



Understanding the community dynamics, timing, and intensity of the 2017 and 2018 cyanobacteria blooms in two shallow eutrophic bays in Lake Champlain

August 1, 2019 || VT EPSCoR 2019 Undergraduate Research Symposium

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Funding #: NSF Grant OIA-1556770

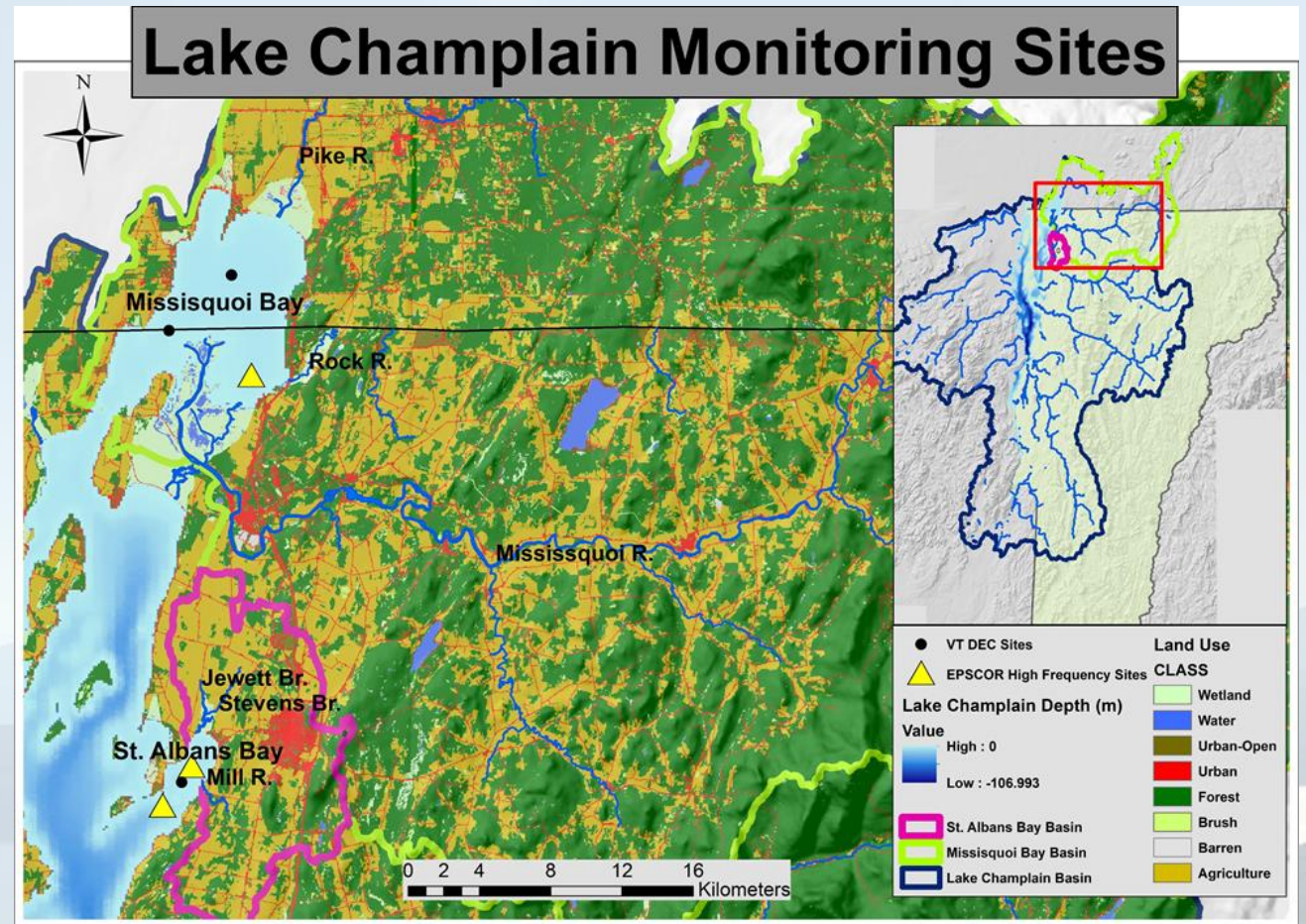


Research objectives

- Study differences between bloom dynamics and phytoplankton community composition of 2 shallow recently eutrophic systems that have summer cyanobacteria blooms due to enhanced anthropogenic nutrient loading
- We hypothesize the bays differ both in the composition and sensitivity to environmental drivers (events, seasonality) due to differences in configuration



