

WQI Monitoring Program Summary Report

November 30, 2007

Muskoka Lakes Association
Box 298 • Port Carling, Ontario P0B 1J0
Tel: 705.765.5723 • Fax: 705.765.3203

Citizens' Environment Watch
147 Spadina Avenue, Suite 204 • Toronto, Ontario M5V 2L7
Tel: 647.258.3280 • Fax: 416.637.2171

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Summary Report

The 2007 Water Quality Initiative (WQI) monitoring program involved 133 volunteers in collecting and analyzing lake water samples from 165 sites on 19 lakes and rivers across West Muskoka and South Parry Sound. Volunteers collected samples bi-weekly eight times between May 21 and August 27. Parameters considered were total phosphorus, *E.Coli*, total Coliform and water clarity (measured either by turbidity or secchi depth). This report summarizes the results of the first four parameters, comparing each to acceptable thresholds as well as expected ranges and deviations.

Each of the following pages summarizes the results from one sampling area. Data from previous years are available online at http://www.citizensenvironmentwatch.org/wqi/muskoka_lakes. Detailed information including protocols, quality assurance/quality control measures, conclusions and recommendations can be found in the 2007 WQI Technical Report at the same website. A printed copy is available from the Muskoka Lakes Association.

Water Quality Parameters

The four parameters monitored as part of the WQI are meant to give a good overview of ecosystem health, but not to duplicate monitoring efforts of government agencies. Table 1 summarizes the purpose of monitoring each parameter, what the parameter could indicate and actions that individuals can take to mitigate the problems each parameter might indicate.

Table 1 - Summary of Parameters Reported

Parameter	Type	Sources	Indicates	Actions
Total Phosphorus	Chemical	Fertilizers, soaps, sewage, agriculture	Eutrophication (algae and plant growth), colour, fish habitat	Plant vegetation, do not fertilize, maintain/replace septic systems
Total Coliform	Biological	Wildlife, wetlands	Biologically active ecosystem	
<i>E.Coli</i>	Biological	Sewage, wildlife, agriculture	Faecal contamination, abnormal ecosystem	Maintain/replace septic systems, plant vegetation
Clarity	Physical	Fertilizers, stormwater, sewage, boat traffic, construction, agriculture	Eutrophication, erosion	Plant vegetation, control erosion, avoid destructive behaviour

Further information on each parameter is included in the Glossary.

Understanding the Summaries

Results presented here and online are average seasonal values (arithmetic mean of total phosphorus, clarity and temperature; geometric mean of *E.Coli* and total Coliform). Averages are reported because individual results are not typically significant. Averages are only reported if results from at least six of the sample periods were successfully analyzed. It is noted if less than six results were reported.

More detailed information useful for understanding the summaries is included in Appendix A – *Understanding the Summaries*.

To obtain a copy of some or all of the raw data used to create this report, please contact the Muskoka Lakes Association at 705-765-5723 or <http://www.mla.on.ca>.

Cox Bay, Lake Joseph



Volunteers monitored five sites in Cox Bay eight times over the summer of 2007. Cox Bay has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: **◆◆◆**
There are no concerns with *E.Coli* or total Coliform, but phosphorus concentration is over-threshold.

- Ranks 10/32 in level of Total Coliform
- Ranks 1/32 in level of *E.Coli*
- Ranks 7/22 in secchi depth (clarity)

2007 Results

All *E.Coli* and total Coliform measurements are below or within the expected range and expected standard deviation. Secchi depth was over 4.5m, ranking highly among 22 areas monitored.

Phosphorus

A lake’s phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is “healthy.”

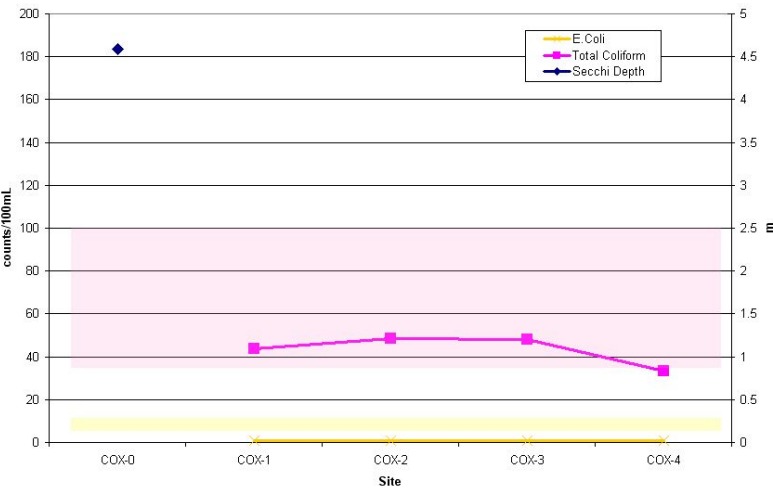
Cox Bay’s threshold is 3.855 µg/L. Spring turnover and average phosphorus have remained above the threshold since 2002.

Cox Bay is classified as Over-threshold by the District of Muskoka, and is currently subject of a community-based RCAP to reduce phosphorus concentration.

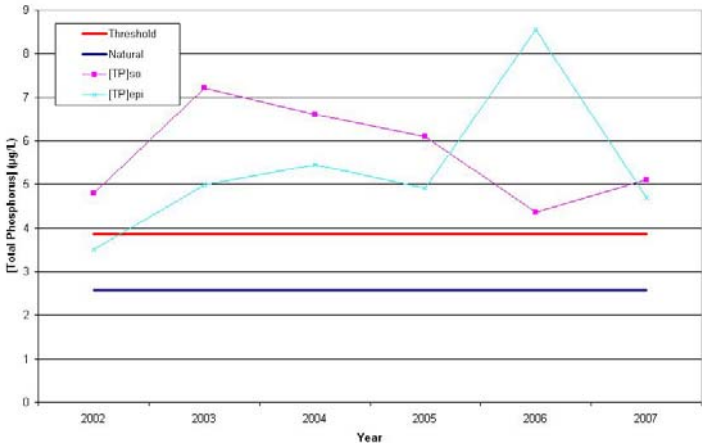
Site-by-site phosphorus

All sites except site 4 had very similar average phosphorus concentrations, above the threshold. Site 4’s high average concentration was due to one very high reading in August.

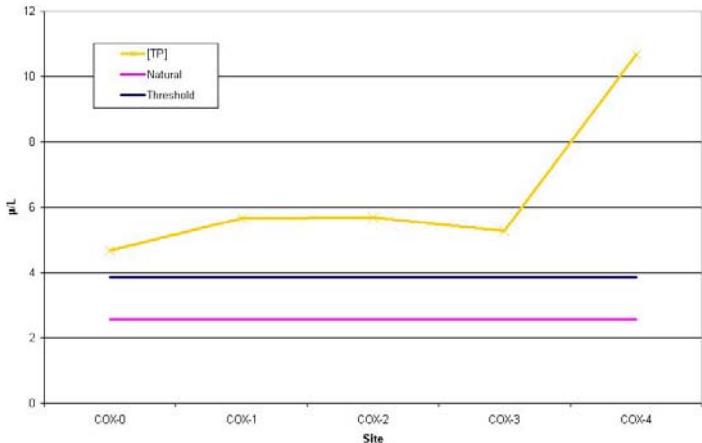
2007 Results - Cox Bay



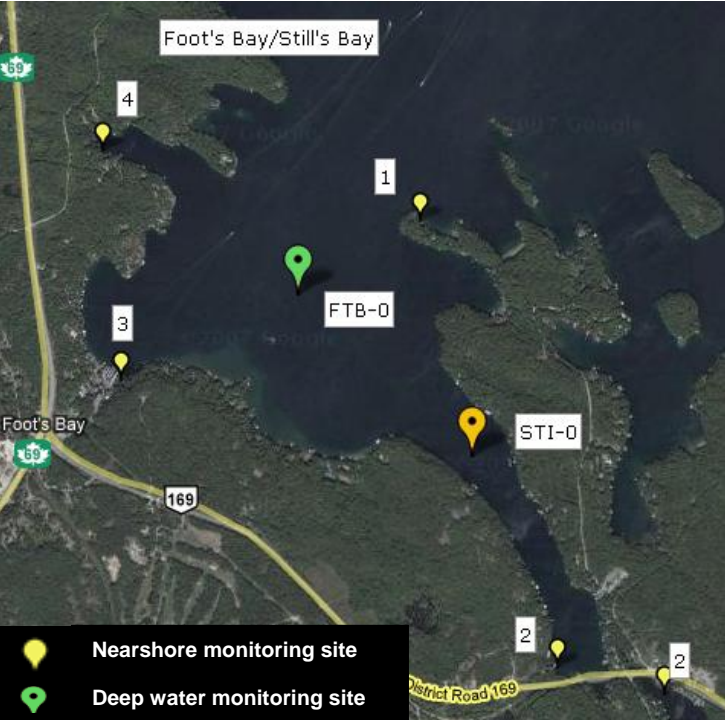
Cox Bay Total Phosphorus



2007 [TP] Results - Cox Bay



Foot's/Still's Bay, Lake Joseph



Volunteers monitored three sites (STI-0, 2 & 3) in Foot's/Still's Bay eight times over the summer of 2007. Foot's/Still's Bay has been monitored since 2003. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: **◆◆◆**
There are no concerns with *E.Coli* or total Coliform, but phosphorus concentration is potentially over-threshold.

- Ranks 6/32 in level of Total Coliform
- Ranks 1/32 in level of *E.Coli*
- Ranks 11/22 in secchi depth (clarity)

2007 Results

All *E.Coli* and total Coliform measurements are below the expected range and have expected standard deviations.

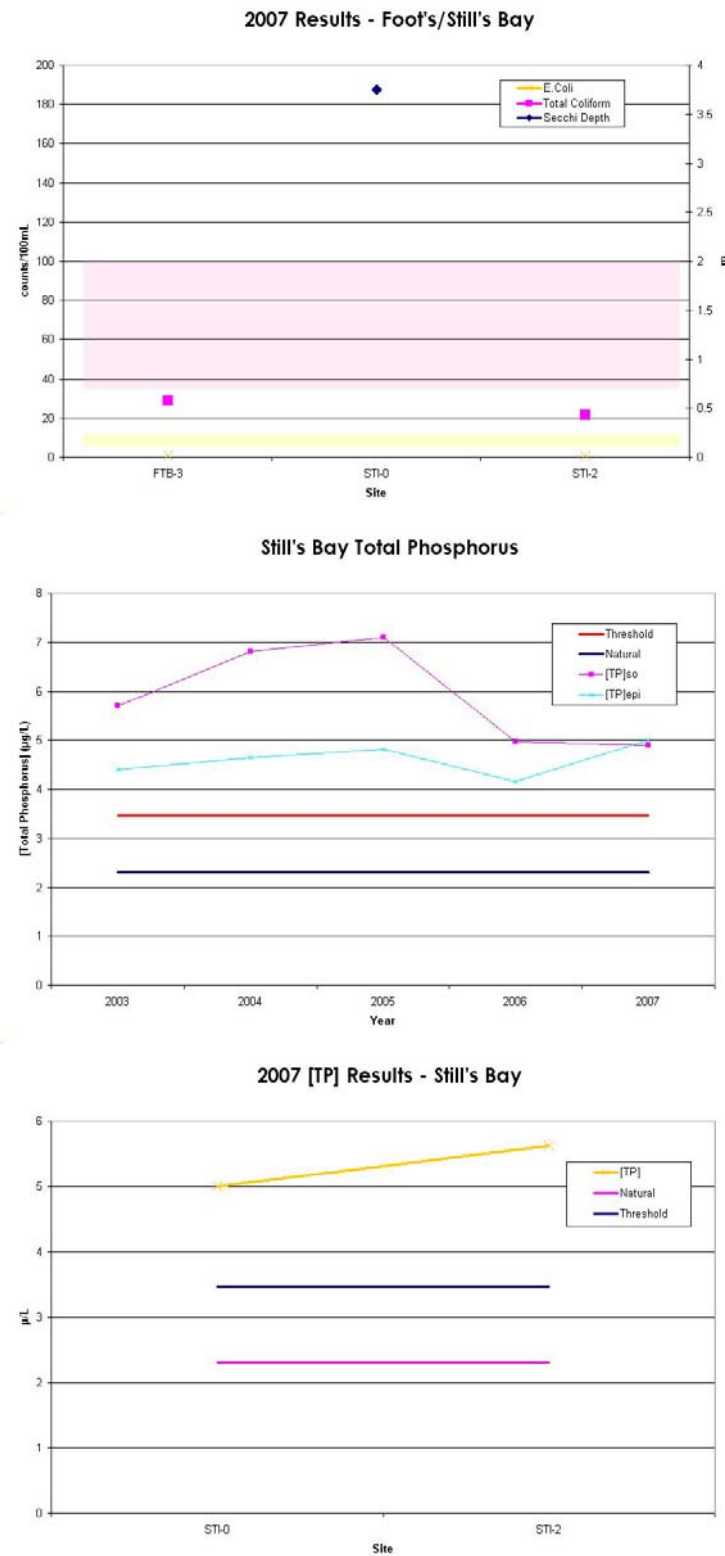
Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

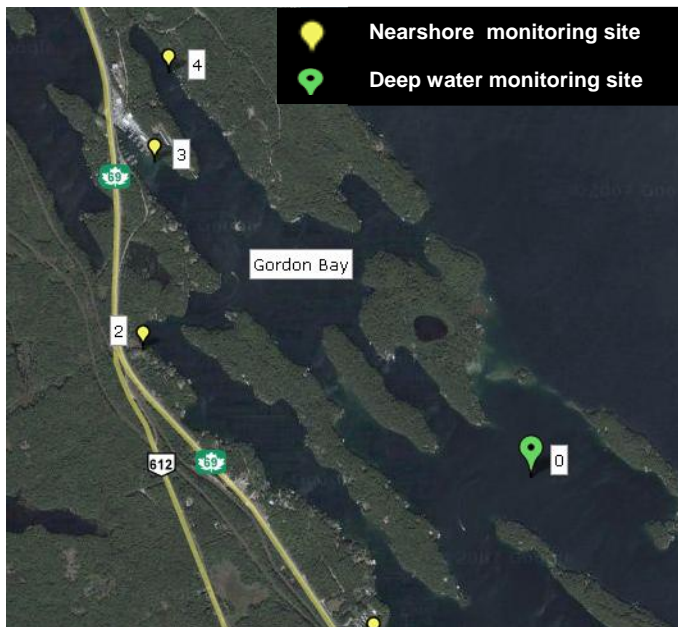
Foot's/Still's Bay is not specifically considered by the District of Muskoka. The threshold for the main basin of Lake Joseph is 3.465 µg/L. Spring turnover and average phosphorus measurements from Still's Bay have remained above the threshold since 2003.

Site-by-site phosphorus

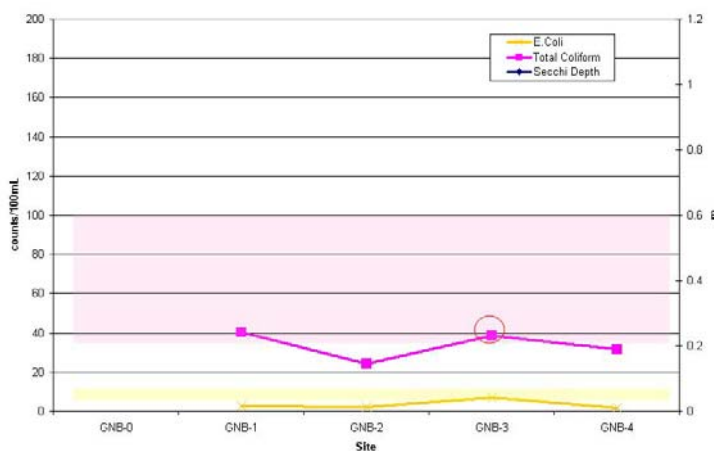
Both sites in Still's Bay (STI-0 & 2) both had phosphorus concentrations well above the threshold for Lake Joseph.



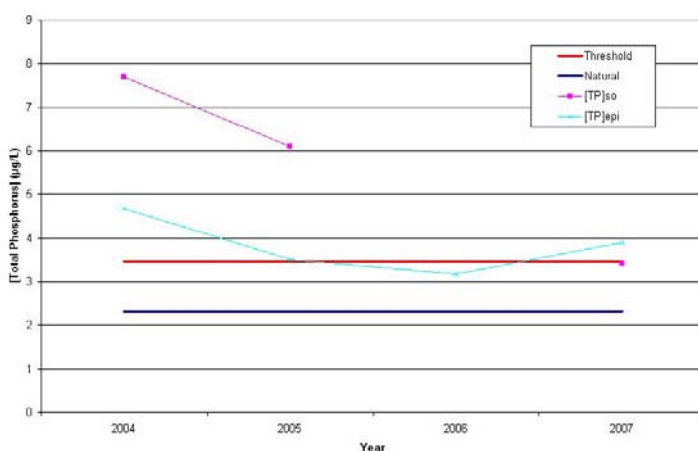
Gordon Bay, Lake Joseph



2007 Results - Gordon Bay



Gordon Bay Total Phosphorus



Volunteers monitored five sites in Gordon Bay eight times in the summer of 2007. Gordon Bay has been monitored since 2004. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦
There are no concerns with *E. Coli*, total Coliform or phosphorus concentration. No secchi depth measurements were submitted.

- Ranks 8/32 in level of Total Coliform
- Ranks 13/32 in level of *E. Coli*

2007 Results

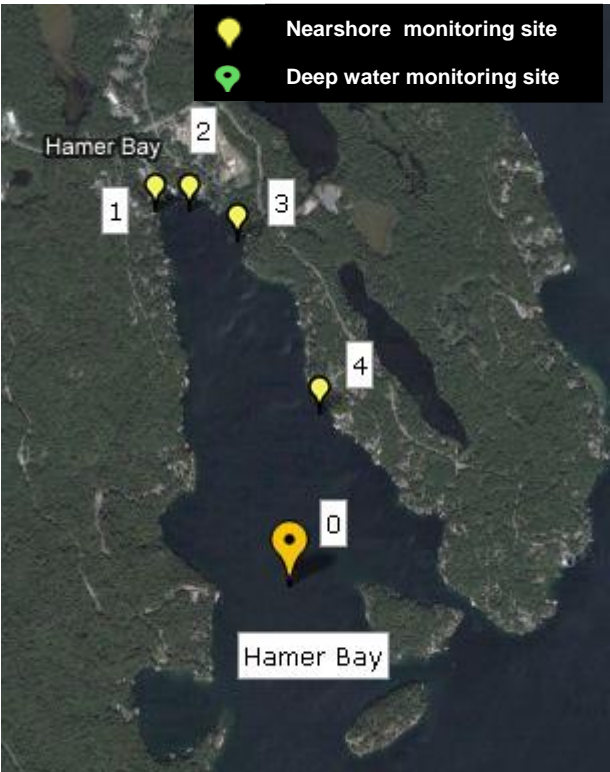
All measurements are within or below the expected range, even though total Coliform results at site 3 had a larger than expected standard deviation.

Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Gordon Bay is not specifically considered by the District of Muskoka. The main basin of Lake Joseph's threshold is 3.465µg/L. Spring turnover phosphorus was below threshold in 2007. Average phosphorus has remained around the threshold since 2004.

