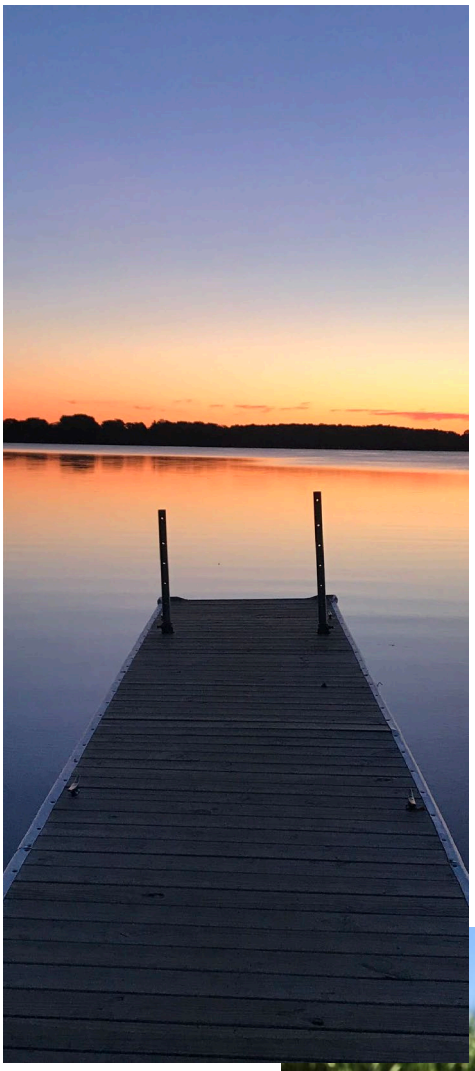


Clearwater River
WATERSHED DISTRICT
Promote | Protect | Preserve

2019 ANNUAL REPORT

Table of Contents

ACRONYMS ..... **IV**

EXECUTIVE SUMMARY ..... **V**

1.0 INTRODUCTION **1-1**

1.1 Mission Statement 1-1
1.2 District History 1-1
1.3 District Information 1-2
1.4 Monitoring & Report Objectives 1-2

2.0 2019 FINANCIAL CONDITION OF THE CRWD **2-1**

3.0 PROGRESS TOWARDS WATER QUALITY GOALS | STATUS OF CRWD PROJECTS AND PROGRAMS **3-1**

3.1 Process 3-1
3.2 Yearly Summary of Progress | Status of Projects and Programs 3-1
3.3 Summary of Priority Projects 3-9

4.0 MANAGERS' PLAN OF WORK FOR 2020 ..... **4-1**

4.1 Plan Overview 4-1
4.2 Plan Details 4-2

Table of Contents (Cont.)

TABLES

Table 3—1: 2019 Summary of Progress | Status of Projects and Programs 3-7
Table 3—2: Priority Implementation Projects 3-9
Table 4—2: 2020 Detailed Plan of Work 4-2

FIGURES

Figure 4: Impairments and water quality monitoring locations in the Clearwater River Watershed District. 1-4

APPENDICES

Appendix A: 2019 Water Quality Monitoring Plan
Appendix B: 2019 Lake Report Cards

Acronyms

BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BWSR	MN Board of Water & Soil Resources
cfs	cubic feet per second
CFU/100 mL	colony forming units per 100 milliliters
Chlor-*a*	Chlorophyll-*a*
CREP	Conservation Reserve Enhancement Program
CRWD	Clearwater River Watershed District
CWP	Clean Water Partnership
District	Clearwater River Watershed District
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
lbs	Pounds
MDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
µg/L	micrograms per liter
mg/L	milligrams per liter
NCHF	North Central Hardwood Forest
Ortho-P	Ortho-Phosphorus
RIM	Reinvest in Minnesota
SOD	Sediment Oxygen Demand
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSS	Total Suspended Solids
WMP	Watershed Management Plan

Executive Summary

This report was prepared for the Clearwater River Watershed District (CRWD) to provide a progress report of Watershed Management Plan (WMP) Implementation activities in the District. The report summarizes 2019 hydrologic, hydraulic and water quality monitoring data and provides an analysis of progress towards goals in the context of the District's watershed management activities.

In 2019, the CRWD made progress towards goals established in the Watershed Management Plan by doing the following:

- Secured funding for and constructed the $2.8 million Nitrogen Mitigation System for the Clearwater Harbor, Hidden River Waste Water Treatment System forward including initiating the Project.
- Worked through staff transitions, changed office locations and Comprehensive Planning for the next 10 years.
- Continued to monitor water quality, hydrology, and hydraulics to track water quality trends and the effectiveness of existing management strategies. These actions help to improve efficiencies of implementation of projects.
- Completed maintenance on existing projects as noted in annual project inspections.
- Continued education and outreach efforts including an update of the Districts Web Site (in progress).
- Conducted the annual strategic planning session in March to evaluate WMP implementation, performed adaptive management and identified additional needs. This includes identifying additional projects and continuing to apply for grant dollars to fund other CRWD projects.
- Provided $10,000 in cost share and technical services to support a Wright SWCD project to stabilize a ravine and reduce sediment and nutrient loading to Lake Augusta.
- Stabilized the Pleasant Lake Outlet Channel to reduce sediment and nutrient loading to downstream Clearwater Lake.

At District's annual planning session in March, the Board set the direction for 2020. The major tasks upcoming for the District include:

- Finalize the update the WMP (last updated in 2009).
- Continue work on the task force to address potential water quality threats to two trout streams, Theil Creek and Fairhaven Creek.
- Implementation projects and programs towards achieving water quality goals.
- Continue monitoring, inspection and maintenance, and civic engagement programs.
- Continue to coordinate with lake associations, county and state government on AIS issues.

- Year 1 System Commissioning for the Nitrogen Mitigation Project for the Clearwater Harbor / Hidden River waste water systems.

Significant hydrologic, hydraulic and water quality findings in this report include the following:

1. Annual precipitation and runoff was extremely high, ranging from 34.19 inches in Kimball, 38.31 inches in Watkins, to 41.92 in St. Cloud (30 year normal for St. Cloud is 27.73 inches).
2. Early ice out, early warm temperatures sparked significant algae blooms even in lakes with typically good water quality.
3. Of the lakes monitored in 2019, all met the clarity standard, even with significant blooms.
4. While long term lake water quality is stable to improving in all CRWD lakes, some higher TP concentrations were measured this year in Lake Betsy and Clear Lake. Lake Betsy water quality has improved dramatically since implementation activities began in 2009 (139 ug/L in in 2019 vs 269 for the 10-year average during the TMDL study). Water quality in Cedar Lake has stabilized below the water quality goal since work began in 2007.
5. Lake Augusta, impaired for nutrients, met the water quality TP standard 5 of the past 10 years monitored (2009-2018), and the 10-year average continues to improve and is 40.68 ug/L, just shy of the 40 ug/L standard (it was 42 in 2017 and 40.8 in 2018).
6. While Clear Lake water quality TP continued to improve and saw a record low concentration of 71 ug/L TP and three years of stable to improving water quality, just above it 60ug/L state standard in 2017, algae blooms plagued the lake in 2018 accompanied by a higher TP average in 2018 of 131 ug/L TP.
7. The 10-year average summer surface TP concentration in Union Lake remains below the 40ug/L TP standard.

Information on the status of existing CRWD projects and water quality in the District can be found online at http://www.crwd.org/.

1.0 Introduction

1.1 MISSION STATEMENT

The District's mission is to promote, preserve and protect water resources within the boundaries of the CRWD in order to maintain property values and quality of life.

1.2 DISTRICT HISTORY

The area encompassed by the CRWD is rich in soil and water resources. The presence of those resources has encouraged the growth of two economic mainstays in this Central Minnesota territory – farming and tourism. Around these basics have grown the communities that support their needs. As population and industry grow, those priceless resources, which we often take for granted, may deteriorate.

In the 1960s and early 1970s, those who fished and enjoyed the waters of the Clearwater River Chain of Lakes began to notice a decrease in the clarity of those waters, an increase in the number of rough fish (bullheads and carp), and an increase in the growth of algae on the surface of the water. Property owners sought new tests from scientists interested in water quality. Those tests revealed that the nutrient content of the water had increased substantially since 1946 – phosphorus was coming into the Clearwater Lake at a rate almost double the rate considered damaging.

The lakes through which the Clearwater River flowed were aging much too quickly. That process, which is a natural phenomenon called "eutrophication," was being helped along at an alarming rate via pollution entering the river system from cities, farmland, private property, and industry.

Further reports concluded that the rate of phosphorus input could be reduced by as much as 50% if the cities of Watkins, Kimball, and Annandale, and the Modern Craftsmen's Milk Association of Watkins installed on-land waste treatment systems instead of discharging sewage and industrial effluents into the Clearwater River and Warner Creek. In addition, if the phosphorus input from all non-point sources (such as septic tanks, agricultural wastes, storm water runoff, and soil erosion) could be significantly reduced, water quality in the watershed could be restored to an acceptable level.

After a lengthy series of meetings and legal research, those concerned came to the conclusion that only a watershed district, with its powers of enforcement and its abilities to assess and to obtain federal and state funding, could tackle the pollution problem in the Chain of Lakes. The CRWD was the culmination of years of hard work and the beginning of many more years of work aimed at undoing some of the damage done over a long period of time to one of our most important resources – our lakes and streams.

The CRWD was established as a unit of local government on April 9, 1975, through citizen petition by order of the Minnesota Water Resources Board, acting under authority of Chapter 112, MSA (the Minnesota Watershed Act). Though the original thrust of the CRWD and its five-member Board of Managers was the improvement of water quality in the Clearwater River Chain of Lakes, its scope has grown into a complete program of water management within its boundaries.

1.3 DISTRICT INFORMATION

In February of 2019, the District authorized a move of the physical address, the mailing address and changed meeting locations, this information is reflected in the table below.

Physical Address	93 Oak Street, Suite 5 Annandale, MN 55302
Mailing Address	3232 Fernbrook Ln, N Plymouth, MN 55447
Website	www.crwd.org
Email, Phone	admin@crwd.org, 320-274-3935
Office hours	By appointment in office, by phone during business hours
Board meeting schedule	Regular meetings are held monthly on the 3rd Wednesday at 6:00pm at the District's physical office in Annandale, MN. Special meetings are called on an as-needed basis.

The current Board members and staff are listed on the District's web site.

1.4 MONITORING & REPORT OBJECTIVES

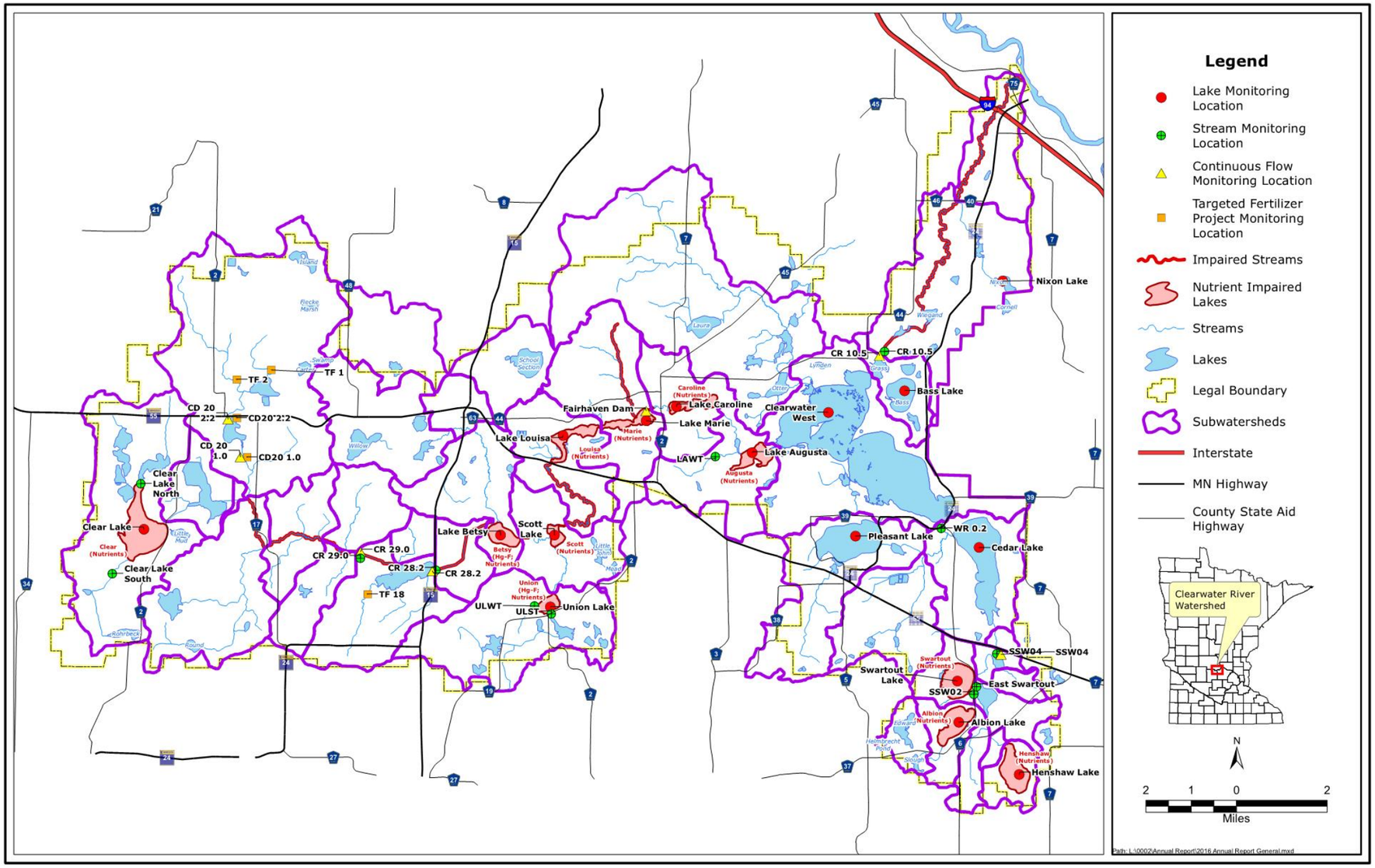
The Clearwater River Watershed District's (CRWD's) ongoing monitoring program– started in 1980- is critical to track long term water quality and hydrologic trends. This report summarizes data to evaluate progress towards water quality goals through program/ project implementation. This allows the CRWD to optimize costs and benefits of natural resource protection programs within the District. The 2019 monitoring plan is summarized in Appendix A, monitoring locations and impaired waters are summarized in Figure 1-1.

The objectives of the Water Quality Monitoring and Watershed Management Plan Implementation Status program are:

1. Track progress towards water quality goals for impaired waters by:
   a) Measuring water quality trends in lakes and streams and pollutant loads.
   b) Tracking programs and projects implemented.
   c) Evaluating water quality in the context of programs/ projects implemented.
2. Fill data gaps identified in the TMDLs.
3. Continue to provide baseline water quality data and calibration data sets to refine TMDL load reductions.

4. Track long-term trends in all CRWD waters monitored ensuring early detection of declining trends. The appendices summarize historical lake water quality data.
5. Provide recommendations for ongoing programs, projects and watershed management strategies based on data.

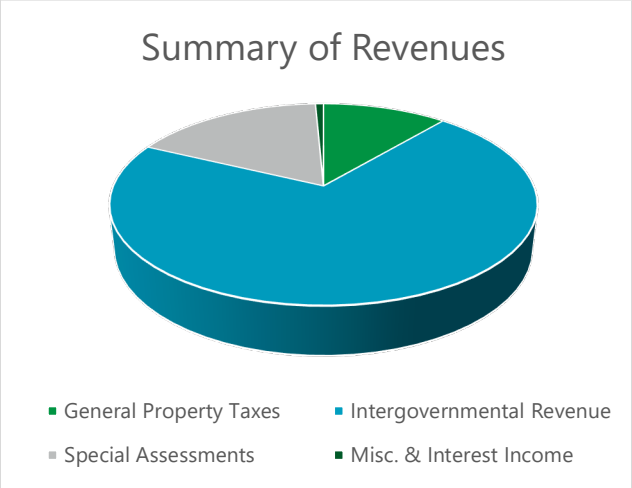
Figure 1: Impairments and water quality monitoring locations in the Clearwater River Watershed District.

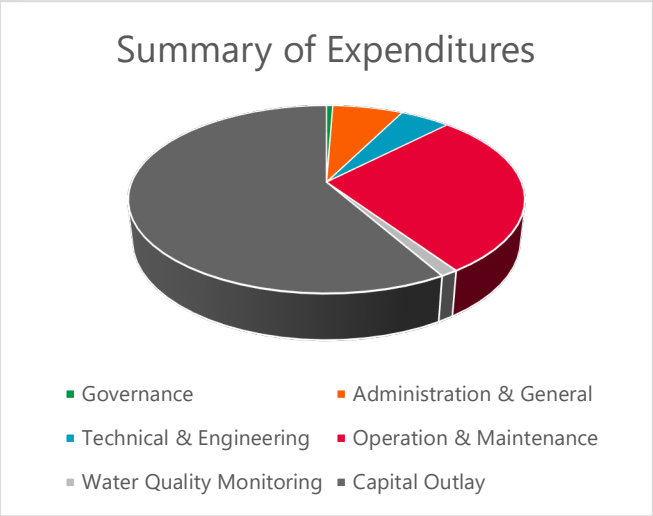


2.0 2019 Financial Condition of the CRWD

SUMMARY OF REVENUES		SUMMARY OF EXPENDITURES	
General Property Taxes	$248,161	Governance	$19,633
Intergovernmental Revenue	$1,567,610	Administration & General	$219,729
Special Assessments	$380,277	Technical & Engineering	$156,956
Misc. & Interest Income	$16,113	Operation & Maintenance	$903,791
		Water Quality Monitoring	$39,395
		Capital Outlay	$1,871,407
Total Revenue	$2,212,161	**Total Expenditures**	$3,210,911

Fund Balances - January 1, 2019	$949,620
Fund Balances - December 31, 2019	$1,362,765





Note: The District conducts an independent audit annually; audited financial statements are available for public review at the District's office during normal business hours, at the Annandale Public Library, and online at: https://www.crwd.org/uploads/1/3/0/2/130247478/annual_financial_report_-_crwd_2019.pdf.
The above information can be found on pages 10 of the audit report.

The activities of the CRWD are funded by a combination of an ad valorem tax levy (based on property values within the CRWD), special assessments, and grants. Funds raised by special assessment can only be used for the specific purpose they were levied for. The CRWD budget, corresponding levies and special assessments are approved after public notice and hearing, as dictated by statute. This public hearing is normally held at the September regular meeting. A detailed budget is available for public review at the CRWD office.

3.0 Progress Towards Water Quality Goals | Status of CRWD Projects and Programs

The CRWD Watershed Management Plan (WMP) identifies the upper watershed (upstream of Lake Betsy) as the highest priority for implementing both capital projects and programmatic BMPs. Because of the flow-through nature of the Clearwater Chain of Lakes, water quality in upper watershed lakes like Clear Lake and Lake Betsy is the primary driver of water quality in downstream lakes like Clearwater Lake. Nutrient loads from upper watershed lakes and their tributary watersheds drive impairments in lakes further downstream. Clear Lake, Lake Betsy, and the tributary watersheds are targeted for intensive BMPs to not only improve water quality in those lakes, but to also reduce the load to downstream water bodies. All lakes will eventually be targeted, but the greatest impact will be achieved for the lowest cost by initially focusing the efforts on improvements in the upstream end of the District and working downstream.

3.1 PROCESS

The CRWD WMP is specific in its focus: implement the identified projects and programs in high priority geographical areas. The District makes annual adjustments to further focus and refine management activities. The Board and staff review this report, compare findings to the WMP, and then prioritize projects and programs. They typically select one-three projects and programs to focus on in the coming year. The annual planning is based on remaining programs and projects identified in the Plan, water quality monitoring findings as well as other opportunistic projects identified during the year. This on-going strategic planning keeps the CRWD focused and efficient.

3.2 YEARLY SUMMARY OF PROGRESS | STATUS OF PROJECTS AND PROGRAMS

The following section summarizes year by year strategy as well as programs and projects undertaken since the plan was adopted:

2009

- Prioritized six projects from the overall TMDL Implementation Plan
  - City of Kimball Stormwater Retrofit
  - Lake Betsy Internal Load Management
  - Watkins treatment area
  - Targeted Fertilizer Application Project
  - Kingston Wetland Restoration
  - Clear Lake South Sand Filter/ Weir
- Applied for grants for each of prioritized projects, received grant for Kimball stormwater (Kimball Stormwater would eventually be broken into two phases, grant for Phase I was received in 2009).

- Implemented agricultural BMPs identified in the TMDL Implementation Plan in upper watershed.
- Conducted additional monitoring, including collection of lake bottom samples and sediment phosphorus release analysis in Clear and Betsy Lakes.
- Implement education program including watershed tours and outreach to lake associations, farmers and local government units.

2010

- Applied for and received Section 319 grant for Kingston Wetland Restoration and Targeted Fertilizer Application Project.
- Applied for Watkins Area Restoration Grant and Lake Betsy Internal Load, grants not funded.
- Applied for and received CCM funding for streambank restoration.
- Implemented BMPs identified in the TMDL Implementation Plan.
- Conducted additional monitoring to fill in data gaps and continue to assess internal loading in District lakes, including collection of lake bottom samples and sediment phosphorus release analysis in Augusta and Scott Lakes.
- Implement education program including watershed tours and outreach to lake associations, farmers and local government units.
- Implemented Fertilizer Field Trial Project.

2011

- Constructed Kimball Stormwater Project (now known as Phase I).
- Applied for and secured a grant for Kimball Stormwater Phase II.
- Implemented BMPs identified in the TMDL Implementation Plan.
- Applied for and received CCM funding for streambank restoration.
- Conducted supplemental water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to track progress and focus implementation efforts.
- Implement education program including watershed tours and outreach to lake associations, farmers and local government units.
- Implemented Fertilizer Field Trial Project.

2012

- Applied for and secured one grant for two projects in the Cedar Lake Subwatershed:
  - Highway 55 project
  - Swartout Wetland Project
- Completed Clear Lake South Sand Filter/ Weir.
- Implemented BMPs identified in the TMDL Implementation Plan.
- Applied for and received CCM funding for streambank restoration.
- Conducted supplemental water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.

- Implement education program including watershed tours and outreach to lake associations, farmers and local government units.
- Implemented Targeted Fertilizer Project.

2013

- Advanced implementation for priority projects:
  - Completed design of Kimball Phase II stormwater retrofit; worked to complete permitting.
  - Further developed feasibility for Betsy Lake Internal Load Management.
  - Feasibility study of Lake Augusta Internal Load management options.
  - Lake Augusta AIS Project.
- Applied for and received CCM funding for streambank restoration.
- Secured funding for 20 CCM crew hours for stream bank stabilization for 2014.
- Implemented BMPs identified in the TMDL Implementation Plan.
- Conducted supplemental water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.
- Implement education program including watershed tours and outreach to lake associations, farmers and local government units.
- Began Kingston Wetland Restoration Project.
- Implemented Targeted Fertilizer Project.

2014

- Advanced implementation for priority projects:
  - Completed 90% of construction for Kimball Phase II stormwater retrofit.
  - Conducted Feasibility Study Betsy Lake Internal Load Management.
  - Completed design and permitting for two Cedar Lake watershed projects, construction to begin early in 2015
  - Continued implementation of Targeted Fertilizer Application Program, early reports from Co-Ops indicate enrollment is approaching goals.
- The Targeted Fertilizer Application Program was Awarded:
  - Minnesota Association of Watershed District Program of the Year
  - Environmental Initiative Natural Resources Award.
- Applied for both rounds of MN Board of Water and Soil Resources' (BWSR) Targeted Watershed Implementation Program to complete the plan implementation; CRWD was not selected for either grant.
- Applied for a Clean Water Legacy (CWL) grant for the Watkins Project.
- Applied for Section 319 funds for the Alternative Tile Intake Demonstration Program
- Measured and recorded positive results of the Kingston Wetland Restoration Project including reduced soluble phosphorus export from the wetland and improved dissolved oxygen concentrations downstream.

- Conducted supplemental water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.
- Implemented education program including watershed tours and outreach to lake associations, farmers and local government units.

2015

- Received a Clean Water Legacy Grant for the Watkins project and began design and permitting.
- Completed final project closeout for Kimball Phase II.
- Completed construction for the Highway 55 portion of the grant-funded Cedar Lake Watershed Protection and Improvement Project.
- Achieved substantial completion Swartout portion of the grant-funded Cedar Lake Watershed Protection and Improvement Project.
- Awarded 319 funds for the Alternative Tile Intake Demonstration Program and began program implementation.
- Continued to enroll landowners in the Targeted Fertilizer Application Program.
- Reported positive results of the Kingston Wetland Restoration Project in the final report and maintained sediment forebay.
- Continued to implement rough fish management (removal and migration barriers).
- Implemented agricultural best management practices via existing District cost-share and/or partnering with other entities (ex SWCDs).
- Conducted water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.
- Continued Aquatic Invasive Species (AIS) work with lake associations as initiated by lake associations. Actively participated with county-level AIS activities.
- Implemented education program including school district outreach via partnership with Sauk River Watershed District, watershed tours and outreach to lake associations, farmers and local government units.

2016

- Continued implemented 319 funded Alternative Tile Intake Demonstration Program.
- Completed and submitted the final project report to the MN Pollution Control Agency.
- Continued to implement rough fish management (removal and migration barriers).
- Implemented agricultural best management practices via existing District cost-share and/or partnering with other entities (ex SWCDs).
- Continued annual project and program inspections and maintenance.
- Conducted water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.
- Continued Aquatic Invasive Species (AIS) work with lake associations as initiated by lake associations. Actively participated with county-level AIS activities.

- Continued education program including school district outreach via partnership with Sauk River Watershed District, watershed tours and outreach to lake associations, farmers and local government units.

2017

- Completed construction of the Watkins stormwater management project.
- Implemented agricultural best management practices via existing District cost-share and/or partnering with other local entities.
- Conducted water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.
- Continued Aquatic Invasive Species (AIS) work as initiated by lake associations. Actively participated with county-level AIS activities.
- Continued to implement education program including school district outreach via partnership with Sauk River Watershed District, watershed tours and outreach to lake associations, farmers and local government units.
- Inspected District projects to assess maintenance needs and function
- Conducted active maintenance on District projects including
    - Lake Augusta Erosion Control Project
    - School Section Lake Outlet
- Biological monitoring conducted at Kinston Wetland showing the Clearwater River met state IBI standards.

2018

- Continued to make progress on the $3 million Nitrogen Mitigation Project in terms of community consensus, completion of design, and securing funding.
- Lake bottom cores were collected in Swartout Lake to measure P release rates. Preliminary results indicate that alum dosing may not be the ideal management approach for Swartout Lake. The results will be published in 2018.
- Implemented agricultural best management practices via existing District cost-share and/or partnering with other local entities.
- Conducted water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.
- Continued Aquatic Invasive Species (AIS) work as initiated by lake associations. Actively participated with county-level AIS activities. Specifically, the Clearwater Lake Property Owners (CLPO) AIS project moved forward, and a petition for Bass Lake AIS management was advanced.
- Supported Meeker County in reconstruction of County Road 17 by offering review and technical support for erosion control and improved erosion management. The project location was within the District's priority zone for sediment and nutrient management.

- Continued to implement education program including school district outreach via partnership with Sauk River Watershed District, watershed tours and outreach to lake associations, farmers and local government units.
- Inspected District projects to assess maintenance needs and function:
    - Swartout Iron Enhanced Sand Filter Repair and Maintenance
    - School Section Lake Outlet Maintenance
    - Completed Augusta Erosion Control Maintenance and Repair
- Partnered with the Clear Lake Property Owners Association to conduct additional monitoring on Clear Lake Tributaries to advance the initiation of projects intended to improve water quality in Clear Lake.
- Welcomed Dale Homuth to the Board of Managers. Manager Homuth is a retired DNR employee with significant local and historical knowledge of the District and its resources.
- Transitioned staff due to the departure of our administrative team. The District Administrator took another position and his assistant (the prior administrator) retired. The District pivoted to cover accounting duties with a contractor to provide space to make a thoughtful decision about staffing going forward. The new accounting contractor provides separation between District Administration and accounting as the two entities are separate. The new administrator was hired in November 2018.

2019

- Constructed the $2.8 million Nitrogen Mitigation Project after securing $2.1 million in funding from a PSIG.
- Conducted water quality and hydrologic monitoring in accordance with recommendations of the implementation plan throughout the District to monitor project performance and better focus implementation efforts.
- Continued Aquatic Invasive Species (AIS) work as initiated by lake associations. Actively participated with county-level AIS activities. Specifically, the petition from the Bass Lake Association was formalized into a District Project.
- Continued to implement education program including school district outreach via partnership with Sauk River Watershed District, watershed tours and outreach to lake associations, farmers and local government units.
- Restored and stabilized the Pleasant Lake Outlet Channel.
- Inspected District projects to assess maintenance needs and function, though high water levels prohibited access to several projects. A full inspection report will be provided in 2020.
- Partnered with Wright SWCD to stabilize a ravine which was delivering large sediment loads to Lake Augusta.
- Continued our partnership with the Clear Lake Property Owners Association to conduct additional monitoring on Clear Lake Tributaries to advance the initiation of projects intended to improve water quality in Clear Lake.
- Again, transitioned staff due to the departure of our administrative team. After the District Administrator took another position and his assistant (the prior administrator) retired mid-2018. The Administrator position was filled for a brief time before being

again vacated in June 2019. In response the District added administrative duties to their long-time engineer and her support staff.

Table 3—1: 2019 Summary of Progress | Status of Projects and Programs

Activity	Notes
Advisory Committee	Per MN Statute 103D, the CRWD Board of Managers has appointed an advisory committee. More information on the committee, include meeting minutes, can be found at: https://www.crwd.org/advisory-committee.html.
Annual Project Inspections	On an annual basis, the CRWD conducts a review of the operational status of all projects the CRWD owns, operates and/ or maintains on the landscape. At a minimum visual inspection of individual project's components are performed, with more in-depth inspections performed as warranted. From this, actions items needed to maintain operational effectiveness are determined. The results of these inspections are summarized annual in a Project Inspection Report, which serves to provide an annual status update to the CRWD Board of Managers. A copy of report can be viewed at: https://www.crwd.org/publications-and-reports.html Status of projects and programs that do not physically exist on the landscape are covered below.
Aquatic Invasive Species (AIS) Treatment Programs	The CRWD has been, from time to time, petitioned to established programs for the identification, management and treatment of AIS in certain CRWD waters. These programs are funded by special assessments, and the lake associations on each lake undertake the management of the treatment programs via agreement with the CRWD; the CRWD acts as a fiscal agent on all projects. In addition, the CRWD actively participated with county-level AIS activities, principally by serving in an advisory role. Bass Lake Association petition was initiated into a project.
Bog Control Projects	In response to high water levels in the mid-1980s that caused severe floating bog problems on Augusta, Clearwater, and Grass Lakes, the CRWD set up two bog control projects with the cooperation of the lake property owners involved. These projects included acquisition and improvement of access areas for bog removal, and the funding (via assessment) and process for removal of floating bogs deemed harmful. The CRWD works in conjunction with the Minnesota Department of Natural Resources as well as other local authorities in removal of bogs from choke points on these three lakes in order to ensure river flow is not restrict such that flooding could result. Bog removal by the CRWD is governed by CRWD Policy. Minimal bog activity was noted in 2019.
Education and Outreach Program	Program is a collection of activities, events, publications, etc. that fall under various projects and programs of the CRWD. Provides means to: • Inform citizens on CRWD activities • Encourage involvement and ownership of water-resource issues • Discover citizen concerns • Establish and test methods Activities completed in 2019 under this program include: • Updated the District's web site (ongoing) • Several CRWD advisory committee meetings.

Activity	Notes
	• Booth at both Annandale and Kimball Business Expos. • Attendance at multiple meetings and with individuals on a variety of circumstances. • Commented on variance and permit requests from Corinna Township, Meeker County, Stearns County and Wright County. • Partnership continued with Sauk River Watershed District to extend their school-age outreach programming to schools in the CRWD.
Incentive Program	**Agricultural Incentives** • Inventive program focused on variable rate fertilizer application and alterative tile intake programs. Visit: https://www.crwd.org/incentives.html to learn more about these incentive offerings.
Partnerships	**Mississippi River (St. Cloud) Watershed WRAPS** Collaborated with partners on this project where possible. The CRWD remains committed to working with its partners on the watershed restoration and protection strategies report process. **SWAG** The District is partnered with Sherburne SWCD to conduct SWA monitoring under an MPCA grant. The work is on-going.
Project-specific	**Agricultural Cost-Share BMPs** Continued targeted implementation of agricultural cost-share best management practices (BMPs) in high priority locations identified in TMDL studies. The Federal Section 319-funded Alternative Tile Intake Project and the Clearwater River Restoration and Protection Phase II Project (Clean Water Partnership-funded) both concluded in 2019 successfully.
Rough Fish Management Program	The CRWD continues to implement rough fish management strategies (principally removal and migration barriers) in areas of the CRWD where management funding has been established. In addition, several test net surveys were conducted to determine if lake seining was warranted in 2016. Open water seining was conducted on Lake Louisa in fall 2016 with low rough fish pull numbers. The Highway 55 Fish Barrier Removal contract, awarded in 2018, could not be implemented in 2018 or 2019 due to high water levels. The work is still planned. A repair of the fish migration barriers is planned for 2020. A report of a carp virus has potentially reduced carp populations in Swartout Lake, which is tributary to Cedar Lake. As water levels allow, fisheries surveys will be conducted.
Water quality monitoring	Conducted water quality and hydrologic monitoring in accordance with recommendations of the WMP throughout the District to monitor project performance and better focus implementation efforts. See also SWAG Grant implementation for 2019 and 2020.

