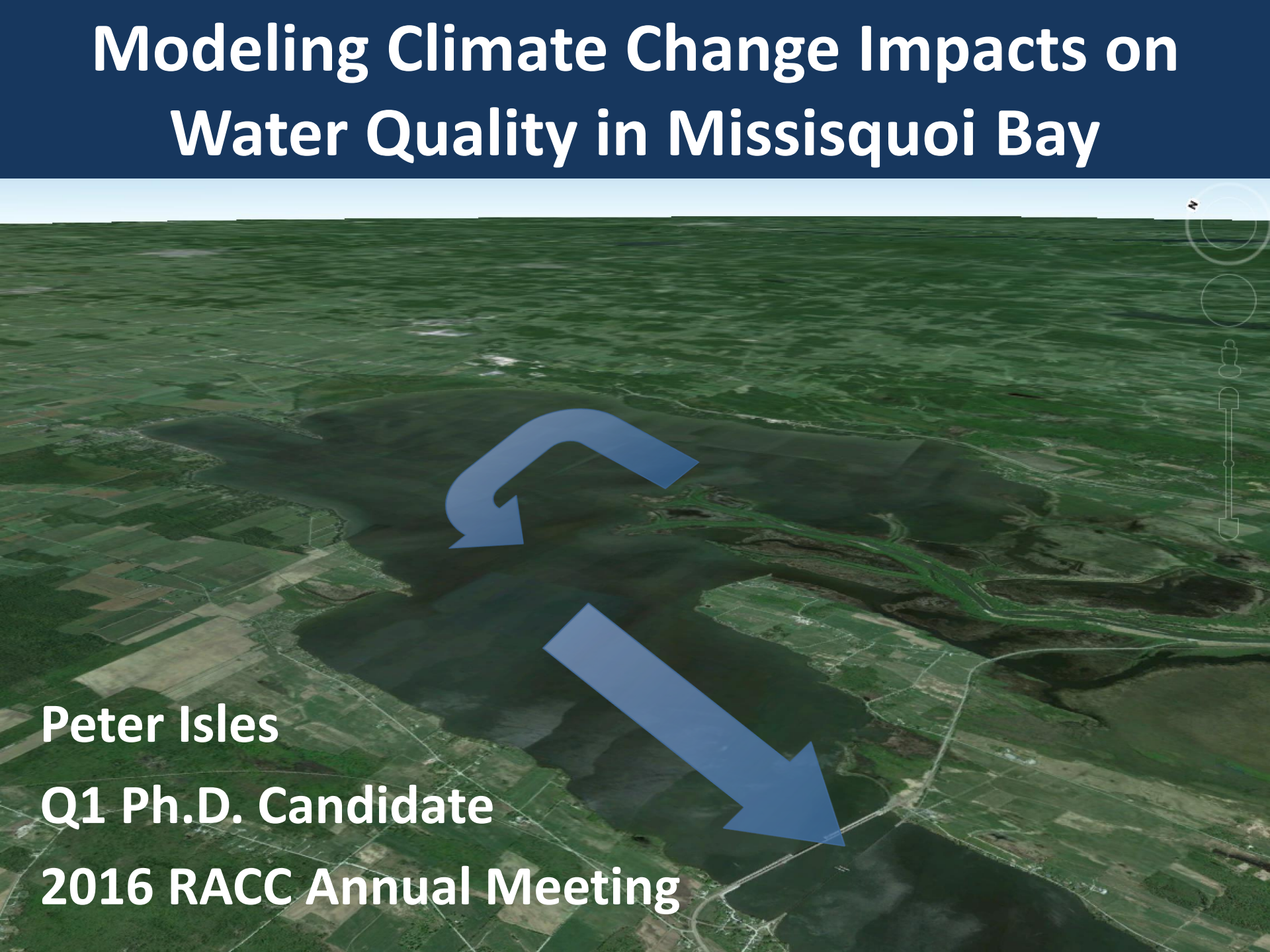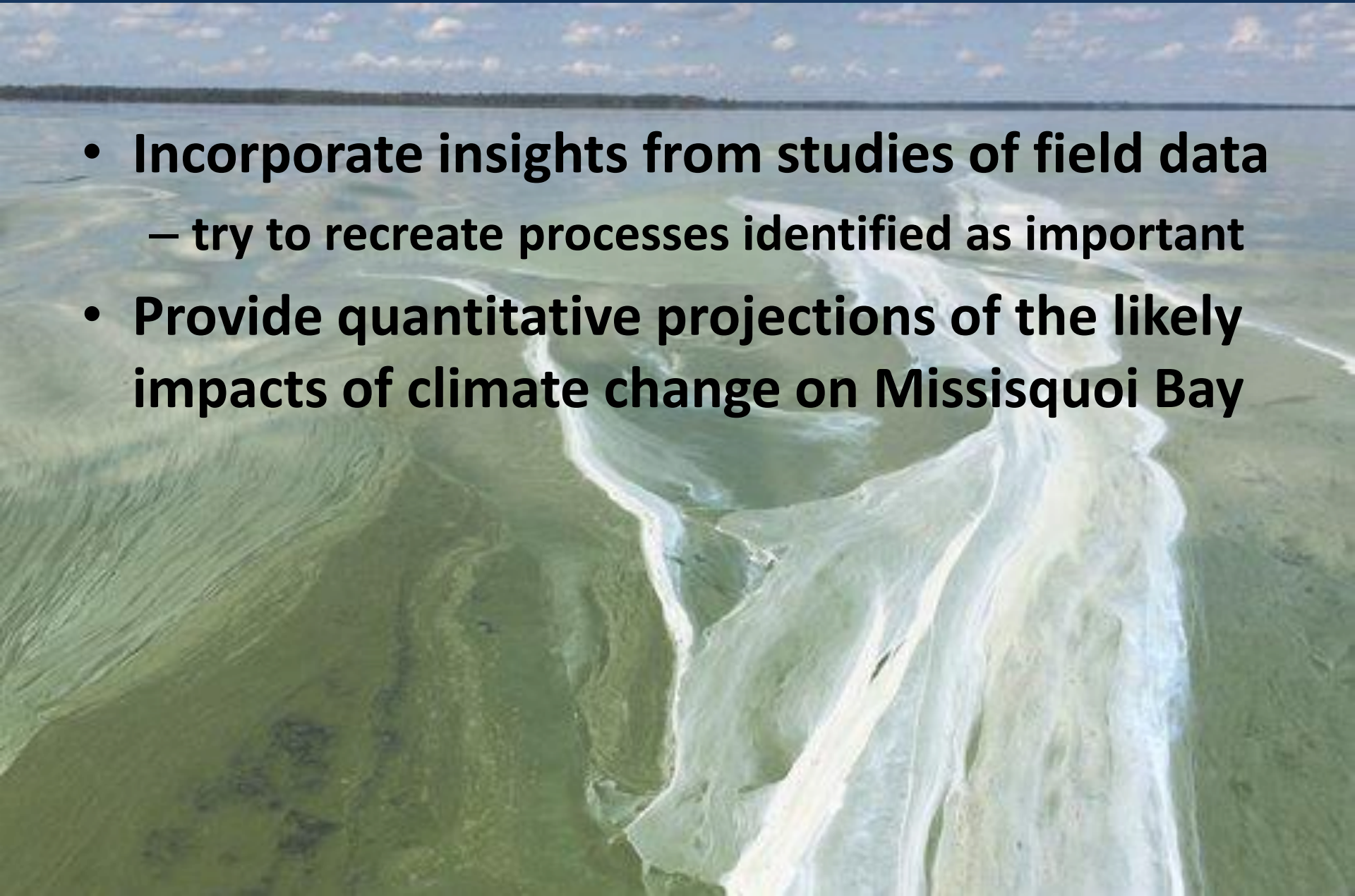# Modeling Climate Change Impacts on Water Quality in Missisquoi Bay
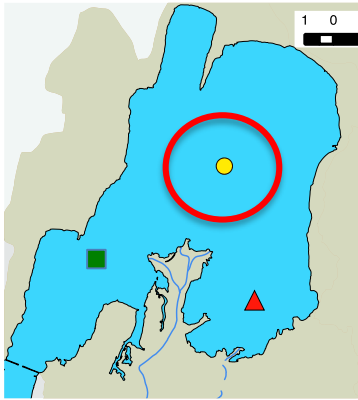
Peter Isles

