



**CLFLWD**  
WATERSHED DISTRICT

# **Comfort Lake-Forest Lake Watershed District**

## 2022 Progress Summary

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## INTRODUCTION

MN Rules 8410.0150, subpart 3, item E, states that watershed districts shall provide a report including: “E. at a minimum of every two years, an evaluation of progress on goals and the implementation actions, including the capital improvement program, to determine if amendments to the implementation actions are necessary according to part 8410.0140, subpart 1, item C, using the procedures established in the goals and implementation sections of the plan under parts 8410.0080, subpart 1, and 8410.0105, subpart 1.”

In 2015, the Comfort Lake-Forest Lake Watershed District (CLFLWD or District) began a comprehensive effort to evaluate progress toward the goals and metrics described in the District’s 10-Year Watershed Management Plan, resulting in the creation of the first comprehensive Progress Report in 2016. The District has produced this report on an annual basis from 2016-2021. Starting with reporting year 2022, the District will scale back its reporting efforts on a biennial basis. Every other year the District will produce a comprehensive Progress Report evaluating progress toward all of the goals in the Watershed Management Plan. In the off years, the District will produce an abridged Progress Summary focusing on the highest priority water quality goals and capital improvement projects.

The following Progress Summary provides an update on project implementation, water quality improvements, impaired waters delisting statuses, and grant awards associated with capital improvement projects.

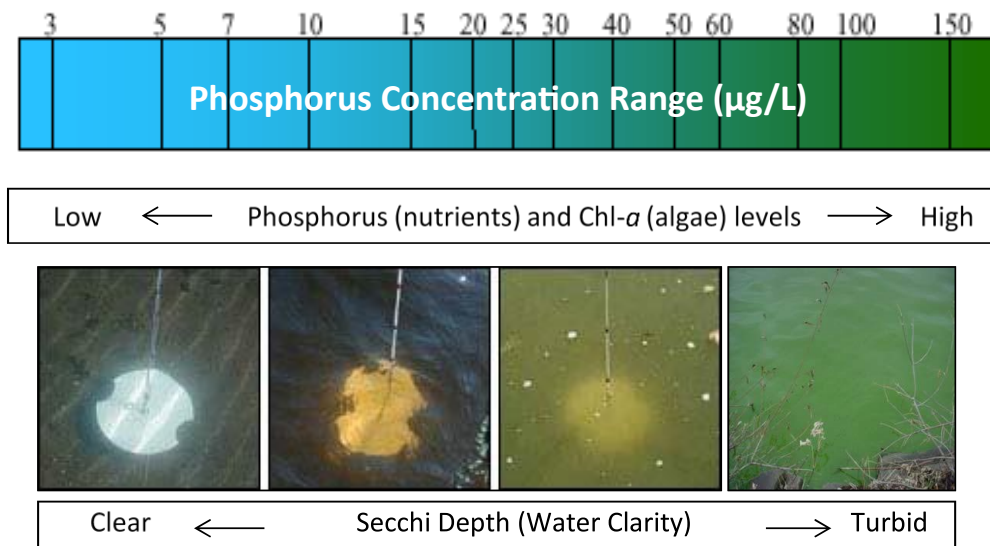
The Comfort Lake-Forest Lake Watershed District engages in a multitude of activities to realize these water quality improvements as well as achieve additional benefits for water resources. While this report includes a summary of the portfolio of water quality projects, the District also offers multiple programs. Examples of such programs include permitting, aquatic invasive species management, public education and outreach, and several cost-share programs. For more information on District accomplishments in 2022, see the 2022 Yearend Summary Infographic and 2022 Annual Report. Both are available at [www.cflwd.org](http://www.cflwd.org).

### Why Do We Want to Meet Water Quality Goals and Standards?

#### Cleaner, clearer water means:

- Better visibility/clarity
- Less frequent and less severe algae blooms
- Healthy native aquatic plant community
- Thriving gamefish population (muskie, northern, walleye, etc.)

### More Phosphorus = More Algae = Less Clarity



## 5200 PROGRESS TOWARD LAKE GOALS

This section describes progress made toward lake goals as of 2022. The goals described are those set forth in the 2022-2031 Watershed Management Plan, which was adopted September 23, 2021. The District’s science-based diagnostic monitoring and commitment to using economic principles are the main drivers for the District’s success toward restoring lakes to pre-development conditions within a short timeframe. As of 2022, four of the six lakes that were impaired for excess nutrients are now meeting state water quality standards.

Overall, water quality trends are generally improving, with a few basins showing declining water quality in some measures. Table 1 shows lake water quality trends, calculated as of the end of 2022. This table is a simplified version of the trends table shown in the 2022 Water Monitoring Report (visit [www.clfiwd.org](http://www.clfiwd.org) to view the 2022 Water Monitoring Report). Note that trends that are not “significantly” improving or declining are not statistically significant. Water quality grades are generally good as well (Table 2).

Table 1. Lake Water Quality Trends (Simplified)\*

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Bone	Significantly Improving since 2013	Significantly Improving since 2013	Significantly Improving since 2013
Comfort	Improving since 1994	Significantly Improving since 2013	Significantly Improving since 2013
Forest – West	Significantly Improving since 1984	Significantly Improving since 2001	Significantly Improving since 2013
Forest – Middle	Declining since 2013	Declining since 2013	Declining since 2013
Forest – East	Declining since 2013	Declining since 2013	Improving since 2013
Keewahtin	Improving since 2013	Improving since 2013	Declining since 2013
Little Comfort	Significantly Improving Since 2013	Improving since 2013	Improving since 2013
Moody	Significantly Improving since 2005	Improving since 2005	Improving since 2005
Shields	Significantly Improving since 2013	Significantly Improving since 2013	Improving since 2013

\*Trends that are not “significantly” improving or declining are not statistically significant.

Table 2. Lake Water Quality Grades (Simplified)

Lake	DNR ID	Acres	Total Phosphorus		Chlorophyll-a		Secchi (Clarity)		Overall	
			2022	5-yr Avg	2022	5-yr Avg	2022	5-yr Avg	2022	5-yr Avg
Birch	13-0042-00	33	--	C-	--	B	--	C-	--	C
Bone	82-0054-00	221	B	B	B	B+	C	C	B	B
Comfort	13-0053-00	218	B	B+	B	B+	C	C+	B	B+
Forest (West)	82-0156-00	1,086	A	B+	A	A-	B	B-	A	B+
Forest (Middle)	82-0156-00	364	B	B-	B	B	C	B-	B	B-
Forest (East)	82-0156-00	790	C	B-	B	B	C	B-	C	C+
Forest (All Basins)	82-0156-00	2,240	B	B-	B+	B+	C+	B-	B	B-
Keewahtin	82-0080-00	75	A	A	A	A	A	A	A	A
Little Comfort	13-0054-00	36	B	C+	A	B	B	C+	B	C+
Moody	13-0023-00	45	C	C-	C	C+	C	C-	C	C
School	13-0057-00	47	B	C+	B	B-	C	C-	B	C+
Shields	82-0162-00	30	B	C-	A	B-	C	C-	B	C

5-yr Avg = Most recent five-year average (2018-2022)

## **5200 Evaluation in 2022 (All Priority Lakes)**

- **Goal 1:** Adaptively manage District lakes to reduce phosphorus loads and delist impaired lakes with Total Maximum Daily Loads (TMDLs) to achieve state water quality eutrophication standards (total phosphorus, chlorophyll-a and Secchi).
  - **2022 Evaluation:** Most District lakes are showing an improving water quality trend. The following lake summary pages provide a detailed analysis of progress toward water quality goals.
- **Goal 2:** Adaptively manage District lakes to improve water quality by achieving the 10-year (2031) total phosphorus and Secchi goals.
  - **2022 Evaluation:** Most District lakes are showing an improving water quality trend. The following lake summary pages provide a detailed analysis of progress toward impairment delisting.
- **Goal 3:** Partner with agencies to manage District lakes for healthy fish and aquatic plant communities.
  - **2022 Evaluation:** CLFLWD adheres to MN Department of Natural Resources (DNR) regulations with all of its aquatic invasive species (AIS) treatments in order to avoid undue harmful impacts to native aquatic plants. The District coordinates with DNR on the scheduling and performance of fish surveys within District lakes in order to keep track of both native and invasive fish populations. In early 2023 the District began communicating with the Great Lakes Indian Fish & Wildlife Commission (GLIFWC) about herbicide usage on District lakes and potential impacts on wild rice beds, fisheries, and native aquatic plants. District staff will continue to maintain open lines of communication and seek input from GLIFWC and area tribes with respect to balancing herbicide usage with lake ecology.
- **Goal 4:** Establish bottom water chloride trends in District lakes and provide resources to salt applicators on ways to reduce chloride inputs.
  - **2022 Evaluation:** The District continued to collect lake bottom water chloride data in 2022. However, due to a calibration issue with the monitoring sensor, the 2022 data cannot be used in determining a trend. The District will continue to collect data in 2023 in order to establish chloride trends for its lakes.
- **Goal 5:** Promote natural, deep rooted, native vegetation buffers to ensure at least 75% of lakeshore parcels have at least 75% natural shoreline condition. For example, in its last shoreline survey 55% of parcels on Bone Lake were covered in at least 75% natural shoreline vegetation; the goal is to ensure 75% of parcels are vegetated thusly.
  - **2022 Evaluation:** In 2022 the District continued implementation of both its regulatory permitting program and its voluntary plant grant cost-share program while laying the groundwork for implementation of new programs in 2023. In 2023 the District will offer two new programs with an emphasis on shoreline restorations: an expanded Residential Cost-Share Program and a new Lake Association Grant Program. These programs will fit into the District's comprehensive shoreline restoration program and help achieve the District's ambitious shoreline restoration goals. 2023 will serve as a pilot year for the new cost-share programs.

## Example Lake Summary Page

Explanations regarding tables and figures are provided in the following Example Lake Summary Page.

**(Example) 2022 Water Quality Grade:** lake grade will be outlined in bold borders

Excellent	Good	<b>Average</b>	Marginal	Poor
A All or most samples meet the desired threshold	B Many samples meet or are near the desired threshold	<b>C Some samples meet or are near desired threshold</b>	D Many samples no not meet the desired threshold	F Most samples do not meet the desired threshold

## (Example) Lake Goals & Status Summary

Table 3. Example Lake Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration <sup>1</sup>	(µg/L) micrograms per liter	(µg/L) micrograms per liter	(lb/yr) pounds per year phosphorus load still in need of removal
5-Year Average Secchi Depth <sup>1</sup>	(ft) feet	(ft) feet	
10-Year Average Bottom Water Chloride <sup>2</sup>	(mg/L) milligrams per liter	(mg/L) milligrams per liter	TBD
% of Parcels with ≥75% Natural Shoreline <sup>3</sup>	(%) percentage of parcels	(%) percentage of parcels	(%) percentage of parcels without natural shorelines

<sup>1</sup>5-year average phosphorus concentration and Secchi depth goals are based on the summertime (June-September) averages for each of the five most recently-monitored years. While state standards are based on the most recent 10-year summer average, District goals take the most recent 5-year summer average, which is a stricter measure.

<sup>2</sup>Chloride concentrations for each lake will be determined between 2022-2026.

<sup>3</sup>Data is not available for some lakes on the percent of parcels with >75% natural shoreline/streambank. Lake shoreline and streambank goals will be determined following completion of shoreline/streambank inventories.

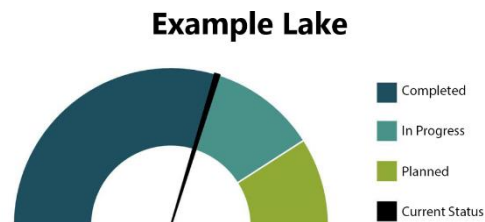
Table 4. Example Lake Phosphorus Reduction Goals

Watershed Management Plan Code, Lake Name	Phosphorus Reduction (lb/yr)
<b>Load Reduction to Achieve Long-term Goal of X µg/L:</b> (based on YEAR benchmark of X µg/L)	Phosphorus reduction needed, compared to benchmark (starting place), for the lake to achieve District long-term sustainable water quality goals (stable natural waterbody state, sometimes stricter than state standards)
Load reduction progress through 2022	Phosphorus reduction achieved between benchmark load date and December 31, 2022
<b>2022 Remaining Load Reduction</b>	Phosphorus reduction needed, compared to most recent available data, for the lake to achieve District long-term sustainable water quality goals (stable natural waterbody state, sometimes stricter than state standards)

### **(Example) Project Implementation Progress**

This figure illustrates progress achieving the necessary phosphorus load reductions to meet water quality goals.

- **Completed:** Phosphorus reductions achieved by projects that are completed as of the end of 2022.
- **In Progress:** Reductions that will be achieved by projects that are in progress as of the end of 2022.
- **Planned:** Reductions that will be achieved by projects that are planned, but not yet started, as of the end of 2022.
- **Current Status:** Aligns with completed projects and emphasizes phosphorus reductions achieved by **completed projects** as of the end of 2022.



**Reduction Goal: Pounds of Phosphorus**  
**Progress (Completed + In Progress): % Complete**

*Figure 1. Example Phosphorus Reduction Goals and Project Progress Graph*

The District bases its water quality goals on historic data, collecting actual lake sediment cores in some cases, in order to determine the water quality level which each lake can sustain in the long-term. In many cases, the District goal goes beyond the minimum state water quality standards.

### **(Example) Progress Toward State Standards**

Six CLFLWD priority lakes are on the impaired waters list for nutrients: Moody Lake, Bone Lake, School Lake, Shields Lake, Little Comfort Lake and Comfort Lake. Forest Lake is not listed as impaired for nutrients, but its summertime water quality readings occasionally exceed state standards. The lake summaries for these seven lakes contain an additional section evaluating progress toward meeting State nutrient standards and delisting (or prevention of being listed) for nutrient impairments. The District’s ultimate goal is to delist impaired waters and prevent unimpaired waters from becoming impaired. In the meantime, an impairment listing, or even being close to the state standard, can put a lake into a higher priority ranking for certain water quality improvement grant programs.

All State water quality standards are based on growing season (June-September) averages. **To be removed from the impaired waters list, a lake must meet minimum requirements in the following two categories.**

1. **Water Quality Samples:** Meet the phosphorus standard and the chlorophyll-a or Secchi depth standard based on at least 8 samples collected from at least 2 years within the most recent 10-year period. Chlorophyll-a samples are pheophytin-corrected. The MN Pollution Control Agency considers 10-year average phosphorus concentrations in addition to the 2 most recent summer averages and the individual samples of the most recent 2 years.
2. **Trend/Management:** In addition, there must be an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations. The local entity must provide information that details how the response conditions will be met over time for a lake to be delisted.

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.

The most recent 2-year period of data will be outlined in black. Up to eight samples are shown in each table. In some cases, more than eight samples are collected within a single growing season. The summer average includes all samples taken between June-September, but all individual samples may not be shown.



<b>Example Lake Phosphorus</b> Deep Lake State Standard $\leq 40 \mu\text{g/L}$ Shallow Lake State Std $\leq 60 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>										
Samples 1-8. Sample dates vary by year. All samples shown were taken between June-September.	Orange cells indicate samples that do not meet state standards					Blue cells indicate samples that meet state standards				

<b>Example Lake Secchi</b> Deep Lake State Standard $\geq 4.6 \text{ ft}$ Shallow Lake State Std $\geq 3.3 \text{ ft}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>										
Samples 1-8. Sample dates vary by year. All samples shown were taken between June-September.	Orange cells indicate samples that do not meet state standards					Blue cells indicate samples that meet state standards				

<b>Example Lake Chlorophyll-a</b> Deep Lake State Standard $\leq 14 \mu\text{g/L}$ Shallow Lake State Std $\leq 20 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>										
Samples 1-8. Sample dates vary by year. All samples shown were taken between June-September.	Orange cells indicate samples that do not meet state standards					Blue cells indicate samples that meet state standards				

**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

**Trend:** Phosphorus trend is the criterion necessary for delisting. Chlorophyll-a and Secchi trends are shown for reference.

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Example Lake	<b>Significantly Improving Trend</b> Improving Trend Declining Trend <b>Significantly Declining Trend</b>	<b>Significantly Improving Trend</b> Improving Trend Declining Trend <b>Significantly Declining Trend</b>	<b>Significantly Improving Trend</b> Improving Trend Declining Trend <b>Significantly Declining Trend</b>

**Management Activities:**

- List of management activities in place, as well as in-progress/future activities

**Conclusion:**

This section will conclude whether the lake meets de-listing criteria. Once reliable data shows that the lake meets the de-listing criteria, the District may contact the MN Pollution Control Agency to proceed with the de-listing process. The District will consider management activities in place to protect water quality when evaluating lakes for de-listing.