3.3 SUMMARY OF PRIORITY PROJECTS

The CRWD has implemented several major projects to achieve water quality goals; status is shown below.

Table 3—2: Priority Implementation Projects

Project	TP Reduction (lbs/yr)	Expense	Learn more
Projects Recently Completed			
Cedar Lake Restoration (06-01 Original)	1,500	$295,000	https://www.crwd.org/cedar-albion-swartout-henshaw-project-06-1.html
City of Kimball Stormwater Management (Phase I)	244	$189,550	https://www.crwd.org/willow-creek-kimball-phase-i-stormwater-retention--reuse-project.html
Clear Lake Notched Weir	588	$80,000	https://www.crwd.org/clear-lake-south-notch-weir.html
City of Kimball Stormwater Reclamation and Reuse (Phase II)	1,175	$985,000	https://www.crwd.org/city-of-kimball-stormwater-treatment-phase-ii.html
Kingston Wetland Feasibility Study and Wetland Restoration	1,955	$589,000	https://www.crwd.org/kingston-wetland-feasibility-study-and-restoration-project.html
Conservation Corps Streambank Restoration	TP load reduction associated with sediment load reduction	$65,275	https://www.crwd.org/clearwater-river-channel-stabilization-ccm-riparian-project.html
Cedar Lake Watershed Protection and Improvement Projects (06-01-Modified)	1,280	$583,000	https://www.crwd.org/cash-project-06-1-segner-pond.html

Project	TP Reduction (lbs/yr)	Expense	Learn more
GPS Fertilizer Application	3,200	$437,000	https://www.crwd.org/targeted-fertilizer-application-reduction-project.html
Expand Education Program	N/A	N/A	Incorporated in grant funded scopes of work are efforts to expand the CRWD's Education/ Outreach programs. The CRWD had a strong relationship with Lake Associations and hosts educational events that primarily target adults. The education program was expanded to include social media outreach as well as school age children in the community.
Watkins Area Stormwater Treatment	796	$645,882	Land was acquired for this project in mid-2000s. An initial grant application for $351,906 scored highly but was not selected in 2009 due to amount requested. Conducted additional feasibility work and completed another grant application which was not awarded. The District received grant award in 2015 and began design and permitting. Construction was substantially completed in 2017, and finalized in 2018. https://www.crwd.org/watkins-area-stormwater-treatment-project.html
Clearwater River Restoration & Protection Phase II	TBD	$144,000	Source inventory update complete. Design and implementation of best management practices at prioritized locations underway. https://www.crwd.org/clearwater-river-restoration--protection-phase-ii-project.html
Alternative Tile Intake	TBD	$88,000	A 319 grant to promote the use of alternative tile intakes to reduce sediment, nutrient and bacteria concentrations in the upper watershed. The project, started in 2015, wrapped up in the summer of 2018 with some modifications due to low uptake of the practice. However several other projects which promote load reductions were implemented. https://www.crwd.org/alternative-tile-intake-project.html
Projects In Progress			
Clearwater Harbor/ Hidden River Nitrogen Mitigation Project	NA	$2.8 million	The project is a requirement for the two small community sanitary sewer systems to meet new MPCA regulations for nitrogen. The District is pursuing PSIG funding for the project. Construction was complete in December 2019, and system commissioning will continue for a period of 1 year. https://www.crwd.org/clearwater-harbor---hidden-river-project-18-1-nitrogen-mitigation--analysis-plan-implementation.html
Project	**Potential TP Reduction (lbs/yr)**	**Estimated Expense**	**Status**

Project	TP Reduction (lbs/yr)	Expense	Learn more
Potential Future Projects			
Lake Betsy internal load management	1,300 – 6,500 lbs	$250,000-$600,000	A feasibility study was conducted in 2014 to support project development, alum treatment is under consideration.
Clear Lake soluble phosphorus load from watershed	TBD	TBD	Watershed soluble phosphorus loads to Clear Lake are a priority and needed to meet lake water quality goals. Investigate opportunities to retrofit existing project to incorporate soluble phosphorus removal.
CD 20 project	TBD	TBD	CD 20 is a major source of bacteria to the Clearwater River. Investigate sources and opportunities to mitigate loads.
Watkins soluble phosphorus load reduction project	TBD	TBD	Identify and develop projects to reduce soluble phosphorus loading in the watershed.
Other soluble phosphorus load reduction projects	TBD	TBD	Identify and develop projects to reduce soluble phosphorus loading.
Theil Creek Restoration and Protection	TBD	TBD	Theil Creek is a trout stream in the District. The Board of Managers authorized formation of and participation in a task force to evaluate opportunities to protect and improve the stream.
Fairhaven Creek Restoration and Protection	TBD	TBD	Fairhaven Creek is a trout stream in the District. The Board of Managers authorized formation of and participation in a task force to evaluate opportunities to protect and improve the stream.

4.0 Managers' Plan of Work for 2020

4.1 PLAN OVERVIEW

The CRWD Board of Mangers approved the following plan at their March 11th, 2020 regular meeting. The scope of this plan is limited to a high-level overview, providing a summary of work envision by the CRWD Board of Managers for the year. Throughout the year, new information and opportunities may arise; as such, implementation of the plan may be altered at any time. While focused only on 2020, the plan factors in long-term planning to ensure the District remains on task to accomplish its mission and purposes.

Many work items covered below are too complex to be completely covered in a single, all-encompassing work plan. As such, many of these items have their own stand-alone work plans.

4.2 PLAN DETAILS

Table 4-2 provides detail for each of the five categories that make up the Managers' Plan of Work for 2020.

Table 4—1: 2020 Detailed Plan of Work

Work Category	WMP Goal	Title	Summary	Plans	Priority	Status
Administration	General Coordination	Complete staff transitions	Ongoing improvements are being made to increase productivity. Compile contracts, bonds, update accounting system.	• Make improvements to CRWD's file management system to implement new record retention schedule and provide secure, off-site storage for disaster recovery •Update accounting system	Medium	Ongoing
Capital Improvement	Other	School Section Lake Project #17-1	Newly re-established project, currently in construction phase	• Complete construction. • Move into operation & maintenance phase.	High	Substantially complete
Capital Improvement	Reduce Watershed Loads	Clearwater Harbor - Hidden River Project #18-1	The MN Pollution Control Agency, as part of its operating permit for these two sewer systems, has mandated a nitrogen mitigation and analysis plan (NMAP) be implemented by permit expiration in 2019.	• Year 1 System Commissioning	High	In progress
Capital Improvement	Reduce Watershed Loads- Sediment		CR 17 Partnership - Road + Field Corner		High	In Design
Capital Improvement	Reduce Watershed Loads	Clear Lake North subwatershed - soluble phos abatement	Funding opportunity to better quantify nutrient loading through the Clear Lake North Wetland complex. Previous work by CRWD noted this area high in soluble phosphorus export.	•Perform monitoring study to better quantify nutrient loading sources and rates. • Present results of study and begin working on potential abatement actions.	High	In progress
Capital Improvement	Reduce Watershed Loads	Ag Incentive Programs	The CRWD has a history of leading, partnering and encouraging installation and adoption of practices on agricultural lands to address nutrient exportation to water resources. Today the CRWD has multiple efforts underway to continue this effort.	• Continue to develop partnerships with locals SWCDs to accelerate practice adoption in priority subwatersheds. • Continue district-wide incentive offering, focusing on leveraging existing offerings from outside groups (ex. RIM/ CREP/ CRP, state cost-share, EQUIP) for implementation in prioritized areas.	Medium	Ongoing
Education & Outreach	Education and Outreach	Business Expos	Part of programming to create & increase public awareness, develop ownership & buy-in among citizens in water quality improvement efforts, provide useful information & encourage decision makers and improve adoption of conservation on the landscape.	• Host booth at Annandale Business Expo. • Host booth at Kimball Business Expo.	Medium	In progress
Education & Outreach	Education and Outreach	Education + Outreach		At Board Discretion- 2-3 small events with food. Clear Lake, Cover Crops, Cedar Lake, Targeted subwatershed outreach with food. Pollinators?, Shoreland Protection, partner with DNR, River Bank Protection,	High	
Education & Outreach	Education and Outreach	Education + Outreach		• Continue to maintain website, make social media postings as time allows.	High	Not complete

Work Category	WMP Goal	Title	Summary	Plans	Priority	Status
Education & Outreach	Education and Outreach	Bi-annual press releases		• Complete press releases summer and winter 2018.	Medium	Not complete
Education & Outreach	Education and Outreach	Brochures on CRWD activities		• Minimum two-page document	Medium	Not complete
Education & Outreach	Education and Outreach	Outreach to public officials and stakeholders		• As able, attend meetings (ex. lake associations) to discuss watershed issues.	Medium	Ongoing
Education & Outreach	Education and Outreach	School-age education outreach	A few years ago, the CRWD make a significant investment in outreach of school-age children by partnering with the Sauk River Watershed District and its programming.	• Continue to provide adequate funding to continue this partnership.	High	Ongoing
Education & Outreach	Environmental Education	CE 2.0	Make new investments to help improve CRWD storytelling	• Take high-quality photos/ videos of CRWD projects and activities.	High	
Monitoring	Performance Monitoring	Annual Project Inspection Program	The CRWD has implemented an annual inspection program of its existing infrastructure as part of its commitment to ensuring all projects are operationally effective.	• Perform visual inspections of each CRWD infrastructure during the months of April - June. • Summarize inspections in a report to the CRWD Board by July. Prioritization of necessary repairs/ modifications follows.	High	Annual
Monitoring	Other	Fairhaven Creek monitoring study		• Implement a monitoring study to help determine issues in subwatershed, seeking grant funding to help improve conditions.	Medium	Complete
Monitoring	Reduce Watershed Loads- SRP		Augusta Wetland loading assessment			
Monitoring	Performance Monitoring	Annual Water Quality Monitoring Program	Program to collect water quality data (primarily chemistry and hydrology) to establish trends, assist with setting goals, determine projects, practices, and programs to implement and evaluate effectiveness of completed projects, practices and programs.	• Refer to individual work plan	High	Annual
Monitoring	Performance Monitoring	Field testing data collection application	Software application to assist with water quality monitoring in the field.	• Complete field testing.	Medium	Complete
Monitoring	Other	Theil Creek monitoring study		• Implement a monitoring study to help determine issues in subwatershed, seeking grant funding to help improve conditions.	Medium	Complete
Operation & Maintenance	Reduce Watershed Loads	Maintain sanitary sewer systems	The CRWD owns and operates four communal wastewater treatment systems that were petitioned either by developers or Stearns County.	• Continue to operate and maintain said systems via professional management contract and set maintenance schedules.	High	Ongoing

Work Category	WMP Goal	Title	Summary	Plans	Priority	Status
Operation & Maintenance	Maintain Biologic Integrity	Vegetation Management Program	Several CRWD projects require various levels of vegetation management. For maintaining native plantings to controlling invasive and noxious species, this program ensures the work is completed.	• Get quotes for management services at select CRWD projects. • Control woody vegetation and noxious species at three sewer systems treatment areas. • Control woody vegetation and noxious species at the three wetland treatment systems and the isolation unit.	High	Scheduled for 2019
Operation & Maintenance	Maintain Biologic Integrity	Existing CRWD AIS Projects	The CRWD is addressing AIS in three ways: 1) acting as a fiscal agent via establishment of projects to control existing and new AIS infestations on lakes were residents have petitioned for projects, 2) serve in advisory roles on county-established AIS committees and task forces and 3) encourage local groups and governments, along with state groups and governments, in their AIS efforts and provide support as needed/ as able.	• Continue fiscal agent role. • Consider amending projects, instituting projects based on resident efforts. • Continue to advise county AIS programs	High	Ongoing
Operation & Maintenance	Other	Bog Control Projects	Instituted in the 1980s to control floating bogs that could potentially cause flooding problems by blocking flow at key choke points, namely the Grass Lake Dam, the channel between Grass and Clearwater Lake and the channel between Augusta and Clearwater Lake. Can also remove problem floating bogs below Grass Lake Dam if deemed necessary.	•As needed, remove floating bogs that threaten to block flow at noted points.	High	As needed
Operation & Maintenance	Control Flooding, Reduce Watershed Loads	Pleasant Lake Outlet Control Project	Instituted in the 1980s to provide flood control assistance.	• Complete small repairs. • Operate as needed.	High	Ongoing
Operations & Maintenance	Reduce Watershed Loads		Maintenance Projects, Watkins (2), Swartout IESF, Fish Barriers, CD 20 Outlet,			
Operations & Maintenance	Reduce Watershed Loads- Biological Load		Operations Contract w/ Blackstone for fish migration, lake outlets, Swartout Boards, Kimball Boards			
Operations & Maintenance	Reduce Watershed Loads		Watkins Retrofit South of 55			

Work Category	WMP Goal	Title	Summary	Plans	Priority	Status
Operation & Maintenance	Reduce Watershed Loads	Watkins Wetland Treatment System - Maintenance/ Restoration	Previous project inspections have noted this project needs channel and berm maintenance. In addition, monitoring has indicated this wetland is likely a soluble phos source.	• Direct engineer to undertake study on potentially retrofitting the system. • Implement recommendations.	High	In progress
Operation & Maintenance	Reduce Internal Loads	Replace Henshaw Lake Fish Barrier	Current barrier is not functioning. Requires frequent cleaning.	• Replace with new design. Work with township on replacement.	High	In progress
Operation & Maintenance	Reduce Internal Loads	Ongoing rough fish management	Fish seining has been performed on multiple lakes in the CRWD to improve lake ecology and maintain water quality. Multiple fish traps and migration barriers have been installed in the CRWD to improve management.	• Maintain existing fish migration barriers. • Trap & sein from lakes/ streams as deemed necessary. State Highway 55 fish trap will not be operated in 2018. • Consider add'l investments to improve management efforts.	High	In progress

Clearwater River Watershed District

2019 Annual Report

Appendix A: 2019 Monitoring Program

Resilience
RESOURCES LLC

TO: BOARD OF MANAGERS

FROM: DISTRICT ENGINEER

DATE: 4/16/2019

SUBJECT: PROPOSED 2019 WATER QUALITY MONITORING PROGRAM

Introduction

The Clearwater River Watershed District has conducted an annual water quality monitoring program at select locations throughout the watershed since 1981 in an effort to assess District progress towards water quality goals, track long-term water quality trends, and evaluate effectiveness of existing water quality improvement projects and programs. The proposed 2019 program is in line with previous efforts however has pulled back in some areas to reduce scope.

Baseline Monitoring: Lakes

The recommended 2019 lake monitoring includes the 9 lakes covered by the SWAG grant (except OP), and Pleasant, Bass and School Section recommended additional (Table 2) for a total of 12 lakes.

- Lakes sampled monthly June – September (Parameters: temperature and dissolved oxygen profiles, Secchi depth, Chlorophyll-A, ortho-phosphorus and total phosphorus surface samples).
- Aquatic vegetation survey schedule (by others) is shown in Table 4.

Baseline monitoring: Streams

The recommended 2019 stream monitoring includes the 9 streams shown in Table 5 (no water quality sample at 10.5).

- All streams will be monitored monthly April to October (Parameters include: temperature, dissolved oxygen, pH, specific conductance and flow, ortho-phosphorus, total phosphorus and total suspended solids).
- Continuous water level monitoring will be recorded using pressure transducers at stations CR28.2, CR16.7 (Fairhaven Dam) CR10.5, CD 20-1.0, SSW04 (Illsley Ave), Theil Creek and School Section Lake.

Table 1: Proposed 2019 Water Quality Monitoring Cost & Fund Allocation

Category	Sites	Lab	Labor	Total
Lake Monitoring	12	$5,327	$4,050	$9,377
Stream Monitoring	9	$2,550	$3,938	$6,488
Continuous water level monitoring	8		$2,800	$2,800
Lake Level Gauge Install	10		$2,625	$2,625
Rain gauges	6		$1,575	$1,575
Expenses (mileage, supplies, shipping, rentals)				$7,000
Reporting, lab coordination, submittals				$32,000
SUBTOTALS	45	$7,877	$14,988	$61,865
10% contingency				$6,186
SWAG				($19,390)
TOTAL				**$48,661**

Funding Source	Costs
General [100]	$21,898
Chain of Lakes [210]	$21,898
Project #06-1 [215]	$1,946
SSL#17-1 [407] (Lake + Thiel Creek)	$2,920
SWAG	$19,390

Table 2: Baseline lake monitoring for CRWD lakes

STATIONS	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Clearwater East^*	X	X		X		X		X		X		X~	X		X		X
Clearwater West^*		X	X		X		X		X		X	X~		X		X	
Augusta^*		X	X	X	X	X	X	X	X	X	X	X~	X	X	X	X	X
Caroline*	X	X	X	X	X	X	X	X	X		X			X		X	
Marie^*	X	X	X	X	X	X	X	X	X	X	X	X~		X		X	
Louisa^*		X	X	X	X	X	X	X	X	X	X	X~	X		X		X
Scott*	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
Betsy*		X	X	X	X	X	X	X	X	X	X	X~	X	X	X	X	X
Clear	X	X	X	X	X	X	X	X	X	X	X	X~	X	X	X	X	X
Cedar^#	X	X	X	X	X	X	X	X	X	X	X	X~		X		X	
Albion#	X	X	X	X	X	X	X	X	X	X	X			X		X	
Swartout#	X	X	X	X	X	X	X	X	X	X	X			X		X	
Henshaw#	X	X	X	X	X	X	X	X	X	X	X			X		X	
Bass	X	X		X		X			X			X			X		
Grass*	X	X		X		X		X					X				
Little Mud		X			X			X					X	X			X
Nixon	X	X		X		X			X				X		X		
Otter		X			X			X					X		X		
Pleasant	X	X	X		X		X		X			X				X	
School Section		X		X		X		X				X				X	
Union	X	X	X	X	X	X	X	X	X	X	X	X~		X			X
Wiegand*!		X															
TOTALS	14	22	14	17	16	17	14	17	16	12	13	12	8	13	9	13	8

NOTES

^ denotes a lake that has a CRWD AIS Project

* denotes a lake that falls under the 1980 Project

# denotes a lake that falls under Project #06-1

~ SWAG Funding

! Wiegand lake sampling was discontinued in favor of stream sampling at Nordell Bridge downstream; that event will be tracked in separate schedule going forward

Table 3: Lake sediment surveying for CRWD lakes

STATIONS	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Clearwater East^*																	
Clearwater West^*																	
Augusta^*			X											X			
Caroline*														X			
Marie^*!											X						
Louisa^*!											X						
Scott*			X														
Betsy*		X											X				
Clear		X											X		X		
Cedar^#																	
Albion#																	
Swartout#										X							
Henshaw#																	
Bass																	
Grass*																	
Little Mud																	
Nixon																	
Otter																	
Pleasant																	
School Section																	
Union															X		
Wiegand*																	
TOTALS	0	2	2	0	0	0	0	0	0	1	2	0	2	2	2	0	0

NOTES

^ denotes a lake that has a CRWD AIS Project

* denotes a lake that falls under the 1980 Project

# denotes a lake that falls under Project #06-1

! These lakes had surveys completed in 2006

~ denotes outside entity plans to complete (ex. MNDNR, MPCA, lake association)

Table 4: Proposed Long-Term Lake Assessments: Indices of Biological Integrity (Vegetation/ Fisheries Surveying)

STATIONS	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Clearwater East^*	F!						F+	PI+, F!		PI+,D+~	D+~	D+~	PI+,D+~	D+~	D+~	PI+,D+~
Clearwater West^*								PI+		PI+,D+~	D+~	D+~	PI+,D+~	D+~	D+~	PI+,D+~
Augusta^*							F+		PI+,D+~	D+~	D+~	PI+,D+~	D+~	D+~	PI+,D+~	D+~
Caroline*							F+						PI			
Marie^*!							F+			PI+,D+~	D+~	D+~	PI+,D+~	D+~	D+~	PI+,D+~
Louisa^*!							F+			PI+,D+~	D+~	D+~	PI+,D+~	D+~	D+~	PI+,D+~
Scott*													PI			
Betsy*					F+		V			PI, F+			PI			
Clear					V+	F+				PI, F+			PI			
Cedar^#							F+	PI+	PI+,D+~	D+~	D+~	PI+,D+~	D+~	D+~	PI+,D+~	D+~
Albion#				V+		PI	PI	PI			PI			PI		
Swartout#			PI	PI	PI	PI, V+	PI	PI			PI			PI		
Henshaw#						PI, V+	PI				PI			PI		
Bass								V+		F+						PI
Grass*							F+									PI
Little Mud									PI+							
Nixon							V+									PI
Otter				F+, V+											PI	
Pleasant										F+					PI	
School Section	F+, F!			V+											PI	
Union					F+			V+	PI	F+			PI			
Wiegand*																
TOTAL (by CRWD)	0	0	1	1	1	3	3	2	1	2	3	0	2	3	3	3

NOTES F stands for standard fisheries survey, PI stands for point-intercept survey, D stands for AIS delineation, V stands for vegetation survey

^ denotes a lake that has a CRWD AIS Project

* denotes a lake that falls under the 1980 Project

# denotes a lake that falls under Project #06-1

! Fish IBI assessment and/or targeted survey was performed by MNDNR

~ denotes will be completed under CRWD AIS Project Policy

+ denotes outside entity performed (ex. MNDNR, lake association)

Table 5: Baseline stream monitoring for CRWD streams

STATIONS	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
SCE01~!	X	X	X	X	X	X	X	X									
SHE01*!	X	X	X	X	X	X	X	X									
SSW01*!	X	X	X	X	X	X	X	X									
SSW02*#	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	
SSW04*	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CR7.0 (Nordell Br)					X			X									
CD10.5	X	X	X	X	X	X	X	X	X	X	X	Flow only	X	X	X	X	X
CR28.2^	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CR29.0^				X	X	X	X	X	X	X	X		X	X	X	X	X
CLN			X		X	X	X	X	X	X	X	X	X	X	X	X	X
CLS#			X		X	X	X	X	X	X	X		X	X	X	X	X
CD20-1.0^		X				X	X	X	X	X	X	X	X	X	X	X	X
CD20-2.2^						X	X	X	X			X					X
LAWT									X								X
ULST									X							X	
ULWT									X							X	
WS1^#										X	X		X	X	X		
WC2.5^					X	X	X	X				X			X		
WC3.0^					X	X	X	X				X			X		
WR0.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TOTALS	8	9	10	9	14	15	15	16	13	10	10	9	10	10	13	11	10

NOTES ^denotes a site that falls under the 1980 Project *denotes a site that falls under Project #06-1

#Multiple samples taken to test project effectiveness *denotes outside entity plans to complete (ex. MNDNR, MPCA, lake association)

!These sites were discontinued in 2016- they are lake outlets and the lakes are sampled yearly (redundant)

Table 6: Baseline 2019 Monitoring Schedule- at a glance

Category	2019 Schedule	Station	Parameters
Lakes:	Once per month, May- Sept. Note: lake sampling to be completed by September 15	*Clearwater (East + West), Augusta, Marie, Louisa, Betsy, Cedar, Clear, Union (SWAG Grant) and Pleasant, Bass and School Section.	*Field: Secchi depth, DO and temperature profiles. *Lab: surface samples for total phosphorus, ortho phosphorus and chlorophyll-a. *Additional parameters for SWAG grant in 2019.
Streams:	Monthly April-November Note: additional samples taken at SSW04 and Watkins Stormwater	*CLN, CR10.5, WR0.2, WC 2.5, WC 3.0 (General Fund) *CD20-1.0 CD20-2.2, CR28.2, (Chain of Lakes O&M Fund) *SSW04 (Project #06-1 O&M)	Field: DO, temperature, conductivity, pH Lab: total phosphorus, ortho phosphorus, TSS (no grab samples at CR10.5 as Clearwater Lake samples are sufficient)
	Continuous WSEL: April-October	*CR10.5 & CR16.7 (FHD) (General Fund) *CR28.2, (Chain of Lakes O&M Fund) *SSW04 (Project #06-1 O&M) *School Section Lake, TC1 (Project #17-1 Capital Fund)	*Place pressure transducers after ice-out, check throughout year, pull in October *TC1 will also have stream field parameters taken whenever they are checked
Lake Levels	Weekly	Administrator recruitment	Level
Precipitation:	Daily	Multiple in watershed	Rain gauge stations (6)
Note: any approved supplements are added to the schedule at field staff's discretion.			

Clearwater River Watershed District

2019 Annual Report

Appendix B: 2019 Report Cards

METHODS FOR DETERMINING VEGETATION & FISH HEALTH

Overview

Biodiversity is important in maintaining a healthy lake ecosystem. Biodiversity is considered to be a principle driver of ecosystem function and critical to ecosystem resilience and stability. A diverse ecosystem provides a number of services such as nutrient recycling, improved water quality, and increased recreational opportunities. Human disturbances often lead to a decrease in species diversity resulting in a weakening and/or loss of support to the ecosystem services provided by healthy biotic community.

The development of health assessment indices have provided a means in which natural resources managers can evaluate and monitor the health of a lake's biological community to help focus restoration and preservation efforts. The species that make up a community vary in their tolerance to human disturbances, therefore, as the episodic and cumulative disturbances occur to a system a decrease in species richness and a shift to species that are very tolerant to disturbance. Assessment tools developed by the MnDNR use these tolerance differences to relate the relative health of a given lake. Specifically, different sets of tools have been developed to relate the health of the fish community (Fish IBI) and another set of tools for the vegetation community (FQI).

Floristic Quality Index

The Floristic Quality Index (FQI) is a vegetation health assessment tool that is based on a metric of species richness and a Coefficient of Conservatism (C), which is a score (0 -10) that relates a species site fidelity and tolerance to disturbance. Thus, species that have narrow habitat ranges and/or low tolerance to stress have high C-values. Therefore, the more species observed in a lake and the greater the C-values the greater the system health.

FQI assessment was designed to allow for health assessment from various community sampling techniques. Three different survey methods can be used: Minnesota Biological Survey methods, MnDNR transects or point intercept surveys (most common). All three methods have limitations yet all are relatively good at capturing and evaluating the health of the vegetation community.

Due to natural differences in species composition between deep and shallow lakes and ecoregions, two unique sets of thresholds were developed for FQI scoring for the North Central Hardwoods ecoregion (Table 1). The MnDNR has performed at least one survey and FQI assessment on all of the CRWD lakes presented in this appendix. Each lake report card shows the most recent FQI score for each lake and how it relates to the impairment thresholds presented in Table 1. It should be pointed out that the report cards only show FQI assessments conducted by the MnDNR, and therefore do not include any FQI assessments based on surveys performed by CRWD or other parties.

Table 1: Minnesota Department of Natural Resources North Central Hardwoods ecoregion point intercept and transect sampling FQI impairment thresholds for deep and shallow lakes.

Classification	Deep	Shallow
Exceptional	32.4	26.0
Impaired	18.6	17.7

Fish Index of Biotic Integrity

The Fish IBI is comprised of multiple metrics that integrate aspects of species richness, community assemblage, and trophic composition. The combining of all individual metrics results in a single score that relates the relative health of the fish community with healthier systems having greater overall scores. Low scores are typically associated to imbalanced communities filled with tolerant species and high scores are typically received when communities are balanced and filled with intolerant species.

Fish IBI sampling includes trap and gill net surveys along with nearshore backpack electrofishing and beach seining. Together these various sampling gears are able to capture information from various habitats throughout a lake and also target all fish species.

Minnesota lakes that fall within lake classes 20 - 43 (Schupp lake classification) have been partitioned into four distinct Fish IBIs. Lake class groups are clustered together using eight lake attributes that account for the expected variability of a fish community due natural phenomenon (Table 2).

Table 2: Minnesota Department of Natural Resources fish IBI tool classification.

IBI Tool	Schupp's Lake Class	Lake Classification Group Description
2	22, 23, 24, 25, 27	Generally, deep lakes with high shoreline complexity (SDI) that are typically less than 80% littoral.
4	28, 29, 30, 31, 32	Compared to LCG 2 these lakes on average are smaller, have intermediate littoral area, have less shoreline complexity (typically rounder basins). They also typically have a low trophic status, low phosphorus levels, and clearer water compared to LCG2.
5	33, 34, 35, 36, 37, 39	Central and Northern MN lakes of shallow to moderate depths (mostly littoral). Generally, naturally eutrophic lakes with lots of vegetation and soft sediment.
7	38, 41, 42, 43	Shallowest lakes typically consisting of > 80% littoral area. Primarily in the southern half of the state. Excludes winterkill lakes (w/in 10 years) and riverine lakes

Due to these expected differences and unique IBIs each tool has its own set of thresholds to generalize the relative health of a lake's fish community (Table 3).

Table 3: Minnesota Department of Natural Resources impairment thresholds for fish IBI tools.

Classification	Tool 2	Tool 4	Tool 5	Tool 7
Exceptional	64	59	61	NA
Impaired	44	38	24	36

The MnDNR has performed Fish IBI assessments on six lakes throughout the CRWD: Cedar, Betsy, Louisa, Clearwater, School Section, and Bass. The lake report cards for each of these lakes present the Fish IBI score and how it relates to the impairment thresholds presented in Table 3.