Q1 Ph.D. Candidate

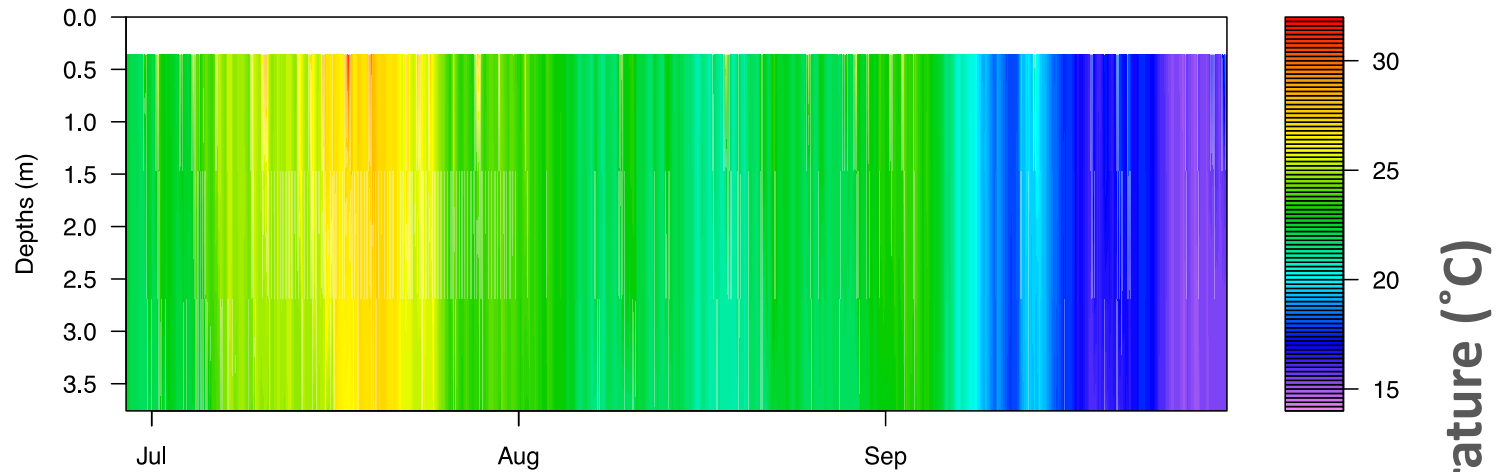**2016 RACC Annual Meeting**

Goals

- **Incorporate insights from studies of field data**
  - **— try to recreate processes identified as important**
