Comfort Lake-Forest Lake Watershed District

2017 Progress Report

May 22, 2018

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Introduction

The Comfort Lake-Forest Lake Watershed District's (CLFLWD or District) 2012-2021 Watershed Management Plan (Plan) details several guidelines for measurement of progress for carrying out activities within the Plan. In January of 2018, the District completed a minor amendment to the Plan, including revisions to the progress evaluation metrics for the following programs: 3002 Permitting, 3004 Non-Point Source Pollution Abatement, and 3005 Education and Outreach. As part of the amendment, three new programs and associated progress metrics were added: 3009 Grant Research and Preparation, 3010 Operations and Maintenance, and 3011 Aquatic Invasive Species Prevention and Management. New and revised progress metrics are shown in underlined in this report. This report contains a variety of progress evaluation metrics derived from the Plan, board member input, and staff and stakeholder recommendations.

For more information on District accomplishments in 2017 see the 2017 Yearend Summary Infographic and 2017 Annual Report. Both are available at www.clflwd.org.

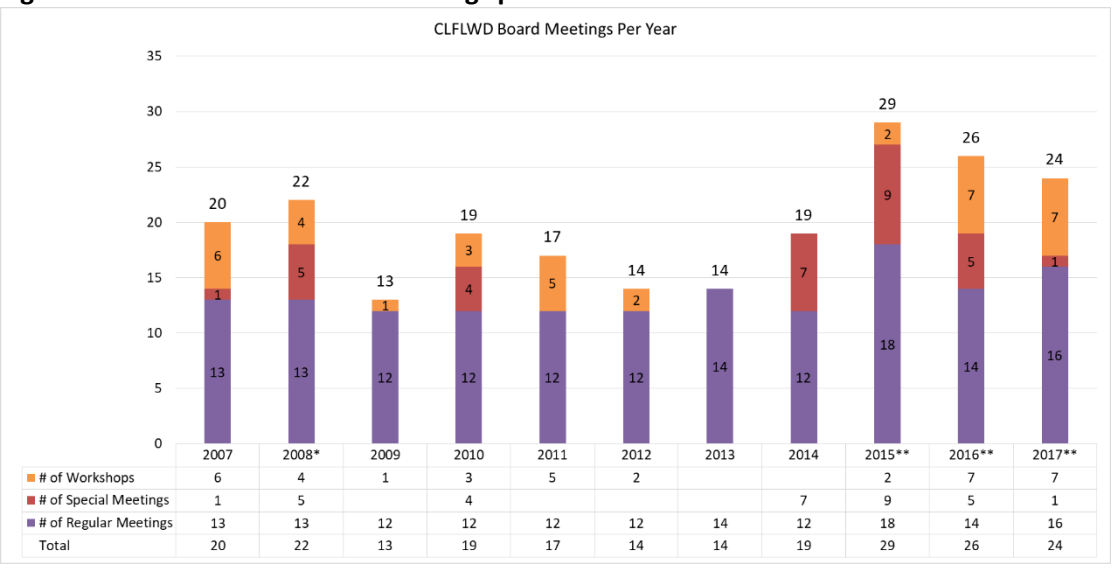
1000 Series – Administration

1001 Board Administration

2017 Evaluation

Progress evaluation metrics for Board Administration are not laid out in the Plan. However, the CLFLWD Board is very active and engaged in the District's activities. This level of commitment can be measured in a multitude of ways; one of which being number of board meetings held per year.

Figure 1001.1 – CLFLWD Board Meetings per Year



**District Rules were drafted in 2008*

***Increased to 2 regular meetings per month during summer months in 2015-2017*

1002 General Office Expenses

2017 Evaluation

Like Board Administration, progress evaluation metrics are not outlined in the Plan for General Office Expenses. However, it is the philosophy of the District to spend tax dollars wisely and efficiently. Employing cost efficient practices in the office is consistent with this philosophy.

The District will incorporate specific cost reduction/efficiency improvement projects into the work plan each year. Examples may include digitizing records, upgrading the office conference room, reducing permitting costs by sharing staff with another watershed district, etc. Each year staff will work on such projects in an effort to maximize time efficiency and cost-effectiveness. The following efficiency activities were completed in 2017:

- Continued preparations with Carnelian-Marine-St. Croix Watershed District (CMSCWD) for a staff-sharing program. The 2018 CLFLWD work plan includes staff time for assisting CMSCWD with permitting administration, permitting site inspections, watershed management plan update, and may potentially include additional items moving forward.
- The CLFLWD completed a boundary update along the border with Rice Creek Watershed District (see section 3006 for more details), effectively placing the District office within CLFLWD boundaries. With this and the office conference room updates completed, the CLFLWD Board adopted the District office as its principle place of business. While monthly regular meetings will continue to be held at Forest Lake City Hall, more frequent, smaller meetings will be held at the District office. Holding more meetings at the District office will increase staff efficiency for meeting setup and exhibit display.

- Staff continued to make progress toward the goal of fully digitizing all of the District's records so that older records and information can be readily accessed. This effort will continue into 2018.

1003 General Administration

Progress evaluation metrics are not outlined in the Plan for the 1000 series - Administration. It has been suggested that success in the overall Administration category be measured by the cost of administration as a percentage of the overall yearend expenses. This can be calculated in two ways: the entire 1000 Administration series (budget sections 1001 through 1004) as a percentage of the total 2017 yearend expenses, and the "in house" administration expenses (1001 through 1003) as a percentage of the total 2017 yearend expenses. A breakdown of each is provided below.

Figures 1003.1 and 1003.2 – Administration over Total Expenses

All Administration (1001 through 1004)	
2017 Est. YE Expenses	
1001 Board Administration	$26,285
1002 General Office Expenses	$63,907
District Staff Wages	$286,770
Allocated to programs/projects (remainder of $68,452 located in 1003 General Administration)	-$218,318
1004 Professional Services	$63,676
Total 1001-1004 Series Yearend Expenses (includes Professional Services)	**$222,320**
Total CLFLWD Yearend Expenses	**$2,019,930**
2017 Administration/Total Expense	**11.0%**
2016 Administration/Total Expense Comparison	**17.2%**

"In House" Administration (1001 through 1003) [Excluding professional services]	
2017 Est. YE Expenses	
1001 Board Administration	$26,285
1002 General Office Expenses	$63,907
District Staff Wages	$286,770
Allocated to programs/projects (remainder of $68,452 located in 1003 General Administration)	-$218,318
~~1004 Professional Services~~	
Total 1001-1004 Series Yearend Expenses (does NOT include Professional Services)	**$158,644**
Total CLFLWD Yearend Expenses	**$2,019,930**
2017 Administration/Total Expense [without professional services]	**7.9%**
2016 Administration/Total Expense Comparison [without professional services]	**11.5%**

Additionally, it has been suggested that success be measured by the breakdown of administration costs per staff member. Administration costs for total admin as well as the "in-house" costs were divided among number of staff members for each year for the past 5 years.

Figures 1003.3 and 1003.4 – Administration over Number of Staff Members

All Administration (1001 through 1004)			
Year	1001 thru 1004 Admin Costs	# of Full-Time Staff	Admin Expense/# of Staff
2017	$222,320	4.00	$55,580
2016	$299,389	3.52	$85,034
2015	$241,928	2.00	$120,964
2014	$207,299	1.08	$191,353
2013	$152,969	1.00	$152,969

"In House" Administration (1001 through 1003) [Excluding Professional Services]			
Year	1001 thru 1003 Admin Costs	# of Full-Time Staff	Admin Expense/# of Staff
2017	$158,644	4.00	$39,661
2016	$199,829	3.52	$56,756
2015	$130,669	2.00	$65,335
2014	$90,386	1.08	$83,433
2013	$84,721	1.00	$84,721

In 2017 the District began allocating a portion of expenses under budget section 1004 Professional Services to the Programs and Projects sections of the budget, according to percentage of consultant time spent on program and project activities. Similarly, a portion of District staff costs (wages, benefits, retirement contribution/PERA, and payroll taxes) are allocated out of 1003 General Administration and into Programs and Project; this is done in accordance with the CLFLWD work plan.

3000 Series - Programs

3001 District Rules and Rulemaking

Progress Evaluation Metric from Plan

Success in the District Rules and Rulemaking Program will be measured by the continued implementation of the District's Rules and by the periodic reviews of rule effectiveness (CLFLWD, 2018, p. 28).

2017 Evaluation

Since adoption of the rules on December 18, 2008, the District has utilized the permitting program to implement the rules. Specific progress statistics on the permitting program are provided in section 3002 of this report.

In 2016 the District began the process of reviewing rule effectiveness and exploring rule revisions. One of the driving forces for this review process was to incorporate Minimal Impact Design Standards in order to improve rule review efficiency and maintain consistency across other regulatory agencies within the state. Specifically, the following components of the rules were revised: Definitions, 1.0 Procedural Requirements, 2.0 Stormwater Management, 3.0 Erosion Control, 9.0 Fees, 10.0 Financial Assurances, 11.0 Variances and 12.0 Enforcement. The first Technical Advisory Committee (TAC) meeting for the rule revisions was held in December 2016. The majority of the rule revision work was completed in 2017 including a second TAC meeting, multiple board meeting discussions, board meetings with the cities of Wyoming and Forest Lake, frequent staff-level coordination with other local agencies and municipalities, a public comment period, and a public hearing. The revised rules were adopted at the February 22, 2018 regular board meeting, and went into effect on March 12, 2018 (the purpose of this delay is to allow time for local municipalities to receive the final revised rules, as approved, and incorporate into their documents as necessary).

3002 Permitting

Progress Evaluation Metric from Plan

Success in the Permitting Program will be measured by the number of permits issued which are inspected in compliance with the District Rules. Completion of inspections in compliance with the District Rules on 90% – 100% of active permits is measured as "Excellent", 70% - 89% is measured as "Good", 60% - 79% is measured as "Fair" and completion of inspections on less than 60% of active permits is measured as "Poor". Additionally, metrics for evaluating program activity levels will be assessed on an annual basis including, but not limited to: number of permit applications received, number of permits issued, number of permits closed out, number of site inspections performed, total amount of permit financial deposits received, and numbers of permitted best management practice annual reports received, inspections performed, and compliance with maintenance agreements and declarations (CLFLWD, 2018, p. 29).

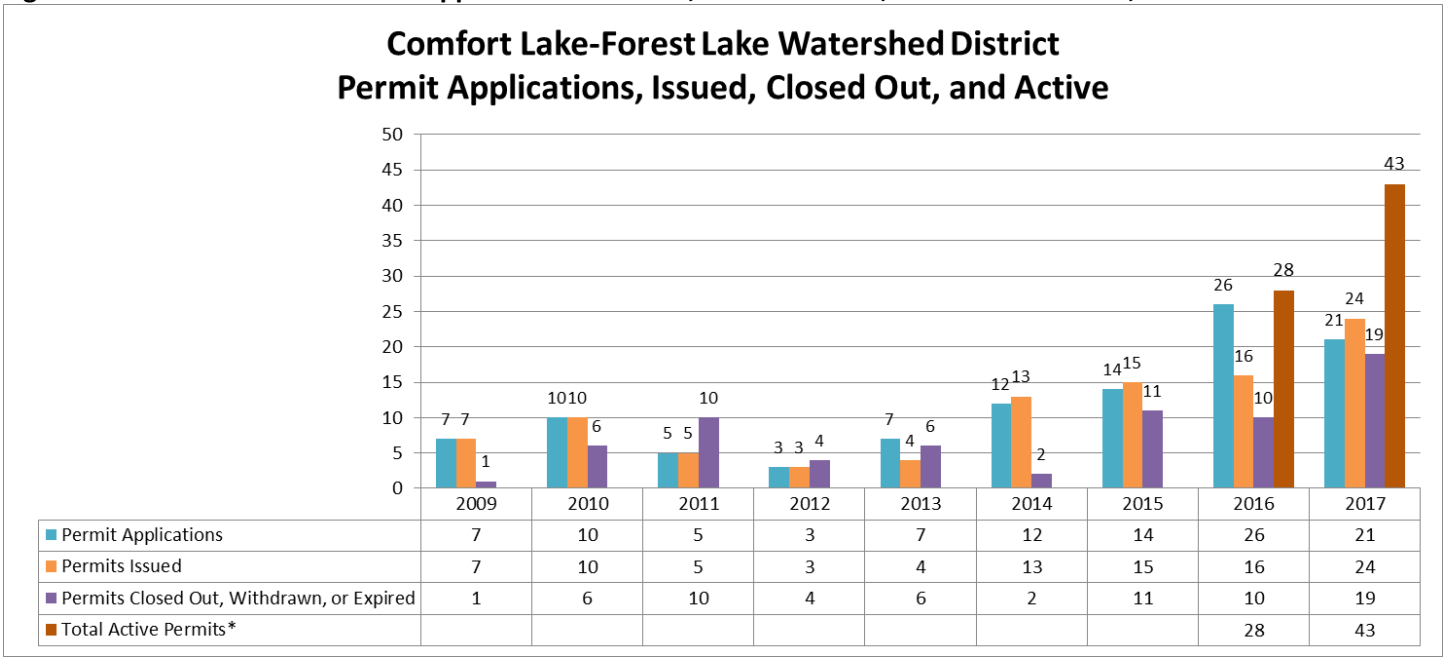
2017 Evaluation

During the year 2017 the District performed 159 permit site inspections. Compliance rates of these inspections were evaluated for each active permit based on the ratio of "compliant" to "non-compliant" items within the inspection reports. Seven categories are evaluated in an average inspection report: perimeter control, inlet protection, stabilized construction entrance, sediment tracking, soil stabilization, designated concrete washout area, and dewatering activities. If a certain activity does not apply to a given site during the time of inspection, that activity is marked as N/A (not applicable). Items marked N/A are not incorporated into the total ratio of "compliant" to "non-compliant" items. For example, if dewatering is not occurring on a construction site during the inspection, that item is marked "N/A" on the report and not included in compliance rate calculation. One example of a compliance ratio calculation for a single inspection is if a project site was deemed "compliant" in four of five applicable categories, its compliant ratio would be 80% (4/5).

Compliance ratios were calculated for all 159 inspections that were performed in 2017. Throughout the year, a total of 43 permits were active at various times and received at least one site inspection (n=43). The annual average was calculated for each active permit, then the global average was calculated, for an equally-weighted mean compliance ratio.

Using this calculation method, the average compliance rate of all inspections performed in 2017 is **93.0%**, which is measured as "Excellent". In 2016 the compliance rating was 88.9%, which is measured as "Good."

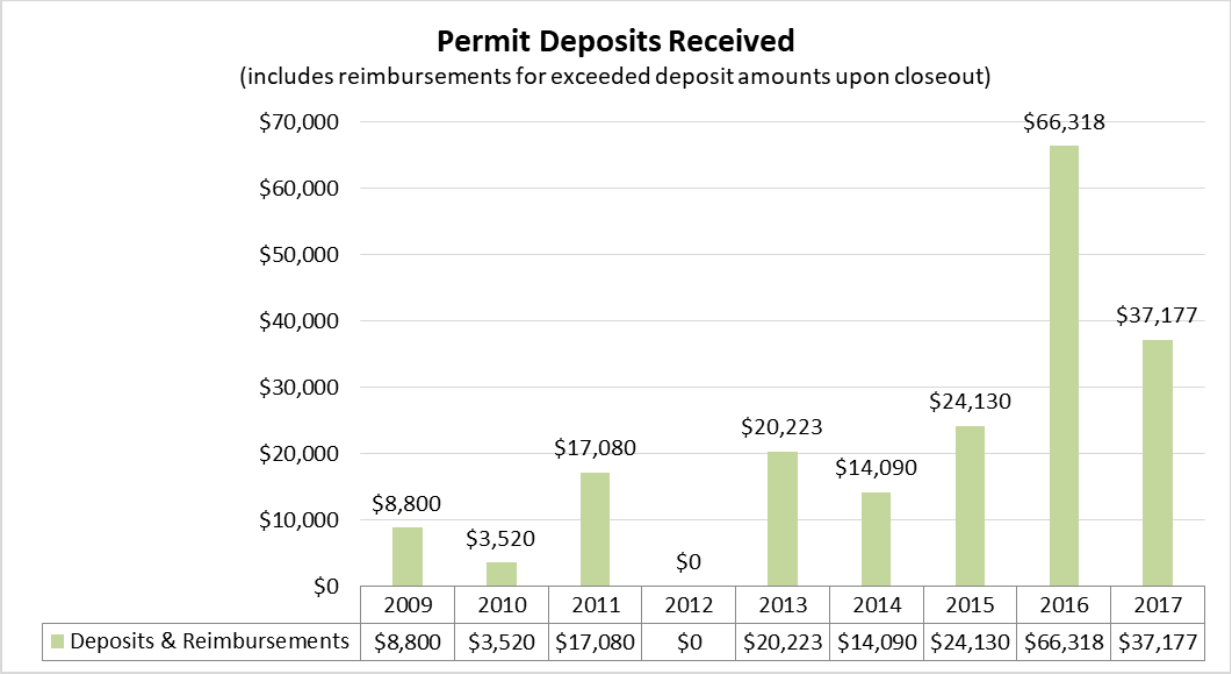
Figure 3002.1 – Number of Permit Applications Received, Permits Issued, Permits Closed Out, and Active Permits



	2009	2010	2011	2012	2013	2014	2015	2016	2017
Permit Applications	7	10	5	3	7	12	14	26	21
Permits Issued	7	10	5	3	4	13	15	16	24
Permits Closed Out, Withdrawn, or Expired	1	6	10	4	6	2	11	10	19
Total Active Permits*								28	43

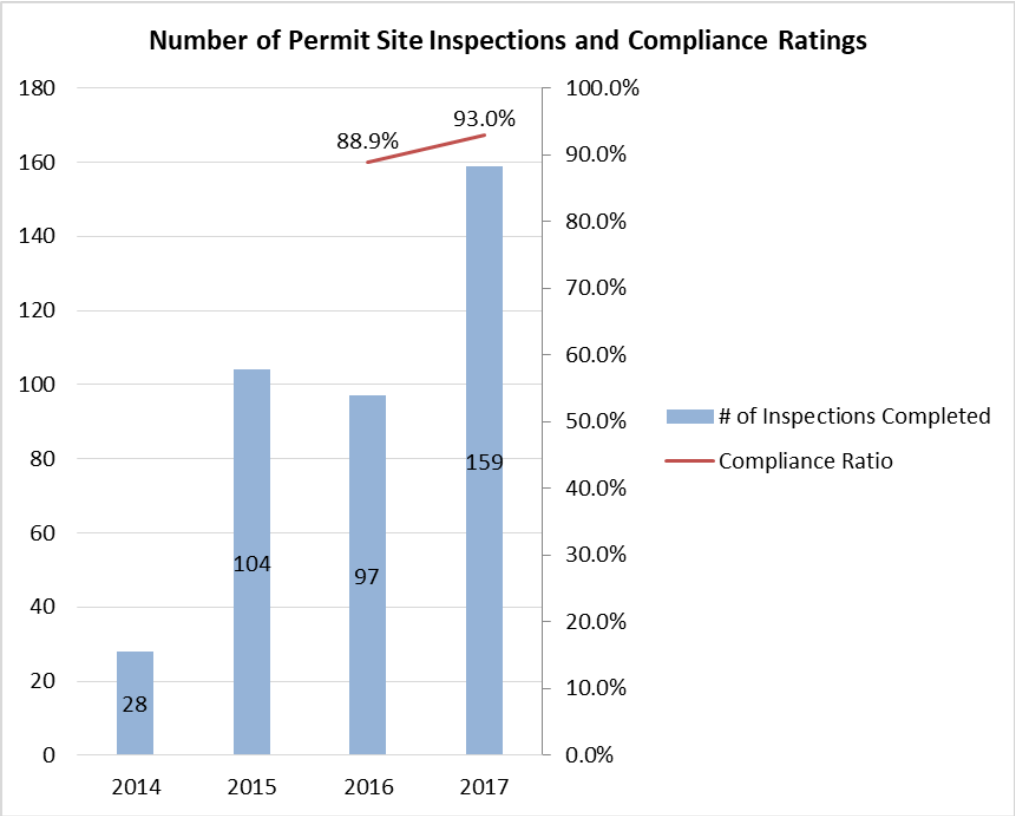
**Total active permits per year is number of different permits active at any given point during the year; does not necessarily reflect total number of permits all active at the same time*

Figure 3002.2 – Total Dollars Received as Permit Deposits per Year



	2009	2010	2011	2012	2013	2014	2015	2016	2017
Deposits & Reimbursements	$8,800	$3,520	$17,080	$0	$20,223	$14,090	$24,130	$66,318	$37,177

Figure 3002.3 – Total Number of Permit Site Inspections and Compliance Ratio per Year



3003 Monitoring and Data Assessment

Progress Evaluation Metric from Plan

Success in the Monitoring and Data Assessment Program will be measured by the completion of monitoring and data evaluation needed to support the District's activities and evaluate progress toward water quality and resource goals and the quality and consistency of data collected (Watershed, Vol I, 32).

2017 Evaluation

In 2017 the District contracted with Washington Conservation District (WCD) to monitor water quality and flowage at 19 sites including six stream monitoring sites and 13 in-lake monitoring sites. Monitored parameters for stream sites included discharge and water quality composite samples. Monitored parameters for in-lake sites varied by lake, and consisted of one or more of the following: surface water quality samples, benthic iron and orthophosphate, and elevation. Surface water quality samples include total Kjeldahl nitrogen, total phosphorus, chlorophyll-a, and Secchi disk transparency. At a minimum, all lake monitoring sites had surface water quality samples taken.

The District also continued coordination of the Citizen Assisted Monitoring Program (CAMP) through the Metropolitan Council, enlisting the help of nine volunteers to take surface water quality samples on Moody, Bone, Little Comfort, Keewahtin (formerly Sylvan), Forest, and Comfort lakes. The volunteers collected water samples, took Secchi transparencies and surface water temperature, and recorded basic user perceptions and climate information. The samples were analyzed for total phosphorus, total Kjeldahl nitrogen, and chlorophyll-a.

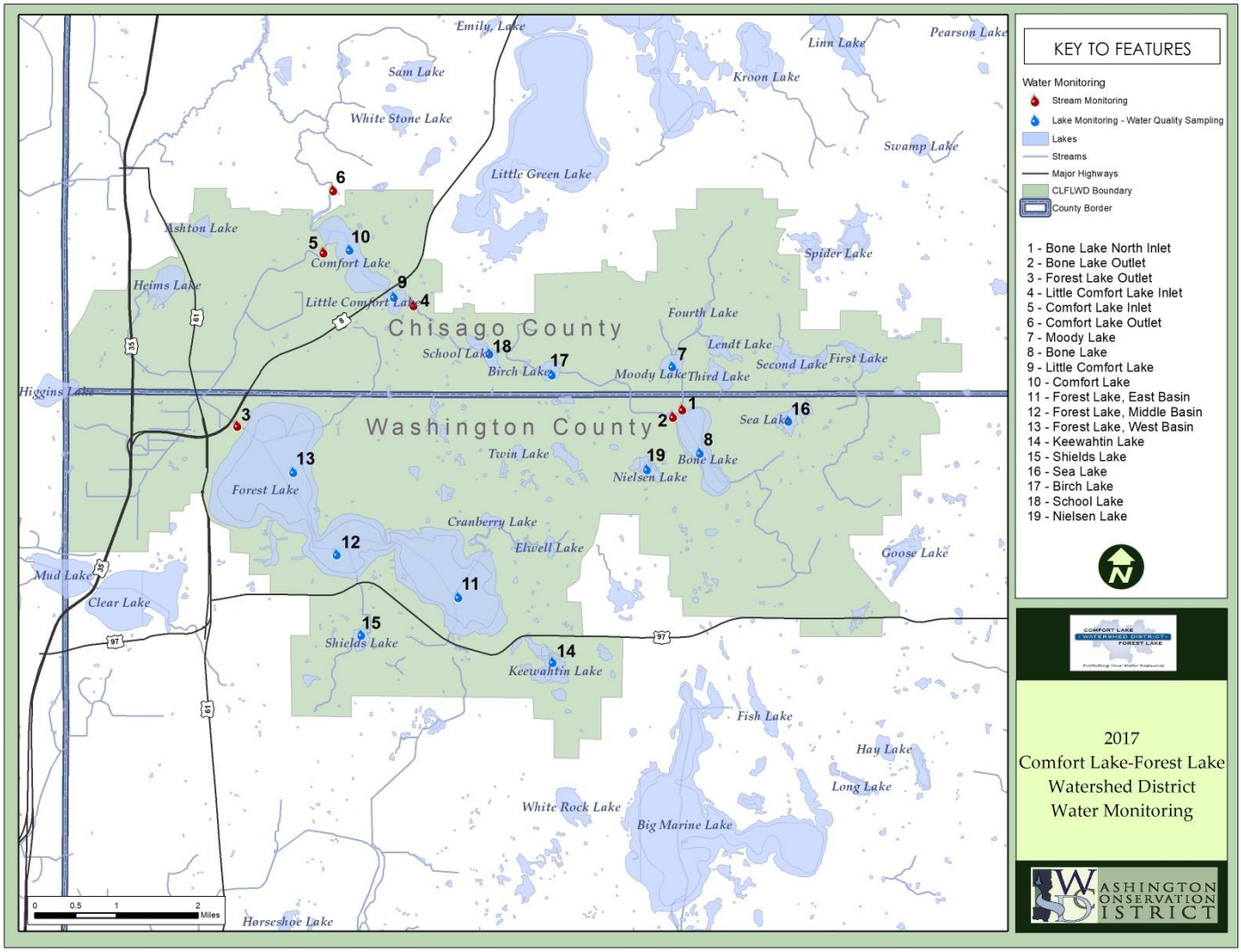
Automated lake elevation gauges (a.k.a. level loggers) were installed on Bone Lake and Comfort Lake in 2016. The gauges were removed during the winter months and re-installed in spring 2017. Real-time lake level data was streamed from these devices and posted to the District website.

In addition to ongoing baseline monitoring, the District performed targeted monitoring for the following studies and projects:

1. Forest Lake Diagnostic Study
2. Little Comfort Lake Phosphorus Source Assessment Study
3. Project Effectiveness Monitoring – Moody Lake Wetland Rehabilitation
4. Project Effectiveness Monitoring – Bixby Park Water Quality Project
5. Project Effectiveness Monitoring – Forest Lake Wetland Treatment Basin Project (a.k.a. 3rd Lake Pond)

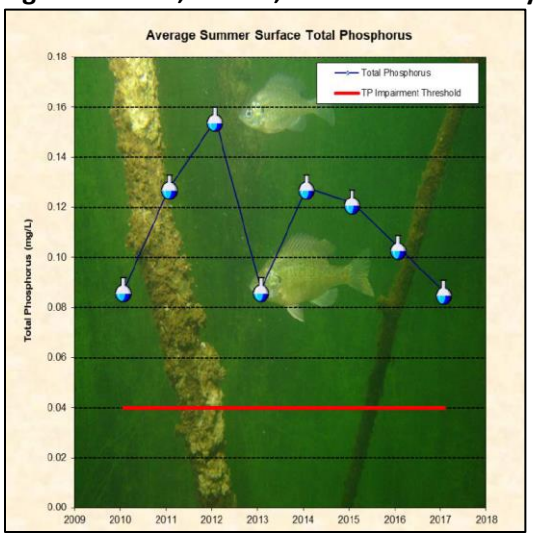
A summary of the project effectiveness monitoring results is available at www.clflwd.org/monitoring.php.

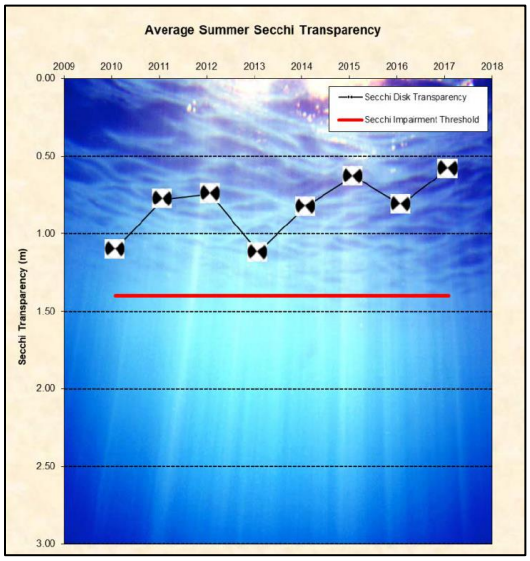
Figure 3003.1 WCD Water Monitoring Site Locations in 2017



The water monitoring data that is collected is analyzed on an annual basis in order to determine progress toward water quality goals. As more projects and programs continue to be implemented, water quality should improve over time. Each year a monitoring report summarizes the results of the year's monitoring efforts. Below is an example of the data that is contained in the report; monitoring data for Moody Lake. The full monitoring report can be found at www.clflwd.org. More analysis into progress toward water quality goals can be found in the "5000 Series – Projects" section of this report.

Figures 3003.2, 3003.3, and 3003.4 – Moody Lake 2017 Water Monitoring Data





Date/Time	Total Phosphorus (mg/L)	Uncorrected Trichromatic Chlorophyll-*a* (µg/L)	Pheophytin-Corrected Chlorophyll-*a* (µg/L)	Total Kjeldahl Nitrogen (mg/L)	Secchi Disk Depth (m)	Surface Temperature (Celsius)	Surface Dissolved Oxygen (mg/L)
4/19/2017 10:57	0.073	21.0	17.0	1.20	1.22	11.7	9.96
5/3/2017 8:25	0.071	12.0	10.0	1.20	1.68	10.1	10.03
5/16/2017 13:41	0.047	9.0	8.0	1.00	1.22	19.0	9.12
5/31/2017 14:08	0.069	20.0	18.0	1.10	1.07	16.6	8.67
6/14/2017 10:54	0.101	24.0	22.0	1.70	1.22	23.6	5.91
6/27/2017 13:21	0.107	82.0	80.0	2.30	0.30	21.3	12.27
7/11/2017 12:00	0.152	69.0	66.0	2.30	0.38	26.8	9.54
7/25/2017 9:38	0.063	84.0	72.0	0.97	0.46	24.6	5.20
8/8/2017 14:15	0.068	38.0	34.0	1.90	0.46	24.6	9.72
8/21/2017 9:00	0.072	30.0	27.0	1.40	0.61	23.4	7.61
9/6/2017 11:46	0.071	35.0	30.0	1.30	0.61	18.8	6.14
9/20/2017 10:33	0.054	28.0	24.0	1.10	0.61	19.7	6.36
10/4/2017 12:33	0.065	19.0	16.0	1.10	1.07	16.5	7.28
10/19/17 9:28	0.055	25.0	22.0	1.10	1.07	12.2	7.26
2017 Average	0.076	35.4	31.9	1.41	0.85	19.2	8.22
2017 Summer Average	0.086	48.8	44.4	1.62	0.58	22.9	7.84
Volunteer Data							
04/23/2017 17:30	0.052	4.8	2.7	1.10	2.00	11.9	NA
05/07/2017 17:30	0.043	4.1	4.6	1.00	2.40	17.7	NA
05/21/2017 09:00	0.061	12.0	9.4	1.10	1.70	17.6	NA
06/04/2017 09:00	0.082	57.0	55.0	1.70	0.80	22.3	NA
06/18/2017 19:00	0.107	58.0	53.0	1.60	0.70	23.9	NA
07/02/2017 17:00	0.125	190.0	190.0	3.00	0.40	27.5	NA
07/16/2017 17:30	0.105	99.0	88.0	1.90	0.50	26.9	NA
07/30/2017 19:00	0.073	48.0	47.0	1.60	0.60	27.6	NA
08/13/2017 15:00	0.073	30.0	23.0	1.40	0.90	22.7	NA
08/27/2017 17:30	0.076	42.0	36.0	1.20	0.60	20.1	NA
09/10/2017 17:00	0.037	24.0	20.0	0.94	0.80	19.7	NA
09/24/2017 16:30	0.046	19.0	15.0	1.20	0.90	24.6	NA
10/08/2017 17:00	0.051	18.0	13.0	1.20	1.10	17.3	NA
10/22/2017 08:30	0.182	33.0	30.0	1.40	1.10	12.3	NA
2017 Average	0.080	45.6	41.9	1.45	1.04	20.9	NA
2017 Summer Average	0.080	63.0	58.6	1.62	0.69	23.9	NA
Water quality thresholds are 0.04 mg/L TP, 14 µg/L CL-a, 1.4 m Secchi depth*							
Shallow lake water quality thresholds are 0.06 mg/L TP, 20 µg/L CL-a, 1.0 m Secchi depth*							
	High	**High Date**	**Low**	**Low Date**	**Average**		
2017 Elevation (ft)	912.00	5/3/2017	911.32	9/20/2017	911.60		

*Data requirements and determinations of use assessment according to the MPCA's Guidance Manual for Assessing the Quality of Minnesota Surface Waters: "Samples must be collected over a minimum of 2 years and data used for assessments must be collected from June to September. Typically, a minimum of 8 individual data points for TP, corrected chlorophyll-a (chl-a corrected for pheophytin), and Secchi are required. Data used for phosphorus and chlorophyll-a calculations are limited to those collected from the upper most 3 meters of the water column (surface). If more than one sample is collected in a lake per day, these values are averaged to yield a daily average value. Following this step, all June to September data for the 10-year assessment window are averaged to determine summer-mean values for TP, corrected chl-a, and Secchi depth. These values are then compared to the standards and the assessment is made."

3004 Nonpoint Source Pollution Abatement (Cost-Share) Program

Progress Evaluation Metric from Plan

Success in the Non-Point Source Abatement Grant Program will be measured by the level of public participation in each program area and levels of pollutant reductions achieved by projects. Specific metrics for evaluation may include, but are not limited to: number of site visits performed, number of practices installed, number of grant applications received, and number of applications approved for funding. Target pollutant reductions include, but are not limited to total phosphorus and total suspended solids. The District recognizes that these pollutants affect in-lake chlorophyll levels (CLFLWD, 2018, p. 35).

