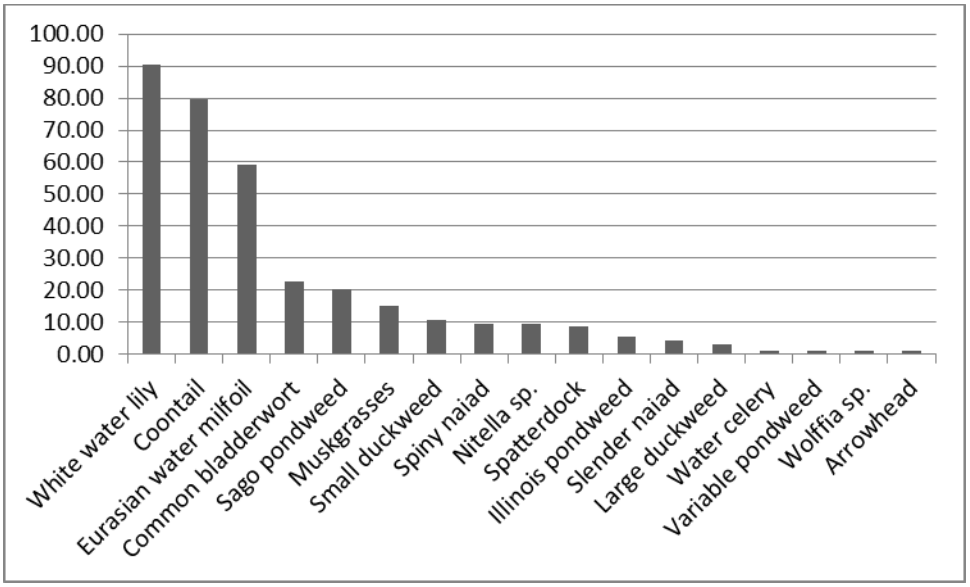


Chart 10. Millpond Frequency of Occurrence at Sites less than the Maximum Depth of Plant Growth (2017)



Hardstem Bulrushes

The hardstem bulrush population in Korth Bay has an additional survey that was performed in 1998, 2002, 2009, and 2011 by the DNR and the LWCD. The survey involves 7 transects through the beds in which the number of stems in a 0.2 m^2 square are counted every 5 meters. The average stem density for the bulrush bed is then determined. The results indicate that the stem density for the bulrush bed seems to be increasing. In 2011, it was noted that the bulrushes are starting to naturally die-off at

the end of August. Therefore, the number of live stems (still standing out of the water) and the number of dead stems (those that were broken off and were below the water) were counted separately. The results of the bulrush surveys are included in Table 20.

The 2002 through 2011 bulrush surveys also included a delineation of the circumference of the bulrush bed using GPS so that it can be determined if the size of the entire bed changes in the future. Though the method can have some operator error (due to how close they drive the boat next to the bulrushes), the size of the bed has appeared to have decreased by 1.2 acres in 2011 compared to the 2002 and 2009 surveys.

Table 20. Stem Density of the Korth Bay Hardstem Bulrushes

Date	Stem Density (m^2)
September 9, 1998	3.0
July 23-24, 2002	3.4
August 11-12, 2009	6.1
August 24-25, 2011	8.8 live stems only, 10.7 live and dead stems

Eurasian Water Milfoil

Eurasian water milfoil (EWM) is an invasive species that was documented in the first aquatic plant survey on Rock Lake in 1990. In some lakes, EWM crowds out native aquatic plant species so that there is a monoculture of Eurasian water milfoil and a reduction in the diversity of plants in a lake. Milfoil in dense stands can provide a refuge for panfish and thus interferes with predator-prey interactions. The results can be over-populated, slow growing panfish and slow growing gamefish. Dense stands of milfoil can also hinder the movement of larger fish. In addition, milfoil can adversely impact recreational uses by hindering boating, swimming and fishing and impair the aesthetic quality of the lake.

Eurasian water milfoil mainly reproduces via plant fragments that are separated from the main plant naturally or augmented by boat propellers. Landowners who cut or rake aquatic plants in front of their lots may also disperse plant fragments. These cleared areas more likely than not will be re-vegetated by Eurasian water milfoil. (Please see section on aquatic plant laws below.)

In Rock Lake the data show that EWM has not taken over as the dominant plant in the lake. EWM had a FOO of 20.88% in 2010 and 16.14% in 2017 and was the 5th most prevalent plant in the lake during both surveys. Its density rating (the amount of plants found on the sampling rake on a scale of 1-3 with 1 being a few plants and 3 being many plants) was 1.25 in 2010 and 1.18 in 2017. In past surveys, it was mostly found in depths of 9-15 feet. In 2010, it was found in a range of depths from 2 feet to 20 feet, but was found most frequently in 9 feet of depth. In 2017, it was found in a range of depths from 1 foot to 27 feet, but was found most frequently in at 12 feet of depth.

All of the information obtained in the surveys indicates that the Eurasian water milfoil population has not significantly changes between 2010 and 2017. In other lakes, EWM

can become the main problem in the lake. There are some lakes, including Rock Lake, where the EWM population is stable and is not causing substantial problems in the lake.

In the past couple of years, there have been some concerns about the amount of Eurasian water milfoil in the area near the Miljala channel outlet in Korth Bay. It is thought that this increase in growth is due to the nutrient transport from the stream/channel into the lake with sediment during rain storms.

Rock Lake is known to have a native population of milfoil weevils (*Euhrychiopsis lecontei*). This insect prefers Eurasian water milfoil over native milfoil plants. It burrows inside the milfoil stem and damages the plant causing it to collapse and die. Research has shown that the milfoil weevil is effective at some sites, but ineffective at other sites. Unfortunately, the research is not refined enough to predict when, where, and how weevils will be effective at controlling EWM.

A few of the important factors to a healthy population of weevils are adequate over-wintering habitat (natural shoreline vegetation, not lawns), low predation pressure, and abundant food. Sunfish have been shown to include milfoil weevils as a part of their diet. Rock Lake contains sunfish which include bluegills, pumpkinseed, and rock bass. If weevil densities in the lake are low, then predation would probably be a significant limiting factor to the insect's population. Alternatively, if weevil densities are moderate or high, then sunfish would have little effect on the populations. Milfoil populations and distribution throughout the lake may impact the number of weevils present in the lake. Some biological control of the EWM by the native milfoil weevil might already be happening in Rock Lake.

Curly-Leaf Pondweed

Curly-leaf pondweed (CLP) is another exotic species found in Rock Lake. It was first found during the 2001 aquatic plant survey, but only at one sampling point out of 132. It was found in the northwest bay of the lake known as Shultz Bay. In 2010, it was found at 17 sampling locations. It was found at one site in 2017 – but this decline was expected because the CLP starts dying off in July when the survey was performed.

Curly-leaf pondweed starts growing under the ice and grows its spring and summer foliage in May. Because of this growth pattern, curly-leaf pondweed provides habitat for fish and insects in the winter and spring – a time when other plants are dormant. However, when curly-leaf pondweed dies-off (typically in late June to mid-July), it creates a sudden loss of habitat. When it dies off it can also cause algal blooms and turbid water conditions. In addition, curly leaf pondweed can interfere with recreational activities in the spring because it can grow to the water's surface.

Aquatic Plant Management Rules

The Department of Natural Resources (DNR) regulates the management of aquatic plants. Manual and mechanical removal methods are regulated under Administrative Code NR 109 and the chemical treatment of aquatic plants is regulated under Administrative Code NR 107.

A DNR permit is not required for the manual removal of aquatic plants provided that the removal meets ALL of the following:

- Removal of native plants is limited to a single area with a maximum width of no more than 30 feet measured parallel to the shoreline. Any piers, boatlifts, swim rafts, and other recreational and water use devises must be located within that 30 foot wide zone.
- Removal of nonnative plants designated by the DNR (such as Eurasian water milfoil, curly-leaf pondweed) when performed in a manner that does not harm the native aquatic plant community.
- Removal of plants that drift on-shore and accumulate along the waterfront.
- Location is NOT in a sensitive area or in an area known to contain threatened or endangered resources. Sensitive areas in Rock Lake are: Korth Bay, Shultz Bay, Marsh Lake, and the millpond.
- Does not interfere with the rights of other lakeshore owners.

Otherwise, a permit for manual removal of aquatic plants is required from the Department of Natural Resources.

A DNR permit is required for the mechanical removal of aquatic plants and for chemical management of aquatic plants. An aquatic management plan may also be required.

Wetlands

There are approximately 1,836 acres of wetlands representing 23% of the land cover in the Rock Lake watershed (Map 2). Much of this acreage is owned by the Department of Natural Resources. Three features define a wetland: hydrology (water is present either at the surface or within the root zone), soil (classified as hydric soils), and vegetation (plants adapted to permanent or semi-permanent wet conditions). The wetland communities in the watershed include tamarack swamp, shrub carr (mostly tall shrubs), sedge meadow (more than ½ the community is sedges rather than grasses), calcareous fen (shrub-herb community on a wet and springy site with an internal flow of alkaline water), and shallow marsh.

Wetlands have several functions that contribute many ecological, social, and economic benefits.

- Filter pollutants, nutrients, and sediment from water before it enters the lake
- Store runoff to reduce flood potential and damage
- Provide habitat (feeding, breeding, resting, nesting, escape cover, and travel corridors for many animals) and spawning ground for fish
- Protect shorelands from erosion
- Recharge and discharge of groundwater
- Aesthetics, recreation, education, and science

The majority of the wetlands are south of Rock Lake. Because of their location in the watershed, the wetlands act as a filter for the water entering the lake. Degradation or reduction of the wetlands could cause a negative impact on Rock Lake.

There is a wetland complex that is west of Rock Lake that includes an ephemeral wetland known as "Lost Lake." An ephemeral wetland typically holds water in the spring and early summer and is dry in mid to late summer. Because of this water regime, this type of wetland does not contain fish and is a highly important habitat for amphibians, reptiles, and migrating waterfowl. Because these species also rely on upland areas, the land surrounding ephemeral wetlands are important to protect.

Throughout the years, there have been areas in the Rock Lake watershed in which wetlands have been restored. Approximately 135 acres of wetlands in the watershed have been restored through federal and state funding programs. There are certainly other areas in the Rock Lake watershed where additional wetland could be restored given interested landowners and funding.

Biodiversity

From "Rock Lake Priority Lake Project Water Resources Appraisal", July 1997, Department of Natural Resources:

"The representative fish and aquatic plant species….comprise only a small fraction of the plant and animal communities that reside in the Rock Lake Watershed. The watershed includes a variety of aquatic and riparian habitats and species adapted to them. In Rock Lake alone, fish depend upon the complex food web including freshwater mussels, crustaceans, micro-crustaceans, aquatic insects, plants, waterfowl, and heptiles."

"To the scientist, biodiversity means the entire spectrum of life forms and the many ecological processes that support them. For many people, biodiversity is not a scientific concept but rather a part of the lake experience. Gazing at schools of minnows, basking turtles, leaping frogs or hovering dragonflies are examples of appreciating the rich diversity of healthy lakes."

"Within both publicly owned lands and some relatively undisturbed privately owned parcels are some unique and scarce habitats that support Rock Lake Watershed's rich biodiversity… Some of the interesting plants that the complex wetlands support include grass-of-parnassus, Ohio goldenrod, lesser fringed gentian, small white lady's slipper, small yellow lady's slipper, showy lady's slipper, and fen betony. Herptiles that can be found in the watershed include:

- Turtles: spiny softshell, painted, Blanding's (a threatened species), musk, snapping
- Frogs and toads: northern leopard, green, bull, spring peeper, chorus, Blanchard's cricket, and Eastern American toad
- Salamanders: mudpuppy, central newt, and eastern tiger
- Snakes: Northern water, brown, garter, bull, Eastern milk, smooth green, queen, and Northern redbelly."

"Public ownership of lands is one of the reasons that the watershed still supports diverse and rare species. However, rapid development of the Rock Lake shoreline and encroachment around the natural areas are stressing our ability to protect biodiversity. Many herptile species are dependent on undisturbed riparian areas. Extensive piers,

seawalls and riprap destroy nearshore habitat and interrupt the links between terrestrial and aquatic ecosystems. Intense development beyond the shores and wetlands will also affect migrating heptiles, such as the Threatened Blanding's Turtle."

Frogs and Toads

Since 1983, a Lake Mills citizen has been implementing a frog and toad survey at the Millpond. The survey includes visiting the site 3 times each year (defined by water temperature) to identify the species by call and to assign a call index. The call index is as follows:

- 1 = individuals can be counted
- 2 = calls of individuals can be distinguished but there is some overlapping of calls
- 3 = full chorus; calls are constant, continuous, and overlapping; individual calls cannot be distinguished

Table 21 shows the species identified during the last 5 years. The table also gives a range under each sampling time that indicates the range of the call index in the last 5 years.

Table 21. Frog and Toad Species and Call Index Recorded from 2013-2017 at the Millpond

Species	Water Temp 50F April 8-30	Water Temp 60F May 20-June 5	Water Temp 70F July 1-15
Chorus frogs	1-3	1	
Spring peeper	1-3		
Leopard frog	1		
American toad		1-3	
Cope's gray treefrog		1	
Green frog		1-2	1-2
Bullfrog		1	1-3

It is important to note that the leopard frog and the American bullfrog are both classified as State Special Concern species.

Bats

Since 2010, there has been an acoustic bat survey performed on Rock Lake through the Wisconsin Citizen-Based Acoustic Bat Monitoring Project. The water route starts north of Ferry Park and travels counterclockwise along the lake shore to the ending point of the North End boat launch. From 2010 through 2016, a total of 6 different species have been identified: little brown myotis, Northern long-eared myotis, Eastern pipistrelle, big brown bat, Eastern red bat, and hoary bat.

Invasive and Exotic Species

Invasive and exotic species often pose threats to the biodiversity of a lake and its watershed. The invasive fish and aquatic plant species were discussed in previous

sections. A discussion of other invasive and exotic species is contained below. For laws related to the launching of boats and trailers containing invasive species, please see the section on Aquatic Plant Laws.

Zebra Mussels

Zebra mussels were confirmed to be in Rock Lake in the spring of 2005. They are exotic species that spread to uninfested waters by hitching a ride on boats and boat trailers, or in livewells or bait buckets from infested waters. They can live for 5 days out of water. One female mussel can produce up to 1 million eggs each season.

Zebra mussels form dense clusters that attach to hard surfaces including piers, boats, and water intakes. There are at least 3 pipes in Rock Lake that could be impacted by zebra mussels: "dry" fire hydrants at the north end and Elm Point boat launches, and the water intake used by the DNR fish hatchery. Zebra mussels can decimate native mussel and crayfish populations because the zebra mussels attach to them, and the native species cannot carry the extra weight.

Though zebra mussels are effective filter feeders of algae, they prefer "eating" the good algae, and do not "eat" blue-green algae that can produce toxins harmful to people and animals. They also do not "eat" filamentous algae because that algae is too large. So, the mussels can actually cause a worsening of harmful algal blooms. They also upset the food-chain because they will "eat" algae – so zooplankton have less algae to eat, causing there to be less zooplankton for the small near-shore fish to eat, causing there to be less small near-shore fish for the game fish to eat. Zebra mussels can also decrease the oxygen that fish and other aquatic species need. Their sharp shells can cut the feet of beach walkers and swimmers.

Chinese Mystery Snail

The Chinese mystery snail has been documented in Rock Lake. This snail is large, growing up to 3 inches tall. The ecological impact is not fully understood, but it is thought to compete for food and resources with native snails. Chinese mystery snails also can serve as a host for a parasite that can kill waterfowl.

Banded Mystery Snail

The banded mystery snail has been documented in Rock Lake. The snail can grow to 1.5 inches tall and 1-1.5 inches wide. It has brown horizontal bands on the shell. The ecological impact is not fully understood, but it is through to compete for food and resources with native snails. This snail can also be a host to a parasite which has been linked to waterfowl die-offs in the Mississippi River area.

Phragmites

Phragmites has been documented adjacent to Mud Lake. It is a grass that can grow up to 16 feet tall. Phragmites is known to form very dense monotypic stands that can shad out native vegetation and prevent human and wildlife access.

Yellow Iris

Yellow Iris has been documented adjacent to Rock Lake. This plant can spread quickly resulting in crowding out native plants and decreasing plant and animal diversity.

Rusty Crayfish

Rusty crayfish have been noted to be in Rock Lake, but the species has not been officially documented. They are native to some Great Lakes states, but invaded Wisconsin waters probably through the use of fishing bait. They are an aggressive species that can displace native crayfish. They reduce aquatic plant abundance and species diversity. In addition, they eat benthic invertebrates, reducing the population for fish consumption.

Canada Geese

Canada geese are native to Wisconsin but have become an invasive species because they have stopped migrating. They access shoreland areas that have short grasses to eat because they like to graze in areas where they have clear sight of predators. The geese start reproducing at 2 or 3 years of age, live over 10 years, and raise an average of 4 young per year.

Canada geese droppings are not only a nuisance to people, but they can add nutrients to the lake. Other problems associated with large numbers of Canada geese include overgrazing of grass and ornamental plants, attacks on humans by aggressive birds, and the pollution of beaches, lawns, and golf courses.

In the past, the Rock Lake Improvement Association, in association with the Fish Hatchery, DNR wildlife biologist, and the City of Lake Mills Parks Department, organized a count of the Canada geese in the Rock Lake area. The count was done during the molting period when the birds are flightless. The results of these counts are given in Table 22. The areas where counts were performed include the golf course, fish hatchery, Topel's Trailer Park and driving range, Korth Park, Elm Point, Sandhill Station parkland, Ferry Park, Schultz's Bay, Lower Rock Lake Park, Sandy Beach, Bartel's Beach, the Millpond, and Tyranena Park. The land adjacent to the old Planar building on Tyranena Park Road was added to the survey in 2006. It should be noted that there are many areas that were not included in the survey because they were inaccessible wetlands, or were not identified as significant molting areas for the birds.

2004 was the year with the largest count. This amount of birds produces an estimated 138 pounds of nitrogen and 42 pounds of phosphorus deposited directly into the water.

Table 22. Canada Geese Population Counts

Year	Date	Adults	Juveniles	Total Number	USDA Removal*
2002				347	
2003				363	

Year	Date	Adults	Juveniles	Total Number	USDA Removal*
2004				449	
2005	June 30	118	145	263	
2006	June 29	101	212	362	
2007	June 25	190	244	434	
2008	June 25	150	156	306	208
2009	June 18	44	134	178	147
2010				No count	
2011	June 16	36	80	116	
2012				No count	
2013				No count	
2014				No count	
2015				No count	162

*Number removed if known.

Purple Loosestrife

Purple loosestrife is an exotic plant species that is 3-7 feet tall and grows in wetlands, along shorelines and roadsides, and in other moist areas. It spreads mainly by seeds and a single plant can produce 100,000-300,000 seeds per year. Purple loosestrife crowds out native species creating dense stands of plants reducing habitat available for wildlife. The presence of purple loosestrife in the Rock Lake watershed has not been reported.

Garlic Mustard

Garlic mustard is an exotic, invasive plant that is found in wooded or shaded areas throughout the Rock Lake watershed. It displaces native woodland species, reduces the diversity of the habitat, and can cause long term degradation of wooded areas by shading out tree and shrub seedlings. Seeds can be spread by animals, and through human contact as the seeds can be carried on the soles of shoes.

Hand pulling of garlic mustard can be effective for small infestations. This control method must be done every year for several years because the seeds may stay in the soil for as long as 7 years. Pulled plants should either be burned or buried deep enough to prevent re-sprouting because seeds can be produced even after the plants are pulled. Severe infestation can be controlled using herbicides.

The annual Rock Lake Clean-up (organized by the RLIA) added the pulling of garlic mustard in 2005 along with the collection of trash. This effort is concentrated in public parks around the lake.

Other Species

Other terrestrial invasive plants found in the watershed include honey suckle, buckthorn, and box elder.

NONPOINT SOURCE POLLUTION

Nonpoint source pollution is pollution that enters water bodies via overland flow from areas including lawns, streets, paved areas, rooftops, and farm fields. As water flows over land, it picks up nutrients, sediment, salt, pesticides, fertilizers, oil, grease, leaves, litter, and many other pollutants. Stormwater discharges into Rock Lake via a pipe are also considered nonpoint source pollution because the water and pollutants are carried from a wide area that cannot be traced to a single point or source.

Pollutants delivered to water bodies have several detrimental effects. Sediment will initially make the water cloudy or turbid which affects the aesthetics of the water as well as the survival of fish and various aquatic plants. For instance, sediment can scour the gills of fish, impairing their respiration. Once the sediment settles out, it can cover fish eggs and cause them not to survive. When phosphorus is delivered to water, the growth of algae and aquatic plants in the lake will increase. Algae and aquatic plants are important in providing food and habitat for fish and wildlife. However, rapid and/or excessive growth of algae and aquatic plants can deteriorate water quality and impair recreational enjoyment.

Pollution Sources and Estimates

Determining the amount of sediment and phosphorus inputs to the lakes is difficult. In a 1995 study, R.A. Smith & Associates performed a WINHUSLE model that estimated that 339 tons of sediment and 2,066 pounds of phosphorus flow into Rock Lake annually from the rural lands in the watershed. These estimates were dependent on rainfall, soil type, slope, flow path lengths, cropping practices, and erosion control practices.

The Wisconsin Lake Modeling Suite was developed by the Department of Natural Resources. The model takes information entered on lake characteristics and land uses to predict both nonpoint source phosphorus loading to the lake and the summer total phosphorus in the lake via 13 different models. One of the 13 models is then chosen as the best "fit" when compared to the actual summer total phosphorus in the lake. The user can then select a nonpoint source reduction percentage and determine the predicted phosphorus loading and the total phosphorus in the lake. The Rechow model (1979 Natural Lake Model) was the one that was the best fist for Rock Lake. This model predicted that Rock Lake receives 1,862-3,753 pounds/year of phosphorus, which is in line with the results from the WINHUSLE model. The Rechow model also predicted total phosphorus was 13-26 mg/l in the lake. In the last 9 years, the actual total phosphorus in the lake ranged from 14.47 – 26.5 mg/l. Table 23 shows the predictions of the model when the nonpoint source pollutant load is reduced by different amounts.

Table 23. Phosphorus Predictions from the Wisconsin Lake Modeling Suite for Rock Lake

Predictions	Predicted Phosphorus Load	Predicted Lake Total Phosphorus
Current Predictions	1,861.9 – 3,753.2 lbs/yr	13 – 26 mg/l
10% NPS Reduction	1,675.7 – 3,377.9 lbs/yr	11 – 24 mg/l
20% NPS Reduction	1,489.5 – 3,002.6 lbs/yr	10 – 21 mg/l
30% NPS Reduction	1,303.3 – 2,627.3 lbs/yr	9 – 19 mg/l
40% NPS Reduction	1117.1 – 2251.9 lbs/yr	8 – 17 mg/l

The 1997 Nonpoint Source Control Plan for the Rock Lake Priority Watershed Project estimated the potential amount of phosphorus and sediment coming from different sources. Please note, these are not the amounts deposited into Rock Lake. The sediment and phosphorus estimates are contained in Table 24. Progress on controlling some of these sources has been made since this time through various programs. With the Rock Lake Priority Project funds, reductions of pollutants were achieved as follows:

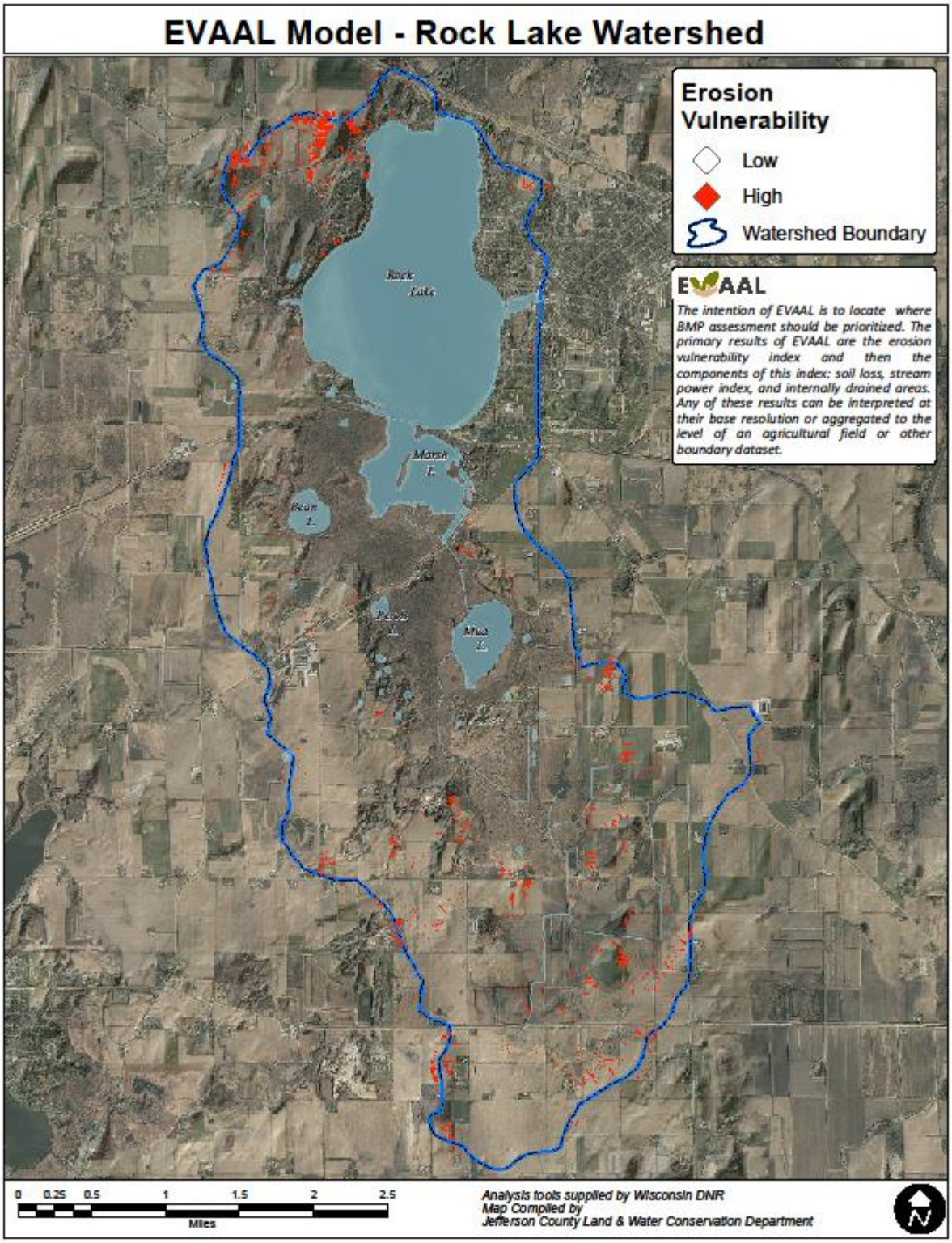
- Agricultural source reductions: 46.4 tons/yr sediment, 156 lbs/yr phosphorus
- Shoreline erosion: 97 tons/year of sediment, 111 lbs/year of phosphorus

Table 24. Estimated Sediment and Phosphorus from Different Sources

Source	**Sediment**		**Phosphorus**	
	tons	**% of total**	**pounds**	**% of total**
Barnyards 23 assessed			146	4%
Ditches 9 miles assessed	210	15%	298	8%
Shoreline erosion 1.75 miles assessed	370	26%	423	12%
Agriculture 2,800 acres assessed	446	31%	2,011	56%
Urban 628 acres assessed	50	3%	236	7%
Construction sites estimated 7 acre/yr	370	26%	472	13%
Total	1,446		3,586	

The Land and Water Conservation Department (LWCD) used the Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) model on the Rock Lake Watershed. This model, developed by the Wisconsin Department of Natural Resources (DNR), identifies areas that may be vulnerable to water erosion using information about topography, soils, rainfall and land cover. It is important to point out that the areas identified may or may not actually be experiencing erosion. Instead, the model provides areas where resource managers and landowners should investigate to ensure that practices are in place to prevent erosion. Map 4 shows the locations in the Rock Lake watershed identified through EVAAL that should be investigated.

Map 4. Possible Areas Susceptible to Erosion in the Rock Lake Watershed



Agricultural Nonpoint Source Pollution

Agricultural nonpoint source pollution can result from cropland erosion and runoff from animal lots, farm fields, and faulty manure storage. Pollutants can consist of soil, manure, fertilizers and pesticides.

Miljala Channel Watershed

An extensive study was done in the subwatershed that drains to the navigation channel located between Cedar Lane and Shorewood Hills Road. The study found that sediment, phosphorus, and bacteria are being delivered to the channel by the stream. The majority of the sediment being delivered was found to be predominately sand with some muck. Given the flows needed to move sand, it is being delivered during storm events. In addition, the source was found to be stream bed and bank erosion. The source of phosphorus in the watershed is most likely chicken manure spreading on farm fields. Likewise, manure spreading and wildlife were identified as likely sources of bacteria. In addition, higher bacteria amounts were noted after extended warm, dry periods, indicating the growth of bacteria in the soil that get flushed to the stream in wet weather conditions. The reports from this study can be found at www.rocklake.org.

