Recent Ecological Studies in Nearshore Lake Michigan

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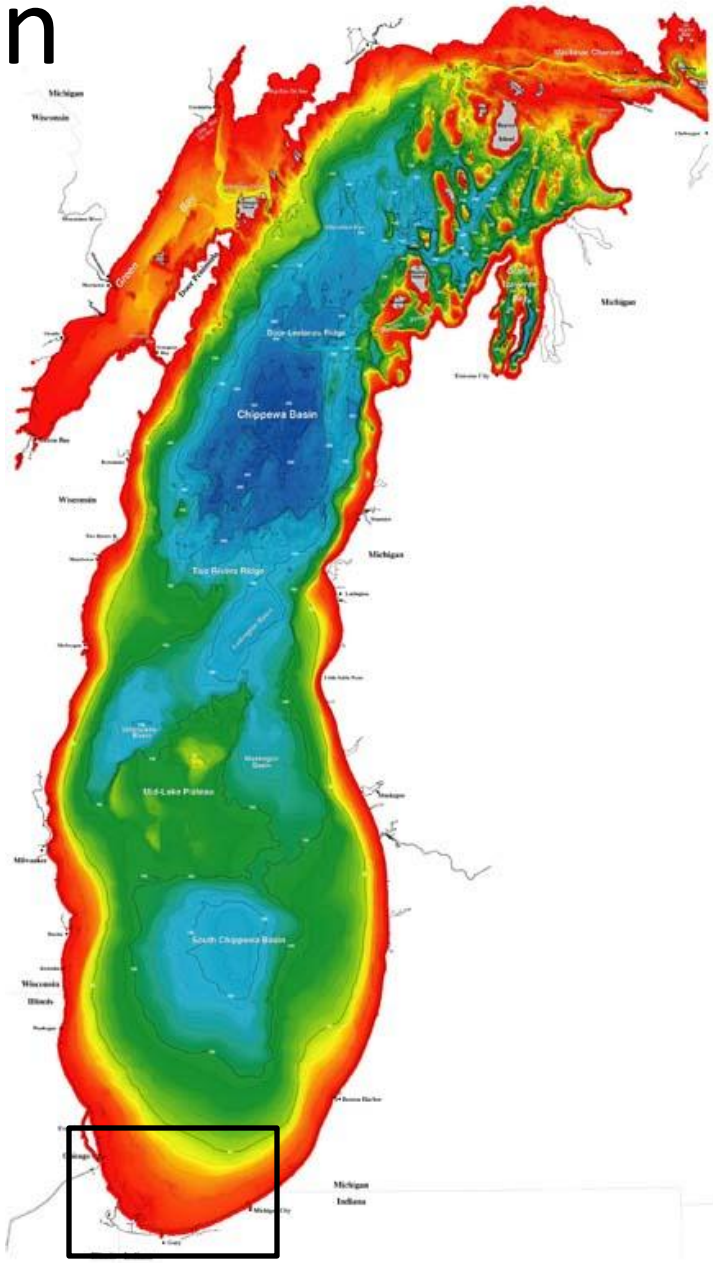
Nearshore Lake Michigan

- Lake Michigan is a continuous system
- Nearshore region has recently increased in importance
  - Decreases in nutrient loading
  - Invasive species
    - ***Dreissena* spp**., round gobies, *Hemimysis, Cercopagis*
- Nearshore foodweb and ecological processes are under-described

