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RICE LAKE, BARRON COUNTY

2020 LAKE MANAGEMENT SUMMARY REPORT

WDNR WBIC: 2103900

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March 4, 2021

RICE LAKE-LAKE PROTECTION
AND REHABILITATION DISTRICT

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PREPARED FOR THE RICE LAKE – LAKE PROTECTION AND REHABILITATION DISTRICT

INTRODUCTION

The Rice Lake – Lake Protection and Rehabilitation District (Lake District) completed many actions in 2020 – some with the support of grant funding and some on their own. During the 2020 season, Covid-19 restricted many activities but did not cancel them entirely. Two regular events that the Lake District is usually involved did get cancelled – Aquafest and the Barron County Fair. The following list of 2020 activities will be discussed in this Summary Report.

- Curly-leaf pondweed (CLP) and nuisance and navigation relief native aquatic plant management
- Hybrid watermilfoil (HWM) management
- Purple loosestrife (PL) management
- Aquatic invasive species (AIS) monitoring
- Watercraft inspection through the Clean Boats Clean Waters (CBCW) program
- Buoy placement with installation of nighttime navigation lights and debris removal
- Water quality monitoring through the Citizen Lake Monitoring Network (CLMN)
- Maintenance of shoreland improvement projects
- Update of the old Aquatic Plant Management (APM) Plan
- Comprehensive lake management data analysis – Lake Response and Watershed Modeling
- Support for community projects (Arnolds Landing, Wooly the Mammoth, Rusty the Draft Horse, and Red Cedar Watershed Conference)
- Board Meetings
- Annual Meeting
- Moon Lake native aquatic plant harvesting
- Grant Reimbursements

CLP AND NATIVE AQUATIC PLANT MANAGEMENT

The Lake District continues each year to manage early season CLP in Rice Lake. Early season CLP management moves into native aquatic plant management later in the season to provide nuisance and navigation relief by cutting navigation lanes and removing nuisance level vegetation. 2020 was no exception. CLP management planning was completed by Lake Education and Planning Services (LEAPS) and a WDNR mechanical harvesting permit application for approximately 193 acres of CLP and native aquatic plant nuisance and navigation lanes was submitted.

During the 2020 harvesting season, a higher end GPS system was installed on one of the three harvesters owned by the Lake District. After some initial modifications, the system worked well helping to track where harvesting took place. Having the GPS on the harvester also allows for uploading of files to identify where harvesting lanes are to be cut. Use of this system in 2020 was limited, but it is expected that it will be used more in 2021.

Unfortunately, record keeping in 2020 did not separate CLP harvesting from native plant harvesting so there are not numbers specific to each management action. However, approximately 155 truckloads (1,550-tons) of CLP and native plants were removed from Rice Lake in 2020. This equates to 3,100,000-lbs of vegetation. Randy Bina, a Lake District Board member and retired agricultural consultant collected plant samples from the harvested loads and had them analyzed for phosphorous content. The samples he took in were 70% water and 30% dry matter. This suggests there were 930,000-lbs of dry plant material removed from Rice Lake in 2020. The phosphorus content of the

samples was 0.29%. This suggests that aquatic plant harvesting in Rice Lake removed 2,697-lbs of phosphorus from Rice Lake.

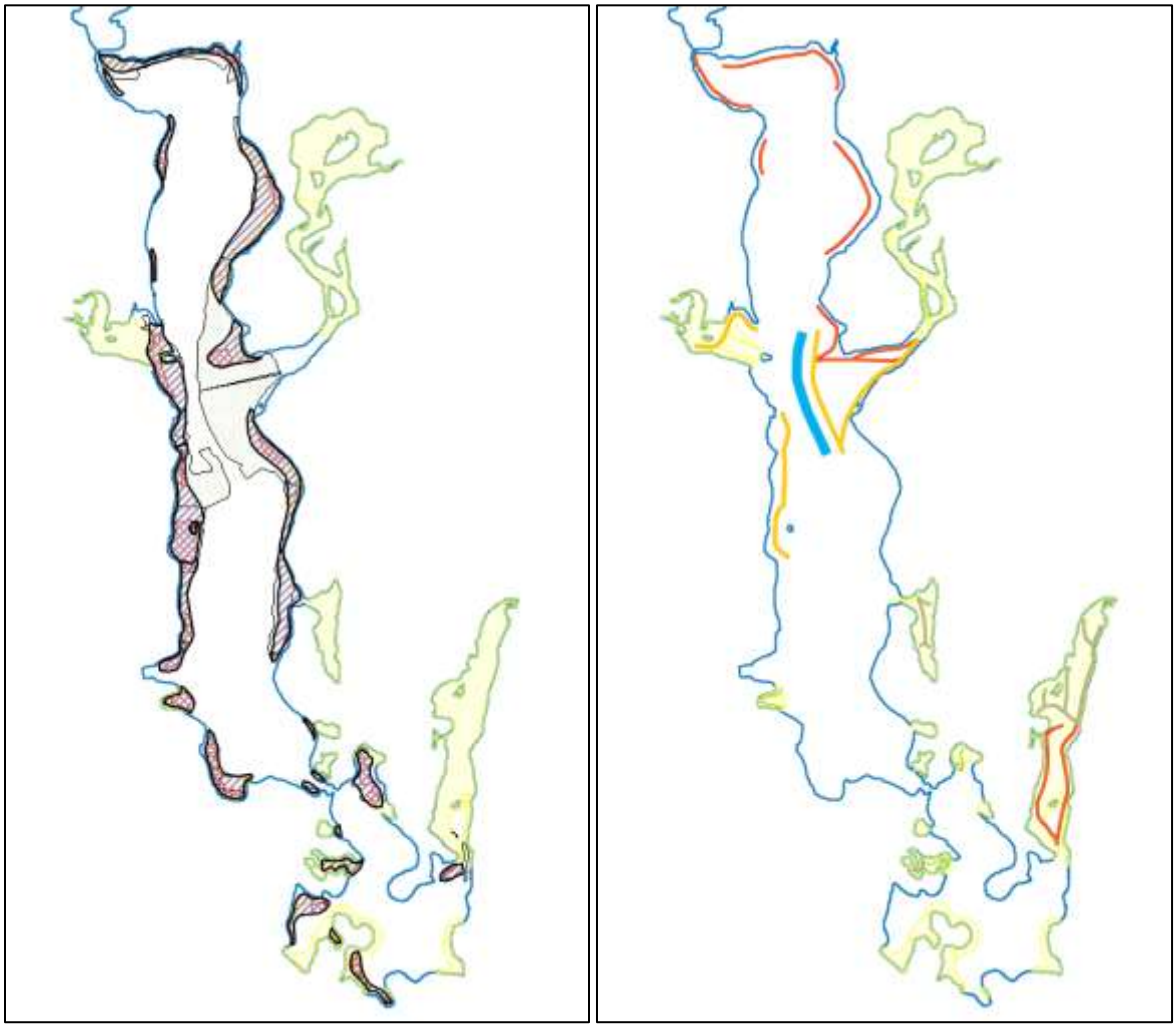

Figure 1: 2020 CLP harvesting areas (left); 2020 nuisance and navigation lanes (right)

Table 1: 2020 CLP and native aquatic plant harvesting details

2020 Expected CLP Harvesting Plan March 23, 2020			
2008, 2018, & 2019 CLP Bedmapping Comparison			
Color	*Year*	*# of Beds*	*Total Acres*
Tan/Black	2008	33	199.3
Orange/orange	2018	23	32.34
Red/red	2019	27	34.63
2020 CLP Harvesting Plan			
Purple/black	2020	23	137.43

2020 Rice Lake, Barron County Summer Navigation Lanes Harvesting Program March 23, 2020			
Color	*Width (ft)*	*Miles*	*Acres*
Gray	20	1.2	2.91
Yellow	20	1.21	2.93
Green	40	0.36	1.75
Red	60	3.14	22.8
Orange	80	1.77	17.2
Blue	160	0.45	8.73
		8.13	56.32

No chemical treatments for CLP or native plants were completed in 2020.