Nonpoint Source Laws

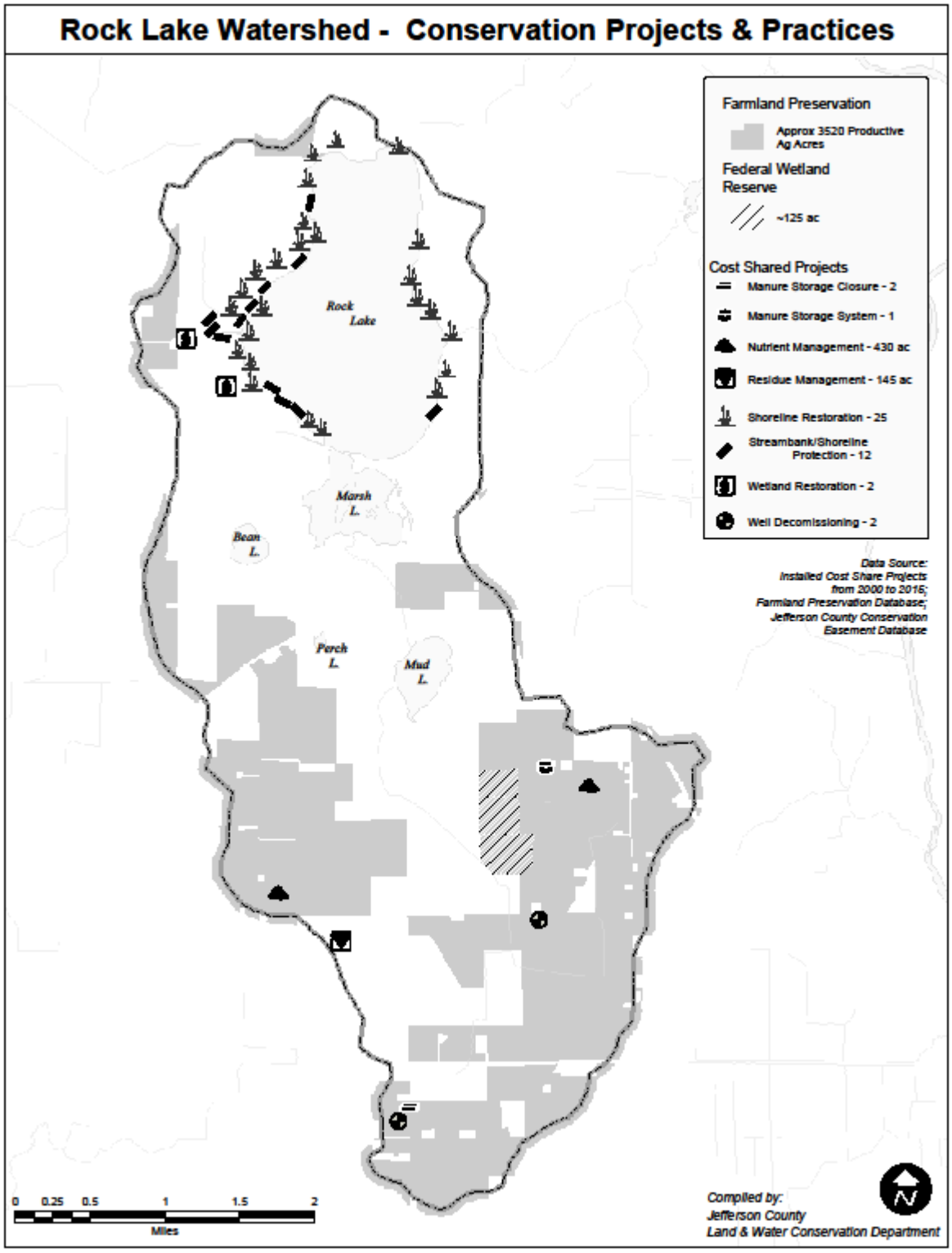
There are State and County rules that are in existence to protect waterways from agricultural pollution. State rules include performance standards and prohibitions for farms to prevent runoff, and identify conservation practices that farms must follow to meet the standards. The rules cover standards for reduction of soil erosion from cropland and standards to prevent manure discharges to water. The Land and Water Conservation Department has primary responsibility for implementing the State standards. In most cases, agricultural operations that are not following the standards can only be forced to follow them if cost-sharing is made available. However, in some circumstances, the operations can be issued citations from the DNR.

Programs to Fund Conservation Practices

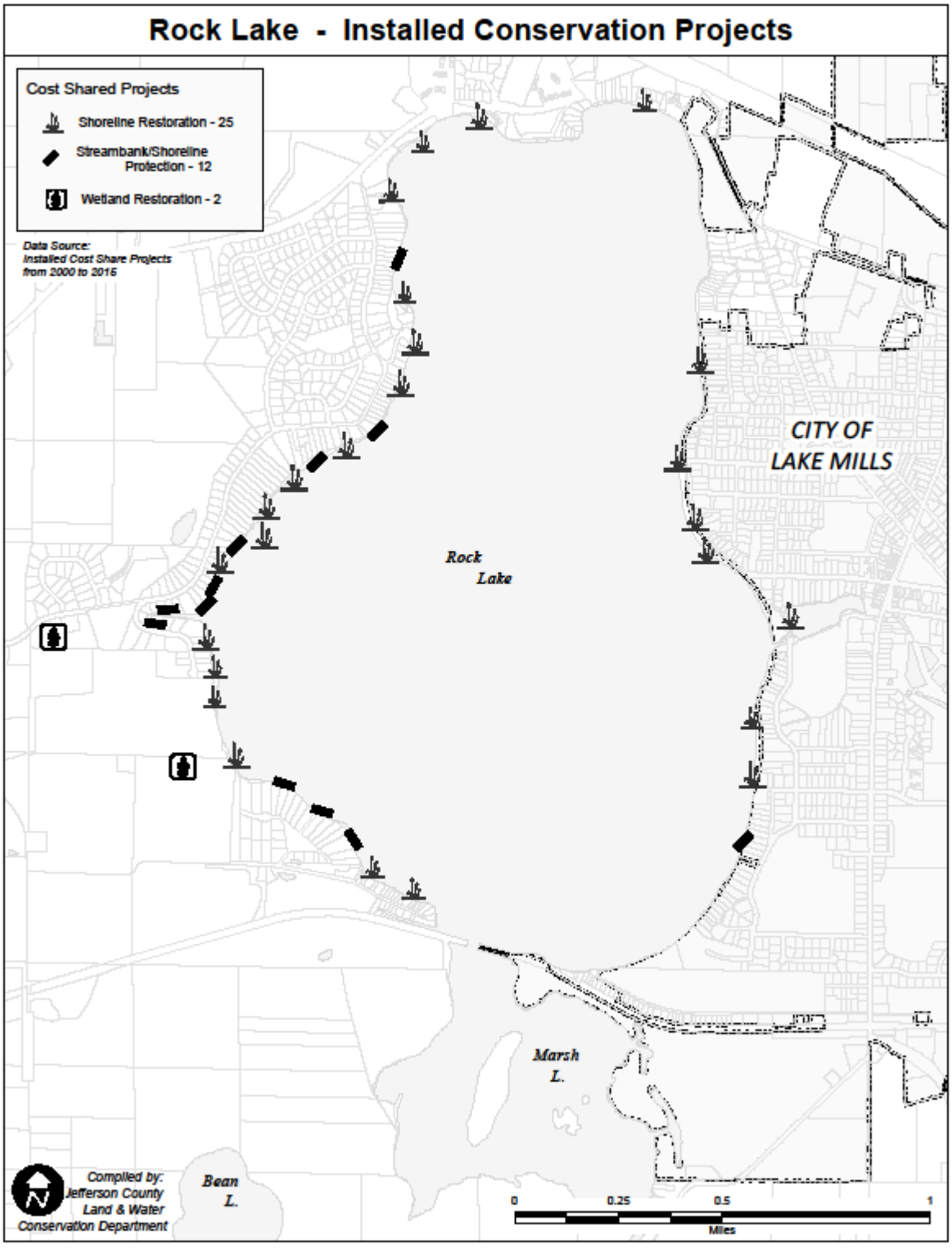
There are various programs available to assist in the implementation of both structural and management conservation practices to control nonpoint sources of pollution. Examples of structural practices include manure storage, and shoreline erosion control. Management practices include nutrient management plans, and reduced tillage. The majority of the practices are for agricultural land. However, the programs also fund practices on non-agricultural land such as shoreline and streambank erosion control, native plant buffers, and well closures.

Maps 5 and 6 show the locations of conservation practices that have been implemented through multiple programs. There are very likely other conservation practices on the land that haven't been implemented through government funds and are therefore not on the map. The streambank and shoreline protections on the map could be rock riprap, coconut fiber rolls, or other biological practices. Also, the scale of the watershed map is

Map 5. Conservation Practices Installed in the Rock Lake Watershed



Map 6. Conservation Practices Installed on Rock Lake



such that the locations of the shoreline projects (shoreline protection and shoreline restoration) are not exact because they would have overlapped otherwise.

From 1999 to 2005, the Rock Lake Priority Lake Project assisted farmers and landowners with the design, implementation, and partial costs of implementing conservation practices. This project was funded by the Department of Natural Resources. A total of $139,582.54 of State money and $66,995.27 of landowner money was expended on conservation practices. For the State money, $33,276.69 was spent on practices on agricultural land, and $106,305.85 was spent on practices on non-agricultural land. For the landowner money, $18,120.64 was spent on practices on agricultural land, and $48,874.63 was spent on practices on non-agricultural land.

From 2005 to 2012, the Jefferson County Land and Water Conservation Department (LWCD) had a cost-share program funded by Jefferson County. It also assisted with the implementation of conservation practices both on agricultural and non-agricultural land in the Rock Lake watershed. This program was cut from the County's budget in 2013.

The LWCD currently implements a program funded by the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP). This program has been in effect for 17 years. It assists farmers and landowners with the design, implementation, and partial payment for conservation practices on both agricultural and non-agricultural land. The funds have been reduced throughout the years. In 2017, the LWCD received $36,000 for conservation practices and $14,000 specifically for nutrient management plans for the entire County. The funds that go to conservation practices are allotted based on a ranking system. Typically, the funds are used by agricultural practices.

The Federal Department of Agriculture also has several programs to fund conservation practices on farmland. The main programs include the following:

- Wetland Reserve Program – converts farmed wetlands to permanent wetlands
- Environmental Quality Incentives Program – structural and management conservation practices
- Conservation Reserve Program – converts highly erodible land to vegetative cover for either 10 or 15 years
- Conservation Reserve Enhancement Program (a joint project with the State of Wisconsin) – establishes stream buffers, grassed waterways, and wetland restorations either for 15 years or permanently

There are some conservation practices in which it is generally agreed that offer the best control of phosphorus runoff from agricultural areas. For all of the following practices, the Natural Resources Conservation Service pays usually 70% of the costs under the Environmental Quality Incentives Program.

<u>Reduced tillage</u>

- Limits soil disturbance by maintaining crop and plant residue on the soil by either no-till or reduced tillage methods
- No-Till and strip-till costs are $21.60 per acre

Cover crops

- Maintaining seasonal cover of the soil with grasses, small grains, legumes and other plants. Cover crops are planted in the late summer or fall around harvest and before spring planting of the following year's crops.
- Costs range from $89.26 to $104.70 per acre

Filter strips

- Vegetation that removes contaminants from overland flow; adjacent to streams and lakes
- Costs range from $178.40 to $730.29 per acre

Grassed waterways

- A shaped or graded channel that is established with suitable vegetation to convey surface water at a non-erosive velocity using a broad and shallow cross section to a stable outlet.
- Costs range from $3.37 to $9.04 per foot

Farmland Preservation Program

The Wisconsin Farmland Preservation Program is a State program that is implemented by the LWCD. It enables farmers to claim a tax credit each year when they certify to the following:

- They have and follow a soil and water conservation plan written to reduce possible soil loss from cropped land.
- They have and implement a nutrient management plan. Starting in 2018, these plans much include pastures.
- If they have manure storage: the facility meets certain standards, there is no signs of leakage, it is maintained to prevent overflow, and the storage is properly closed after not using it for up to 2 years.
- Runoff is diverted away from feedlots, manure storage, and barnyards that are within 300 feet of streams and wetlands and within 1,000 feet of lakes and areas susceptible to groundwater contamination such as wells and sinkholes.
- There are no unconfined manure piles within 300 feet of streams and wetlands and within 1,000 feet of lakes and areas susceptible to groundwater contamination such as wells and sinkholes.
- There are no discharges of manure into waters of the State.
- There is vegetative cover adequate to preserve streambanks and lakeshores in areas where livestock have access.
- Starting in 2018, cropland must be managed to include a minimum setback of 5 feet from the top of the bank of surface water.
- Starting in 2018, there must be no significant discharge of wastewater to waters of the state from feed storage, milk house waste, or other sources.

The tax credit is $7.50/acre for all of the land zoned agricultural. The LWCD inspects farms in a rotation so that each farm in the program is visited every 4 years to ensure they are following the program requirements. If problems are found, then a schedule of compliance is given to the landowner. If standards are not achieved, then the

landowner will not be certified as part of the Farmland Preservation Program and will not receive the tax credit.

There is approximately 61.5% of the eligible agricultural land in the Rock Lake watershed enrolled in the program.

Nutrient Management Plans

Nutrient management plans are used by farmers to determine the amount of nutrients (including manure and fertilizer) to apply to their crops to obtain optimal yields. These plans are based on soil tests, crop rotations, and crop nutrient needs. There are also certain groundwater and surface water protections that must be followed.

All farms in Wisconsin are required to have nutrient management plans. However, if a farm doesn't have a nutrient management plan, they must be offered partial funding to develop a plan. Any enforcement action can only happen if they refuse to develop a plan after the offer of cost-sharing.

Livestock Operations

There are a number of County and State rules that govern livestock operations. These include a County ordinance that regulates waste storage structures, a County ordinance that sets requirements and standards for livestock operations ≥ 150 animal units, and a State law that sets requirements and standards for livestock operations ≥ 1,000 animal units. Animal units are defined differently for different animal types. For instance, 1 milking cow is equivalent to 1.4 animal units, and 1 layer chicken is equivalent to 0.01 animal units.

The Jefferson County Animal Waste Storage and Nutrient Management Ordinance requires a permit for the construction, alteration and closure of manure storage structures to ensure that these activities meet State standards. In addition, applicants must submit a nutrient management plan as part of their application for a permit.

The livestock siting portion of the Jefferson County Zoning Ordinance was passed in 2006. It consists of a state statute and rule that governs new and expanding livestock operations of ≥ 150 animal units. The law details the standards that operators must meet to obtain permit approval. The LWCD reviews the required application, employee training plan, environmental incident response plan, and the 5 worksheets that cover: animal units, odor management, waste and nutrient management, waste storage facilities, and runoff management. The Zoning Department holds a public hearing on the permit application and it also issues the permits and is in charge of any enforcement of the law. As of December 2017, there are no facilities in the Rock Lake watershed that have gone through this livestock siting process. However, if the livestock facilities in the watershed either propose to expand or make a change to their facility, then they will be required to go through the process.

The Department of Natural Resources requires livestock operation of ≥ 1,000 animal units to obtain a State permit. Once these facilities receive their State permit, they must

follow standards that are stricter than those required of operations less than the threshold. For instance, the nutrient management plan standards for protecting groundwater and surface water are stricter for DNR-permitted facilities. There is currently 1 operation located in the Rock Lake watershed that has a State permit – Creekwood Farms, Inc., an egg-laying chicken facility. At this time, Creekwook Farms does not spread any of the manure in the Rock Lake watershed. There are 2 other DNR permitted facilities that are located outside of the Rock Lake watershed, however, some of the manure from the facilities is spread on land in the watershed. These facilities include Daybreak Foods (an egg-laying chicken facility) and Nature Link Farms (a cage-free egg-laying chicken facility).

The LWCD also responds to public complaints on manure spreading and erosion. Investigations are done and appropriate actions are initiated. If manure is being discharged into water, then the DNR gets involved with water sampling and potential citation issuance.

Residential and Urban Nonpoint Source Pollution

Sources of residential and urban nonpoint source pollution include lawns, rooftops, driveways, parking lots, and roads. Pollutants can consist of fertilizers, oil, litter, salt, and leaves. In an article entitled "Sources of Phosphorus in Stormwater and Street Dirt from Two Urban Residential Basins in Madison, Wisconsin, 1994-1995," it was found that streets and lawns are the largest contributors of suspended solids, total phosphorus, and dissolved phosphorus loads in a residential urban basin.

Shoreline Erosion

Shoreline erosion around Rock Lake occurs to varying degrees and is caused by different factors. Typically the most severe erosion happens with ice action. When temperatures fluctuate in the winter during ice cover on Rock Lake, the ice will melt in areas and then freeze again. This will result in the expansion of the ice cover into the land which can cause erosion. In addition, when there is a combination of melting ice and strong winds, sheets of ice can be pushed into the land and scour and heave the soil. The location of this type erosion will vary according to the wind direction and the ice cover.

Shoreline erosion can also occur when vegetation is cleared from the land near the water and replaced with turf grass. The roots of turf grass are as deep as the grass is tall. Whereas native plants typically have extensive root systems that are typically deeper than 2 feet. Therefore, the roots of native vegetation will effectively hold the soil in place. However, when that vegetation is eliminated, the bank is left vulnerable to erosion by overland water flow and wave action.

Shoreline erosion, depending on its severity and cause, can be controlled by rock riprap, coconut fiber rolls, grading, or shoreland habitat restorations. Assistance with determining severity of erosion, engineered solutions, and potential sources of funding are available through the LWCD.

Stormwater Management

The City of Lake Mills has a storm drain system that carries storm water (and associated pollutants) to both Rock Lake and Rock Creek. There are 15 storm drains that discharge directly to Rock Lake, 1 that discharges to Marsh Lake and 6 that discharge to the Millpond. The Town of Lake Mills does not have storm drains on the streets near the lake. Instead, they have curb cutouts that direct stormwater to approximately 12 catchment basins and grassed ditches. Some of the grassed ditches deliver water to Rock Lake.

All stormwater basins in the City of Lake Mills must follow State performance standards and are reviewed by the City's engineering firm. New and expanding businesses that involve construction are required to construct some kind of storm water detention.

The storm water control basins located in the area that drains to Rock Lake are the following: Sandy Beach, Lakeside Lutheran, and the Cedars. The Sandy Beach system (located within the parking lot for the beach) directs storm water to a grassed area where it infiltrates into a tile drain that outlets to the lake. The Lakeside Lutheran system is a biofilter and retention – some storm water infiltrates into the ground and the excess is discharged into a drain that discharges to the lake. The Cedars system (located where Lake Park Place takes a 90 degree turn) is a natural kettle with no outlet that the City has augmented and maintains so that the storm water infiltrates into the ground.

New subdivisions in the Town of Lake Mills are required to have grassed ditches and include detention basins based on storm water modeling. Storm water and erosion control plans are reviewed by the Town's engineering firm and the Jefferson County Zoning Department. In addition, subdivisions must follow all State permit requirements related to storm water management and erosion control.

Storm water along Shorewood Hills Road is controlled by asphalt curbs that direct the water either to natural low areas for infiltration or to areas that discharge to the lake. The stream that is south of Lost Lake receives storm water from grassed road ditches before it discharges into the lake. This stream also flows through some agricultural areas.

On Shorewood Hills Road, in between Woodfield Lane and Sunset Court, there is an area where runoff from the street is directed off the street via an asphalt strip to a drain. The asphalt strip discharges to rocks that filter out sand and other debris. When the water reaches a certain height in the drain, it is piped under a residential lawn to a well that is located approximately 30-40 feet away from the lake. This well has a grate on top of it and an opening directed to the lake. When water fills the well, it comes out of the opening and over large rocks before it runs over the ground to the lake.

There are maintenance requirements for this system. Each spring, the landowner removes the rocks and cleans out the sand and debris. He also sweeps the road in front of his property as rain carries sand to this area. In addition to a disposal location for the sand and debris, the Town should be working on this cleaning system. Sand and debris

should be removed from the drain by the road and the well by the lake. The landowner also reports that the asphalt strip near the road needs to be repaved. In addition, when there is a lot of water running off the road, the water tends to run around the rocks to the lawn area.

There is a retention pond south of Lake Lane at the bottom of the hill on the west side of Shorewood Hills Road. During heavy rains, water flows over the road for a small amount of time before it recedes to the retention pond. Maintenance of the retention pond includes cleaning out sediment approximately every 3 years.

The stream that flows into the lake via the navigation channel near Cedar Lane receives storm water from the road. In addition, there has been some bank erosion surrounding the road culvert. The engineer for the Town of Lake Mills is currently assessing the situation to make some recommendations that could include: French drains or rain gardens to capture the road runoff and riprap along the channel banks near the culvert.

Leaves and Streets

Leaves are considered a pollutant to waterways because more leaves are delivered via storm drains than naturally fall into the water and they also add phosphorus to the water. A recent U.S. Geological Survey (USGS) study in Madison found that 56% of the annual total phosphorus load in urban stormwater came from leaf litter and other organic debris that were not removed by the city. In comparison, when streets were cleared of leaves prior to a rain event, the annual total phosphorus load in urban stormwater from leaves and organic debris fell to 16%. The USGS study also found that nutrient levels in urban stormwater are the highest in the fall.
The City of Lake Mills has had a leaf vacuum truck since 2006. Homeowners are instructed to rake their leaves to the tree lawn and keep them out of the street. The vacuum truck collects the leaves from the tree lawn. It takes 2 weeks for the vacuum truck to travel all of the city streets. The City also uses a street sweeper to help with cleaning the leaf litter and organic debris from the streets. In addition to the fall leaf pick-up, the City also schedules a spring leaf-pickup. They also do a brush pick-up in the spring and fall.

Compared to when the leaf vacuum was first used, the City reports that the homeowners are getting better at placing the leaves in the tree lawn and keeping them off the streets. The City will talk to residents who put their leaves in the street to educate them about proper leaf management. The Rock Lake Improvement Association has taken other educational steps including information at a fall community event, and a flyer that was sent with the City light and water bills.

The Town of Lake Mills has residents near the lake bag their yard waste for pick up. These areas include the north end of Rock Lake, Shorewood Hills, Elm Point, Linden Street, and Sandy Beach Road.

In the Town of Lake Mills and the City of Lake Mills, there are some lakeshore residents that either burn leaves adjacent to the lake or use the lake as the disposal site for their leaves. These practices, though not widely used by residents, are detrimental to the

lake. When burn piles are upslope from the lake, storm water can carry the pollutants in the leaf ash to the water. In the City of Lake Mills, the burning of leaves and brush is illegal. In the Town of Lake Mills, burning is allowed, but the residents must contact the Sheriff prior to burning.

Street sweeping is an important practice that reduces the amount of pollutants that can be washed into lakes and streams via storm drains. The City of Lake Mills has a street sweeping program that is run from mid-May to mid-September. During this time frame, every street is swept approximately every 3 to 4 weeks.

The Town of Lake Mills contracts out their street sweeping and cleaning of the approximately 12 catch basins. They do this work once per year in order to clean up the sand put on the streets during the winter. Though ideally this work should be done soon after the end of winter, it is typically done in the middle of the summer.

Road Salts and Sand

The use of road salts and sand is important to safety on our roads and sidewalks during the winter. However, the salt can become a pollutant when it reaches the water, soils and groundwater after snowmelt. Fish and other aquatic life can be harmed by too much chloride reaching surface waters. The Environmental Protection Agency has established the following water quality criteria for chloride:

- Acute water quality criteria (one-hour average concentration) = 860 mg/l
- Chronic water quality criteria (four-day average concentration) = 230 mg/l

Research from Canada found that an estimated 5% of aquatic species would be affected at chloride concentrations of about 210 mg/l; and 10% of species would be affected at chloride concentrations of about 240 mg/l (Environment Canada, 1999).

There have been concerns raised by citizens about the practice of piling snow cleared from City streets on east side of the millpond along the extended road of Veteran's Lane. When the snow melts, chloride and other pollutants in the snow will wash into the cattail region of Rock Lake's millpond. The City does take a chloride sample from the millpond a couple times a year. However these samples are not targeted to be taken during snow melt events, and therefore will not show the full impact from the practice of piling the snow along the millpond.

In order to determine if chlorides are entering the millpond and Rock Creek downstream, the Jefferson County Land and Water Conservation Department consulted with research limnologist Richard Lathrop of the Wisconsin Department of Natural Resources. They devised a monitoring protocol to both sample the chloride levels in Rock Lake and to determine the chloride levels during snow melt events. The chloride levels in Rock Lake from 2011 to 2013 indicated that the average chloride levels in Rock Lake were 18.4 mg/l. For comparison sake, the chloride levels in the Madison lakes were all above 50 mg/l in 2015. Unfortunately, large snow melt events during the 2011-2013 sampling period were not able to be sampled.

In 2017, the City of Lake Mills stated that they would use Veteran's Lane adjacent to the Millpond as a last resort for snow disposal. They intend to pile the snow in the industrial park away from Rock Creek. However, during large snow fall winters, they may need to use Veteran's Lane.

The City of Lake Mills has been working to reduce the amount of salt used on the roads during the winter. For the last 2 years, they have been pre-wetting rock salt in certain instances to ensure that the salt doesn't bounce off the road. This practice can be used 24 hours before a storm if the streets are already clear of snow. When used, it keeps the snow and ice from binding to the streets and can reduce the amount of salt used during the winter season.

The City hopes to make retrofits to their equipment in order to start using a brine solution (23% salt) on the streets in the winter. Brine is preferable to pre-wetting rock salt because it can be put down on the road up to 3 to 4 days before a storm, and it has been shown to reduce the amount of salt needed for the winter season. The City's Director of Public Works has stated that besides working on brine spreading equipment, they are also working on training their crew, and better calibrating the trucks used to spread the pre-wetted rock salt.

Construction Site Erosion

Construction sites can be a significant source of nonpoint source pollution (both sediment and attached phosphorus) if proper erosion control isn't used. Because vegetative cover is removed on construction sites, there is a 10 times higher erosion rate at construction sites than on cropland. In fact, an acre under construction with no erosion control delivers, on average, as much sediment to local waterways as 75 acres of cropland.

The Town and City of Lake Mills require that construction sites install proper erosion control prior to land disturbance. Building inspectors for each municipality inspect sites. However, due to their workload, construction site erosion control isn't always high on their lists of items to check. Both municipalities contracted out for the building inspectors that work part time. Sometimes they are unable to address problems that arise in a timely fashion.

If land disturbance is projected to be ≥ 1 acre, then a construction site storm water runoff permit is also required from the Department of Natural Resources prior to construction. The State also has several construction site erosion and stormwater control technical standards.

Wastewater Treatment Plant

The wastewater treatment plant (WWTP) that services the City of Lake Mills and portions of the Town of Lake Mills discharges into Rock Creek downstream from Rock Lake. Though it isn't in Rock Lake's watershed, it is important to note some future changes that might benefit areas within the Rock Lake watershed.

As part of their new 2016 discharge permit from the Department of Natural Resources, the City's WWTP must reduce their phosphorus discharge from 1 mg/l to an annual average of 0.075 mg/l and a monthly average of 0.225 mg/l. They have 10 years to achieve this reduction and the ability to extend the timeframe under certain conditions.

In order to achieve the reduction in phosphorus, they have multiple options that can also be combined:

- Treatment plant upgrades – This option it typically very expensive. However, the Lake Mills WWTP has not been updated for approximately 25 years. So, there may be some upgrades that would be beneficial.
- Water quality trading – The City can choose to pay for conservation practices on the land. Each conservation practice is given an estimated amount of phosphorus reduced. For the phosphorus reduced on the land, the WWTP can be credited with just a portion of that amount. The result is a calculation on paper that show that the City has reduced more phosphorus in their watershed than they need to achieve at their WWTP.
- Adaptive management – The City can choose to pay for conservation practices on the land and take measurements of in-stream phosphorus on Rock Creek. The sampling point would be just upstream of Rock Creek's confluence with the Crawfish River. They would achieve their permit requirement if the in-stream phosphorus meets the stream phosphorus water quality criteria. Rock Creek's water quality criteria is 0.075 mg/l.

For both water quality trading and adaptive management, the City of Lake Mills has the option to install conservation practices both in the Rock Lake watershed, and in the City in areas that are downstream of the Rock Lake watershed. Installing practices in the Rock Lake watershed would benefit the lake. For water quality trading, the DNR would likely approve a trading ratio that would give less phosphorus credits to the City for practices installed in the Rock Lake watershed versus the other areas in the City. This is because Rock Lake already acts as a sink for phosphorus to the benefit of Rock Creek. The phosphorus reductions would have to be very large in the Rock Lake watershed to benefit Rock Creek. A similar scenario exists for adaptive management. Rock Creek will benefit more from practices installed downstream of Rock Lake. This doesn't mean that the City cannot do practices in the Rock Lake watershed. In fact, the City of Oconomowoc is a great example. The Oconomowoc River is close to meeting the water quality standard. They chose to implement adaptive management in their entire watershed (even though there are a chain of lakes on the Oconomowoc River) because they see it as a benefit to work with the entire Oconomowoc River watershed community. However, they are targeting many conservation practices downstream of the lakes.

At this time, there isn't any phosphorus data on Rock Creek near the confluence with the Crawfish River that is housed in the DNR's database. There are 2 dedicated volunteer stream monitors that sample Rock Creek at Manske Road for air and water temperature, dissolved oxygen, flow, clarity, and biotic index which is based on the community of macroinvertebrates in the stream. They could certainly be trained to collect phosphorus samples for analysis.

There are 2 dedicated volunteers who also monitor the Rock Creek just upstream of Stony Road. They measure the same parameters as listed for the Manske Road site. In 2016, the Department of Natural Resources paid for 6 samples for total phosphorus analysis. It is not expected that the DNR will continue to pay for phosphorus analysis at this location because they target different locations each year. The 2016 results are shown in Table 25. It is important to point out that all samples, except for the October sample, where higher than the water quality criteria of 0.075 mg/l of phosphorus for Rock Creek. The City of Lake Mills also is required to sample the phosphorus of Rock Creek near their WWTP discharge to the creek. At this point, that data is not publicly available on the DNR's database.

Table 25. Total Phosphorus Results on Rock Creek Upstream of Stony Road

Date	Total Phosphorus (mg/l)
5/6/2016	0.218
6/7/2016	0.141
7/5/2016	0.110
8/4/2016	0.273
9/6/2016	0.232
10/4/2016	0.0715

ROCK LAKE SHORELANDS AND SHALLOWS

The land adjacent to our lakes and the shallow water next to the land are important areas for many reasons. These areas are where people use the waters for fishing, bird watching, swimming, getting their boats out on the water, or simply sitting and enjoying the view. The shoreland area is a vital place for many species that are dependent on native habitat during part of their life cycle. In fact as much as 90% of the living things in lakes are found in the shallow waters and shoreland areas.

How we manage our shoreland areas can impact our lakes positively or negatively. The 2007 National Lakes Assessment identified the loss of shoreland habitat as the number one stressor to our lakes in the nation and in Wisconsin. A shoreland area containing a native plant garden can prevent pollutants carried by rainwater from reaching our lakes and also prevent shoreline erosion. In fact, when comparing native shoreland habitat to lawns, areas with lawns contribute 7-9 times more phosphorus and 18 times more sediment to the water. These phosphorus and sediment inputs to the water can reduce water clarity and increase algae blooms which can cause a decrease in property values.

Development of our shorelands and shallow areas can negatively impact lake fish and wildlife. Shorelines that contain seawalls and rock riprap impede the movement of turtles and other animals that need to access the lake and the shoreland area. Increased development (lawns, impervious surfaces, bare ground, piers) has been linked to degraded aquatic plant habitat, decreases in green frog and uncommon bird populations, and a decline in fish species.

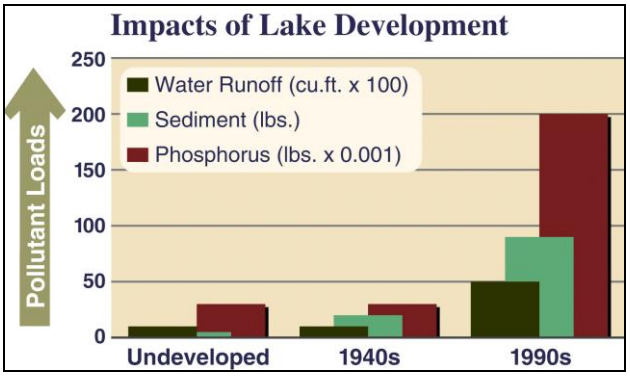
Many of the values lake front property owners appreciate and enjoy about their properties—natural scenic beauty, tranquility, privacy, relaxation—are enhanced and preserved with good shoreland management. And studies have shown that healthy lakes with good water quality translate into healthy lake front property values.

