

# Patterns of Eutrophication in Lake Matoaka

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# Introduction



- Eutrophic watersheds
  - High organic productivity
  - ‘Well-fed’ in phosphorus and nitrates
  - Murky water depleted in oxygen
- Chlorophyll
  - Energy fixation in photosynthesis
  - Assessment of algal biomass in lakes/ponds
  - Accurate measure of photosynthetic activity
  - Depends on availability of nutrients

# Objectives

- Develop a technique for measuring algal chlorophyll concentration in Lake Matoaka
- Establish any patterns of anoxic zones
- Determine whether or not there are spatial/temporal/depth gradients of chlorophyll within the lake
  - Hypothesis: Eastern side of the lake would have greater amounts of algae (and therefore chlorophyll) due to the higher amounts of development-associated runoff



# Materials & Methods

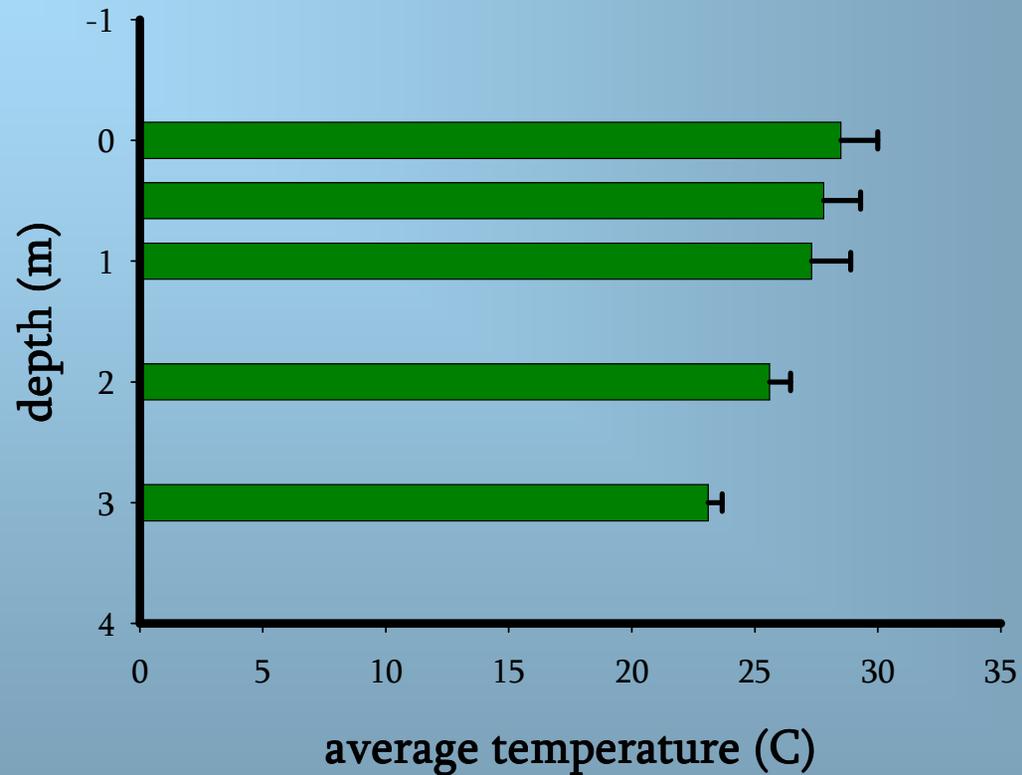


# Materials & Methods

- Field measurements
  - Temperature
  - DO<sub>2</sub>
  - Conductivity
- Filtration
- Spectrophotometric methods