2020 was the last year included in the old APM Plan. New management is guided by the updated 2021-2025 APM Plan currently residing with the WDNR for review and approval.

HYBRID WATERMILFOIL MANAGEMENT

In 2018, hybrid watermilfoil was found in the Clearwater Bay area of the south basin of Rice Lake. A WDNR Rapid Response grant was applied for and awarded to help manage the new non-native infestation, including survey, physical removal (rake, snorkel, and scuba), and the use of chemical herbicides. In 2018, physical removal and herbicide were used to control HWM. No harvesting was completed in the Clearwater Bay area of the south basin in 2018. In 2019, no HWM was found early in the season so no herbicide treatment was completed. Several surveys later in 2019 did find more HWM which was mapped and then physically removed.

In the spring of 2020, initial survey work completed in early May discovered a lot of HWM, much more than had been found in 2018. Mapping was completed. Physical removal was completed with scuba, snorkel and rake removal while a chemical treatment permit application was submitted to the WDNR for approval. A local scuba diver was contacted and spent half a day diving on HWM identified by the Lake District's consultant. Lake District volunteers and paid staff supported the scuba diver removal program.

Chemical treatment was proposed in three areas covering nearly four acres. Chemical treatment using Shredder Amine 4, a liquid 2,4D based herbicide was completed by Northern Aquatic Services on June 3, 2020 with very good results. Additional survey work was completed on several different dates with physical removal via rake and snorkeling was completed. All HWM discovered after the chemical treatment was documented and will be the basis of a 2021 chemical treatment proposal. It is also expected that some level of chemical management of CLP will be completed in 2021 along Lakeshore Drive in the main basin and in the south basin.

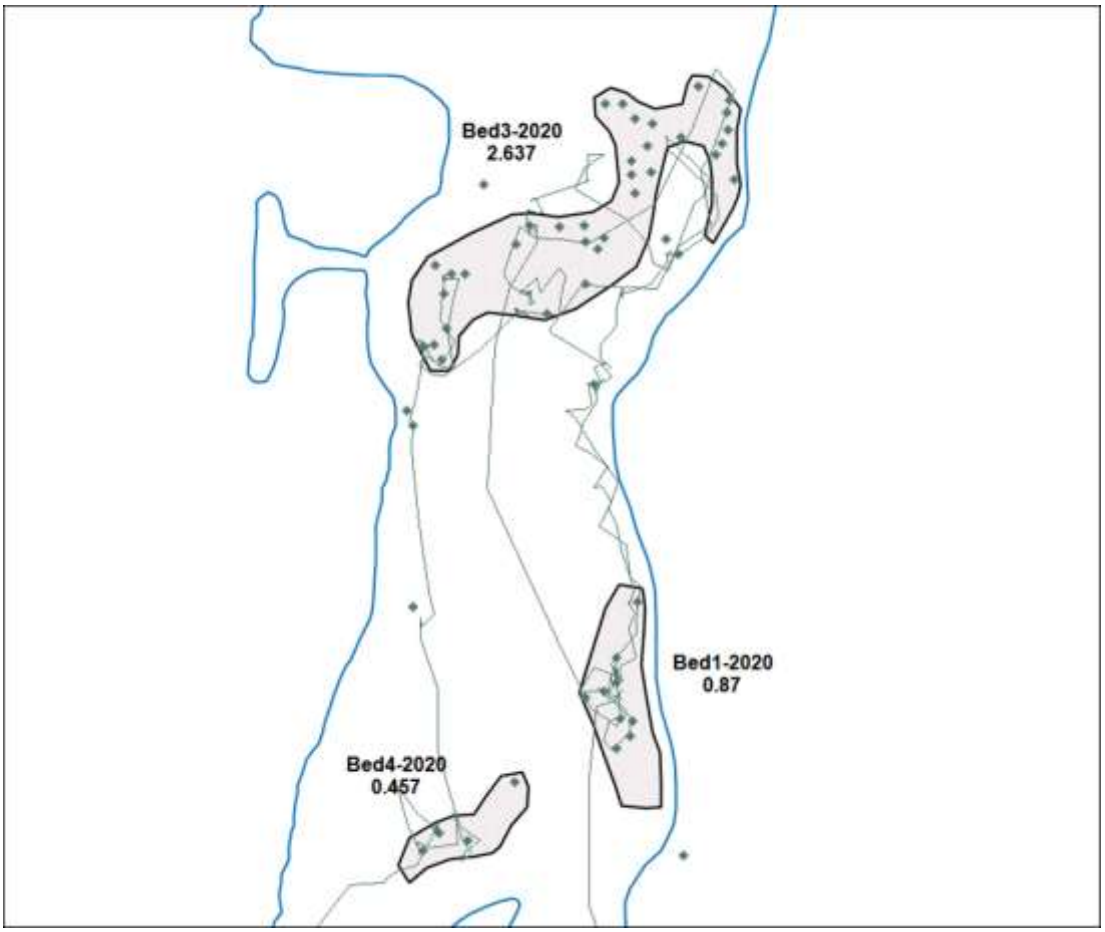

Figure 2: 2020 HWM Chemical Treatment Map w/acreage

Table 2: 2020 HWM Chemical Treatment Details

Rice Lake, Barron County 2020 HWM Chemical Treatment Plan 5/23/2020						
Treatment Site	**Acreage**	**Mean Depth (feet)**	**Volume (acre-feet)**	**Treatment a.i. ppm**	**Treatment application (gal)**	**Application rate (gal/ac-ft)**
Bed4-2020	0.46	3	1.38	3.5	3.44	2.49
Bed1-2020	0.87	3	2.61	3.5	6.50	2.49
Bed3-2020	2.64	3	7.92	3.5	19.72	2.49
	3.97		**11.91**		**29.66**	

PURPLE LOOSESTRIFE MANAGEMENT

In early August, a purple loosestrife survey was completed of the entire lake. PL was only found in the south basin along the southern shore adjacent to Orchard Beach Lane just before the Orchard Beach Public Boat Landing on the south basin. Several volunteers for the Lake District, guided by their consultant removed several large bags of flowering PL plants. No herbicide was applied, but as much of the plant as possible was cut and disposed of.

Figure 3: Lake District volunteers Lana Blumer, Molli Fauske, and Kylie Zeilie with the purple loosestrife and hybrid watermilfoil they removed on August 4, 2020

AQUATIC INVASIVE SPECIES MONITORING

Another non-native plant, yellow-flag iris was discovered along the same shore that the bulk of the purple loosestrife is located. It was really too late to remove it in August, but future monitoring and removal will be completed in 2021. Several other non-native, invasive plant species have also been discovered on the shores of Rice Lake in the past including Japanese knotweed and reed canary grass.

AIS monitoring was completed by Lake District volunteers and their consultant. At least one trip to the lake was made in each month June-September to look for, document, and remove if possible invasive species. CLP, HWM, PL, yellow-flag iris, and zebra mussels were looked for. No new AIS (other than yellow-flag iris) was found in Rice Lake in 2020.

WATERCRAFT INSPECTION – CLEAN BOATS CLEAN WATERS

Because of Covid-19, the start date for watercraft inspection at the two main landings on Rice Lake was delayed until late May. However, from May 29 to September 3, 328 hours of CBCW watercraft inspection time were completed. Inspectors spent 167.5 hours at the Stein/Lumbering Hall of Fame Park landing and 160.5 hours at the Orchard Beach/Veteran's Park landing. Overall, 400 boats were inspected – 730 people were directly contacted by inspectors.

The 2020 CBCW results were fewer than previous years as the program was directed by the Lake District's consultant. Several part-time employees spent 4-hr shifts at the landings throughout the summer season. The 2020 program was funded by a WDNR CBCW grant. That grant has been completed and reimbursed. The Lake District has received another CBCW grant to support the 2021 watercraft inspection season.