Qualifies for de-listing



To be determined



Does not qualify for de-listing



## 5221 Moody Lake Summary

### (Moody) 2022 Water Quality Grade: C

Excellent	Good	Average	Marginal	Poor
A	B	C	D	F
All or most samples meet the desired threshold	Many samples meet or are near the desired threshold	Some samples meet or are near desired threshold	Many samples do not meet the desired threshold	Most samples do not meet the desired threshold

### (Moody) Lake Goals & Status Summary

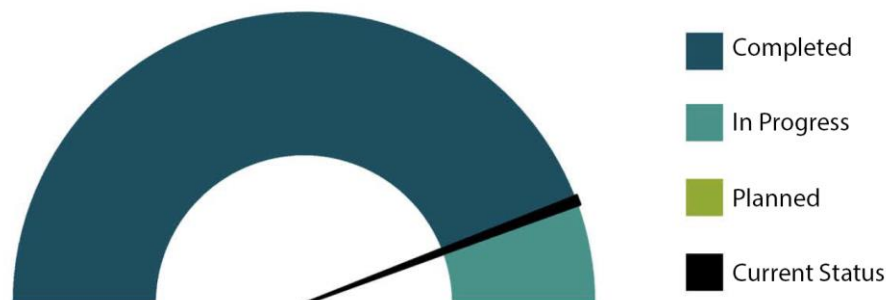
Table 5. Moody Lake Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤40 µg/L	51 µg/L	100 lb/yr phosphorus load
5-Year Average Secchi Depth	≥4.6 ft	4.1 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline	≥75% of parcels	TBD	TBD

Table 6. Moody Lake Phosphorus Reduction Goals

5221 Moody Lake	Phosphorus Reduction (lb/yr)
Load Reduction to Achieve Long-term Goal of 40 µg/L: (based on 2004 benchmark of 152 µg/L)	879
Load reduction progress through 2022 (completed projects)	779
2022 Remaining Load Reduction	100

### (Moody) Project Implementation Progress



**Reduction Goal: 879 lbs**

**Progress (Completed + In Progress Projects): 100%**

Figure 2. Moody Lake Phosphorus Reduction Goals and Project Progress Graph

Additional notable projects: annual curly-leaf pondweed management, permitting oversight (e.g., erosion control, stormwater management, and waterbody buffer requirements).

## (Moody) Progress Toward State Standards

Moody Lake is nutrient impaired for aquatic recreation.

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.

### #1 – Water Quality Samples:



Moody Lake is meeting the criteria for phosphorus concentration, but not for Secchi depth nor chlorophyll-a. **Moody Lake does not meet criterion #1 for de-listing.**

<b>Moody Lake Phosphorus</b> Deep Lake State Standard $\leq 40 \mu\text{g/L}$ 10-Year Average: $82 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>87</b>	<b>113</b>	<b>122</b>	<b>104</b>	<b>86</b>	<b>92</b>	<b>60</b>	<b>36</b>	<b>33</b>	<b>36</b>
Sample 1	49	185	79	59	101	73	75	58	30	46
Sample 2	80	220	114	72	107	103	83	24	62	39
Sample 3	178	102	158	130	152	84	67	45	47	51
Sample 4	144	95	175	106	63	153	109	31	55	37
Sample 5	105	78	195	91	68	112	64	34	14	44
Sample 6	65	62	138	117	72	112	57	30	14	26
Sample 7	60	54	89	162	71	41	37	40	11	17
Sample 8	62	44	84	91	54	60	40	32	27	20

<b>Moody Lake Secchi</b> Deep Lake State Standard $\geq 4.6 \text{ ft}$ 10-Year Average: $3.0 \text{ ft}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>3.7</b>	<b>2.7</b>	<b>2.1</b>	<b>2.7</b>	<b>1.9</b>	<b>1.8</b>	<b>2.4</b>	<b>3.6</b>	<b>8.7</b>	<b>4.2</b>
Sample 1	7.5	3.0	3.0	4.0	4.0	2.5	1.5	2.6	8.9	5.9
Sample 2	6.5	1.5	3.5	3.0	1.0	1.0	2.0	4.3	8.5	5.6
Sample 3	2.5	2.5	1.5	2.0	1.2	1.5	1.7	2.0	7.2	4.9
Sample 4	2.0	2.0	1.0	2.5	1.5	0.5	0.8	3.6	7.9	3.6
Sample 5	3.5	2.0	2.0	2.0	1.5	1.2	1.5	3.3	7.2	3.0
Sample 6	2.5	3.0	1.5	1.5	2.0	1.0	1.0		7.2	3.3
Sample 7	3.0	3.0	1.5	3.0	2.0	3.5	4.0	5.2	9.8	4.3
Sample 8	2.5	3.5	1.5	3.0	2.0	3.5	2.0	3.9	12.5	5.2

<b>Moody Lake Chlorophyll-a</b> Deep Lake State Standard $\leq 14 \mu\text{g/L}$ 10-Year Average: $43 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>32</b>	<b>45</b>	<b>59</b>	<b>42</b>	<b>44</b>	<b>77</b>	<b>41</b>	<b>22</b>	<b>4</b>	<b>24</b>
Sample 1	12	36	46	28	22	34	60	33	3	8
Sample 2	25	110	17	38	80	110	45	11	5	11
Sample 3	33	61	67	48	66	73	63	41	4	23
Sample 4	49	41	110	30	72	130	45	17	2	20
Sample 5	54	51	67	47	34	84	19	27	7	20
Sample 6	30	45	69	74	27	93	46	23	5	20
Sample 7	33	33	65	44	30	43	22	9	5	11
Sample 8	31	23	47	33	24	30	54	17	1	8

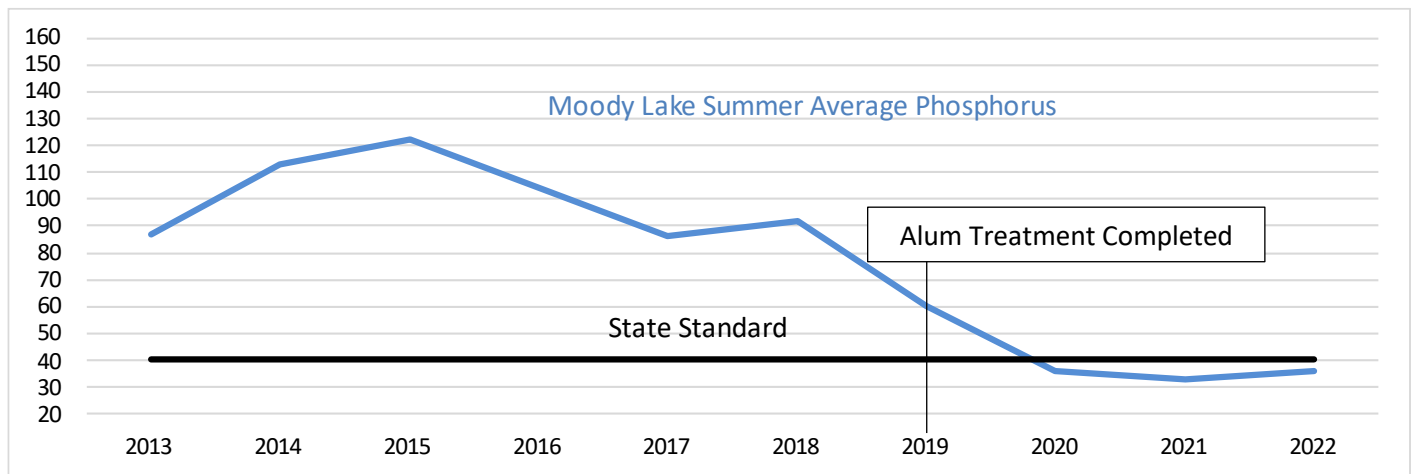
**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

✓ **#2 Trend/Management:**  
 Management activities are in place to maintain improved chlorophyll-a and Secchi observations in Moody Lake. The phosphorus trend is improving. **Moody Lake meets criterion #2 for de-listing.**

**Trends:**

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Moody Lake	<b>Significantly Improving Trend Since 2005</b>	Improving Trend Since 2005	Improving Trend Since 2005

*\*Trends that are not “significantly” improving or declining are not statistically significant.*



**Management Activities:**

- Wetland Restoration Projects (445 lb/yr phosphorus reduction)
- Whole Lake Alum Treatment (324 lb/yr phosphorus reduction, completed in 2019 – split application '18 and '19)
- Rough Fish Harvest (performed in 2009)
- Winter Aeration System (operated annually by CLFLWD)
- Downstream Fish Barrier at Bone Lake Inlet (operated annually by CLFLWD)
- Curly-leaf Pondweed Treatments (performed annually by CLFLWD)
- CLFLWD Rules and Permitting (ongoing program resulting in erosion prevention, stormwater management practices, native buffers, etc. for development projects)
- Additional projects that are currently in-progress:
  - Moody Lake Agricultural Practices (estimated 38 lb/yr phosphorus reduction)
  - Moody Lake Capstone Projects (estimated 62 lb/yr phosphorus reduction)

✗ **Conclusion:**  
**Moody Lake does not qualify for de-listing at this time, but it is very close.** Once Secchi and/or chlorophyll-a summer averages meet state standards two years in a row, the District can proceed with de-listing discussions with MN Pollution Control Agency. The District will continue to collect at least 8 water quality samples each year, analyze trends, and complete implementation and O&M of water quality improvement projects.

## 5222 Bone Lake Summary

### **(Bone) 2022 Water Quality Grade: B**

Excellent	Good	Average	Marginal	Poor
A	<b>B</b>	C	D	F
All or most samples meet the desired threshold	Many samples meet or are near the desired threshold	Some samples meet or are near desired threshold	Many samples do not meet the desired threshold	Most samples do not meet the desired threshold

### **(Bone) Lake Goals & Status Summary**

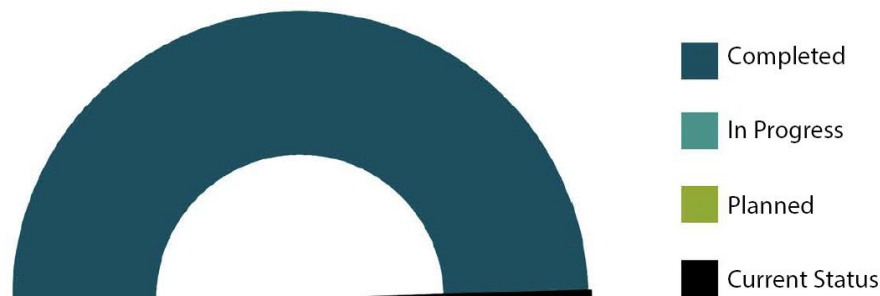
Table 7. Bone Lake Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤30 µg/L	26 µg/L	0 lb/yr phosphorus load
5-Year Average Secchi Depth	≥7 ft	6.1 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline <a href="#">Source: 2013 Shoreland Inventory</a> (more recent photo inventories have occurred but % not quantified)	≥75% of parcels ≥72 parcels	55% of parcels 53 parcels	20% of parcels 19 parcels

Table 8. Bone Lake Phosphorus Reduction Goals

5222 Bone Lake	Phosphorus Reduction (lb/yr)
Load Reduction to Achieve Long-term Goal of 30 µg/L: (based on 2004 benchmark of 60 µg/L)	786
Load reduction progress through 2022 (completed projects)	786
2022 Remaining Load Reduction	0

### **(Bone) Project Implementation Progress**



**Reduction Goal: 786 lbs**

**Progress (Completed + In Progress Projects): 100%**

Figure 3. Bone Lake Phosphorus Reduction Goals and Project Progress Graph

Of the completed projects, non-structural agricultural practices comprise 83 pounds of phosphorus (10%); these projects will need to be maintained in order to maintain the associated nutrient reductions. Additional notable projects: cost-share projects, annual curly-leaf pondweed management, permitting oversight (e.g., erosion control, stormwater management, and waterbody buffer requirements).

## (Bone) Progress Toward State Standards

Bone Lake is nutrient impaired for aquatic recreation, mercury, and fish bioassessments.

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.



### #1 – Water Quality Samples:

Bone Lake is meeting the criteria for phosphorus concentration, Secchi depth, and chlorophyll-a. **Bone Lake meets criterion #1 for de-listing.**

<b>Bone Lake Phosphorus</b> Deep Lake State Standard $\leq 40$ $\mu\text{g/L}$ 10-Year Average: 32 $\mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	34	55	39	39	30	22	29	26	26	25
Sample 1	32	24	44	35	35	22	24	30	32	24
Sample 2	36	46	26	37	41	21	23	45	36	37
Sample 3	53	130	32	58	38	24	28	13	31	26
Sample 4	35	103	36	31	28	26	35	20	17	16
Sample 5	39	34	45	51	20	22	30	31	28	29
Sample 6	32	25	53	28	23	20	29	22	18	24
Sample 7	33	31	42	41	26	19	30	18	22	19
Sample 8	25	48	37	42	23	20	33		22	28

<b>Bone Lake Secchi</b> Deep Lake State Standard $\geq 4.6$ ft 10-Year Average: 4.9 ft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	3.9	3.6	3.9	4.2	5.8	6.5	5.0	5.8	7.3	5.9
Sample 1	4.5	4.3	4.0	3.5	2.5	6.5	7.0	4.9	6.2	4.3
Sample 2	4.5	4.6	3.5	4.0	4.5	7.0	6.0	5.6	6.9	5.2
Sample 3	3.5	3.9	4.5	4.5	3.5	6.5	5.0	8.5	7.9	6.6
Sample 4	4.5	3.3	4.0	3.5	4.5	7.5	4.5	5.6	7.5	8.2
Sample 5	3.0	3.0	3.0	3.5	6.5	4.5	3.0	5.6	8.2	6.9
Sample 6	5.0	2.6	3.5	5.5	9.5	5.0	4.5	6.6	8.2	5.9
Sample 7	4.5	3.3	4.0	5.5	8.5	9.0	4.5	3.9	8.2	5.6
Sample 8	3.0	3.6	4.0	4.0	7.0	6.0	5.5		4.9	4.3

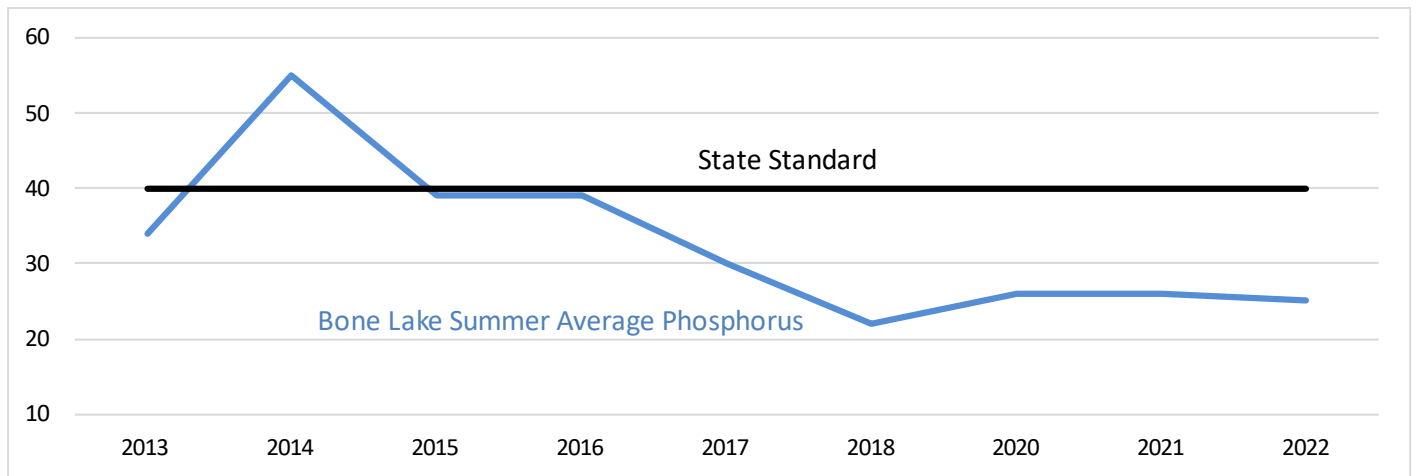
<b>Bone Lake Chlorophyll-a</b> Deep Lake State Standard $\leq 14$ $\mu\text{g/L}$ 10-Year Average: 17 $\mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	20	24	30	22	20	10	21	12	8	14
Sample 1	31	22	14	26	59	9	10	16	10	11
Sample 2	18	31	13	20	15	6	11	11	6	18
Sample 3	15	26	20	27	26	1	15	4	6	8
Sample 4	18	26	36	21	12	12	26	9	6	10
Sample 5	33	26	56	24	11	20	40	12	6	15
Sample 6	18	13	33	15	7	10	18	19	6	18
Sample 7	20	23	43	17	9	7	26	11	5	18
Sample 8	15	27	37	33	17	16	21		15	16

**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

✓ **#2 Trend/Management:** Phosphorus trends are improving in Bone Lake. Bone Lake meets criteria #2 for de-listing, **but the District is putting additional management activities into place to protect water quality.**

**Trends:**

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Bone Lake	<b>Significantly Improving Trend Since 2013</b>	<b>Significantly Improving Trend Since 2013</b>	<b>Significantly Improving Trend Since 2013</b>



**Management Activities:**

- Melanie Trail Row Crop Conversion to Perennial (34 lb/yr phosphorus reduction)
- Southeast (Meadowbrook) Drained Wetland Restorations (35 lb/yr phosphorus reduction)
- Northeast Legacy Wetland Restoration (15-20 lb/yr phosphorus reduction)
- Inlet and Outlet Fish Barriers (operated annually by CLFLWD)
- Curly-leaf Pondweed Treatments (performed annually by CLFLWD)
- CLFLWD Rules and Permitting (ongoing program resulting in erosion prevention, stormwater management practices, native buffers, etc. for development projects)
- Bone Lake Non-Structural Agricultural Practices (83 lb/yr phosphorus reduction; must be maintained annually)
- Southwest Wetland Improvements (TBD)

✓ **Conclusion:** Bone Lake qualifies for de-listing at this time. Given that management activities are in place upstream of Bone Lake (i.e., Moody Lake) and within the Bone Lake watershed, Bone Lake is currently the best positioned to be delisted. The District must initiate this process with MN Pollution Control Agency.