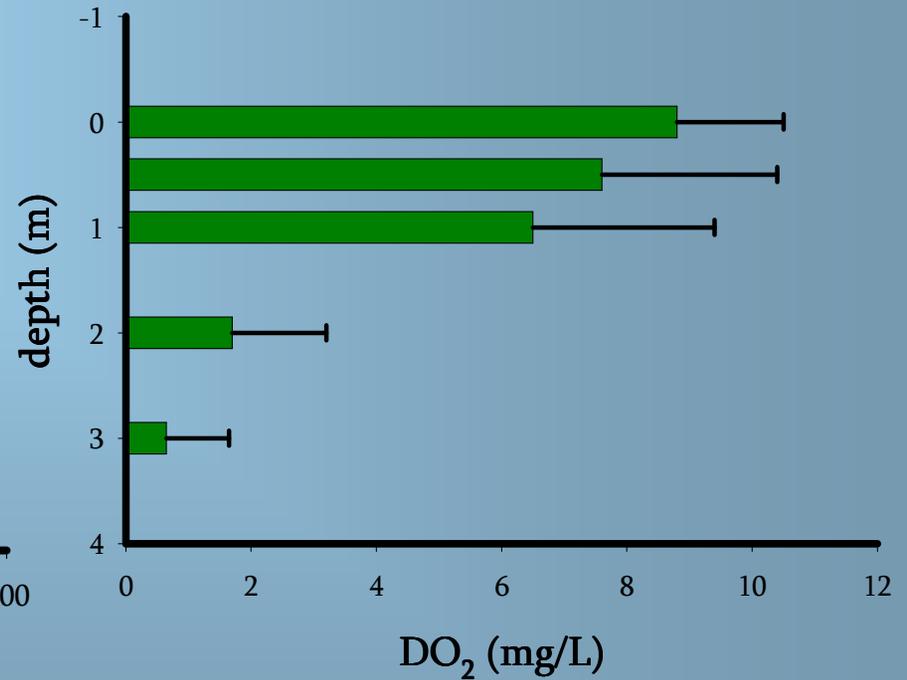
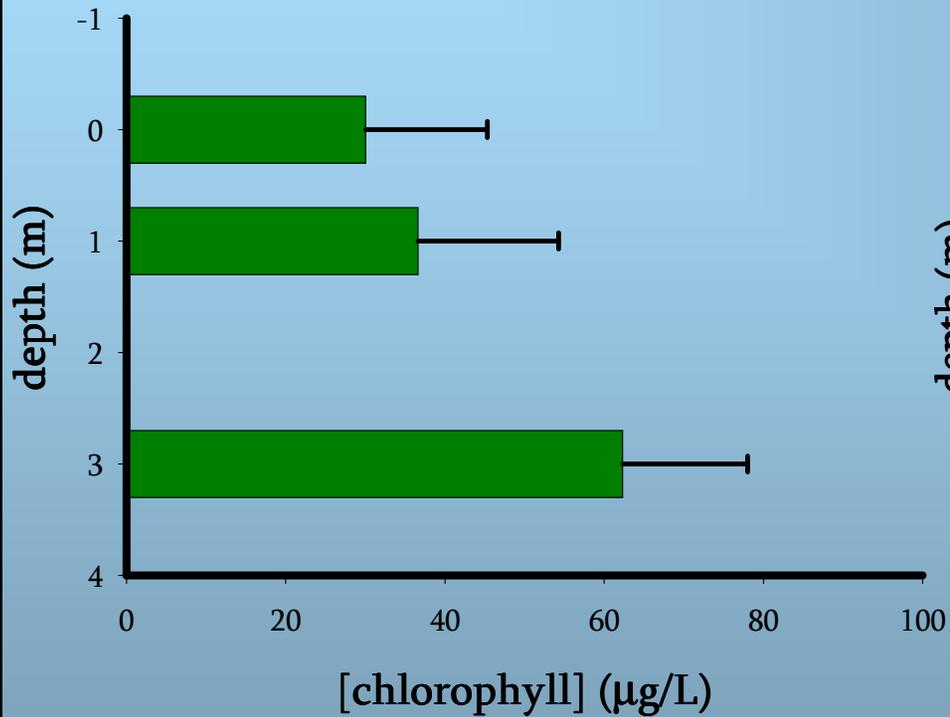


