

2018 ANNUAL REPORT

PELICAN RIVER
watershed district



Table of Contents

2018 Annual Report Introduction.....3

Managers, Staff, Consultants, Advisors.....4-5

2018 Highlights.....6-7

Weather & Water Quality Influences.....8-9

Data Collection-Lakes.....10-15

Data Collection-Lake Vegetation Surveys.....16-17

Data Collection-Shoreline Surveys.....18-19

Project-Aquatic Plant Management.....20-21

Data Collection-Streams.....22-25

Rice Lake Nutrient Reduction Project.....26-27

Drainage Systems, Ditch 11, 12, 13 & 14.....28

Rules & Permitting.....29

Education & Outreach.....30-31

2018 Operating Revenue & Expense.....32

2019 Work Plan.....33



2018 Annual Report

In 2018, the District continued its work in the areas of education and outreach, regulations and permitting, capitol projects, data collection and lake management, aquatic invasive species prevention and management, drainage system inspection and maintenance, and general administration.

Education and outreach are a main focus of the District. Staff developed new education handouts, display boards, and pull-up displays. In addition to giving presentations to groups, the District planned or participated in a number of community events including a new event, Aqua Chautauqua at Dunton Park.

The District's Water Management Rules and permitting program are one of ways the District protects or improves water quality. Lakeshore site visits and working with larger scale development projects continue to consume many hours of staff time. Marlon Mackowick, District Engineer, reviews large site permit applications. The District adopted the Drainage Systems Only Buffer Rule in 2018 and will be updating the Rules in 2019.

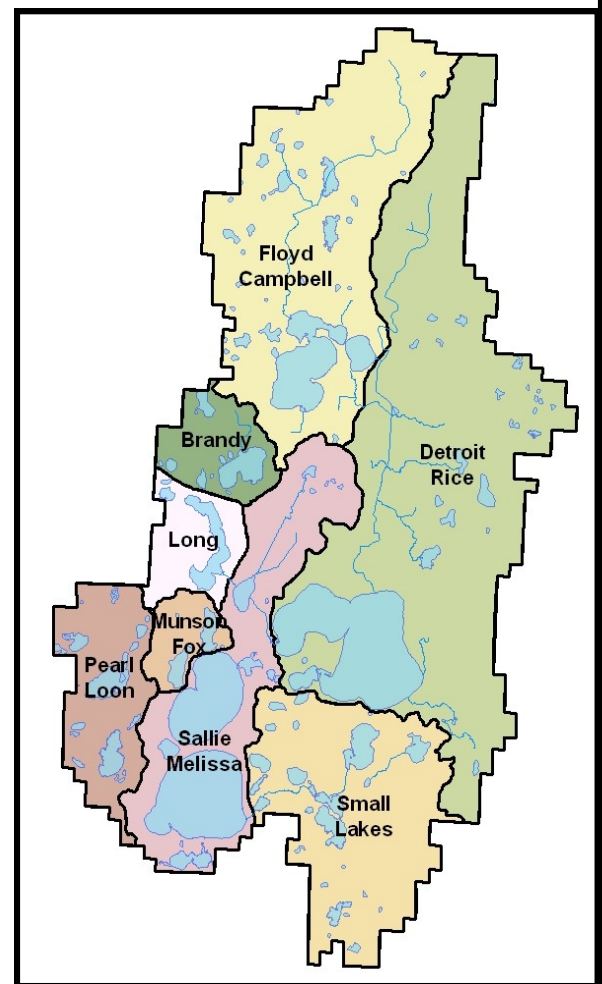
The Rice Lake Nutrient Reduction Capital Project final construction designs are nearly complete and construction is expected to move forward in 2019.

Staff and summer interns continue to collect data to analyze lake and stream health, including collecting water quality samples, taking water level and flow measurements, assessing shoreline changes, and recording weather conditions— precipitation and air temperature. In 2018, phytoplankton and zooplankton monitoring was added to study ecosystem shifts and impacts of zebra mussels infected waters within the District.

Aquatic Invasive Species (AIS) prevention, education, and management work continues throughout the District. Aquatic invasive plants on Detroit, Curfman, Sallie and Melissa are controlled on an annual basis. In 2018, the District organized a regional University of Minnesota AIS Research Update in Detroit Lakes where AIS researchers presented their research findings to the public.

The District is the drainage authority for Becker County drainage systems 11, 12, 13, and 14. Beaver control and blockage removal are the main activities conducted by the District. In 2018, the District adopted the Buffer Rules and approved an order to impound water on Drainage System 13 for the Rice Lake Wetland Project.

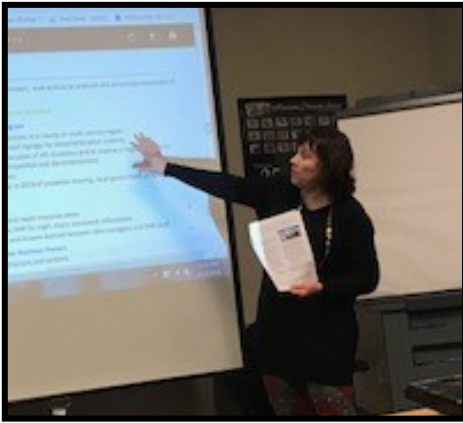
This 2018 Annual Report is submitted to the Board of Water and Soil Resources, the Commission of the Department of Natural Resources, and the Director of the Division of Waters. Copies of this report are available on the website at www.prwd.org and in the District office.



Pelican River Watershed District (PRWD) is one of 45 watershed districts established under MN Statute 103D. The purpose of watershed districts is to conserve the natural resources of the state by land use planning, flood control, and other conservation projects utilizing sound scientific principles for the protection of the public health and welfare and the prudent use of the natural resources. The District also acts as the drainage authority under MN Statute 103E for managing the public drainage systems within its boundaries for Becker County.

The District is 120 square miles and located primarily in Becker County (95%) with the balance (5%) in Ottertail County. PRWD is part of the Ottertail River basin which eventually discharges to the Red River of the North. There are eight major lakes including the Floyd chain, Big/Little Detroit Lakes, Long, Sallie and Melissa which as the economic engine for the NW region of Minnesota. These lakes provide recreational opportunities for residents and visitors, including fishing, boating and swimming.

PRWD Staff



Tera Guetter, Administrator
Tera.guetter@arvig.net

Tera joined PRWD in 1999 and oversees all the District operations, including staff, annual budget and work plan, capitol improvement projects, grant programs, plan reviews, project coordination and watershed restoration planning.



Brent Alcott
Asst. Administrator
Brent.alcott@arvig.net

Brent has been with the District since 2014 and he manages the PRWD's water quality monitoring program, Rules and Permitting program, as well as directing in-lake aquatic plant control treatments.



Seasonal Staff
Terry Anderson & Rob Kiihn

Terry and Rob work from the end of May through September picking up and disposing of the aquatic vegetation that residents remove from lakes Sallie, Melissa, Detroit and Curfman.



Summer Interns
Eli Disse & Ali Chalberg

Each summer the District hires two students to collect water samples from area lakes, conduct shoreline surveys, plant surveys, enter data and assist with educational activities. Many students earn college credits while completing important tasks for the District.



Brenda Moses, Sr. Office Coord.
Brenda.moses@arvig.net

Brenda has worked at PRWD since early 2013. She handles the District's financials including payroll, accounts payable, budgets, and grant tracking. She also develops educational materials, manages the website and assists with permitting.

District Consultants

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Board of Managers

The PRWD Board of Managers are appointed by the Becker County Board of Commissioners to three year terms. Their meetings are held the third Thursday of each month at 5:00 PM in the second floor conference of the Wells Fargo Bank Building located at 211 Holmes St. West, Detroit Lakes, MN. All meetings are open to the public.

Each year, many of the Managers attend the MAWD Summer Tour held in June. In 2018, this event took place in Chanassen, MN.



Managers Kral and Okeson making observations during the Summer Tour event.

Guetter and Manager Haggart also enjoyed the sites during the Summer Tour.

2018 PRWD Managers	E-mail Address	Subwatershed	Service From	Term Expires
Dennis Kral, President	dskral@arvig.net	Big Floyd	1988	2019
Rick Michaelson, Treasurer	rickathy@arvig.net	Sallie	2013	2019
Janice Haggart, Manager	Janice.haggart@gmail.com	Muskrat	2005	2019
Ginny Imholte, Manager	imholtegl@gmail.com	Big Detroit	1991	2020
Brad Refsland, Manager	refsland@arvig.net	Long	2017	2020
Orrin Okeson, Vice-President	okesonov@q.com	Campbell	1988	2021
Lowell Deede, Manager	lowelldeede@q.com	Floyd/Small Lakes	2017	2021



Citizen Advisory Committee (CAC)

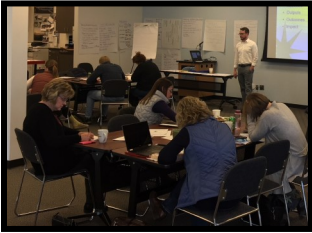
John Okeson, Becker County Commissioner; Dick Hecock, Detroit Lake; Wanda Roden, Sallie-Melissa; Larry Anderson, Floyd Lake; Tom Anderson, Long Lake; Wes Pare, Landscaper

Technical Advisory Committee (TAC)

MN Department of Natural Resources— Roger Hemphill, Lori Clark, Nathan Olson, Nicole Kovar
 MN Board of Water and Soil Resources—Brett Arne, Steve Hofstad, Darrin Mayers, Tim Gile
 MN Pollution Control Agency—Tim James (retired October 2018), Danielle Kavasager
 MN Department of Transportation—Gabe Dretsch
 Becker County HWY Department—Jim Olson
 Becker County Soil and Water Conservation District—Peter Mead, Ed Clem

2018 Highlights

January



- * Guetter attended the MN DNR Roundtable held Jan. 5 in St. Paul. Fisheries stocking and management, climate change and AIS impacts were key topics.
- * A meeting was held Jan. 10 with NRCS, MN DNR, HEI and Guetter regarding construction costs and design of the Rice Lake Project. O&M and MOU details were also addressed.
- * Alcott is working with Wenck Assoc. investigating options for possible Alum treatment on St. Clair lake. Preliminary costs are as high as \$450K-\$500K.
- * Moses attended 2 day seminar on Volunteer Impact Training hosted by Riley Purgatory Bluff Creek Watershed District.

February



- * A Clean Water Partnership loan application was completed. The funds would be used for the Rice Lake Project and St. Clair/Ditch 14 wetlands phosphorous reductions.
- * Alcott and Moses attended Stearns County Shoreland training to gain insight how other counties run their permitting program and also to observe how their annual workshop was executed.
- * Guetter met with the MAWA education committee and Executive Director, Emily Javens, to develop a strategic plan and 2 year training calendar based upon a recent survey by members.
- * Alcott attended the Aquatic Invaders Summit in Minneapolis. Topics included Starry Stonewort, AIS Innovation Grants, and the impacts of AIS on MN Fisheries.

March



- * "Zcience on Tap" is a monthly gathering for local scientists or anyone interested in the science field and is held at Zorbaz with a different presenter each month. Topics have so far included: The State of our Lakes, Pollinators, Lake Sturgeon.
- * The Association of Watershed Administrators was held on March 7 in St. Paul. The education committee presented training framework and reported on their work with BWSR for sessions at the BWSR Academy in the fall.
- * Guetter and Board President, Kral, met with Senator Eken and discussed MAWD legislative priorities including Tax and Funding, along with Policy Issues/

April



- * Campbell Creek opened mid-April and samples were collected on April 18. Stream monitoring equipment was also installed at that time.
- * Eli Disse from Detroit Lakes and Ali Chalberg from Mahtowa, MN (Duluth area) have been hired as summer interns.
- * Guetter and Alcott have met with MN DNR staff to review potential treatment areas on Detroit, Curfman, Sallie and Melissa for Flowering Rush and Curly-leafed pondweed.
- * Moses is mentoring 4th graders from Rossman on Stormwater Best Management Practices.
- * Data Practices & Records Retention Policy has been adopted by the Board of Mangers

May



- * Lake Detroit Ice-off on May 1st, almost two weeks later than the average date.
- * The Public Hearing to Impound Waters of Becker County Ditch 13 for the Rice Lake Project was held on May 24.
- * Guetter & Moses have been working diligently organizing the MN AIS Research Center Update Event to be held in Detroit Lakes on June 8. Alcott assisted with DLHS 9th Grade Sucker Creek Field Day.
- * Staff has been fielding a high volume of calls on the Long Shore Gravel Extraction CUP permit with Becker County. The Planning Commission voted to deny the proposed application.

June



- * Alcott attended PTM app training on June 13. The tool can be used to interactively prioritize water resources and the issues impacting them and then target areas for improvements.
- * MN AIS Research staff travelled to Detroit Lakes to present at a seminar hosted by the District along with Becker, Ottertail and Hubbard County COLA. The seminar was attended by 125 people including Senator Eken and Rep Green who attended the legislative listening portion.
- * The District is sampling phytoplankton and zooplankton on Sallie and Melissa to study potential plankton population shifts and ecological impacts of zebra mussels.
- * Lake Report handouts have been completed and distributed to lake associations for their use for the following lakes: Long, Big & Little Detroit, Sallie, Melissa, Little Floyd, and Big & North Floyd.

2018 Highlights

July



- * July 19th—Adoption of Pelican River Watershed District Drainage Systems Only Buffer Rule
- * There have been several storm events producing between 1-2 inches of rain, increasing both stream levels and flow velocities.
- * The only new AIS designation on District lakes in 2018 was on Floyd Lake for Zebra Mussels. Staff has surveyed treatment areas on Detroit, Sallie, Melissa and Muskrat to assess the effectiveness of Curly-leaved pondweed treatments. Of the 95 points surveyed only 10 were found to have any CLP growth.
- * Staff continues to work with U of MN Extension staff to plan the Aqua Chautauqua event scheduled for August 9 at Dunton Locks County Park.

August



- * Water quality has been above average for most District lakes.
- * Vegetation surveys were completed on Long and Pearl lakes.
- * Aqua Chautauqua event at Dunton Locks Park was very successful with over 300 people attending. PRWD received a MN Sustainable Development Partnership grant in the amount of \$500 to offset costs of the event.
- * The second Flowering Rush treatment was delayed until August 6 & 7, however, weather conditions were very favorable at that time and treatment was highly successful.
- * Guetter, Alcott, summer interns and Manager Okeson, joined the MN DNR to assess streambank erosion and riverbank erodibility between Co. Rd 149 to Floyd Lake.

September



- * Guetter continues to work on completing the final order for the impoundment on Ditch 13, and partial road abandonment with Detroit Township in order to keep the Rice Lake project moving forward.
- * The District continues to review cost estimates and best management practices for St. Clair and North Floyd Lake, as well as Ditch 14 Wetland, to determine the most effective way to reduce phosphorus loading.
- * With lower nighttime temperatures, surface water temperatures have also begun to cool, and the mixing process has begun on thermally stratified lakes.

October



- * A total of 19 beaver were trapped out of the three ditch systems in September & October.
- * Alcott & Moses attended BWSR Academy training Oct. 29 & 30 at Breezy Point Resort.
- * Stream monitoring is completed.
- * An Interactive Meeting Attendance Policy was presented to the board for their review. This procedure could be used when managers are unable to physically be present at board meetings.
- * In mid-October, the Pelican River between Sallie and Melissa was blocked with a heavy deposit of up-rooted plants, zebra mussels and sand, causing the downstream water level to drop by .65 ft.

November



- * Ice-on arrived earlier than normal for Big Detroit Lake, November 13. Open water in 2018 consisted of only 195 days due to late spring and earlier than average ice on in November.
- * Stream and lake monitoring data has been reviewed and submitted to the MPCA EQuIS (Surface Water Quality) Database.
- * The District has adopted an Interactive Television/Technology which allows board managers to participate in meetings in via Skype. Managers must give notice of their intent to attend a meeting in this manner seven days in advance of meeting.
- * Staff has begun working on a Permitting Guide to help residents navigate through the process.

December



- * The 2019 Budget was presented to the Board on 12/13/18. Levies, Assessments and Fees were approved and sent to Becker And Ottertail Counties
- * The last permits of 2018 were issued in mid-December, bringing the total to 68. There were several large sites, requiring stormwater plans, approved in 2018.
- * Managers Kral, Refsland and Haggart, as well as Administrator Guetter attended the annual MAWD conference in Alexandria, MN.
- * District staff continues to work with the City of Detroit Lake as part of the Ordinance Review Committee. Comments have been received from the MN DNR and are being reviewed.