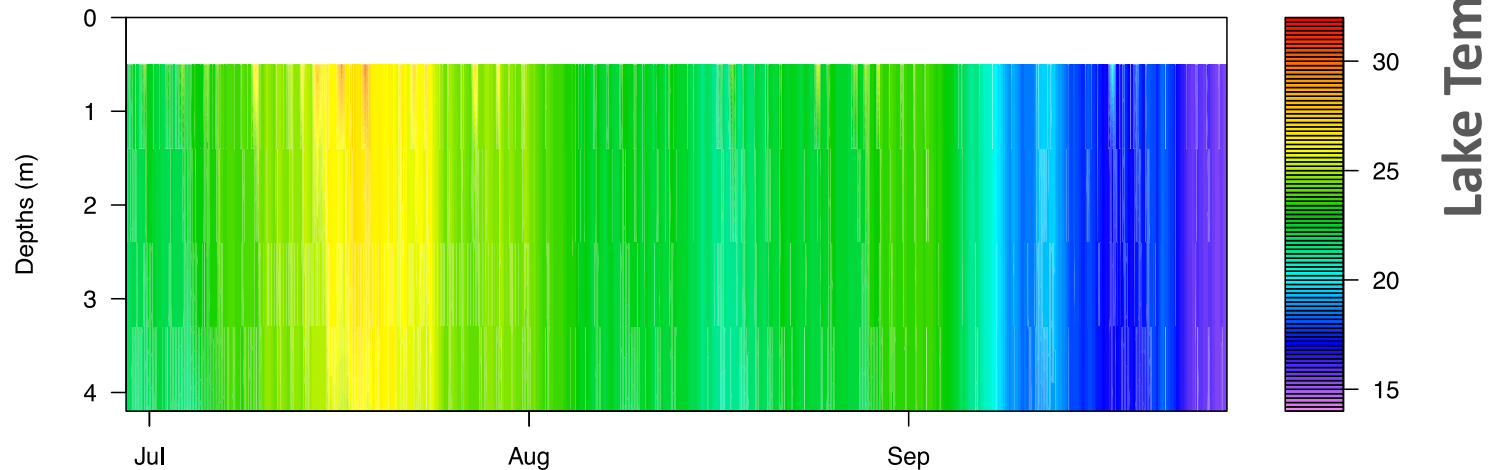- **Provide quantitative projections of the likely impacts of climate change on Missisquoi Bay**
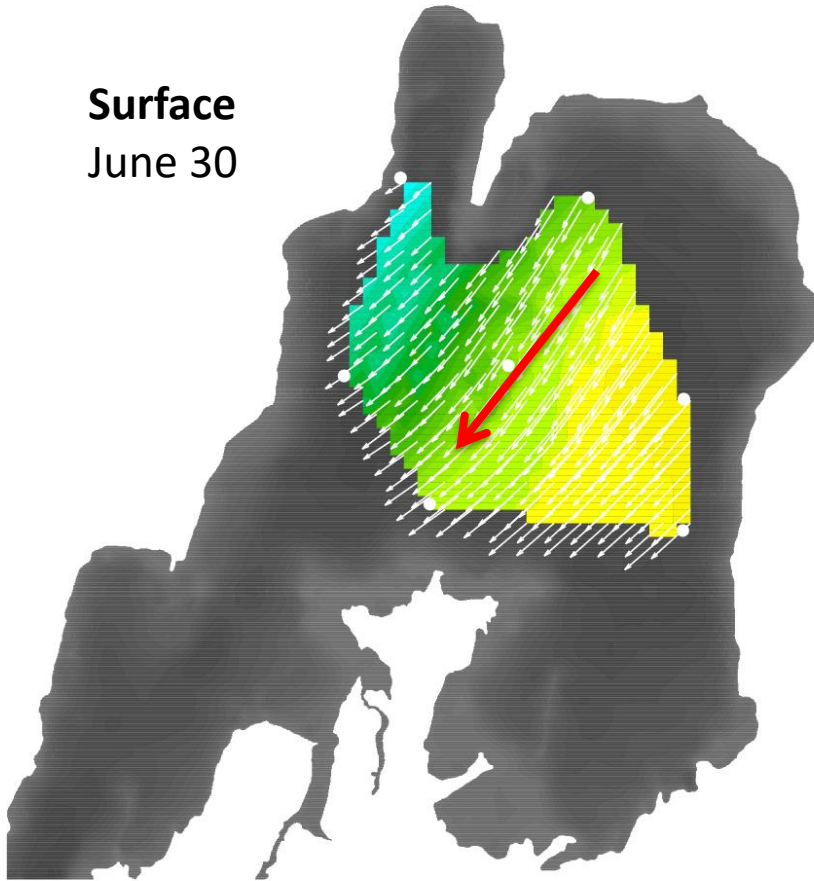
Hydrodynamic Model Results
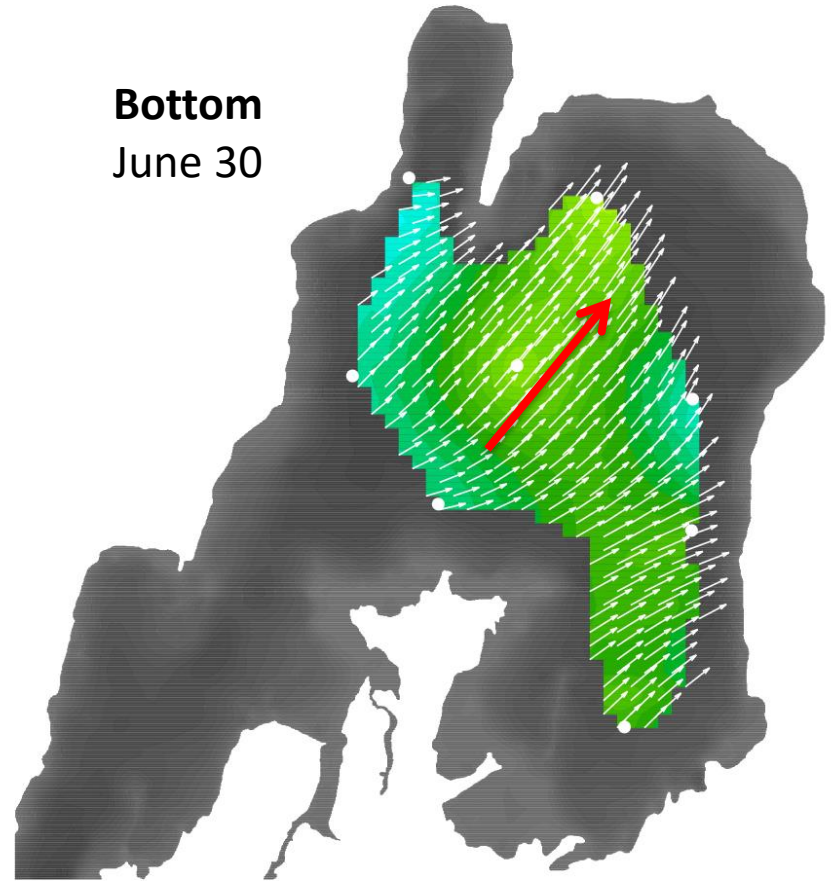

