



# A Spatial Comparison of Phosphorus, pH, Temperature, and Depth Profiles in Missisquoi Bay

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## BACKGROUND

- Water quality is a major issue around the world.
- Missisquoi Bay (max. depth 5m) is host to many recreational activities and also provides habitat for animals and plants.
- Phosphorus (P) is a critical nutrient affecting water quality in the lake, and may vary with respect to location as well as depth, temperature, pH and dissolved oxygen (DO) concentration.

## OBJECTIVES

- Analyze soluble reactive phosphorus (SRP) in surface and bottom water collected at 11 sites in Missisquoi Bay.
- Identify relationships between SRP concentration and pH, temperature, DO, and depth throughout the bay.

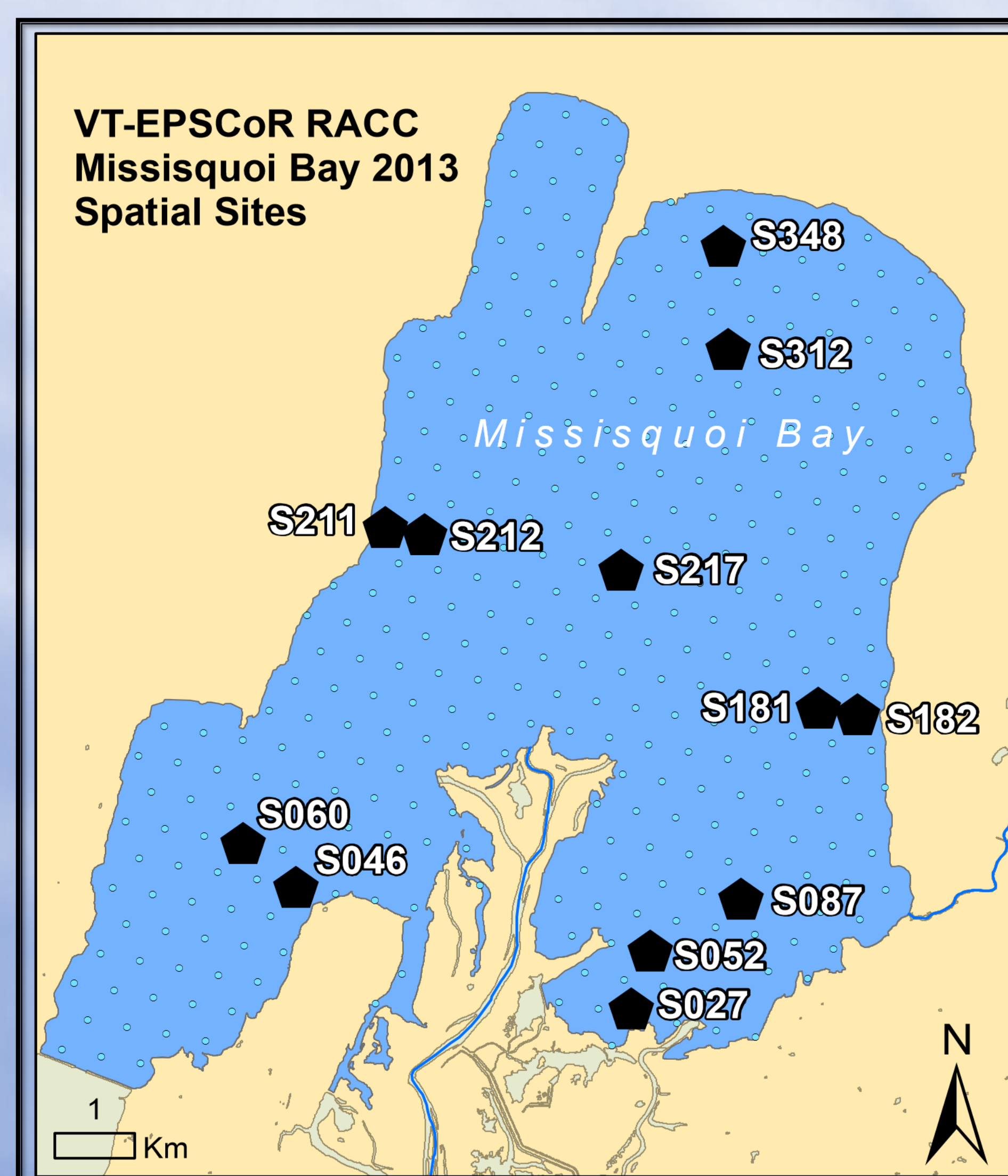
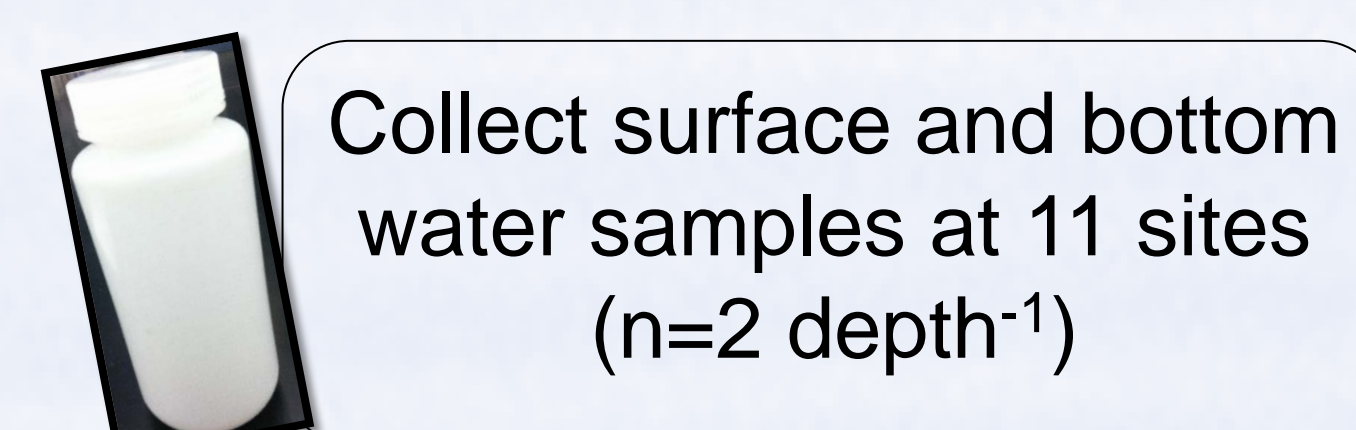