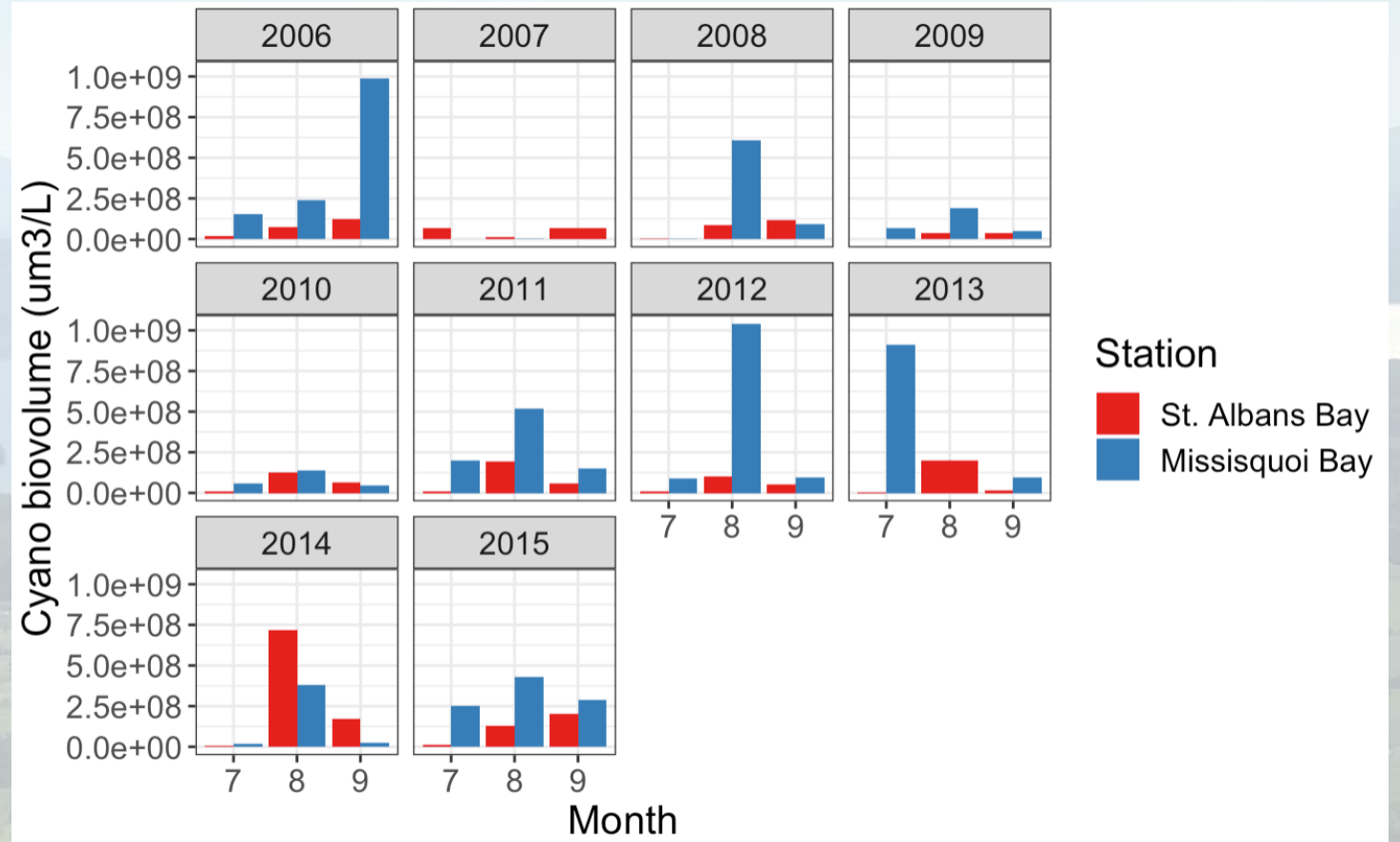
St. Albans Bay Buoy



| | Missisquoi Bay | St. Albans |
|---------------------------------|----------------|------------|
| Surface Area (km ²) | 77.5 | 7.2 |
| Mean depth | 2.8 | 8 |
| Volume (km ³) | 0.220 | 0.023 |
| Watershed debate ratio | 40 | 19 |

