Water Quality in Lake Matoaka and the Surrounding Watershed

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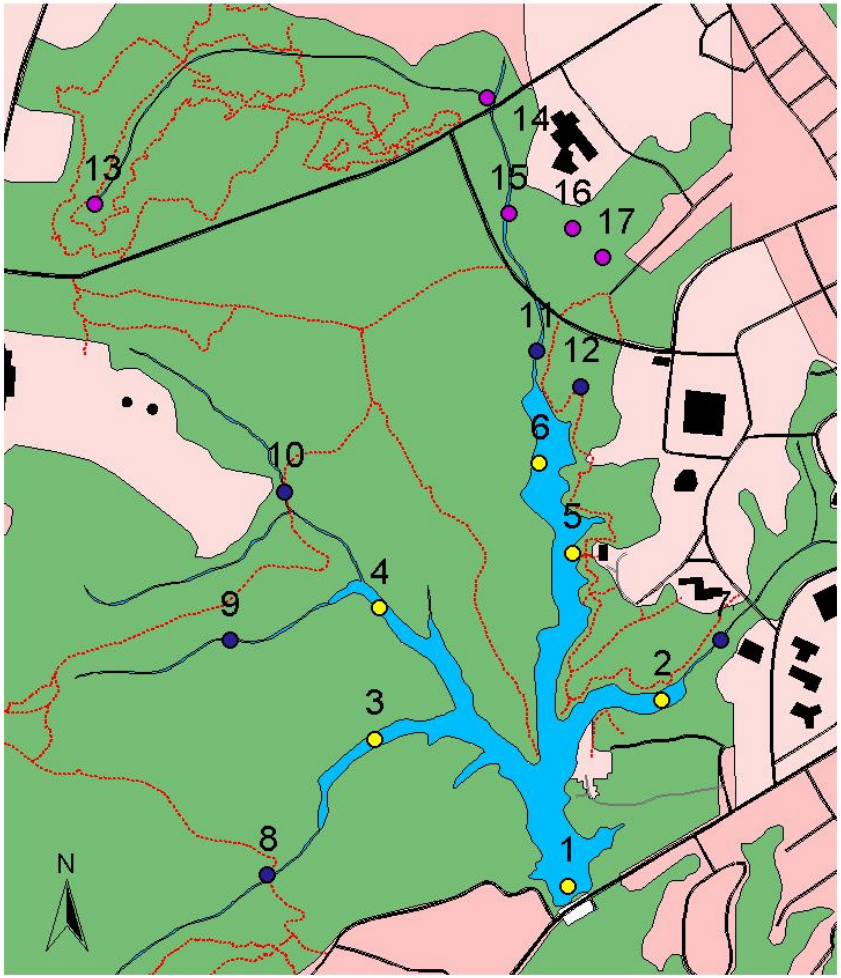
Water Quality Sampling Locations



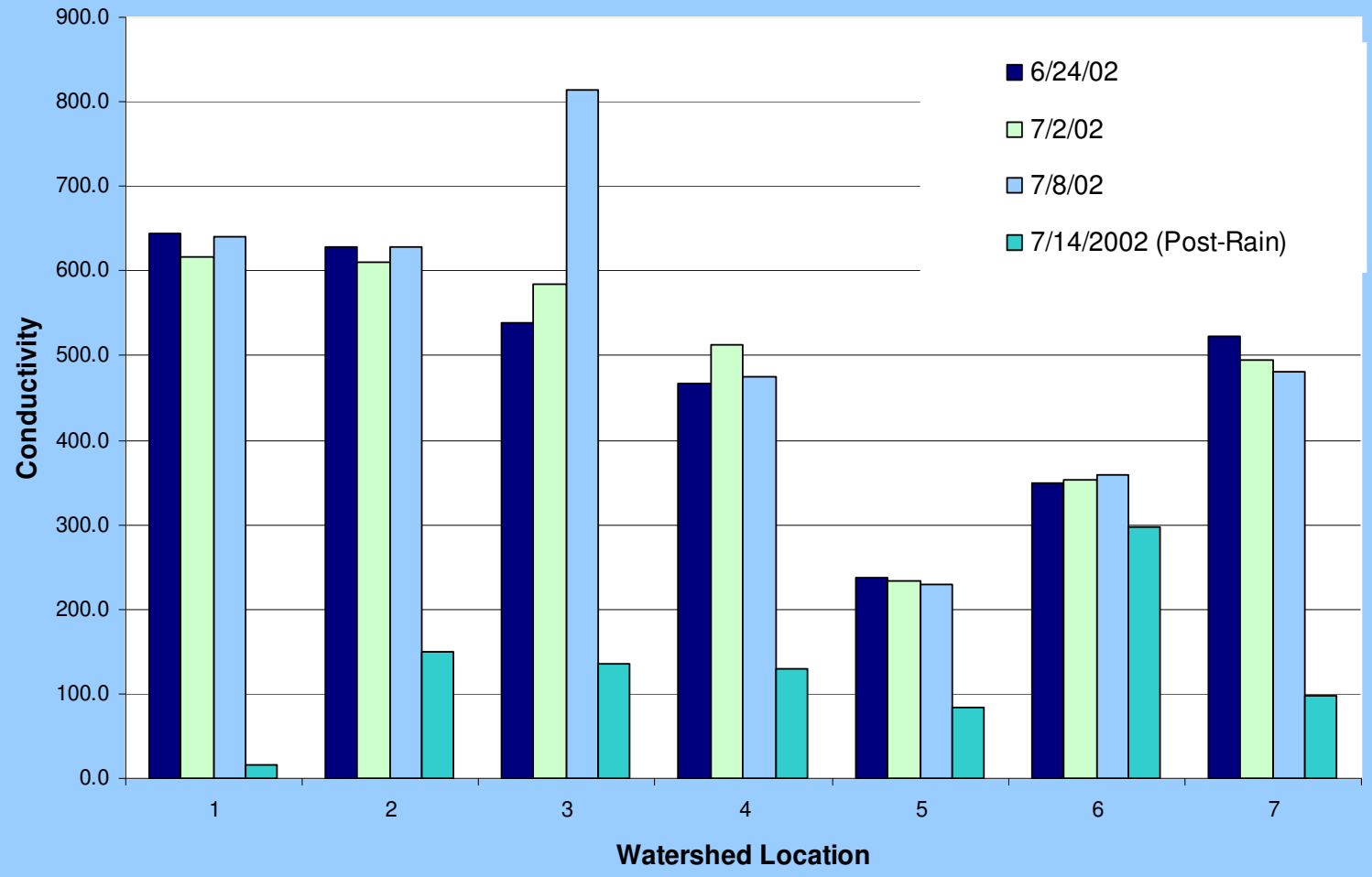
We sampled 6 locations on the lake, 6 in the surrounding streams, and 5 locations throughout the watershed.

