

Crustacean Zooplankton in Lake Erie, 1997-2014 (with a little bit of phytoplankton added in.....)

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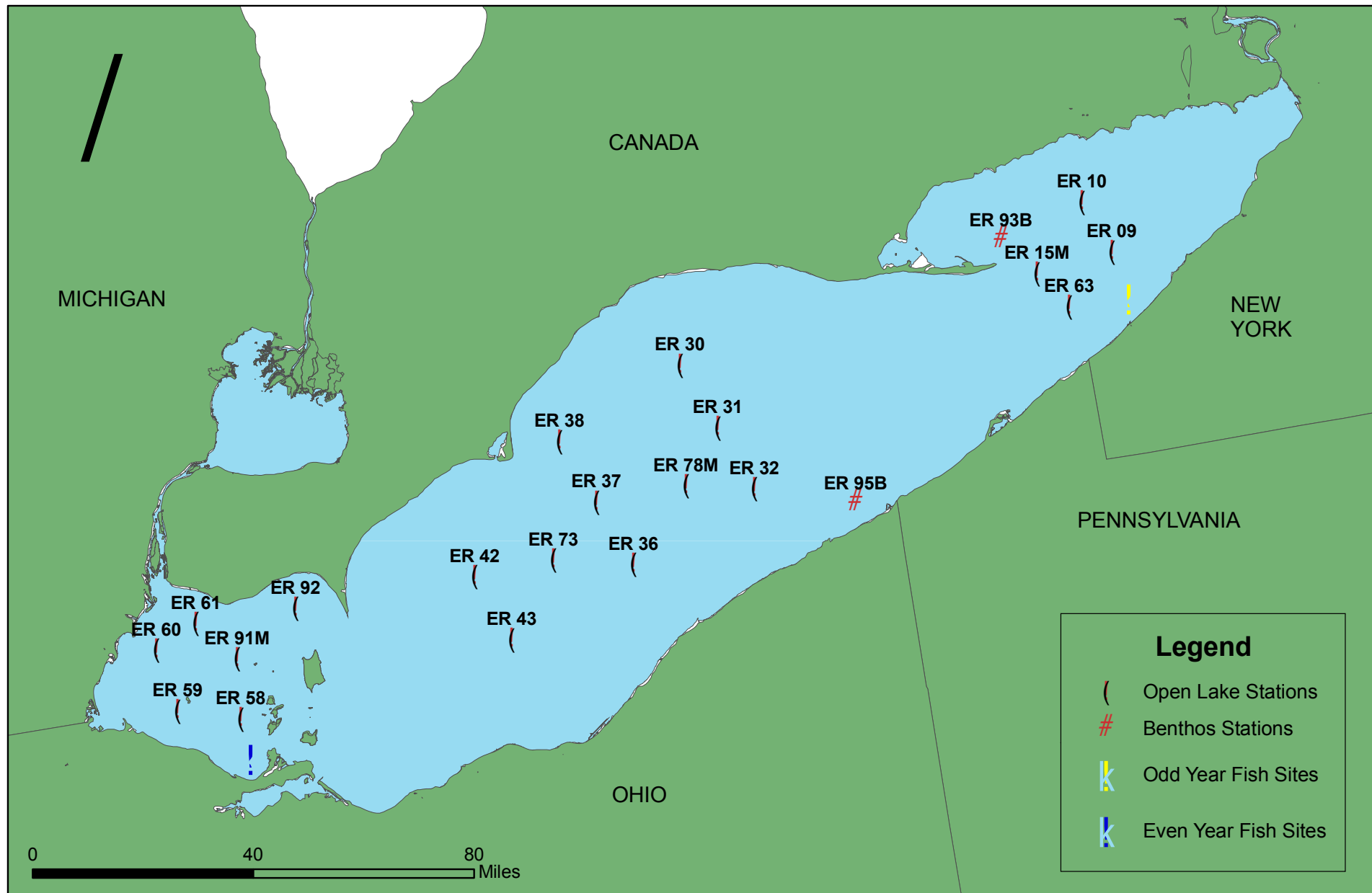
³ US EPA Great Lakes National Program Office, 77 W. Jackson Blvd., Chicago, IL 60604

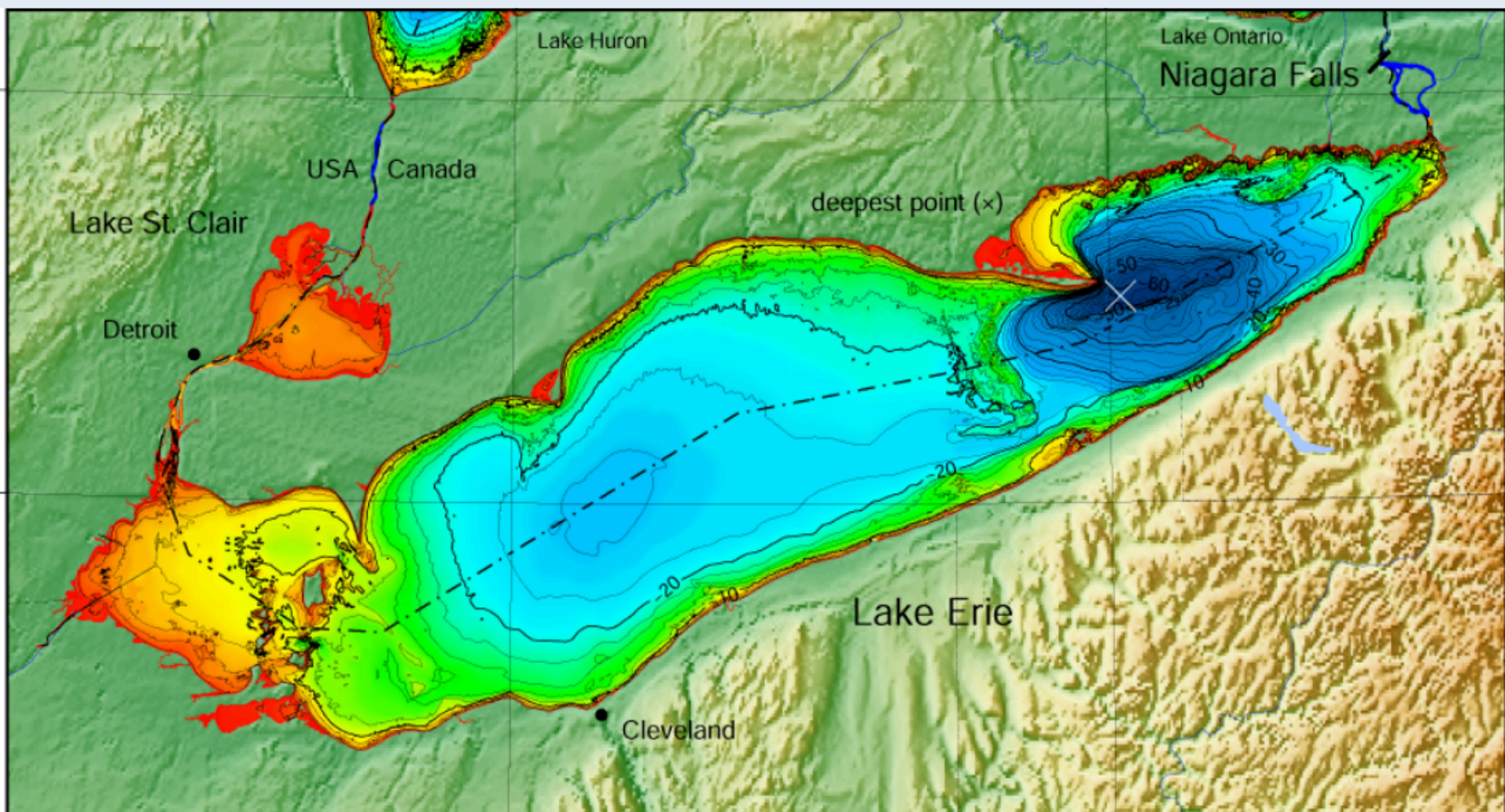
⁴ University of Minnesota, Duluth, Natural Resources Research Institute, Duluth, MN