2017 Evaluation

The number of projects over the lifetime of the cost-share program were tracked by Soil and Water Conservation Districts in Chisago and Washington counties, and are shown in figure 3004.1 below. In general, more projects and site visits occur in the Washington County portion of the District. As such, additional metrics are tracked using the table in figure 3004.2 below.

Figure 3004.1 Residential Cost-Share Projects Completed 2006-Present

County	# Traditional Cost-Share Projects	# Plant Grant Projects*
Washington County	40	12
Chisago County	7	1
TOTAL	**47**	**13**

**Plant grant program was started in 2016*

Figure 3004.2 – Cost-Share Project Site Visits and Implementation Tracking (Washington County only)

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Totals
Total Number of Site Visits	1		2	2	21	7	12	23	17	26	22	35	168
Installed And Closed Out in Current Year	1		2	2	13	6	3	1	2	1	5	2	38
Had Site Visit in Previous Year, But Closed Out in Current Year						4		3	1	0	0	6	14
Total Completed Projects	1	0	2	2	13	10	3	4	3	1	5	8	52
													0
Total Load Reduction P, lbs/yr	1.4		0.16	NA	4.25	7.42	1.61	0.5	0.37	0.17	0.5	4.84	21.22
Total Load Reduction TSS, lbs/yr	3300		50.18	NA	474.03	6866.2	143.46	28	61	16.84	0	0	10,939.71

3005 Education and Outreach

Progress Evaluation Metric from Plan

Success in the Education and Outreach Program will be measured by the level of participation and exposure to the District's education and outreach efforts. Metrics for measuring participation and exposure may include, but are not limited to number of users reached by social media posts, number of new email addresses added to the District's notification list, and attendance numbers for District-sponsored meetings and events (e.g. workshops, classroom visits, open house events). Measuring participation and exposure to many education and outreach efforts may be impractical or infeasible. Therefore, success in the Education and Outreach Program may also be measured by the level of outgoing and consistent communications. Outgoing communications may include newsletters, brochures, publications in print media, posts on social media, and staff and board attendance at non-District sponsored meetings such as lake associations, schools, and nature centers. Gross total of outgoing messages will be considered as well as number of different types of media avenues. Overall, the District's communications with the public should be frequent and consistent (CLFLWD, 2018, p. 37).

2017 Evaluation

The District sustained a high-level of education and outreach activity in 2017 with the help of the Program Assistant and Watershed Assistant. Below is a summary of education and outreach activities performed by the District in 2017.

- Regularly presented at local lake association meetings (Bone Lake, Forest Lake, Comfort Lake)

- Visited classrooms and/or coordinated field trips or two local schools (Lakes International Language Academy, Forest Lake High School)
- Hosted an aquatic invasive species identification workshop at Lakeside Park in June
- Provided support to local water stewards during the design and implementation of their capstone projects
- Presented at a meeting of a local junior high robotics and engineering club
- Coordinated a District-wide storm drain stenciling effort in September
- Organized storm drain stenciling kits that can be borrowed from the District office by civic organizations
- Worked with Citizen Advisory Committee to develop District stakeholder awards program framework
- Presented at local zebra mussel conference in April
- Increased Citizen Advisory Committee (CAC) involvement in education and outreach activities
- Increased social media presence (Facebook, Instagram, Twitter)
- Hosted a booth at Forest Lake High School Agriculture Open House in May
- Maintained increased level of "in-house" informational material and mailer development

Since initially ramping up the District's social media presence in 2016 the District has been utilizing Facebook Insights to assess post reach and interaction. The following figures are generated through Facebook Insights.

Figure 3005.1 – Total Page Likes

Figure 3005.2 – Total Page Views

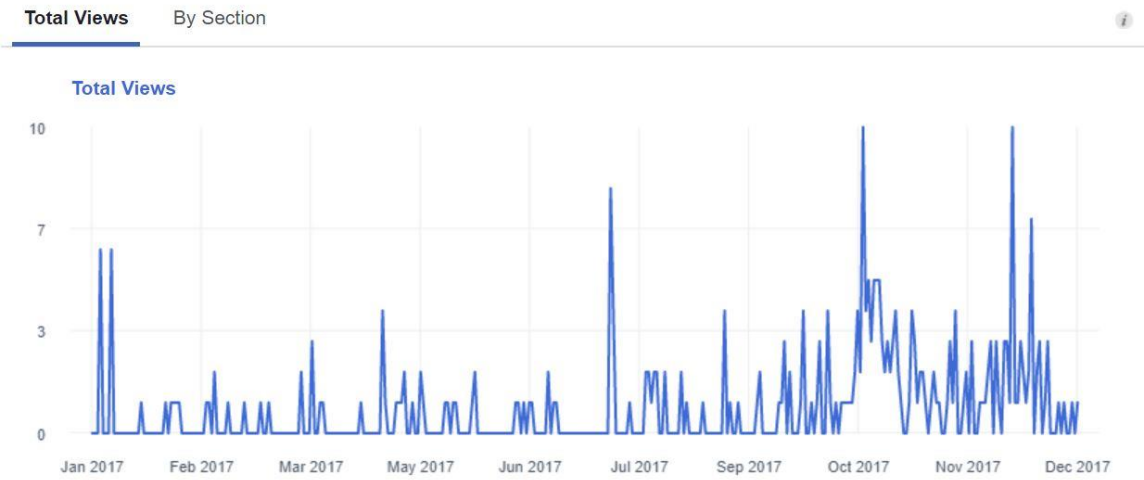


Figure 3005.3 – People Reached

Appendix A includes several of the informational materials and infographics that were developed by District staff in 2017.

In 2017 the District continued its partnership with the East Metro Water Resource Education Program (EMWREP) which involved a vast array of education and outreach activities including: public workshops, volunteer engagement, youth education, media and communications, outreach support for project implementation, and professional trainings for business and local government. In 2017 EMWREP submitted 41 educational articles to local newspapers that circulate in the CLFLWD including the Chisago County Press, Forest Lake Lowdown, Forest Lake Times, and Scandia Country Messenger. A full list of articles sent to each paper can be found in Appendix B of the 2017 EMWREP Annual Report, as well as Appendix B of this report. Semi-annual education updates from EMWREP are posted to the District's education and outreach webpage at www.clflwd.org/education.php. The 2017 EMWREP Annual Report provides additional information on the variety of EMWREP activities completed throughout the year.

3006 Technical Resource Sharing and Interagency Communication

Progress Evaluation Metric from Plan

Success in the Technical Resource Sharing and Interagency Communication Program is measured in two ways. Success in the Technical Resource Sharing aspect of the program is measured by the use of District data and information by other parties. Success in the Interagency Communication aspect of the Program will be measured by the percent of District initiatives and projects that are conducted in partnership or cooperation with another agency and the distribution. Completion of 70 – 100% of the District projects in cooperation with other agencies is measured as "Excellent", 50% - 69% is measured as "Good", 30% - 49% is measured as "Fair" and less than 30% is measured as "Poor" (CLFLWD, 2018, p. 39).

2017 Evaluation: Technical Resource Sharing

Since 2016 the District has been utilizing Google Analytics to assess traffic on the District website. The two figures below are generated through Google Analytics.

Figure 3006.1 – Website usage overview

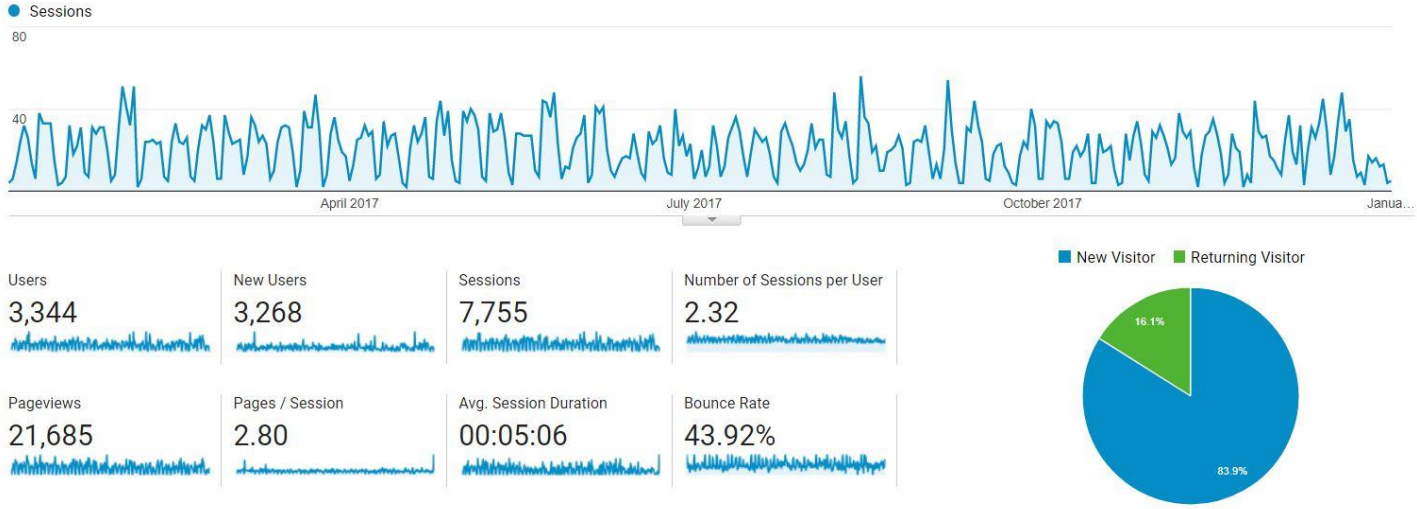
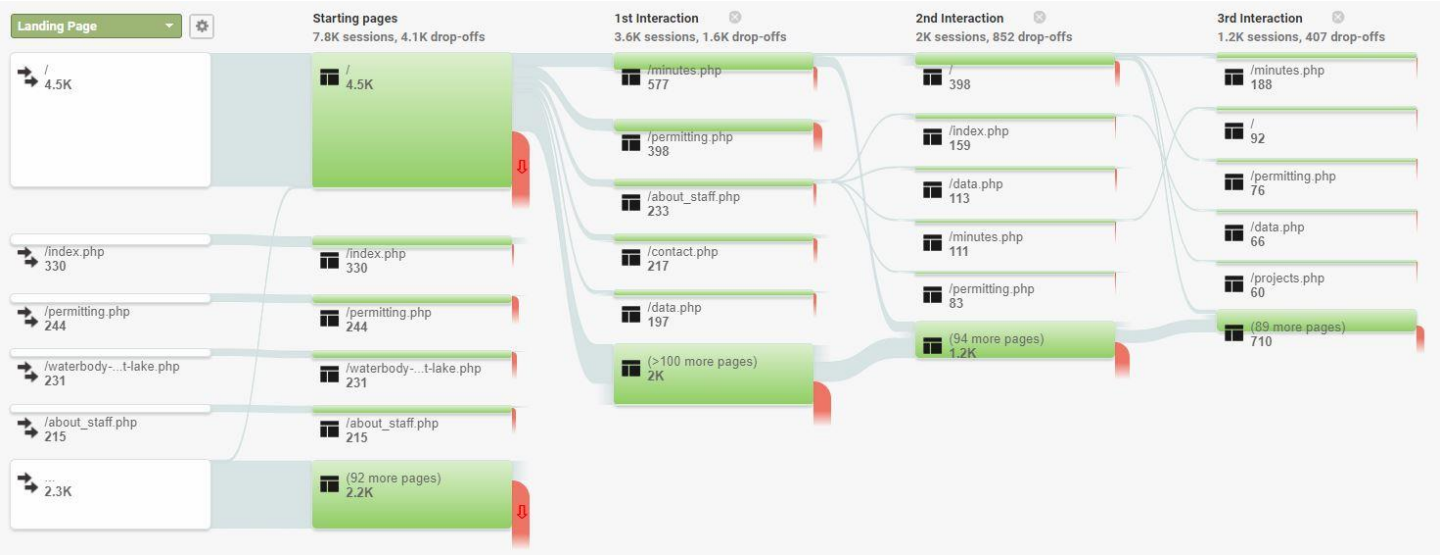


Figure 3006.2 – Website traffic flow graphic



2017 Evaluation: Interagency Communication

Boundary Update

In 2017 the District completed a boundary update in two main areas along the border with Rice Creek Watershed District. The purpose of the update was to align District political boundaries with the latest knowledge of on-the-ground hydrologic drainage patterns. Two major outcomes of the boundary change were the inclusion of the District office within CLFLWD boundaries and acquisition of drainage authority over Washington Judicial Ditch 6 (WJD 6). The boundary change placed several reaches of this ditch within CLFLWD borders. In May, 2017 the Board of Water and Soil Resources approved the boundary change petition, resulting in the CLFLWD becoming the drainage authority for WJD 6. Studies and projects related to WJD 6 were added to the District's Watershed Management Plan as part of the minor amendment that was largely completed in 2017.

Watershed Management Plan Amendment

In late 2016 the District began the process of updating its 2012-2021 Watershed Management Plan in order to incorporate three new programs (3009 Grant Research & Preparation, 3010 Operations & Maintenance, and 3011 Aquatic Invasive Species Prevention & Management) and several projects that were not specifically included in the plan previously. The update process included a Technical Advisory Committee meeting, an open house meeting at the District office, Board review and discussion at three board meetings, coordination with the Board

of Water and Soil Resources (BWSR), outreach to local stakeholder groups and the Citizen Advisory Committee, a 45-day public comment period, and a duly noticed public meeting. After the public comment period, BWSR concurred that the proposed amendment would constitute a minor amendment, thus requiring fewer procedural steps compared to a major plan amendment. The CLFLWD Board adopted the minor plan amendment at the January 25, 2018 regular board meeting.

The amended plan can be found at www.clflwd.org/watershed-management-plan.php.

Ongoing Interagency Communication

The District coordinates with other agencies on a regular basis in order to implement the majority of its programs and projects. It is estimated that **at least 70%** (likely more) of the District's activities are coordinated with another organization or agency. This is measured as "Excellent" according to the metric provided in the District's 2012-2021 Watershed Management Plan. Below is a list of District activities that are coordinated with other agencies.

Project/Initiative	**Partnering Organization(s)**	**Description**
District Rules and Rulemaking Program	Municipalities, neighboring watershed districts, counties, Department of Natural Resources, Metropolitan Council, MnDOT, Pollution Control Agency	Technical Advisory Committee meetings and joint board meetings for rule revisions
Permitting Program	City of Forest Lake, City of Wyoming, City of Scandia, Chisago County Zoning Department (for Chisago Lake Twp)	Meetings and communications regarding development
Monitoring and Data Assessment Program	Washington Conservation District, local volunteers, Metropolitan Council	Ongoing monitoring, CAMP
Non-point Source Pollution Abatement (Cost-Share) Program	Washington Conservation District, Chisago Soil and Water Conservation District	Technical assistance, site inspections
Education and Outreach Program	East Metro Water Resources Education Program, Forest Lake High School, Lakes International Language Academy, Chisago Lakes High School	News releases, event coordination
Research Program	St. Croix Watershed Research Station, University of St. Thomas	Deep sediment cores
Grant Research and Preparation Program	Washington Conservation District, City of Forest Lake	Jointly submitted grant applications, letters of support for grant proposals
Watercraft Inspection Program	Chisago County/Chisago Lake Improvement District; City of Forest Lake, Forest Lake Lake Association, Comfort Lake Association, Washington County	Jointly managed program; funding contributors
Forest Lake Wetland Treatment Basin Project	City of Forest Lake	Project design input, landowner coordination and public outreach

In addition to coordinating with partners to implement District activities, District staff attend inter-agency meetings on a regular basis and participate as part of collaborative, state-wide organizations:

Washington County Water Consortium	Chisago Water Policy Plan Team
Watershed Partners	Washington County AIS Early Detection, Rapid Response Team
MN Association of Watershed Districts (MAWD) Annual Meeting	DNR Watercraft Inspection yearend collaboration meeting
Metro MAWD Annual Conference	St. Croix Basin Planning Team

3007 Research

Progress Evaluation Metric from Plan

Success in the Research Program will be measured by the number of updates on current research received by the Board and on the number of research initiatives completed by the District or in partnership with the District. Completion of four updates and one research project per year is anticipated (CLFLWD, 2018, p. 40).

2017 Evaluation

In 2017, District staff provided numerous updates to the Board on current research initiatives. Updates were provided at board meetings on the following dates. (Note for readers viewing via PDF: dates are hyperlinks to the relevant board meeting packet item containing the update.)

Deep Sediment Cores

In 2017 the St. Croix Watershed Research Station (SCWRS) completed its analysis of the deep sediment cores that were collected on Moody, Shields, and Comfort lakes in 2016. A final report was submitted to the District, and SCWRS presented the data at the October 5, 2017 regular board meeting. District staff created simplified fact sheets for each lake using data from the reports. The report and fact sheets can be found at www.clflwd.org/data.php and links to each are below.

Report and Fact Sheets
- Deep Sediment Core Report
- Moody Lake Fact Sheet
- Shields Lake Fact Sheet
- Comfort Lake Fact Sheet
- General Paleolimnology Fact Sheet

Board Updates
- July 27, 2017 – Update in Administrator's report on deep sediment core final report
- August 24, 2017 – Update in Administrator's report on deep sediment core final report
- October 5, 2017 – Deep sediment core final report presented to Board of Managers. Final Report. Staff prepared fact sheets for each lake: Comfort, Moody, Shields.

Project Effectiveness Monitoring Protocol

- February 23, 2017 – Update in Administrator's report on collaboration with MN Pollution Control Agency to perform project effectiveness monitoring on District projects

Aquatic Invasive Species

- June 29, 2017 – Note in Administrator's report about MN Aquatic Invasive Species Research Center funding

Iron-Enhanced Sand Filters

- January 26, 2017 – Update in Administrator's report on collaboration with St. Anthony Falls Research Laboratory (SAFL)

University of St. Thomas

- May 25, 2017 – Update in Administrator's report on final research presentations from University of St. Thomas
- October 26, 2017 – Note in Administrator's report about coordination with University of St. Thomas Sustainable Communities Partnership
- November 16, 2016 – Update in Administrator's report about coordination with University of St. Thomas Sustainable Communities Partnership
- December 21, 2017 – Update in Administrator's report about coordination with University of St. Thomas Sustainable Communities Partnership

3008 Measurement of Progress

Progress Evaluation Metric from Plan

Success in the Measurement of Progress Program will be based on completion of the annual progress report (CLFLWD, 2018, p. 41).

2017 Evaluation

The first draft of the 2017 progress report was included in the meeting materials for the February 22, 2018 regular board meeting. The report was accepted by the Board of Managers at the May 22, 2018 regular board meeting.

3009 Grant Research & Preparation

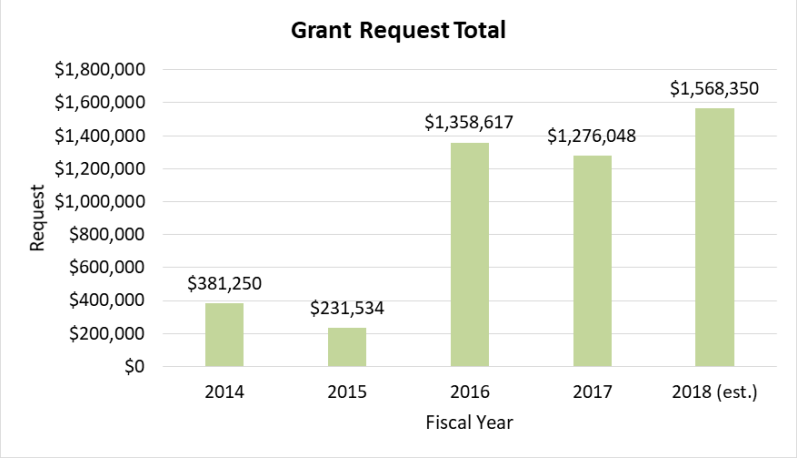
Progress Evaluation Metric from Plan

Success in the Grant Research and Preparation Program will be measured by the number of grant applications submitted, number of grants awarded, total grant dollars requested, and total grant dollars awarded per year (CLFLWD, 2018, p. 41a).

2017 Evaluation

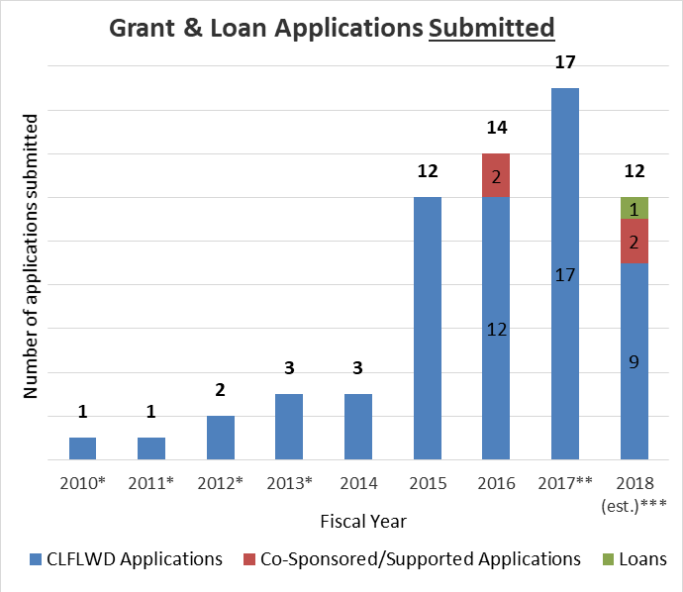
The Grant Research and Preparation program was added to the Plan as part of the minor amendment that was adopted by the Board in January 2018. The graphs below illustrate progress in this program.

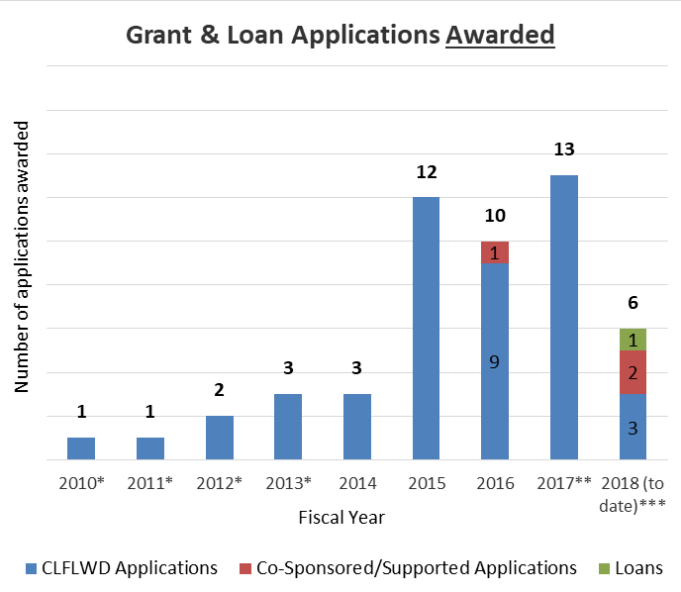
Figure 3009.1 – Total Grant Requested Dollars per Year



Total 2018 grant request is still an estimate as some FY18 grant applications have not yet been finalized.

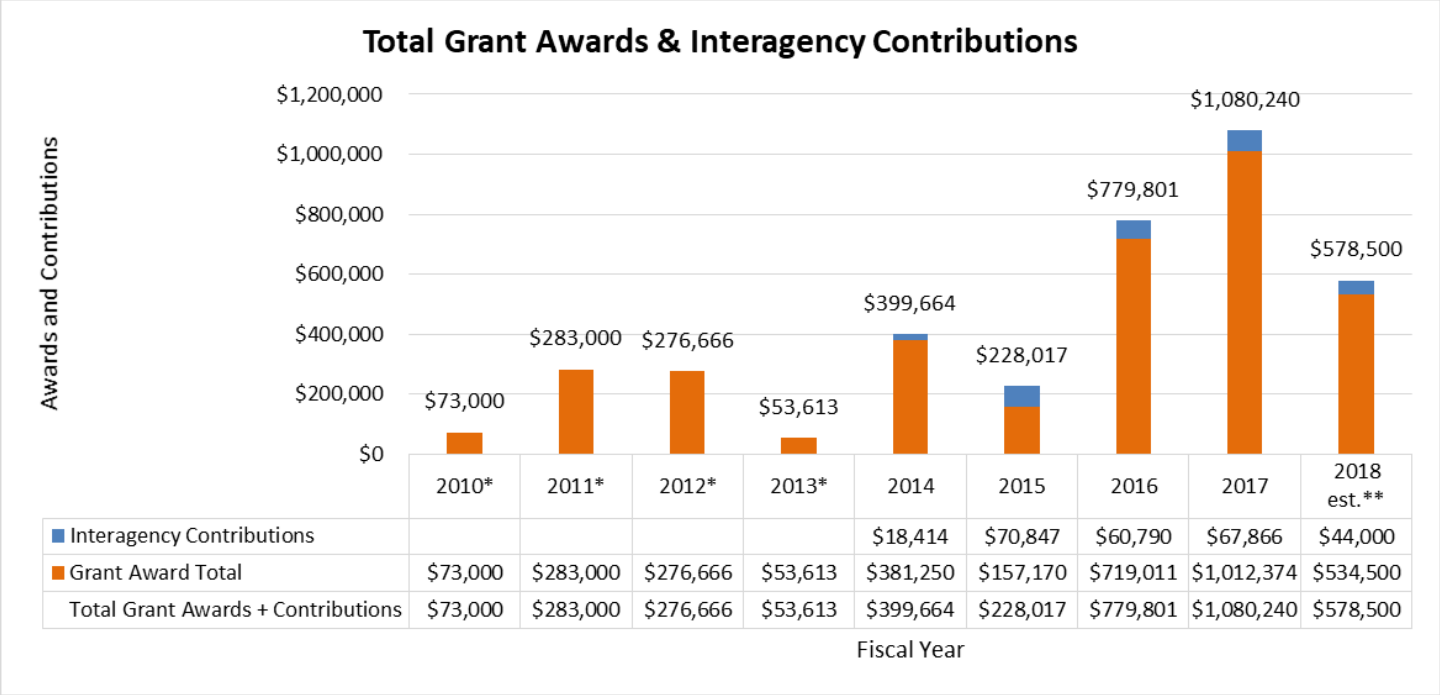
Figures 3009.2 & 3009.3 – Grant & Loan Applications Submitted per Year, Applications Awarded per Year





** Applications for 2010-2013 are based on available electronic records.*
*** In 2017 the District applied for and was awarded seven DNR AIS Control grants for three lakes; in previous years grants for the same lake were combined. The DNR did not offer this grant program in 2018 due to lack of funding.*
**** Total 2018 grant applications is still an estimate as some FY18 grant applications have not yet been finalized. Grant awards are those that have been awarded to date, and may change as the year goes on.*

Figure 3009.4 – Total Grant and Interagency Contribution Dollars Awarded per Year



Grant awards do not necessarily equate to actual grant income for the fiscal year.

**Awards for 2010-2013 are based on available electronic records. Due to changes in District accounting, interagency contribution figures for these years are not readily available.*

***2018 estimated grants are preliminary and subject to change based on upcoming grant applications*

2017 grant award projects included: Shields Lake Stormwater Project, Forest Lake Enhanced Street Sweeping Plan, Bone Lake Partially Drained Wetland Restorations, Forest Lake Watercraft Inspections, Forest Lake Flowering Rush Management (2 grants), Shields Lake Culvert Fish Barrier Retrofit, Forest/Bone/Comfort Lake curly-leaf pondweed and Eurasian watermilfoil treatments.

In addition to the above statistics, grant awards will continue to be tracked in the previously utilized "grant summary" format. A shortened version of the 2010-2018 grant summary is provided in Appendix B.

In December 2017 the District was notified that both the CLFLWD and City of Forest Lake would be awarded major 2018 Clean Water Fund grants. The table below summarizes these two grants.

Project	**Clean Water Fund Category**	**Grant Request**	**Grant Award**
Moody Lake Alum Treatment	Projects and Practices	$135,000	$135,000
Forest Lake Enhanced Street Sweeping Implementation	Projects and Practices	$220,000	$220,000

3010 Operations and Maintenance

Progress Evaluation Metric from Plan

Success in the Operations and Maintenance Program will be measured by the successful implementation of activities included in operations and maintenance plans for District facilities. A summary of inspections and maintenance activities will be developed each year (CLFLWD, 2018, p. 41a).

2017 Evaluation

The Operations and Maintenance program was added to the Plan as part of the minor amendment that was adopted by the Board in January 2018. Below is a table outlining operations and maintenance activities performed in 2017.

BMP/Project/Asset	Operations and Maintenance Activities
Moody Lake winter aeration system	Operated the winter aeration system per owner's manual & operations guide, and performed regular inspections to ensure thin ice signage stayed in place. Ceased operation of system and collected thin ice signage after lake ice-out.
Bone Lake inlet and outlet fish barriers	Continued operation of both fish barriers per operations and maintenance manual that was developed in 2016. This included stop log management and removal of debris from grates throughout 2017.
Bixby Park Water Quality Improvement Project	Completed an operations and maintenance plan for the north and south weirs in early 2017. In spring, began operation of weirs in accordance with operations and maintenance plan.
Bone Lake and Comfort Lake automated level loggers	Level loggers were removed and stored at District office during winter months, then re-installed in spring.
Shields Lake electric fish barrier operation and retrofit	In 2015 ownership of the electric fish barrier between Shields Lake and Forest Lake was transferred from the City of Forest Lake to the District. The District has continued operations of the barrier since then. In 2016 the District obtained a grant to install a passive barrier similar to those located at Bone Lake. The existing electric barrier will remain in place as a backup, but will not be maintained as the primary barrier. Switching to a passive barrier as the primary feature is expected to result in long-term cost savings. Project site survey, soil borings, project design and construction quote solicitation was begun in 2017. Construction will occur in 2018.

3011 Aquatic Invasive Species Prevention and Management

Progress Evaluation Metric from Plan

Success in the Aquatic Invasive Species Prevention and Management Program will be measured by metrics including, but not limited to, the annual reduction in coverage and density of invasive species in District lakes and the number of watercraft inspections performed at District accesses. Additional metrics may be developed each year as appropriate (CLFLWD, 2018, p. 41c).

2017 Evaluation

The Aquatic Invasive Species (AIS) Prevention and Management program was added to the Plan as part of the minor amendment that was adopted by the Board in January 2018. Prior to the amendment, goals and objectives for AIS prevention and management were identified on page 12 of the Watershed Management Plan. They are as follows (a full list of 3.2 goals and objectives can be found in the 5000 Series – Projects section of this report):

3.2.2 Goals

B. Be proactive in aquatic invasive species management through education and projects that improve lake water quality and/or reduce the risk of entry of invasive species.

3.2.3 Objectives

5. Implement projects identified in this Plan to manage aquatic invasive species in lakes where these species present a water quality problem or that can lead to or be a cause of water quality degradation.
6. Work to limit the spread of aquatic invasive species to unimpacted lakes through the Education & Outreach Program and the Research Program.
7. Work to improve rough fish management for water quality through the Research Program.

District staff presented monthly AIS Updates at board meetings throughout most of 2017, and a yearend summary was presented at the December 21, 2017 regular board meeting. Blue Water Science presented on invasive plant surveys at the January 25, 2018 regular board meeting. Below are hyperlinks to the yearend summary materials.

- 2017 AIS Program Yearend Summary
- 2017 Watercraft Inspection Program Yearend Report
- 2017 Watercraft Inspection Program Yearend Summary Infographic
- Curly Leaf Pondweed/Eurasian Watermilfoil (Comfort, Bone, Forest)
- Flowering Rush (Forest)
- Zebra Mussels (Comfort)
- Zebra Mussels (Forest Lake) *(Due to varying factors, an insufficient amount of data was collected in 2017 to compile a detailed yearend population report for Forest Lake. It was observed that zebra mussels had spread throughout all three of Forest Lake's basins in 2017. The District will resume monitoring efforts in order to create a report in 2018.)*

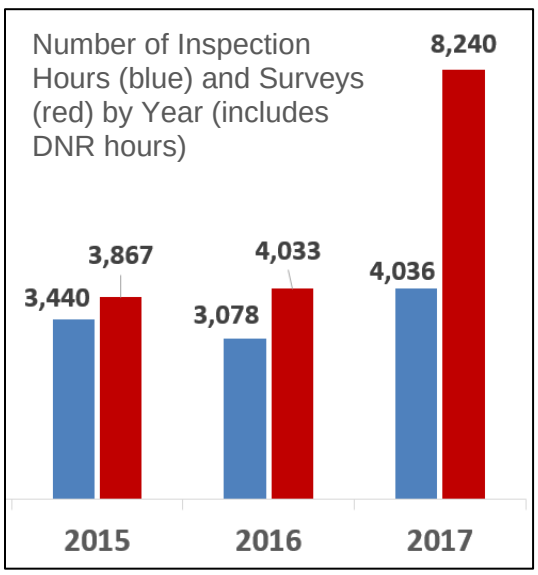
Prevention – Watercraft Inspections

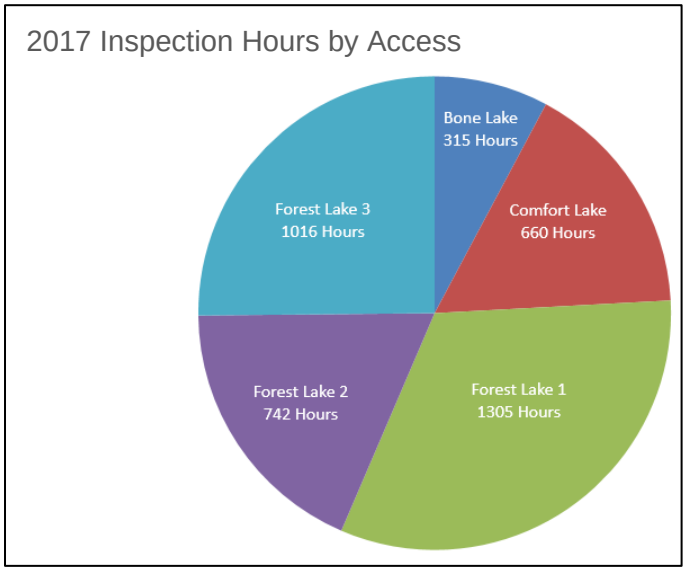
It is generally recognized that the most effective strategy against invasive species is to prevent their introduction and establishment. Therefore, preventing the spread of invasive species is the primary objective of the District's AIS Prevention and Management Program. Through the watercraft inspection program, the District aims to educate as many boaters as possible and empower them to take steps to prevent the spread of AIS.