Watershed Response to Rainstorms

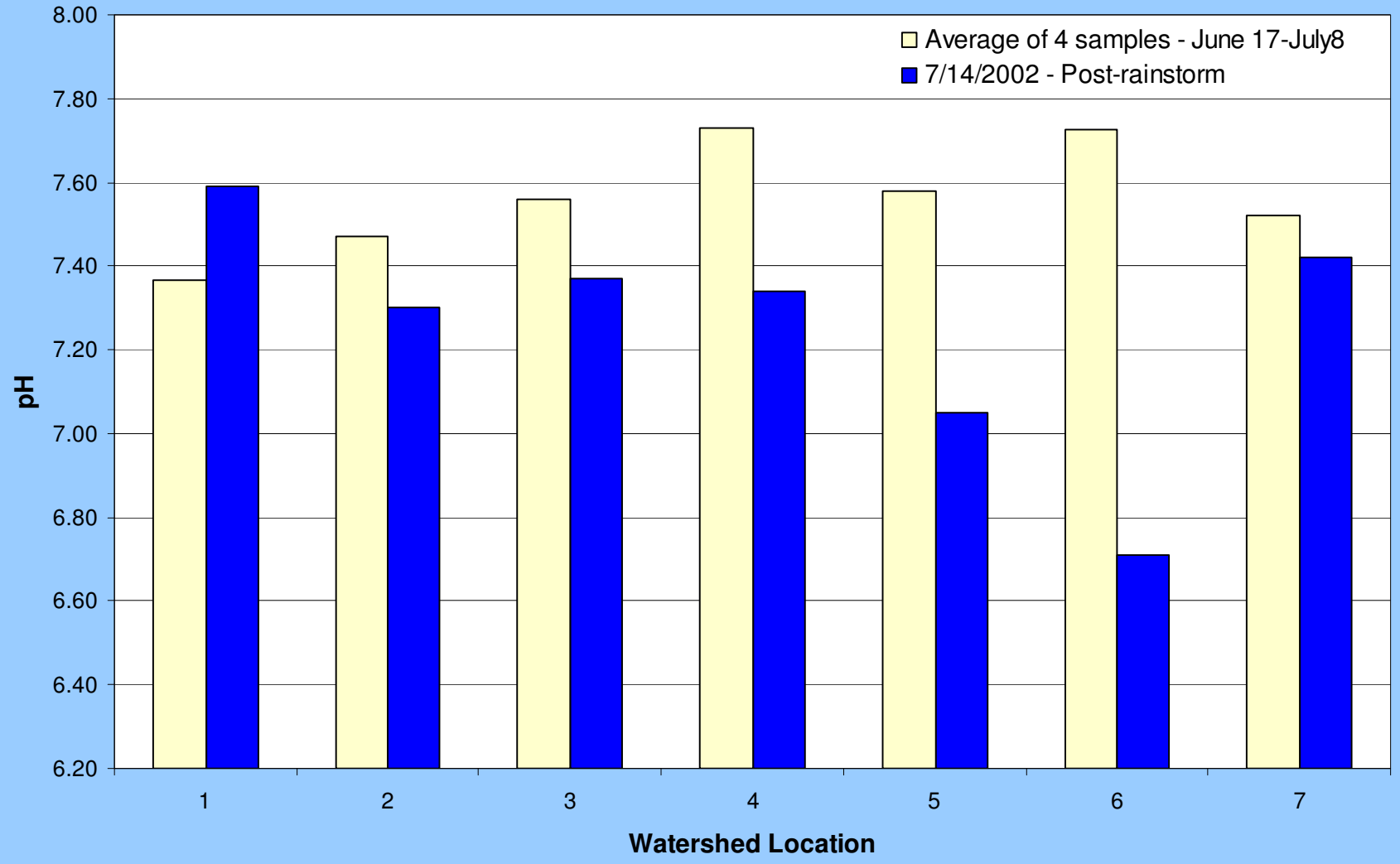
The following graphs illustrate changes in conductivity, pH, and dissolved oxygen following a rainstorm.

