

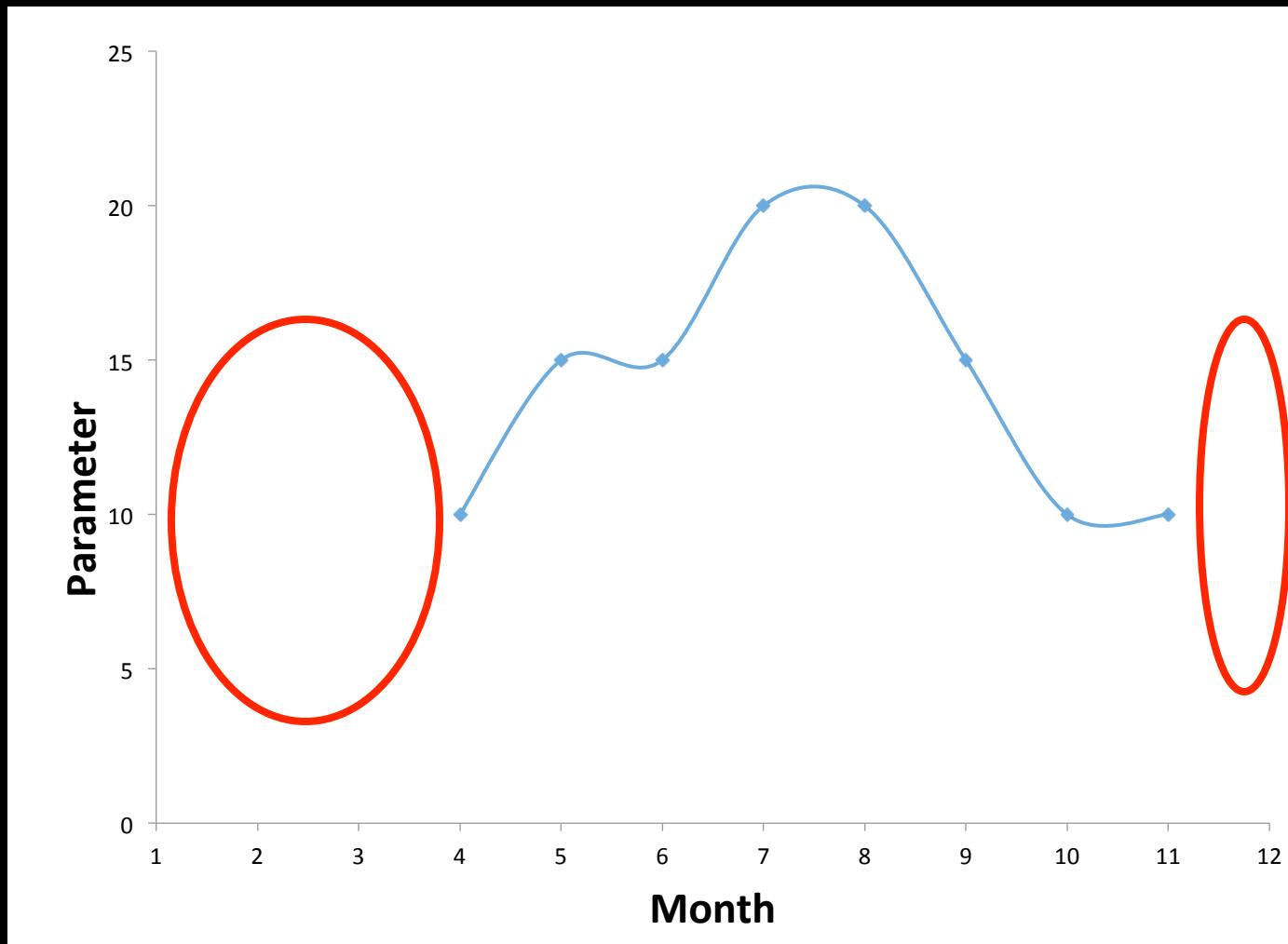
Life (and death) under ice: Lake Erie's “other” algal bloom

