

Monitoring and Assessment in the Chequamegon Bay Area



Randy Lehr, Ph.D.

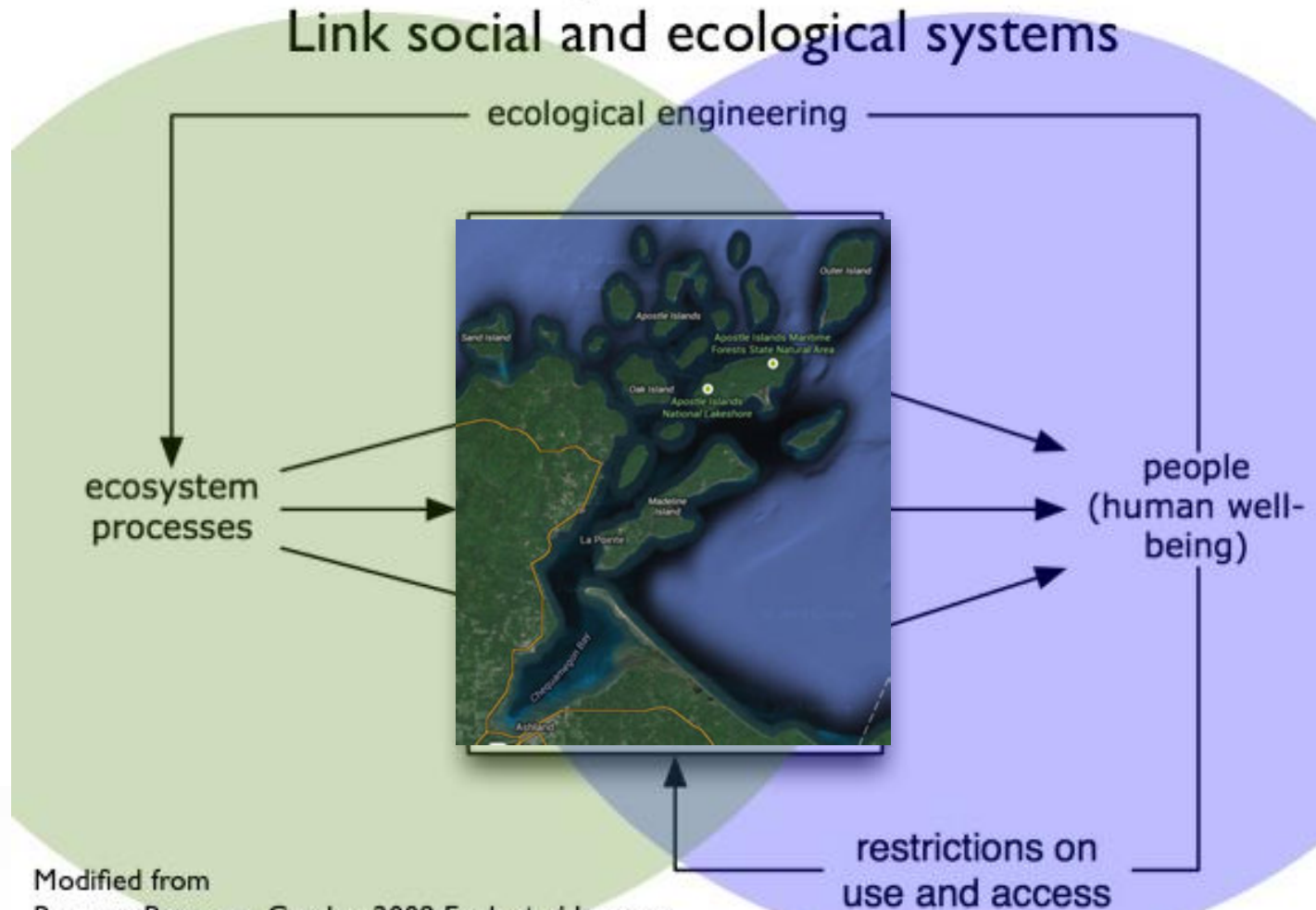
Ecological Solutions Initiative