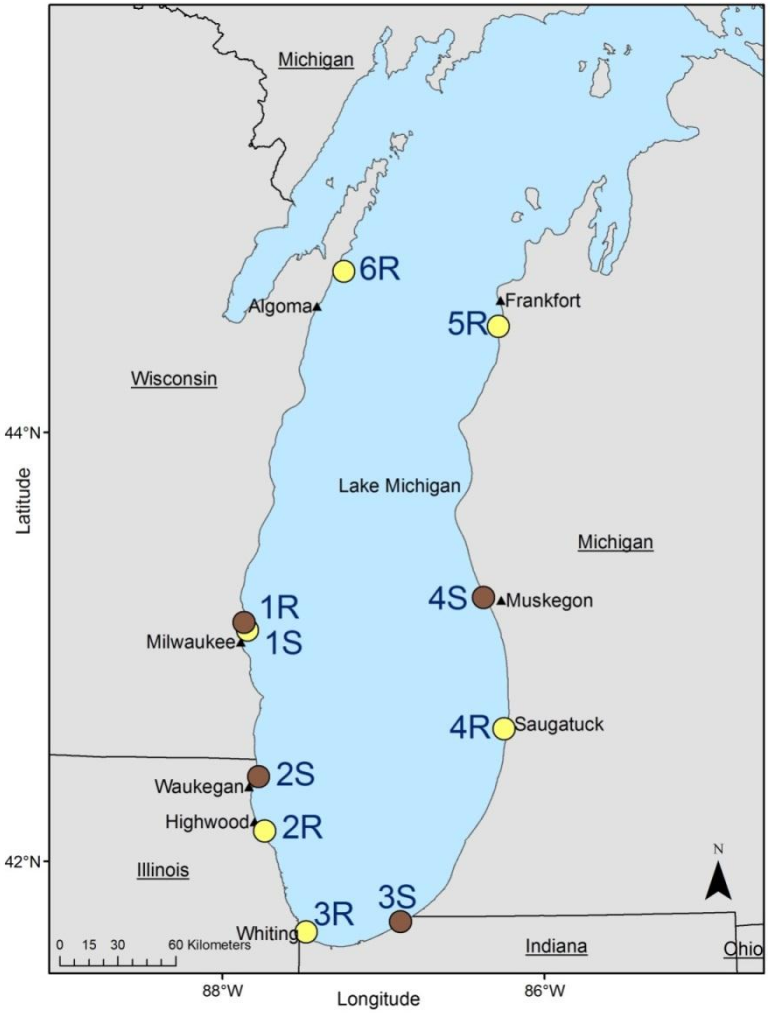


Current Nearshore Southern Lake Michigan Studies

- Nearshore physical effects on fish and invertebrates
  - Observing distributions, growth, survival of larval fish
  - Modeling transport of larval fish
  - Modeling current fish thermal habitat
- Modeling future fish thermal habitat
- Characterizing the nearshore foodweb
- Larval fish – predatory zooplankton interactions
- Role of river plumes as hotspots of fish production

Characterizing the nearshore Lake Michigan foodweb.

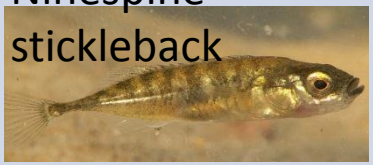
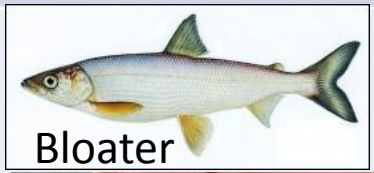
Funding: IL-IN and WI Sea Grants, EPA



Sampling

- Physical variables
- Biotic variables
  - Zooplankton
  - Benthic inverts and algae
  - Fish (micromesh gillnets)
- Trophic connections
  - Gut analyses
  - Fatty acid analyses
  - C-N stable isotopes
  - H-O stable isotopes

Nearshore Fish community (2010)

Fish caught in 178 net sets	Mean CPUE (# fish/10m net/hour)		Mean CPUE (# fish/10m net/hour)
Yellow perch	3.4 ± 2.3	Ninespine stickleback 	0.1 ± 0.01
Round goby	1.7 ± 0.9	 Bloater	0.1 ± 0.2
Rainbow smelt	1.2 ± 0.3	Salmonidae	0.02 ± 0.1
Spottail shiner	0.7 ± 0.8	Log perch White perch	
Alewife	0.5 ± 1.5	FW drum Threespine stickleback	< 0.003