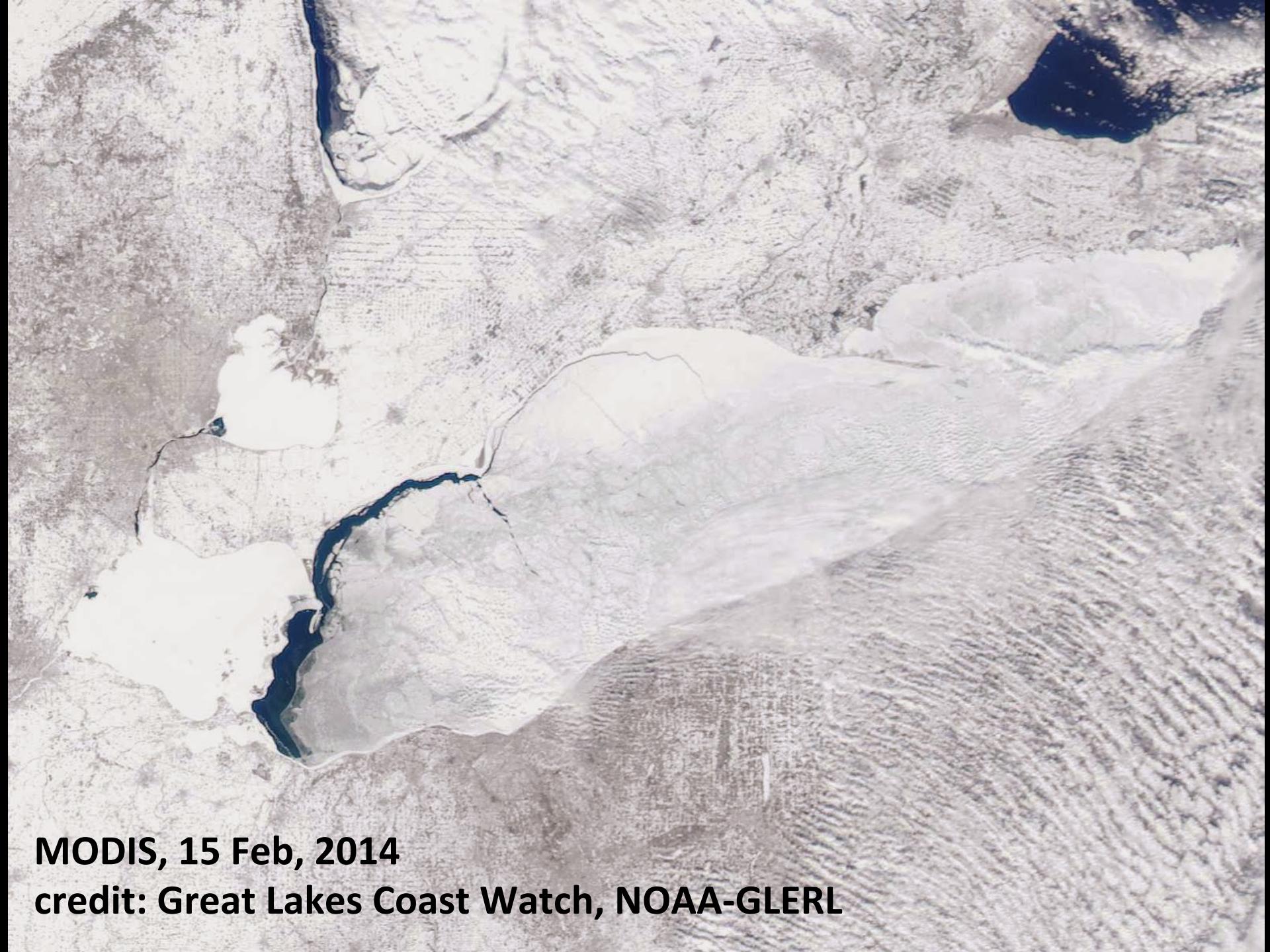
R.M. McKay

Bowling Green State University



Temporal Resolution of Surveys: North Temperate Lakes





MODIS, 15 Feb, 2014

credit: Great Lakes Coast Watch, NOAA-GLERL



MODIS, 19 Feb, 2017

credit: Great Lakes Coast Watch, NOAA-GLERL



Erie central basin
4 March, 2015

Operation Coal Shovel



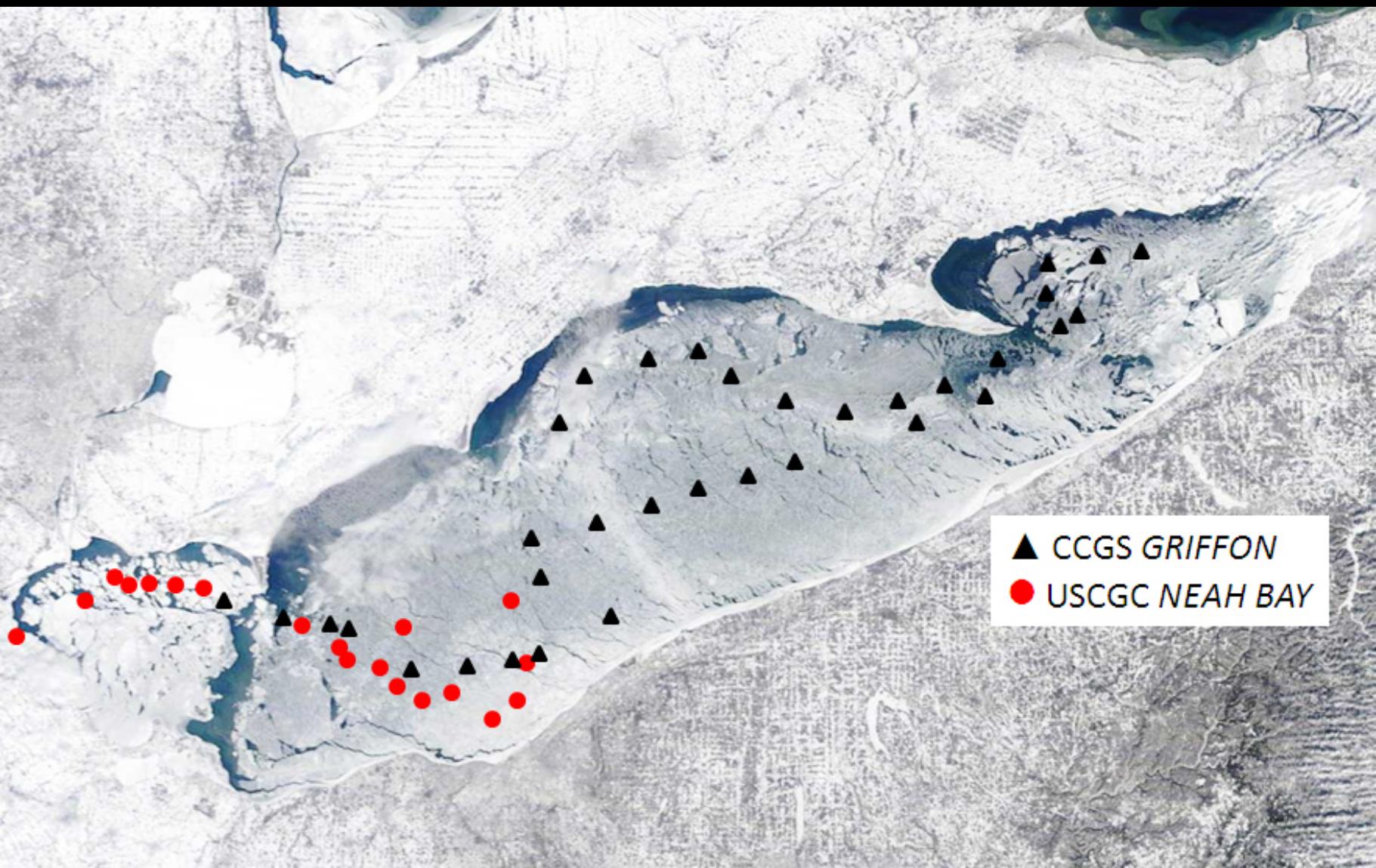