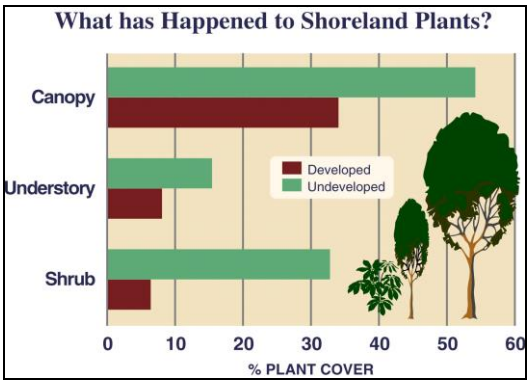
Shoreland Zoning Rules

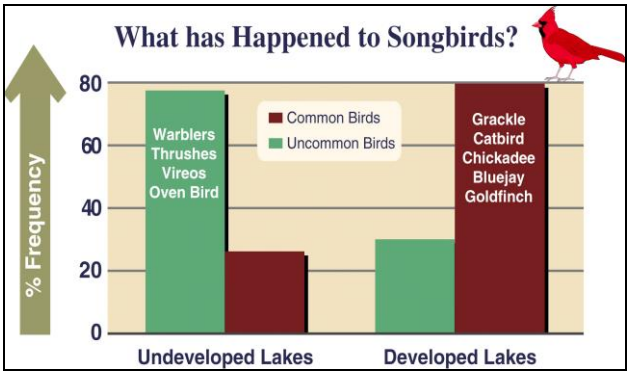
Shoreland zoning rules are in place to protect water from activities on land that can impact the water resource in adverse ways. Development near water leads to increased stormwater runoff, and increased sediment and phosphorus loads to the water. This in turn impairs water quality. In addition, land clearing activities associated with development results in the loss of habitat essential for wildlife that contribute to a diverse and healthy lake environment. Studies in Wisconsin have documented the decline of shoreland plants, songbirds, and green frogs in shoreland areas due to development (see Chart 11).

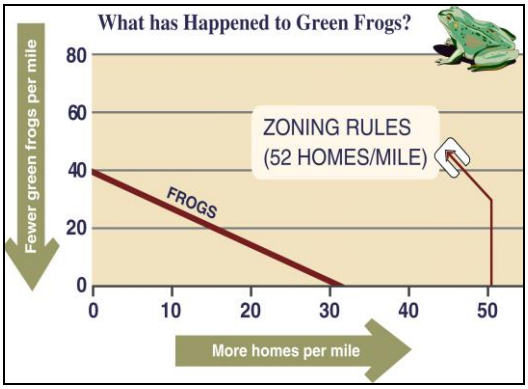
Shoreland zoning rules and rules on the placement of piers and other structures in the water are put in place to ensure reasonable development while protecting shoreland areas and water resources. Shoreland zoning consists of rules that cover 75 feet from water. Generally, these rules strive to keep development within 75 feet of the water to a minimum. Setting structures away from water creates a buffer that can help mitigate the environmental impact of structures and surrounding development. Shoreland

Chart 11. Wisconsin Research on the Impacts of Shoreland Development









buffers of native vegetation are crucial to protecting water quality, preventing flooding, providing fish and wildlife habitat, and screening neighboring properties to ensure privacy and natural scenic beauty. Likewise, minimizing the size and number of structures placed in the water will help prevent adverse impacts to lake and river environments.

Chapter NR 115 of the Wisconsin Administrative Code is Wisconsin's Shoreland Management Program. It requires counties to adopt regulations to protect shorelands in unincorporated areas. The City of Lake Mills does not fall under Jefferson County Shoreland Zoning Ordinances. Instead, Wisconsin Statute 281.31 gives municipalities the authority to adopt regulations in order to "further the maintenance of safe and healthful conditions; prevent and control water pollution; protect spawning grounds, fish and aquatic life; control building sites, placement of structure and land uses and preserve shore cover and natural beauty." To this end, the City has adopted some, but not all, of the NR 115 language.

Up until 2015, NR 115 defined state minimum standards and county shoreland ordinances were not able to be less restrictive than these rules. However, counties were able to be more restrictive and many counties assessed their lake and river resources and decided to adopt stricter rules in order to provide more protection to these resources.

In 2015, as part of the budget bill, the state legislature decided that counties could no longer be more restrictive than the DNR shoreland zoning standards. The previous

state minimum standards were then the state maximum standards. In 2016, Jefferson County was required to adopt a new shoreland zoning ordinance in order to adhere to the new state law.

In 2015, the City of Lake Mills finalized changes to their zoning ordinance. The public process to make changes to the zoning ordinances resulted in greater protections for water resources in the shoreland zoning related sections of the ordinance.

Shoreland Development Concerns

Throughout the years, there have been concerns about the way that development of properties on Rock Lake has occurred. Some concerns include:

- Development without adequate erosion control
- Different rules on the Town versus the City sides of the lake
- The type and amount of land grading that has occurred
- The use of retaining walls within 35 feet of the water on lots in the City
- The amount of vegetation (trees, shrubs, flowers/grasses) that have been removed.
- In the case of tree removal, the resulting enforcement and subsequent planting of a replacement tree is disappointing given the large size of the tree removed and the small size of the replacement tree

Shoreland and Shallow Areas

In 2015, the Jefferson County Land and Water Conservation Department (LWCD) obtained a Department of Natural Resources (DNR) lake planning grant in order to assess the current conditions in the shoreland and near-shore shallow areas of Rock Lake (Cicero 2017). The survey will serve as a baseline so that future changes (improvements or declines) in conditions can be measured.

The shorelands and shallows survey was performed on Rock Lake during the summers of 2015 and 2016. The protocols for the survey were determined by the DNR. The amount of shoreline assessed in the survey was 7.3 miles (38,520 feet) and included the Miljala channel, the Elm Point channel, and the mill pond. The survey did not include Marsh Lake. The survey covered 347 tax parcels.

Shoreland and Shallow Vegetation

The state and county standard is to have a vegetated area that consists of shrubs, trees, grasses, and flowers to a depth of 35 feet from the water. This area is called a vegetated buffer. A viewing and access corridor is allowed to be 35 feet wide parallel to shore for a parcel that is 100 feet. Ideally, every lot would contain a vegetated buffer to project the quality of the water.

Shorelands that were reported as having ≥65% cover of shrubs and herbaceous plants are the parcels that meet or exceed the state and county standard. The shoreland and shallows survey revealed that out of 347 tax parcels, Rock Lake had 64 parcels that meet

the state/county standard. Therefore only 18.4% of parcels meet the state standards for protecting the water quality of Rock Lake.

Another way to assess how Rock Lake is doing in terms of meeting the buffer standard is to look at the total length of shoreline that meets the standard. There are 2.07 miles of shoreline that have ≥65% shrubs and/or herbaceous plants within 35 feet of the lake. Therefore, 28.3% of the shoreline meets the standard (Map 7).

The percent cover of items found within 35 feet of the lake was estimated. This information on all of the parcels is summarized in Table 26. The "other" component included bare soil, sand, gravel, mulch, riprap, and retaining walls.

The presence of emergent and floating-leaf aquatic plants located adjacent to shoreland lots were noted in the survey (Table 27).

Table 26. Percent Cover on Land within 35 Feet of Rock Lake

	Average % Cover	Minimum Cover	Maximum Cover
Shrubs and/or Herbaceous Plants	40%	0%	100%
Impervious Surfaces	17%	0%	95%
Lawn	39%	0%	100%
Other	4%	0%	70%

Table 27. Lots Adjacent to Emergent and Floating-Leaf Aquatic Plants

	Number of Lots Containing Aquatic Plants	% of Lots Containing Aquatic Plants
Emergent plants	49	14.1%
Floating-leaf plants	79	22.8%

Shoreland and Shallows Structures

The number of structures within 35 feet of the water are noted in Table 28. Structures in the "other" category included items such as paths, retaining walls, decks patios, boats on shore, fishing platforms and roads.

Map 7. Lots that Meet the State Standard for Shoreland Vegetation

Table 28. Structures within 35 Feet of Rock Lake

Structure	Number of Structures	Number of Parcels Containing Structures
Residences	18	18
Boathouses on land	84	82
Out buildings	25	24
Commercial buildings	2	2
Stairs	219	197
Fire Pits	15	15
Other	266	55

The number of structures in the water near shore are in Table 29. The items that were counted in the "other" category included 6 boat launches, a dam, 1 handicap access fishing platform, stairs to the water, a deck hanging over the water, and a wooden landing in the water. Both watercraft in the water and boat lifts were counted to obtain an approximation of the number of watercraft (boats, sail boats, jet skis, etc.) kept on the lake. However, it should be noted that empty lifts were counted and some of the watercraft in the water could typically be "housed" on those empty lifts. In addition, some watercraft typically kept at the pier in the water (or on a lift) could have been in use on the lake and therefore would not have been counted as part of the survey. The approximate number of watercraft associated with lots is 682. This number does not include the number of boats found on shore.

Table 29. Structures in the Near Shore Area

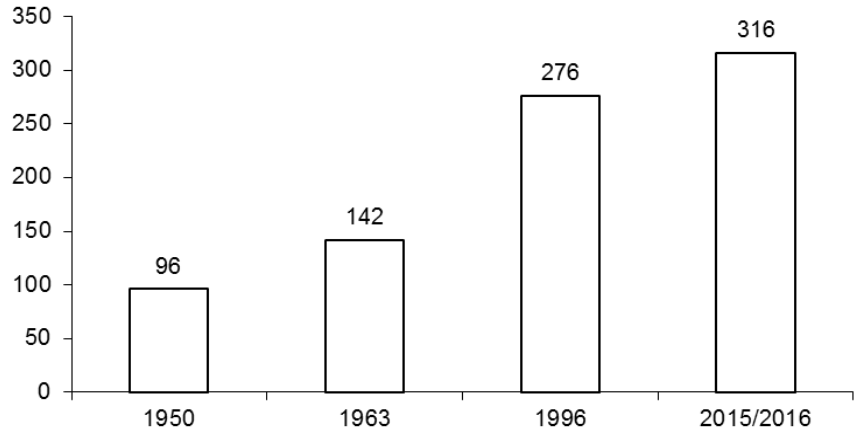
	Number of Structures	Number of Lots Containing Structures
Piers	332	285
Watercraft in the water	274	157
Boat lifts	408	157
Rafts & Inflatables	23	23
Boathouses over water	4	4
Buoy*	3	3
Marina	2	1
Bridge	7	3
Public beach	4	3
Other	11	10

*It is thought that the buoys associated with the lots was undercounted because sometimes the survey boat was in between the land and the buoy, and the surveyors were looking at the land.

Piers

Throughout the years, there have been surveys of piers on Rock Lake (Chart 12). This number is important because it gives an indication of the development of the near-shore water area. The 1950 and 1963 data was generated by the Department of Natural Resources (DNR) via mid-summer aerial photos. The DNR also did a pier survey by boat in 1996. These 3 surveys didn't include piers in the millpond, Marsh Lake, or the channel located along Elm Point Road. The number of piers displayed in the chart for 2015/2016 includes the piers counted on Rock Lake (not the Marsh, millpond, or Elm Point channel). The number of piers documented in 2015 and 2016 in the Elm Point channel was 3 and in the Millpond was 13. Properties that don't have piers in the Elm Point channel still have boats that are parked along their frontage. In 2015/2016, the total number of piers on Rock Lake, the Millpond, and the Elm Point channel was 332.

Chart 12. Number of Piers on Rock Lake (not including Marsh Lake, Millpond, or Elm Point channel)



Pier Shading

In 2004, DNR researchers teamed up with the Land and Water Conservation Department and the Lake Ripley Management District to determine how piers influence near-shore aquatic habitat on Rock Lake and Lake Ripley. Both lakes have similar water quality and have a mix of developed and undeveloped shorelines with a variety of pier shapes and sizes. The research team evaluated sunlight availability, and the abundance and diversity of aquatic plants, insects and juvenile and small non-game fish under a variety of piers and at nearby control sites that did not have piers. The key findings are as follows:

- Piers cause significant shading, contributing to a 10-fold decrease in light availability.
- Under piers, plant biomass was 20 times less and diversity was reduced, but growth could not be predicted based on light data alone; substrate and degree of pier use also appeared to be factors. There was a 55-fold reduction of plant biomass under larger deck sections.

- The aquatic plant community under piers shifted to one dominated by shade-tolerant plant species (i.e., wild celery), resulting in less overall plant diversity under piers.
- Pier height showed a positive relationship with plant growth – the higher the pier off the water, the more plants under the pier.
- Pier width showed an inverse relationship with plant growth – the wider the pier, the fewer plants under the pier.
- Insects were 3 times less under piers, but there were no clear differences in species richness.
- Juvenile Centrarchids (bluegill, green sunfish, rock bass, pumpkinseed, black crappie, smallmouth bass, largemouth bass) demonstrated habitat preferences for sites with abundant and non-fragmented plant cover in areas away from piers. A nearly 4-fold decrease in fish numbers were found under piers.
- Piers with the greatest numbers of juvenile Centrarchids under them were generally located in close proximity to designated Sensitive Areas.

In addition to direct shading, associated motorboat activity around piers may adversely impact the plant community, mainly through direct cutting by propellers, bottom sediment scouring and contact with boat hulls. The reduction in plant growth can, in turn, affect the food chain as evidenced by reduced insects and fish numbers underneath piers. Cumulatively, the overall habitat effects of shading are just a portion of the total disturbances and fragmentation around piers.

This research, as well as research in other regions, suggest that the proliferation of piers and other structures in the water and adjacent to the water are contributing to the degradation of nearshore habitat and biological diversity. It also highlights the importance of identifying and protecting Sensitive Areas in lakes.

Pier Rules

State rules dictate that piers can only be placed by riparian owners. Piers that were in existence prior to April 2012 do not need any DNR authorization. However, all new piers must adhere to State and Town rules. Properties in the City of Lake Mills must follow the State rules. If a riparian proposes a new pier that does not follow these rules, then they can apply for a permit from the DNR, and the Town if that is where they live

Main provisions of State rules:

- Piers can only be placed in the "exclusive riparian zone", which is the water adjacent to the property
- Number of boat slips = 2 slips for the first 50 feet of shoreline, and no more than 1 slip for each additional full 50 feet of shoreline
- Number of personal watercraft (PWC) = 2 PWCs for the first 50 feet of shoreline, and no more than 1 PWC for each additional full 50 feet of shoreline
- Piers can extend out to 3 feet of water, or to adequate depth for mooring a boat or using a boat lift or hoist.
- Maximum pier width is 6 feet. However, a loading platform can be wider but the platform area cannot exceed 200 square feet.

- Piers cannot enclose water.

Swim Rafts and Inflatables

The 2015/2016 shoreland survey documented swim rafts and inflatables in Rock Lake (Table 29). There were 18 swimming rafts and 5 inflatables counted during this survey.

The State, Town of Lake Mills, and City of Lake Mills all have rules associated with swim rafts.

Shoreland Runoff Concerns

Areas that could increase runoff into the lake were documented in the 2015/2016 shoreland and shallows survey (Table 30).

Table 30. Runoff Concerns on Lake Lots

Runoff Concerns	Number Found
Point Sources	9
Channelized Flow	4
Stairs, paths, roads leading directly to top of bank	94
Lawn or soils that slopes to lake	37
Bare soil	49
Slumping banks (erosion)	3

The amount of shoreline erosion (slumping banks) was further documented with the amount of area that is eroding.

- One site in the Town of Lake Mills had approximately 10 feet of erosion that was more than 1 foot high.
- One site in the Town of Lake Mills had approximately 5 feet of erosion that was less than 1 foot high; and approximately 5 feet of erosion that was more than 1 foot high.
- One site (along the Glacial Drumlin Trail) had approximately 6 feet of bank erosion that was more than 1 foot high.

Bank Modifications

Bank modifications were documented in the 2015/2016 shoreland and shallows survey (Table 31).

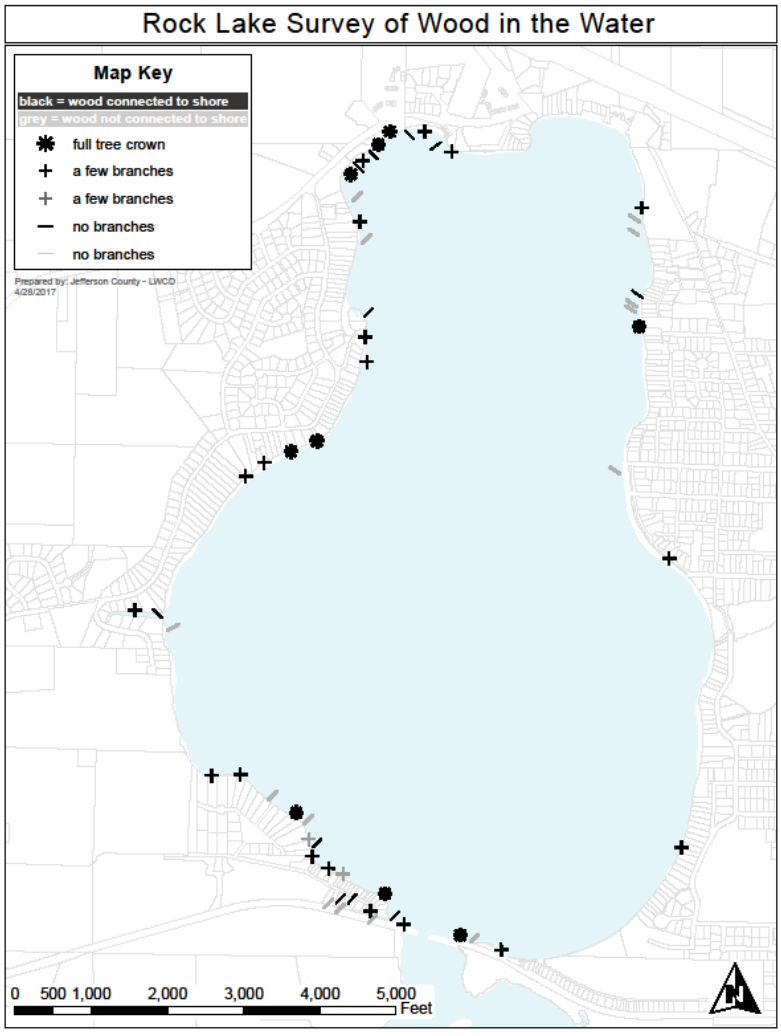
Table 31. Bank Modification on Rock Lake Shorelines

	Length (miles)	Number of Parcels
Seawall	1.3	60
Rock riprap	2.8	175
Other erosion control	0.1	12
Artificial beach	0.2	8

Wood in the Water

The 2015/2016 shorelands and shallow survey documented information on the natural wood contained in Rock Lake. The wood in Rock Lake that met certain conditions (at least 4 inches in diameter, at least 5 feet in the water, and within 2 feet of depth) was documented and consisted of 55 pieces of wood (Map 8).

Map 8. Rock Lake Survey of Wood



Sandy Beach Feasibility Study

In August of 2016, the City Council for the City of Lake Mills voted to have a study completed to determine the feasibility of having a restaurant, lodging, or banquet/meeting hall at the Sandy Beach site. This study was initiated after a discussion on the future of the current restaurant at Sandy Beach.

The consultant performing the feasibility study outlined their work as follows:

1. Situational assessment
   - Perform a site visit to examine property, and identify challenges and opportunities
   - Tour the area to become acquainted with the market and to evaluate potential competitors in the area
2. Market demand
   - Estimate the market demand for dining – full service and limited service
   - Estimate the market demand for lodging – traditional hotel and resort-style facilities such as cabin rentals
   - Estimate the market demand for banquet/meeting space – social functions and small meeting demand
3. Competition
   - Identify and examine the competition for the development types proposed
   - Assess strengths and amenities of each, in order to determine viability of site and to make recommendations concerning the positioning of a potential development project
4. Opportunity analysis
   - Assess the site, market, competition, and other factors to identify the uses best suited to the site
   - Estimate development costs
   - Estimate projected cash flow (5 years)
   - Compare projected costs/cash flow to projected returns on the developed seasonal trailer park
   - Recommend a site development program to the City (may include a combination of existing and new uses) which demonstrates a probable financial return on investment
5. Recommendations
   - Prepare a series of recommendations related to ownership, management structures, project financing, phasing, site amenities, related off-site real estate development opportunities (such as in the nearby TIF), and other issues relevant to the development project

As of the printing of this report, the Sandy Beach feasibility report was not yet public.

Separate from the feasibility study, the City will need to decide whether it will move forward with plans to upgrade the trailer park at Sandy Beach in order to bring the water and sewer services up to code, make the roads within that area accessible by fire truck, provide necessary parking, and construct a weather shelter.

WATER LEVELS AND OUTLET DAM

Rock Lake is a natural drainage lake – there are a few inlets and one outlet. In 1865, a mill dam was constructed for the purposes of hydraulic power production. The City of Lake Mills purchased the dam property in 1928 and the mill ceased operation in 1935. In 1940, the location of the dam was moved to the outlet of the millpond where it remains today.

Water Levels

The Department of Natural Resources (DNR) is the entity that determined the seasonal water levels for Rock Lake. The levels have been set based on a number of different considerations including fish management, recreation, and shoreline erosion.

The dam is owned by the City of Lake Mills who is responsible for following the water level orders set by the Department of Natural Resources. Water levels in place for the dam are contained in Table 32. There is a water level gage affixed to the lake-side of the dam.

Table 32. Water Level Orders for Rock Lake

Season	Minimum/Maximum	Median
November 1 to Spring breakup	minimum = 827.25 ft. maximum = 827.50 ft.	median = 827.38 ft.
Spring breakup to May 1	minimum = 827.25 ft. maximum = 827.63 ft.	median = 827.44 ft.
May 2 to September 15	minimum = 828.03 ft. maximum = 828.33 ft.	median = 828.18 ft.
September 15 to October 31	minimum = 827.25 ft. maximum = 827.63 ft.	median = 827.44 ft.

The water level regime of the lake set by the DNR generally mimics what the water levels would be if there was no dam: lows in the winter, rising levels in the spring, diminishing levels in the fall. However, there are a couple distinct differences – the natural levels would not be as high without the dam; and the natural levels from time to time would have more drastic highs and lows. The reasoning for the seasonal water level regime is as follows:

Winter Levels: Water levels are kept at their lowest. High water levels result in more shoreline erosion caused by ice push. Ice push occurs when portions of the ice melts and then re-freezes, resulting in a horizontal expansion of the ice. Ice push also occurs when the ice starts to come off the lake, and the wind pushes the ice into the bank.

Spring Levels: Water levels are raised to benefit fish spawning and to be a transition between winter and summer levels. The water level is lower than the summer level to provide some storage for spring runoff.

Summer Levels: The level of the water is at its highest. It enables boaters to access Rock Lake from Topels Court in Marsh Lake and from the shallow bays and channels.

The DNR water level order also stipulates the following:

- A minimum discharge of 0.13 cubic feet per second shall be passed by the dam at all times. This minimum flow is needed both by the aquatic life in Rock Creek and the City's wastewater treatment plant.
- The City shall request approval from the DNR to draw down the lake below minimum established levels during periods of prolonged drought.
- The City shall keep a daily record of water levels and make such information available to the DNR upon request.

Throughout the years, the DNR has communicated to the City of Lake Mills information and suggestions on managing the dam. Some of these comments are:

- The dam cannot be operated to decrease the flow downstream to help the fish hatchery when they drain their ponds if the Rock Lake water level is not within the ordered water levels.
- It is better for Rock Creek to have a more constant flow than to open the dam fully then close it quickly.
- The water levels can be gradually reduced starting on September 15, but the average water level for the fall time period should be attained by October 1. This communication was made to accommodate people who live in shallower areas to give them enough time to get their boats out of the lake.

Change in DNR Operating Orders

There are some people who have voiced concerns that the water level regime set by the DNR is not appropriate. The DNR Water Regulations and Zoning Engineer commented on what would be involved in re-assessing the water level regime and perhaps proposing a new one:

"This is an extensive process. An Environmental Assessment (EA) is required. In another lake level case, we required the 'applicant' to do an Environmental Impact Report which was essentially the same as the EA and submit it to us. It was to address the hydrologic and hydraulic issues, wetland and upland effects, effects on private property, and what is gained and lost from an environmental view. We wouldn't even get involved unless there was broad consensus on this issue."

Outlet Dam

For many years, the Rock Lake dam consisted of boards that were manually removed and put in to adjust the water level. After the water ran over the boards, it discharged through a culvert and then became visible again and flowed down an incline and

eventually through the Main Street road culvert. In 2013, an emergency repair to the culvert under Main Street was required after it started collapsing. This repair was done in such a way that the dam spillway was taken out and put through pipes underground.

After a series of required reports on the dam (including a dam inspection report, and a dam failure analysis report), the City of Lake Mills was required by the DNR to make a decision about the future of the dam. The options that were developed by a consultant of the City included: repair existing dam to bring it into compliance, repair the existing dam and include additional enhancements, construct a new dam and leave the spillway underground, or construct a new dam and make the spillway visible again.

In 2014, the City of Lake Mills, the Jefferson County Land and Water Conservation Department, Mead and Hunt, and the DNR hosted 2 public input sessions to explain the options to the public. Citizens could fill out a questionnaire to provide their input on the decision. There responses were compiled and provided to the City Council. In September 2014, the City of Lake Mills made a decision to build a new dam and open the spillway. The majority of the work on the dam and spillway was completed in 2016 with some landscaping work finished in 2017. The new dam has slide gates to alter the water level. After the dam, the water travels through a box culvert, is discharged into a rock lined spillway, and then goes through an underground structure that takes the water under Main Street and the buildings on the east side of Main Street.

One of the benefits of the new dam is that the water levels can be monitored electronically instead of having to go to the dam. The intent is that the City staff will be able to make adjustments to the water levels as needed in a more timely fashion. The plan is that the City will post a weekly water level report on their website so that the public can view the information from the previous week. The water level can, however, still be viewed by reading the water level gage affixed to the dam.

RECREATION

Because of its size and quality, Rock Lake offers a wide variety of recreational opportunities: everything from sailing to fishing, kayaking to jetskiing, and swimming to wake-boarding and water skiing. Winter sports include ice skating, ice fishing, ice-boating, and snowmobiling.

Boat Launches and Public Access

There are a total of 5 public boat launches on Rock Lake: Sandy Beach, Mill Pond, North End, Ferry Park, and Elm Point. Allowable maximum boat launch fees are set by Wisconsin Administrative Code, NR 1. The Town of Lake Mills collects boat launch fees from May 1 through September 30. The City of Lake Mills used to have the same time period, but it was changed to be a year-round fee in October 2006. Table 33 shows the allowable boat launch fees from the State, and the City and Town fees. For purposes of the boat launch fees, residents of the Sand Beach trailer park are considered City residents.

Table 33. State, City and Town Boat Launch Fees

	State Maximum Allowable Fee	City of Lake Mills Fees	Town of Lake Mills Fees
Daily Resident Fee	$8	$7 City & WI	$7
Daily Non-Resident* Fee	$11	$10 Out of State	$7
Seasonal Resident Fee	$80	$25	$40
Seasonal Non-Resident* Fee	$110	$50 Wisconsin	$40
		$75 Out of State	

* A non-resident is defined as someone who is not a resident of the local municipality.

In 2013, a Rock Lake Improvement Association Board member obtained seasonal and daily pass information from both the City and Town of Lake Mills. Tables 34 and 35 summarize the information on the seasonal and daily passes.

Table 34. Seasonal Passes Purchased in 2013

Residency	**City Seasonal**	**Town Seasonal**	**Totals**
Lake Mills	145	106	251
Wisconsin	70	187	260
Out of State		3	
Totals	215	296	511

Table 35. Daily Passes Purchased in 2013 (numbers based on state where boat is registered).

Registration of Boat	City Daily	Town Daily	Totals
Wisconsin	1481	2351	3832
Out of State	76	110	186
Totals	1557	2461	4018

In addition to the boat launches, there are other public access points on Rock Lake. There are 4 public parks: Glacial Drumlin Trail, Korth County Park, Miljala Park (Town), and Tyranena Park (City). There are 3 public beaches: Sandy Beach (City), Bartel's Beach (City), and Ferry Park Beach (Town). In addition there are several public piers in the City at the end of Hubbs Street, Freemont Street, and College Street, as well as public accesses with no piers at Brook Street and at the corner of Lake Shore Drive and West Lake Street.

Lake Usage

Because of concerns related to the amount of boat traffic, the Joint Rock Lake Committee implemented a survey in 2003, 2004, and 2005 to determine how Rock Lake is used during busy summer weekends. The surveys consisted of 3 different elements:

1. Inventory of total watercraft associated with riparian lots (performed during a week day when the majority of boats are moored at piers)
2. Inventory of the parked boat trailers at the various boat launch parking areas (performed in the morning and afternoon of summer weekends in conjunction with the water count)
3. Inventory of the number and type of watercraft on the lake (performed in the morning and afternoon of summer weekends in conjunction with the parking lot count)

The survey data from 2003 is the best based on weather and data completeness. The 2003 data revealed there were 843 watercraft associated with riparian lots (Chart 13). This riparian count included lots located in the main basin of Rock Lake and Marsh Lake. On the morning of July 5, 2003, there were 43 watercraft on the lake and 46 boat trailers at the launch parking areas (Chart 14). The discrepancy may be due to the fact that only watercraft on the main basin of the lake were counted and Marsh Lake was not always included in the on-water survey. On the afternoon of July 5, 2003, there were 203 watercraft on Rock Lake and 144 trailers at the launch parking areas (Chart 15). Therefore, there were approximately 59 watercraft associated with riparian lots on the lake.

By comparing the morning and afternoon lake use, it is apparent that fishing is the primary use in the morning and pleasure boating (pontoon boats, etc.) is the primary use in the afternoon. The launch used the most during the morning of the survey was the Mill Pond launch. It should be noted that in 2003, the Mill Pond launch had no boat launch fee. Because the Mill Pond launch now has a launch fee, any future surveys may

reveal different launch usage. The trailer counts for Sandy Beach include the parking lot, Sandy Beach Road, and the parking lot associated with Rotary Park.