2018 Weather —drier, record temperature swings, and snowier

Among the climate highlights of 2018, the calendar year was drier than average for the Detroit Lakes area. The total amount of precipitation was 22.8 inches, which was almost 6.0 inches less than the 30-year normal of 28.6 inches. Overall, only four months of the year (February, March, June, and October) exhibited wetter-than-normal precipitation. June was the wettest month of 2018, with a total of 5.41 inches and capturing the largest storm recorded of the year on June 17th (1.96 inches). July and October were also wetter, with October well above the monthly normal rainfall. All other months were drier-than-normal, attributing to the large total departure from normal annual precipitation. However, snowfall was above the average at 64.4 inches, 13 inches greater than the average annual snowfall of 51.2 inches. The overall annual year-round temperature was 50 degrees F, near the long term average temperature of 51 degrees F.

2017-18 Winter—Long and snowy

2018 will be remembered for the long, snowy winter, especially the months of February—April. The first winter season snowfall arrived in late October 2017 dropping 1.5 inches. Early November was dry and cooler than average and area lakes froze earlier than normal. The cool spell was broken mid-month with a few days of above average temperatures, but dipped back down late in the month.

December 2017 recorded a large temperature range, with a high temperature of 45 degrees F on the 2nd and -28 degrees F on the 31st, producing a 73 degree F range for the month. In addition to the temperature swings, December had 15.2 inches of snowfall, bringing the total 2017 snowfall from October—December to 22.25 inches.

Temperature highs were 10-25 degrees F colder than normal the first several days of January, with most parts of the state experiencing overnight subzero temperatures. There was a warming mid-month, setting a new record high of 45 degrees F on the 20th, breaking the previous record set in 2017 of 44 degrees F. There were 10 days in January with a high of 30 degrees or more. The average January monthly high was 17 degrees F; average low -1 degrees F.

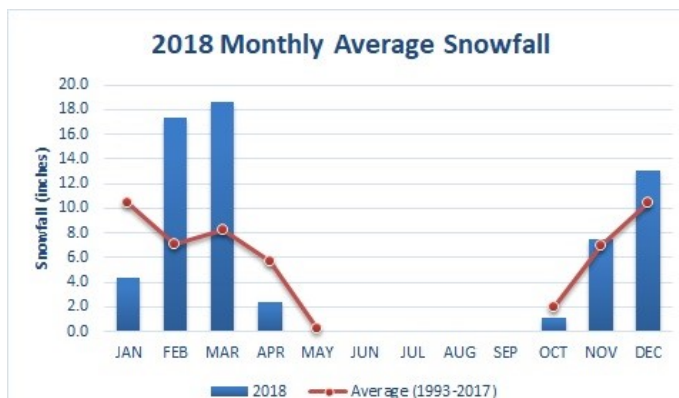
Detroit Lakes had over 42 inches of snowfall from January—April, with February and March blizzards that produced heavy snowfall that dumped the majority (35.9 inches).

2018 Spring—Cooler and later

The month of March was the wettest since 2013, and the snowiest since 1997, with 9 days of precipitation reported. March was also cooler than normal, as temperatures did not reach 50 degrees F compared to 2017, when temps reached 50 degrees F six times and 60 degrees F twice.

April-May precipitation was well below average, and the winter was capped off in April with 2.4" of snowfall. April 4th had a temperature low of -4 degrees F and the official Detroit Lake ice off was May 1st, almost two weeks later than average.

May temperatures were average, except for a spike on May 27th, reaching a high of 91 degrees F, 30 degrees warmer than the monthly average temperature of 60 degrees F. This unseasonable, rapid in-lake temperature increase caused a fish-killing bacteria growth in Little Detroit lake causing a small scale fish die off. The cool, wet spring created difficult planting conditions for area farmers.



Lake Ice On/Ice Off. Detroit Lake had ice-on for 146 days, from December 6, 2017—May 1, 2018. Over the past several years, temperature has influenced the annual average days of open water.

A little excitement. Detroit Lake froze and reopened three times in late 2017, creating a kerfuffle for the locals who closely follow the official freeze up data. Below average temperatures caused the lake to first freeze up on November 9th, about 16 days sooner than the average for the last 20 years. Weather patterns then shifted to well above average temperatures in mid-late November causing a large portion of Detroit surface area to break up. A second attempt to freeze-up occurred on December 1st after a drop in nighttime temperatures closed the open portion of the lake once again. However, it was short-lived as Detroit reopened on December 4th, interestingly, this time not due to warming temperatures, but from storm event high winds. The lake froze over just before midnight on December 6.

2018 Lake Ice Off Delayed. The 2018 low spring temperatures delayed ice off on area lakes by almost two weeks. The average ice on date is November 21st and the average ice off date is April 20th.

Data Collection—Weather



2018 Summer—a little Wetter

Following the long winter and cool spring, summer followed with wetter conditions, especially in June and July.

There were 12 days of rainfall in June, totaling 5.41 inches, with 1.96 inches falling on June 17th.

July had 14 days of rainfall, totaling 3.97 inches, with 1.80 inches on July 20th. July came close to setting a record temperature low on the 27th with a low of 44 degrees F. The record low in July is 41 degrees F set in 1981.

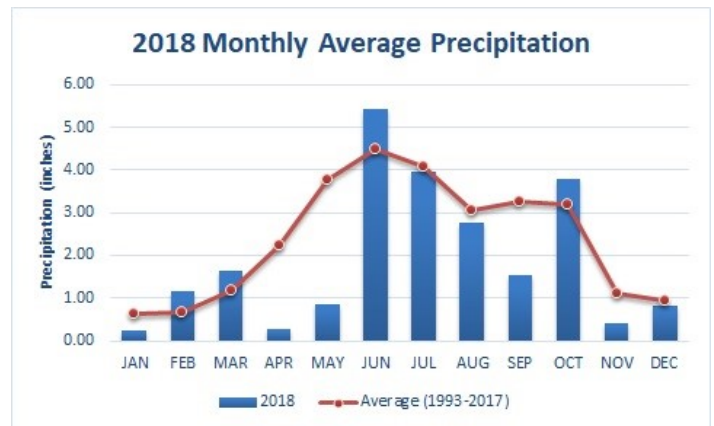
August was a “normal” month with average rainfall amounts and temperatures.

2018 Fall—Cloudy and Cooler

The autumn season was dominated by cloudy and cool conditions with plenty of rain, snow, and fog—absent of the usual spell of sunny, clear blue skies following the first frost. September had 12 days of rainfall, but only 1.55 inches of precipitation.

The cool spell was broken for a short time in September with a record breaking high temperature of 89 degrees F on the 17th, breaking a 1910 record of 87 degrees F. The first frost was on September 28th, which extended the growing season for area farmers.

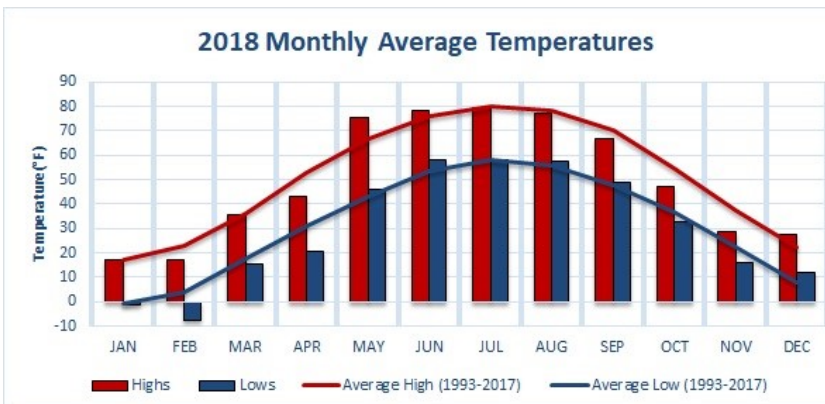
While September was drier than normal, October was wetter and much cooler than average. October had 3.78 inches of rainfall and an average high temperature of only 47 degrees F, 8 degrees F cooler than the 55 degree F average. The first snowfall arrived on October 11th, with almost an inch of snow.



2018 Winter/Start of 2019 Winter

November continued with cooler and wetter than average conditions with an average temperature of 29 degrees F, 8 degrees F below the average temperature of 37 degrees F. Toward the end of November, 7.5 inches of snowfall was recorded.

December made up for the cool, wet fall with warmer than average temperatures of 28 degrees F, six degrees F warmer than the average of 22 degrees F and 13 inches of total snowfall. 2018 ended on a snowy note with 10.5 inches arriving between December 26th-28th.



Data Collection—Lake Monitoring

The overall objectives of the monitoring program are to identify water quality problem areas, quantify pollutant loadings, evaluate the effectiveness of BMPs, and promote understanding of District water resources and water quality. District staff and two seasonal interns collect and analyze the data. In 2018, the District spent \$28,000 for seasonal labor, equipment, and lab analysis.

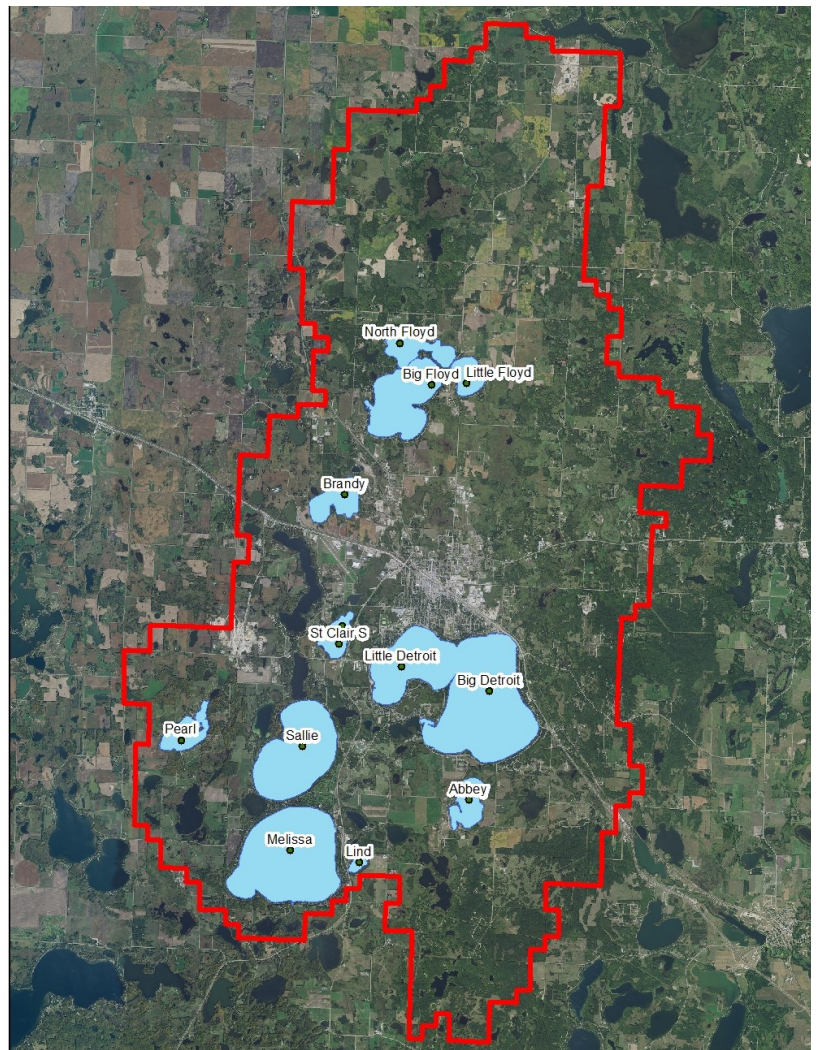
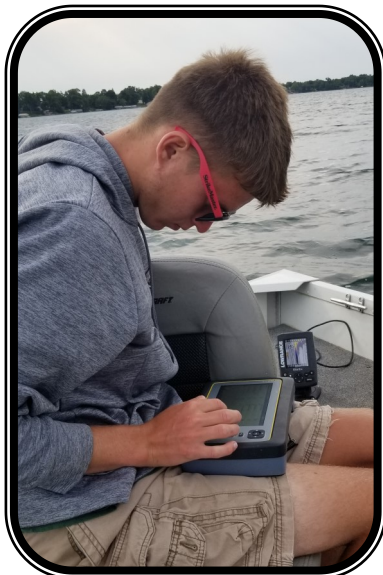
The District studied the water quality of 12 District lakes (Floyds-Big, Little, North; Detroit – Big, Little; Curfman, Pearl, Sallie, Melissa, Abbey, Brandy, Lind, St. Clair, Long) during the monitoring season (April through October).

The District collects 8-10 water samples on a bi-weekly basis throughout the summer season on each lake. Specific water quality data (total phosphorus, chlorophyll-a, and Secchi disk depth) for each lake are compared to historical data collected in previous monitoring years. Total phosphorus concentration readings represent the potential available phosphorus that will feed lake's aquatic plants and water column algae during the summer months. These three water quality parameters are a measure of the water column's productivity. Additional biological and physical parameters (i.e., macrophytes, dissolved oxygen, water temperature, pH, water levels, shoreline alterations/uses) and climatological information (air temperature, precipitation and notable climatic events) are also collected. Phytoplankton was added this year for Big and Little Detroit, Sallie, and Melissa to collect additional information to study potential impacts on the aquatic food web due to Zebra mussel invasion.

The data is reviewed and used to characterize overall lake water quality and health, and examines trends over time to determine if each lake supports their designated uses for swimming, fishing, and/or aesthetics. Lakes with increasing phosphorus trends and/or big swings in TP concentrations over time, are cause for concern. An increasing phosphorus trend suggests something is changing in the lake, along the shoreline or in the watershed that is causing phosphorus concentrations to rise. Caught early, intervention may stop or abate the source. Lakes with big swings in phosphorus may be experiencing episodic phosphorus pollution. This information influences lake management decisions for continued protection and improvement of District lakes. All of the lakes receive stormwater runoff (directly or indirectly) and are located within the Ottertail River Basin.

Big Floyd, North Floyd, Little Floyd, Detroit, Curfman, Pearl, Sallie, Melissa are classified as deep lakes. Deep lakes have a maximum depth greater than 15 ft, or less than 80% of the lake within the littoral zone. The littoral zone is the near-shore area of the lake in which plants grow. Abbey, Brandy, and St. Clair are classified as shallow lakes. Shallow lakes have a maximum depth less than 15 ft, or more than 80% of the lake within the littoral zone.

Previous annual monitoring reports, vegetation and shoreline surveys are available on the PRWD website at www.prwd.org.



Data Collection—Lake Monitoring

PRWD 2018 average, historical average, and lake standards for TP/Chl-a/Secchi depth

Lakes	2018 Averages			Historical Averages (1998-2017)			MN Pollution Control Agency Lake Standards		
	TP Mg/L	Chl-a Mg/L	Secchi (feet)	TP Mg/L	Chl-a Mg/L	Secchi (feet)	TP Mg/L	Chl-a Mg/L	Secchi (feet)
Big Detroit	19	6	12	26	9	9.5	<40	<14	>4.6
Little Detroit	19	7	11	20	4	11	<40	<14	>4.6
Big Floyd	18	7.5	9	15	4.5	12	<40	<14	>4.6
North Floyd	26	10.5	7	32	13.5	8	<40	<14	>4.6
Little Floyd	21	7	8.5	24	10	9	<40	<14	>4.6
Sallie	25	7	13	35	15	7.5	<40	<14	>4.6
Melissa	18	4.5	14	22	7.5	10.5	<40	<14	>4.6
St. Clair*	111	57.5	2.5	90	41	2.9	<60	<20	>3.3
Lind	34	13	8	42	12	9.6	<40	<14	>4.6
Pearl	21	5.5	9	30	10	10	<40	<14	>4.6
Abbey*	17	4.5	6	37	11	5	<60	<20	>3.3
Brandy*	19	6.5	N/A	42	8	N/A	<60	<20	>3.3
	Value does not meet the state standard								
*shallow lake	Value meets the state standard								



Data Collection—Lake Monitoring

Unusual Changing Water Quality Trends on Detroit, Sallie, and Melissa

Detroit: Detroit (Big and Little) is a 3,067 acre lake with a maximum depth of 89 ft and is located within the city of Detroit Lakes. It is considered a deep lake with 62% littoral zone. Detroit lake has a 9,770 acre sub-watershed with land uses being urban, forest and grasslands. Big Detroit has two inlets (Sucker Creek and Pelican River) and one outlet (Pelican River) which flows to Muskrat lake. Detroit has been monitored since 1999. The infestation of zebra mussels (ZM) in this lake was first documented in 2016. Visual assessments in 2018 found that the mollusks are now spread lake wide and are increasing in population density. ZMs filter large amounts of water, removing particulate organic matter in the water column, thereby increasing water clarity. The District has sampling locations on both Big and Little Detroit due to the differences in lake characteristics.