Hamer Bay, Lake Joseph



Volunteers monitored five in Hamer Bay eight times over the summer of 2007. Hamer Bay has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦
There are no concerns with *E.Coli* or clarity, but total Coliform is high at site 1, and phosphorus concentration is potentially over-threshold.

- Ranks 22/32 in level of Total Coliform
- Ranks 16/32 in level of *E.Coli*
- Ranks 3/22 in secchi depth (clarity)

2007 Results

Average total Coliforms at site 1 were far above the expected range, which is consistent with a steady and dramatic increase since 2004. This site warrants further investigation. Total Coliform counts at sites 1 & 2 had larger standard deviations than expected.

All other measurements are below the expected range and have expected standard deviations.

Phosphorus

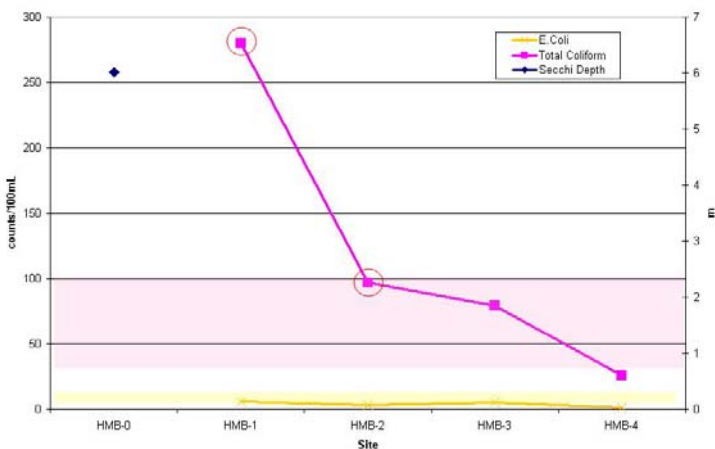
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Hamer Bay is not specifically considered by the District of Muskoka. The threshold for the main basin of Lake Joseph is 3.465 µg/L. Spring turnover phosphorus measurements have remained above the threshold since 2002.

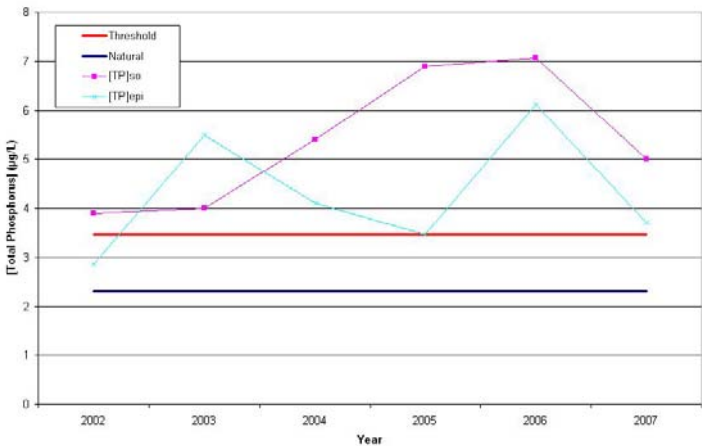
Site-by-site phosphorus

All sites had average phosphorus concentrations well above the threshold for Lake Joseph. Site 1 had an average far exceeding other sites. Concentration at sites 2 & 3 were also much higher than the threshold for Lake Joseph. These results are consistent with previous years and warrant investigation.

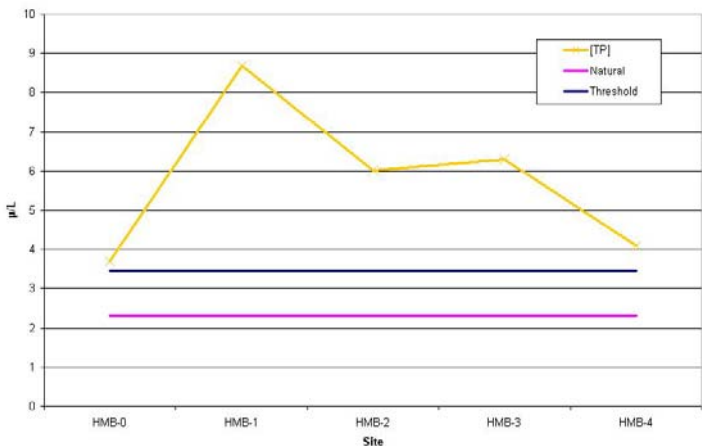
2007 Results - Hamer Bay



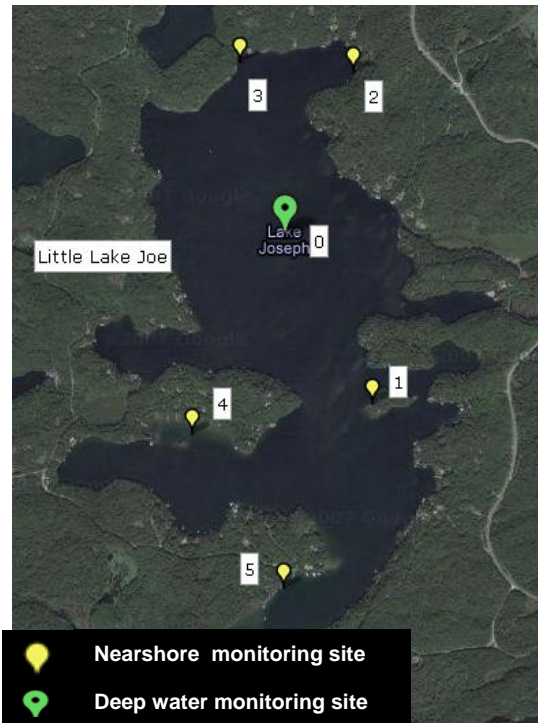
Hamer Bay Total Phosphorus



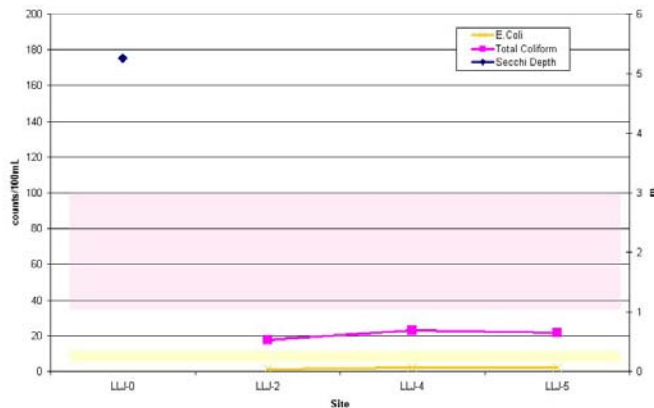
2007 [TP] Results - Hamer Bay



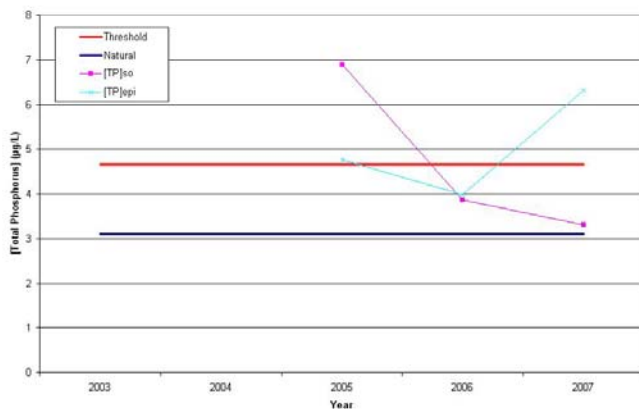
Little Lake Joseph, Lake Joseph



2007 Results - Little Lake Joseph



Little Lake Joseph Total Phosphorus



Volunteers monitored five sites in Little Lake Joseph eight times in the summer of 2007. Little Lake Joseph has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦♦

There are no concerns with *E. Coli*, total Coliform, phosphorus concentration or clarity.

- Ranks 4/32 in level of Total Coliform
- Ranks 5/32 in level of *E. Coli*
- Ranks 5/22 in secchi depth (clarity)

2007 Results

All measurements are within or below the expected range.

Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Little Lake Joseph's threshold is 4.65µg/L. Spring turnover phosphorus has been below threshold since 2006.

Stanley Bay, Lake Joseph



Volunteers monitored four sites in Stanley Bay eight times in the summer of 2007. Stanley Bay has been monitored since 2004. 32 areas on 19 lakes and rivers were monitored in 2007.

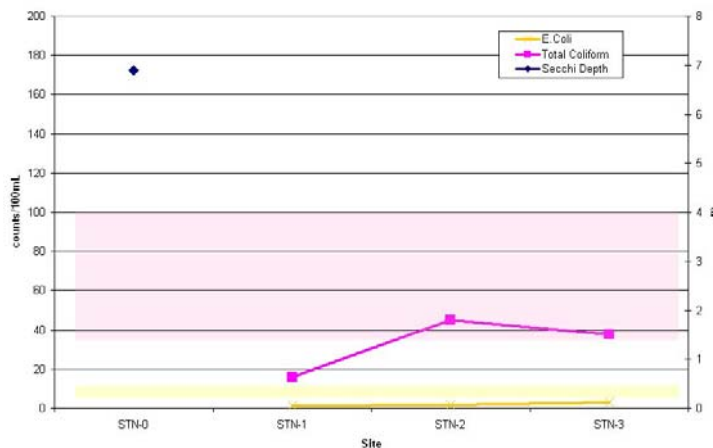
Summary

Overall water quality: ◆◆◆

There are no concerns with *E.Coli*, total Coliform or clarity, but phosphorus concentration is potentially over-threshold.

- Ranks 7/32 in level of Total Coliform
- Ranks 4/32 in level of *E.Coli*
- Ranks 2/22 in secchi depth (clarity)

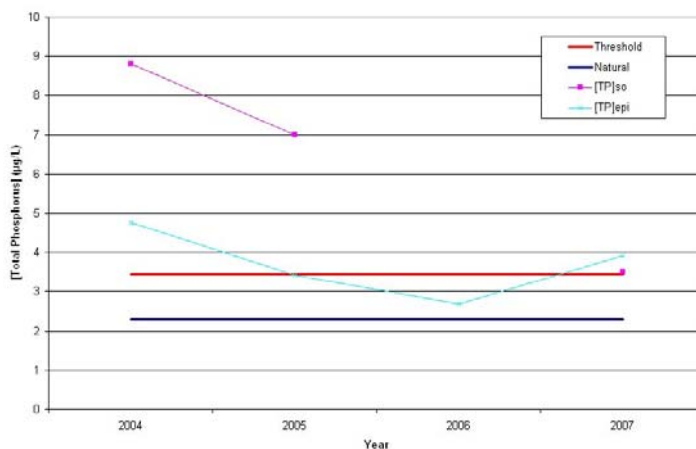
2007 Results - Stanley Bay



2007 Results

All measurements are within or below the expected range and had expected standard deviations.

Stanley Bay Total Phosphorus

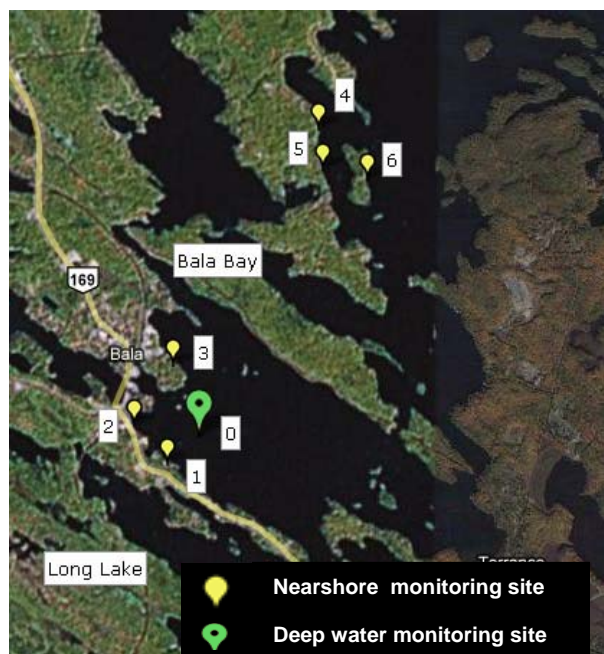


Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Stanley Bay's threshold is 3.435µg/L. Spring turnover phosphorus has been above threshold since 2004.

Bala Bay, Lake Muskoka



Volunteers monitored five sites (0, 1, 2, 3 and 4) in Bala Bay eight times in the summer of 2007. Bala Bay has been monitored since 2003. 32 areas on 19 lakes and rivers were monitored in 2007.

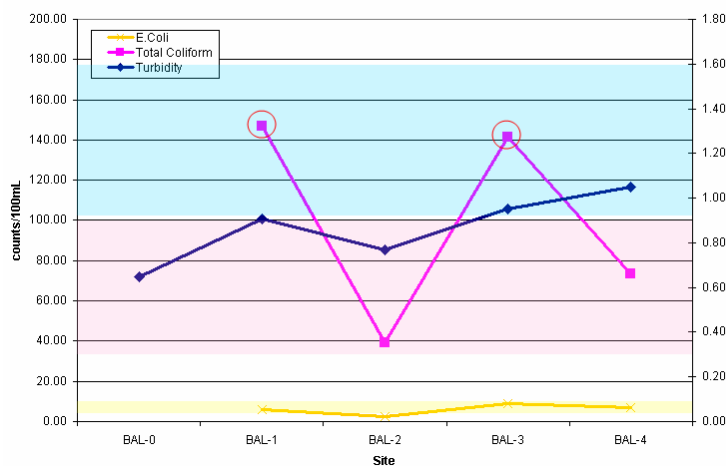
Summary

Overall water quality: ♦♦♦♦

There are no concerns with phosphorus, *E.Coli* or turbidity.

- Ranks 23/32 in level of Total Coliform
- Ranks 25/32 in level of *E.Coli*
- Ranks 3/9 in turbidity (clarity)

2007 Results - Bala Bay

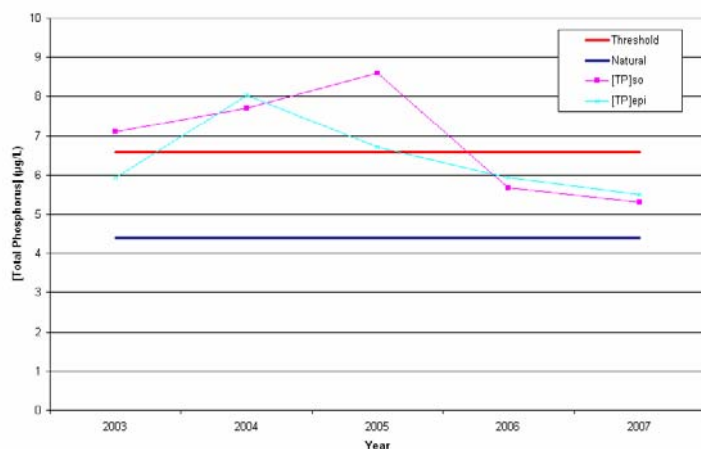


2007 Results

Total Coliform readings at sites 1 and 3 were above the expected range and outside the expected standard deviation. Readings at site 1 have been increasing steadily for three years, and may warrant investigation.

All other measurements are within or below the expected range and standard deviation.

Bala Bay Total Phosphorus



Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Bala Bay's threshold is 6.58 µg/L. Phosphorus has not been over-threshold for the past two years.

Beaumaris, Lake Muskoka



Volunteers monitored five sites (0, 2, 3, 4, 5 and 6) in Beaumaris eight times over the summer of 2007. Beaumaris has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ◆◆◆

- Ranks 14/32 in level of Total Coliform
- Ranks 27/32 in level of *E.Coli*
- Ranks 6/9 in turbidity (clarity)

2007 Results

E.Coli readings are still very low, but sites 3, 4 and 6 had readings higher than the expected range and readings at all sites are increasing over time. Further investigation of *E.Coli* readings may be warranted.

The same sites also had total Coliform readings higher than the expected range.

All parameters at site 4 had higher standard deviations than expected. As this site is located near a natural wetland, it is naturally high in bacteria and monitoring here should be discontinued.

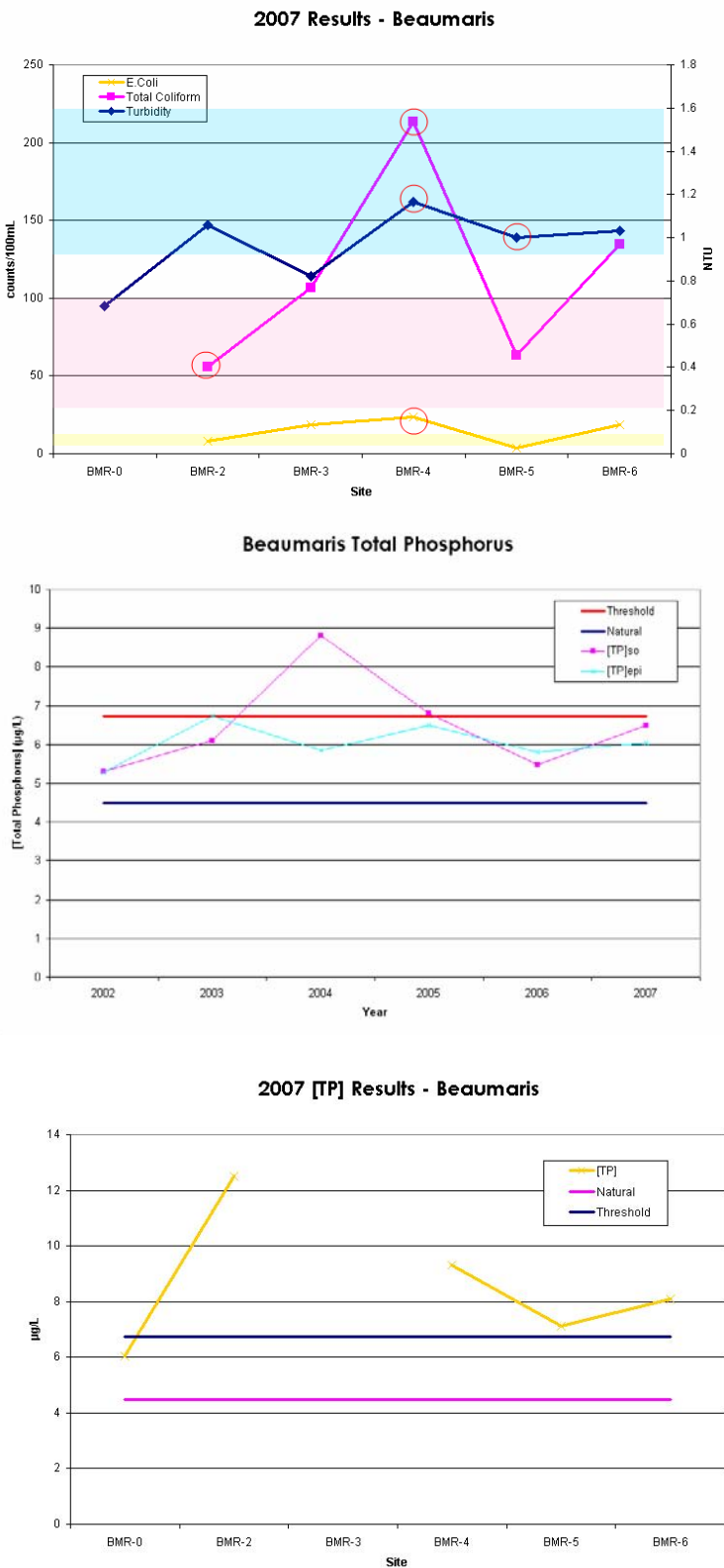
Phosphorus

A lake’s phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is “healthy.”