BUOY PLACEMENT AND DEBRIS REMOVAL

Lake District employees are involved in many activities other than harvesting aquatic plants. Each year now, since 2010 navigation buoys have been installed in the central basin of the lake between the Red Cedar River delta and large western bay below the Fairgrounds. The purpose of these buoys is to direct large boats and fast moving boats through a narrower part of the lake in an effort to maintain a deeper channel and to minimize disturbances for fishermen along this area. On either side of the 160-ft wide fast navigation channel are narrower channels for more leisurely passage and fishing. For the first time in a number of years, the channels on each side of the buoys were harvesting increasing fishing and leisurely boat usage.

The Lake District also installed navigation lights on top of the buoys that mark the main traffic lane in this area. The buoys had been taking hits from boats navigating in the dark. The lights now make the buoys much more visible.

Lake District employees also spend a lot of time removing floating mats of plant fragments and other debris from the lake during the harvesting season.

WATER QUALITY MONITORING THROUGH CLMN

Water quality data through the CLMN program was collected by Lake District volunteers and their consultant in 2020 from three locations on the lake: North Basin, Central Basin, and South Basin. Total phosphorus, chlorophyll, water clarity, and dissolved oxygen/temperature profiles were collected from the South Basin and the Central Basin. Only water clarity and dissolved oxygen/temperature profiles were collected from the North Basin.

NORTH BASIN

Rice Lake - North Basin was sampled 4 different days during the 2020 season. The average summer (July-Aug) secchi disk reading for Rice Lake - North Basin (Barron County, WBIC: 2103900) was 3.75 feet. The average for the Northwest Georegion was 8.6 feet. Typically the summer (July-Aug) water was reported as MURKY and BROWN. This suggests that the secchi depth may have been mostly impacted by suspended sediments, tiny particles of soil or organic matter that are suspended in the water. Shallow lakes are often turbid because wind stirs up sediment from the bottom. High suspended sediments are often found in flowages and impoundments where precipitation runoff from the watershed transports solids via an incoming stream.
The overall Trophic State Index (based on secchi) for Rice Lake - North Basin was 58. The TSI suggests that Rice Lake - North Basin was eutrophic. This TSI usually suggests decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

However, since your lake's water clarity was not predominately impacted by algae, your lake's trophic state might be different than the secchi TSI suggests. TSI is a value to measure nutrient enrichment. On your lake, to determine the true trophic state, you would need to measure chlorophyll. A limited number of grants are available to expand your monitoring to this level if you are interested (contact your Region Coordinator for more info).

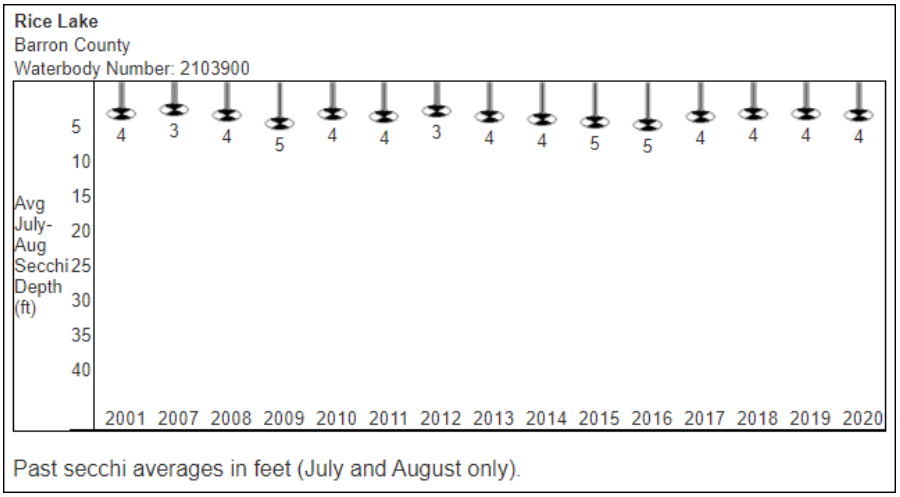

Figure 4: Historic averages of summer Secchi disk readings of water clarity in the North Basin of Rice Lake

CENTRAL BASIN

Rice Lake - Site B/Central Basin was sampled 6 different days during the 2020 season. Parameters sampled included water clarity, temperature, dissolved oxygen, total phosphorus, and chlorophyll.

The average summer (July-Aug) secchi disk reading for Rice Lake - Site B/Central Basin (Barron County, WBIC: 2103900) was 4 feet. The average for the Northwest Georegion was 8.6 feet. Typically the summer (July-Aug) water was reported as MURKY and BROWN. This suggests that the secchi depth may have been mostly impacted by suspended sediments, tiny particles of soil or organic matter that are suspended in the water. Shallow lakes are often turbid because wind stirs up sediment from the bottom. High suspended sediments are often found in flowages and impoundments where precipitation runoff from the watershed transports solids via an incoming stream.

Chemistry data was collected on Rice Lake - Site B/Central Basin. The average summer Chlorophyll was 23.3µg/l (compared to a Northwest Georegion summer average of 15.5µg/l). The summer Total Phosphorus average was 39.3 µg/l. Lakes that have more than 20 µg/l and impoundments that have more than 30µg/l of total phosphorus may experience noticeable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Rice Lake - Site B/Central Basin was 59. The TSI suggests that Rice Lake - Site B/Central Basin was eutrophic. This TSI usually suggests decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

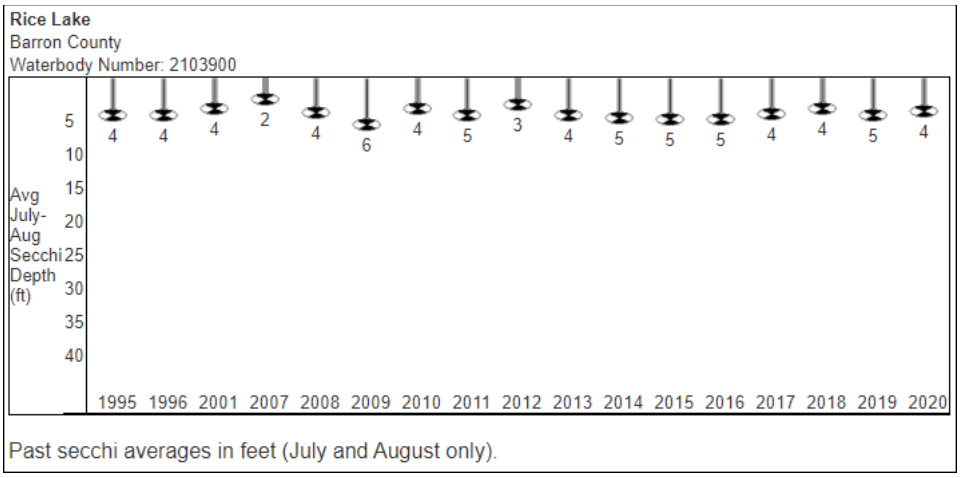

Figure 5: Historic averages of summer Secchi disk readings of water clarity in the Central Basin of Rice Lake