Big Detroit: In 2018, Big Detroit water clarity averaged 12 feet, an increase of 2.6 ft over the long term average of 9.4 feet. Phosphorus was effected in a similar way with a season average of 19 ppb, compared to the 20-year average of 26 ppb. The annual average Chlorophyll-a (algae) concentration was 5.74 mg/L, a decrease from the 20-yr average of 8.85 mg/L. This year plankton was also collected and analyzed for species composition and biomass for future comparisons. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).

Little Detroit: Surprisingly, Little Detroit Lake did not experience the same increase in water clarity and measured right at the 20-year average of 11 feet. This is the first year since PRWD began monitoring these lakes that Big Detroit has exhibited better water clarity than Little Detroit. Total phosphorus was 19ppb, slightly better than the 21 ppb 20-year average. The annual average Chlorophyll-a concentration (algae) was 7.2 mg/L, a 39% increase from the 20-yr average of 4.3 mg/L, with the highest measurement of 14.7 mg/L on June 26th. None of the Chl-a samples collected had results below 4.3 mg/L. Plankton samples were collected and analyzed for species composition and biomass for future comparisons. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).

Sallie: Sallie is a 1,273 acre lake and is classified as a deep lake with a maximum depth of 50 ft. Sallie has a 3,159 acre sub-watershed with land uses primarily forests, grasslands, and developed. Sallie has four inlets (Pelican River, wetland streams from Fox, Munson, Mud) and one outlet (Pelican River) to Melissa. Sallie has been monitored since 1999. Like Big Detroit, Lake Sallie's infestation of Zebra Mussels (ZMs) was documented in 2016, and the effects are being seen through increasing water clarity. In 2018, Lake Sallie's annual average water clarity measured 12.9 feet, almost 6 ft greater than the 20-year average of 7.1 feet. The annual phosphorus readings were also at historic lows at 25 ppb, well below the 20-year average of 35 ppb. The annual average Chlorophyll-a (algae) was 6.81 mg/L, a significant decrease from the 20-yr average of 15 mg/L. Plankton samples were collected and analyzed for species composition and biomass for future comparisons. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).

Melissa: Melissa is a 1,846 acre lake and is classified as a deep lake with a maximum depth of 37ft. Melissa has a 3,509 acre sub-watershed with land uses primarily grasslands, rural development, and agriculture. Melissa has one inlet (Pelican River) and one outlet (Pelican River). Melissa has been monitored since 1999. Water clarity readings averaged 14.1 ft in 2018 and like Detroit and Sallie, were significantly greater than the 20-year average of 10.4 ft. The phosphorus average was 18 ppb, improving from the long-term average of 22 ppb. The annual average Chlorophyll-a (algae) readings were 4.47 mg/L, a decrease from the 20-yr average of 7.5 mg/L. Melissa will be part of a MN AIS Research Center and MN DNR study to measure the effect of Zebra mussels on walleye populations in 2019. Plankton samples were collected and analyzed for species composition and biomass for future comparisons. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).



Water Quality and Zebra mussels

It is understood that Zebra Mussels are the cause of the increase in water clarity and the decrease in nutrient levels, however, it is less understood to what extent the long term impacts will be. As monitoring of zebra mussel infested lakes continue, trends in water clarity and nutrient concentrations will be compared in infested and non-infested conditions.

Zebra Mussels feed by filtering particles out of the water and have a very high filtering capacity. Studies have shown that ZM infestations have effects on chlorophyll-a and total phosphorus concentrations. ZMs feed by filtering out the phytoplankton and zooplankton in the water column, causing plankton community composition changes. In some lakes, shifts in phytoplankton populations have caused increases in filamentous algae and cyanobacteria (blue-green algae) blooms.

The District began monitoring plankton communities in 2018 to assess how the composition changes over time.



Data Collection—Lake Monitoring

2018 sampled lakes near or better than long term water quality averages

Little Floyd: Little Floyd is a 214 acre lake with a maximum depth of 32 ft and is located five miles north of Detroit Lakes. It is considered a deep lake with less than 44 % littoral zone. The 341 acre sub-watershed land uses are primarily grasslands, forests and agriculture. The Pelican River begins at the inlet to Little Floyd Lake and has two outlets, at the historic location near the public water access and a man-made outlet was constructed in the early 1919s to channel the water to Big Detroit lake. Little Floyd lake has been monitored since 1985. In 2018, Little Floyd’s water quality was near or better than the long term annual averages. Phosphorus and Chlorophyll-a had better than average results—Total phosphorus at 21ppb, (24 ppb long term average) and Chlorophyll-a (algae) concentration was 7.12 mg/L, (8.9 mg/L long term average). Water clarity averaged 8.5 ft, near the 20-year average of 8.9 ft. The most notable event occurred in September when the average summer phosphorus concentration increased from 18 ppb to 48 ppb after the lake water “turned over”, bringing the phosphorus laden bottom waters to the surface causing a nutrient spike. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).



North Floyd: North Floyd is a 298 acre bay area of Floyd lake with a maximum depth of 34 ft and is located five miles north of Detroit Lakes. It is considered a deep lake with less than 73% littoral zone. The combined Big and North Floyd Lake 6,281 acre sub-watershed area land uses are primarily forest, grassland, and agriculture. North Floyd has two inlets (Campbell Creek and Tamarac) and outlets to Little Floyd Lake. North Floyd has been monitored since 1999. In 2018, North Floyd had better than average phosphorus nutrient levels at 26 ppb, compared to the 20-year average of 32 ppb. Water clarity averaged 7.2 feet, near the long term average of 7.8 feet. The annual average Chlorophyll-a concentration (algae) was 10.41 mg/L, an improvement from the 20-yr average of 13.6 mg/L. June was the wettest month and the June 17th storm event (2.7” rainfall) impacted water quality. After the storm, water clarity on North Floyd sharply declined to 8 ft. (14.5 ft prior to the storm) and phosphorus nutrient levels doubled from 16ppb to 32 ppb causing an algae bloom. Fortunately, the readings improved over the following weeks. Also, in late June, Zebra mussels, an aquatic invasive species were confirmed present. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).

Pearl: Pearl is a 281 acre lake with a maximum depth of 54 ft and is located six miles southwest of Detroit Lakes. It is considered a deep lake with 60 % littoral zone. Pearl lake 3,534 acre sub-watershed land uses are primarily forests, grasslands, and agriculture. Pearl has no inlet and one outlet located on the south end which flows to a nearby wetland. Pearl has been monitored since 1999. The mean summer Secchi reading in Pearl, which measures water clarity, was 9 feet, a one-foot decline from the long term average of 10 feet. However nutrient levels significantly improved with total phosphorus averaging out at 21 ppb, compared to the long term average of 29 ppb. The annual average Chlorophyll-a concentration (algae) was 5.51 mg/L, an improvement over the 20-yr average of 9.7 mg/L.. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing). Pearl lake has a healthy and diverse aquatic plant population. A vegetation survey was conducted in 2018, see page 15 for details of the findings.

Brandy: Brandy is a 336 acre lake and is classified as a shallow lake with a maximum depth of 9 ft. The Brandy lake 1,986 acre sub-watershed land uses are primarily forests, grasslands, and agriculture. Brandy has no inlet and one outlet to a nearby wetland. Brandy has been monitored since 1999. Total phosphorus concentration was 19 ppb, compared to the ten year average (2008-2017) of 23 ppb and 44 ppb (1998-2007). Water clarity extended to the lake bottom (9 feet) all season. This lake has an improving water quality trend attributed to Becker County landfill groundwater remediation. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).

Lind: Lind is a 45 acre lake and is classified as a deep lake with a maximum depth of 51 ft. The Lind lake 599-acre sub-watershed land uses are primarily grasslands, agriculture, and forest. Lind has one inlet from Nottage Lake and one outlet to Melissa. This is the 2nd year Lind was comprehensively monitored. In early June, water clarity and nutrient levels were good at 15 ft of clarity and 3 ppb phosphorus. When samples were taken on June 20th, it was noted that cattle were present and the water clarity decreased to 10.5 ft, a 4.5 ft decline and phosphorus levels spiked from 3 ppb to 27 ppb. Algae levels also significantly increased during this time from 3mg/L to 29 mg/L. An early July storm event further influenced water quality degradation with readings of water clarity at 4.5 ft and phosphorus at 72ppb. By mid July, readings started to improve with clarity rebounding to 9 ft and phosphorus to 21 ppb. Water quality was stable until late August when water clarity dropped to 3.5 ft and phosphorus increased to 38 ppb after the water “turnover” event, with levels stabilizing through September.

Data Collection- Lake Monitoring

Big Floyd: Big Floyd is a 862 acre lake with a maximum depth of 26 ft and is located five miles north of Detroit Lakes. It is considered a deep lake with less than 73% littoral zone. The combined Big and North Floyd Lake sub-watershed of 6, 281 acre has land uses primarily of forest, grassland, and agriculture. Floyd has two inlets (Campbell Creek and Tamarac) and outlets to Little Floyd Lake. Big Floyd has been monitored since 1998. 2018 was the fourth consecutive year that water clarity and nutrient (phosphorus) concentrations were poorer than the long term averages. The 2018 average water clarity was 8.9-feet, a 23% decrease from the 11.6-foot 20-yr average. Phosphorus was higher at 18 ppb, an 11% increase from the 16ppb long term average. The annual average Chlorophyll-a (algae) concentration was 7.52 mg/L, a decrease from the 20-yr average of 4.5 mg/L. Climate patterns influences on Big Floyd water quality were evident in 2018. Big Floyd lake water was weakly stratified throughout June and most of July, but on July 27th the weather turned cold (44 degrees F) almost setting a record low temperature and the lake water “turned over” or un-stratified causing a nutrient spike and algae bloom. Chl-a (algae) doubled from the previous two week period from 4.5 mg/L to 8 mg/L and water clarity dipped a couple of feet during the month of July from 10.5 ft to 8.5 ft. Floyd also experienced declining water quality in late August and through September after the lake turnover. Zebra mussels, the first aquatic invasive species found in Big Floyd, was confirmed in June. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing).

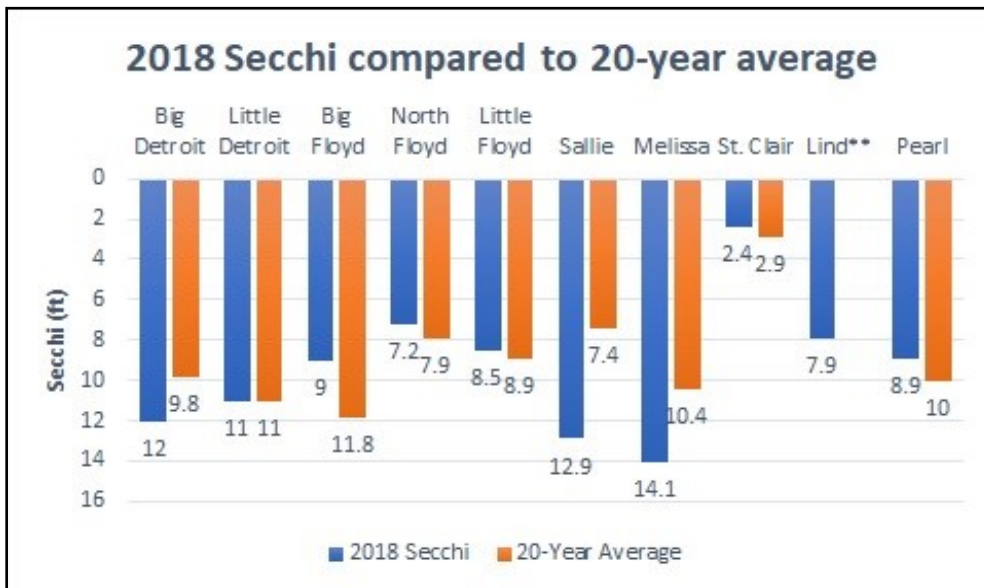
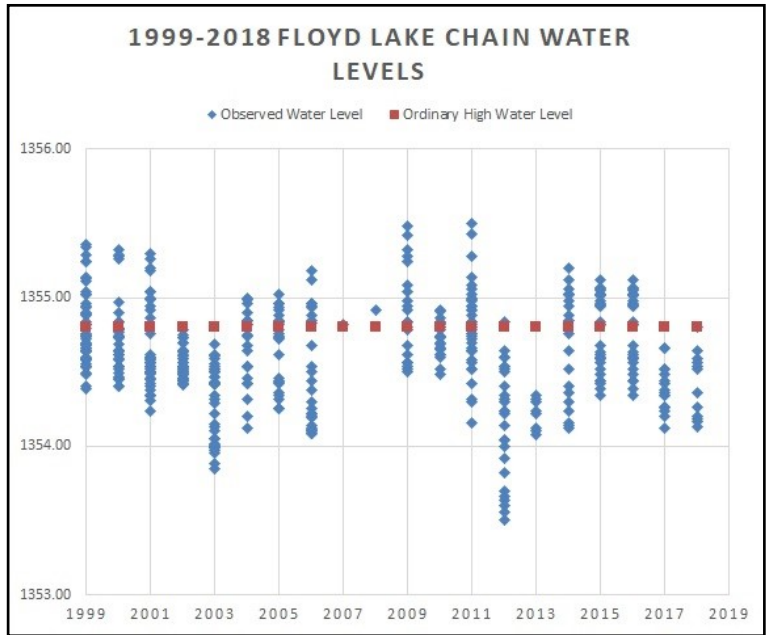
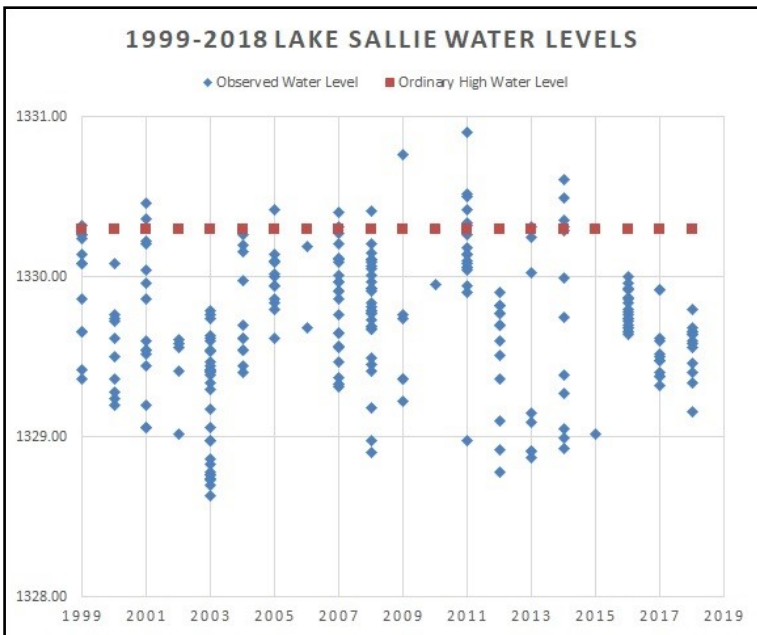
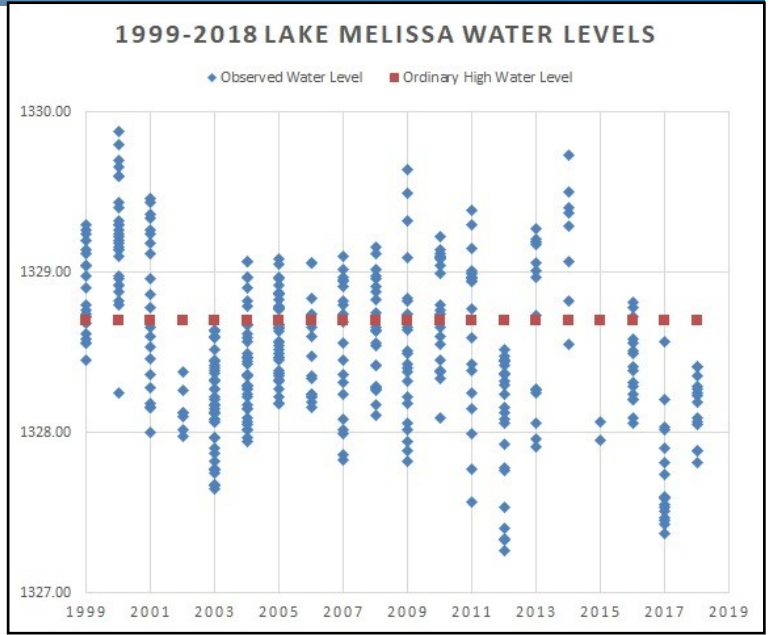
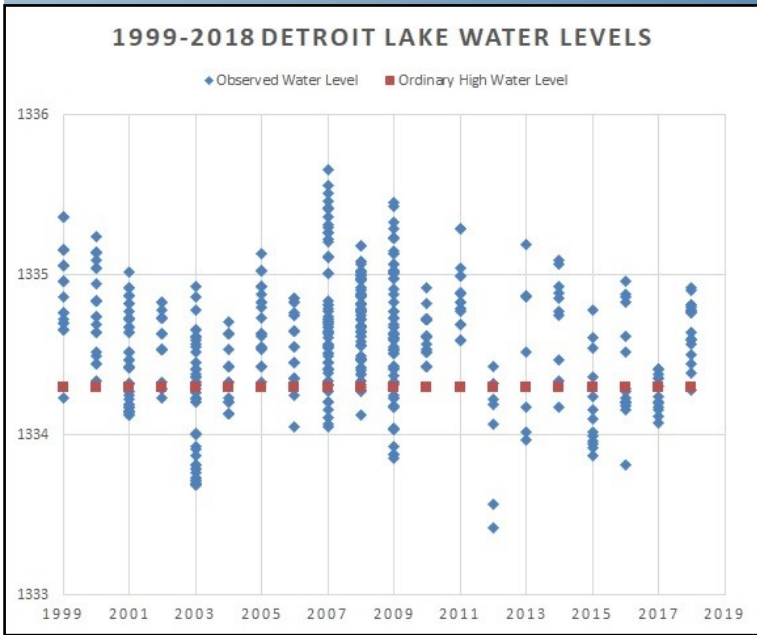
Long: Long is a 409 acre lake with a maximum depth of 61 ft and is located on the westerly edge of Detroit Lakes. It is considered a deep lake with less than 37% littoral zone. The Long lake 2,761 acre sub-watershed land uses are primarily grassland, forest, and agriculture. Long has one inlet (HWY 10 wetland area) and one outlet to St. Clair Lake. Long has been monitored since 1999. Sampling results meet all MPCA water quality standards and supporting uses (swimming, fishing). Although the District did not collect water samples in 2018, the Long Lake Association sampled monthly from May– September. Average annual water clarity was 14 ft, Chl-a (algae) at 3.5gm/L, and phosphorus at 10ppb., all well within normal average annual ranges. The District conducted a vegetation survey in late August (see page 16).

