

2020 PGOLID Lake Monitoring Summary



Pelican Lake

From 2007 to 2020, all three lake sites (see graphic below) were monitored. Site 206 in the middle of the lake has been monitored since 1996.

Site 205 (Fairhills Bay) has the highest phosphorus concentration over the long term, which makes sense because the Pelican River is the largest contributor of phosphorus to Pelican Lake. Stream monitoring since 2001 has shown that the Pelican River contributes 64% of the total stream phosphorus loading into Pelican Lake. The Pelican River enters Pelican Lake on the east end. The best water quality in the lake was at site 206 in the middle of the lake. This makes sense because this site is the furthest from any stream inputs. At site 201 the Spring Creek and Bob Creek inlets carry nutrients and sediment into the lake from the west side, but combined, they only contribute 35% of the stream phosphorus loading into Pelican Lake.

In 2019 site 201 near the Spring Creek inlet had the highest phosphorus concentration. Even though we would have expected the increase in total phosphorus to also increase the chlorophyll-a, the results show the chlorophyll-a concentrations decreased. This is likely due to the zebra mussels eating the algae and re-depositing it on the lake bottom. With less algae in the water it is clearer and site 201 had an average secchi measurement of 20 feet which is comparable to what is normally seen in low nutrient, rocky bottom lakes in Canada.



Figure 1. Pelican Lake monitoring site comparisons in phosphorus concentration.

Trends: Pelican Lake (Site 206)

- Total Phosphorus: Total phosphorus is stable, which indicates no change in lake quality.
- Chlorophyll a (algae): Chlorophyll a concentration is decreasing, which indicates less algae suspended in the water.
- Secchi Depth (clarity): Secchi depth is increasing, which indicates improving water clarity.

Table 1. Pelican Lake Total Phosphorus results from 2007-2020.

Parameters	2007-2020	2020	2007-2020	2020	2007-2020	2020
	Site 206	Site 206	Site 201	Site 201	Site 205	Site 205
Total Phosphorus Mean (ug/L):	14.7	12.8	13.8	19.8	16.6	15.8
Chlorophyll-a Mean (ug/L):	4.2	2.7	3.7	1.5	4.8	2.9
Secchi Depth Mean (ft):	15.2	19.2	16	20	14.8	21.1

Little Pelican Lake

Little Pelican Lake has been monitored at Site 202 from 2003 to 2020, and has an average total phosphorus concentration of 23.6 ug/L. This is higher than the phosphorus levels in Big Pelican Lake. The phosphorus in Little Pelican Lake comes from the Pelican River, so any phosphorus loading upstream in Detroit Lakes eventually goes into Little Pelican Lake.



Little Pelican Lake is considered a shallow lake; therefore, it has different dynamics than Pelican, Bass and Fish lakes. Most of the lake is less than 15 feet deep, which means that the sunlight can reach the bottom and plants can grow in the entire lake. It is important to preserve the aquatic plants in Little Pelican to take up the nutrients in the lake and stabilize the lake sediments. If large portions of these plants are removed, there will be more nutrients available for algae, and the lake water could become "greener".

The 2018 lake monitoring season results were similar to historical averages. Trend analysis shows stable phosphorus concentrations. The phosphorus in Little Pelican mostly comes from upstream, so improvements planned in Detroit Lakes should benefit Little Pelican Lake in future years.

Little Pelican Lake is not showing as much of an improvement in clarity from zebra mussels and that has been observed in other shallow lakes as well. It could be because zebra mussels do not do as well in shallow eutrophic lakes. Many reports were received concerning excessive aquatic plant growth in Little Pelican Lake in 2019. Site visits revealed the plants were almost entirely native species.

Trends:

Years monitored: 2003-2020

Total Phosphorus:	Total phosphorus is stable, which indicates no change in lake quality.
Chlorophyll a (algae):	Chlorophyll a (algae) is decreasing, which indicates less algae suspended in the water.
Secchi Depth (clarity):	Secchi depth is increasing, which indicates increasing water clarity.

Table 2. Little Pelican Lake historical data, 2003-2020.

Parameters	Historical Site 202	2020 Site 202
Total Phosphorus Mean (ug/L):	23.6	19.6
Chlorophyll-a Mean (ug/L):	8.5	3.8
Secchi Depth Mean (ft):	9	13

Fish Lake

Fish Lake has been monitored from 2003 to 2020 at site 201. Fish Lake has the best water quality in the Pelican Group of Lakes. One reason for this is that it does not have a direct stream inlet discharging into it. Pelican Lake is attached, but the phosphorus in that water is already filtered by the time it reaches Fish Lake.

The south bay of Fish Lake (Echo Bay) is some of the only shoreline in the Pelican Group of Lakes that is still undeveloped. It is not sandy, but is lined with reeds and cattails, which make excellent habitat for aquatic animals and fish.

Due to a proposed development project in this area a few years ago, site 202 was monitored in 2007-2008 to get a good picture of baseline water quality. Since then, this development has fallen through, but now we have baseline conditions to compare in case this area ever gets developed in the future. This site was once again monitored in 2015 and again in 2017.



The results from the 2020 lake monitoring season indicate that the average water quality is staying stable or improving, in comparison to the historical average. The clarity (Secchi depth) was almost 4 feet better than the historical average, which is due to zebra mussels filtering the water, capturing the algae and other particles, and depositing them on the shallow lake bottom.

Trends:

Total Phosphorus: Total phosphorus is stable, which indicates no change in lake quality.
 Chlorophyll a (algae): Chlorophyll a concentration is decreasing, which indicates less algae is suspended in the water.
 Secchi Depth (clarity): Secchi depth is increasing, which indicates improving water clarity.

Parameters	Historical Site 201	2020 Site 201	2017 Site 202	Historical Site 202
Total Phosphorus Mean (ug/L):	11.8	13.2	12.6	12.3
Chlorophyll-a Mean (ug/L):	3.2	1.9	2.0	3.7
Secchi Depth Mean (ft):	15.7	19.9	16.9	14.6

Bass Lake

Bass Lake total phosphorus concentration at Site 201 has been monitored from 2003 to 2020. It has an average of 16.8 ug/L. Bass Lake has nutrient levels similar to those in Big Pelican Lake and higher than the phosphorus levels in Fish Lake.

Bass Lake has no direct inlets and outlets, just a connection with Fish Lake that doesn't show much flow of water either direction. Because of its isolation and small surface area, Bass Lake is more susceptible to impacts occurring on the shoreline of the lake such as adding impervious surface, adding artificial sand beaches, and removing aquatic plants.

The 2020 lake monitoring season indicates improving water clarity and chlorophyll-a concentrations in comparison to the historical average. This is due to zebra mussels filtering the water, capturing the algae and other particles, and depositing them on the shallow lake bottom. Many reports of excess, matted, or dislodged floating plants came from Bass Lake in 2019 and 2020. Field examination found the plants to be almost exclusively native species.

Trends:

Years monitored: 2003-2020

Total Phosphorus: Total phosphorus is stable, which indicates no change in lake quality.
 Chlorophyll a (algae): Chlorophyll a concentration is decreasing, which indicates less algae is suspended in the water.
 Secchi Depth (clarity): Secchi depth is increasing, which indicates improving water clarity.

Parameters	Historical Site 201	2020 Site 201
Total Phosphorus Mean (ug/L):	16.8	14.4
Chlorophyll-a Mean (ug/L):	4.5	3
Secchi Depth Mean (ft):	12.7	15.6