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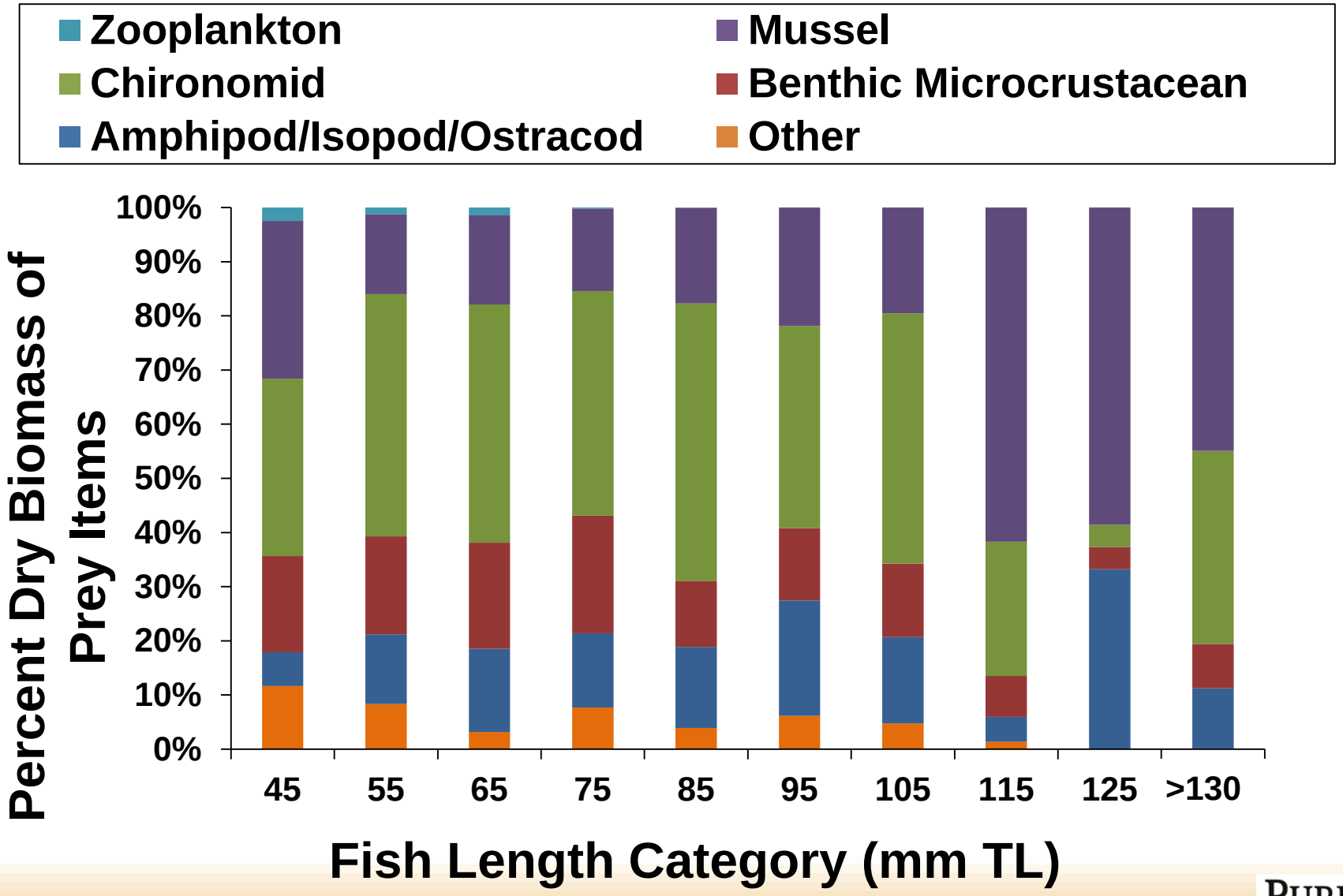
Round goby diets in nearshore Lake Michigan

Photo by Kristi Arend



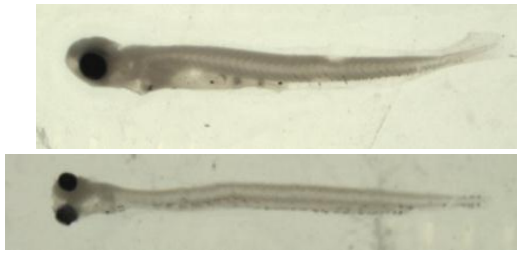
Larval fish dynamics in nearshore Lake Michigan

Funding: IN-DNR, Lake Michigan Coastal Program

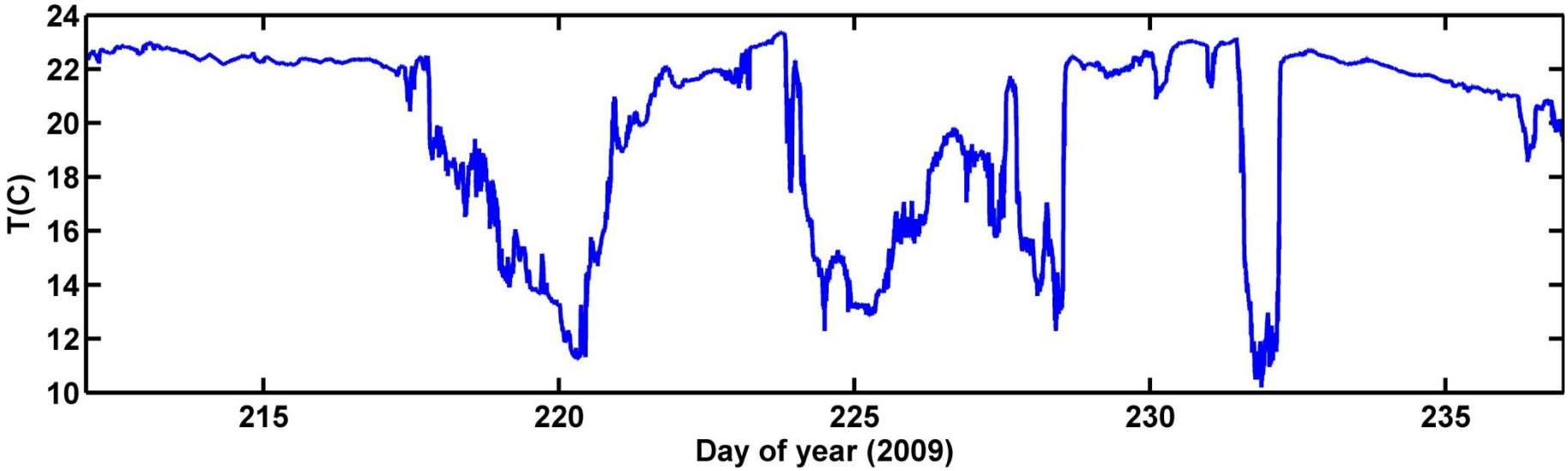
Many larval fish hatch and begin exogenous feeding in nearshore zone