St. Clair: St. Clair is a 142 acre lake with a maximum depth of 7.5 ft and is located on the west side of Detroit Lakes. It is considered a shallow lake. St. Clair Lake’s 4, 430 acre sub- watershed land uses are primarily urban and wetland fringe. St. Clair has one inlet from Long Lake and outlets to Ditch 14 and downstream to the Pelican River. St. Clair has been monitored since 1999 and is on the EPA impaired waters list for exceeding the allowable shallow lake standard of 60 ppb. for phosphorus. The 2018 sampling results indicate impaired water quality for all parameters tested. The annual phosphorus average was 111 ppb, over 20 points higher than the long range average of 90 ppb. August 22nd had the highest phosphorus reading at 174 ppb. Water clarity also declined in 2018 with an average secchi reading of 2.4 feet compared to the 3-ft long term average. The annual average Chlorophyll-a concentration (algae) was 57.64 mg/L, an increase from the 20-yr average of 43 mg/L, with a measured high on August 22nd of 102 ppb. This declining water quality trend is largely due to continued phosphorus discharges to St. Clair lake from undertreated stormwater runoff from over 400 acres in the City of Detroit Lakes as well as from internal loading from the lake sediments. The St. Clair Lake nutrient annual reduction goal for phosphorus is 270 lbs via stormwater management practices. In 1998, the District applied an alum treatment to “cap off” the 18 ft. organic lake bed layer which contains high levels of “legacy” phosphorus, a hold over from 1900—1950 antiquated waste water disposal practices. The alum creates a layer in the lake sediment that binds the phosphorus, making it unavailable to be taken up by algae. The alum life span was originally estimated at 5-years, and is now 20 years out and the layer is finally starting to deteriorate. The District received a proposal from Wenck Associates that estimated an alum treatment cost of \$500,000 resulting in an in-lake phosphorus removal of 22 lbs/year. To add another level of complexity, the City of DL’s new wastewater treatment facility will be on-line in 2020 and will discharge, on a year-round basis, treated effluent into St. Clair Lake and will discontinue land applying (spray irrigation fields/rapid infiltration basins) during the summer months. There is some concern by the District the added discharge volume during the summer months through St. Clair lake and the downstream Ditch 14 wetland complex could potentially increase summer phosphorus loads to downstream Muskrat and Lake Sallie.

Abbey: Abbey is a 269 acre lake with a maximum depth of 7.0 ft and is located three miles south of Detroit Lakes. It is considered a shallow lake. Abbey Lake 772 acre sub-watershed land uses are primarily grassland, forest, and agriculture. Abbey has no inlet and one outlet to a downstream wetland. Abbey has been monitored since 2000. In 2018 all parameters measured vastly improved from previous monitoring years. The 2018 average water clarity was 6-feet, almost lake bottom for most of the season, an increase of one foot over the last 10-yr period. Average phosphorus concentrations were 17 ppb, much lower than the 10-year average of 37 ppb. Chl-a readings decreased over one-half from 11 mg/L to 4.5 mg/L in 2018. Changes to nearby land use are the most likely influences. The District will sample in 2019 to further explore this trend.



Data Collection– Water Levels and Clarity

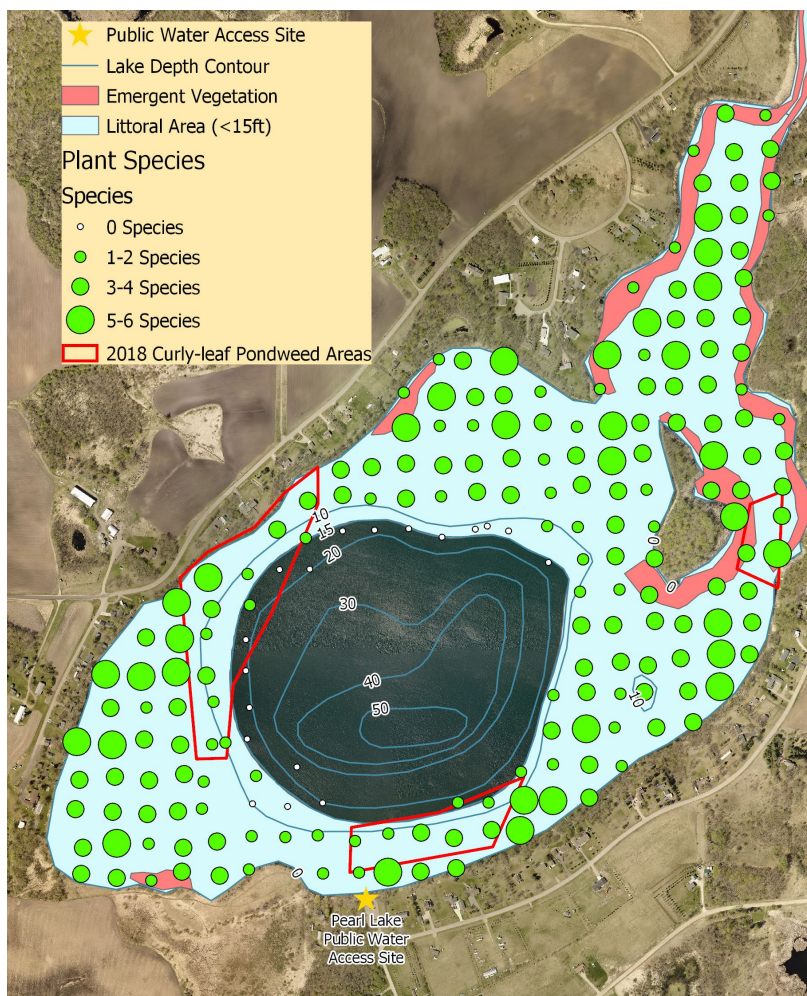


Data Collection- Lake Vegetation Surveys

Native aquatic vegetation is an important part of the lakes ecosystem health. The presence of plants and the depth at which one finds them is related to the lake's water clarity. In areas where the sunlight does not reach the lake's bottom, there won't be plants present. Plant communities maintain good water clarity by holding lake sediment in place, create oxygen for invertebrates, and provide habitat for fish.

In 2018, vegetation surveys were completed in early August on Pearl, Munson, and Long Lakes. Long, Munson, and Pearl have good water quality and plants were found in 15 ft of water depth, indicative of healthy ecosystems.

The surveys describe the lake aquatic plant community by collecting data at sample points and recording depth, plant species, and estimated plant abundance. This information is then used to calculate frequency, abundance, and distribution of plant species, maximum depth of submersed species, and also to identify any invasive aquatic plants. Data is collected using the point-intercept method, where a grid of points are created in the lake littoral zone (<15-feet deep) at equal distance intervals. Technicians use a double-headed, weighted garden rake, attached to a rope to survey the vegetation (see picture to the right).



PEARL LAKE DATA

**187 survey points littoral area (less than 15ft water depth)
@ 50 meter intervals**

- ◆ 32 points had 5-6 plant species present
- ◆ 100 points had 3-4 plant species present
- ◆ 55 points had 1-2 plant species present
- ◆ 0 points had no plants present
- ◆ **87 points had an invasive plant present—Curlyleaf pondweed**

18 survey points in deep water area (greater than 15 Ft. Water depth)

- ◆ 1 point predominantly coontail—17 ft deep.
- ◆ 17 point had no plants found

Pearl Lake Vegetation Survey—August 8 & 9, 2018

Pearl is a 261 acre lake with 60 % (168 acres) classified as littoral zone (less than 15 ft depth). Pearl has a maximum depth of 54 feet. There are no MN DNR Aquatic Management Areas on Pearl.

Survey Findings. Fifteen different types of plants were identified as well as one invasive species. There is significant plant abundance throughout the littoral area as well as species diversity with over 60% of the sampling sites containing 3 or more plant types. Seven submersed species make up the most common occurring plants (> 10% occurrence) in Pearl lake - Coontail, Flatstem pondweed, Bushy pondweed, Northern Milfoil, Sago pondweed, Large leaf pondweed, and Canada Waterweed.

Comparison to 2011 Survey. The 2011 plant survey identified 16 native plant species and one invasive plant (Curlyleafed pondweed) . The 2011 native plant species diversity, abundance and distributions were nearly identical to the 2018 survey, except for the widespread expansion of the invasive plant, Curlyleaf pond weed (CLP). CLP was first identified on Pearl Lake in 2010, just west of the public water access in a 400 S.F. area and the District applied for a rapid response treatment permit but was denied by the MN DNR. By 2011, CLP further spread and was identified in 5% of the sample points. Unfortunately, the 2018 survey found CLP in over 50% of the sample points, with four very dense CLP areas totaling 32 acres that had little to no native plants present (see map).

14 Native Plant Species Present

- 1 emergent (above water surface) plant species - Hardstem bulrush; 1 free floating species— Water moss; 1 floating leaf plant species—yellow water-lily
- 11 submergent (below water surface) plant species- Coontail, Flat stem pondweed, Bushy pondweed, Northern watermilfoil, Sago pondweed, Large leaf pondweed, Illinois pondweed, Canada waterweed, Claspingleaf pondweed, Whitestem pondweed
- **1 Invasive Plant Species** - Curlyleaf pondweed

Data Collection- Lake Vegetation Surveys

Munson Lake Vegetation Survey—August 15, 2018

Munson is a 134 acre lake, with 48 acres (36%) of area classified as littoral (< 15ft depth) and has a maximum depth of 26 feet. Munson has good water clarity and improving water quality over the past 10 years (2008-17). The most common submersed species (> 10%) are: Northern watermilfoil, muskgrass, Illinois pondweed, Coontail, Sago pondweed, and yellow waterlily. Of note, Burr-Reed, a native, emergent “look alike” plant to the invasive Flowering Rush species is found at the eastern and northern areas of Munson lake. No invasive plant species were identified. There are three Aquatic Management Areas (AMA), located on the west and southeast sides which are fish spawning habitat. This is the first comprehensive vegetation survey conducted on Munson Lake.

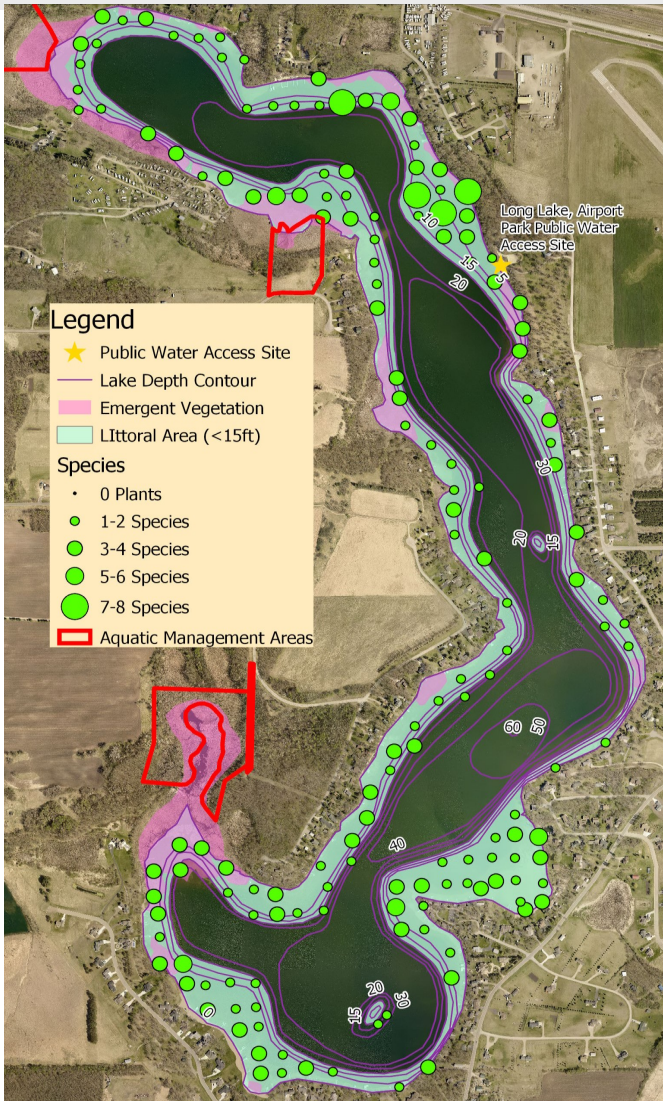
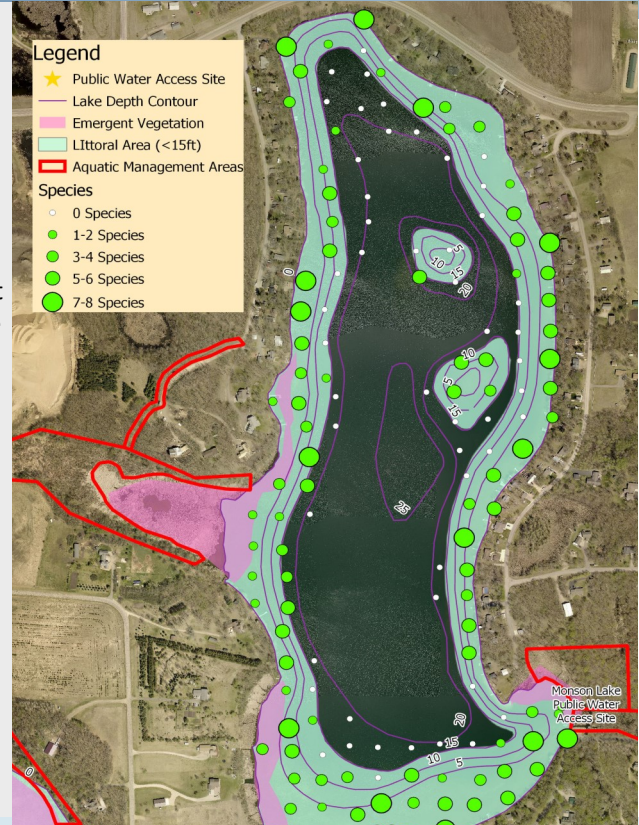
100 survey points littoral area (less than 15ft water depth) @ 50 meter intervals

- ◆ 16 points had 7–9 plant species present
- ◆ 34 points had 5-6 species present
- ◆ 32 points had 3–4 species present
- ◆ 12 points had 1-2 species present
- ◆ 6 points had no plants present (10-13ft water depth)

12 Native Plant Species Identified

- 3 emergent species (above water surface) - Bur-reed, Hardstem Bulrush, Cattail
- 1 floating leaf species—yellow waterlily
- 8 submergent species (below water surface). Northern water milfoil, musk grass, Illinois Pondweed, Coontail, Sago pondweed, Narrowleaf pondweed, Whitestem Pondweed

45 survey points in deep water area (greater than 15ft. Water depth)



Long Lake

Vegetation Survey—August 27, 2018

Long is a 409 acre lake, with 152 acres (37%) classified at littoral zone (< 15 Ft. depth), and has a maximum depth of 60 feet. Long Lake has good water clarity. The most common submersed species (>10%) are Muskgrass, Bladderwort, Sago pondweed, Northern watermilfoil, Illinois pondweed, Yellow waterlily. No invasive species were found. This is the first comprehensive vegetation survey conducted on Long Lake. The MN DNR maintains 3 aquatic management areas (AMA) consisting of dense bulrush beds located in the southwest, west, and north areas which are fish spawning habitat. Staff noted significant shoreline alteration (removal of aquatic vegetation, rip-rap installation, weed rollers) occurring next to these areas which may impact fish reproduction.