# Results: Depth Patterns



- no significant thermocline
- even mixing of water

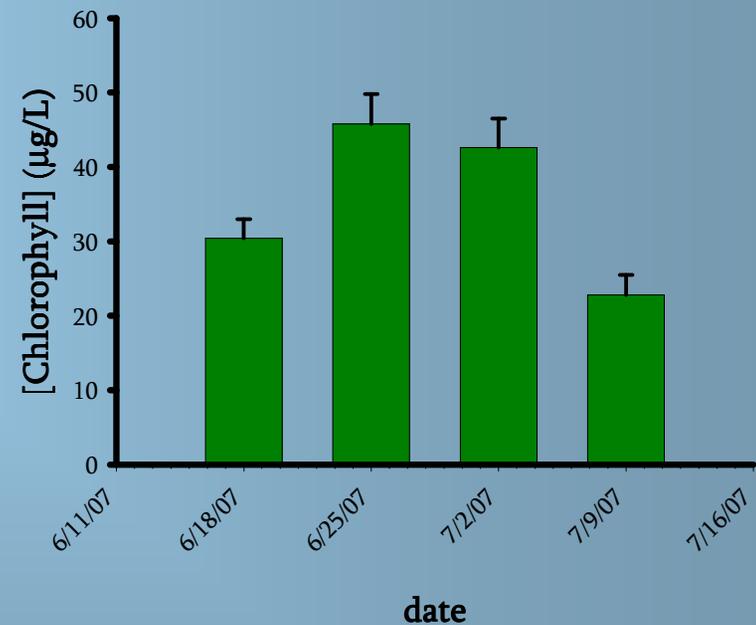
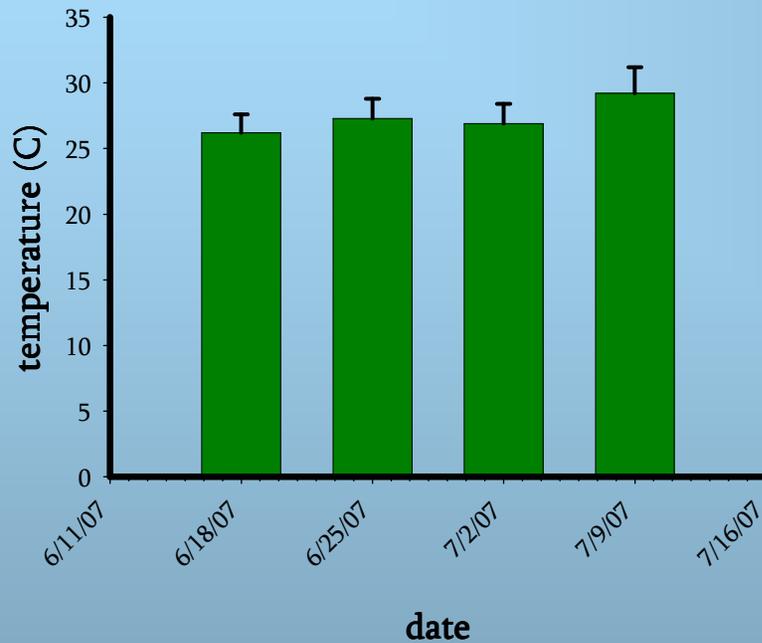
# Results: Depth Patterns



