

## Pelican Lake

In 2007-2016, all three lake sites (see graphic below) were monitored. Site 206 in the middle of the lake has been monitored since 1996.

Site 205 had the highest phosphorus concentration, 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 Sites 201 and 206. This makes sense because these sites are the furthest from the Pelican River. 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.

The 2016 lake monitoring season showed better than average water quality at every site except 205. The clarity (Secchi depth) has averaged 4 feet higher than the long-term average in the past 2 years. This could be due to zebra mussels.



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

### Trends: Pelican Lake (Site 206)

- Total Phosphorus:** Total phosphorus concentration is decreasing, which indicates improving water quality (99% confidence)
- Chlorophyll a (algae):** Chlorophyll a concentration is decreasing, which indicates improving water quality (99% confidence)
- Secchi Depth (clarity):** Secchi depth is increasing, which indicates improving water quality (99.9% confidence)

Table 1. Pelican Lake Total Phosphorus results from 2007-2016.

Parameters	Historical	2007-2016	2016	2007-2016	2016	2007-2016	2016
	Site 206	Site 206	Site 206	Site 201	Site 201	Site 205	Site 205
Total Phosphorus Mean (ug/L):	14.6	13.6	17.8	12.9	15.8	15.8	21.0
Chlorophyll-a Mean (ug/L):	4.5	4.4	4.3	4.0	5.3	5.3	4.3
Secchi Depth Mean (ft):	14.7	15.8	16.5	15.3	14.0	14.0	13.4

## Little Pelican Lake

Little Pelican Lake has been monitored at Site 202 from 2003 to 2016, and has an average total phosphorus concentration of 24.0 ug/L. This is higher than the phosphorus levels in Big Pelican Lake (14.6 ug/L). 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 will become "greener".

The 2016 lake monitoring season showed water clarity and chlorophyll-a concentrations were better than the historical average. The phosphorus trend is increasing, but this is more due to upstream practices, since 94% of the phosphorus loading to Pelican Lake comes from the Pelican River.

### Trends:

- Total Phosphorus: Total phosphorus concentration is increasing, which indicates declining water quality (99% confidence)
- Chlorophyll a (algae): No trend
- Secchi Depth (clarity): No trend

Table 2. Little Pelican Lake historical data, 2003-2016.

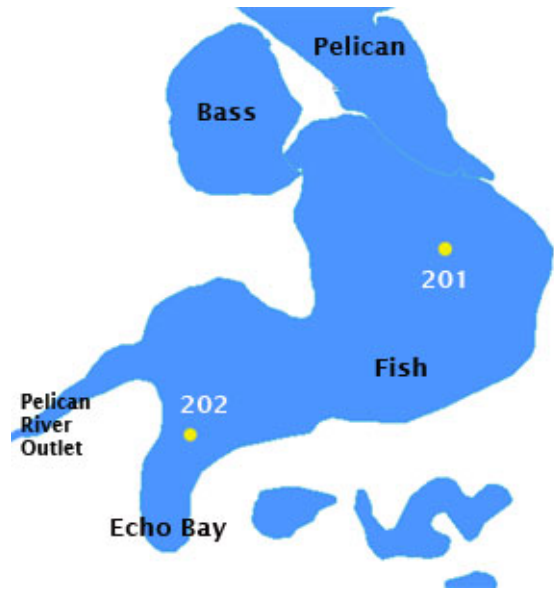
Parameters	Historical Site 202	2016 Site 202
Total Phosphorus Mean (ug/L):	24.1	27.0
Chlorophyll-a Mean (ug/L):	9.5	4.9
Secchi Depth Mean (ft):	8.5	9.8

## Fish Lake

Fish Lake has been monitored from 2003 to 2016 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 any direct stream inlet discharging into it. Pelican Lake is attached, but the phosphorus in that water is already diluted 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.



The 2016 lake monitoring season showed better than average water quality. The clarity (Secchi depth) was one foot better than the historical average, which could be due to zebra mussels.

### Trends:

Total Phosphorus: No trend  
 Chlorophyll a (algae): Chlorophyll a concentration is decreasing, which indicates improving water quality (99.9% confidence)  
 Secchi Depth (clarity): Secchi depth is increasing, which indicates improving water quality (99.9% confidence)

Parameters	Historical Site 201	2016 Site 201	Historical Site 202	2015 Site 202
Total Phosphorus Mean (ug/L):	11.7	13.5	12.1	11.0
Chlorophyll-a Mean (ug/L):	3.5	2.3	4.0	1.6
Secchi Depth Mean (ft):	15.0	16.4	13.9	20.0

## Bass Lake

Bass Lake total phosphorus concentration at Site 201 has been monitored from 2003 to 2016, and has an average of 16.8 ug/L. This is relatively similar to the phosphorus levels in Big Pelican Lake (14.6 ug/L) and higher than the phosphorus levels in Fish Lake (11.7 ug/L).

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 2016 lake monitoring season showed water clarity and chlorophyll-a concentrations were better than the historical average.

### Trends:

Total Phosphorus: no trend  
 Chlorophyll a (algae): Chlorophyll a concentration is decreasing, which indicates improving water quality (90% confidence)  
 Secchi Depth (clarity): no trend

Parameters	Historical Site 201	2016 Site 201
Total Phosphorus Mean (ug/L):	16.8	18.3
Chlorophyll-a Mean (ug/L):	4.9	2.2
Secchi Depth Mean (ft):	12.1	15.4