Lake Erie Summer Survey Stations





Phytoplankton (Euan Reavie, UMD)

Key Questions (2001-2015 Data)

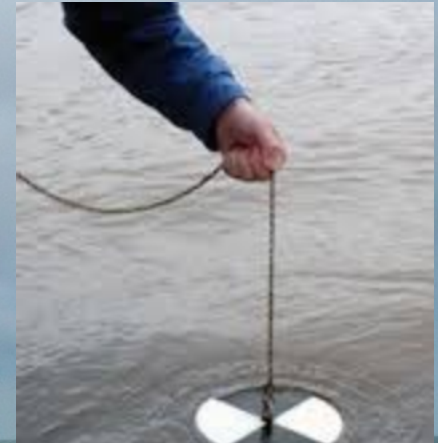
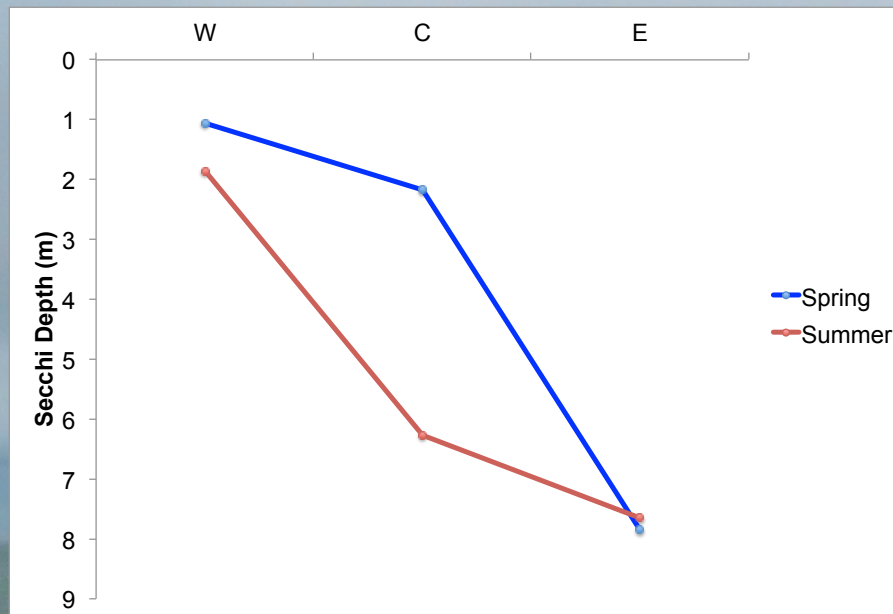
Has the spring diatom bloom changed over time?

Are summer blue-green algae blooms getting worse?

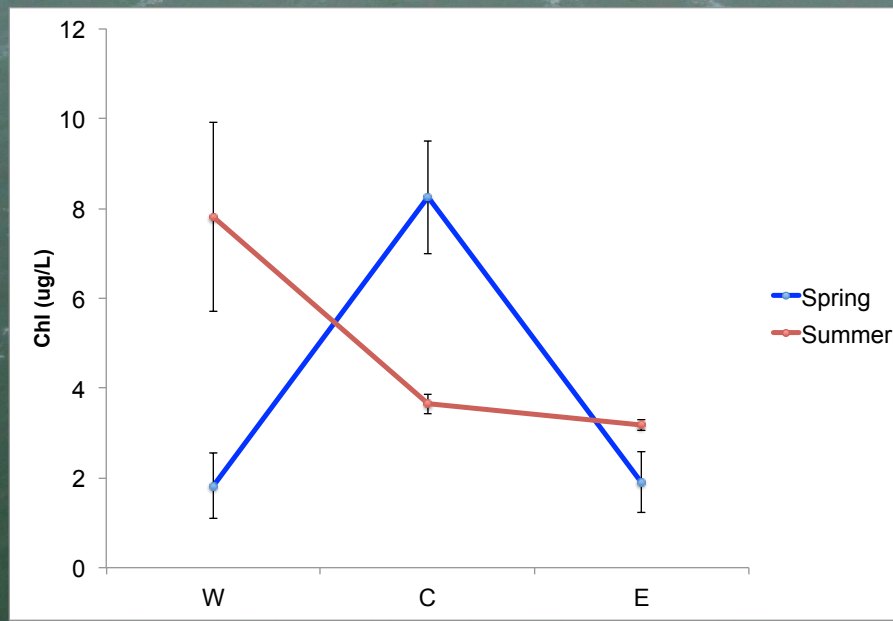
Is there a connection to summer anoxia in central basin?