151 survey points littoral area (less than 15ft water depth) @ 65 meter intervals

- ◆ 3 points had 7–9 plant species present
- ◆ 5 points had 5-6 species present
- ◆ 64 points had 3–4 species present
- ◆ 66 points had 1-2 species present
- ◆ 3 points had no plants present (10-13ft water depth)

21 Native Plant Species

- 3 emergent species (above water surface) - Cattail, and Hardstem bulrush, Bur-reed
- 1 free floating species— Water Moss
- 3 floating leaf species—yellow waterlily, White waterlily, Floating-leaf pondweed
- 14 submergent species (below water surface). Northern water milfoil, Muskgrass, Illinois Pondweed, Coontail, Sago pondweed, Canada Waterweed, Flat-stem pondweed, Whitestem pondweed, water Celery, Arum-leaved Arrowhead, Clasping-leaf pondweed, Slender Nitella

17 survey points in deep water area (greater than 20 Ft. Water depth) @ 65 meter intervals

- ◆ No plants found

Data Collection—Shoreline Surveys

The Pelican River Watershed District conducts periodic assessments of the land use, lake use, and level of shoreline alteration on main District lakes.

In 2018, District staff completed surveys of Detroit (Big and Little) and Curfman Lakes. An assessment was conducted on each shoreline parcel which included: (1) counting the number and type of waterfront equipment including docks, lifts, personal watercraft, motorized boats (wakeboard, fishing, pontoons) and non-motorized boats/equipment (rafts, kayaks, paddleboards, sailboats, etc.) and (2) rating the shoreline condition based upon an alteration scale of greatly, moderately, or minimally altered/natural condition.



2018 Shoreline Surveys Waterfront Equipment Big and Little Detroit, Curfman Totals			
Big/Little Detroit and Curfman	2010	2018	Change
Docks	495	569	15%
Covered Boat lift	343	506	48%
Uncovered Boat lift	315	418	33%
PWC	70	230	229%
Motorized	596	920	54%
Non-motorized	109	375	244%
Mechanical Plant Control	23	32	39%

Waterfront Equipment

Over the past 8 years, since the 2010 survey, there are notable equipment changes on Big Detroit, Little Detroit, and Curfman lakes in the various types and number of watercraft (wake boats, pontoons, fishing boats, kayaks, paddleboards, etc.), docking systems, use of weed rollers, etc.

Big Detroit Lake—316 parcels

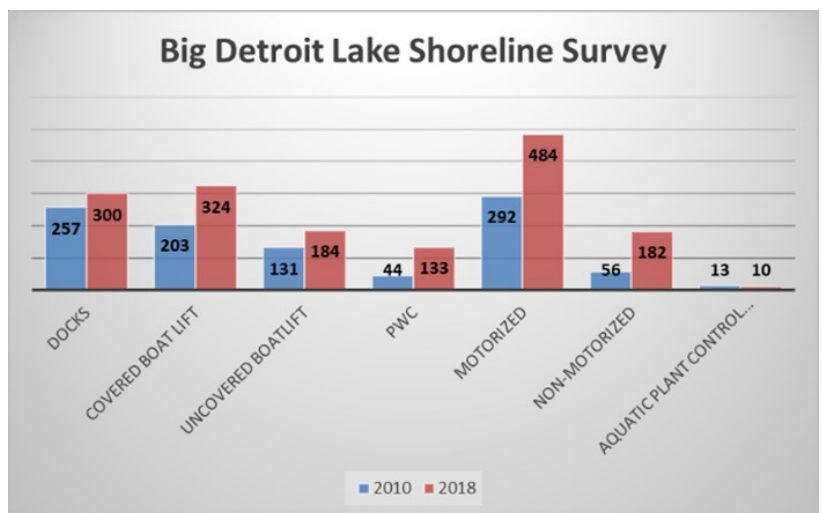
The number of all types of waterfront equipment increased significantly from the 2010 to the 2018 survey, except for automated plant control devices, which decreased from 13 to 10 devices. Pontoons, covered boat lifts, personal watercraft, kayaks, and paddleboards had the greatest amount of changes.

In 2018, 484 motorized boats were counted, a 66% increase from the 2010 survey of 292. The 2010 survey did not specify the type of watercraft, but the 2018 survey noted over one-half of the boats (290) were pontoons. With 316 parcels on Big Detroit, there is an average of 1.5 motorized boats per parcel. The number of PWC's (jet skis) **almost tripled** in eight years, from 44 to 133. The number of non-motorized watercraft (stand up paddleboards, kayaks, etc.) also tripled from the 2010 survey, up from 56 to 182 in 2018.

Along with the increases in number of watercraft, boat lifts also significantly increased by 52% from 334 in 2010 to 508 in 2018. The majority of lifts are covered (324 lifts) in comparison with uncovered (184 lifts).

There was a slight increase (17%) in the number of docks, from 257 in 2010 to 300 in 2018. However the survey noted there are more “U-shape” and “L-shape” docking systems which can handle multiple boat lifts.

There were three less automated aquatic plant control devices (i.e., weed rollers) observed in 2018 (10) than in 2010 (13).

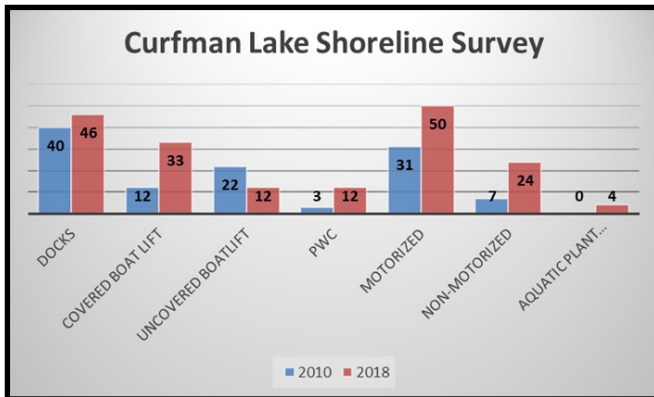
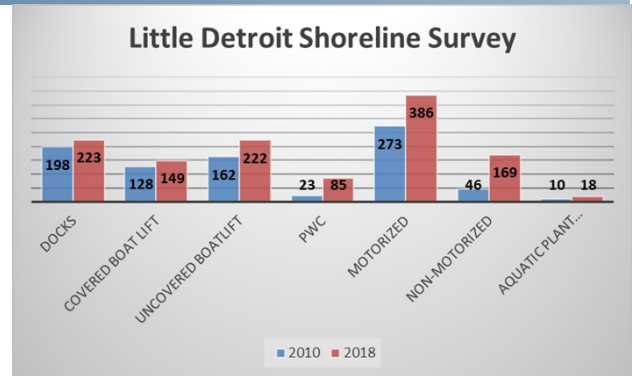


Data Collection—Shoreline Surveys

Little Detroit Lake— 198 parcels

In comparing the 2018 survey to the 2010 survey, increases in all types of waterfront equipment were noted. The total number of watercraft per parcel increased from 1.4 in 2010 to 2.0 boats per parcel in 2018.

Motorized watercraft increased from 273 in 2010 to 386, an increase of 42%. There are 251 pontoons on Little Detroit which account for 65% of all watercraft. The number of PWC's (jet skis) more than tripled, from 23 to 85. Total and non-motorized equipment (kayaks, paddle boards, etc.) increased from 46 in 2010 to 169 in 2018. Along with the increases in watercraft and PWC's, the number of docks increased from 198 in 2010 to 223, a 13% increase in 2018, as well as the number of boat lifts from 290 in 2010 to 371, a 28% increase in 2018. Uncovered boat lifts increased 37%, from 162 lifts to 222 lifts in 2018, while covered lifts only increased from 128 lifts in 2010 to 149 lifts. Most of the uncovered lifts were for personal watercraft. There were 18 automated aquatic plant management (APM) devices (i.e. weedroller) counted in 2018, up from 10 in 2010. Little Detroit has more APM devices than Big Detroit and Curfman.



Curfman Lake—43 parcels

Curfman Lake had similar increases of waterfront equipment, with the exception of boat lifts. It was clear that covered lifts were preferred with an increase from 12 to 33 (175%) and a decrease in non-covered lifts from 22 to only 12 (-45%). Motorized watercraft increased from 31 in 2010 to 50, a 61% increase, which averages 1.1 per parcel. Pontoons were the most popular motorized watercraft—22 boats counted. Personal Watercraft increased 4-fold in eight years from 3 to 12 in 2018. Docks modestly increased from 40 to 46 in 2018.

In 2010 there were no automated aquatic plant management devices, however 4 APM devices were surveyed in 2018.

Shoreline Alterations

Big Detroit. In 2018, 27% (84) parcels were classified as natural or minimally modified, 25% (79) parcels were moderately altered and 48% (153) parcels greatly altered. These results are similar to the 2010 survey results.

Little Detroit. 2018 survey results had only 15% (30) parcels remaining in their natural or minimally altered condition, with 18% (36) parcels moderately altered; and 67% (132) parcels greatly altered. Almost half of the 2010 classified minimally altered shorelines were greatly altered by 2018.

Curfman. In 2018, 49% (21) parcels were classified as natural or minimally modified, 16% (7) parcels were moderately altered and 35% (15) parcels greatly altered. As on Detroit, shorelines have been greatly altered since the 2010 survey.

Shoreline Alteration—Big Detroit, Little Detroit, and Curfman	2018	2010	% Change
Minimal Shoreline Alteration. (Naturally vegetated area—trees and/or shrubs /unmowed grasses present along at least 3/4 of shoreline, may contain cattail or bulrush fringe. May have natural rip-rap or sand shore.	84 parcels—Big Detroit	66 parcels—Big Detroit	+27.3%
	30 parcels—Little Detroit	59 parcels—Little Detroit	-49.2%
	21 parcels—Curfman	31 parcels—Curfman	-32.3%
Moderate Shoreline Alteration. (Trees &/or shrubs cover at least ¼ but less than ½ of shoreline Unmowed plants cover at least ¼ but less than ½ of shoreline; lawn &/or impervious covers at least ½ .)	79 parcels—Big Detroit	135 parcels—Big Detroit	-41.5%
	36 parcels—Little Detroit	89 parcels—Little Detroit	-59.6%
	7 parcels—Curfman	9 parcels—Curfman	-22.2%
Greatly altered (Trees &/or shrubs/ cover less than 1/4 of shoreline or not present. Entire shoreline is mowed, bare and/or impervious surface, and/or modified by rip-rap, sand blanket, retaining wall, boat ramp.	153 parcels—Big Detroit	121 parcels—Big Detroit	+26.4%
	132 parcels—Little Detroit	57 parcels—Little Detroit	+131.6%
	15 parcels—Curfman	5 parcels—Curfman	+200%

Project—Aquatic Plant Management

Curly-leaf pondweed (CLP)

This invasive plant has been a nuisance in the District for decades and is found in Detroit, Curfman, Muskrat, Sallie, Melissa, and Pearl lakes. The District manages CLP with chemical treatments conducted in the spring timeframe. This invasive plant begins growing in the spring before the native plants, making an ideal timeframe to treat the invasive and not affect beneficial native plants.

In 2018, the late-ice-off and the unseasonably warm May temperatures made conducting the CLP treatment at an optimum time a challenge. The treatments occurred on May 30-31, 2018, later than average dates, but still before the native plants were actively growing. Treatment areas responded well and plant densities were greatly reduced before plant release and blow-in on beaches.

On Sallie, there is a 9-acre area located on the southeast side of Lake Sallie that is not responding to the treatment as well as other treated areas. There is most likely not enough chemical contact time within this area due to deeper water depths and lake water mixing. The District consulted with the Mississippi State University researchers and an alternate chemical was recommended for this treatment area. A 2018 treatment request was made to the MN DNR to use the recommended chemical but was not approved, however the District is hoping the agency may re-consider its 2018 decision for 2019 treatments based upon additional information and internal agency review.



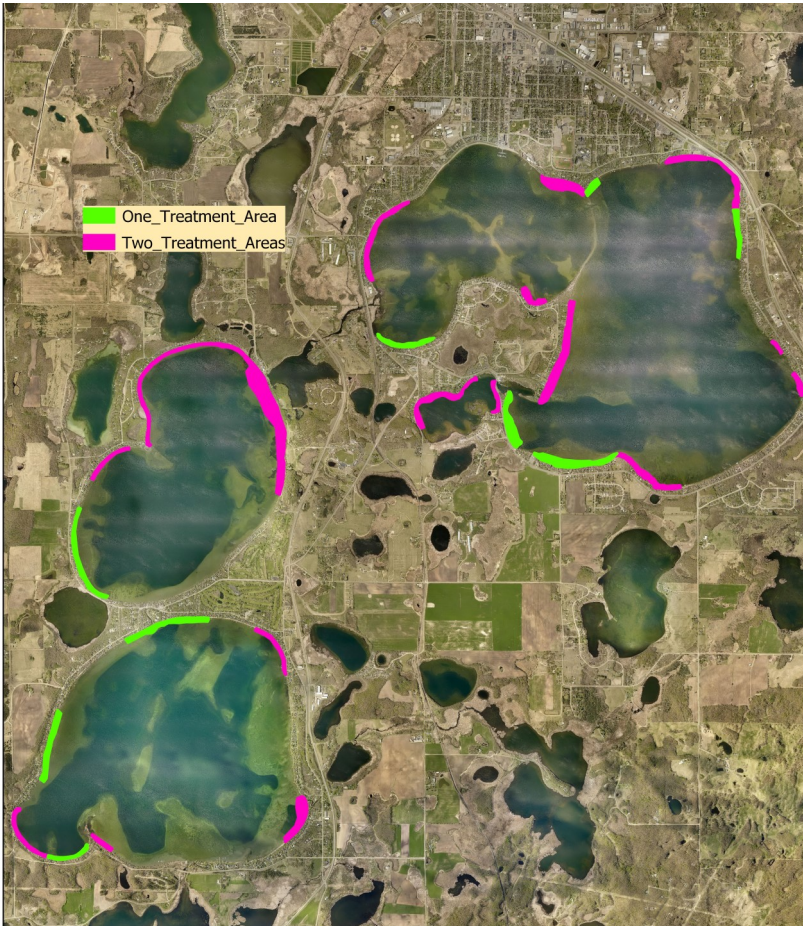
Project—Aquatic Plant Management

Flowering Rush

The District continued to manage invasive Flowering Rush using its *adaptive management strategy* to maintain low population densities, which was developed by the Mississippi State University plant researchers. In early summer, PRWD delineates and estimates the invasive plant density percentages within each infested area on Detroit, Curfman, Sallie, and Melissa lakes. Using this data, a treatment plan is formulated based upon the plant density percentages. If the invasive plant is present at less than 5% of the points surveyed within the area, no treatment is

conducted; if the invasive plant density is between 6% and 20% of the survey points, one treatment is conducted within the area in late June; and if invasive plants are greater than 21% of the area, two treatments will be conducted in June and 4 weeks later in July/early August. The goal is to keep populations at low levels and to minimize the number of treatments. Based upon the research project findings, one annual treatment will keep the invasive plant population “in check” but will not reduce the density. Two annual treatments are needed to reduce plant densities.

