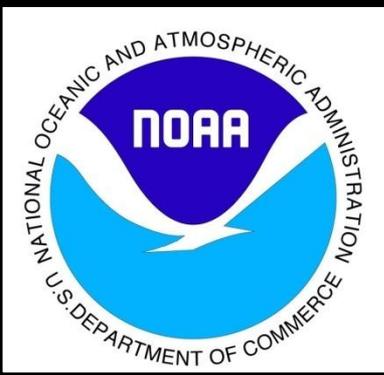




Adaptive Integrated Framework (AIF): a new methodology for managing impacts of multiple stressors in coastal ecosystems

Impacts of Multiple Stressors on Fish Production in Saginaw Bay

Tomas Hook, Steve Pothoven, Lori Ivan, Charles Roswell, Sarah Stein, Carolyn Foley, Hank Vanderploeg, Tom Nalepa, Mike Thomas, Dave Fielder and Tammy Newcomb



Percids in Saginaw Bay

Historically second largest commercial fishery in Great Lakes.

Walleye collapse ~1950 due to eutrophication, over-fishing, invasive species, etc.

Recent collapse of L. Huron alewives has led to improved reproductive success, but poor growth and long-term survival.

Walleye

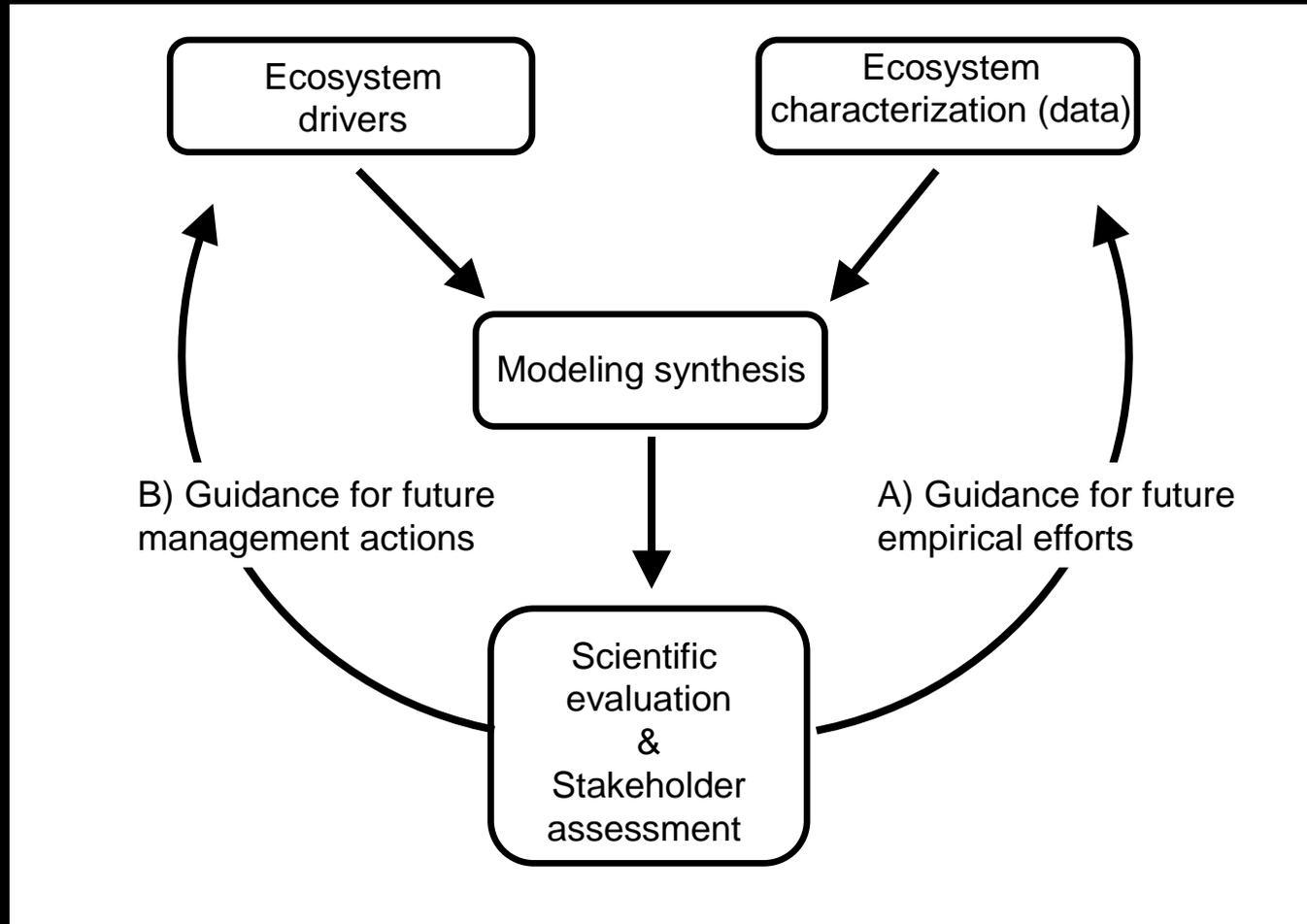


Yellow perch



©Shedd Aquarium

Adaptive Integrative Framework (AIF)



Fisheries Management Objectives

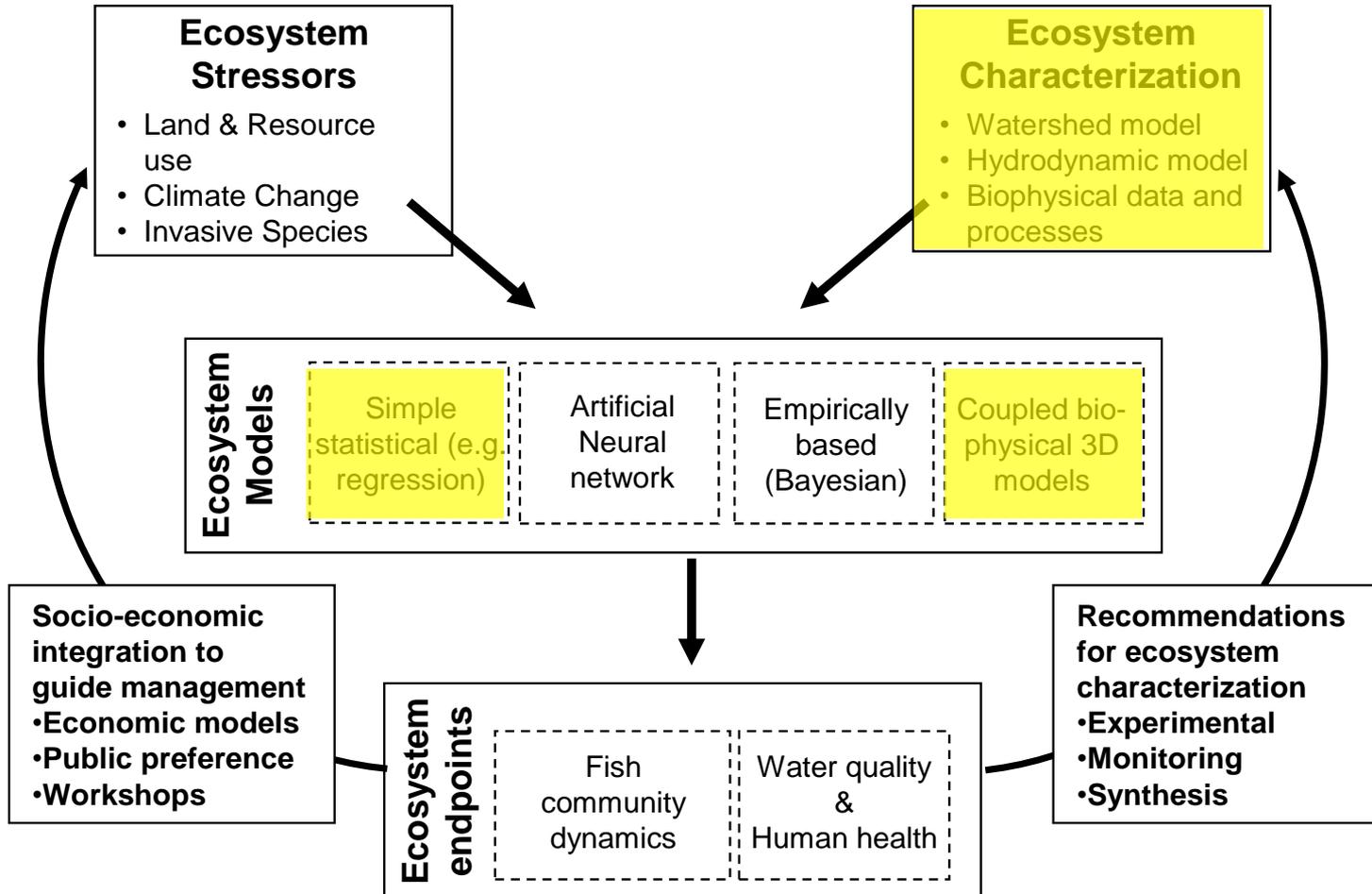
- Management of dominant percid (walleye and yellow perch) populations and their associated fisheries
- Manage for diverse ecosystem, fish community and fisheries
- Restoration of native species and control of non-natives
- Manage for long-term sustainability