## 5223 Birch Lake Summary

### **(Birch) 2021 Water Quality Grade: C (not monitored in 2022)**

Excellent	Good	Average	Marginal	Poor
A All or most samples meet the desired threshold	B Many samples meet or are near the desired threshold	<b>C Some samples meet or are near desired threshold</b>	D Many samples no not meet the desired threshold	F Most samples do not meet the desired threshold

### **(Birch) Lake Goals & Status Summary**

Table 9. Birch Lake Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤60 µg/L	81 µg/L	TBD
5-Year Average Secchi Depth	≥3.3 ft	5.0 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline	≥75% of parcels	TBD	TBD

Birch Lake is very shallow and has characteristics similar to an open water wetland. Birch Lake is located downstream of Bone Lake and is connected by a tributary stream. As such, improvements to Bone Lake will result in improvements to Birch Lake. Within the Birch Lake direct drainage area, a large portion of cropland was converted to residential subdivision in recent years. Conversion from row crop to residential is estimated to actually result in reduced phosphorus and sediment loading to Birch Lake. The District will continue to monitor Birch Lake in order to determine whether upstream improvements to Bone Lake result in reduced phosphorus concentrations in Birch Lake.

## 5224 School Lake Summary

### **(School) 2022 Water Quality Grade: B**

Excellent	Good	Average	Marginal	Poor
A All or most samples meet the desired threshold	<b>B Many samples meet or are near the desired threshold</b>	C Some samples meet or are near desired threshold	D Many samples no not meet the desired threshold	F Most samples do not meet the desired threshold

### **(School) Lake Goals & Status Summary**

Table 10. School Lake Goals & Status Summary

	Long-Term Goal/ State Standard	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤60 µg/L	43 µg/L	[meeting state standard]
5-Year Average Secchi Depth	≥3.3 ft	4.5 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline	≥75% of parcels	TBD	TBD

School Lake is located downstream of Birch Lake and, similarly to Birch Lake, will see improvements resulting from upstream improvements to Bone Lake. Additionally, the District is in the process of working with a rural landowner in the School Lake direct drainage area to implement best management practices to reduce phosphorus and sediment loading from a cattle feedlot. School Lake is classified as a shallow lake, and therefore the state standard is 60 µg/L for phosphorus concentration and 3.3 feet for Secchi depth.



## (School) Progress Toward State Standards

School Lake is nutrient impaired for aquatic recreation.

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.



### #1 – Water Quality Samples:

School Lake is meeting the criteria for phosphorus concentration and Secchi depth, but not chlorophyll-a. School Lake meets criterion #1 for de-listing.

<b>School Lake Phosphorus</b> Shallow Lake State Standard $\leq 60 \mu\text{g/L}$ 10-Year Average: $45 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>					51	53		49	40	28
Sample 1					54	38		49	52	37
Sample 2					53	40		49	39	29
Sample 3					41	49		64	72	14
Sample 4					59	125		34	17	27
Sample 5					34	62			70	33
Sample 6					31	56			30	
Sample 7					116	40			27	
Sample 8					40	48			21	

<b>School Lake Secchi</b> Shallow Lake State Standard $\geq 3.3$ feet 10-Year Average: 4.1 ft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>					2.8	2.5		4.8	5.3	6.1
Sample 1					4.5	4.0		3.0	7.5	7.4
Sample 2					2.5	3.0		3.3	5.6	6.6
Sample 3					1.0	2.0		6.6	7.2	5.2
Sample 4					1.5	1.0		6.2	4.3	5.9
Sample 5					3.0	1.5			3.8	5.6
Sample 6					3.5	1.5			4.3	
Sample 7					3.0	4.0			4.3	
Sample 8					3.0	3.0			4.6	

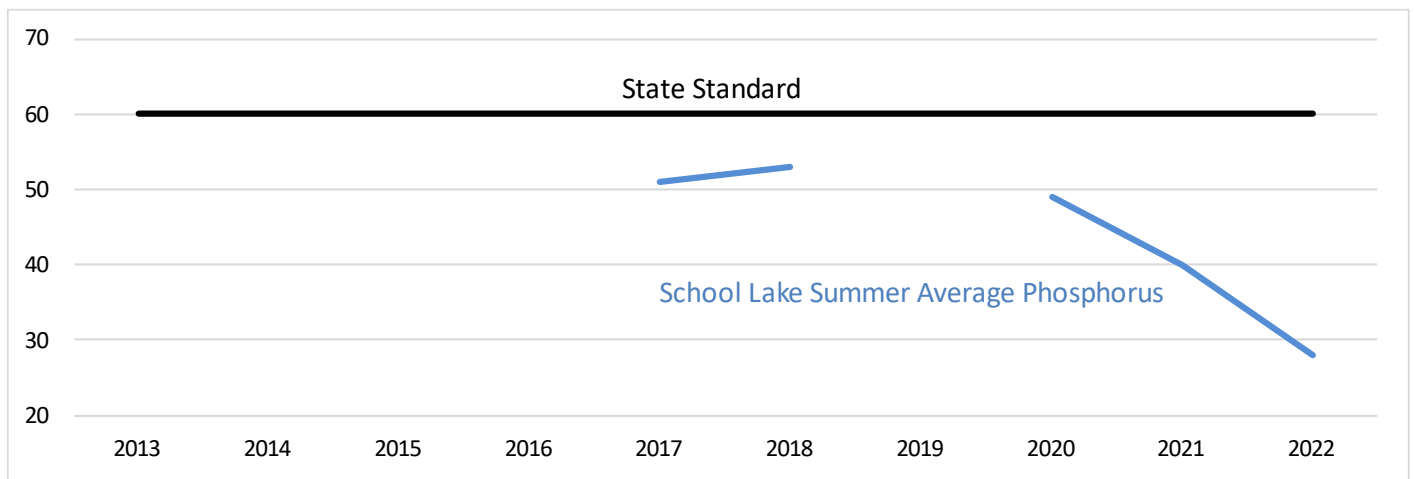
<b>School Lake Chlorophyll-a</b> Shallow Lake State Standard $\leq 20 \mu\text{g/L}$ 10-Year Average: $27 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>					31	50		24	12	14
Sample 1					24	46		38	4	13
Sample 2					42	22		29	4	14
Sample 3					61	44		17	5	16
Sample 4					56	69		13	17	19
Sample 5					19	75			16	10
Sample 6					19	54			15	
Sample 7					38	47			17	
Sample 8					32	46			17	

**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

**#2 Trend/Management:**  
 ✓ School Lake does not have enough water quality data collected to calculate long-term trends. However, recent summer average phosphorus concentrations have been below the state standard, and several management activities are in place for Bone Lake which is located upstream of School Lake and Birch Lake.

**Trends:**

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
School Lake	Not enough data exists to calculate long-term trends for School Lake.		



**Management Activities:**

- CLFLWD Rules and Permitting (ongoing program resulting in erosion prevention, stormwater management practices, native buffers, etc. for development projects)
- Project that is currently in development: July Avenue Feedlot (estimated 79 lb/yr phosphorus reduction)

**Conclusion:**  
 ✓ **School Lake qualifies for de-listing at this time.** However, the District still has a project in-progress that will reduce watershed phosphorus loading. **The District will implement more management activities to protect School Lake's water quality long-term.**

## 5225 Little Comfort Lake Summary

### (Little Comfort) 2022 Water Quality Grade: B

Excellent	Good	Average	Marginal	Poor
A All or most samples meet the desired threshold	<b>B</b> Many samples meet or are near the desired threshold	C Some samples meet or are near desired threshold	D Many samples do not meet the desired threshold	F Most samples do not meet the desired threshold

### (Little Comfort) Lake Goals & Status Summary

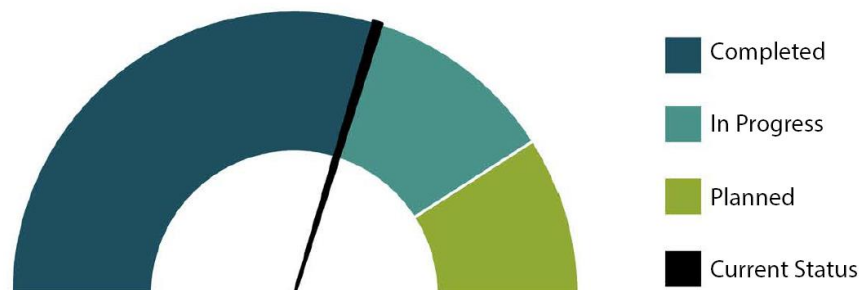
Table 11. Little Comfort Lake Water Quality Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤30 µg/L	41 µg/L	336 lb/yr phosphorus load
5-Year Average Secchi Depth	≥7 ft	6.1 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline <a href="#">Source: 2015 Shoreland Inventory</a>	≥75% of parcels ≥25 parcels	82% of parcels 27 parcels	[maintain]

Table 12. Little Comfort Lake Phosphorus Reduction Goals

5225 Little Comfort Lake	Phosphorus Reduction (lb/yr)
<b>Load Reduction to Achieve Long-term Goal of 30 µg/L:</b> (based on 2004 benchmark of 72 µg/L)	<b>839</b>
Load reduction progress through 2022 (completed projects)	503
<b>2022 Remaining Load Reduction</b>	<b>336</b>

### (Little Comfort) Project Implementation Progress



**Reduction Goal: 839 lbs**  
**Progress (Completed + In Progress Projects): 70%**

Figure 4. Little Comfort Lake Phosphorus Reduction Goals and Project Progress Graph

Additional notable projects: permitting oversight (e.g., erosion control, stormwater management, and waterbody buffer requirements).

## **(Little Comfort) Progress Toward State Standards**

Little Comfort Lake is nutrient impaired for aquatic recreation.

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.

### **#1 – Water Quality Samples:**



Little Comfort Lake is meeting the criteria for Secchi depth and chlorophyll-a, but not for phosphorus. **Little Comfort Lake does not meet criterion #1 for de-listing.**

<b>Little Comfort Lake Phosphorus</b> Deep Lake State Standard $\leq 40 \mu\text{g/L}$ 10-Year Average: $48 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>62</b>	<b>58</b>	<b>88</b>	<b>68</b>	<b>43</b>	<b>50</b>	<b>56</b>	<b>34</b>	<b>43</b>	<b>23</b>
Sample 1	32	63	26	28	19	33	74	33	54	24
Sample 2	64	93	67	176	42	33	37	29	86	24
Sample 3	65	97	74	44	26	45	41	44	34	31
Sample 4	62	50	366	50	63	114	76	30	12	26
Sample 5	64	40	56	61	71	52	113	36	22	24
Sample 6	37	44		56	34	50	39		34	17
Sample 7	47	72	23	71	36	33	29		100	12
Sample 8	80	25	28	92	50	43	39		24	10

<b>Little Comfort Lake Secchi</b> Deep Lake State Standard $\geq 4.6 \text{ ft}$ 10-Year Average: $5.3 \text{ ft}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>5.5</b>	<b>5.9</b>	<b>4.3</b>	<b>3.5</b>	<b>3.6</b>	<b>4.2</b>	<b>4.5</b>	<b>5.8</b>	<b>8.4</b>	<b>7.5</b>
Sample 1	7.5	6.0	6.0	5.0	3.5	6.0	5.5	5.7	9.8	8.5
Sample 2	6.0	3.5	3.5	2.5	3.0	4.5	4.5	4.8	9.8	8.2
Sample 3	3.0	3.7	2.0	4.0	1.5	3.0	5.5	6.2	9.5	7.2
Sample 4	5.0	5.5	3.5	3.0	2.0	2.5	2.0	5.6	10.2	7.1
Sample 5	5.5	8.5	4.5	2.5	3.0	3.0	3.5	6.6	7.2	7.5
Sample 6	7.5	5.5	4.5	4.0	3.5	3.5	4.8		5.9	6.9
Sample 7	6.0	5.0	4.5	3.0	5.0	4.5	5.5		4.6	8.5
Sample 8	5.5	7.5	4.5	4.0	7.0	7.0	4.5		7.2	7.2

<b>Little Comfort Lake Chlorophyll-a</b> Deep Lake State Standard $\leq 14 \mu\text{g/L}$ 10-Year Average: $19 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>25</b>	<b>22</b>	<b>28</b>	<b>47</b>	<b>26</b>	<b>26</b>	<b>27</b>	<b>13</b>	<b>7</b>	<b>7</b>
Sample 1	10	13	7	19	29	5	15	23	3	3
Sample 2	22	24	37	43	26	7	13	16	3	7
Sample 3	30	30	77	27	44	30	19	12	4	7
Sample 4	18	16	24	36	28	41	30	10	3	7
Sample 5	25	12	20	51	20	43	35	2	13	8
Sample 6	13	27		31	23	24	36		15	6
Sample 7	13	37	23	90	19	28	27		12	6
Sample 8	61	16	28	77	17	27	41		10	8

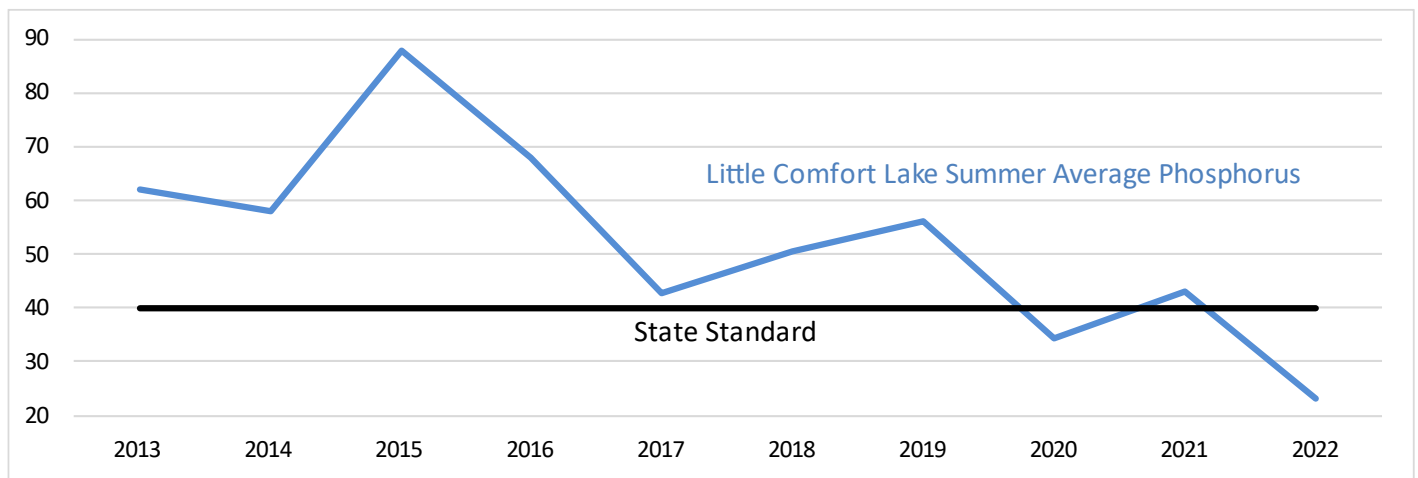
**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

✓ **#2 Trend/Management:** Phosphorus trends are improving in Little Comfort Lake. Little Comfort Lake meets criteria #2 for de-listing, **but the District is putting additional management activities into place to protect water quality.**

**Trends:**

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Little Comfort Lake	<b>Significantly Improving Trend Since 2013</b>	Improving Trend Since 2013	Improving Trend Since 2013

*\*Trends that are not "significantly" improving or declining are not statistically significant.*



**Management Activities:**

- Curly-leaf Pondweed Surveys (performed annually by CLFLWD, treatment usually not warranted- due to low density growth)
- CLFLWD Rules and Permitting (ongoing program resulting in erosion prevention, stormwater management practices, native buffers, etc. for development projects)
- In progress projects:
  - Little Comfort Infiltration Basin (estimated 80-100 lb/yr phosphorus reduction)
  - School Lake Outlet Channel Improvements (TBD)
- Potential future projects:
  - Heath Avenue Outlet Stormwater Management
  - Livestock Management

✘ **Conclusion:** **Little Comfort Lake does not qualify for de-listing at this time, but it is very close.** Once summer phosphorus averages meet state standards two years in a row, and management activities are in place, the District can proceed with de-listing discussions with MN Pollution Control Agency. The District will continue to collect at least 8 water quality samples each year, analyze trends, and complete implementation and O&M of water quality improvement projects.