In 2018, Detroit had 110 acres treated, with 70 acres treated twice and Curfman had 13 acres treated twice. Melissa had 45 acres treated and 22 acres treated twice. Sallie had 70 acres treated with 57 acres treated twice, 43 of those acres were first time treatments on the mixed stands of Bulrush and Flowering rush located on the eastside of the lake. To help offset the costs with the new treatment areas on Sallie and near the public accesses, the Pelican River Watershed District received a \$4,000 treatment grant from the Becker County State of MN AIS Prevention Aid funds.



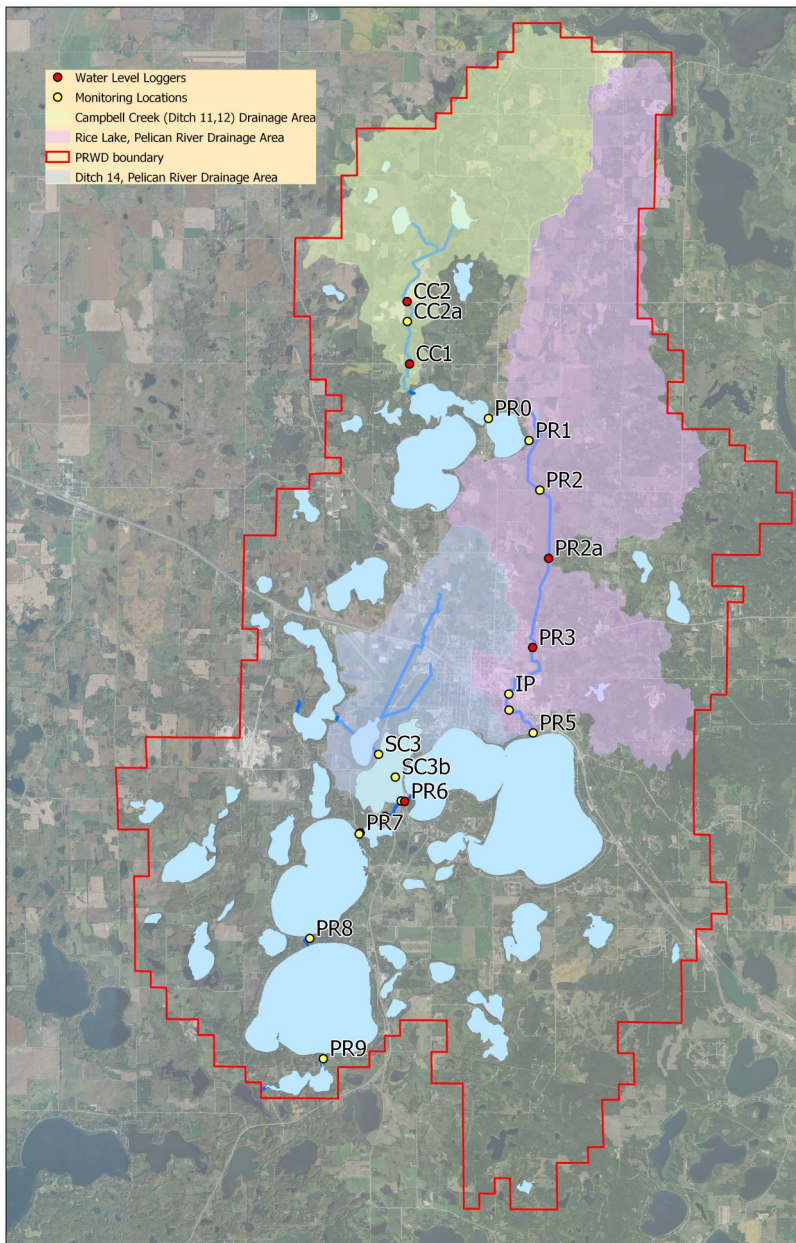
	Curly-Leafed Pondweed Acres 5/31/2018	Curly-Leafed Pondweed-Cost	Flowering Rush Trtmt #1 Acres 6/28/2018	Flowering Rush Trtmt #1—Cost	Flowering Rush Trtmt #2 Acres 8/6/2018	Flowering Rush Trtmt #2 Cost	Totals per lake
Sallie (1B)	14.7	\$7,726.64	70.1	\$8,260.58	57.5	\$6,919.55	\$22,906.77
Melissa (1B)	13.4	\$7,035.96	45.9	\$5,154.52	22.3	\$2,683.58	\$14,874.06
Detroit (1C)	63.2	\$31,870.77	110.9	\$12,503.29	70.2	\$8,272.37	\$52,646.43.
Curfman (1C)	—	—	13.6	\$852.31	13.6	\$1,636.62	\$2,488.93
Muskrat (LMP)	4.6	\$2,713.65	0.4	\$50.14	—	—	\$2,763.79
TOTAL							\$95,679.98

Data Collection—Stream Monitoring

The Pelican River Watershed District monitors stream water quality and levels on Campbell Creek (Ditch 11 & 12), Pelican River (Ditch 13), and Ditch 14, Pelican River (Detroit —Mill Pond) at key locations where nutrient and sediment loading information can help pinpoint the optimal locations for protection and nutrient reduction practices.

The parameters tested include Phosphorus (TP), bio-available phosphorus (OP), and sediment (TSS). The sampling stations also monitor water levels and staff take flow rate measurements (high, med, low flow periods) throughout the sampling season. Water quality samples are collected on a bi-weekly basis, from spring melt through October. Precipitation data is also collected throughout the season. Following rain events greater than 1-inch, additional samples are taken at 7 sites along Campbell Creek and the Pelican River within the City of Detroit Lakes industrial park area to measure increases in nutrient and sediment loads.

In 2018, 21 stream sites were monitored for a total of 276 stream gage readings, along with 195 phosphorus samples and 89 suspended sediment samples collected. In addition to the typical measured parameters, chloride samples were also taken at the outlet of Ditch 14 to the Pelican River to gather baseline concentration for future studies.



Lab Analysis Costs			
	# Sites	# of Samples	Total Cost
TP	15	10	\$2100
OP	15	10	1800
TSS	7	10	630
Chl	2	10	220
		Total	\$4750

Minnesota Pollution Control Agency Otter Tail River Basin WRAPS Study

The Minnesota Pollution Control Agency and the MN DNR has been collecting data since 2016 throughout the Otter Tail River Basin which will be used to develop restoration and protection strategies for identified water resources(ground water, rivers, lakes, wetlands). The 3-year study is a multi-step approach and involves numerous agencies including the Minnesota Pollution Control Agency (MPCA), MN Department of Natural Resources (MN DNR), Becker and Otter Tail Counties Soil and Water Conservation Districts (SWCDs), Pelican River, Cormorant, and Buffalo-Red Watershed Districts, and other local units of government as well as the general public. The steps in developing the strategy include monitoring (chemistry, aquatic life, and flow regime), assessment of the resources that were monitored, creating reports that identify strategies that could be used to improve the resource, and implementation of those strategies.

Data Collection. Within the District, two river segments were assessed —(1) Pelican River between Highway 10 and Detroit Lake and (2) Campbell Creek (Ditch 12) between 230th Street and Floyd Lake.

Data Collection—Stream Monitoring

Campbell Creek (Ditch 11/12)

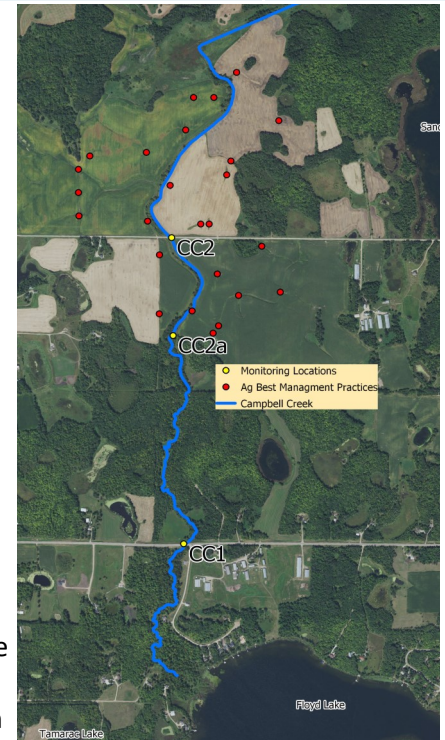
Campbell Creek is a ditched stream which drains to Floyd Lake and is the major contributor of nutrient and sediment load to the Lake. This segment is a targeted, high priority nutrient and sediment reduction area. Three key monitoring stations are located along the stream at 230th Street (CC2 station), at the south edge of the farm field (CC2a station) and further downstream at Cty Road 149 (CC1 station). CC2 & CC1 are sampled May-October on a bi-weekly basis and also during storm events > 1". CC2a is sampled only during storm events. Stream water levels are recorded using HOBO loggers placed at the CC2 and CC1 locations. Flow rate measurements are also collected throughout the summer during low, medium, and high water level periods.

Ag Area. There are 730 acres of highly erodible soils of cropland on the upper Campbell Creek segment. In 2013-14, landowners installed over 20 best management structures and a 25 ft stream buffer. The 2014-18 sampling results show the ag practices are reducing field erosion sediment loss during rainfall events < 1", however, phosphorus loads have not been reduced and additional practices may be required.

Natural Area. This non-ag stream segment starts at the CC2a monitoring site and outlets at North Floyd Lake. Portions of this segment have significant stream bank erosion/channel bed scour due to the steep stream gradient and fluctuating water levels.

2018 Monitoring Season. Campbell Creek opened the week of April 15th, much later than average, due to cold March temperatures (less than 50 degrees F) followed by even colder, frigid temperatures (-4 degrees F) in early April. Both April and May were drier than normal, totaling only 1.5 " of rain all, significantly lower than the average of 6" rainfall during this timeframe. Water quality results were good during this low precipitation timeframe. The May 4th "first flush" water quality readings in the agricultural area monitoring stations (CC2, CC2a) were low in phosphorus and sediment, however, in the downstream natural creek segment where bank erosion is prevalent, the sediment readings more than tripled at County Rd 149 (CC1) to 36.4 mg/L. However in June, the wettest month of the year with 12 days of rainfall, including two high intensity storm events on the 6th (1.4" rainfall) and from June 17- 18th (2.6" rainfall), nutrient and sediment levels started to increase at County Road 149 with suspended sediment results in June ranging between 44—81 mg/L. In early July after two days of rain totaling 1.4", the suspended sediment level peaked at 346 mg/L at CC1/County Rd 149. The July–September suspended sediment concentrations at CC1 were much lower ranging between 4—18 mg/L but increased during the wet month of October to 32 mg/L.

Campbell Creek Characteristics	
Length	9.6 miles
Elevation Change	108 ft
Watershed Size	12.9 square miles
# of monitoring sites	3
Impairment	TSS
Common Fish	Northern Pike
Invasive Species	None



2018 Annual Average Loading: CC2—Total Phosphorus 1,244 lbs/yr; TSS 94 tons/yr (2014-18 average is 179 tons/yr)
CC2a—Total Phosphorus 1221 bs/yr; TSS 147 tons/yr (2014-18 average is 175 tons/yr)
CC1—Total Phosphorus 1,345 lbs/yr; TSS 312 tons/yr (2014-18 average is 259 tons/yr)



MN DNR Campbell Creek Stream bank Stability Assessment. As part of the Otter Tail Basin watershed data collection, a stream bank stability assessment was conducted by MN DNR staff in 2018 on the stream segment between 230th Street to Floyd Lake towards identifying the excess sediment sources. The bank stability assessment measures bank height and angle, vegetation root depth, river bed composition, areas of deposition, and access to the flood plain. Several sections of the stream had disconnected floodplains, bank incising or vegetation degradation, and gravel deposits. The assessment identified significant bank erosion (sediment source) between CC2a and Floyd Lake in the natural, non-channelized section. The stream bank section between CC2 and CC2a was stable and not a sediment contributor from bank erosion. Guetter, Alcott, and Manager Okeson tagged along with the MN DNR while they were conducting the stream bank assessments on the Pelican River and Campbell Creek.

Data Collection—Stream Monitoring

Pelican River Segment/Ditch 13—Little Floyd Lake Outlet to Detroit Lake

There are six monitoring and one storm event sites within this segment area including the Rice Lake Wetland and City of DL Industrial Park Areas.

Rice Lake Wetland (PR1, PR2, PR2a, PR 3)

In 2018, the nutrient load coming into Rice Lake at Anchor Rd (PR2) was 1,733 lbs./year while the load leaving the wetland (PR2a) was 3,302 lbs./year. However the downstream vegetated area between the wetland and HWY 34 “used up” 629 lbs. of phosphorus and reduced the phosphorus load to 2,673 lbs. at Highway 34 (PR3). Due to higher than normal rainfall amounts in July, over one-half of the phosphorus load occurred between July 23rd and August 20th, with the release of 1,677 lbs of phosphorus from the wetland. The fluctuating water levels within the wetland peat layer cause phosphorus to be released to the Pelican River/Ditch 13.

Pelican River/Ditch 13 Characteristics	
Length	6.8 miles
Elevation Change	20 ft
Watershed Size	23.4 square miles
# of monitoring sites	8
Impairment	E.coli
Common Fish	Northern Pike, White Sucker
Invasive Species	None Known

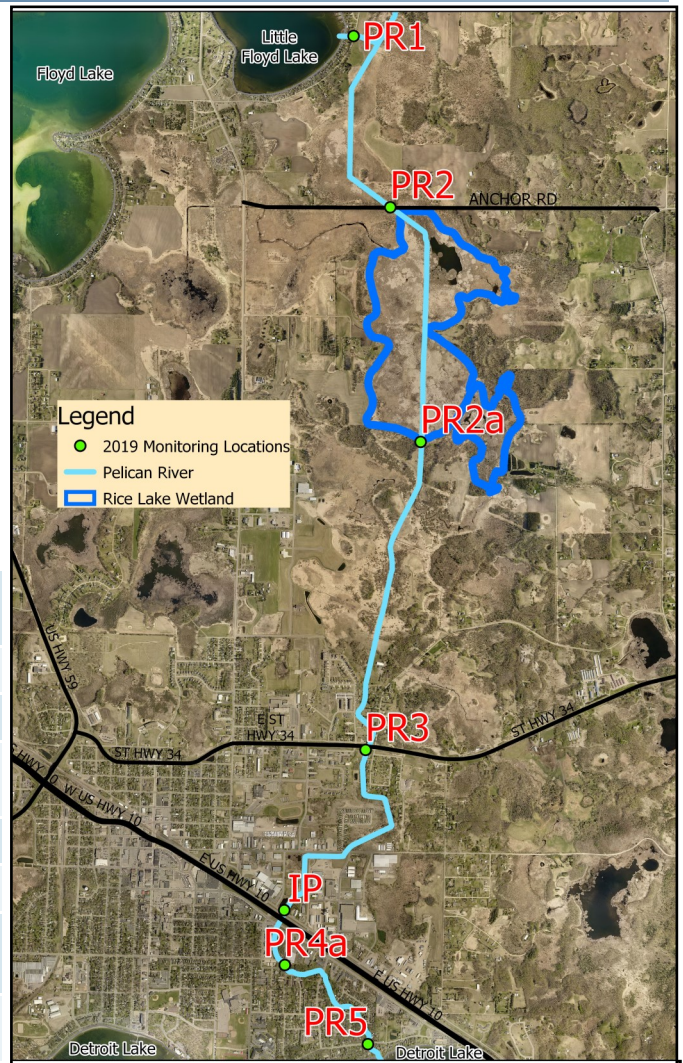
Industrial Park (IP) Storm

Event Sampling– Additional samples are taken following 1” or greater rainfall events to investigate potential phosphorus and sediment loading from the Industrial Park (IP) north of Highway 10.