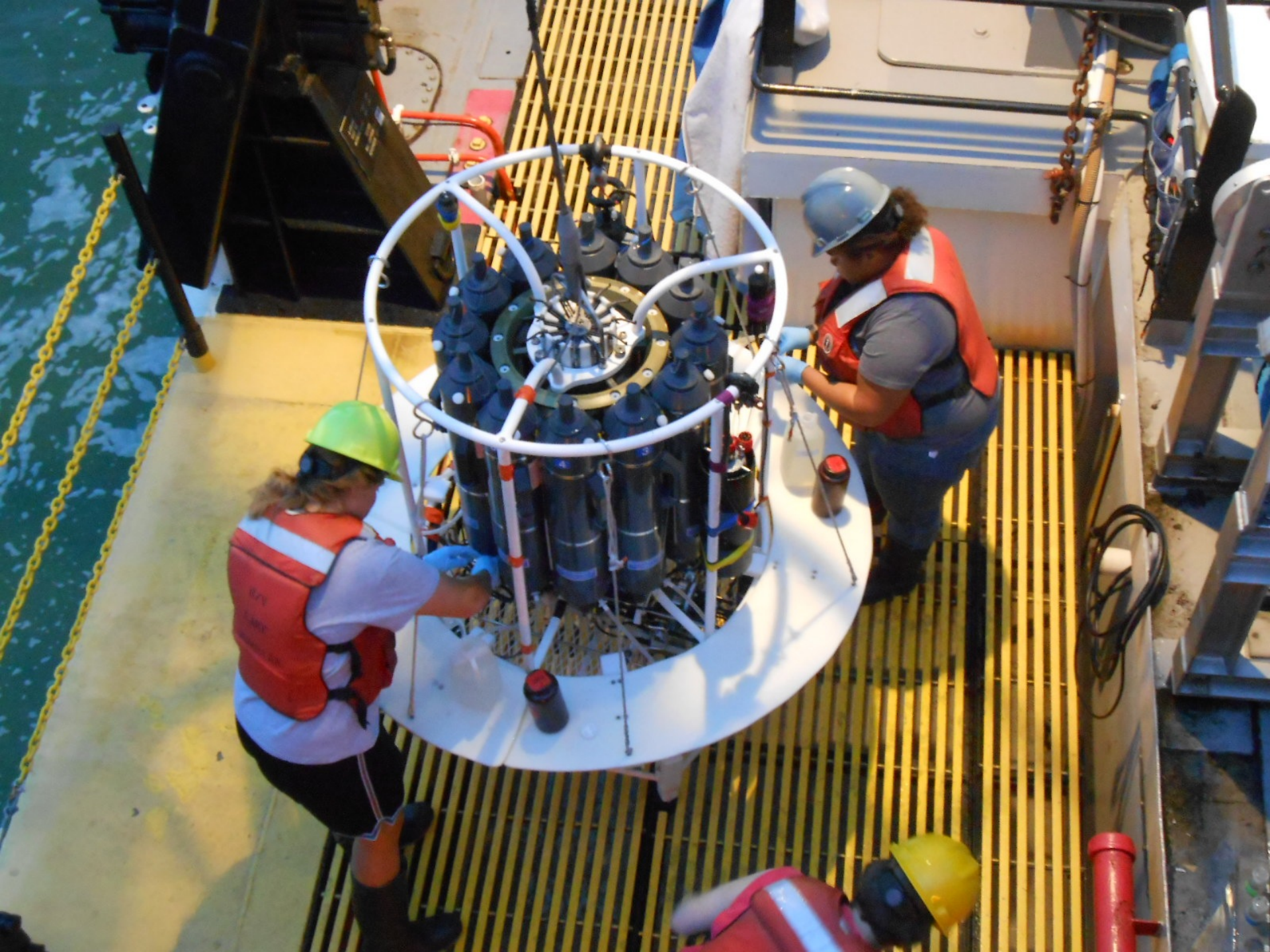


Secchi 2013



Surface Chlorophyll 2013





Phytoplankton trends in the Great Lakes, 2001–2011

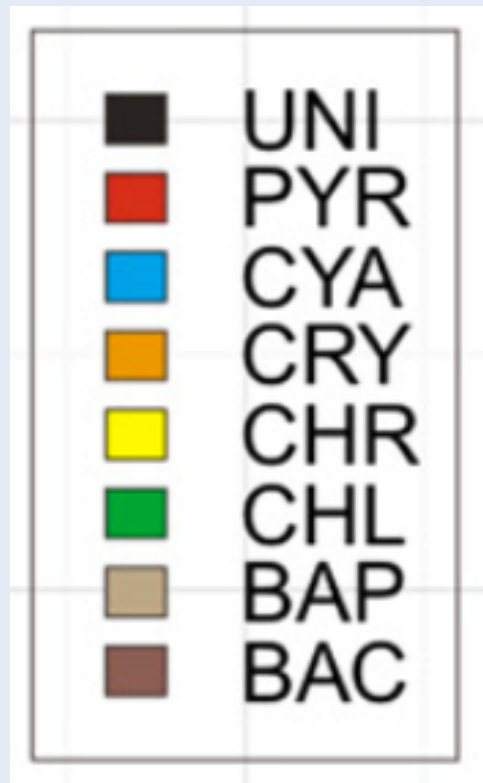
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JGLR 2014, 40:618-639



Unidentified

Pyrrophytes (Dinoflagellates)

Cyanobacteria (blue-green, *Microcystis aeruginosa*)

Cryptophytes

Chrysophytes

Chlorophytes (Green algae)

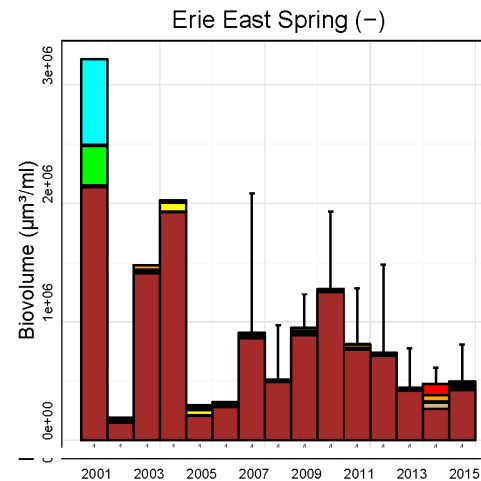
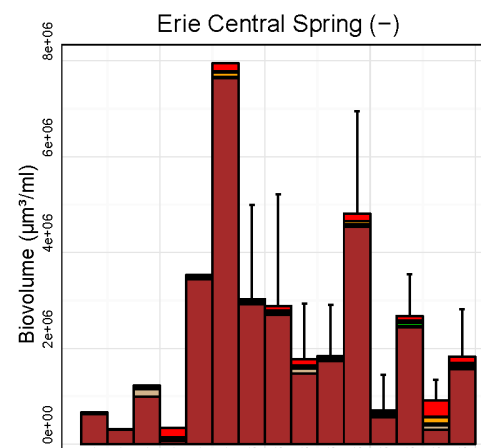
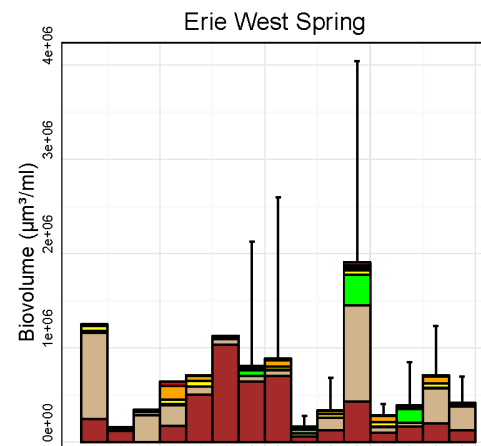
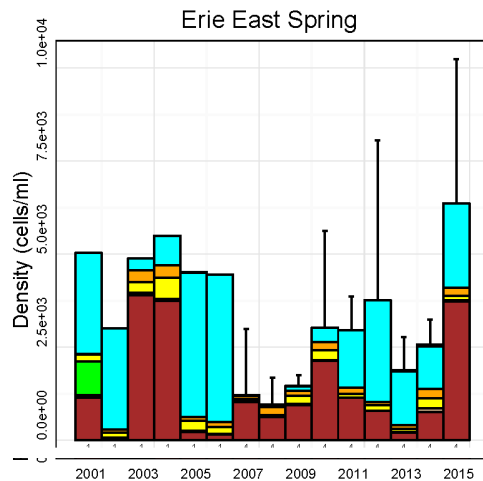
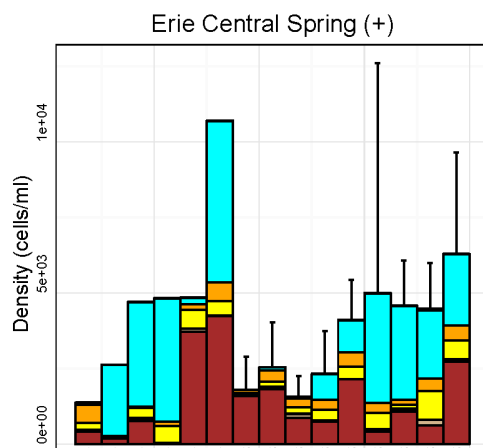
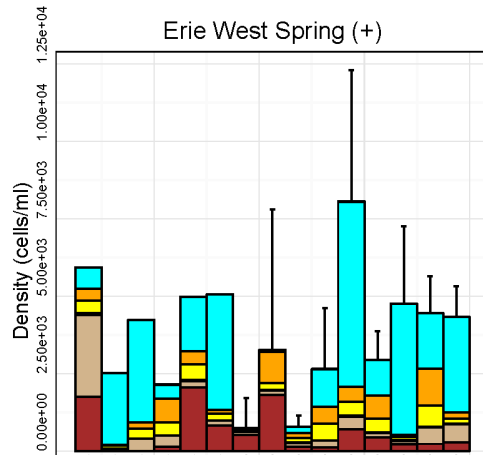
Pennate diatoms