Sampling Location behind Ace Hardware, pre-rainstorm

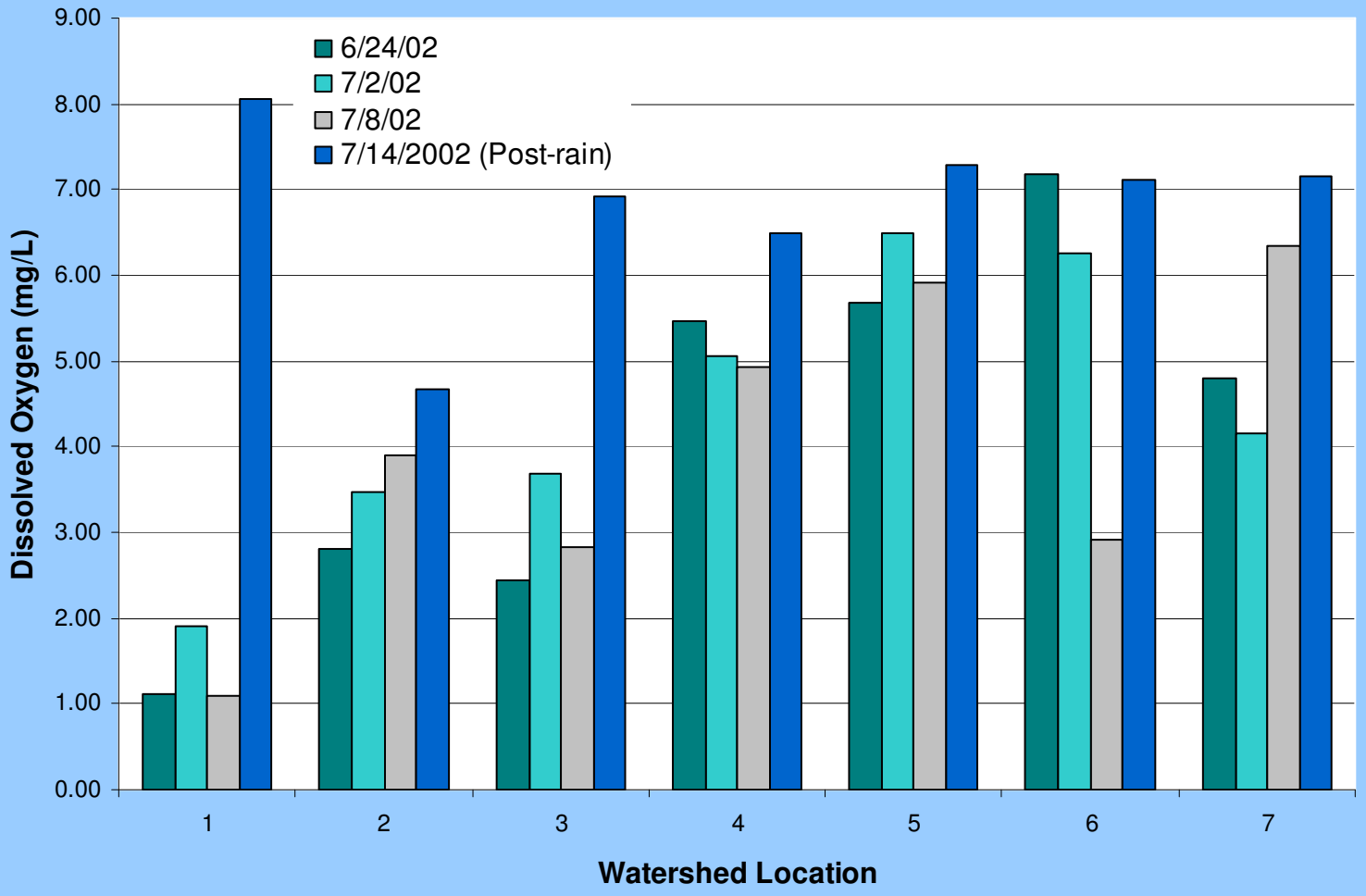
Watershed Conductivity - Pre-Rain and Post-Rain

