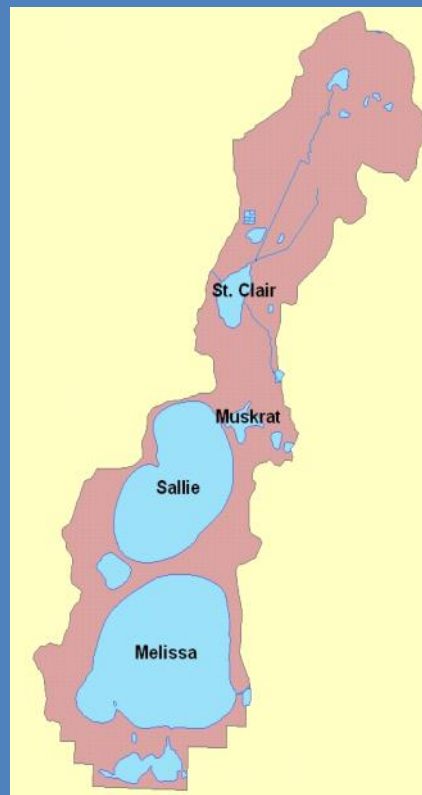


Sallie/Melissa Water Quality 2009

Pelican River Watershed District

"Protecting Our Lakes"

The Sallie-Melissa Lake Water Quality Management Area is 11,400 acres. Drainage area includes Pelican River downstream from Little Detroit Lake, Ditch 14 and a small area of wetlands and small lakes draining westward through Lind Lake to Lake Melissa. It also receives nutrients and runoff from the Detroit/Rice LWQMA. A relatively large part of the area is urbanized. Due to the early cottage development, lots surrounding Lake Sallie and Melissa are relatively small, so shoreline development is dense. Modifications to the shoreline are extensive with little shoreline remaining undeveloped.

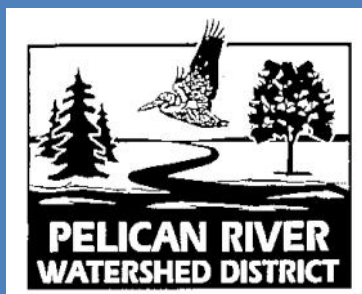


Sallie is currently borderline eutrophic, though it has improved greatly since the early 1970's when it was subjected to very high nutrient loadings from upstream sources. In recent years upstream loadings have continued to decline, presumably because of favorable runoff conditions, the St. Clair alum treatment, and improvements in Little Detroit's water quality. Nevertheless, the lake is still subject to moderate to severe algae blooms in July and August. These appear to be brought on by internal circulation patterns whereby nutrient enriched water from the lake's bottom is brought to the surface where it stimulates algae growth.

Melissa's condition is classified as mesotrophic. It is strongly affected by conditions in Lake Sallie. Discharges from Lake Sallie during the late summer algae blooms carry nutrients and algae into Melissa through the Pelican River at Shoreham.

St. Clair's poor eutrophic condition is largely the result of it's use as a receiving pond for partially treated sewage effluent for over 50 years. Very thick, phosphorus enriched sediments cause more or less continuous severe algae blooms. An alum treatment in 1998 provided some relief, and reduced nutrient loadings from the lake to downstream areas, but it is unlikely that this reduction will persist indefinitely.

Muskrat is heavily impacted by upstream nutrient sources from Ditch 14 and Little Detroit. Because of improving conditions in Little Detroit and as a result of the St. Clair alum treatment, nutrient loading to Muskrat has declined in recent years.



211 Holmes Street West
Wells-Fargo Bank Building, Suite 201
PO Box 1043

Phone: (218) 846-0436 Fax: (218) 846-0778
www.prwd.org

The PRWD Monitoring Program

The PRWD monitoring program is focused on lakes and streams. Measurements on some District lakes are taken monthly during the growing season, others on a biweekly basis. Data collected on lakes include samples tested for phosphorus, ortho-phosphorus, chlorophyll-a and readings of clarity, pH, and conductivity. Temperature and dissolved oxygen observations are made at one-meter intervals from the surface to the lake's bottom.

Baseline data has been collected on District lakes since 1995. Starting in 2005 more lakes were sampled, but lakes for which water quality is well understood have been sampled less frequently. More volunteers have been recruited to assist in the District's monitoring, and there is coordination with Becker County COLA's monitoring efforts.

Few District lakes exhibit limitations for swimming or boating as defined by the Minnesota Pollution Control Agency, and only one, Lake St. Clair has been designated as "Impaired". Nevertheless, the District holds its lakes to higher standards. Lake specific goals call for water quality improvements, or at least protection on all lakes. Such goals are to be accomplished by implementing best-management practices, especially shoreline protection, stormwater runoff controls, or other means.

A routine component of the District's monitoring program involves surveys of shoreline conditions around district lakes. The object is to provide current data on shoreline, and to assist in the District's rule-enforcement efforts. Shoreline surveys are repeated for main district lakes on a 5-year schedule.