Manager Workshop (Winter 2008)

5 Research Priorities

- 1a-b)** Walleye and yellow perch recruitment dynamics (early life factors affecting survival to later age...incl. habitat effects)
- 2a)** Ecological connections between Saginaw Bay and Lake Huron
- 2b)** Suitability of SB for lake herring
- 2c)** Fish community dynamics

Saginaw Bay AIF

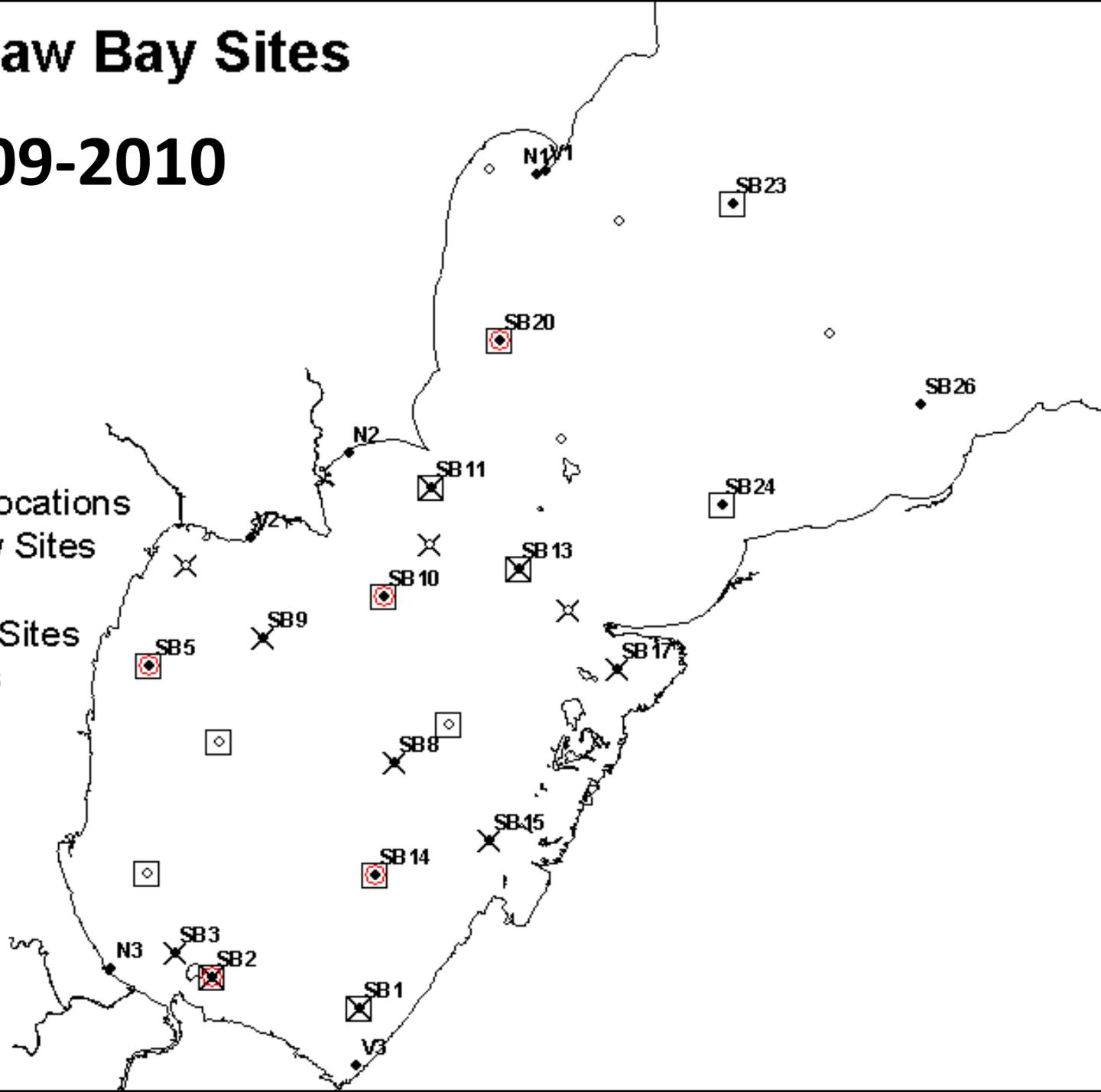


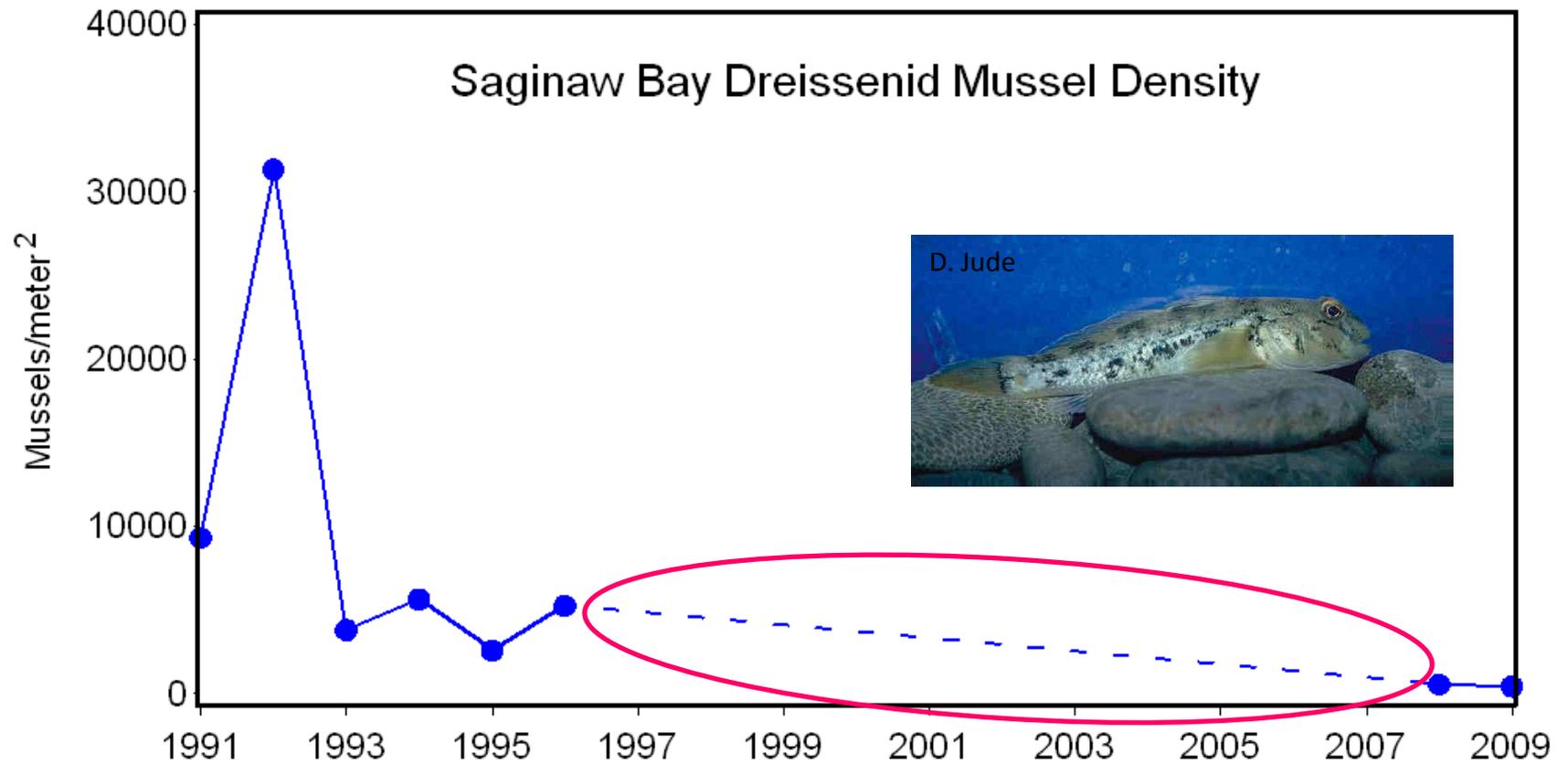
Saginaw Bay Sites

2009-2010