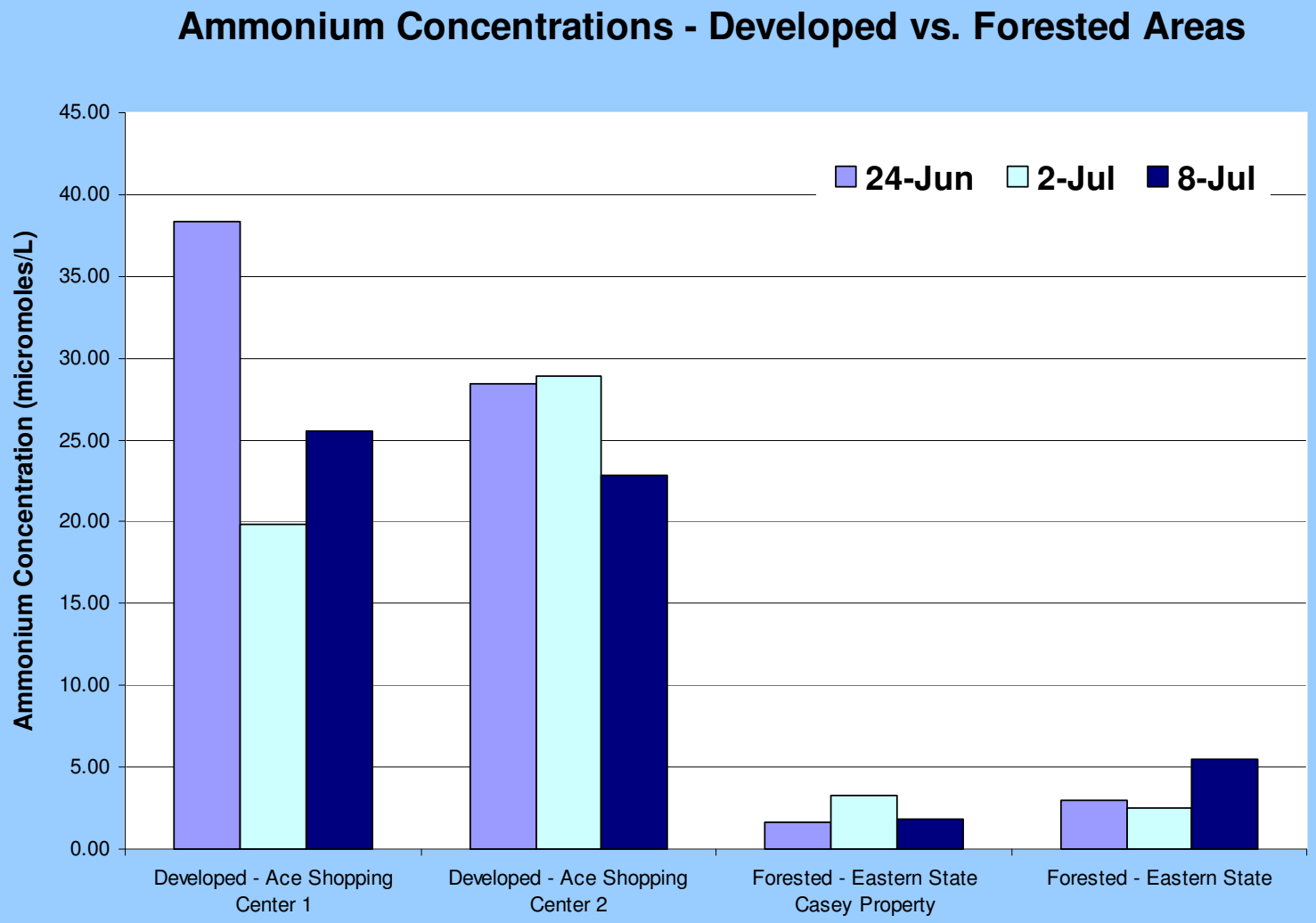


Watershed pH - Pre-rain and Post-rain



Watershed Dissolved Oxygen
Pre-Rain and Post-Rain

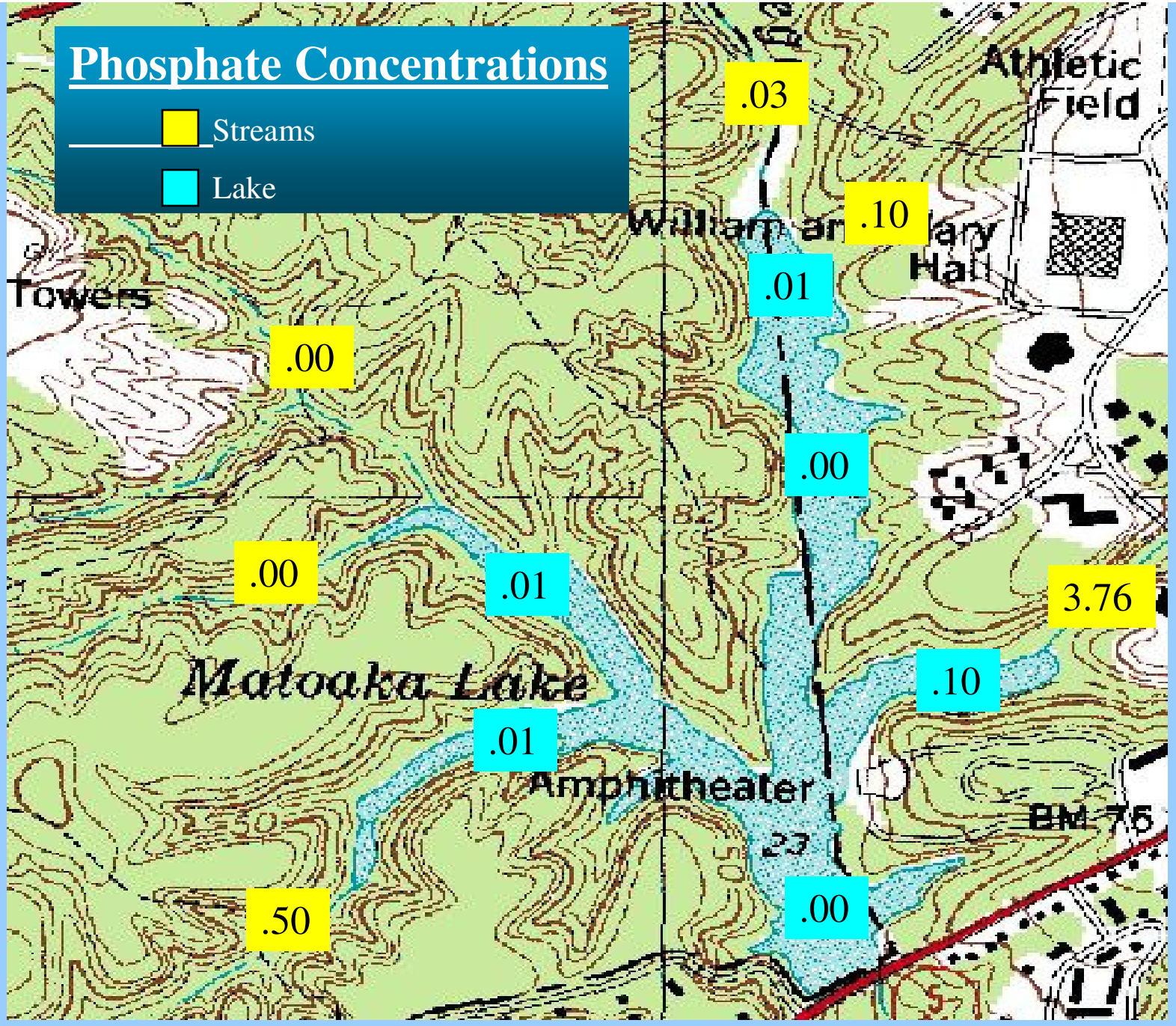