Both bays have cyanobacteria blooms during the summer, but timing and severity differs from year to year

- Blooms are harmful to humans and the organisms that live in the lake
- Differences detectable in long-term data, suggest dynamics are often different
- High frequency data useful for identifying drivers and capturing variability

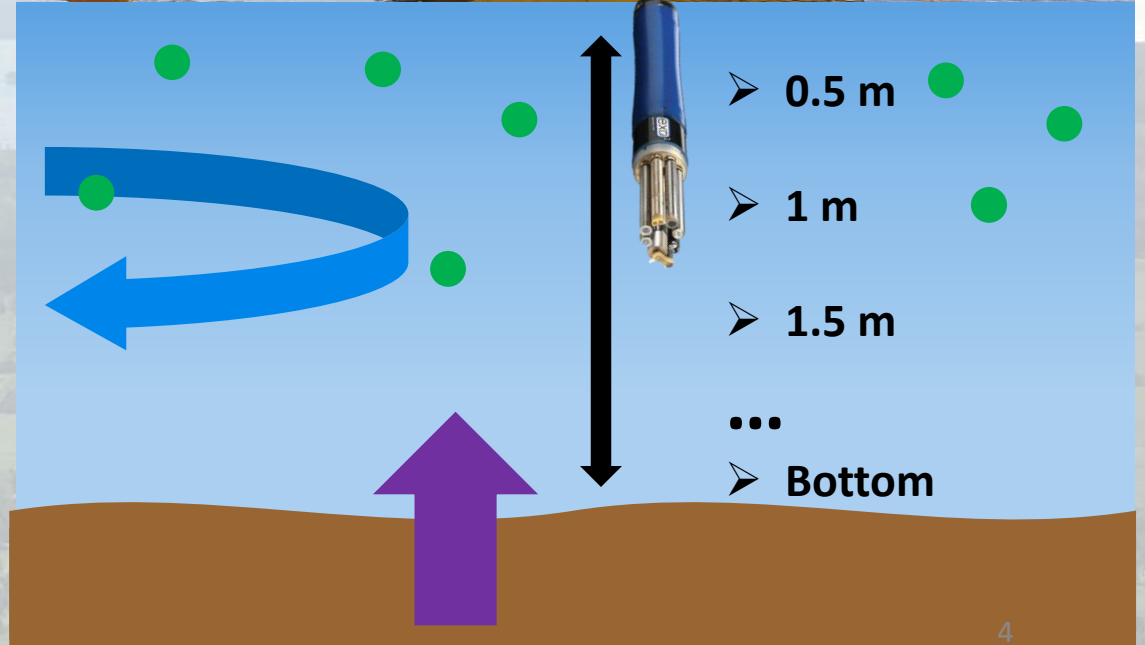


High-frequency monitoring of Missisquoi and Saint Albans bays

- YSI quality monitoring buoys in each bay that take hourly depth profiles
 - PC: phycocyanin (a proxy for amount of cyanobacteria)

Lake grab samples (weekly):

- Phytoplankton counts (enumerated using light microscopy)