Under the CLFLWD's 2017 watercraft inspection program, in coordination with Chisago County, a total of 7,504 inspections were performed over 3,726 hours. This does not include inspections performed under the Department

of Natural Resources' (DNR) program. Combined with the DNR's program, there were 8,240 inspection surveys performed over 4,036 hours at public accesses within the CLFLWD, which includes three accesses on Forest Lake, one on Bone Lake, and one on Comfort Lake. Below are charts summarizing inspection surveys and hours.

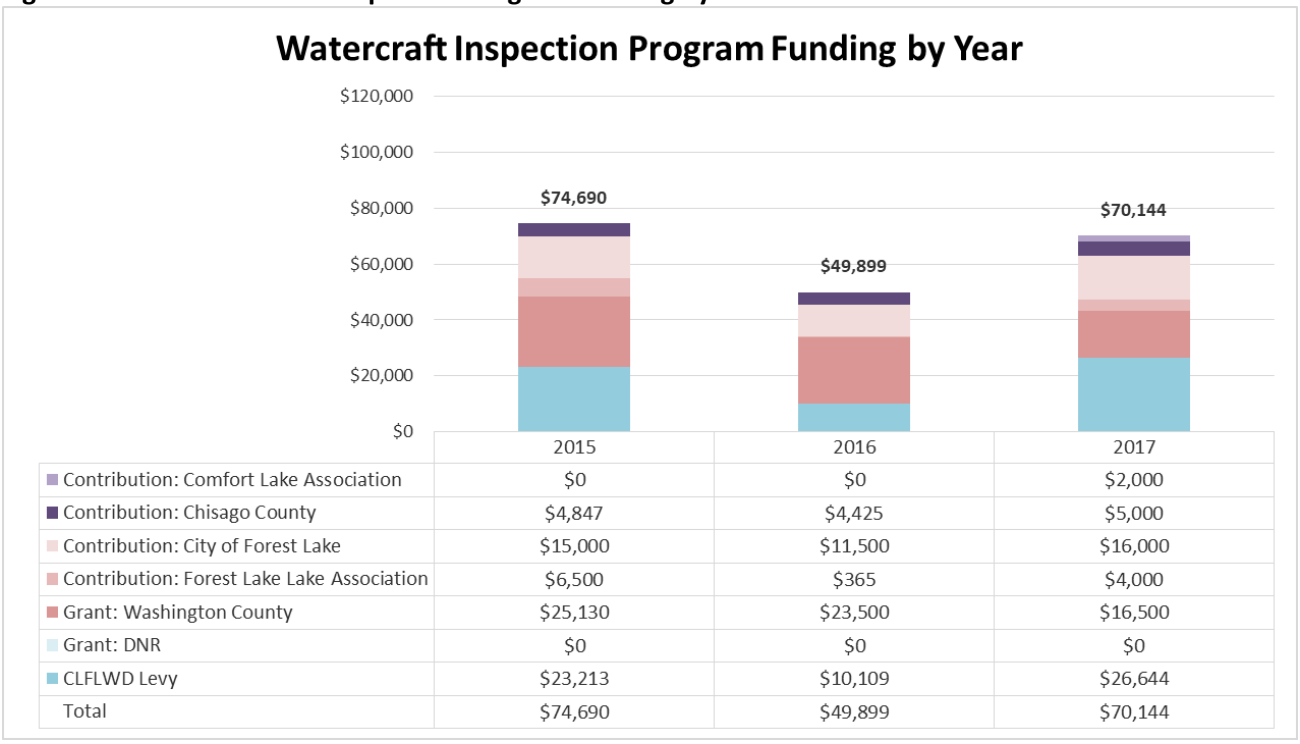
Figures 3011.1 & 3011.2 – Inspection Surveys and Hours by Year, 2017 Inspection Hours by Public Access





The 2017 numbers are higher than any previous year, which follows the increasing trend of program expansion in recent years. A major factor in the District's ability to perform more inspection surveys and hours at accesses is funding, which comes from multiple sources including: the District's levy, grants, and partner organization contributions. Below is a summary of program funding sources over the past three years.

Figure 3011.3 – Watercraft Inspection Program Funding by Year



	2015	2016	2017
Contribution: Comfort Lake Association	$0	$0	$2,000
Contribution: Chisago County	$4,847	$4,425	$5,000
Contribution: City of Forest Lake	$15,000	$11,500	$16,000
Contribution: Forest Lake Lake Association	$6,500	$365	$4,000
Grant: Washington County	$25,130	$23,500	$16,500
Grant: DNR	$0	$0	$0
CLFLWD Levy	$23,213	$10,109	$26,644
Total	$74,690	$49,899	$70,144

Funding allocations to each lake are color-coded: blue = combination of Bone, Forest, and Comfort Lakes, pink = Forest Lake, purple = Comfort Lake

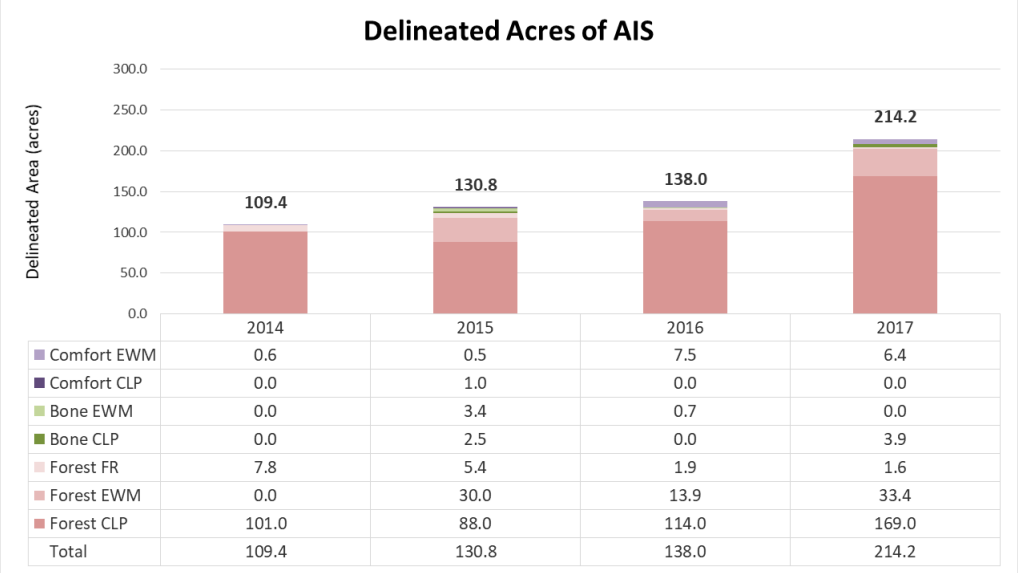
Management – Invasive Plant Control

The "management" aspect of the AIS Prevention and Management Program aims to holistically manage aquatic invasive species in District lakes with a view toward the overall health of the waterbody. Policies and goals in the CLFLWD Watershed Management Plan are designed around the ecological integrity of water resources within the District. Accordingly, the District's involvement in the long-term management of AIS present is based on the benefit to ecological systems.

One of the ways that invasive species can negatively impact a waterbody is through uncontrolled growth then subsequent die-off and phosphorus release. Specially, curly-leaf pondweed follows this pattern. In the early summer months it can grow to high densities and vast acreages. Then, in mid-summer it will die off and decompose, releasing phosphorus into the water column which then promotes algae growth and reduces water quality. Depending on growth density, curly-leaf pondweed is estimated to result in an annual phosphorus release between **one and seven pounds per acre** (McComas). For lakes with large acreages of dense growth, this amount of phosphorus release can be significant. By managing curly-leaf pondweed in its lakes, the District aims to prevent phosphorus release and preserve water quality. While other species such as Eurasian watermilfoil and flowering rush do not have such a direct impact on water quality, they can negatively impact recreational suitability, and in severe cases limit the ability for some native plants and animals to thrive.

For the past several years the District contracted with Blue Water Science to survey aquatic plant growth, including aquatic invasive species. It is both time- and cost-prohibitive to perform a detailed point-intercept survey for each species on each lake every year. Therefore, lake-wide plant coverage is not quantified from year to year. Instead, Blue Water Science delineates nuisance growth areas using a meander survey. These areas are then considered by District staff for treatment. While this information is not always an exact measurement of invasive plant coverage, it is useful in understanding general growth trends over time. Below are two charts: the first shows the delineated acreage of nuisance growth that was considered for treatment, the second shows the actual acreage of the treatment area.

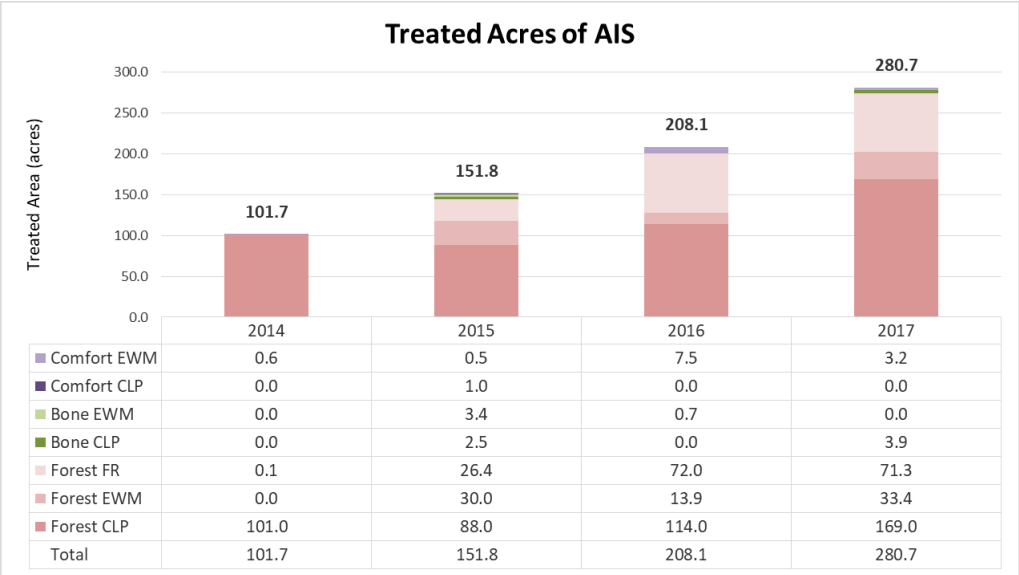
Figure 3011.4 – Delineated Acres of Aquatic Invasive Species by Year



	2014	2015	2016	2017
Comfort EWM	0.6	0.5	7.5	6.4
Comfort CLP	0.0	1.0	0.0	0.0
Bone EWM	0.0	3.4	0.7	0.0
Bone CLP	0.0	2.5	0.0	3.9
Forest FR	7.8	5.4	1.9	1.6
Forest EWM	0.0	30.0	13.9	33.4
Forest CLP	101.0	88.0	114.0	169.0
Total	109.4	130.8	138.0	214.2

Acreages for each lake are color-coded: green = Bone Lake, pink = Forest Lake, purple = Comfort Lake. Delineated species include: Eurasian watermilfoil (EWM), curly-leaf pondweed (CLP), and flowering rush (FR).

Figure 3011.5 – Treated Acres of Aquatic Invasive Species by Year



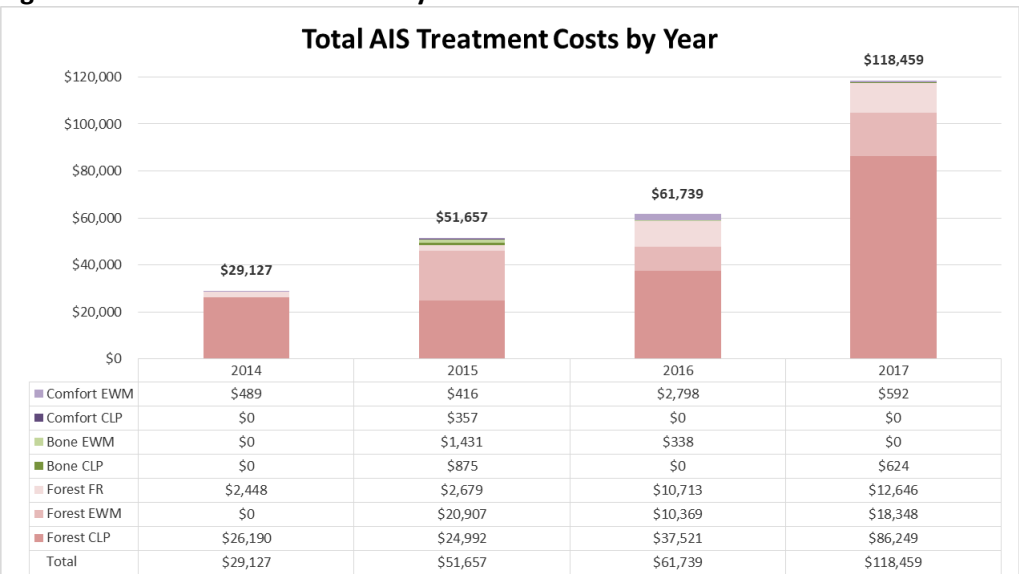
	2014	2015	2016	2017
Comfort EWM	0.6	0.5	7.5	3.2
Comfort CLP	0.0	1.0	0.0	0.0
Bone EWM	0.0	3.4	0.7	0.0
Bone CLP	0.0	2.5	0.0	3.9
Forest FR	0.1	26.4	72.0	71.3
Forest EWM	0.0	30.0	13.9	33.4
Forest CLP	101.0	88.0	114.0	169.0
Total	101.7	151.8	208.1	280.7

Acreages for each lake are color-coded: green = Bone Lake, pink = Forest Lake, purple = Comfort Lake. Treated species include: Eurasian watermilfoil (EWM), curly-leaf pondweed (CLP), and flowering rush (FR). If multiple treatments occurred, the acreages are added together for a total amount treated (e.g. two rounds of treatment of flowering rush occurred in 2017 (40.2 acres and 31.1 acres), which equate to a combined 71.3 acres).

Note regarding delineated acres vs treated acres: There are a few instances in which these two acreages do not align: 1. Forest Lake Flowering Rush (2014-2017): In 2014, the District began its flowering rush treatment program. In this first year of the program, the treatment technique was mainly experimental and therefore did not cover the entire delineated acreage of the plant. Since 2015, the District's treatment approach to flowering rush has been to treat large patches or entire shorelines where flowering rush is present, rather than treating each individual stem/small patch. This results in greater treatment acreage than actual plant coverage, which has achieved effective control. 2. Comfort Lake Eurasian Watermilfoil (2017): In 2017, the treatment area for Eurasian watermilfoil was surveyed at 6.4 acres. Through the Invasive Aquatic Plant Management permit process, the DNR required reduction of treatment area due to some patches being in close proximity to native water lilies, which would be negatively affected by the proposed herbicide treatment.

Figure 3011.6 shows the annual costs associated with the treatments shown in figure 3011.5.

Figure 3011.6 – Treatment Costs by Year



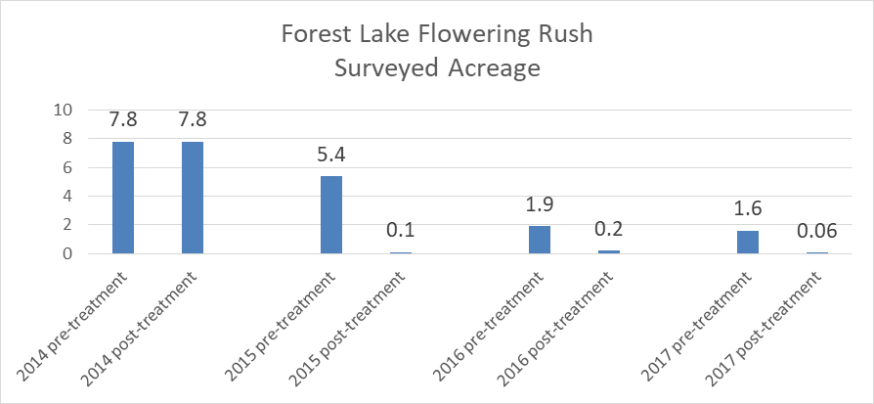
	2014	2015	2016	2017
Comfort EWM	$489	$416	$2,798	$592
Comfort CLP	$0	$357	$0	$0
Bone EWM	$0	$1,431	$338	$0
Bone CLP	$0	$875	$0	$624
Forest FR	$2,448	$2,679	$10,713	$12,646
Forest EWM	$0	$20,907	$10,369	$18,348
Forest CLP	$26,190	$24,992	$37,521	$86,249
Total	$29,127	$51,657	$61,739	$118,459

Acreages for each lake are color-coded: green = Bone Lake, pink = Forest Lake, purple = Comfort Lake. Treated species include: Eurasian watermilfoil (EWM), curly-leaf pondweed (CLP), and flowering rush (FR).

In general, the trend of AIS coverage in District lakes is increasing over time as new infestations spread and become more established. As illustrated in the figures above, one of the main driving factors for district-wide AIS coverage is Forest Lake curly-leaf pondweed, which is well established throughout the lake and fluctuates from year to year based on a variety of conditions. The District has generally been limited to achieving seasonal control of AIS, with new patches and existing patches growing and re-growing year after year. One exception to this trend is Forest Lake flowering rush.

An aggressive annual treatment program of Forest Lake flowering rush began in 2014. That year, flowering rush was surveyed across Forest Lake's middle and east basins, covering an estimated 340,740 square feet (***almost 8 acres***). With annual financial assistance from a variety of grants and partner agencies, the CLFLWD coordinated two herbicide treatments per year along with hand cutting of small patches in 2016 and flower removal in 2016 and 2017. The variety of flowering rush present in Forest Lake is different from other populations in the state of Minnesota in that it can spread in two ways: via rhizomes in the roots and viable seeds in the flowers. The flower cutting method aims to prevent propagation via seeds, and appears to be effective at preventing new patches from showing up. In October 2017, flowering rush was surveyed at 15 sites, covering approximately 2,655 square feet (***0.06 acres***). Below is a chart showing the surveyed flowering rush growth year by year; one pre-treatment survey and one post-treatment survey each year. It should be noted that herbicide impacts to native plants are taken into consideration with every round of treatment. Native plants are surveyed alongside flowering rush and the District is careful to avoid beds of native plants during herbicide treatments when feasible.

Figure 3011.7 – Forest Lake Flowering Rush Surveyed Acreage (2014-2017)



5000 Series- Projects

5200 District-Wide: Lake Goals & Objectives

The following lake issue, goals and objectives are listed in section 3.2 of the Plan (CLFLWD, 2018, p. 12).

3.2.1 Issue

Lakes are popular recreational assets in the District. In addition, lakes provide detention of flood waters, feeding grounds for wildlife, and habitat for fish and other aquatic organisms. Lakes can also provide a certain degree of pollutant settling, treatment through in-lake processes, and cooling of stormwater runoff while still maintaining good water quality. However, land use and land management practices have caused excessive discharge of pollutants, impacting the water quality and recreational use of a number of lakes within the District. Other lakes are at risk of impacts to water quality and recreational use due to invasive species, current land use practices or land use and land management changes. This changing backdrop requires adaptive management.

3.2.2 Goals

A. Adaptively manage District lakes to protect and improve water quality and recreational utility as appropriate to each lake.

B. Be proactive in aquatic invasive species management through education and projects that improve lake water quality and/or reduce the risk of entry of invasive species.

C. Preserve existing shoreland buffers and encourage the establishment of new buffers and lakescaping for water quality and habitat benefits.

3.2.3 Objectives

1. Implement projects and capital improvements identified in this Plan, as feasible, to reduce watershed nutrient loading to District lakes, limit internal nutrient loads, and manage for healthy fish and aquatic macrophyte populations.
2. Address a portion of the total phosphorus load reduction needed to attain total phosphorus load capacities of impaired lakes through the projects and capital improvements identified in this Plan.
3. Implement nutrient and sediment load reduction projects through the Non-Point Source Pollution Abatement Grant Program.
4. Monitor lake water quality through the Monitoring Program to guide adaptive management and provide the measure of progress.
5. Implement projects identified in this Plan to manage aquatic invasive species in lakes where these species present a water quality problem or that can lead to or be a cause of water quality degradation.
6. Work to limit the spread of aquatic invasive species to unimpacted lakes through the Education & Outreach Program and the Research Program.
7. Work to improve rough fish management for water quality through the Research Program.
8. Protect shoreland buffers through the District Rules & Rulemaking Program and Permitting Program.
9. Encourage and implement reestablishment of shoreland buffers and shoreline restoration through the Non-Point Source Pollution Abatement Grant Program.

Water Quality Goals & Status Summary

Additional, quantified, water quality goals are outlined for each lake in Volume II of the Plan. Figure 5200.1 includes long-term phosphorus concentration goals for major District lakes, as identified in the Watershed Management Plan, and compares measured monitoring data over time.

Figure 5200.1 Lake Phosphorus Concentration Goals and Measured Averages

Lake	Measured Data					CLFLWD Goals	
	Measured Average (2005-2009)		Measured Average (2011-2017)			2040 In-Lake Total Phosphorus Goal	
	Phosphorus Concentration	Years of Data	Phosphorus Concentration	Years of Data	% Change from '05-'09 Avg	5-Year Mean Concentration	Goal Load (approximate)
Moody	165 µg/L TP	3	102 µg/L TP	5	**-38%**	40 µg/L TP	144 lb/yr
Bone	46 µg/L TP	5	39 µg/L TP	5	**-15%**	30 µg/L TP	443 lb/yr
Birch	103 µg/L TP	3	72 µg/L TP	0	**N/A**	60 µg/L TP	471 lb/yr
School	66 µg/L TP	4	51 µg/L TP	0	**N/A**	40 µg/L TP	452 lb/yr
Little Comfort	42 µg/L TP	4	64 µg/L TP	5	**52%**	30 µg/L TP	416 lb/yr
Shields	214 µg/L TP	3	239 µg/L TP	5	**12%**	60 µg/L TP	84 lb/yr
Keewahtin (formerly Sylvan)	15 µg/L TP	4	15 µg/L TP	5	**0%**	20 µg/L TP	74 lb/yr
Forest (average)	36 µg/L TP	5	35 µg/L TP	5	**-3%**	30 µg/L TP	2,459 lb/yr
Forest 1 (west basin)	*36 µg/L TP*	*5*	*35 µg/L TP*	*5*	*-3%*	*30 µg/L TP*	*748 lb/yr*
Forest 2 (middle basin)	*38 µg/L TP*	*1*	*34 µg/L TP*	*5*	*-11%*	*30 µg/L TP*	*671 lb/yr*
Forest 3 (east basin)	*40 µg/L TP*	*1*	*34 µg/L TP*	*5*	*-15%*	*30 µg/L TP*	*1,040 lb/yr*
Heims	37 µg/L TP	1	43 µg/L TP	2	**16%**	<40 µg/L TP	N/A
Comfort	30 µg/L TP	5	33 µg/L TP	5	**10%**	30 µg/L TP	1,640 lb/yr

This table has been simplified for inclusion in the Progress Report text. The full version of this table can be found in Appendix F.

The following subsections of this report contain tables summarizing the goals and progress for each lake. In order to simplify the data, the language for each of the goals has been shortened. A general example of the full description for the lake-specific water quality goals is provided below for reference. Note that the exact language may vary slightly for each lake. Please refer to Volume II of the Plan for the full goal descriptions for each lake.

Resource Goals

Plan Goals– Year [2020, 2030, or 2040]

- Maintain a water quality rating of ____.
- Maintain a five-year mean summer phosphorus concentration below ____ µg/L ± 4%.
- Maintain a mean summer secchi depth no less than _____ ft.

Project Implementation Progress

Phosphorus Reduction Goals and Project Progress Detail (Appendix G)

This report quantifies project implementation progress through phosphorus load reduction. Phosphorus loading is a main contributor to the water quality parameters described above (water quality rating, phosphorus concentration, secchi depth). Progress toward reducing phosphorus loads to waterbodies results in progress toward achieving water quality goals. Projects are assigned to different categories depending on the following factors:

- Type of load addressed (upstream lakes, watershed, or internal load)
- Implementation status (completed, ongoing, or future)

Implementation progress tables summarize all completed, ongoing and proposed projects affecting the phosphorus load to each major District lake. Reductions listed are with respect to the District's long-term (2040) goal for each lake.

Phosphorus Reduction Goals and Project Progress Graph

Charts are meant to better assist with visualizing the District's progress toward its long-term phosphorus reduction goals for each lake. Bar graph charts in this section coincide with the progress represented in the detail tables in Appendix G, and are reflective of the District's long-term (2040) estimated phosphorus reduction goals from all loading sources (watershed, upstream lakes, and internal). The figures in these charts and graphs are based on monitoring data collected to date and hydrologic modeling. The benchmark load for Forest Lake is based on data from the 2016 Forest Lake Diagnostic Study. Benchmark loads for all other lakes are based on the District's 2004 water quality response model. Updating the hydrologic models associated with these benchmarks is time-consuming, and is therefore not feasible to do year after year. Rather, they should be updated roughly every 10 years or so. As such, the District may consider updating hydrologic models and reconsidering lake goals as part of its 2021 major Watershed Management Plan update.

Note that while the information contained in this section can be useful for high-level implementation planning, the data is always associated with some level of uncertainty. Watersheds are dynamic systems that are subject to frequent changes. Annual water monitoring data is subject to many different variables such as weather events and land use changes. Because of this annual variability, multi-year averages are generally used when evaluating progress toward goals. This report attempts to reflect actual conditions as accurately as possible, but recognizes the limitations of the data and associated margin of error.

Furthermore, while modeling can be used to estimate phosphorus load reductions for many of the District's capital improvement projects (e.g. wetland restorations and stormwater basins), some projects have impacts that are more difficult to estimate (e.g. public education projects, regulatory measures, curly-leaf pondweed management). While such projects are difficult to quantify, and therefore would not be reflected in the bar graph charts, they are nonetheless important in protecting and improving water resources. Additional notable projects and programs that have been completed to date, or are ongoing, are listed under some of the bar graph charts below. Some of which are also described in the 3000 – Programs section of this report above.

A table which further summarizes capital improvement project implementation progress can be found in Appendix E.

5221 Moody Lake

(Moody) Water Quality Goals & Status Summary

Figure 5221.1 – Moody Lake Water Quality Goals & Status Summary

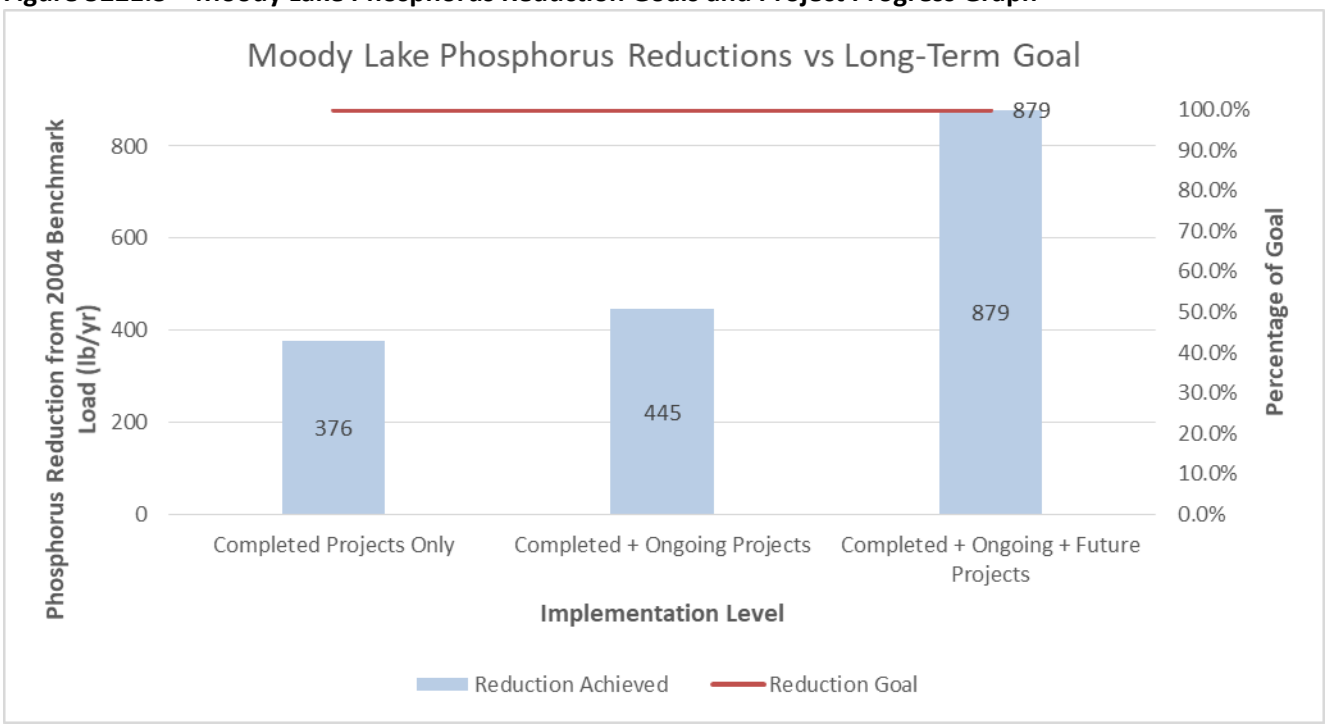
5221 Moody Lake					
	2020 Goal	2030 Goal	2040 Goal	2017 Data	5-Year Average
Water quality rating at or above	C	C	C	D+	D+
Mean summer phosphorus concentration below (µg/L)	60	40	40	86	102
Mean summer secchi depth at or above (ft)	3.3	4.6	4.6	1.9	2.6

Figure 5221.2 – Moody Lake Phosphorus Sources and Reduction Goals

Load Component	2004 Benchmark (152 µg/L) Load (lb/yr)	State Standard (40 µg/L)		District 2040 Goal (40 µg/L)	
		Reduction Needed (lb/yr)	Goal Load (lb/yr)	Reduction Needed (lb/yr)	Goal Load (lb/yr)
Watershed	636	555	81	555	81
Lendt Lake	15	0	15	0	15
Internal Load	368	324	44	324	44
Atmosphere	4	0	4	0	4
TOTAL	**1,023**	**879**	**144**	**879**	**144**

(Moody) Project Implementation Progress

Figure 5221.3 – Moody Lake Phosphorus Reduction Goals and Project Progress Graph



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

5222 Bone Lake

(Bone) Water Quality Goals & Status Summary

Figure 5222.1 – Bone Lake Water Quality Goals & Status Summary

5222 Bone Lake					
	2020 Goal	2030 Goal	2040 Goal	2017 Data	5-Year Average
Water quality rating at or above	C	C	B	B-	C
Mean summer phosphorus concentration below (µg/L)	40	40	30	30	39
Mean summer secchi depth at or above (ft)	4	4	7	5.8	4.4

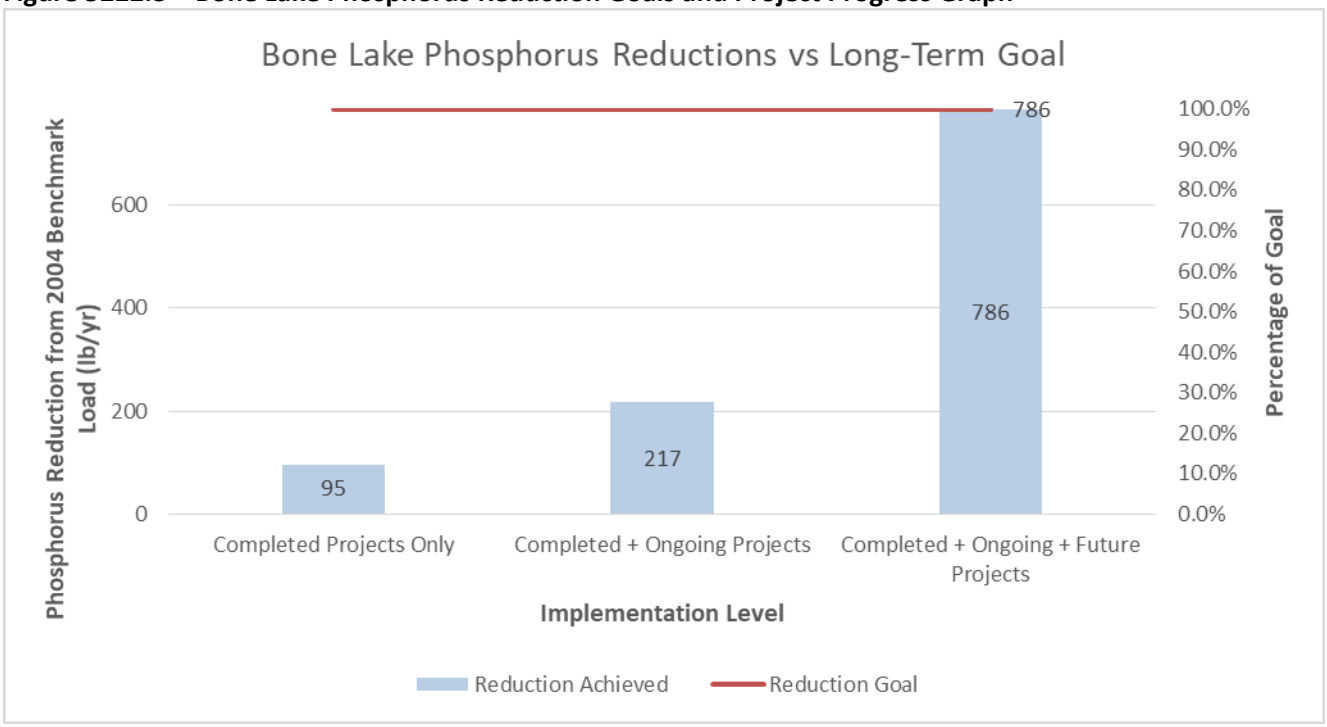
**Goals shown in green are currently being met according to the latest 5-year average*

Figure 5222.2 – Bone Lake Phosphorus Sources and Reduction Goals

Load Component	2004 Benchmark (60 µg/L) Load	State Standard (40 µg/L)		District 2040 Goal (30 µg/L)	
		Reduction Needed (lb/yr)	Goal Load (lb/yr)	Reduction Needed (lb/yr)	Goal Load (lb/yr)
Watershed	855	423	432	649	206
Moody Lake	186	137	49	137	49
Third Lake	11	0	11	0	11
Sea Lake	18	0	18	0	18
Internal Load	132	0	132	0	132
Atmosphere	27	0	27	0	27
TOTAL	**1,229**	**560**	**669**	**786**	**443**

(Bone) Project Implementation Progress

Figure 5222.3 – Bone Lake Phosphorus Reduction Goals and Project Progress Graph



Additional notable projects: curly-leaf pondweed management in 2015 and 2017, increased permitting oversight (e.g. erosion control, stormwater management, and waterbody buffer requirements).