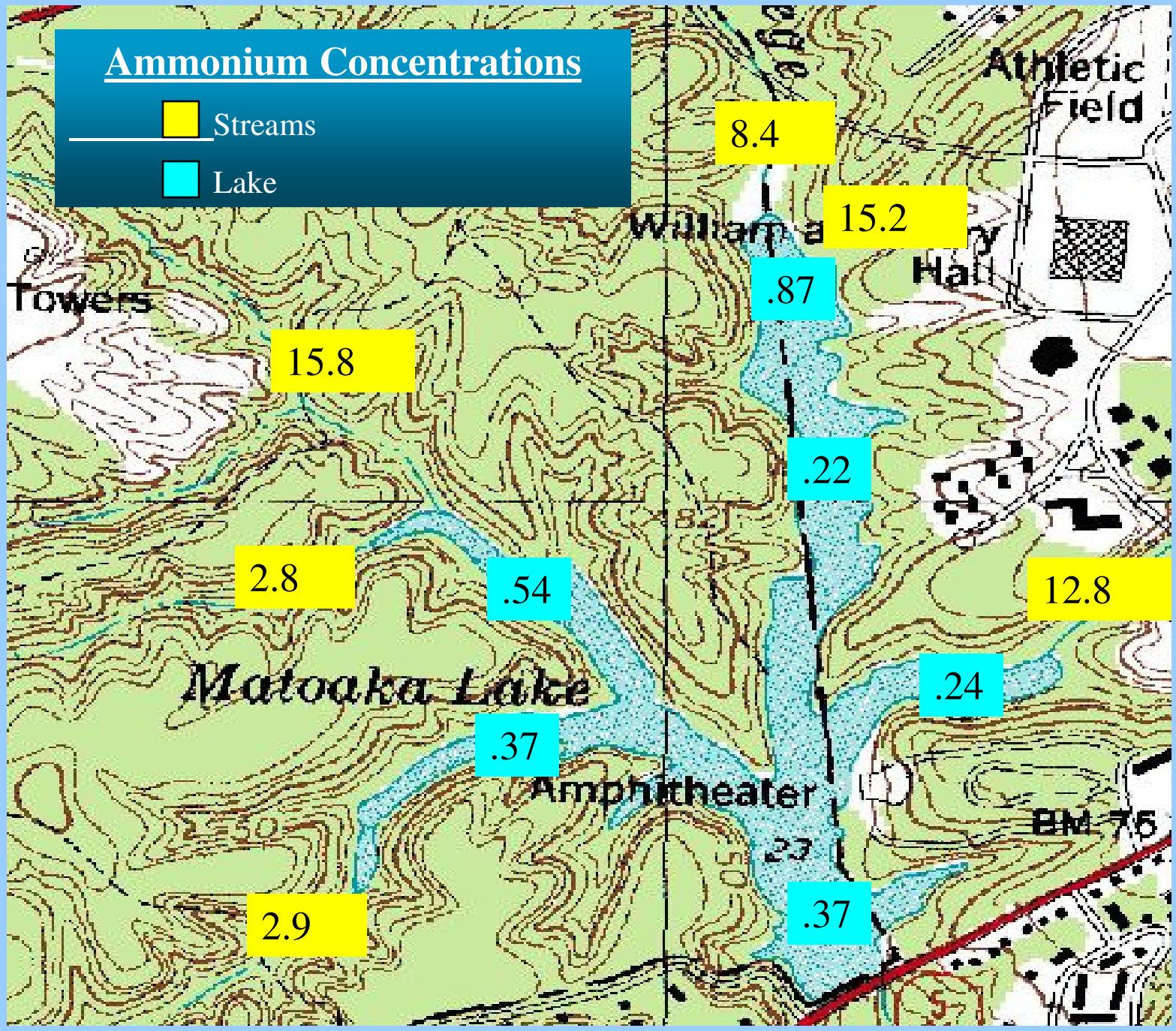

Ammonium Concentrations - Developed vs. Forested Areas
Ammonium Concentration (micromoles/L)
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
24-Jun
2-Jul
8-Jul
Developed - Ace Shopping Center 1
Developed - Ace Shopping Center 2
Forested - Eastern State Casey Property
Forested - Eastern State