Stream observations and sampling also are conducted on a biweekly or monthly basis, depending on the season and the site. Protocols for storm-event sampling are also in place. Samples are analyzed for phosphorus and sediments. Gage readings provide important information on stream flow which determine patterns of nutrient and sediment inputs to lakes.

Results from nutrient and sediment samples are provided by RMB Environmental Laboratories. Together with other monitoring data, lake and stream conditions are described and summarized by PRWD staff. Trends are identified, as are any special problems on specific lakes or stream segments. Results of these data are reported to state and federal agencies. The District's website contains records of lake levels, water quality data and interpretations, ice-in and ice-out information, climate data, stream flows and loading, and others. See www.PRWD.org

Program Costs

The District's monitoring program derives from the need to understand and address water quality problems for lakes. About \$25,000 is expended each year for staff and student intern wages, chemical analysis, equipment and transportation costs.

Describing and Summarizing Water Quality

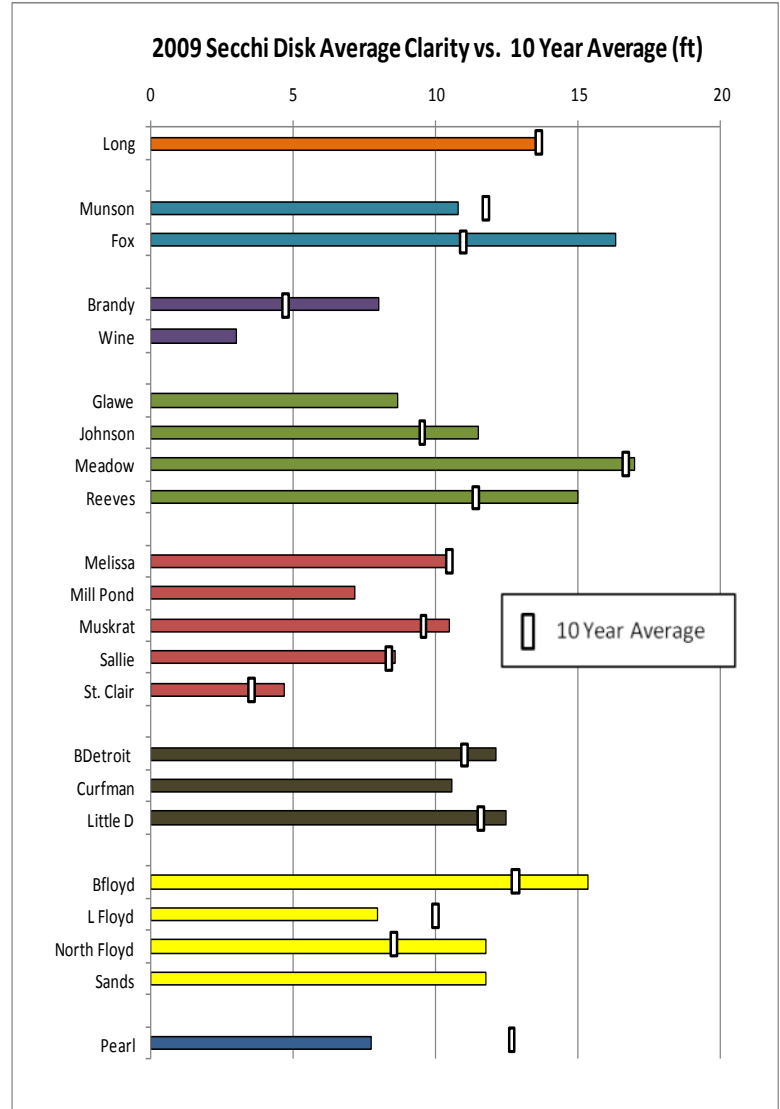
In 2009 the District made slight modifications in its approach to summarizing water quality data for lakes. Previously the three main indicators, clarity, total phosphorus and chlorophyll-a results were indexed in order to characterize a lake's water quality, and to facilitate trend analysis and comparisons among lakes. The so-called Trophic Status Index (TSI) assumes that there is a high degree of correlation among the three indicator variables, and it is common to use the resultant scaled variables interchangeably or to average them. However, District data shows that the three variables are not always closely related, and that averaging the three disguises some important differences. Henceforth in characterizing lake water quality, the District will look at the variables independently. The District's monitoring program derives from the need to understand and address water quality problems for lakes.

2009 Water Quality Overview

2009 - Lake Water Quality

2009 was an outstanding water quality year — nearly all lakes with a substantial monitoring history showed near- or better-than record conditions. This is the second year in a row that results have been very good. Once again weather conditions are believed to have helped. The spring ice-out date, April 23rd, came a few days later than the long-term average, and summer high temperatures were noticeably below the long-term average. Both of these are conditions which help to curtail nuisance algae blooms.

Adding to the favorable conditions, the incidence of runoff events capable of carrying large amounts of nutrients to the lakes were somewhat below average and most of those occurred outside the growing season. The graph indicates that all but three lakes (Pearl, Munson and Little Floyd) exhibited better-than-average clarity. Phosphorus and chlorophyll-a measures generally showed similar better-than-average patterns.