5225 Little Comfort Lake

(Little Comfort) Water Quality Goals & Status Summary

Figure 5225.1 – Little Comfort Lake Water Quality Goals & Status Summary

5225 Little Comfort Lake					
	2020 Goal	2030 Goal	2040 Goal	2017 Data	5-Year Average
Water quality rating at or above	C	C	B	C	C
Mean summer phosphorus concentration below (µg/L)	40	40	30	43	64
Mean summer secchi depth at or above (ft)	5	5	7	3.6	4.5

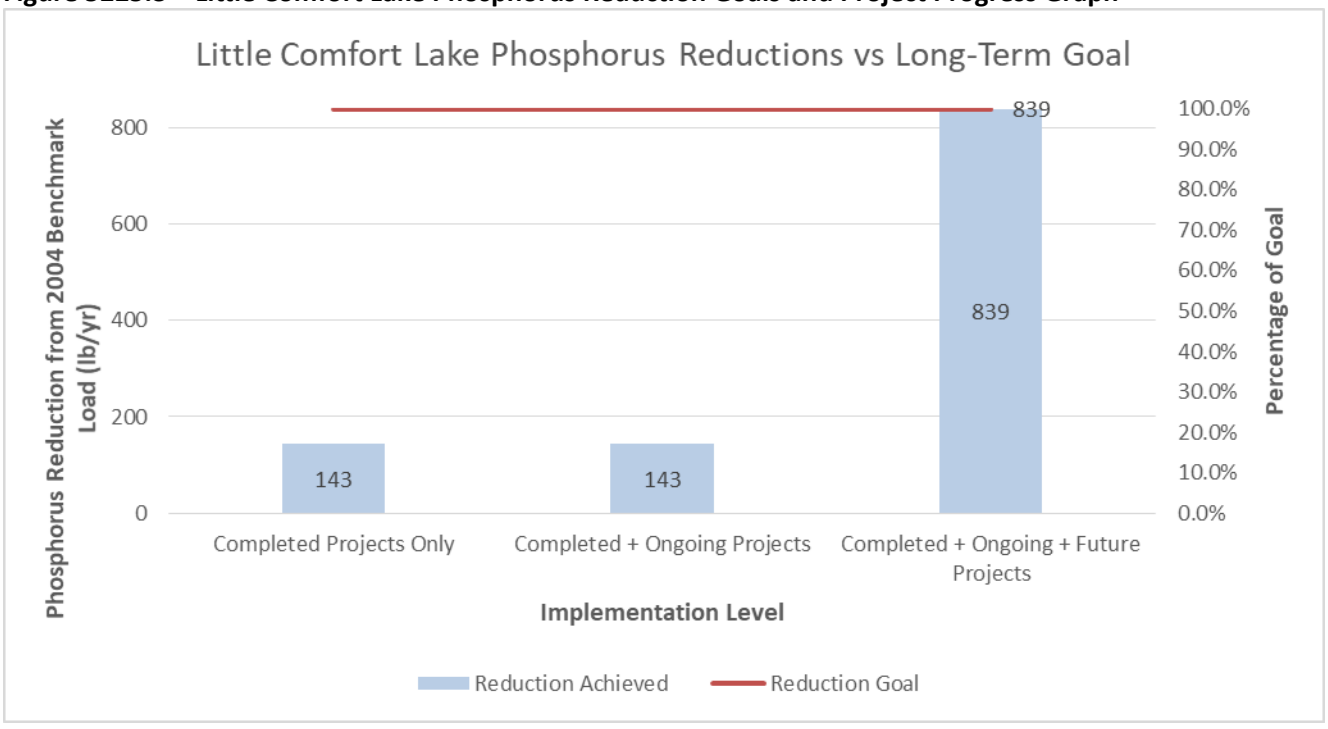
**Goals shown in green are currently being met according to the latest 5-year average*

Figure 5225.2 – Little Comfort Lake Phosphorus Sources and Reduction Goals

Load Component	2004 Benchmark (78 µg/L) Load (lb/yr)	State Standard (40 µg/L)		District 2040 Goal (30 µg/L)	
		Reduction Needed (lb/yr)	Goal Load (lb/yr)	Reduction Needed (lb/yr)	Goal Load (lb/yr)
Watershed	405	186	220	347	59
School	475	215	260	215	260
Internal Load	370	278	93	278	93
Atmosphere	5	0	5	0	5
TOTAL	**1,255**	**678**	**577**	**839**	**416**

(Little Comfort) Project Implementation Progress

Figure 5225.3 – 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).

5226 Shields Lake

(Shields) Water Quality Goals & Status Summary

Figure 5226.1 – Shields Lake Water Quality Goals & Status Summary

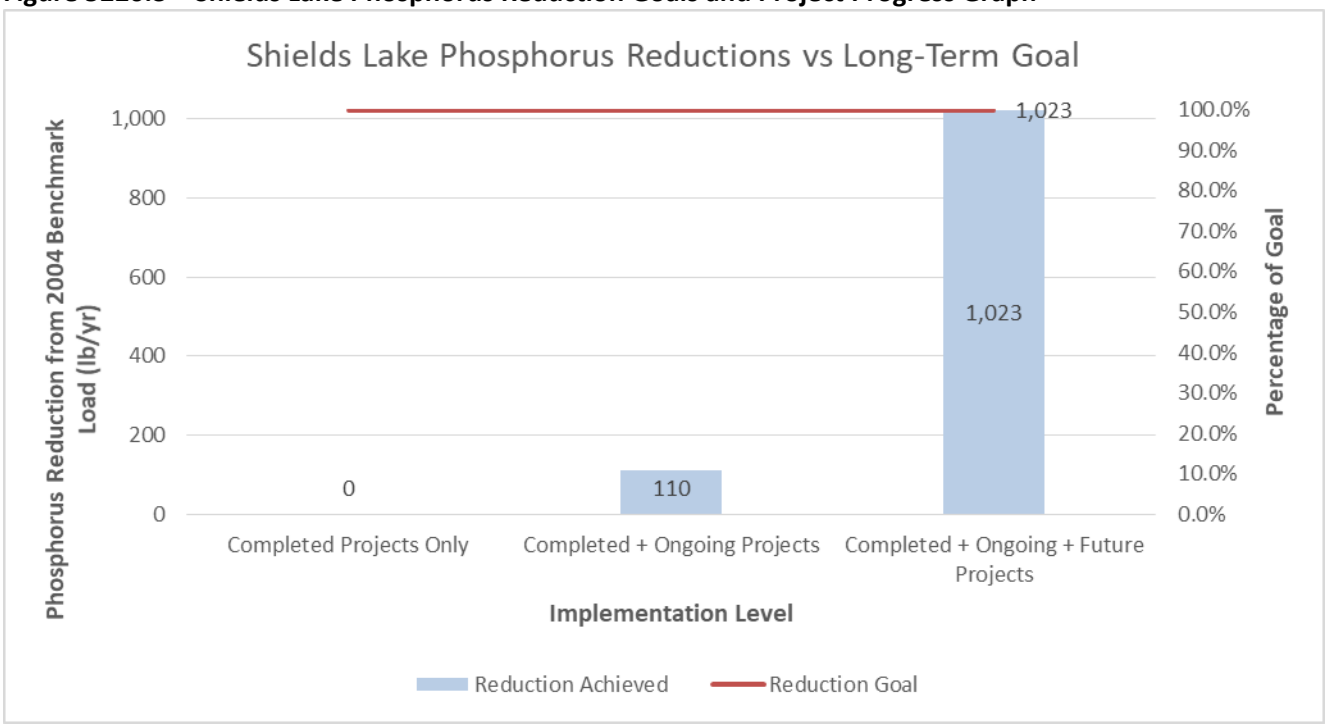
5226 Shields Lake					
	2020 Goal	2030 Goal	2040 Goal	2017 Data	5-Year Average
Water quality rating at or above	D	C	C	D-	D-
Mean summer phosphorus concentration below (µg/L)	100	60	60	191	239
Mean summer secchi depth at or above (ft)	4.26	4.26	4.26	2.2	2.9

Figure 5226.2 – Shields Lake Phosphorus Sources and Reduction Goals

Load Component	2004 Benchmark (229 µg/L) Load (lb/yr)	State Standard (60 µg/L)		District 2040 Goal (60 µg/L)	
		Reduction Needed (lb/yr)	Goal Load (lb/yr)	Reduction Needed (lb/yr)	Goal Load (lb/yr)
Watershed	190	0	190	110	80
Internal Load	913	913	0	913	0
Atmosphere	4	0	4	0	4
TOTAL	**1,107**	**913**	**194**	**1,023**	**84**

(Shields) Project Implementation Progress

Figure 5226.3 – Shields Lake Phosphorus Reduction Goals and Project Progress Graph



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

5227 Lake Keewahtin (formerly Sylvan Lake)

(Keewahtin) Water Quality Goals & Status Summary

Figure 5227.1 – Lake Keewahtin Water Quality Goals & Status Summary

5227 Lake Keewahtin					
	2020 Goal	2030 Goal	2040 Goal	2017 Data	5-Year Average
Water quality rating at or above	A	A	A	A	A
Mean summer phosphorus concentration below (µg/L)	20	20	20	14	15
Mean summer secchi depth at or above (ft)	10	10	10	14.2	14.8

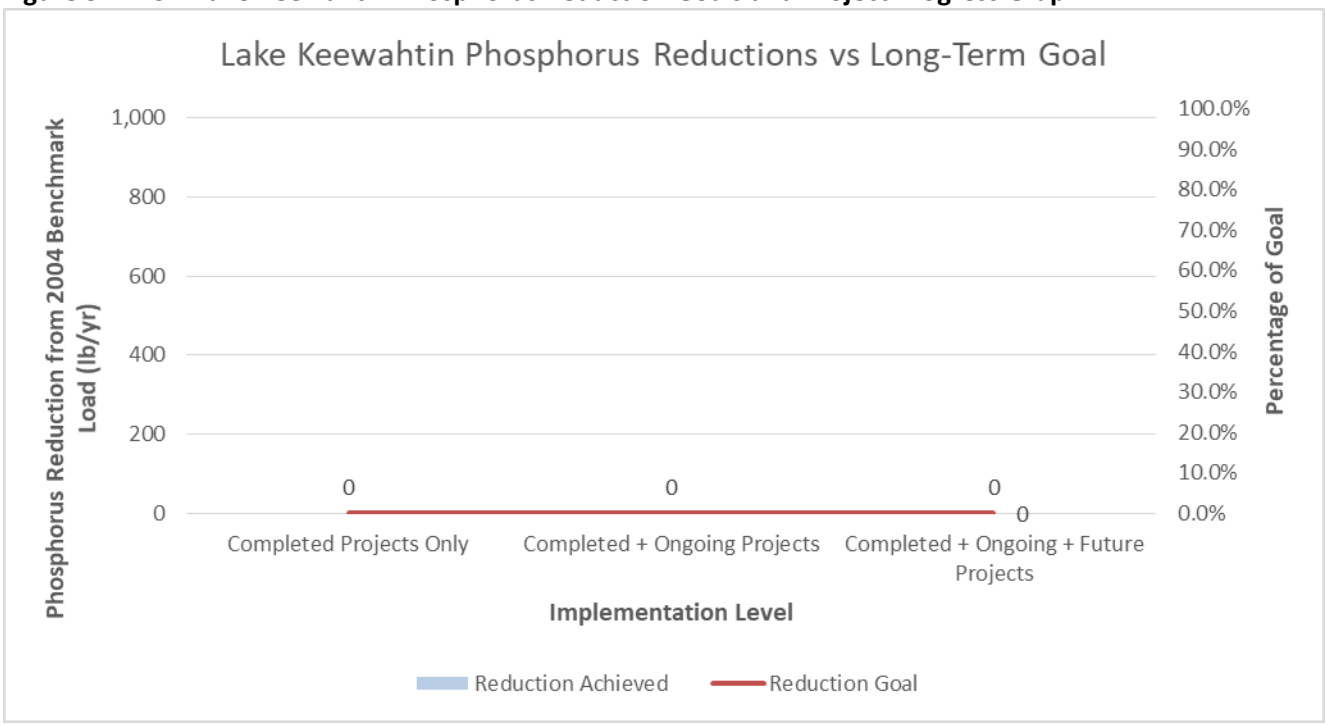
**Goals shown in green are currently being met according to the latest 5-year average*

Figure 5227.2 – Lake Keewahtin Phosphorus Sources and Reduction Goals

Load Component	2004 Benchmark (20 µg/L) Load (lb/yr)	State Standard (40 µg/L)		District 2040 Goal (20 µg/L)	
		Reduction Needed (lb/yr)	Goal Load (lb/yr)	Reduction Needed (lb/yr)	Goal Load (lb/yr)
Watershed	46	0	46	0	46
Internal Load	17	0	17	0	17
Atmosphere	11	0	11	0	11
TOTAL	**74**	**0**	**74**	**0**	**74**

(Keewahtin) Project Implementation Progress

Figure 5227.3 – 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

(Forest) Water Quality Goals & Status Summary

Figure 5228.1 – Forest Lake Water Quality Goals & Status Summary

5228 Forest Lake					
	2020 Goal	2030 Goal	2040 Goal	2017 Data	5-Year Average
Water quality rating at or above	C	C	B	B-	C+
Mean summer phosphorus concentration below (µg/L)	37	37	30	35	35
Mean summer secchi depth at or above (ft)	5	5	7	7.5	6.0

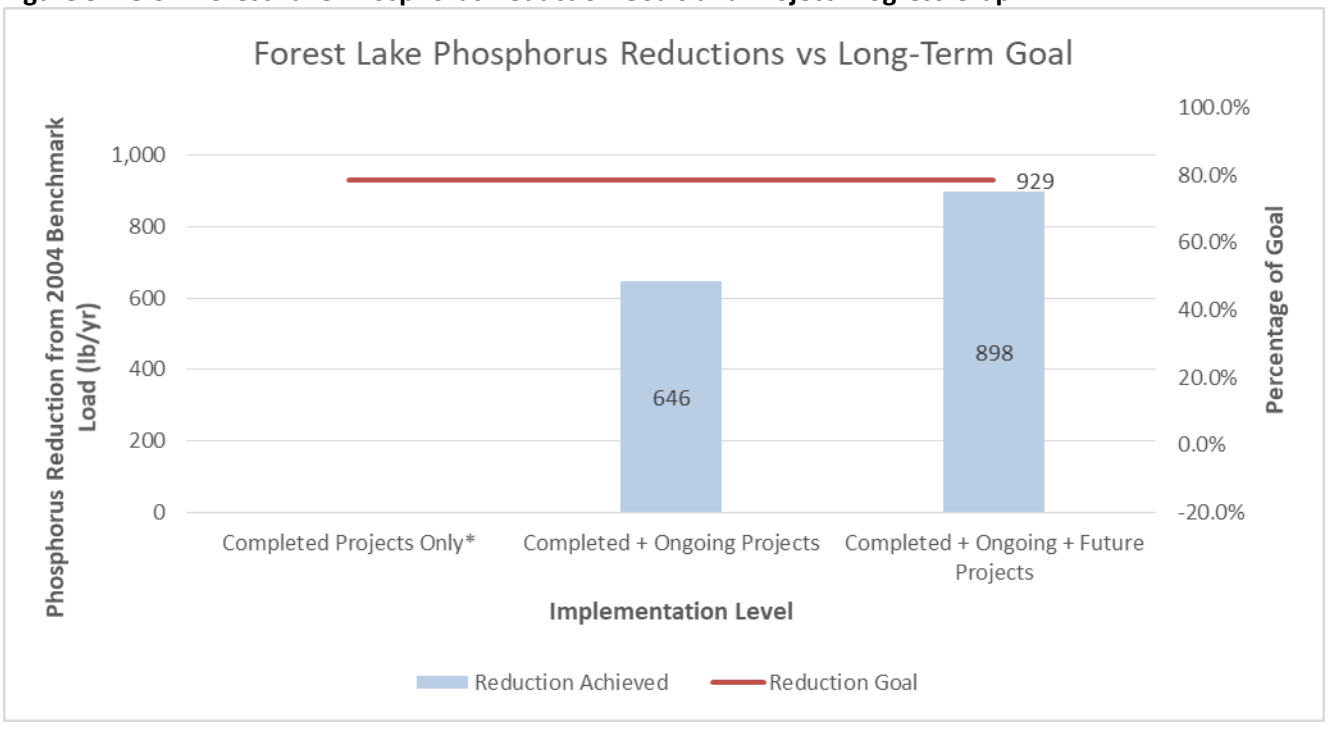
**Goals shown in green are currently being met according to the latest 5-year average*

Figure 5228.2 – Forest Lake Phosphorus Sources and Reduction Goals

Load Component	2016 Benchmark (35 µg/L) (Existing) Load	State Standard (40 µg/L)		District 2040 Goal (30 µg/L)	
		Reduction Needed (lb/yr)	Goal Load (lb/yr)	Reduction Needed (lb/yr)	Goal Load (lb/yr)
Watershed	1,622	398	1,224	398	1,224
Shields Lake	687	531	156	531	156
Internal Load	1,488	0	1,488	0	1,488
Other Lakes	127	0	127	0	127
Atmosphere	535	0	535	0	535
TOTAL	**4,459**	**929**	**3,530**	**929**	**3,530**

(Forest) Project Implementation Progress

Figure 5228.3 – Forest Lake Phosphorus Reduction Goals and Project Progress Graph



**Several projects in the Forest Lake subwatershed have been completed to-date. However, Shields Lake, which is directly upstream, has had declining water quality since the benchmark load was established in 2004. The completed Forest Lake projects do not equally counteract this decline, therefore do not appear as a positive reduction on the bar graph. Completed capital projects to-date include: Forest Lake Wetland Treatment Basin (aka 3rd Lake Pond), Hilo Lane Stormwater Retrofit, several cost-share projects, and dead-end street raingardens; see Appendix G for more details.*

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

5229 Comfort Lake

(Comfort) Water Quality Goals & Status Summary

Figure 5229.1 – Comfort Lake Water Quality Goals & Status Summary

5229 Comfort Lake					
	2020 Goal	2030 Goal	2040 Goal	2017 Data	5-Year Average
Water quality rating at or above	C	C	B	C+	C+
Mean summer phosphorus concentration below (µg/L)	40	40	30	31	33
Mean summer secchi depth at or above (ft)	5	5	7	5.8	5.4

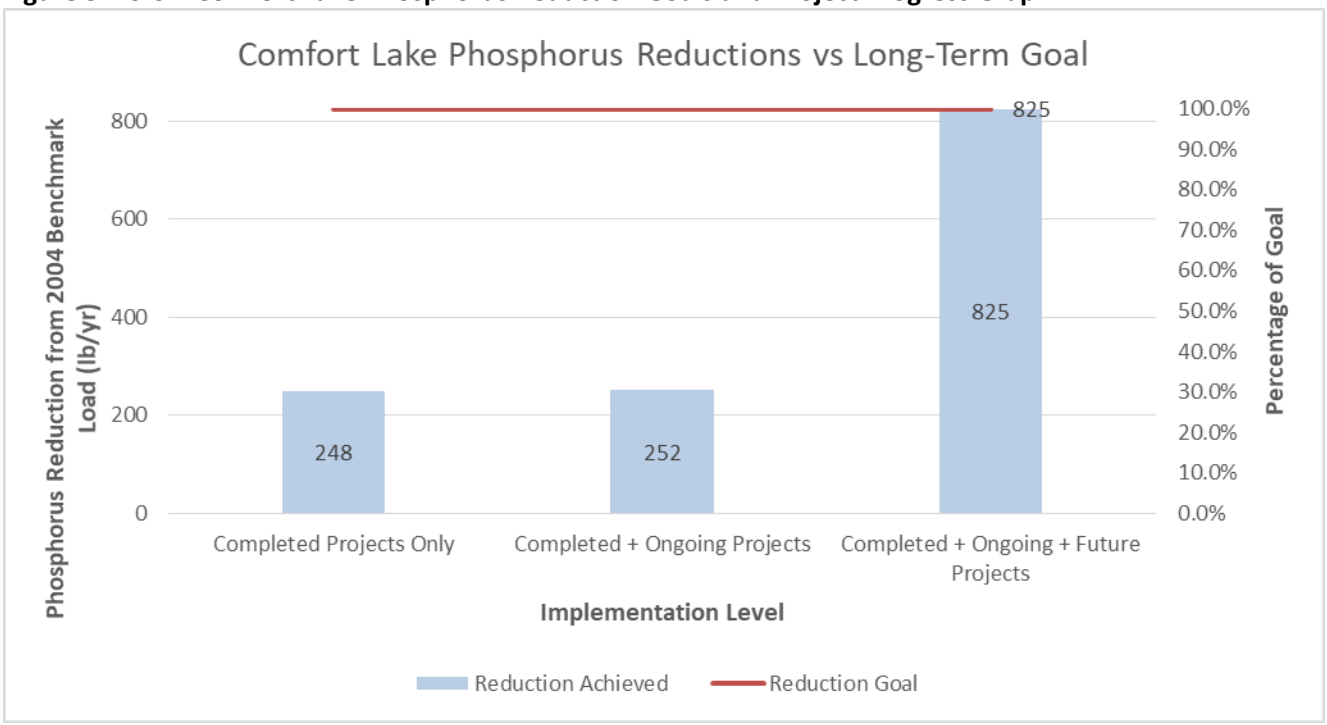
**Goals shown in green are currently being met according to the latest 5-year average*

Figure 5229.2 – Comfort Lake Phosphorus Sources and Reduction Goals

Load Component	2004 Benchmark (42 µg/L) Load (lb/yr)	State Standard (40 µg/L)		District 2040 Goal (30 µg/L)	
		Reduction Needed (lb/yr)	Goal Load (lb/yr)	Reduction Needed (lb/yr)	Goal Load (lb/yr)
Watershed	489	0	489	295	195
Little Comfort	678	127	551	415	263
Shallow Pond	1,135	0	1,135	15	1,120
Internal Load	134	0	134	101	34
Atmosphere	29	0	29	0	29
TOTAL	**2,465**	**127**	**2,338**	**825**	**1,640**

(Comfort) Project Implementation Progress

Figure 5229.3 – 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).

References

CLFLWD 2012-2021 Watershed Management Plan, Vol I, Amended January 2018:
http://www.clflwd.org/documents/CLFLWDWMPVolI-AmendedJan2018.pdf

CLFLWD 2012-2021 Watershed Management Plan, Vol II, Adopted October 2011:
http://www.clflwd.org/documents/CLFLWDWMPVolumeIIResourceInventory_000.pdf

McComas, Steve. Curlyleaf Pondweed Growth Characteristics:
http://www.clflwd.org/documents/CLPgrowthcharacteristics_BWS.pdf

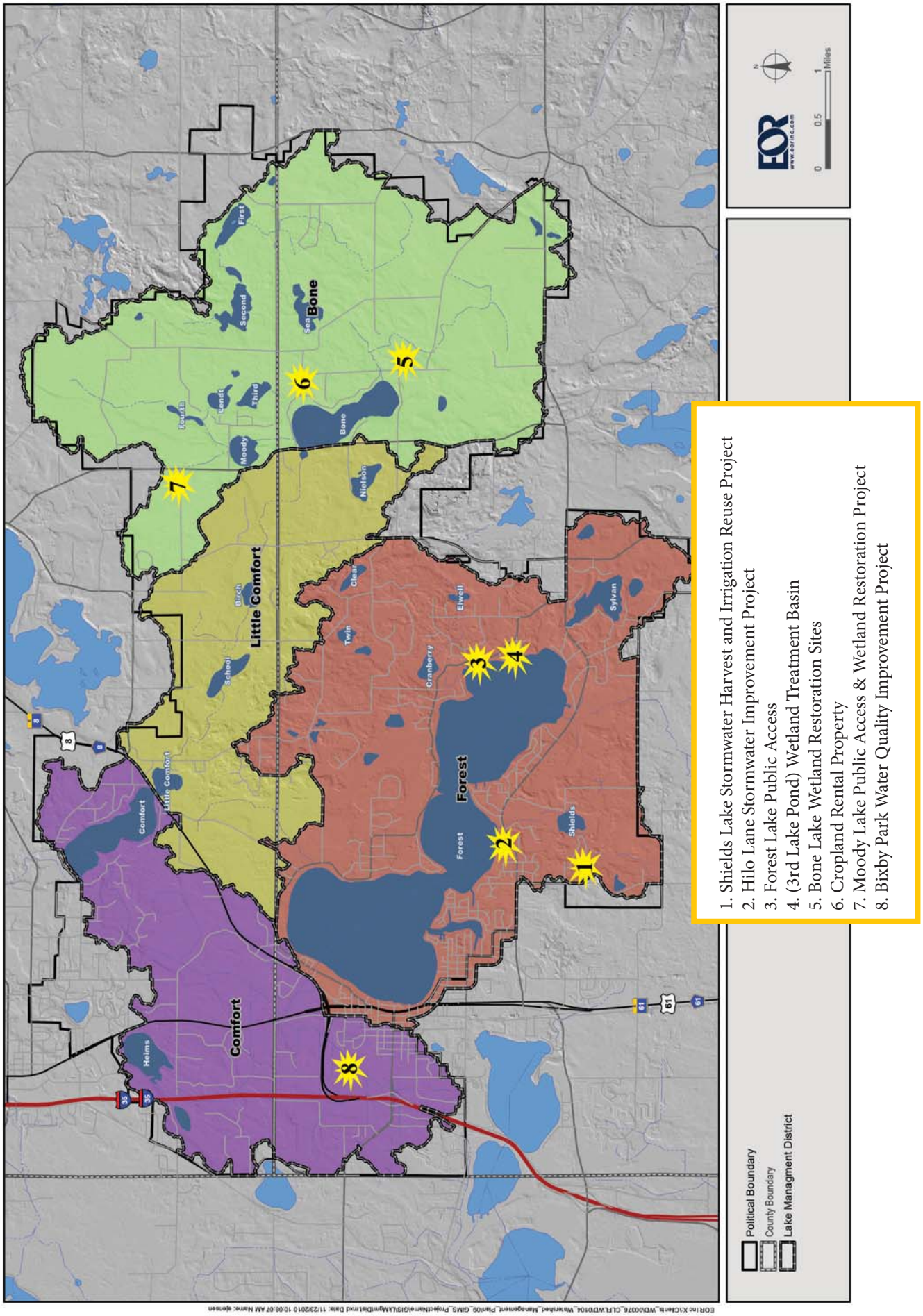
Appendices

District Tour Info Packet

COMFORT LAKE
- WATERSHED DISTRICT -
FOREST LAKE

2017 DISTRICT TOUR

May 6, 2017


1. Shields Lake Stormwater Harvest and Irrigation Reuse Project
2. Hilo Lane Stormwater Improvement Project
3. Forest Lake Public Access
4. (3rd Lake Pond) Wetland Treatment Basin
5. Bone Lake Wetland Restoration Sites
6. Cropland Rental Property
7. Moody Lake Public Access & Wetland Restoration Project
8. Bixby Park Water Quality Improvement Project
Political Boundary
County Boundary
Lake Managment District
Bone
Little Comfort
Forest
Comfort
Sea
First
Second
Third
Fourth
Landt
Moody
Nielson
Birch
School
Clear
Twin
Cranberry
Elwell
Sylvan
Shields
Little Comfort
Comfort
Helms
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Miles
EOR
www.eorinc.com

STORMWATER HARVEST AND IRRIGATION REUSE SYSTEM

Forest Hills Golf Club - Shields Lake

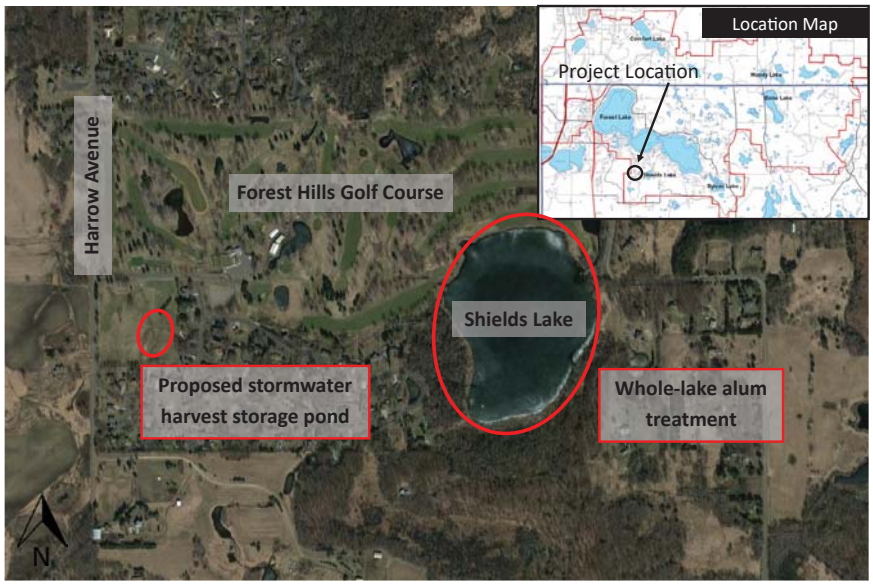
Project Description

Phase 1 of this project will entail impounding/harvesting water from a tributary to Shields Lake for irrigation reuse by Forest Hills Golf Course. Based on the outcomes of phase 1, phase 2 of the project will likely entail the application of a whole-lake alum treatment to Shields Lake.

Project Outcomes

The stormwater harvest and irrigation reuse component of the project is expected to result in a phosphorus reduction of 77 pounds per year to Shields Lake. The combination of the irrigation reuse system and alum treatment is expected to reduce phosphorus loads which will reduce phosphorus loads to Forest Lake by up to 250 pounds per year. This reduction will help Shields Lake achieve its long-term lake water quality goal and a clear water state.

Project Location



OVERVIEW

Timeline

Winter 2017 / 2018
Stormwater harvest and irrigation reuse system construction
2018 / 2019
Whole-lake alum treatment

Financials

Clean Water Fund Grant	$824,000
District Grant Match	$206,000
Total Project Budget	$1,030,000

STORMWATER RETROFIT PROJECT

Hilo Lane - Forest Lake

Project Description

This project involved stormwater treatment modifications for a 14 acre tributary drainage area comprised of residential land uses. Stormwater treatments included bio-filtration, iron-enhanced sand filtration, and channel stabilization.

Project Outcomes

This project is estimated to keep 12 pounds of phosphorus from entering Forest Lake every year This will help reduce seasonal exceedances of state water quality standards and move the lake toward long-term improvement of water quality.

Project Location

OVERVIEW

Timeline

Summer 2016
- Initial tree triming/removal, pipe boring, & channel stabilization

Fall/Winter 2016
- Primary construction

Spring/Summer 2017
- Final adjustments & restorations

Financials

MPCA Clean Water Partnership Grant	$41,615
District Grant Match	$143,025
Total Project Budget	$184,630

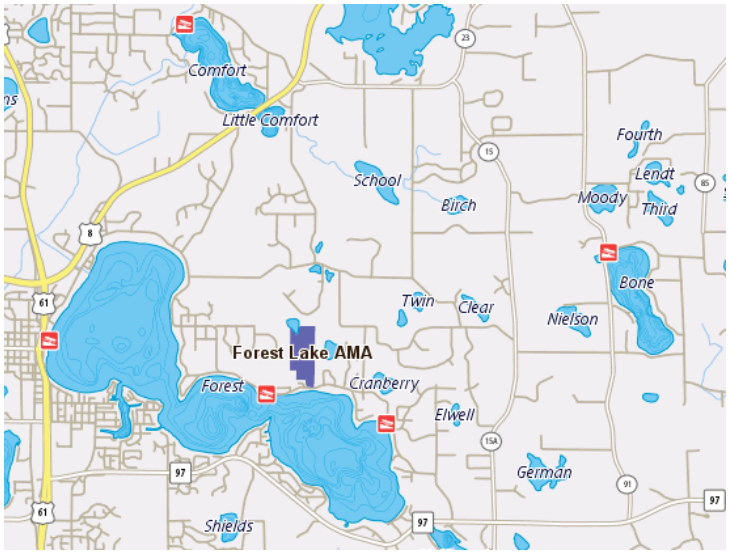
LAKE PUBLIC ACCESS IMPROVEMENTS

Launch sites - Bone, Comfort, & Forest Lake

Project Description

During the summer of 2015, the District conducted a boat launch feasibility study to identify ways to maximize efficacy of watercraft inspections and provide more clear instructions for boaters to prevent the spread of aquatic invasive species (AIS). In 2016 the District began implementation of identified improvements to boat launches on Bone Lake, Comfort Lake, and Forest Lake. Improvements included compost bins, pavement stencils, the addition of garbage and recycling bins, and the development of an information kiosk.