Figure 1. Missisquoi Bay study sites

## METHODOLOGY

### Soluble Reactive Phosphorus (SRP) Determination



Filtration (0.45 µm, Polyethersulfonate)

Molybdate Colorimetry for SRP

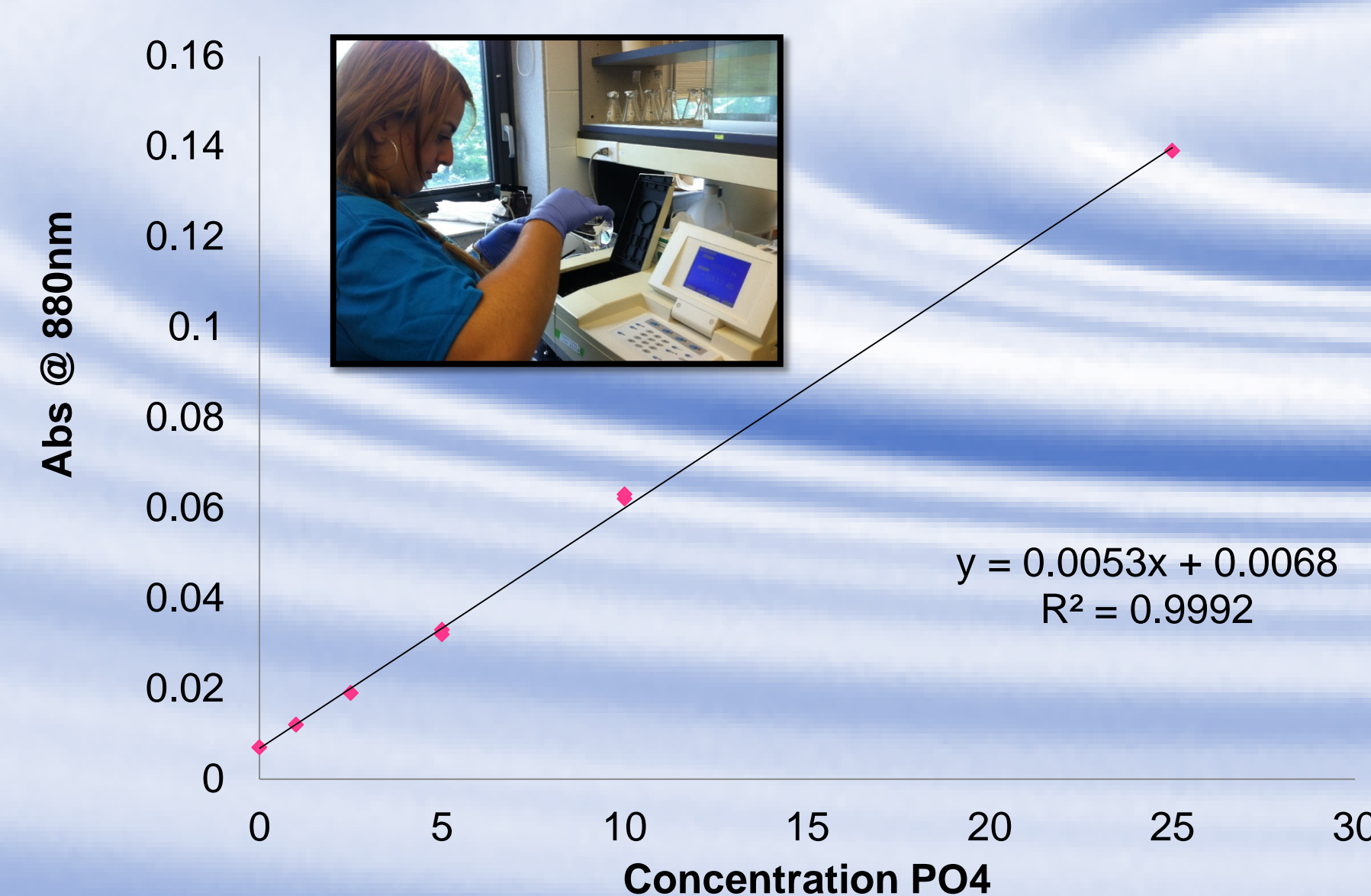


Figure 2. Example of SRP standard curve