More information on Fish IBI methodology can be found on the MnDNR's website:

http://www.dnr.state.mn.us/waters/surfacewater_section/lake_ibi/index.html

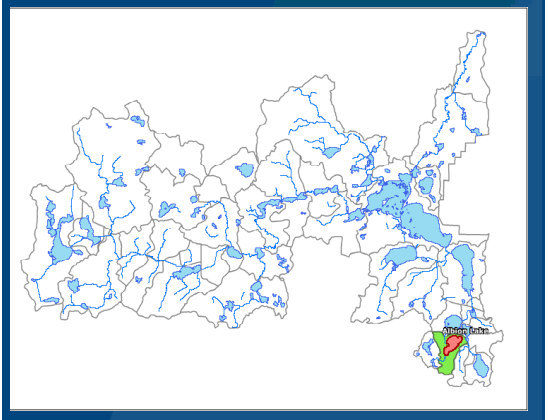
ALBION LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

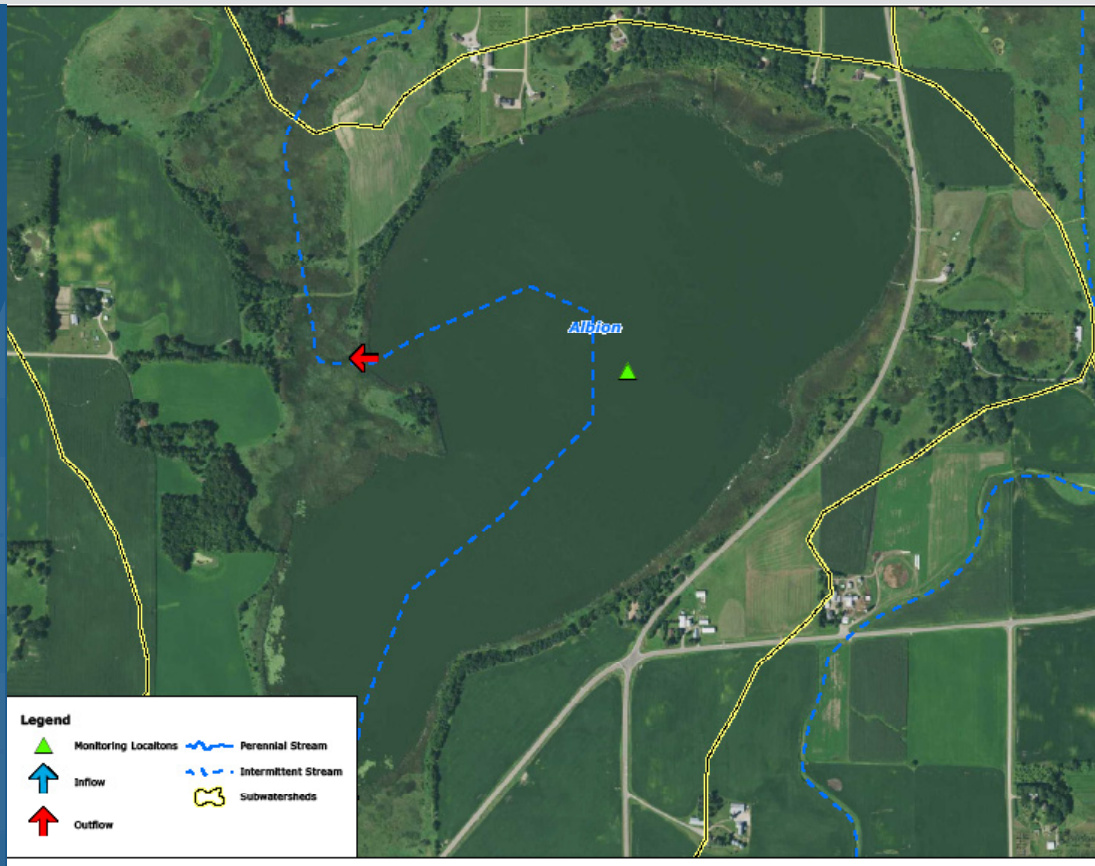
- **Littoral Area**: 251 acres
- **Residence Time**: 1477 days
- **Surface Area**: 251 acres
- **Subwatershed Area**: 1,094 acres
- **Maximum Depth**: 9 feet
- **Upstream Waters**: None

Common Fish	Common carp, black bullhead
Dominant Vegetation	Sago pondweed
Invasive Species	Curly-leaf pondweed
Status	Impaired; TMDL Completed 2010



TO DO LIST

- Rough fish management
- AIS management
- Manage upstream loads



Fish Health (IBI)

Impaired	Supporting
0	36 — 100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

12.7

Impaired	Supporting	Exceptional
0 — 17.8		26

**Sample date: 8/14/2015*

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0 — 3.3		7.5

**Sediment release rate has not been assessed*

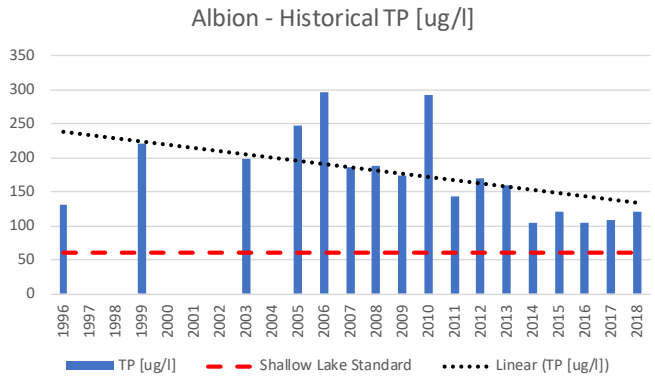
Resilience RESOURCES LLC

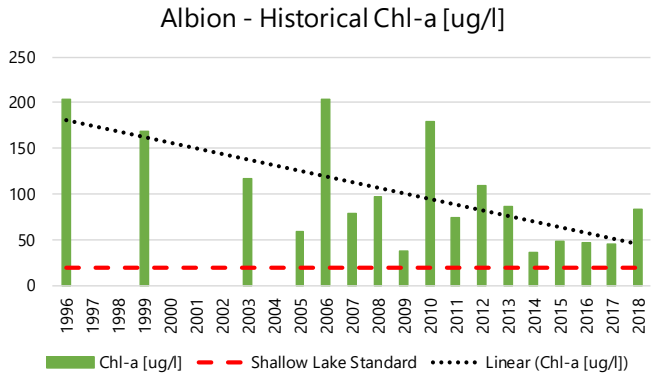
ALBION LAKE

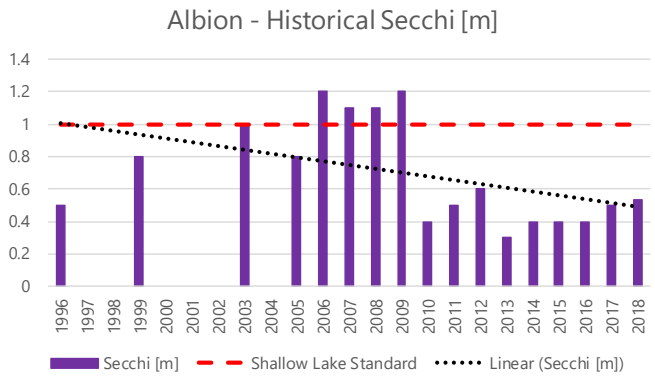
2019 Water Quality

Lake not sampled

Historic Water Quality





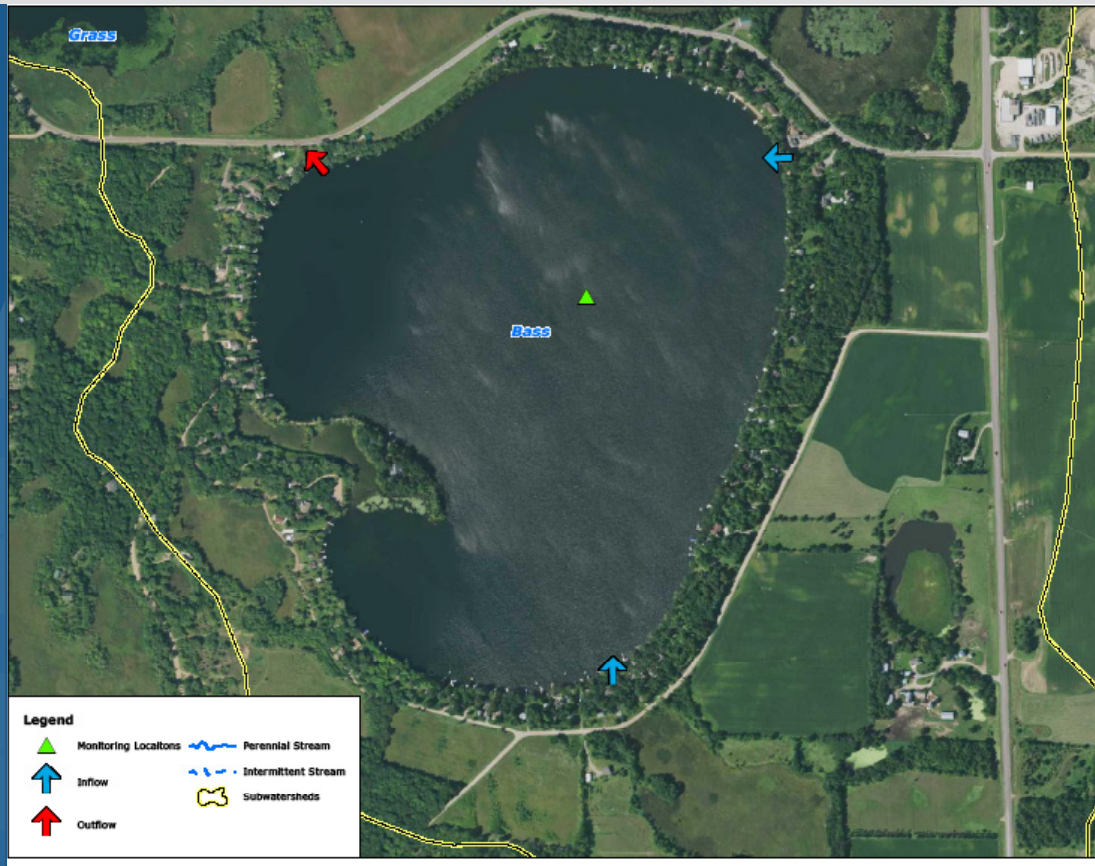


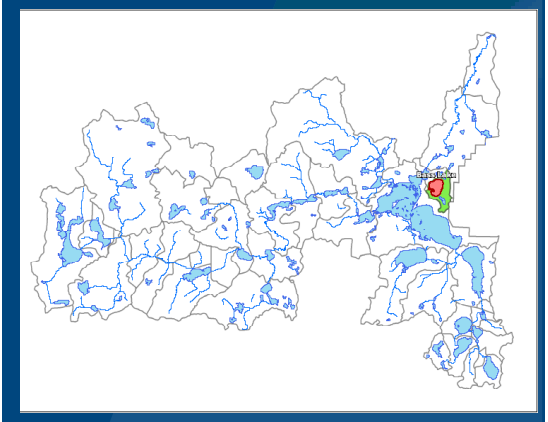
BASS LAKE

Clearwater River WATERSHED DISTRICT
Protect · Protect · Preserve

QUICK FACTS

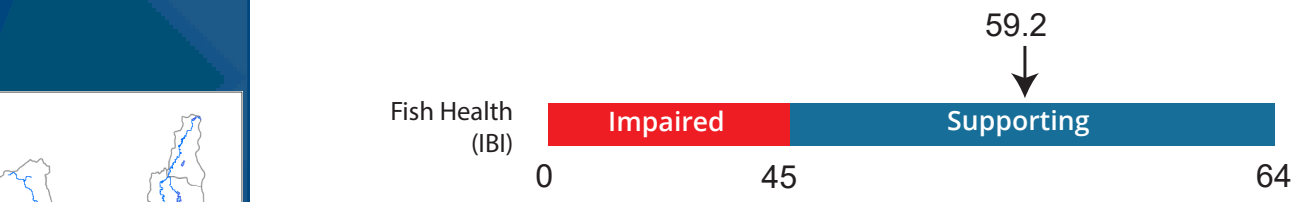
- **Littoral Area**: 96 acres
- **Surface Area**: 222 acres
- **Subwatershed Area**: 796 acres
- **Maximum Depth**: 34 feet
- **Upstream Waters**: None
- **Common Fish**: Bluegill, Northern Pike, Yellow Bullhead, Largemouth Bass
- **Dominant Vegetation**: Currently obtaining vegetation info from DNR
- **Invasive Species**: Currently obtaining vegetation info from DNR
- **Status**: Not impaired



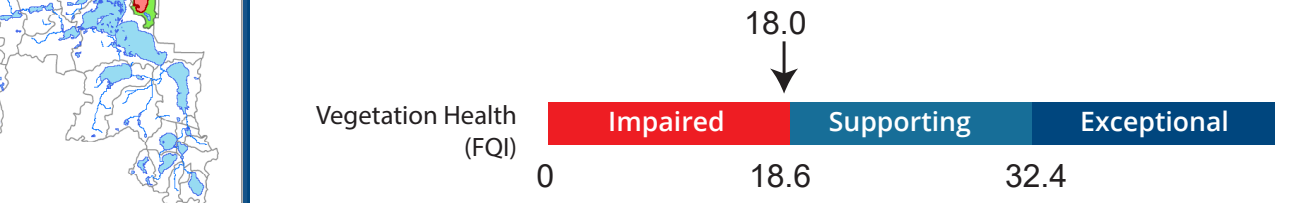


TO DO LIST

- Protect water quality
- Manage upstream loads
- AIS management and prevention



*Sample date: 8/09/2017



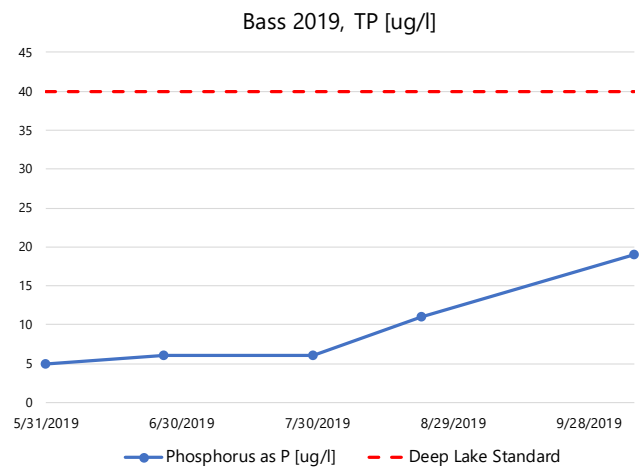
*Sample date: 8/10/2015

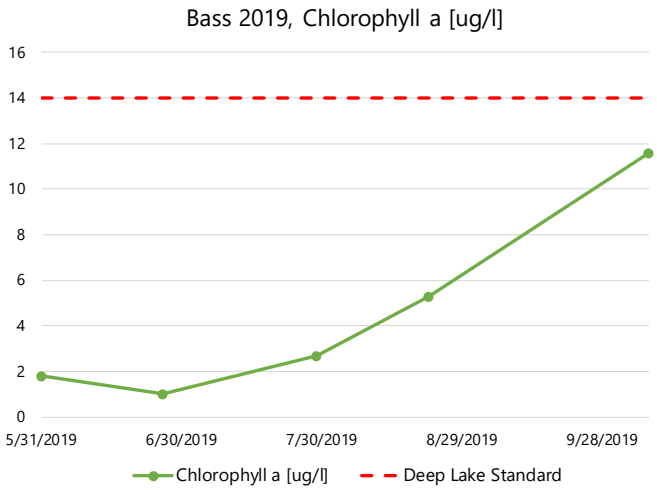
*Sediment release rate has not been assessed

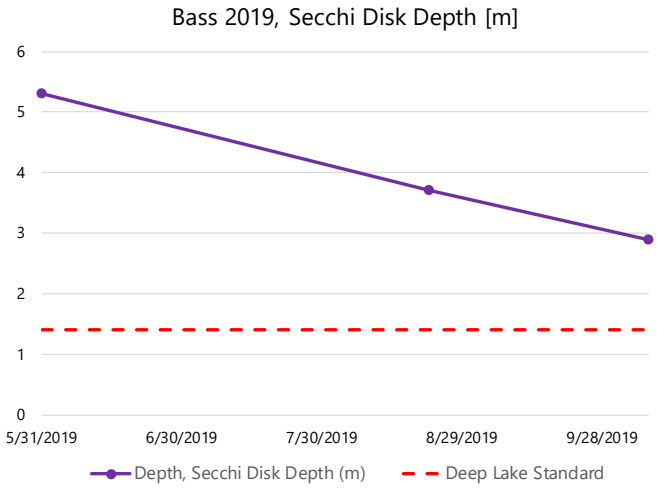
Resilience RESOURCES LLC

BASS LAKE

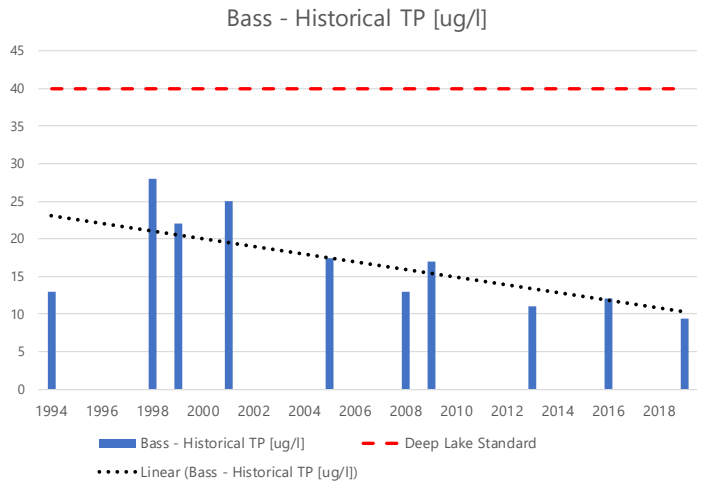
2019 Water Quality

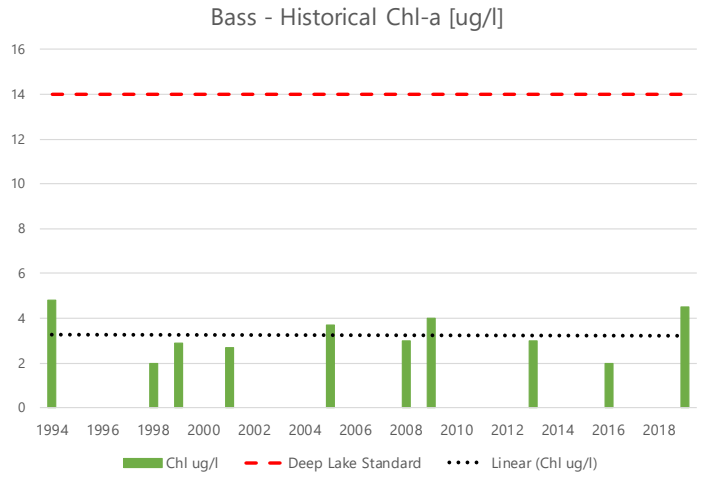


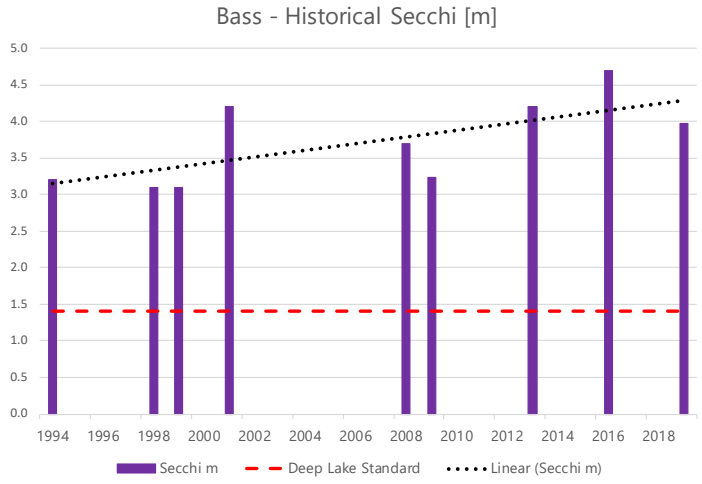




Historic Water Quality







CEDAR LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

Littoral Area: 315 acres

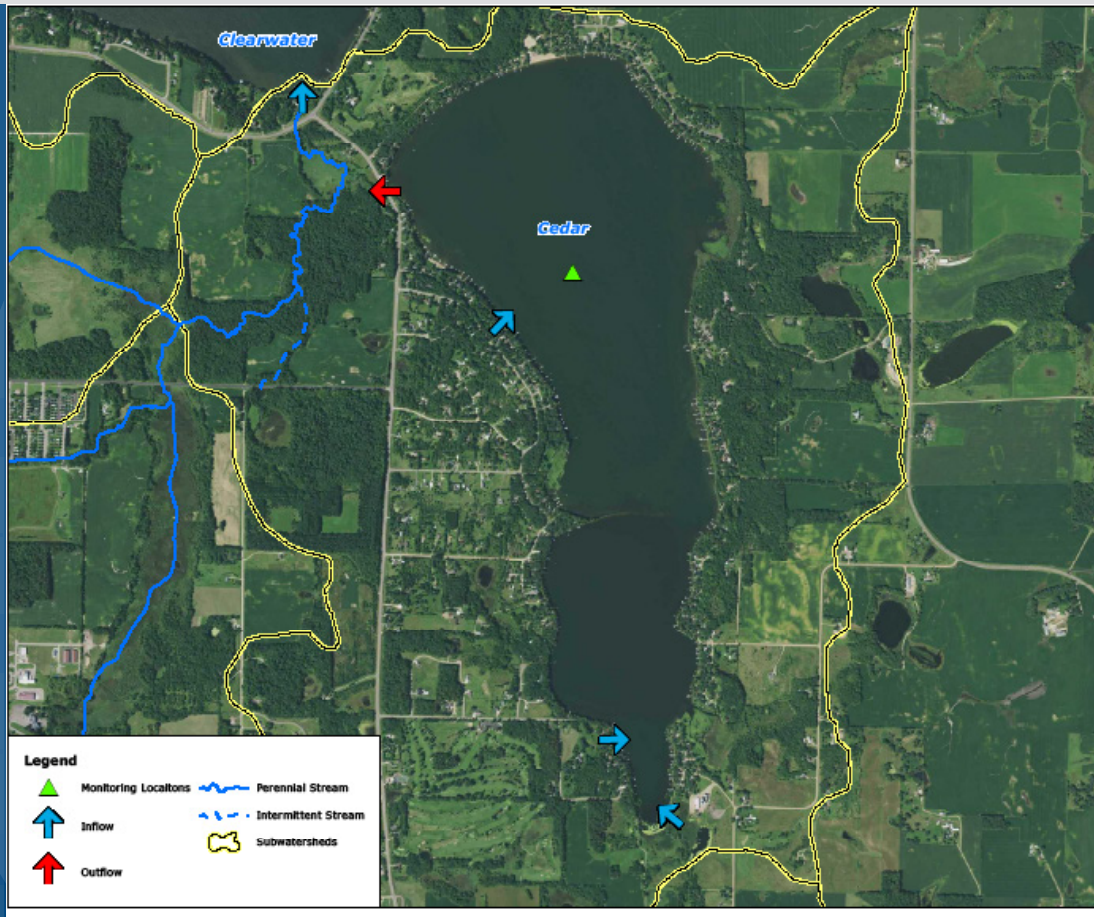
Surface Area: 790 acres

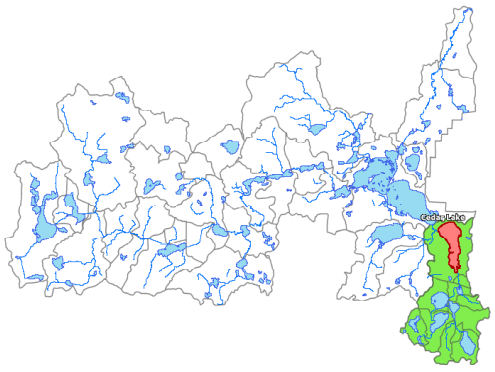
Subwatershed Area: 9,715 acres

Maximum Depth: 108 feet

Upstream Waters: Swartout, Albion, Henshaw

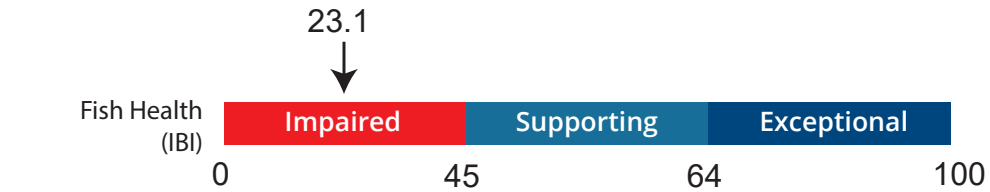
Common Fish	Bluegill, Northern Pike, Walleye, Largemouth Bass
Dominant Vegetation	Coontail, northern water milfoil, chara
Invasive Species	Eurasian water milfoil, curly-leaf pondweed
Status	Not Impaired



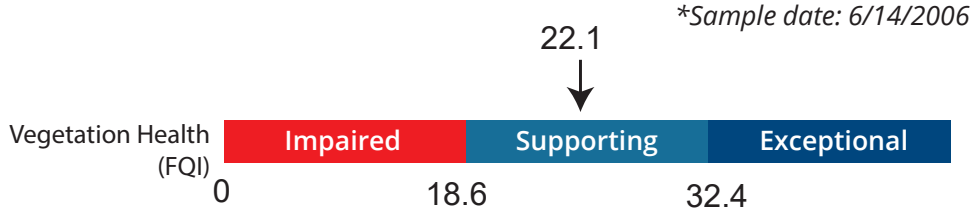


TO DO LIST

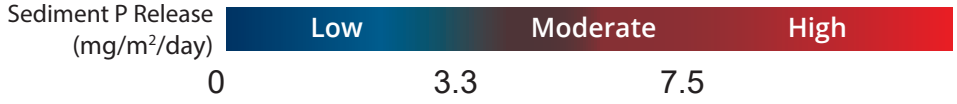
- AIS management
- Rough fish management in upstream lakes
- Manage upstream soluble P loads



*Sample date: 6/14/2006



*Sample date: 8/17/2015



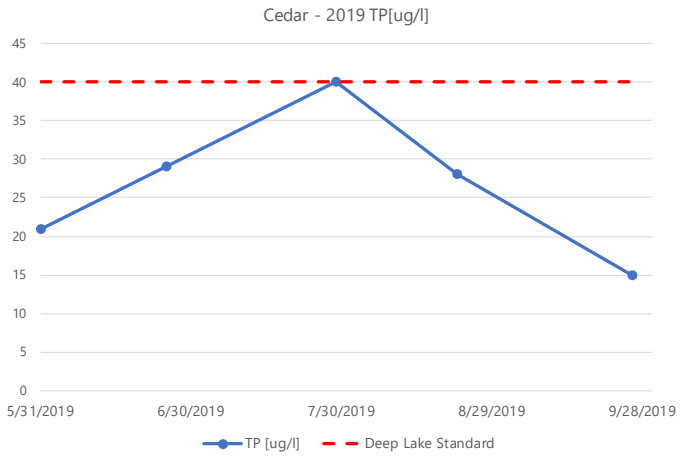
*Sediment release rate has not been assessed

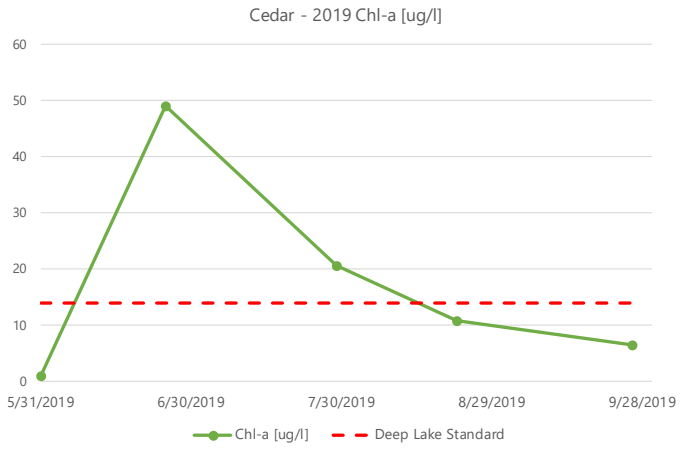
Resilience RESOURCES LLC

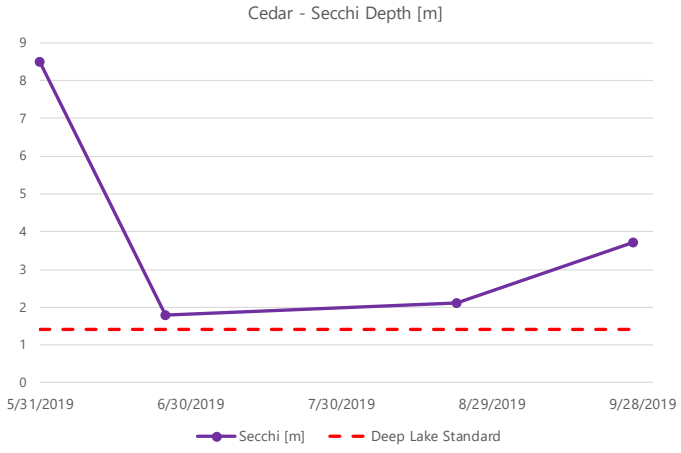
CEDAR LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

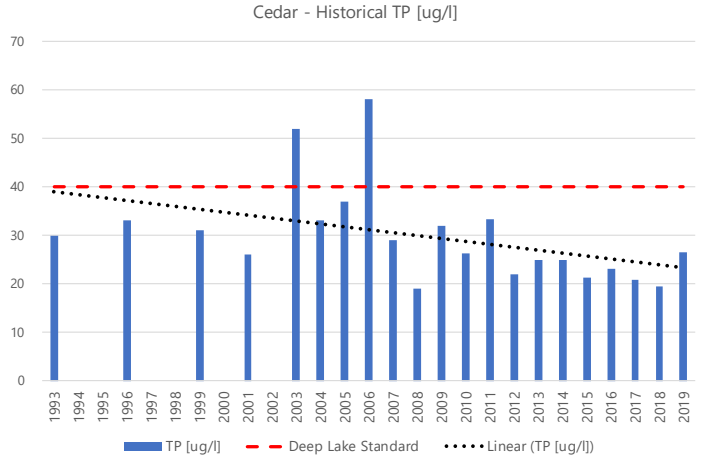
2019 Water Quality

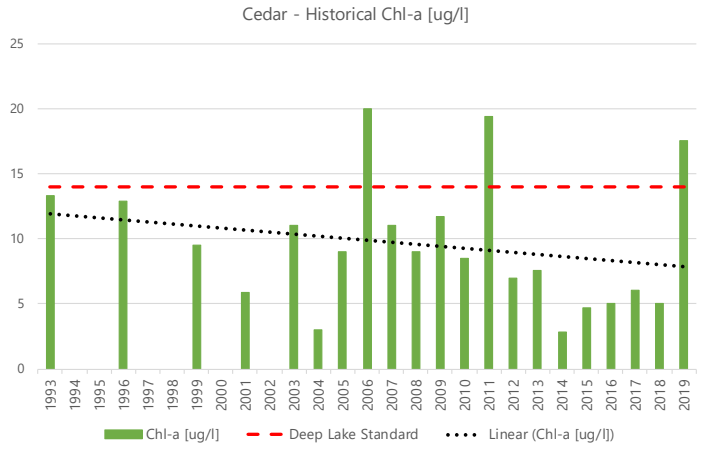


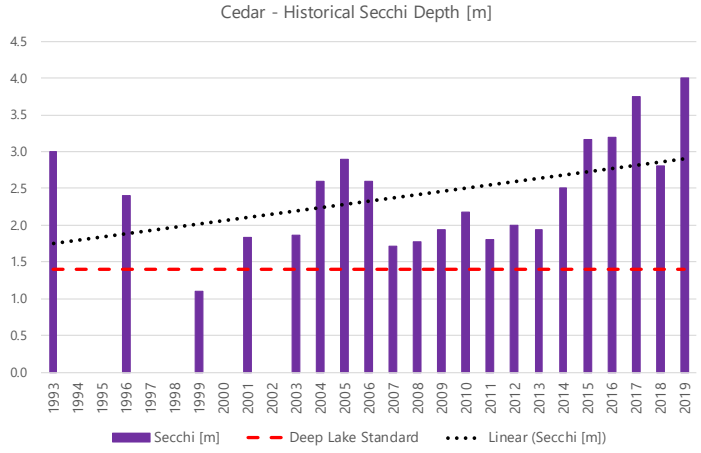




Historic Water Quality







Resilience RESOURCES LLC

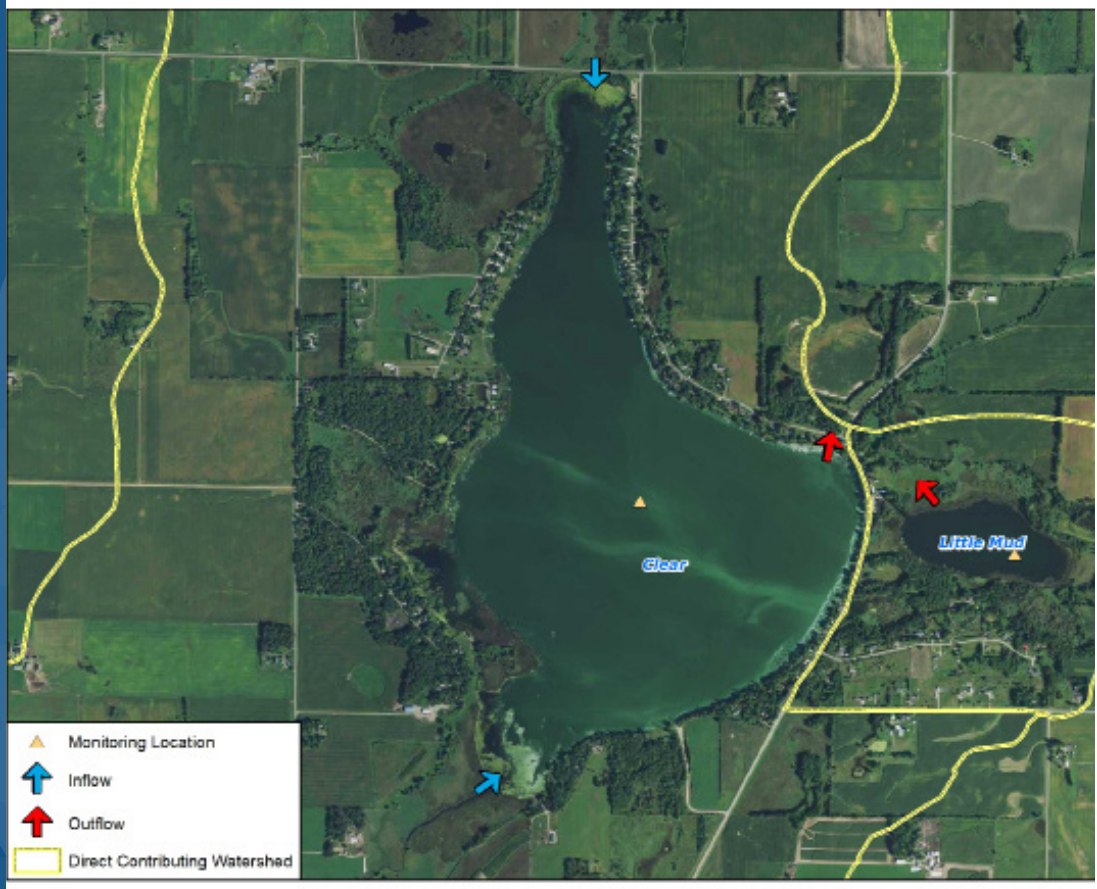
CLEAR LAKE

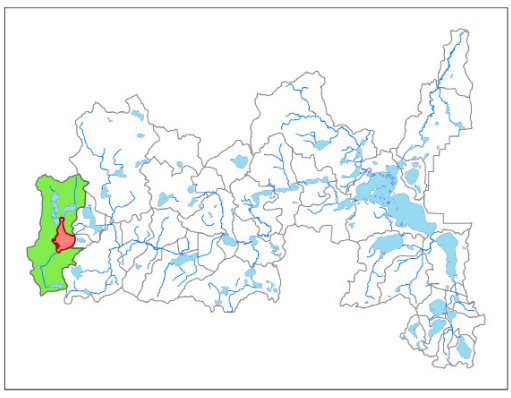
Clearwater River WATERSHED DISTRICT
Protect · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 441 acres
- **Residence Time**: 686 days
- **Surface Area**: 529 acres
- **Subwatershed Area**: 6,801 acres
- **Maximum Depth**: 18 feet
- **Upstream Waters**: None