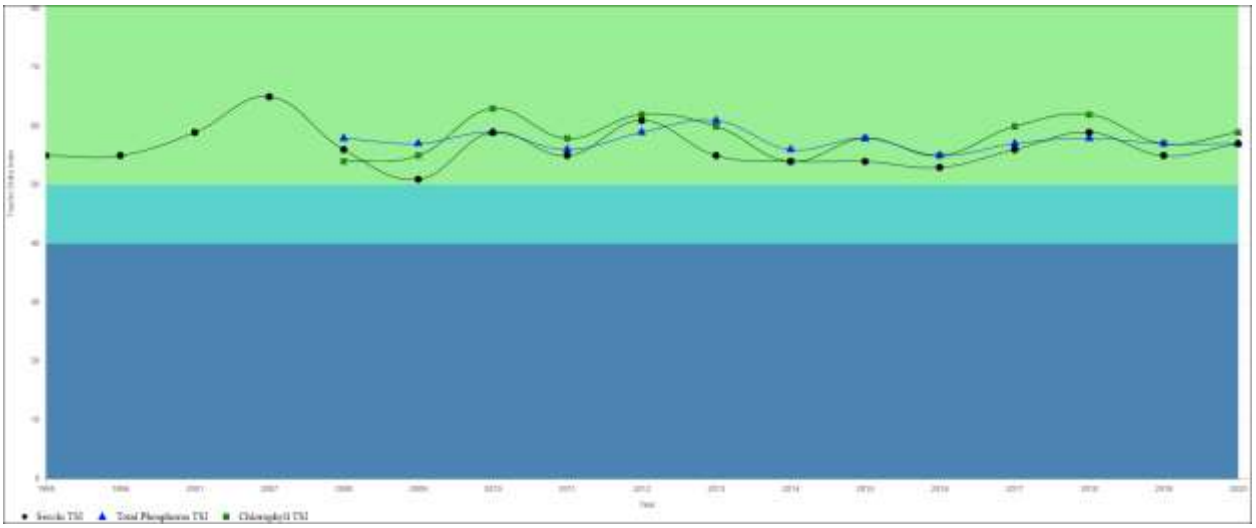

Figure 6: Trophic State Index values for Secchi, total phosphorus, and chlorophyll for the Central Basin of Rice Lake

SOUTH BASIN

Rice Lake - Site C/South Basin was sampled 7 different days during the 2020 season. Parameters sampled included water clarity, temperature, dissolved oxygen, total phosphorus, and chlorophyll.

The average summer (July-Aug) secchi disk reading for Rice Lake - Site C/South Basin (Barron County, WBIC: 2103900) was 4.9 feet. The average for the Northwest Georegion was 8.6 feet. Typically the summer (July-Aug) water was reported as MURKY and GREEN. This suggests that the secchi depth may be mostly impacted by algae. Algal blooms are generally considered to decrease the aesthetic appeal of a lake because people prefer clearer water to swim in and look at. Algae are always present in a balanced lake ecosystem. They are the photosynthetic basis of the food web. Algae are eaten by zooplankton, which are in turn eaten by fish. You will know algae are causing reduced Secchi depth if the water generally appears green when you assess the color

against the white background of the secchi disc.

Chemistry data was collected on Rice Lake - Site C/South Basin. The average summer Chlorophyll was 13.5µg/l (compared to a Northwest Georegion summer average of 15.5µg/l). The summer Total Phosphorus average was 24.6µg/l. Lakes that have more than 20µg/l and impoundments that have more than 30µg/l of total phosphorus may experience noticeable algae blooms.

The overall Trophic State Index (based on chlorophyll) for Rice Lake - Site C/South Basin was 54. The TSI suggests that Rice Lake - Site C/South Basin was eutrophic. This TSI usually suggests decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

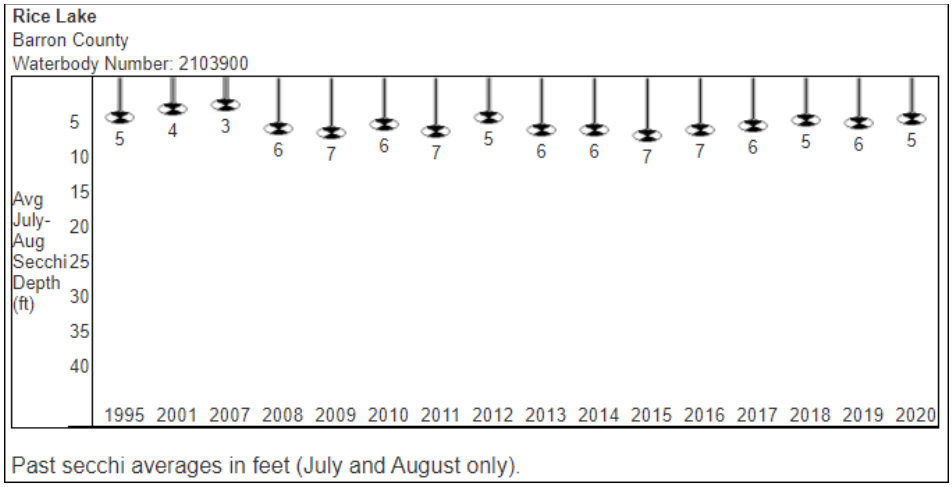

Figure 7: Historic averages of summer Secchi disk readings of water clarity in the Central Basin of Rice Lake

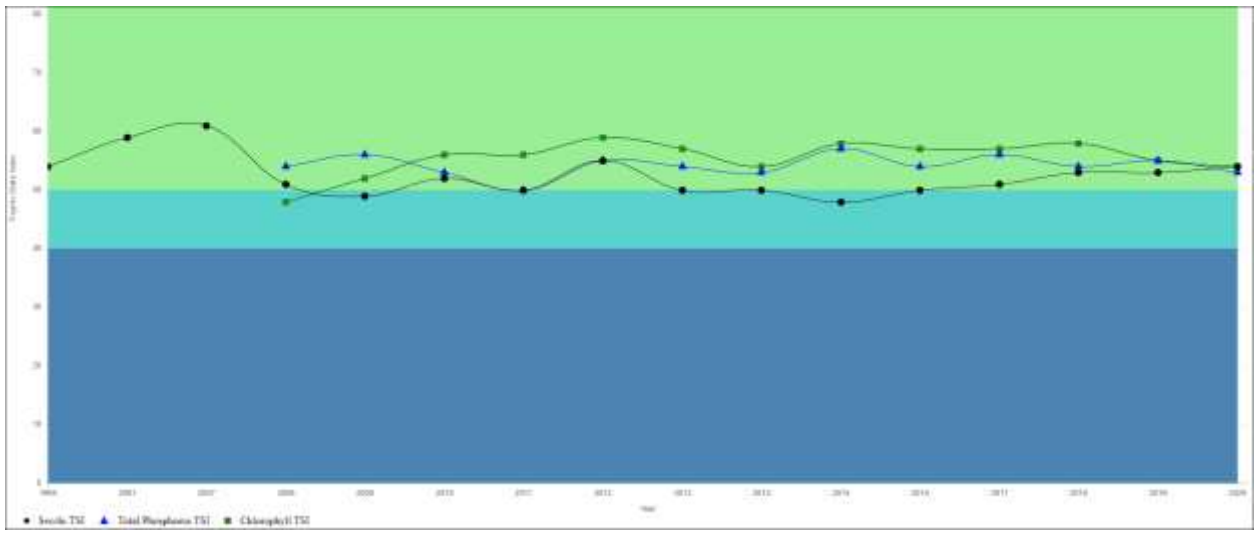

Figure 8: Trophic State Index values for Secchi, total phosphorus, and chlorophyll for the Central Basin of Rice Lake

DISSOLVED OXYGEN AND TEMPERATURE PROFILES

Lake District volunteers and their consultant collected dissolved oxygen (DO) and temperature (Temp) profiles from each site three or four times in 2020. In the South Basin, the water column becomes fully stratified in June

with the thermocline established in the 12-15 foot range. It remains this way through September. Oxygen levels were below 2.0 ppm for most of the summer and into the fall.

In the Central and North Basins, the water column remained mixed for most of the season, with oxygen levels only dipping below 2.0 ppm briefly a couple of times in the August and September. Mixing in the Central and North Basins occurs because of the amount of water coming into the Main Basin from Bear Creek and the Red Cedar River providing nearly continuous flushing. There is no such tributary entering into the South Basin, so flushing does not occur as continuously, leading to low oxygen levels and phosphorus release from the bottom sediments at times when no oxygen is present in the deep water. As has been mentioned in past reports, the South Basin and the Main Basin are basically two different types of lakes connected by a narrow channel. Water moves from the South Basin into the Main Basin. Water does not flow into the South Basin from the Main Basin.