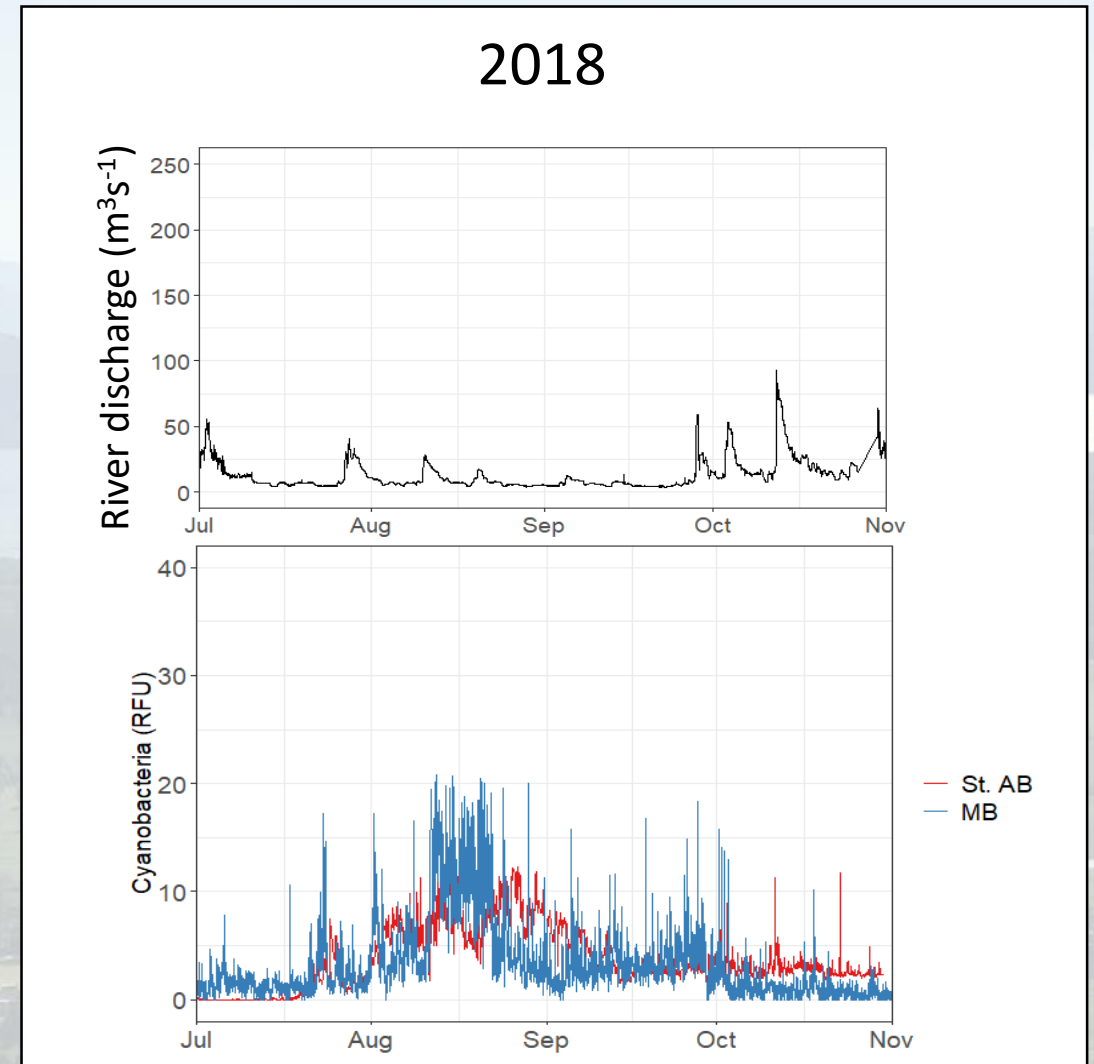
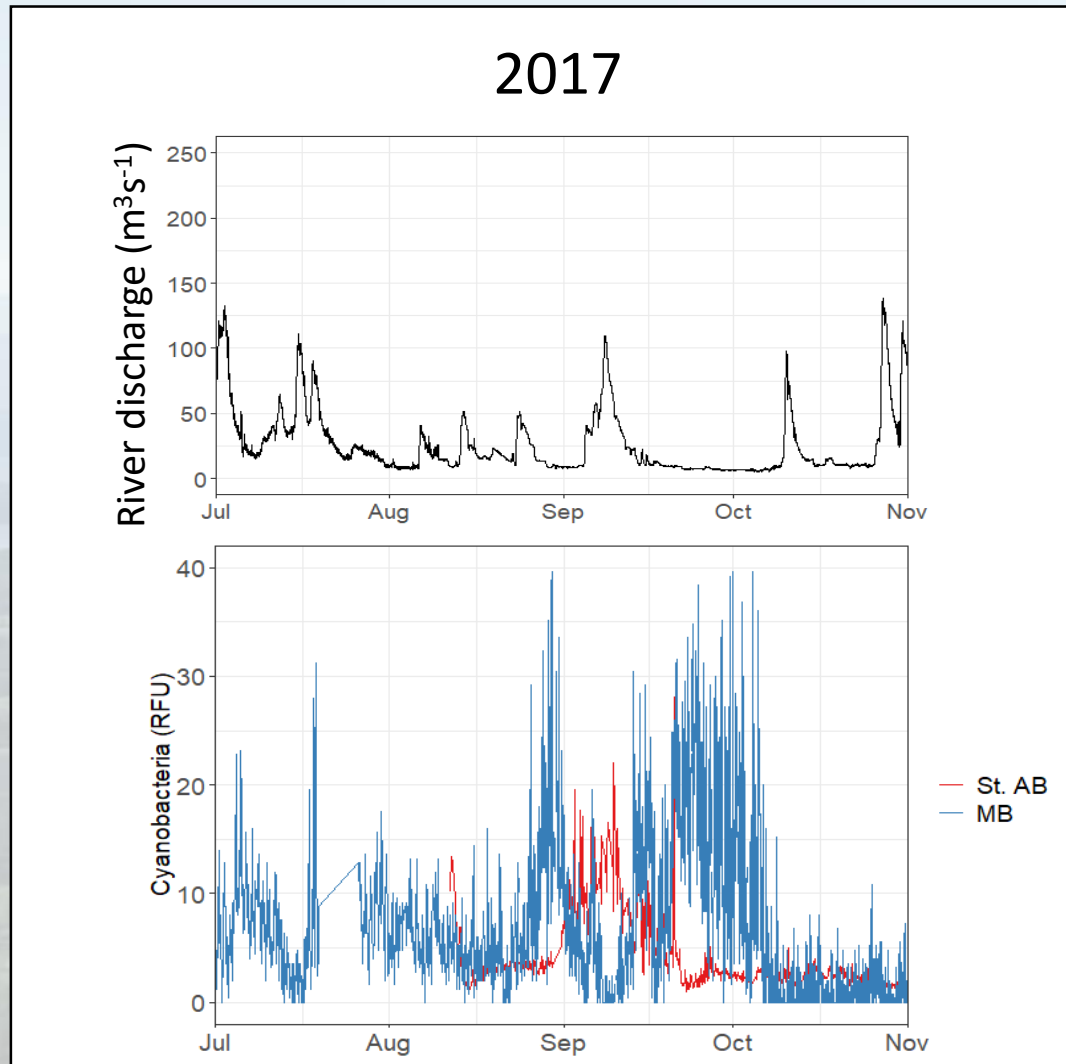
Exo 2 sensor