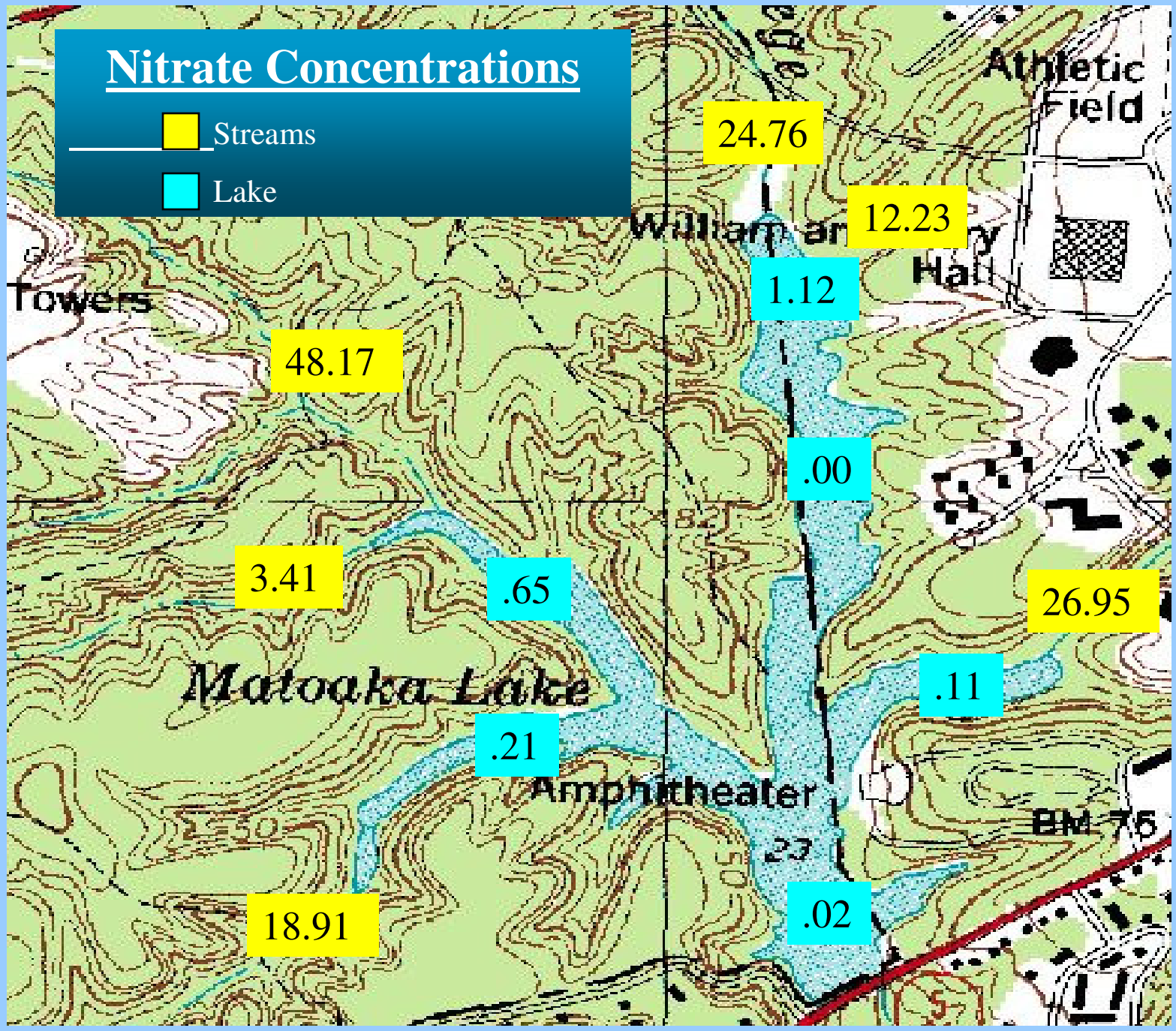
Nutrient Analysis

- The following charts illustrate the average concentration of three different, dissolved inorganic nutrients – ammonium, phosphate, and nitrate – in the Lake and in the surrounding streams. The levels of nutrients in the lake are generally one order of magnitude lower than levels in the streams. All concentrations expressed in micromoles per liter of water.

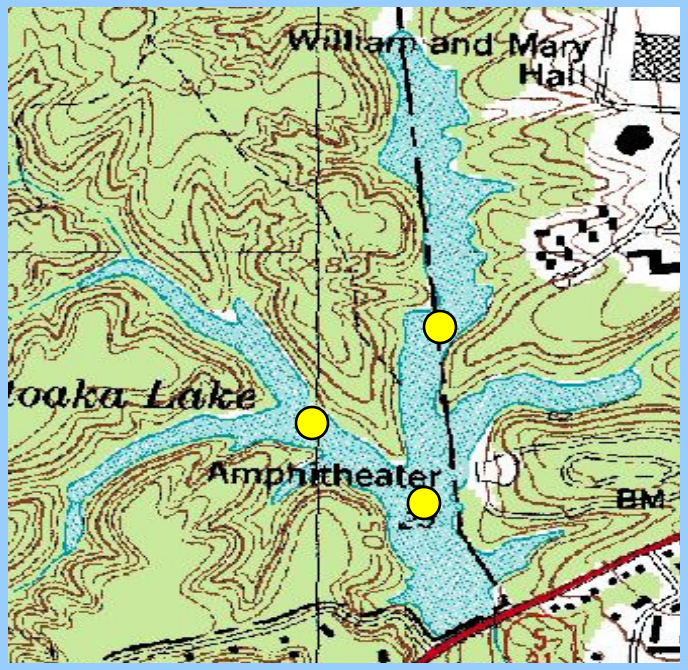
- Thus, we can conclude that Lake Matoaka acts as a sink for inorganic nutrients. Based on the presence of extensive algal blooms in the lake, most of the dissolved nutrient load from streams is incorporated into living organic matter. In addition, some of the nitrate must also be used for anaerobic decomposition in the anoxic lake sediments (denitrification).


Phosphate Concentrations
Streams
Lake
.03
.10
.01
.00
.00
.01
3.76
.10
.01
.00
.50
Matoaka Lake
Amphitheater
Athletic Field
Towers
BM 75


Ammonium Concentrations
Streams
Lake
8.4
15.2
.87
15.8
.22
2.8
.54
12.8
.24
.37
2.9
.37
Athletic Field
Towers
Matoaka Lake
Amphitheater
BM 75


Nitrate Concentrations
Streams
Lake
24.76
12.23
1.12
48.17
.00
3.41
.65
26.95
.11
.21
18.91
.02
Matoaka Lake
Amphitheater
Towers
Athletic Field
BM 75