Three storm events were sampled on the 6/6, 6/18, and 7/9 with results showing a 12 ton increase in sediment between HWY 34 (PR3) and the IP river segment, a 25% sediment increase (47.4 to 59.4 tons). However, no significant increase in phosphorus was observed.

Urban Detroit Lakes Area (PR 4a, PR5)—The sediment load (TSS) between HWY 10 to Detroit Lake (PR5) was lower than average at 90 tons/yr. compared to the long term average of 146 tons/yr. The phosphorus load was also lower than average at 2,009 lbs/yr. compared to the long term average of 3,092 lbs/yr.

MN Pollution Control Agency Chemical Data Collection. As part of the Otter Tail Basin watershed data collection, water chemistry and fish/macro-invertebrate biological integrity data was collected by MPCA and MN DNR staff from 2016-18 on the stream segment between Highway 10 to Detroit Lake. Both the macro-invertebrate and fish assessment data indicate a declining trend, nearing impairment levels which are attributable to low dissolved oxygen levels, high suspended solids, stream flow instability, and insufficient habitat. This stretch of the river has high levels of E.coli bacteria which exceed allowable standards. The City of Detroit Lakes will also be checking in the Spring of 2019 the sanitary sewer pipes in the vicinity for potential leaks. If the source is not identified, this river segment will be placed on the impaired waters list for E. coli. The river assessment recommended the continued need to reduce untreated storm water runoff and to convert mowed turf grass along the stream banks to vegetated buffers with trees, shrub, and grasses. In 2019, the District plans on taking E.coli samples from June-September.



Data Collection—Stream Monitoring

Willow Springs/City of DL/St. Clair Lake/Drainage System 14 (SC3, SC3b, SC4)

Ditch 14 (St. Clair) Outlet to the Pelican River. The District monitors three sites on Ditch 14 from St. Clair lake , through a wetland complex, and at the confluence Ditch 14 and the Pelican River. St. Clair lake is impaired for high phosphorus levels and Ditch 14 picks up additional phosphorus released from the wetland peat layer. The 2018 phosphorus load at the SC4 monitoring site between St. Clair Lake to the Pelican River was 1,750 lbs./year, a 38% increase from the 10-year average of 1,265 lbs./year.

Additionally, the City of Detroit Lakes is in the process of removing spray irrigation fields and rapid infiltration basins as part of airport expansion and wastewater treatment facility upgrades. While the effluent wastewater will be much lower in nutrients currently, the discharge rates will increase by 1.2 million gallon/day. The increases in flow through the wetland will most likely result in increased phosphorus loads to the Pelican River.

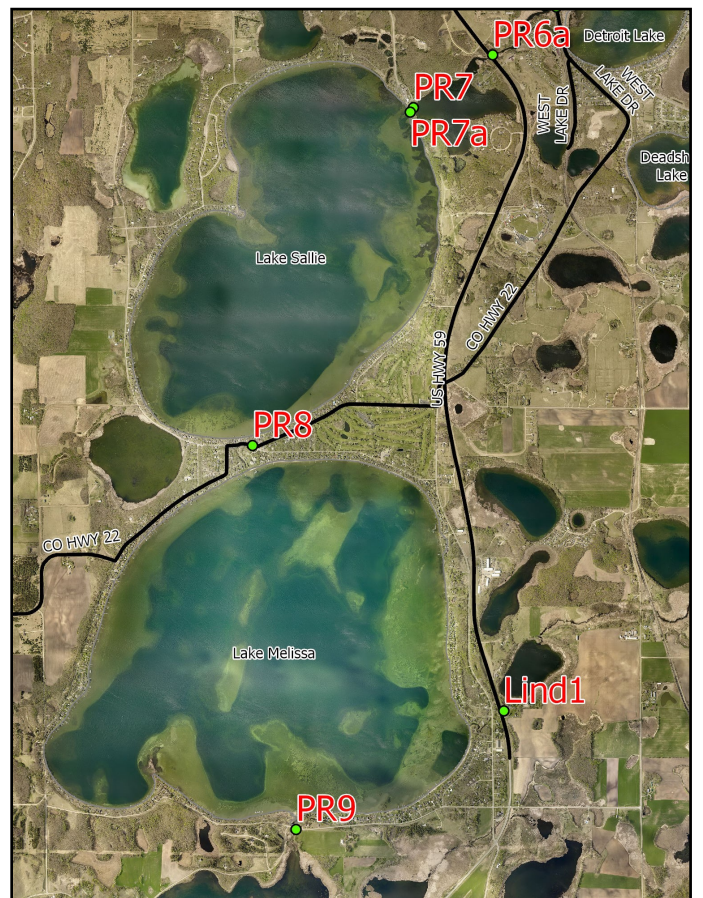


Pelican River Segment between Detroit Lake and outlet of Melissa.

The 2018 annual phosphorus loads at Detroit, Sallie, and Melissa lake outlets were less than long term averages, due to the zebra mussels lowering the overall “particulate” concentrations in the lakes. However, zebra mussels excrete “dissolved phosphorus” which algae readily feed on, causing localized near-shore algae blooms.

PR6—Detroit Lake Outlet: The annual phosphorus load leaving Detroit Lake at West Lake Drive was better than average at 659 lbs./year, compared to the 10-year average of 954 lbs./year.

PR8-Sallie and PR9- Melissa Outlets: The Sallie outlet (PR8) annual average phosphorus load was 1,128 lbs., one-half the 10-year average of 2,239 lbs. and the Melissa outlet (PR9) annual phosphorus load was 976 lbs., much lower than the 10-year average of 1,522 lbs/year



Rice Lake Nutrient Reduction Project



Since the inception of the District in 1966, the Rice Lake Wetland, a ditched 280 acre wetland, was identified as the primary source and contributor of “legacy” phosphorus loading to Big Detroit- contributing 3,000-4,000 lbs/year and 100 tons of sediment /year to the Pelican River. The majority of the nutrient load occurs during the spring and summer months when phosphorus is released from the wetland after rain events.

The phosphorus “pulsing” events can be reduced by increasing and stabilizing the wetland water levels and preventing the phosphorus from leaching out of the peat soils and traveling downstream to Big Detroit Lake. The water quality goal is to reduce phosphorus levels by 40-60%.



The ProjectA Long Journey!

During the 1980’s, the District began to develop a plan to address the phosphorus loading, but concluded that installing water level control structures was not an option due to topography constraints and potential impacts to upstream Little Floyd lake residents.

In 2003, the District partnered with the Natural Resource Conservation Service to re-examine the feasibility for installing water level control structures or using other technology to reduce phosphorus from the wetland. After three years of intensive studies and using updated data, it was determined that water control structures could be installed.

Since 2010, the District has worked with landowners to secure property and flowage rights on over 35 parcels and with Detroit Township to vacate a portion of Anchor Road.

Project Features

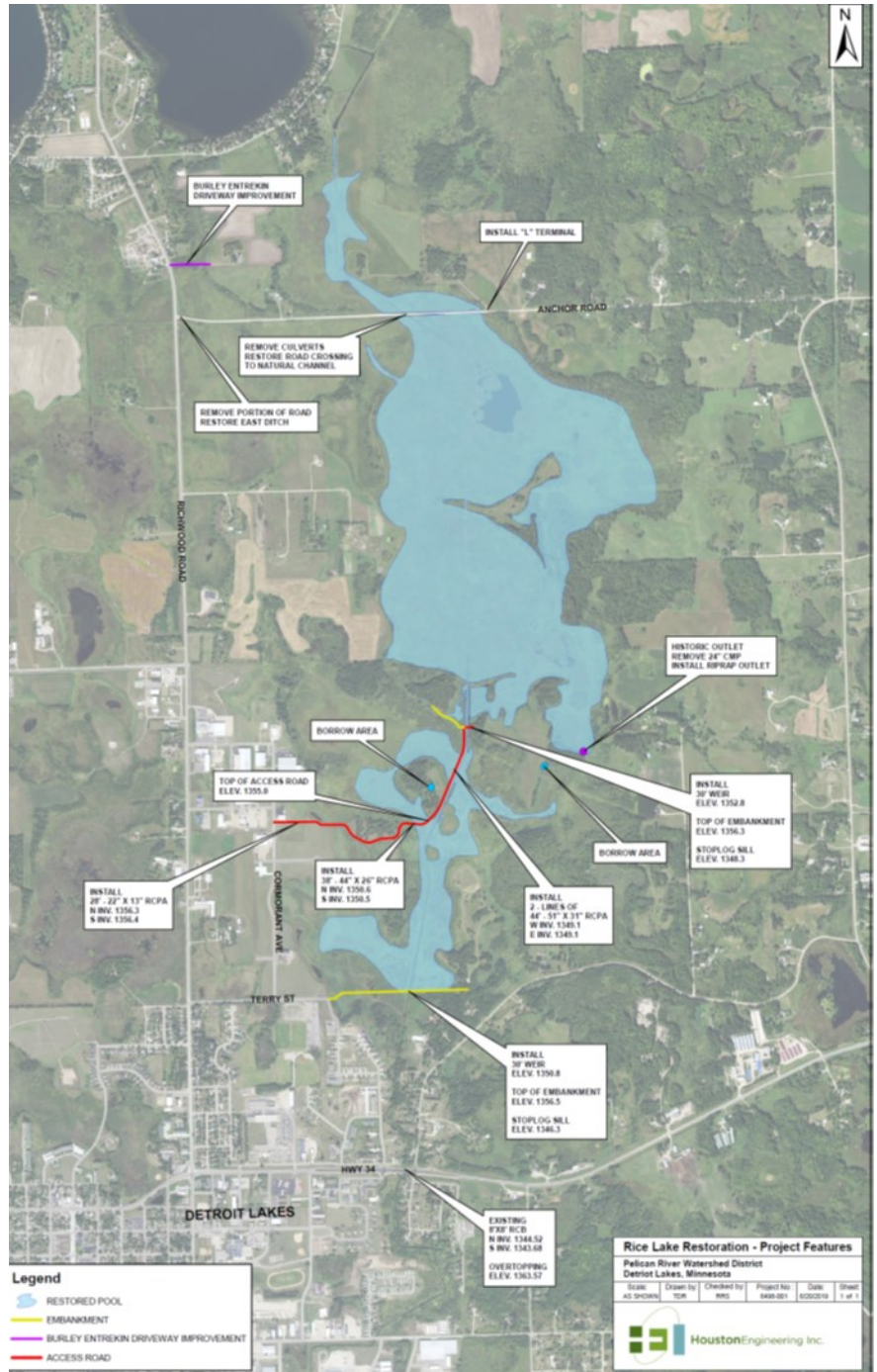
- **2 water control structures and access roads** for maintenance
- **Anchor Road**—Vacate west portion and remove ditch culverts
- **Funding & Partnerships**—Natural Resource Conservation Service, Board of Soil and Water Resources—Clean Water Legacy Funding, Minnesota Pollution Control Agency, Department of Natural Resources, City of Detroit Lakes, and landowners.
- **Project Cost**—\$2.5 Million



Rice Lake Nutrient Reduction Project

2018 Highlights:

- January** – Received Natural Resource Conservation Service (NRCS) Engineering Plans for Upper Structure. Project costs projected more than \$750,000 over previous estimates—primarily due to Anchor Road and Upper Structure costs and additional hydrological modelling for MN DNR dam safety permit. Houston Engineering reviewed project designs and will suggest ways to reduce construction costs. Houston Engineering gave a progress report to the Board of Managers and reviewed the project plans, updated budget, geotechnical evaluation, wetland restoration report, permit list, and process for Notice of Hearing and Draft Drainage Authority Petition to impound waters on a drainage system and Findings of Fact.
- March**- Board of Managers approved a resolution to impound waters on Becker County Drainage System 13 and appointed Houston Engineering as the project engineer to investigate the effect of the project and file a report of findings.
- April**—City of DL property easements, structure site, and 20 ft access road easement. The District and Detroit Township reviewed the joint permits for the Anchor Road project construction and wetland replacement credits.
- May**—Public Notices were published and mailed to affected property owners. The Public hearing was held on May 24th and the Petition to impound water on a public drainage system (Becker County Drainage System 13) was authorized by the Board of Managers. The Memorandum of Understanding and Maintenance Plan Agreements are under review by the MN DNR.
- June**—Project permits and wetland replacement credits were submitted for agency approval.
- July**— Detroit Township held a public input meeting on July 10 regarding Anchor Road Improvements and to begin discussion to vacate a portion of the road.
- August**—Houston Engineering modified plans in response to wetland permit review comments.
- September** - Continued to work with Detroit Township on partial Anchor Road vacation, updating additional flowering easements, completing the final order to impound water on Ditch 13. City reviewed Joint Powers Agreement.
- October**— Approval by City of Detroit Lakes of property flowage easements, structure and access road agreements, and joint powers agreement.
- November**—Final Approval and Adoption of the Findings, and Order granting the Petition to Impound, Reroute, Divert Drainage Systems for the Rice Lake Project. Houston Engineering submitted revised plans for the wetland replacement permits.
- December**— Continue to work with Detroit Township to vacate a portion of Anchor Road.



District Drainage Authority Becker County Systems 11, 12, 13 & 14

Most of the District's work as the Drainage Authority centers on beaver control and removing debris blockages from the drainage system channel. However in 2018, the District adopted a Buffer Rule and approved a petition to impound water on Becker County Drainage System 13

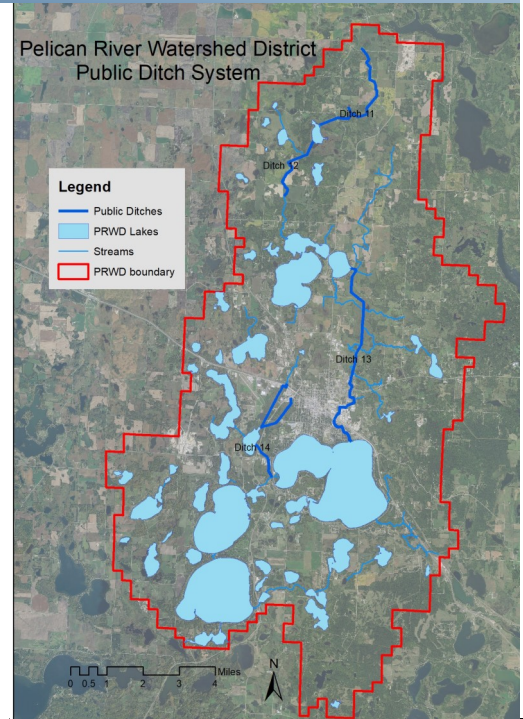
Adoption of Drainage Systems Only Buffer Rule. On July 19, 2018, the Board of Managers adopted the "Pelican River Watershed District 103E Drainage Systems Only Buffer Rule" that provides adequate provisions for compliance and enforcement of Minn. Stat. 103F.48 (Buffer Law) and in August the Rule was determined adequate by the MN Board of Soil and Water Resources. The District's Drainage System Buffer Rule applies only to the public drainage systems within its authority and not to public waters. The District receives funding assistance from the State of MN for enforcement of the buffer law. Becker County Soil and Water Conservation District inspects the systems to verify compliance with the MN Buffer Law and notifies the District if an enforcement action is required. The District was not informed of any non-compliance parcels in 2018 by Becker County SWCD.

Approved an order to impound water on Becker County Drainage System 13. A Public Hearing was held on May 24, 2018 at 5:00 PM regarding Ditch 13 and the Rice Lake Wetland Restoration project. In the 1980's, Rice Lake Wetland was identified by the PRWD, MPCA, and MN DNR as a major phosphorus nutrient source to downstream Detroit Lake. The Natural Resource Conservation Service conducted an assessment of the Upper Pelican River and recommended impounding water on Rice Lake Wetland to reduce phosphorus loads to Detroit Lake by 1200 lbs Annually. Public comments were received. No one appeared in opposition of the project.