Beaumaris’ threshold is 6.735 µg/L. Spring turnover and average phosphorus have remained at or under the threshold for three years.

Site-by-site phosphorus

Among the nearshore sites, site 2 had the highest phosphorus readings, whereas the phosphorus readings at sites 5 and 6 (near the golf course) were lower.



Boyd Bay, Lake Muskoka



Volunteers monitored four sites in Boyd Bay seven times in the summer of 2007. Boyd Bay has been monitored since 2006. 32 areas on 19 lakes and rivers were monitored in 2007.

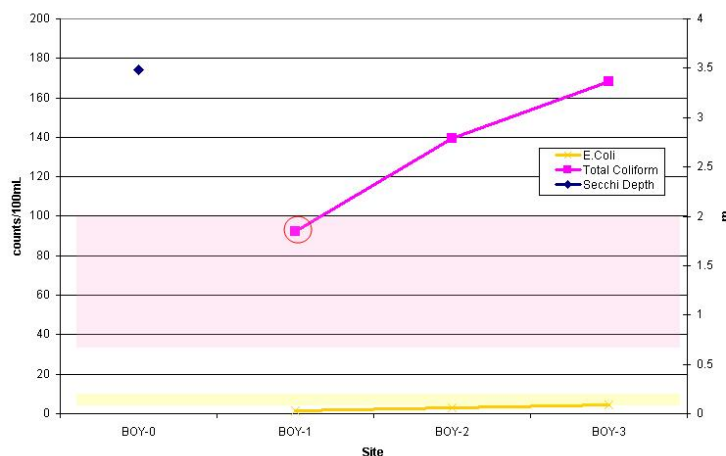
Summary

Overall water quality: ♦♦♦♦

There are no concerns with phosphorus or *E.Coli*.

- Ranks 29/32 in level of Total Coliform
- Ranks 9/32 in level of *E.Coli*
- Ranks 13/22 in secchi depth (clarity)

2007 Results - Boyd's Bay

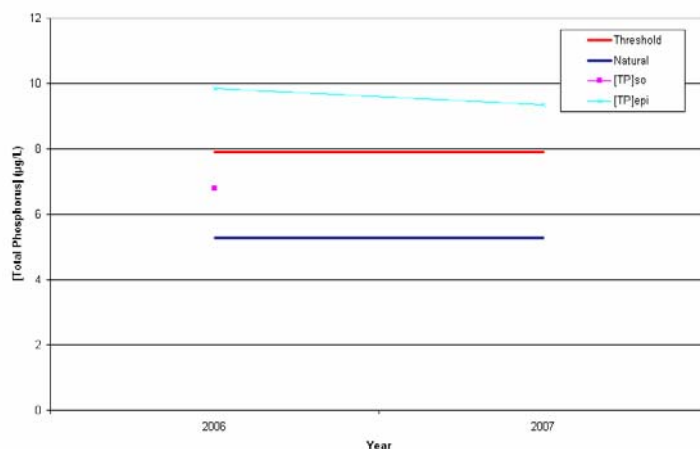


2007 Results

Total Coliform readings at sites 2 and 3 are currently above the expected range, and readings at site 1 are outside of the expected standard deviation. These readings have been above the expected range in both monitoring years, but averages are coming down so further investigation is not warranted at this time.

All other measurements are within or below the expected range and standard deviation.

Boyd's Bay Total Phosphorus



Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Boyd Bay's threshold is 7.89 µg/L. Spring turnover phosphorus was below threshold in 2006 and not available in 2007.

East Bay, Lake Muskoka



Volunteers monitored four sites in East Bay six times over the summer of 2007. Unfortunately, one set of bacteria samples was spoiled and therefore no average bacteria readings can be reported.

East Bay has been monitored since 2002. The bay acts as the “benchmark” sampling area, as it is the only sampling area where there is no development.

Summary

Overall water quality: ◆◆◆

There were no concerns with *E. Coli* or total Coliform in previous years.

Phosphorus concentration remains high compared with available thresholds in 2007.

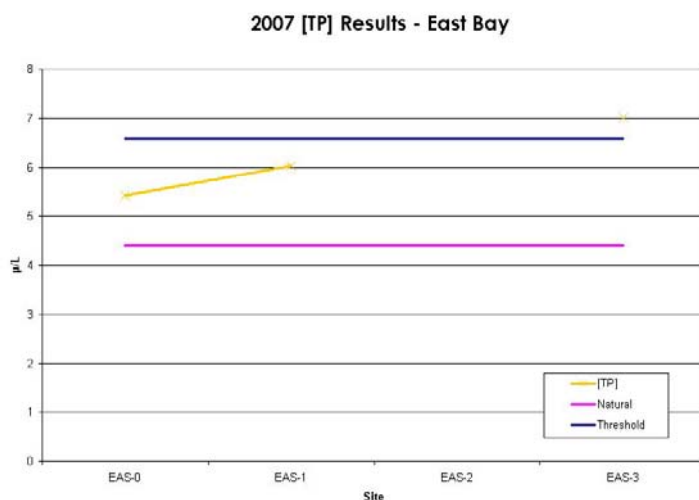
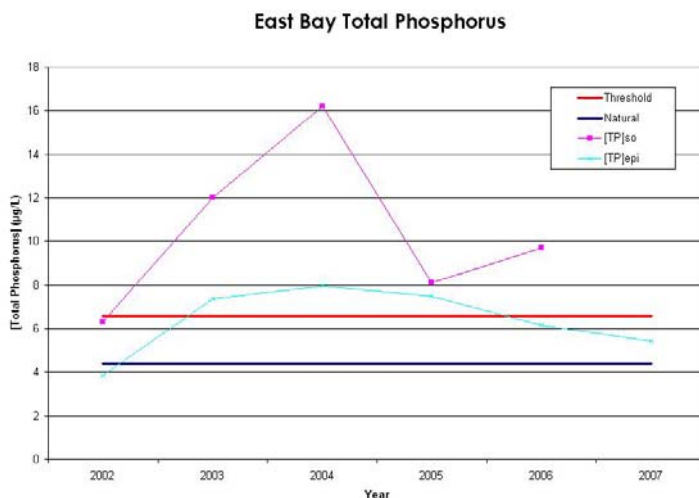
Phosphorus

A lake’s phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is “healthy.”

East Bay is not specifically considered by the District of Muskoka. The threshold for Bala Bay (the closest area) is 6.585µg/L. Spring turnover phosphorus has remained above this threshold since 2003.

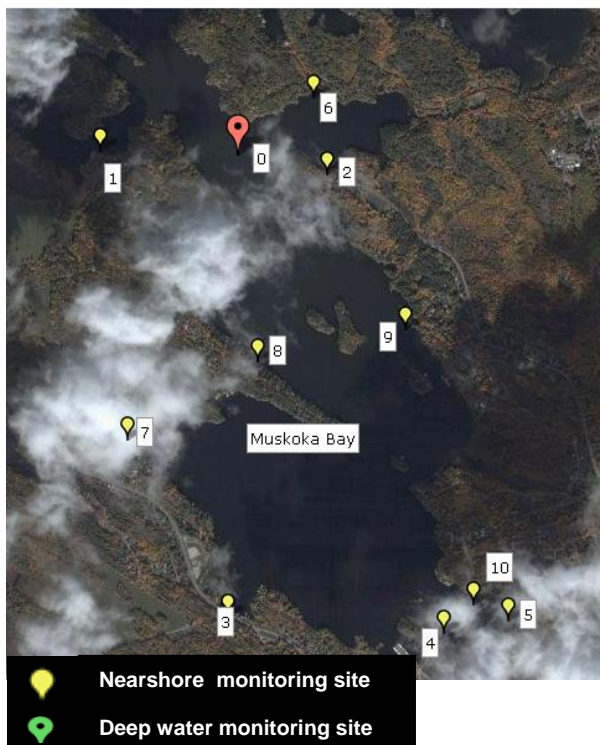
Site-by-site phosphorus

Data is available for sites 0, 1 and 3 (only five samples were analyzed for site 2). Average concentrations for these sites were under or near the threshold, as expected.



For more information, please see http://www.citizensenvironmentwatch.org/wqi/muskoka_lakes.

Muskoka Bay, Lake Muskoka



Volunteers monitored nine sites (0, 2, 3, 4, 5, 7, 8, 9 & 10) in Muskoka Bay eight times over the summer of 2007. Muskoka Bay has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: **◆◆◆**

There are no concerns with *E.Coli* or turbidity, but the bay is classified as over-threshold by the District of Muskoka, and some sites have high total Coliform counts.

- Ranks 20/32 in level of Total Coliform
- Ranks 20/32 in level of *E.Coli*
- Ranks 7/9 in turbidity (clarity)

2007 Results

Turbidity measurements at sites 3, 4 & 7 have larger than expected standard deviations, but all are within the expected range. Sites 4 & 5 also have higher than expected total Coliform counts, and site 5's counts had a larger than expected standard deviation. These results are similar to those observed in previous years; site 5 in particular has had high total Coliform counts. Site 5 may warrant further investigation.

All *E.Coli* measurements are within the expected range and expected standard deviation.

Phosphorus

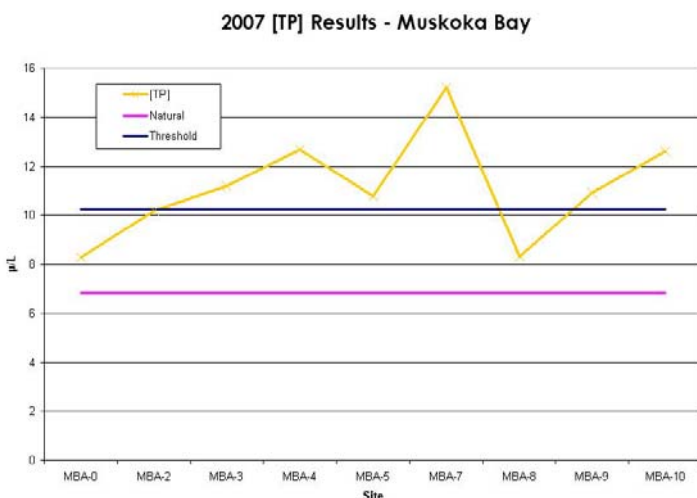
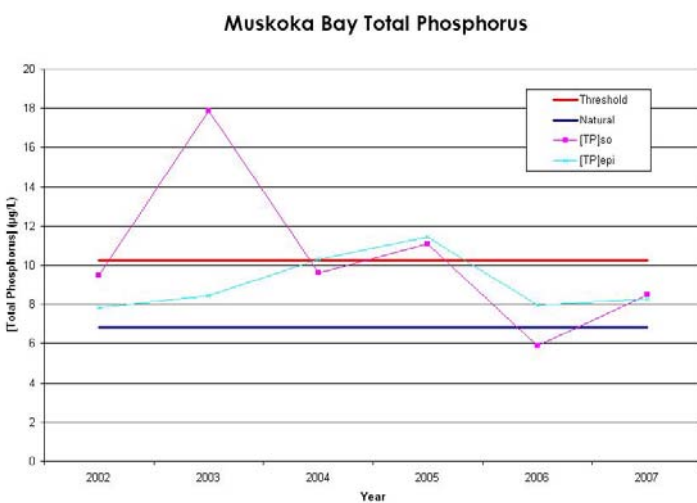
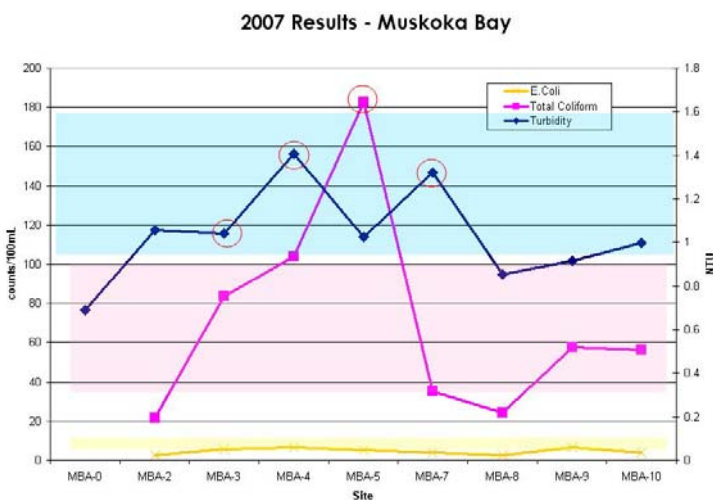
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Muskoka Bay's threshold is 10.245µg/L. Spring turnover phosphorus has been below the threshold four out of six years since 2002.

Muskoka Bay is classified as Over-threshold by the District of Muskoka, and is currently subject of a community-based RCAP to reduce phosphorus concentration.

Site-by-site phosphorus

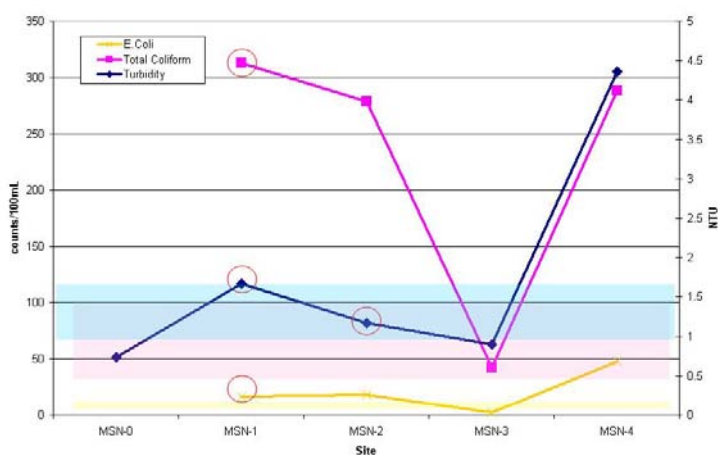
Sites 0 (the deep water site) & 8 had low average phosphorus concentrations, below the threshold. Sites 4, 7 & 10 had the highest average phosphorus concentrations.



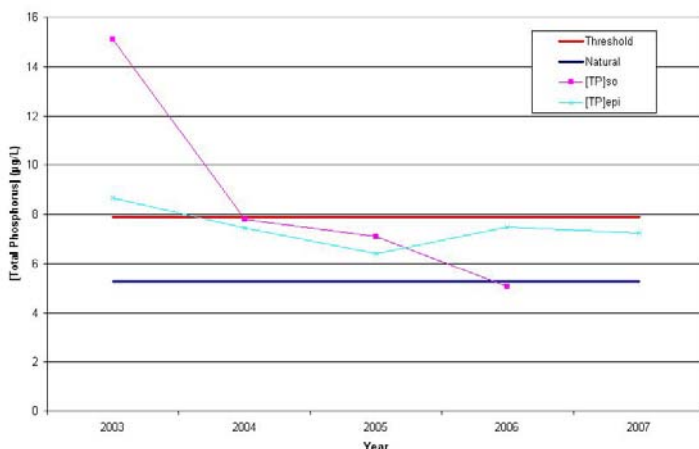
Muskoka Sands, Lake Muskoka



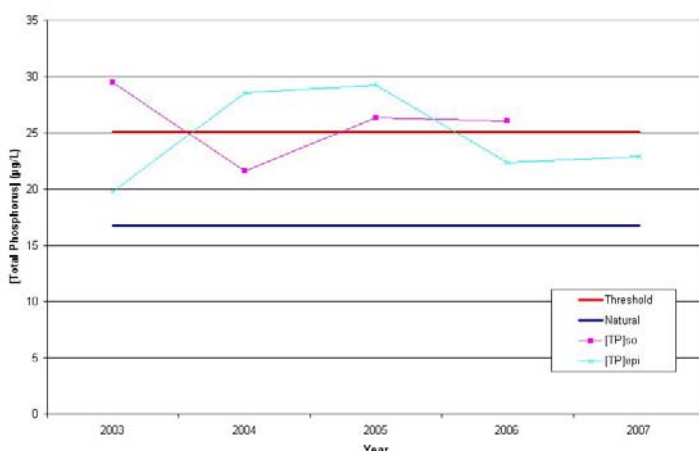
2007 Results - Muskoka Sands



Muskoka Sands Total Phosphorus



Hoc Roc River Total Phosphorus



Volunteers monitored five sites at Muskoka Sands seven times over the summer of 2007. Muskoka Sands has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦

E. Coli, total Coliform and phosphorus concentration are all high. The Hoc Roc River is potentially over-threshold.

- Ranks 31/32 in level of Total Coliform
- Ranks 30/32 in level of *E. Coli*
- Ranks 9/9 in turbidity (clarity)

2007 Results

All *E. Coli* and total Coliform counts are higher than the expected range and both counts at site 1 have higher than expected standard deviations.

Water quality in general warrants further investigation as results are often high and unpredictable.

Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

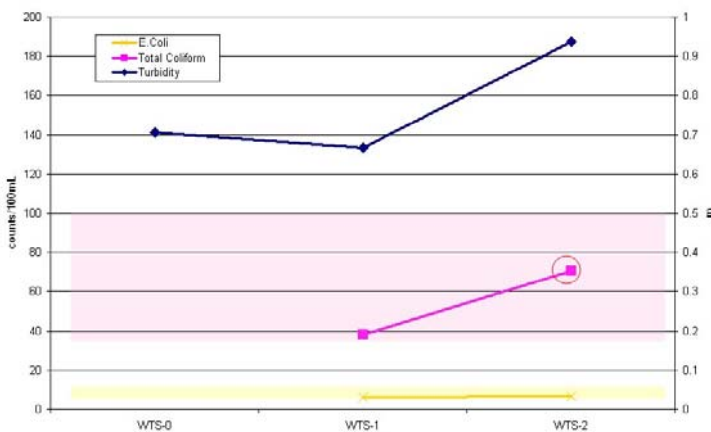
The Muskoka Sands is not specifically considered by the District of Muskoka. The threshold for the south basin of Lake Muskoka is $7.89\mu\text{g/L}$. Spring turnover and average phosphorus measurements have been below this threshold since 2004.

The Hoc Roc River's threshold is $25.065\mu\text{g/L}$. Spring turnover phosphorus measurements were above this threshold in 2005 and 2006.

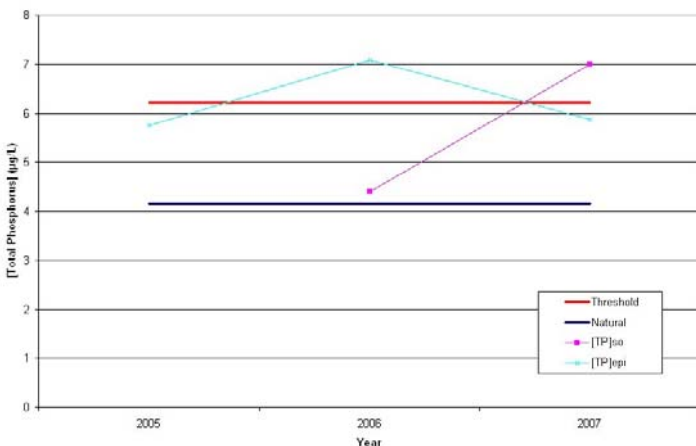
Whiteside Bay, Lake Muskoka



2007 Results - Whiteside Bay



Whiteside Bay Total Phosphorus



Volunteers monitored three sites in Whiteside Bay eight times in the summer of 2007. Whiteside Bay has been monitored since 2005. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦

There are no concerns with *E. Coli*, total Coliform, phosphorus concentration or clarity.