OFF NC 328110
REG. TO





Credit: Lauren Jorgensen, USCG



▲ CCGS *GRIFFON*
● USCGC *NEAH BAY*

Winter Blooms

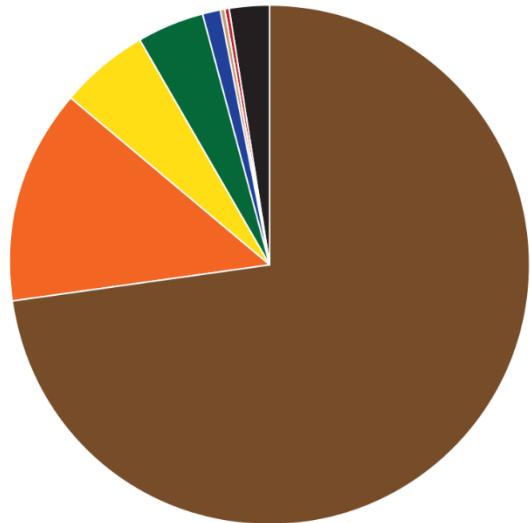


Credit: M. Saxton

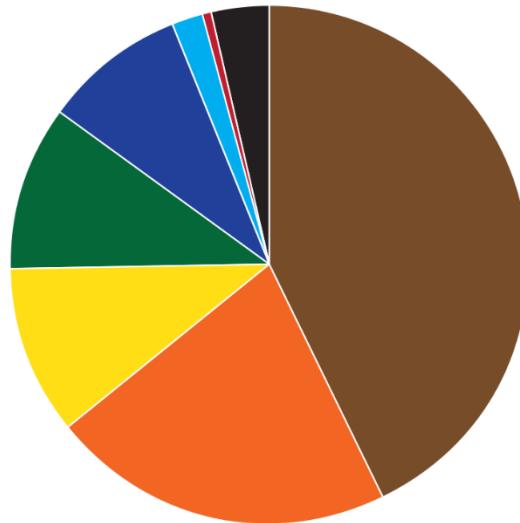
Credit: CPO Lauren Jorgensen

Ice cover as a factor driving microbial community composition in Lake Erie

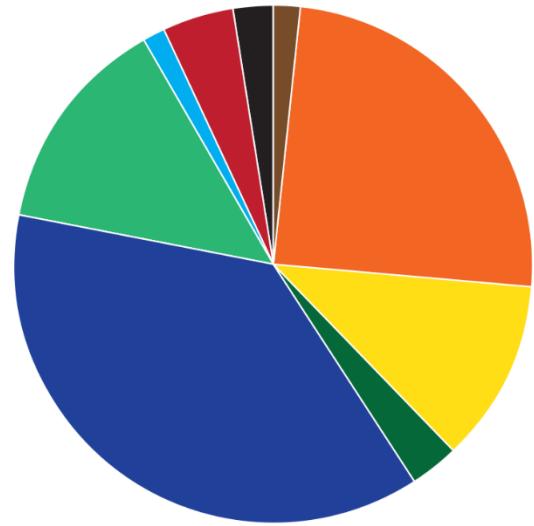