Common Fish	Northern Pike, Black Crappie, Walleye, Bluegill
Dominant Vegetation	Coontail
Invasive Species	Eurasian water milfoil, Curly-leaf pondweed
Status	Impaired, TMDL completed in 2009





TO DO LIST

- AIS Management
- Manage rough fish
- Manage upstream soluble P loads

Fish Health (IBI)

Impaired | Supporting

0 — 36 — 100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

25.5

Impaired | Supporting | Exceptional

0 — 18.6 — 32.4

**Sample date: 8/22/2017*

Sediment P Release (mg/m²/day)

2.4

Low | Moderate | High

0 — 3.3 — 7.5

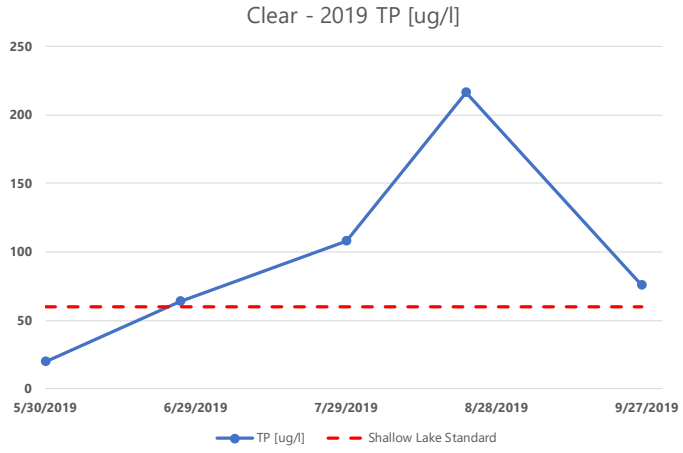
**Sample date: 2009*

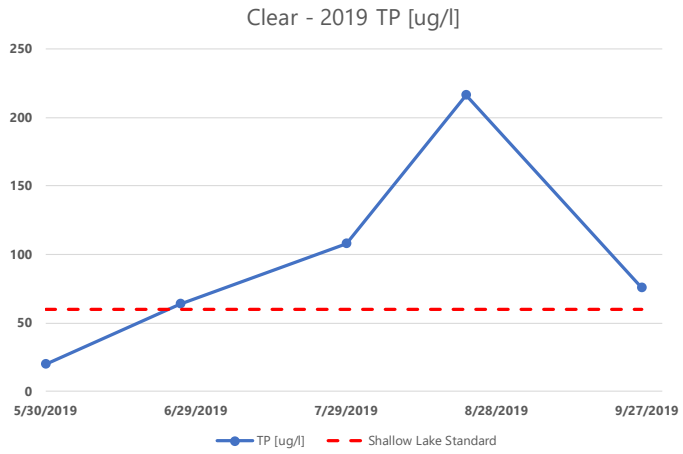
Resilience RESOURCES LLC

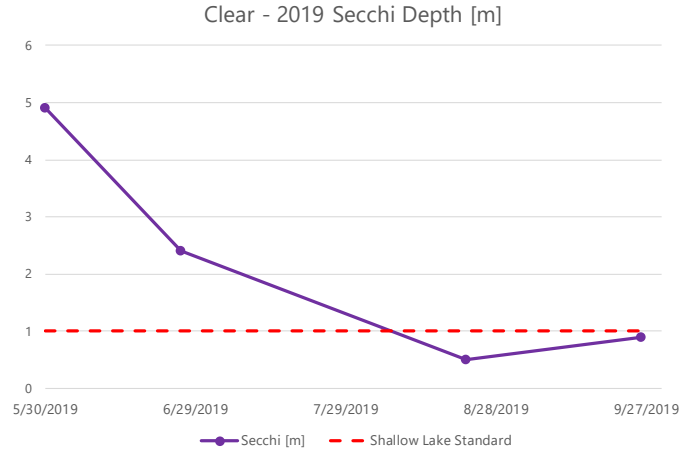
CLEAR LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

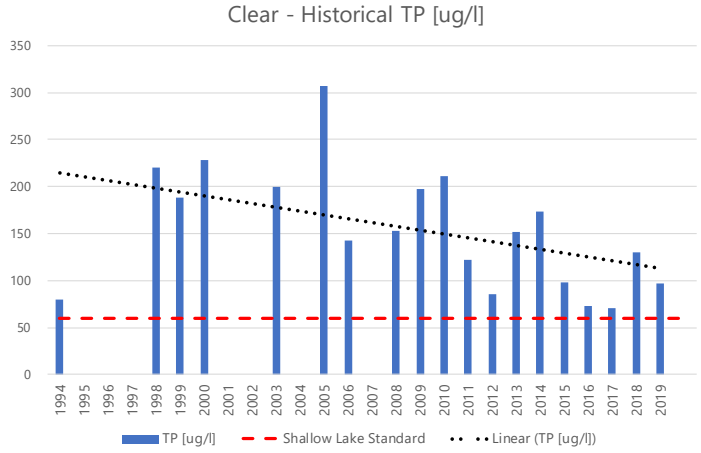
2019 Water Quality

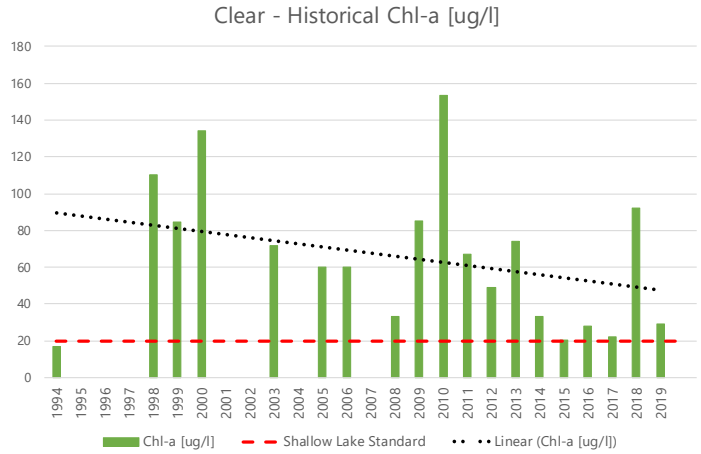


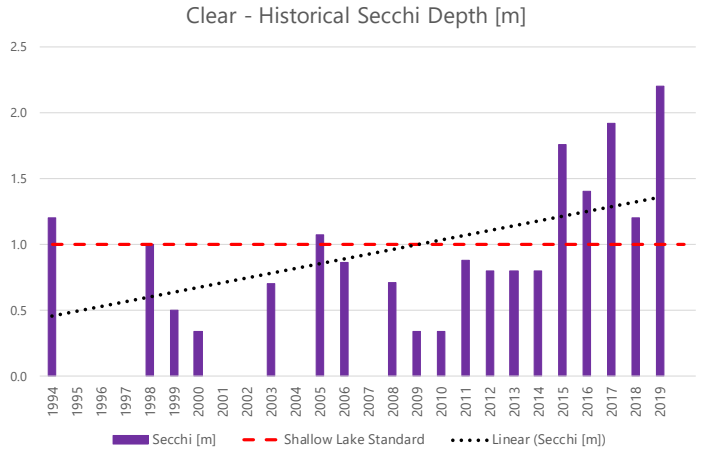




Historic Water Quality







Resilience RESOURCES LLC

CLEARWATER LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

Littoral Area: 1,596 acres

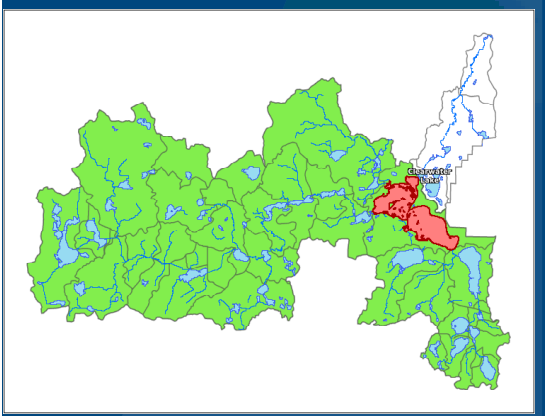
Surface Area: 3,158 acres

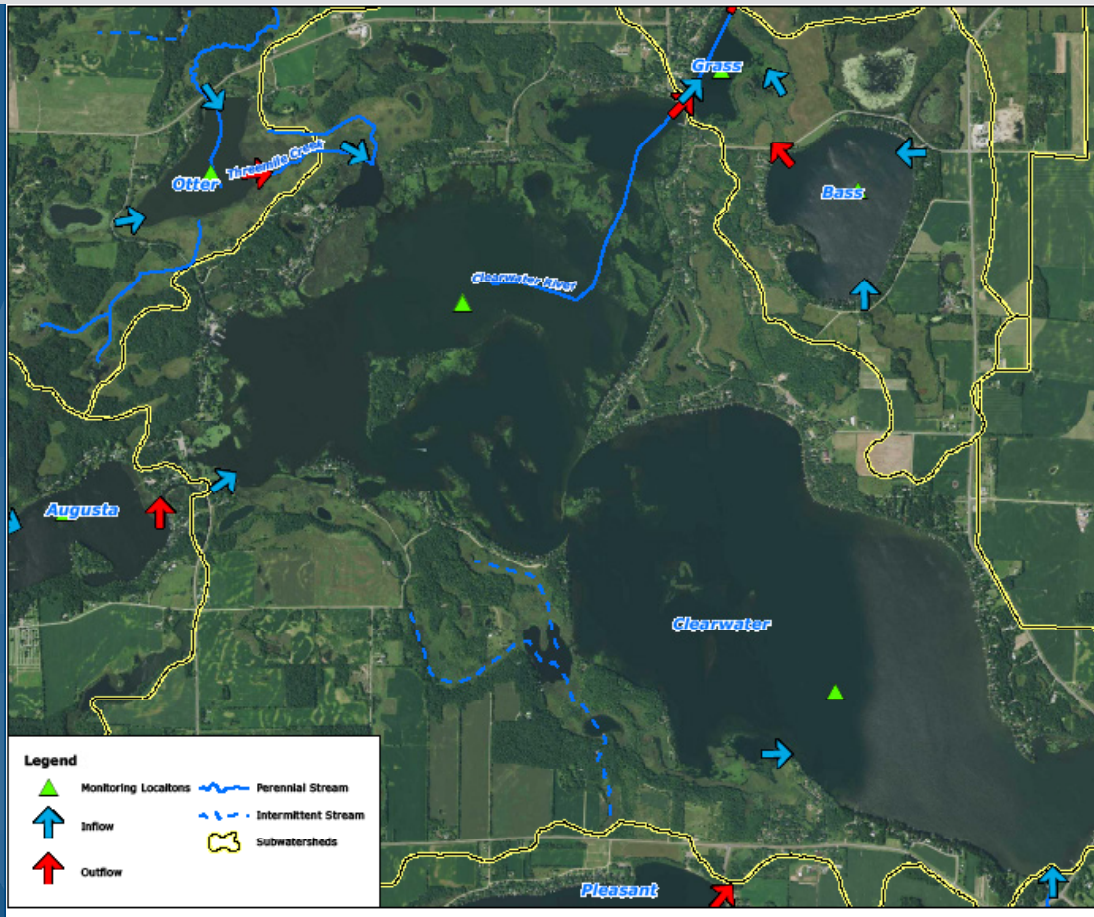
Subwatershed Area: 100,232 acres

Maximum Depth: 73 feet

Upstream Waters: Clearwater River, Augusta, Cedar, Otter, and Pleasant Lake

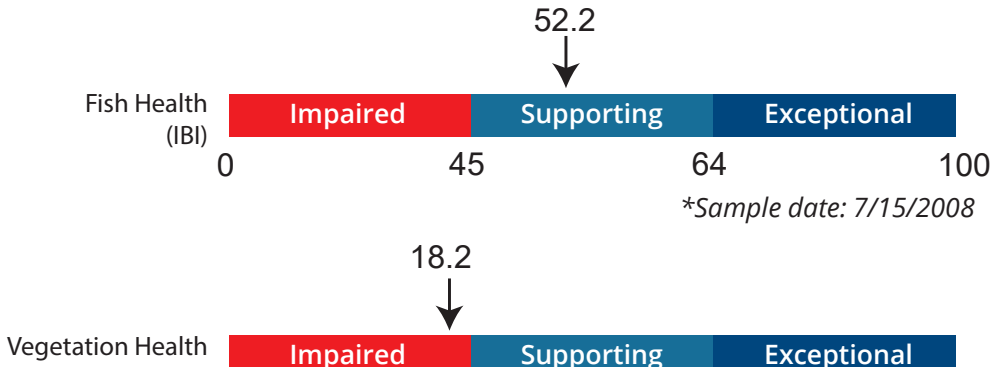
Common Fish	Bluegill, Northern Pike, Walleye, Largemouth Bass, Yellow Bullhead
Dominant Vegetation	Obtaining Recent Survey from DNR
Invasive Species	Eurasian water milfoil, curly-leaf pondweed, zebra mussels
Status	Not Impaired





TO DO LIST

- Protect water quality
- Manage upstream loads
- AIS management



*Sediment release rate has not been assessed

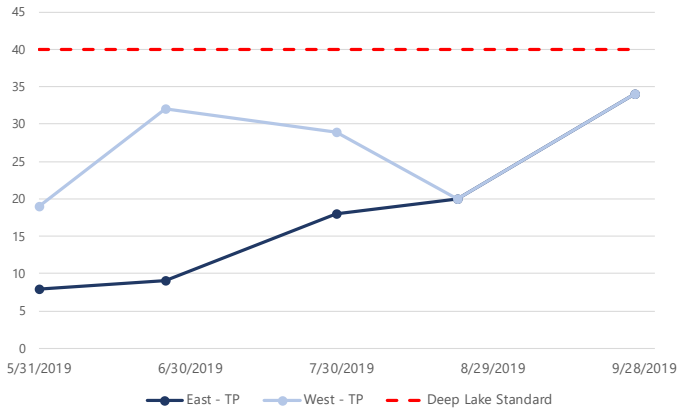
Resilience RESOURCES LLC

CLEARWATER LAKE

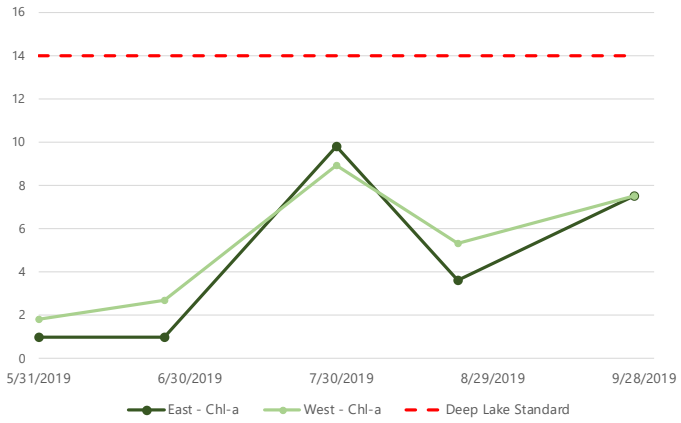
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

2019 Water Quality

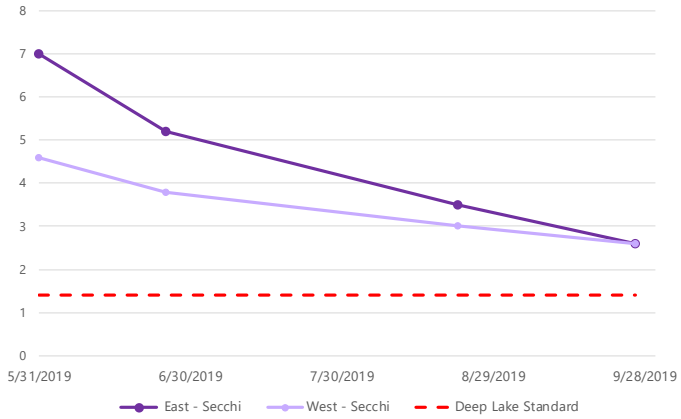
Clearwater - 2019 TP [ug/l]



Clearwater - 2019 Chl-a [ug/l]

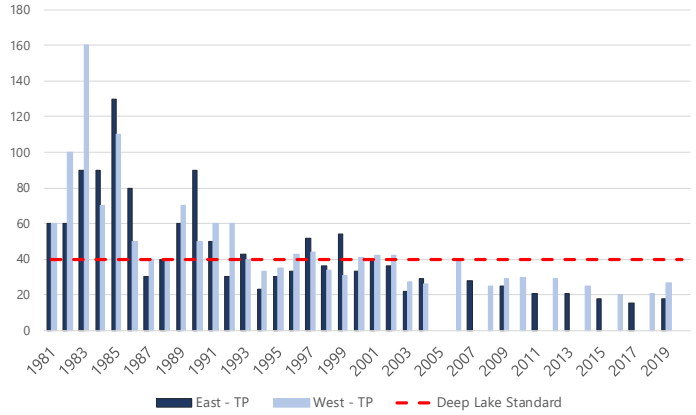


Clearwater - 2019 Secchi Depth [m]

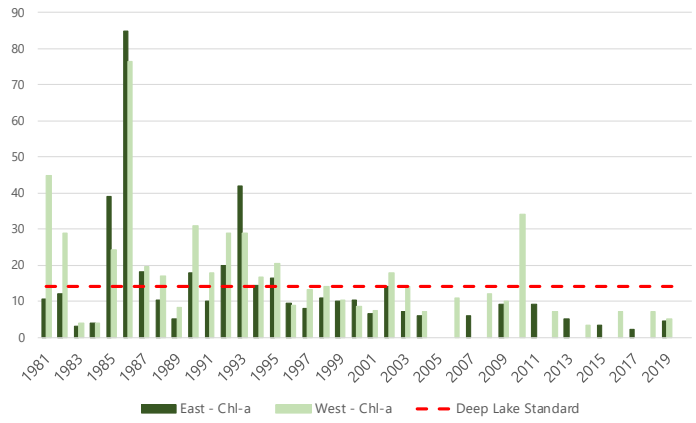


Historic Water Quality

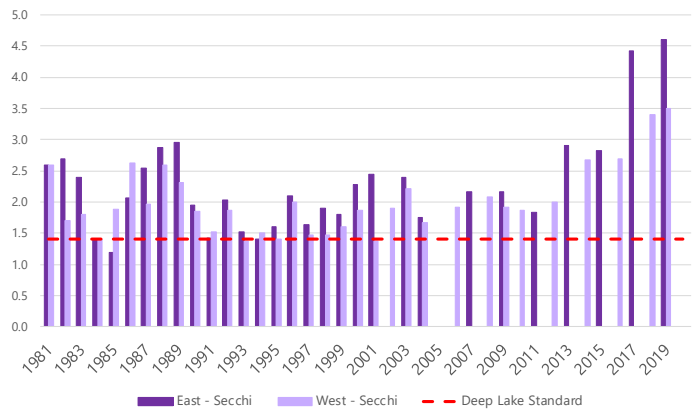
Clearwater - Historical TP [ug/l]



Clearwater - Historical Chl-a [ug/l]



Clearwater - Historical Secchi [m]



Resilience RESOURCES LLC

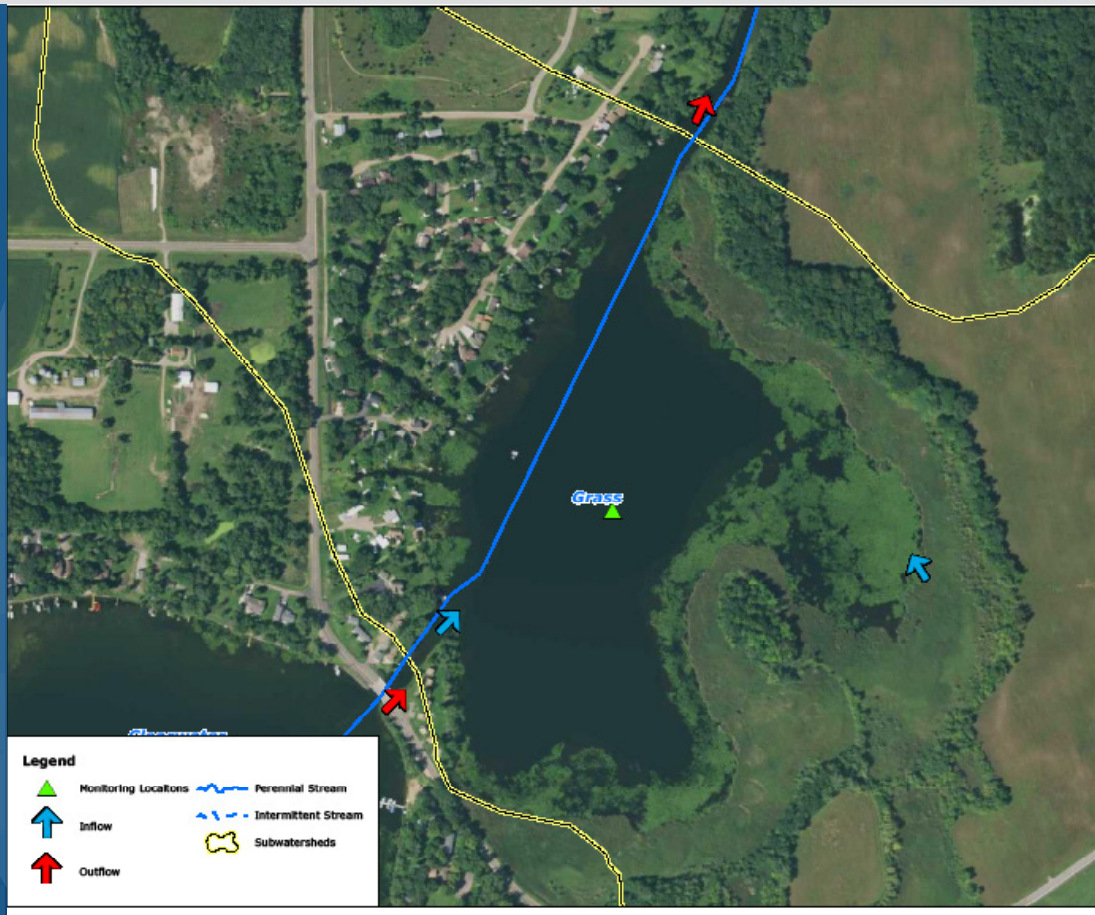
GRASS LAKE

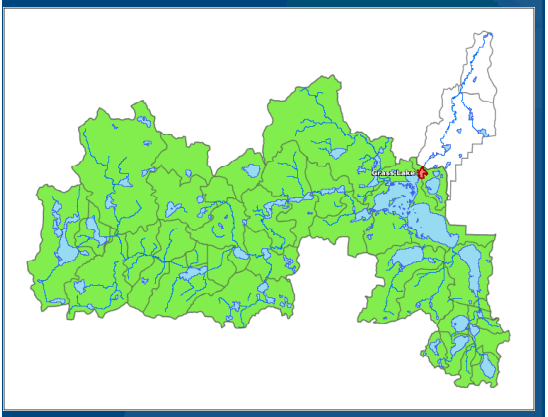
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 62 acres
- **Surface Area**: 71 acres
- **Subwatershed Area**: 101,508 acres
- **Maximum Depth**: 35 feet
- **Upstream Waters**: Clearwater Lake, Clearwater River, Bass Lake

Common Fish	Bluegill, Northern Pike, Yellow Bullhead
Dominant Vegetation	No Recent Survey
Invasive Species	Zebra Mussells
Status	Not Impaired





TO DO LIST

- Protect water quality
- Manage upstream loads
- AIS Management

Fish Health (IBI)

Impaired	Supporting	Exceptional
0	38	59	100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

31.6

Impaired	Supporting	Exceptional
0	18.6	32.4

**Sample date: 8/01/2005*

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0	3.3	7.5

**Sediment release rate has not been assessed*

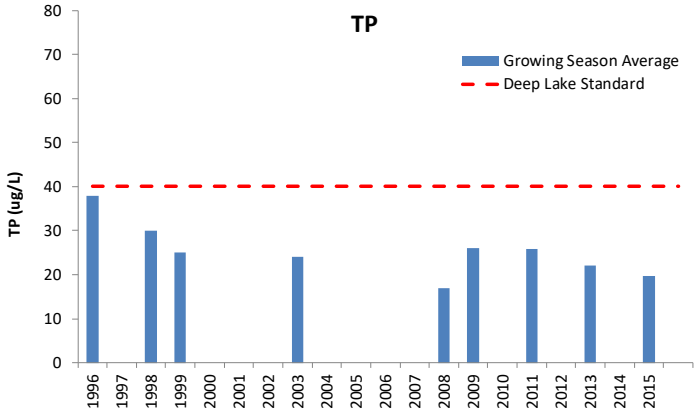
Resilience RESOURCES LLC

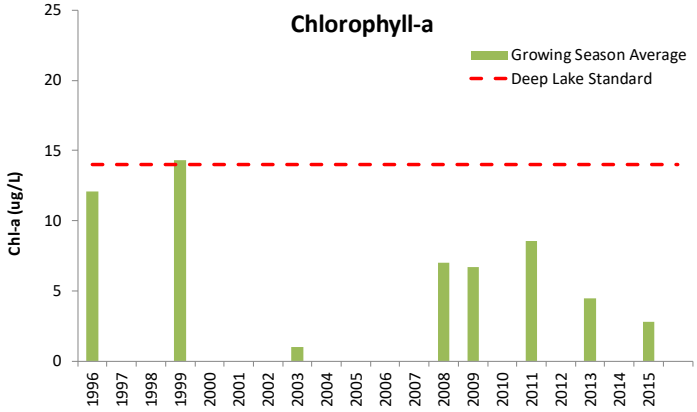
GRASS LAKE

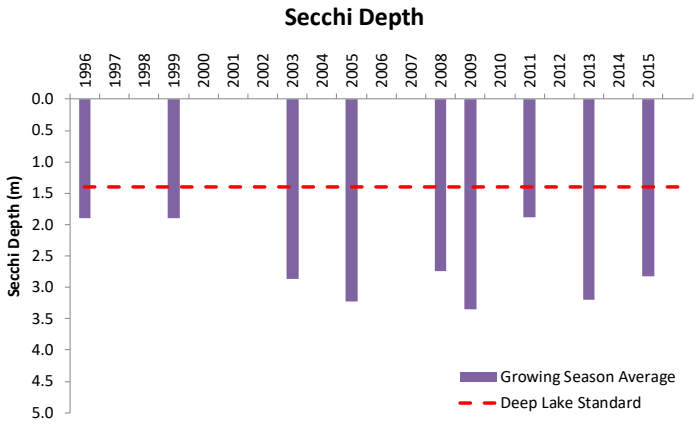
2019 Water Quality

Lake not sampled

Historic Water Quality







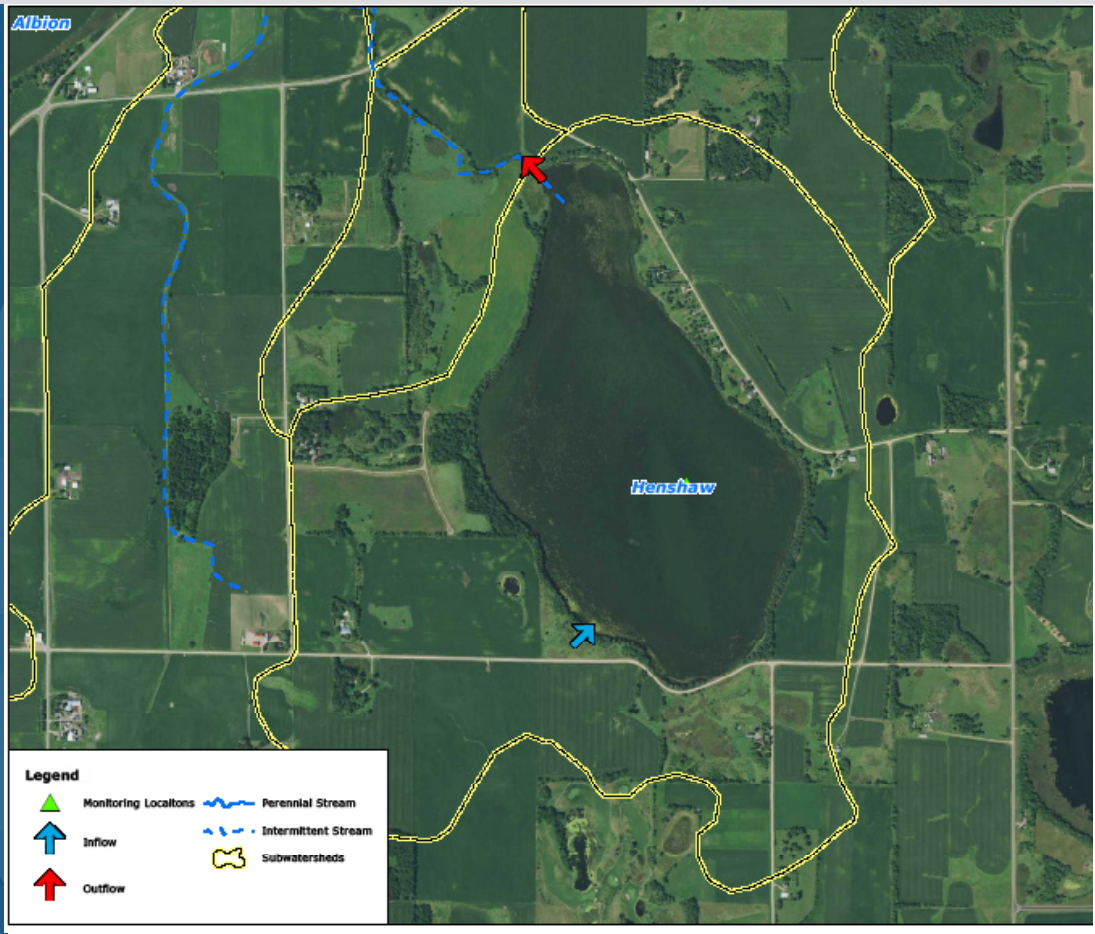
HENSHAW LAKE

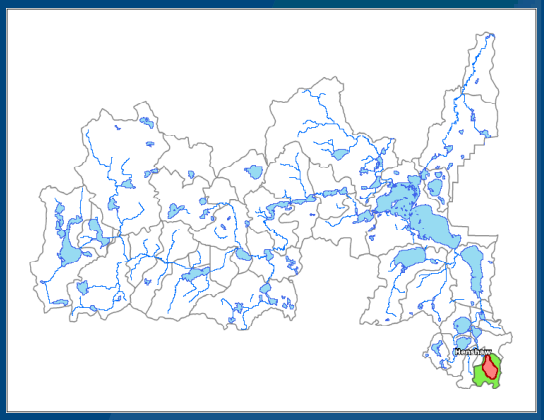
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 271 acres
- **Residence Time**: 1,697 days
- **Surface Area**: 272 acres
- **Subwatershed Area**: 903 acres
- **Maximum Depth**: 8 feet
- **Upstream Waters**: None

Common Fish	Black Bullhead, Common Carp
Dominant Vegetation	Sago pondweed, Coontail, Bushy pondweed
Invasive Species	Curly-leaf pondweed
Status	Impaired, TMDL Completed 2010





TO DO LIST

- Rough fish management
- AIS management
- Internal load management study
- Manage upstream load

Fish Health (IBI)

Impaired | Supporting

0 — 36 — 100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

22.1

Impaired | Supporting | Exceptional

0 — 17.8 — 26

**Sample date: 8/26/2014*

Sediment P Release ($mg/m^2/day$)