•decomposition > photosynthesis

# Results:

## Temporal Patterns



•seasonal variation due to nutrient limitation

# Results: Spatial Patterns

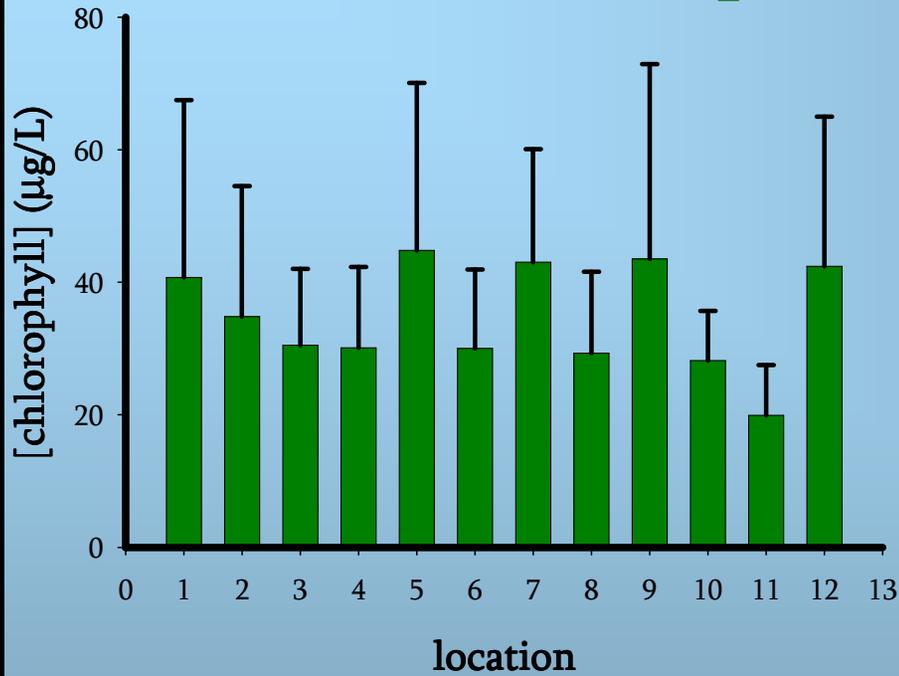
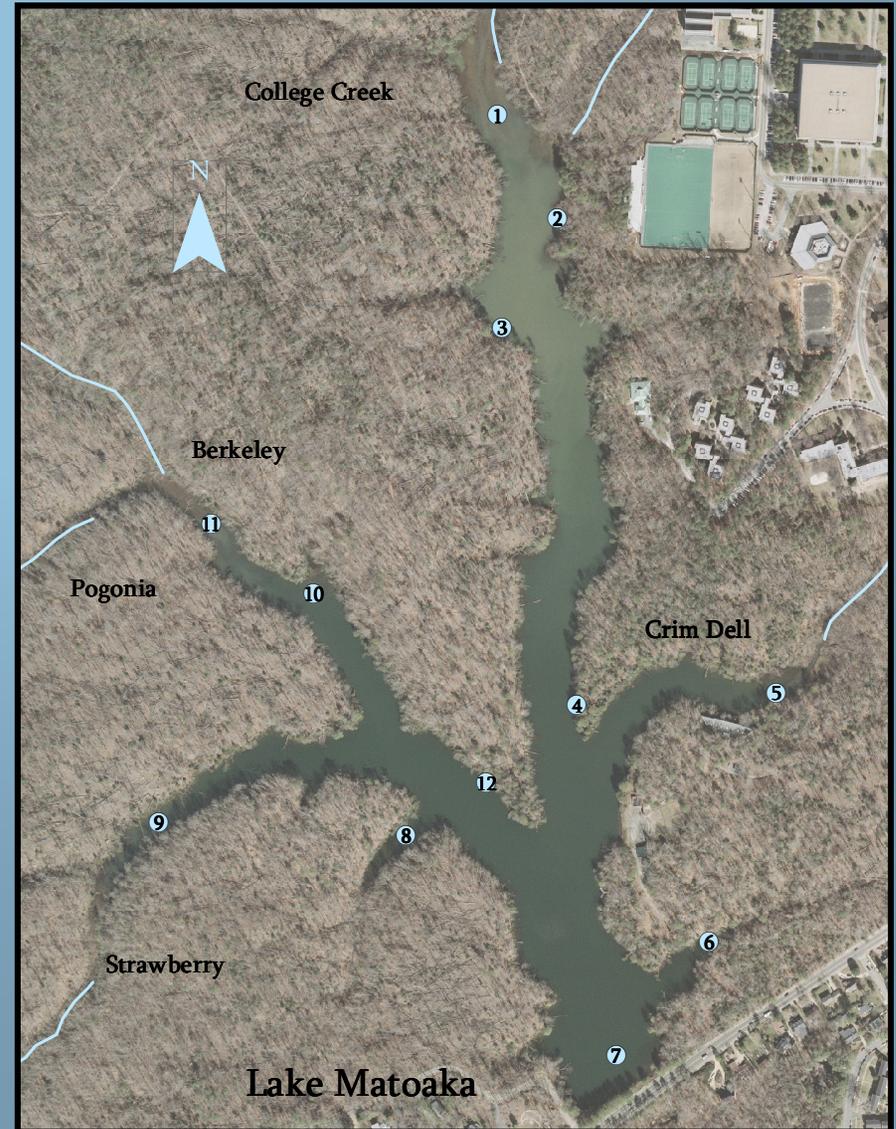
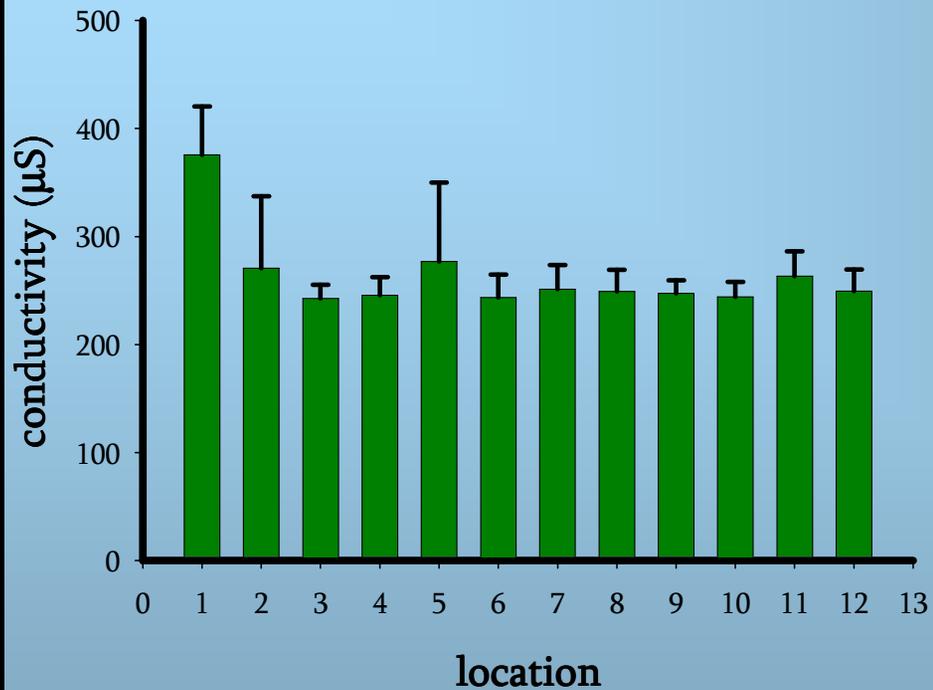