Cyanobacteria communities seen under the microscope



Blooms had different timing in 2017 vs 2018, wet vs. dry summer



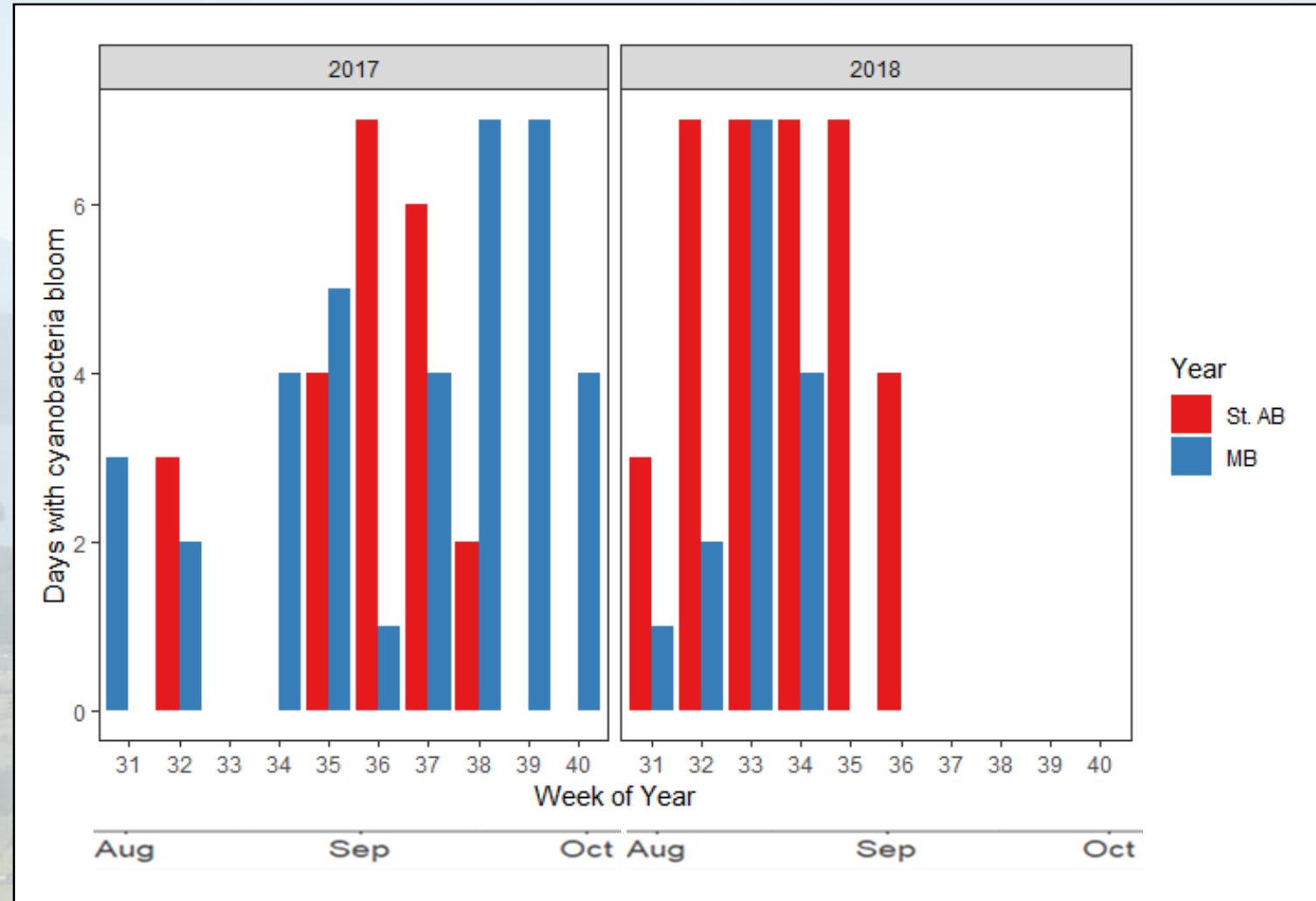
Bloom persistence comparison between Missisquoi Bay (MB) and Saint Albans Bay (St. AB) in 2017 and 2018