Low | Moderate | High

0 — 3.3 — 7.5

**Sediment release rate has not been assessed*

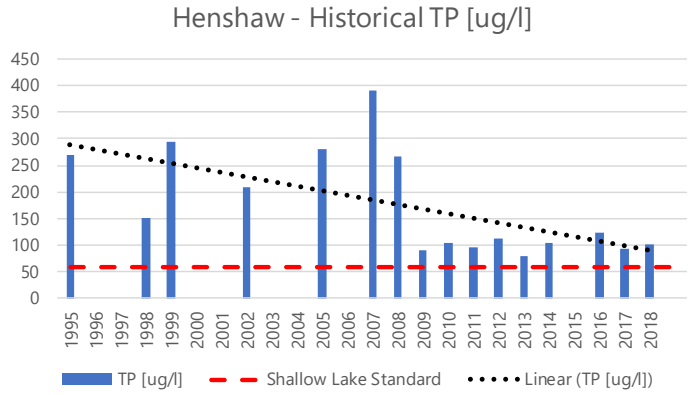
Resilience RESOURCES LLC

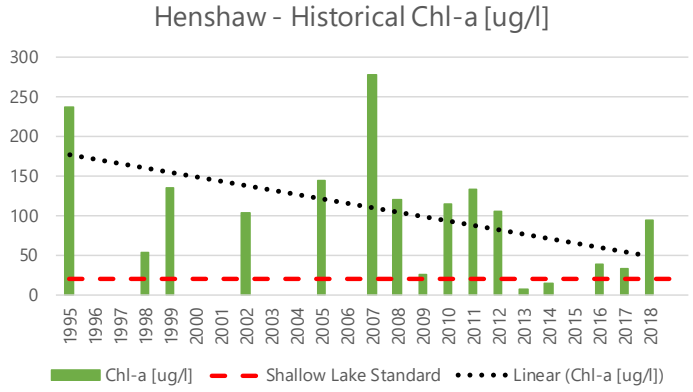
HENSHAW LAKE

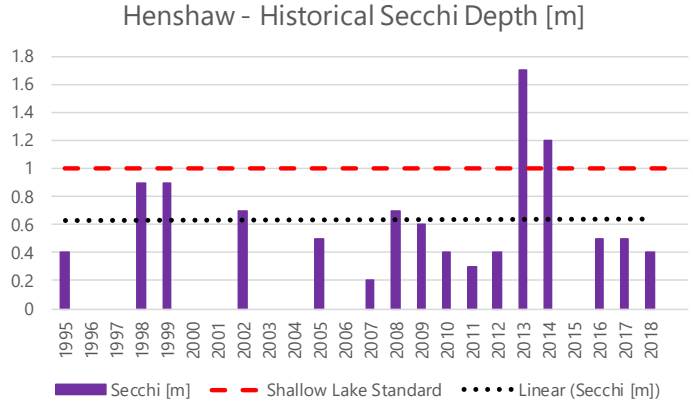
2019 Water Quality

Lake not sampled

Historic Water Quality







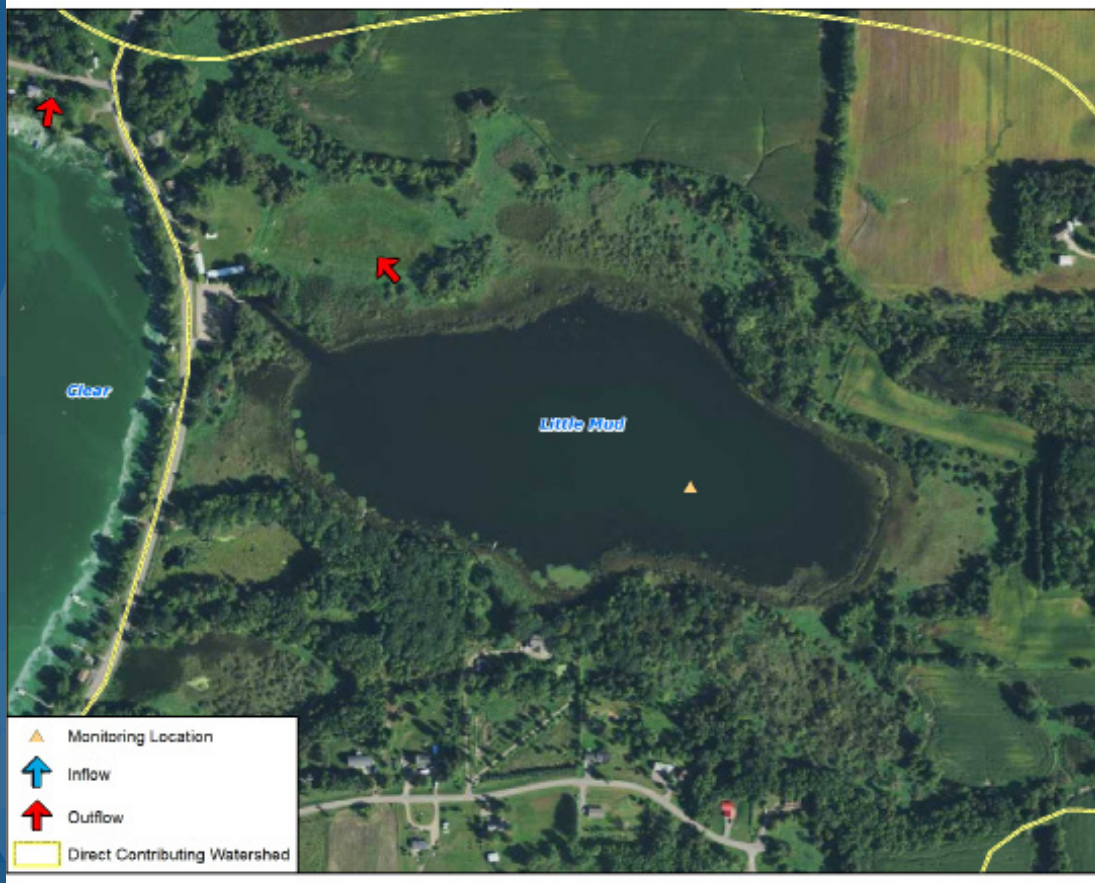
LITTLE MUD LAKE

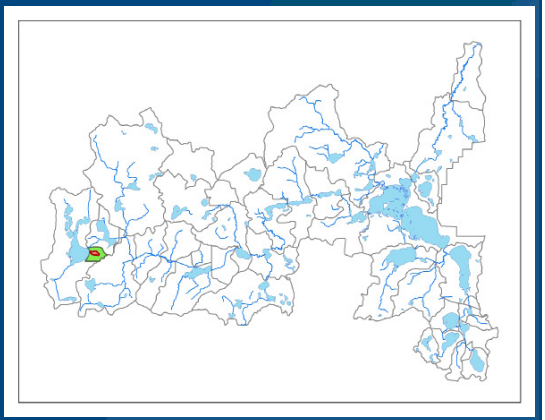
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 25.1 acres
- **Residence Time**: 1299 days
- **Surface Area**: 37.4 acres
- **Subwatershed Area**: 294 acres
- **Maximum Depth**: 42 feet
- **Upstream Waters**: None

Common Fish	No Recent Survey
Dominant Vegetation	Coontail
Invasive Species	Eurasian watermilfoil
Status	Not Impaired





TO DO LIST

- Rough fish management
- AIS management
- Internal load management study
- Manage upstream load

Fish Health (IBI)

Impaired	Supporting
0	36 — 100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

Impaired	Supporting	Exceptional
0	17.8	26

**Vegetation FQI has not been assessed*

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0	3.3	7.5

**Sediment release rate has not been assessed*

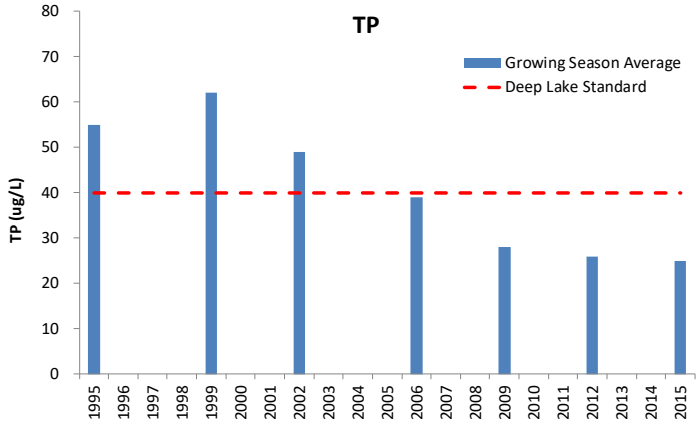
Resilience RESOURCES LLC

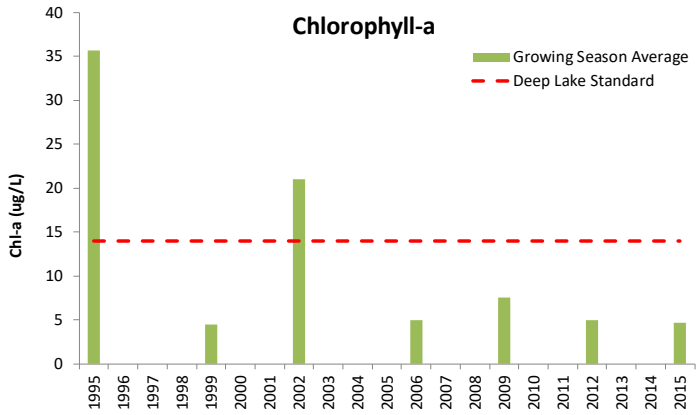
LITTLE MUD LAKE

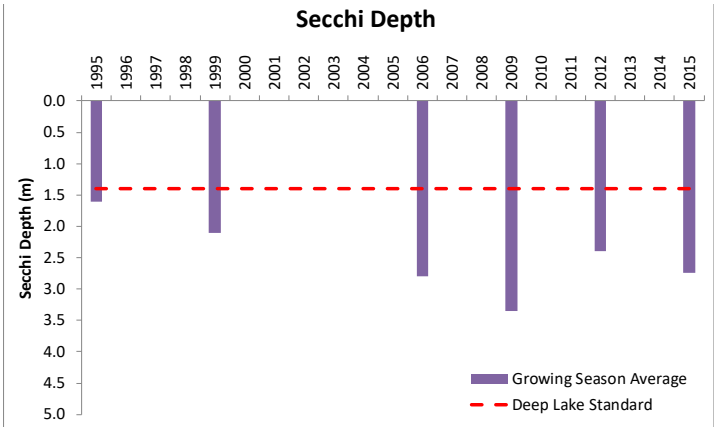
2019 Water Quality

Lake not sampled

Historic Water Quality







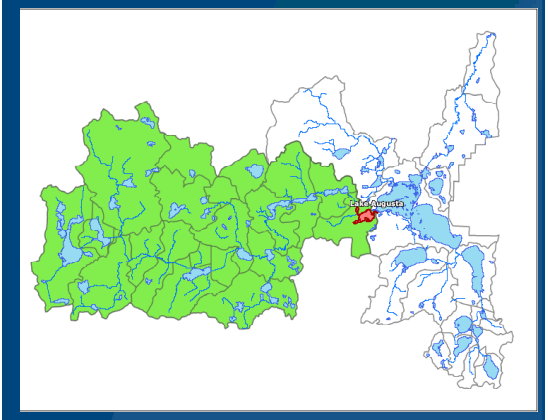
LAKE AUGUSTA

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

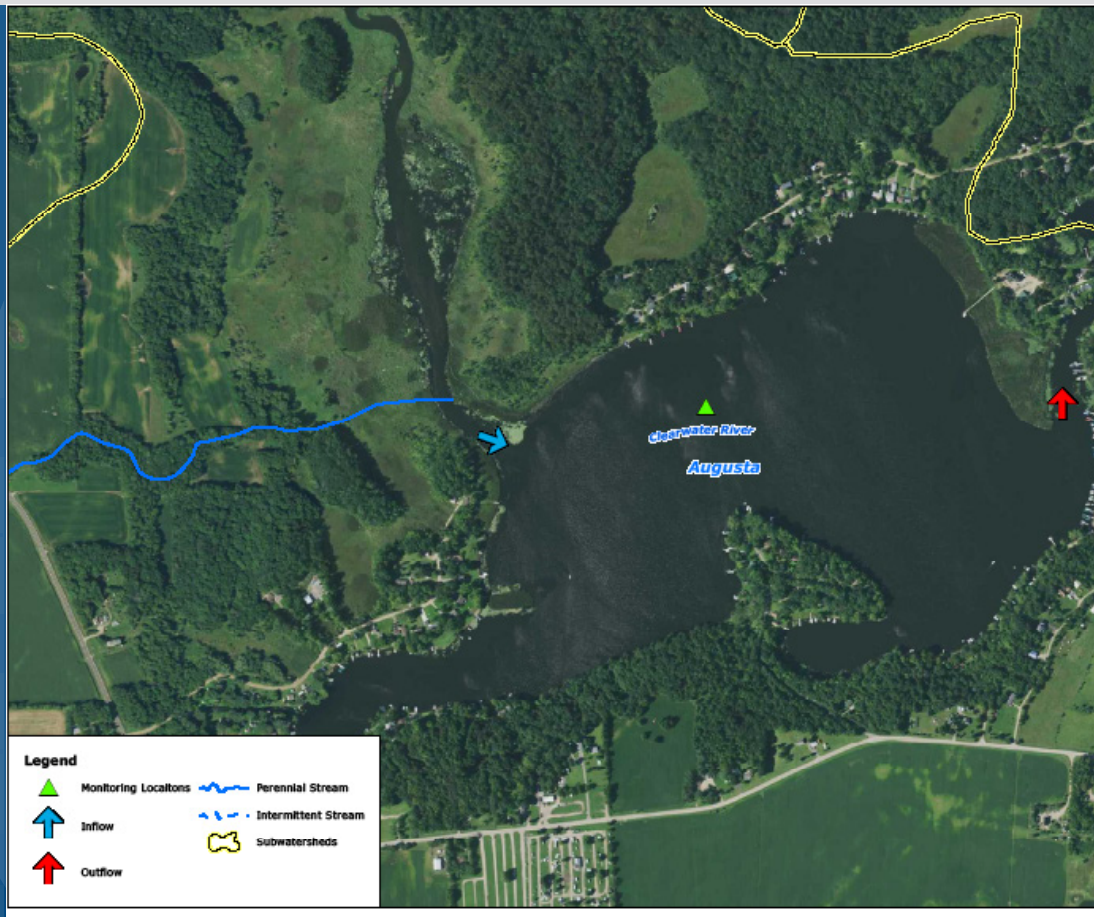
- **Littoral Area**: 65 acres
- **Residence Time**: 55 days
- **Surface Area**: 187 acres
- **Subwatershed Area**: 62,936 acres
- **Maximum Depth**: 82 feet
- **Upstream Waters**: Caroline, Louisa, Marie

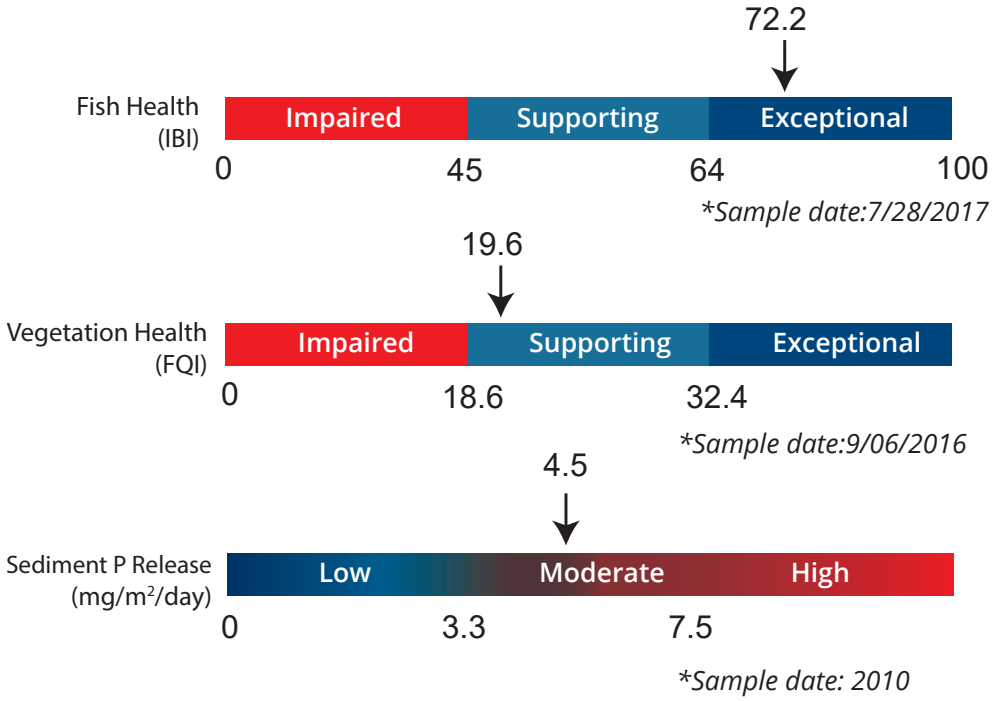
Common Fish	Bluegill, Northern Pike, Crappie, Yellow Bullhead, Common Carp
Dominant Vegetation	No species was dominant (>50% occurrence)
Invasive Species	Eurasian water milfoil, curly-leaf pondweed, zebra mussels
Status	Impaired, TMDL completed in 2010



TO DO LIST

- Manage upstream loads
- AIS management





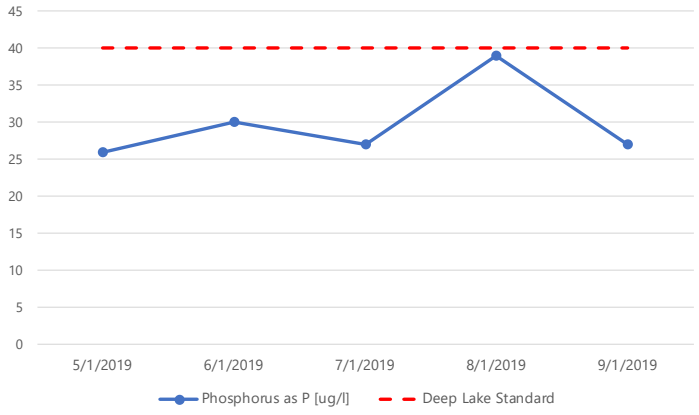
Resilience RESOURCES LLC

LAKE AUGUSTA

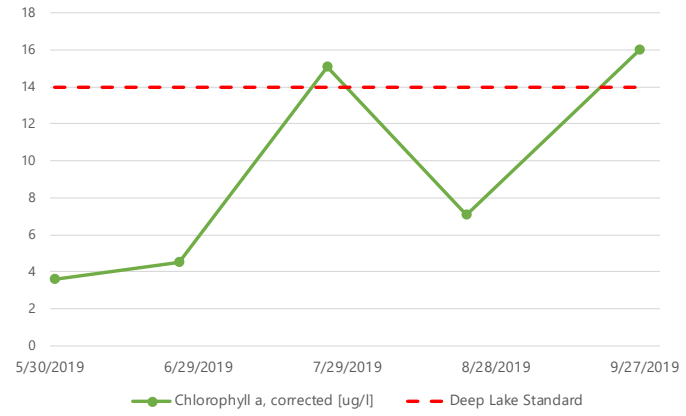
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

2019 Water Quality

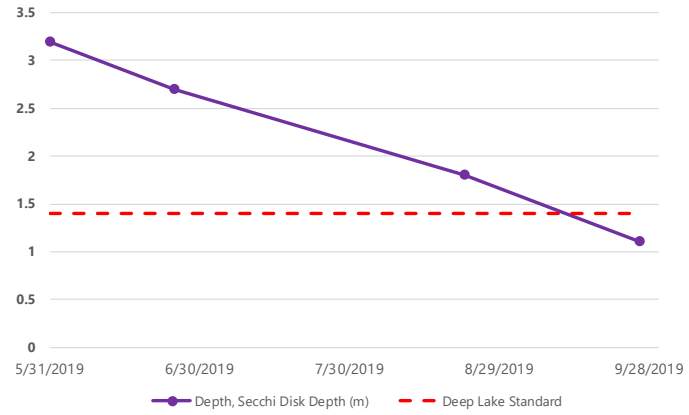
Augusta - 2019 TP [ug/L]



Augusta - 2019 Chl-a [ug/L]

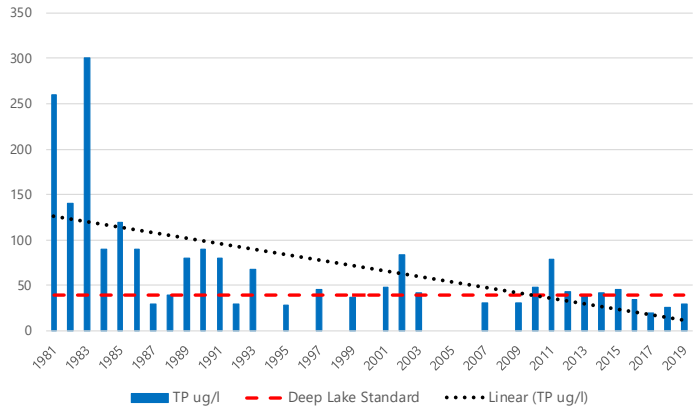


Augusta - 2019 Secchi Depth [m]

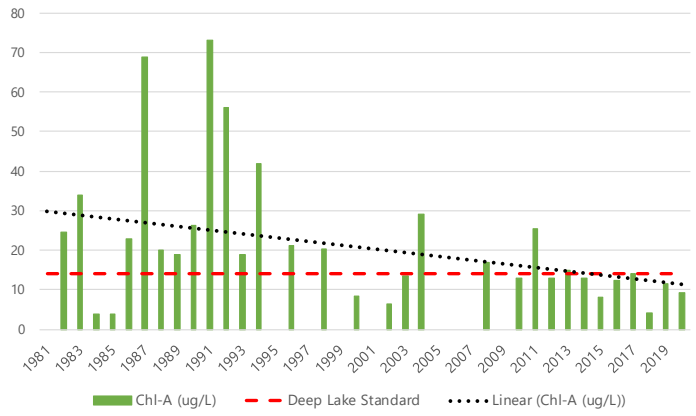


Historic Water Quality

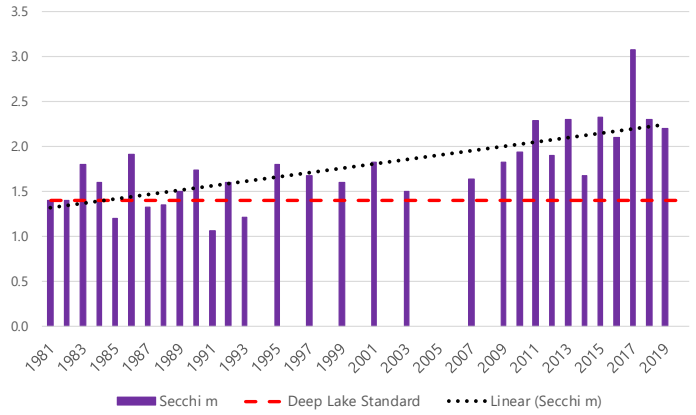
Augusta - Historical TP [ug/L]



Augusta - Historical Chl-a [ug/L]



Augusta - Historical Secchi [m]



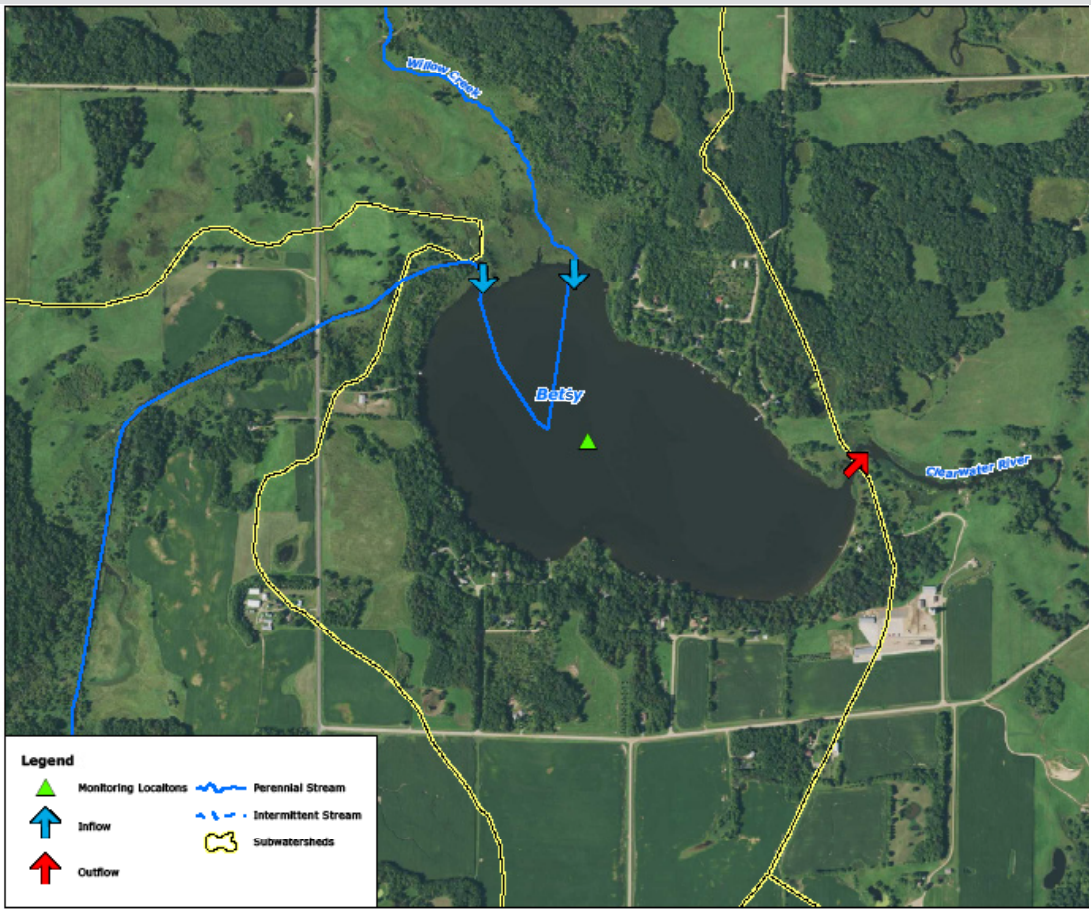
Resilience RESOURCES LLC

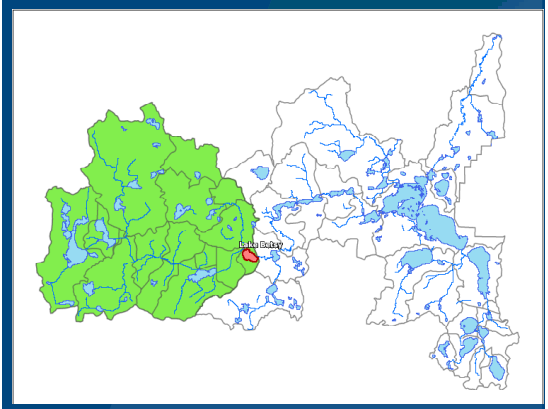
LAKE BETSY

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

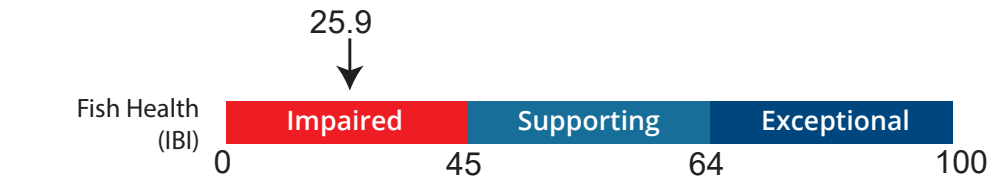
- **Littoral Area**: 90 acres
- **Residence Time**: 33 days
- **Surface Area**: 154 acres
- **Subwatershed Area**: 43,789 acres
- **Maximum Depth**: 29 feet
- **Upstream Waters**: Clearwater River
- **Common Fish**: Channel Catfish, Northern Pike, Black Crappie, Bluegill, Common Carp
- **Dominant Vegetation**: Coontail, Curly-leaf pondweed
- **Invasive Species**: Curly-leaf pondweed
- **Status**: Impaired, TMDL completed in 2009





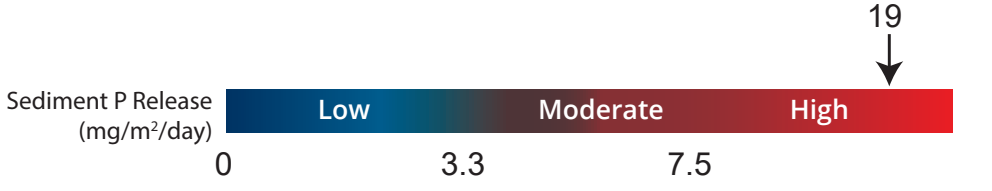
TO DO LIST

- Rough fish management
- Internal load reduction study and implementation
- Manage upstream loads
- AIS management



*Sample date: 7/27/2012

*Sample date: 8/22/2017



*Sample date: 2009

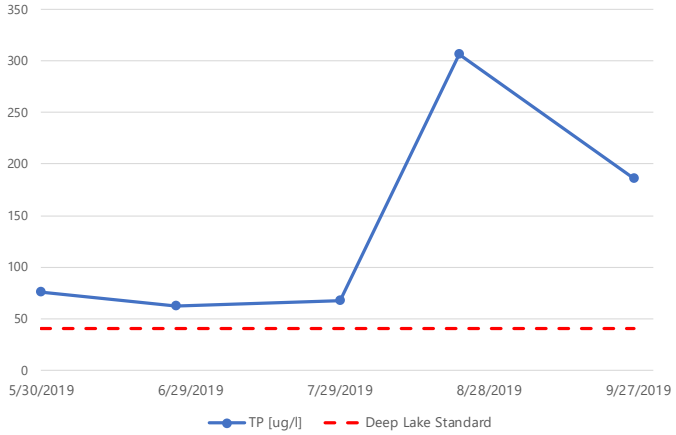
Resilience RESOURCES LLC

LAKE BETSY

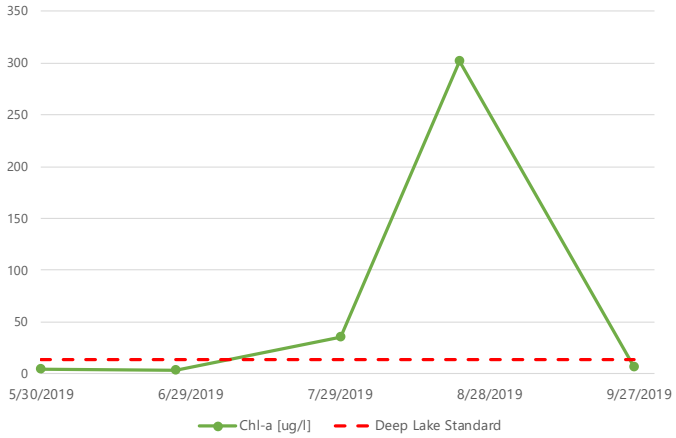
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

2019 Water Quality

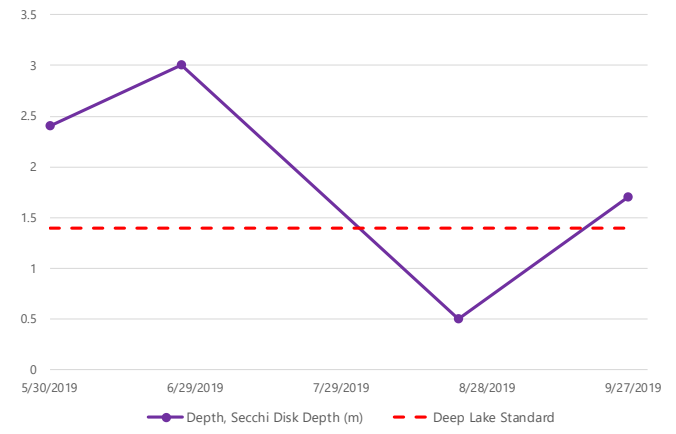
Betsy - 2019 TP [ug/l]



Betsy - 2019 Chl-a [ug/L]

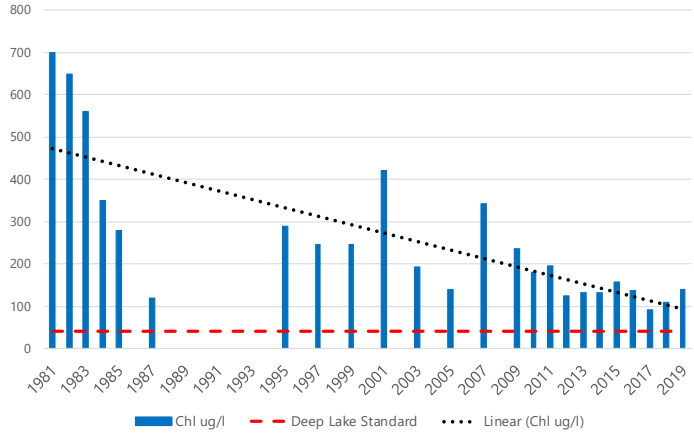


Betsy - 2019 Secchi Depth [m]