V1−N.Delta; Observed

V1−N.Delta; Modeled

Lake Temperature (°C)

Hydrodynamic Model Results

Circulation patterns

Surface
June 30

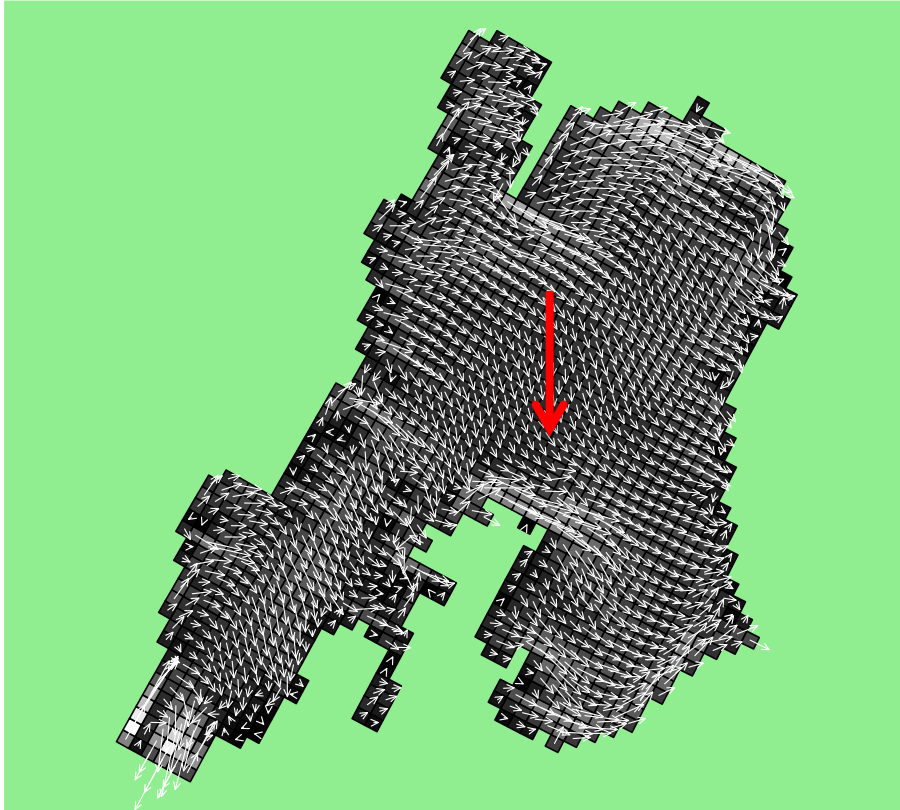**Bottom**
June 30

Zach Perzan and Tom Manley

Hydrodynamic Model Results