2017

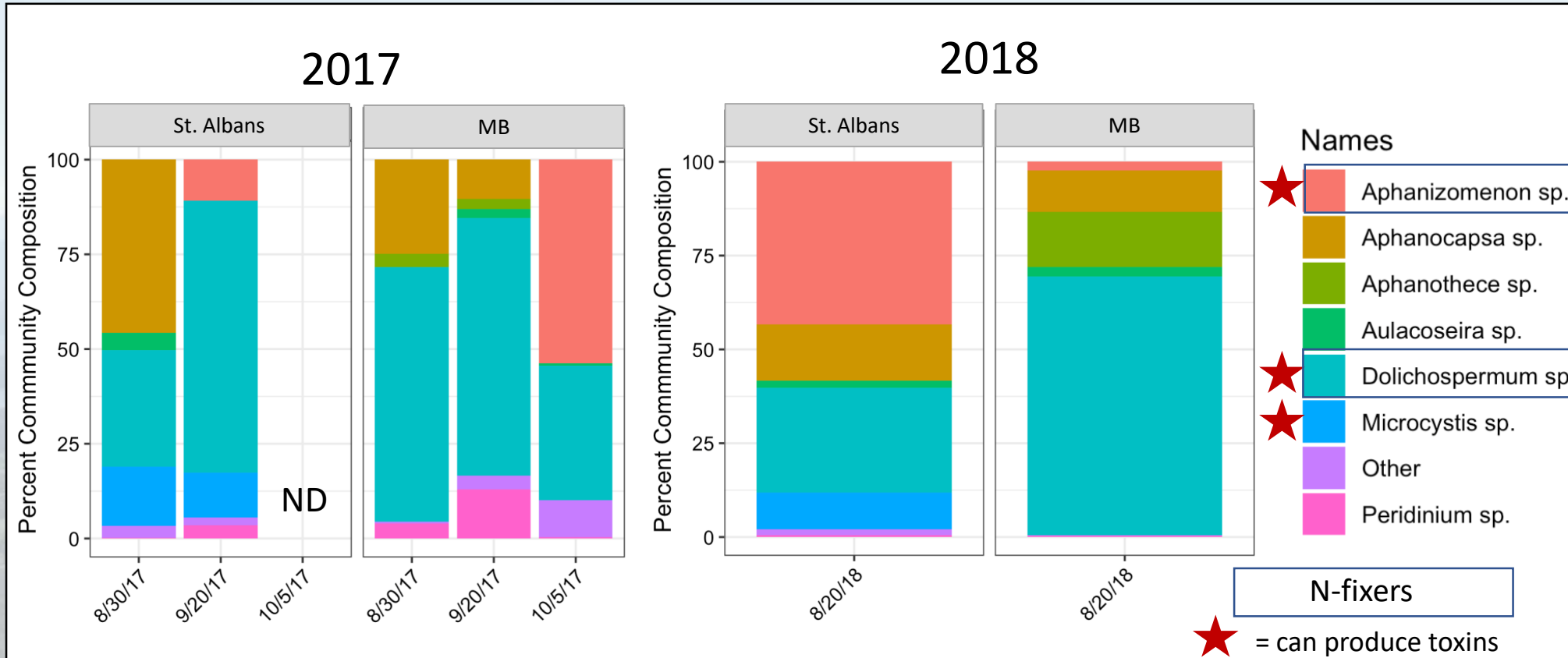
- main bloom in both bays later in year than usual
- different timing of peak blooms for each bay, MB continued much longer into October