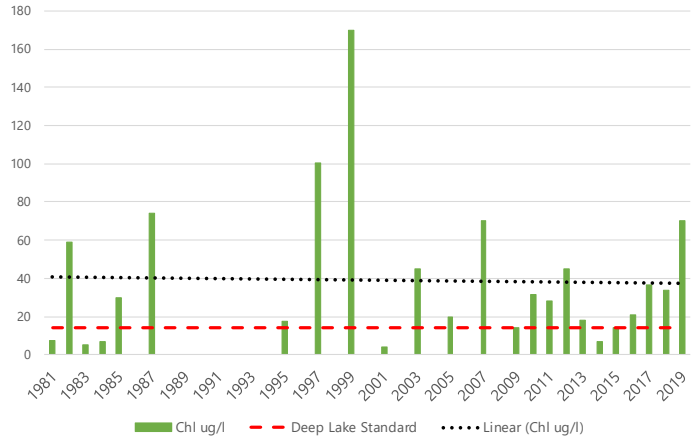


Historic Water Quality

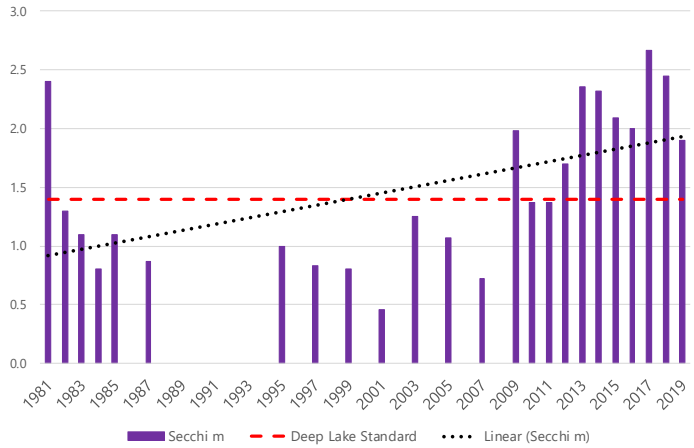
Betsy -Historical TP [ug/L]



Betsy - Historical Chl-a [ug/L]



Betsy - Historical Secchi [m]



Resilience RESOURCES LLC

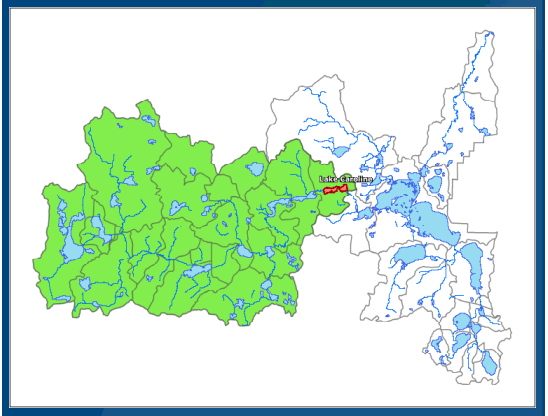
LAKE CAROLINE

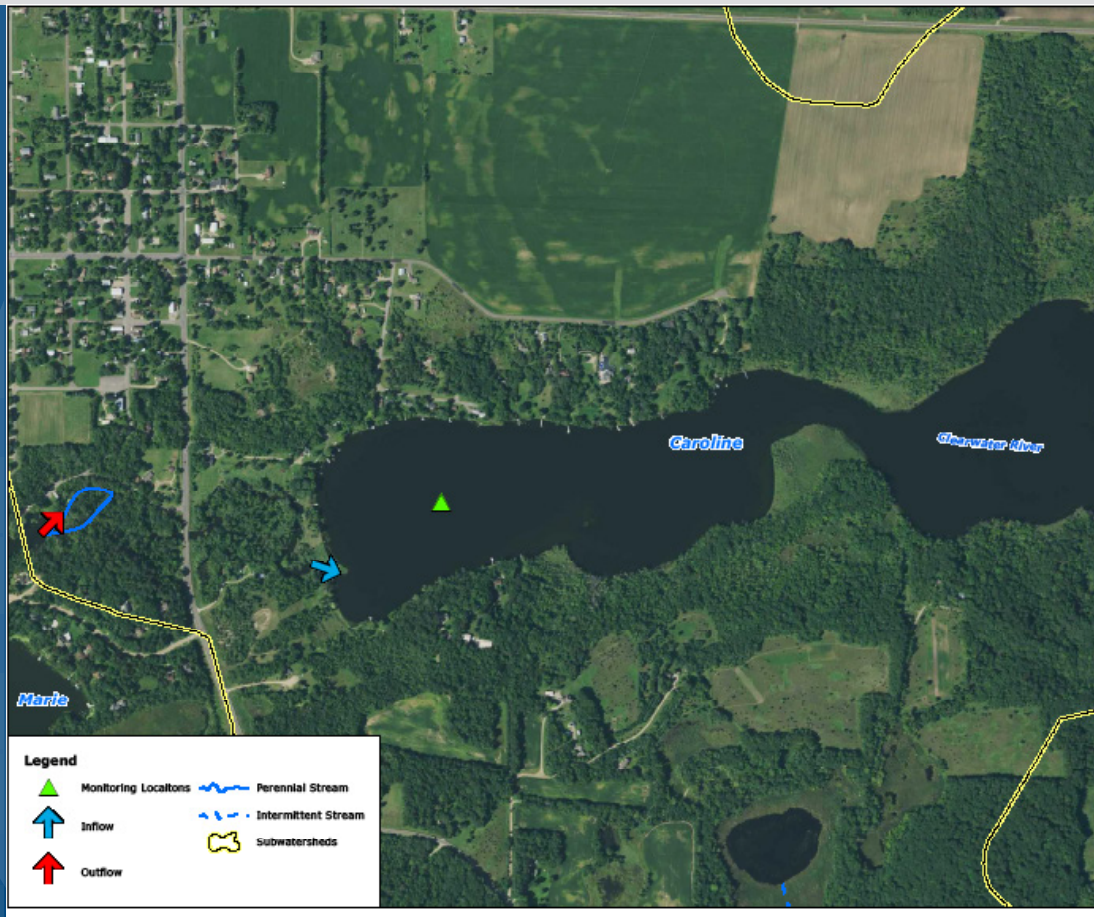
Clearwater River WATERSHED DISTRICT
Protect · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 46 acres
- **Residence Time**: 26 days
- **Surface Area**: 135 acres
- **Subwatershed Area**: 60,132 acres
- **Maximum Depth**: 45 feet
- **Upstream Waters**: Louisa, Marie

Common Fish	Black Crappie, Bluegill, Northern Pike, Largemouth Bass, Common Carp, Walleye, White Sucker
Dominant Vegetation	No Recent Survey
Invasive Species	Curly-leaf pondweed, Eurasian watermilfoil
Status	Impaired, TMDL completed in 2010





Fish Health (IBI)

Impaired	Supporting	Exceptional
0	45	64	100

**Fish IBI has not been assessed*

21.7

Vegetation Health (FQI)

Impaired	Supporting	Exceptional
0	18.6	32.4

**Sample date: 6/28/2005*

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0	3.3	7.5

**Sediment release rate has not been assessed*

TO DO LIST

- Manage upstream loads
- AIS management
- Internal load management study

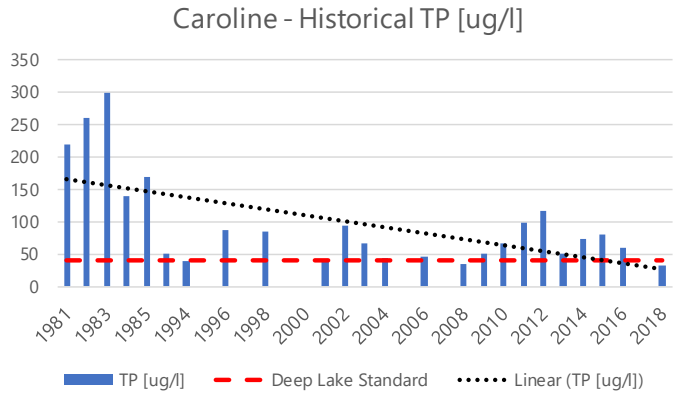
Resilience RESOURCES LLC

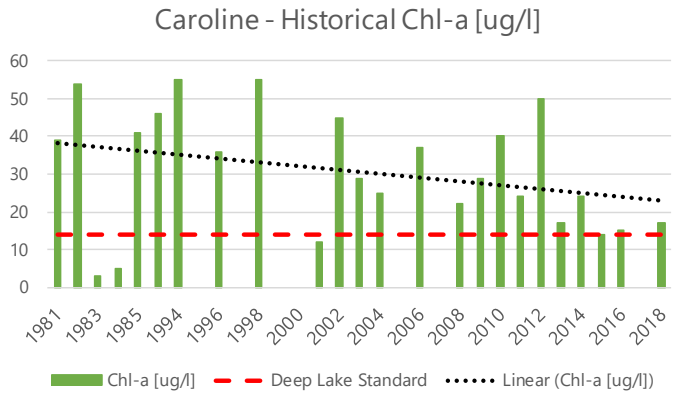
LAKE CAROLINE

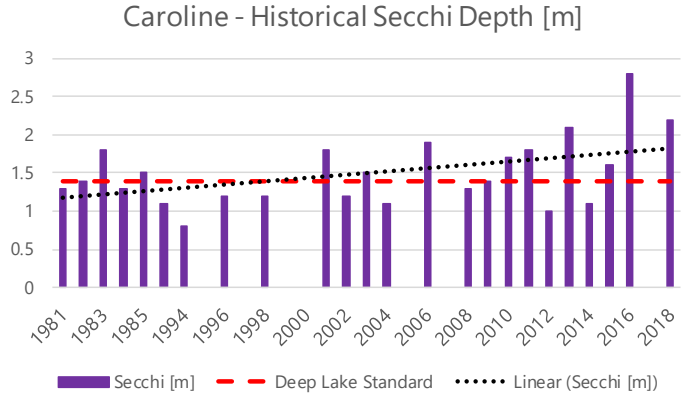
2019 Water Quality

Lake not sampled

Historic Water Quality







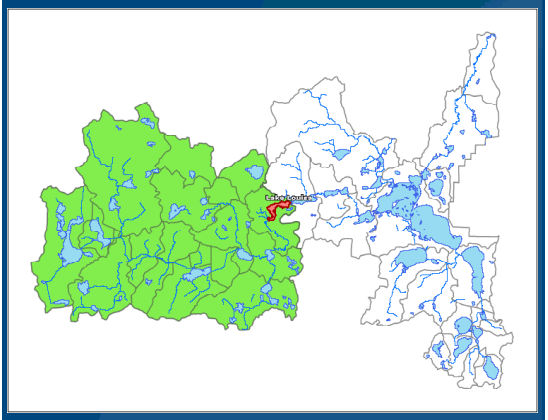
LAKE LOUISA

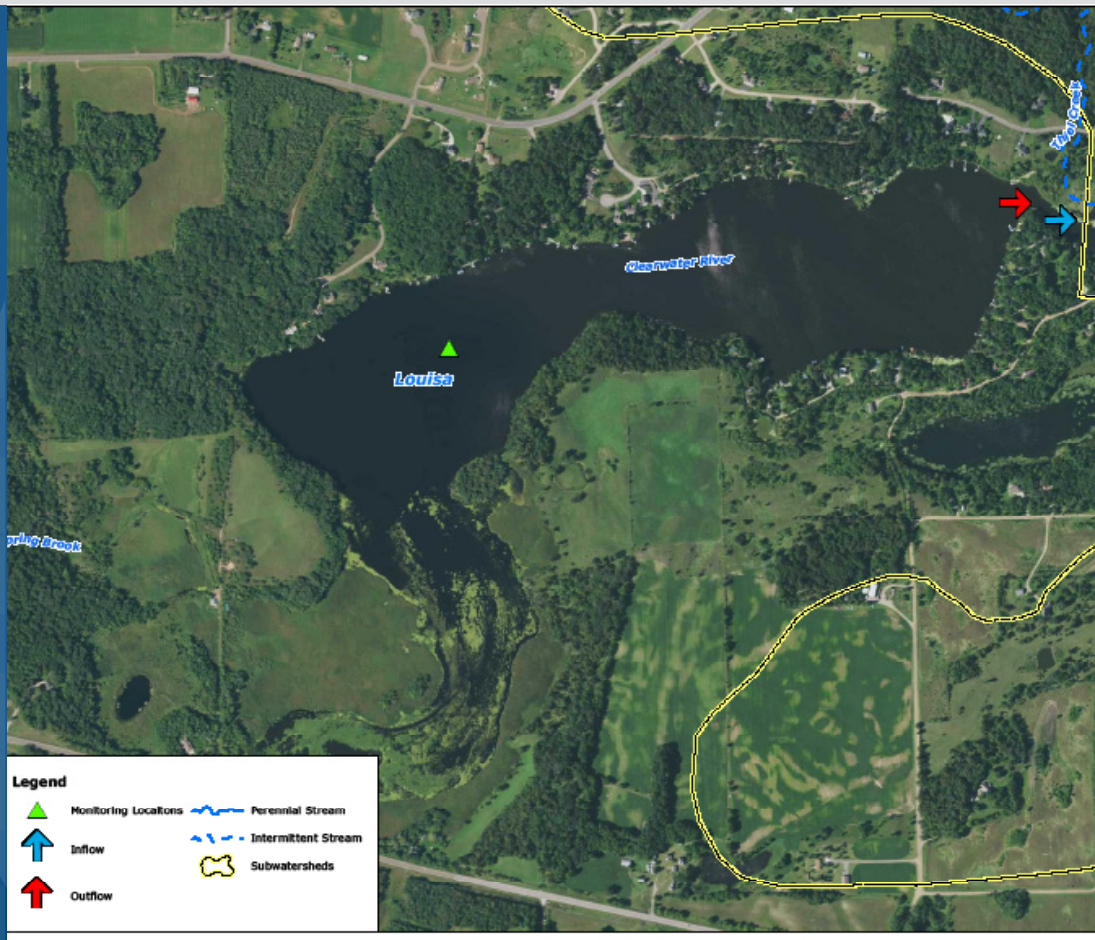
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

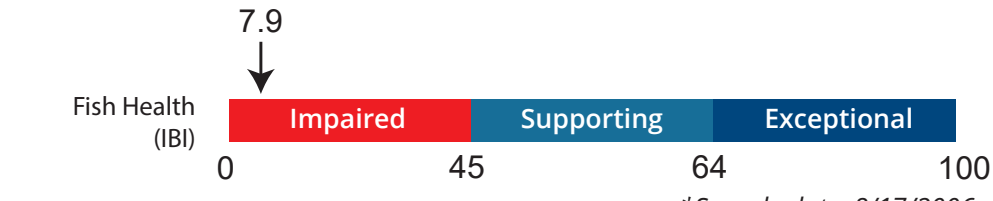
QUICK FACTS

- **Littoral Area**: 122 acres
- **Residence Time**: 17 days
- **Surface Area**: 189 acres
- **Subwatershed Area**: 58,881 acres
- **Maximum Depth**: 44 feet
- **Upstream Waters**: Clearwater River, Lake Betsy

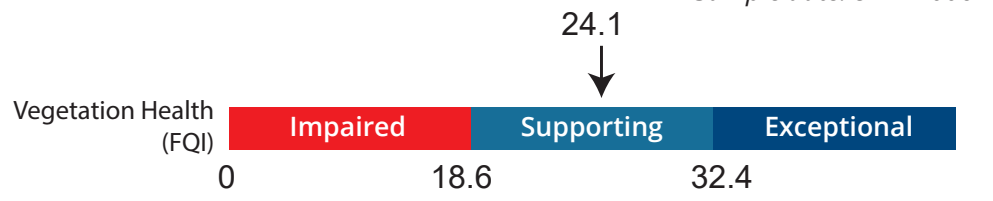
Common Fish	Bluegill, Northern Pike, Largemouth Bass, White Sucker
Dominant Vegetation	Coontail
Invasive Species	Curly-leaf pondweed
Status	Impaired, TMDL Completed 2009



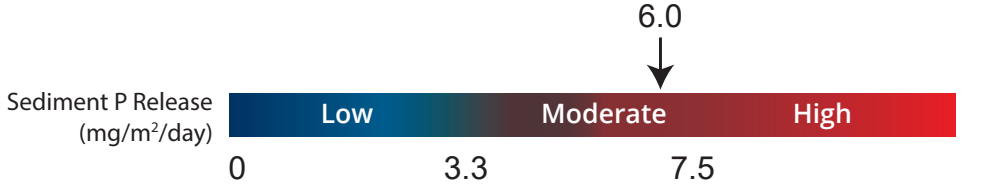




*Sample date: 8/17/2006



*Sample date: 6/20/2005



*Sediment release rate has not been assessed

*Sample date: 2003

TO DO LIST

- Manage upstream loads
- AIS management
- Internal load management study

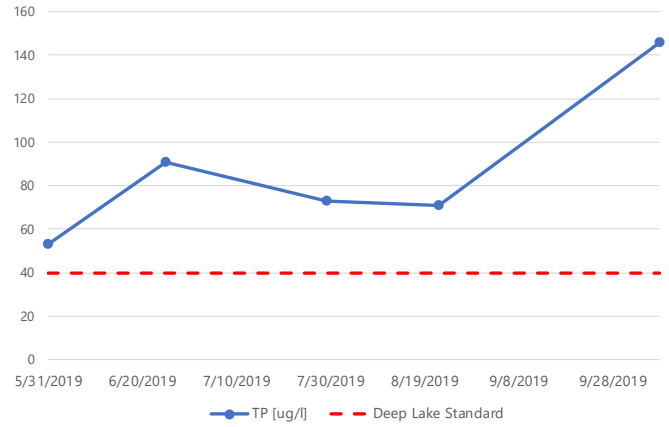
Resilience RESOURCES LLC

LAKE LOUISA

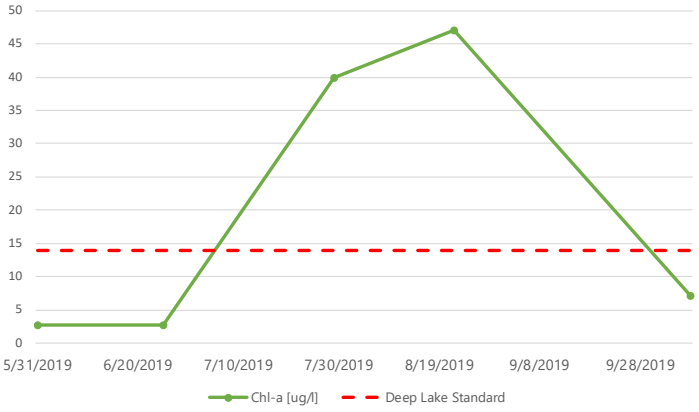
Clearwater River WATERSHED DISTRICT
Protected · Preserved

2017 Water Quality

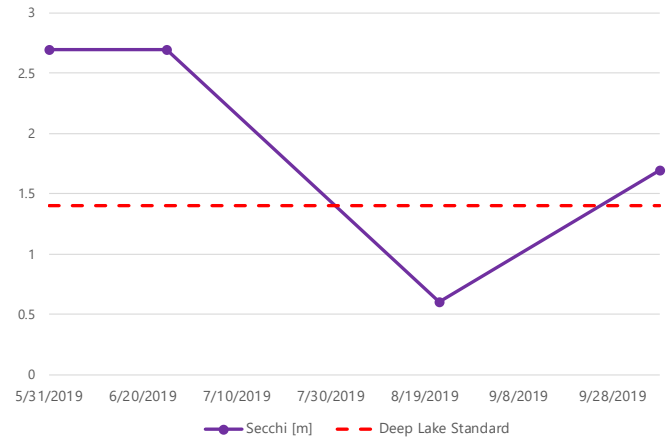
Louisa - 2019 TP [ug/l]



Louisa - 2019 Chl-a [ug/l]

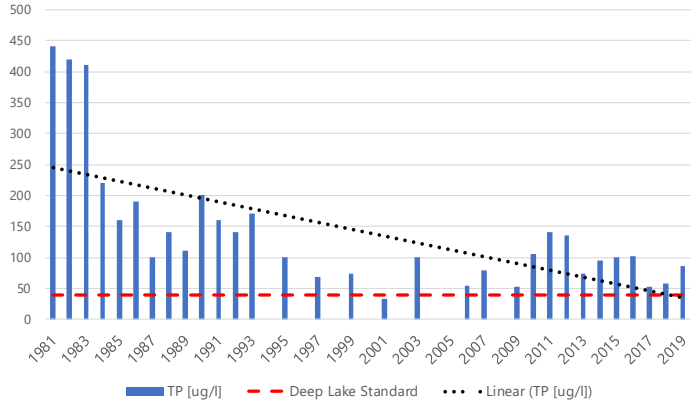


Louisa - 2019 Secchi Depth [m]

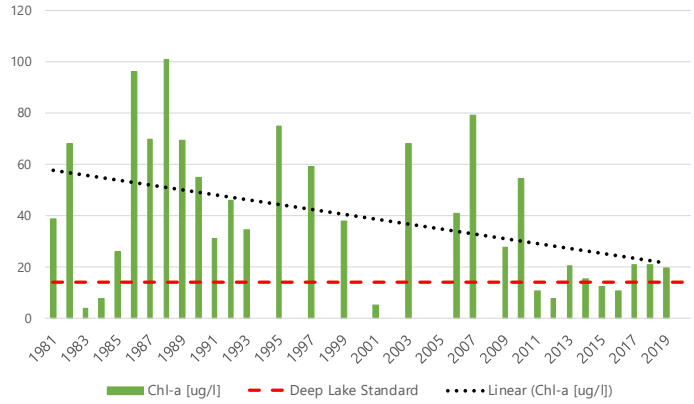


Historic Water Quality

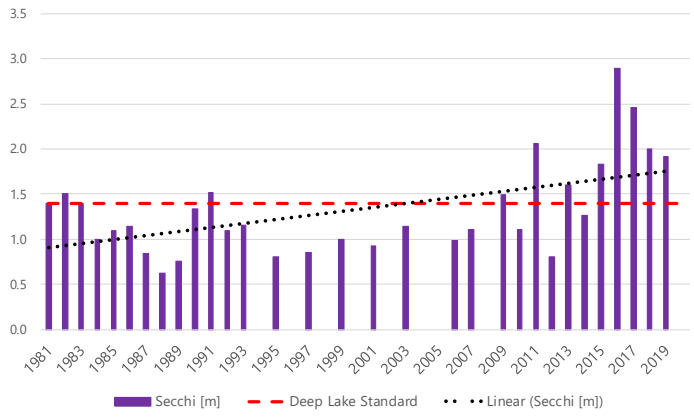
Louisa - Historical TP [ug/l]



Louisa - Historical Chl-a [ug/l]



Louisa - Historical Secchi Depth [m]



Resilience RESOURCES LLC

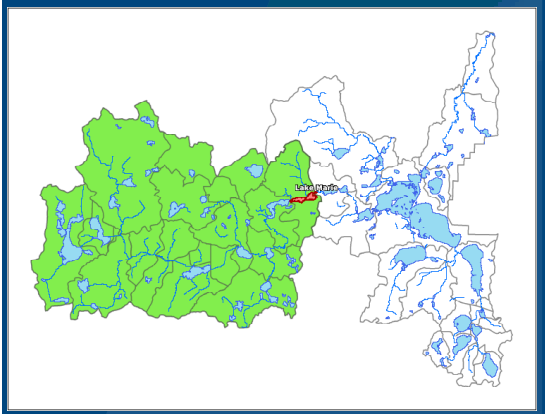
LAKE MARIE

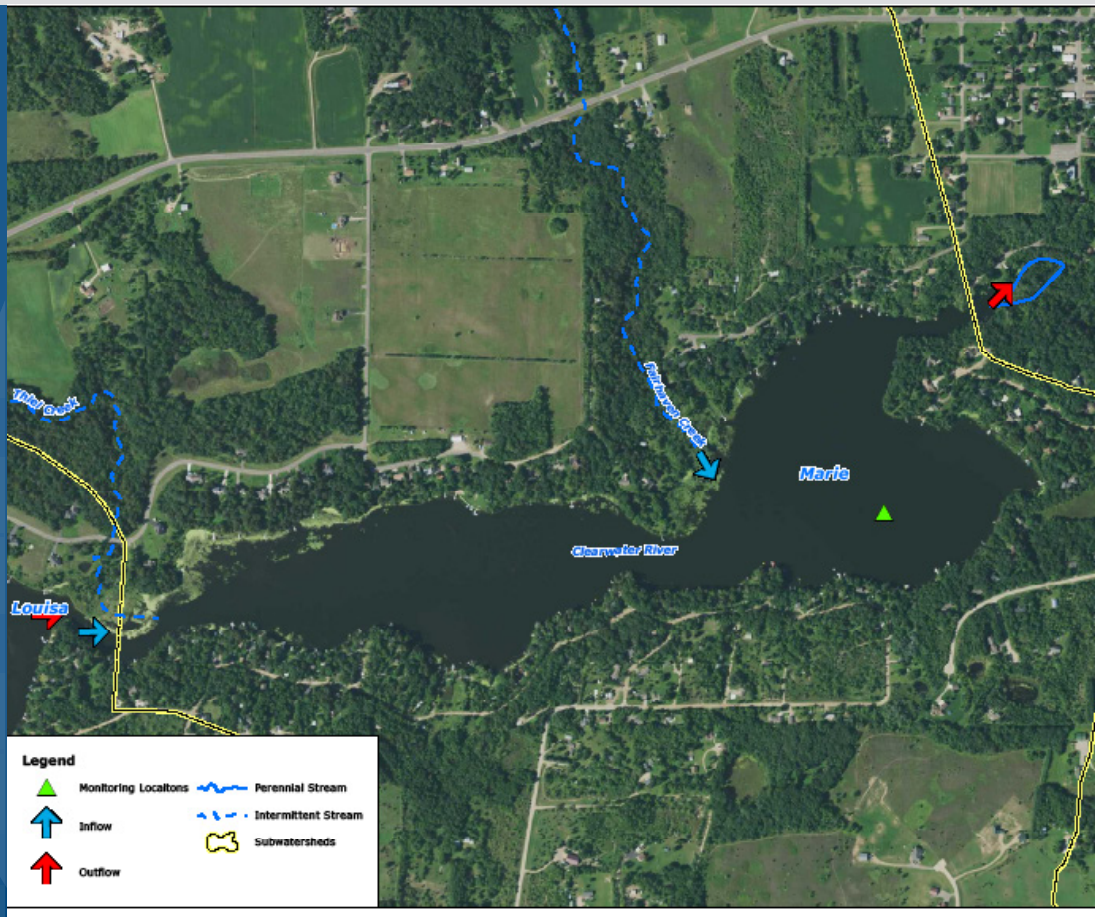
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 107 acres
- **Residence Time**: 24 days
- **Surface Area**: 146 acres
- **Subwatershed Area**: 59,837 acres
- **Maximum Depth**: 36 feet
- **Upstream Waters**: Clearwater River, Louisa

Common Fish	Black Crappie, Bluegill, Northern Pike, White Sucker, Yellow Perch
Dominant Vegetation	Coontail, Canadian waterweed
Invasive Species	Curly-leaf pondweed
Status	Impaired, TMDL Completed 2009





Fish Health (IBI)

Impaired	Supporting
0	36 — 100

**Fish IBI has not been assessed*

22.6

Vegetation Health (FQI)

Impaired	Supporting	Exceptional
0 — 18.6		32.4

**Sample date: 6/23/2005*

18.0

Sediment P Release ($mg/m^2/day$)

0 — 3.3 — 7.5

**Sediment release rate has not been assessed*

**Sample date: 2003*

TO DO LIST

- Manage upstream loads
- AIS management
- Internal load management study

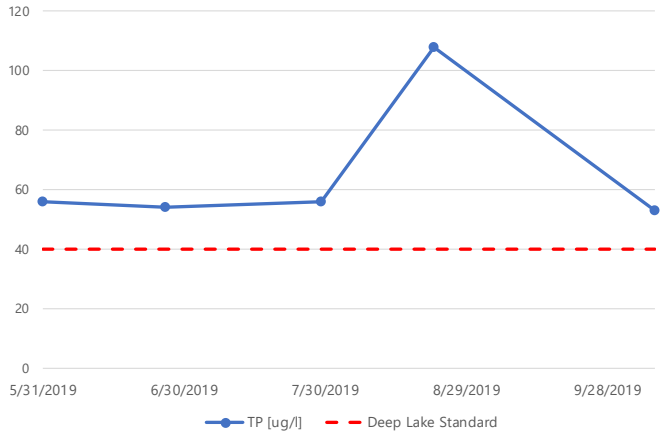
Resilience RESOURCES LLC

LAKE MARIE

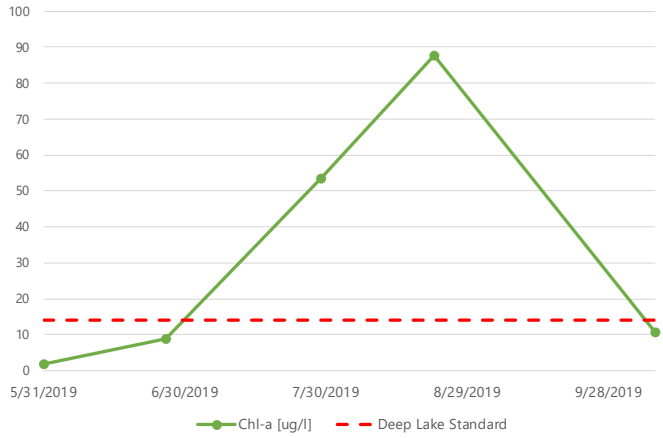
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

2019 Water Quality

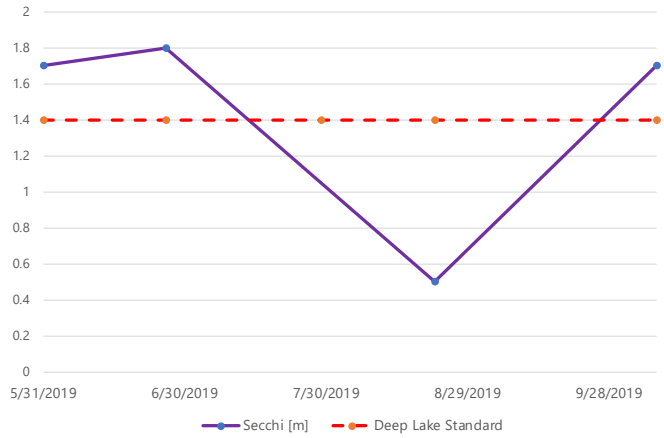
Marie - 2019 TP [ug/l]



Marie - 2019 Chl-a [ug/l]

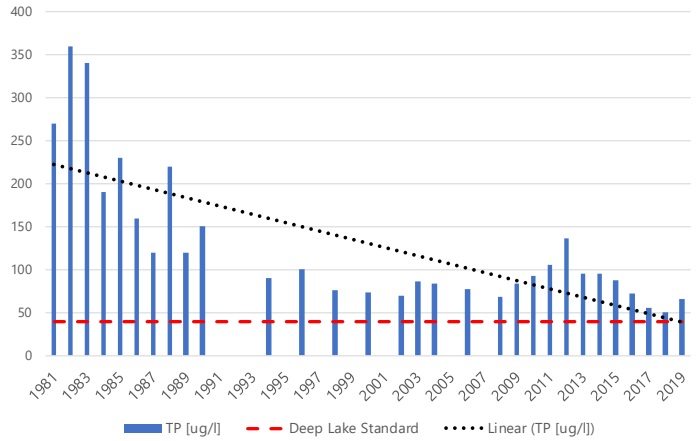


Marie - 2019 Secchi Depth [m]

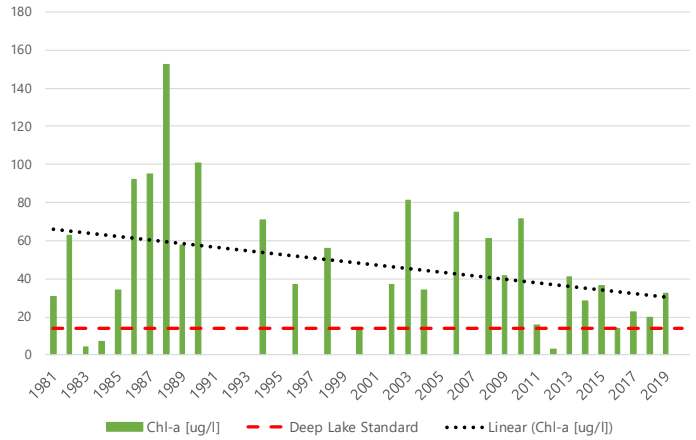


Historic Water Quality

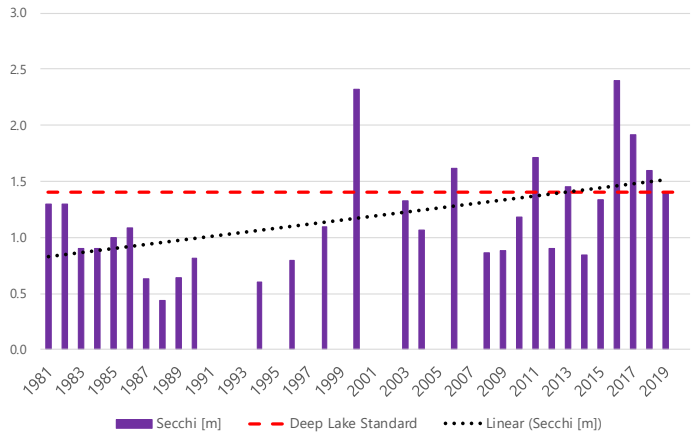
Marie - Historical TP [ug/l]



