Putting Your Data to Work! Using Long-Term Volunteer Data to Establish Water Quality Trends

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Background

- Craine Lake (Madison County, NY) is in the towns of Hamilton and Earlville.
- 26-acre glacial lake with a manmade dam, max depth of 34 ft (~10.3 m)
- Harmful algal blooms (HABs), nutrient pollution, and wetland health are the main stakeholder concerns.

Craine Lake Watershed

Data Collection

- Data collected for the Citizens Statewide Lake Assessment Program (CSLAP) which was established by NYSDEC
- The Craine Lake Association has participated in this program since 1988.
- The only gaps in our data occur in 1999, 2002-2008 and 2014.
- Long-term data allows us to analyze trends that otherwise would be tough to confidently predict.

Data Visualization

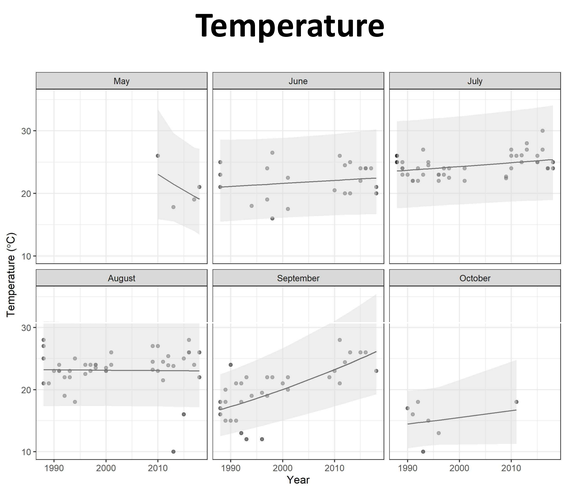

Figure 1: Predictions from analysis of covariance (ANCOVA) model for predicted annual water temperature by month against mean (±standard deviation) observed water temperature. The solid lines shows predictions from statistical model, and the gray ribbons represent 95% prediction intervals.

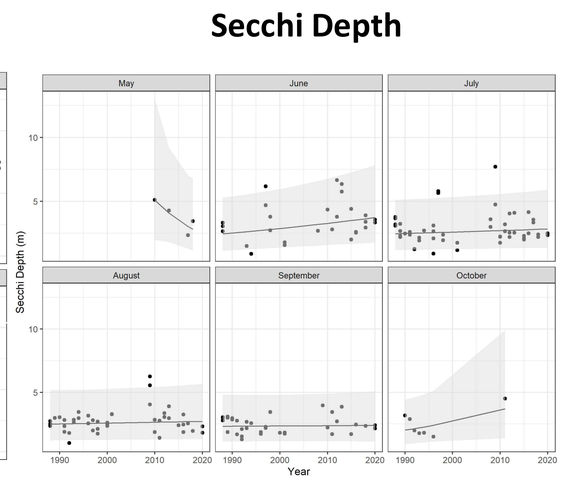

Figure 2: Predictions from analysis of covariance (ANCOVA) model for predicted secchi depth by month against mean (± standard deviation) observed secchi depth. The solid lines show predictions from statistical model, and the gray ribbon shows 95% prediction intervals.

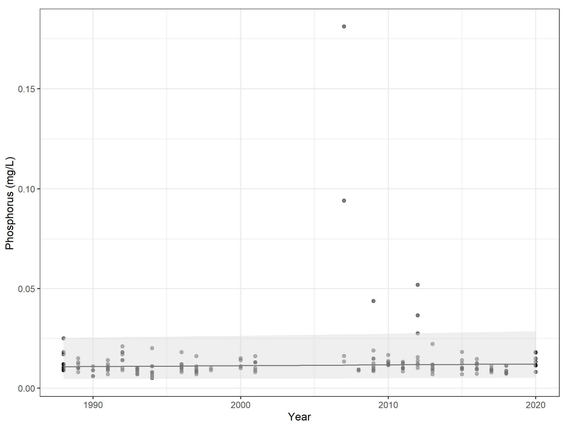

Figure 3: Predictions from analysis of covariance (ANCOVA) model for predicted annual phosphorus against (±standard deviation) observed phosphorus. The solid line shows predictions from statistical model, and the gray ribbons are 95% prediction intervals.

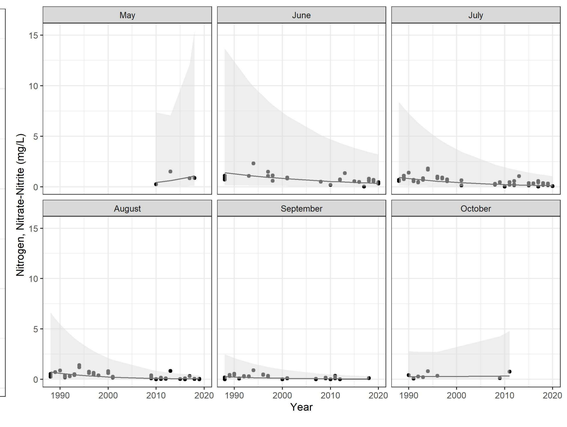

Figure 4: Predictions from analysis of covariance (ANCOVA) model for predicted nitrogen (nitrate-nitrite) by month against mean (± standard deviation) observed nitrogen. The solid line show predictions from statistical model, and the gray ribbons are 95% prediction intervals.

Results of Data Analysis

Water Temperature:
Increase in surface temperature was a statistically significant year to year trend.

Secchi Depth:
Showed a statistically significant impact from year to year in the ANCOVA

Phosphorus:
Year was the only model that impacted surface phosphorus with no correlation between month.

Nitrogen:
The general trend of a year to year decrease in total nitrogen was statistically supported.

Discussion

- Secchi depth and nitrogen had statistically significant impacts from year-to-year.
- Year over year increase for surface water temperature.
- Water temperature and secchi depth chosen due to their relationship with Trophic State Index (TSI)
- Phosphorus and nitrogen selected due to their impacts on HABs and overall productivity.

Acknowledgments

- Craine Lake Association for participating in SUNY Oneonta's Lake Management program
- Special thanks to Patty Mattson who currently collects the CSLAP samples for Craine Lake and has been integral in project planning.