Table 1. Runoff into Lake Matoaka

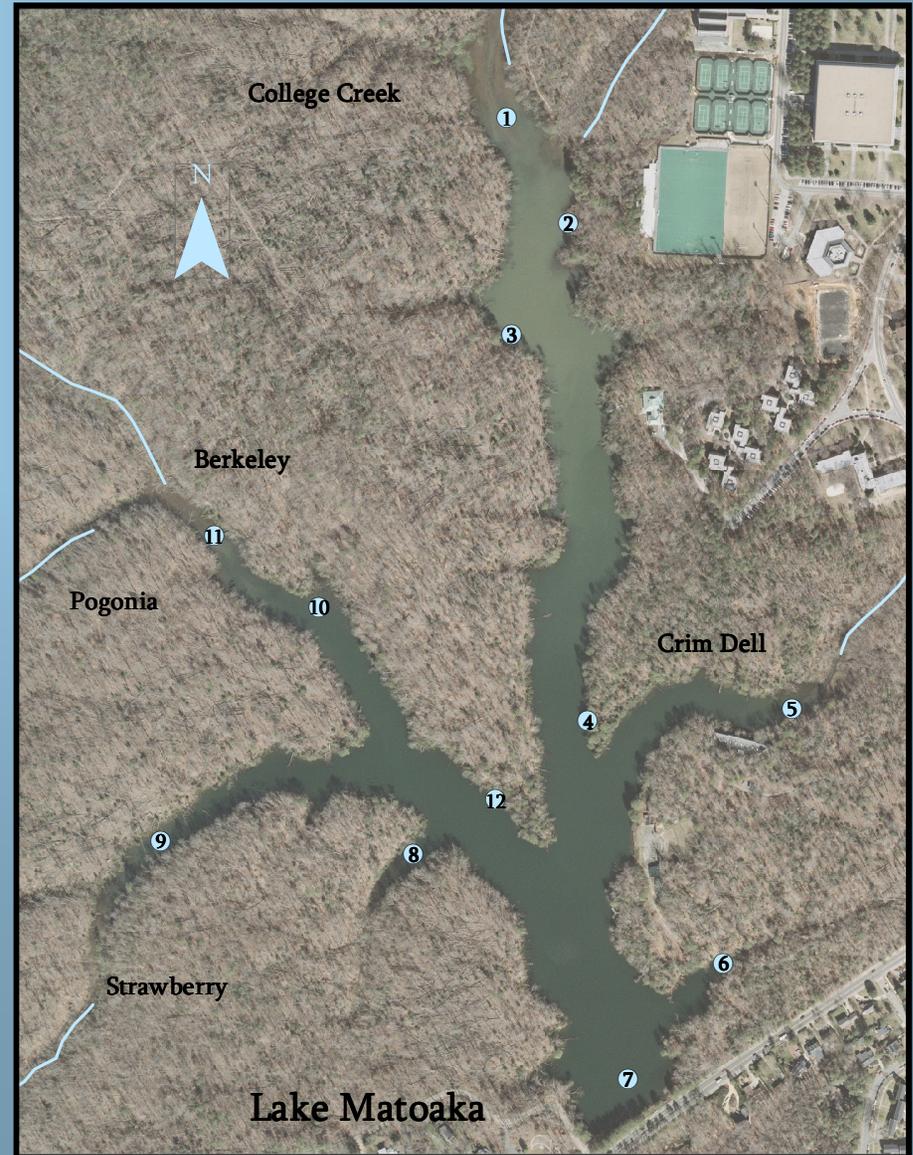
College Creek	0.030 m <sup>3</sup> /s
Crim Dell	0.012 m <sup>3</sup> /s
Strawberry	0.008 m <sup>3</sup> /s