Chart 13. Watercraft Associated with Riparian Lots in 2003 (Total = 843)

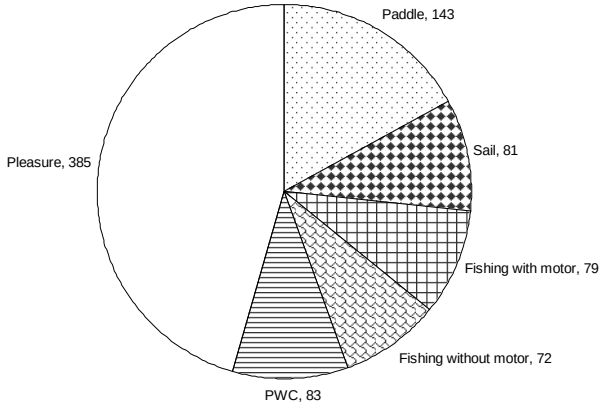


Chart 14. Watercraft on Rock Lake and Parked Trailers – Morning of July 5, 2003

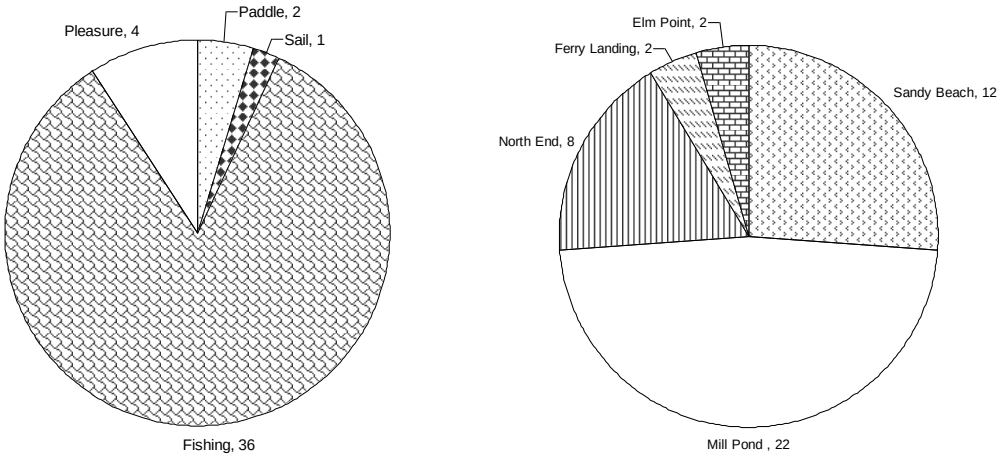
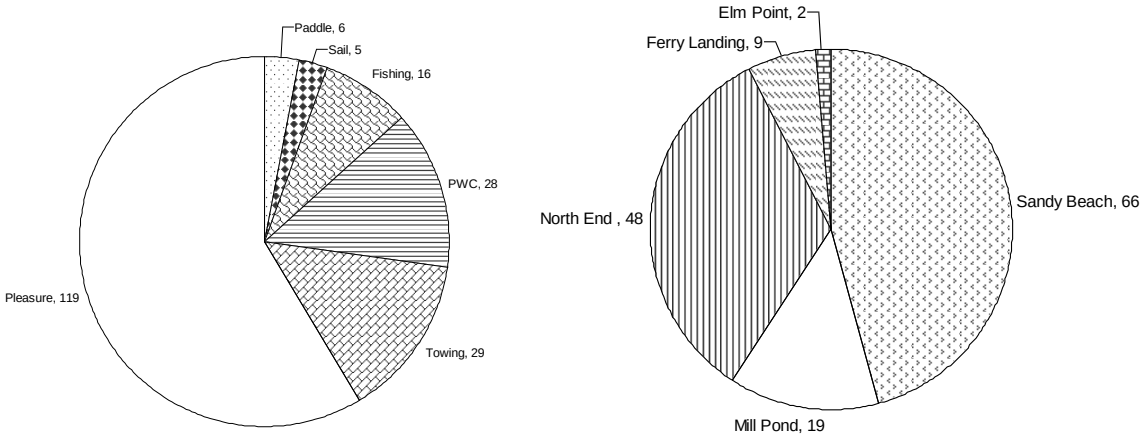


Chart 15. Watercraft on Rock Lake and Parked Trailers – Afternoon of July 5, 2003



Due to the weekend boating safety concerns after the boat counts were performed, the Town of Lake Mills and Jefferson County collaborated on plans for re-configuring the North End boat launch parking lot. In 2009 the new parking lot was completed. It includes 49 car only parking spots and 28 boat trailer parking spots.

Boating Regulations

Boating regulations can consist of speed restrictions (such as slow-no-wake), time restrictions (including hours of operation), and area restrictions (such as buoyed areas). Some boating regulations are State regulations which are in effect on all lakes. Municipalities can also adopt and implement boating regulations. According to Wisconsin State Statute, if there is more than one municipality surrounding a lake, then one of two scenarios is followed:

- the municipality with at least 60% of the lake frontage is responsible for enacting ordinances regarding regulation of boating, or
- multiple municipalities can enact identical ordinances regarding regulation of boating.

For Rock Lake, the Town of Lake Mills has enacted, implemented, and enforced the boating regulations on Rock Lake. In addition, there are State boating regulations that are applicable on Rock Lake. The City of Lake Mills has included some of the Town's boating ordinances into a City ordinance. A list of the boating regulations in effect on Rock Lake is included in Appendix D. This pamphlet is supplied at the boat launches, inserted into the packet mailed to new shoreland property owners, and is provided to the City and Town with the intent that they give it to people obtaining seasonal boat launching passes. Sometimes the boat patrol officers also provide the pamphlet to boaters during official stops.

Speed Restrictions

Slow-no-wake restrictions are adopted in part to provide both safe conditions and quiet time on the lake. The slow-no-wake hours on Rock Lake are from sunset to sunrise.

The Town of Lake Mills has an ordinance that enables them to declare and post an emergency slow-no-wake rule on the entire lake during periods of high water. The guideline is that the rule should be enacted when the water level exceeds 6 inches above the seasonal maximum water level. The purpose for such a rule is to reduce wave action which can erode shorelines.

Other SNW rules can be found in the boating regulations pamphlet (Appendix D).

Time Restrictions

Personal watercraft (PWC) use is restricted to sunrise to sunset. Towing activities including waterskiing and tubing are restricted to 10 a.m. to 7 p.m.

Area Restrictions

The DNR designated Sensitive Areas in Rock Lake have area restrictions. The Sensitive Areas (Korth Bay, Marsh Lake, Shultz Bay, and the Millpond) are slow-no-wake areas in the lake (Map 3). For more information on these areas, please see the section on DNR Designated Sensitive Areas.

The Town of Lake Mills has responsibility for marking the slow-no-wake areas with buoys. They have DNR permits for these buoys and other buoys that mark the location of any hazards.

Winter Regulations

There is a Town of Lake Mills ordinance that regulates activities on the ice of Rock Lake. The provisions include:

- Lighting requirements for motor vehicles using the lake from sunset to sunrise.
- Vehicles must be operated at speeds that are reasonable and prudent for the conditions.
- Reckless driving provision to protect the safety of people and property.
- Towing of vehicles or objects with people onboard is prohibited.
- Vehicles must remain 150 feet from shore after entering the ice.
- Disabled vehicles and those partially imbedded or submerged in the water must be removed within 48 hours.

Enforcement

There are 3 different entities that patrol and enforce boating regulations: officers with the Town of Lake Mills, officers with the Jefferson County Sheriff's Department, and the Conservation Warden with the Department of Natural Resources. Both citations and warnings are issued by the patrol officers.

The DNR pays for a portion of the costs associated with the Town's boat patrol. The portion varies from year to year, with an average of 60% reimbursement. The Town then bills the City of Lake Mills for 40% of the remaining costs after the DNR reimbursement. The City's portion amounts to approximately 15% of the total costs and the Town's portion is approximately 25% of the total costs.

In 2016, the total boat patrol budget was $18,947.50. The budget included a DNR reimbursement of $11,500 (61%) and a City reimbursement of $2,500 (13%). This means that the Town of Lake Mills budgeted expense is $4,947.50 (26%).

Beach Water Quality

Through natural and human-made causes, pollutants may enter Rock Lake that pose a health risk to swimmers and boaters. Many events, alone or in combination can degrade water quality. These pollution sources can be caused by seagulls, geese and other waterfowl; storm water runoff; and density of bathers at the beach. Factors that

can increase the amount of bacteria at a beach include: warm water which helps bacteria grow, and windless days or wind direction which causes bacteria to stay in one location.

Microscopic pollutants, such as bacteria and viruses can cause illness in humans. The symptoms and illnesses that these pathogens can cause vary based on multiple factors. Some people might get a sore throat or cold-like symptoms, others might get diarrhea. Usually the elderly, people with compromised immune systems and children are more at risk of illness from disease causing bacteria in the water.

To help prevent people from getting sick, the Rock Lake beaches are tested for the presence of E. coli bacteria. Data for Rock Lake beaches is posted at: http://www.wibeaches.us/apex/f?p=181:16:0::NO. E. coli live in the digestive systems of humans and animals, as well as in soils and water. Most strains of the bacteria are not dangerous, but some strains can cause illness. Water is monitored for E. coli because it can indicate the presence of other disease-causing bacteria.

The Environmental Public Health Consortium of Jefferson County tests Ferry Park Beach once a week for E. coli bacteria. The City of Lake Mills Wastewater Treatment Plant tests for E. coli bacteria once a week at 4 locations on Rock Lake: Sandy Beach west, Sandy Beach east, Bartel's Beach and Tyranena Park. The City changed from fecal coliform testing to E. coli testing in August 2016 in order to be in line with the state and federal guidelines for beach water quality testing.

The following are the Environmental Protection Agency and Wisconsin guidelines for posting beaches:

- If the E. coli in the water exceeds 235 cfu/100 ml, then an advisory sign is posted at the beach. An advisory means that an increased risk of illness may be present.
- If the E. coli exceeds 1,000 cfu/100 ml, then a beach closure sign is posted. A closure means that a serious risk of illness may be present.

After advisories and closures, the water is tested again in a week unless the Town or the City chooses to test again sooner.

Mill Pond and Channel Study

In February 2016, the City Manager provided information to the City Council on alternative methods for dredging the Mill Pond and the channel between the Mill Pond and the lake. This idea arose as an effort to alleviate problems with odor, vegetation, and sedimentation.

Odor complaints come from people who live over the businesses along Hwy 89 next to the Legion Post. The odors are coming from storm sewer pipes in the area that are connected to the Mill Pond. The City's engineer, Strand and Associates, has made measurements of hydrogen sulfide gas and found it high in August, September and October when plants are dying back for the year.

Complaints about sedimentation come from boaters using the launch in the Mill Pond to access the lake. Erosion is also a concern. They feel the pond is getting shallower over the years. There is no data regarding depths at this time.

Complaints about vegetation in regards to access come from boaters and shoreline property owners. Complaints have also been heard from shoreline fishermen who can't get a line into the water in some locations, such as the Legion fishing pier. The DNR has received no complaints about navigation in the Mill Pond and as noted that many times they have seen in person and on aerial images that shoreline property owners create their own channels for access to the main channel simply by driving their boats through the plant beds, which is to be expected.

In April 2017, the City of Lake Mills received a grant from the Department of Natural Resources to study the Mill Pond and the channel connecting the Mill Pond to the lake. The total project cost is $39,595 in which the DNR will reimburse the City $25,000 and the City's share of the costs will be $14,595. The elements of the study are as follows:

- Obtain topographic survey data on the Mill Pond and channel sediments (8 top of sediment sites, 5 bottom of sediment sites)
- Obtain laboratory analysis data on Mill Pond and channel sediments regarding composition and any contamination (10 samples for PCP analysis, 5 samples for PAH analysis)
- Evaluate the impacts and/or benefits of sediment removal on habitat, odor, downstream nutrient loading, and lake access. If sediment removal is recommended, then the following will also be provided: probable construction costs, list of required permits, list of grant funding opportunities, and implementation plan.
- Identify locations of shoreline erosion and recommend stabilization that will enhance the natural habitat. Natural shoreline treatments such as coir fiber logs, native plantings, or vegetated boulder revetment will be recommended.
- Identify possible storm water treatment best management practices surrounding the Mill Pond to aid in future Rock River TMDL compliance. At 5 outfalls to the Mill Pond, a model will be implemented to quantify pollutant loads. The data can be used to prioritize outfalls to receive future storm water treatment devices.

A DNR suggestion that was not included in the grant was to sample total phosphorus, chlorophyll *a*, clarity or other water chemistry parameters in the Mill Pond itself.

It is important to note that the Mill Pond is a DNR-designated Critical Habitat Area because it has aquatic vegetation identified as offering critical or unique fish and wildlife habitat (including seasonal or life stage requirements), or offering water quality or erosion control benefits. A 2013 near-shore fish survey at one location in the Mill Pond found 6 fish species including the Least Darter which is a Special Concern Species and the Iowa Darter which is a species intolerant of environmental degradation. Dredging would take out many of the aquatic plants that fish use for spawning, rearing, and resting and therefore could negatively impact the fish. The aquatic plants help control algae in the water. If the aquatic plants are removed, there is a possibility of turning the mill pond from a plant dominated area to an algae dominated area.

ODOR

The area surrounding Rock Lake and Lake Mills is agriculture. Animal farms in the area include dairy, hog, and chicken farms. As such, there will be agricultural odors of one sort or another from time to time. Larger farms tend to spread their livestock manure on agricultural land in the Spring and Fall when the land is free of crops. Therefore, there will be more agricultural odors during those times. Other than some farms that compost the manure and sell it to areas outside of the Lake Mills area, there are not economical alternatives for farms to handle the manure differently. Please also see the section on Nonpoint Source Pollution which explains nutrient management plan standards that are required for manure spreading.

Starting in 2012, chicken manure odors were especially pungent and occurred throughout the year. The odor sources were identified primarily as the chicken farm's industrial waste storage and the emissions from the composting business. As a result, the chicken farm added aerators to their industrial waste storage and reduced the odor coming from that source. Another source may have been a dog food plant located adjacent to the farm.

The composting business had emissions due to the fact that they were using dryers in their process. The Department of Natural Resources required the composting business to obtain an air permit and achieve certain standards. The composting business decided to test various emissions reducing technology. However, after the chicken farm was depopulated due to the avian influenza, the composting business didn't have enough chicken manure to adequately do the testing. In the end, the chicken farm decided to buy the composting business. Currently, the chicken farm composts the chicken manure without the use of dryers or an emission stack in the composting barns. This will reduce the odors associated with composting.

The chicken farm is planning an expansion and redesign of their facility. They are planning to dry and handle the manure within buildings and anticipate that the odor emanating from the farm will be reduced more. This work is expected to begin in 2018.

Citizens have been concerned about the odors and how they impact their enjoyment of the outdoors – including recreating on Rock Lake. Despite the recent and future changes to the chicken farm, it is important to note that odors will still be present from time to time from a variety of agricultural sources.

LAKE AND WATERSHED INSTITUTIONS

There are several entities that can and will be part of implementing actions that will impact the lake and/or watershed.

Rock Lake Improvement Association

The Rock Lake Improvement Association is a nonprofit organization whose mission is to promote and generate positive action on issues concerning the preservation, protection, and improvement of Rock Lake. They have a Board of up to 10 citizens that volunteer their time to run the organization. They have approximately 150 members per year that include individuals, families, and businesses.

Through the years, their work has included a wide range of activities including:

- Education on lake and watershed issues: newspaper articles, displays at community events, community presentations/workshops, informational packets to new lake homeowners, etc. Board members also obtain a variety of lake/watershed information at the annual Wisconsin Lakes conference.
- Advocacy on lake and watershed issues: letters to the editor, and letters to local and state elected officials and government staff
- Research on lake and watershed issues by sponsoring or contributing to grants
- Funding: lake monitoring equipment, contributions to grants, appraisals on land that might be purchased for parkland, etc.

Currently, they meet on the 3rd Monday of every month at 6:30 pm at the City of Lake Mills community center. Their website provides additional information on their meetings and activities: www.rocklake.org.

Joint Rock Lake Committee

In 1998, the Joint Rock Lake Committee was established through ordinances by the City of Lake Mills and the Town of Lake Mills. The purpose of the committee is stated in the ordinance as: "The Town of Lake Mills and the City of Lake Mills recognize the importance of coordination with each other and with the Wisconsin Department of Natural Resources as they establish policies which impact the quality of Rock Lake, and as they provide funding for activities related to the lake, and as they balance public and private interests in navigation and recreational activities. To help facilitate the joint efforts of the Town and City in attaining their shared goals regarding the lake, and to aid in exchange of information with the DNR and in attraction of state resources, both entities wish to establish a committee known as the Joint Rock Lake Committee."

The Joint Rock Lake Committee consists of 3 Town residents appointed by the Town and 2 City residents appointed by the City.

The powers and duties of the Committee are detailed in the establishing ordinance and are summarized as:

- Review and recommend the adoption or amendment of ordinances affecting Rock Lake
- Receive all correspondence or reports from the DNR and place them on file with the Town. Provide the Town with copies of all of their correspondence with the DNR. They also may provide their own reports of these communications to the Town and City.
- Provide reports and recommendation to the Town on public education for the safe and lawful use of Rock Lake, and on public education efforts to increase public involvement or awareness on the preservation or improvement of Rock Lake's environmental quality.
- Monitor and report to the Town on the proper maintenance or deployment of navigational aids, informational and ordinance signs, and other similar items.
- Apply for DNR grants or other funding sources for Rock Lake feasibility studies, and improvement or maintenance projects, when authorized to do so by the Town Board.
- Prepare long-range plans for the improvement, protection, and preservation of Rock Lake. Submit the plans with recommendations to the Town and City.
- Maintain communications with the DNR, the Priority Watershed Project, the Rock Lake Improvement Association, the City Parks and Forestry Director, the County Parks Department, and any other organizations or entities with an interest in Rock Lake.
- Annually prepare and submit recommended budget proposals for all Rock Lake activities to the Town and City no later than September 1.

Through their Town and City budget, this committee has paid for education materials and conference/travel for educating their members at the Wisconsin Lakes conference.

The Joint Rock Lake Committee currently meets the first Tuesday of every month at 6:00 pm at the City of Lake Mills community center. Their agendas and minutes are posted on the Town of Lake Mills' website at www.townoflakemills.org.

Town of Lake Mills

The Town of Lake Mills contains approximately 60% of the land adjacent to Rock Lake. They manage the boat patrol for the lake and get reimbursed for some of these costs from the Department of Natural Resources and the City of Lake Mills.

The Town of Lake Mills has funded or contributed funding to a number of lake-related items through their boat launch fees including: updates/repairs to the boat launches, launch piers, and launch parking lots; the purchase and placement of buoys; boat launch patrol; watercraft inspectors who educate boaters about the aquatic invasive species laws; kayak racks; and other items.

City of Lake Mills

The City of Lake Mills contains approximately 40% of the land adjacent to Rock Lake.

The City of Lake Mills has funded or contributed funding to lake-related items including: a new outlet dam and spillway; maintenance of boat launches, launch piers, and associated parking lots; boat launch patrol; and kayak racks. The City also applies for a DNR grant that provides funds to support the watercraft inspection program managed by the Town of Lake Mills.

Jefferson County Land and Water Conservation Department

The Jefferson County Land and Water Conservation Department (LWCD) has a Water Resource Management Specialist on staff whose job it is to work on surface water education, research, protection measures, and planning. She does this in partnership with state, regional and local governments and resource groups.

The LWCD not only funds the Water Resource Management Specialist job, but they also fund items that have benefited Rock Lake including: partial funding for both agricultural and residential conservation practices, educational materials, lake and stream sampling support, and a variety of research projects on the lake and watershed (aquatic plants, shoreland and shallows study, Korth Park shoreland restoration, near-shore fish surveys, pier shading study, etc.). The LWCD obtains grants for staff, cost-sharing conservation practices, and research projects.

Jefferson County Parks Department

The Jefferson County Parks Department is responsible for maintaining and improving the park facilities within the park system, as well as expanding the system as the demand for additional recreational facilities increases. County Parks in the Rock Lake watershed include Korth Park and upper and lower Rock Lake Park located on the north side of Rock Lake.

Jefferson County Zoning and Sanitation Department

The Jefferson County Zoning and Sanitation Department advises the public about required permits and approvals, issues permits, makes inspections, and takes enforcement actions under the Jefferson County Zoning, Land Division/Subdivision, Floodplain, and Sanitation Ordinances.

Rock River Coalition

The Rock River Coalition is a nonprofit regional organization whose mission is to educate and provide opportunities for people of diverse interests to work together to improve the environmental, economic, cultural and recreational resources of the Rock River Basin. They fund a Stream Monitoring Program Coordinator who trains and supports volunteers monitoring streams through the Rock River Basin. They also equip the monitors with the required equipment. They currently support 1 monitoring team in the Rock Lake watershed (on Rock Creek at CTH A) and 2 other teams downstream of the watershed on Rock Creek (upstream of Stony Road, and at Manske Road).

Wisconsin Lakes

Wisconsin Lakes is a state-wide nonprofit organization whose mission is to conserve, enhance and restore Wisconsin's lakes to ensure their sustainability for the benefit and collective use and enjoyment for this and future generations.

Wisconsin Lakes provides a variety of resources including: lake policy information and updates, education resources and events such as co-hosting the annual Wisconsin Lakes conference, co-coordinates the Wisconsin Lake Leaders Program (in which several Rock Lake leaders have completed), and advice on a variety of lake topics.

UW-Extension Lakes Program

The UW-Extension Lakes Program is a team of professionals dedicated to preserving lakes through education, communication and collaboration. They provide a variety of resources including: educational resources and events such as co-hosting the annual Wisconsin Lakes conference, co-coordination the Wisconsin Lake Leaders Program (in which several Rock Lake leaders have completed), co-coordination of the Citizen Lake Monitoring Network, co-coordination of the Clean Boats, Clean Waters program, and lakeshore habitat restoration training.

Department of Natural Resources

The Wisconsin Department of Natural Resources (DNR) has a variety of staff that works on lakes and streams including stream biologists, fisheries biologists, lakes specialists, wildlife biologists, permit officials, and other experts. The staff work on Rock Lake and its watershed in a variety of ways including: providing technical advice and education; performing fish surveys; and performing water quality sampling. The state trails, state wildlife areas and campgrounds owned and managed by the DNR in the Rock Lake Watershed include: the Glacial Drumlin Trail, the Lake Mills wildlife area, and the Sandhill Station campground.

The DNR offers surface water grants to fund a variety of projects as shown in Table 36.

Table 36. Department of Natural Resource Grants

Grant	Awards	Application Deadline
Aquatic Invasive Species	Education, Prevention, & Planning Projects: 75% up to $150,000 depending on project	December 10
	Early Detection and Response Projects: 75% up to $20,000	Year-round
	Established Population Control Projects: 75% up to $200,000	February 1
	Research and Demonstration Projects: 75% up to $500,000	Year-round

Grant	Awards	Application Deadline
	Maintenance and Containment Projects: full cost of permit	Year-round
Lake Management Planning	67% up to $25,000 for large scale	December 10
	67% up to $3,000 for small scale	
Lake Protection	75% up to $200,000	February 1
Lake Classification & Ordinance Development	75% not to exceed $50,000 total ($21,807.28 remaining for Jefferson County)	December 10
River Protection - Planning	75% up to $10,000	December 10
River Protection - Management	75% up to $50,000	February 1

Department of Agriculture, Trade, and Consumer Protection

The Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) is the state agency that is responsible for establishing and administering statewide soil and water conservation policies and programs. DATCP administers state funds for a variety of Land and Water Conservation Department operations including support of staff, materials, and conservation practices.

U.S. Department of Agriculture

The U.S. Department of Agriculture is made up of the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA).

NRCS provides soil survey, conservation planning, and technical assistance to local land users. They administer the Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, and the Wetland Reserve Program.

The Farm Service Agency administers agricultural programs including the Conservation Reserve Program, Conservation Reserve Enhancement Program, price supports, production controls, and conservation cost sharing.

U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (FWS) works with others to conserve, protect and enhance fish, wildlife and plants and their habitats. The FWS was a previous owner of the Mill Pond area in the City of Lake Mills. When the City took ownership of the area, there was an agreement that they would be consulted over items that may impact the fish and wildlife of the Mill Pond. Therefore, they will have to be contacted if there is a proposal to dredge the Mill Pond.

VISION, GOALS, AND RECOMMENDATIONS

The Vision, Goals, and Recommendations of the Rock Lake Management Plan are detailed below. Please see the section on the Lake Management Plan Process to understand how these items were developed and finalized.

The successful implementation of the recommendations contained in this report will depend on interest level, political will, funding availability, work loads, and many other factors. Individuals, organizations, and government entities should play an active role in both implementation of the plan and encouraging possible implementers to move forward with the recommendations.

There are 5 main goals of the plan that deal with water quality, water quality monitoring habitat, recreation, and education. Each recommendation listed under the goals identifies several possible implementers. Any bolded implementers are the most likely lead implementer for the recommendation. The list is not meant to exclude any future entities that are interested or involved in the implementation of the recommendations.

It was originally anticipated that the recommendations would be prioritized and a time line for implementation would be developed. Instead, the RLIA decided to place the recommendations under the 5 main goals in no specific order. As the RLIA is one of the main implementers of the plan and they are made up of a volunteer board, it was decided that each year the Board would determine which recommendations will receive priority and be pursued for implementation.

Vision of the Rock Lake Management Plan

Work in partnership with our community to protect and enhance water quality, habitat, and recreational assets in Rock Lake and its watershed for current and future generations.

Water Quality Goal

Improve the water quality of Rock Lake by reducing the summer average phosphorus level in Rock Lake by 20% by the year 2027.

- The current 8-year (2009-2016) average phosphorus is 17.7 µg/l. A 20% reduction will result in average phosphorus of 14 µg/l.
- Review this goal in 5 years (2022) to adjust as appropriate given the levels achieved and additional research into phosphorus loading to the lake.

Agricultural Recommendations to Achieve Water Quality Goal

- Install conservation practices on agricultural lands within the Rock Lake watershed to prevent soil erosion and protect water quality. [Implementer: **LWCD**, RLIA]
  - Recommended practices include cover crops, reduced tillage including no-till, filter strips, and grassed waterways.

- Find an agriculture leader(s) in the Rock Lake watershed who is interested in forming a Rock Lake Producer-Led Watershed Protection Committee, in collaboration with either Rock Lake Improvement Association (RLIA) or Land and Water Conservation Department (LWCD) or both, to be eligible for funds to prevent and reduce runoff from farm fields. [Implementer: LWCD, RLIA]
- The LWCD should investigate areas identified in the EVAAL analysis to determine if erosion control practices are needed. If they are, then contact the landowners and provide available technical and financial assistance to control the erosion. [Implementer: **LWCD**]
- Implement the 2014 "Miljala Channel Tributary Watershed" recommendations. [Implementer: LWCD, RLIA]
  - Maintain the channel turbidity barrier until installed practices make it unnecessary.
  - Continue to work with Daybreak Foods to ensure that chicken manure spreading on farm fields is done according to state standards.
  - Implement a vegetated buffer on farm fields adjacent to the stream.
  - Stabilize the stream banks in partnership with landowners along the stream.
  - Once upstream practices are installed, pursue wetland restoration to trap sediment and associated phosphorus, and to improve wildlife habitat.
  - Perform monitoring to document changes resulting from practice implementation.

Residential Recommendations to Achieve Water Quality Goal

- Increase the total length of shorelands that have native vegetation (trees, shrubs, flowers, grasses) and meet state standards from 28.3% in 2016 to 39% by 2022 and 50% by 2027. (This is a recommendation that will also aid in achieving the habitat goal.) [Implementer: LWCD, RLIA]
  - Review this goal after repeating the shoreland and shallows survey (in 2021 and 2026) to determine if it should be adjusted.
  - Actions could include: educate property owners about the importance of shoreline vegetation and financial support via Healthy Lakes grant, RLIA native plant sale, shoreland garden workshops, and garden tours among other ideas.
- The City and Town of Lake Mills should ensure that construction site erosion laws are enforced by either their building inspectors or other officials as required. [Implementer: City, Town, RLIA]
- The Town and City of Lake Mills should work together on a new composting area so citizens have more yard waste disposal options to reduce phosphorus pollution. [Implementer: City, Town]
- Promote the use of stormwater management practices in the watershed including rain barrels and rain gardens. [Implementer: RLIA, LWCD, City, Town]

Streets Recommendations to Achieve Water Quality Goal

- Continue to work with the Town and City of Lake Mills to reduce the delivery of pollutants from streets to lakes and streams (such as runoff from Cedar Lane into the Miljala channel, sediment buildup in the Shorewood Hills Road cutouts, and updates

to the storm drainage system on Lake Shore Road). [Implementer: RLIA, City, Town, LWCD]
- The City of Lake Mills should find another location for snow disposal which doesn't impact the lake. Otherwise, the City should pile the snow on Veterans Lane on the side of the road that is farthest from the Mill Pond. [Implementer: **City**]
- In the short term, the Town of Lake Mills should direct their contactor to not spread sand and salt together. Salt should be placed at stop signs, hills, and curves; sand should be placed on straight road stretches. After salt turns the snow to slush, the roads should be plowed again. [Implementer: **Town**]
- In the long term, the Town of Lake Mills should modernize their approach to snow/ice removal to incorporate a brining system (or other system that is superior to the current situation). [Implementer: **Town**]
  - The Town could investigate partnering with the City of Lake Mills or Jefferson County to obtain the equipment and/or personnel if local contractors cannot implement more modern systems of snow/ice removal.

Other Recommendations to Achieve Water Quality Goal

- Research the pros, cons, and mechanics of restoring Rock Creek to its natural channel by bypassing the man-made ditch downstream of County Highway A. [Implementer: RLIA, LWCD, DNR]

Water Quality Sampling Goal

Measure the health of lakes and streams in the Rock Lake Watershed with volunteers and applicable technologies to track trends and identify sources of pollutants.

Recommendations to Achieve Water Quality Sampling Goal

- Increase the number of water clarity measurements to at least every other week on Rock Lake by recruiting and training volunteers. [Implementer: LWCD, RLIA]
- The Land and Water Conservation Department and the Department of Natural Resources should take their phosphorous samples on different days in July and August so that there are 4 summer samples used to analyze the trends instead of 2 samples. [Implementer: LWCD, DNR]
- Measure the dissolved oxygen profile at the deep hole biweekly rather than monthly in the summer to better document the amount of anoxic water and the depth when anoxia happens throughout the summer. [Implementer: **LWCD**]
- Determine the level of internal phosphorus loading in Rock Lake by implementing a sampling regime of additional dissolved oxygen and phosphorus testing. [Implementer: **LWCD**]
- Determine the costs and the protocols/equipment needed to measure the phosphorus loading that occurs from Marsh Lake to Rock Lake. [Implementer: RLIA, LWCD]
- Expand water quality monitoring at Rock Lake's inlets: add phosphorus at Hwy A; initiate temperature, dissolved oxygen, macroinvertebrates, and phosphorus at

Cedar Lane; determine if the creeks at Shorewood Hills Road and Hope Lake Road can be monitored. [Implementer: **LWCD**, RLIA]
- Collect concurrent samples of both base stream flow and phosphorous levels from all the sampled input streams, where possible, on the same day. Storm event sampling should also be pursued at these sites. [Implementer: **LWCD**, RLIA]
- In Mud Lake, add water quality measurements (temperature/dissolved oxygen profiles, phosphorus, and chlorophyll) to the existing clarity measurements being taken by volunteers. [Implementer: **LWCD**, RLIA, DNR]

Habitat Goal

Achieve a diverse ecosystem in the water and on the land for native plants and animals to thrive.