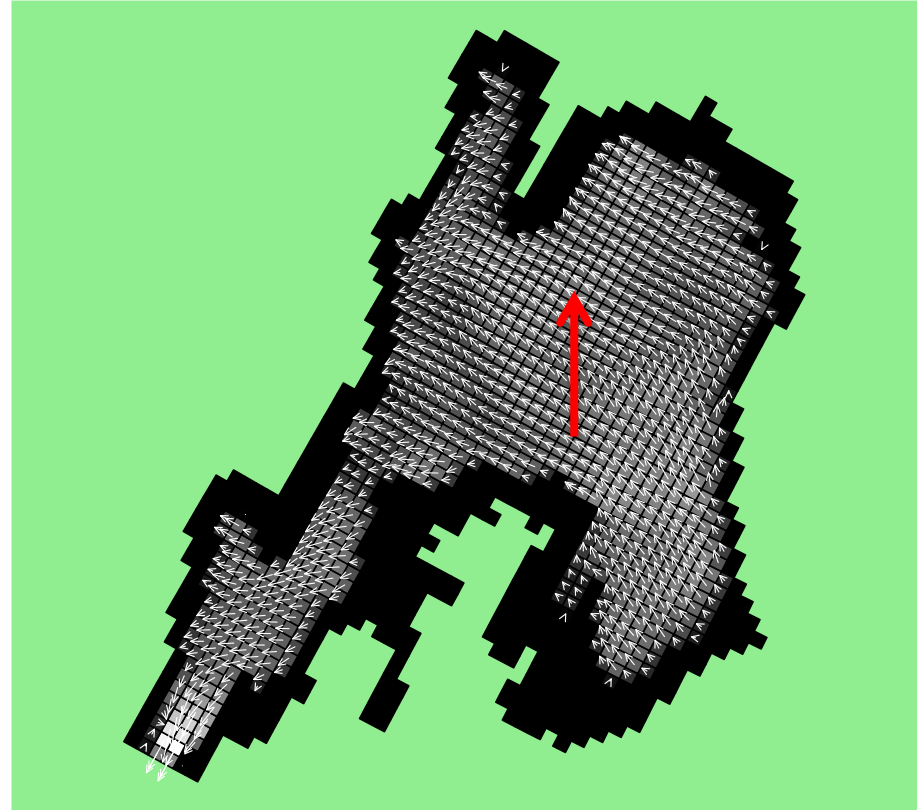
Modeled Flow Patterns: Shear Events

Surface June 30
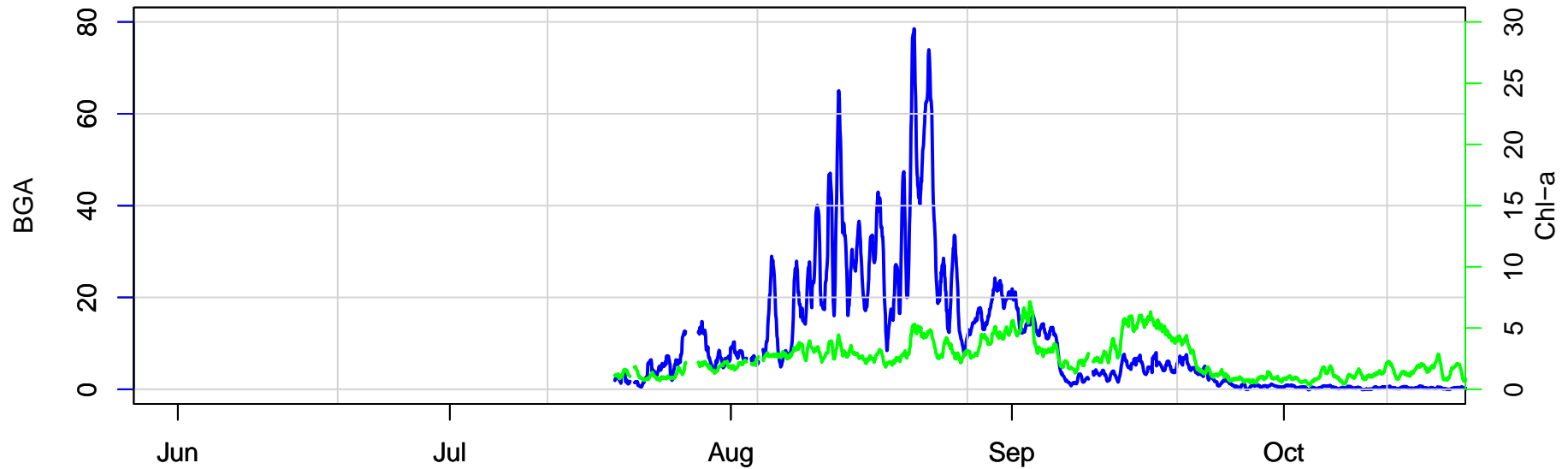
Horizontal Velocity Surface; Jun 30, 2013 19:58
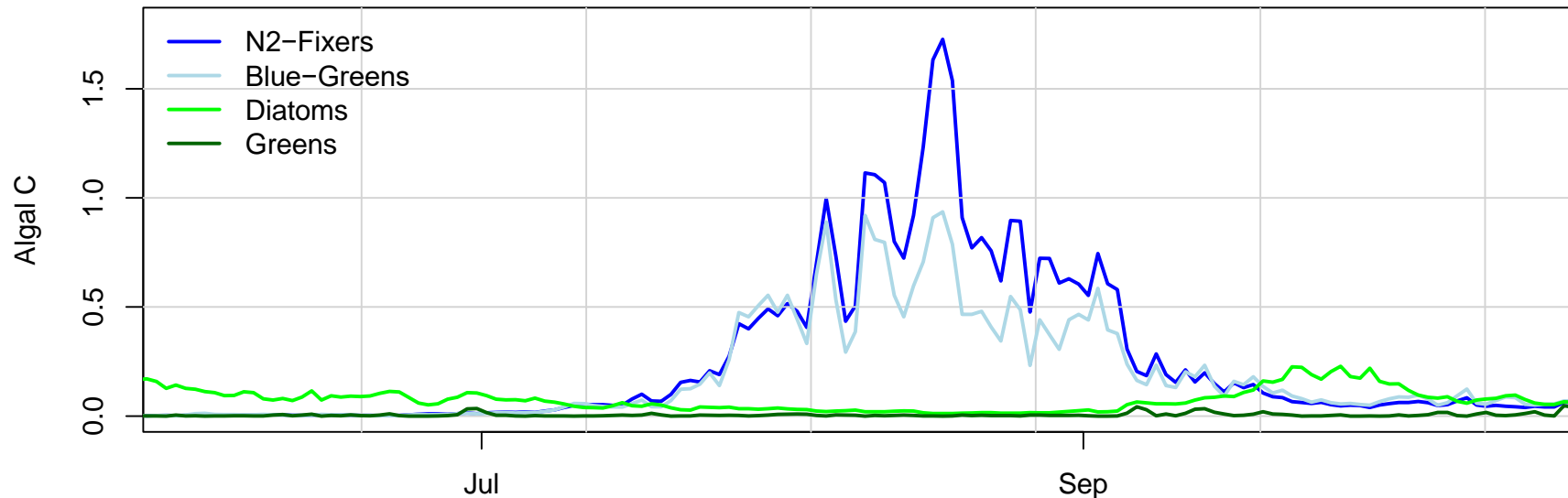
Bottom June 30