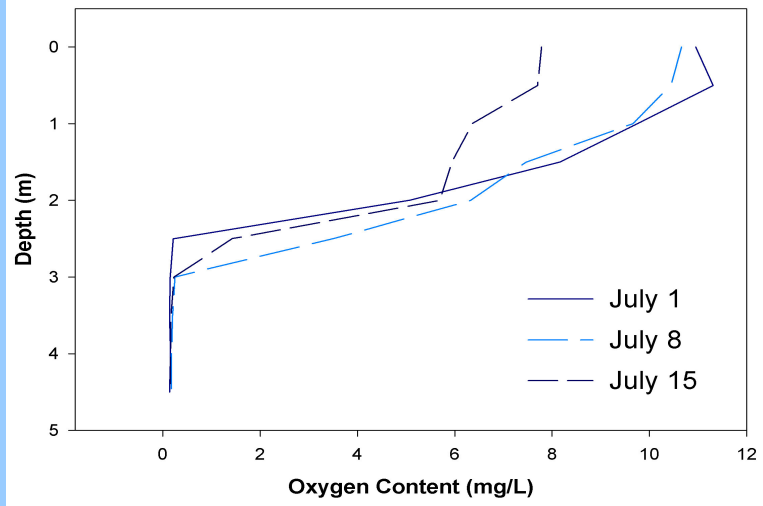
Dissolved Oxygen Profiles



Three Sampling Locations

- **Zipline**
- **West Arm of Lake**
- **East Arm of Lake**

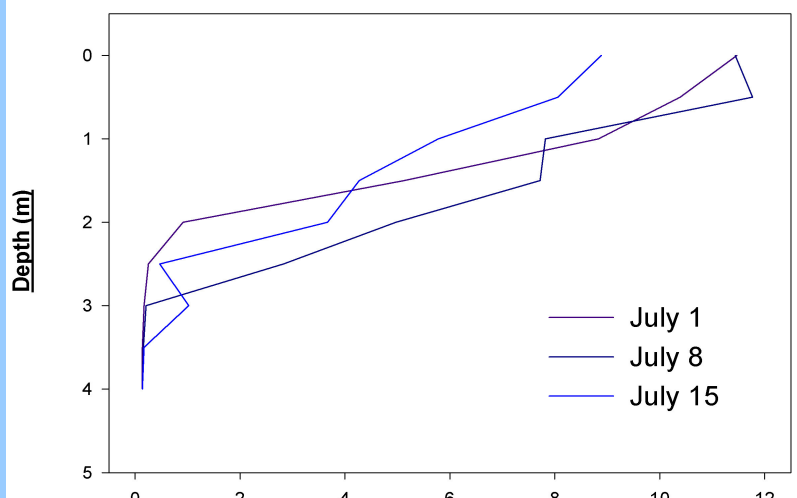
Oxygen Profiling - Zipline Location



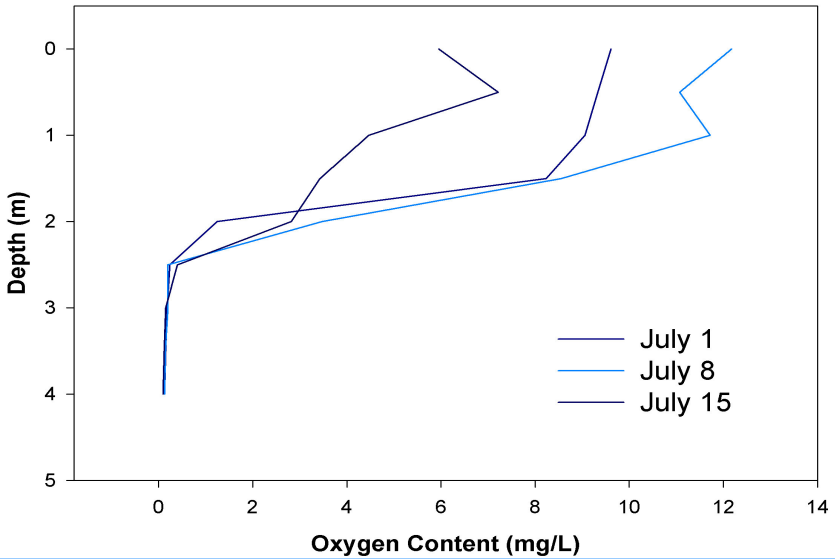
Dissolved Oxygen Analysis

•Dissolved Oxygen Levels clearly show a significant drop between 2 and 3 meters below surface waters indicating lake eutrophication --the decomposition of organic material in deeper lake waters decreases amounts of dissolved oxygen.

Oxygen Profiling - West Arm of Lake



Oxygen Profiling - East Arm of Lake



Conclusions

- **Nutrient concentrations are consistently higher in streams that run through developed areas than in streams that run through forested areas.**
- **Lake Matoaka acts as a sink for nutrients from surrounding streams, as nutrients are taken up by algae and submersed aquatic vegetation.**
- **Lake Matoaka has a pronounced oxycline, and the lake is hypoxic-anoxic below 2 m. The decomposition of organic matter drives down the oxygen concentration in the summertime.**