Fish and Wildlife Recommendations to Achieve Habitat Goal

- Look for opportunities to increase fish and wildlife habitat in Rock Lake and its watershed including the fish sticks project at Tyranena Park. [Implementer: LWCD, RLIA, DNR]
- The nearshore fish survey should be performed in future years to monitor the trends in nongame fish populations. Future surveys should be performed using both seining and electrofishing gear. [Implementer: **LWCD**, DNR]
- The Department of Natural Resources should add a boom shocking survey in Rock and Marsh Lakes that specifically targets smaller, rare fish species by using fine-mesh nets. [Implementer: **DNR**]
- Additional and more frequent nearshore fish sampling should be performed in Mud Lake because both rare and environmentally sensitive fish species have been documented there in 2007 and 2013. In addition, more sites should be added and both seining and electrofishing gear be used. [Implementer: LWCD, DNR]
- Additional fish surveys on Mud Lake should be performed. The carp population should be assessed as it may be negatively impacting the aquatic plants. [Implementer: LWCD, DNR]
- Research whether fishing tournaments held on Rock Lake may be having a negative impact on the lake or the fish population. [Implementer: RLIA, LWCD, DNR]
- Continue to educate the public in the spring regarding Columnaris, a naturally occurring bacterium that can lead to fish kills. [Implementer: RLIA, LWCD, DNR]
- Research the feasibility of expanding frog and toad surveys to include other areas such as Mud Lake, Bean Lake, Korth Park, and Lost Lake. [Implementer: RLIA, LWCD, DNR]
- Continue to have volunteers perform the bat survey on Rock Lake each summer. [Implementer: RLIA, LWCD, DNR]

Aquatic Plant Recommendations to Achieve Habitat Goal

- Review the results of the 2017 aquatic plant survey and the 2018 bulrush survey to determine if actions should be added to this plan. [Implementer: RLIA, LWCD, DNR]

- Determine if the water milfoil near the outlet of the Miljala channel is native, Eurasian, or a hybrid (via genetic testing), and pursue a DNR permit to hand pull any Eurasian or Hybrid water milfoil. [Implementer: RLIA, LWCD, DNR]
- Aquatic plant surveys (including the bulrush survey) should be performed approximately every 5 years (starting in 2022) on Rock Lake, Marsh Lake, and the mill pond to keep track of community changes and the appearance or spread of invasive species. [Implementer: LWCD, DNR]
- Aquatic plant surveys should be performed on Mud Lake (starting in 2018/2019) and done at a time when curly-leaf pondweed is growing. [Implementer: LWCD, DNR]
- Continue to educate landowners about the value of native aquatic plants and removal laws (especially that permits are required in sensitive areas prior to any removal). [Implementer: RLIA, LWCD, DNR]

Invasive and Nuisance Species Recommendations to Achieve Habitat Goal

- Continue to implement the Clean Boats/Clean Water program at the City and Town of Lake Mills launches and expand coverage during waterfowl hunting season. [Implementer: City, Town, LWCD, RLIA]
- Continue holding an annual environmental cleanup including invasive species control (garlic mustard) and garbage pick-up. [Implementer: **RLIA**, LWCD]
- Take action to reduce the Canada geese and sea gull population (including a geese count to inform management officials on the population). [Implementer: **RLIA**]

Shoreland and Shallows Recommendation to Achieve Habitat Goal

- Perform the shoreland and shallows survey every 5 years (2021, 2026) to track changes. [Implementer: **LWCD**]
- Investigate how to make it clear to boaters how to navigate through Korth Bay in order to protect the sensitive area. Navigational buoys could be placed in the "channel" that is known to local residents. [Implementer: RLIA, LWCD, DNR]

Mill Pond and Channel Recommendation to Achieve Habitat Goal

- The City of Lake Mills should hold a public comments session (separate from a City Council meeting) to review options proposed in the Mill Pond and Channel dredging feasibility study prior to the City Council making a final decision. [Implementer: **City**, RLIA]

Lake Recreation Goal

Ensure a safe and healthy multipurpose recreational environment.

Water Recreation Recommendations to Achieve Lake Recreation Goal

- Perform a survey in the summer to determine boat congestion on the lake and if there is a potential safety hazard during busy weekends. [Implementer: RLIA, Joint Rock Lake Committee]
  - The survey could include: determining the number of boat trailers parked at the launches, and counting the number of boats on the lake. Surveys on multiple dates increases the likelihood of more meaningful data. Follow-up actions could include limiting parking spaces to prevent the over usage of the lake.
- Research if the Town of Lake Mills can adopt an ordinance to limit the total number of people on a watercraft and being towed to the total capacity of the watercraft. [Implementer: RLIA, Joint Rock Lake Committee, Town, DNR]
- Share with the lake patrol the public survey results regarding which recreational rules respondents observed being violated. Recommend that the lake patrol increase education and perhaps citations on those violations. [Implementer: RLIA, Joint Rock Lake Committee]
- Research, with broader public input, the viability of simplifying the current Slow-No-Wake distance regulation for all motorized boats to 200 feet from shore. [Implementer: RLIA, Joint Rock Lake Committee, Town, DNR]
- Educate lake residents regarding slow-no-wake rules including: definition of slow-no-wake, location of slow-no-wake areas, and distances in which motorized vehicles must operate at slow-no-wake speeds. [Implementer: RLIA, Joint Rock Lake Committee]
  - This could be achieved by sending a letter to all lake residents.
- Provide the recreational rules pamphlet to people obtaining season launch passes and continue to put the pamphlets at the launches. [Implementer: RLIA, Joint Rock Lake Committee, Town, City]

Beach Water Quality Recommendations to Achieve Lake Recreation Goal

- The City of Lake Mills and Town of Lake Mills should follow the current DNR and EPA protocols on posting beach water advisories and closures. [Implementer: City, Town]
- The day after a beach water sample exceeds an advisory or closure standard, the City of Lake Mills and/or Town of Lake Mills should take a beach water sample and pay the costs to overnight it to the State Lab of Hygiene in Madison. [Implementer: City, Town]
- Review the status and enforcement of laws regarding dogs on public beaches and explore options to provide lake access at other areas to prevent them from polluting the beaches. [Implementer: City, Town, Joint Rock Lake Committee]

Sandy Beach Recommendations to Achieve Lake Recreation Goal

- Prior to making a final decision, the City of Lake Mills should hold a public comments session (separate from a City Council meeting) to review the proposal(s) for changes to the Sandy Beach and trailer park areas. [Implementer: City]

- Any development to the Sandy Beach and trailer park areas should include practices that result in no negative environmental and/or recreational impact to the lake (including water runoff, boat use & access, and recreational safety). Further, if no development is undertaken at Sandy Beach, the impacts to the lake of the current situation should be reviewed to identify practices that improve the impact that the park and its uses have to the lake. [Implementer: City]

Education Goal

Achieve a more knowledgeable and active public in regards to Rock Lake, the watershed, and the lake management plan.

Education Recommendations to Achieve Education Goal

- Expand education efforts to create a more knowledgeable public on lake and watershed issues, including efforts to train more citizen scientists. [Implementer: RLIA, LWCD, Joint Rock Lake Committee]
  - The public survey results can be used to determine topics that could be covered.
  - Activities could include articles in the paper, internet and social media, direct mail, workshops, one topic talks, garden or conservation practice tours, and water tours.
- Continue to provide new and current lake shore property owners with information on the lake including zoning rules, recreational rules, and native shoreland gardens. [Implementer: RLIA, LWCD]
- Improve peace and tranquility by educating the public about light and noise pollution. [Implementer: RLIA, LWCD, Joint Rock Lake Committee]

Lake Management Plan Amendments

The RLIA realized that new issues could emerge during the 10-year time-frame of the management plan. Therefore a process for amending the plan was developed.

When a new issue arises that could impact Rock Lake and its watershed, the Rock Lake Improvement Association will take the following steps:

- If the issue(s) will have a significant impact on Rock Lake or its watershed, then the RLIA will amend the management plan accordingly.
- The RLIA will decide if other people/groups/stakeholders (including the Advisory Committee and the Joint Rock Lake Committee) should be included in the process to amend the plan.
- The plan will be amended if consensus is reached by the RLIA Board with input from the identified stakeholders.

Costs and Funding

The cost of implementing each of the recommendations will vary from no cost to expensive. As the implementers start working on the details of each recommendation, the cost will be researched and sources of funding can be pursued.

There are a variety of funding sources depending on the recommendation and the main implementer. The main sources of funding will most likely include:

- RLIA funds – memberships, donations and special appeals
- Department of Natural Resources grants (see section on Institutions)
- Department of Agriculture, Trade, and Consumer Protection cost-share funds through the Land and Water Conservation Department
- Local government budgets (including funds from boat launch fees)

Other sources of funding could include funds from organizations in Lake Mills that donate to special causes.

APPENDIX A

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APPENDIX B

Public Session Notes

Public Comments Session - February 9, 2017

Attendance

Ashley Berg	Scott Lange	Cecilia Smoniewski
Tom Cianciolo	Anita Martin	Stan Smoniewski
Patricia Cicero	Ed Morse	Tim Sprecher
Larry Clark	Alex Mulligan	Bob Volenec
Wes Dawson	Mike Nesemann	Joan Warsinski
Karen Etter Hale	Hope Oostdik	Gray Whitney
Melissa Fehrman	John Puhr	Steve Wilke
James Kerler	Lynn Puhr	
Claire Kirschhoffer	Nathan Pyles	

Opening and Welcome – Wes Dawson, Rock Lake Improvement Association
Wes gave an overview of the 2006 Rock Lake Management Plan. He shared that RLIA has received a grant to complete an update to the Rock Lake Management Plan, and introduced the members of the project's citizen Advisory Committee. He also gave an overview of the three handouts:

a) Project Overview
b) Lake Management Plan for Rock Lake - Roles and Responsibilities
c) Project Timeline

Public Comments Session – Patricia Cicero, Jefferson County Land and Water Conservation Department
Patricia explained that the public can provide comments in a variety of ways: at the public meeting, submitting their views on the provided comments sheet, and contacting the organizers after the event. She asked the public to provide input on 3 main topics.

Similar comments were grouped together in these notes after the meeting. Written comments received before, during and after the meeting are also included in the notes.

a) What is your vision for the future of Rock Lake? What do you love about Rock Lake?
Lake Quality

- It's a beautiful and clean lake
- It is considered one of the cleanest lakes in the area
- The quality of the water
- The lake seems to be generally cleaner than in the past except for occasional algae blooms. I noticed a few times during last summer (2016) when algae was visible in major areas of the lake.

- The clean and clear water (most of the time) of Rock Lake is its biggest asset.

Flora & Fauna

- Likes the oak trees surrounding the lake and the natural shoreline
- The variety of the shorelines with native plants
- Biodiversity of the aquatic species
- We have loons and eagles on Rock Lake
- Enjoy the variety of birds that live on Rock Lake, especially birds such as Osprey who live on the fish in the lake

Recreation

- Enjoys that Rock Lake does not appear to be overrun with motorboat traffic
- Being able to go swimming in a clean lake
- I like being able to swim every day in the summer (spring & fall too)
- I used to train in the lake for long distance swimming for Ironman triathlon.
- Fishing
- Recreational opportunities
- Ice skating, bike trail, public beaches – it is a year round playground for our family
- Non-motorized boating
- Sailing opportunities
- Being able to sail on the lake without fear of motor boats
- Diversity of activities
- Like to bicycle around the lake and enjoy the music and events at Korth Park
- There are many public access points so it is easy to get to no matter where you live
- We really enjoy the Sand Bar restaurant on the beach

Cultural/Historic

- The three sisters boat houses and the historic nature of them
- Enjoys the Native American history of the lake.

Other

- The lake is an asset and an economic boost to our community
- Enjoys the sunsets and being able to see the stars at night
- The lake is the reason we live in Lake Mills
- The size and proximity of the lake to urban centers
- The diversity of the watershed (rural, urban, agriculture)

b) What are your concerns for Rock Lake? What would you change?

Water Quality/Pollution

- Maintaining the water quality
- I have a concern about pesticide and herbicide use on properties around the lake, and that these poisons flow into the lake. I am concerned that these chemicals will impact the flora and fauna that live in the lake. My family enjoys fresh greens that grow around the lake, and these are edible if they are not sprayed with poisons. We have a responsibility to the pollinators – bees and monarchs butterflies – to ensure that they can survive.
- Phosphorus and nitrogen levels in the lake

- There are concerns about chloride runoff from road salt application in the winters.
- The proliferation of impervious surfaces that increases the volume of run off – streets, large houses, driveway.
- I have concerns about construction site runoff on and near lake shore properties – it does not appear that rules for controlling construction site runoff are followed.
- I worry about increasing algae due to runoff and fertilized lawns around the lake
- The west watershed is moving silt and fertilizer from the stream directly into the lake from the channel. I monitor the stream and when we get excessive rain or a spring melt, the field runoff is clearly visible. The stream turns brown to black with fine silt and debris.

Agriculture

- While it is a good thing nutrient management practices have improved, we need to remember the number of animals producing manure in the watershed has increased considerably (by thousands – especially chickens) the last 10-15 years. Therefore, this offsets the reductions in terms of phosphorus and nitrogen due to improved practices.
- For nearly 10 years, tons of manure on a farm in the watershed were dried and processed. The chemicals added contributed to particulate matter in the air, which got into the lake. Hopefully, this practice is no longer being used. But it is not impossible in the future that similar or other agricultural practices may be used. It's not just manure spreading that can impact the health and quality of the lake. Manure processes can too.

Beach Water Quality

- Bacteria that causes beach closures

Light, Noise, and Odor Pollution

- I would like to minimize light pollution in the area
- I have concerns about very loud spear or bow-fishing activity in the early morning hours that are loud enough to wake shoreline home owners. The generators for the flood lights they use are incredibly noisy.
- I'm concerned about the smell of chicken waste.

Invasive Species

- Garlic mustard is an invasive plant that needs to be controlled, and volunteers for pulls are inconsistent
- Weed growth at the mouth of the Miljala Channel is still pretty intense although it seems to have decreased slightly in the past 2 years. The channel still appears to be a main source of phosphates coming into the lake.
- The Elm Point channel may also be a source of phosphates. While weed growth is not significant outside the Elm Point Channel, I do recall one summer weekend when the algae was so numerous that the water 0-50 feet out from the mouth of the channel had a highly visible florescent green color that could be seen from a distance.
- An invasive weed that feels like a sponge when stepped on is spreading on the lake bottom. It only grows about 4-18 inches high, but it is now found in many parts of the lake (especially Elm Point) and even spots that historically have been sandy. The weed never reaches the water surface unless the water is very shallow. It's visible from the

surface of the water in the NW corner of the lake and the south end of the lake. My lake bottom is starting to show signs of the weed too.

- I don't know what is causing their population to drop, but the Zebra Mussels do not seem to be as numerous compared to their peak about 2-3 years ago. Rocks and metal structures are not covered as much as they were in the past. I don't know what is causing this decline, but whatever it is, we should encourage it.

Shoreland vegetation

- I am concerned that shoreline trees and natural growth are being cut
- Lack of shoreline buffers of native plants
- I support keeping the shorelines as natural as possible. While I do not think owners should need permission to trim trees or remove scrub like invasive Buckthorn, I do think owners should not be allowed to remove mature trees without a replacement plan (i.e. 2 new trees for 1 old tree). Too many shoreline properties have been nearly clearcut with no tree replacement.

Development

- I have concerns that we will love it to death with too much use – too much development.
- Development pressure including Shorewood Hills III and long term south watershed
- I have concerns about excess development along the south shore – including the possibility of development of large condominiums.
- Concerned if anything were ever to happen to the Sandbar and the mobile homes (while they may not be the most attractive buildings/areas) that beach traffic and the crowds that come to town are so essential to the local businesses. Our town really comes alive in the summer, from locals and visitors alike. Not having that area to gather for food, sports, drinks, and meeting would be a giant loss.
- Terraces (retaining walls on land) along the shoreline should be limited unless absolutely necessary. If a terrace is needed, natural materials (i.e. boulders, timber, etc.) should be used instead of man-mad retaining wall block. New "terraces" of man-made retaining wall block still seem to appear and are inappropriate for the shoreline.
- In the theme of keeping the lake as natural as possible, owners of old concrete sea walls should be encouraged to remove them and replace them with boulder rip-rap. The concrete sea walls are not only not visually appealing but they also "echo" the waves back in the lake which creates unnecessarily choppy water. The worst concrete sea wall is along Bartels Beach park where the water is always extra choppy if there is any wave movement in the lake. The City should be encouraged to eventually replace the seawall with rip-rap.

Recreation

- Motorboat overuse
- I have concerns that we will love it to death with too much use – too many boats
- I usually avoid the lake on summer weekends because of the high activity.
- The high boat traffic releases too much sediment into the lake.
- There is abuse of the bulrush area on the west side. Forty years ago no one would drive through that area, now you see boats there every weekend. Now that the water levels

are higher, boats and pontoons go all the way around the lake, including in front of Korth Park. In the past, the water in front of Korth Park was either restricted or impossible for boats to pass through.

Other

- Are Christmas trees allowed to be put out on the lake? (Not without a permit.) Can we run articles that make people aware that they should not leave trees on the lake?
- There is a lack of funding for doing the projects that really need to be done. Funding is needed to keep the lake in the pristine condition it is

c) What are your ideas for positive change for Rock Lake and its watershed?

Conservation Practices

- Models of rain gardens and native plantings to educate the public on their benefits
- A program to encourage shoreline owners to plant native plants in the riparian zone.
- I suggest property owners on the lake let their lawns go wild – we need sanctuaries for pollinators.
- Would like to make sure we are implementing best practices in regards to sand and salt for road maintenance in the winter.
- Also, somewhere in the plans/documents, I would like to see other manure management practices noted.
- Limit pollution
- A compelling case must be made to stabilize the stream banks west of Rock Lake. Grants or funds must be generated to clear the stream and stabilize the banks to prevent silt from entering the channel and eventually Rock Lake. The farm land east of Highway S needs action to prevent runoff. If a series of earth berms were built it would help. If a retaining pond with a spillover dam was built at the entrance to the stream, it would help settle the chemicals and runoff prior to the water entering the stream. Also, a short informational letter to the watershed residents could motivate more people to become involved.

Sampling/Research

- I'd like to see water sampling/testing at sites where water runs into the lake
- I would like to see additional water testing, recognizing this costs money. Grants may not be available. RLIA may need to do more fundraising.
- We should consider a lake Bio blitz – where experts come in to lead volunteers in collecting a variety of data followed by an event to share the results. Get to meet people and get great pictures.

Invasive Plants

- Guidance on controlling or removing aquatic invasive plants should be prepared & distributed.

Recreation

- Offer a boat safety class through the kid summer school program which is very popular. Anything to get more kids on the lake.
- A rule should be established and enforced to prevent boaters from anchoring within 100 feet of any swim area, pier, or swim raft. Unfortunately, some boaters boldly anchor

too close to where people are swimming. This seems to be a regular issue for property owners where the lake bottom is sandy and a decent depth.

- An engine noise rule should be established and enforced to prohibit engine noises louder than a certain level. Ever summer, there seems to be a few boats that love to gun their engines and speed across the lake. A rule that the police could enforce would be great to curtail this activity that seems to have increased as boats have generally gotten larger.
- Limit power boats

Development

- I think there is regulation on some books that prohibits decks on new boathouses. If this law still exists, the law should be eliminated. Decks on top of boat houses make logical sense and use the man-made structures efficiently. I personally would like to see a boat house rooftop deck versus a separate deck AND a boat house.

General Education

- Space in the Lake Mills leader could be dedicated to an article on the lake
- Interview a Lake Mills citizen (adult or child) and ask them what they love about the lake, or a short story, and share it on facebook or in the paper a couple times a month.
- Science fair at the school
- When children are made aware of issues that impact the lake, they will also influence their parents.
- Field trips for school groups
- Perhaps have dinner events combined with lake education.
- Hold small educational events at lakeshore owner's homes for their neighbors.
- It would be nice to have a kiosk in the downtown area where people can learn about the unique characteristics about the lake.
- Would like to see the informational packets delivered to new lakeshore owners.
- Pontoon boat tours to natural sites in lake a few times a year.

Signage

- There should be signs on the highway that point to Rock Lake so more people will know about it
- Have signs on waterways so that they can take on their own identity and people do not think of them as ditches.

Trash

- More clean-up activities on the weekends. When we did this as children in the schools, it increased our appreciation of the lake. Can also work with the scouts.
- Would like to see more trash receptacles along the shoreline to minimize litter.
- A Rock Lake clean-up day should be organized. When I kayak around the lake, I see some large submerged items such as old home radiators, heating oil tanks, oil barrels, etc in addition to beer cans. Some of those things are old raft anchors, others are ice fishing items that were left, and probably a few are intentional discards. I don't think a person or a few people could lift them up themselves, so a suitable boat with a crane/winch would be needed.

Fundraising

- Link fundraising dollars to specific needs such as sampling (such as chloride), equipment (such as a constant temperature probe) or any smaller test or need that could be fulfilled by small to large donations ($25-$500). There could be a list of needs with a dollar amount next to them for donors to choose from. Donors could be recognized with plaques or posting of names in a newsletter or on the website.
- Partner with local gyms and offer early morning yoga on the beach or some sort of very early morning workout. I would be happy to approach the gyms to propose this idea.
- Design tshirts. Sell them and use proceeds towards projects. I am a professional web & graphic designer and happy to donate my time.

Infrastructure

- We should relook at the possibility of creating a lake district to raise funds for caring for the lake.
- There should be a student Board member

Other

- Transfer of stewardship commitment to the next generation
- Photo contests of people enjoying the lake
- Change from "shoreline" owners to "Rock Lake watershed residents"

Public Comments Session - October 19, 2017

Attendance

Ashley Berg
Chris Frost
Alex Mulligan
Erin Catalani
Paul Hermanson
Laura Pennington
Tom Cianciolo
Jim Kerler
Nathan Pyles
Patricia Cicero
Margaret Krueger
Stanley Smoniewski
Jim Colegrove
Alex Mulligan
Bob Volenec
Wes Dawson

Handout

Draft Vision, Goals, and Recommendations for 2017 Rock Lake Management Plan (dated October 19, 2017)

Public Input Session

Wes Dawson, President of the Rock Lake Improvement Association (RLIA), welcomed everyone in attendance. He gave an overview of the planning process that included a grant, 10 meetings of an Advisory Committee, a public survey, and 2 public input sessions.

Nathan Pyles, RLIA Board member and Chair of the Advisory Committee, explained the Advisory Committee working to update the lake management plan and listed the names of those involved and the area they represented including fishing, motorized boating, non-motorized boating, agriculture, shoreland residents, environment, and local governments.

Patricia Cicero, Water Resources Management Specialist for the Jefferson County Land and Water Conservation Department, presented an overview of the public survey results. She explained that the draft Vision of the plan is to:

> Work in partnership with our community to protect and enhance water quality, habitat, and recreational assets in Rock Lake and its watershed for current and future generations.

Patricia presented the 5 main goals of the plan and briefly reviewed the recommendations under each goal.

- Water Quality Goal: Improve the water quality of Rock Lake by reducing the summer average phosphorus level in Rock Lake by 20% by the year 2019.
- Water Quality Sampling Goal: Measure the health of lakes and streams in the Rock Lake Watershed with volunteers and applicable technologies to track trends and identify sources of pollutants.
- Habitat Goal: Achieve a diverse ecosystem in the water and on the land for native plants and animals to thrive.
- Lake Recreation Goal: Ensure a safe and healthy multipurpose recreational environment.
- Education Goal: Achieve a more knowledgeable and active pubic in regards to Rock Lake, the watershed, and the lake management plan.

The process going forward was explained. The Rock Lake Improvement Association Board will have a meeting on November 20th at 6:30 pm. They will review all of the comments received at the public session, in addition to any input provided by citizens between the session and the November meeting. The Board will then decide on any revisions to the Vision, Goals, and Recommendations before finalizing them. It was also noted that the actions to achieve the goals and recommendations would be determined through meetings of RLIA committees. Citizens who are interested in serving on one of the committees should contact the RLIA.

A final report containing data, topic issue papers, and the vision, goals, and recommendations will be completed in December.

The public was asked for their comments, questions, or suggestions for the lake management plan vision, goals, and recommendations.

One citizen had a question on the recommendation that the Town and City should work together on a new composting area so citizens have more yard waste disposal options to reduce phosphorus pollution. He asked whether the composted material would be available to citizens to take and use on their gardens. It was stated that this is one of the elements that would be determined through discussions on how the recommendations will get implemented.

When talking about boating regulations, one person stated that it would be helpful to have the fines for the violations posted and advertised as a deterrent.

Someone asked who controls the hours of operation for water skiing and towing. Wes Dawson explained that the Town of Lake Mills is the entity that has a lake recreation ordinance containing the water skiing and tubing hours. Patricia also shared information from the public survey that indicated that 58.5% of respondents liked the existing hours of 10 am to 7pm. All other choices had less than 9% of responses. When you look at just lake shore owners and just fishermen, the data was very similar.

Someone asked if the temperature of the water was posted some place. The temperature of the lake at the deep hole is sampled once a month and that information is available on a DNR webpage. Otherwise, the water temperature is not officially taken and recorded.

Paul Hermanson, the Director of Public Works for the City of Lake Mills, stated that the City has decided to no longer place snow on Veteran's Lane. He also explained some of the ways that the City works with citizens to pile their fall leaves on the tree lawns instead of the streets.

Someone asked about the fall and winter water levels and the management of the dam. Patricia explained that the water levels that must be maintained by the City are stipulated by the Department of Natural Resources. The summer water levels are the highest throughout the year to accommodate recreation and access. The winter water levels are the lowest throughout the year to prevent against shoreline erosion. Starting on September 15th, the water levels are reduced and must reach the stipulated fall water levels by October 1. This requirement is important in order to ensure that amphibians in the lake hibernate under water; otherwise they will perish.

The new dam should work much better than the old dam because it can be monitored electronically and the mechanism to alter the water level is more accurate. Paul Hermanson noted that the City is working to make sure that these features are working properly. In the future, there will be a page on the City's website that will show the water level readings – but this information will be about 1 week old due to security issues of the system.

APPENDIX C

Public Survey Results

Results of Rock Lake Survey – 2017

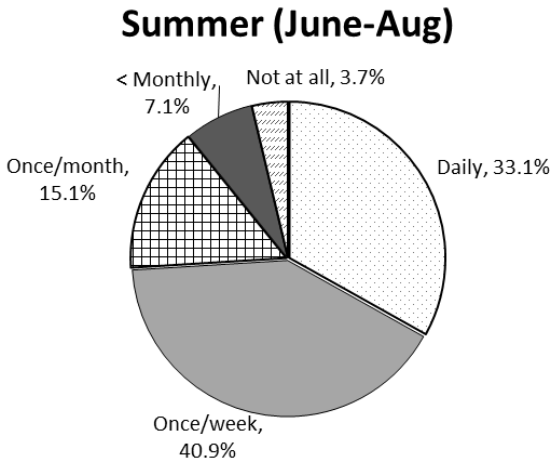
23.8% return rate: 2483 surveys mailed out, 592 surveys returned

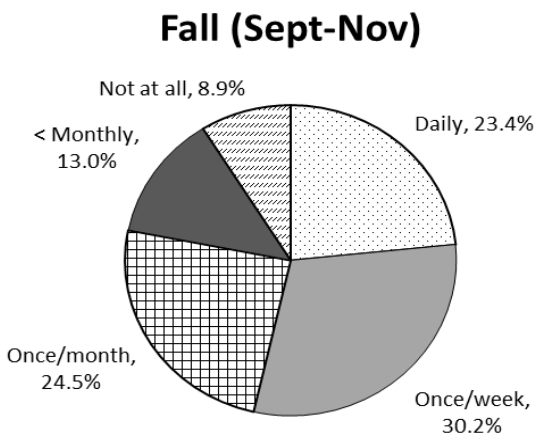
Lake Enjoyment

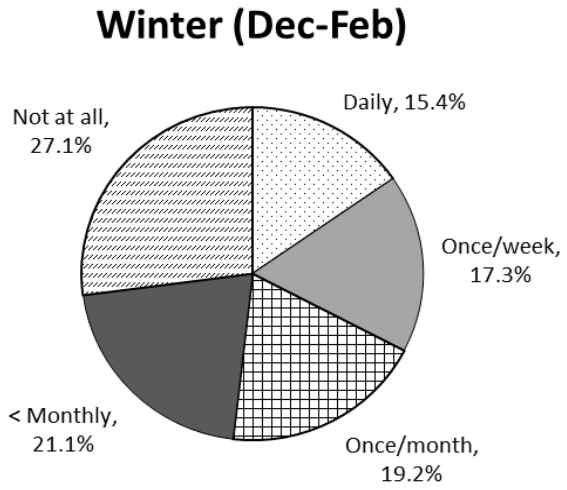
1. How many years have you enjoyed Rock Lake? (if less than 1, answer 1)
Responses = 572

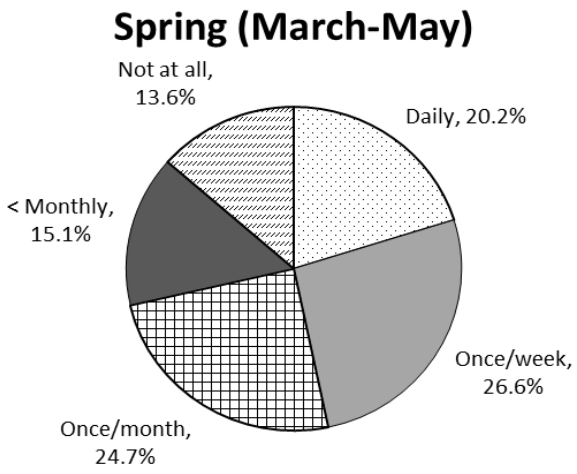
Min	0
Max	90
Ave	26.6

2. What best describes how often you enjoy Rock Lake in each season?
Responses = 562 Summer; 539 Fall; 521 Winter; 531 Spring

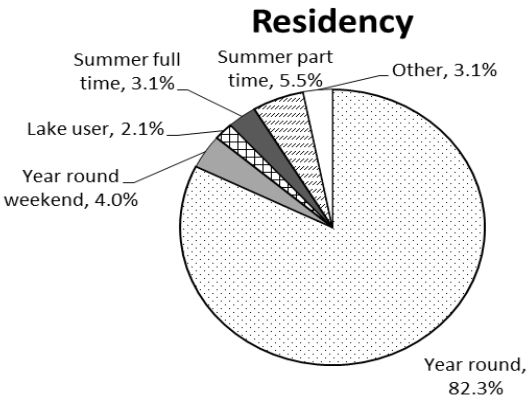








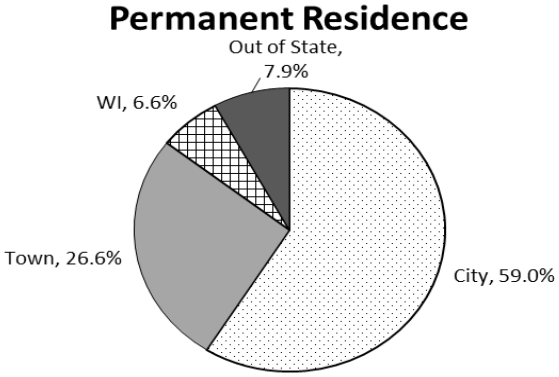
3. Which option best describes you?
Responses = 581