Horizontal Velocity Bottom; Jun 30, 2013 19:58
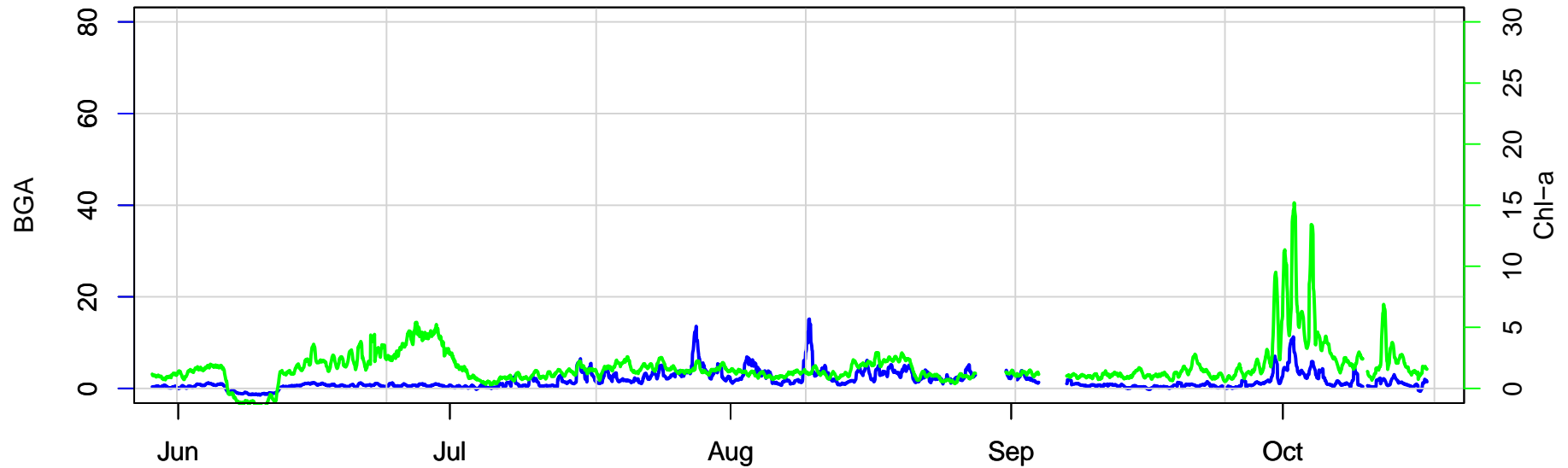
Water Quality Results: Phytoplankton