Marie - Historical Chl-a [ug/l]



Marie - Hisotrical Secchi Depth [m]



Resilience RESOURCES LLC

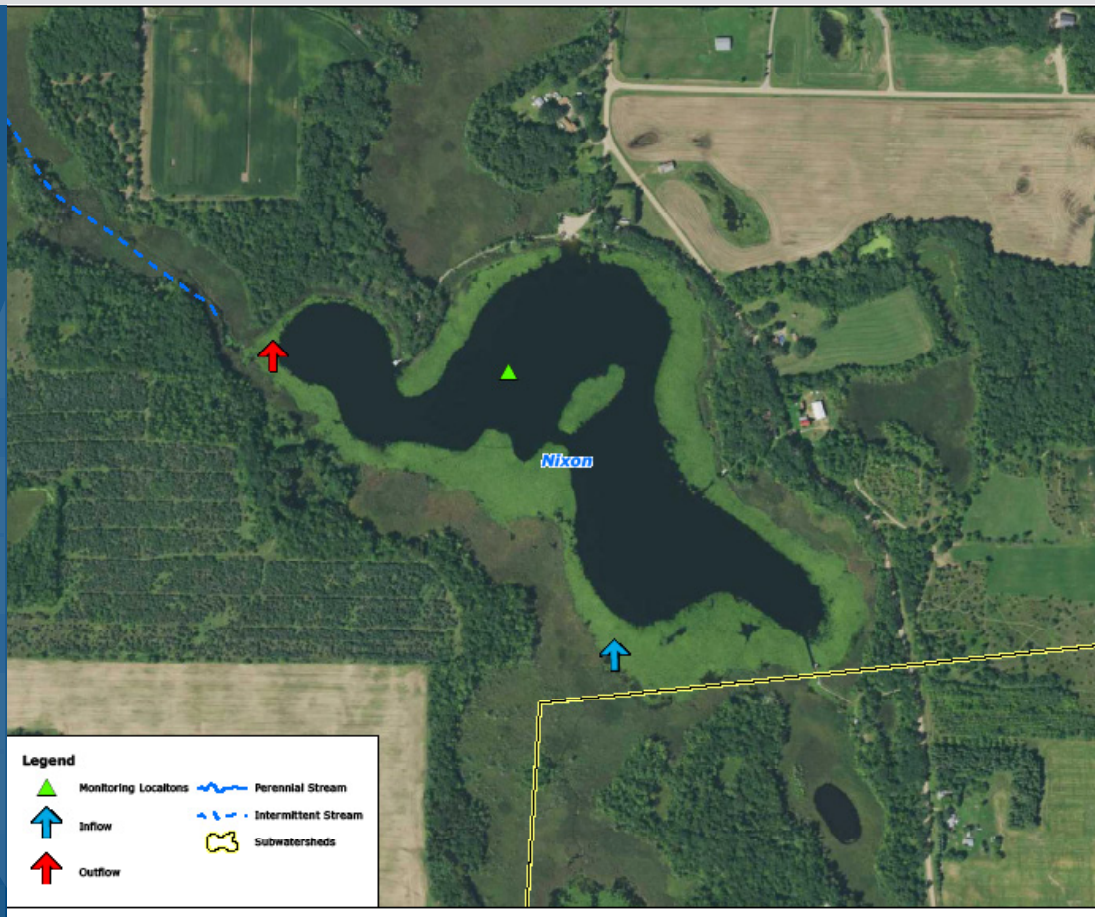
NIXON LAKE

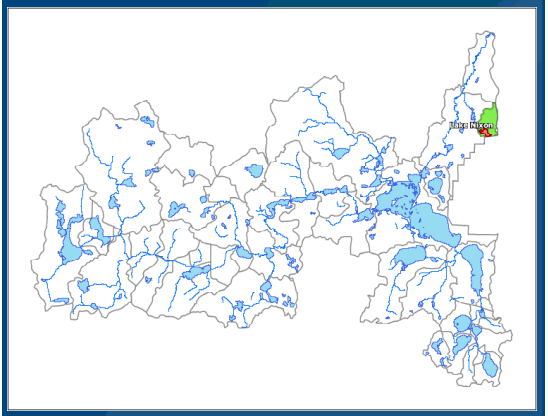
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 33 acres
- **Surface Area**: 60 acres
- **Subwatershed Area**: 690 acres
- **Maximum Depth**: 67 feet
- **Upstream Waters**: None

Common Fish	Bluegill, Northern Pike, Yellow Bullhead, Largemouth Bass
Dominant Vegetation	Currently obtaining vegetation info from DNR
Invasive Species	Currently obtaining vegetation info from DNR
Status	Not impaired





TO DO LIST

- Protect water quality
- Manage upstream loads
- AIS management and prevention

Fish Health (IBI)

**Fish IBI has not been assessed*

Vegetation Health (FQI)

**Vegetation FQI has not been assessed*

Sediment P Release ($mg/m^2/day$)

**Sediment release rate has not been assessed*

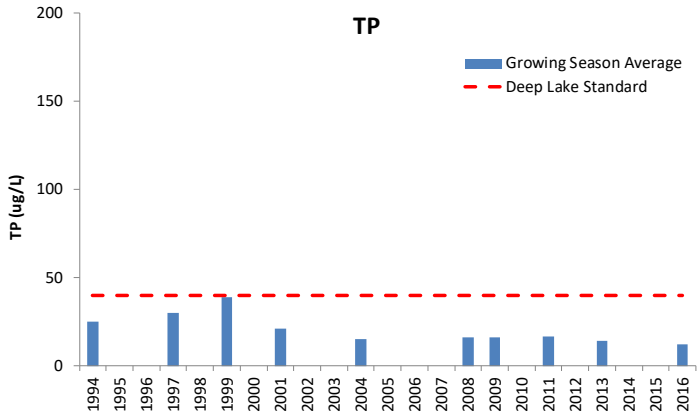
Resilience RESOURCES LLC

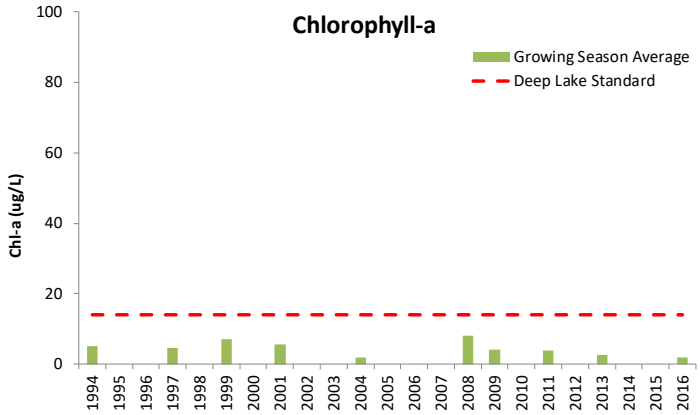
NIXON LAKE

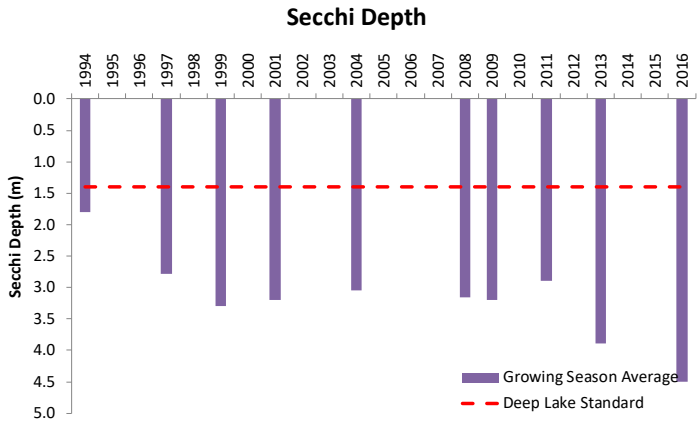
2019 Water Quality

Lake not sampled

Historic Water Quality







OTTER LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

Littoral Area: 32 acres

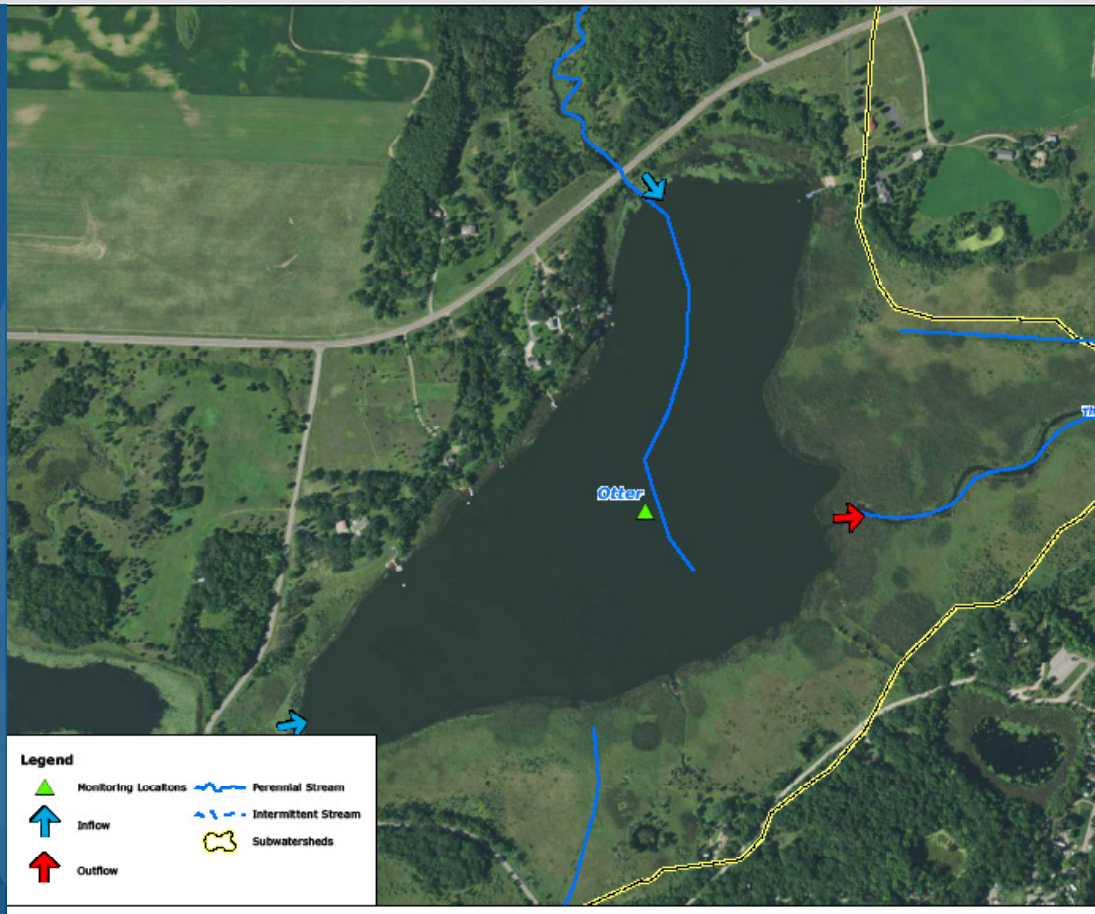
Surface Area: 92 acres

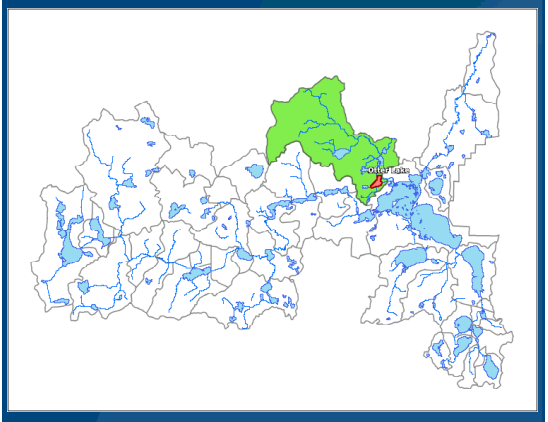
Subwatershed Area: 10,574 acres

Maximum Depth: 51 feet

Upstream Waters: Lake Laura

Common Fish	Black Crappie, Bluegill, Northern Pike, Largemouth Bass, Walleye
Dominant Vegetation	Diverse community
Invasive Species	Curly-leaf pondweed, Eurasian water milfoil
Status	Not impaired





TO DO LIST

- Protect water quality
- Manage upstream loads

Fish Health (IBI)

Impaired	Supporting	Exceptional
0	45	64 100

**Fish IBI has not been assessed*

25.6

Vegetation Health (FQI)

Impaired	Supporting	Exceptional
0	18.6	32.4

**Sample date: 8/15/2011*

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0	3.3	7.5

**Sediment release rate has not been assessed*

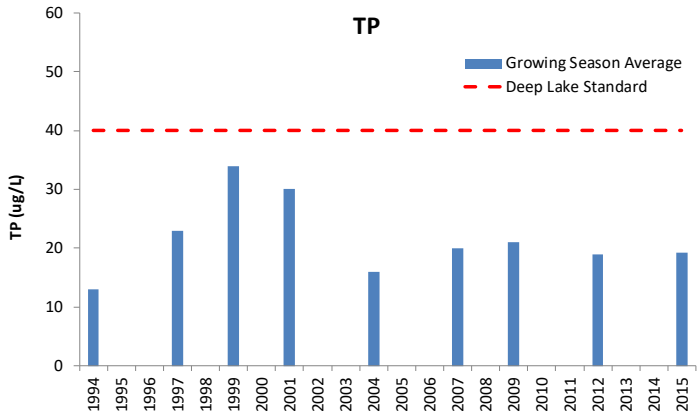
Resilience RESOURCES LLC

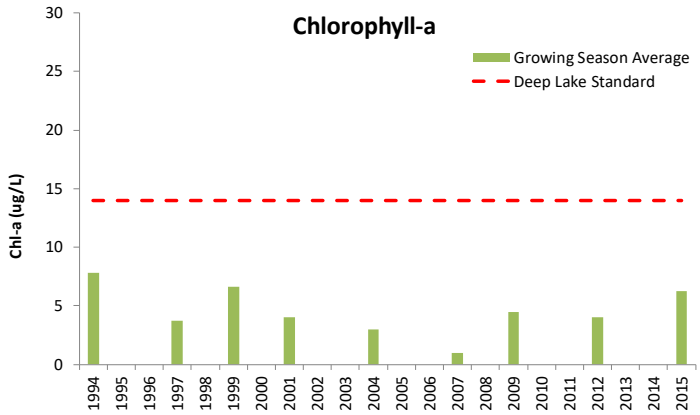
OTTER LAKE

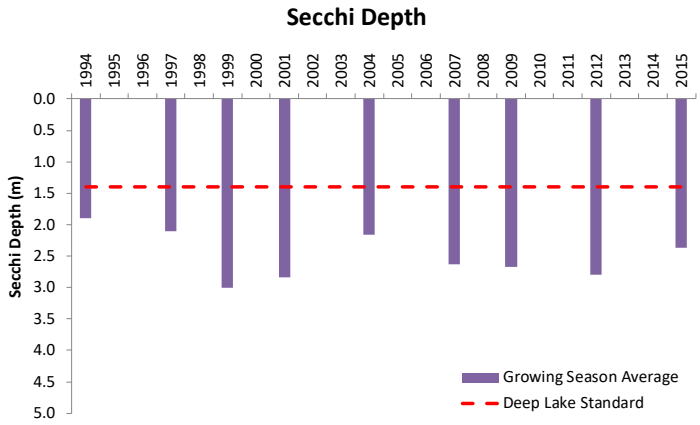
2019 Water Quality

Lake not sampled

Historic Water Quality







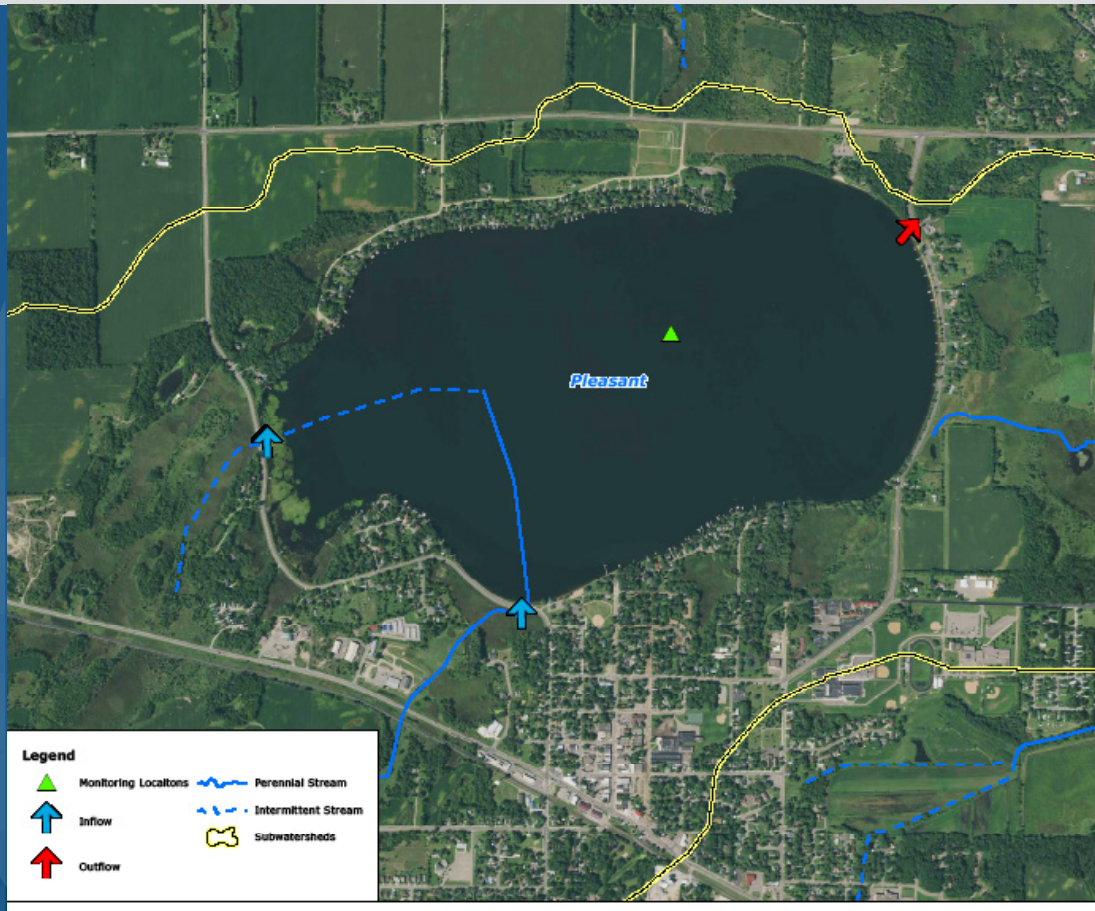
PLEASANT LAKE

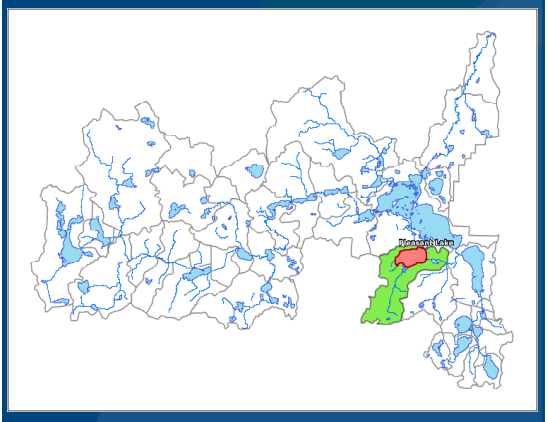
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 260 acres
- **Surface Area**: 597 acres
- **Subwatershed Area**: 4,325 acres
- **Maximum Depth**: 74 feet
- **Upstream Waters**: None

Common Fish	Bluegill, Yellow Bullhead, Northern Pike, Pumpkinseed Sunfish
Dominant Vegetation	Curlyleaf, Coontail, chara species, Eurasian watermilfoil
Invasive Species	Currently obtaining vegetation info from DNR
Status	Not impaired





TO DO LIST

- Manage watershed loads
- Protect water quality
- Operate outlet to minimize flooding

Fish Health (IBI)

Impaired	Supporting	Exceptional
0	24	61 — 100

**Fish IBI has not been assessed*

31.2

Vegetation Health (FQI)

Impaired	Supporting	Exceptional
0	18.6	32.4

**Sample date: 8/21/2017*

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0	3.3	7.5

**Sediment release rate has not been assessed*

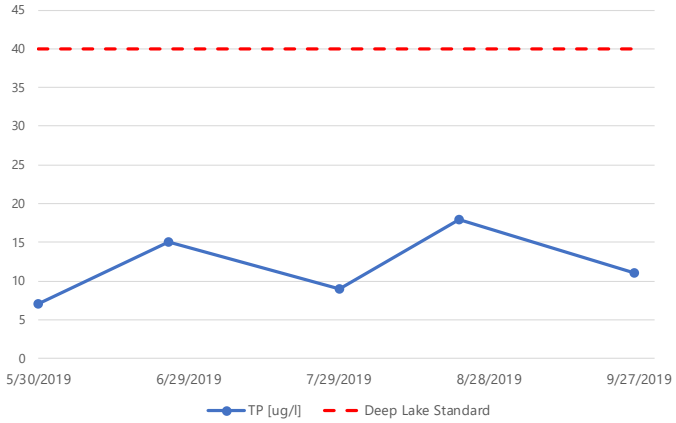
Resilience RESOURCES LLC

PLEASANT LAKE

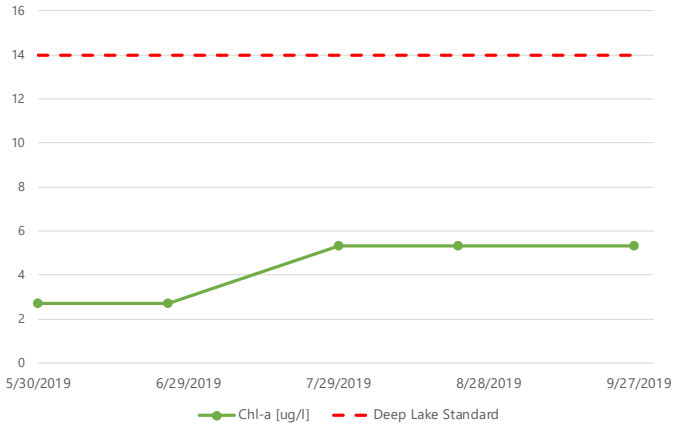
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

2019 Water Quality

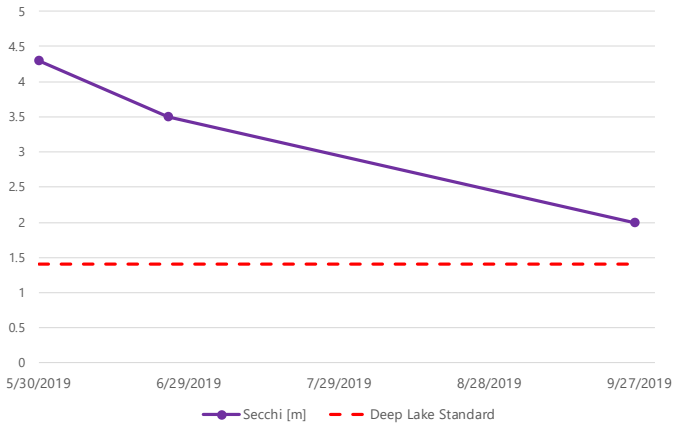
Pleasant - 2019 TP [ug/l]



Pleasant - 2019 Chl-a [ug/l]

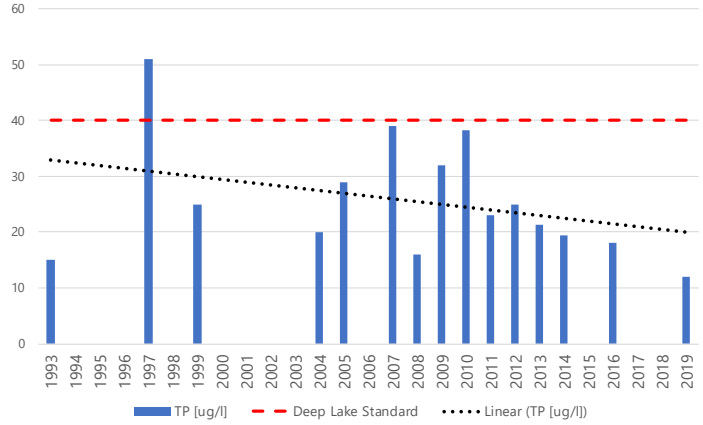


Pleasant - 2019 Secchi Depth [m]

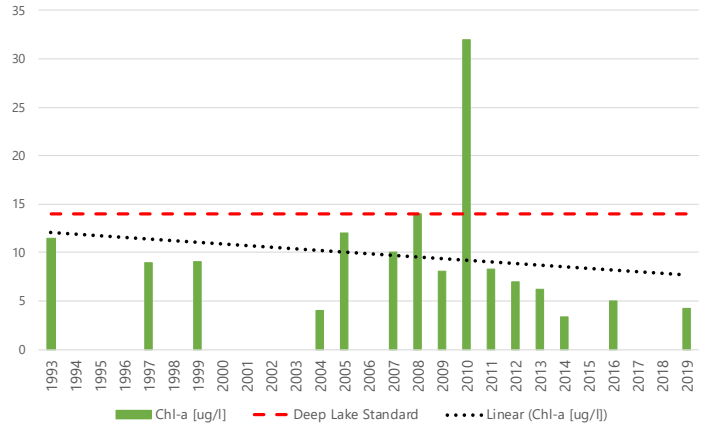


Historic Water Quality

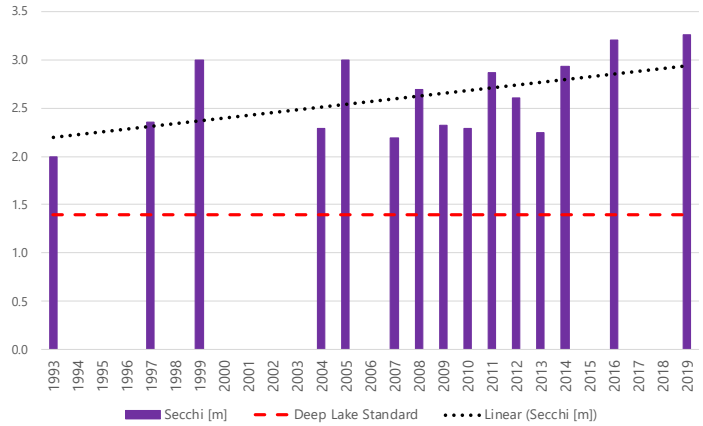
Pleasant - Historical TP [ug/l]



Pleasant - Historical Chl-a [ug/l]



Pleasant - Historical Secchi [m]



Resilience RESOURCES LLC

SCHOOL SECTION LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

Littoral Area: 188 acres

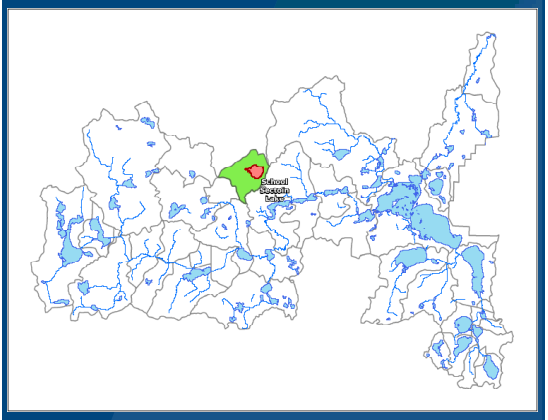
Surface Area: 193 acres

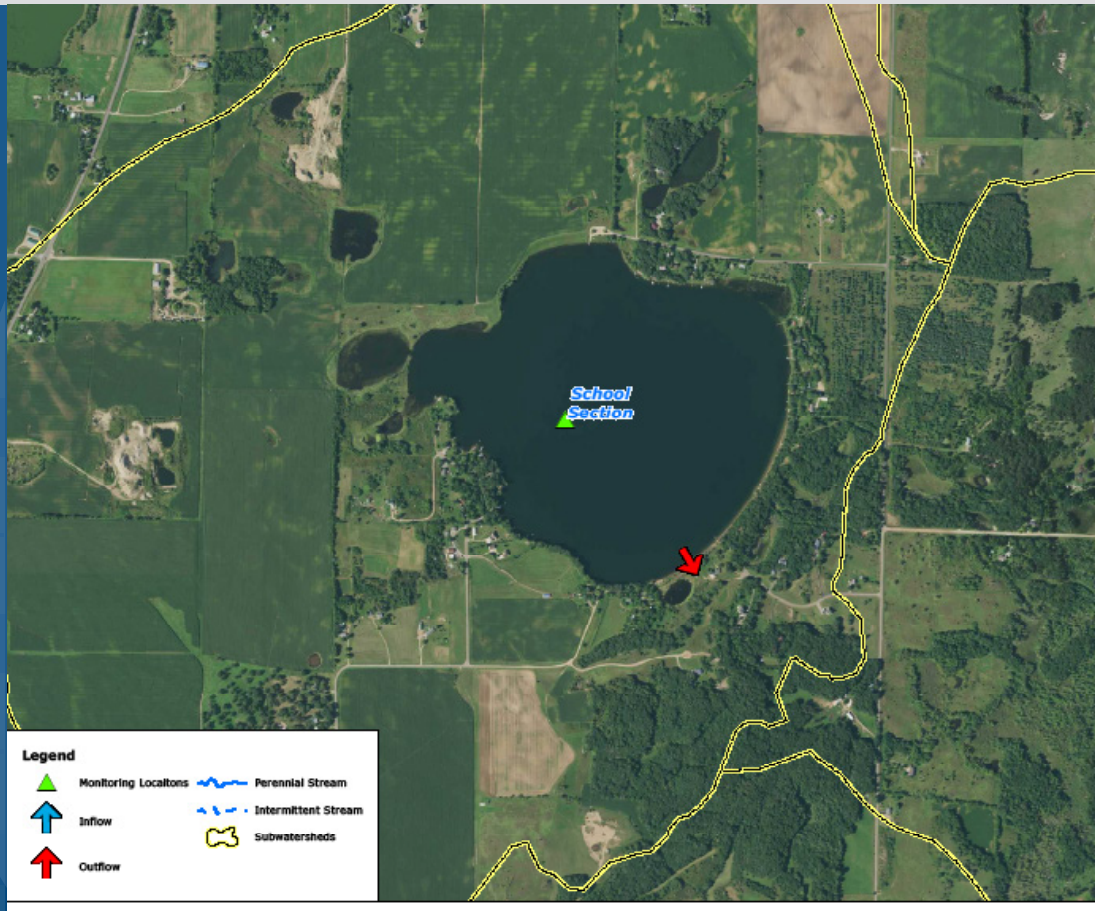
Subwatershed Area: 1,843 acres

Maximum Depth: 12 feet

Upstream Waters: None

Common Fish	Black bullhead, Bluegill, Northern Pike
Dominant Vegetation	Northern water milfoil, Illinois pondweed, muskgrass
Invasive Species	Curly-leaf pondweed
Status	Not impaired





26.7

Fish Health (IBI)

Impaired	Supporting	Exceptional
0	24	61 — 100

*Sample date: 8/18/2008

19.4

Vegetation Health (FQI)