4. Are you a lakefront property owner on Rock Lake?
Responses = 585

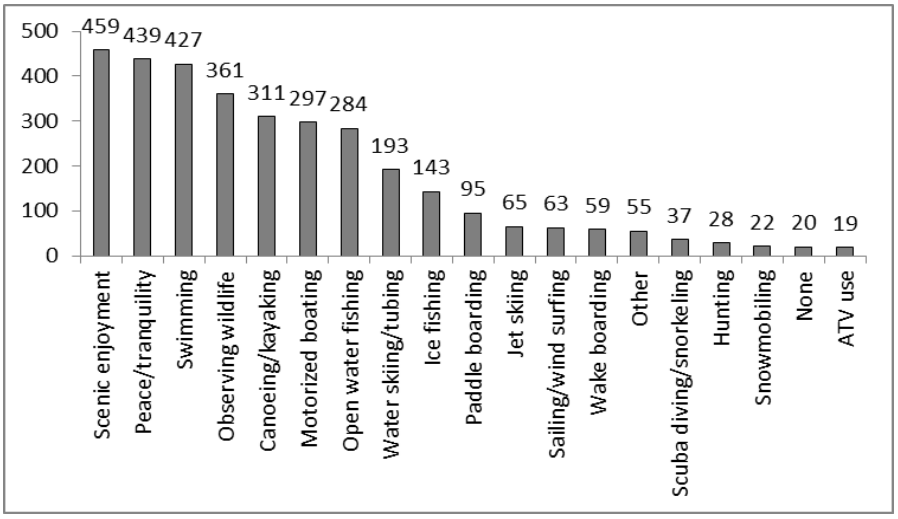
Yes	161	27.5%
No	424	72.5%

5. Where is your permanent residence?
Responses = 580

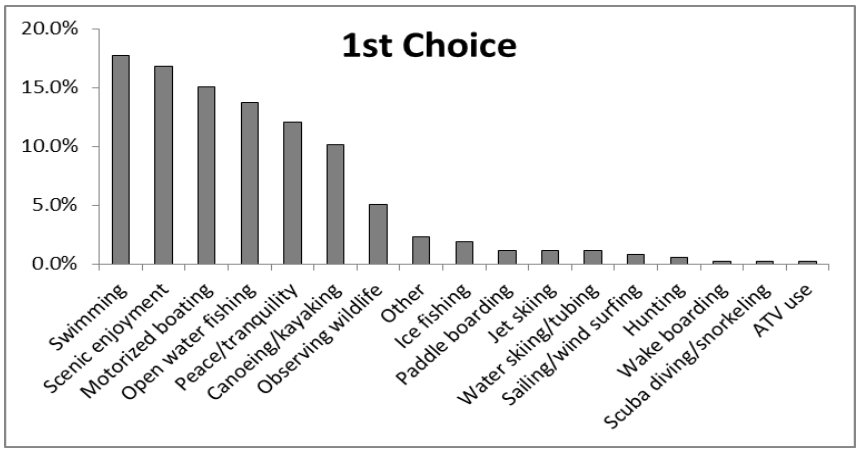


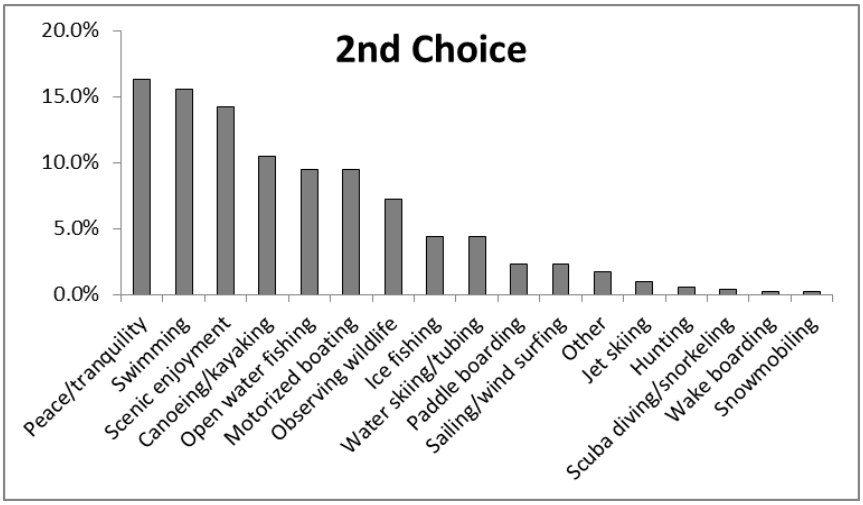
Recreation

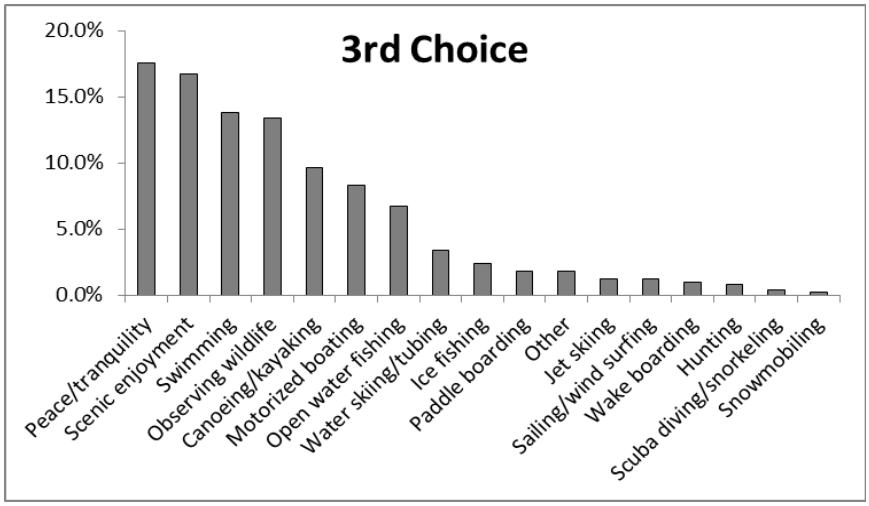
6. Circle all of the activities that you and members of your household enjoy on Rock Lake.



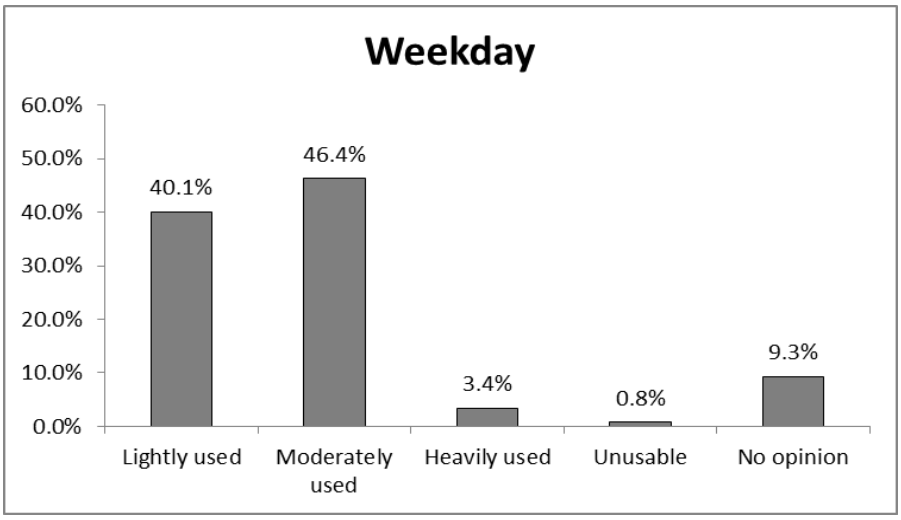
Enter the numbers of the top three activities that you enjoy most.
Responses = 531 for 1st; 527 for 2nd; 508 for 3rd

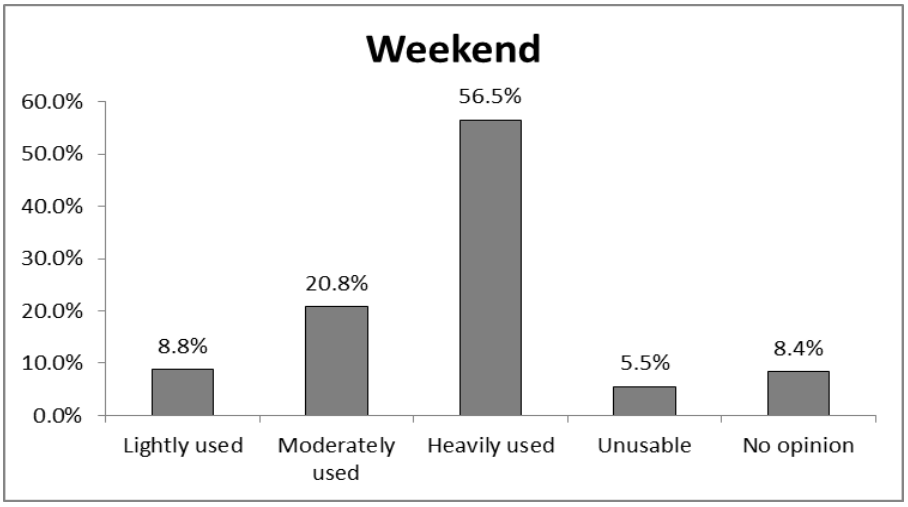




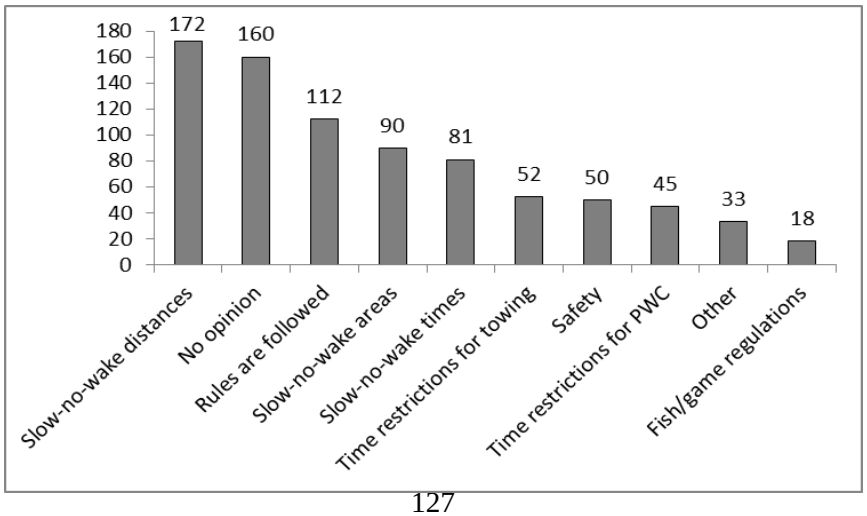


7. Which statement best describes the watercraft activity on a beautiful summer day?
Responses: 494 Weekday; 490 Weekend

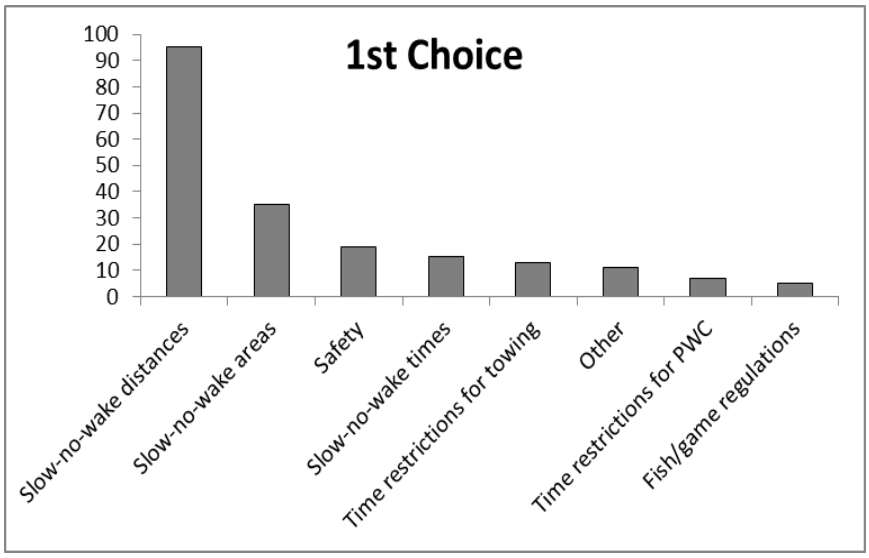


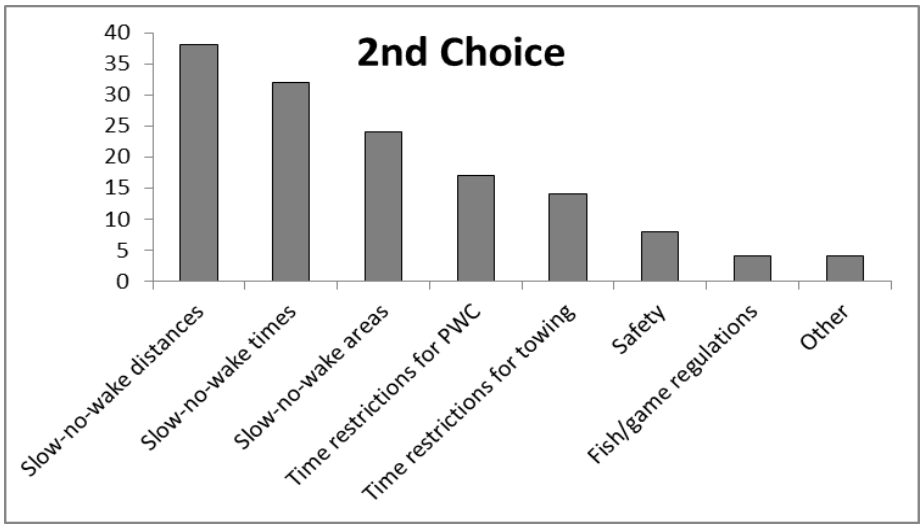


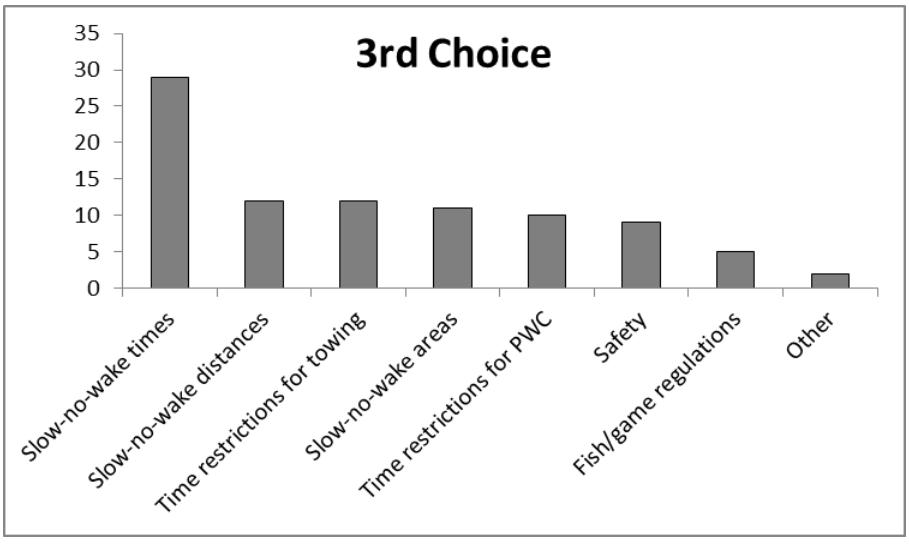
8. In your opinion which recreational rules have you observed that are not being consistently followed? Circle all that apply.



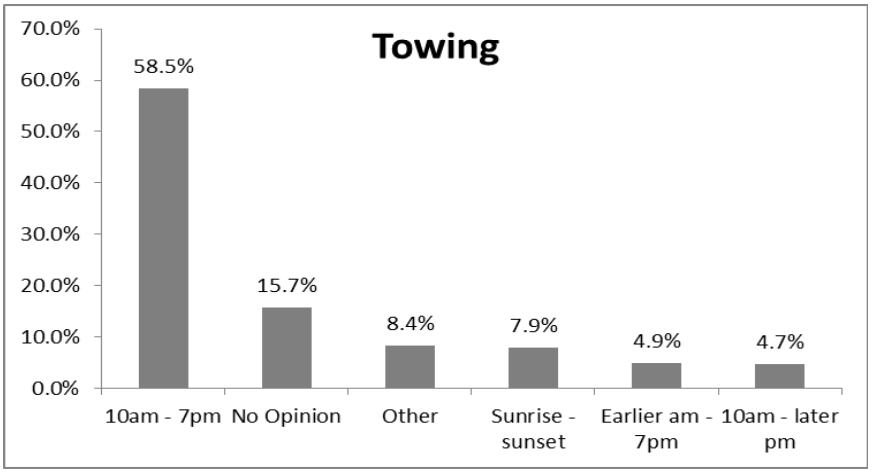
Which recreational regulations are most frequently violated on Rock Lake?
Responses: 531 for 1st; 141 for 2nd; 90 for 3rd



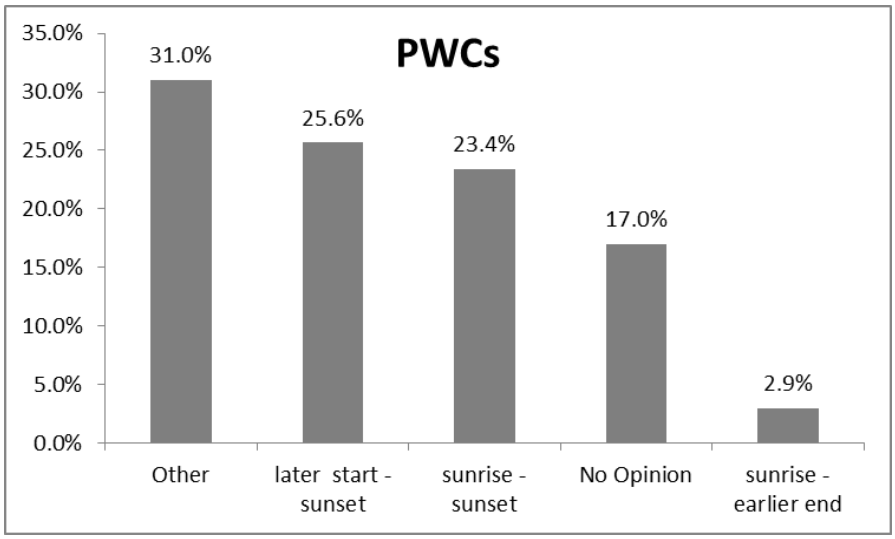




9. Time restrictions are often adopted to provide safe conditions and some quiet time on the lake. Which hours of operation fo you support for towing (includes waterskiing and tubing)?
Responses = 573



10. Which hours of operation do you support for personal watercraft such as jetskis?
Responses = 577



There were many "other" answers, the top ones were: 91 responded "10am-7pm", 15 responded "same as towing", 15 responded "no PWCs", and 12 responded "10am-6pm". All other answers had 5 or less responses.

11. Which best describes how often you drive a vehicle (snowmobile, ATV, care, truck) on the ice of Rock Lake?
Responses = 579

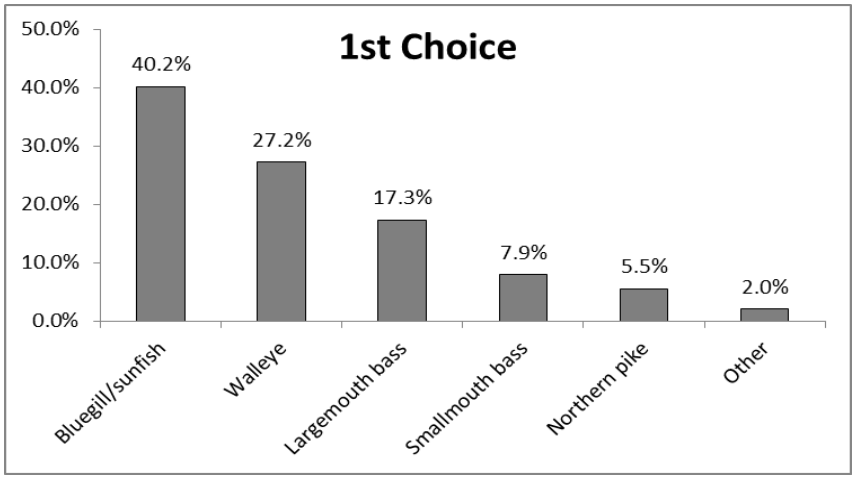
Never	86.0%
1-5 times/winter	11.7%
>5 times/winter	2.2%

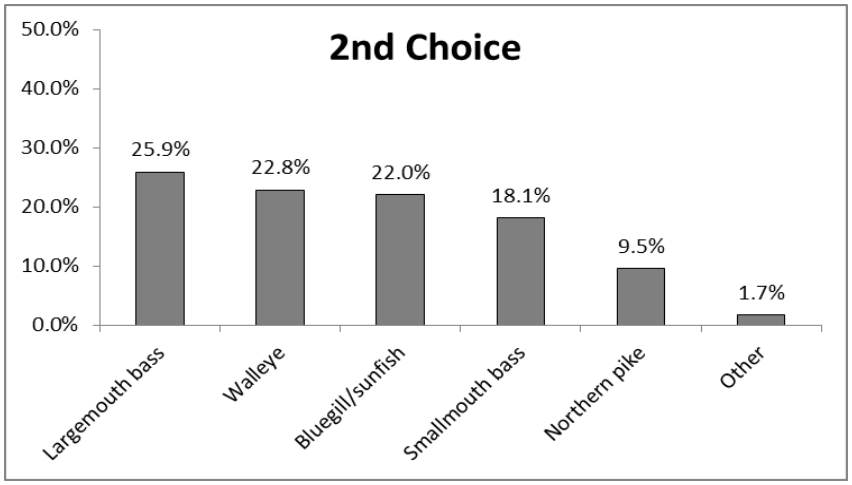
Fishing

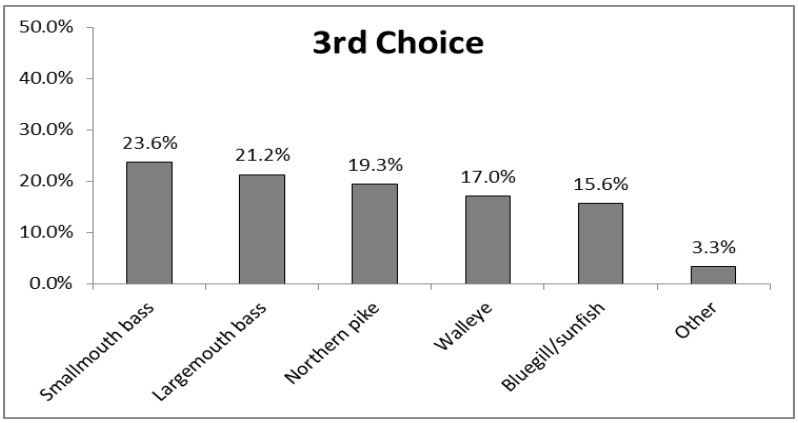
12. Have you fished Rock Lake in the past 3 years? (If no, please go to question 17.)
Responses = 574

Yes	48.3%
No	51.7%

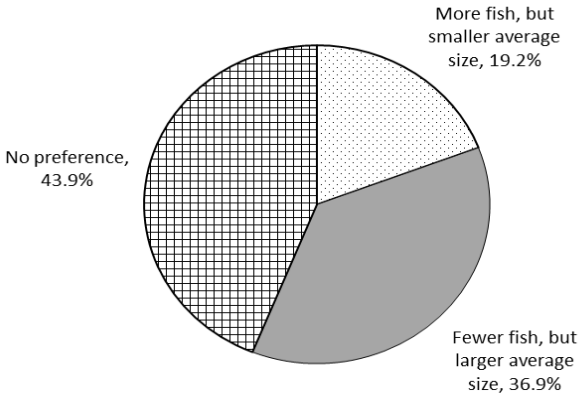
13. Which of the following Rock Lake fish species do you prefer to catch?
Responses = 254 for 1st; 232 for 2nd; 212 for 3rd







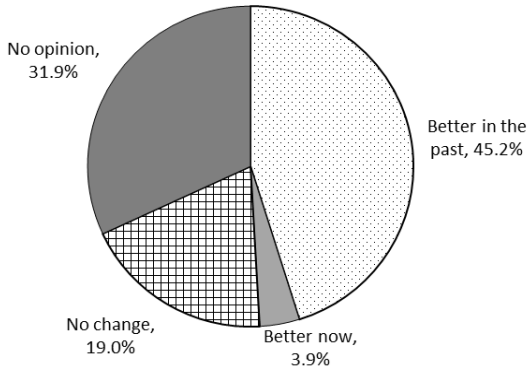
14. Of the fish you listed in question 13, in general which would you most prefer?
Responses = 271



15. How many years of experience do you have fishing on Rock Lake?
Responses = 273

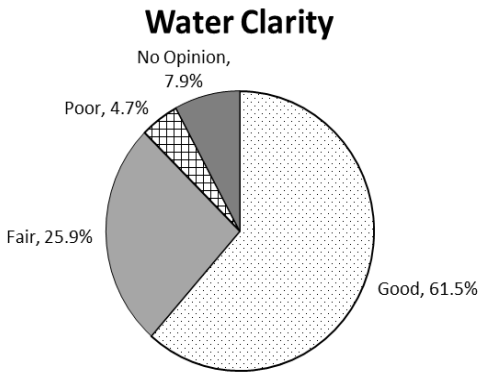
Min	1
Max	75
Ave	22.3

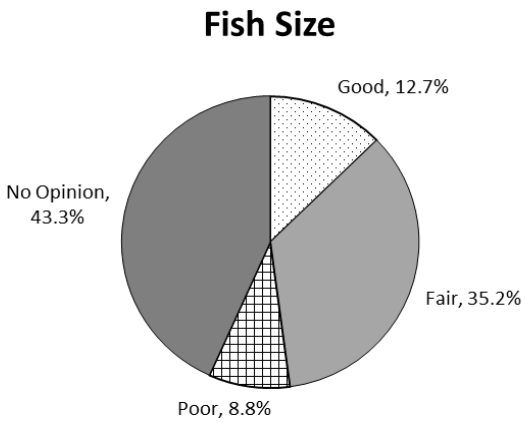
16. How has the quality of fishing changed on Rock Lake?
Responses = 279

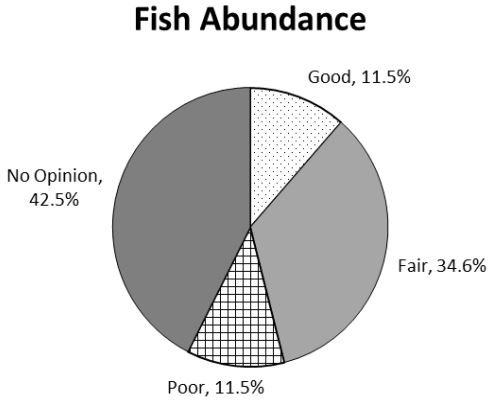


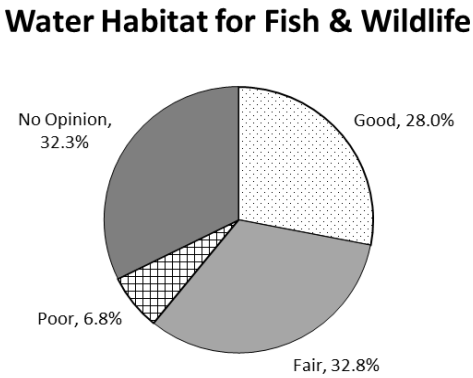
Lake Quality

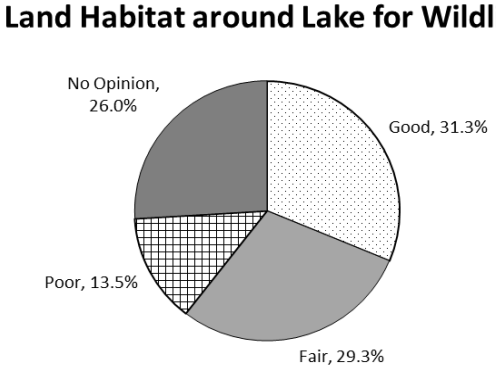
17. How would you rate each item for Rock Lake?
Responses: 556 water clarity, 543 fish size, 541 fish abundance, 542 water habitat for fish and wildlife, 547land habitat around lake for wildlife



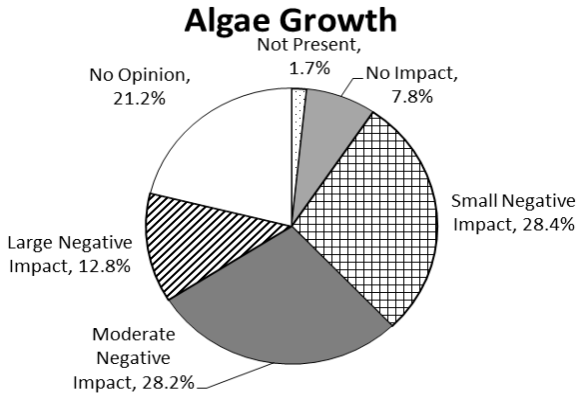


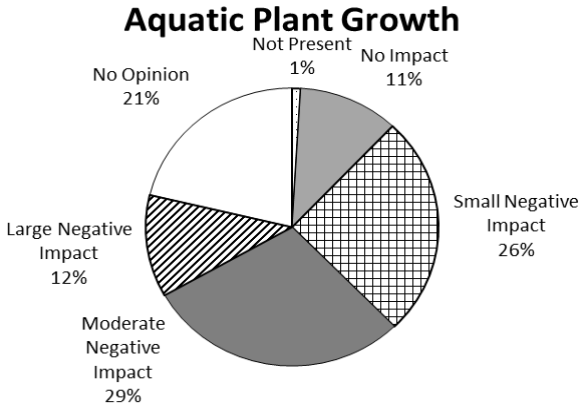


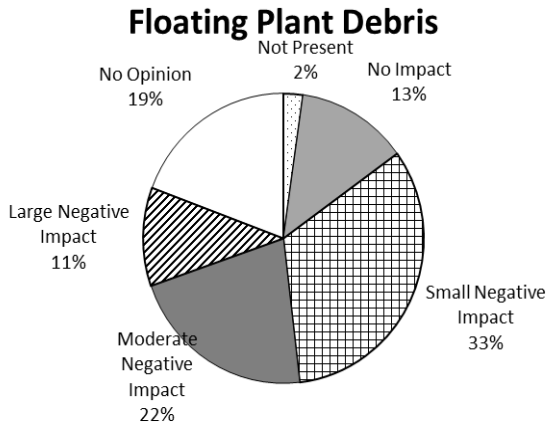


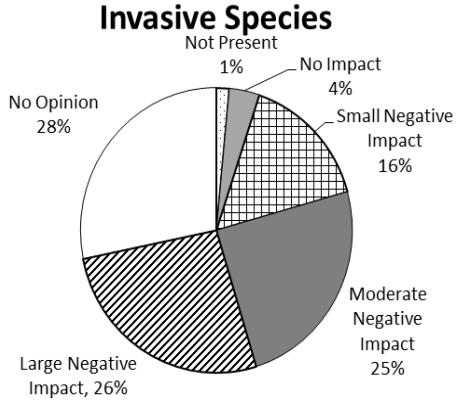


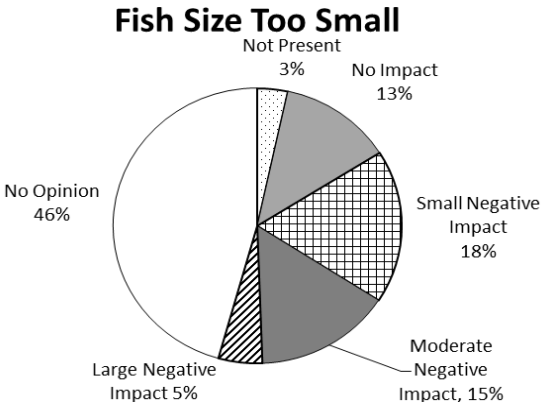
18. Below is a list of possible impacts to Wisconsin lakes. To what level do you believe each of the following factors may currently be negatively impacting Rock Lake?
Responses = 539 algae growth; 531 aquatic plant growth; 538 floating plant debris; 528 invasive species; 528 fish too small; 518 fish quantity too low; 521 poor wildlife habitat on land; 519 poor fish/wildlife lake habitat; 528 poor water clarity; 527 unsafe recreational conditions; 532 loud noises; 537 bad odors, 533 poor beach water quality