## 5226 Shields Lake Summary

### (Shields) 2022 Water Quality Grade: B

Excellent	Good	Average	Marginal	Poor
A	B	C	D	F
All or most samples meet the desired threshold	Many samples meet or are near the desired threshold	Some samples meet or are near desired threshold	Many samples do not meet the desired threshold	Most samples do not meet the desired threshold

### (Shields) Lake Goals & Status Summary

Table 13. Shields Lake Water Quality Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤60 µg/L	85 µg/L	16 lb/yr phosphorus load
5-Year Average Secchi Depth	≥4.26 ft	4.6 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline	≥75% of parcels	TBD	TBD

Table 14. Shields Lake Phosphorus Reduction Goals

5226 Shields Lake	Phosphorus Reduction (lb/yr)
<b>Load Reduction to Achieve Long-term Goal of 60 µg/L:</b> (based on 2006-2015 benchmark of 241 µg/L)	<b>1,023</b>
Load reduction progress through 2022 (completed projects)	1,007
<b>2022 Remaining Load Reduction</b> (one active stormwater permit)	<b>16</b>

### (Shields) Project Implementation Progress



**Reduction Goal: 1,023 lbs**

**Progress (Completed + In Progress Projects): 100%**

Figure 5. Shields Lake Phosphorus Reduction Goals and Project Progress Graph

Additional notable projects: curly-leaf pondweed management, permitting oversight (e.g., erosion control, stormwater management, and waterbody buffer requirements).

## **(Shields) Progress Toward State Standards**

Shields Lake is nutrient impaired for aquatic recreation.

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.



### **#1 – Water Quality Samples:**

Shields Lake is meeting the criteria for phosphorus concentration and Secchi depth, but not chlorophyll-a. Shields Lake meets criterion #1 for de-listing.

<b>Shields Lake Phosphorus</b> Shallow Lake State Standard $\leq 60 \mu\text{g/L}$ 10-Year Average: 161 $\mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>162</b>	<b>299</b>	<b>349</b>	<b>194</b>	<b>191</b>	<b>180</b>	<b>128</b>	<b>54</b>	<b>38</b>	<b>27</b>
Sample 1	98	255	358	121	74	222	102	19	27	22
Sample 2	128	326	366	238	170	210	150	45	27	33
Sample 3	358	291	333	317	262	283	212	66	28	32
Sample 4	275	356	346	241	300	201	141	81	25	23
Sample 5	190	299	329	153	203	174	138	75	104	21
Sample 6	81	327	383	128	226	149	93	65	36	36
Sample 7	83	332	303	190	190	122	82	24	51	22
Sample 8	90	288	582	168	118	76	114		23	14

<b>Shields Lake Secchi</b> Shallow Lake State Standard $\geq 3.3$ feet 10-Year Average: 3.7 ft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>4.1</b>	<b>3.4</b>	<b>1.9</b>	<b>2.7</b>	<b>2.2</b>	<b>1.9</b>	<b>2.5</b>	<b>3.7</b>	<b>8.4</b>	<b>6.5</b>
Sample 1	7.0	5.0	3.5	5.0	6.5	4.0	5.5	5.9	13.6	7.9
Sample 2	8.0	3.5	1.0	3.0	4.5	0.5	2.0	3.6	14.4	6.6
Sample 3	4.0	3.0	1.5	2.5	1.0	1.0	1.5	5.2	14.4	5.2
Sample 4	2.0	2.5	1.5	2.5	1.0	1.5	3.2	3.3	8.4	5.9
Sample 5	3.5	2.0	1.0	2.0	1.5	1.7	0.5	2.5	2.6	6.9
Sample 6	3.0	2.5	1.0	1.5	1.5	1.5	2.0	2.0	6.6	6.6
Sample 7	2.0	3.5	1.0	2.5	1.0	2.0	2.0	3.6	4.3	7.9
Sample 8	2.0	2.5	1.5	3.5	2.0	3.0	2.5		5.9	6.9

<b>Shields Lake Chlorophyll-a</b> Shallow Lake State Standard $\leq 20 \mu\text{g/L}$ 10-Year Average: 42 $\mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>39</b>	<b>34</b>	<b>77</b>	<b>52</b>	<b>64</b>	<b>67</b>	<b>52</b>	<b>31</b>	<b>6</b>	<b>7</b>
Sample 1	9	11	59	22	7	21	25	14	1	9
Sample 2	15	44	120	37	35	160	88	25	2	1
Sample 3	18	33	64	76	160	99	52	13	4	5
Sample 4	52	39	75	82	97	56	28	48	9	7
Sample 5	69	28	86	59	92	68	62	45	9	8
Sample 6	60	37	98	41	55	47	68	58	10	7
Sample 7	39	59	64	51	58	52	73	13	5	5
Sample 8	70	47	126	65	39	36	51		14	5



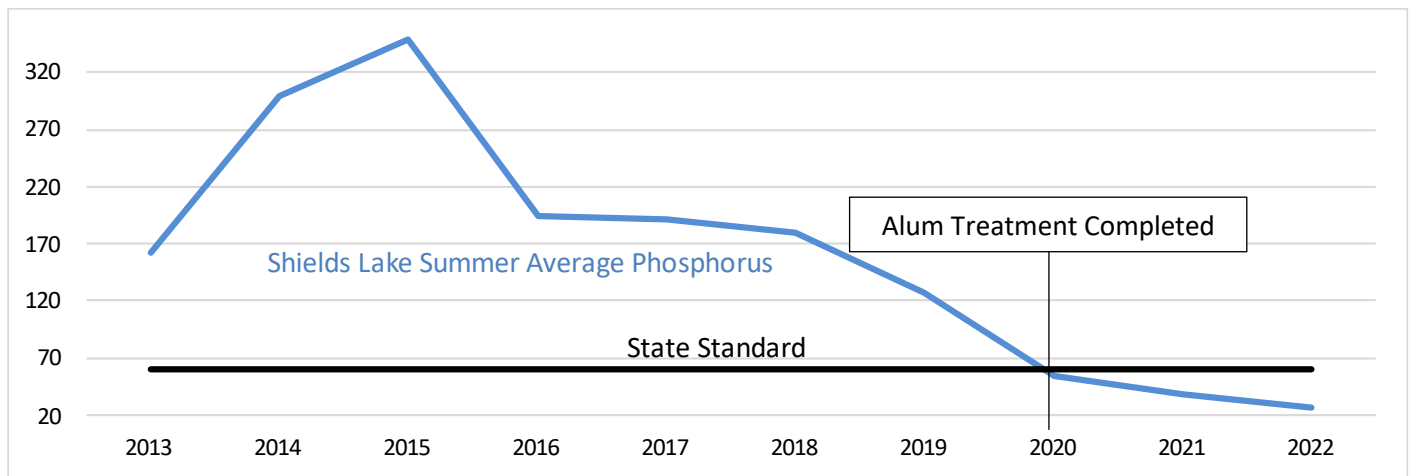
**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

✓ **#2 Trend/Management:** Phosphorus trends are improving in Shields Lake, and management activities are in place. **Shields Lake meets criteria #2 for de-listing.**

**Trends:**

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Shields Lake	<b>Significantly Improving Trend Since 2012</b>	Improving Trend Since 2001	Improving Trend Since 2012

*\*Trends that are not “significantly” improving or declining are not statistically significant.*



**Management Activities:**

- Stormwater Harvest & Irrigation Reuse System (94 lb/yr phosphorus reduction completed in 2018)
- Whole Lake Alum Treatment (913 lb/yr, completed in 2020 – split application between fall '19 and fall '20)
- Winter Aeration System (upgraded in 2021, operated annually by CLFLWD)
- Downstream Fish Barriers (operated annually by CLFLWD)
- Curly-leaf Pondweed Treatments (performed annually by CLFLWD)
- CLFLWD Rules and Permitting (ongoing program resulting in erosion prevention, stormwater management practices, native buffers, etc. for development projects)

✓ **Conclusion:** **Shields Lake qualifies for de-listing at this time.** The District may collect a few more years of data to ensure trends are on track prior to initiating the delisting process with MN Pollution Control Agency.

## 5227 Lake Keewahtin Summary

### (Keewahtin) 2022 Water Quality Grade: A

Excellent	Good	Average	Marginal	Poor
<b>A</b> All or most samples meet the desired threshold	<b>B</b> Many samples meet or are near the desired threshold	<b>C</b> Some samples meet or are near desired threshold	<b>D</b> Many samples do not meet the desired threshold	<b>F</b> Most samples do not meet the desired threshold

### (Keewahtin) Lake Goals & Status Summary

Table 15. Lake Keewahtin Water Quality Goals & Status Summary

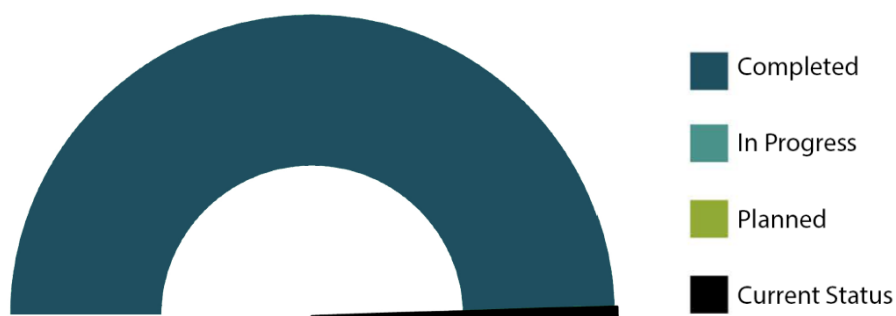
	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤20 µg/L	15 µg/L	0 lb/yr phosphorus load*
5-Year Average Secchi Depth	≥10 ft	12.9 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline <a href="#">Source: 2016 Shoreland Inventory</a>	≥75% of parcels ≥57 parcels	67% of parcels 50 parcels	8% of parcels 7 parcels

\*Currently meets goal, no further reductions needed until the next round of diagnostic monitoring.

Table 16. Lake Keewahtin Phosphorus Reduction Goals

5227 Lake Keewahtin	Phosphorus Reduction (lb/yr)
Load Reduction to Achieve Long-term Goal of 20 µg/L: (based on 2004 benchmark of 20 µg/L)	0
Load reduction progress through 2022	N/A
2022 Remaining Load Reduction	N/A

### (Keewahtin) Project Implementation Progress



**Reduction Goal: 0 lbs**

**Progress (Completed + In Progress Projects): N/A**

Figure 6. Lake Keewahtin Phosphorus Reduction Goals and Project Progress Graph

Additional notable projects: cost-share projects, permitting oversight (e.g., erosion control, stormwater management, and waterbody buffer requirements).

## 5228 Forest Lake Summary

### (Forest) 2022 Water Quality Grade: B

Excellent	Good	Average	Marginal	Poor
A	<b>B</b>	C	D	F
All or most samples meet the desired threshold	<b>Many samples meet or are near the desired threshold</b>	Some samples meet or are near desired threshold	Many samples do not meet the desired threshold	Most samples do not meet the desired threshold

### (Forest) Lake Goals & Status Summary

Table 17. Forest Lake Water Quality Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤30 µg/L	34 µg/L	657 lb/yr phosphorus load
5-Year Average Secchi Depth	≥7 ft	6.7 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline <a href="#">Source: 2013 Shoreland Inventory</a> (more recent photo inventories have occurred but % not quantified)	≥75% of parcels ≥636 parcels	27% of parcels 229 parcels	48% of parcels 407 parcels

Table 18. Forest Lake Phosphorus Reduction Goals

5228 Forest Lake	Phosphorus Reduction (lb/yr)
Load Reduction to Achieve Long-term Goal of 30 µg/L: (based on 2007-2016 benchmark of 35 µg/L)	1,450
Load reduction progress through 2022 (completed projects)	793
<b>2022 Remaining Load Reduction</b>	<b>657</b>

### (Forest) Project Implementation Progress



**Reduction Goal: 1,450 lbs**

**Progress (Completed + In Progress Projects): 93%**

Figure 7. Forest Lake Phosphorus Reduction Goals and Project Progress Graph

Additional notable projects: cost-share projects, educational storm drain stenciling, annual curly-leaf pondweed management, permitting oversight (e.g., erosion control, stormwater management, and waterbody buffer requirements).

## (Forest) State Standards Status

Forest Lake is **not** nutrient impaired for aquatic recreation, but water quality readings are sometimes close to or exceed the state standard. Forest Lake is impaired for polychlorinated biphenyls (PCBs) in fish tissue.

## (Forest West) State Standards Status

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.

<b>Forest Lake West Phosphorus</b> Deep Lake State Standard $\leq 40 \mu\text{g/L}$ 10-Year Average: $30 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>37</b>	<b>37</b>	<b>37</b>	<b>40</b>	<b>25</b>	<b>37</b>	<b>26</b>	<b>27</b>	<b>24</b>	<b>20</b>
Sample 1	45	34	22	24	22	46	13	21	24	25
Sample 2	21	30	15	29	27	44	23	26	38	22
Sample 3	26	24	42	27	23	35	24	26	19	23
Sample 4	39	49	21	30	28	45	30	38	17	22
Sample 5	41	25	41	35	30	39	38	32	19	20
Sample 6	32	39	39	44	26	31	26	22	19	21
Sample 7	35	54	43	90	21	30	25	32	24	17
Sample 8	45	40	28	45	25	29		19	28	12

<b>Forest Lake West Secchi</b> Deep Lake State Standard $\geq 4.6 \text{ ft}$ 10-Year Average: $5.1 \text{ ft}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>3.8</b>	<b>3.4</b>	<b>4.7</b>	<b>4.3</b>	<b>6.2</b>	<b>4.9</b>	<b>7.1</b>	<b>5.7</b>	<b>7.5</b>	<b>7.3</b>
Sample 1	4.5	5.0	7.5	6.5	6.5	5.0	12.0	8.2	11.2	8.5
Sample 2	6.5	4.0	7.0	5.0	6.5	5.0	7.0	5.6	10.2	9.5
Sample 3	4.5	3.0	6.5	3.5	6.5	4.5	5.0	6.9	6.2	5.9
Sample 4	3.5	2.5	5.0	5.0	5.5	4.5	6.5	5.2	7.9	5.2
Sample 5	2.0	3.5	3.5	4.5	6.5	4.5	5.5	4.8	5.9	6.2
Sample 6	3.0	4.0	3.0	3.5	6.5	5.0	6.0	4.8	5.6	7.5
Sample 7	4.0	2.5	3.0	3.0	6.0	5.5	7.5	4.3	5.1	7.2
Sample 8	3.0	2.5	3.0	4.0	5.5	5.5		6.2	6.7	8.5

<b>Forest Lake West Chlorophyll-a</b> Deep Lake State Standard $\leq 14 \mu\text{g/L}$ 10-Year Average: $12 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>17</b>	<b>17</b>	<b>19</b>	<b>19</b>	<b>8</b>	<b>13</b>	<b>8</b>	<b>8</b>	<b>6</b>	<b>6</b>
Sample 1	15	7	5	7	6	13	2	4	2	3
Sample 2	7	6	5	11	8	9	6	4	2	3
Sample 3	12	14	13	14	6	15	8	6	6	5
Sample 4	17	16	16	12	6	15	6	8	7	8
Sample 5	23	12	22	13	8	15	13	10	8	8
Sample 6	17	19	21	23	9	11	9	10	8	7
Sample 7	18	36	29	53	10	12	9	12	11	9
Sample 8	23	22	10	22	9	11		7	6	5

### **(Forest Middle) State Standards Status**

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.