- Ranks 12/32 in level of Total Coliform
- Ranks 26/32 in level of *E. Coli*
- Ranks 2/9 in turbidity (clarity)

2007 Results

Total Coliform counts had a higher than expected standard deviation at site 2, even though the average was within the expected range.

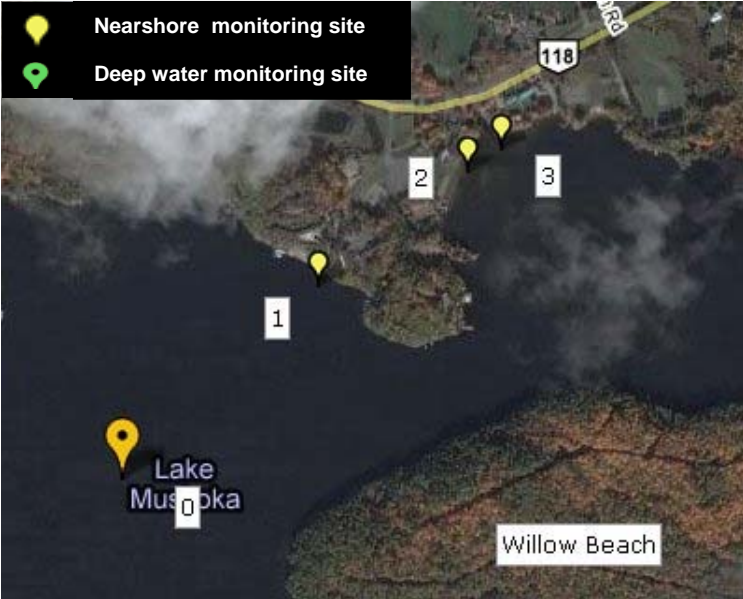
All other measurements are within or below the expected range and had expected standard deviations.

Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Whiteside Bay's threshold is 6.225µg/L. Spring turnover phosphorus was above this threshold for the first time in 2007, but as of yet there is no concern.

Willow Beach, Lake Muskoka



Volunteers monitored four sites at Willow Beach seven times over the summer of 2007. Willow Beach has been monitored since 2004. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦
E.Coli and total Coliform counts at sites 2 & 3 are high, and phosphorus concentration is potentially over-threshold. No clarity measurements submitted.

- Ranks 28/32 in level of Total Coliform
- Ranks 28/32 in level of *E.Coli*

2007 Results

E.Coli and total Coliform counts are higher than the expected range at sites 2 & 3; total Coliform counts at site 3 also have a larger than expected standard deviation. These results are consistent with previous years and warrant further investigation.

All other results are below or within expected ranges and had expected standard deviations.

Phosphorus

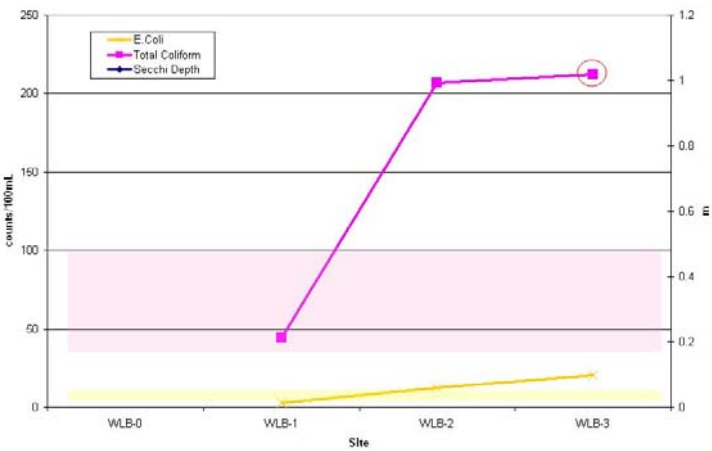
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Willow Beach is not specifically considered by the District of Muskoka. The south basin of Lake Muskoka's threshold is 7.89µg/L. 2007 average phosphorus concentration is the first reading from Willow Beach that is below this threshold (spring turnover phosphorus not available).

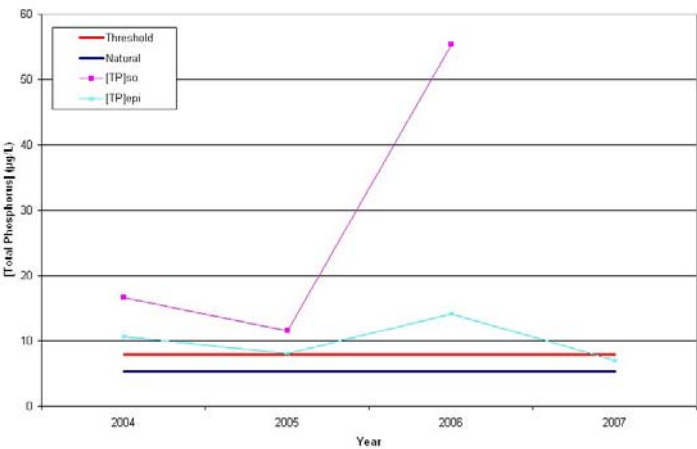
Site-by-site phosphorus

In 2007, sites 1 & 3 had average phosphorus concentrations above the threshold for Lake Muskoka's South Basin. Concentration at site 3 was significantly higher than the other sites.

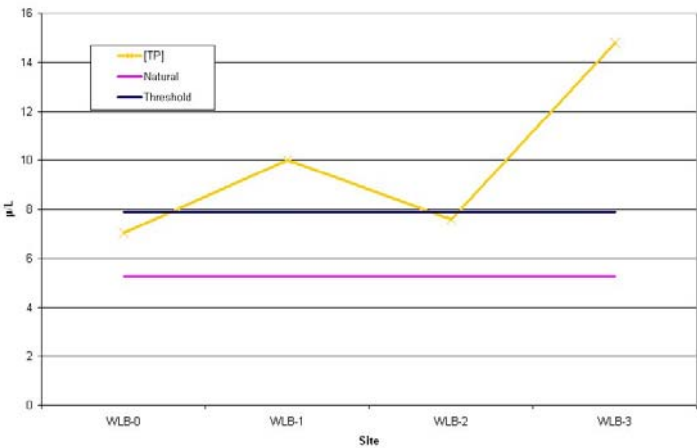
2007 Results - Willow Beach



Willow Beach Total Phosphorus



2007 [TP] Results - Willow Beach



Brackenrig Bay, Lake Rosseau



Volunteers monitored four sites in Brackenrig Bay eight times over the summer of 2007. Brackenrig Bay has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: **◆◆◆**

There are no concerns with *E.Coli* or total Coliform, but phosphorus concentration is over-threshold.

- Ranks 15/32 in level of Total Coliform
- Ranks 11/32 in level of *E.Coli*
- Ranks 8/9 in turbidity (clarity)

2007 Results

Turbidity measurements at sites 1 and 2 are above the expected range and have larger than expected standard deviations. This is consistent with all results in the bay since 2002, and may be attributable to high phosphorus concentration in general.

All *E.Coli* and total Coliform measurements are within the expected range and expected standard deviation.

Phosphorus

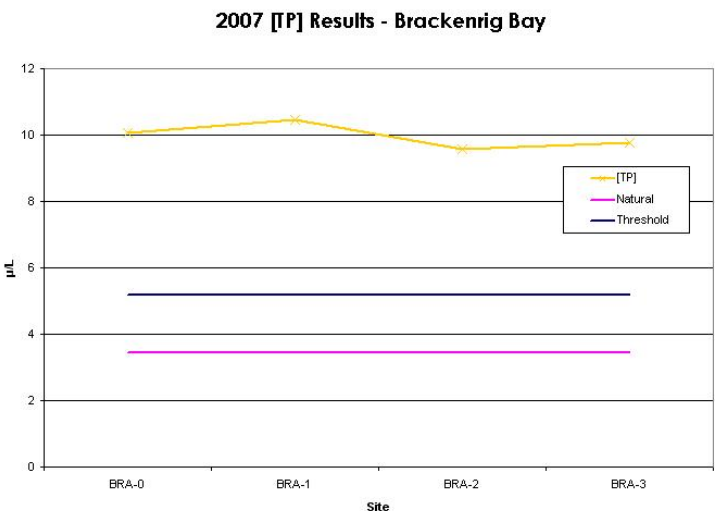
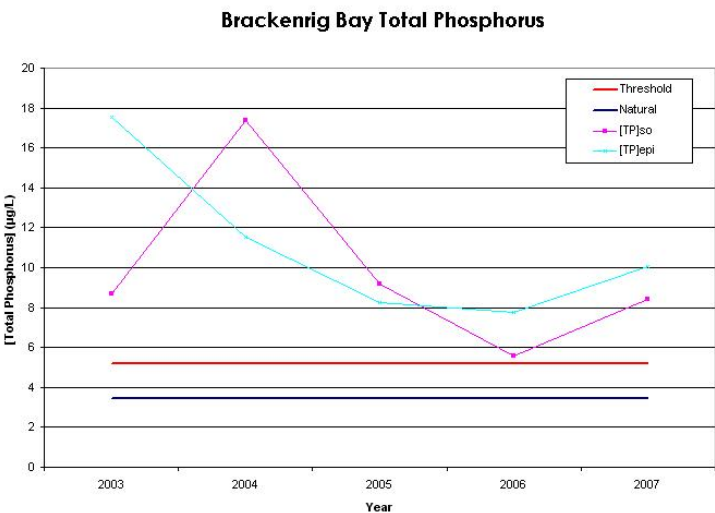
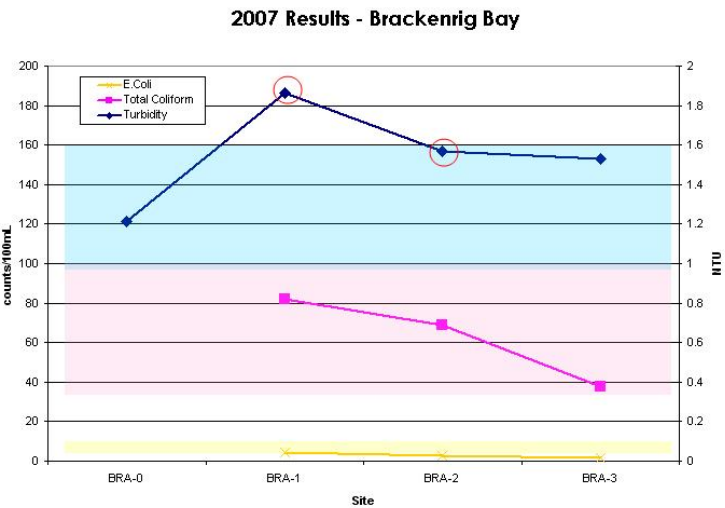
A lake’s phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is “healthy.”

Brackenrig Bay’ threshold is 5.175 µg/L. Spring turnover and average phosphorus have remained above the threshold since 2002.

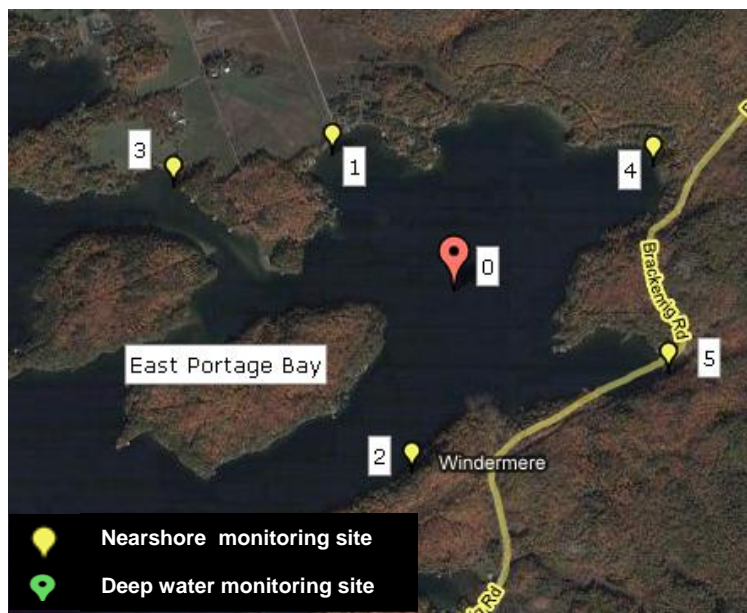
Brackenrig Bay is classified as Over-threshold by the District of Muskoka, and is currently subject of a community-based RCAP to reduce phosphorus concentration.

Site-by-site phosphorus

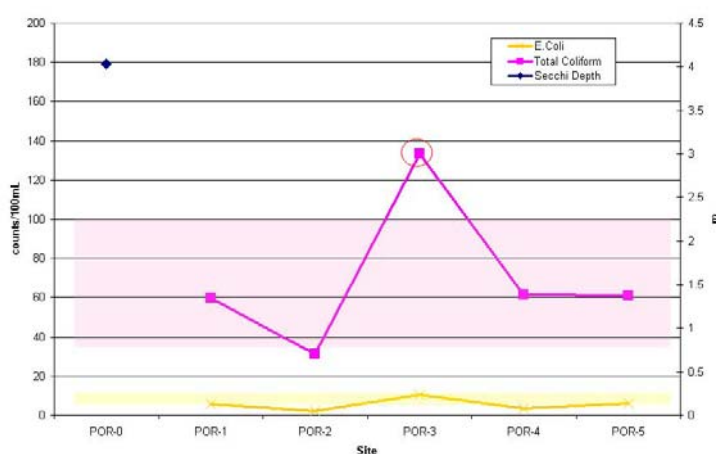
All sites (including the deep water site) had very similar average phosphorus concentrations, far above the threshold. No site had a concentration significantly higher than any other.



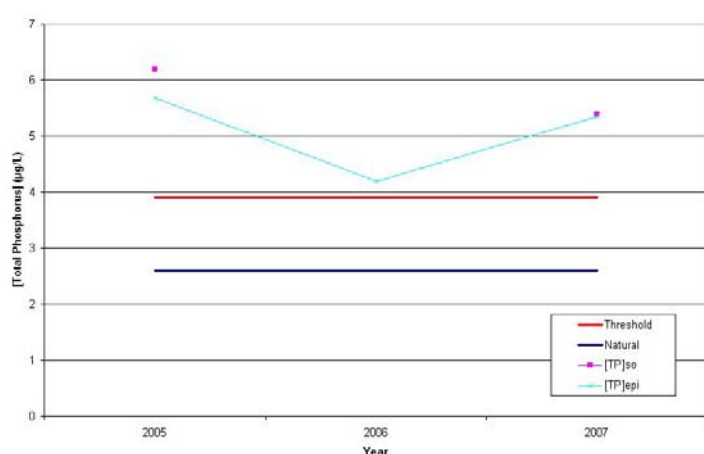
East Portage Bay, Lake Rosseau



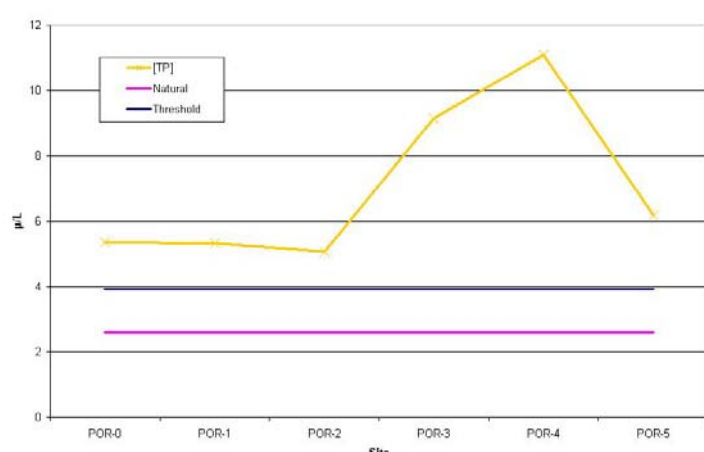
2007 Results - East Portage Bay



East Portage Bay Total Phosphorus



2007 [TP] Results - East Portage Bay



Volunteers monitored six sites in East Portage Bay eight times over the summer of 2007. East Portage Bay has been monitored since 2005. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦

Phosphorus concentration is over-threshold and both *E.Coli* and total Coliform counts at site 3 are high.

- Ranks 18/32 in level of Total Coliform
- Ranks 21/32 in level of *E.Coli*
- Ranks 10/22 in secchi depth (clarity)

2007 Results

E.Coli and total Coliform counts are higher than the expected range at site 3; total Coliform counts at the same site also have a larger than expected standard deviation. There are no previous records for this site, as it was monitored for the first time in 2007.

All other results were below or within expected ranges and had standard deviations smaller than expected. There are no concerns with clarity.

Phosphorus

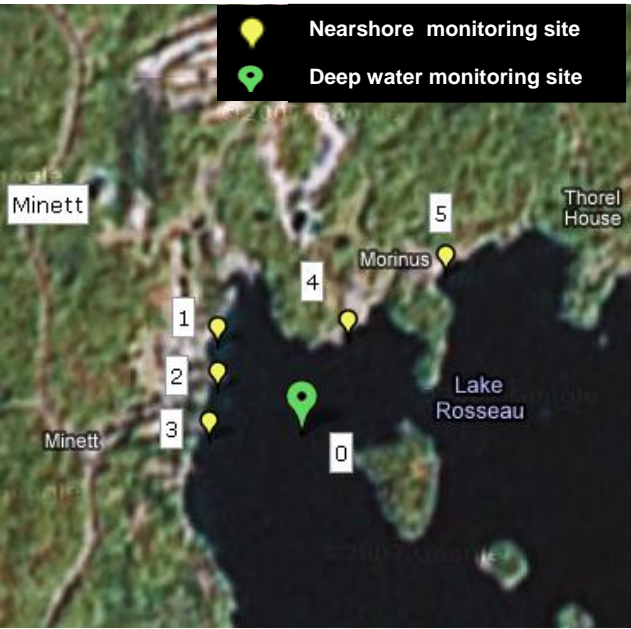
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

East Portage Bay's threshold is 3.915 µg/L. Spring turnover and average phosphorus measurements have remained above the threshold since 2005. East Portage Bay is classified as over-threshold by the District of Muskoka.

Site-by-site phosphorus

In 2007, all sites had average phosphorus concentrations above the threshold for East Portage Bay. Concentrations at sites 4 & 3 were significantly higher than the other sites.

Minett, Lake Rosseau



Volunteers monitored five sites (0, 1, 2, 4 & 5) in Minett six times over the summer of 2007. Minett has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦
There are no concerns with clarity or phosphorus concentration, but there were some high *E.Coli* and total Coliform counts.

- Ranks 16/32 in level of Total Coliform
- Ranks 23/32 in level of *E.Coli*
- Ranks 4/9 in turbidity (clarity)

2007 Results

E.Coli and total Coliform counts at site 1 were higher than expected, and total Coliform counts at site 2 had a larger than expected standard deviation. Further investigation is not yet warranted, since these high readings have not been observed before.

All other results were below or within expected ranges and had standard deviations smaller than expected.