Lake Erie Ice, Feb 2012



Lake Erie (1 m), Feb 2012



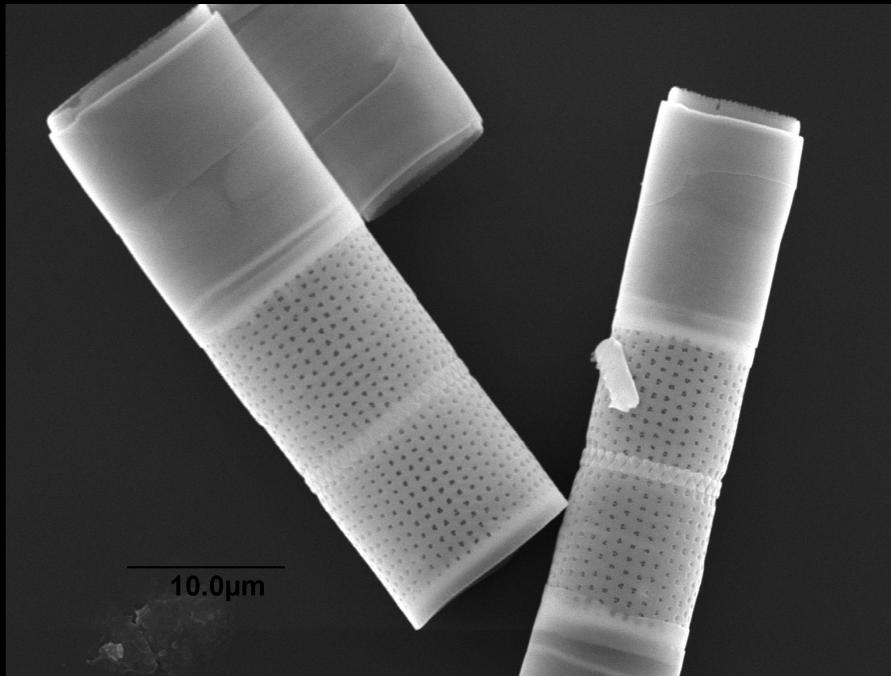
Lake Erie (1 m), July 2012



Bacillariophyceae
 Proteobacteria
 Bacteroidetes

Verrucomicrobia
 Actinobacteria
 Cyanobacteria

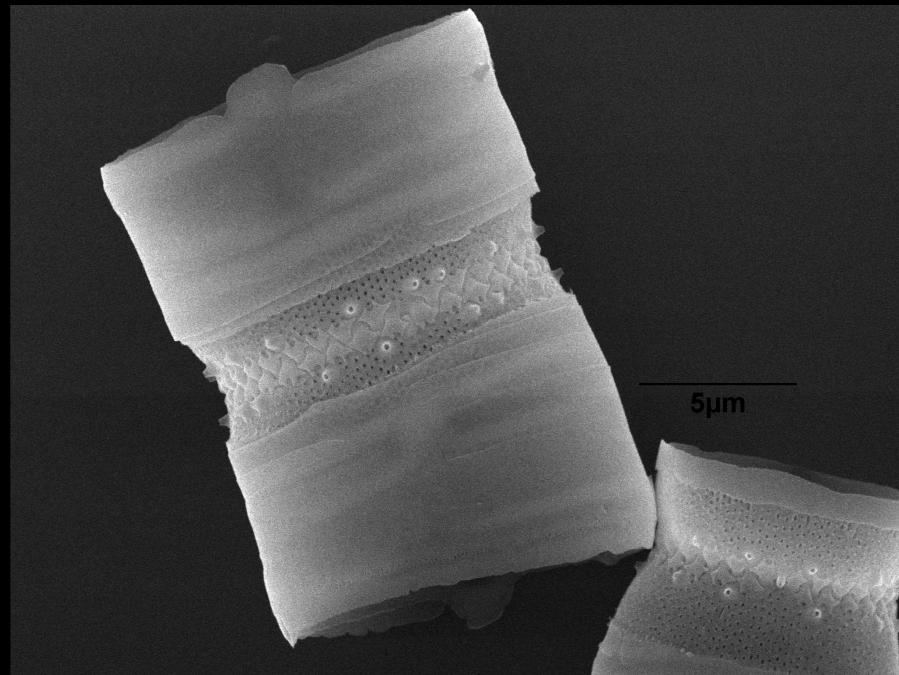
Acidobacteria
 Cryptophyceae
 Others



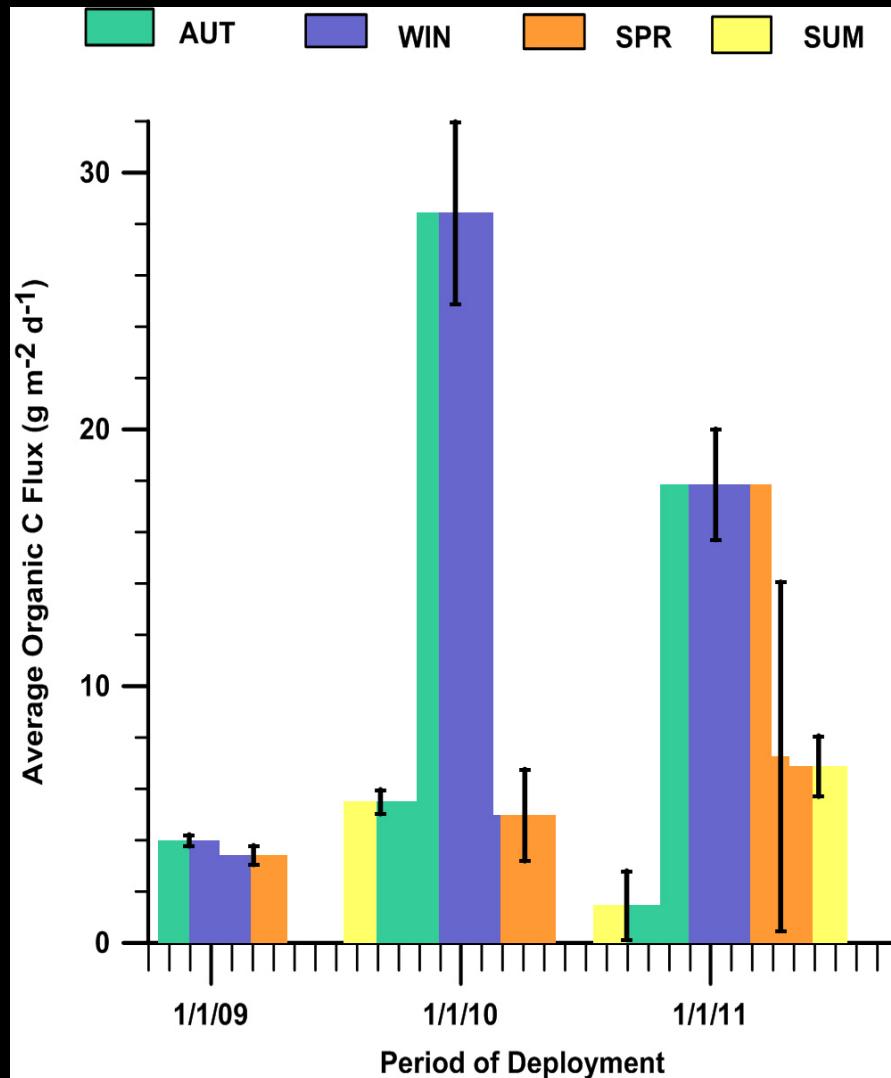
Aulacoseira islandica (O.
Müller) Simonsen