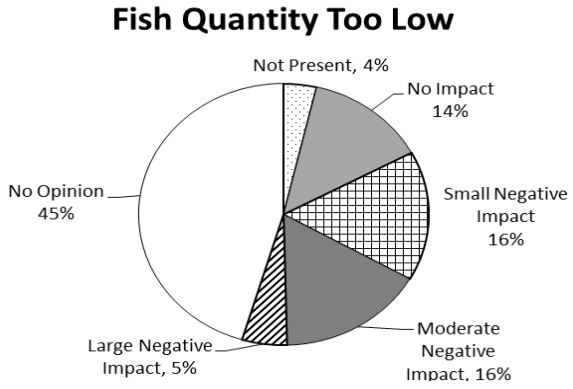




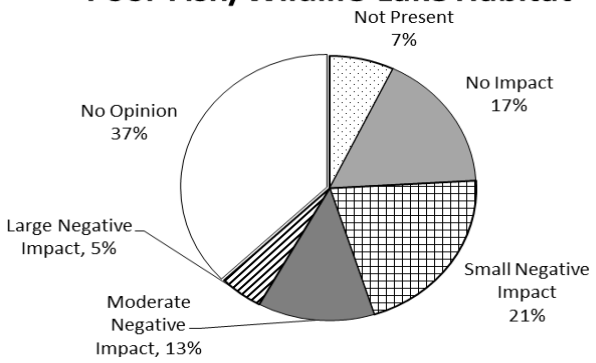




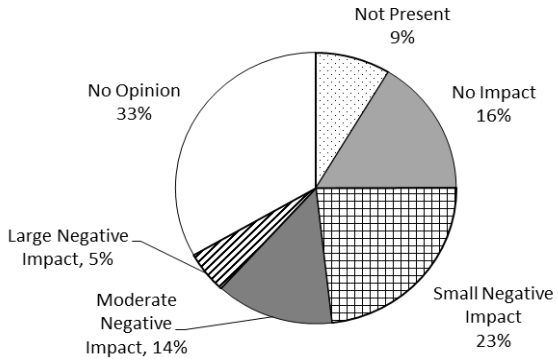




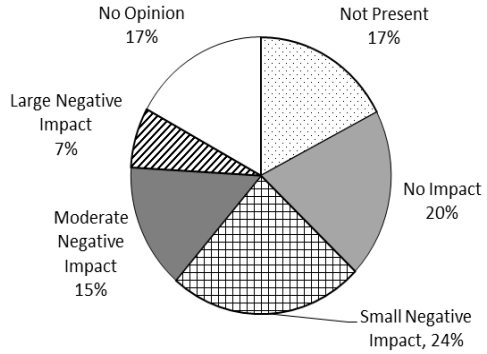
Poor Fish/Wildlife Lake Habitat



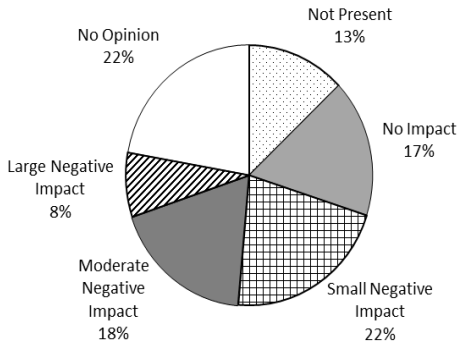
Poor Wildlife Habitat on Land



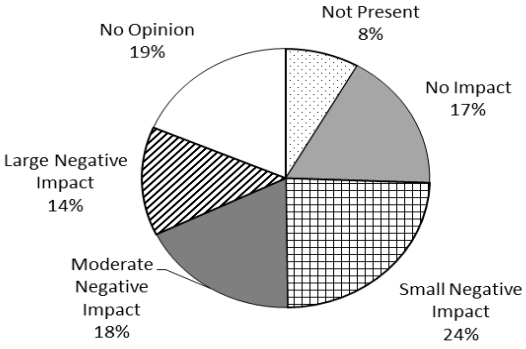
Poor Water Clarity



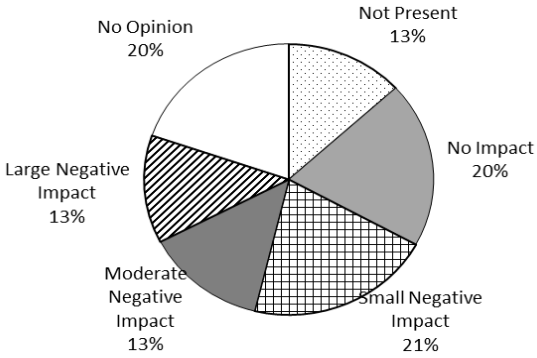
Unsafe Recreational Conditions



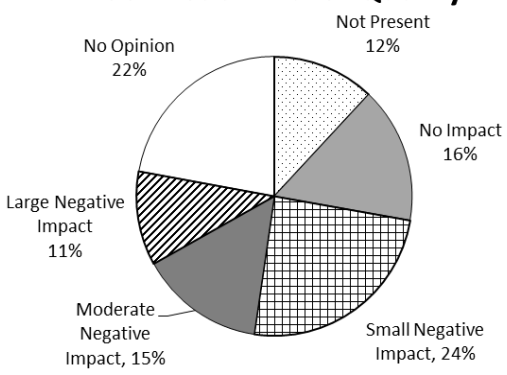
Loud Noises



Bad Odors

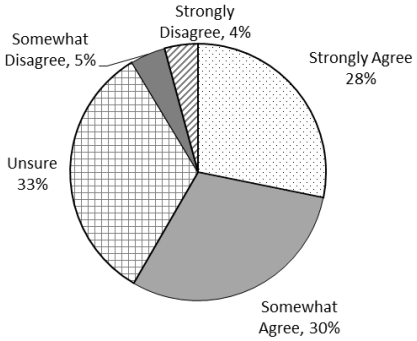


Poor Beach Water Quality

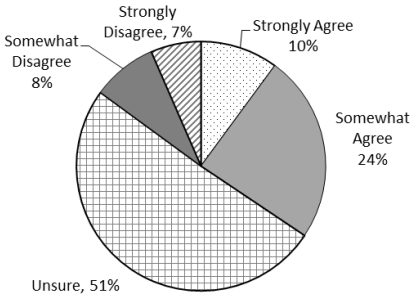


19. Please indicate if you agree or disagree that each of the following items are causing problems in Rock Lake.
Responses = 543 pollution for lawn fertilizers/pesticides; 535 pollution from construction sites; 538 pollution from farm fields; 538 pollution from streets/storm drains; 528 shoreline erosion, 517 fishing pressure; 535 invasive species; 535 pollution from geese and seagulls; 531 not enough native plants nest to lake; 535 too much development near water; 529 insufficient Town shoreland zoning rules; 524 Insufficient City shoreland zoning rules; 532 watercraft congestion; 528 insufficient watercraft rules; 526 inadequate watercraft rule enforcement; 252 ineffective lake management; 26 other

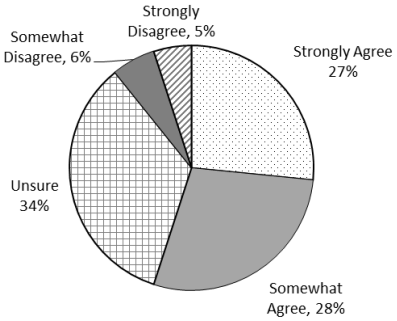
Lawn Fertilizers/Pesticides



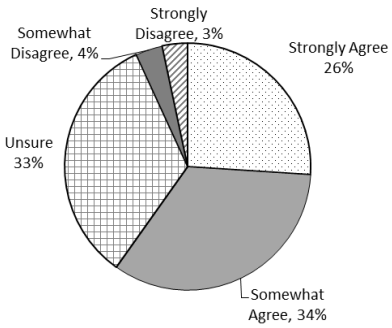
Construction Sites



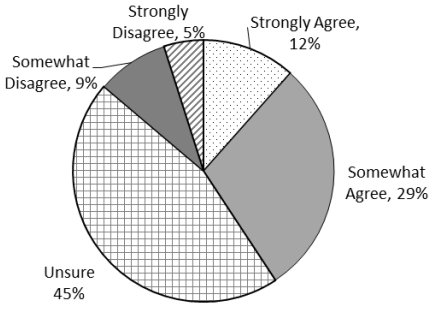
Farm Fields Cause Problems



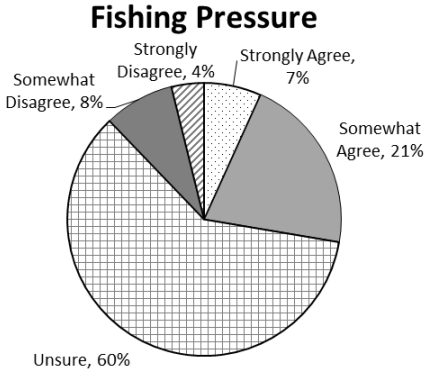
Streets/Storm Drains



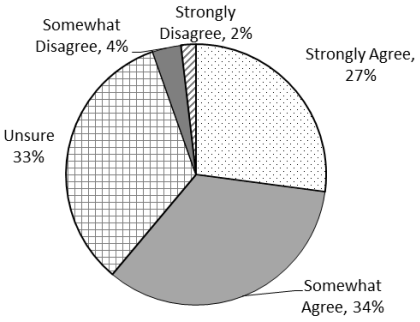
Shoreline Erosion



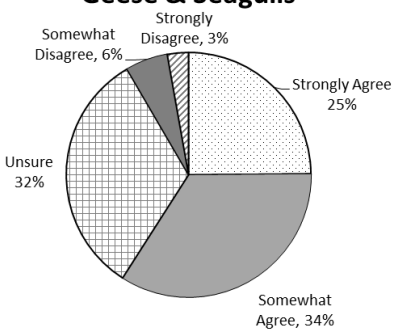
Fishing Pressure



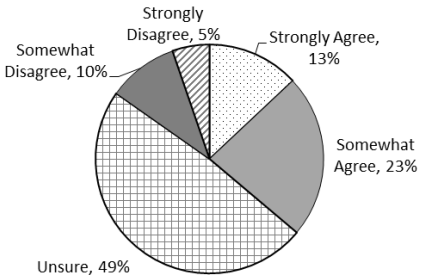
Invasive Species



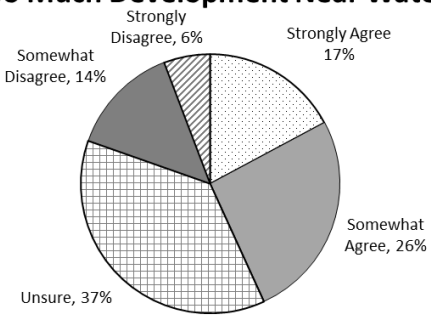
Geese & Seagulls



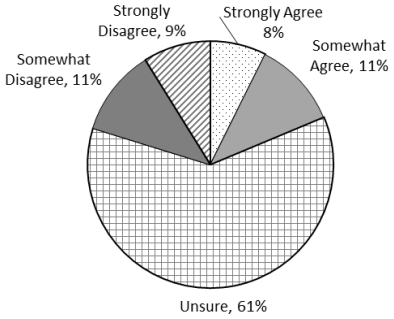
Not Enough Native Plants Next to Lake



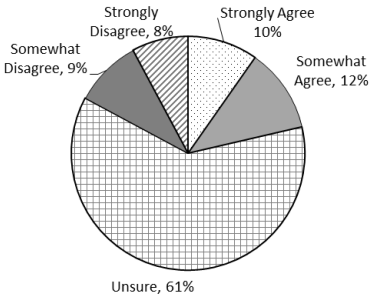
Too Much Development Near Water



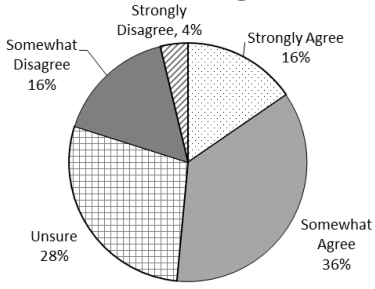
Insufficient Town Shore Zoning Rules



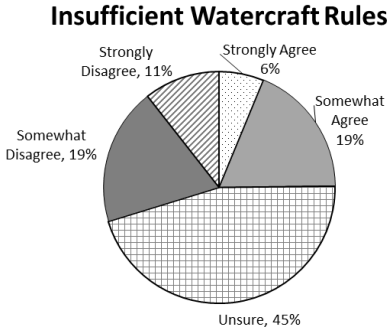
Insufficient City Shore Zoning Rules

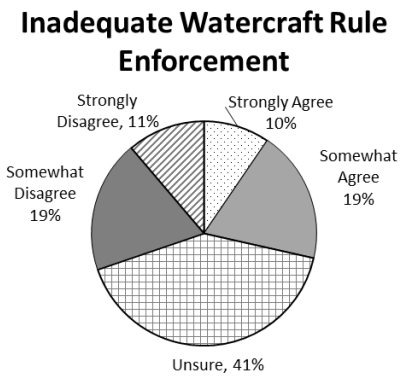


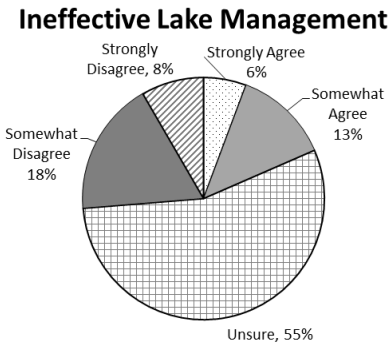
Watercraft Congestion



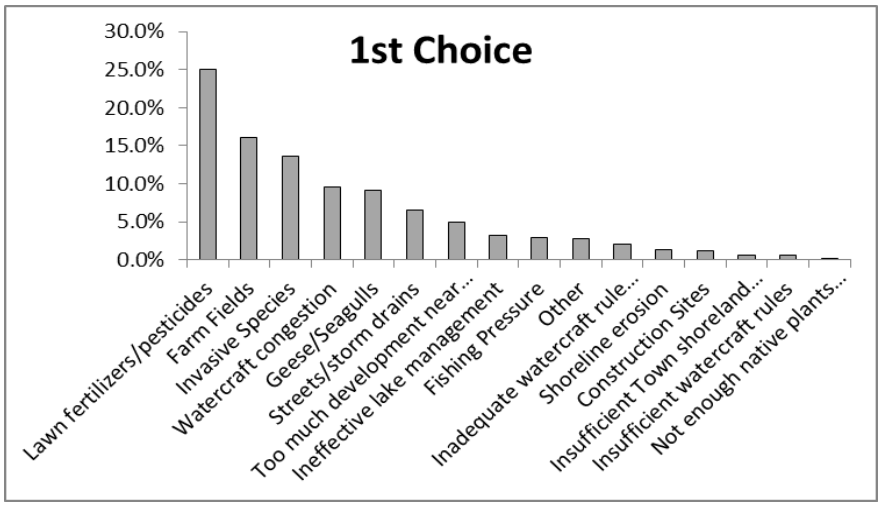
Insufficient Watercraft Rules

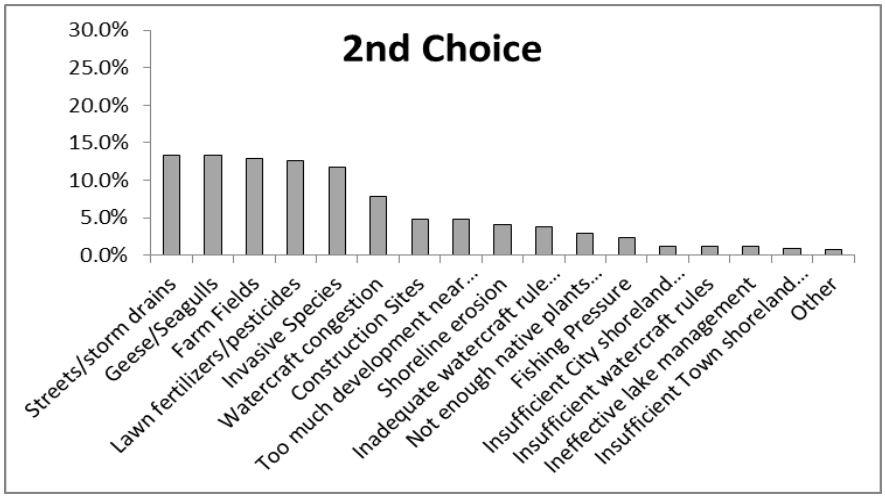


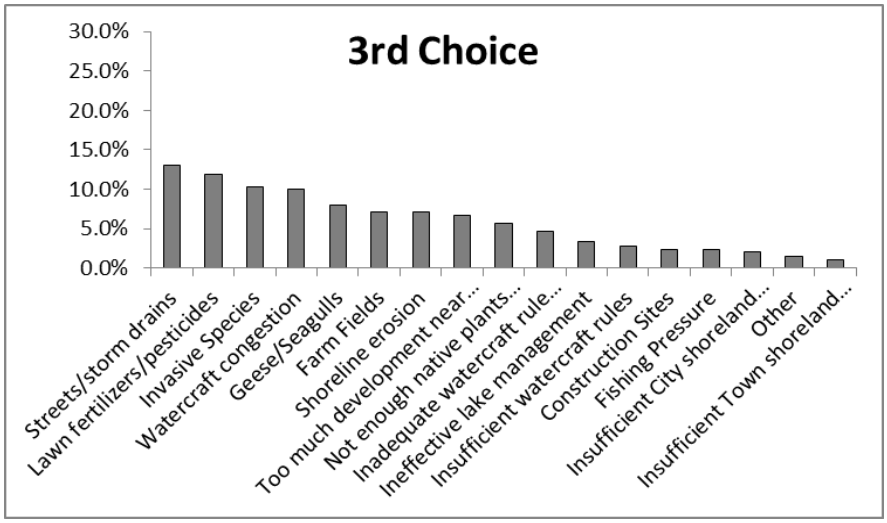




Please enter the top three that you believe are causing the greatest problems in Rock Lake. Responses = 440 for 1st; 418 for 2nd; 389 for 3rd

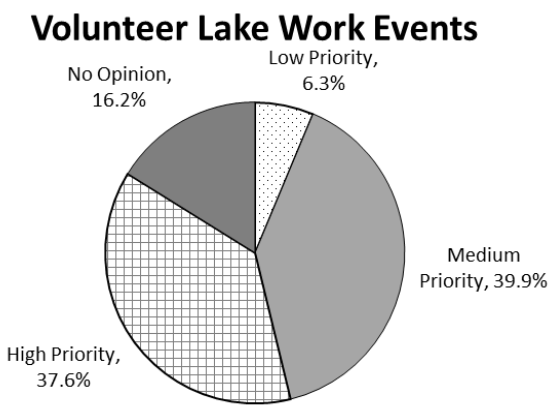


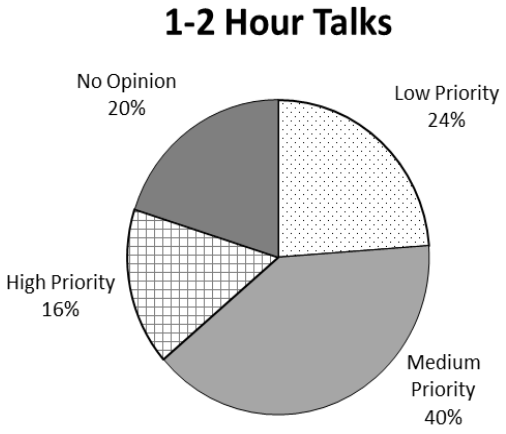


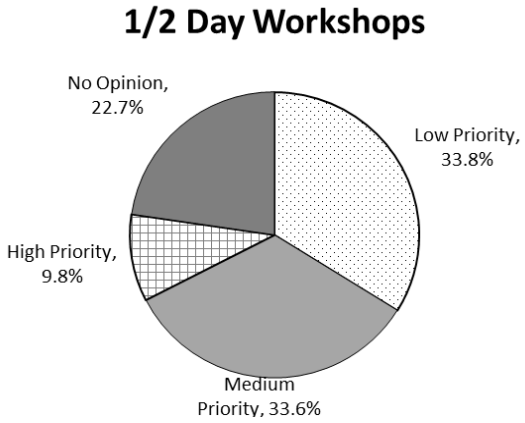


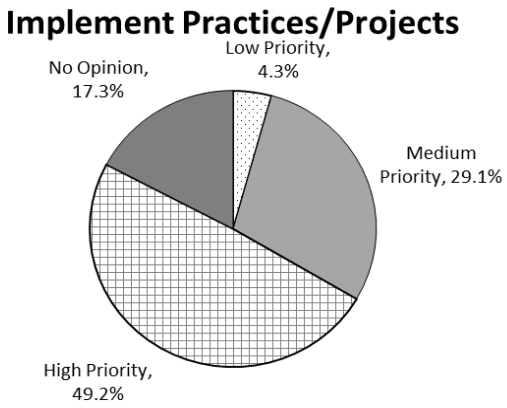
20. Indicate the level of priority that the Rock Lake Improvement Assocation should assign to each item. Circle one for each item.

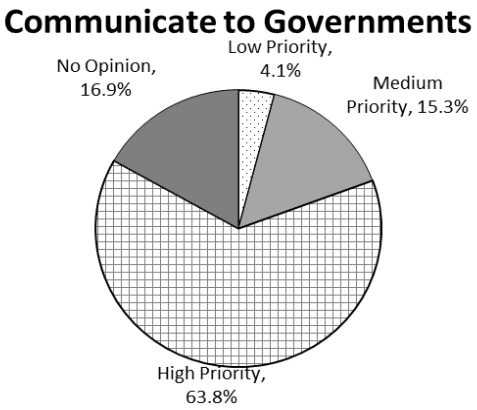
Responses = 537 for host volunteer work events to benefit the lake; 533 for host 1-2 hour talks on lake-related topics; 529 for host ½ day or longer lake-related workshops; 532 for assist with implementing lake practices/projects; 516 for communicate lake management issues to government officials; 24 for other.

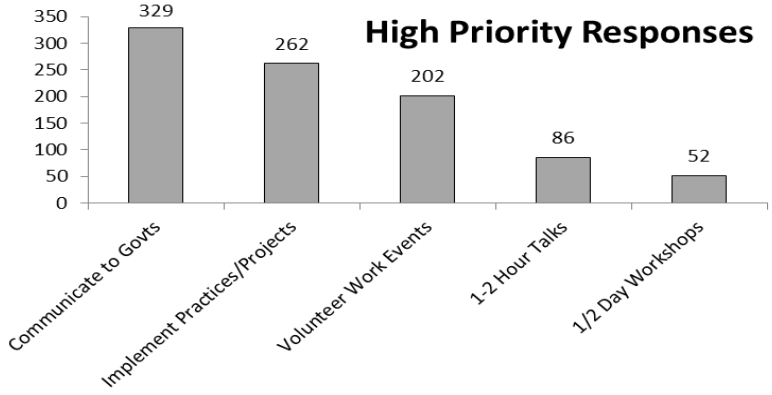




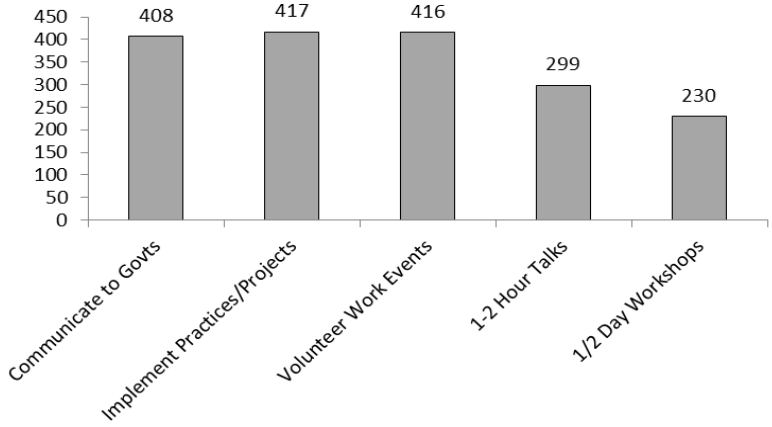




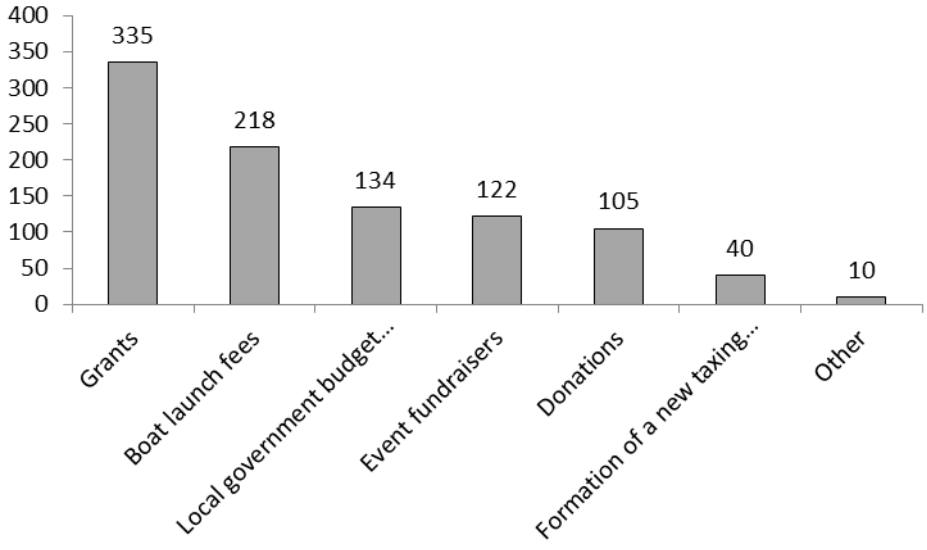




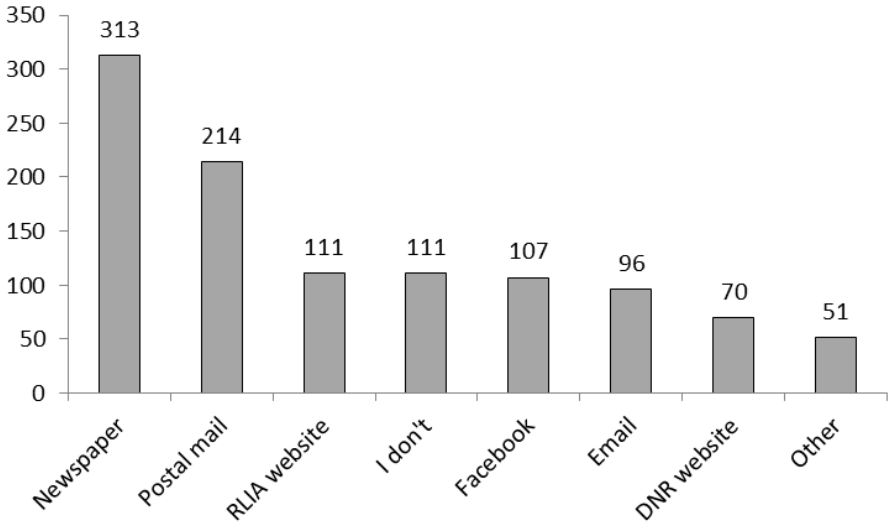
High + Medium Priority Responses



21. How should lake improvement activities be funded? Only cirlce your top 2 choices.



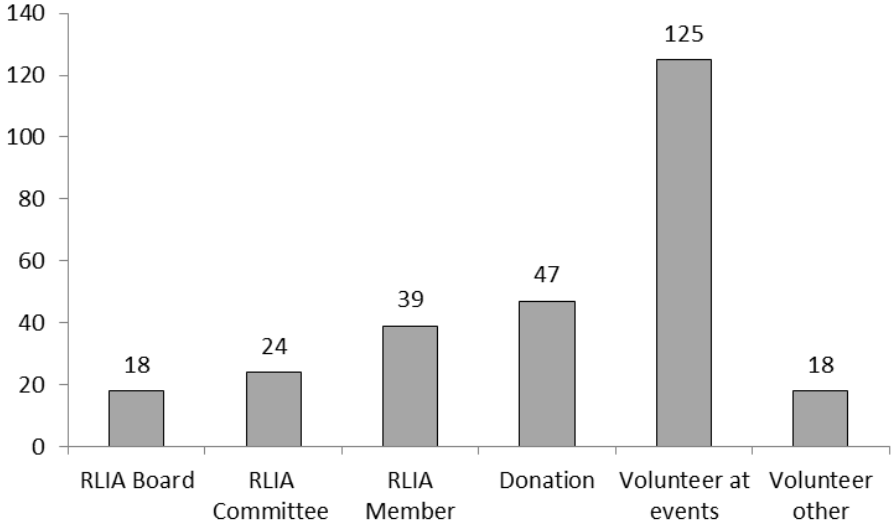
22. How do you currently get information about Rock Lake? Check all that apply.



23. If you own lake property and would like to receive information on possible funds to plant native plants (adjacent to the water or in a rain garden), then please check here and also include your contact information in number 25.

35 people checked this question and 34 people provided their contact information.

24. Please circle any activity you or your family would like to participate in and provide your contact information below.



Comments Provided on the Rock Lake Public Survey

Algae/Aquatic Plant Growth

- At times, early spring or late summer, our lake has always had algae growth on west end (Korth Park) - is a marshy area – been natural situation – when people built there and tried to eradicate it – was start of problems. People need to learn the natural environment and respect it.
- Algae and aquatic plant growth continue as a large problem with no noticeable help from the lake association. In the 1980's the DNR gave us permission to use certain chemicals that did not harm fish, humans, etc. It really helped!
- Algae growth substantial over past 10 years.
- Years ago, you could take your kids downtown to Rock Lake and swim. They had a concession stand there. Now it is closed up with algae all in that area. What happened!?
- #1 biggest concern is the uptick of weed growth.