Centric diatoms (*Aulacoseira islandica*)

All based on integrated epilimnion water samples, have added DCL for eastern Erie

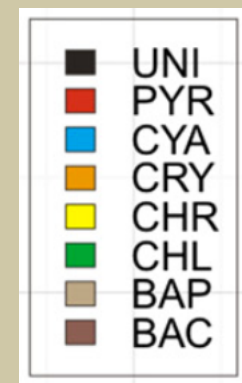
Data shown updated to from 2001 to 2015, Density (Left) and Biovolume (Right)

Density

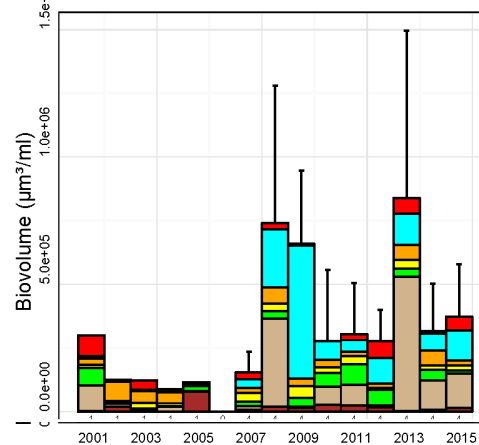
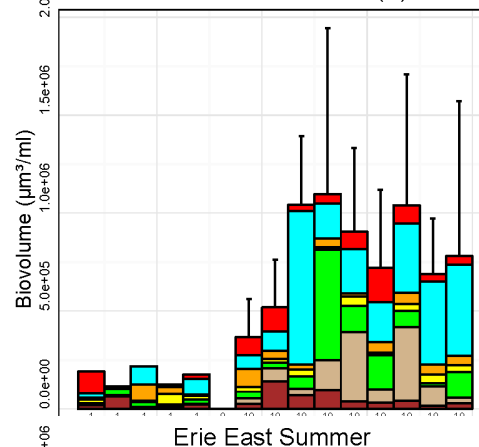
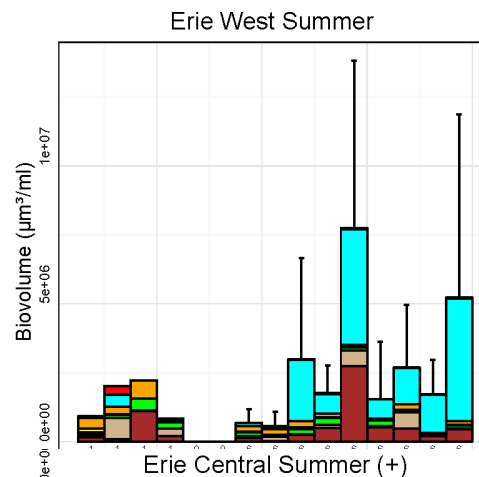
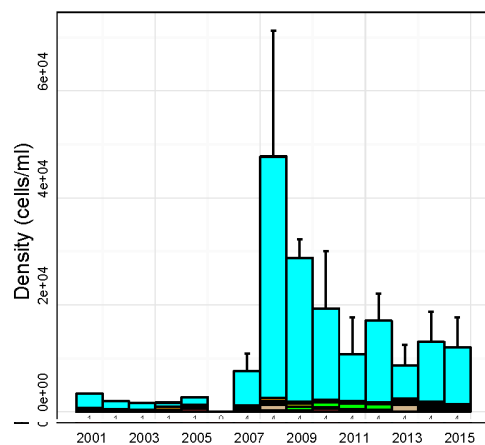
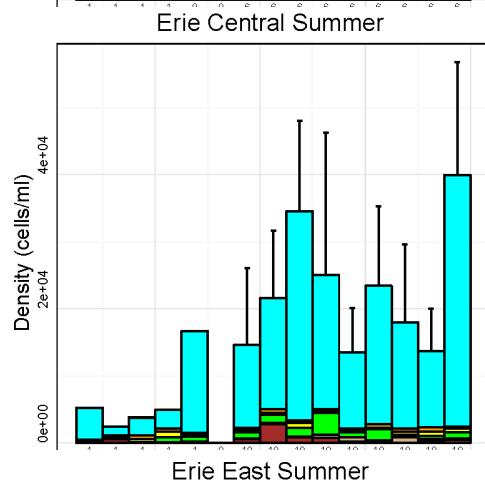
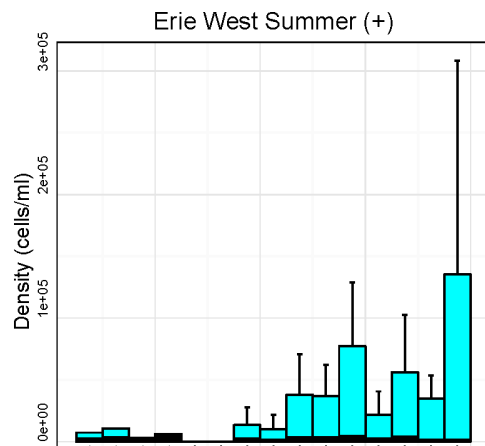


Spring

Biomass

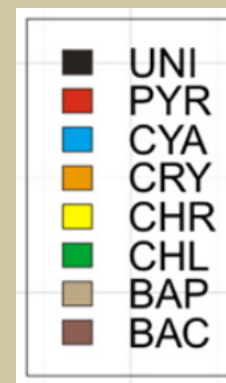


Density



Summer

Biomass



Zooplankton

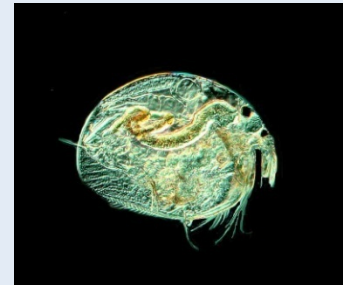
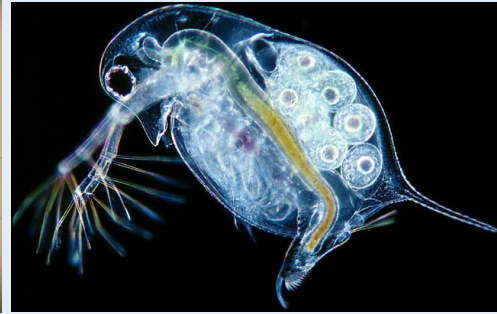
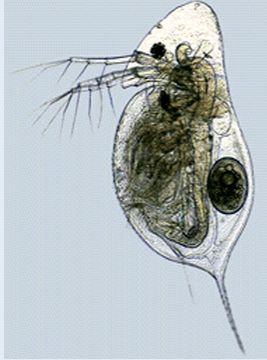
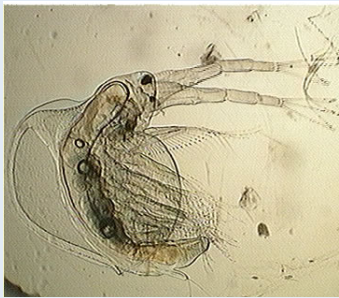
Questions-

Is there good use of phytoplankton by zooplankton grazers?