Water Quality Results: Phytoplankton

Observed 2013

Modeled 2013

Legend:
- N2-Fixers
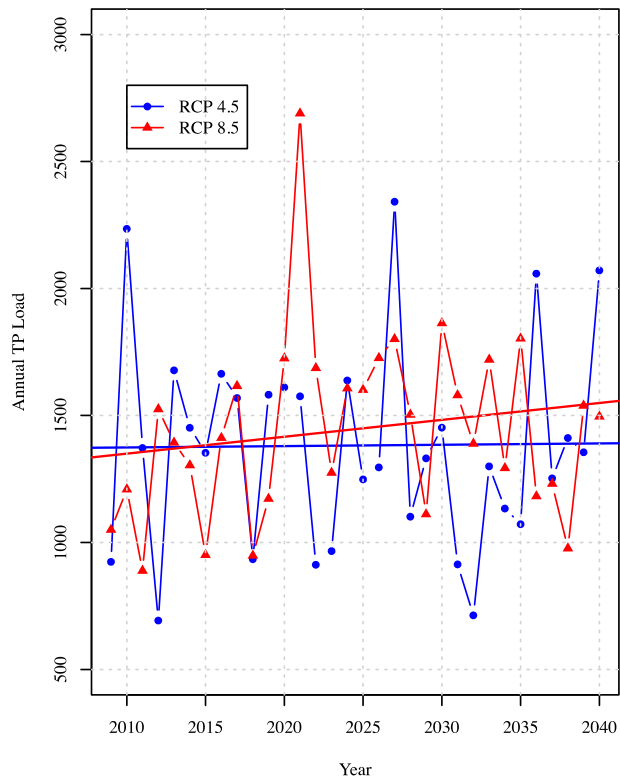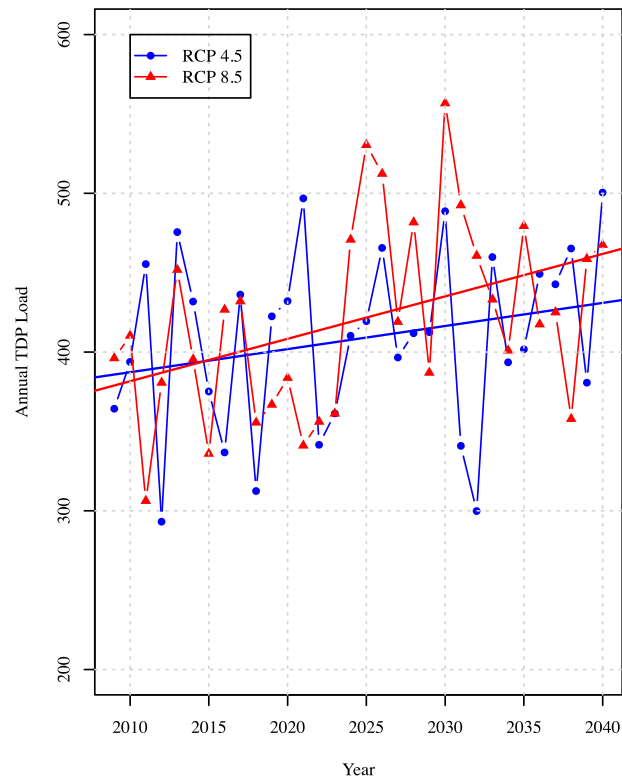- Blue-Greens
- Diatoms
- Greens
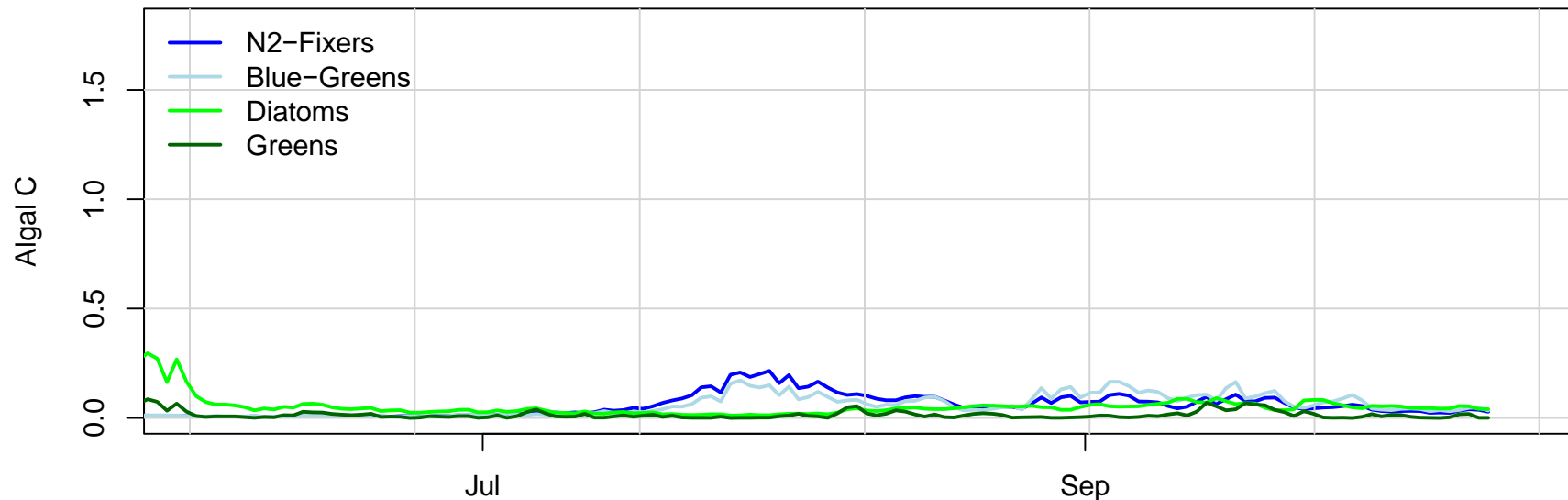
Climate Projections: Nutrient Loads