Pogonia	0.006 m <sup>3</sup> /s
Berkeley	0.005 m <sup>3</sup> /s



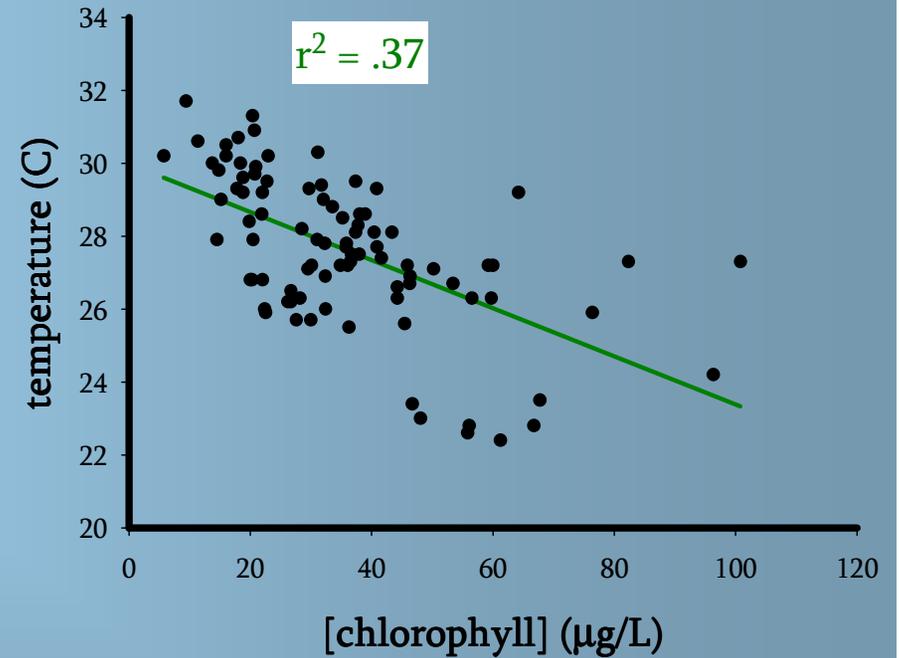
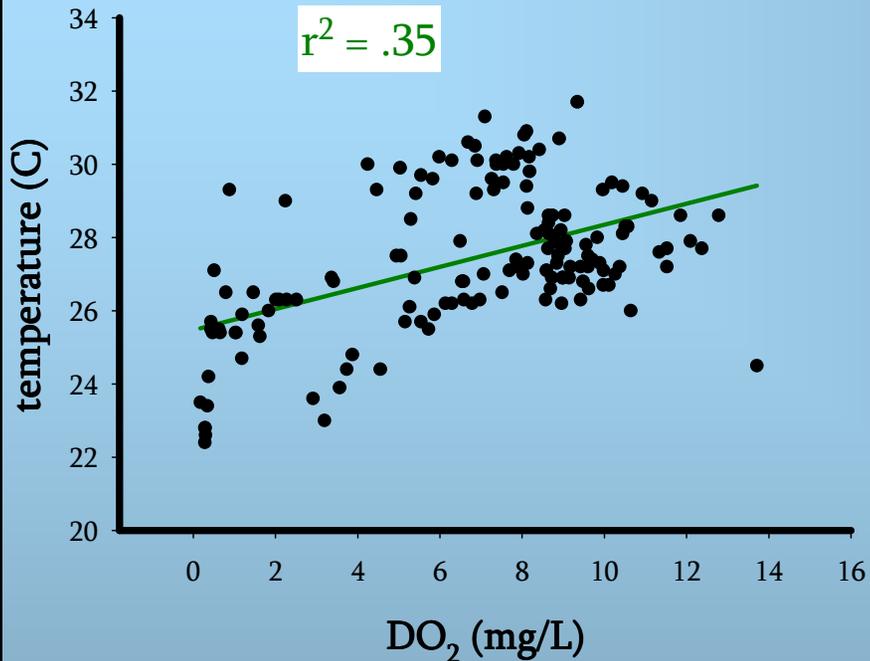
# Results: Spatial Patterns