Is there enough food for planktivorous fish (alewife and smelt)?

How is the community structured?

Are there any new invasives (latest 2006 *Hemimysis anomola*)?



GLNPO Zooplankton Sampling



63 and 153 micron
metered 0.5 m net
(D20 and D100)



Triaxus Vehicle LOPC
and Closing Nets
for vertical patterns

Mysid Nets Too!

Lab Analysis



Analysis Team Beth, Gabriella, Chris, and Joe



600-800 individuals per sample identified
Stratified subsampling protocol
All large species (Cerc, Byth, mysids counted
First 20 of every taxa measured

Common Zooplankton Species by Density, Western Basin Erie

Cladocerans

Eubosmina coregoni
Diaphanosoma birgei
Bosmina longirostris
Diaphanosoma spp.
Daphnia retrocurva
Daphnia mendotae

Leptodora kindti
Ceriodaphnia lacustris
Daphnia lumholtzi
Bythotrephes cederstroemi
Chydorus sphaericus
Sida crystallina
Ilyocryptus
Holopedium gibberum

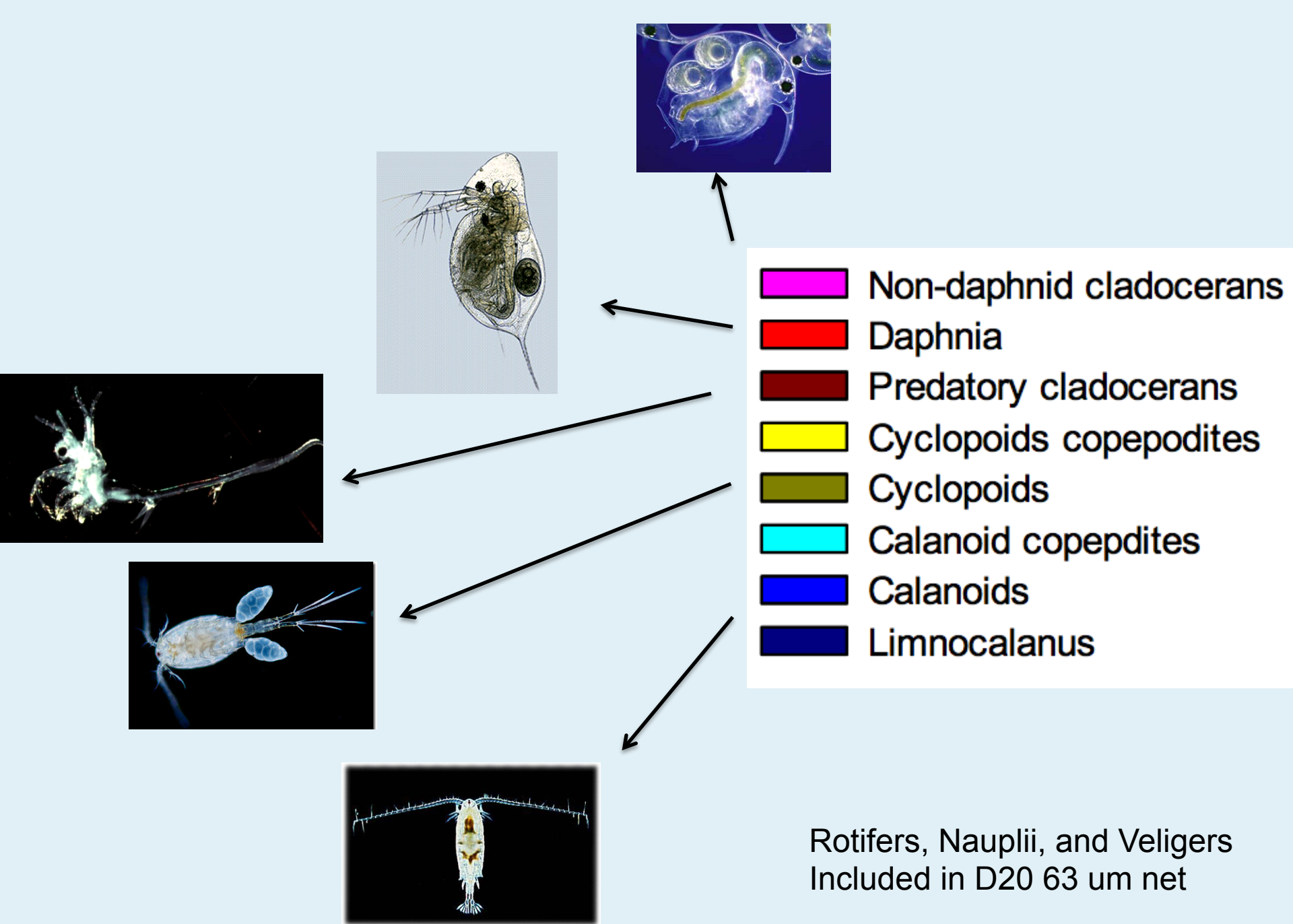
Cyclopoids

Mesocyclops edax
Tropocyclops prasinus
Acanthocyclops vernalis
Microcyclops rubellus
Diacyclops thomasi
Diacyclops nanus
Eucyclops agilis
Thermocyclops crassus

Calanoids

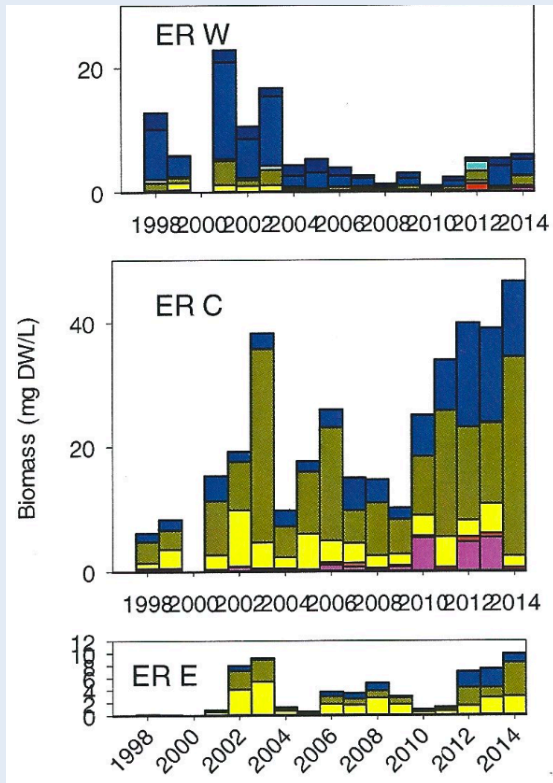
Leptodiaptomus siciloides
Eurytemora carolleea
Skistodiaptomus oregonensis
Skistodiaptomus reighardi
Skistodiaptomus pallidus
Leptodiaptomus ashlandii
Leptodiaptomus minutus
Epischura lacustris
Limnocalanus macrurus