Legend

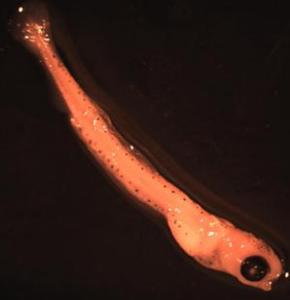
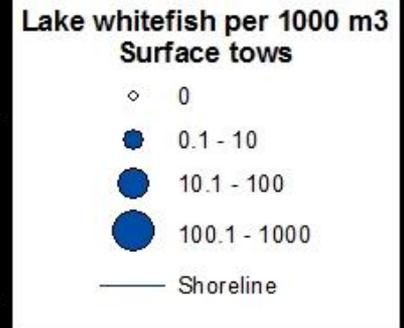
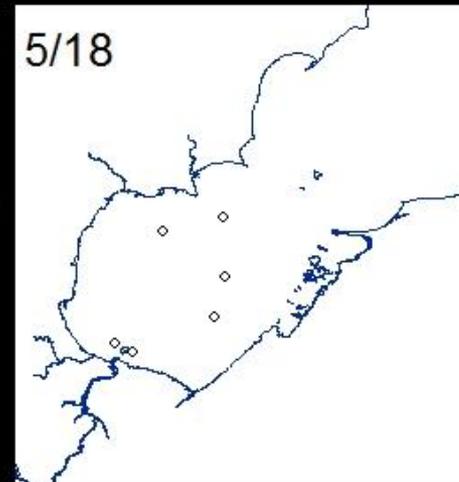
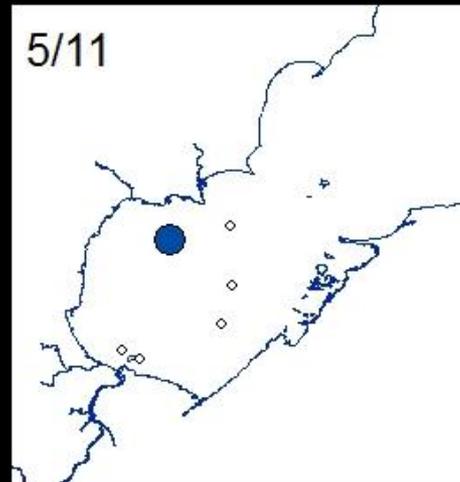
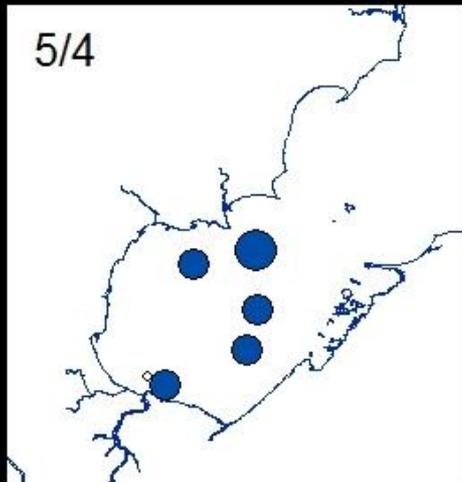