<b>Forest Lake Middle Phosphorus</b> Deep Lake State Standard $\leq 40 \mu\text{g/L}$ 10-Year Average: $35 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>30</b>	<b>31</b>	<b>35</b>	<b>41</b>	<b>34</b>	<b>35</b>	<b>61</b>	<b>42</b>	<b>36</b>	<b>31</b>
Sample 1	19	38	32	28	27	21	23	23	19	53
Sample 2	19	20	19	23	29	35	97	30	32	33
Sample 3	26	45	22	22	31	25	39	36	31	34
Sample 4	29	33	26	71	25	51	44	58	21	21
Sample 5	32	20	43	40	51	63	103	33	28	30
Sample 6	30	24	31	35	37	28	50	35	38	30
Sample 7	44	32	46	39	35	29	91	56	57	20
Sample 8	26	39	51	65	35	26	41	64	47	29

<b>Forest Lake Middle Secchi</b> Deep Lake State Standard $\geq 4.6 \text{ ft}$ 10-Year Average: $6.3 \text{ ft}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>5.7</b>	<b>5.2</b>	<b>6.4</b>	<b>5.7</b>	<b>8.2</b>	<b>7.7</b>	<b>7.1</b>	<b>5.7</b>	<b>6.9</b>	<b>5.0</b>
Sample 1	6.5	8.0	10.0	8.0	13.0	11.0	15.0	12.1	12.8	6.2
Sample 2	10.0	6.5	10.5	6.5	8.0	10.0	12.0	9.5	9.2	5.6
Sample 3	7.5	5.0	9.5	5.5	9.5	7.5	8.0	6.2	6.9	4.4
Sample 4	5.5	5.0	6.5	6.0	9.5	10.0	5.5	3.9	6.6	5.6
Sample 5	3.5	4.0	4.5	6.0	7.5	5.0	4.0	3.6	5.9	4.6
Sample 6	4.0	5.2	4.5	5.0	5.5	6.5	4.0	2.6	5.2	3.6
Sample 7	5.0	4.0	5.0	4.0	6.0	5.5	4.0	3.0	4.9	4.9
Sample 8	5.5	3.5	3.5	5.5	7.0	6.0	4.0	4.3	5.2	5.2

<b>Forest Lake Middle Chlorophyll-a</b> Deep Lake State Standard $\leq 14 \mu\text{g/L}$ 10-Year Average: $15 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>14</b>	<b>13</b>	<b>21</b>	<b>17</b>	<b>13</b>	<b>15</b>	<b>20</b>	<b>24</b>	<b>9</b>	<b>13</b>
Sample 1	8	5	4	6	4	3	1	3	3	2
Sample 2	5	8	6	10	10	10	8	12	1	12
Sample 3	11	11	8	9	9	10	9	15	7	16
Sample 4	11	12	9	12	5	12	14	32	6	16
Sample 5	23	10	24	11	11	33	28	38	7	11
Sample 6	20	10	28	16	23	18	34	30	12	23
Sample 7	10	18	27	29	21	21	32	36	16	11
Sample 8	11	27	38	20	23	12	31	22	11	12

## (Forest East) State Standards Status

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.

<b>Forest Lake East Phosphorus</b> Deep Lake State Standard $\leq 40 \mu\text{g/L}$ 10-Year Average: $34 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>25</b>	<b>28</b>	<b>28</b>	<b>44</b>	<b>46</b>	<b>36</b>	<b>34</b>	<b>26</b>	<b>34</b>	<b>38</b>
Sample 1	19	20	15	22	18	24	26	19	13	21
Sample 2	23	28	14	22	38	25	28	19	28	46
Sample 3	18	22	14	24	46	30	31	20	50	48
Sample 4	21	36	27	87	44	39	28	32	29	48
Sample 5	29	23	27	26	51	57	28	40	26	35
Sample 6	33	27	40	56	51	28	39	27	41	38
Sample 7	29	29	43	55	53	47	47		38	34
Sample 8	28	38	34	53	65	37	43		43	36

<b>Forest Lake East Secchi</b> Deep Lake State Standard $\geq 4.6 \text{ ft}$ 10-Year Average: $6.4 \text{ ft}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>6.6</b>	<b>5.5</b>	<b>7.8</b>	<b>5.7</b>	<b>8.1</b>	<b>6.4</b>	<b>7.3</b>	<b>9.6</b>	<b>8.1</b>	<b>4.7</b>
Sample 1	9.5	7.0	15.0	8.5	14.0	9.0	14.5	11.8	18.0	9.7
Sample 2	10.0	6.5	10.0	8.0	13.0	9.5	12.0	21.3	14.8	5.9
Sample 3	9.0	6.5	12.0	7.5	8.5	7.5	9.0	6.2	6.6	4.6
Sample 4	7.5	6.5	8.0	7.0	6.5	7.5	6.0	5.2	6.6	3.6
Sample 5	4.5	4.0	6.5	5.0	5.5	4.5	4.5	3.6	4.9	3.3
Sample 6	5.5	5.0	5.0	3.0	6.0	4.5	4.5		4.9	3.0
Sample 7	4.0	4.5	5.5	3.5	6.0	4.5	4.0		4.9	3.9
Sample 8	5.0	4.0	4.0	4.5	5.0	4.5	4.0		4.1	3.6

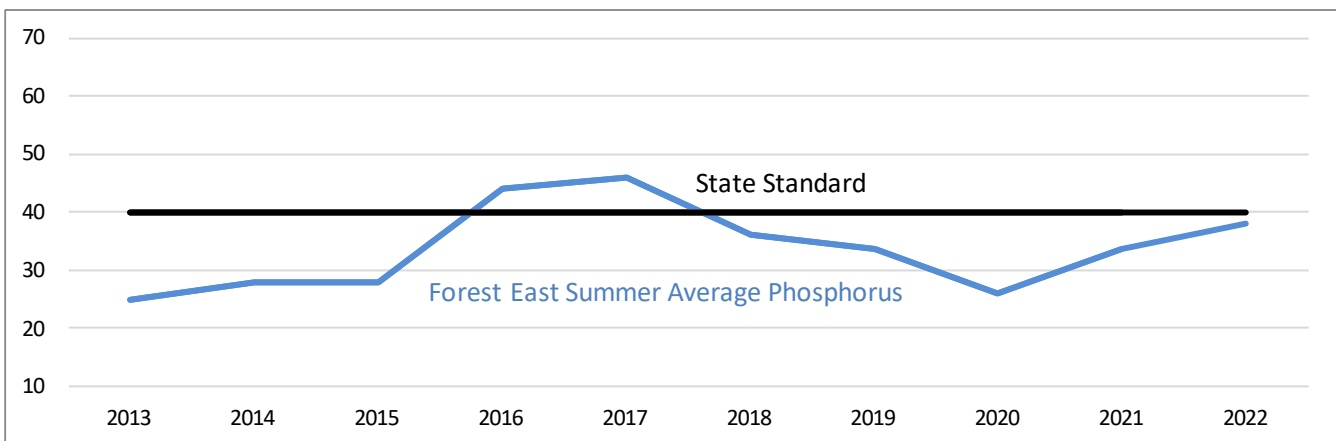
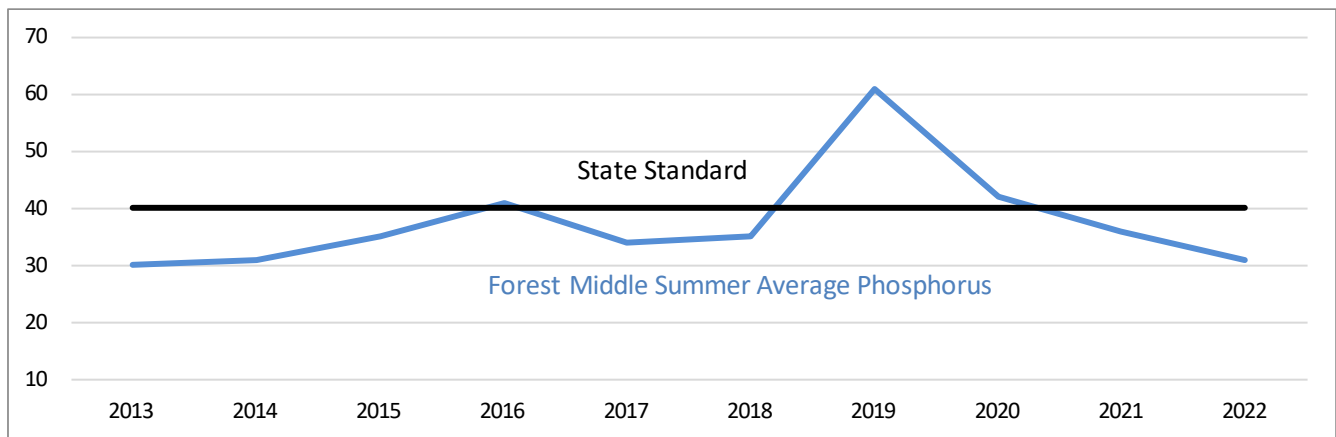
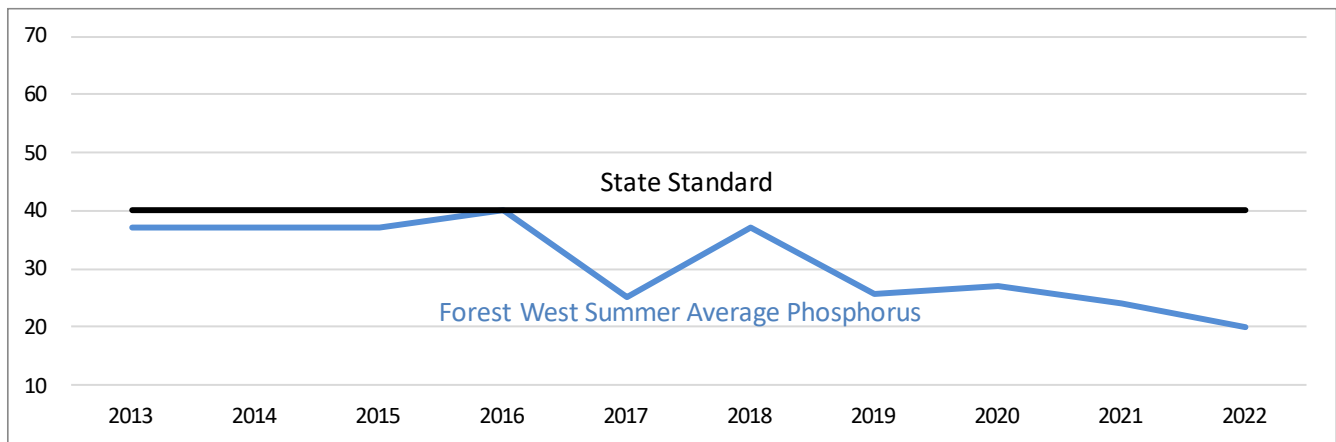
<b>Forest Lake East Chlorophyll-a</b> Deep Lake State Standard $\leq 14 \mu\text{g/L}$ 10-Year Average: $19 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>14</b>	<b>14</b>	<b>19</b>	<b>22</b>	<b>23</b>	<b>22</b>	<b>18</b>	<b>14</b>	<b>14</b>	<b>22</b>
Sample 1	6	4	3	5	7	5	3	3	1	3
Sample 2	6	12	8	10	12	9	5	10	12	9
Sample 3	6	8	7	7	15	11	9	9	14	20
Sample 4	8	8	10	13	26	20	13	34	8	32
Sample 5	14	16	17	23	25	45	29		16	20
Sample 6	19	12	34	45	28	31	34		16	32
Sample 7	16	28	22	33	27	33	24		20	26
Sample 8	44	28	34	24	45	25	25		28	32

**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

**Trends:**

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Forest Lake West	Significantly Improving Trend Since 1984	Significantly Improving Trend Since 2001	Significantly Improving Trend Since 2013
Forest Lake Middle	Declining Trend Since 2013	Declining Trend Since 2013	Declining Trend Since 2013
Forest Lake East	Declining Trend Since 2013	Declining Trend Since 2013	Improving Trend Since 2013

*\*Trends that are not "significantly" improving or declining are not statistically significant.*





**Management Activities:**

- Shields Lake Improvement Projects (531 lb/yr)
- County Road 50 Iron Enhanced Sand Filter (97 lb/yr phosphorus reduction)
- Enhanced Street Sweeping Program (72 lb/yr)
- 3<sup>rd</sup> Lake Pond Wetland Treatment Basin (56 lb/yr phosphorus reduction)
- Hilo Lane Stormwater Retrofit (12 lb/yr phosphorus reduction)
- Cost-Share Projects (16 lb/yr)
- Stormwater Management Permits (10 lb/yr)
- Curly-leaf Pondweed Treatment (performed annually by CLFLWD)
- CLFLWD Rules and Permitting (ongoing program resulting in erosion prevention, stormwater management practices, native buffers, etc. for development projects)
- Additional projects that are currently in-progress or planned for future:
  - WJD-6 Wetland Restoration (20 lb/yr phosphorus reduction)
  - Castlewood Agricultural BMPs (5 lb/yr phosphorus reduction)
  - North Shore Circle Improvements Roadside BMPs (3.4 lb/yr phosphorus reduction)
  - Forest Lake Alum Treatment (527 lb/yr phosphorus reduction)
  - Forest Lake Dead End Street Improvements (TBD)
  - Lakeside Park Shoreline Restoration Project (TBD)

**Conclusion:**

Forest Lake is **not** nutrient impaired for aquatic recreation, but water quality readings are sometimes close to or exceed the state standard. The District will continue to implement management activities to improve water quality in Forest Lake and monitor in-lake water quality annually. The alum treatment project will help Forest Lake achieve its long-term water quality goals and maintain water quality within state standards.

## 5229 Comfort Lake Summary

### (Comfort) 2022 Water Quality Grade: B

Excellent	Good	Average	Marginal	Poor
A All or most samples meet the desired threshold	<b>B</b> Many samples meet or are near the desired threshold	C Some samples meet or are near desired threshold	D Many samples do not meet the desired threshold	F Most samples do not meet the desired threshold

### (Comfort) Lake Goals & Status Summary

Table 19. Comfort Lake Water Quality Goals & Status Summary

	Long-Term Goal	Current Status	Remaining
5-Year Average Phosphorus Concentration	≤30 µg/L	27 µg/L	161 lb/yr phosphorus load
5-Year Average Secchi Depth	≥7 ft	9.2 ft	
10-Year Average Bottom Water Chloride	≤230 mg/L	TBD	TBD
% of Parcels with ≥75% Natural Shoreline <a href="#">Source: 2014 Shoreland Inventory</a> (more recent photo inventories have occurred but % not quantified)	≥75% of parcels ≥81 parcels	61% of parcels 65 parcels	14% of parcels 16 parcels

Table 20. Comfort Lake Phosphorus Reduction Goals

5229 Comfort Lake	Phosphorus Reduction (lb/yr)
Load Reduction to Achieve Long-term Goal of 30 µg/L: (based on 2004 benchmark of 42 µg/L)	825
Load reduction progress through 2022 (completed projects)	664
<b>2022 Remaining Load Reduction</b>	<b>161</b>

### (Comfort) Project Implementation Progress



**Reduction Goal: 825 lbs**

**Progress (Completed + In Progress Projects): 96%**

Figure 8. Comfort Lake Phosphorus Reduction Goals and Project Progress Graph

Additional notable projects: cost-share projects, permitting oversight (e.g., erosion control, stormwater management, and waterbody buffer requirements).

## **(Comfort) Progress Toward State Standards**

Comfort Lake is nutrient impaired for aquatic recreation.

**#1 – Water Quality Samples:** If seasonal averages of the last two years of data (minimum of 8 samples) meet the total phosphorus standard, and either the Secchi or chlorophyll-a standard, then the lake meets criterion #1 for delisting.