SHORELAND IMPROVEMENT PROJECTS AND SIGNAGE

According to the Shoreland Habitat Committee Chair, signs hi-lighting shoreland improvement projects and identifying Lake District owned land were installed at 7 sites: Narrows Park Rain Garden, Beach Walk Rain Garden, Scout Island, Pebler Wetland Property, Fairgrounds Rain Garden, Arnold's Landing Rain Garden, and the Shudlick Park Rain Garden. Spring clean-up was completed at the Beach Walk and Narrows Park. Planning for clean up and maintenance is scheduled for 2021 at the Fairgrounds, Arnold's landing and the Rice Lake Town Hall. The rain garden at the Rice Lake Town Hall was not draining appropriately in 2020.

The Lake District has a program in place that provides up to $500.00 of matching funds for shoreland improvement projects or any other project for a property included in the Lake District Boundaries that will help reduce runoff into the storm sewer system and into the lake. Native plants have been grown in cooperation with the UW-Eau Claire Barron County Biology Department for use in installing native plantings and rain gardens.

Additional work was done by this Committee to manage the sites where several historical sculptures were installed along Lakeshore Drive. This committee has also been working on a transfer of land owned by the Town of Rice Lake to the Lake District. This property is adjacent to the Hwy 48 bridge between the North Basin of Rice Lake and Stump Lake. This transfer has not been completed yet.

Along with the Operations Committee and the Lake District consultant, this Committee has been working on a new Lake Coordinator position description with the intent to hire a part-time person in 2021.

UPDATE OF THE LAST APM PLAN FOR RICE LAKE

When hybrid watermilfoil was discovered in the Clearwater Bay area of the South Basin in 2018 a WDNR rapid response was applied for and received by the Lake District. This grant was primarily for the survey, planning and management implementation to control the new infestation. It also included and update of the existing Aquatic Plant Management Plan for the lake.

This update was completed in December 2020. A draft of the new APM Plan was approved by the Lake District Board in February 2021. The APM Plan and its appendices have been sent to the WDNR with a formal request for review and approval.

Due to Covid-19 in 2020, presentation of the APM Plan to the Rice Lake District constituency was delayed until such a time in 2021 when restrictions for gatherings are lifted and risk of spread is much lower.

The new APM Plan covers the years 2021-2025. It includes goals, objectives, and actions to control aquatic invasive species including CLP, HWM, and PL. It also includes harvesting of native vegetation to improve navigation and relieve nuisance conditions.

COMPREHENSIVE LAKE MANAGEMENT PLANNING

As a part of a Lake Management Planning grant that was awarded several years ago, the existing Comprehensive Lake Management Plan for Rice Lake was supposed to be updated to a 9-Key Element Plan. Unfortunately, the necessary data to update the plan was not available. As a result a lot of data was collected and is being used to identify projects that could be done in the watershed to improve or maintain Rice Lake. Certain grant funds from the WDNR can be used to support projects like this that are shovel ready and referred in some form or another. This could be Lake Management Plan, a County Land and Water Resource Plan, etc.

Despite not completing a full 9-Key Element Plan for the lake some of the data was analyzed and recorded. It is summarized in the next few paragraphs.

The area of land that drains towards a lake is called a watershed. The watershed for Rice Lake is 68,060.10 acres in size. The largest land uses in this management area are row crop (34.2%) and forest (35.5%), with forest contributing the greatest phosphorus load to the Lake (61%).

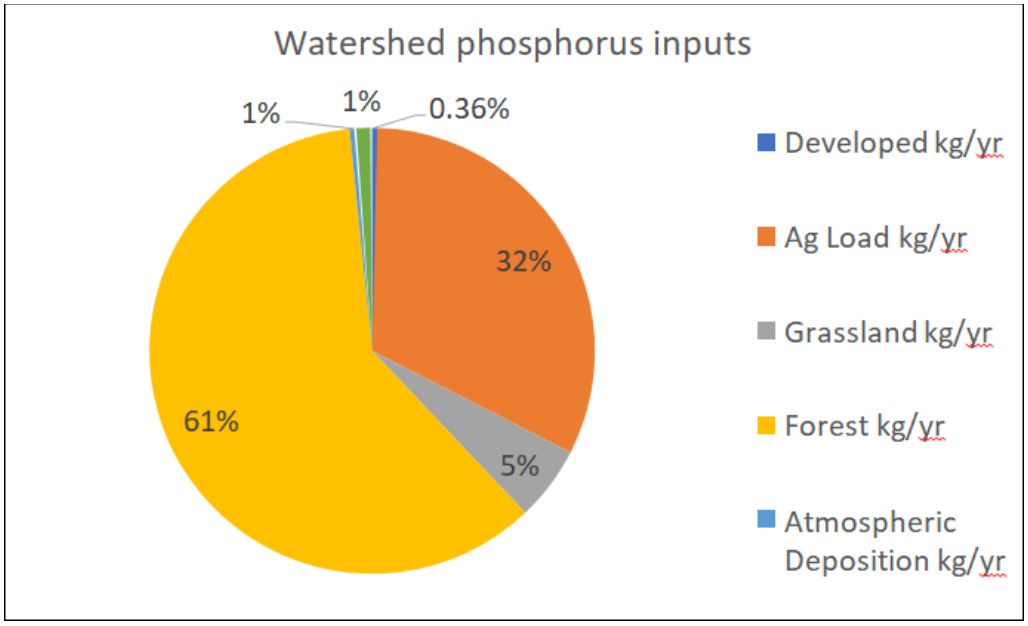

Figure 9: Rice Lake watershed phosphorus inputs (JAW, 2020)

The larger Rice Lake watershed was divided into sub-watersheds based on tributary flow from Bear Creek and Little Bear Creek, the Brill River, Fenton Lake, and the Red Cedar River between Mikana and Rice Lake, and the immediate drainage into Rice Lake.

The Wisconsin Lakes Modeling Suite (WiLMS) was used to model current conditions for Rice Lake, verify monitoring, and estimate land use nutrient loading for the watershed. Phosphorus is the key parameter in the modeling scenarios used in WiLMS because it is the limiting nutrient for algae growth in most waterbodies.

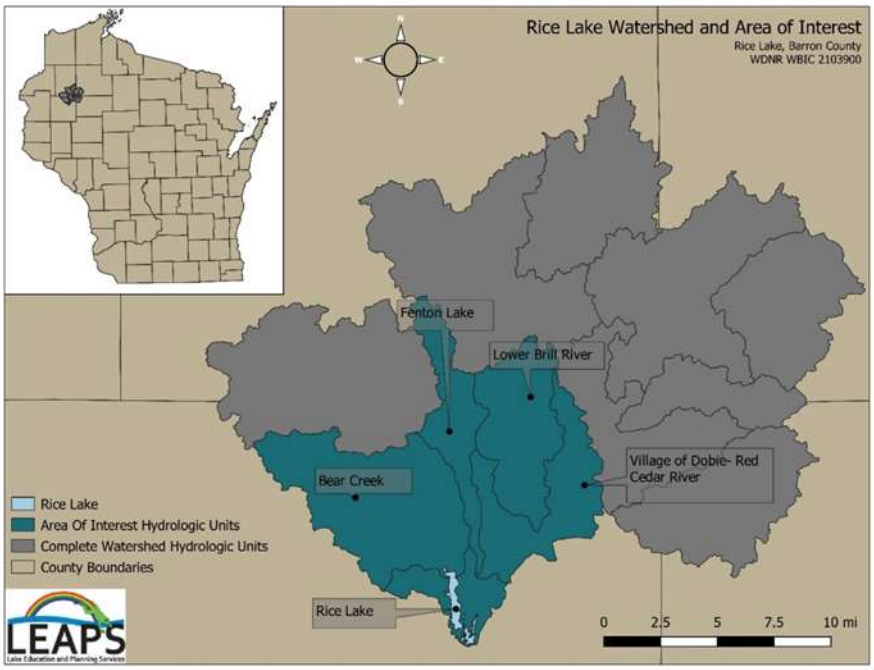

Figure 10: Rice Lake sub-watersheds – Rice Lake, Bear Creek, Fenton Lake, Lower Brill River, and Dobie-Red Cedar River