Project Locations



Public Acess Points where improvements were implemented

OVERVIEW

Timeline

Summer 2015
Boat launch feasibility study
Summer 2016
Implementation of identified improvements

Financials

Washington Co. FY 15 Grant	$1,870
Washington Co. FY 16 Grant	$710
Total Project Budget	$2,580

WETLAND TREATMENT BASIN

3rd Lake Pond - Forest Lake

Project Description

Over the past few decades, the open water portion of this wetland had filled in with nutrient-rich material such as leaves and sediment. This project removed roughly 2,800 cubic yards of material from the wetland, which created room for pollutants such as suspended sediments and phosphorus to settle out in the open area. Shallow benches were also created along the perimeter of the pond to support the growth of rooted aquatic plants and a wetland vegetation buffer. These aspects will allow for the filtering of nutrients and sediment from adjacent lawns and should assist in the uptake of phosphorus during storm events.

Project Outcomes

This project is predicted to keep 56 pounds of phosphorus out of Forest Lake per year. That is approximately a 50% reduction of the phosphorus load to Forest Lake from this tributary. Although the quality of the water in the wetland is expected to be cleaner initially, wetlands are naturally high in nutrients and support abundant aquatic plant growth as well as a variety of algae. The purpose of the project was not to specifically improve the water quality of the wetland, but improve the ability of the wetland to remove pollutants from the water before entering the lake.

Project Location

OVERVIEW

Timeline

Fall 2016:
- Land access agreements, permitting, and community outreach

Winter 2016 / 2017
- Construction

Spring 2017
- Seeding and site restoration

Financials

Clean Water Fund Grant	$162,000
District Grant Match	$40,000
Total Project Budget	$202,500

4

PARTIALLY DRAINED WETLAND RESTORATIONS

Prioritized Sites - Bone Lake

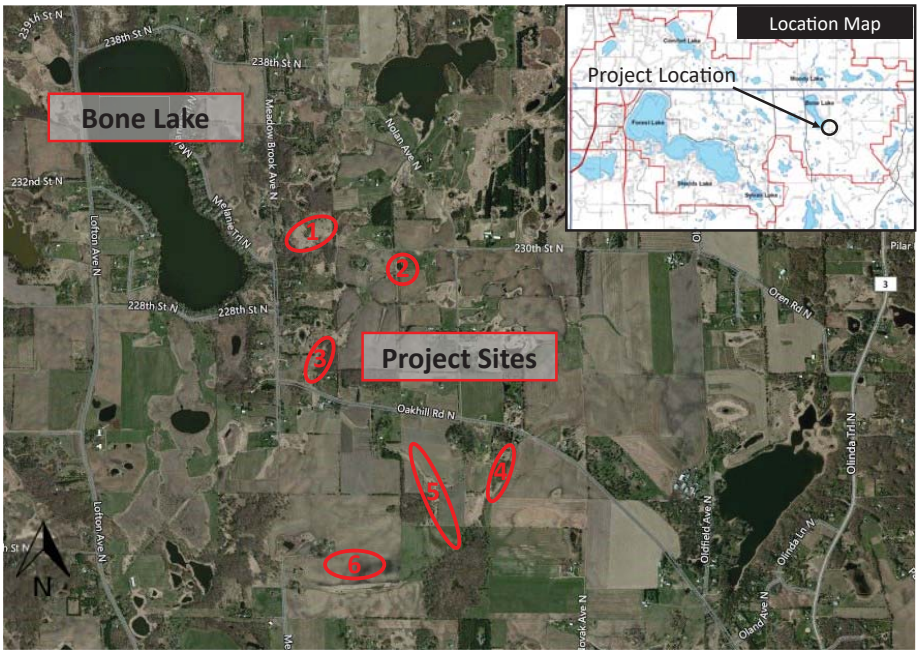
Project Description

This project proposes the implementation of six wetland restorations located along the tributary identified as the single highest source of phosphorus loading to Bone Lake. These locations were identified using information from the 2014 District-Wide Drained Wetland Inventory and 2015 Bone Lake Diagnostic Study

Project Outcomes

These wetland restorations are estimated to reduce watershed phosphorus loads to Bone Lake by 50 lb/yr, or 9% of the total load reductions needed for Bone Lake to achieve its in-lake water quality goal. Additionally, the restored wetlands will provide suitable habitat for a diverse assemblage of wetland plants and animals.

Project Location



OVERVIEW

Timeline

2017-2018
- Landowner outreach & contracts
- Wetland restoration engineering

2018-2019
- Wetland restoration construction

Financials

Clean Water Fund Grant	$88,000
District Grant Match	$22,000
Total Project Budget	$110,000

5

CROPLAND RENTAL
Bone Lake

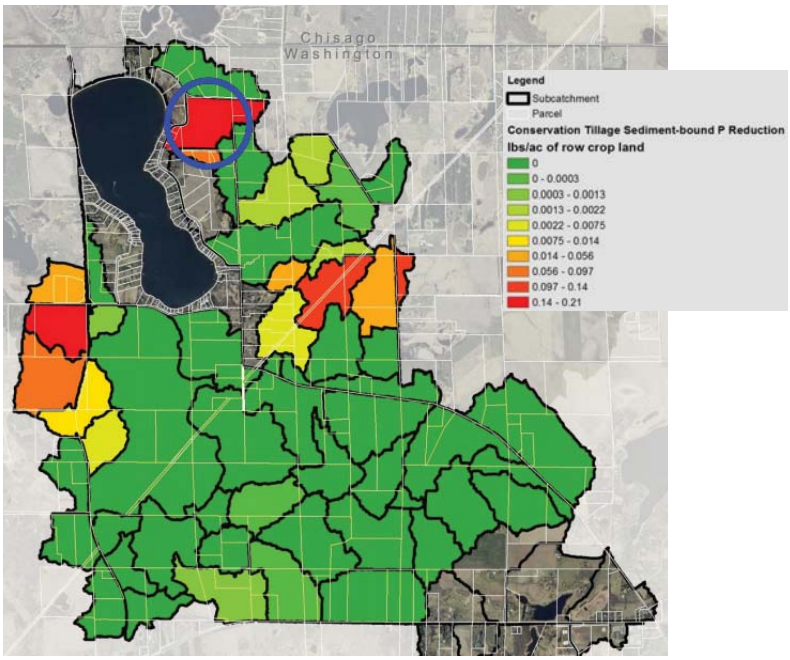
Project Description

This project was identified by the Bone Lake Diagnostic Study conducted in 2015. The results of the diagnostic report and field assessments provided evidence that the best option for reducing the annual loading from this field was to change the cropping system from continuous row crops to a cropping system that established permanent grass cover. The District has executed a year-to-year rental contract with the landowner of the field. The contract will renew automatically each year unless it is terminated by either party. It is expected that the contract will remain in place for at least 5 years.

Project Outcomes

Allowing the cropland to return to a permanent grass cover is estimated to reduce the phosphorus load coming from the property by 75%.

Project Location



6

OVERVIEW

Timeline

2016-2017
Landowner coordination & contract
2017-2018
Year 1 of year-to-year rental contract

Financials

District Dollars/Yr	$3,040
Total Project Budget*	$15,200

*Based on 5 year contract

WETLAND RESTORATION PROJECT

Farmland - Moody Lake

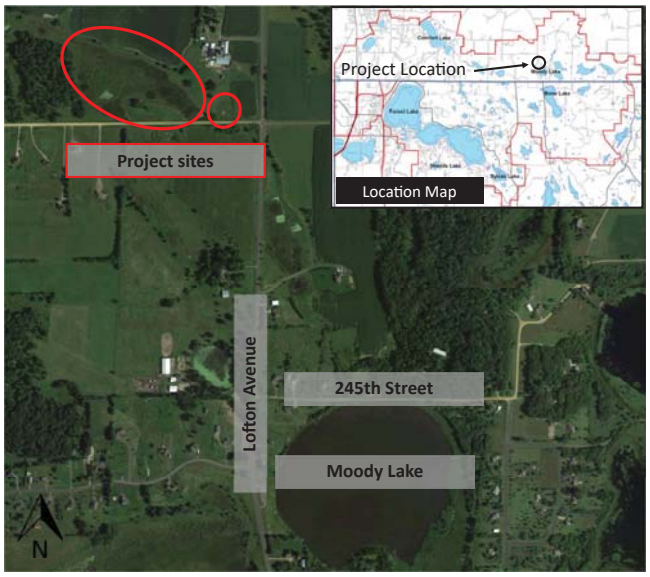
Project Description

This project involved the rehabilitation of degraded wetlands located northwest of Moody Lake in Chisago County. Rehabilitation activities included installation of wetland buffer strips, management of livestock access to two of the wetlands, and removal of nutrient-rich sediment within the wetlands. This project, among other recommended projects, was identified as a result of the Moody Lake Sequential Diagnostic Study.

Project Outcomes

It is estimated that this project will keep 445 pounds of phosphorus from entering Moody Lake per year. This is equal to 80% of the watershed phosphorus load reduction needed for Moody Lake to achieve its 2030 goal of obtaining an average in-lake phosphorus concentration of 40 µg/L.

Project Location



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OVERVIEW

Timeline

Winter 2016 / 2017
Wetland buffer strip, livestock exclusion, soil excavation and wetland restoration

Spring / Summer 2017 & 2018
Effectiveness monitoring

Financials

Clean Water Fund Grant	$429,284
District Grant Match	$107,321
Total Project Budget	$536,605

WATER QUALITY IMPROVEMENT PROJECT

Bixby Park - Comfort Lake

Project Description

This project improved the function of an existing ditched wetland complex located in Bixby Park in the City of Forest Lake. Bixby Park is located at the southeast corner of the intersection of I-35 and HWY 8. The City of Forest Lake partnered with the District on this project by providing access to the land on which the project is located. This project, among other recommended projects, was identified as a result of the Sunrise River Water Quality and Flowage Study.

Project Outcomes

This project increased the interaction between the natural floodplain and wetland, increased storage capacity (i.e. the amount of water that the wetland can hold), and improved habitats by restoring disturbed wetland areas with native vegetation. In addition, a permeable filter berm was added to the outlet of the wetland to remove additional dissolved phosphorus from the water. This project is predicted to result in the removal of 206 pounds of phosphorus per year.

Project Location

OVERVIEW

Timeline

Fall 2015
Project bidding
Winter 2015 / 2016
Project Construction
2017 / 2018+
Vegetation Management & Monitoring

Financials

Clean Water Fund Grant	$360,750
District Grant Match	$146,805
Total Project Budget	$507,555

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Project Cost Effectiveness - Dollars per Pound of Phosphorus Removed ***Does not include annual operations and maintenance costs

Project Name	Total Cost (dollars)	P Removed/Year (pounds)	Lifespan (years)	Total P Removed Over Lifespan (pounds)	Cost-Effectiveness ($/pound/year)
Shields Lake Stormwater Harvest/Irrigation only	*$880,000*	*77*	*25*	*1,925*	***$457***
Shields Lake Alum Treatment only (includes reduction to Forest)	*$150,000*	*913*	*10*	*9,130*	***$16***
Shields Lake Harvest/Alum Whole Project Total&Avg Cost Effect.	$1,255,000	990	25	24,750	**$51**
Hilo Lane Stormwater Retrofit	$184,630	12	25	300	**$615**
FL Wetland Treatment Basin (3rd Lake Pond)	$202,500	56	25	1,400	**$145**
BL Partially Drained Wetland Restorations	$110,000	50	10	500	**$220**
BL Cropland Rental (Dahlin Property) All figures per contract year	$3,040	30.4	1	30	**$100**
ML Wetland Restoration Project (all phases, exclude whole lake alum tmt)	$536,605	445	25	11,125	**$48**
Bixby Park Water Quality Improvement Project	$507,555	206	25	5,150	**$99**

STREET SWEEPING

BACKGROUND

The Comfort Lake-Forest Lake Watershed District received a $36,000 grant in 2017 to develop an enhanced street sweeping plan for the City of Forest Lake that optimizes phosphorus removal. Phosphorus is a nutrient found in leaves and grass clippings that can lower water quality.

LAKE GOALS

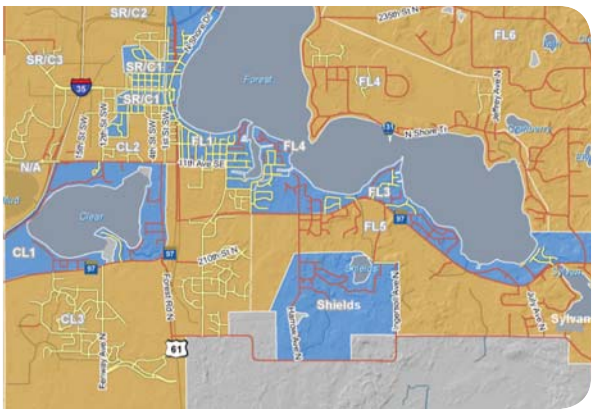
Many of our local lakes require phoshorus reductions to meet their water quality goal of seeing past your toes when treading water (7 feet). Significantly reducing the amount of phosphorus-laden material such as leaves, grass clippings and sediment entering the lakes via stormdrains, street sweeping will help us get closer to reaching that goal. With increased water clarity comes increased property values, commercial interest, and recreation! Roadways and best management practices, such as raingardens and stormwater ponds, will also see benefits and require less maintenance.

SWEEPER TYPES

Belive it or not, all street sweepers are NOT created equal! The City of Forest Lake currently utilizes a mechanical broom sweeper in the spring and a vacuum sweeper in the fall through a contractor. Switching to a full-time regenerative air vacuum sweeper could provide significantly more benefits. For instance, a regenerative air vacuum sweeper removes up to 3x more phosphorus than the mechanical broom sweeper. Furthermore, purchasing a vacuum sweeper and performing the sweeping in-house would result in measurable cost savings compared to contract sweeping. As the frequency of sweeping increases, so does the cost-benefit efficiency of in-house sweeping†. This significant increase in phosphorus removal will not only help the city achieve it's stormwater pollution prevention plan goals (required by the state) but will also help improve local water quality and help use taxpayer dollars more effectively!

ACCURACY

By targetting the blue zones 12x per year and the orange zones 7x per year the street sweeping program will obtain the most efficient material removal for the lowest dollars spent!



FACTS

Completed in 2017, the Forest Lake Enhanced Street Sweeping Plan is the result of intense modeling and engineering work. A basic summary of the resulting phosphorus reduction benefits and annual costs are below. To provide context, the reductions needed to reach water quality goals are as follows: 1,329 lb/yr (Forest), 825 lb/yr (Comfort), 140 lb/y (Clear).

Phosphorus Reduction Benefits (lb/yr)		
Lake	Current Contract (2x/yr)	Vacuum Sweeper (7-12x/yr)
Clear	6	20
Forest	37	122
Shields	0.7	1.6
Sylvan	0.9	2.3
Comfort	6	22
Total Reduction	**51**	**168**
Annual Cost (No CWF grant)*		
	$66,000	$68,000
$ per lb removed	$1,294	$405
Annual Cost (w/ CWF grant)*		
		$45,800
$ per lb removed		$272

*The City of Forest Lake, with support form the Comfort Lake-Forest Lake Watershed District submitted a Clean Water Fund (CWF) grant proposal to help off-set the expenses associated with purchasing a new sweeper and implementing a new street sweeping plan. Results regarding the grant award will be known in late December.

CLEAN WATER LAND & LEGACY AMENDMENT

EXISTING PROJECT PERFORMANCE

BIXBY PARK WATER QUALITY IMPROVEMENT PROJECT

Restoration of existing ditched wetland complex

- Total Cost = $507,555 ($360,750 grant + $146,805 match)
- Phosphorus Reduction = 206 lb/yr
- 2017 monitoring data shows project is achieving goals (40% P reduction)
- Re-connected ditches to floodplain
- Increased water storage
- Improved wetland vegetation & habitat
- Constructed on City of Forest Lake Property

HILO LANE STORMWATER RETROFIT

Stormwater treatment of 14-acre drainage area

- Total Cost = $184,650 ($41,615 grant + $143,025 District match)
- City of Forest Lake contribution of $25,000
- Phosphorus Reduction = 12 lb/yr to Forest Lake middle basin (2nd Lake)
- Iron-enhanced sand filter & shoreline stabilization

FOREST LAKE WETLAND TREATMENT BASIN

Wetland basin improvement

- Total Cost = $202,500 ($162,000 grant + $40,500 match)
- Phosphorus Reduction = 56 lb/yr to Forest Lk East (3rd Lk)
- Improved treatment capacity of existing wetland
- Excavation of nutrient rich sediments
- Vegetation/buffer restoration
- 2017 monitoring data shows project is achieving goals (~50% P reduction)
- Constructed on City of Forest Lake Property

COMFORT LAKE - WATERSHED DISTRICT - FOREST LAKE

Comfort Lake-Forest Lake Watershed District
44 Lake St. South, Suite A | Forest Lake, MN 55025
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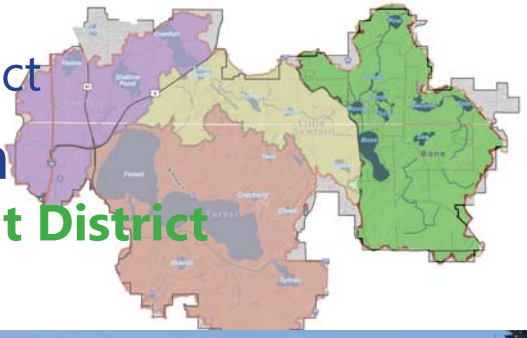
Comfort Lake-Forest Lake Watershed District



Moody Lake Wetland Restoration

Project Update - Bone Lake Management District

Moody Lake is on the Environmental Protection Agency's impaired waters list for excess phosphorus. Phosphorus is a nutrient that makes algae grow in the lake just like it makes grass grow on a yard. Phosphorus is needed for a lake in small amounts, but in excessive amounts it can create nuisance algae blooms and negatively impact the lake. The Comfort Lake-Forest Lake Watershed District (CLFLWD) has conducted intensive monitoring of the surrounding areas to locate the primary sources of phosphorus. The current average summer phosphorus concentration is 128 micrograms per liter. The long-term water quality goal for Moody Lake is 40 micrograms per liter. Given these conditions, the District planned a multi-year, multi-phase, adaptive management approach for reducing phosphorus loads to Moody Lake. The intensive monitoring effort resulted in the discovery of several phosphorus laden wetlands upstram of the lake which accounted for 75% of the phosphorus load coming into Moody Lake!

In early 2017, the CLFLWD excavated two of these degraded wetlands that were discharging high levels of phosphorous. This excavation and the associated installation of cattle management fencing concluded Phase-One of the project.

Post construction monitoring suggests that the project is obtaining <u>68% of the total watershed phosphorus reduction goal to Moody Lake!</u> The next phase of the project, planned for early 2018, will move further down the watershed to address a smaller phosphorus-loading hotspot located just upstream of Moody Lake. The cycle will continue with post-project effectiveness monitoring in the summer of 2018. Once the external phosphorus load to Moody Lake has been addressed through these projects, the District will turn its attention to the "internal" phosphorus loading that is occurring within the lake (e.g., what's already in the lake). The final phase of the project will be a whole-lake alum treatment on Moody Lake, which will sequester phosphorus in the sediment of the lake. This is predicted to bring Moody Lake to its long-term water quality goal and a clear water state!

Improvements to Moody Lake will have a significant impact on Bone Lake just downstream. Bringing Moody Lake to its water quality goal will result in a <u>17% reduction in the phosphorus load entering Bone Lake</u>. Additional projects going on in the Bone Lake subwatershed, including cropland best management practices and wetland restorations, will further improve water quality in that lake.

Pre-project sediment sampling
July 2016

Active excavation of wetland
February 2017

Post construction - vegetation regrowth
August 2017

Notice: Winter Aeration on Moody Lake Will Cause Thin Ice

The Comfort Lake-Forest Lake Watershed District (CLFLWD) is planning to run an **aeration system on Moody Lake beginning Monday, January 8th 2018.** This will result in thin ice and/or open water on the west side of the lake near Lofton Avenue. The aerator will remain on until ice-out in spring 2018. Signage will be posted around the perimeter of the thin ice.

Aerating Moody Lake will help protect gamefish populations that compete with undesirable rough fish such as black bullheads, yellow bullheads, and common carp. Bullheads are bottom- feeding fish that stir up lake sediment and nutrients from the lake bottom harming native aquatic plants and decreasing water quality. Bullheads are able to survive the low oxygen conditions better than gamefish, which means they can outlive their predators during the winter months when the lake is frozen over and oxygen is depleted. Winter aeration increases oxygen levels in the water which can help gamefish survive and keep the rough fish populations in check. A lower population of rough fish is also expected to result in cleaner, clearer water in Moody Lake. **Please exercise EXTREME CAUTION on Moody Lake from early January until ice-out in spring**

Historic Sediment Cores - Moody Lake Paleolimnological Study

The goal of the CLFLWD is to return our local lakes to their pre-settlement conditions. To figure out exactly what these conditions were, the CLFLWD has partnered with the St. Croix Watershed Research Station to perform sediment analysis. Lake sediments provide a record of physical, chemical, and biological clues for determining how and when a lake has changed. Scientists (paleolimnologists) work from an anchored boat or the surface of the ice to recover sediment cores. A piston corer uses a clear tube that is lowered to the lake bottom using alloy rods that thread together. The tube is fitted with a piston held in place with a cable; as the tube is pushed into the mud, the piston helps "pull" the sediment into the tube. Physical, chemical, and biological indicators preserved in the sediment are analyzed to reconstruct the ecological history of the lake. For example, naturally occurring radioisotopes, which decay at a known rate, allow scientists to establish an age-depth relationship for the core; and fossil diatoms (algae that were preserved due to their biologically produced glass cell walls) tell us about historical water quality and ecology.

Moody Lake is hypereutrophic. The sedimentation rate (how fast sediment is accumulating) started increasing in the late 1800s after European settlement and reached a peak in the 1980s. The increase in sedimentation rate can be attributed to erosion on the landscape. Diatoms show that nutrient levels increased in the 1960s, shifting the lake into the hypereutrophic (nutrient-rich) category we see today. Core results suggest that internal phosphorus loading (coming from the lake bottom) is currently a major factor contributing to Moody Lake's hypereutrophic state.

COMFORT LAKE -WATERSHED DISTRICT- FOREST LAKE

Protecting your water resources

www.clflwd.org | 651-395-5850 | info@clflwd.org

A Paleolimnological Study in the Comfort Lake-Forest Lake Watershed District

Deep Sediment Core Fact Sheet

COMFORT LAKE

THE PROBLEM:

In Comfort Lake (pictured left), total phosphorus levels have been improving in recent years, however water clarity has been declining. This study used sediments from the lake bottom to tell us about the historical condition of the lake, and when it changed, to help inform lake management decisions.

ANALYSIS:

Lake sediments provide a record of physical, chemical, and biological clues for determining how and when a lake has changed. Scientists (paleolimnologists) work from an anchored boat or the surface of the ice to recover sediment cores. A piston corer uses a clear tube that is lowered to the lake bottom using alloy rods that thread together. The tube is fitted with a piston held in place with a cable; as the tube is pushed into the mud, the piston helps "pull" the sediment into the tube.

Physical, chemical, and biological indicators preserved in the sediment are analyzed to reconstruct the ecological history of the lake. For example, naturally occurring radioisotopes, which decay at a known rate, allow scientists to establish a age-depth relationship for the core; and fossil diatoms (algae that were preserved due to their biologically produced glass cell walls) tell us about historical water quality and ecology.

Coring Location

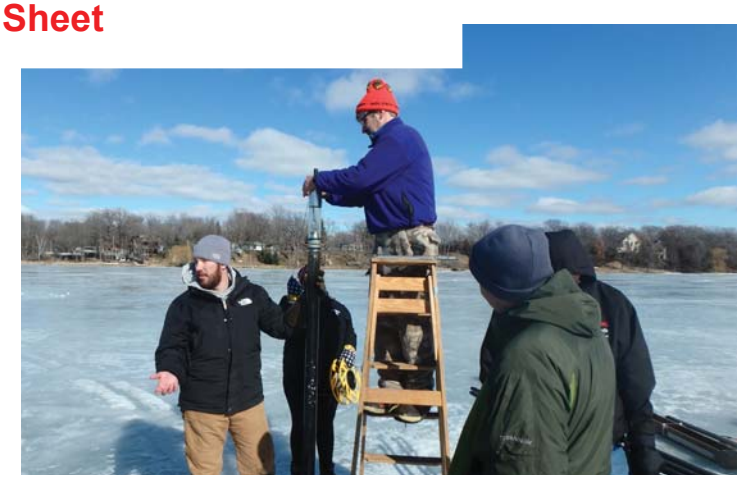
Core Processing

Field Work

THE LAKE:

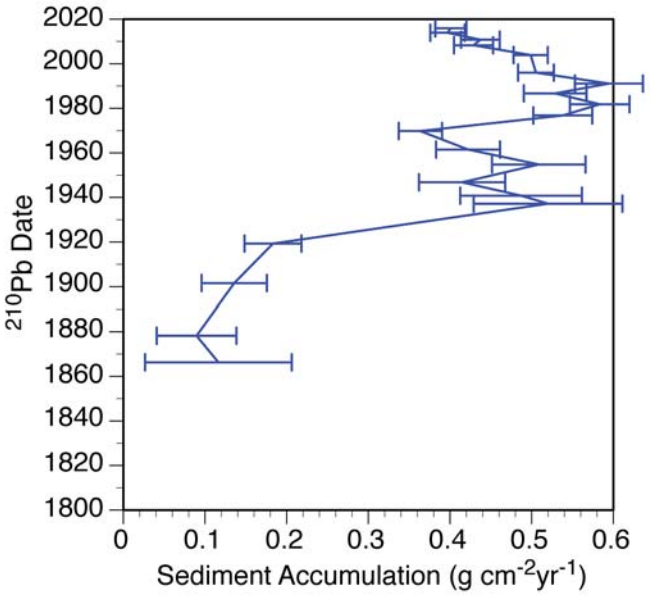
Comfort Lake has a surface area of 218 acres, making it the third largest lake in the Comfort Lake–Forest Lake Watershed District (CLFLWD). The lake is 13.7 m (45 feet) deep and the summer of 2016 average TP was 34 µg/l. Comfort Lake has a public boat launch and is heavily used for recreation. Comfort Lake is at the outlet of the CLFLWD, and has two main tributaries. One of the tributaries is from Little Comfort Lake, entering at the southeast end of Comfort Lake. The other main tributary is the Sunrise River, which enters at the west side of the lake after discharging from Forest Lake and flowing through wetland, residential, and agricultural lands. The Sunrise River flows out of Comfort Lake at the northwest end and discharges to the St. Croix River. In February of 2016, a sediment core was collected through the ice to determine the lake's ecological history.

Deep Sediment Core Fact Sheet



THE CORE:

The image to the right represents a portion of the sediment core recovered from Comfort Lake. The top of the image shows sediments that were deposited in recent years, and sediments get older downcore. Naturally-occurring radioisotopes (lead-210) were used to establish a date-depth relationship for the core. Sediments were sectioned into 2-cm increments for analysis.



THE RESULTS:

The sedimentation rate (how fast sediment is accumulating) has changed over time in Comfort Lake. The sedimentation rate began to rise in the 1930s, and peaked in the early 1990s. The rate has been decreasing in recent decades, however the sedimentation rate at the core top (2016) remains about three times higher than it was in the 1800s and early 1900s.

- Comfort Lake experienced a **large shift in sediment composition**; there was an increase in organic material being delivered to the lake that began in the 1930s and persisted through about 2005 (a similar and synchronous change was found in the sediment core from Shields Lake). During the post-World War II era, agricultural practices shifted in many areas to include tile drainage, ditching, and increased fertilizer use; the pulse of organic matter from the landscape may have been the result of these practices in the watershed.

- Diatom results indicated that Comfort Lake was **nutrient-rich from the mid-1800s through the 1980s/90s**. There was a significant shift in the diatom community composition around 1990, which indicated a decline in total phosphorus levels since that time.

- However, algal pigment results showed that **overall algal abundance has sharply increased** in recent years. This includes cyanobacterial groups, including those that have the potential to cause toxic blooms.

- Although monitoring efforts and diatom assemblage shifts both indicate a decrease in total phosphorus in recent years, **observations of decreasing water clarity and algal pigment** results show that there are still issues with the lake.

Contact
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St. Croix Watershed Research Station | Science Museum of Minnesota | Comfort Lake - Watershed District - Forest Lake | College of Arts and Sciences | University of St. Thomas

Deep Sediment Core Fact Sheet

MOODY LAKE

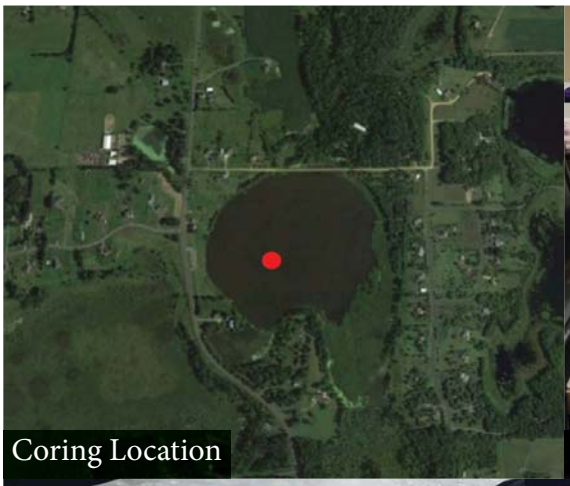
THE PROBLEM:

Moody Lake (pictured left) is impaired due to high nutrient levels. This study used sediments from the lake bottom to tell us about the historical condition of the lake, and when it changed, to help inform lake management decisions.

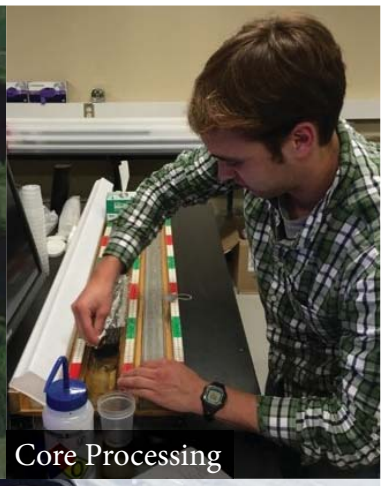
ANALYSIS:

Lake sediments provide a record of physical, chemical, and biological clues for determining how and when a lake has changed. Scientists (paleolimnologists) work from an anchored boat or the surface of the ice to recover sediment cores. A piston corer uses a clear tube that is lowered to the lake bottom using alloy rods that thread together. The tube is fitted with a piston held in place with a cable; as the tube is pushed into the mud, the piston helps "pull" the sediment into the tube.

Physical, chemical, and biological indicators preserved in the sediment are analyzed to reconstruct the ecological history of the lake. For example, naturally occurring radioisotopes, which decay at a known rate, allow scientists to establish a age-depth relationship for the core; and fossil diatoms (algae that were preserved due to their biologically produced glass cell walls) tell us about historical water quality and ecology.



Coring Location



Core Processing

Field Work

THE LAKE:

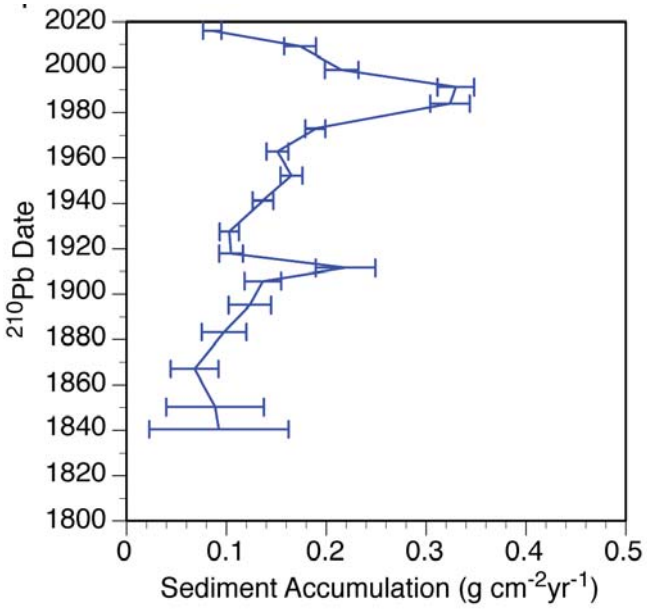
Moody Lake has a surface area of 34 acres and a maximum depth of 14.3 m (47 feet). The Moody Lake 2,315-acre watershed is primarily agricultural and rural; there is a carry-in only public boat launch, and the lake is used for watering livestock, and some fishing and non-motorized boating. Average summer total phosphorus (TP) in 2016 was 104 µg/l, and the Comfort Lake – Forest Lake Watershed District notes that TP levels have been improving. In February of 2016, a sediment core was collected through the ice to determine the lake's ecological history.

Deep Sediment Core Fact Sheet

THE CORE:

The image to the right represents a portion of the sediment core recovered from Moody Lake. The top of the image shows sediments that were deposited in recent years, and sediments get older downcore. Naturally-occurring radioisotopes (lead-210) were used to establish a date-depth relationship for the core. Sediments were sectioned into 2-cm increments for analysis.

THE RESULTS:



The sedimentation rate (how fast sediment is accumulating) has changed over time in Moody Lake. The sedimentation rate began a slow rise in the late 1800s and peaked in the early 1900s and again in the 1990s (where it was over three times higher than it had been in the 1800s). The rate has decreased in recent decades and the rate at the core top (2016) was comparable to the rate in the 1800s.