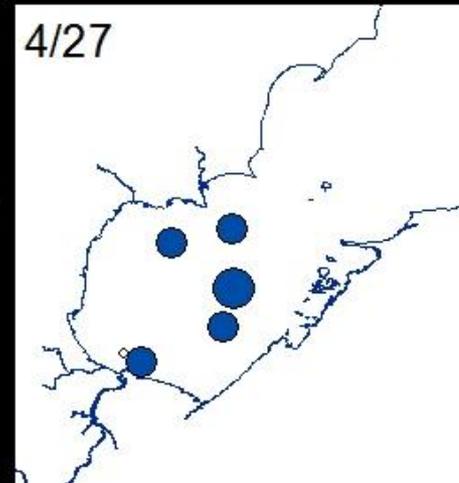
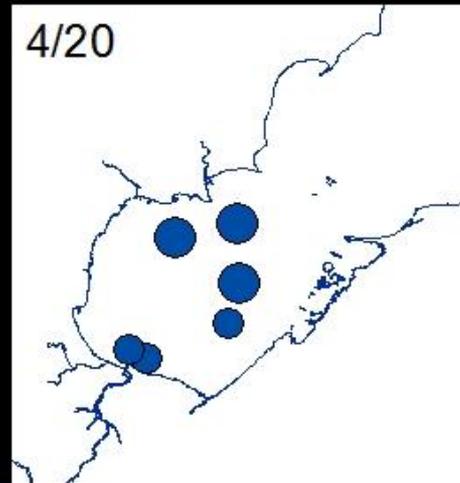
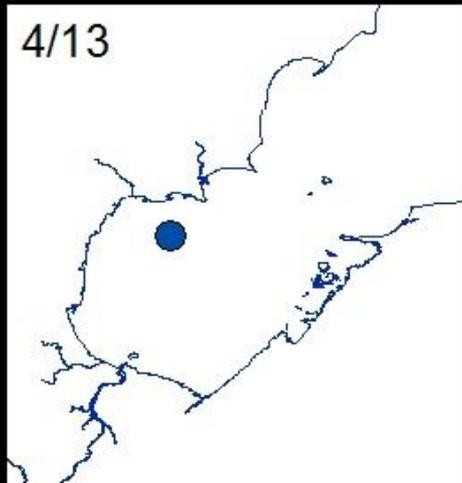
- Larval Fish Locations
- Water Quality Sites
- Master Sites
- ◇ Other NOAA Sites
- × D. Jude Sites
- Shoreline