For each of the sub-basins, loading was calculated using the WiLMS model. For Bear Creek WiLMS determined that the land use that contributed the most nutrients to the lake was agriculture, contributing approximately 70% of the total phosphorus load. For Fenton Lake the contributions were different with forest contributing the major percentage of phosphorus to the lake. Previous studies have shown that Fenton Creek contributes very little water and nutrients to the lake. For Dobie Red Cedar agriculture primarily contributes to phosphorus with 80% of the phosphorus load coming from this land use. The total contribution of Dobie Red Cedar to Rice Lake is 2,283 kg/yr or 5,022.6 lbs/yr of phosphorus. For Brill River agriculture again is the primary source of phosphorus with 73% of the phosphorus load coming from this land use. The total contribution of Dobie Creek to Rice Lake is 1,940 kg/yr or 4,268 lbs/yr of phosphorus. The loading from the Rice Lake sub-basin was not calculated as there was no tributary draining it.

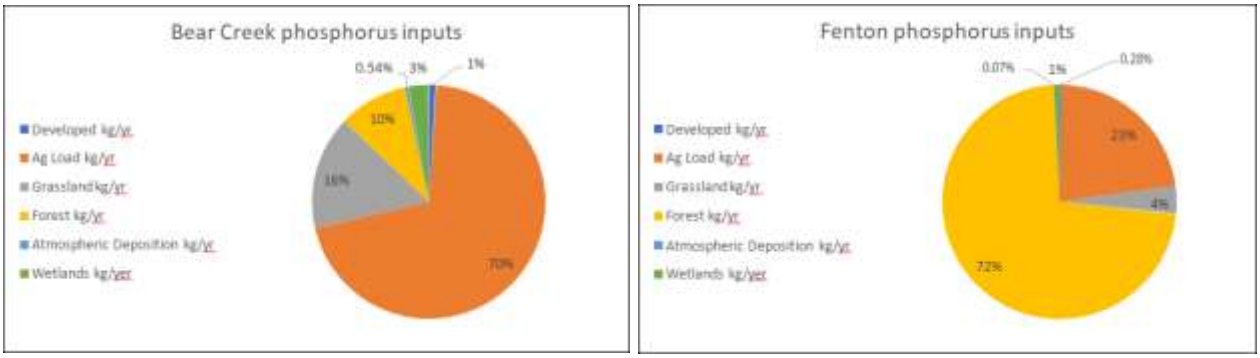

Figure 11: Bear Creek and Fenton Lake sub-basin loading

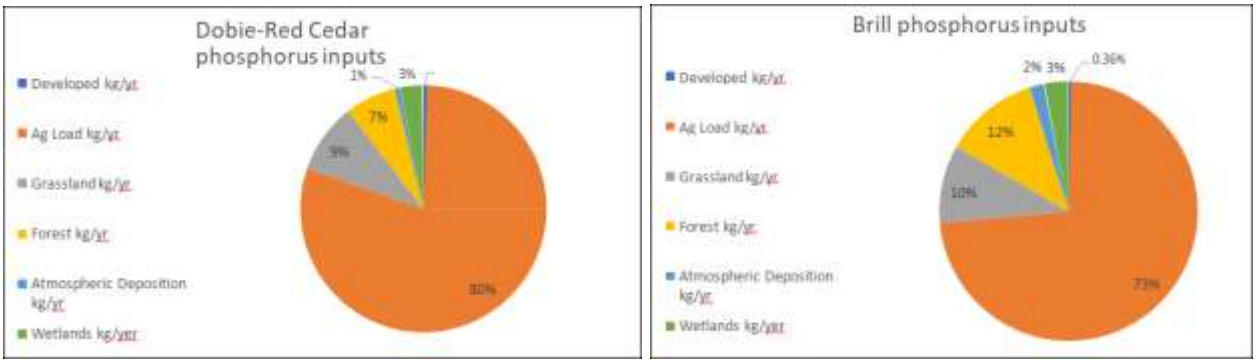

Figure 12: Dobie-Red Cedar and Brill River sub-basin loading

The US EPA STEPL (Spreadsheet Tool for Estimating Pollutant Load) model was used to calculate the nutrient budget for Rice Lake. STEPL employs simple algorithms to calculate nutrient and sediment loads from different land uses, and the load reductions that would result from the implementation of various best management practices (BMPs).

For each watershed, the annual nutrient loading is calculated based on the runoff volume and the pollutant concentrations in the runoff water, as influenced by factors such as the land use distribution. For nutrient inputs into the lake the model uses the equation: Total Load form various sources = Urban + Cropland + Pastureland + Forest + Feedlots + User – Defined + Septic + Gully + Streambank + Groundwater.

When the STEPL model is applied the loading results from each sub-basin is represented in the following table.

Table 3: STEPL model results for each Rice Lake watershed sub-basin

Watershed	N Load (no BMP)	P Load (no BMP)	BOD Load (no BMP)	Sediment Load (no BMP)
	lb/year	lb/year	lb/year	t/year
Dobie-RCR	42407.93462	18221.11959	86490.59586	4961.466639
Bear Creek	112316.5821	34172.20897	228227.5481	6656.80368
Fenton LK	51670.0083	18652.66068	91272.12404	4257.687441
Lower Brill	34021.54557	14882.57815	69609.7303	4069.824238
Total	**240416.0705**	**85928.56738**	**475599.9983**	**19945.782**

The results show that management activities should be concentrated in the Bear Creek sub-basin first and then Dobie Creek and the Brill.

When loading results are broken down by land use, the following results are given.

Table 4: Watershed loading results based on sub-basins and land use

Sources	N Load (lb/yr)	P Load (lb/yr)	BOD Load (lb/yr)	Sediment Load (t/yr)
Urban	8468.730945	1331.539658	30006.95242	193.6155747
Cropland	142424.7601	66239.52383	278255.9684	17918.11285
Pastureland	27588.43754	3575.653595	87151.55404	627.7169916
Forest	3804.453164	2139.831941	9145.586204	228.4666916
Feedlots	46545.19112	9309.038225	62060.25483	0
Wetlands	754.6297691	622.5695595	1509.259538	235.8218028
Septic	389.5775767	152.5845509	1590.775105	0
Total	**229975.7802**	**83370.74136**	**469720.3506**	**19203.73391**

Not surprising, the model shows that agriculture is the largest contributor to nutrients and sediment. Therefore, management activities on those land uses may prove to be the most beneficial for lake water quality.

The STEPL model also allows the user to run different scenarios applying BMPS to land uses within each sub-basin. In this case five different scenarios were run. In Scenario 1 buffers were applied to 5% of the agricultural land in Dobie and Bear Creeks and 10% in the Brill River sub-basin. In Scenario 2, 50% of all the agricultural land had 35' buffers applied to them. In Scenario 3, 50% of the agricultural land had traditional cover crops applied to them. Scenario 4 had 50% traditional cover crop applied and rain gardens applied to the residential land within the watershed. Finally, Scenario 5 had 100% of the agricultural land in the sub-basins (minus Fenton as the runoff form that sub-basin rarely reaches the lake). How much phosphorus and sediment each of these scenarios may reduce the loading by are shown in the following figure. Scenario 2 with 35-ft buffers applied to all agricultural land provides the best reductions of these scenarios.