Stephanodiscus binderanus
(Kützing) Krieger



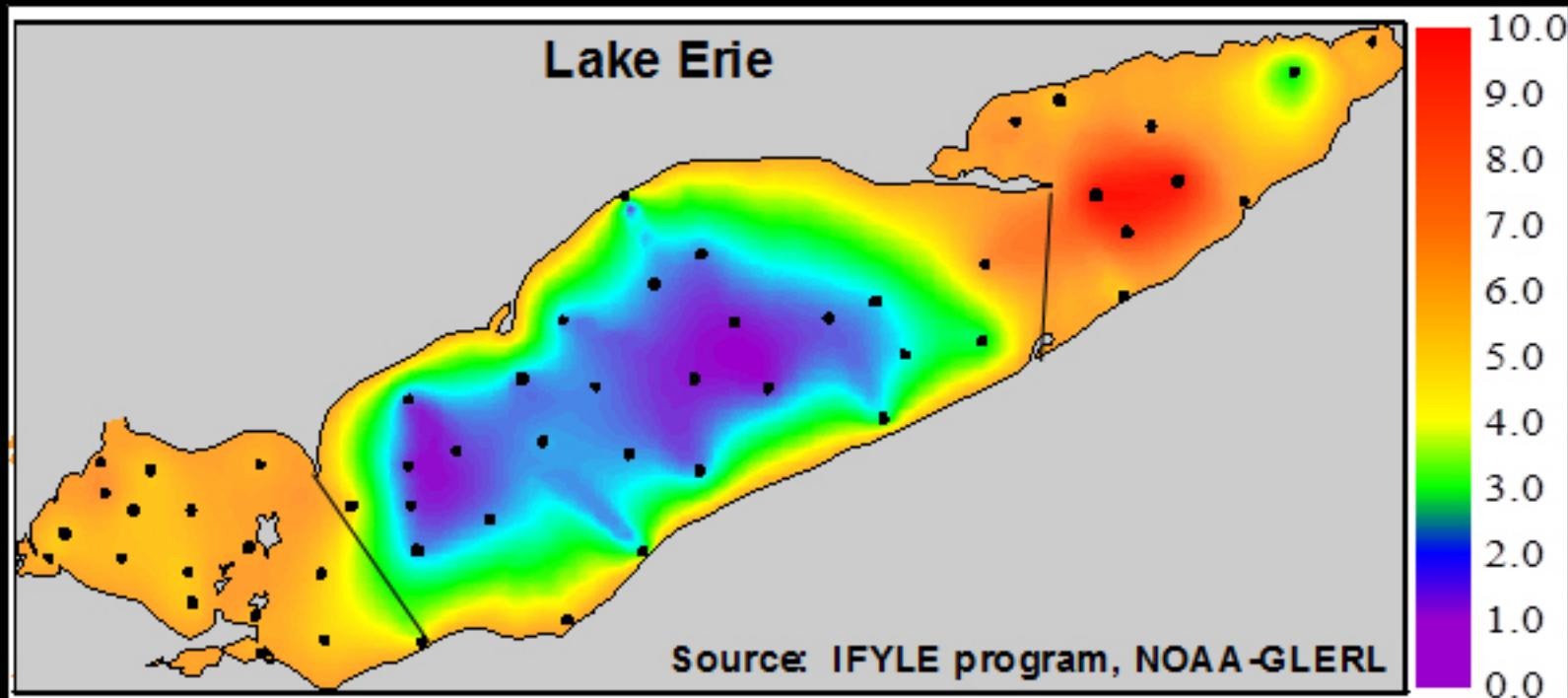
Fate of the winter bloom?



True export or
sediment
resuspension?

C:N ratios below 8
in winter, similar to
plankton
indicating new
production

Fate of the winter bloom?