2009 Sampling
Data courtesy of Tom Nalepa

Larval lake whitefish distributions



0 25 50 100 Kilometers



Burrowing Mayflies

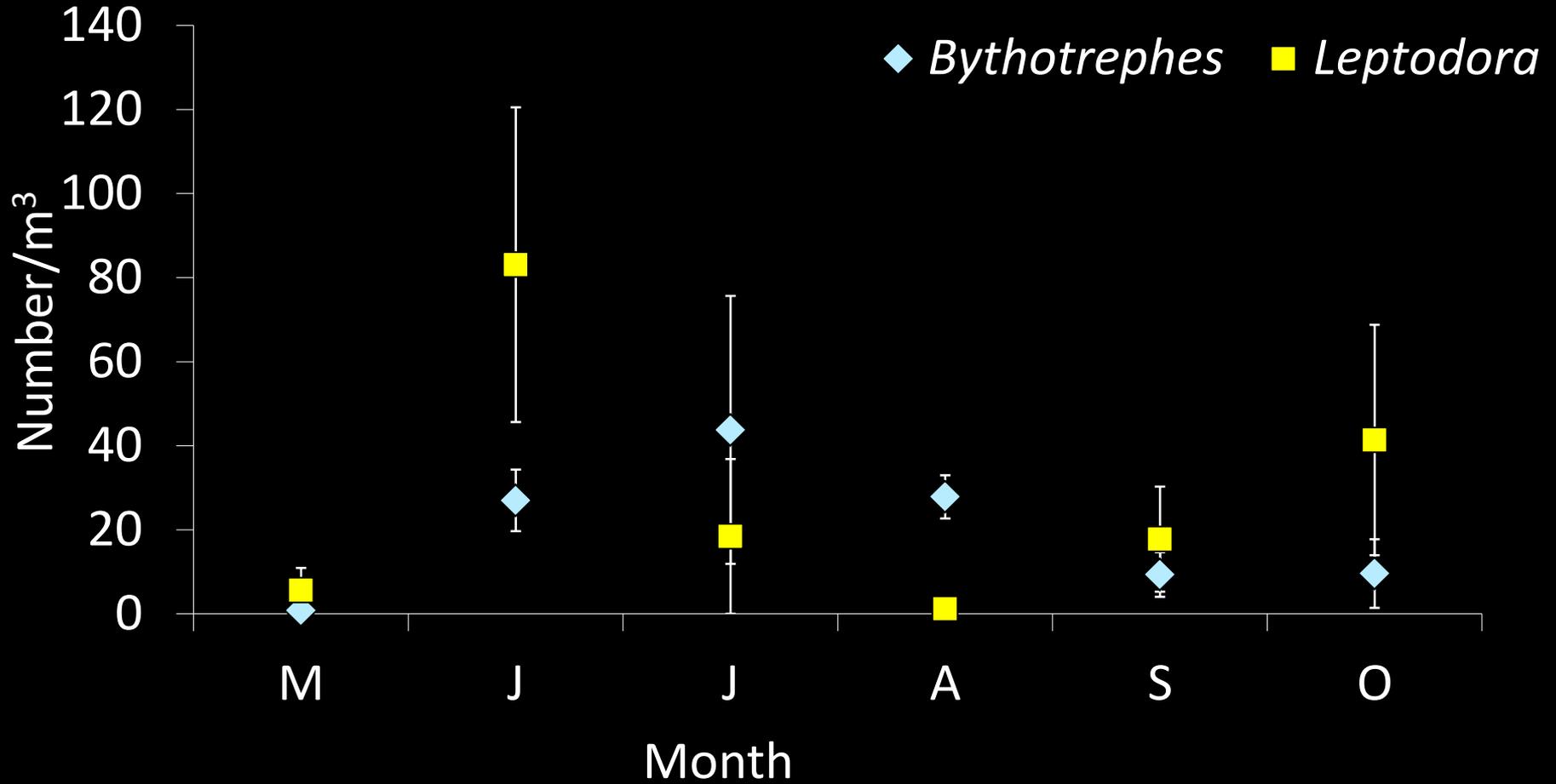
Hexagenia



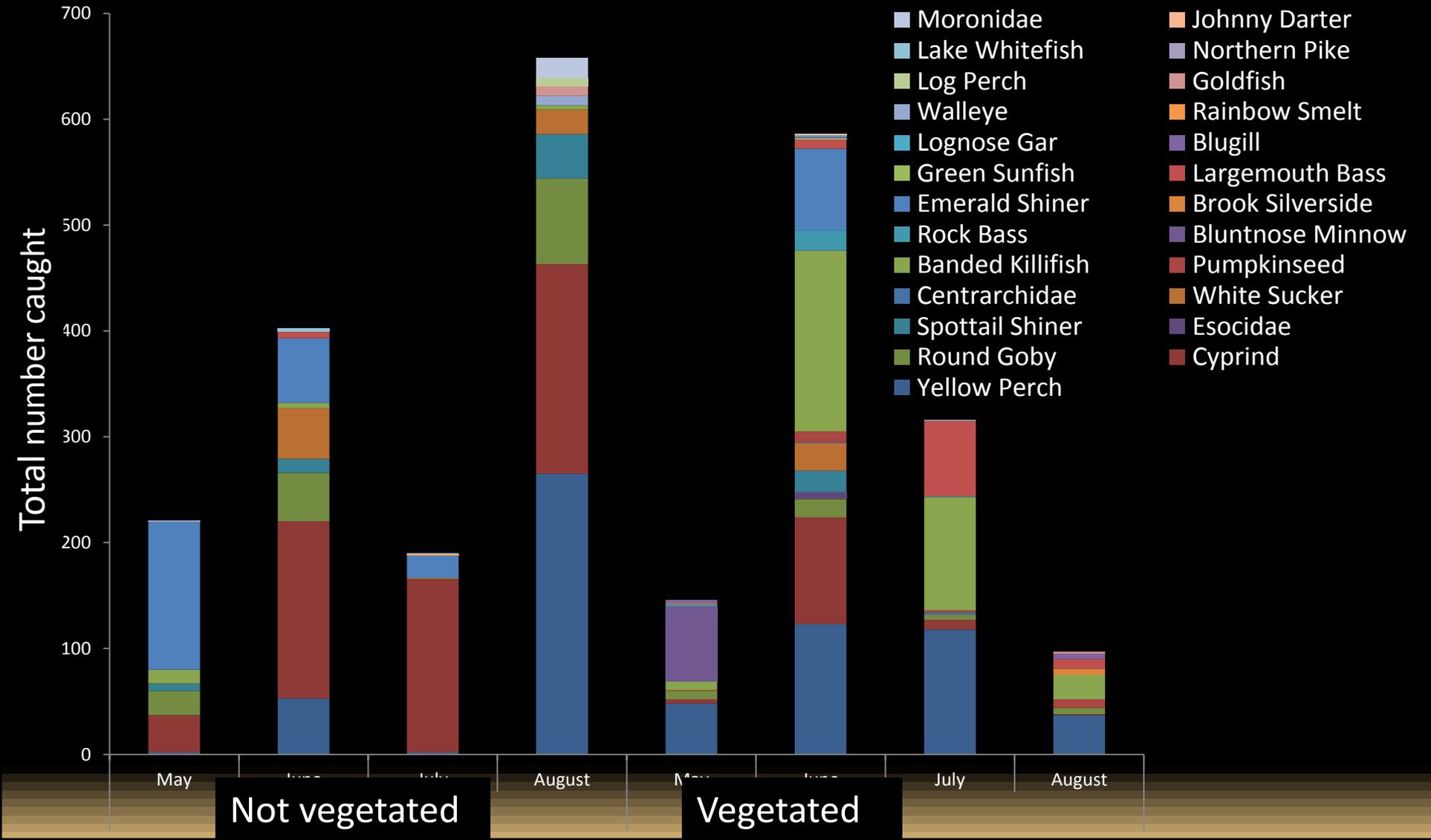
Ephemera



Predatory Zooplankton



Fish spp. in nearshore areas



Research Goals

- 1a-b)** Walleye and yellow perch recruitment dynamics (early life factors affecting survival to later age...incl. habitat effects)
- 2a)** Ecological connections between Saginaw Bay and Lake Huron
- 2b)** Suitability of SB for lake herring
- 2c)** Fish community dynamics

Data to inform modeling efforts.

Overview

1. Retrospective statistical analyses (*Ivan*)
2. Field surveys/data
(*Pothoven/Roswell/Foley/Stein/Hook*)
 - a. zooplankton, benthos, larval fish, adult fish, diets, nearshore sampling
 - b. yellow perch recruitment mechanisms
3. Mechanistic IBM modeling (*Ivan*)