### **#1 – Water Quality Samples:**

Comfort Lake is meeting the criteria for phosphorus concentration, Secchi depth, and chlorophyll-a. **Comfort Lake meets criterion #1 for de-listing.**

<b>Comfort Lake Phosphorus</b> Deep Lake State Standard $\leq 40 \mu\text{g/L}$ 10-Year Average: $30 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>25</b>	<b>43</b>	<b>31</b>	<b>34</b>	<b>33</b>	<b>32</b>	<b>26</b>	<b>31</b>	<b>20</b>	<b>28</b>
Sample 1	18	45	23	16	18	51	57	21	31	26
Sample 2	21	61	14	27	67	20	22	13	44	34
Sample 3	38	85	28	86	27	34	24	17	20	38
Sample 4	40	45	50	28	55	38	20	16	8	25
Sample 5	24	17	38	32	23	24	30	73	12	25
Sample 6	20	16	36	29	23	22	33	45	15	15
Sample 7	21	41	38	29	17		19	30	16	24
Sample 8	20	30	28	27	18		23	18	15	33

<b>Comfort Lake Secchi</b> Deep Lake State Standard $\geq 4.6 \text{ ft}$ 10-Year Average: $5.7 \text{ ft}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>5.7</b>	<b>4.6</b>	<b>5.5</b>	<b>5.5</b>	<b>5.8</b>	<b>7.7</b>	<b>5.3</b>	<b>6.0</b>	<b>8.4</b>	<b>5.9</b>
Sample 1	6.5	6.0	7.5	8.0	7.5	14.0	7.5	6.6	9.8	8.2
Sample 2	9.0	4.0	6.5	6.0	6.5	8.5	6.0	9.5	9.8	6.6
Sample 3	4.5	3.5	4.5	6.5	6.0	7.0	5.5	7.5	8.9	4.6
Sample 4	4.0	4.0	3.0	6.0	4.5	4.5	5.0	5.6	10.2	5.2
Sample 5	3.5	4.5	4.5	3.0	4.5	6.0	4.0	6.0	7.9	4.6
Sample 6	5.0	6.0	4.5	4.5	6.0	6.0	4.5	5.7	9.2	5.9
Sample 7	6.5	4.5	4.5	4.0	5.5		5.5	5.5	6.2	6.9
Sample 8	7.0	4.5	5.0	4.5	6.0		6.0	4.9	5.6	5.6

<b>Comfort Lake Chlorophyll-a</b> Deep Lake State Standard $\leq 14 \mu\text{g/L}$ 10-Year Average: $14 \mu\text{g/L}$	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Summer Average</b>	<b>14</b>	<b>17</b>	<b>20</b>	<b>16</b>	<b>12</b>	<b>14</b>	<b>16</b>	<b>10</b>	<b>4</b>	<b>10</b>
Sample 1	16	6	10	7	9	4	9	5	4	2
Sample 2	7	28	10	10	1	9	13	7	7	8
Sample 3	14	16	26	9	13	10	21	6	2	16
Sample 4	18	24	27	14	17	33	21	8	1	10
Sample 5	16	16	28	31	13	12	15	16	3	13
Sample 6	15	7	25	22	13	14	27	10	4	8
Sample 7	7	16	26	25	13		20	11	8	8
Sample 8	21	26	24	23	21		15	12	6	13

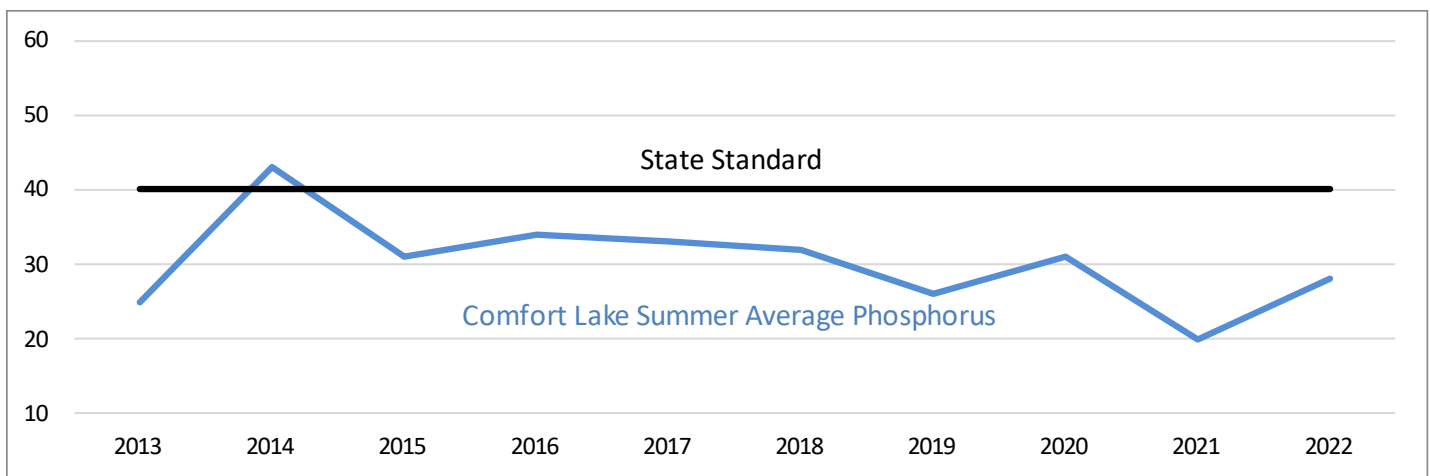
**#2 Trend/Management:** If there is either an improving trend in total phosphorus or management activities in place to maintain improved chlorophyll-a or Secchi observations, then the lake meets criterion #2 for delisting.

**#2 Trend/Management:**  
 ✓ Phosphorus trend is improving in Comfort Lake. Several management activities are in place to maintain improved chlorophyll-a or Secchi observations in Comfort Lake, but several projects are still in progress. **Comfort Lake meets criteria #2 for de-listing, but more management activities are in progress.**

**Trends:**

Lake	Total Phosphorus Trend	Chlorophyll-a Trend	Secchi Disk Trend
Comfort Lake	Improving Trend Since 1994	Significantly Improving Trend Since 2013	Significantly Improving Trend Since 2013

*\*Trends that are not "significantly" improving or declining are not statistically significant.*



**Management Activities:**

- Bixby Park Water Quality Improvement Project – Chisago Co. Petitioned Project (92 lb/yr phosphorus reduction)
- Target Big Box Retrofits (5 lb/yr phosphorus reduction)
- Stormwater Management Permits (43 lb/yr)
- Curly-leaf Pondweed Surveys (annually by CLFLWD, treatment usually not warranted- due to low density growth)
- CLFLWD Rules and Permitting (ongoing program resulting in erosion prevention, stormwater management practices, native buffers, etc. for development projects)
- Additional projects that are currently in-progress or planned for future:
  - Tax Forfeit Wetland Restoration – Chisago Co. Petitioned Project (65 lb/yr phosphorus reduction)
  - Little Comfort Lake Improvement Projects (estimated 64 lb/yr phosphorus reduction)
  - Forest Lake Urban Retrofits (estimated 17 lb/yr phosphorus reduction)
  - Shoreline Restorations (TBD)
  - Shallow Pond Restoration (estimated phosphorus/sediment reduction TBD)
  - Regional Stormwater Treatment Facility (estimated phosphorus/sediment reduction TBD)

**Conclusion:**  
 ✓ Comfort Lake qualifies for de-listing at this time. However, the estimated phosphorus load entering Comfort Lake is still above the long-term District goal. **The District will implement more management activities to protect Comfort Lake’s water quality long-term.**

## APPENDICES

- Appendix A Project Implementation Update: status summary of active projects and their outcomes
- Appendix B Portfolio of Completed and In Progress Projects: maps and tables of the District's projects and their outcomes
- Appendix C Clean Water Fund Grant Award Comparison: aggregate Clean Water Fund Projects & Practices grant award data for all grantees (this grant program has been critical to the District's success with its projects)

## Appendix A – Project Implementation Update

Project Name (2022 Active Projects)	Project Description	Project Outcomes Phosphorus (P), Sediment, Storage, Wetland or Field Acres	Progress Update (Project Phase as of 12/31/22)
Moody Lake Capstone Projects	Target projects to achieve the remaining phosphorus load reduction to Moody Lake in order for Moody Lake to maintain long-term water quality goals. Proposed projects include: agricultural field gully repair, excavation of phosphorus-laden soils, raingarden and other park improvements, and wetland dredging.	To Moody Lake: 62 lb/yr P reduction 8,940 lb/yr sediment reduction  Storage added: 0.8 acre-ft (estimated)  Wetland restored: 0.5 acres	(Phase 2. Feasibility) Executed the Clean Water Fund grant agreement in spring 2023. Began landowner coordination and project agreements/legal coordination. Began preliminary project design. A feasibility report and project ordering will be brought to the Board in March 2023. Once the project is ordered, it will transition to Phase 3. Design.
Subwatershed Assessment Implementation	Implement best management practices (BMPs) on agricultural lands identified as having the best cost-benefit of phosphorus reduction to downstream Moody and Bone Lakes. Practices were funded through a variety of means including a Clean Water Fund grant, partnership with Chisago SWCD, and landowner local funds.	To Bone Lake: 83 lb/yr P reduction 177,293 lb/yr sediment reduction  Fields converted/treated: 89 acres	(Phase 4. Implementation) The District spearheaded the creation of a farmer-led advisory council, which meets multiple times per year. Creation of this council, along with staff's outreach to landowners, resulted in several landowners implementing non-structural agricultural best management practices on their properties.
Bone Lake Northeast Wetland Restoration	Remove accumulated phosphorus-rich sediment from the northern portion of a wetland directly adjacent to Bone Lake that had a history of receiving direct livestock manure runoff from an adjacent dairy farm barnyard.	To Bone Lake: 15 lb/yr P reduction  Storage added: 3.4 acre-ft (estimated)  Wetland restored: 2.0 acres	(Phase 5. O&M) Project construction occurred in early 2022, and site revegetation occurred throughout the 2022 growing season. This project was closed out in December 2022 and is now in the operations & maintenance phase.

<b>Project Name (2022 Active Projects)</b>	<b>Project Description</b>	<b>Project Outcomes</b> Phosphorus (P), Sediment, Storage, Wetland or Field Acres	<b>Progress Update</b> <b>(Project Phase as of 12/31/22)</b>
Melanie Trail Roadside Best Management Practices  Partnership project with City of Scandia.	Construct roadside best management practices on Melanie Trail to treat road runoff prior to entering Bone Lake. Stormwater treatment above and beyond regulatory requirements	To Bone Lake: 2 lb/yr P reduction	(Phase 5. O&M) District engineers worked closely with City of Scandia engineers to perform feasibility and construction oversight. Construction was completed in summer/fall 2022. This project will be maintained by the City of Scandia.
Little Comfort Lake Infiltration Basin	Re-direct ditched flow into an out-of-commission gravel pit in order to convert the gravel pit into an infiltration basin. The project will likely involve some re-shaping of the pit in order to maximize water quality and habitat benefits.	To Little Comfort Lake: 80-100 lb/yr P reduction  Storage added: TBD	(Phase 2. Feasibility) Continued landowner coordination, project feasibility, and data gathering in 2022. The District has requested a grant extension to 12/31/24 in order to complete this project. This project will replace the East Wetland Impoundment project that was originally proposed as part of the Little Comfort Lake Diagnostic Study. The new Infiltration Basin project is estimated to achieve water quality benefits equal to or greater than the East Wetland Impoundment.
School Lake Outlet Channel	Implement best management practices in this subwatershed in order to treat excess phosphorus and sediment loading.	TBD	(Phase 2. Feasibility) The originally proposed project involved beaver dam analogs in the stream channel, which is a low-cost way to mimic natural conditions and improve water quality. However, the MN DNR will not permit these practices. District staff and engineers continue to evaluate project alternatives.
Little Comfort Lake Alum Treatment Project (on hold)	Whole lake alum treatment project is on hold as a result of new data. The District must focus on addressing external nutrient loading, then collect more data before proceeding with an alum treatment.	TBD	(On Hold) Newly obtained in-lake data, combined with existing data the District already gathered, suggests that an alum treatment is not recommended at this time. The District Engineer produced a technical memorandum summarizing the data and recommendation.



Project Name (2022 Active Projects)	Project Description	Project Outcomes Phosphorus (P), Sediment, Storage, Wetland or Field Acres	Progress Update (Project Phase as of 12/31/22)
July Avenue Agricultural Practices and Wetland Restoration	Address nutrient loading from an agricultural operation draining to School Lake	TBD	(Phase 1. Planning) District staff and engineers gathered data to evaluate the impacts that historic cattle farming had on downstream wetlands between agricultural operation and School Lake. This data will inform potential future projects.
Washington Judicial Ditch 6 Wetland Restoration	Restore wetland including sediment excavation and vegetation rehabilitation. The current wetland condition is partially drained by a small private ditch that flows into WJD-6 and eventually into Forest Lake, and 100% dominated by a monotype of reed canary grass.	To Forest Lake: 20 lb/yr P reduction 3,200 lb/yr sediment reduction  Storage added: 5.7 acre-ft  Wetland restored: 4 acres	(Phase 2. Feasibility) Executed the Clean Water Fund grant agreement in spring 2023. Began landowner coordination and project agreements/legal coordination. Began preliminary project design. A feasibility report and project ordering will be brought to the Board in February 2023. Once the project is ordered, it will transition to Phase 3. Design.
Washington Judicial Ditch 6 Country Road 50 Iron Enhanced Sand Filter	Treat 50% of the WJD-6 subwatershed runoff with an offline, multi-cell iron enhanced sand filtration (IESF) treatment system.	To Forest Lake: 97 lb/yr P reduction 3,000 lb/yr sediment reduction	(Phase 4. Implementation) Completed the first phase of construction in late 2022. Will complete the second phase of construction in spring 2023, site revegetation over the 2023 growing season, and project closeout by late 2023.
Castlewood Agricultural Best Management Practices	Reduce cropland erosion and nutrient loading to Forest Lake tributaries by implementing agricultural best management practices (BMPs), such as perennial crop conversion, on a farm field in the Castlewood subwatershed.	To Forest Lake: 6.1 lb/yr P reduction 284,000 lb/yr sediment reduction	(Phase 4. Implementation) Continued to implement perennial hay crop in 2022. Sold hay crop harvest to offset planting costs. Will conduct soil testing in 2023 to track fertility and soil health metrics.
North Shore Circle Roadside Best Management Practices  Partnership project with City of Forest Lake.	Construct roadside best management practices on North Shore Circle to treat road runoff prior to entering Forest Lake. Stormwater treatment above and beyond regulatory requirements.	To Forest Lake: 3.4 lb/yr P reduction 807 lb/yr sediment reduction	(Phase 5. O&M) District engineers worked closely with City of Forest Lake engineers to perform feasibility/design. These BMPs were constructed in 2022. The City is responsible for operations & maintenance.

Project Name (2022 Active Projects)	Project Description	Project Outcomes Phosphorus (P), Sediment, Storage, Wetland or Field Acres	Progress Update (Project Phase as of 12/31/22)
Forest Lake Enhanced Street Sweeping Plan and Implementation	CLFLWD created a comprehensive street sweeping plan to quantify and optimize phosphorus removal. City of Forest Lake implements the Enhanced Street Sweeping Plan by utilizing a newly purchased a vacuum sweeper and hiring in-house staff to operate it according to frequencies identified in the plan.	<p>Estimated reductions, by lake subwatershed, based on actual 2019 sweeping data. Reductions achieved at the lake are estimated to be approximately 50% of reductions achieved at the source (sweeper).</p> <p>Reductions achieved at the sweeper:            Forest Lake: 143 lb/yr P            Forest Lake: 381,648 lb/yr solids</p> <p>Shields Lake: 11 lb/yr P            Shields Lake: 32,802 lb/yr solids</p> <p>Keewahtin Lake: 2 lb/yr P            Keewahtin Lake: 4,831 lb/yr solids</p> <p>Comfort Lake: 65 lb/yr P            Comfort Lake: 154,814 lb/yr solids</p>	(Phase 5. O&M) City continued street sweeper operation in 2022. This program received two awards in 2022: League of Minnesota Cities City of Excellence Award, and Comfort Lake-Forest Lake WD's Watershed Champion Award.
Sunrise River-Highway 61 (Tax Forfeit) Wetland Enhancement – Chisago County Petitioned Project	Modify an existing ditched wetland complex located on District-owned tax forfeited property to increase water quality treatment and storage capacity.	<p>To Comfort Lake:            65 lb/yr P reduction            18,630 lb/yr sediment reduction</p> <p>To Sunrise River:            89 lb/yr P reduction            154,814 lb/yr sediment reduction</p> <p>Storage added: 18.5 acre-ft            Wetland restored: 22.1 acres</p>	(Phase 4. Implementation) Completed project design, bidding, and site prep in 2022. Construction to occur in early 2023 under frozen conditions. Site revegetation to occur over 2023 growing season. Project closeout expected in late 2023.