-Nearshore region highly variable.

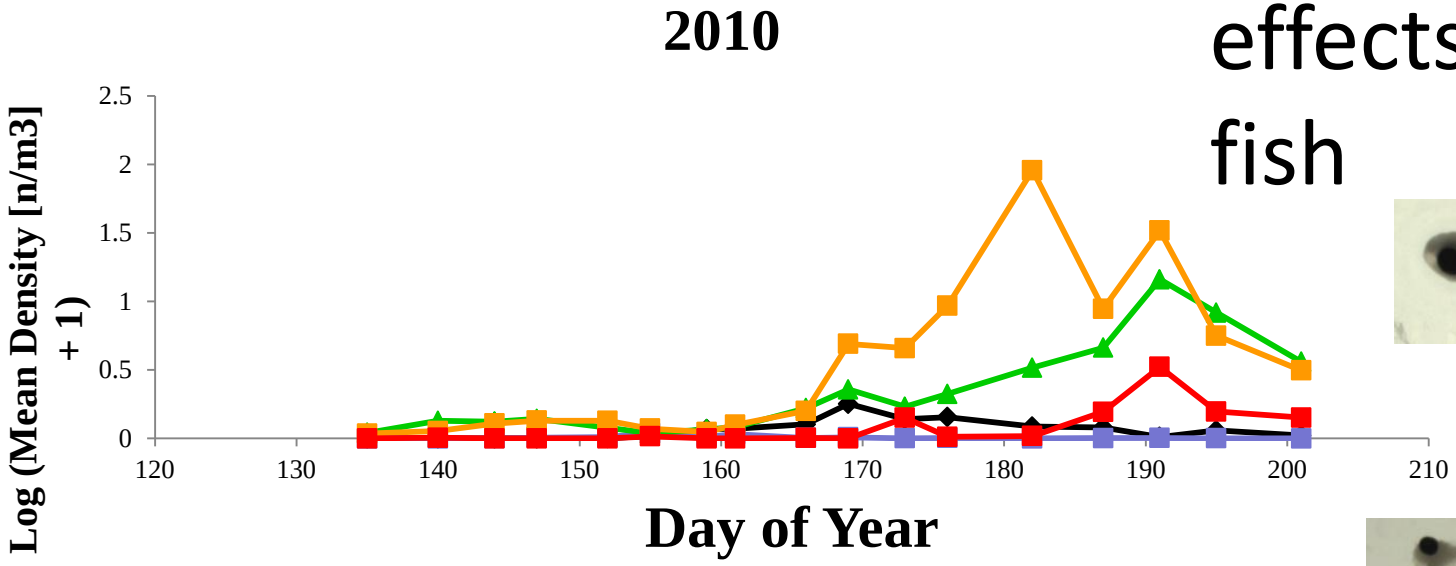
-Larval fish may be impacted by invaders.