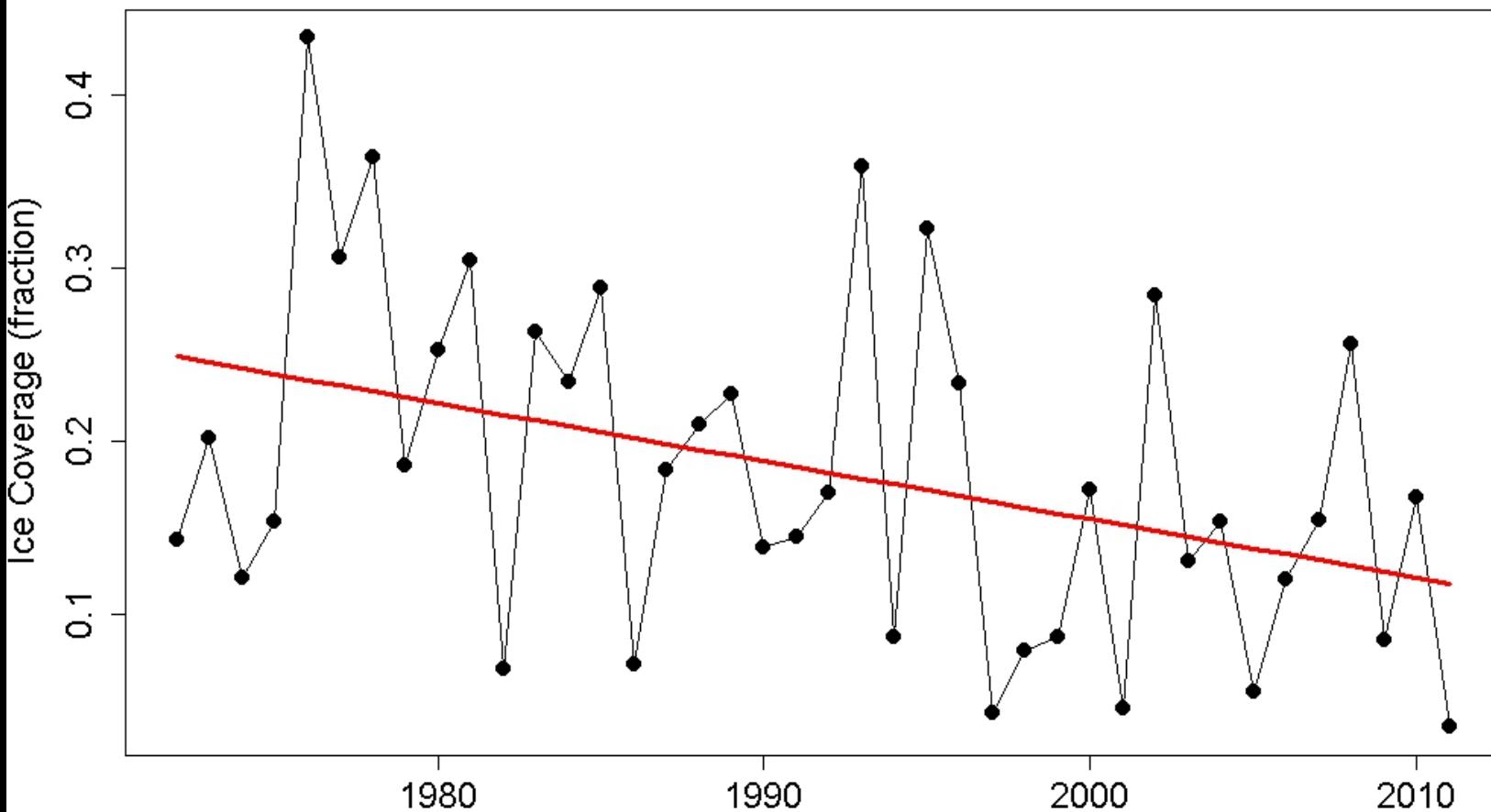


New insights on the winter food web

- influence of ice decline
- novel microbial community interactions

Declining ice cover

Great Lakes



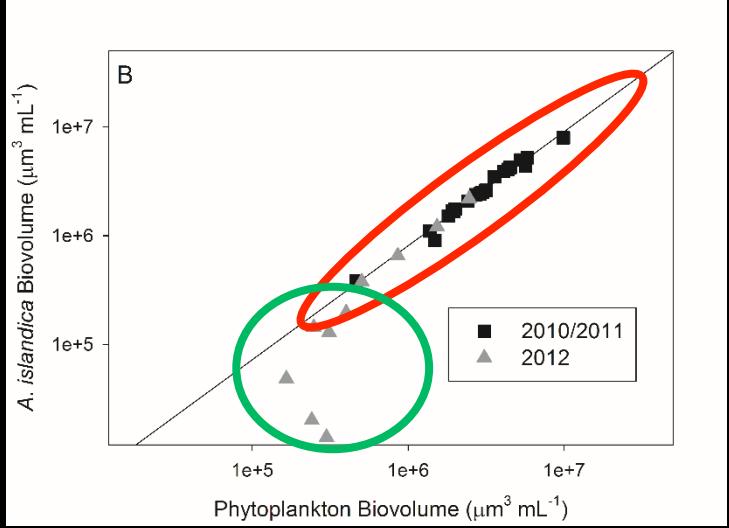
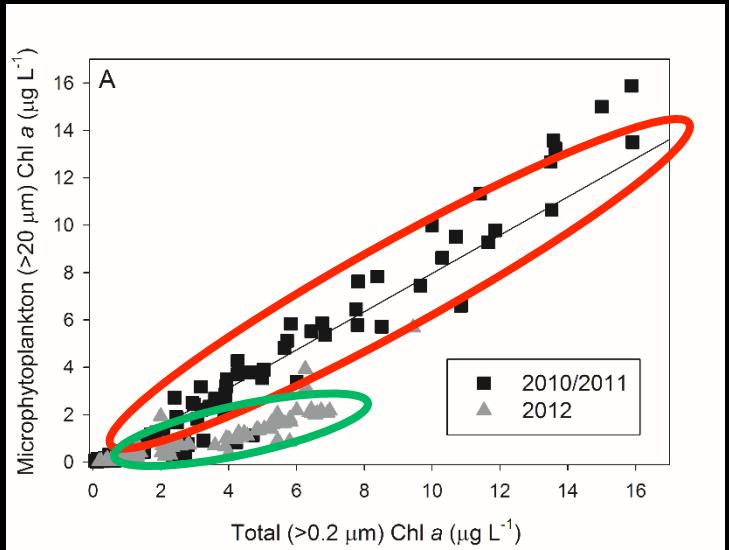
Adapted from Wang et al. 2012, *J Climate*