- There was a **rise in the relative proportion of organic matter in the 1850s**, this may have been due to initial settlement and land clearance in the area. There were no drastic changes in sediment composition in the core in the 1900s or 2000s.

- The diatom community assemblage had one **significant shift between 1905 and 1917**; prior to this time diatoms which are often associated with shallow lakes, and a few that are associated with aquatic plants, were present in significant abundance. This suggested that the lake may have been shallower with more macrophytes prior to the early 1900s.

- Diatom results indicated that the **nutrient levels in Moody Lake increased in the 1960s, shifting the lake into the eutrophic (nutrient-rich) category**. The phosphorus measured in the sediments also showed an increase in the flux of phosphorus to the core site at this time.

- The phosphorus (P) measured in the core showed a sharp spike at the core top (2016), with the majority of the P in readily exchangeable forms (the P is not tightly bound within the sediments). This means that **internal loading of P could be an issue in Moody Lake**; the P continues to cycle back into the water column where it is available to algae, instead of being lost to burial in the sediments.

- Algal pigment analysis showed that types of blue-green algae (cyanobacteria) that have the potential to form toxic blooms have been present since the 1940s.

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A Paleolimnological Study in the Comfort Lake-Forest Lake Watershed District

Deep Sediment Core Fact Sheet

SHIELDS LAKE

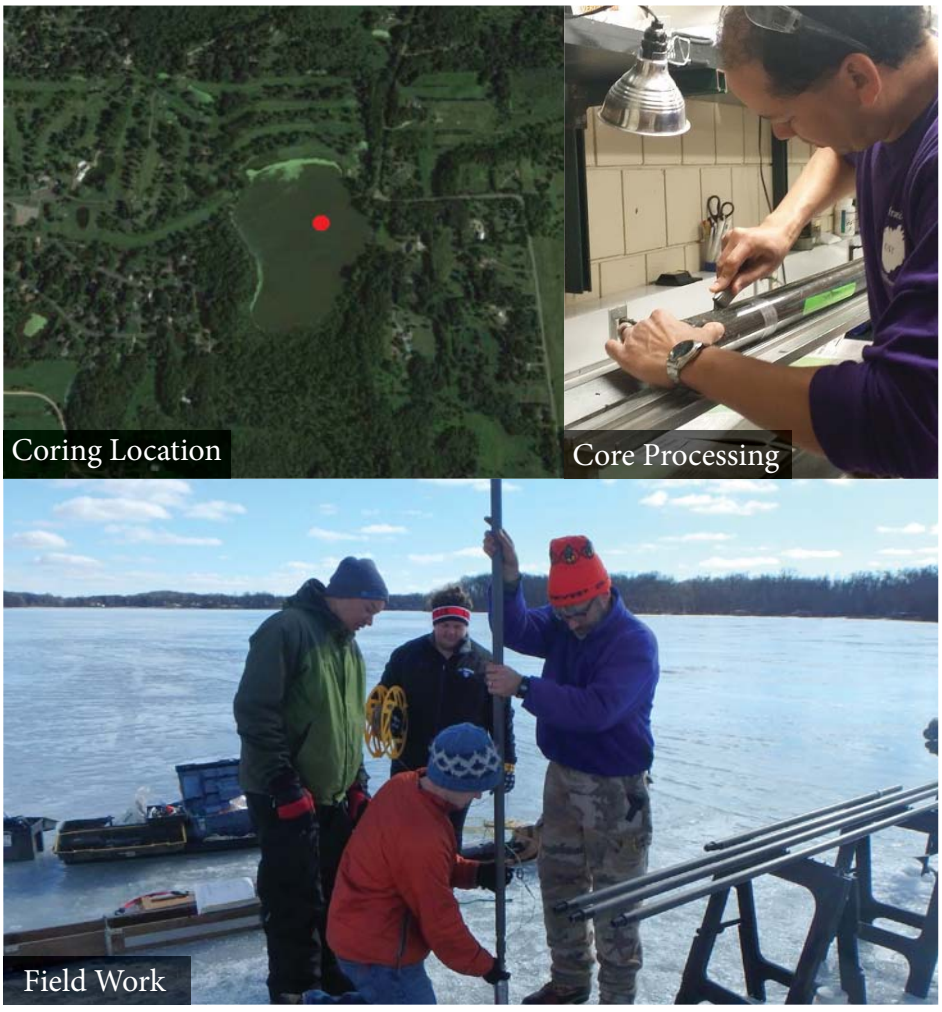
THE PROBLEM:

Shields Lake (pictured left) is impaired due to high nutrient levels. This study used sediments from the lake bottom to tell us about the historical condition of the lake, and when it changed, to help inform lake management decisions.

ANALYSIS:

Lake sediments provide a record of physical, chemical, and biological clues for determining how and when a lake has changed. Scientists (paleolimnologists) work from an anchored boat or the surface of the ice to recover sediment cores. A piston corer uses a clear tube that is lowered to the lake bottom using alloy rods that thread together. The tube is fitted with a piston held in place with a cable; as the tube is pushed into the mud, the piston helps "pull" the sediment into the tube.

Physical, chemical, and biological indicators preserved in the sediment are analyzed to reconstruct the ecological history of the lake. For example, naturally occurring radioisotopes, which decay at a known rate, allow scientists to establish a age-depth relationship for the core; and fossil diatoms (algae that were preserved due to their biologically produced glass cell walls) tell us about historical water quality and ecology.



THE LAKE:

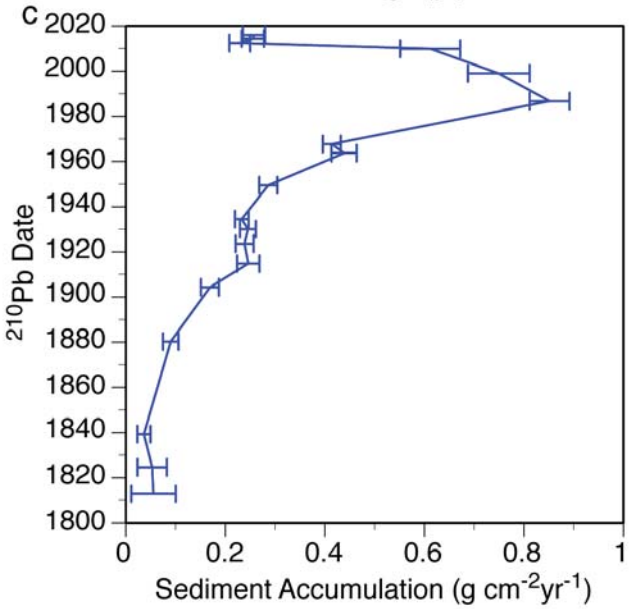
Shields Lake is shallow, with a maximum depth of 7.8 m (26 feet), and surface area of 30 acres. Rooted plants grow in 87% of its area and it is used mainly for fishing. The lake drains 538 acres, mostly from the south; Shields Lake drains to Forest Lake to the north. The lake borders the Forest Hills Golf Club, which began construction in 1958. In 2006, the lake was placed on MN's Impaired Waters List due to high nutrient levels; summer average TP concentrations are near 200 µg/l. In February of 2016, a sediment core was collected through the ice to determine the lake's ecological history.

Deep Sediment Core Fact Sheet

THE CORE:

The image to the right represents a portion of the sediment core recovered from Shields Lake. The top of the image shows sediments that were deposited in recent years, and sediments get older downcore. Naturally-occurring radioisotopes (lead-210) were used to establish a date-depth relationship for the core. Sediments were sectioned into 2-cm increments for analysis.

THE RESULTS:



The sedimentation rate (how fast sediment is accumulating) has changed over time in Shields Lake. **The rate started to increase in the late 1800s and reached a peak in the 1980s.** Even though the sedimentation rate has declined in recent decades, it still remains about five times higher than it was in the 1800s.

- **Shields experienced a large shift in sediment composition,** in the form of an increase in organic material being delivered to the lake, that began in the 1940s and persisted through about 2010 (a similar and synchronous change was found in the sediment core from Comfort Lake). During the post-World War II era, agricultural practices shifted in many areas to include tile drainage, ditching, and increased fertilizer use; the pulse of organic matter from the landscape may have been the result of these practices in the watershed.

- Golf course construction began almost two decades after the large sediment change in Shields Lake. The golf course may have had impacts on Shields Lake, but these **localized impacts were difficult to discern** due to the other large-scale changes in the watershed.

- Results of the diatom analysis suggested that Shields Lake has been **high in nutrients since the early 1900s**.

- An alum treatment on Shields Lake in about 1995 may have had an effect on the sediment phosphorus concentration around that time. However, the effect was small, and there was **no significant change to the diatom community assemblage during that time** (we would expect the diatoms to respond if there was a sustained change in phosphorus concentration).

- Algal pigment analysis showed that types of blue-green algae (cyanobacteria) that have the potential to form toxic blooms first appeared in the late 1930s, at the time of the large influx of organics, and have persisted in Shields Lake since that time.

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2017 Flowering Rush Herbicide Treatment

The CLFLWD, in partnership with other local organizations, plans to treat flowering rush with herbicide following this schedule:

Late July	Survey #1 to determine treatment areas
Early August	Herbicide treatment #1
Mid-August	Flower removal #1 to prevent seed spread
Mid-August	Survey #2 to determine effectiveness and areas for 2nd round treatment
Late August	Herbicide treatment #2
Late August/Sep.	Survey #3 to assess effectiveness of treatments

Maps depicting flowering rush treatment locations, as well as all herbicide safety information, can be found at www.clflwd.org

www.clflwd.org | info@clflwd.org | 651-395-5850

What you need to know:

Flowering rush, an aquatic invasive species found in Forest Lake, will be treated with herbicide this year. This is the second year in a multi-year management plan.

Past Treatment:
In 2014 flowering rush was surveyed covering almost 8 acres across Forest Lake's middle and east basins. In 2015 and 2016 the CLFLWD organized an aggressive approach to management including multiple rounds of herbicide treatment, cutting, and seed removal to prevent further spread. In September 2016, coverage was surveyed at less than a quarter acre. This is a decrease of 97% since the start of the program in 2014. However, some regrowth is expected in 2017.

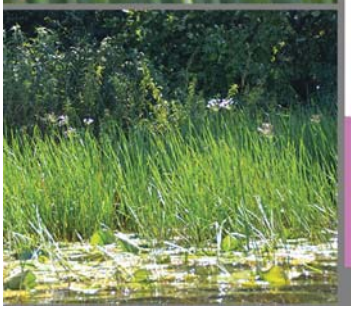
Please try to avoid boating through areas of flowering rush growth, as cutting the plant helps it spread.

Herbicide Information:
Same as in previous years, the herbicide that will be used is called Tribune, with active ingredient Diquat. All safety information can be found at www.clflwd.org. Water use restrictions will be posted around treatment areas immediately following herbicide treatments.

Identification:
Flowering rush plants in Forest Lake are unique for MN in that they can spread in two ways: seeds within the flowers and rhizomes within the roots. The below image depicts the growth stages. Seeds are released in final stage.

Maps depicting flowering rush treatment locations, as well as all herbicide safety information, can be found at www.clflwd.org

www.clflwd.org | info@clflwd.org | 651-395-5850



Flowering Rush Treatment Information

Flowering rush, an aquatic invasive species found in Forest Lake, will be treated with herbicide this year. This is the third year in a multi-year management plan. Here is what you need to know:

Past Treatment:

In 2014 flowering rush was surveyed covering almost 8 acres across Forest Lake's middle and east basins. In 2015 and 2016 the CLFLWD organized an aggressive approach to management including multiple rounds of herbicide treatment, cutting, and seed removal to prevent further spread. In September 2016, coverage was surveyed at less than a quarter acre. This is a decrease of 97% since the start of the program in 2014. However, flowering rush is a resilient plant and some **regrowth is expected in 2017.**

Herbicide Information:

Same as in previous years, the herbicide that will be used is called Tribune, with active ingredient Diquat. All safety information can be found at www.clflwd.org. Water use restrictions will be posted around treatment areas immediately following herbicide treatments.

Please do not cut or pull the plants. Root fragments and seeds can float and spread to other parts of the lake.

For more information visit **www.clflwd.org** or call 651-395-5850

Flowering rush plants in Forest Lake are unique for MN in that they can spread in two ways: seeds within the flowers and rhizomes within the roots.

POSTMASTER RETURN TO:
Comfort Lake-Forest Lake Watershed District
44 Lake Street South, Suite A
Forest Lake, MN 55025

The CLFLWD, in partnership with other local organizations, plans to treat flowering rush with herbicide following this schedule:

Late July	Survey #1 to determine treatment areas
Early August	Herbicide treatment #1
Mid August	Flower removal #1 to prevent seed spread
Mid August	Survey #2 to determine effectiveness and areas for 2nd round treatment
Late August	Herbicide treatment #2
Late August/ Early September	Flower removal #2

COMFORT LAKE -WATERSHED DISTRICT- FOREST LAKE
Protecting Your Water Resources

IT'S NO JOKE:

WHATEVER ENTERS A STORM DRAIN FLOWS DIRECTLY INTO **OUR LOCAL WATERS**!

The storm drain system provides no filters and no treatment! But you can help keep our water clean! Never dump, wash, or rake anything into the path of storm drains!

Brought to you by St. Croix Valley Master Watershed Stewards Program, the Comfort Lake-Forest Lake Watershed District, Rotary Club, Forest Lake Good Samaratons, Forest Lake Lake Association, Forest Lake 4H, Target, & Big Apple Bagel. THANK YOU!

Only Rain in the Drain!

Greetings from your local watershed steward! This fall we are out stenciling storm drains around Forest Lake to help remind people that **our streets connect directly to our wetlands, lakes, and streams!** We love our local waterways and want to have clean water for swimming, fishing, boating, and other activities!

How you can Help!

Don't Dump

Storm drains help prevent flooding, but they also connect directly to nearby lakes and streams! Never dump pet waste, used oil, soapy water, or wash out painting supplies in the street. The chemicals will travel through the drains and end up in lake killing fish and other animals!

Rake & Sweep

Leaves and dirt might be natural, but when too much washes into our water it adds phosphorus that feeds smelly, green algea! When raking in the fall, take a few extra minutes to sweep & rake the leaves and dirt out of the street in front of your home!

Storm Drain Stenciling Thank You Post

ST. CROIX MASTER WATERSHED STEWARDS

COMFORT LAKE - WATERSHED DISTRICT - FOREST LAKE

FOREST LAKE AREA CHAMBER OF COMMERCE

TARGET

Big Apple BAGELS

Kodiak Coffee

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · September 12, 2017

Staff made a discovery in Birch Lake a couple weeks ago that inspired us to start posting for #TriviaTuesday!!

Can you identify the object resting on the bow? Share your guesses in the comments below and check in tomorrow for the answer!

187 people reached — Boost Post

Like · Comment · Share

Kristyn May, Jacqueline Anne Bussjaeger and 3 others — Chronological

Ashley Brundrett A very large pondweed
Like · Reply · Message · 22w

Becky Cermak A root of something?
Like · Reply · Message · 22w

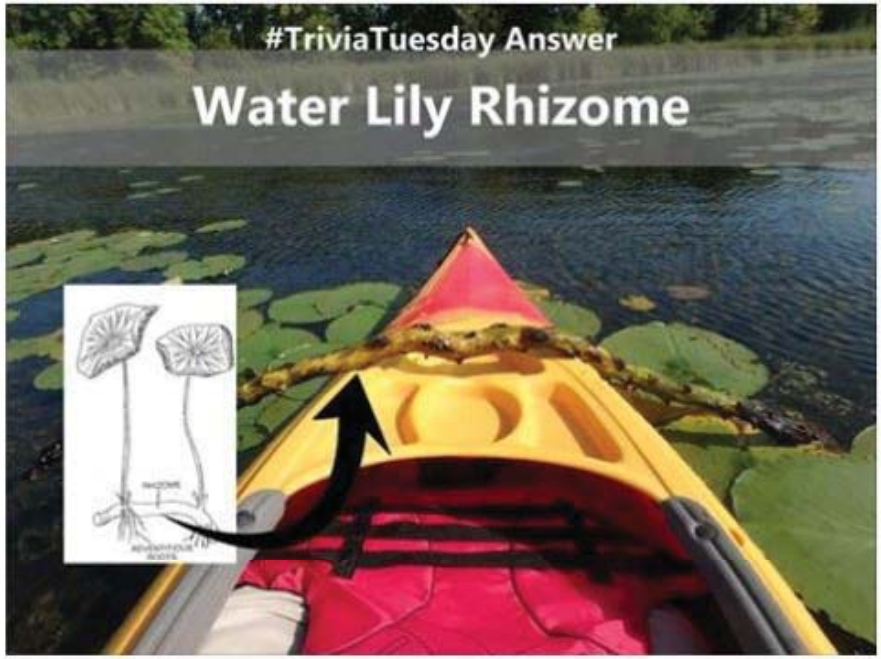
Margie At Allina The root of Eurasian Watermilfoil
Like · Reply · Message · 22w

Comfort Lake Forest Lake Watershed District All great guesses! What you're seeing is actually a water lily rhizome, a modified stem of the plant that sends out both roots and shoots! More info: https://tinyurl.com/y8s54u4w

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · September 13, 2017

#TriviaTuesday Answer! This strange stick-like object is actually a water lily rhizome! Rhizomes are horizontal plant stems that send out both roots and shoots. Though usually buried in the sediment they will occasionally be uprooted and float to the surface. The rhizomes of some water lily species are even edible!



37 people reached — Boost Post

Like · Comment · Share

Becky Cermak and Eduardo Mardones

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · September 19, 2017

This week's #TriviaTuesday image was taken out on Second Lake. Do you know what this strange looking blob is? Share your guesses in the comments below and check in tomorrow for the answer!

127 people reached — Boost Post

Like · Comment · Share

Kathy Schlemmer and Kristyn May — Chronological

Kristyn May Alien egg for sure
Like · Reply · Message · 21w

Kathy Schlemmer Ewww! Have never seen that and hope it's not by me! What is it - I have no clue!
Like · Reply · Message · 21w

Comfort Lake Forest Lake Watershed District This strange, seemingly alien-like blob, is known as a bryozoan colony and is made up of hundreds of microscopic animals joined together!
More info: https://tinyurl.com/yd9p5uq3
Like · Reply · Commented on by Jessica Lindemyer [?] · 21w

Kristyn May Whoa. I was close then.
Like · Reply · Message · 21w

Write a comment...

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · September 20, 2017

#TriviaTuesday answer! This strange gelatinous blob is known as a bryozoan colony and is made up of hundreds of microscopic animals joined together! These tiny animals make jellylike tubes and attach themselves to submerged objects. By connecting their tubes together they can form colonies as large as a volleyball! The animals themselves live in the tubes and extend their tentacles out to capture even smaller microscopic organisms for food!!

Believe it or not these colonies are actually fairly common in Minnesota and are not toxic, venomous, or harmful - Though we won't blame you if they make you a bit squeamish!

Learn More: https://tinyurl.com/ybr9tu4y

52 people reached — Boost Post

Like · Comment · Share

Mike Kinney, Sandi Smith Knutie and Ashley Brundrett

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · September 26, 2017

This week's #TriviaTuesday image was taken out on Lake Keewahtin! Do you know what this is? Share your guesses in the comments below and check in tomorrow for the answer!

227 people reached — Boost Post

Like · Comment · Share

Jackie Jonathan Loose and Sam Hathaway — Chronological

Kristyn May Poseidon's beard?

1

Haha · Reply · Message · 20w

Comfort Lake Forest Lake Watershed District Though this isn't in fact a strange gift from a Greek god, you may find it to be equally bizarre!
https://www.facebook.com/CLFLWD/photos/a.1750288475205308.1073741830.1750274831873339/2041881419379344/?type=3&theater

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · September 27, 2017

#TriviaTuesday Answer! Believe it or not this strange looking plant is actually carnivorous! Bladderworts are native freshwater plants that utilize small vacuum traps to catch tiny aquatic animals. Each one of those dark ovals are equipped with small trigger hairs that lure in unsuspecting prey. These plants have no true root system and can usually be seen in the spring and summer when they send up yellow snapdragon-like flowers!
More info: https://tinyurl.com/y755ktqj

44 people reached — Boost Post

Like · Comment · Share

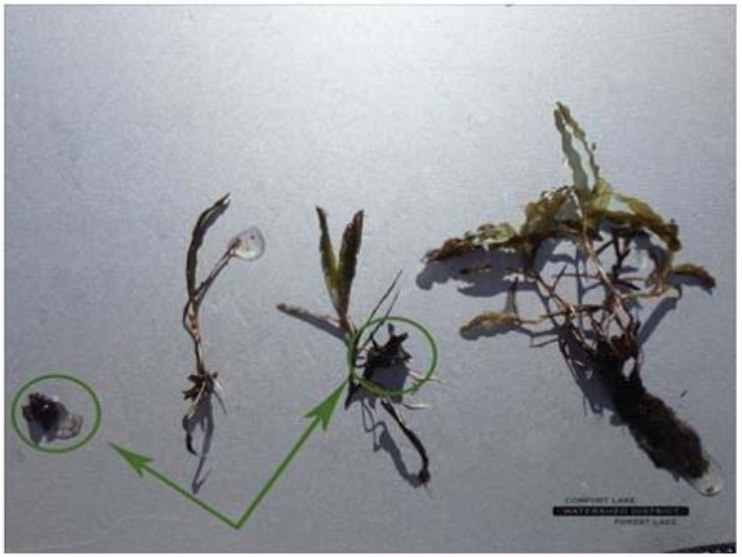
Jarrod Cicha

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 4, 2017 ·

In lieu of #TriviaTuesday this week we've got #WhatIsThatWednesday! (Bonus points to anyone who can identify the objects circled in green) Leave your guesses in the comments and check back tomorrow for the answer!



109 people reached — Boost Post

Like · Comment · Share

Kristyn May and Lynne Grant — Chronological

Kathy Schlemmer wonder if that is a zebra mussel on a piece of broken plastic?
Like · Reply · Message · 19w

Kristyn May Root boot
Like · Reply · Message · 19w

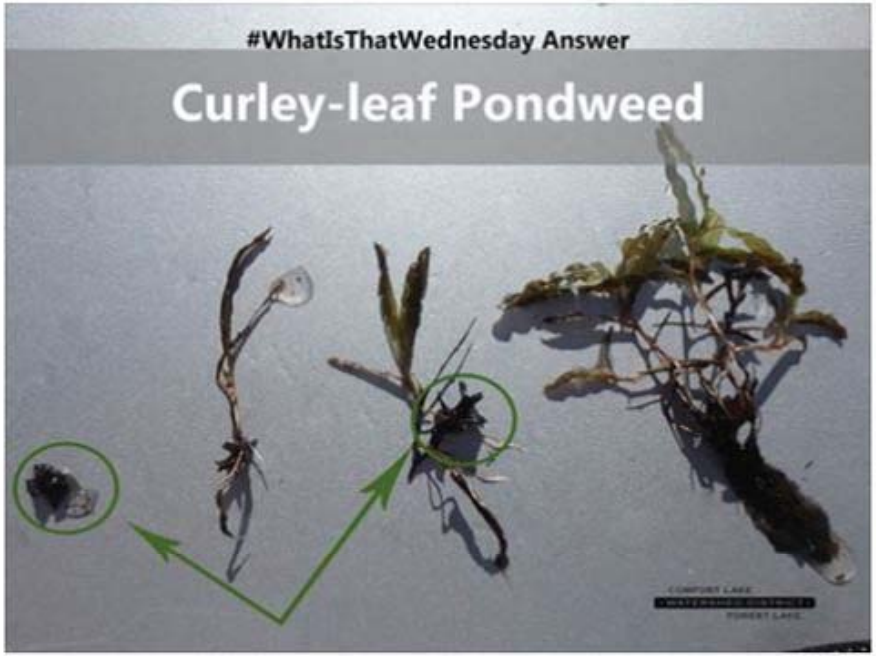
Comfort Lake Forest Lake Watershed District Both great guesses! Check out the answer here: https://tinyurl.com/yd7wuox5
Like · Reply · Commented on by Jessica Lindemyer [?] · 19w

Kristyn May LOL, one great guess, unless root boot is actually a thing... but thanks!
1
Like · Reply · Message · 19w

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 5, 2017 ·

The answer to this week's #WhatIsThatWednesday is curly-leaf pondweed! This #invasive aquatic plant grows in very dense stands and is often the first pondweed to come up in the spring. The circled objects are buds called "turions". An individual plant can produce hundreds of these buds, each of which is capable of producing a new plant - Yikes! More info: https://tinyurl.com/yco5wpkp



44 people reached — Boost Post

Like · Comment · Share

Kristyn May, Kathy Schlemmer and Eduardo Mardones

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 10, 2017 ·

For this week's #TriviaTuesday we've got a plant that was originally sold for use in garden pools but is now illegal to buy, sell or possess - can you guess what it is?

65 people reached — Boost Post

Like · Comment · Share

Mike Kinney — Chronological

Kathy Schlemmer Is that Flowering Rush?
1
Like · Reply · Message · 18w

Comfort Lake Forest Lake Watershed District Kudos Kathy, you're correct! This image is focused on one of the plant's dried seed pods, luckily we were able to cut it before the seeds were released
Like · Reply · Commented on by Jessica Lindemyer [?] · 18w

Write a comment...

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 11, 2017 ·

This week's #TriviaTuesday answer is flowering rush! When not flowering this invasive plant closely resembles many native shoreland plants, such as common bulrush. The vast majority of flowering rush populations reproduce through root fragmentation. However, the flowering rush in Forest Lake is the only population in MN known to be capable of also reproducing via seeds.

Learn more about our efforts to control flowering rush here: https://tinyurl.com/y7f92gux

29 people reached — Boost Post

Like · Comment · Share

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 17, 2017 ·

#TriviaTuesday! This contraption is out at Bone Lake, do you know what it is or what it does? Hint: There is one at both the inlet and the outlet.

123 people reached — Boost Post

Like · Comment · Share

Jackie Jonathan Loose and Mike Kinney — Chronological

Janna Zuleger Peckman Carp barrier!
1
Like · Reply · Message · 17w

Mike Kinney Someone beat me to the answer!!
Like · Reply · Message · 17w

Write a comment...

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 18, 2017 ·

This week's #TriviaTuesday answer is a two-for-one special! The structure you see in the photo serves two main purposes 1) prevent passage of undesired fish species and 2) regulation of water level!

The most visible portion of the structure, that looks like a cage, provides a physical barrier against undesirable fish such as invasive carp. What you can't see are the heavy steel stop-logs stacked within the structure that allow staff to alter water flow through the structure! These logs can be added or removed as needed.

54 people reached — Boost Post

Like · Comment · Share

Sam Hathaway, Ashley Brundrett and Eduardo Mardones

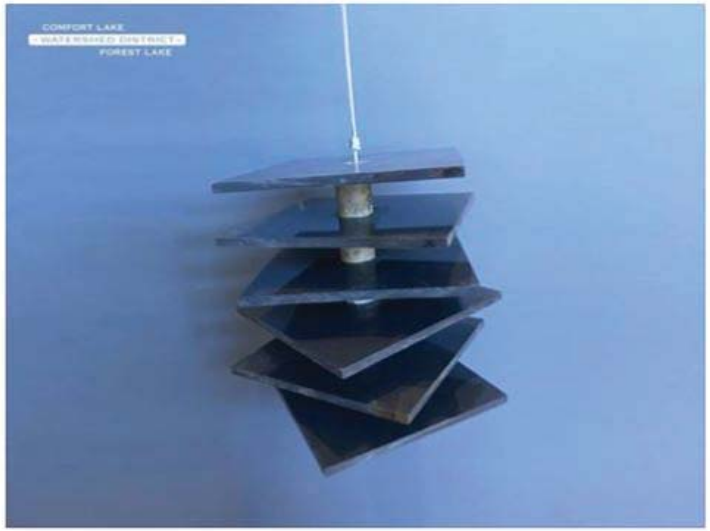
Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 24, 2017 ·

#TriviaTuesday kudos to anyone who can identify what this is! Hint: It spends most of the summer submerged below the water's surface!



129 people reached — Boost Post

Like · Comment · Share

Chronological

Kristyn May That's where the zebra mussels chill.
1
Like · Reply · Message · 16w

Kathy Schlemmer Yeah, what Kristyn said. Wish it would stay that way 😔
Like · Reply · Message · 16w

Eduardo Mardones Sample plates!
Like · Reply · Message · 16w

David Dale Palme Settlement Sampler or Plate Sampler. Used as a quantitative sampling method for colonizing aquatic invertebrates and aquatic insects. Commonly used to monitor for zebra mussels.
Like · Reply · Message · 16w

Comfort Lake Forest Lake Watershed District Clearly you all know your zebra mussels - well done!
Like · Reply · Commented on by Jessica Lindemyer [?] · 16w

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · October 25, 2017 ·

As many of you know, the subject of this week's #TriviaTuesday is a zebra mussel sampler plate! These plates help us monitor lakes for new infestations and keep track of population growth in waters that are already infested.

Plates are put out in the spring and removed in the fall. Any mussels attached to the plate at the end of the season are scraped off and counted by staff - a fairly tedious task for the plates recovered from Forest Lake as the population continues to grow.

47 people reached — Boost Post

Like · Comment · Share

Mike Kinney, Ashley Brundrett and Kathy Schlemmer

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District

Like Page

Published by Jessica Lindemyer [?] · November 7, 2017 ·

#TriviaTuesday Can you identify this plant from just its close-up? Hint: It's a native perennial that typically grows up to 2ft tall and is favorite of bees and butterflies!

53 people reached

Boost Post

Like Comment Share

Comfort Lake Forest Lake Watershed District

Like Page

Published by Jessica Lindemyer [?] · November 8, 2017 ·

#TriviaTuesday answer: Purple Coneflower! If you've been around our page long enough you've likely seen many posts about this photogenic flower!!

If you'd like some in your yard feel free to stop by and clip some seed heads - we've got plenty to go around! Learn more about this native here: https://tinyurl.com/ydd59qg

50 people reached

Boost Post

Like Comment Share

Sue Sorensen, Prior Lake - Spring Lake Watershed District and 2 others

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ Like Page ···

Published by Jessica Lindemyer [?] · November 14, 2017 ·

#TriviaTuesday There are several lakes in the District that we know very little about. This lake near Scandia is one of them...do you know which one it is?

95 people reached **Boost Post**

Like Comment Share

Mike Kinney, Eduardo Mardones and Greg Seitz Chronological

Eric Langness Sea Lake on the northern edge of the city.
Like · Reply · Message · 13w

Write a comment...

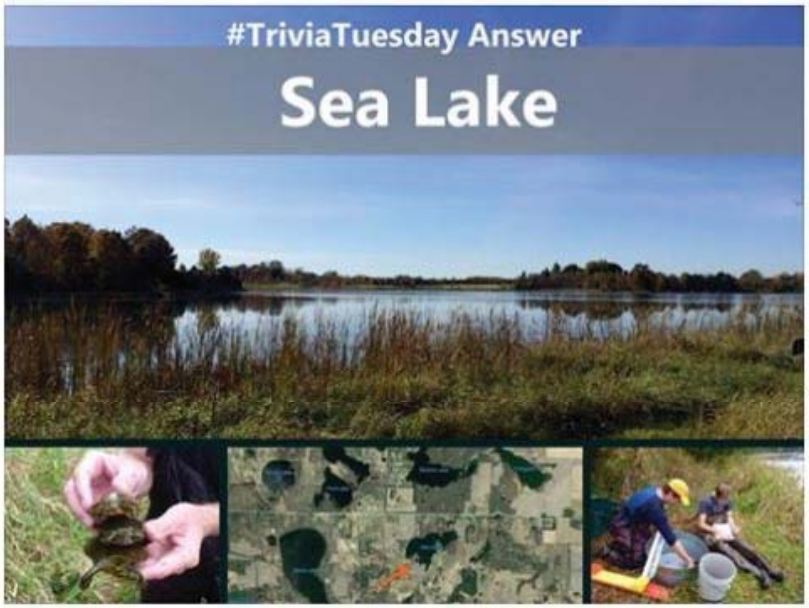
Comfort Lake Forest Lake Watershed District ✓ Like Page ···

Published by Jessica Lindemyer [?] · November 15, 2017 ·

#TriviaTuesday Answer! Though little is known about Sea Lake right now, staff will be conducting a sonar survey within the next year to learn more about it!

In the mean time, here is what we do know about the lake! Shout out to Blue Water Science for the survey work!

Fish Survey: https://tinyurl.com/ydax4n5g
Plant Survey: https://tinyurl.com/y7bstfnm
Sediment Survey: https://tinyurl.com/y8aaulg8



46 people reached **Boost Post**

Like Comment Share

Mike Kinney, Kristyn May and Prior Lake - Spring Lake Watershed District

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · November 21, 2017 ·

It's #TriviaTuesday! This aerial of Moody Lake during the winter shows a peculiar site - a big hole in the ice! Do you know what caused it? 🤔
Leave your best guess in the comments below and check back tomorrow for the answer!