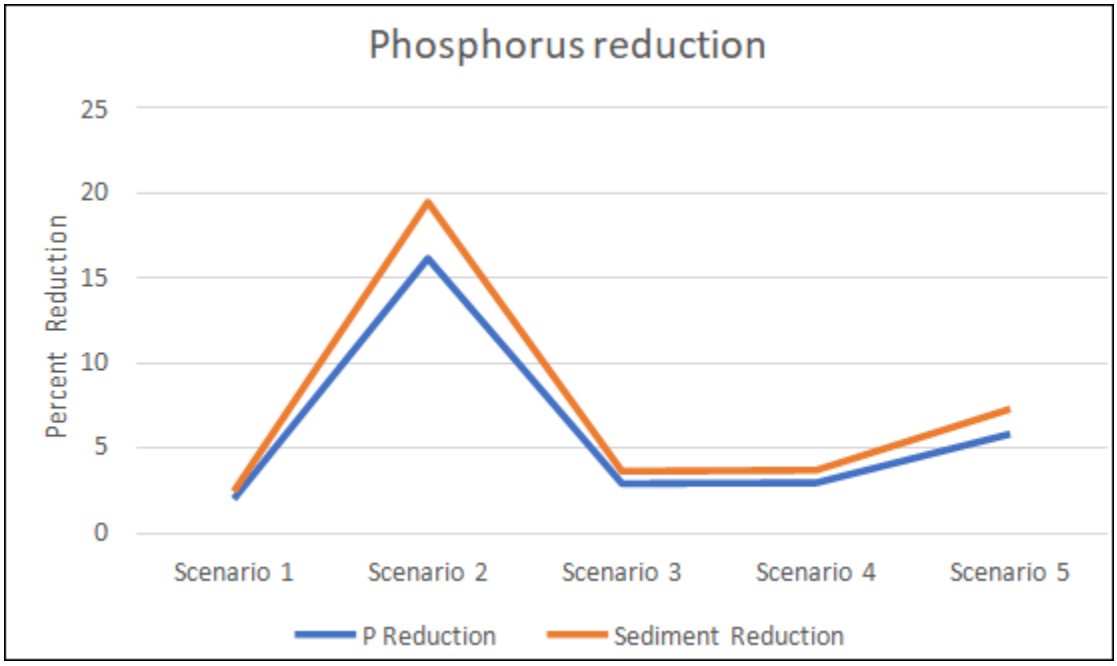

Figure 13: Phosphorus and sediment reduction by scenario

A total phosphorus mass budget method was used and estimates of the internal load were calculated for Rice Lake. This method concluded that phosphorus is more likely to be deposited into the sediment than be released, however more in-situ monitoring near the sediment/water interface could better extrapolate internal nutrient dynamics.

The model was calibrated using available data for the lake and reductions based of the STEPL model were incorporated to calculate the lake's response. With a 5% reduction in P loading, the surface water P value is predicted to be 58.36µg/L. A 10% reduction results in a value of 55.65µg/L. A 15%reduction results in 52.92 µg/L. A 20% reduction in the areal phosphorus load to Rice Lake resulted in a predicted mixed water column phosphorus concentration of 50.17µg/L.

By using the modeled data and comparing it to monitored data it is possible to predict reductions in chlorophyll *a* concentration in the water column and total gross primary production. When done, the predicted values for chlorophyll *a* concentration are much higher than the observed values corroborated through actual field sampling. However, it is still a useful exercise to model the results graphed against reductions in the areal load of phosphorus. See the following graphs.

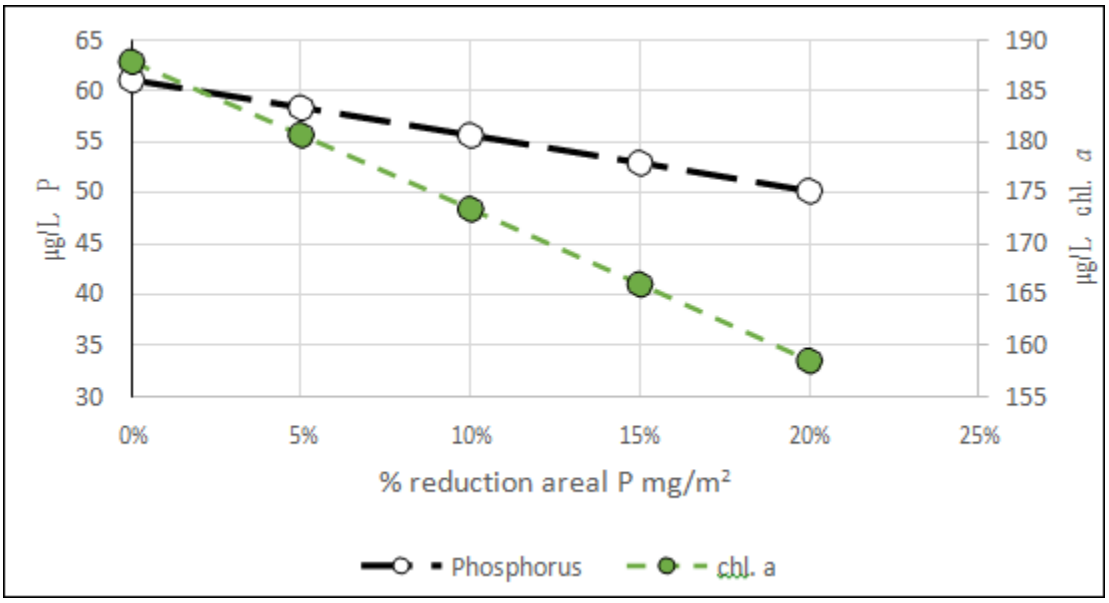

Figure 14: Reduction in phosphorus and chlorophyll a

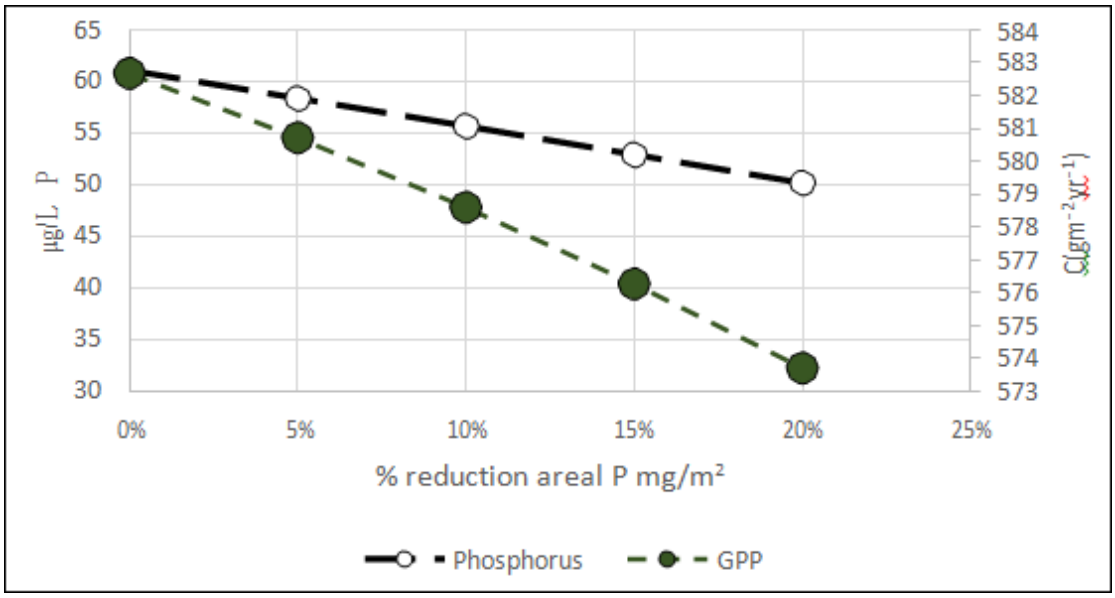

Figure 15: Reduction in phosphorus and gross primary production

Although the values are much higher than the observed data, the reduction in both chlorophyll and gross primary production do not show the diminishing returns that are often seen in watershed phosphorus reduction models. Because the trend line for production follows the trend line for phosphorus reduction it is likely the lake would begin to "clear" or become less green as nutrient loads are reduced.