Phosphorus

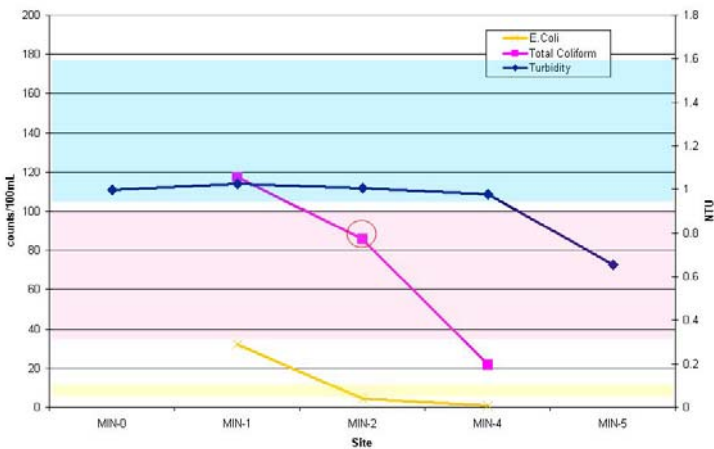
A lake’s phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is “healthy.”

Minett is not specifically considered by the District of Muskoka. The threshold for the main basin of Lake Rosseau is 6.225µg/L. Spring turnover and average phosphorus measurements have remained below the threshold since 2006.

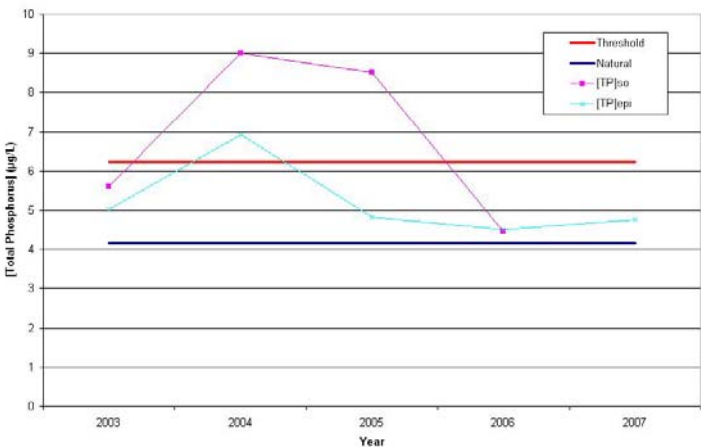
Site-by-site phosphorus

Site 1 has an average phosphorus concentration above the threshold for Minett. The other sites have averages below the threshold.

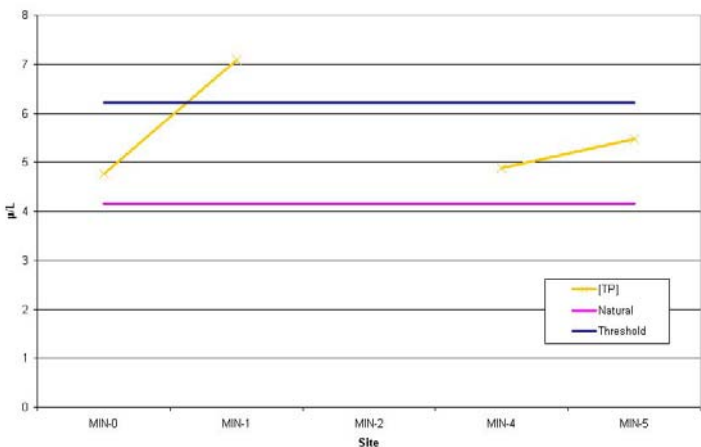
2007 Results - Minett



Minett Total Phosphorus



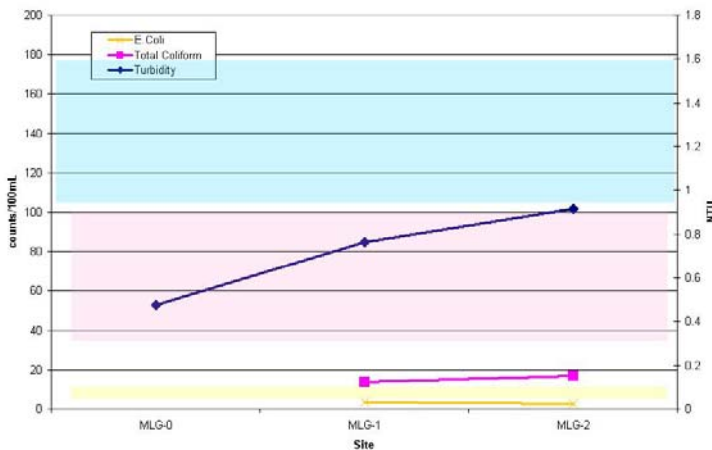
2007 [TP] Results - Minett



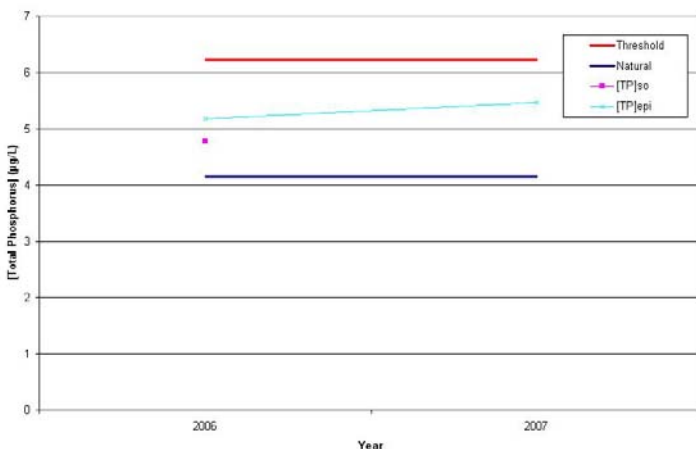
ML G&CC, Lake Rosseau



2007 Results - Muskoka Lakes G&CC



Muskoka Lakes G&CC Total Phosphorus



Volunteers monitored three sites (0, 1 & 2) at the ML G&CC eight times in the summer of 2007. The ML G&CC has been monitored since 2006. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦♦

There are no concerns with phosphorus, *E. coli*, total Coliform or turbidity.

- Ranks 2/32 in level of Total Coliform
- Ranks 12/32 in level of *E. coli*
- Ranks 1/9 in turbidity (clarity)

2007 Results

All measurements are within or below the expected range, and all have expected standard deviations.

Phosphorus

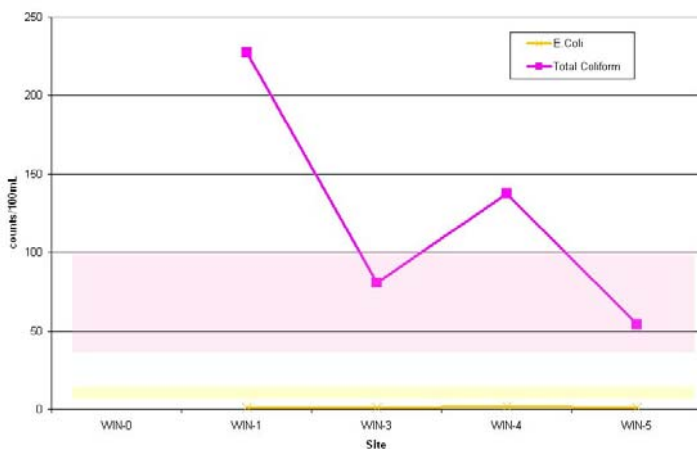
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

The ML G&CC is not specifically considered by the District of Muskoka. The main basin of Lake Rosseau's threshold is 6.225 µg/L. Phosphorus remains below this threshold.

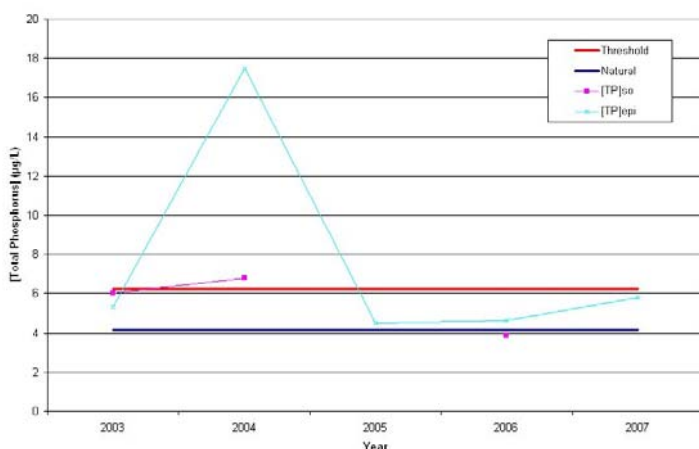
Windermere, Lake Rosseau



2007 Results - Windermere



Windermere Total Phosphorus



Volunteers monitored five sites (0, 1, 3, 4 & 5) at Windermere six times in the summer of 2007. Windermere has been monitored since 2003. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦

There are no concerns with *E. coli* or phosphorus concentration, but total Coliform counts are high at sites 1 & 4. No clarity information was collected.

- Ranks 26/32 in level of Total Coliform
- Ranks 3/32 in level of *E. coli*

2007 Results

Total Coliform counts were above the expected range at sites 1 & 4. Counts at site 1 are much lower than in 2005 and 2006. Counts at site 4 are consistent with previous years, warranting further investigation.

All other measurements are within or below the expected range and had expected standard deviations.

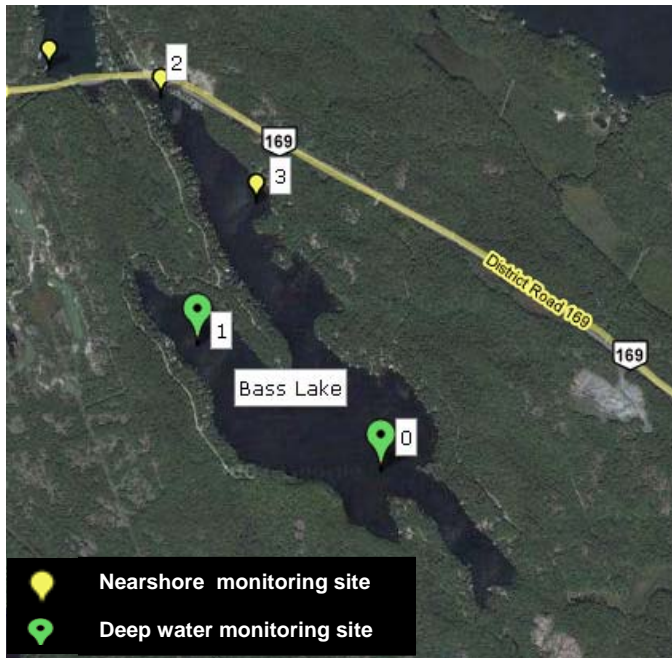
Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Windermere is not specifically considered by the District of Muskoka. The main basin of Lake Rosseau's threshold is 6.225µg/L. Spring turnover and average phosphorus has been below the threshold since 2005.

For more information, please see http://www.citizensenvironmentwatch.org/wqi/muskoka_lakes.

Bass Lake



Volunteers monitored four sites in Bass Lake eight times over the summer of 2007. 32 areas on 19 lakes and rivers were monitored. Bass Lake has been monitored since 2005.

Summary

Overall water quality: ◆◆◆

There are no concerns with *E.Coli*, total Coliform or turbidity, but phosphorus concentration is potentially over-threshold.

- Ranks 24/32 in level of Total Coliform
- Ranks 29/32 in level of *E.Coli*
- Ranks 20/22 in secchi depth (clarity)

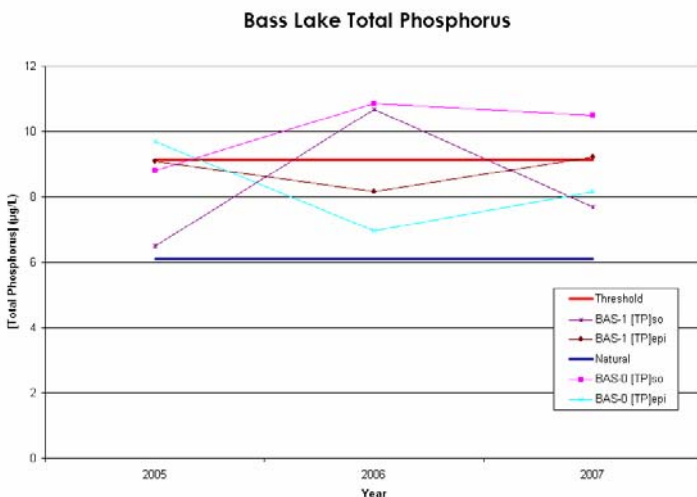
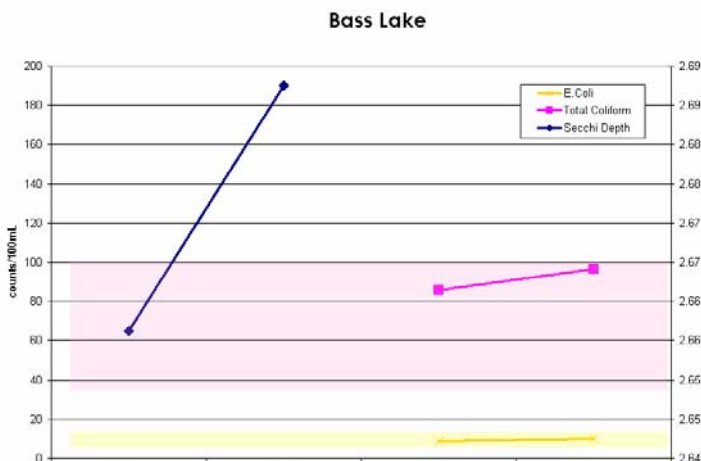
2007 Results

All measurements are currently within or below their expected range and standard deviation.

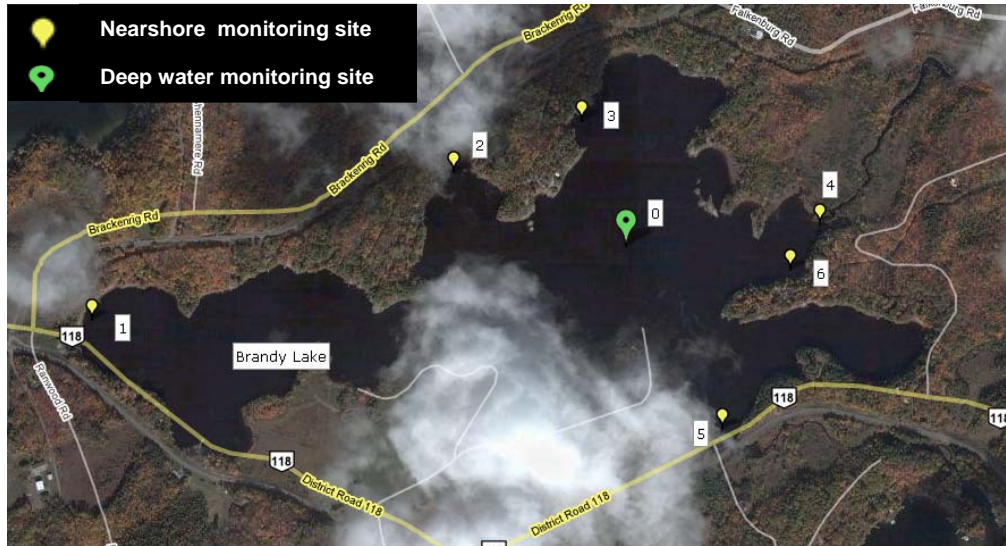
Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Bass Lake's threshold is 9.15 µg/L. Spring turnover phosphorus at site 0 has been over-threshold for the past two years.

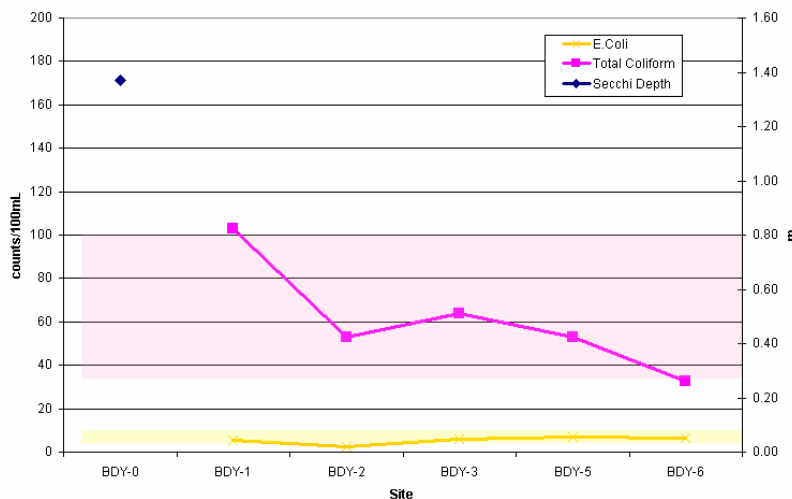


Brandy Lake

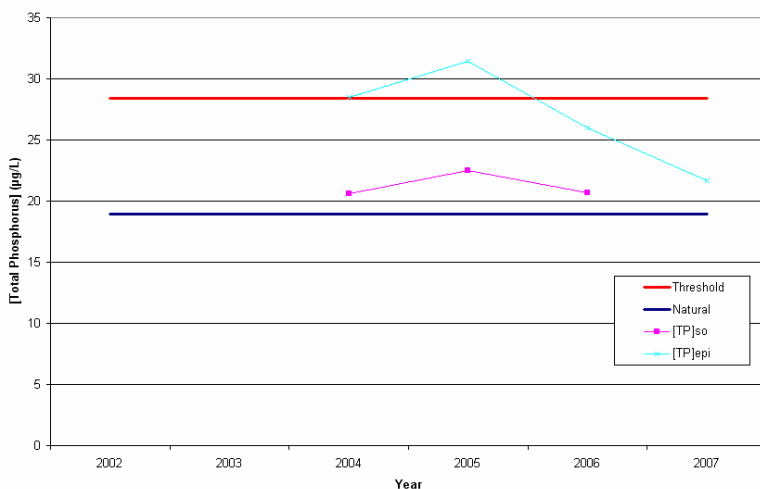


Volunteers monitored five sites (0, 1, 2, 3, 5 and 6) in Brandy Lake eight times over the summer of 2007. Brandy Lake has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored (Brandy Lake is the only dystrophic or “tea coloured” lake, naturally rich in nutrients and organic carbon).

2007 Results - Brandy Lake



Brandy Lake Total Phosphorus



Summary

Overall water quality: ♦♦♦♦♦

There are no concerns with *E. Coli*, total Coliform or turbidity.

- Ranks 13/32 in level of Total Coliform
- Ranks 22/32 in level of *E. Coli*
- Ranks 22/22 in secchi depth (clarity)

2007 Results

All measurements are currently within or below their expected range and standard deviation.

Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is “healthy.”

Brandy Lake's threshold is 28.39 µg/L. Spring turnover phosphorus remains under the threshold.

Clear Lake



Volunteers monitored five sites in Clear Lake seven times in the summer of 2007. Clear Lake has been monitored since 2005. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ◆◆◆

There are no concerns with *E.Coli*, total Coliform or clarity, but phosphorus concentration is over-threshold.

- Ranks 19/32 in level of Total Coliform
- Ranks 8/32 in level of *E.Coli*
- Ranks 4/22 in secchi depth (clarity)

2007 Results

All measurements are within or below the expected range, even though results at sites 2 and 3 had a larger than expected standard deviation. These large standard deviations have not been observed before, so no further investigation is warranted.