environmental microbiology

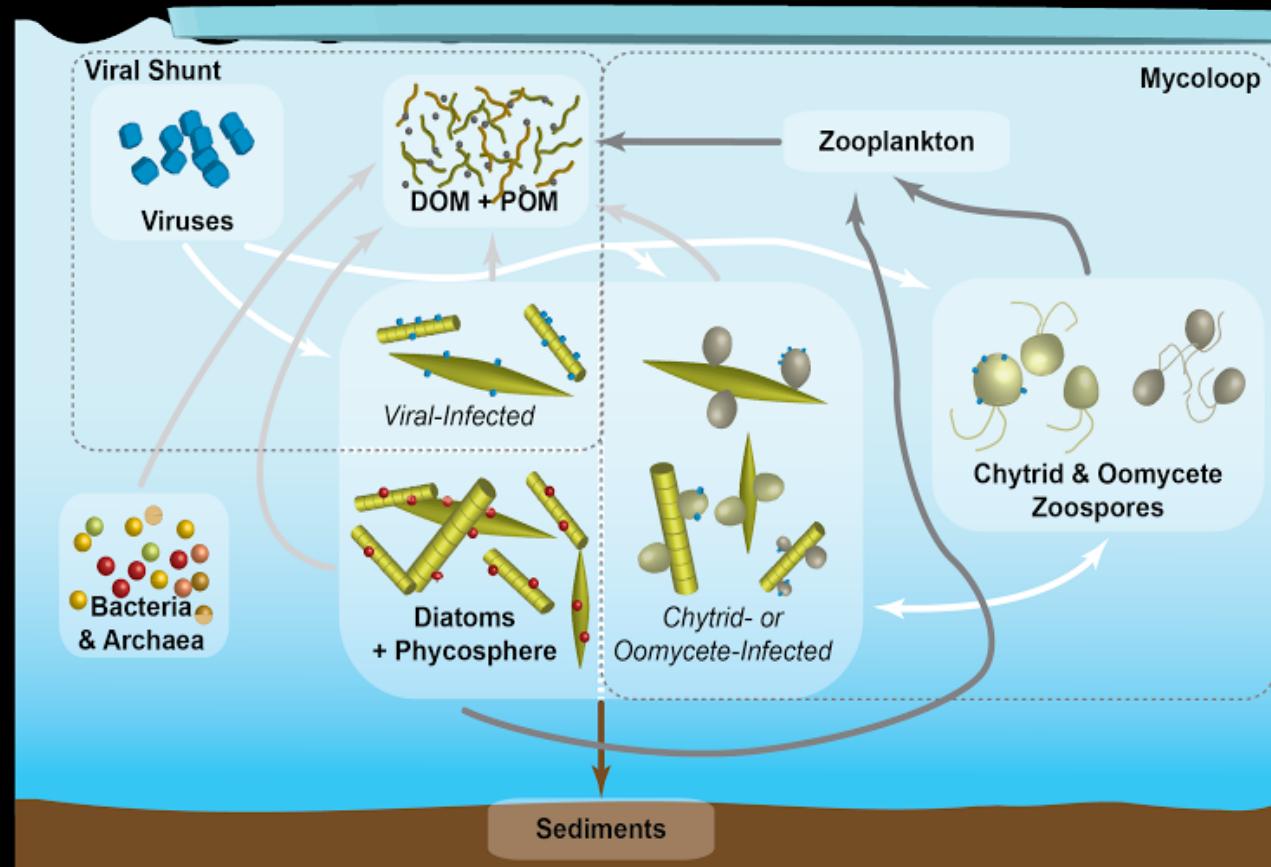


Special Issue on Microbial Communities

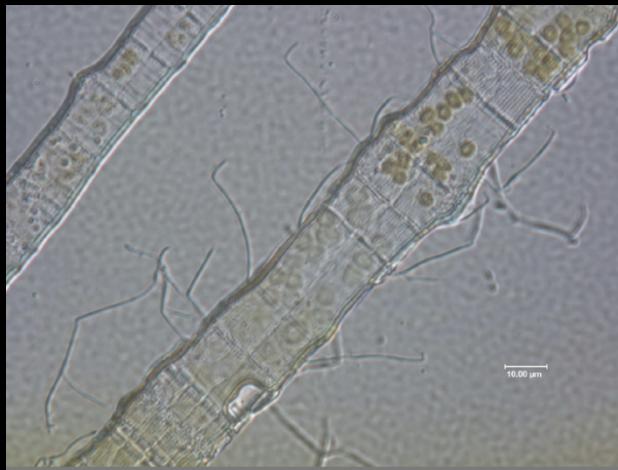
WILEY Blackwell



Unraveling novel microbial community interactions involved in the decline and fate of an ice-associated diatom bloom