### Field Measurements



**YSI Sonde 6600v2**  
 pH  
 Dissolved oxygen (%)  
 Temperature (°C)  
 Depth (m)

## RESULTS

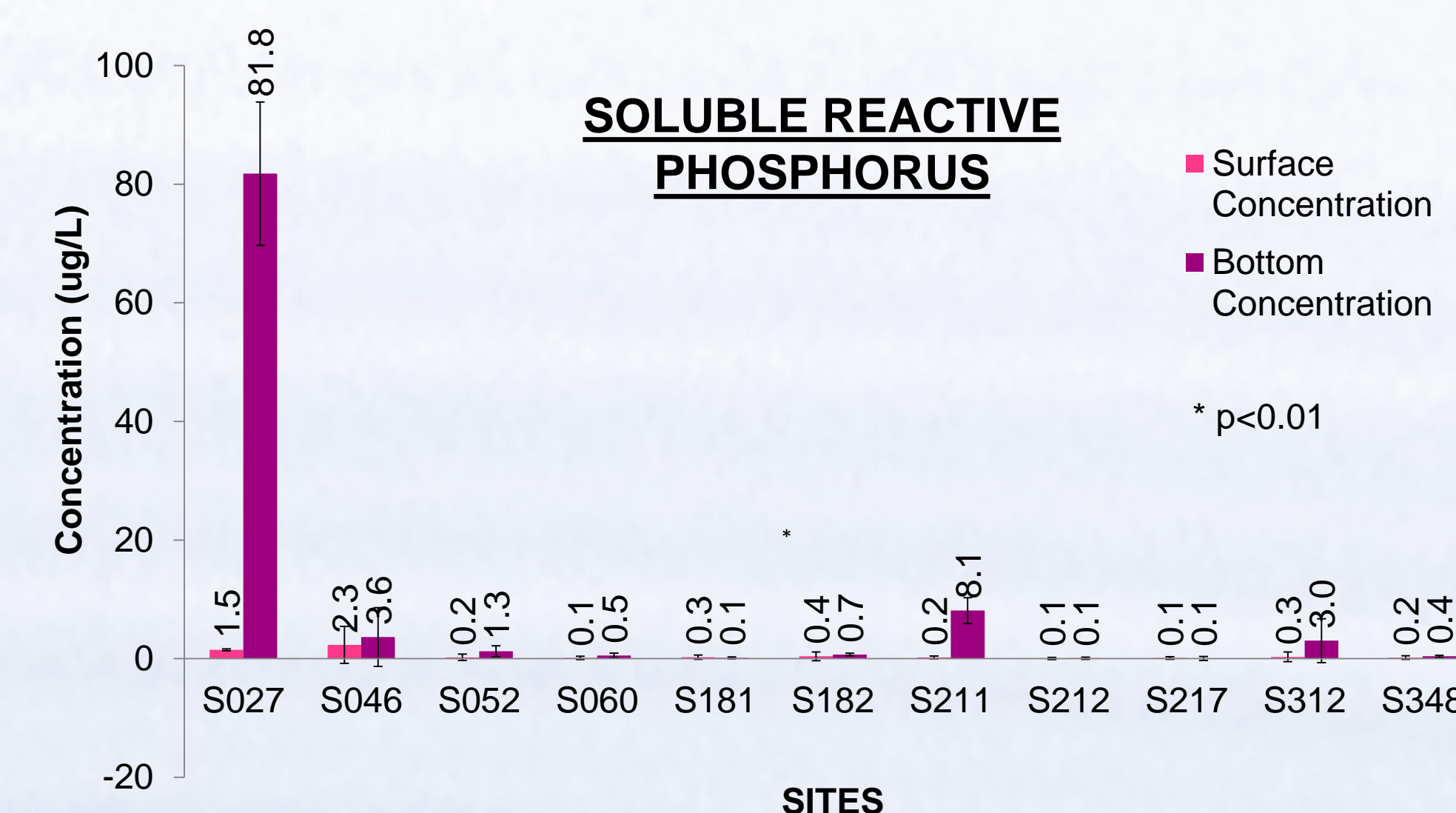


Figure 3. Comparison of SRP concentrations in surface and bottom water at Missisquoi Bay sampling sites.