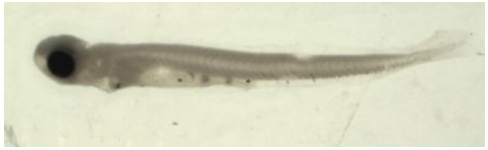


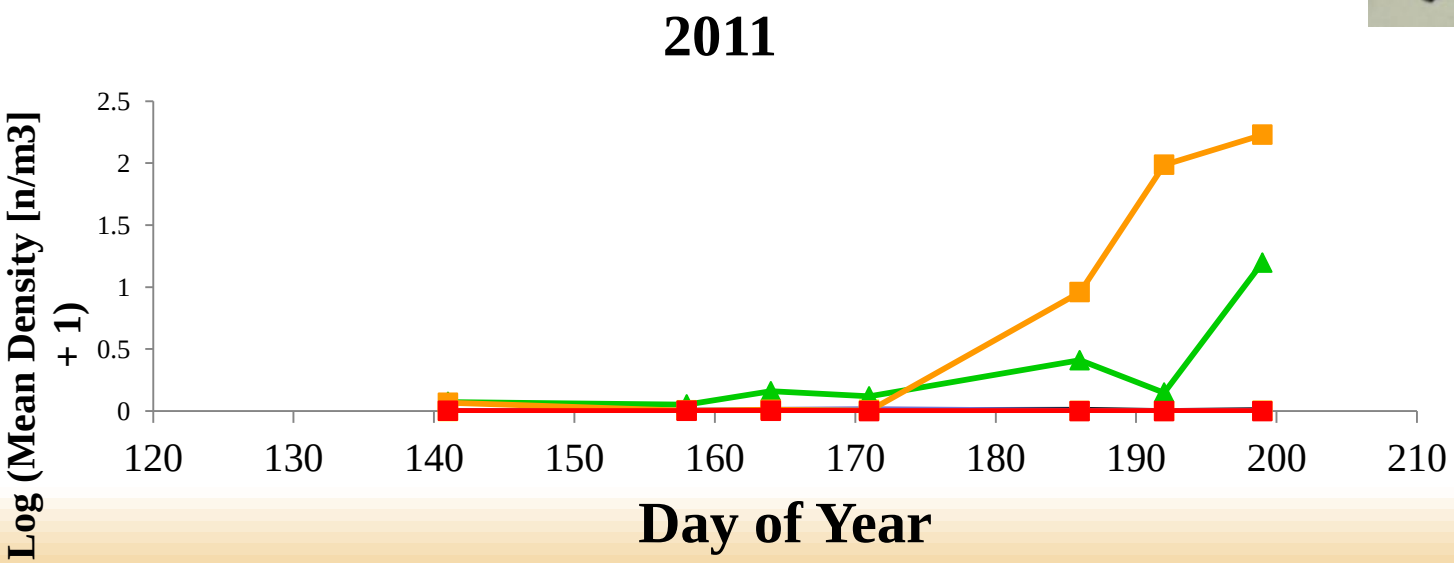
2009 thermal record from nearshore Lake Michigan (Mich. City)



Predatory Zooplankton effects on larval fish





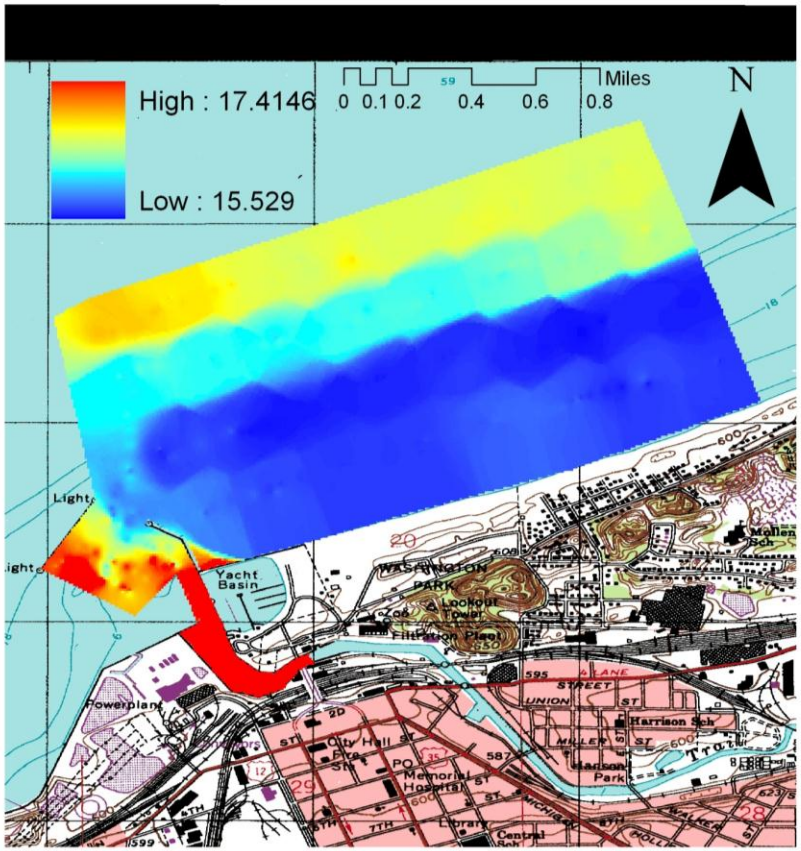


Temporal variation in larval alewife (black diamond), larval yellow perch (blue square), *Leptodora* (green square), *Cercopagis* (orange square), and *Bythotrephes* (red square) densities.