Chequamegon Bay Area

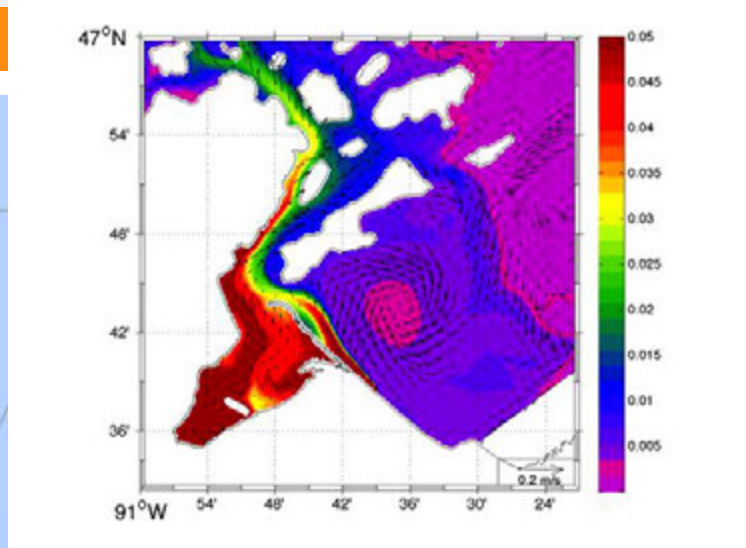
- Model Social Ecological System

- Prioritizing management and restoration