86 people reached — Boost Post

Like · Comment · Share

Mike Kinney, Jackie Jonathan Loose and Sam Hathaway — Chronological

Margie At Allina The aerator?
1
Like · Reply · Message · 12w

Comfort Lake Forest Lake Watershed District You're exactly right Margie - The aerator causes the water to circulate opening up a big hole in the ice!
Like · Reply · Commented on by Jessica Lindemyer [?] · 12w

Meganjune Fleming Underground and spring fed. Moving water under there continuously.
Like · Reply · Message · 12w

Meganjune Fleming Also not safe for animals over there.
South comfort never freezes near the river. Keep an eye on your dogs!
Like · Reply · Message · 12w

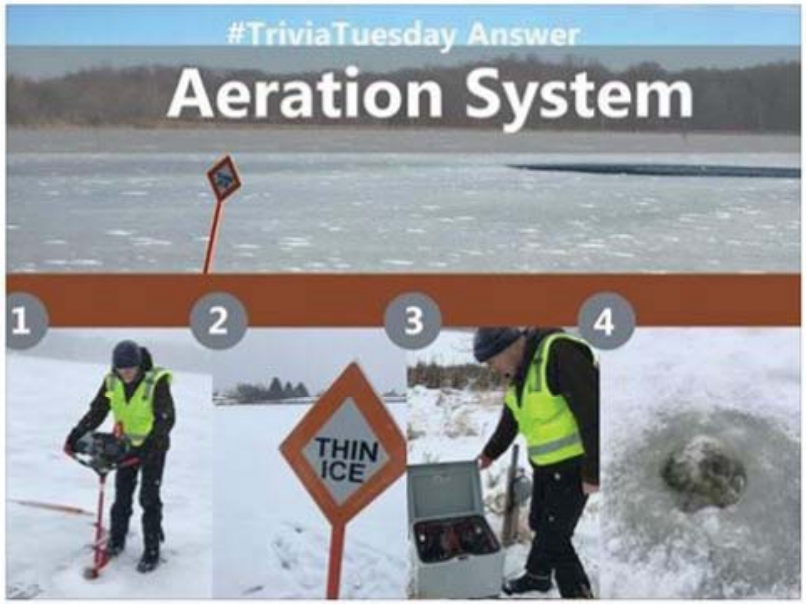
Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · November 22, 2017 ·

If you guessed "Aeration System for Rough Fish Management" as the answer to this week's #TriviaTuesday you're correct!

The aeration system in Moody Lake works much like an air stone in an aquarium! Air is pumped through a hose down to a diffuser on the lakebed where the air is then released. This process infuses the water with oxygen helping to keep desirable fish species like sunfish alive so that they can compete with rough fish like bullheads!

Learn more about aeration on Moody Lake: https://tinyurl.com/y7tqkjzg



39 people reached — Boost Post

Like · Comment · Share

Mike Kinney and Eduardo Mardones

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · November 28, 2017 ·

It's #TriviaTuesday! Any guesses on what this device is used for? Hint: We deploy two of them each spring and retrieve them in the fall. Check back tomorrow for the answer!

69 people reached — Boost Post

Like · Comment · Share

3 · Chronological

Jon Spence I know, I know 🙂. But I am probably disqualified from answering so I will just pass on answering!
😆 1
Haha · Reply · Message · 11w

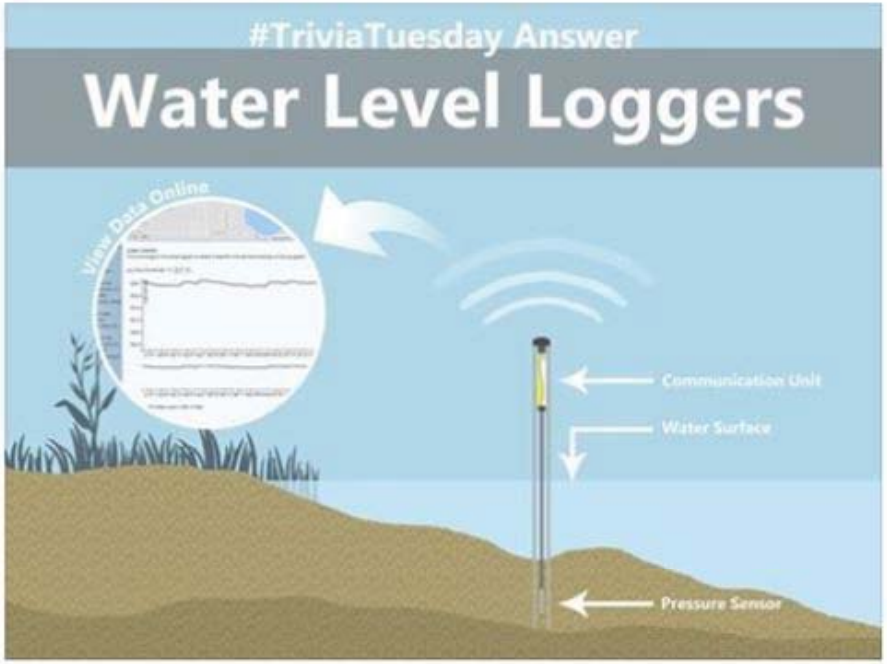
Prior Lake - Spring Lake Watershed District We just brought a couple of ours back in this week!
Like · Reply · Message · 11w

Write a comment...

Comfort Lake Forest Lake Watershed District ✓ — Like Page

Published by Jessica Lindemyer [?] · November 29, 2017 ·

#TriviaTuesday Answer! The District currently owns two water level loggers that are deployed on Comfort Lake and Bone Lake each spring. These valuable devices are able to monitor the water level in real-time and update our website 4x a day! Check it out: https://tinyurl.com/y9um39hd (Comfort) https://tinyurl.com/ydfjmrzl (Bone)



32 people reached — Boost Post

Like · Comment · Share

Eduardo Mardones

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ Like Page ···

Published by Jessica Lindemyer [?] · December 5, 2017 ·

While cleaning out the storage room staff made an interesting discovery perfect for #TriviaTuesday! Do you know what lurks inside these sample jars? Put your best guess in the comments and check back for the answer tomorrow!

33 people reached Boost Post

Like Comment Share

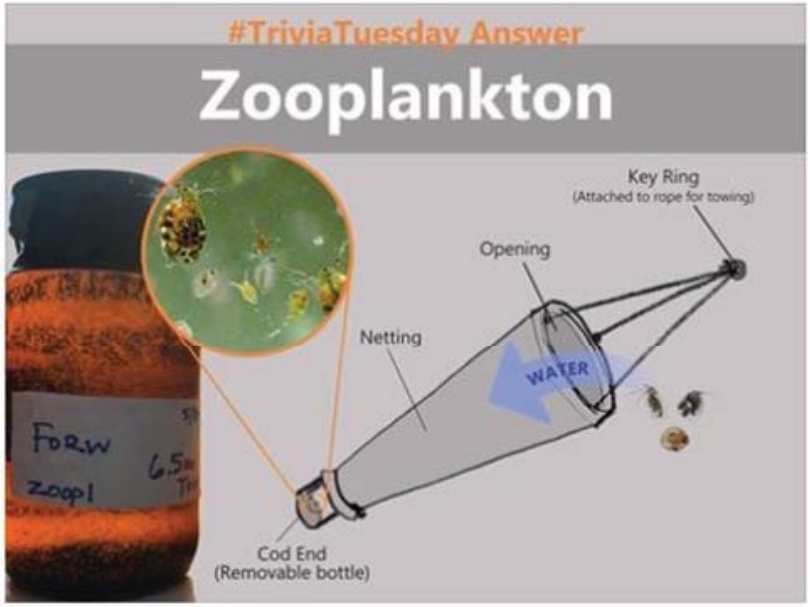
Write a comment...

Comfort Lake Forest Lake Watershed District ✓ Like Page ···

Published by Jessica Lindemyer [?] · December 6, 2017 ·

Believe it or not these eerie sample jars are full of preserved organisms! Specifically #microorganisms known as Zooplankton! These little guys are an important element of the aquatic food chain and are highly sensitive to changes in aquatic #ecosystems which makes them good indicators of water quality!

Water samples are collected from varying depths using specialized equipment known as a plankton net. This net, pictured below, uses a fine nylon mesh to collect the microorganisms. When the net is hauled to the surface the zooplankton accumulate in the "codend", a removable container that can be emptied into a jar for storage and late analysis.



35 people reached Boost Post

Like Comment Share

Write a comment...

Trivia Facebook Post

Comfort Lake Forest Lake Watershed District ✓ Like Page ···

Published by Jessica Lindemyer [?] · December 19, 2017 ·

It's #TriviaTuesday time! Do you know which lake in the District is the deepest? Hint: We're not talking about the average depth, but rather the lake with the deepest single point!

140 people reached **Boost Post**

Like Comment Share

Chronological

Kristyn May Comfort?
Like · Reply · Message · 8w

Comfort Lake Forest Lake Watershed District Good guess, you're just a "little" off 😉
Like · Reply · Commented on by Jessica Lindemyer [?] · 8w

View more replies

Margie At Allina Little Comfort?
2
Like · Reply · Message · 8w

Meganjune Fleming South comfort?
1
Like · Reply · Message · 8w

Comfort Lake Forest Lake Watershed District ···

Published by Jessica Lindemyer [?] · December 20, 2017 ·

Little Comfort is the star of this week's #TriviaTuesday! With a max depth of 56 feet Little Comfort holds the title of deepest lake in the District! Moody Lake (48'), Comfort Lake (47'), Forest Lake (37'), and Lake Keewahtin (34') just can't compete!

Learn more about Little Comfort Lake:
CLFLWD: https://tinyurl.com/y9xs8atj
DNR: https://tinyurl.com/yc64gpnh

38 people reached **Boost Post**

Like Comment Share

Mike Kinney and Eduardo Mardones

Write a comment...

Appendix B - EMWREP (East Metro Water Resources Education Program) Submitted to Local Newspapers

Appendix B: NEWSPAPER ARTICLES SUBMITTED IN 2017

Date	Article Title	Chisago Press	Forest Lake Lowdown	Forest Lake Times	Hugo Citizen	Oakdale-Lake Elmo Review	Ramsey County Review	Scandia Country Messenger	South Washington County Bulletin	St. Croix 360	St. Croix Lowdown	Stillwater Gazette	Valley Life	White Bear Press	Woodbury Bulletin
10-Jul	All that glitters and is gold			x		x		x	x				x	x	x
11-Apr	Rethinking the traditional lawn	x		x		x	x	x	x				x		x
3-Jan	2017 brings more than $2 million in Clean Water Funds to Washington County			x		x		x	x				x		x
2-Nov	Elected board at Washington Conservation District provides leadership behind the scenes					x		x	x				x		x
7-Feb	Whisper of spring			x		x	x		x				x		x
17-Jan	The changing face of outdoor recreation and environmental protection					x	x		x				x		x
14-Feb	Measuring stream health				x	x			x				x		x
9-Oct	Adapting to a changing climate					x			x				x		x
28-Feb	State of the Mississippi River			x					x				x		x
14-Nov	Cole Williams becomes a river steward								x				x		x
14-Mar	Water conservation												x		x
17-Apr	Rain barrels herald spring												x		x
13-Apr	MASWCD Day at the Capitol					x						x			x
5-Sep	Brown's Creek Watershed District 20th Anniversary Celebration & Fall Open Yards Event				x						x	x	x	x	
25-Apr	Earth Day clean-up event in Grant												x	x	
9-May	MN Water - Let's keep it clean	x		x		x	x	x					x		
12-Sep	Community water meetings			x		x		x					x		

20-Mar	Turning trash into treasure			x	x			x					x		
25-Jul	Creating a legacy of landscape restoration in Washington County			x	x			x					x		
24-Jan	Moody Lake wetland rehabilitation	x		x				x					x		
7-Mar	Community supported agriculture			x				x					x		
28-Mar	Spring landscaping workshops			x				x					x		
28-Nov	Water Quality Certification Program helps to nudge Minnesota farmers in a new direction			x				x					x		
8-Aug	Tracing lazy circles in the sand							x					x		
17-Oct	Nature based education							x					x		
1-May	Turf and lakes in Forest Lake	x		x		x							x		
15-May	Watch for AIS during 2017 fishing season			x		x							x		
27-Jun	Using geology to read the past			x		x							x		
1-Aug	Reflecting on 75 years of Conservation in Washington County			x		x							x		
18-Oct	Lake Elmo area flood prevention project					x							x		
18-Dec	Aquatic Invasives – The Battle Continues					x							x		
31-Jan	Swimming to Antarctica			x									x		
17-Aug	After the storm			x									x		
28-Sep	Street sweeping for cleaner lakes			x									x		
26-Oct	Caring for wetlands and lakes			x									x		
21-Feb	Change underway at Cottage Grove Ravine Park												x		
4-Apr	Migrating birds and habitat												x		
23-May	celebrate summer with upcoming events												x		

30-May	**Incentive grants for raingardens and shoreline plantings**												**x**		
19-Jun	**The long and winding road**												**x**		
4-Jul	**Clean the Croix**												**x**		
18-Jul	**Exploring the smaller side of nature**												**x**		
16-Aug	**Turtle tunnel provides a rare glimpse into the secret lives of wildlife**												**x**		
29-Aug	**Protecting pollinators**												**x**		
19-Sep	**Grey Cloud Bridge**												**x**		
26-Sep	**Schaffer Family conservation**												**x**		
20-Nov	**Winter weather ahead**												**x**		
5-Dec	**Pausing**												**x**		
23-Jun	***Special pollinator insert**		**x**								**x**				
23-Jun	**Maintaining your new native planting**		**x**								**x**				
9-Jan	**Finding light in the darkness**									**x**					

Appendix C - Grant Summary Sheet (FY 2010-2018)

2018 ESTIMATED Grants					
Agency	**Program**	**Description**	**Lake**	**Est. Match Amount**	**Est. Total Grant Award**
BWSR	CWF - Projects & Practices	Moody Lake Alum Treatment	Moody Lake	$ 100,000	$ 135,000
BWSR	CWF - Projects & Practices	Bone Lake SWA Implementation (Ag. BMPs)	Bone Lake	$ -	$ -
BWSR	CWF - Projects & Practices	Sunrise River Tax Forfeit Project	Comfort Lake	$ -	$ -
Wash. Co.	AIS Prevention Aid Grant	Watercraft Inspections	Forest & Bone	$ 31,000	$ 16,500
Wash. Co.	AIS Prevention Aid Grant	Flowering Rush	Forest Lake	$ 8,950	$ 8,000
ESRI	Conservation GIS Program	GIS software purchase for office (1-yr licenses)	District-Wide	$ 1,200	(~$11K discount)
DNR**	AIS Control Projects	CLP, EWM, FR Treatment	Forest Lake	N/A	N/A
DNR**	AIS Control Projects	CLP, EWM Treatment	Bone Lake	N/A	N/A
DNR**	AIS Control Projects	CLP, EWM Treatment	Comfort Lake	N/A	N/A
SCMWS	St. Croix Master Watershed Steward	Lakes Area Television educational special	District-Wide	$ -	$ -
SCMWS	St. Croix Master Watershed Steward	Standard project signage initiative	District-Wide	$ -	$ -
PCA	Section 319 Small Watersheds Focus	TBD	TBD	TBD	TBD
McKnight Found	TBD	TBD	TBD	TBD	TBD
LCCMR	Environment & Nat. Res. Trust Fund	TBD	TBD	$ 100,000	$ 500,000
DNR	Conservation Partners Legacy (CPL)	TBD	TBD	TBD	TBD
			2018 Grant Total	**$ 241,150**	**$ 659,500**

*DNR AIS Grant Program will not be offered in 2018

2018 ESTIMATED Other Income (Donations, Permit Revenue, Loans etc.)					
Agency	**Program**	**Description**	**Lake**		**Est. Award/Total Contribution**
City of FL	AIS Mgmt on Forest Lake	Flowering rush, curlyleaf pondweed	Forest Lake	$ -	$ 16,000
City of FL	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake	$ -	$ 14,000
FLLA	AIS Mgmt on Forest Lake	Flowering rush	Forest Lake	$ -	$ 2,500
FLLA	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake	$ -	$ 2,500
CLA	Watercraft Inspections	Boat launch inspections for Comfort Lake	Comfort Lake	$ -	$ 2,000
Chisago Co.	AIS Prevention Aid: Watercraft Inspect	Boat launch inspections for Comfort Lake	Comfort Lake	$ -	$ 5,000
BLA	Watercraft Inspections	Boat launch inspections for Bone Lake	Bone Lake	$ -	$ 2,000
Permittees	Permitting	Permit Deposits	District-Wide	$ -	$ 70,000
PCA	Clean Water Partnership Loan	CLFLWD Adaptive Management Project Implementation	District-Wide		$ 1,500,000
			2018 Other Income Total	**$ -**	**$ 1,863,500**

2018 ESTIMATED Other Agency Grants (District would support, but not manage funds directly)					
Applying Organization	**Agency - Program**	**Description**	**Lake**	**Est. CLFLWD Match Contribution**	**Actual Award**
City of FL	BWSR - Clean Water Fund	Street Sweeper Purchase	Forest Lake	$ 19,415	$ 220,000
LSC 1W1P LGUs	BWSR - Clean Water Fund	Lower St. Croix One Watershed-One Plan Planning	District-Wide	N/A	$ 185,000

2018 Combined Totals (excludes other agency grants)	**$ 241,150**	**$ 2,523,000**

2017 Grants					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Total Grant Award**
BWSR	CWF - Projects & Practices	Shields Lake SW Harvest, Irrigation Reuse & Alum Treat.	Shields Lake	$ 206,000	$ 824,000
BWSR	CWF - Accelerated Implementation	Forest Lake Enhanced Street Sweeping Plan	Forest Lake	$ 9,000	$ 36,000
BWSR	CWF - Projects & Practices	Forest Lake South BMPs (SEH projects)	Forest Lake	$ 26,487	$ -
BWSR	CWF - Projects & Practices	Bone Lake Partially Drained Wetland Restorations	Bone Lake	$ 22,000	$ 88,000
BWSR	CWF - Accelerated Implementation	Forest Lake Priority Subcatchment Implement. Planning	Forest Lake	$ 36,000	$ -
Wash. Co.	AIS Prevention RFP	Watercraft Inspections	Forest Lake	$ 36,000	$ 17,000
Wash. Co.	AIS Prevention RFP	Flowering Rush	Forest Lake	$ 10,300	$ 9,000
Wash. Co.	AIS Prevention RFP	Clean, Drain, Dry, Dispose (CD3) Station	Forest Lake	$ -	$ -
Wash. Co.	AIS Prevention RFP	AIS Identification Workshop	District-Wide	$ -	$ -
DNR	Conservation Partners Legacy (CPL)	Shields Lake fish barrier retrofits	Shields Lake	$ 8,000	$ 30,600
DNR	AIS Control Projects	Curly-leaf pondweed treatment	Forest Lake	$ -	$ 4,999
DNR	AIS Control Projects	Eurasian watermilfoil treatment	Forest Lake	$ -	$ 900

DNR	AIS Control Projects	Flowering rush treatment	Forest Lake	$ -	$ 1,200
DNR	AIS Control Projects	Curly-leaf pondweed treatment	Bone Lake	$ -	$ 200
DNR	AIS Control Projects	Eurasian watermilfoil treatment	Bone Lake	$ -	$ 50
DNR	AIS Control Projects	Curly-leaf pondweed treatment	Comfort Lake	$ -	$ 50
DNR	AIS Control Projects	Eurasian watermilfoil treatment	Comfort Lake	$ -	$ 375
			2017 Grant Total	**$ 353,787**	**$ 1,012,374**

2017 Other Income (Donations, Permit Revenue etc.)					
Agency	**Program**	**Description**	**Lake**		**Est. Total Contribution**
City of FL	AIS Mgmt on Forest Lake	Flowering rush, curlyleaf pondweed, Eurasian watermilfoil	Forest Lake		$ 35,366
City of FL	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake		$ 16,000
FLLA	AIS Mgmt on Forest Lake	Flowering rush, Eurasian watermilfoil	Forest Lake		$ 5,500
FLLA	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake		$ 4,000
Chisago Co.	Watercraft Inspections	Boat launch inspections for Comfort Lake	Comfort Lake		$ 5,000
CLA	Watercraft Inspections	Permit Deposits	Comfort Lake		$ 2,000
Permittees	Permitting	Permit Deposits	District-Wide		$ 55,000
Permittees	Permitting	Stormwater Impact Fund	District-Wide		$ 95,376
			2017 Other Income Total		**$ 459,242**

			2017 Combined Totals	**$ 353,787**	**$ 1,471,616**

2016 CLFLWD Grants & Other Income					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Total Grant Award**
BWSR	Clean Water Fund (CWF)	Forest Lake Wetland Treatment Basin Implementation	Forest Lake	$ 40,500	$ 162,000
BWSR	Clean Water Fund (CWF)	Moody Lake Wetland Rehabilitation	Moody Lake	$ 107,321	$ 429,284
BWSR	Clean Water Fund (CWF)	Bone Lake Conservation Practices and Infiltration Basin	Bone Lake	$ 138,047	$ -
BWSR	Clean Water Fund (CWF)	Drained Wetland Inventory Project	District-Wide	$ 10,000	$ -
Washington Cou	AIS Prevention RFP	Watercraft Inspections	Forest Lake	$ -	$ 24,000
Washington Cou	AIS Prevention RFP	Flowering Rush	Forest Lake	$ -	$ 17,500
Washington Cou	AIS Prevention RFP	Boat Launch Improvements	Forest Lake	$ -	$ 1,500
DNR	AIS Control Projects	CLP, FR & EWM Treatment	Forest Lake	$ -	$ 4,999
DNR	AIS Control Projects	CLP & EWM Treatment	Comfort Lake	$ -	$ 500
DNR	AIS Control Projects	CLP & EWM Treatment	Bone Lake	$ -	$ 1,200
DNR	Watercraft Inspections by DNR staff	Watercraft Inspections	Forest, Bone, Com	$ -	$ -
EPA, PCA	CWA Section 319	Moody Lake Wetland Rehabilitation	Moody Lake	$ 210,000	$ 78,028
			2016 Grant Total	**$ 505,868**	**$ 719,011**

2016 Other Income (Donations, Permit Revenue etc.)					
Agency	**Program**	**Description**	**Lake**		**Total Contribution**
City of Forest La	AIS Mgmt on Forest Lake	Flowering rush, curlyleaf pondweed, Eurasian watermilfoil	Forest Lake		$ 39,900
City of Forest La	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake		$ 13,100
FLLA	AIS Mgmt on Forest Lake	Flowering rush, Eurasian watermilfoil	Forest Lake		$ 3,000
FLLA	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake		$ 365
Chisago County	Watercraft Inspections	Boat launch inspections for Comfort Lake	Comfort Lake		$ 4,425
Permittees	Permitting	Permit Deposits	District-Wide		$ 62,880
			2016 Other Income Total		**$ 123,670**

			2016 Combined Totals	**$ 505,868**	**$ 842,681**

2016 Co-Sponsored Grants					
Agency	**Program**	**Description**	**Project Partners**	**Grant Request**	**Match Amount**
St. Croix River Association	Clean Water Act 319; MN Portion of St. Croix River Watershed	Native Prairie Establishment for Water Quality	WCD	$ 50,000	
LCCMR	Environmental and Natural Resources Trust Fund	Preventing the Spread of AIS with Decontamination Units	Washington Co, WCD, DNR	$ 455,000	
			2016 Co-Sponsored Total	**$ 505,000**	**$ -**

2015 Grants & Other Income					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Grant Award/ Contrib.**
DNR	Public Awareness Projects	Boat launch give-aways	District-Wide	$ 543.00	$ 543.00
DNR	AIS Control Projects	CLP & FR Treatment	Forest Lake		$ 12,100.00
DNR	Watercraft Inspections Administered b	Watercraft Inspections	Forest Lake		$ 4,000.00
DNR	Conservation Partners Legacy Grant Pr	Fish Barrier Retrofits	Bone Lake		$ 20,027.00
PCA	Clean Water Partnership (CWP)	FL Diagnostic Study	Forest Lake	$ 52,500.00	$ 52,500.00
Washington Co.	AIS Prevention RFP	Watercraft Inspections	Forest Lake		$ 29,000.00
Washington Co.	AIS Prevention RFP	Flowering Rush	Forest Lake		$ 39,000.00
City of FL	AIS Mgmt on Forest Lake	Flowering rush, curlyleaf pondweed	Forest Lake		$ 46,000
City of FL	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake		$ 15,000
FLLA	AIS Mgmt on Forest Lake	Flowering rush, curlyleaf pondweed	Forest Lake		$ 8,500
FLLA	Watercraft Inspections	Boat launch inspections for Forest Lake	Forest Lake		$ 7,500
Chisago Co.	Watercraft Inspections	Boat launch inspections for Comfort Lake	Comfort Lake		$ 5,000
			2015 Total	**$ 53,043**	**$ 239,170**

2014 Grants					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Total Grant Award**
BWSR	Clean Water Fund	Bixby Park WQ Improvement Project	Comfort Lake		$ 360,750
DNR	AIS Control Projects	CLP & FR Treatment	Forest Lake		$ 16,500
DNR	Watercraft Inspections Administered b	Watercraft Inspections	Bone, Comfort, Forest		$ 4,000
			2014 Total	**$ -**	**$ 381,250**

2013 Grants					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Total Grant Award**
PCA	Clean Water Partnership	Hilo Lane SW Retrofit Project	Forest Lake	$ 94,250	$ 41,615
PCA	Clean Water Partnership	Forest Lake North Subwatershed Assessment	Forest Lake	$ 12,378	$ 12,000
			2013 Total	**$ 106,628**	**$ 53,615**

2012 Grants					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Total Grant Award**
BWSR	Accelerated Implementation Grant	Tools for Targeting Drained Wetlands		$ 30,400	$ 30,200
BWSR	Clean Water Assistance	Greening the Big Box and Streets (Target Retrofits)		$ 70,419	$ 246,466
			2012 Total	**$ 100,819**	**$ 276,666**

2011 Grants					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Total Grant Award**
DNR	Conservation Partners Legacy	Bone Lake Fish Barriers	Bone Lake		$ 283,000
			2011 Total	**$ -**	**$ 283,000**

2010 Grants					
Agency	**Program**	**Description**	**Lake**	**Match Amount**	**Total Grant Award**
BWSR	Clean Water Fund	Feedlot Water Quality			$ 73,000
				$ -	**$ 73,000**

Appendix D - Clean Water Fund Grant Award Comparison (FY 2014-2018)

(grant program from 2008 MN constitutional amendment)

Rank	Organization	Total Projects and Practices Grants Awarded (FY 2014-2018)
1	Becker SWCD	$2,012,306
2	**Comfort Lake-Forest Lake WD**	**$1,999,034**
3	Benton SWCD	$1,830,750
4	Anoka Conservation District	$1,589,325
5	Lower Mississippi River WMO	$1,472,000
6	Shingle Creek WMC	$1,192,040
7	Vermillion River JPB	$1,145,450
8	Pope SWCD	$1,126,300
9	Minnehaha Creek WD	$1,115,520
10	**City of Forest Lake***	**$1,107,000**
11	Pomme de Terre River Association	$1,093,549
12	Chisago SWCD	$1,047,500
13	Scott SWCD	$1,000,319
14	Stearns SWCD	$900,437
15	Rice Creek WD	$817,500
16	Fillmore SWCD	$804,385
17	Bassett Creek WMC	$800,000
18	Capitol Region WD	$735,000
19	Dakota SWCD	$700,000
20	City of St. Paul	$695,000
21	Wilkin SWCD	$686,000
22	Crow Wing SWCD	$680,000
23	East Polk SWCD	$618,680
24	Cedar River WD	$598,000
25	Carlton SWCD	$592,394
26	Brown's Creek WD	$567,850
27	Red Lake SWCD	$537,763
28	Ramsey Washington Metro WD	$500,000
29	Middle St. Croix River WMO	$498,950
30	Freeborn County	$494,500
31	West Polk SWCD	$475,000
32	Isanti SWCD	$471,893
33	City of Savage	$459,665
34	Lake of the Woods SWCD	$439,000
35	Okabena-Ocheda WD	$428,000
36	Pioneer-Sarah Creek WMC	$416,000
37	Olmstead SWCD	$400,000
38	City of Minneapolis	$399,425
39	City of Burnsville	$398,000
40	Le Sueur SWCD	$387,100
41	Riley-Purgatory-Bluff Creek WD	$383,400
42	Washington Conservation District	$376,130
43	Blue Earth SWCD	$374,500
44	Sauk River WD	$353,500
45	Clearwater River WD	$351,906
46	Wright SWCD	$333,375
47	Le Sueur County	$325,240
48	Goodhue SWCD	$317,984
49	Snake River WMB	$312,025
50	Ramsey Conservation District	$284,266
51	Chippewa River Watershed Project	$271,073
52	Nobles SWCD	$264,700
53	Heron Lake WD	$264,535
54	Carver County	$240,000
55	Sherburne SWCD	$236,805
56	Carnelian-Marine-St. Croix WD	$206,631
57	Elm Creek WMC	$200,000
58	Valley Branch WD	$199,000
59	Pennington SWCD	$196,500
60	Coon Creek WD	$195,158
61	Dodge SWCD	$191,550
62	Prior Lake-Spring Lake WD	$189,200
63	South Washington WD	$180,000
64	Middle Fork Crow River WD	$176,000
65	Kanabec SWCD	$165,590
66	Roseau River WD	$147,700
67	Itasca SWCD	$141,000
68	Kandiyohi SWCD	$120,024
69	Lake SWCD	$114,000
70	Polk SWCD	$103,000
71	Mahnomen SWCD	$100,938
72	St. Louis County	$100,000
73	Wadena SWCD	$100,000
74	Vadnais Lake Area WMO	$97,000
75	Todd County	$79,054
76	Rock SWCD	$78,930
77	City of Bloomington	$50,000
78	Turtle Creek WD	$35,625
79	Crow Wing County	$31,000
	Total	**$41,118,974**

WD = Watershed District SWCD = Soil and Water Conservation District

WMB = Watershed Management Board WMC = Watershed Management Commission WMO = Watershed Management Organization

***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.**

Appendix E – Project Implementation Update

Project Name	Brief Description	Estimated Phosphorus Load Reduction	Progress in 2017 and Projections for 2018
Moody Lake Wetland Rehabilitation Project	Remove phosphorus-laden sediment to turn wetlands from P sources to sinks, and managed cattle grazing.	To Moody Lake: 445 lbs/yr	Phase 1 of construction (Wetland A/B sediment excavation and livestock access management) and effectiveness monitoring completed in 2017. Phase 2 (Wetland A/B alum spot treatments and Wetland C flow management) to occur in 2018.
Moody Lake Alum Treatment Project	Apply whole-lake alum treatment to reduce internal phosphorus loading to Moody Lake, and subsequently reduce load flowing downstream to Bone Lake.	To Moody Lake: 324 lbs/yr	Clean Water Fund grant of $135,000 awarded in late 2017. Alum dosing and treatment to occur in 2018.
Bone Lake Wetland Restorations	Restore six partially drained wetlands.	To Bone Lake: 50 lbs/yr	Activities performed in 2017: project setup, planning meetings, outreach to 22 landowners, site visits, and Wetland Conservation Act discussions.
Little Comfort Lake Diagnostic Monitoring	Perform targeted monitoring to identify major sources of pollutant loading and prioritize best management practices.	N/A	Continued monitoring in 2017. In 2018 monitoring will continue with additional sampling near Heath Avenue.
Hilo Lane Stormwater Retrofit Project	Retrofit existing stormwater treatment facility to improve performance.	To Forest Lake: 12 lbs/yr	Phase 2 of construction (installation of iron-enhanced sand filter) and final site restoration and project closeout completed in 2017.
Forest Lake Wetland Treatment Basin Project	Remove phosphorus-laden sediment to restore wetland and turn from phosphorus source to phosphorus sink	To Forest Lake: 56 lbs/yr	Construction and project effectiveness monitoring completed in 2017. Final site restoration and project closeout to occur in 2018.
Shields Lake Stormwater Harvest	Create stormwater harvest basin, install irrigation reuse system for Forest Hills Golf Course, and perform whole-lake alum treatment.	To Shields Lake: 1,007 lbs/yr To Forest Lake: 250 lbs/yr	Activities performed in 2017: initial monitoring and feasibility report, project design, project operations and maintenance plan, agreement with Forest Hills Golf Club, and Board project ordering. Construction of stormwater harvest and irrigation reuse system will occur in 2018.
Forest Lake Enhanced Street Sweeping Plan	Create a comprehensive street sweeping plan to quantify and optimize phosphorus removal.	(See load reductions for Forest Lake Enhanced Street Sweeping Implementation)	Completed study final report and assisted City of Forest Lake with grant submittal for plan implementation.

Forest Lake Enhanced Street Sweeping Implementation	City of Forest Lake to implement the Enhanced Street Sweeping Plan by purchasing a vacuum sweeper and hiring in-house staff to operate it according to frequencies identified in the plan.	To Forest Lake: 122 lbs/yr To Shields Lake: 1.6 lbs/yr To Keewahtin Lake: 2.3 lbs/yr To Comfort Lake: 22 lbs/yr	City of Forest Lake was awarded Clean Water Fund grant of $220,000 for purchase of a vacuum sweeper. CLFLWD assisted City with grant application and work plan development.
Forest Lake Diagnostic Study	Compile data from past studies and perform targeted monitoring to identify major sources of pollutant loading and potential best management practices.	N/A	Activities performed in 2017: continued diagnostic monitoring, drafted final report, coordinated report review with Pollution Control Agency. Report to be finalized in 2018. Additional subwatershed assessments resulting from the study data are underway in 2018.
Bixby Park Water Quality Improvement Project	Restore ditched wetland to improve hydrologic function and habitat	Immediately downstream: 206 lbs/yr To Comfort Lake: 92.7 lbs/yr	Project effectiveness monitoring was performed in 2017.

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

Appendix F - Lake Water Quality Goals and Measured Averages (Phosphorus)

Full version of figure 5200.1

The following table includes phosphorus concentration goals for major District lakes, as identified in the Watershed Management Plan (WMP), and compares measured monitoring data over time. A shortened version of this table is available on page 27 of the 2017 Progress Report. Three sets of measured data are presented: from WMP, 2005-2009, and 2011-2017. The first of which is included in the District's WMP, but is associated with some caviats that make it difficult to use for progress evaluation (see footnote). The other two datasets have been collected under more similar standards and are therefore more comparable. Years 2005-2009 are some of the earliest years that the District has a consistent dataset for many of its lakes. Years 2011-2017 represent the most recent 5-year average (or however many years that were monitored in the most recent 5-year period).