Lake Michigan River Plumes: Fish Recruitment Hotspots?

Funding: Great Lakes Fishery Trust

Michigan City Plume Mapping (10/10/11)



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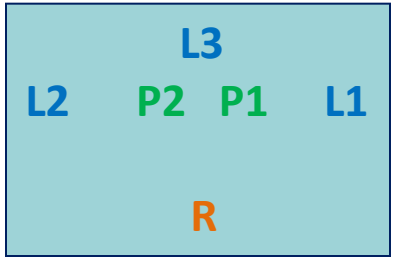
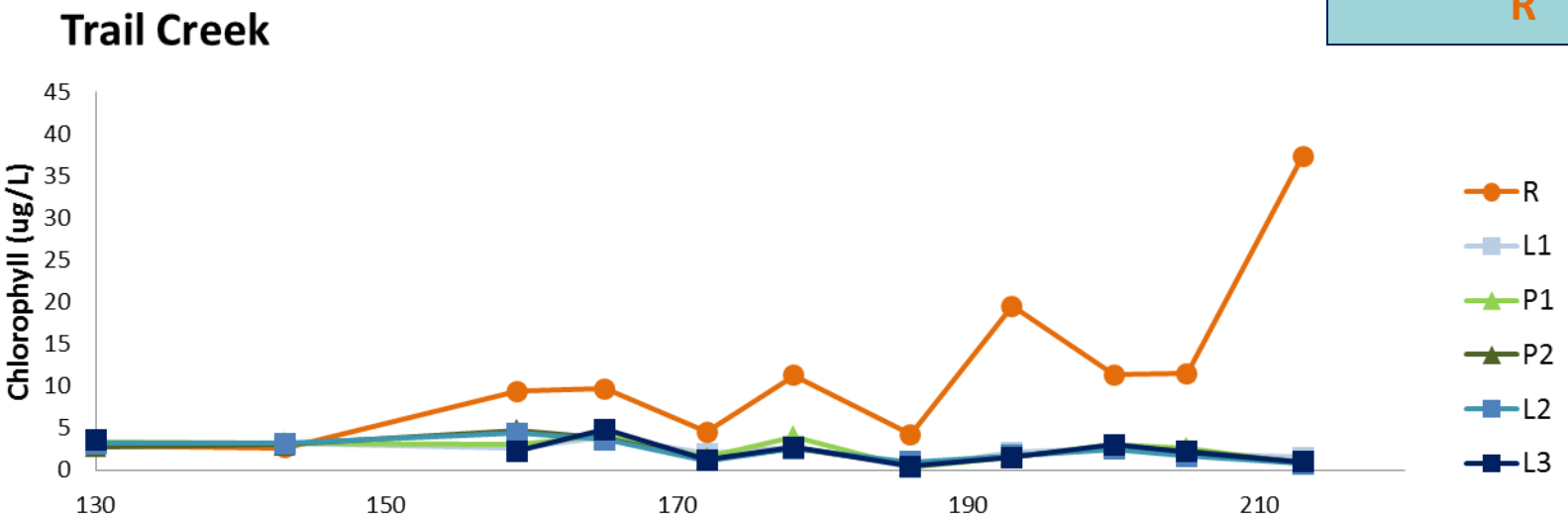
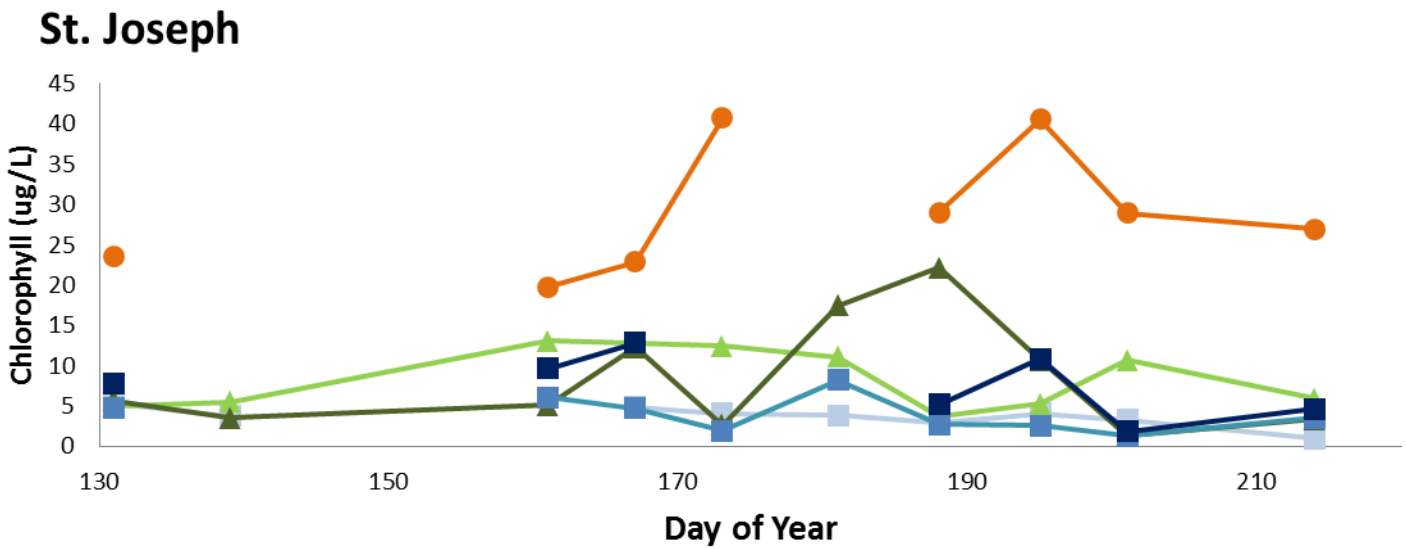
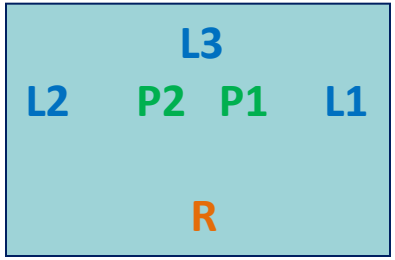
Primary Productivity:
Chlorophyll 2011