PRWD 2009 Lake and Stream Sampling			
Lakes Sampled	22		
Streams Sampled	17		
Shoreline Surveys	Pearl, Munson, Big Floyd, North Floyd and Little Floyd.		
Lake Secchi Readings	216		
Parameter	Lake	Stream	Total
Total Phosphorus	147	134	281
Ortho Phosphorus	114		114
Chlorophyll A	114		114
Suspended Solids		29	29
Gage Readings		341	341

Thanks to 2009 Monitoring Volunteers

- Curfman:** Ed Welke
- Big Floyd:** Mark Geihl, Les Froiland
- North Floyd:** Mark Geihl, James McGough
- Little Floyd:** Arnold Hilde,
- Big/Little Detroit:** Dick Hecock
- Fox:** Sue Portilla
- Long:** Curt Noyes, Shirley Fihn
- Pearl:** Ryan Kalberer
- Melissa:** Clayton Jenson
- Sallie:** John McLaughlin

Sallie/Melissa Water Quality 2009

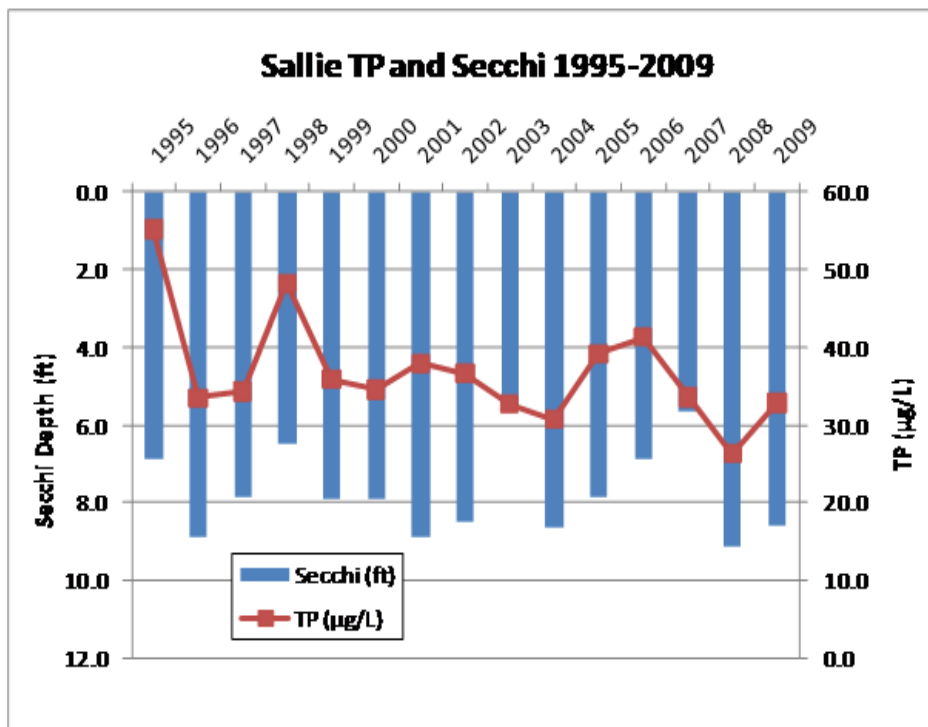
Water Quality Trends:

Over the past 10 years or more, Lake Sallie has seen an improvement in overall water quality. Levels of phosphorus have dropped and instances of intense summer algae blooms have decreased. Although summer algae levels are improving, there seems to be a trend towards decreasing clarity in the spring. Overall water clarity is improving, but not at the rate that the drop in phosphorus suggests.

Lake Melissa often reflects the changes in Lake Sallie. This continues to be true in that Lake Melissa has also had overall decreases in TP, yet not a significant improvement in water clarity as one might expect.

It appears that the clarity of Lake Sallie and Melissa is not driven significantly by the reduction of phosphorus levels in the lake. Although reducing phosphorus loading to these lakes is an important management issue, it appears the District needs to look at each lake as a complex system that is driven by many factors, including temperature, precipitation patterns, internal nutrient loading, algae community composition and stratification regimes.

Both Muskrat and St. Clair have also seen significant improvements in water quality. Annual phosphorus levels have decreased and as a result Secchi disk clarity has improved.



Improvements in phosphorus levels in Lake Sallie and further downstream are primarily a result of the 1998 alum treatment on Lake St. Clair. This resulted in a decreased amount of phosphorus exported from St. Clair, ending up in downstream locations.

Although these lakes are not considered "impaired" for recreational use by the State of Minnesota, the District considers these lakes "at risk" and its goal is to continue to reduce algal blooms, with emphasis on instances occurring in summer months as well as the decreased clarity in the spring.

Invasive Species

The District continues to search for a treatment of Flowering Rush. At present the District has suspended lake-wide control efforts in order to conduct some basic research on the nature of the Flowering Rush. Also laboratory and field trials are now being conducted on alternative herbicides which might be used in the future.

The District also continues to encourage hand-removal methods for small Flowering Rush infestations.