SUPPORT FOR COMMUNITY PROJECTS

The Lake District supports many different community activities. In 2020, the Town of Rice Lake improved the boat landing at Arnold's Landing. The Lake District contributed financial support to complete the project.

Lakeshore Drive is becoming an area that the City of Rice Lake is trying to promote by making improvements and installing what amounts to historical monuments aimed at the history of Rice Lake and the surrounding area. One such project is the installation of iron sculptures along with information slates. Wooly the Mammoth is an iron sculpture hi-lighting the early post-glacial period of the area. Rusty the Draft Horse is a similar sculpture hi-lighting

the logging history of Rice Lake. A third sculpture hi-lighting the Native American community in and around Rice Lake when settlers first came here will be installed in late 2021 or early 2022. The Lake District has contributed financial support for all three of these important historic projects.

Related to these is the Bayfield Trail sign near Indian Mounds Park along the lakefront. To date this has been an ugly, falling apart sign supposedly providing information about an Indian and Trading Route through Rice Lake that started up in Bayfield County. It crisscrosses the state north to south. A new sign will be installed that will do a much better job at hi-lighting the historic trail. The Lake District has contributed financial support for this project as well.

Rice Lake and its watershed are part of the larger Red Cedar River Watershed that begins up by Birchwood with Big Chetac Lake and follows the Red Cedar River through to south of Menomonie WI to the Chippewa River. The Red Cedar River Watershed includes nearly all of Barron and Dunn Counties and parts of Sawyer, Washburn, Rusk, and Chippewa Counties. Every year, a Red Cedar River Watershed Conference is held in Menomonie at UW-STOUT. For every year of the conference, the Lake District has been a major sponsor.

LAKE DISTRICT BOARD MEETINGS AND ANNUAL MEETING

The Lake District holds board meetings monthly throughout the year. These meeting are always open to the public. Because of Covid-19, several of the meetings were held by ZOOM only, and one was canceled. Current meetings are a combination of ZOOM and in-person. All CDC guidelines are followed included social distancing and mask wearing.

The Annual Meeting of the Lake District occurs in October and is preceded by a mailing to every property owner included in the District Boundaries, even to those who have main addresses outside of the District receive this mailing. The mailing provides a summary of the activities completed during the year, lays out a budget for the coming year, and invites all to participate. This year, digital attendance was promoted.

MOON LAKE AQUATIC PLANT HARVESTING

For the second consecutive year, the Lake District completed native aquatic plant harvesting using its own equipment on Moon Lake. This has been a point of discussion for several years. Half of the property around Moon Lake is included within the Lake District boundaries. As such property owners automatically pay taxes to support operations of the Lake District. Until 2019, few services were provided to the Moon Lake folks. Moon Lake is a very shallow, plant-dominated waterbody. It currently has no non-native invasive species, only over-abundant native vegetation that causes navigation issues, nutrient loading, contributes to anoxic waters that can and has caused fishkills under the ice, and that pretty much covers up any open water.

New properties are being developed on Moon Lake by the City of Rice Lake. Many property owners on Moon Lake have asked the Lake District to include them in their management actions. Several years ago, the Lake District aided the Moon Lake Association in the development of an Aquatic Plant Management Plan.

In 2020, the Lake District completed the purchase of a new mechanical harvester and a tilt-bed trailer making it much easier to launch a harvester into Moon Lake using its very shallow landing. Harvesting was first done as a test run in 2019. In 2020, 31 truckloads (310 tons) of aquatic vegetation were removed from Moon Lake late in August and September. During the harvest, the Lake District consultant checked in on the progress to make sure harvesting was following the APM Plan that had been developed. Lake District employees and Moon Lake volunteers cleaned and disinfected the harvester before it was launched into Moon Lake and again after it was removed from the lake. The harvester used was immediately put in storage for the winter season and will not see water again in Rice Lake until sometime in late April 2020.

The harvester was operated by a Moon Lake resident who has also been an active participant with the Lake District. More than 70% of the plants harvested from Moon Lake were watershield. The estimated cost to the Lake District was $7,095.00.

2020 WDNR GRANT REIMBURSEMENT REQUESTS AND CLOSEOUTS

In 2020, five different grant-funded projects were completed and final WDNR requests for reimbursement filed.

LAKE MANAGEMENT PLANNING PROJECT – PHASE 1

This was the first of two project phases with the purpose of updating the Comprehensive Lake Management Plan for Rice Lake. Phase 1 of the project included two years of tributary monitoring, lake monitoring, and the updated Lake Management Plan. Nearly everything in this project was completed. Only the final version of the update Management Plan was not. When the grant was closed out, the WDNR did not reimburse the money in the grant specifically for this purpose. This was a loss of less than $3000.00 and did not cost the Lake District any money.

LAKE MANAGEMENT PLANNING PROJECT – PHASE 2

The second phase of this lake management planning project was specifically for the development of a Storm Water Management Plan for the Barron County Fairgrounds. Cedar Corporation was contracted with by the Lake District to complete the plan and support implementation. This project has some issues when Cedar Corporation did not initially make good on its project deliverables to the Lake District. After more than a year of haggling, the appropriate deliverables were completed.

A large retention basin/rain garden was installed on a back portion of the Fairground to capture runoff from the animal sheds and road around the horse track. Barron County assisted with this project. Funding for the project was provided through another grant given to the Lake District as a result of construction and runoff issues from the V&53 Highway Interchange in Haugen. This project was reimbursed in its entirety.

HYBRID WATERMILFOIL EARLY DETECTION AND RAPID RESPONSE PROJECT

When hybrid watermilfoil was found in the Clearwater Bay area of the South Basin in Rice in 2018, the Lake District applied for and received a grant from the WDNR to help with planning and management of the new invasive species. This grant funded three years of HWM management including physical removal, rake removal, snorkel removal, and scuba removal. It also funded two years of herbicide application in Clearwater Bay.

The grant also included funding to update an existing APM Plan. This was completed in late December 2020. The new plan covers the years 2021-25. A final draft of the APM Plan was approved by the Lake District in February 2021 and sent to the WDNR with a request for review and approval. A final reimbursement request for this grant was submitted to the WDNR in late February 2021. Once approval has been gained, the APM Plan will again be placed out for public viewing. Management planning in 2021 is already following guidelines in the new plan.

CLEAN BOATS CLEAN WATERS

Each year for the last several, the Lake District has applied for and received a grant from the WDNR to support its watercraft inspection program. The activities assigned to this project were completed in 2020 and a reimbursement made and accepted.

A new grant to support CBCW in 2021 has been applied for and received already.

RECREATIONAL BOATING FACILITIES

In 2019, the Lake District was awarded a Recreational Boating Facilities (RBF) grant to offset costs related to the purchase of a new harvester in 2020. That purchase was made and the grant obligation met and reimbursed in 2020.

FUTURE GRANTS

It is expected that the Lake District will apply for grant funding to support AIS management and/or implementation of BMPs to reduce loading from the watershed. The Shoreland Committee is working on identifying property owners who might be interested in installing Healthy Lakes projects in 2022 and beyond.

The Lake District is working on hiring a Lake Coordinator to act on behalf of the lake and community in 2020. This first year will be a test year to see how well it works out. If the position is successful, the Lake District may apply for grant funding to support the future of the position.

FINAL WORD

Again, it was a busy year for the Lake District, a testament to the concerned, interested, and capable people that make up the Lake District Board. As has been experienced in many previous years, it seems the community is mostly satisfied with what is happening in and around Rice Lake.

Respectfully Submitted by Dave Blumer, LEAPS