Impaired	Supporting	Exceptional
0	17.8	26

*Sample date: 8/11/2011

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0	3.3	7.5

*Sediment release rate has not been assessed

TO DO LIST

- Operate outlet to minimize flooding
- Protect water quality

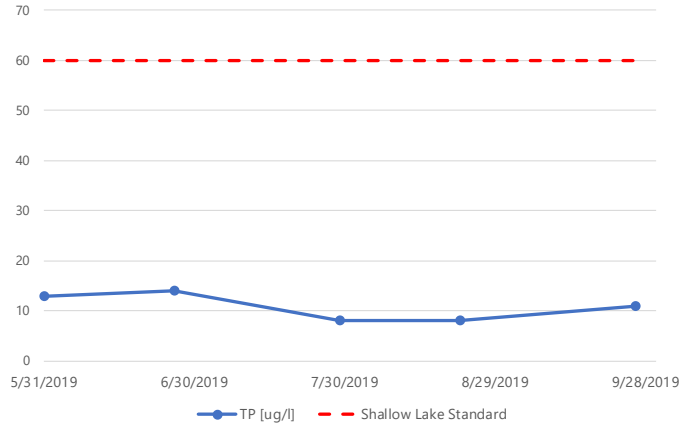
Resilience RESOURCES LLC

SCHOOL SECTION LAKE

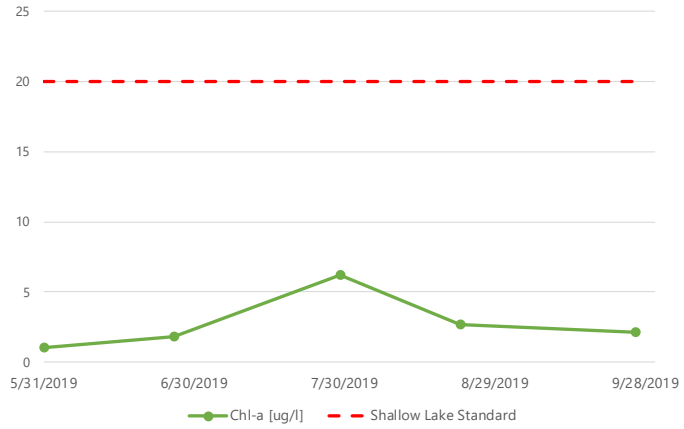
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

2019 Water Quality

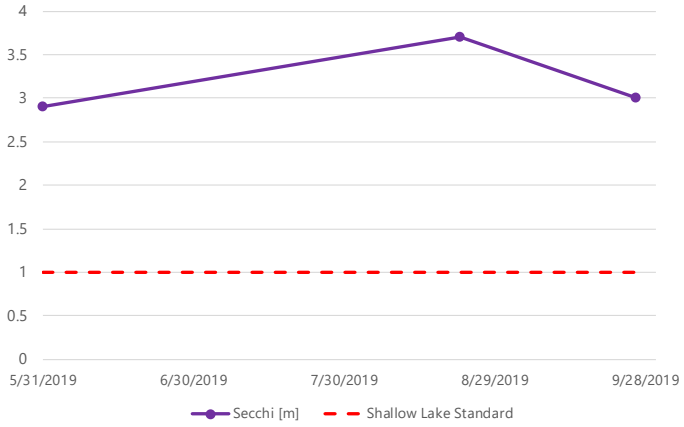
School Section - 2019 TP [ug/l]



School Section - 2019 Chl-a [ug/l]

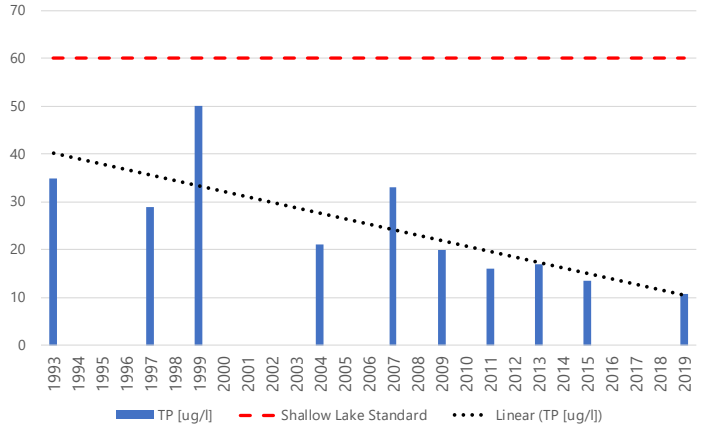


School Section - Secchi Depth [m]

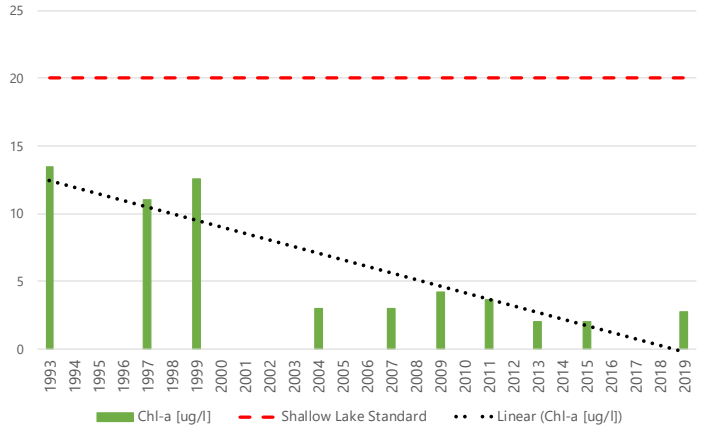


Historic Water Quality

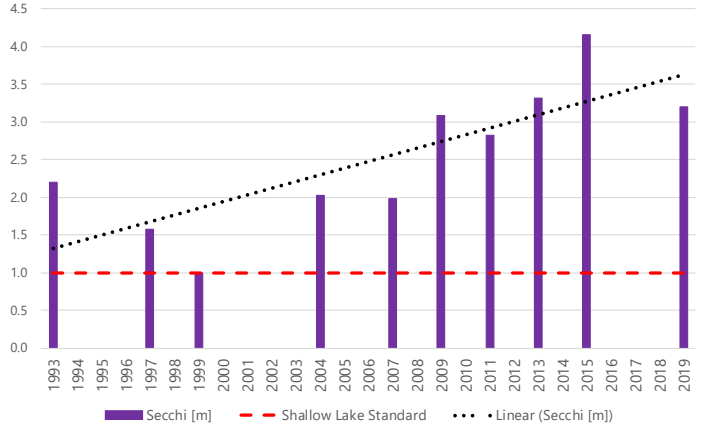
School Section - Historical TP [ug/l]



School Section - Historical Chl-a [ug/l]



School Section - Historical Secchi Depth [m]



Resilience RESOURCES LLC

SCOTT LAKE

Clearwater River WATERSHED DISTRICT
Protect · Protect · Preserve

QUICK FACTS

Littoral Area: 52 acres

Residence Time: 12 days

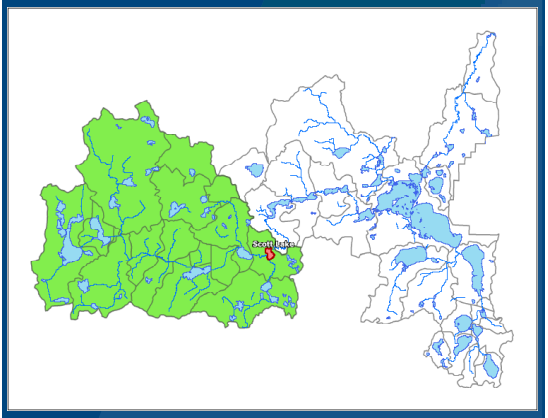
Surface Area: 80 acres

Subwatershed Area: 51,000 acres

Maximum Depth: 23 feet

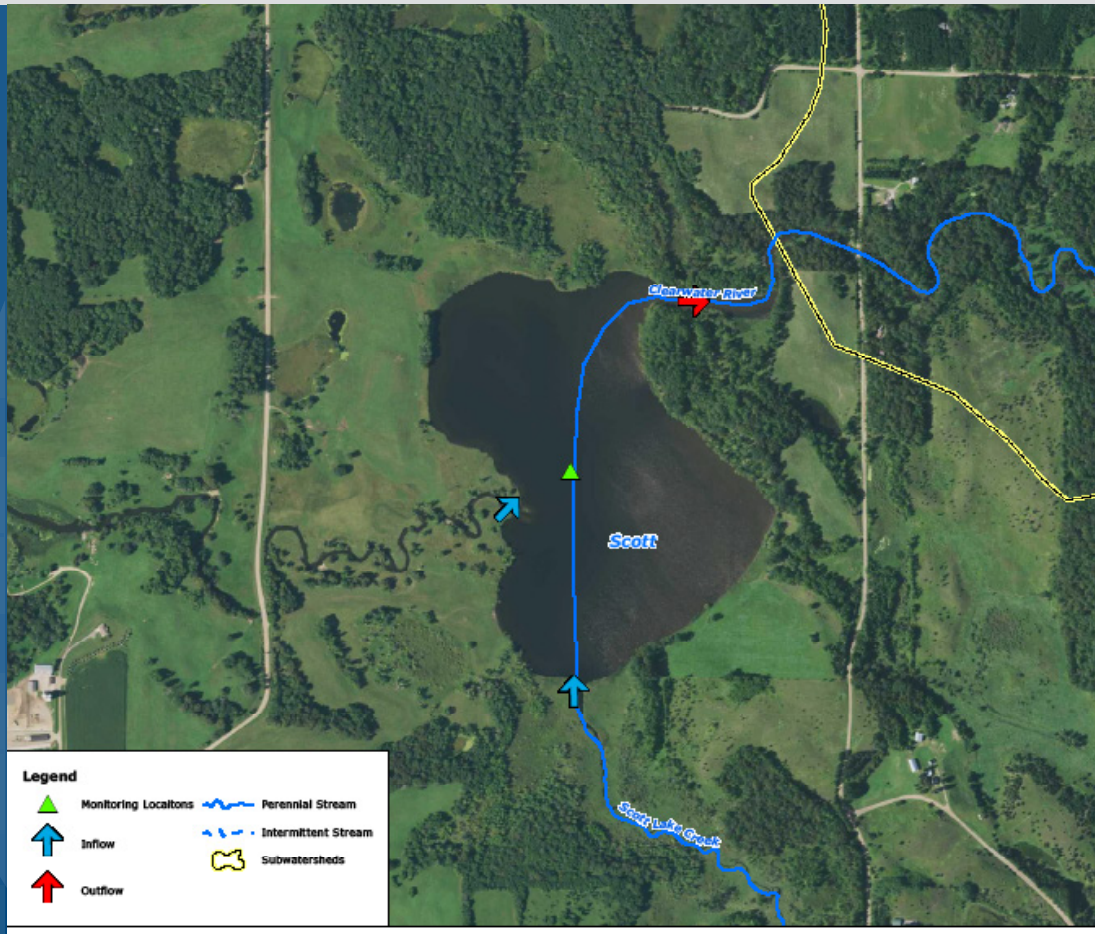
Upstream Waters: Clearwater River, Lake Betsy, Union Lake

Common Fish	Black Crappie, Bluegill, Channel Catfish, White Sucker
Dominant Vegetation	No Recent Survey
Invasive Species	Curly-leaf pondweed
Status	Impaired, TMDL Completed 2009



TO DO LIST

- Rough fish management
- Manage upstream loads
- Internal load management study



Fish Health (IBI)

Impaired	Supporting	Exceptional
0	38	59	100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

13.3

Impaired	Supporting	Exceptional
0	18.6	32.4

**Sample date: 7/28/1997*

Sediment P Release ($mg/m^2/day$)

30

Low	Moderate	High
0	3.3	7.5

**Sample date: 2010*

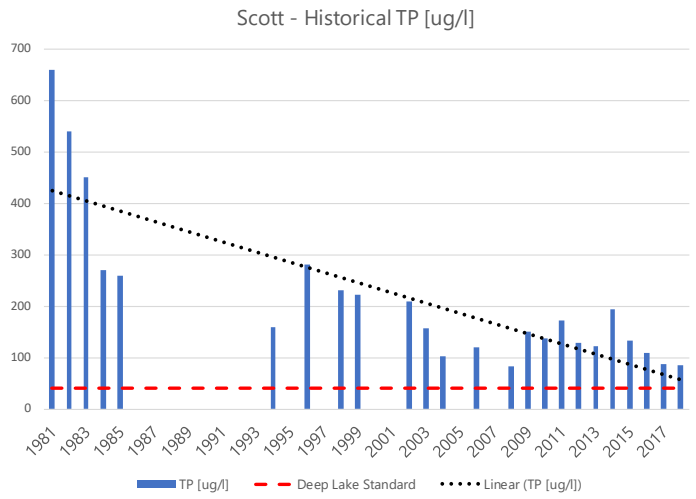
Resilience RESOURCES LLC

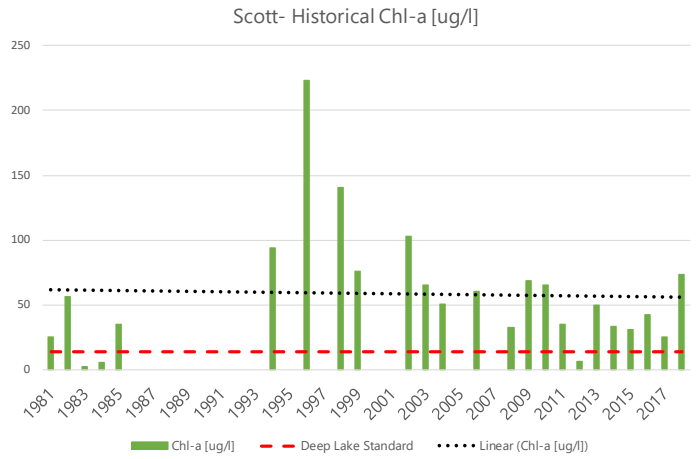
SCOTT LAKE

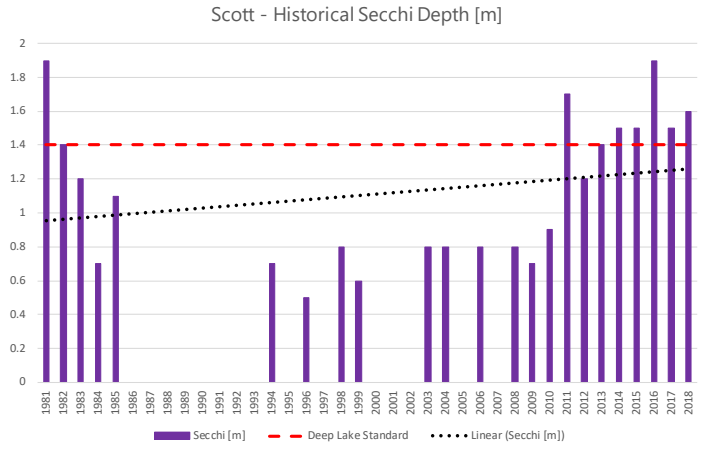
2019 Water Quality

Lake not sampled

Historic Water Quality







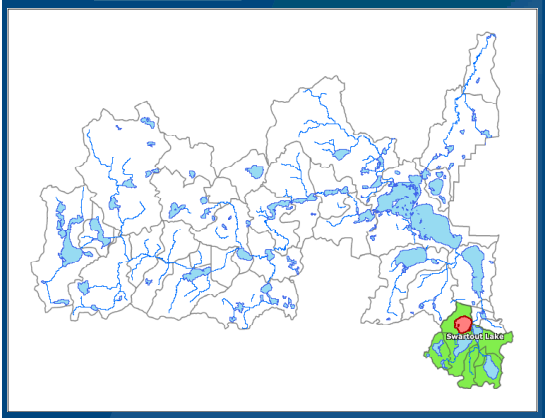
SWARTOUT LAKE

Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

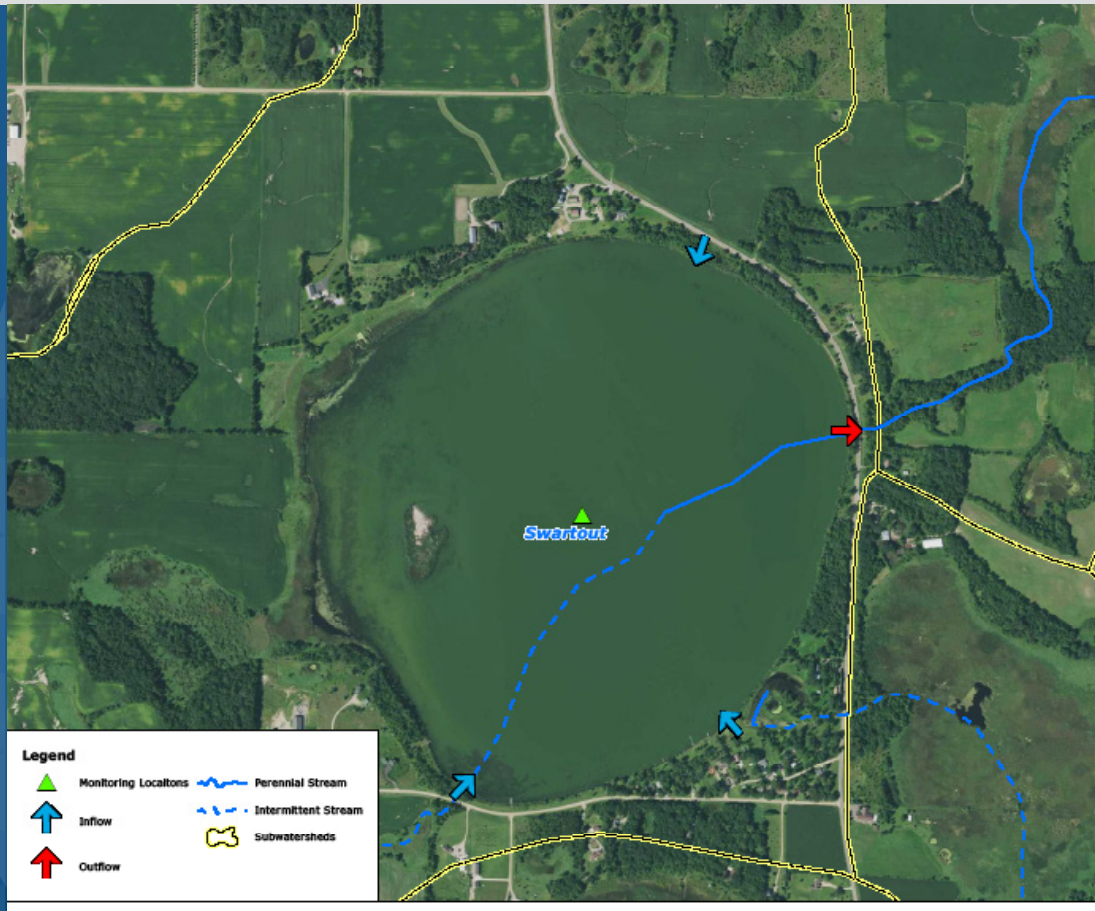
- **Littoral Area**: 171 acres
- **Residence Time**: 460 days
- **Surface Area**: 171 acres
- **Subwatershed Area**: 5,551 acres
- **Maximum Depth**: 12 feet
- **Upstream Waters**: Henshaw, Albion

Common Fish	Black Bullhead, Black Crappie, Common Carp
Dominant Vegetation	Coontail, sago pondweed, bushy pondweed
Invasive Species	Curly-leaf pondweed
Status	Impaired, TMDL Completed 2010



TO DO LIST

- AIS management
- Rough fish management
- Manage upstream loads



Fish Health (IBI)

Impaired	Supporting
0	36 — 100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

12.7

Impaired	Supporting	Exceptional
0	17.8	26

**Sample date: 8/14/2015*

Sediment P Release ($mg/m^2/day$)

4.8

Low	Moderate	High
0	3.3	7.5

**Sample date: 2/22/2018*

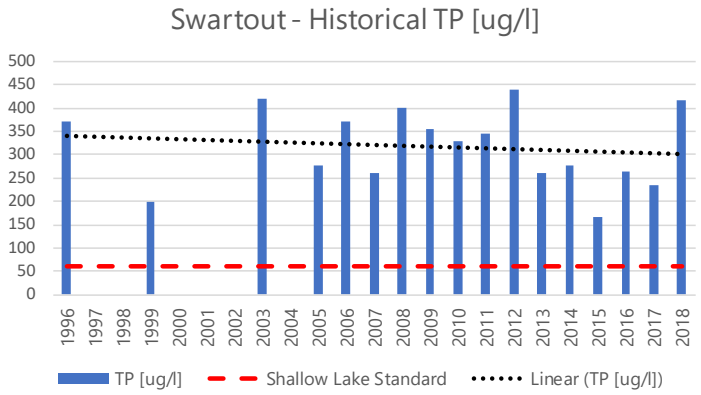
Resilience RESOURCES LLC

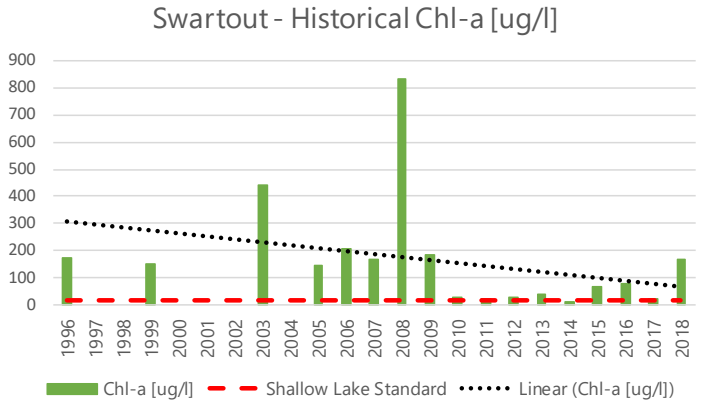
SWARTOUT LAKE

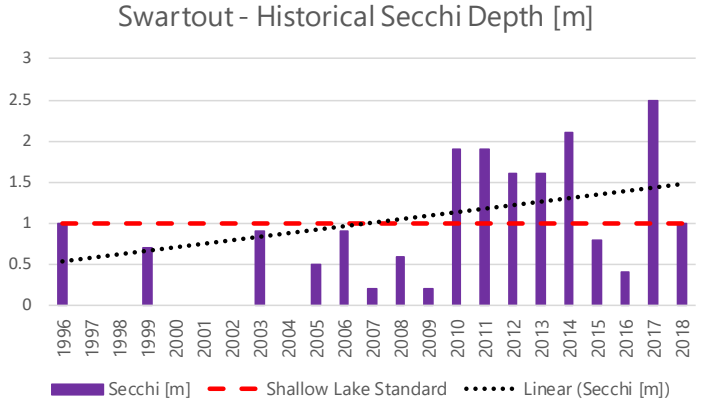
2019 Water Quality

Lake not sampled

Historic Water Quality







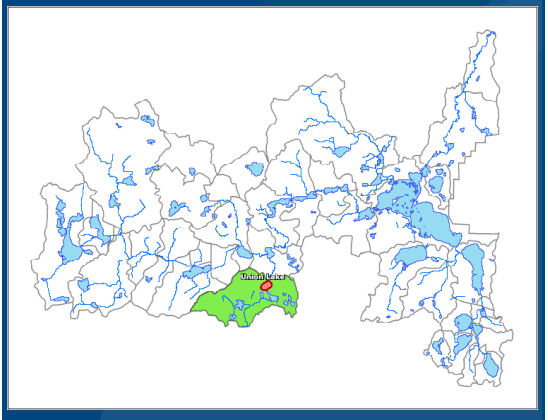
UNION LAKE

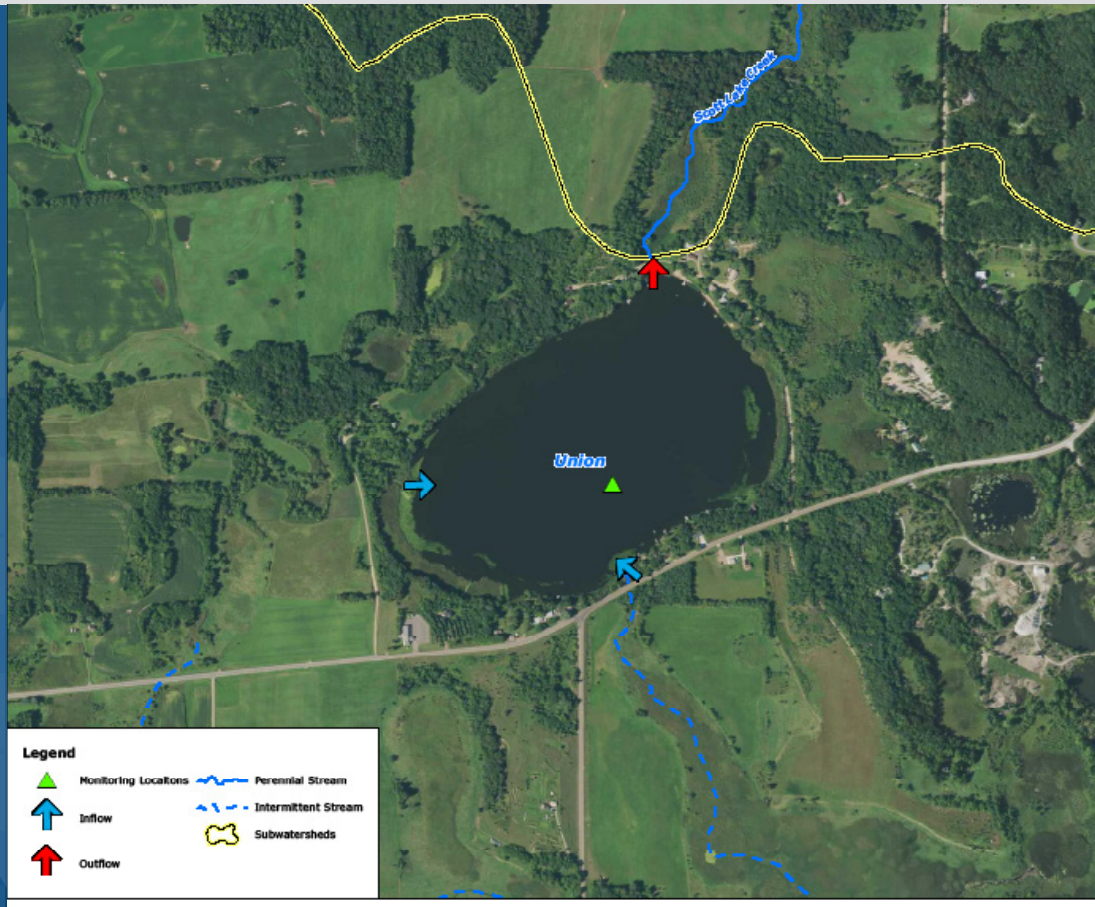
Clearwater River WATERSHED DISTRICT
Promote · Protect · Preserve

QUICK FACTS

- **Littoral Area**: 27 acres
- **Residence Time**: 291 days
- **Surface Area**: 93 acres
- **Subwatershed Area**: 4,741 acres
- **Maximum Depth**: 35 feet
- **Upstream Waters**: None

Common Fish	Black Crappie, Bluegill, Northern Pike, Largemouth Bass
Dominant Vegetation	Coontail, curly-leaf pondweed, sago pondweed
Invasive Species	Curly-leaf pondweed
Status	Impaired, TMDL Completed 2009





Fish Health (IBI)

Impaired	Supporting	Exceptional
0	45	64	100

**Fish IBI has not been assessed*

Vegetation Health (FQI)

14.7

Impaired	Supporting	Exceptional
0	18.6	32.4

**Sample date: 6/17/2016*

Sediment P Release ($mg/m^2/day$)

Low	Moderate	High
0	3.3	7.5

**Sediment release rate has not been assessed*

TO DO LIST

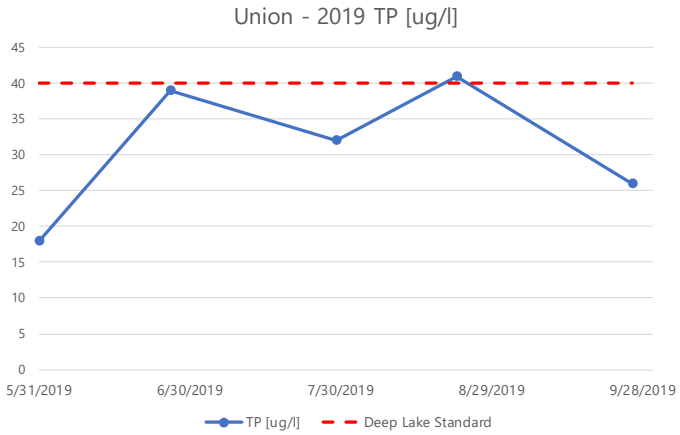
- Manage upstream loads

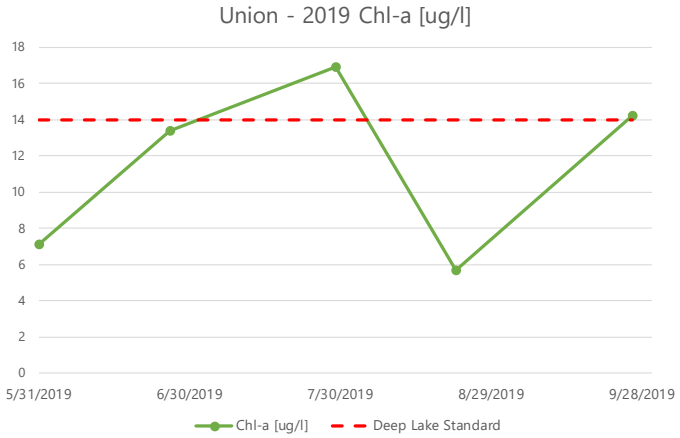
Resilience RESOURCES LLC

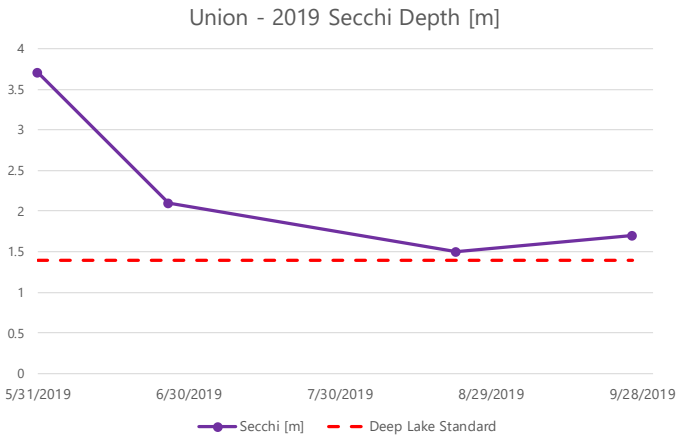
UNION LAKE

Clearwater River WATERSHED DISTRICT
Protect · Protect · Preserve

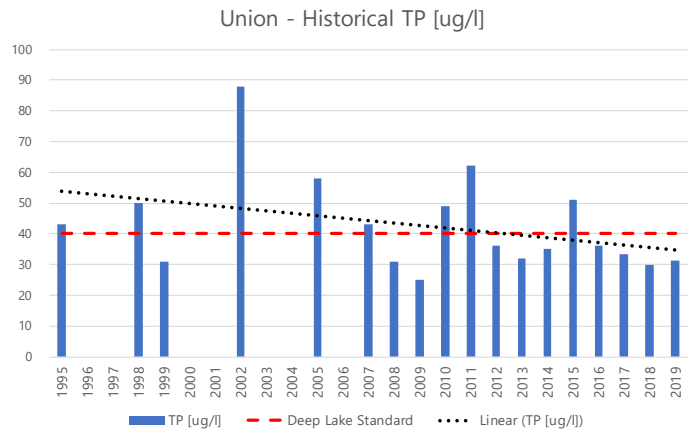
2019 Water Quality

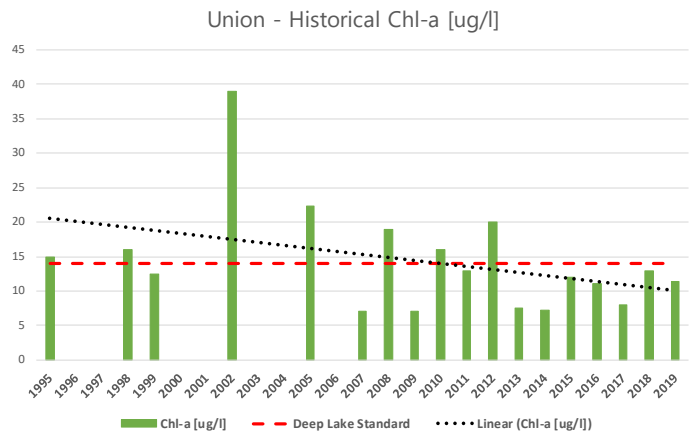


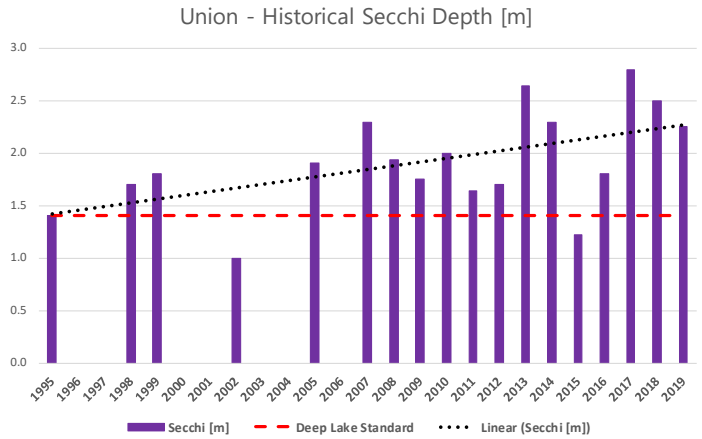




Historic Water Quality







Resilience RESOURCES LLC