Beaver Control and Blockage Removal. There were 35 beaver trapped out of the ditch systems by independent contractors working for the Watershed District in 2018. The cost of trapping and dam removal totaled \$3775. The breakdown per ditch system is as follows:

Ditch 11/12	\$1500
Ditch 13	\$1575
Ditch 14	\$ 700

System	# Removed	Location	2018
Ditch 11	4 beaver	260th St.	Jun 6-9
Ditch 11	6 beaver	Crossing at Whiskey Creek	Aug 8-12
Ditch 12	2 beaver	230th St.	Sep 15-16
Ditch 12	3 beaver	Upstream 230th St.	Oct 23-31
Ditch 13	5 beaver	Rice Lake Outlet and Randolph Rd	May 3—16
Ditch 13	1 beaver	Pelican River near Detroit outlet	Sep 22
Ditch 13	4 beaver	Rice Lake outlet	Sep 22-24
Ditch 13	3 beaver	Downstream of Little Floyd Lake	Oct 4-10
Ditch 14	7 beaver	Pelican River near Dunton Trail culvert	Sep 22-28



The District became the Drainage Authority of Becker County Ditch 11/12 (Campbell Lake/Creek area), 13 (Floyd Lake, Rice Lake, City of Detroit Lakes area) and 14 (St. Clair Lake area) in the late 1990's when the Becker County Commissioners transferred the responsibilities.

Historically, the drainage systems were constructed from 1913 to 1918 for agricultural improvements. The management of these systems follows MN Statute 103E and the costs associated with the systems are paid for by the benefiting properties.

Benefitted drainage system landowners have the lawful right to have these drainage systems maintained. The benefited lands and their owners have paid for construction and maintenance of the systems without the use of public funds.



District Rules & Permitting

Rules. The District Board of Managers adopted on July 19, 2018 the, “Pelican River Watershed District 103E Systems Only Buffer Rule” which grants the District authorities and provisions for compliance and enforcement of the MN Buffer Law (MN Stat. 103F.48). This Rule applies only to the District’s drainage systems and not on other public waters. The District will be updating the Rules in 2019, focusing on storm water management, near shore activities, and wetland protections.

Permits.

There was a slight decline in permits issued in 2018 compared to 2017, down from 77 to 68.

Small Sites. Small site permits in Shore Impact Zone, such as rip rap, sand blankets, tree removal or other shoreline work, decreased from 53 in 2017 to 32 in 2018.

Large Sites. Large Site impervious coverage permits require engineered stormwater management plans which are reviewed by the District’s Engineer, Marlon Mackowick, Wenck Associates. In 2018, larger site permits were issued to Thrifty White Drug, the Spitfire restaurant, Park Core Storage Units, Laker Island Storage, Apex Townhomes, the Essentia Helipad, Pelican Landing Sr. Living, Tomlinson-Schultz planned unit development and Midtown Development on Washington Avenue. The City of Detroit Lakes also moved forward on several large scale projects including the new Boys & Girls Club facility, Airport Phase II, the Waste Water Treatment plant, and road/stormwater treatment expansion to the Lake Forest subdivision and the North Long Lake Road reconstruction (see photo). However, the number of large sites, requiring permits for impervious surface coverage, increased from 13 in 2017 to 24 in 2018.



However, the number of large sites, requiring permits for impervious surface coverage, increased from 13 in 2017 to 24 in 2018.

Fee Structure Update. The wages and expenses associated with the Rules and permitting program are paid by the District’s General and Utility funds. In 2018, permit fees collected totaled \$16,600 for non-government projects. An undated permit fee schedule was adopted in December 2017, which more closely aligns with actual review costs with larger scale stormwater management projects. MN State Statutes do not allow the District to collect permit application fees from government agencies. In 2018, government project reviews costs accounted for almost \$12,000 of the \$28,900 total District review expenses.

Practice Design Guidance Document. The District also updated the “Best Practices for Design of Stormwater Management Systems” guidance document.

Cost Share Program

The District offered a Cost Share Program for the second consecutive year to promote Best Management Practices (BMP), such as native shorelines and buffers for lakeshore property owners, and raingardens and vegetated swales for those living off the lake. The District will pay 75% of eligible expenses up to \$500 for single family homes, \$1,000 for condo and apartment complexes and \$1,500 for Not-for-profit religious organizations, public and private schools, local government agencies and private businesses.

Although the District promotes this program to residents and contractors, only four applications were received, and \$1596.18 was reimbursed to property owners in 2018.

Permit Type	2018 Issued
Small Site Permits	
Shore Impact Zone Alteration (sand blanket, rip rap, vegetation changes)	29
Bluff Impact Zone Alteration	1
Buildings, parking, driveway,	7
Large Site Permits– Private and Government Projects	
Subdivision, PUD, Plat Site Plans	4
Building, Parking lot, driveway	15
Government Projects (Streets, school, wastewater treatment plant, airport, impoundment)	9
Other– Retaining wall removal	3
Total	68

Education & Outreach



MAISRC Seminar—June 8, 2018

Watershed District staff was instrumental in organizing a regional seminar that featured the Director and key staff from the University of Minnesota Aquatic Invasive Species Research Center (MAISRC). Becker, Hubbard and Ottertail CO-LAs, along with AIS Coordinators from Becker and Ottertail County assisted with the planning and cost of the event which was held at the M State campus in Detroit Lakes.



Dr. Nicholas Phelps, Director, began the seminar with an overview of the center and research on modeling and carp viruses. He was followed by a Research Assistant who spoke on zebra mussel research. Megan Weber, a MN Extension Educator, who directs outreach programs such as Starry Trek and AIS Detectors, closed out the morning session.

The afternoon was filled with information on the invasive alga, starry stonewort, presented by Dr. Ranjan Muthukrishnan, followed by Bethany Bethke, MN DNR Fisheries Research Biologist who gave an overview of the research currently being conducted on Mille Lacs lake regarding the impacts of Zebra Mussels and Spiny Water flea.

The day was concluded with a Legislative Listening session attended by Senator Kent Eken and Rep. Steve Green. Those addressing the Legislators spoke on environmental and economic impacts of AIS and the need for sustainable funding for the research center.



The event was attended by 125 people from Becker, Hubbard and Ottertail Counties, as well as staff from the MN DNR, MPCA and local government officials. Because of the large number of people in attendance, and the high level of interest and engagement, MAISRC staff expressed interest in repeating the seminar on a biannual basis.



Around the Community

The District's education and outreach plan aims to fulfill its clean water objectives by building a community of stewards. The goal of our outreach is to improve water quality by leveraging the power of an engaged community to effect meaningful change. To accomplish this we must increase awareness and grow stewardship to achieve a shared goal of protecting clean water. The District staff can be heard monthly on the radio show, Hodge Podge, outlining our current programs and actions. We can be found at lake association meetings, school events, the Becker County Fair, Aquatic Invasive Species conferences, and various other community events that offer the opportunity for public outreach and education.



9th Grade Sucker Creek Field Day- May 16

Steve Fode, Science Teacher at DLHS organized a field day at Sucker Creek where students could learn first hand about monitoring water for nutrients of concern and how data is used to implement programs based on results. Alcott and the interns demonstrated the District's procedures and protocols.

Ike Fischer FarmTour- May 16

Area Fifth grade students are bussed to the Ike Fischer Farm near Frazee, MN to learn about the history of logging in the area, as well as other environmental topics such as Aquatic Invasive Species, Birding, Trees, and invertebrates living in our local waters. Each station is manned by a local government agency. District staff has assisted with this event for several years.

Education & Outreach



Lake Handouts—These handouts were developed in the spring of 2018 using data collected the last 10 years for the District’s largest and most populated lakes. They contain information specific to each lake including water clarity, total phosphorous, invasive species, size, inlets, outlets, shoreline length, etc. Also included was information regarding the District’s Cost Share Program which promotes shoreline restoration, raingardens and other storm-water treatment methods.

Lake Association Meetings—District staff was invited to speak at various meetings throughout the summer. Alcott spoke to members of Floyd Point, Sallie & Melissa and Long Lake.

Board President, Dennis Kral, attended the Lake Detroiters meeting and accepted their “Friends of the Lake” award on behalf of the District for our work in maintaining high water quality.



Aqua Chautauqua—Aug. 9th
This event was held at Dunton Locks County Park and involved 25 stations all dealing with various aspects of water. The District hosted a photo booth for the children where they could dress in various lake props. They could also color an environmental button of their choosing and enjoy a cool drink of water and snack. Alcott assisted the MN DNR with a stream table demonstrating stream hydrology and intern Chalberg explained our monitoring equipment and procedures. This was the first time this event was held in the Detroit Lakes area and it was very well attended and excellent feedback was received.



Lake Life Expo—Feb. 23 & 24
The District was on hand for conversations at the second annual Lake Life Expo held at the Fargo Civic Arena to discuss our work with water quality monitoring, permitting, aquatic invasive species and the benefits of Lake Life. Several podcasts were recorded throughout the event involving government agencies, realtors, and lake service providers.

Becker County Fair, July 25-29—The children below visited the PRWD booth located in the MN DNR building. They are proudly wearing the buttons they created with the District’s new button maker. The District engages with young and old throughout this annual 4-day event. It provides great educational outreach experience for the District’s college interns.



Water Fest, May 8 – This annual event is sponsored by the City of Detroit Lakes and held at the Kent Freeman arena. Over 400 area 4th graders attend sessions learning various aspects of water. PRWD staff addresses with the students how the District implements stormwater practices in their community and what students can do to both conserve and preserve high water quality in their community. In the photo to the left, intern Eli Disse demonstrates how various agricultural and urban practices can impact our local streams, lakes and groundwater.

Operating Revenue & Expenses

The District is funded through Ad valorem tax levies within the boundaries of the watershed district. These funds, along with special assessments, basic water management fees, and grants are used to fund projects and programs. The District does charge permit fees to support their permit program. Tax dollars are collected from watershed residents through its statutory authority according to MN Watershed Act (M.S. 103D).

Watershed Districts have the following programs:

- ◆ General/Administrative: conducting the business of the District
- ◆ Regulations: administering the District’s rules and permits
- ◆ Planning: administering the District’s watershed management plan and budgets
- ◆ Maintenance of Projects and District owned facilities
- ◆ Capital Projects
- ◆ Public Relations: administering the requirements of reporting to and notifying the public

The budget must be adopted and certified on or before September 15th. M.S. Chapter 103D.911 requires that the managers hold a public hearing before adopting a budget. The chart below is a complete budget profile for 2018 and 2019 along with the actual funds spent in 2018.

	2018 Budget	2018 Actual	2019 Budget
Revenue			
Levy	642,000	641,064	632,000
Intergovernmental Revenue		36,368	308
Interest, Fees, Other	(77,627)	61,699	(79,114)
Total Revenue	564,373	739,131	553,194
Expenses			
Capital Outlay	36,500	0	26,500
Community Relations	6,500	5,072	9,000
Loan Payment	33,000	33,000	33,000
Ditch Expense	5,650	3,775	6,050
Program Act./Grant Match	368,050	118,432	269,000
Operating Expenses	80,100	63,755	76,900
Payroll	319,200	288,972	328,400
Rice Lake Project	N/A	150,287	N/A
Contracted Services	141,650	64,898	177,750
Total Expenses	990,650	728,191	926,600

2019 Workplan

District-Wide Goals	Continuing	2019 New Activities
Education <ul style="list-style-type: none"> ◆ Publications, support of organizations, etc ◆ Recruit more volunteers ◆ Upgrade website ◆ Awards/Demo Projects ◆ Contractor Seminar 	Tours for Managers and Citizen Advisors. Presentations for service groups, lake associations, classes, fair booth, water festival, City, County. Assistance to educational programs. Publish annual summaries, lake info sheets. Website/Facebook. Continuing education for managers and staff – work shops, conferences (GF); Support of LA's and COLA News articles/Monthly Hodge Podge radio	Create PRWD permit guide and promote Rule update. PRWD Citizen Advisory Committee project tour. Present to 3 service Clubs, 2-3 Lake Associations. Rice Lake project-mail landowner letters and promote project in media. Sucker Creek education events, Water Festival, Ike Fischer Farm, Becker County Fair Hold Smart Salting Training for road applicators. Storm Drain Education with City of Detroit Lakes.
Data Collection (monitoring) <ul style="list-style-type: none"> ◆ Maintain monitoring program ◆ Upgrade monitoring equipment ◆ Prepare lake-specific evaluations ◆ Integrate monitoring and GIS ◆ citizen volunteers, agency coordination 	Update & implement monitoring plan and data. Recruit additional monitoring volunteers. Employ two summer interns for lake/stream monitoring. Training/seminars/conferences/courses.	Pelican River Storm event monitoring, e-coli and chloride. Shoreline Surveys-Long, Munson, Pearl. More lake volunteers on Pearl, Brandy, Abbey, Meadow, Johnson/ Reeves for secchi readers. Effectiveness monitoring for Rice Lake/Campbell Creek/St. Clair Lake. Phytoplankton and Zooplankton assessment for Detroit, Curfman, Sallie & Melissa (Floyd?) Eqpt Purchases-Stream meter, staff gauges, hobo loggers. Eqpt Repairs-Trimble screen, boat battery, outboard starter. Assist with stormwater basin effectiveness monitoring.
BMP's to Reduce Phos and Sediment <ul style="list-style-type: none"> ◆ Promote BMP's ◆ Promote, acquire buffer zones 	Encourage vegetative buffer easements along riparian areas <ul style="list-style-type: none"> ◆ Encourage other BMP's ◆ Restore-the-shore – HWY 10 overlook maint. 	Re-apply for CWP Grant Funding for West Lake Drive & Industrial Park Improvements. Dunton dry dock outlet modification. Cost Share Assistance for Shoreland BMP's Rice Lake Project construction. Use PTM tool to identify areas for phosphorus reduction. Pursue phosphorous study-Ditch 14, St. Claire, North Floyd. Pelican River Clean up (Hwy 34 to Hwy 10 in Industrial Park).
Water Mgmt. Regulation/ Permitting <ul style="list-style-type: none"> ◆ Advocate regulations to promote water quality ◆ Advocate rigorous and consistent enforcement of District and other rules ◆ Coordinate with other units of government 	Continuous rigorous and consistent enforcement of Rules <ul style="list-style-type: none"> ◆ practice oversight on County and City activities relating to water quality ◆ Advocate for City, County and State water quality enhancement ◆ Serve on inter-agency committees and panels ◆ Update Website - Permit information/location links 	Rule revision and buffer enforcement. Revised Management Plan (Wenck). Ottetail Basin WRAPS Permit Application Software-County BWSR grant; Work with county and city to streamline permitting; MOU with Becker County Zoning for District permitted projects. Inspect permitted projects (BMP functionality).
Lake Management Planning <ul style="list-style-type: none"> ◆ Promote LMP concept; encourage adoption of special protection zones 	Continue to motivate and assist lake associations to become proactive in promoting planning. Encourage the adoption of special protection zones (see also Water Management Reg). Project 1B/1C Aquatic Vegetation Management. AIS prevention, rapid response, control.	Manage AIS infestations of Flowering Rush and Curly Leaf Pondweed on Detroit, Curfman, Sallie, Melissa, Muskrat New AIS Readiness Response Plan; survey public accesses for AIS Infestations. Lake Vegetation survey on Detroit & Curfman. Continue roadside pick up program on Detroit, Curfman, Sallie & Melissa.
Septic System Management <ul style="list-style-type: none"> ◆ Encourage septic BMP's, and rigorous enforcement of regulations 	Monitor permits for installation of ISP's. Support BC Septic inspection program. Encourage cluster systems (Sallie/Melissa). Promote alternative approaches. Work with landowner groups and local govts.	Review Rules. Continue support of County inspection program.
Drainage Systems	Ensure proper ditch management – (Beaver). Enforce buffer compliance Rule.	Rice Lake Project Requirements Buffer Rule Enforcement Beaver and blockage management Drainage systems meetings/trainings
General Administration <ul style="list-style-type: none"> ◆ Project overview, grants, reports, budgets, payroll, etc; office equipment maintenance 	Plan and manage finances; 2018 Audit Office Equipment Updates Annual Report	Office Equipment– Computers (Administrator, 4 monitors, large conference room monitor). Review District Bylaws. Contract renewals—office space, audit firm, GIS Arc map, HR/job descriptions and salary update.