Increased Dissolved P and Total N despite no change in land use

Total P   **Dissolved P**   **Total N**
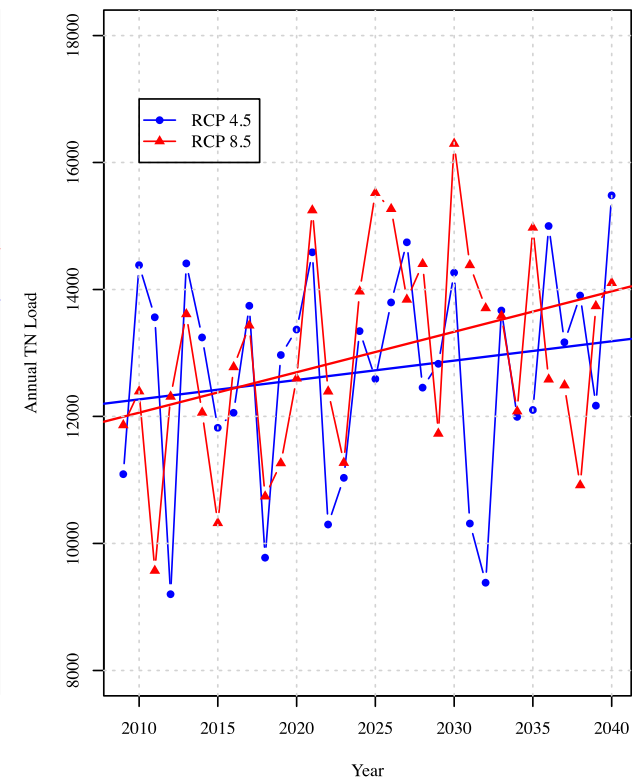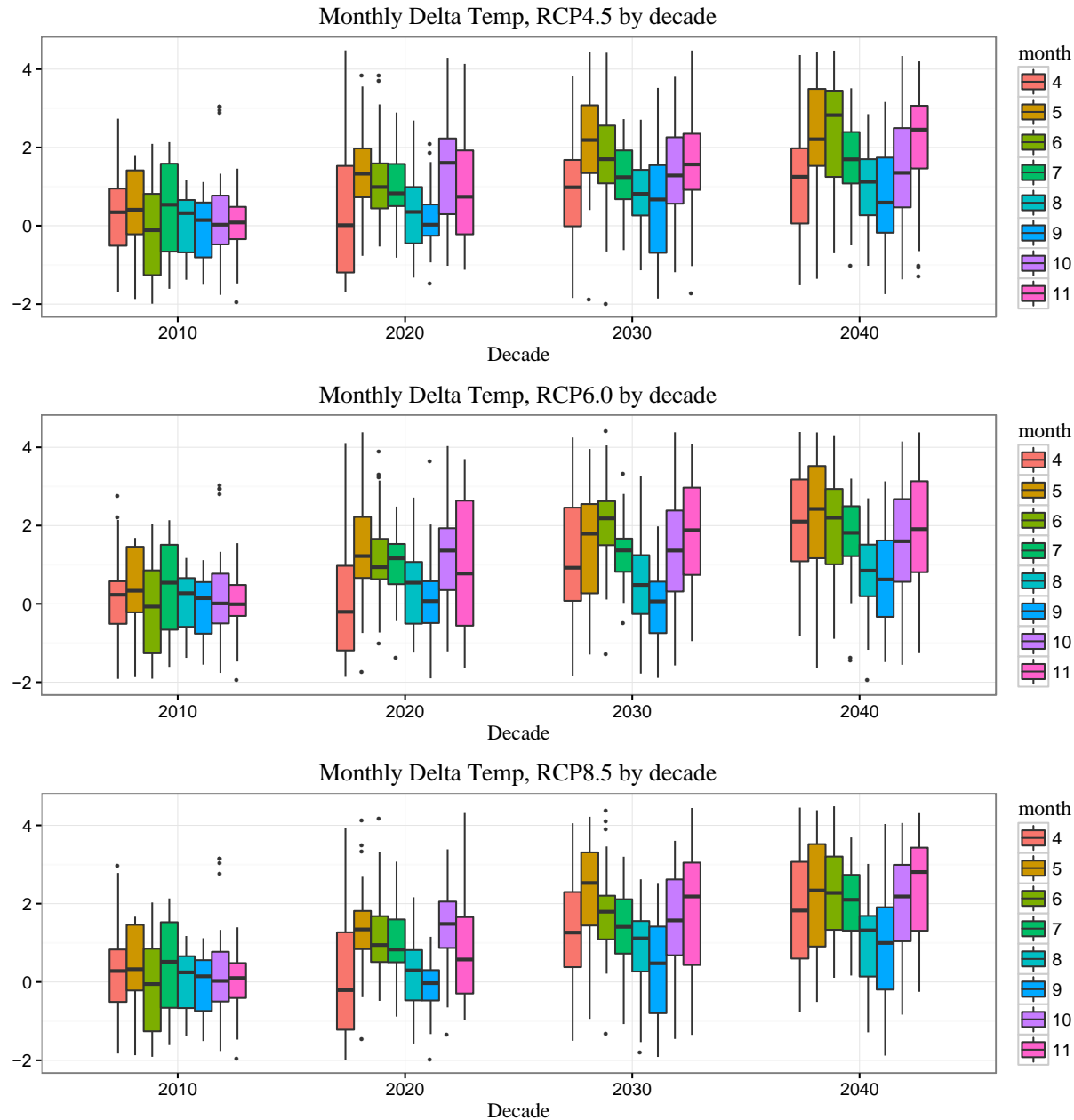
Climate Projections: Lake Temperatures

Next Steps

- **Finalize calibration of sediment flux model to stabilize long-term projections**

- **Project lake Temperature, TP, Chl, Cyanobacteria under 5 GCMs, 3 RCPs, 4 nutrient concentration reduction scenarios (+25%, -25%, -50%, -87%), through 2100.**

- **Submit manuscript (this winter-spring)**