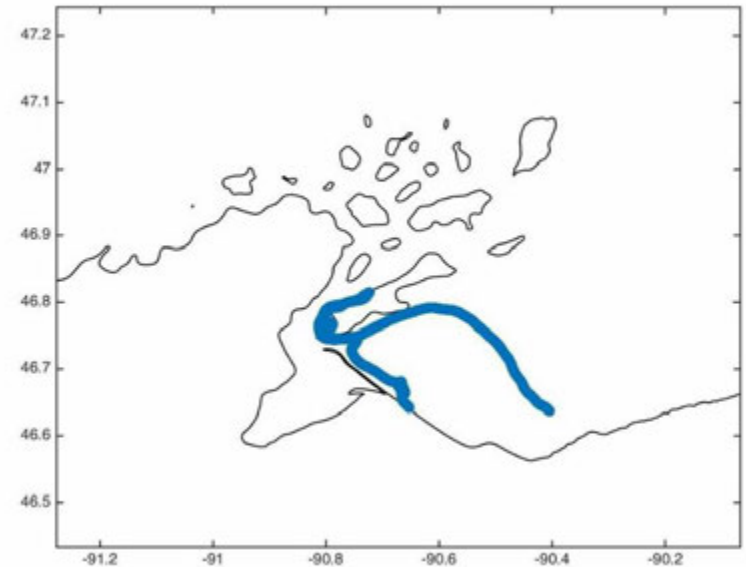
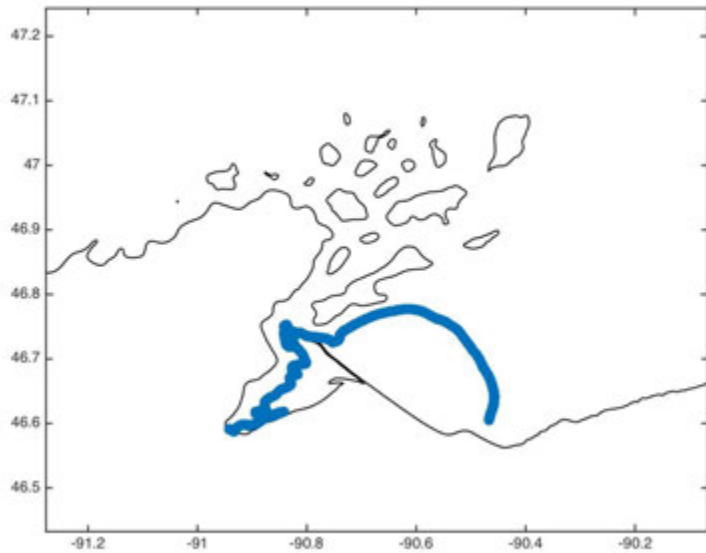
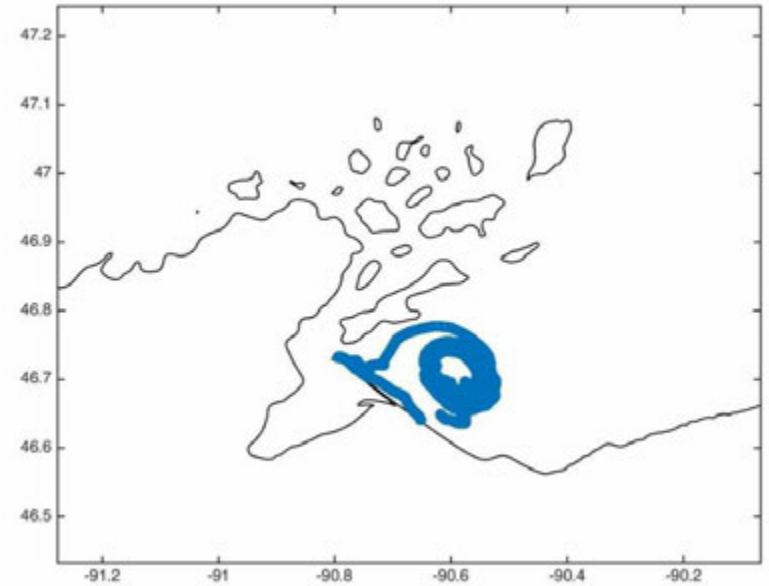
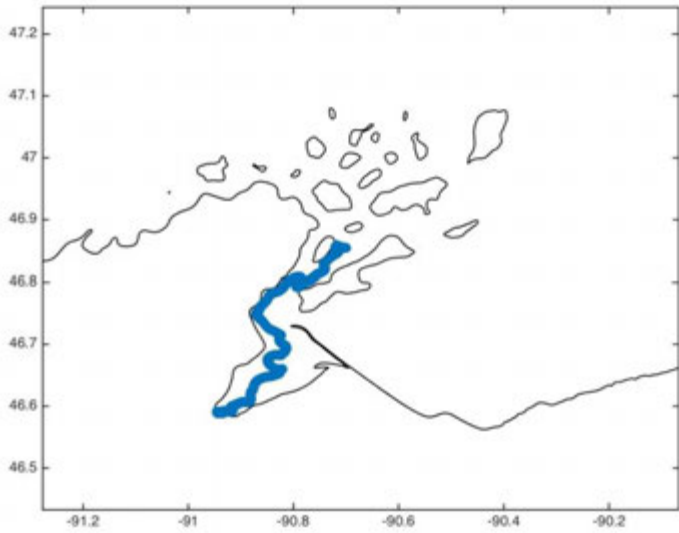