< 100 per m³ below lines
Red font non-native

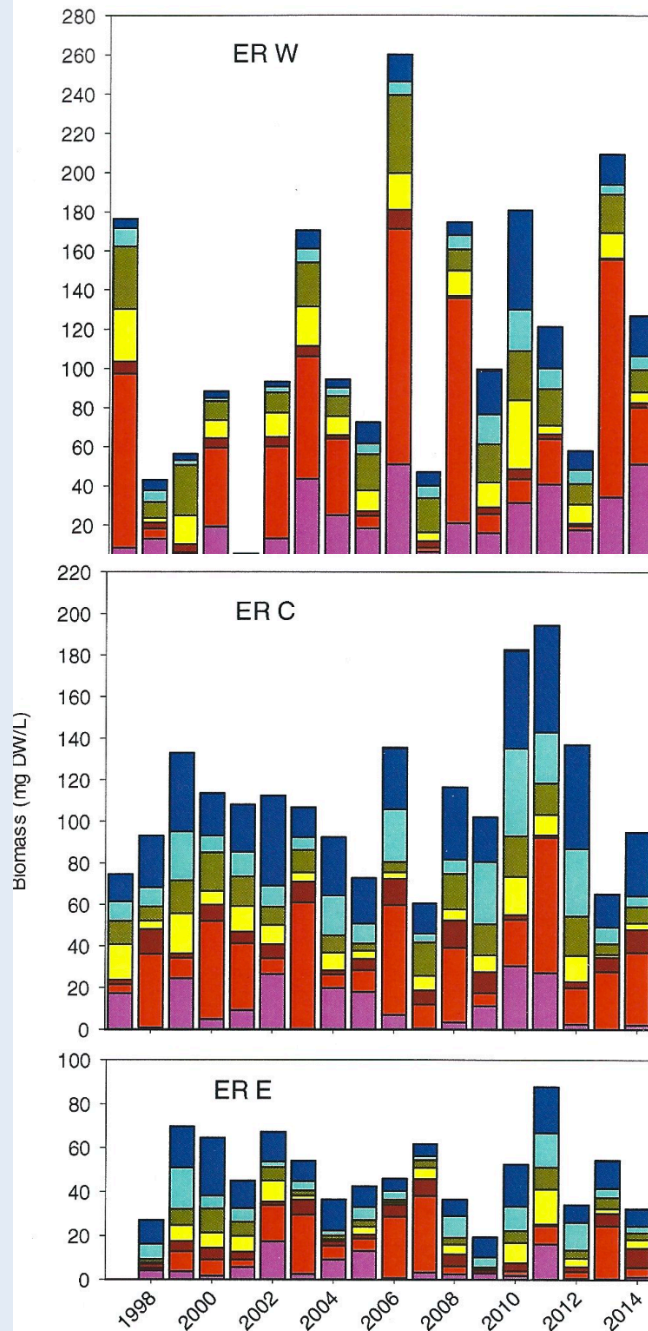


Summer Survey

Spring Survey

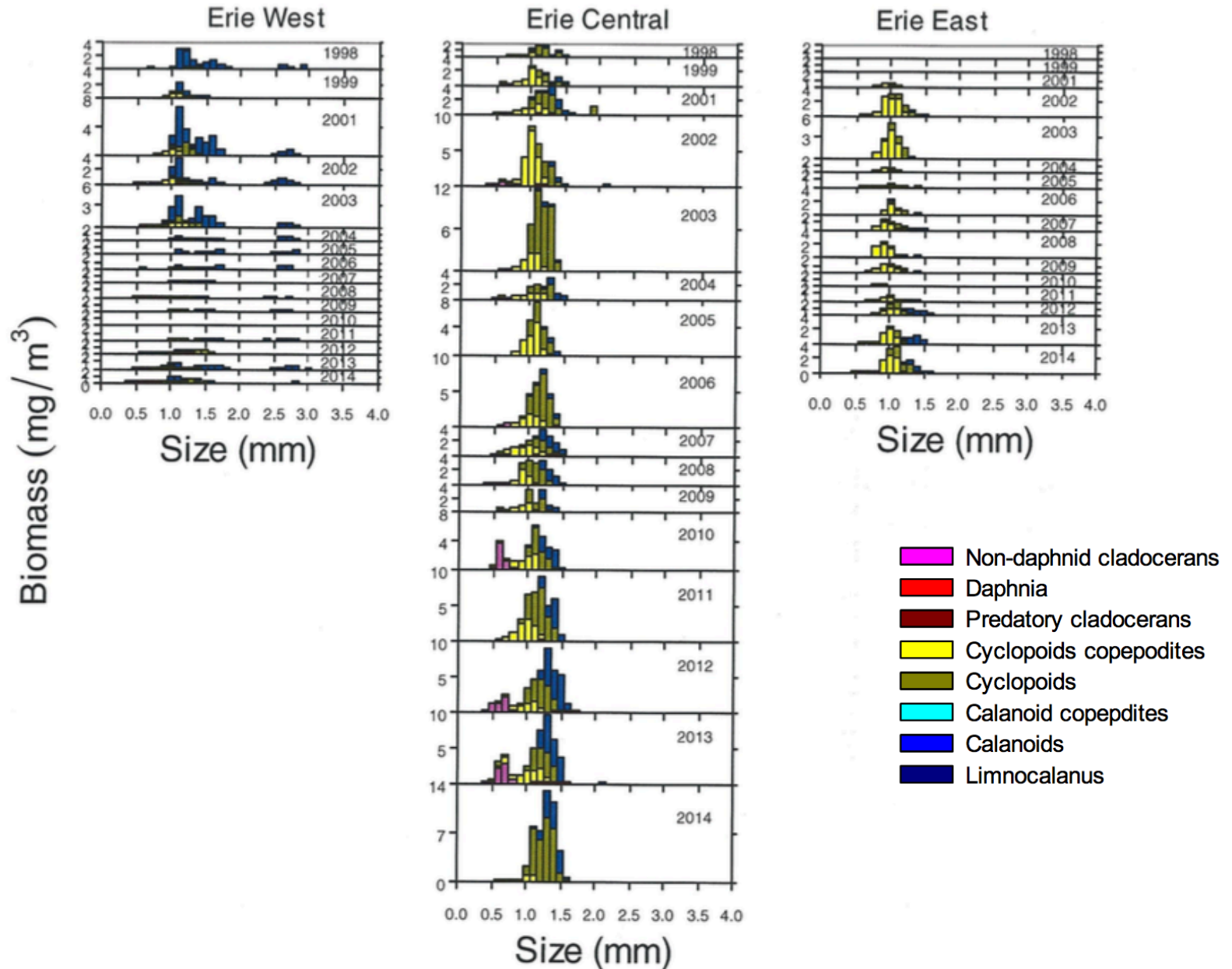


1998-2014
153 um data

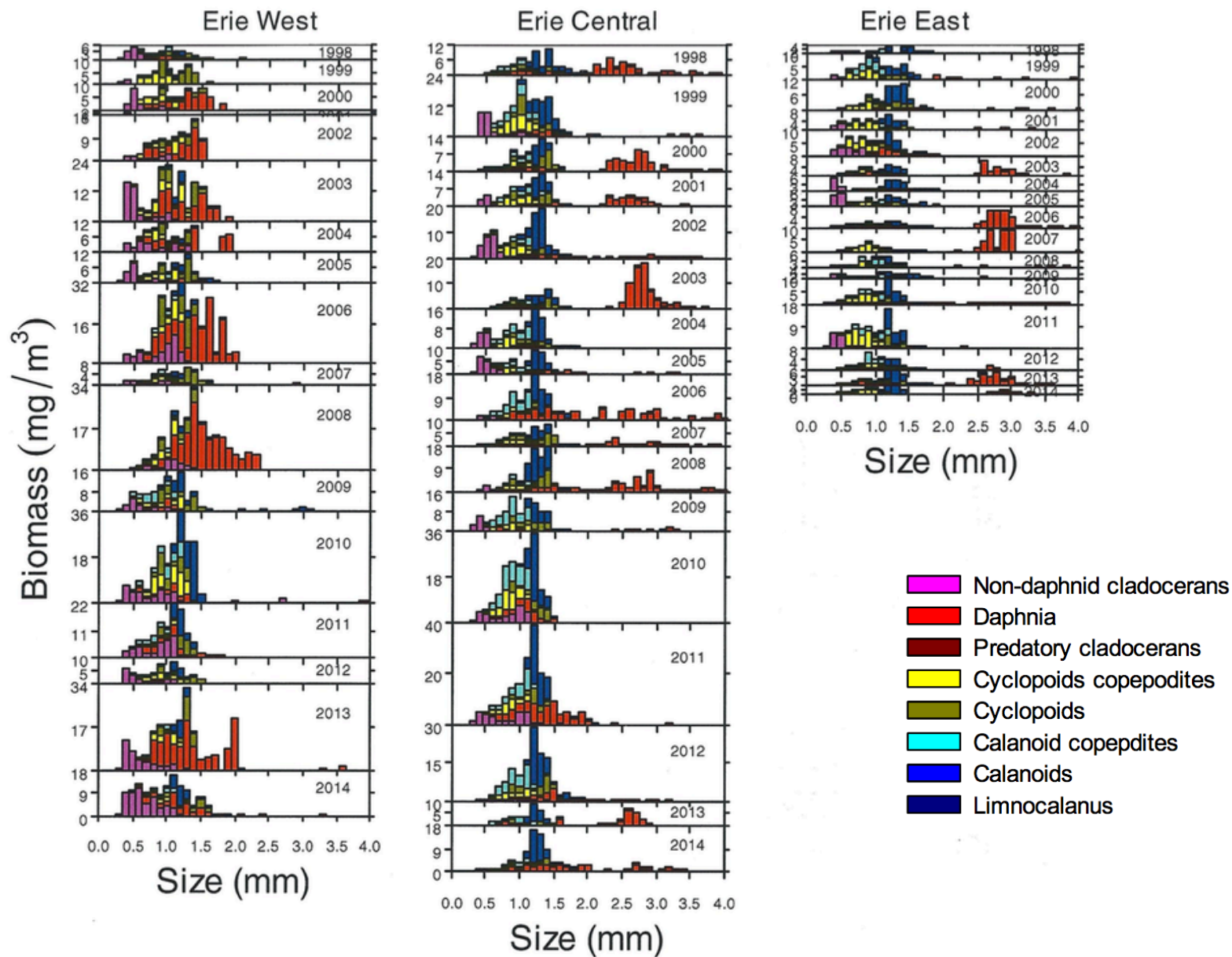


- Non-daphnid cladocerans
- Daphnia
- Predatory cladocerans
- Cyclopoids copepodites
- Cyclopoids
- Calanoid copepodites
- Calanoids
- Limnocalanus