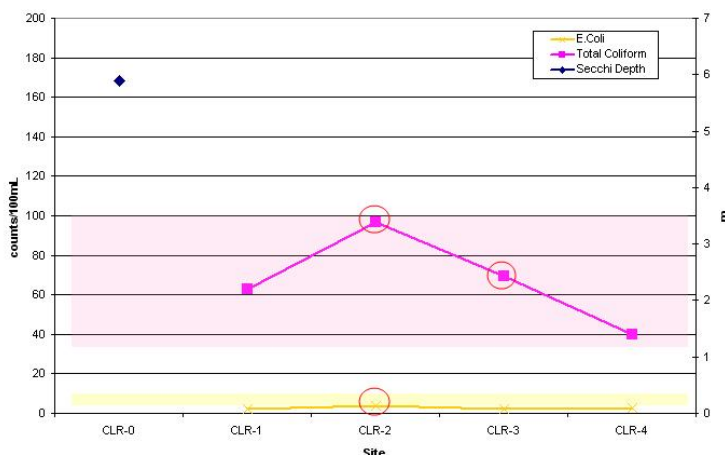
Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

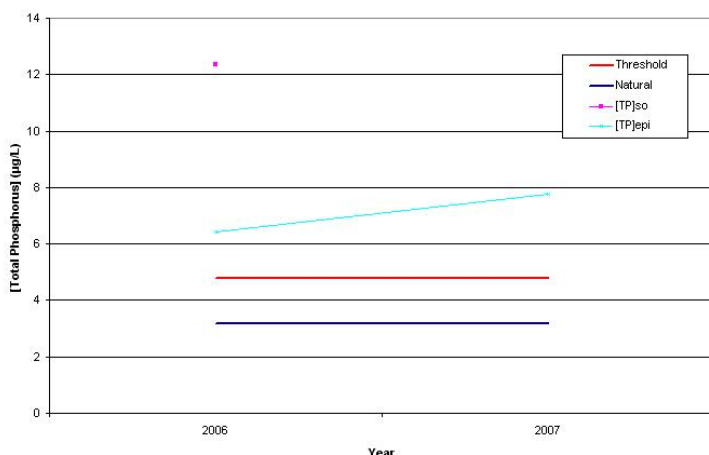
Clear Lake's threshold is 4.785 µg/L. Spring turnover and average phosphorus have been above threshold since 2006.

Clear Lake is classified as over-threshold by the District of Muskoka.

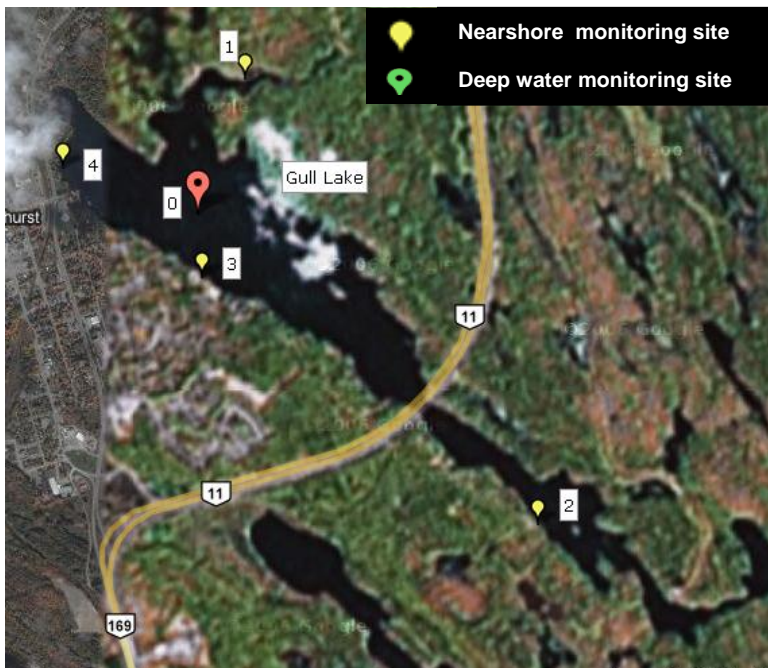
2007 Results - Clear Lake



Clear Lake Total Phosphorus



Gull Lake



Volunteers monitored five sites in Gull Lake six times over the summer of 2007. Gull Lake has been monitored since 2003. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ◆◆◆

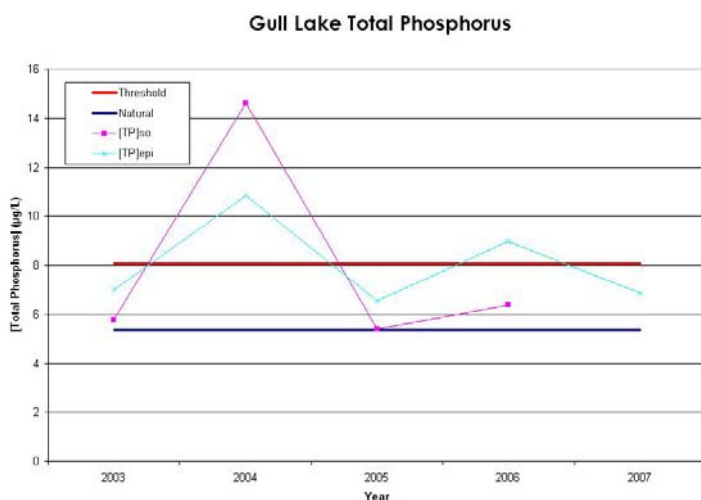
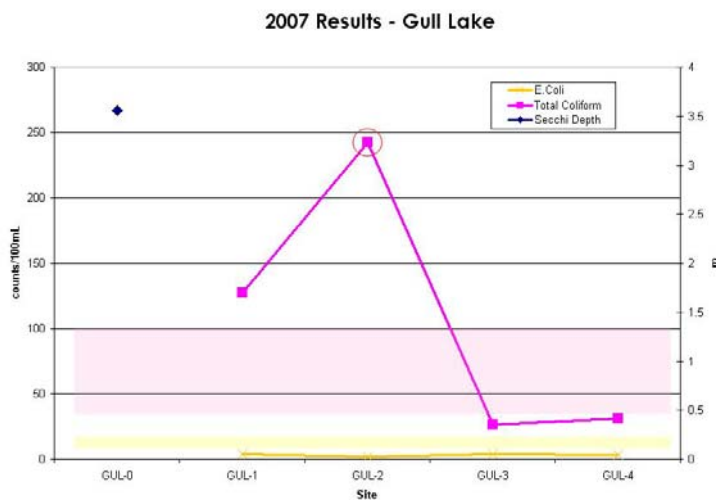
There are no concerns with *E.Coli*. The lake is identified as over-threshold by the District of Muskoka.

- Ranks 21/32 in level of Total Coliform
- Ranks 14/32 in level of *E.Coli*
- Ranks 12/22 in secchi depth (clarity)

2007 Results

Sites 1 & 2 have total Coliform counts outside of the expected range. Site 2 total Coliform counts also had a higher than expected standard deviation. These results are very consistent with previous years and may warrant further investigation.

All other measurements are within or below the expected range.



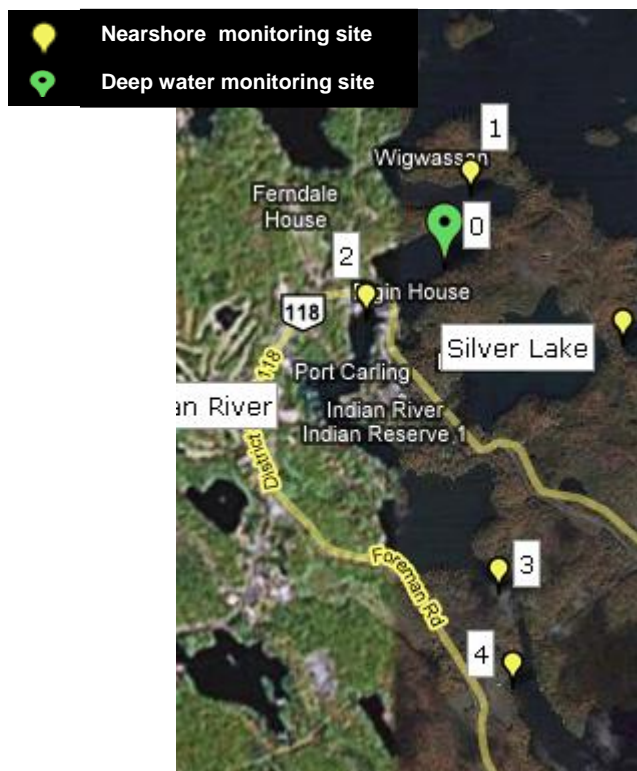
Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Gull Lake's threshold is 8.07 µg/L. Spring turnover phosphorus has only been over-threshold once since 2003.

Gull Lake is currently classified as over-threshold by the District of Muskoka.

Indian River (not including Mirror Lake)



Volunteers monitored three sites (0, 2 & 3) in the Indian River eight times over the summer of 2007. The Indian River has been monitored since 2002. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ◆◆◆

There are no concerns with phosphorus concentration or clarity, but total Coliform and *E.Coli* counts are high.

- Ranks 30/32 in level of Total Coliform
- Ranks 31/32 in level of *E.Coli*
- Ranks 15/22 in secchi depth (clarity)

2007 Results

Average total Coliform counts were far above the expected range; this is consistent with three of the last six years' results. Total Coliform counts at site 2 had larger standard deviations than expected.

While still low, *E.Coli* counts were also higher than the expected range at both sites. These results are also similar to those of previous years.

Further investigations may not be warranted, considering these sites are in urban areas on a complex river system.

Phosphorus

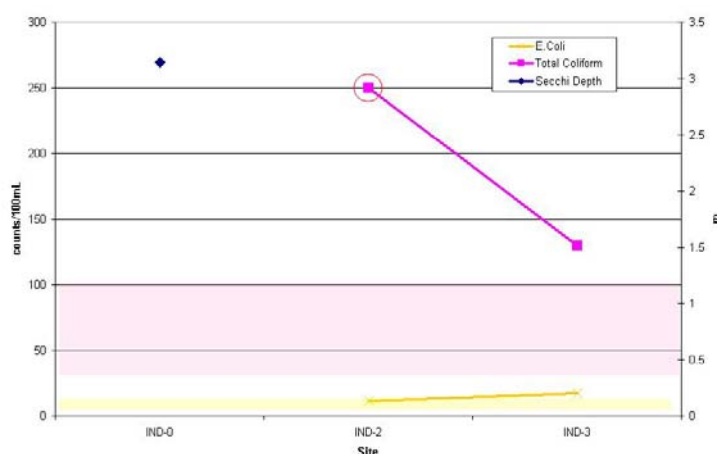
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

The Indian River's threshold is $6.22\mu\text{g/L}$. Spring turnover phosphorus measurements have remained below the threshold since 2006.

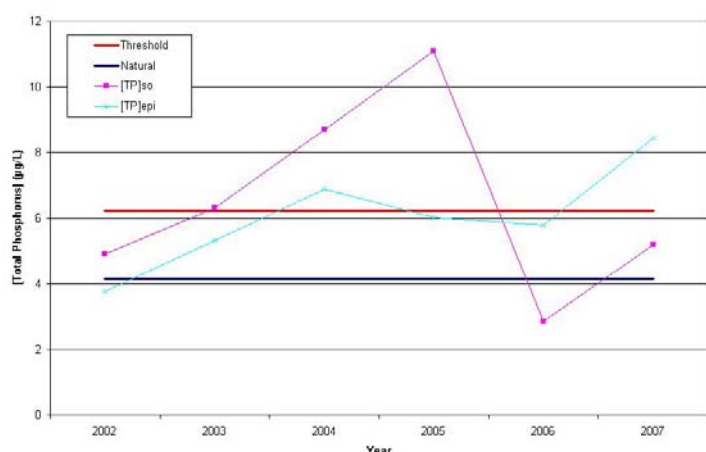
Site-by-site phosphorus

All sites had average phosphorus concentrations well above the threshold for the Indian River. Site 2 had an average higher than other sites.

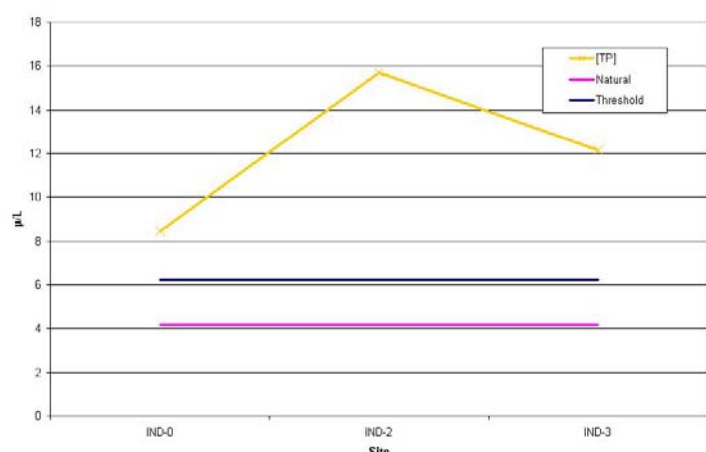
2007 Results - Indian River



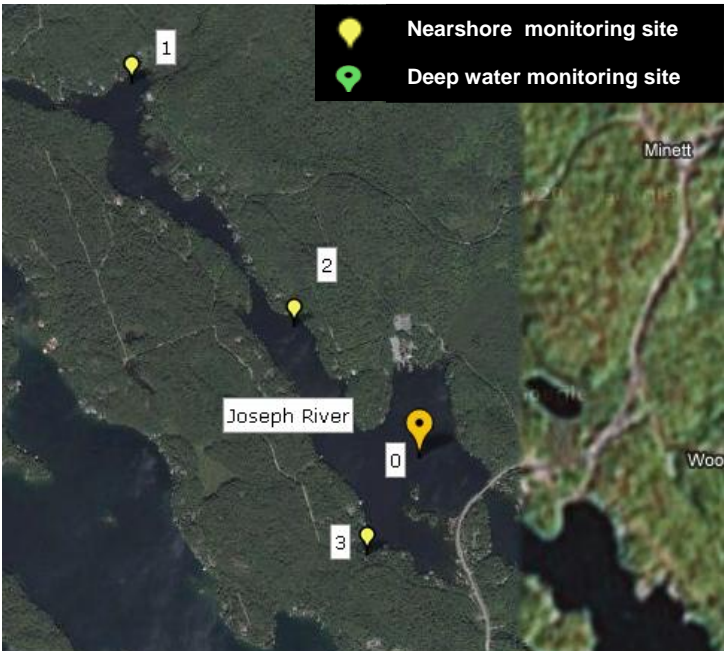
Indian River Total Phosphorus



2007 [TP] Results - Indian River



Joseph River



Volunteers monitored five sites in the Joseph River eight times over the summer of 2007. The Joseph River has been monitored since 2004. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: **◆◆◆**
There are no concerns with clarity, total Coliform or *E.Coli*, but phosphorus concentration is potentially over-threshold.

- Ranks 5/32 in level of Total Coliform
- Ranks 6/32 in level of *E.Coli*
- Ranks 5/9 in turbidity (clarity)

2007 Results

All results were below or within expected ranges and had standard deviations smaller than expected.

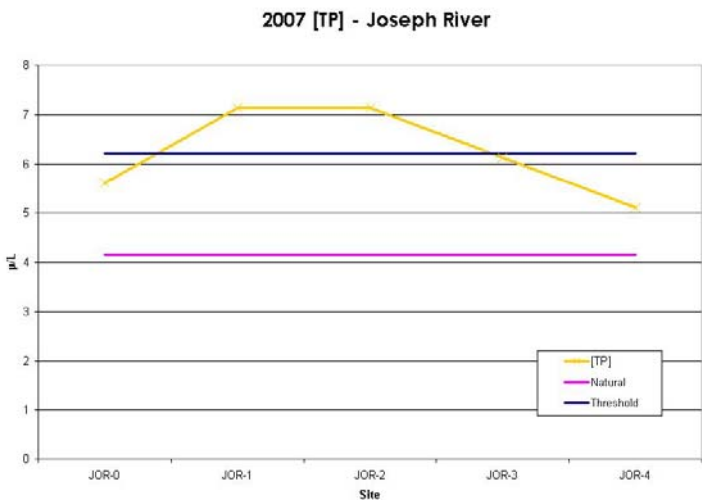
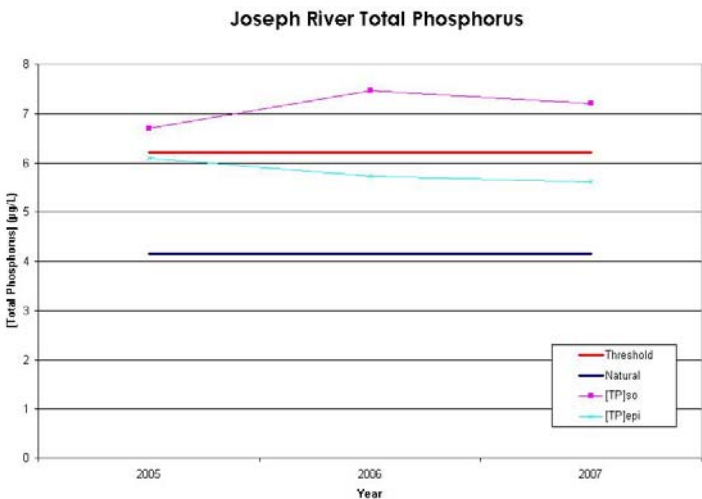
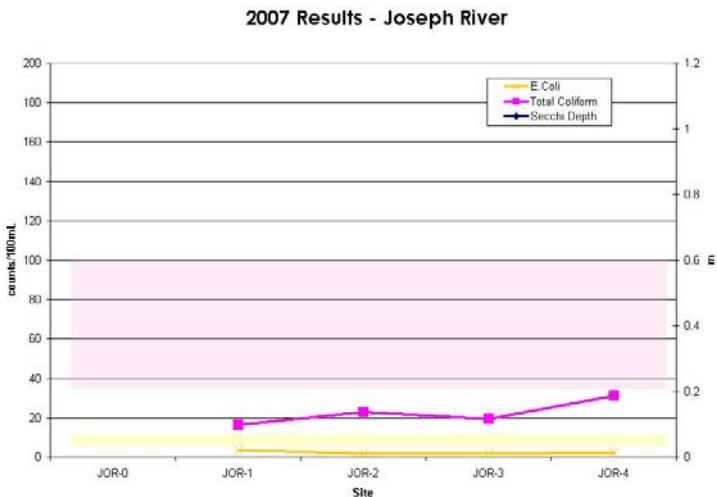
Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

The Joseph River's threshold is 6.225µg/L. Spring turnover phosphorus measurements have remained above the threshold since 2005.

Site-by-site phosphorus

Sites 1 & 2 had average phosphorus concentrations above the threshold for the Joseph River. The other sites had averages below the threshold.