Project Name (2022 Active Projects)	Project Description	Project Outcomes Phosphorus (P), Sediment, Storage, Wetland or Field Acres	Progress Update (Project Phase as of 12/31/22)
Regional Stormwater Treatment Facility	Construct a regional stormwater treatment facility to treat runoff from urban areas and increase floodplain storage. The City of Forest Lake contains the most concentrated urban portion of the District which drains to Comfort Lake and is the top priority for implementation.	To Comfort Lake: TBD  Storage added: TBD	(Phase 2. Feasibility) Continued coordinating this project closely with the City of Forest Lake. Several potential projects have been identified. Additional feasibility and coordination with the City of Forest Lake is necessary prior to continuing to project design.
Wyoming Enhanced Street Sweeping	CLFLWD is in the process of creating a comprehensive street sweeping plan to quantify and optimize phosphorus removal. The City of Wyoming would implement the Enhanced Street Sweeping Plan utilizing its own sweeper.	To Comfort Lake: 5-10 lb/yr 5,000-10,000 lb/yr sediment	(Phase 1. Planning) District staff will complete the Wyoming Enhanced Street Sweeping Plan in partnership with the City and the Lower St. Croix Partnership in early 2023, and the City can begin implementation shortly thereafter.

Projects are color-coded by lake management district: *green = Bone Lake, yellow = Little Comfort Lake, pink = Forest Lake, purple = Comfort Lake*

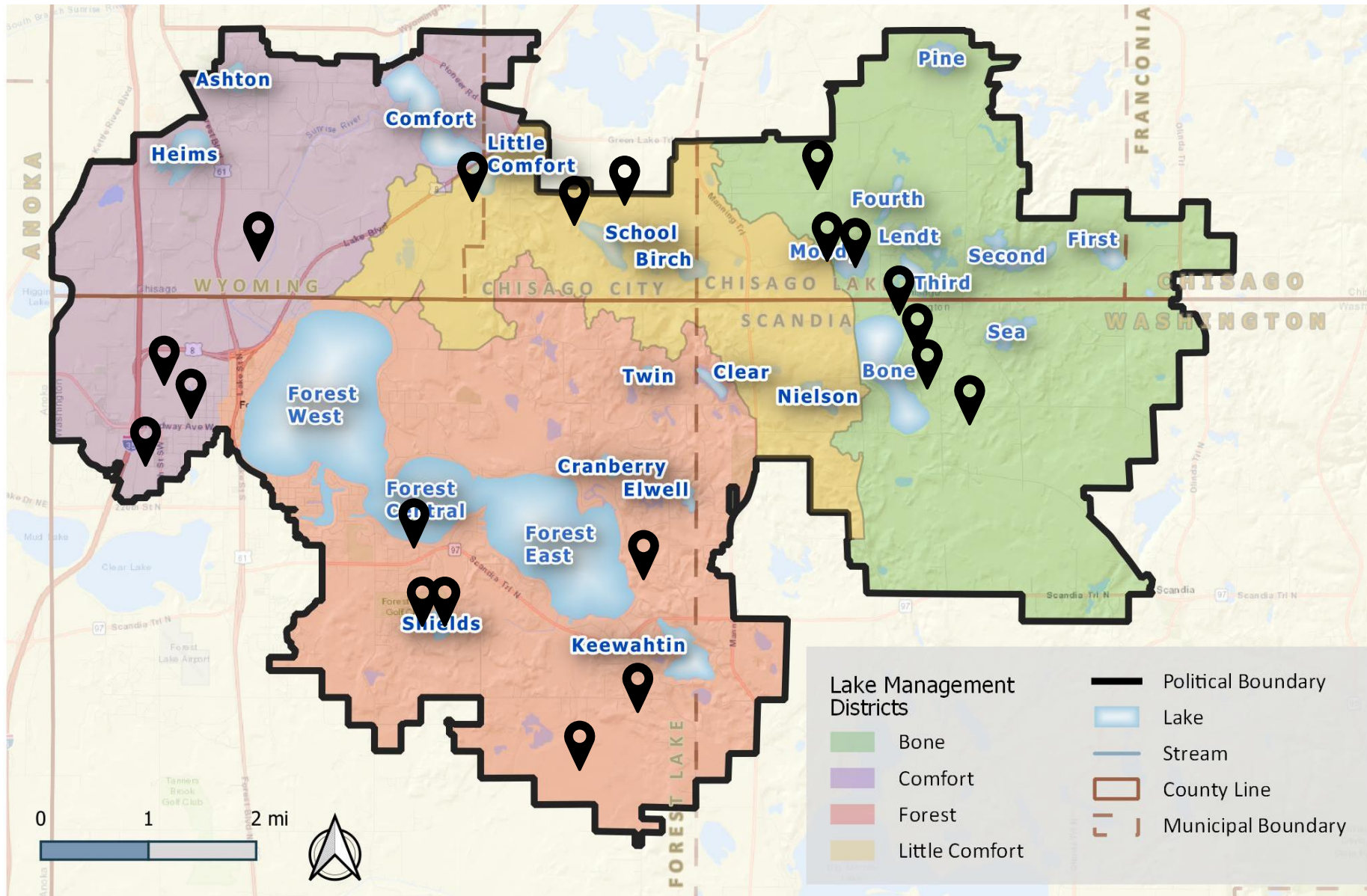
**Project Phases:**

- Phase 0. Not Started
- Phase 1. Planning
- Phase 2. Feasibility
- Phase 3. Design
- Phase 4. Implementation
- Phase 5. Operations & Maintenance (O&M)

# Appendix B – Portfolio of Completed & In-Progress Projects



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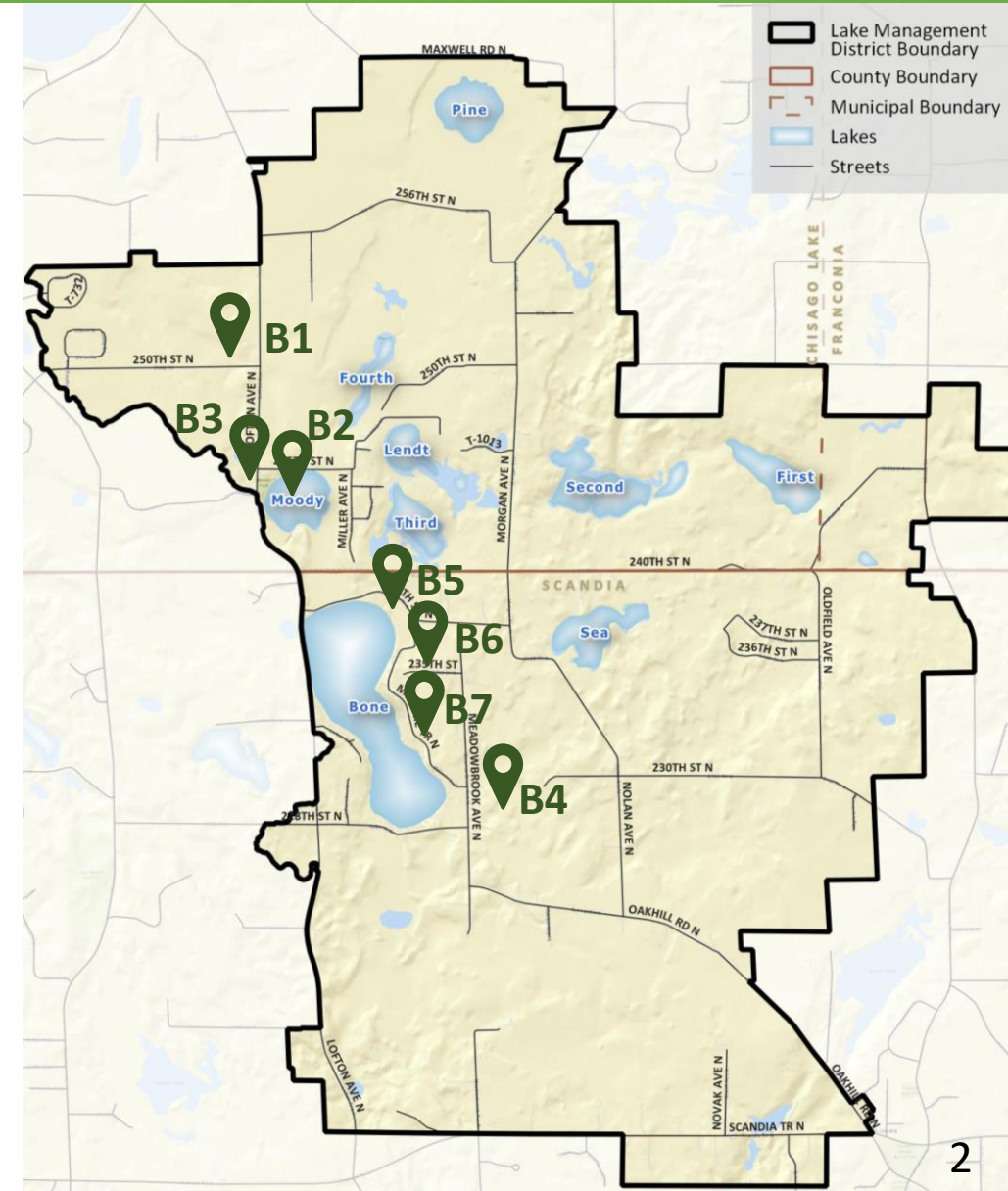
This appendix summarizes programs and projects undertaken by the District and its partners. It is not an exhaustive list of all projects and practices within the watershed, but is merely a summary of some of the activities resulting in significant progress toward nutrient reduction goals.



# Bone Lake Management District



Completed and In-Progress Projects	Outcomes at Moody or Bone Lake (reductions)	Outcomes at Edge of Project (reductions)
B1: Moody Wetland Rehabilitation - Completed	455 lb/yr phosphorus (P) 457,120 lb/yr total suspended solids (TSS)	455 lb/yr P 457,120 lb/yr TSS
B2: Moody Lake Alum Treatment - Completed	324 lb/yr P	324 lb/yr P
B3: Moody Lake Capstone Projects – In Progress	62 lb/yr P 12,257 lb/yr TSS	62 lb/yr P 12,257 lb/yr TSS
B4: Bone Lake Southeast Drained Wetland Restorations - Completed	35 lb/yr P 324,640 lb/yr TSS	35 lb/yr P 324,640 lb/yr TSS
B5: Bone Lake Northeast Legacy Wetland Restoration – Completed	15 lb/yr P	15 lb/yr P
B6: Melanie Trail Cropland Conversion – Ongoing	34 lb/yr P 27,600 lb/yr TSS	34 lb/yr P 27,600 lb/yr TSS
B7: Melanie Trail Roadside Practices – In Progress	2 lb/yr P	2 lb/yr P
Fish Barriers & Rough Fish Harvest – Completed	Necessary to maintain water quality	Necessary to maintain water quality
Moody/Bone Ag Practices – In Progress	83 lb/yr P 177,293 lb/yr TSS	147 lb/yr P 314,000 lb/yr TSS
<b>TOTAL</b>	1,010 lb/yr P or 504,900 lbs of algae growth	910 lb/yr P



\*Many projects result in multiple additional benefits such as wildlife habitat and flood storage creation.

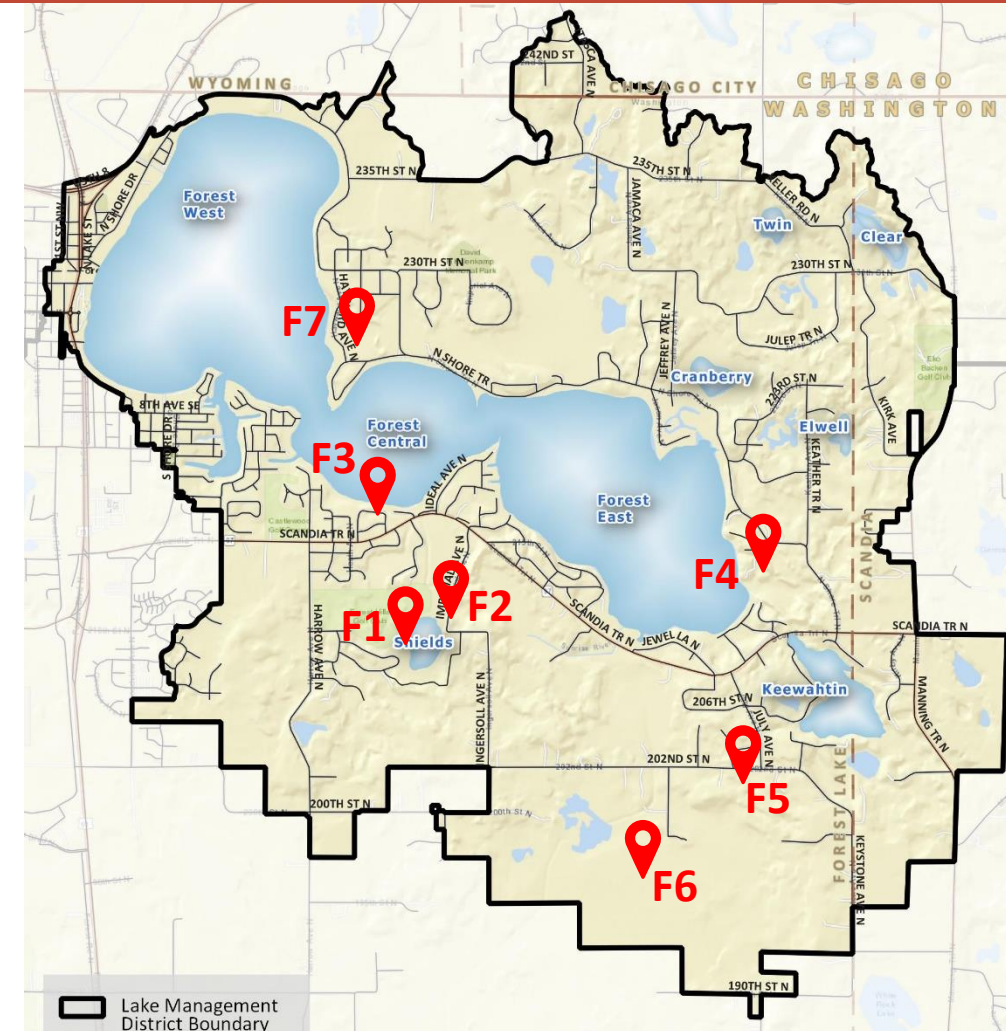
\*Literature values indicate 1 lb of phosphorus can support up to 500 lbs of algae growth.

\*See TSS Footnotes slide after project summary slides.

# Forest Lake Management District



Completed and In Progress Projects	Outcomes at Forest Lake (reductions)	Outcomes at Edge of Project (reductions)
F1: Shields Lake Stormwater Reuse & Alum - Completed	531 lb/yr phosphorus (P) to Forest Lake	1,000 lb/yr P to Shields Lake (edge of project) 185 lb/yr TSS
F2: Shields Lake Fish Barrier, Aerator - Completed Shoreline Restoration – In Progress	Necessary to maintain water quality	Necessary to maintain water quality
F3: Hilo Lane Stormwater Retrofit - Completed	12 lb/yr P	12 lb/yr P
F4: 3 <sup>rd</sup> Lake Pond Restoration - Completed	56 lb/yr P 1,696 lb/yr TSS	56 lb/yr P 1,696 lb/yr TSS
F5: CR50 Iron Enhanced Sand Filter – In Progress	97 lb/yr P 3,000 lb/yr TSS	97 lb/yr 6,000 lb/yr TSS
F6: Washington Judicial Ditch 6 Wetland Restoration – In Progress	20 lb/yr P 5,558 lb/yr TSS	38 lb/yr 5,558 lb/yr TSS
F7: N. Shore Circle BMPs (City Forest Lk) - Completed	6 lb/yr P	6 lb/yr P
Enhanced Street Sweeping – Ongoing	≤ 72 lb/yr P ≤ 190,824 lb/yr sediment	143 lb/yr P 381,648 lb/yr sediment
Forest Lake Alum Treatment – In Progress	527 lb/yr P	527 lb/yr P
<b>TOTAL**</b>	1,321 lb/yr P or 660,300 lbs of algae	1,745 lb/yr P



\*Many projects result in multiple additional benefits such as wildlife habitat and flood storage creation.