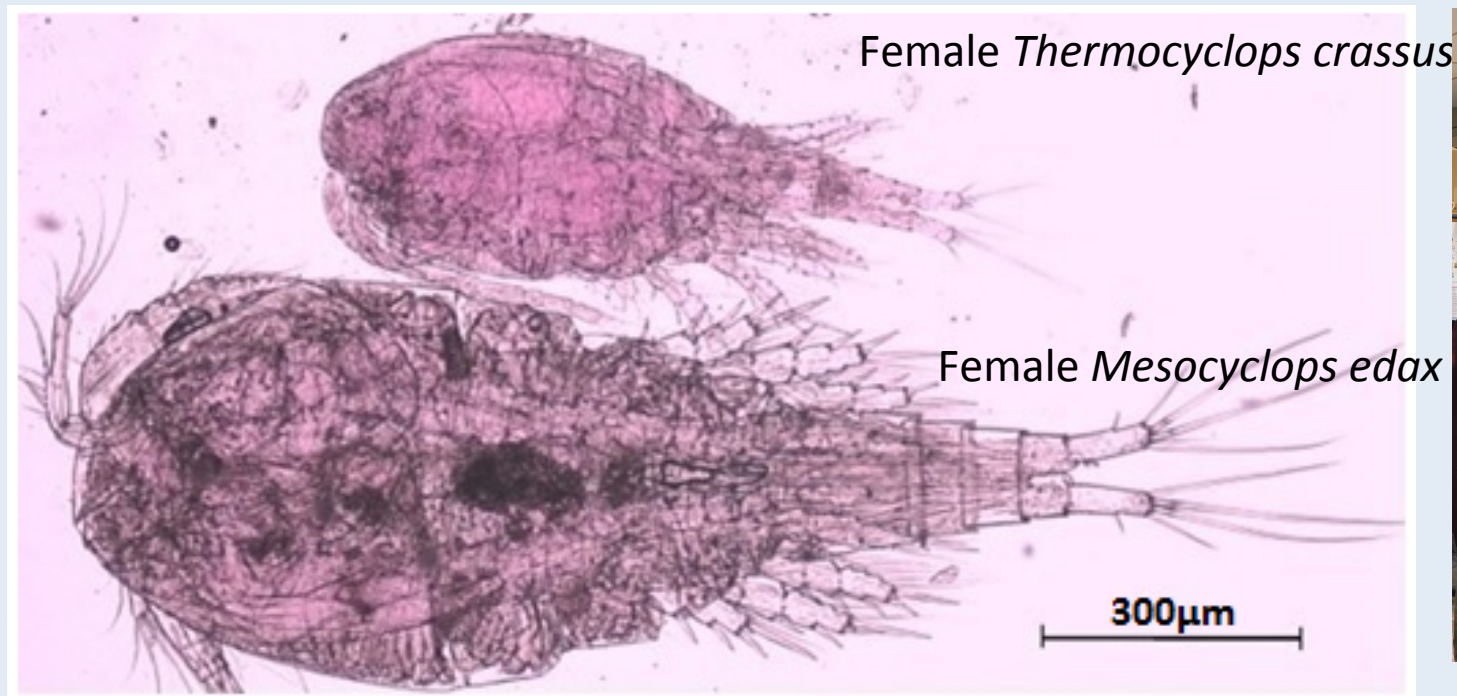
Spring Survey Size Distribution



Summer Survey Size Distribution



New Nonnative in Western Lake Erie in 2014



Joe
Connolly

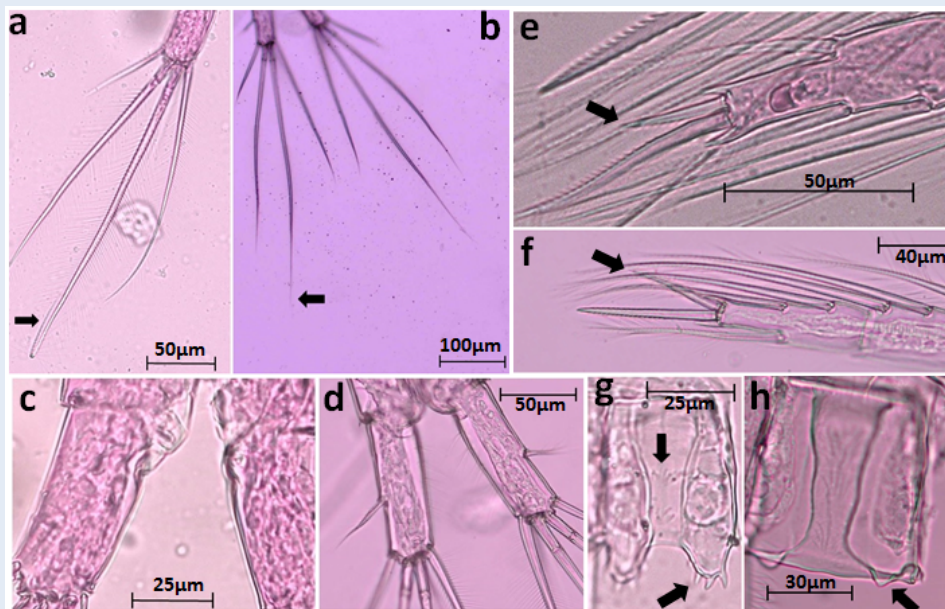
Eurasian species,
spotted in
Lake Champlain in 1991

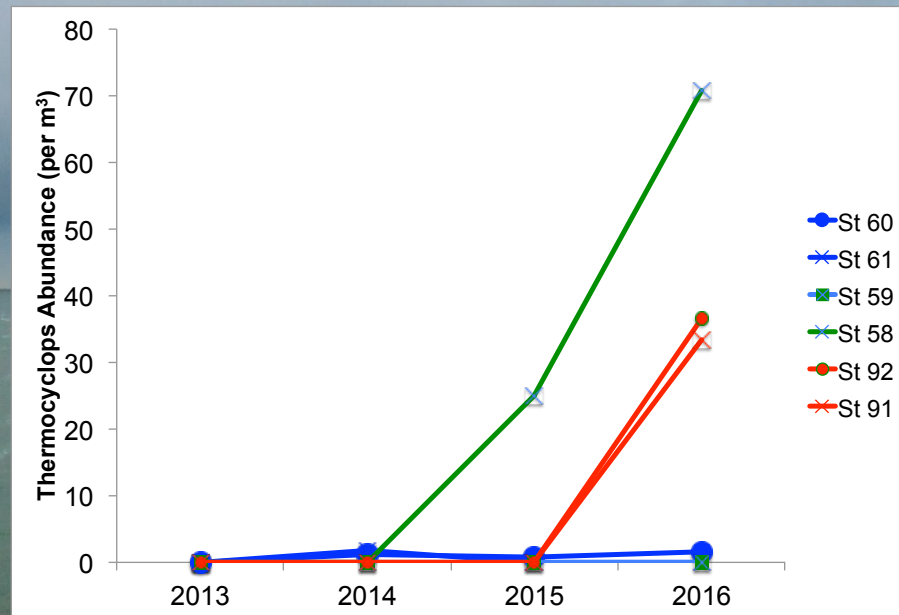
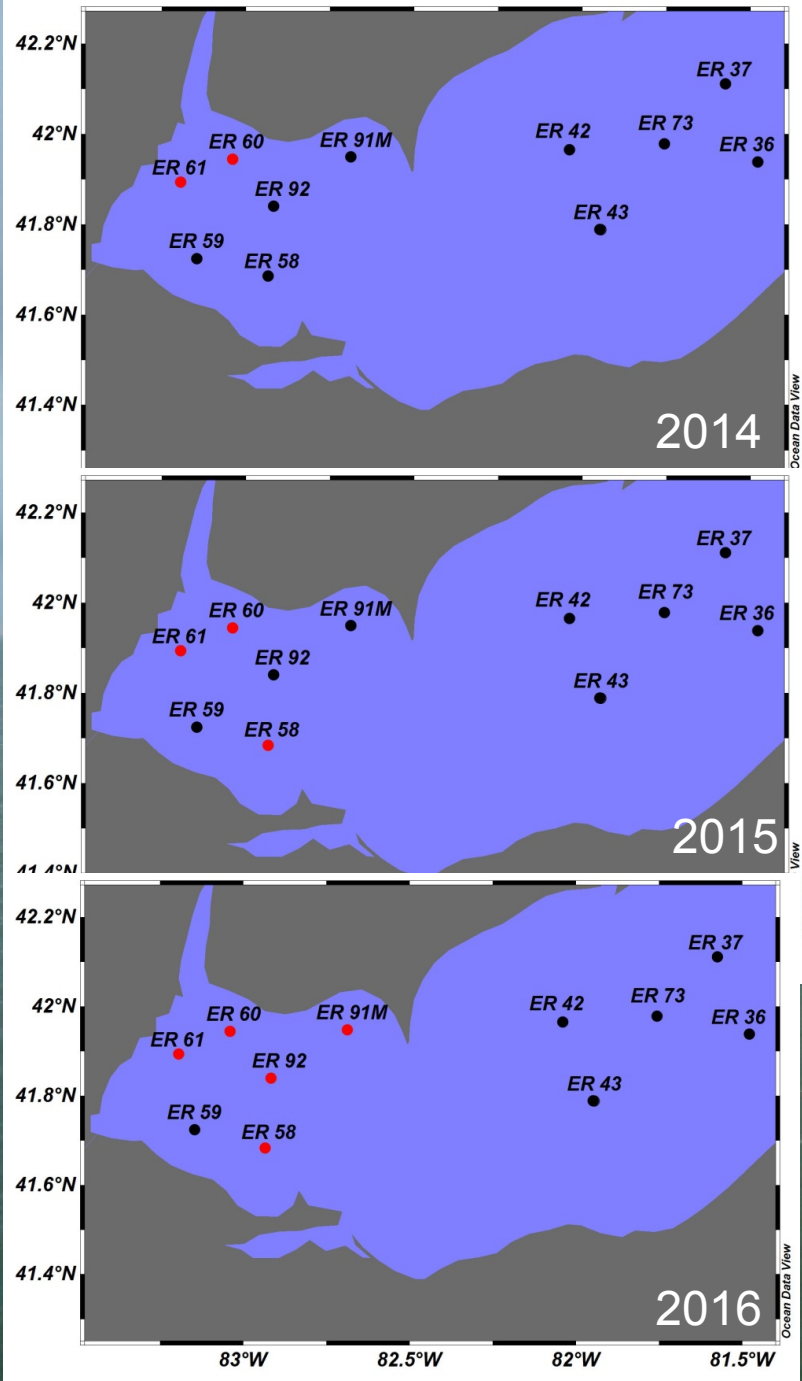
Assist from
Dr. Janet Reid

JGLR note soon



Female
With
Egg sac





Conclusions

Contrast with Other Great Lakes (Shallow and Productive)

Increased connection with seasonal data sources (“robots”, NY DEC)

Phytoplankton

-Spring Diatoms and Anoxia

-Summer Blue-Greens

Zooplankton

Stable biomass and community (in contrast to Lake Huron)

New non-native Thermocyclops- uncertain impact

Several nonnative species are at low concentrations
(except for Cercopagis and Bythotrephes!)

Thank You!

Particularly the Crew

Look for it at Detroit
IAGLR 2017