Moon River



Volunteers monitored eight sites (1, 3, 4, 5, 6, 7, 8 & 9) at the Moon River eight times in the summer of 2007. The Moon River has been monitored since 2005. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

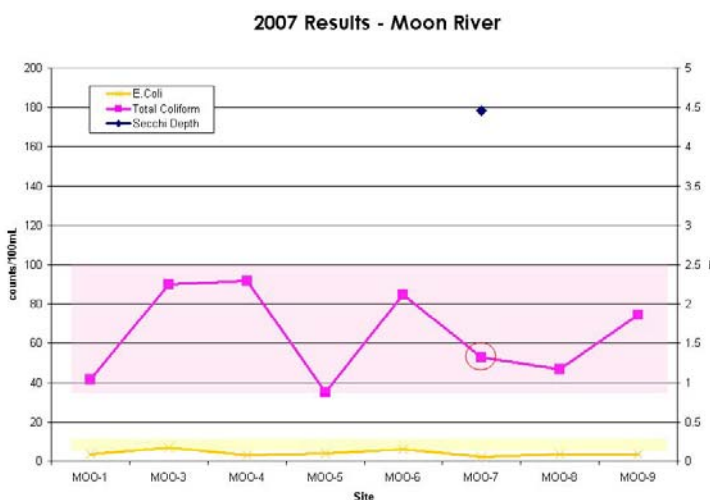
Overall water quality: ♦♦♦♦

There are no concerns *E.Coli*, total Coliform or turbidity. Phosphorus is not monitored.

- Ranks 17/32 in level of Total Coliform
- Ranks 18/32 in level of *E.Coli*
- Ranks 8/22 in secchi depth (clarity)

2007 Results

All measurements are within or below the expected range. Total Coliform counts at site 7 had a higher than expected standard deviation.



Muldrew Lakes



Volunteers monitored seven sites in the Muldrew Lakes eight times over the summer of 2007. The Muldrew Lakes were monitored for the first time in 2007. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦♦
There are no concerns with *E.Coli*, total Coliform or phosphorus concentration.

- Ranks 11/32 in level of Total Coliform
- Ranks 17/32 in level of *E.Coli*
- Ranks 19/22 in secchi depth (clarity)

2007 Results

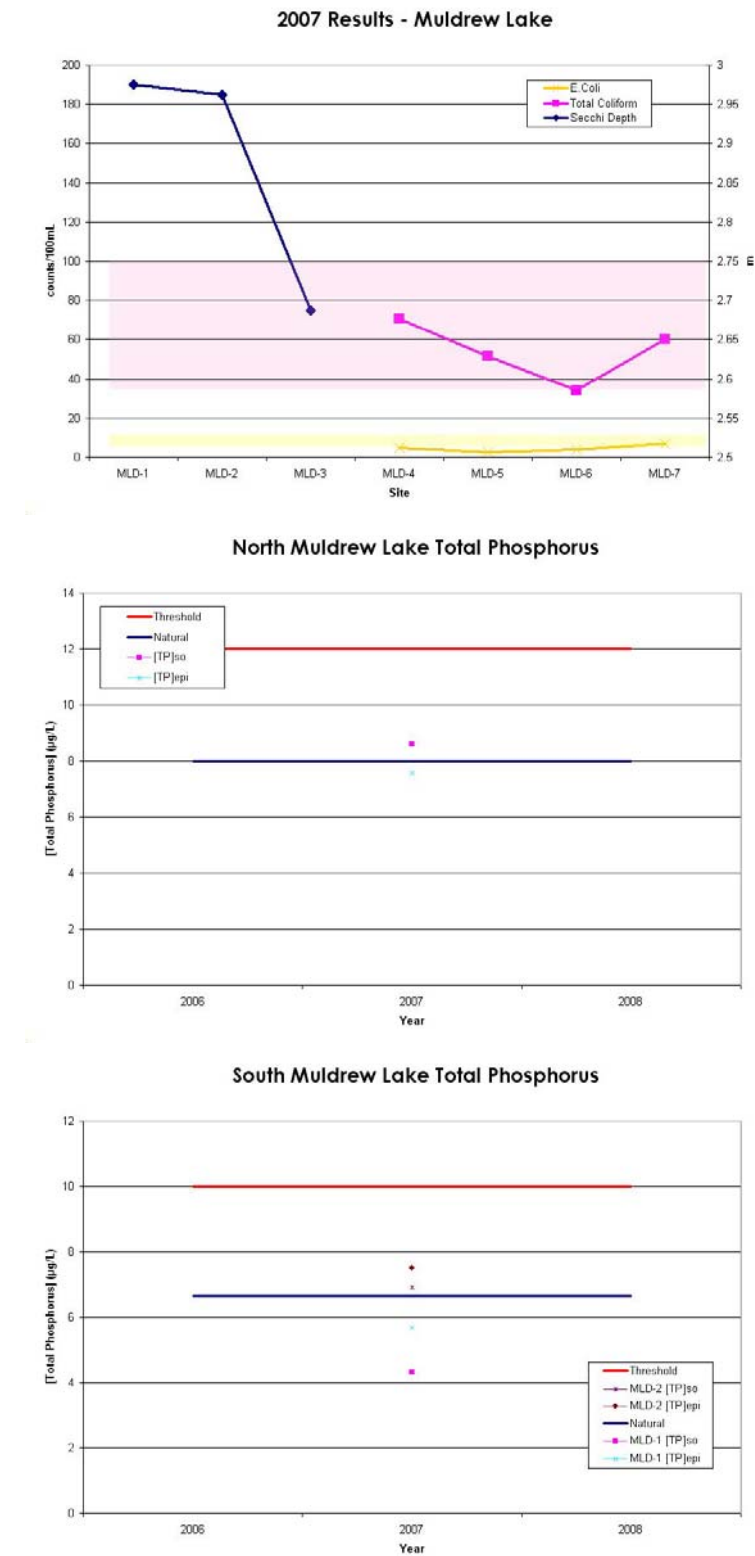
All *E.Coli* and total Coliform counts are below the expected range and have expected standard deviations. The Muldrew Lakes ranked poorly in clarity, but at this point there are no concerns.

Phosphorus

A lake’s phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is “healthy.”

North Muldrew Lakes’s threshold is 11.985µg/L. Spring turnover and average phosphorus measurements at site 3 were below this threshold in 2007.

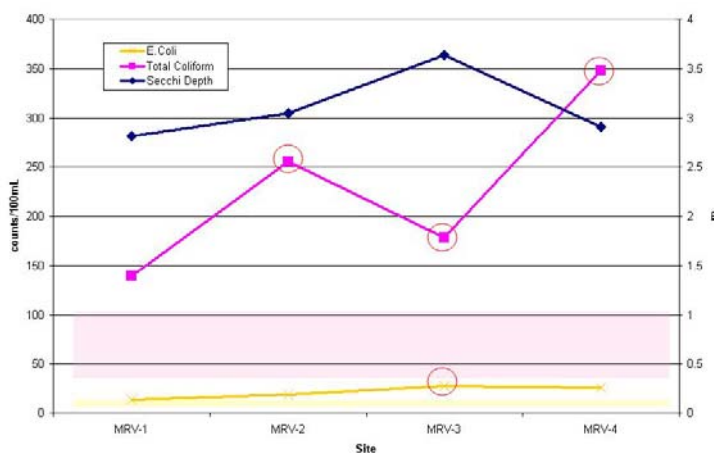
South Muldrew Lakes’s threshold is 9.99µg/L. Spring turnover and average phosphorus measurements at sites 1 & 2 were below this threshold in 2007.



Muskoka River



2007 Results - Muskoka River



Volunteers monitored four sites on the Muskoka River eight times in the summer of 2007. The Muskoka River has been monitored since 2003. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦

There are no concerns with phosphorus, but *E. Coli* and total Coliform are high.

- Ranks 32/32 in level of Total Coliform
- Ranks 32/32 in level of *E. Coli*
- Ranks 17/22 in secchi depth (clarity)

2007 Results

All measurements are above the expected range. Sites 2, 3 & 4 all have total Coliform counts with higher than expected standard deviations and site 3 has *E. Coli* counts with higher than expected standard deviations.

These results are consistent with observations from previous years, but further investigation is not warranted because these sites are located in an urban area on a complex river ecosystem.

Phosphorus

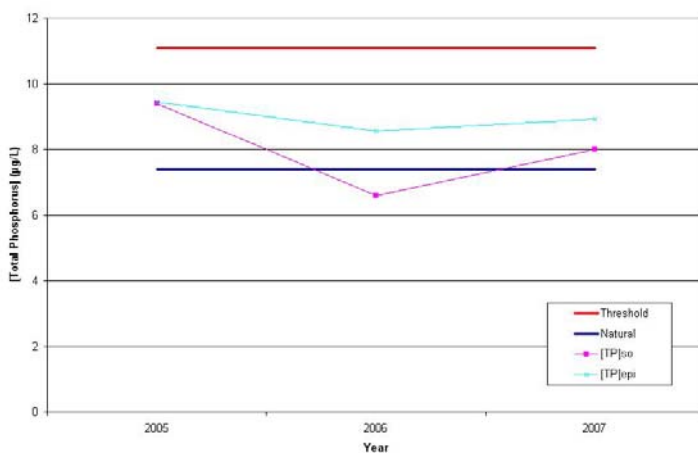
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

The Muskoka River's threshold is 11.085µg/L. Phosphorus remains below this threshold. 30

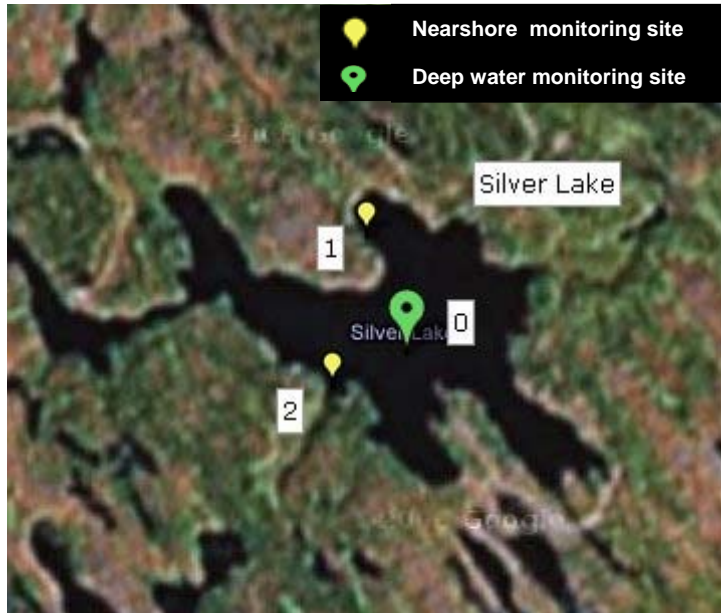
For more information, please see

<http://www.citizensenvironmentwatch.org/wqi/muskoka>

Muskoka River Total Phosphorus



Silver Lake (Gravenhurst)



Volunteers monitored three sites in Silver Lake six times in the summer of 2007. Silver Lake has been monitored since 2003. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: ♦♦♦♦♦

There are no concerns with *E.Coli*, total Coliform, phosphorus concentration or clarity.

- Ranks 9/32 in level of Total Coliform
- Ranks 10/32 in level of *E.Coli*
- Ranks 14/22 in secchi depth (clarity)

2007 Results

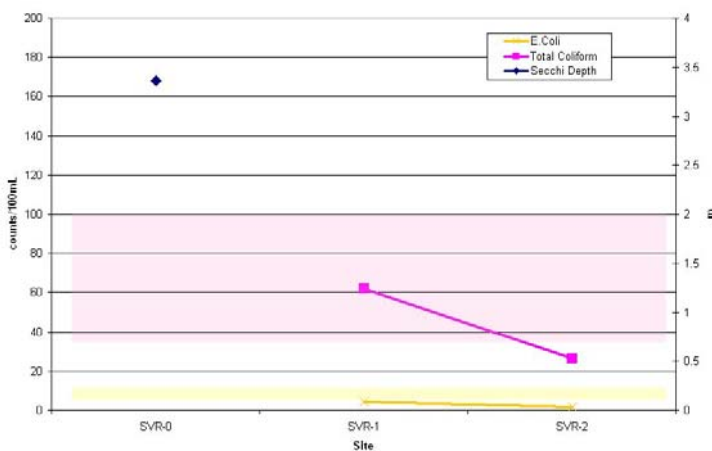
All measurements are within or below the expected range and had expected standard deviations.

Phosphorus

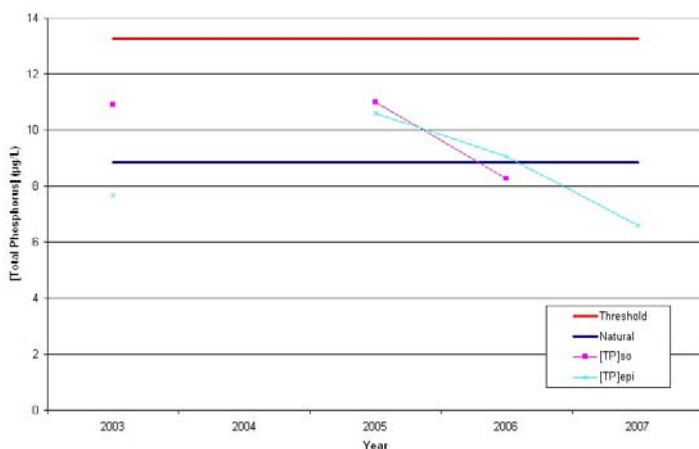
A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Silver Lake's threshold is 13.275µg/L. Spring turnover and average phosphorus has been below the threshold since 2003.

2007 Results - Silver Lake (Gravenhurst)



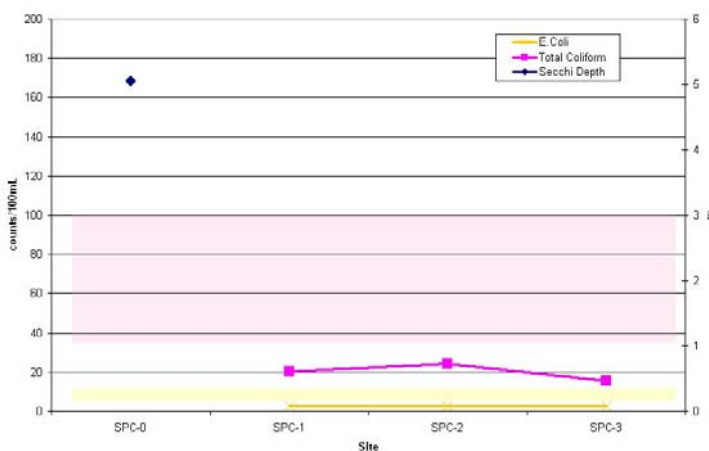
Silver Lake (Gravenhurst) Total Phosphorus



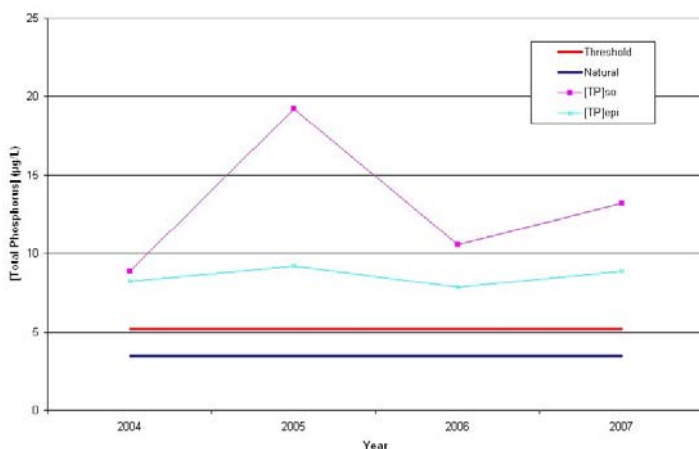
Silver Lake (Muskoka Lakes)



2007 Results - Silver Lake (TML)



Silver Lake (TML) Total Phosphorus



Volunteers monitored four sites in Silver Lake eight times in the summer of 2007. Silver Lake has been monitored since 2004. 32 areas on 19 lakes and rivers were monitored in 2007.

Summary

Overall water quality: **◆◆◆**

There are no concerns with *E. Coli*, total Coliform or clarity, but phosphorus concentration is over-threshold.

- Ranks 3/32 in level of Total Coliform
- Ranks 7/32 in level of *E. Coli*
- Ranks 6/22 in secchi depth (clarity)

2007 Results

All measurements are within or below the expected range, even though results at sites 2 and 3 had a larger than expected standard deviation.

Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Silver Lake's threshold is 5.22µg/L. Spring turnover and average phosphorus have been above threshold since 2004.

Silver Lake is classified as over-threshold by the District of Muskoka.

Skeleton Lake



Volunteers monitored five sites on Skeleton Lake eight times in the summer of 2007. Skeleton Lake has been monitored since 2006. 32 areas on 19 lakes and rivers were monitored in 2007.

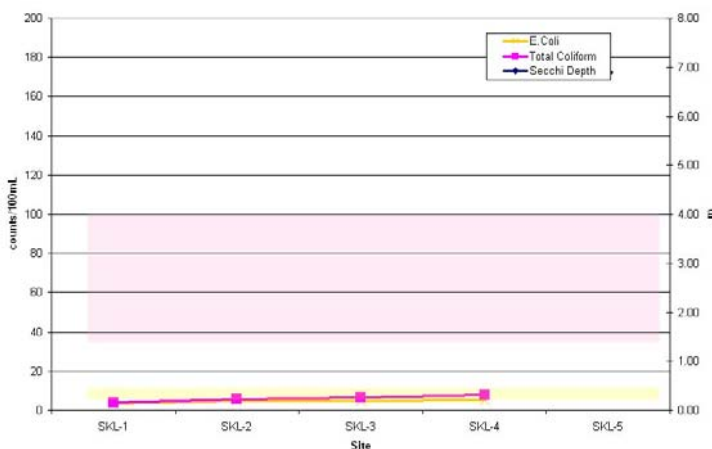
Summary

Overall water quality: ♦♦♦♦♦

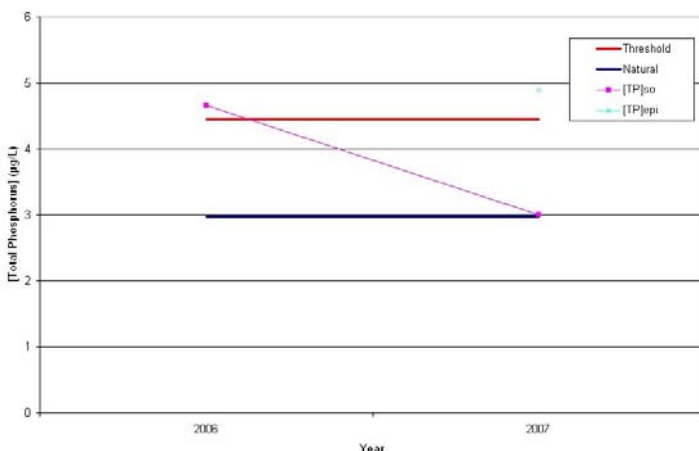
There are no concerns with phosphorus, *E.Coli*, total Coliform or clarity.

- Ranks 1/32 in level of Total Coliform
- Ranks 19/32 in level of *E.Coli*
- Ranks 1/22 in secchi depth (clarity)

2007 Results - Skeleton Lake



Skeleton Lake Total Phosphorus



2007 Results

All measurements are within or below the expected range, and all have expected standard deviations.

Phosphorus

A lake's phosphorus threshold is the concentration at which this nutrient may cause an ecological imbalance. Below this threshold, the lake is "healthy."