2018

- bloom initiation more similar to previous years and similar timing in both bays
- bloom not as long in MB, shut down sooner



Initial results suggest N-fixing cyanobacteria common in both bays

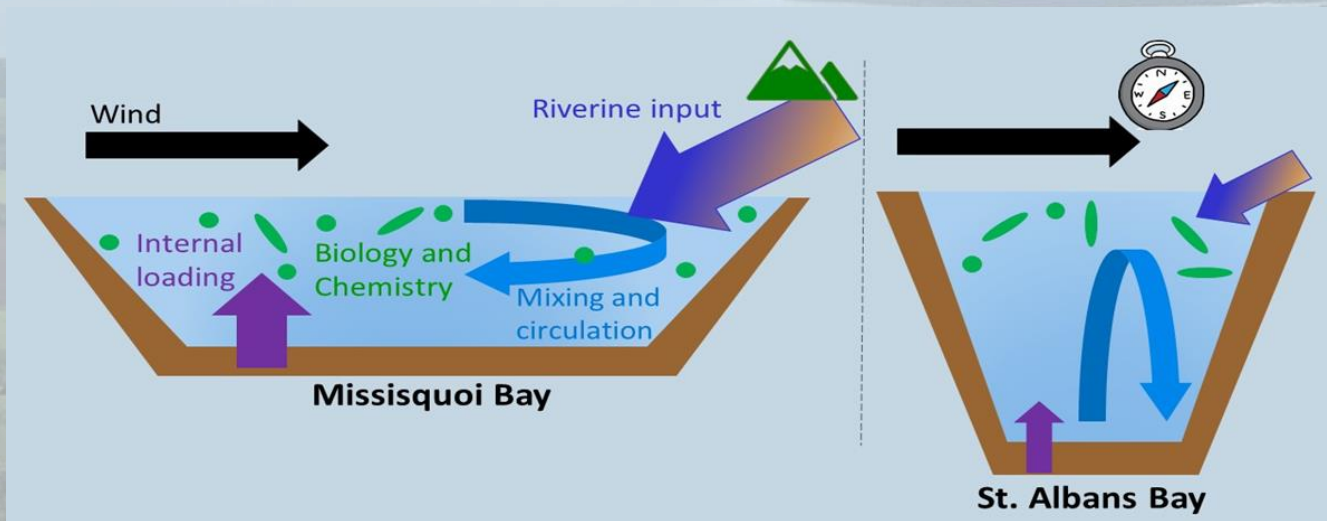


Aphanizomenon sp. and Dolichospermum sp. under the microscope

- 2017: Dolichospermum sp. most abundant phytoplankton for both bays
- 2018: Aphanizomenon sp. was most abundant in Inner and Dolichospermum sp. was most abundant in MB

Take Home Points

- Differences in hydrodynamics, watershed characteristics and environmental events affect blooms year to year
- During 2018 drought summer external inputs were lower and the bloom dynamics were similar between bays
- Phytoplankton communities varied between 2017 and 2018



Acknowledgements

I would like to thank my team members that helped me with this project and the Rubenstein Lab for letting us use your facilities to do this project and to EPSCoR for giving us the opportunity to make this project possible.

This presentation was funded by NSF Grant OIA-1556770.



Colleague Luis A. Esbrí is presenting a poster that focuses more in Nutrients Dynamics in this two eutrophic systems in Lake Champlain.





Thanks for your time!

Any Questions?