\*Literature values indicate 1 lb of phosphorus can support up to 500 lbs of algae growth.

\*Street sweeping estimates are based on material removed from the street surface and do not reflect total load reductions to the downstream lakes. The actual load reduction to downstream water resources is generally 50% or less than the total load recovery and depends on the number and type of BMPs along the treatment train.

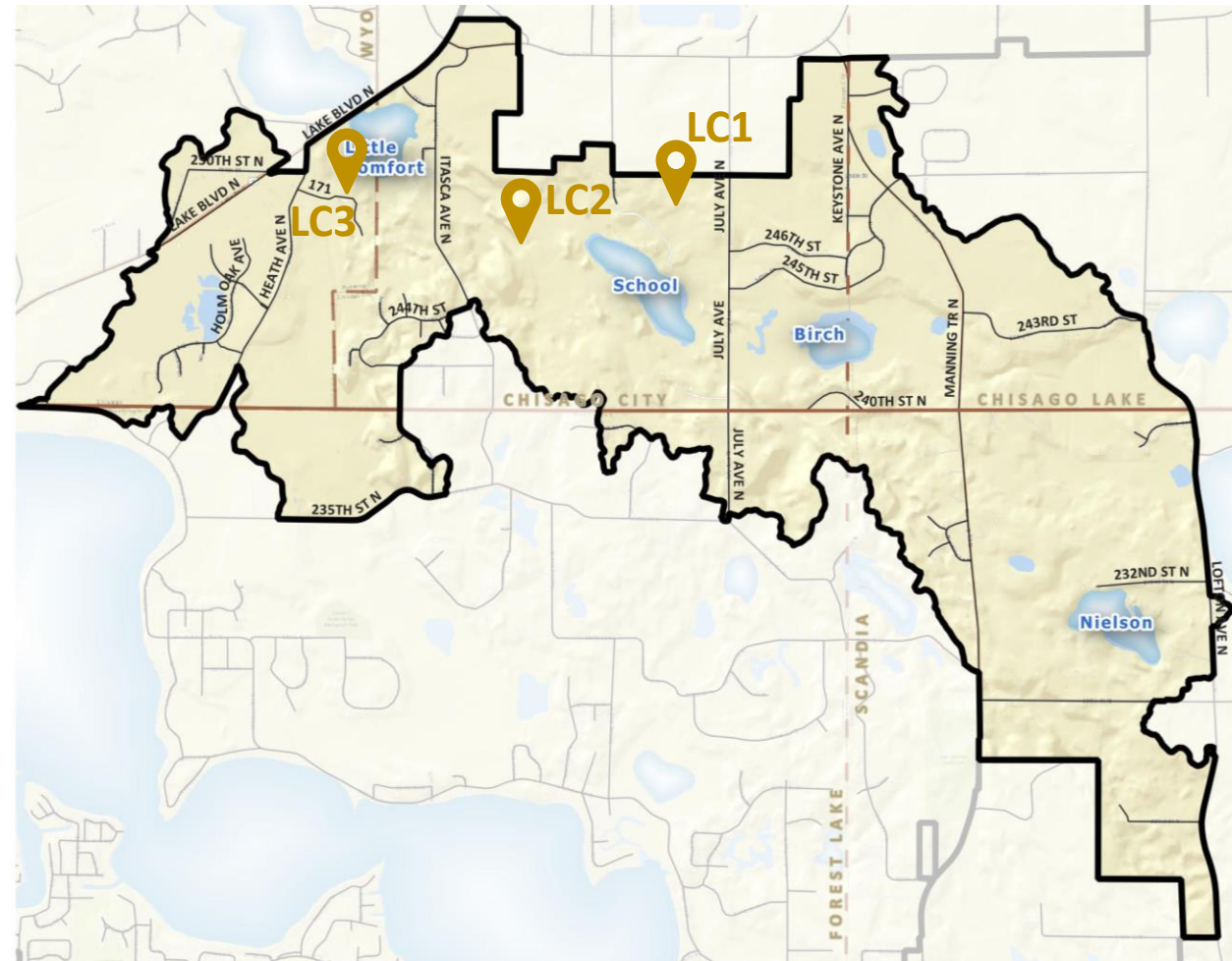
\*See TSS Footnotes slide after project summary slides.



# Little Comfort Lake Management District



Completed and In-Progress Projects	Outcomes at Little Comfort Lake (reductions)	Outcomes at Edge of Project (reductions)
LC1: July Avenue Ag BMPs & Wetland Restorations – In Progress	TBD pending feasibility	TBD pending feasibility
LC2: School Lake Outlet Channel Improvements – In Progress	TBD pending feasibility	TBD pending feasibility
LC3: Little Comfort Infiltration Basin – In Progress	80-100 lb/yr phosphorus	80-100 lb/yr phosphorus
Little Comfort Alum Treatment – On Hold Until Other Projects Complete	TBD	TBD
<b>TOTAL</b>	80-100 lb/yr or 40,000-50,000 lb of algae growth	

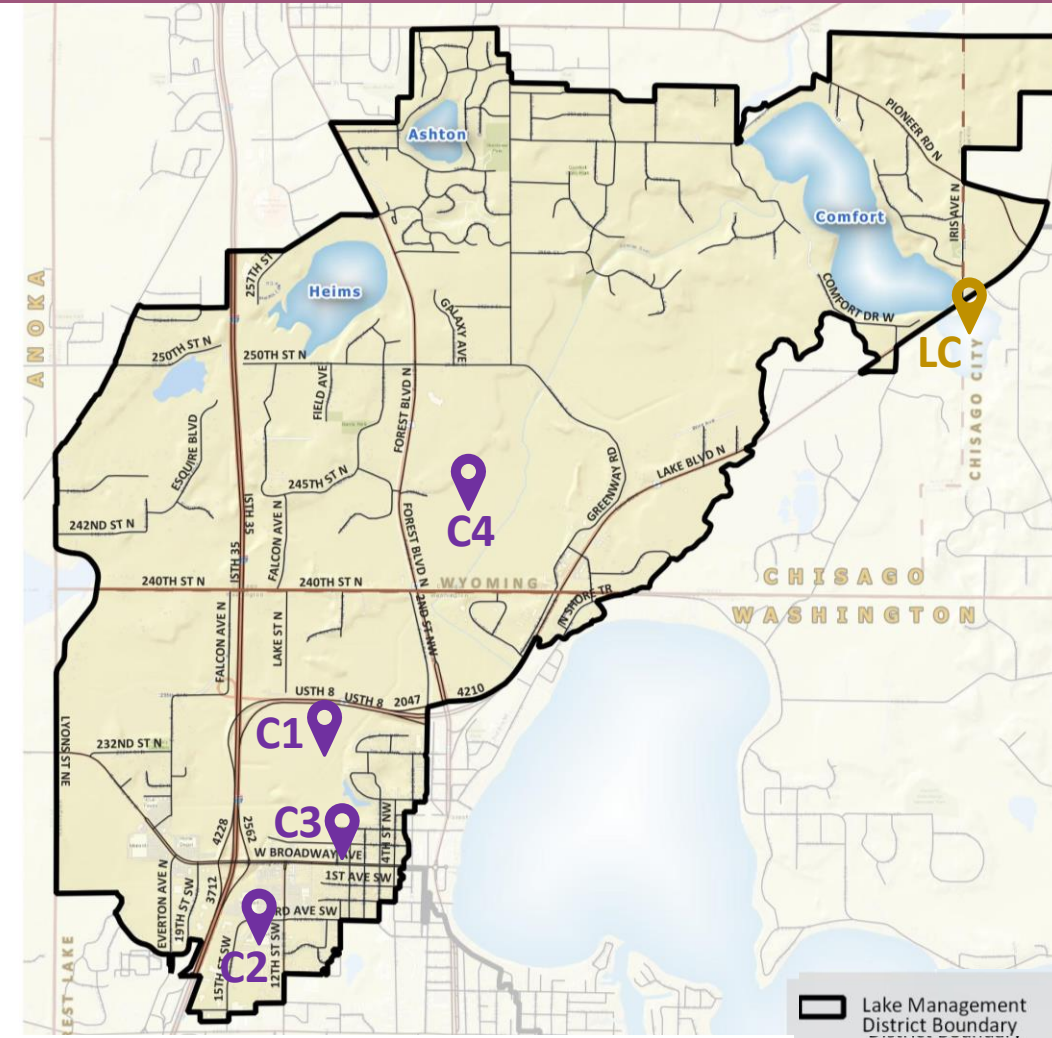


- \*Many projects result in multiple additional benefits such as wildlife habitat and flood storage creation.
- \*Literature values indicate 1 lb of phosphorus can support up to 500 lbs of algae growth.
- \*See TSS Footnotes slide after project summary slides.

# Comfort Lake Management District



Completed and In Progress Projects	Outcomes at Comfort Lake (reductions)	Outcomes at Edge of Project (reductions)
C1: Bixby Park Wetland Enhancement (Chisago Co. Petition) - Completed	93 lb/yr phosphorus (P) 5,546 lb/yr total suspended solids (TSS)	206 lb/yr P 55,458 lb/yr TSS
C2: Target Retrofits - Completed	5 lb/yr P	11 lb/yr P
C3: Broadway Ave Iron Sand Filter – Completed	15 lb/yr P 683 lb/yr TSS	33 lb/yr P 6,834 lb/yr TSS
C4: Sunrise River Hwy 61 Wetland Enhancement (Chisago Co Petition) – In Progress	65 lb/yr P 18,630 lb/yr TSS	89 lb/yr P 51,740 lb/yr TSS
Enhanced Street Sweeping (Multiple Locations) - Ongoing	≤ 32 lb/yr P ≤ 77,407 lb/yr TSS	65 lb/yr P 154,814 lb/yr TSS
Regional Treatment Facility (Location TBD) – In Progress	TBD	TBD
Stormwater Permits (Multiple Locations)	28 lb/yr P	33 lb/yr
LC: Little Comfort Lake Projects – In Progress	64 lb/yr to Comfort Lake	(See Little Comfort Lake Management District)
<b>TOTAL**</b>	301 lb/yr P or 150,600 lbs of algae growth	499 lb/yr P



\*Many projects result in multiple additional benefits such as wildlife habitat and flood storage creation.

\*Literature values indicate 1 lb of phosphorus can support up to 500 lbs of algae growth.

\*Street sweeping estimates are based on material removed from the street surface and do not reflect total load reductions to the downstream lakes. The actual load reduction to downstream water resources is generally 50% or less than the total load recovery and depends on the number and type of BMPs along the treatment train.

\*See TSS Footnotes slide after project summary slides.





# Total Suspended Solids (TSS) Footnotes

The following notes accompany the total suspended solids (TSS) loading figures on the previous slides

- The District monitors sediment loading annually. View the latest monitoring report at [www.clflwd.org/monitoring.php](http://www.clflwd.org/monitoring.php). [View the presentation on Comfort Lake sediment loading from the 3/24/22 regular board meeting here.](#)
- Moody Lake Wetland Rehabilitation: TSS loading estimated from RUSLE raster layer created by EOR. Assumes 80% TSS removal for the wetland and 85% for the buffer. Removal due to buffer was subtracted from load to wetland (the drainage area to the latter includes that for the former).
- Moody Lake Capstone Projects: TSS loading estimated from RUSLE raster layer created by EOR. Value is for buffer establishment only assuming 85% removal. Not enough information on the gully repair to estimate TSS benefits at this time.
- Bone Lake Southeast Drained Wetland Restorations: TSS loading estimated from RUSLE raster layer created by EOR. Assumes 80% TSS removal for each of the wetland restoration projects.
- Shields Lake Stormwater Reuse Project: TSS loading estimated from modeled flows and TSS grab samples. Ponds immediately upstream and downstream significantly reduce the TSS load reduction impact of this pond on the lake.
- 3<sup>rd</sup> Lake Pond Restoration: TSS loading estimated from RUSLE raster layer created by EOR. Assumes 80% TSS removal for the immediate drainage area only due to the pond immediately upstream.
- CR50 Iron Enhanced Sand Filter: TSS load reductions from the feasibility report. Assumes a 50% impact reduction factor due to the downstream wetland.
- WJD-6 Wetland Restoration: TSS loading estimated from measured flows and TSS grab samples from 2018. Assumes 80% TSS removal.
- Bixby Park Wetland Enhancement (Chisago Co Petition): TSS load reductions from the P8 model. Assumes a 90% impact reduction factor due to the distance from the lake.
- Broadway Avenue Iron Enhanced Sand Filter: TSS loading using the simple method, Met Council Generalized Land Use, and unit area loading values from the MN Stormwater Manual. Assumes 100% TSS removal and a 90% impact reduction factor due to the distance from the lake.

\*Disclaimer: These values represent rough approximations of sediment load reductions based on generalized land use and land cover characteristics and limited monitoring data.

## Appendix C - Clean Water Fund Grant Awards (FY 2014-2023)

(Grant program from 2008 MN constitutional amendment. Projects and Practices category only.)

	Organization	Total Projects and Practices Grants Awarded (FY 2014-2023)
1	Comfort Lake-Forest Lake WD	\$5,067,334
2	Becker SWCD	\$4,433,710
3	Benton SWCD	\$3,658,210
4	Crow Wing SWCD	\$3,335,000
5	Chisago SWCD	\$2,702,500
6	Vermillion River JPB/JPO	\$2,666,950
7	Stearns SWCD	\$2,369,737
8	Pope SWCD	\$2,361,300
9	Bois de Sioux WD	\$2,355,010
10	Anoka Conservation District	\$2,255,825
11	Shingle Creek WMC	\$2,057,550
12	Coon Creek WD	\$2,024,023
13	Capitol Region WD	\$1,835,000
14	Rice Creek WD	\$1,777,604
15	Douglas SWCD	\$1,666,908
16	City of Anoka	\$1,662,146
17	Pomme de Terre River Association	\$1,635,325
18	Red Lake SWCD	\$1,502,163
19	Bassett Creek WMC	\$1,500,000
20	Lower Mississippi River WMO	\$1,472,000
21	Pelican River WD	\$1,470,108
22	Minnehaha Creek WD	\$1,400,240
23	Okabena-Ocheda WD	\$1,398,312
24	Middle St. Croix River WMO	\$1,370,450
25	Wilkin SWCD	\$1,346,000

	Organization	Total Projects and Practices Grants Awarded (FY 2014-2023)
26	Carlton SWCD	\$1,341,444
27	Dakota County	\$1,295,724
28	Pennington SWCD	\$1,255,142
29	Cedar River WD	\$1,208,000
30	Middle Fork Crow River WD	\$1,176,250
31	City of Forest Lake	\$1,107,000
32	Scott SWCD	\$1,101,430
33	Redwood-Cottonwood Rivers Contr	\$1,048,880
34	Isanti SWCD	\$950,055
35	Wright SWCD	\$928,375
36	Brown's Creek WD	\$927,950
37	Martin County	\$882,000
38	Pioneer-Sarah Creek WMC	\$821,000
39	Fillmore SWCD	\$804,385
40	Mississippi WMO	\$800,000
41	Carnelian-Marine-St. Croix WD	\$780,481
42	Nine Mile Creek WD	\$750,000
43	Clearwater River WD	\$712,906
44	Dakota SWCD	\$700,000
45	Le Sueur SWCD	\$697,350
46	City of St. Paul	\$695,000
47	Buffalo-Red River WD	\$650,000
48	Prior Lake-Spring Lake WD	\$638,700
49	East Polk SWCD	\$618,680
50	Valley Branch WD	\$604,000
	<b>Total</b>	<b>\$77,818,157</b>

WD = Watershed District      SWCD = Soil and Water Conservation District      CA = Control Area  
WMB = Watershed Management Board      WMC = Watershed Management Commission      WMO = Watershed Management Org.

CLFLWD assisted the City of Forest Lake with its FY18 CWF grant proposal for Forest Lake Enhanced Street Sweeping Implementation (award = \$220,000) by performing the comprehensive street sweeping study and report in 2017 and assisting with the FY18 grant proposal and work plan. CLFLWD also assisted the City of Forest Lake with its FY17 CWF grant proposal for Forest Lake High School Stormwater Reuse (award = \$505,000) by performing initial coordination with the Forest Lake High School and project engineers.