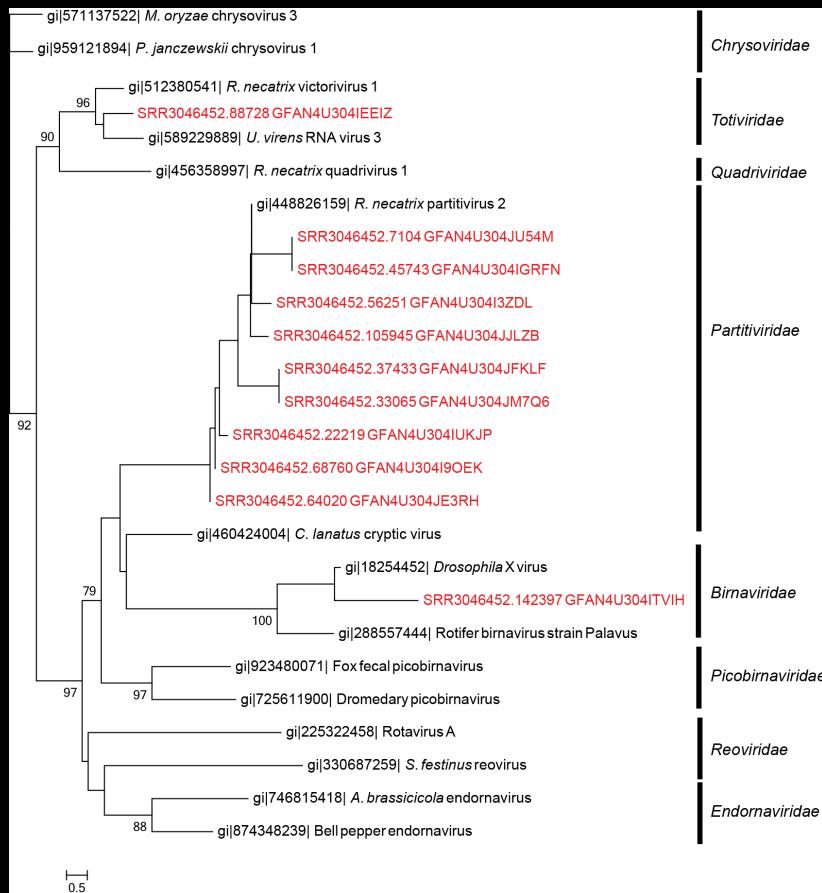


Insights into bloom decline: Metatranscriptome analysis



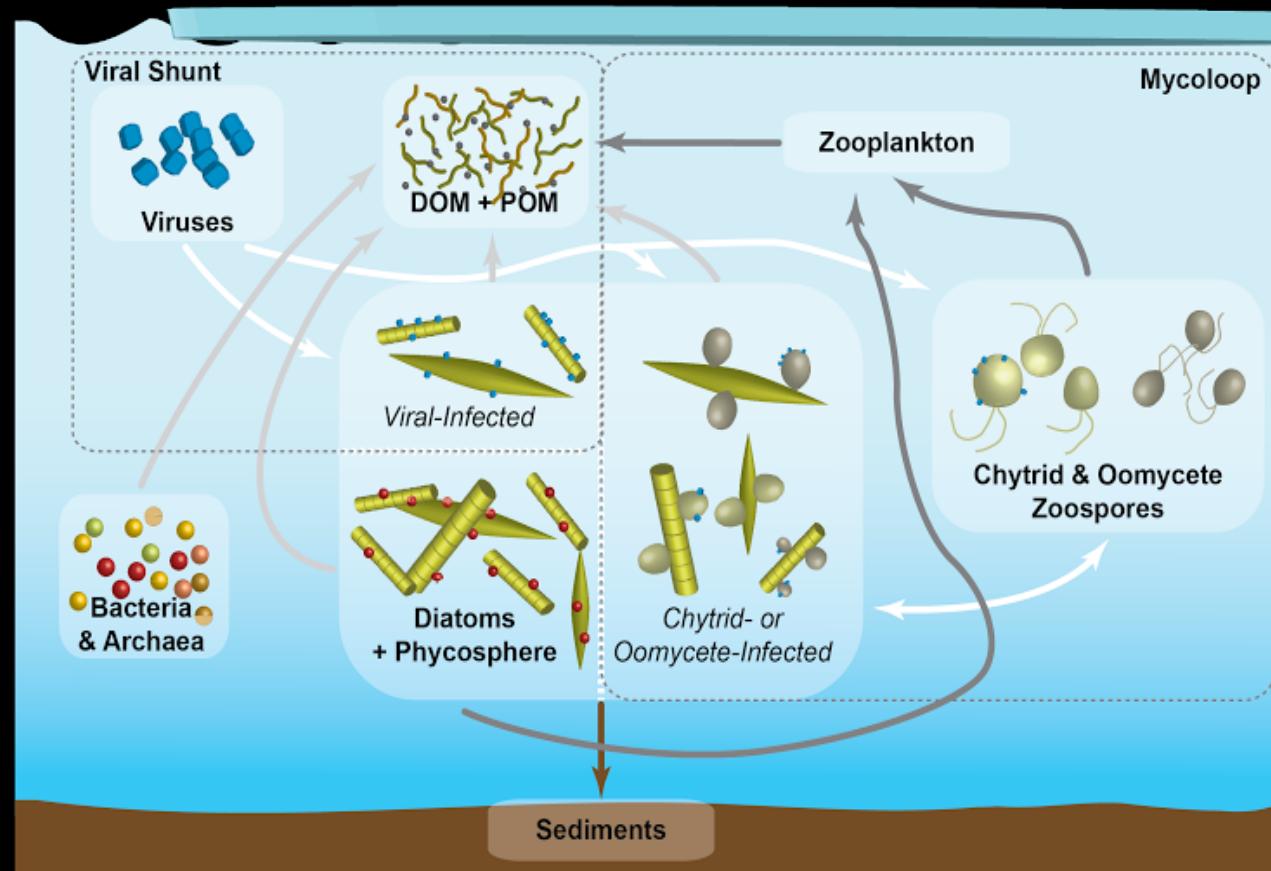
- Oomycetes
 - 0.6% of sequences
- homology hits to virulence factors
- 'Crinkler' proteins
 - cytoplasmic effectors
- proteases
- protease inhibitors
 - apoplastic effectors
- glucanases
- glucanase inhibitors

Insights into bloom decline: Viruses



- factors in bloom control
- Nucleocytoplasmic Large DNA Viruses
 - not detected
- RNA-dependent RNA polymerase sequences
 - Partitiviridae
 - dsRNA viruses
- target plants and fungi
- constrain chytrid parasites?

Unraveling novel microbial community interactions involved in the decline and fate of an ice-associated diatom bloom



Lake Erie's winter diatom bloom:
A proxy to study carbon flux associated with Arctic blooms?

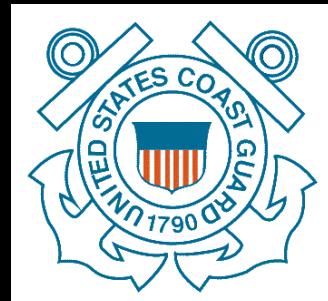
Acknowledgements

MELEE Research Group

CCGS *GRIFFON*

USCGC *NEAH BAY*

USCGC *MORRO BAY*



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Climate Change Canada

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