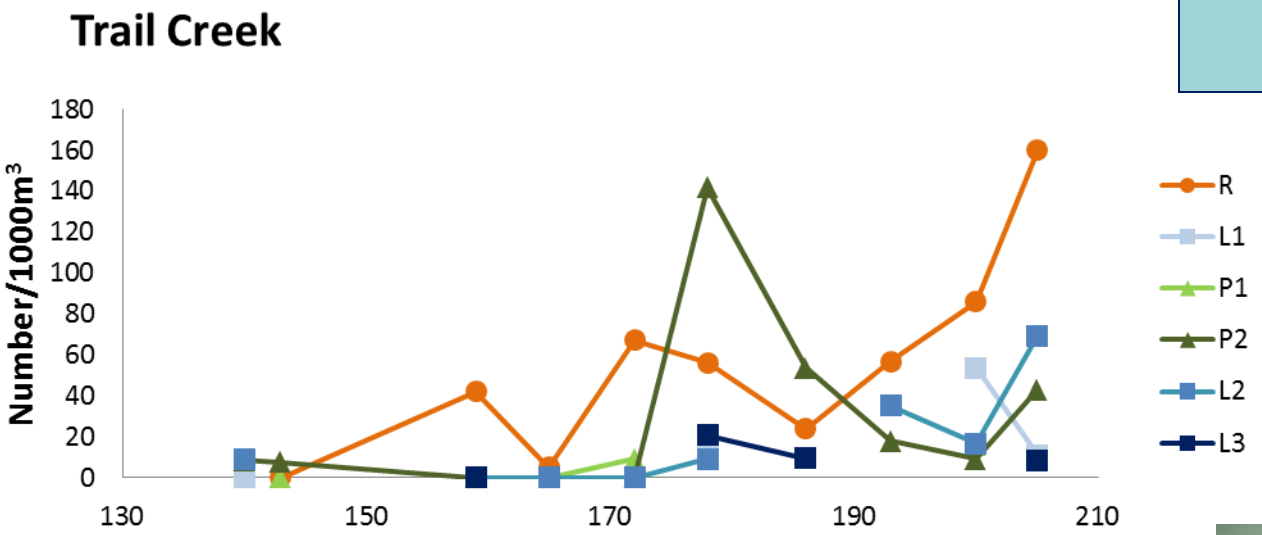


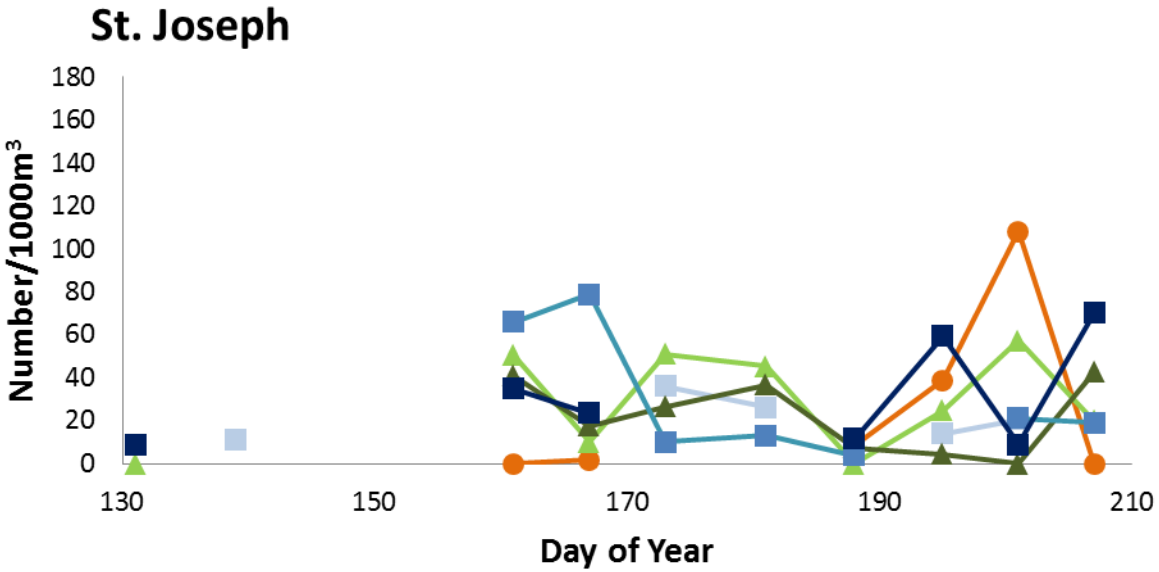




Alewife Density 2011

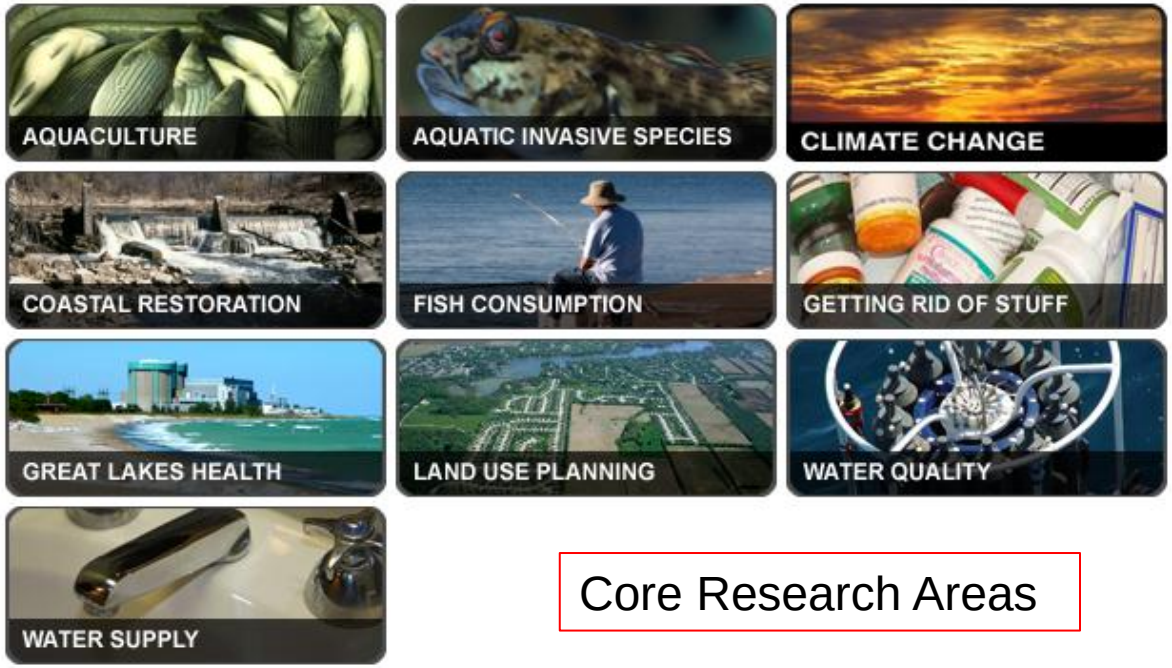






Illinois-Indiana Sea Grant

- Sea Grant College Program
  - Research, Education, Outreach
- UIUC and Purdue University
- Spread across both states



Core Research Areas

IAGLR 2013

- June 2-6
- West Lafayette, IN
- Variety of topics

- Call for abstracts
  - Released this week

- http://iaglr.org/iaglr2013/

Real-Time Buoy

- Michigan City, IN
- Deployed late summer 2012
- http://www.iisgcp.org/buoy/index.html

- Currently: wind, temperature (air and water), rel. humidity, solar radiation, barometric pressure, wave height and direction, webcam

- Future: water temp. at depth, sonde (blue-green algae, DO, conductivity, TSS), ADCP