Lake	Measured Data							CLFLWD Goals			
	*Measured Average (from WMP)**		Measured Average (2005-2009)		Measured Average (2011-2017)			2020 In-Lake Total Phosphorus Goal	2030 In-Lake Total Phosphorus Goal	2040 In-Lake Total Phosphorus Goal	
	Phosphorus Concentration	*Years of Data*	Phosphorus Concentration	Years of Data	Phosphorus Concentration	Years of Data	% Change from '05-'09 Avg	5-Year Mean Concentration	5-Year Mean Concentration	5-Year Mean Concentration	Goal Load (approximate)
Moody	*384 µg/L TP*	*3*	165 µg/L TP	3	102 µg/L TP	5	**-38%**	60 µg/L TP	40 µg/L TP	40 µg/L TP	144 lb/yr
Bone	*85 µg/L TP*	*21*	46 µg/L TP	5	39 µg/L TP	5	**-15%**	40 µg/L TP	40 µg/L TP	30 µg/L TP	443 lb/yr
Birch	*90 µg/L TP*	*3*	103 µg/L TP	3	72 µg/L TP	0	**N/A**	60 µg/L TP	60 µg/L TP	60 µg/L TP	471 lb/yr
School	*62 µg/L TP*	*4*	66 µg/L TP	4	51 µg/L TP	0	**N/A**	50 µg/L TP	40 µg/L TP	40 µg/L TP	452 lb/yr
Little Comfort	*118 µg/L TP*	*5*	42 µg/L TP	4	64 µg/L TP	5	**52%**	40 µg/L TP	40 µg/L TP	30 µg/L TP	416 lb/yr
Shields	*336 µg/L TP*	*18*	214 µg/L TP	3	239 µg/L TP	5	**12%**	100 µg/L TP	60 µg/L TP	60 µg/L TP	84 lb/yr
Keewahtin (formerly Sylvan)	*21 µg/L TP*	*21*	15 µg/L TP	4	15 µg/L TP	5	**0%**	20 µg/L TP	20 µg/L TP	20 µg/L TP	74 lb/yr
Forest (average)	*41 µg/L TP*	*24*	36 µg/L TP	5	35 µg/L TP	5	**-3%**	37 µg/L TP	37 µg/L TP	30 µg/L TP	2,459 lb/yr
Forest 1 (west basin)	*N/A*	*N/A*	*36 µg/L TP*	*5*	*35 µg/L TP*	*5*	*-3%*	*37 µg/L TP*	*37 µg/L TP*	*30 µg/L TP*	*748 lb/yr*
Forest 2 (middle basin)	*N/A*	*N/A*	*38 µg/L TP*	*1*	*34 µg/L TP*	*5*	*-11%*	*37 µg/L TP*	*37 µg/L TP*	*30 µg/L TP*	*671 lb/yr*
Forest 3 (east basin)	*N/A*	*N/A*	*40 µg/L TP*	*1*	*34 µg/L TP*	*5*	*-15%*	*37 µg/L TP*	*37 µg/L TP*	*30 µg/L TP*	*1,040 lb/yr*
Heims	*37 µg/L TP*	*1*	37 µg/L TP	1	43 µg/L TP	2	**16%**	<40 µg/L TP	<40 µg/L TP	<40 µg/L TP	N/A
Comfort	*61 µg/L TP*	*12*	30 µg/L TP	5	33 µg/L TP	5	**10%**	40 µg/L TP	40 µg/L TP	30 µg/L TP	1,640 lb/yr

*At the time the CLFLWD Watershed Management Plan (WMP) was written, all total phosphorus (TP) data for the lakes were pulled from MN Pollution Control Agency's Environmental Data Access (EDA) database and averaged. This included TP data from all months, and sometimes a mix of surface and bottom water TP concentrations. Bottom water TP concentrations are typically many times greater than surface water TP concentrations due to release from the sediments. For example, in Moody Lake, the 3 year average TP concentration reported in the WMP was 384 ppb. However, this was based on an average of 3 years of surface water TP concentrations and one year of bottom water TP concentrations. Using surface water TP concentrations, the average would be closer to 152 ppb. State water quality standards were just being developed at the time the original WMP was written, so there wasn't a standardized way to summarize lake WQ data at that time. Currently, the growing season (June – September) surface water average concentration from the most recent 10 years (or, in the case of the CLFLWD water quality goals, the 5-year average which is stricter) are reported.

Appendix G – Phosphorus Reduction Goals and Progress Detail Tables

Moody Lake Phosphorus Reduction Goals and Project Progress Detail

5221 Moody Lake		
TOTALS	**Reduction (lbs/yr)**	**Percentage of TOTAL Goal**
TOTAL Long-Term Load Reduction Goal	**879**	
TOTAL Completed Upstream+Internal+Watershed:	*376*	*42.78%*
TOTAL Ongoing Upstream+Internal+Watershed:	*393*	*44.71%*
TOTAL Future Upstream+Internal+Watershed:	*110*	*12.5%*
TOTAL Completed + Ongoing + Future	***879***	***100.0%***
Upstream Lakes Load	**Reduction (lbs/yr)**	**Percentage of U/S Lakes Goal**
Upstream Lakes Reduction Goal	**0**	
Watershed Load	**Reduction (lbs/yr)**	**Percentage of WS Goal**
Long-Term Watershed Reduction Goal	**555**	
Total Watershed Projects	**555**	**100.0%**
Completed Projects Subtotal	*376*	
CIP: Livestock access management	✓	
CIP: Moody Lk Wetland A/B Restorations	376	67.7%
Ongoing Projects Subtotal	*69*	*12.4%*
CIP: Moody Lk Wetland C & Alum Spot Treatments	69	12.4%
Future Projects Subtotal	*110*	*19.8%*
CIP: Lofton Pond Alum Treatment	TBD	
CIP: Targeted Agricultral BMPs	TBD	
Internal Load	**Reduction (lbs/yr)**	**Percentage of Internal Goal**
Long-Term Internal Reduction Goal	**324**	
Total Internal Projects	**324**	**100.0%**
Completed Projects Subtotal	*0*	
Carp Harvest	✓	
Carp Barrier	✓	
Winter aeration system	✓	
Ongoing Projects Subtotal	*324*	
CIP: Moody Lake Alum Treatment	324	100.0%
Future Projects Subtotal	*TBD*	
Potential future alum treatment to lengthen lifespan	TBD	

Bone Lake Phosphorus Reduction Goals and Project Progress Detail

5222 Bone Lake		
TOTALS	**Reduction (lbs/yr)**	**Percentage of TOTAL Goal**
TOTAL Long-Term Load Reduction Goal	**786**	
TOTAL Completed Upstream+Internal+Watershed:	*95*	*12.1%*
TOTAL Ongoing Upstream+Internal+Watershed:	*199*	*25.3%*
TOTAL Future Upstream+Internal+Watershed:	*492*	*62.6%*
TOTAL Completed + Ongoing + Future	***785***	***99.9%***
Upstream Lakes (Moody Lake) Load	**Reduction (lbs/yr)**	**Percentage of U/S Lakes Goal**
Upstream Lakes Reduction Goal	**137**	
Based on Moody Lake meeting its long-term goal	137	
Total Upstream Projects	**61**	**44.3%**
Completed Projects Subtotal	*61*	
Based on Moody 2013-2017 Average In-Lake TP	61	*44.3%*
Ongoing Projects Subtotal	*76*	
CIP: Moody Lake Wetland Rehabilitations and Alum Treatment	76	
Future Projects Subtotal	*0*	*0.0%*
Watershed Load	**Reduction (lbs/yr)**	**Percentage of WS Goal**
Watershed Reduction Goal (lb/yr)	**649**	
Total Watershed Projects	**649**	**100.0%**
Completed Projects Subtotal	*34*	*5.3%*
CIP: Melanie Trail Row Crop Conversion to Perennial	34.2	5.3%
Ongoing Projects Subtotal	*123*	*18.9%*
CIP: Bone Lk Drained Wetland Restorations	50	7.7%
CIP: Bone Rural SWA - Ag BMP Implementation	72.5	11.2%
Future Projects Subtotal	*492*	*75.8%*
CIP: Future Project - Meadowbrook	TBD	
CIP: Future Project - 228 West	TBD	
CIP: Future Capital Project (as needed)	TBD	
Internal Load	**Reduction (lbs/yr)**	**Percentage of Internal Goal**
Internal Reduction Goal (lb/yr)	**0**	
Total Internal Projects	**TBD**	
Completed Projects	*0*	
Carp Harvest	✓	
Carp Barrier	✓	
Ongoing Projects Subtotal	*0*	
Curly-leaf pondweed management	✓	
Future Projects	*TBD*	
Bone Lake Alum Treatment	TBD	

Little Comfort Lake Phosphorus Reduction Goals and Project Progress Detail

5225 Little Comfort Lake		
TOTALS	**Reduction (lbs/yr)**	**Percentage of TOTAL Goal**
TOTAL Load Reduction Goal (lb/yr)	**839**	
TOTAL Completed Upstream+Internal+Watershed:	*143*	*17.1%*
TOTAL Ongoing Upstream+Internal+Watershed:	*0*	*0.0%*
TOTAL Future Upstream+Internal+Watershed:	*696*	*82.9%*
TOTAL Completed + Ongoing + Future	***839***	***100.0%***
Upstream Lakes (School Lake) Load	**Reduction (lbs/yr)**	**Percentage of U/S Lakes Goal**
Upstream Lakes Reduction Goal (lb/yr)	**215**	
Based on School Lake meeting its long-term goal	215	
Progress towards Upstream Lake Goal	**215**	**100.0%**
Completed Projects Subtotal	*143*	
Based on School 2013-2017 Average In-Lake TP	143	*66.7%*
Ongoing Projects Subtotal	*0*	
Future Projects Subtotal	*72*	
CIP: Birch Lake Alum Treatment	TBD	
CIP: School Lake Alum Treatment	TBD	
TBD	TBD	
Watershed Load	**Reduction (lbs/yr)**	**Percentage of WS Goal**
Watershed Reduction Goal (lb/yr)	**347**	
Total Watershed Projects	**347**	**100.0%**
Completed Projects Subtotal	*0*	*0.0%*
Ongoing Projects Subtotal	*0*	*0.0%*
Future Projects Subtotal	*347*	*100.0%*
CIP: Targeted Ag BMPs	TBD	
CIP: Watershed Projects (not yet defined)	TBD	
Internal Load	**Reduction (lbs/yr)**	**Percentage of Internal Goal**
Internal Reduction Goal (lb/yr)	**278**	
Total Internal Projects	**278**	**100.0%**
Completed Projects Subtotal	*0*	*0.0%*
Ongoing Projects Subtotal	*0*	*0.0%*
Curlyleaf pondweed monitoring	✓	
Future Projects Subtotal	*278*	*100.0%*
Carp management	✓	
Alum treatment	278	100.0%

Shields Lake Phosphorus Reduction Goals and Project Progress Detail

5226 Shields Lake		
TOTALS	**Reduction (lbs/yr)**	**Percentage of TOTAL Goal**
TOTAL Load Reduction Goal (lb/yr)	**1,023**	
TOTAL Completed Upstream+Internal+Watershed:	*0*	*0.0%*
TOTAL Ongoing Upstream+Internal+Watershed:	*110*	*10.8%*
TOTAL Future Upstream+Internal+Watershed:	*913*	*89.2%*
TOTAL Completed + Ongoing + Future	***1,023***	***100.0%***
Upstream Lakes (School Lake) Load	**Reduction (lbs/yr)**	**Percentage of U/S Lakes Goal**
Upstream Lakes Reduction Goal (lb/yr)	**0**	
Watershed Load	**Reduction (lbs/yr)**	**Percentage of WS Goal**
Watershed Reduction Goal (lb/yr)	**110**	
Total Watershed Projects	**110**	**100.0%**
Completed Projects Subtotal	*0*	*0.0%*
Ongoing Projects Subtotal	*110*	*100.0%*
Permitted: Chestnut Creek (16-008)	16	14.5%
CIP: Shields Lake SW Harvest & Irrigation	94	85.5%
Future Projects Subtotal	*0*	*0.0%*
Internal Load	**Reduction (lbs/yr)**	**Percentage of Internal Goal**
Internal Reduction Goal (lb/yr)	**913**	
Total Internal Projects	**0**	**0.0%**
Completed Projects Subtotal	*0*	*0.0%*
Ongoing Projects Subtotal	*0*	*0.0%*
Electric fish barrier	✓	
Aerator	✓	
Future Projects Subtotal	*913*	*100.0%*
Curlyleaf pondweed management	✓	
CIP: Whole-lake alum treatment	913	100.0%

Lake Keewahtin (formerly Sylvan Lake) Phosphorus Reduction Goals and Project Progress Detail

5227 Keewahtin (formerly Sylvan) Lake		
TOTALS	**Reduction (lbs/yr)**	**Percentage of TOTAL Goal**
TOTAL Load Reduction Goal (lb/yr)	**0**	
TOTAL Completed Upstream+Internal+Watershed:	*0*	
TOTAL Ongoing Upstream+Internal+Watershed:	*0*	
TOTAL Future Upstream+Internal+Watershed:	*0*	
TOTAL Completed + Ongoing + Future	***0***	***0.0%***
Upstream Lakes (School Lake) Load	**Reduction (lbs/yr)**	**Percentage of U/S Lakes Goal**
Upstream Lakes Reduction Goal (lb/yr)	**0**	
Watershed Load	**Reduction (lbs/yr)**	**Percentage of WS Goal**
Watershed Reduction Goal (lb/yr)	**0**	
Internal Load	**Reduction (lbs/yr)**	**Percentage of Internal Goal**
Internal Reduction Goal (lb/yr)	**0**	
Groundwater Protection		
Completed Projects		
Ongoing Projects		
Groundwater Feasibility Study Phase 1		
Future Projects		
CIP: Groundwater Protection Project		

Forest Lake Phosphorus Reduction Goals and Project Progress Detail

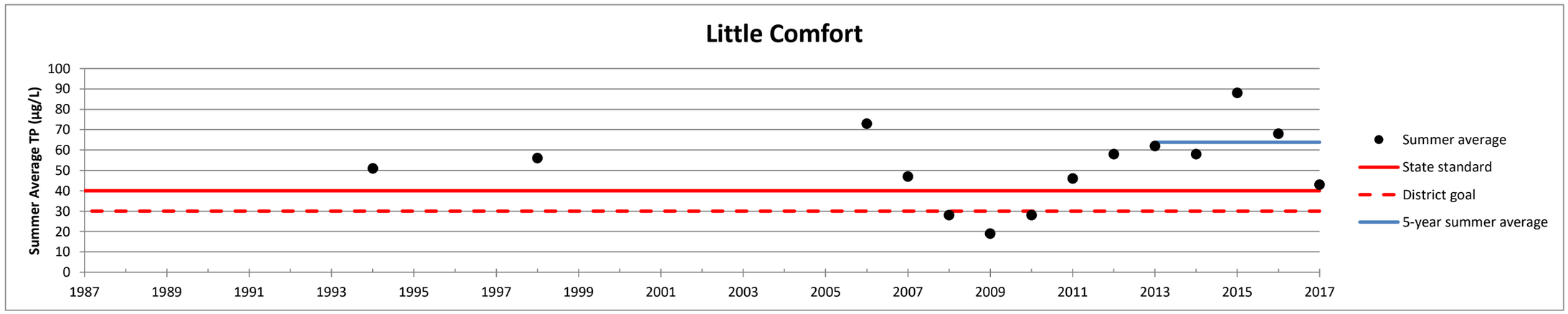
5228 Forest Lake		
TOTALS	**Reduction (lbs/yr)**	**Percentage of TOTAL Goal**
TOTAL Long-Term Load Reduction Goal (lb/yr)	**929**	
TOTAL Completed Upstream+Internal/Watershed:	*-7*	*-0.8%*
TOTAL Ongoing Upstream+Internal/Watershed:	*653*	*70.3%*
TOTAL Future Upstream+Internal/Watershed:	*252*	*27.1%*
TOTAL Completed + Ongoing + Future	***898***	***96.6%***
Upstream Lakes (Shields Lake) Load	**Reduction (lbs/yr)**	**Percentage of U/S Lakes Goal**
Long-Term Upstream Lakes Reduction Goal (lb/yr)	**531**	
Based on Shields Lake meeting its long-term goal	531	
Total Upstream Projects	**531**	**100.0%**
Completed Projects Subtotal	*-31*	*-5.9%*
Based on Shields 2013-2017 Average In-Lake TP (Shields' water quality has declined since 2004 benchmark concentration)	-31	*-5.9%*
Ongoing Projects Subtotal	*531*	*100.0%*
Shields Lake Stormwater Harvest, Reuse, & Alum Treatment	531	100.0%
Future Projects Subtotal		
(Refer to 5226 Shields Lake table)		
Watershed Load	**Reduction (lbs/yr)**	**Percentage of WS Goal**
Long-Term Watershed Reduction Goal (lb/yr)	**398**	
Total Watershed Projects	**398**	**100.0%**
Completed Projects Subtotal	*24.2*	*6.1%*
Permitted: Cherrywood Pointe (13-006)	3.2	0.8%
CIP: FL44 2011 Cattle Exclusion & Prescribed Grazing	5.0	1.3%
BMP Cost Share Projects (25 total)	16.0	4.0%
CIP: Hilo Lane SW Retrofit	12.0	3.0%
CIP: Wetland Treatment Basin (3rd Lk Pond)	56.0	14.1%
Ongoing Projects Subtotal	*122.0*	*30.7%*
Enhanced street sweeping implementation	122.0	
Future Projects Subtotal	*251.8*	*63.3%*
CIP: Castlewood subwatershed capital projects	TBD	
CIP: Hayward Avenue capital projects	TBD	
CIP: JD-6 Watershed Projects - South Lobe	TBD	
CIP: JD-6 Watershed Projects - North Lobe	TBD	
CIP: JD-6 Watershed Projects - West Lobe	TBD	
CIP: Direct Drainage Retrofit Implementation	TBD	
CIP: Future Capital Projects (as needed)	TBD	
Internal Load	**Reduction (lbs/yr)**	**Percentage of Internal Goal**
Internal Reduction Goal (lb/yr)	**0**	
Total Internal Projects	**0**	
Completed Projects Subtotal	*0*	
Shields Lake Culvert Carp Barrier	✓	
Ongoing Projects Subtotal	*0*	
Future Projects Subtotal	*TBD*	
Forest Lake Alum Treatment (West Basin)	TBD	

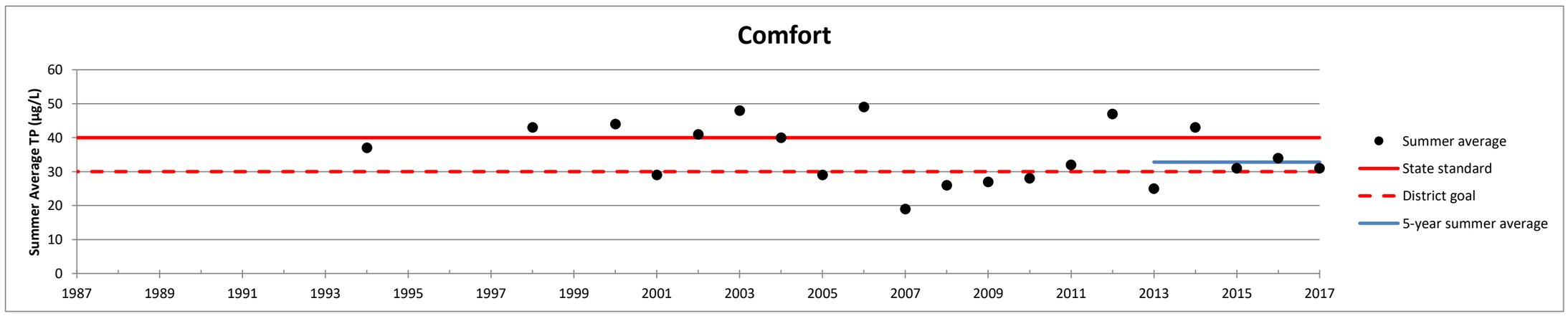
Comfort Lake Phosphorus Reduction Goals and Project Progress Detail

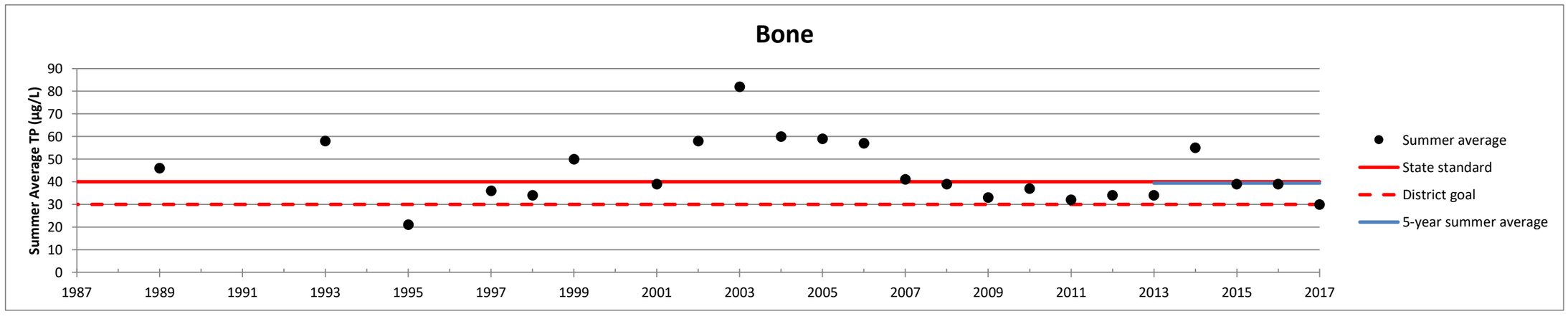
5229 Comfort Lake		
TOTALS	**Reduction**	**Percentage of TOTAL Goal**
TOTAL Load Reduction Goal (lb/yr)	**825**	
TOTAL Completed Upstream+Internal/Watershed:	*248*	*30.0%*
TOTAL Ongoing Upstream+Internal/Watershed:	*5*	*0.6%*
TOTAL Future Upstream+Internal/Watershed:	*573*	*69.4%*
TOTAL Completed + Ongoing + Future	***825***	***100.0%***
Upstream Lakes (Little Comfort & Forest Lake) Load	**Reduction**	**Percentage of U/S Lakes Goal**
Upstream Lakes Reduction Goal (lb/yr)	**430**	
Based on Little Comfort achieving Long-term Goal	415	
Based on Forest Lake achieving Long-term Goal	15	
Total Upstream Projects	**301**	**69.9%**
Completed Projects Subtotal	*129*	*30.1%*
Based on Little Comfort 2013-2017 Average In-Lake TP	123	29.6%
Based on Forest Lake 2013-2017 Average In-Lake TP	6	43.3%
Ongoing Projects Subtotal	*0*	*0.0%*
Future Projects Subtotal	*301*	*69.9%*
TBD	TBD	
Watershed Load	**Reduction**	**Percentage of WS Goal**
Internal/Watershed Reduction Goal (lb/yr)	**295**	
Total Internal/WS Projects	**295**	**100.0%**
Completed Projects Subtotal	*118.3*	*40.2%*
Permitted: CSAH 2 Reconstruction, incl. Broadway IESF (10-009)	15.0	5.1%
Permitted: Goodwill (11-001)	1.4	0.5%
Permitted: Cherrywood Pointe (13-006)	1.4	0.3%
Permitted: Greenway Avenue (14-002)	1.8	0.6%
Permitted: Small (< 1 lb) Permitted Projects	1.1	0.4%
CIP: Target Retrofits	5.0	1.7%
CIP: Bixby Park Wetland Rehab	92.7	31.5%
Ongoing Projects Subtotal	*4.7*	*1.6%*
Permitted: MnDOT I-35 Project (16-022)	3.1	1.0%
Permitted: Lighthouse Apartments (17-002)	1.1	0.4%
Permitted: Small (< 1 lb) Permitted Projects	0.5	0.2%
Future Projects Subtotal	*171.5*	*58.2%*
CIP: Tax Forfeit	TBD	
CIP: Shallow Pond	TBD	
CIP: Stream Restoration Lower Reach of Sunrise	TBD	
CIP: Future Capital Projects (e.g. Home Depot)	TBD	
CIP: DuCharme Property	TBD	
Internal Load	**Reduction (lbs/yr)**	**Percentage of Internal Goal**
Internal Reduction Goal (lb/yr)	**101**	
Total Internal Projects	**101**	**100.0%**
Completed Projects Subtotal	*0*	*0.0%*
Ongoing Projects Subtotal	*0*	*0.0%*
Curlyleaf pondweed management	✓	
Future Projects Subtotal	*101*	*100.0%*
Carp management	TBD	
CIP: Comfort Lake Alum Treatment	101	*100.0%*

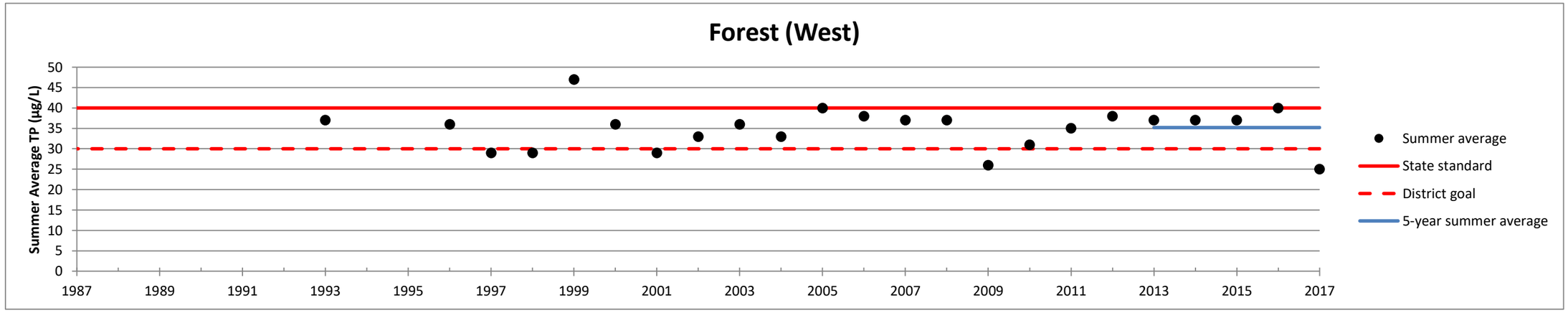
Appendix H - Water Monitoring Charts

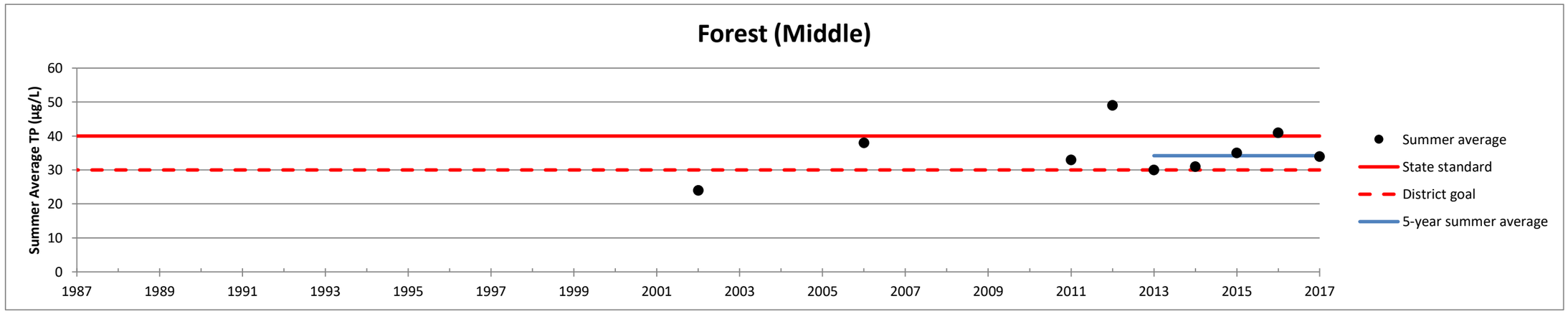
(summer average phosphorus concentration)

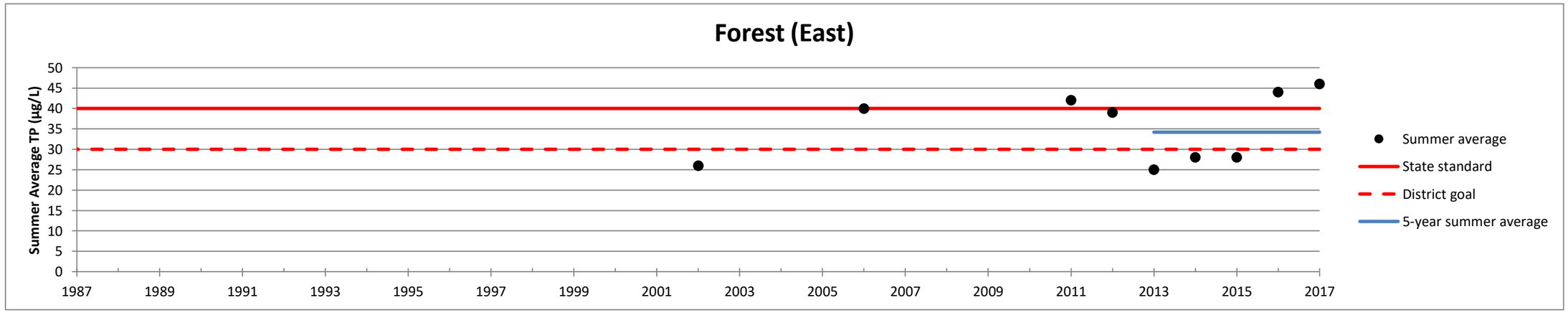


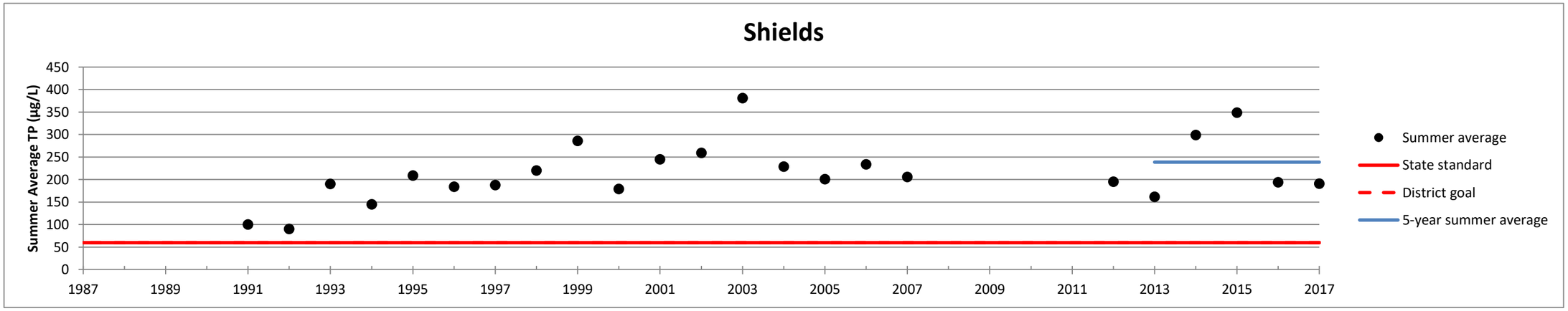


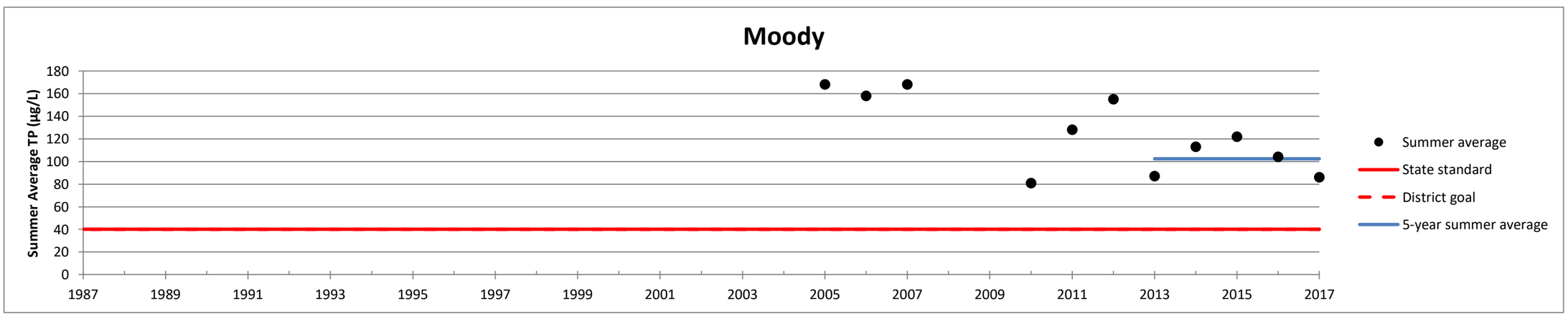



Forest (West)
Summer Average TP (µg/L)
0
5
10
15
20
25
30
35
40
45
50
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Summer average
State standard
District goal
5-year summer average


Forest (Middle)
Summer Average TP (µg/L)
0
10
20
30
40
50
60
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Summer average
State standard
District goal
5-year summer average


Forest (East)
Summer Average TP (µg/L)
0
5
10
15
20
25
30
35
40
45
50
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Summer average
State standard
District goal
5-year summer average


Shields
Summer Average TP (µg/L)
450
400
350
300
250
200
150
100
50
0
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Summer average
State standard
District goal
5-year summer average


Moody
Summer Average TP (µg/L)
180
160
140
120
100
80
60
40
20
0
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
2007
2009
2011
2013
2015
2017
Summer average
State standard
District goal
5-year summer average