### FIELD MEASUREMENTS

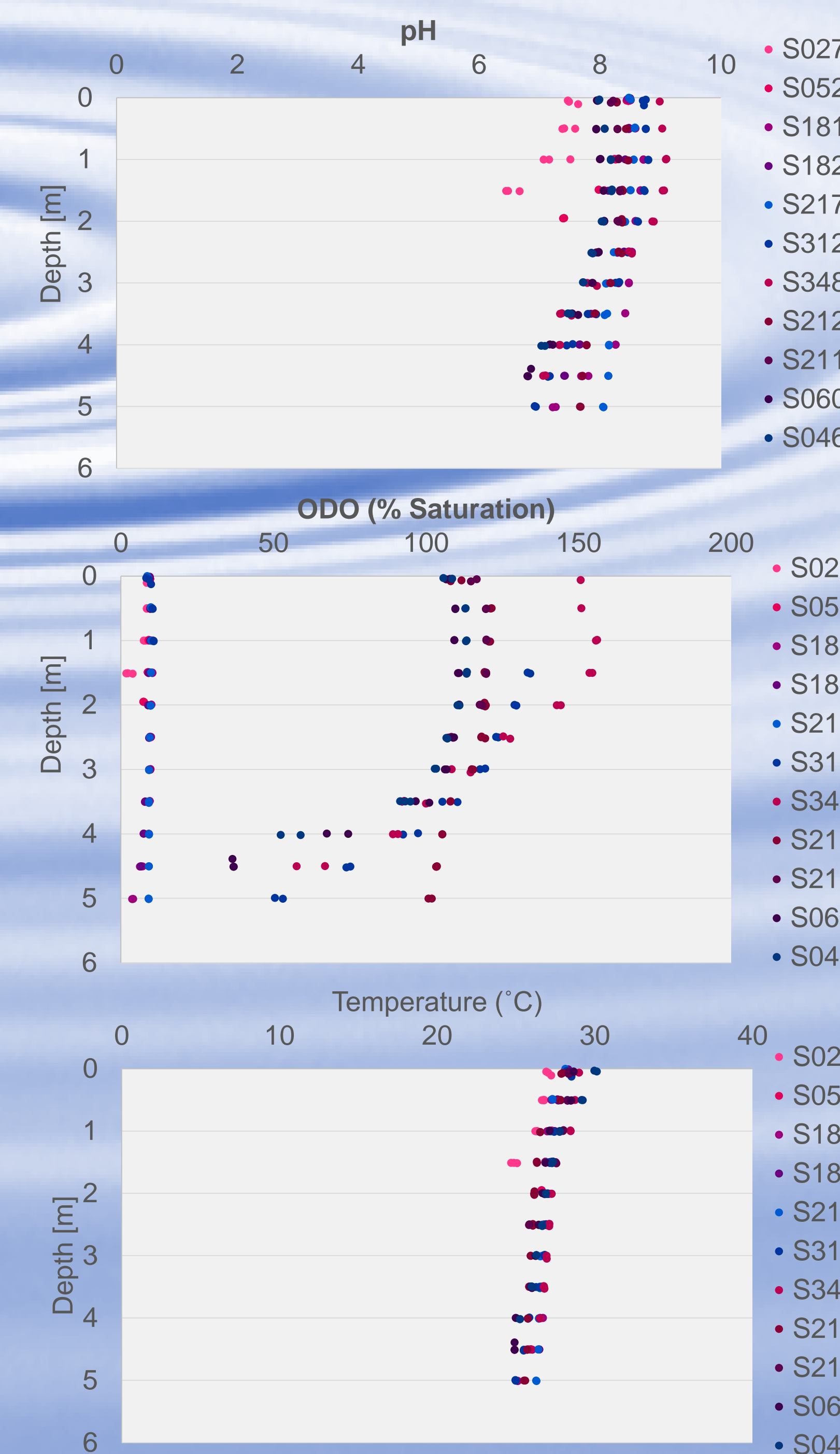


Figure 4. Depth profiles of pH, DO, and temperature in the water column at Missisquoi Bay field sites.

## SUMMARY

- SRP concentrations varies across sites in Missisquoi Bay.
- Sites S027, S211, and S312 showed higher SRP concentrations in the bottom water compared to the surface.
- Site S027 had the highest SRP concentration, was the shallowest (< 2 m), and had the lowest DO concentrations measured.
- High concentrations of SRP at site S027 may be due to aquatic vegetation and easily disturbed bottom sediments.
- In general, pH was higher at the surface (pH ≈ 8-9) than the bottom (pH ≈ 6-7)
- The difference in DO between surface and bottom varied across sites.
  - S027, S052, S217, S212 had very low DO (<20%) and were not stratified.
  - All other sites had higher DO at the surface compared to bottom water.
- Temperature was 2-3°C warmer on the surface than bottom.

## CONCLUSIONS

- Warm, shallow locations within the bay may be an important source of SRP.
- Low dissolved oxygen in bottom waters may also lead to high SRP concentrations in the water column.

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## REFERENCES

- Cade-Menun et al. 2006. *Environ.Sci.Technol* 40, 7874-7880.
- Smeltzer et al. 2012. *Journal of Great Lakes Research* 38 6-18.