Education/Communication

- Communication does nothing unless some action will be taken.
- Involve children. Maybe advertise at school. Educate locals on salt use in winter. Find where city drains empty into lake. Explain what kinds of things hurt the lake. Put flyers around town. Maybe at businesses or at farmers markets at a table.
- Would like to see continuing emphasis on public education and volunteer involvement (and publicity).
- In regards to question # 20 Host 1-2 hour talks on lake-related topics - online/YouTube
- How do I get my info about Rock Lake: I wake up in the morning and look at it. I see the cleanest water ever, ducks, geese, ospreys, eagles, foxes, Ruddy ducks - more wildlife than I saw as a kid.

Fishing/Wildlife

- DNR planting of smallmouth bass has virtually destroyed walleye fishing.
- Smallmouth population is increasing
- Largemouth & blue gill population is decreasing
- We need more walleye and crappies.
- Less walleye remain
- #2 extremely low population of walleye in Rock Lake
- I prefer to catch more walleye and fewer bass. Walleye fishing has diminished while bass has increased. Very disappointed.
- I would prefer to catch walleye, but never catch them on Rock Lake.
- Crappie fishing has improved blue gill production/quality is down walleye no change/better in the past.
- I used to fish, but no fish to get
- We need both of these: Smaller fish for the food chain but larger fish for fishing.
- More & larger fish!
- I would really prefer to catch more fish and larger in size.

- I'd rather fish for what our lake can support without heavy stocking.
- Rock Lake could be and should be managed as a trophy lake with size limits for harvest. You can have more fish and larger fish.
- Fishing is a well-attended activity in Jefferson County. Better management of the various species would increase participation and allow more local residents to enjoy this resource. A stocking program should be identified with assistance from the DNR and possible the UW.
- Bag limits and size limits should be changed for a couple years to allow for fish population to recover.
- Very few people catch and release
- The lake has been overfished in the past 12 years fish life has decreased and size has gotten smaller - there needs to be more enforcement of size limits. Catch and release should be more enforced.
- Slot size limits for fish harvest have been effective in managing fish populations for more fish and larger fish. Catch and release (no harvest) for northerns, bass, walleyes and muskies has improved those fisheries throughout the U.S. and Canada. Sport fishermen love it.
- I would like to see encouragement for rough fish tournaments, would be happy to contribute to such tournaments, open opportunity for fishing public to contribute to rough fish tournaments targeting dog fish, carp, and gar.
- Do you have a fishing derby?
- When I moved here walleye tournaments were successfully held on Rock Lake.
- Have more public fishing access from shore.
- Places of shoreline fishing for children & grandchildren with easy access.
- I think shore fishing opportunities could be improved on the lake. Fish sticks are a good first step. Maybe working with DNR fisheries staff to develop a map and tips for shore fishing. Connect people with the lake and help them have good experiences hopefully will lead to stewardship.
- Wildlife area under 'RR' bridge v. positive for lake & wildlife.
- Really enjoy hunting, fishing, and canoeing on Mud Lake. Would hope this portion of the Rock Lake watershed would be included in any improvement plans.
- Have fished and boated on Rock Lake for 18 years. The marsh used to be a prime spot in both spring and winter. Don't even fish the marsh anymore because you have dropped the water level so low that the fish are out of there so early.
- Eleven years ago when I bought my place on Rock Lake the water was crystal clear, my kids chased crayfish and minnows all along the shore, caught one fish after another off the pier and there were large fresh water clams everywhere off my pier. Now zebra mussels have killed off all the clams, the water is rarely clear, the rocks near shore are covered with slimy algae and very rare to find a crayfish or minnow. Big globs of filamentous algae float of the pier, and the fishing is bad. I think it corresponded to the increase in size of that chicken farm south of the lake. Coincidence? It's like the Lorax.

Funding Lake Improvements

- Grants from the DNR are not going to be happening with the current administration. DNR and clean water are low priorities. Allowing pollution is their current direction.

- As lake home owners, taxes paid/home value are above average so it would make sense to fund lake improvement activities from local government.
- A fund or drive to obtain necessary cleaning, future cleaning and preservation protecting future for our grandchildren and their children, looking forward, being stewards of our precious lake.
- While grants, donations, and fundraisers are great, a steady, reliable stream of funding could allow the RLIA to take a big step forward in protecting Rock Lake. More time can be spent on doing lake management work versus finding money for work.
- I do not support any increases it to the City/Town landowner taxes.
- In regards to question # 21 Formation of a new taxing body - Incentives (fertilizer, etc.)
- Boat launch fees would be #3 but push back may be worth it.
- Budget allocations from local governments - 1st to be cut in a crunch.
- City/town should support RLIA with money. A prime reason for the high tax base is the lake.
- I think the RLIA should be solely funded by its members. Another taxing authority is the last thing Rock Lake needs.

Invasive Species

- Priority should be for removal of zebra mussels, milfoil & other invasive weeds causing green "scum" on water.

Millpond

- The Mill Pond condition needs to be addressed as well. It used to be a great area to fish but is now almost unfishable & most times there is barely enough room to drive a boat through it. It needs to be cleaned up. It's an eyesore!!
- It would be nice to clean up the Mill Pond.
- Bad odors are coming from the Mill Pond.
- (Note: This comment was hard to decipher.) The lily pond by the Fire Department is poorly managed, designed and used. A wasted resource. Parking Lots? Should be walkway. Help make lily pond area a positive – not the current parking lot. Small boat for kids, small watercraft, walkway.
- I'm concerned about the possible dredging of the Mill Pond and what it may mean for the wildlife there. I don't know enough about the problem or the project to know if it may cause any problems. One concern is for the bullfrogs, as the population has been increasing in recent years. When the DNR Frog and Toad survey started 30+ years ago, there weren't any bullfrogs. This data is available through the DNR's ATRI website, or if not, I have copies of all the counts from about 1983 to present. I also have a lot of bird count data, some for the pond and marsh and woods, some for the lake.
- Most negative impact that concerns me is in the mill pond part of Rock Lake
- Consider dredging Mill Pond.
- Mill pond weed removal, used to be best place to fish. Weeds now prevent access

Odor

- Chicken farms cause odors; but it has been better lately.
- Large negative impact from bad odors is from the chicken farm.

- Port-O-Potty on Ferry Park landing smelly and often unclean.
- The egg factory is not managing their odor AGAIN!
- 4 different comments said: Bad odors are from chicken/egg farm.
- Current operating practices at the chicken fertilizer plant have improved dramatically since the avian flu outbreak. Chicken farm odors are now rare and acceptable.

Noise

- If you don't like the noise don't live next to the playground.
- Reduce noise pollution of ATV & snowmobiles. Limit speed?
- Increased use of loud stereos on board power boats is a problem.

Other

- In regards to question regarding negative impacts to lake - No major issues at this point mostly minor or temporary conditions.
- I grew up in the city on the lake. I currently live off of the n. end about 1 block from the boat launch. Eventually I will return to the house I grew up in. I stay in Lake Mills because of the lake. She is the Jewel in the Crown of Lake Mills.
- Zebra Mussels are a problem.
- 85 and 84 years old, come for the summer and enjoy sitting by the lake in the afternoon and evening. In the 54 years they have been coming the lake hasn't changed much. They donate 25$ each year to RLIA.
- Concerned about stewardship and appreciation of great natural resource, its sensitivity and teach the next generation to value what we have.
- Spring cleanup of flotsam at end of lake to remove organic matter.
- I'm native of Lake Mills and lover our lake. I've never lived on it – but doesn't mean I don't have very strong feelings for its future. I'm very nature.
- As a senior citizen, I basically enjoy the scenery around Rock Lake.
- I am not a lake resident. I believe I live in the watershed. I am not a lake user. I still care about the lake and watershed.
- We value Rock Lake. We do not boat, do not fish, nor swim, nor any other water recreation. We do ride the bike trail over the lake, and the streets by the lake (during good weather) and enjoy the scene and ambience. We love to sit at the Sand Bar, have a beer and enjoy the view and invite others from out of town to do so. So the lake is important to us, but not in the ways you ask about. For us it is scenic and ambience more than recreational.
- We live across from the Rock Lake City Park in the end condo and enjoy the view of the lake and the activities that go on there.
- Nice to see ice cream/snack shop open on public beach - I think it is on Mill Pond.
- I am now 74 years old and have lived in LM (city) for 34 years. Since moving her and having my own business, and working, I have not had as much time to spend on the lake. From age 12 to about 40 we used it a lot in the summer, but we didn't live here!
- A lake concern is respect from out-of-towners for our quiet water choices (canoeing, picnicking, for example), our way/choices of using this natural water source, understated people, understated activities, quiet life/activities that we have lived with and wish to continue that understated lifestyle.

- We are a family community – not a resort community. We are family not fame.
- Love Rock Lake. Wish I had more time to enjoy it. Spent every summer of my life at my parent's cottage. When I decided to buy a house I wanted to live in Lake Mills because of the lake and the library. Wish I could afford a place on the lake but that is out of my financial reach.
- I don't know enough to comment. I mainly view it while driving by or when my girls are playing at a park around it.
- Are some lake property owners pumping water from lake to water yards?

Piers, Rafts & Structures in the Water

- Too many boat docks and boats and play toys per household! Should be restricted to certain number per lot. Looks overkill. Shoreline is distorted.

Pollution - Agricultural

- Get rid of chicken farms in watershed area.
- Two years ago when chicken farm was closed, water clarity/quality was much better.
- Runoff, especially when fields are frozen, when it rains and the ground frozen manure runs off into water. Chicken manure in particular.
- Our biggest questions/concerns have to do with the large farms in/near Lake Mills and whether or not their waste & runoff is what we swim in with our kids.
- I believe that farm based runoff has improved dramatically since the public purchase of the Korth and muck farms. These public spaces add great value to the quality of Rock Lake.

Pollution - Residential Fertilizer/Pesticide

- Chemicals on the lawns of lake front owners should be restricted.

Pollution – Stormwater

- So much time and effort is spent on looking at farm runoff what about all the phosphorus from storm drains and people putting leaves in the road. Not to mention the city dumps all theirs in a marsh drainage area. Snow removal piles are dumped next to millpond.
- Since it is now time for mowing lawns, we know there are set rules about blowing fertilized lawn clippings into the streets and roads which ends up in our lake. These rules should be enforced in order to save our lake.
- Very concerned about the small retention pond and recurrent flooding on Shorewood Hills Road. Source of stormwater contamination of lakes and wells. The pond is across from our property on N6682 Shorewood Hills Rd.)
- Require new driveways and parking lots to have permeable surfaces
- Runoff from city

Pollution - General

- Dog waste at landings - would like to see more garbage cans on boat landings.
- Growing number of persons who walk their dogs in the parks and lake front areas, they pollute and destroy vegetation, flowers and quality of nature for others to enjoy, Dogs should not be allowed in parks if this pollution cannot be avoided.

- Increase in boating especially at north end where boats are anchored for long periods at the sand bar convinced human waste in being disposed of in the lake.
- Stop leaf blowing into lake (fines) for homeowners.
- Educate on light pollution at night. Stars, moonlight is what's beautiful.
- Oil and gas in the water
- Pollution from run-off from chemicals, construction, grass clippings
- In regards to question #18 - (floating plant debris) always there after weekends
- We love the lake but it is in the worst condition we've seen in 60 years. If we don't take care of the farm runoff and invasive species the rest won't matter! It makes sense to apply 100% of actions towards resolving the pollution and invasive species problem.
- We attended the report about the run off from the creek under Cedar Lane. They gave a list of inexpensive fixes, vegetation, etc. Never saw anything done. Did any of the recommendations get implemented?

Recreation

- I feel that charging a lake use fee would really separate people who want to use versus abuse the lake while adding good funding for improvements less just a launch fee. The annual fee (& sticker) could include a launch fee too.
- Plans for walking/hiking opportunities around the lake.
- Up fees on ice shanties.
- Sometimes wish they lived on the lake, but during the summer, congestion, noise, etc. makes them glad they don't. Lake is over used for its small size. Resort town.
- I would love to see a dock at Korth Park so my family can pull up, and enjoy the trails and playground.
- We used to use the lake daily when the kids were little.

Recreation – Beaches

- I am not educated enough on the condition of Rock Lake to comment much on its condition. However, I am very concerned about the presence of chiggers/swimmer's itch, and it makes me nervous to take my 4 year old girls swimming there.
- Priority should be for removal of geese droppings on Sandy Beach. The health of our children is more important than allowing geese to roam freely and contaminate the beach and water.
- Last year, brought family to beach. One or two affected by water (itch)/rashes.
- Every year we notice that Bartels Beach has a lot of drunk people and fighting as dinner nears.

Recreation – Boat Launches

- My family and I moved here a year ago. We have a boat and get on the lake about twice a month, usually on weekends. What I have found most surprising are the poor boat launches. There are 5 on the lake but 3 seem unusable (due to their location, lack of parking or a bridge that only allows the tiniest of boats). It is also frustrating that these launches are operated by two different entities – so if I buy an annual pass I'm automatically restricted to those. This seems silly for such a small lake. Lastly, the single slips at the main

launches seem insufficient, especially on weekend where there is typically a queue and zero patience. I'm not trying to complain. We love everything about the lake. If the launches never change we'll simply adjust and go on weeknights.

- Needs to be space reserved on beach by pier for people to dock their boat while parking or retrieving vehicle. There is one pier and usually the side on the right is filled by boaters parked to use the beach and/or restaurant. This backs up the boat launch for people that have to park or retrieve vehicle, and when the area is busy it is a lot of waiting. Maybe a boat parking area specifically for people using beach or restaurant so people docking to retrieve vehicles have access to the pier.
- Landing etiquette - Don't make people wait for you to get your trailer.
- Limit the number of boat launches on any given day.
- Should be a limit of number of boats that can be launched from public boat launch during busy weekends.
- We are lakefront property owners. The thing that bothers me is that we have to pay for launching our boats. $7.00 every time I want to use it. I'm a hunter and fisherman. I think the taxes are high enough that property owners should get a pass to launch our boats!
- Fees for things such as boat launching should be higher for out of state people and out of town people.
- Increase boat launch fees
- Boat launch fees are too low.
- People using lake should be assessed like swimmers are.
- Persons with Lake Mills address (this would include non-city residents with LM address as they are in school district) purchase launch fee at a preferred rate like the current $50 fee. If no Lake Mills address then increase both daily launch fee which would encourage residents to buy annual and raise fee for non-Lake Mills address to $100. Only use money toward lake improvement. This may also solve some congestion.

Recreation – PWCs

- Time for PWCs should be 10am – 7pm because of the noise.
- PWCs should be allowed from 10 am to 7 pm because jet skis are very loud and disruptive at earlier and later times when fishermen, kayakers, and homeowners enjoy the peace and tranquility of the lake.
- Having PWC hours be sunrise to sunset doesn't make sense – just as noisy as a boat if not more so.
- Personal watercraft should have very limited hours – these are so noisy!
- PWCs – noisy, polluters, dangerous behaviors by teens
- PWCs are too loud
- Wish PWCs were restricted completely because of the noise and recklessness of some operators
- I would be happy if there were no jet skis.
- Jet skis are horrid! You can hear them even away from the waterfront.
- No jet skis - our lake is genteel, gently used by locals and enjoys its quietness - not really a hip-hop jumping and jiving place by choice

- Jet ski people don't know the rules. Woodland Beach Resort guests take off from their shore with jet skis or boats with no care. They don't follow the lake rules.
- Have had jet skis cross our tow ropes many times. Scary!

Recreation - Towing

- Rock Lake is the only lake I have used/visited where towing is more restricted than other uses - either give towing equal rights - disallow any wakes for the same hours as towing has currently.
- Tubing really creates havoc on lake, as do wakeboard boats with fat sacks creating large wakes. Outlaw both and many problems to away.
- We have boat up north and like to ski early calm waters before crowded.
- Combining water skiing and tubing in the survey is concerning and unfair to water skiers. Waterskiing is a sport similar to wakeboarding and if it is to be combined with any activity is should be with wakeboarding. Both water skiing & wakeboarding require skill where tubing does not.
- Towing times: If sunrise to sunset can't be achieved every day, select mid-week days should be allowed and one morning and one evening on the weekends. These prime times for skiing have been denied since the 60's. It's wrong. Fishing boats today are bigger, heavier and more capable of managing normal wake activity.

Recreation - Watercraft Activity on the Water

- Often too big of motor boats going too fast: limit engine size or speed or boat size - Whatever could work. Dangerous with all the towers.
- Some large speed boats like to "hot rod" on the lake during the summer weekends. A noise or speed ordinance should be established to prevent this behavior.
- There is absolutely no need for a high power jet boat on the lake! One boat Sun 7/23 just kept going back & forth till almost 8 pm. Loud noise and constant waves when they passed. Very dangerous and disruptive to other boaters and fisherman. They were not towing cause they were too fast. Very dangerous.
- Control speed and large boats – too much power for lake size and noise
- The lake has much less watercraft activity than formerly.
- There are too many big fast boats.
- There are too many jet skis on lake and no one controls the way they ride. Too many high speed boats.
- Too many speed boats/jet skis. It overwhelms the lake, accidents are sure to happen.
- Too many watercraft.
- Too many boats!
- Too much boat traffic to feel safe or enjoy during the weekends.
- On holidays, the watercraft activity is such that the lake is unusable.
- Holiday use of the lake = heavily used
- On the weekends, there is too much boat activity on the lake, especially on holiday weekends. We keep our pontoon on a lift at Sandy Beach. There are times when both upper and lower parking lots are completely full of vehicles and trailers. They are also lined up from the beach to the bowling alley on the street. We used to boat on Pewaukee lake

before we got our lift here. On that lake, when the lots were full, the launch was closed. Perhaps something like this could be considered for Sandy Beach and the launch at the north end.
- Fishing boats with big motors go faster than slow no wake at sunrise.
- On the weekends, the lake is over-used by polluters.
- Boating activity has changed dramatically. In the 60's and 70's organized sailboat races featured 20+ boats on summer Sunday afternoons and many, many more water skiers. Boat traffic was chaotic. Today there are fewer ski boats, more pontoon boats, kayaks and paddle boards. Jet ski use is down as well.

Recreation - Rules
- I think the rules are being consistently followed and often overly applied to the point of not even enjoying our time on the lake. Cops are over the top on the lake.
- Police patrol too anxious to give tickets and are very rude to residents.
- Lake patrol is appropriate and effective.
- I think enforcement of existing rules has diminished in the last few years.
- DNR does a nice job consistently enforcing the recreational rules.
- We need some sort of water patrol that keeps boaters in line. There should also be officials at boats-out to control the chaos. If you don't believe me, come to the boat landing some weekend evening and see for yourself.
- Dogs on beach although signs state they are not allowed.
- Should be a no smoking rule on the beach and areas with children. There should be signs and the rule should be enforced.
- Pontoons & power boats traveling at high rates of speed very close to the shoreline are a safety hazard to swimmers, and their wake causes shoreline erosion. This is a frequent occurrence along the eastern shoreline.
- I think everyone needs to have instruction in proper boat handling
- Renting jet skis to people who do not know the rules should not be allowed.
- It might be helpful to put out informational flyers, emails, newspaper articles featuring key safety issues such as non-motorized boats have the right of way, safe distance from other boats and how important it is to always be able to see the water at the bow of the boat to avoid collisions. Uneducated boaters is my primary concern.
- We have a house on Korth Bay. The "no wake" rules is a start but needs to be augmented with "propeller tilt" information. The un-tilted deep draft boats and inboards leave a trail of muddy water often enough that I think it's a problem.
- At times the snow-no-wake times are not followed. At times, the time restrictions for PWCs are not followed. For the most part, majority of boaters do a great job.
- Is there such a thing as speed limits (in mph) on the water/for watercrafts?
- Please don't look to find ways to restrict use of Rock Lake. It's a treasure that belongs to all Wisconsin citizens.
- Ban vehicles on lake during ice cover.
- Stiff fines and fast timeline to retrieve vehicles that break ice.

Rock Lake Improvement Association

- The RLIA should communicate lake management issues to government officials - especially regarding construction runoff and salt/plowing.
- Volunteers to help those enjoying the lake to stay informed/follow guidelines.
- Interest was expressed to join committees, person was contacted and asked for availability which was provided. The person never heard back. If you want to engage and gain members, it takes effort.
- Is the Rock Lake Improvement Association a nonprofit organization that is in the category similar to humane society and united way?
- Officer's names and phone numbers should be included in all Rock Lake Improvement Association correspondence and newspaper articles. The website only lists 2015 officers!
- RLIA should have a more visual presence @ the lake boat launches. Similar to the fundraising sign for the band shelter. List current projects, current state of funding and include lake usage statistics so people see how heavily the lake is used. (#boats) (fish pop size est)
- RLIA should assist watershed agricultural interests in developing, implementing and verifying effective nutrient and runoff management plans.
- I don't see a useful purpose for the RLIA.
- In regards to question on priorities for RLIA - These items are not management they are important actions!
- Does the Rock Lake Improvement association obtain information on the water quality and plant growth of the refuge - south of the bike trail?

Shoreland Development

- Too many houses near lake.
- Don't build so many homes by the water – harms the lake. Would like to see the lake not have too many houses.
- Too much development near shore.
- Home size has a moderate negative impact on lakefront
- Over the years, the modest homes built on the lake shore have given way to huge "castles." These not only block the lake from neighborhoods, but they are creating more pollution as they tend to have "fancy" landscapes, use chemicals to maintain lawns and prevent pests, and are owned in many cases by summer residents. They are not as engaged in lake improvement or town issues as full-time residents who would LOVE more access to our lake. PLEASE let's not allow Rock Lake/Lake Mills to become another Lake Geneva.
- Too many (part time) visitors with huge expensive homes on the lake from (out of state)

Shoreland Native Plantings

- If you have native plants available for us to plant along the shoreline we will be interested in the information.
- Survey # 271 - Please contact me or give my name to lake property owners looking for information & guidance on native plantings at the shoreline. I have been adding natives for over ten years.

Survey

- Consider an online survey.
- Survey was only addressed to the husband, wife was a member as well.
- Signing the letter with "Rock Lake Improvement Association" is too vague! And unprofessional! Officer's names should be listed here!

Thanks/Praise

- Thanks for the opportunity to give input.
- We are very impressed with the current lake, I can only imagine what improvements can do. We have lived in lake communities our whole lives, Rock Lake is the cleanest & safest we have experienced. Thank you for all you hard work!
- I own land and may build on day. Keep up the good work!
- Your work is appreciated.
- Thank you for including us in the survey!
- Thank you for your concerns and attention. We appreciate this association's work very much! We love Rock Lake and hope it can remain the "hidden gem" that it is. I feel anyone who owns property on the lake should fully understand the importance of "their" shoreline and be educated about the positive and negative impacts they can create.
- Thank you to the Rock Lake Improvement Board for doing a great job.
- I think the RLIA does a great job - Thanks!
- Thank you for the opportunity to share our thoughts.
- Survey # 451 - You know I will help when I can. Keep up the good work and thanks for all you do.
- Thanks for all you do!!
- Thank you for being interested in our input. We want to be active in the efforts to keep Rock Lake an amazing resource for generations to come!
- We all appreciate your efforts and active participation. Please respect the rights on resident boaters also on lake.
- Keep up the good efforts!
- Thank you for sending me this survey. I am willing to get involved with the association. I will have more time available in the next 3 years after I retire. (# 524)
- Thanks for putting this together.
- Keep up the good work.
- Thank you for your efforts to improve the lake.

Water Levels

- Why isn't the water level a prime topic in the survey? To me it is your biggest issue.
- My only concern is and for over 50+ years have been trying for someone to listen to is the water level in the fall of the year. In my opinion the overall regulating of the level could be better. Being a duck hunter the fall draw down starts too soon. I've been fighting this for years. Be city council or management.
- Would also like explanation of WHO in DNR and WHY water levels are regulated as they presently are. Particularly EARLY fall drawdown!!

- Keep the water levels at highest point.
- Lake level maintained much too low.
- Closer attention to lake level to prevent shoreline heaving in winter.
- A reliable source told me a year ago that the City Manager or Management was not following DNR recommendations as to water level, etc. He would receive the directives but still do his own thing. Would like DNR to follow up after giving directives to see if the city is really doing what they should be doing. And we don't hear much about the fish hatchery anymore.

Water Quality

- I see slow deterioration of water quality. The plan needs to outline measures that make a strong commitment to preserving/increasing water quality.
- Spring & fall are best for water quality. June, July, & August get bad. I am unable to swim ever into September because of swimmer's itch.
- In regards to question #19 (#17 other) - Swimmer's itch. Until recent years this was NEVER a problem. I swam at the beach daily growing up & never even heard of this. Now people are all panicky over it. It's crazy.
- Water clarity depends on the time of day.
- This year the clarity is fair. Last year it was good.
- Overall, Rock Lake is a great lake and resource for many. The water clarity is among the best in Southern WI. Rain and activity can diminish but overall we love the lake. There's always room for improvement so education is key. Commercial lawn services and residents desire for grass to the water are 2 concerns – reduce chemical use and clarity/quality will improve.
- Obtaining funding and permit approval to remove phosphate and excessive organic matter from Korth Bay should be top Association priority. The lake will continue to deteriorate until this root cause is addressed.
- The sewer system installed in the 60's is the single biggest improvement. Add parkland like Korth Park and the Zeloski Marsh and the lake will continue to improve on its own.
- Observations indicate the lake quality has improved during the past 5 or so years.
- Lake quality seems great but not qualified to give an opinion.

APPENDIX D

Boating Regulations

(as of August 2016)

Many people enjoy Rock Lake because of its good water quality, and fish and wildlife habitat. Several state and local rules govern its use to help ensure the safety of citizens and to protect Rock Lake's quality into the future. This pamphlet lists some of the rules applying to recreational activities in Rock Lake. It is important to note that violation of these rules can result in fines and enforcement actions. The rules included here are not a complete list, and are subject to change. Please contact the appropriate government official for further details. State boating and fishing regulations can be found on the DNR website: http://dnr.wi.gov

Boat Launches

- The launch fee must be paid to use the Town boat launches from May 1 through September 30.
- The launch fee must be paid to launch or remove watercraft at the City boat launches throughout the year.
- The launch permit must be displayed on the front windshield of the launching vehicle.

Slow-No-Wake Times and Areas

Slow-No-Wake – the slowest possible speed so as to maintain steerage control.

- Boats must operate at slow-no-wake between sunset and sunrise.
- Buoyed restricted areas and ecologically significant areas are slow-no-wake at all times and include the Mill Pond, Korth Bay (from White Oak Drive in the north to just north of the Elm Point boat launch), Schultz Bay (from the east side of Rock Lake Park to the south side of Ferry Park), and Marsh Lake.
- Boats must operate at slow-no-wake speed within 100 feet of shore, piers, docks, rafts, and buoyed restricted areas.
- Personal watercraft must be operated at slow-no-wake speed within:
  - 100 feet of any other vessel
  - 100 feet of a pier, dock, raft, or buoyed restricted areas
  - 200 feet of shore

Water Skiing, Tubing, Aquaplaning, etc.

- Water skiing, tubing, aquaplaning, and similar activities are not allowed between 7:00 pm and 10:00 am.
- A Coast Guard approved life preserver must be worn when water skiing, tubing, aquaplaning, or similar activity.
- When a vessel is towing a person on waterskis or other device, the operator must have a competent person on board to act as an observer.
- Vessels involved in towing may not come within 100 feet of other vessels, buoy-marked swimming areas, or public boat landings.

Personal Watercraft
- Personal watercraft may not be operated between sunset and sunrise.

Age Restrictions – Motorboats
- A person under 10 years of age may not operate a motorboat.
- Persons 10 or 11 years old may operate a motorboat only if accompanied by an adult.
- Persons 12-15 years old may operate a motorboat under either of the following two conditions:
  - they are accompanied by an parent, guardian, or a person at least 18 years old who is designated by the parent or guardian
  - they have successfully completed a DNR-accepted boating safety course
- Persons 16 years old and older and born on or after 01/01/89 may operate a motorboat only if they have completed a DNR-accepted boating safety course.

Age Restrictions – Personal Watercraft
- A person under 12 years of age may not operate a personal watercraft.
- A person born on or after 1/1/89 and at least 12 years old may operate a personal watercraft only if they have successfully completed a DNR-accepted boating safety course.

Other Boating Rules
- Vessels should always be operated at speeds which allow for adequate time and distance required to stop or avoid an accident.
- It is illegal to operate a motorboat or manipulate water skis or similar device while under the influence of alcohol or drugs.
- Motorboats and personal watercraft must be operated in a responsible manner. Maneuvers that endanger people or property are prohibited.
- Vessels must not operate closer than 100 feet from any diver's flag or any swimmer unless the vessel is part of the diving operation or is assisting the swimmer.
- Navigation lights must be on from sunset to sunrise, and during periods of restricted visibility.
- The following must be authorized by the Lake Mills Town Board: boat race, regatta, water ski meet, or other water sporting event or exhibition.

Swimming
- Swimming from an unoccupied boat is not allowed.
- Swimming more than 150 feet from the shore is not allowed unless in a designated swimming zone or when accompanied by a competent person in a boat.
- Swimming more than 150 feet from the shore between sunset and sunrise is not allowed.

Snorkel/Skin/Scuba Diving Limitations
- Persons participating in scuba diving, snorkeling or underwater spear fishing beyond 150 feet from shore must display a diver's flag.

Littering
- It is illegal to dump refuse, garbage, or plastics into or on the water, ice, shore, or upon public or private property.

Fishing

- A person 16 years old or older must have a current Wisconsin fishing license.

Size and Daily Limits

Species	Season	Minimum Length	Daily Limit
Bass	**	14 inches	5 in total
Northern Pike	**	26 inches	2 in total
Bluegill, sunfish, crappie, perch	All Year	None	25 in total
Walleye	**	15 inches	5 in total
Bullhead, rough fish, rock bass	All Year	None	None

**1st Saturday in May to 1st Sunday in March

Aquatic Invasive Species Laws

- It is illegal to launch or place a vehicle, boat, boat trailer, equipment or gear into the water if an aquatic plant or animal is attached.
- It is illegal to transport on a public highway a vehicle, boat, boat trailer, equipment or gear, if an aquatic plant or animal is attached.
- It is illegal to use a live prohibited fish invasive species or live non-native crayfish as fishing bait.

Aquatic Invasive Species Prevention Steps - It is the Law:

- INSPECT your boat, trailer, and equipment.
- REMOVE all attached aquatic plants, animals, and mud before launching and before leaving the water access.
- DRAIN all water from boat, motor, bilge, live wells, bait containers and all equipment before leaving the water access.
- NEVER MOVE plants or live fish away from a waterbody.
- DISPOSE of unwanted bait and other animals and aquatic plants in the trash.
- BUY minnows from a Wisconsin bait dealer.
- Use leftover minnows only under certain conditions: You may take leftover minnows away from any water and use them again on that same water. You may use leftover minnows on other waters only if no lake or river water or other fish were added to the container.

Reporting Violations

- Violations to these rules and regulations can be reported to the Jefferson County Sheriff Department at 920-674-7310 or the DNR at 1-800-TIP-WDNR (1-800-847-9367) or #367 from your cell phone (free for US Cellular customers).
- To email a report of violation not in progress: le.hotline@wisconsin.gov.
- Include the following items when reporting a violation: boat certificate of number, violation, location, and time and date of incident.