•correlation between conductivity  
and runoff volume



# Results



- warmer water near the surface receives more oxygen from atmosphere
- colder water at bottom has more respiration and decomposition

- high chlorophyll and low DO<sub>2</sub> at cold temperatures
- decomposition is occurring faster than photosynthesis

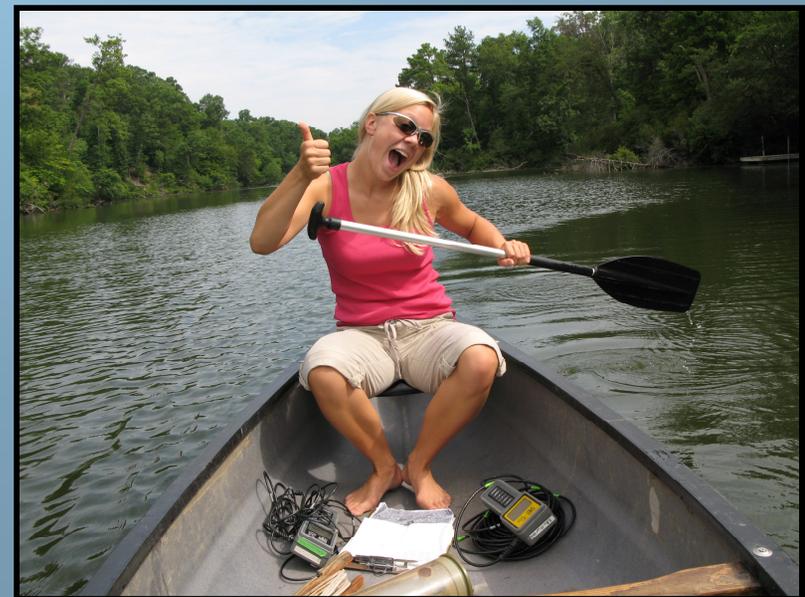
# Conclusions

Table 2. Lake Matoaka as a eutrophic system

	<b>Eutrophic</b>
Chlorophyll ( $\mu\text{g/L}$ )	>15
Phosphorus ( $\mu\text{g/L}$ )	>15
Depth (m) and sediment	<10, organic bottom high in N

Source. Berner, E. Global Environment. p 251.

- Chlorophyll concentration and conductivity correlates directly w. runoff volume
- Lake Matoaka as a large-scale BMP?



# References

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