Skeleton Lake's threshold is 4.455µg/L. Spring turnover phosphorus was below this threshold in 2007.

Star Lake



Volunteers monitored six sites in Star Lake eight times in the summer of 2007 – the first year Star Lake has been monitored. 32 areas on 19 lakes and rivers were monitored in 2007.

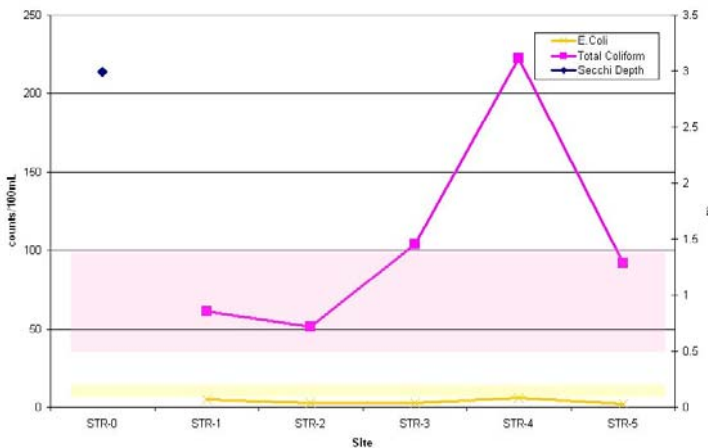
Summary

Overall water quality: ♦♦♦♦

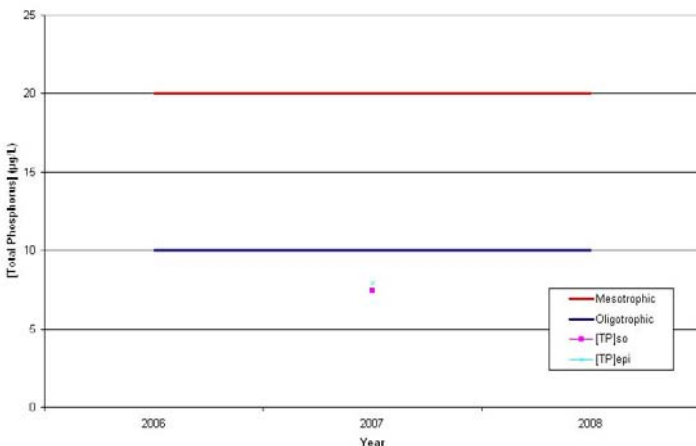
There are no concerns with *E.Coli*, phosphorus concentration or clarity, but sites 3 & 4 have high total Coliform counts.

- Ranks 25/32 in level of Total Coliform
- Ranks 15/32 in level of *E.Coli*
- Ranks 18/22 in secchi depth (clarity)

2007 Results - Star Lake



Star Lake Total Phosphorus



2007 Results

Sites 3 & 4 had total Coliform counts that were above the expected range. No previous data exists for comparison.

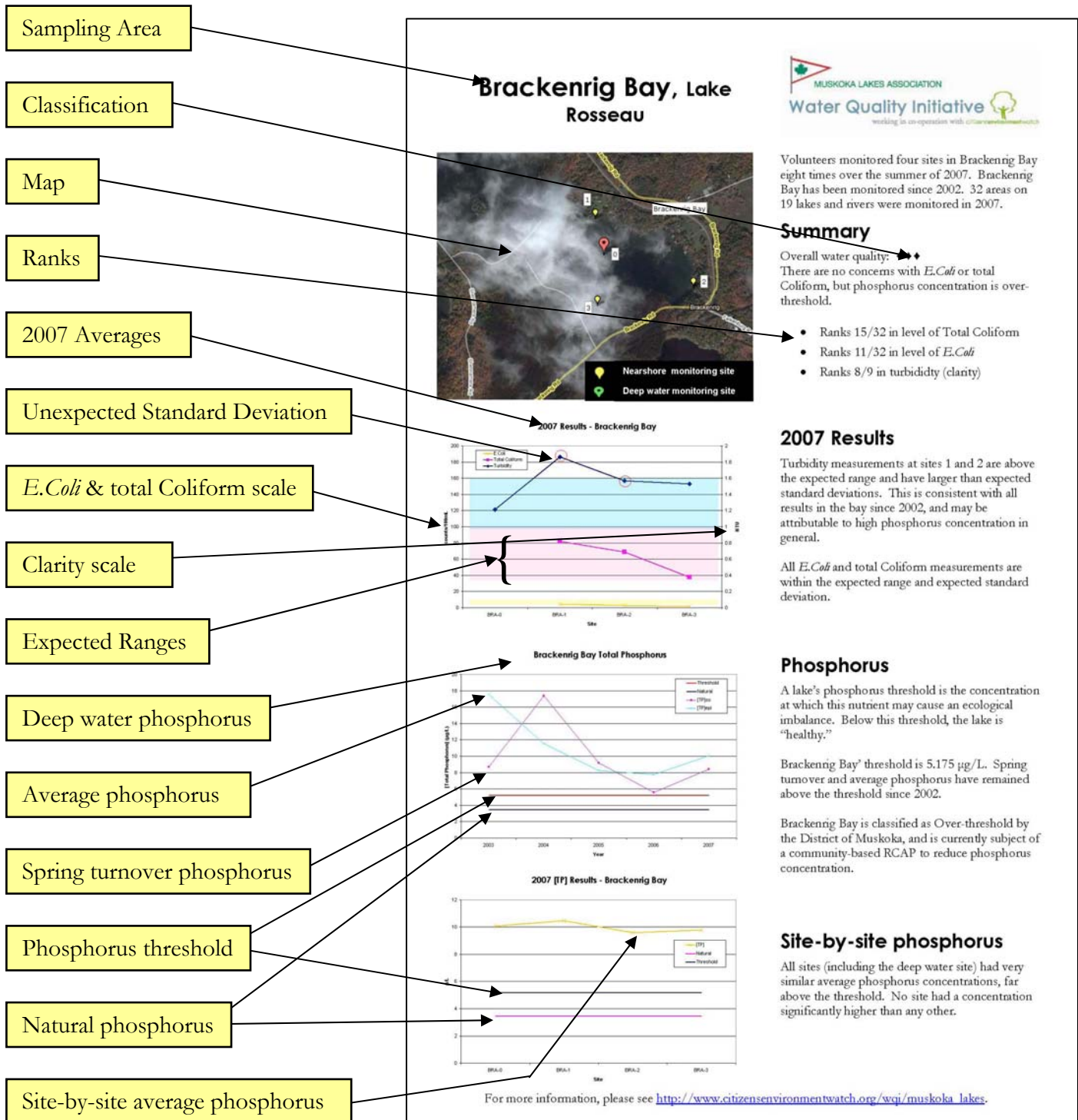
All other measurements are within or below the expected range and had expected standard deviations.

Phosphorus

No lake-specific phosphorus threshold has been defined for Star Lake. Alternatively, a lake can be considered oligotrophic ('nutrient-poor') if it's phosphorus concentration is below 10µg/L. Most lakes on the Canadian Shield are naturally oligotrophic.

Spring turnover phosphorus concentration was in the oligotrophic range in 2007.

Appendix A - Understanding the Summaries



2007 Averages

2007 results (*E.Coli*, total Coliform and clarity) are presented on a graph entitled “2007 Results – Sampling Area.” The graph shows each parameter in units (y-axis) for each site (x-axis). *E.Coli* and total Coliform units are shown on the primary y-axis and clarity units are shown on the secondary y-axis. This graph is accompanied by brief explanatory text.

The geometric mean (see glossary) ***E.Coli*** is shown on the graph in yellow, and reported in counts/100mL (that is, the number of organisms observed in 100 mL of lake water). Expected range is shown in light yellow. Circled results have standard deviations that are higher than expected.

The geometric mean (see glossary) **total Coliform** is shown on the graph in pink, and reported in counts/100mL (that is, the number of organisms observed in 100 mL of lake water). Expected range is shown in light pink. Circled results have standard deviations that are higher than expected.

The arithmetic mean (see glossary) **clarity** (either turbidity or secchi depth) is shown on the graph in blue. Turbidity is reported in Nephilometric Turbidity Units (NTU) and secchi depth is reported in metres (m). Expected range for turbidity is shown in light blue. Circled results have standard deviations that are higher than expected.

Average Phosphorus

The “average” or total epilimnetic total phosphorus ($[TP]_{epi}$) shown is the arithmetic mean (see glossary) of all phosphorus concentrations at the deep water site reported over the sampling season for each year and is shown in light blue.

Clarity Scale

The secondary y-axis on the 2007 Results graph is either in units of Nephilometric Turbidity Units (NTU), if clarity is measured using turbidity, or metres (m), if clarity is measured using secchi depth.

Classification

The water quality in each sampling area is assigned a ranking between one and five diamonds (♦). While this classification is based on a rough synthesis of all parameters and takes local knowledge into consideration, the following table generally describes what the classifications mean. Note that “standard deviations” are discussed in the glossary.

Classification	Meaning
◆◆◆◆	All readings for all parameters are within the expected range of averages and standard deviations
◆◆◆	A between one and 50% of the average <i>E.Coli</i> , total Coliform or clarity readings are higher than expected or a have larger than expected standard deviations
◆◆	Phosphorus concentration is higher than threshold (or it is classified as over-threshold) or concerns exist with the remaining parameters for the majority of sites
◆	Phosphorus concentration is higher than threshold (or it is classified as over-threshold) and concerns exist with at least two of the remaining parameters for the majority of sites
◆	There has been significant evidence of impairment, such as algae blooms, water usage warnings etc.

Deep Water Phosphorus

Deep water total phosphorus results for all years are presented on a second graph entitled “Sampling Area Total Phosphorus.” The graph shows both spring turnover and average (total epilimnetic) total phosphorus concentration in µg/L (y-axis) at the deep water site for each year (x-axis). This graph is accompanied by brief explanatory text.

The spring turnover total phosphorus concentration ($[TP]_{so}$) shown is the value of sample number 1 for each year, and is comparable to the concentration that the District of Muskoka uses to classify lakes for planning and development purposes and is shown in pink. The “average” or total epilimnetic total phosphorus ($[TP]_{epi}$) shown is the arithmetic mean (see glossary) of all phosphorus concentrations at the deep water site reported over the sampling season for each year and is shown in light blue.

The “Natural” phosphorus concentration is the baseline concentration calculated by the District of Muskoka to represent the expected phosphorus concentration within the lake or bay without any development. The “Threshold” phosphorus concentration is 50% more than the baseline concentration, and is the threshold calculated by the District of Muskoka to classify lakes and bays as suitable for a higher level of development control as a precautionary action to protect the long-term health of the lake.

The $[TP]_{so}$ reported here should agree with the classification that the District of Muskoka has given the lake or bay. If the classification does not agree as noted in the text, the MLA and local residents should bring this to the attention of the District. The District may then calculate a threshold value for this area, or classify it as over-threshold. The $[TP]_{epi}$ reported here should be similar to the $[TP]_{so}$; if large or systematic discrepancies occur, there may be an unnatural influence sometime during the summer and further investigation is warranted.

E.Coli & Total Coliform Scale

The primary y-axis on the 2007 Results graph is in units of counts/100mL.

Expected Ranges

Expected ranges shown on graphs are based on the water quality data collected as part of the WQI monitoring program between 2002 and 2007.

Minimum expected *E.Coli* and total Coliform are equal to the six-year geometric mean *E.Coli* and total Coliform readings from the three nearshore undeveloped reference sites located in East Bay, Lake Muskoka respectively. Maximum expected *E.Coli* and total Coliform are 10 counts/mL and 100 counts/mL respectively, equal to the “MLA Water Quality Objective” defined in previous years.

Expected ranges for turbidity are different for deep water and nearshore monitoring sites. In both cases, the minimum expected turbidity is the six-year arithmetic mean of the corresponding deep water or nearshore turbidity from the undeveloped reference sites in East Bay, Lake Muskoka. The maximum expected turbidity is equal to the minimum expected turbidity plus the two times the six-year standard deviation for the corresponding reference sites.

No expected range for secchi depth has been calculated due to lack of data.

In all cases, reported averages should fall within the expected range. If the value falls below the expected range, water quality at that site is better than the undeveloped reference sites and there is no concern. If the value falls above the expected range, there may be a concern. Further investigation should be made if values fall above the expected range for multiple consecutive years. In this case, the explanatory text will indicate that there may be a problem to investigate.

Maps

Maps appearing on summary pages show all monitoring sites documented. Not all sites were monitored in 2007. If not all sites were monitored, monitored sites are listed in the page’s preamble. Small, yellow markers indicate nearshore sites, whereas larger markers with a black dot indicate deep water sites. Green large markers indicate that a sample area is healthy. Yellow large markers indicate that WQI data suggests the sample area is over-threshold for phosphorus concentration. Red large markers indicate that the sample area is officially designated by the District of Muskoka as over-threshold. Maps are not to scale.

Natural Phosphorus

The “Natural” phosphorus concentration is the baseline concentration calculated by the District of Muskoka to represent the expected phosphorus concentration within the lake or bay without any development.

Phosphorus Threshold

The “Threshold” phosphorus concentration is 50% more than the baseline concentration, and is the threshold calculated by the District of Muskoka to classify lakes and bays as suitable for a higher level of development control as a precautionary action to protect the long-term health of the lake.

Ranks

32 sample areas were monitored in 2007. A rank reported on a summary page as “16/32” indicates that this sample area was 16th best (lowest bacteria count; clearest) out of 32 sample areas monitored for that parameter. Water clarity is reported as a rank out of either nine or 22, because nine sample areas used turbidity to measure clarity and 22 areas used secchi depth to measure clarity.

Sampling Area

This title indicates which sampling area (e.g. bay, lake) is summarized.

Site-by-site Average Phosphorus

Some summaries include a third graph entitled “2007 [TP] Results – Sampling Area.” This graph and text is included when phosphorus concentration is collected in the nearshore zone. Reasons for collecting nearshore phosphorus concentration may include the investigation of sources of phosphorus loading in an over-threshold lake or bay or proximity to known sources of phosphorus loading such as a golf course or major construction site. If included, the graph shows total phosphorus concentration in µg/L (y-axis) for each nearshore site where phosphorus data was collected (x-axis). This graph is accompanied by brief explanatory text.

Phosphorus concentration shown is the arithmetic mean of all phosphorus concentrations reported for each site. These results are plotted against the natural and threshold levels calculated by the District of Muskoka, which provide a context for concentrations to be expected, even though nearshore averages are not directly related to natural or threshold levels. If one or more sites have concentrations that are significantly higher than the threshold value or the other sites, sources of phosphorus loading around that site should be investigated.

Spring Turnover Phosphorus

The spring turnover total phosphorus concentration ($[TP]_{so}$) shown is the value of sample number 1 for each year, and is comparable to the concentration that the District of Muskoka uses to classify lakes for planning and development purposes and is shown in pink.

Unexpected Standard Deviations

Expected standard deviations (see glossary) for *E.Coli*, total Coliform and clarity (turbidity) were calculated based on the water quality data collected as part of the WQI monitoring program between 2002 and 2007. If the standard deviation of a one-year set of results from one site exceeds twice the six-year standard deviation of the undeveloped reference sites at East Bay, Lake Muskoka, the result is circled on the graph.

High standard deviations may indicate an unnatural influence on bacteria or clarity levels at a particular site. Further investigation should be made if values fall above the expected standard deviation for multiple consecutive years. In this case, the explanatory text will indicate that there may be a problem to investigate.

Glossary

Arithmetic mean: This type of average is calculated by adding together a group of numbers and dividing the sum by the number of numbers.

Clarity: Water clarity is influenced both by dissolved and suspended matter. Clarity often indicates a lake's overall water quality, especially the amount of algae present. Algae are natural and essential, but too much of the wrong kind can cause problems (<http://www.dnr.state.wi.us/org/water/fhp/lakes/under/wclarity.htm>).

***E. Coli*:** Fully known as *Escherichia Coli*, it is a subset of total coliforms, and is exclusively associated with faecal waste (Schiefer, 2001) making it a good indicator of faecal contamination. There are several different strains of *E. Coli*; most waterborn strains are themselves not harmful, but some (such as *E. Coli* O157:H7) can cause serious illness (OMH, 2001). For more information, please see http://www.citizensenvironmentwatch.org/wqi/muskoka_lakes/waterquality.php#bact.

Geometric Mean: This type of average is calculated by multiplying together a group of n numbers and then taking the n^{th} root of the resulting product. Geometric mean is used to indicate the central tendency or typical value of a set of numbers (http://en.wikipedia.org/wiki/Geometric_mean). It is typically used to calculate average bacteria counts because as a living organism, bacteria counts are highly sporadic and inconsistent.

Phosphorus: Phosphorus is a component of DNA and RNA and an essential element for all living cells (<http://en.wikipedia.org/wiki/Phosphorus>). It is found in fertilizers, soaps, and in human waste. Typically phosphorus is not removed from waste streams by conventional private treatment systems (septic systems) or by some municipal treatment systems.

Lakes on the Canadian Shield are typically oligotrophic, meaning poor in nutrients. Phosphorus is usually the limiting nutrient, that is, phosphorus is in short supply so every bit of phosphorus added to the lake system is directly used to create biological matter such as algae. This makes phosphorus the most important indicator of human-based environmental impacts on our lakes. For more information, please see http://www.citizensenvironmentwatch.org/wqi/muskoka_lakes/waterquality.php#eutro.

Sampling Area: A geographic location named in supporting documentation and encompassing a group of sites.

Secchi Depth: An expression of water clarity, measured using a secchi disk - a small disk attached to a rope. Alternating quarters of the top side of the disk are coloured white and black. The secchi depth is the depth of water whereby the sampler can no longer distinguish the white and black quarters of the disk.

Site: The discrete and unique location as identified in supporting documentation where samples are to be collected on each sample date.

Spring Turnover Phosphorus [TP]_{so}: A single phosphorus concentration measurement taken in a stratified lake during the spring turnover period. This measurement has been shown to adequately represent the overall phosphorus concentration in a lake. Typically the spring turnover lasts for a few days when the surface water reaches 4°C and the entire water column is able to mix. In practice, measurements taken anytime in May are considered to be adequate by Ontario's Ministry of the Environment (http://www.ene.gov.on.ca/envision/water/lake_partner/index.htm).

Standard Deviation: The most common measure of statistical dispersion, measuring how widely spread the values in a data set are (http://en.wikipedia.org/wiki/Standard_deviation). The smaller the standard deviation, the more consistent and predictable are the numbers making up a data set. In the WQI, a large standard deviation within a year suggests that water quality is much different at different times throughout the sampling period, which could mean that specific conditions or influences are affecting water quality at a given site over the course of the season.

Total Epilimnetic Phosphorus [TP]_{epi}: The arithmetic mean of phosphorus concentration measurements taken above a stratified water column's thermocline over the ice-free period. Average phosphorus concentration as reported by the WQI is not a true [TP]_{epi} as samples are not collected over the entire ice-free period.

Total Coliform: Coliform include a variety of bacteria. In practice, detectable coliform are usually enteric, found in the intestinal tracts of humans and other warm-blooded species. For more information, please see http://www.citizensenvironmentwatch.org/wqi/muskoka_lakes/waterquality.php#bact.

Turbidity: The cloudiness of a liquid (in this case lake water) caused by suspended particles. Turbidity is reported in Nephelometric Turbidity Units (NTU), an accurate measurement of the dispersion of light shone through the water column.