Modified from
Bennett, Peterson, Gordon 2009 Ecological Letters

Chequamegon Bay Ecosystem

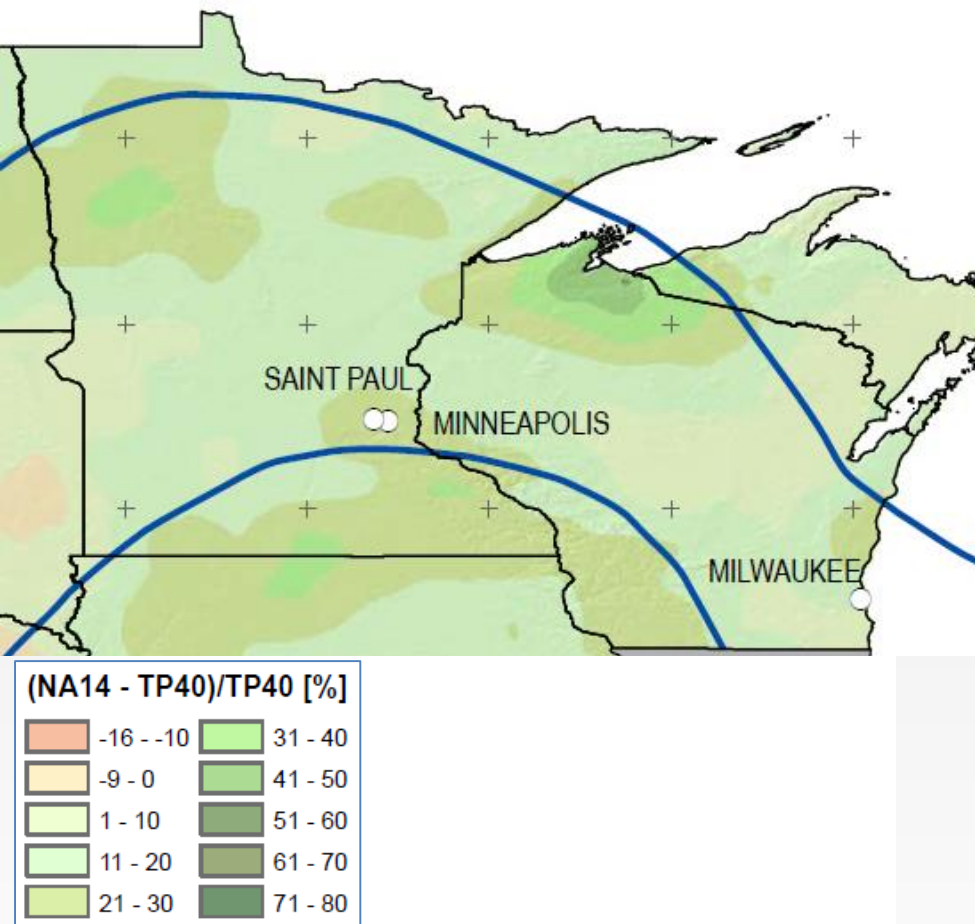


Hydrodynamics – Buoyant object

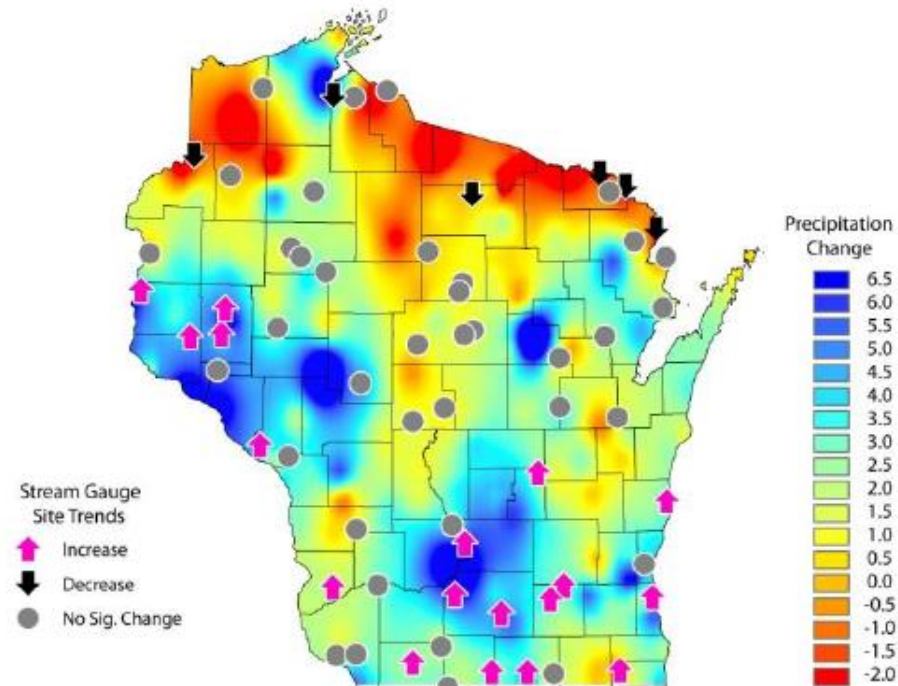


Climate Change Vulnerability

- Latitude, bathymetry, isolation, precipitation



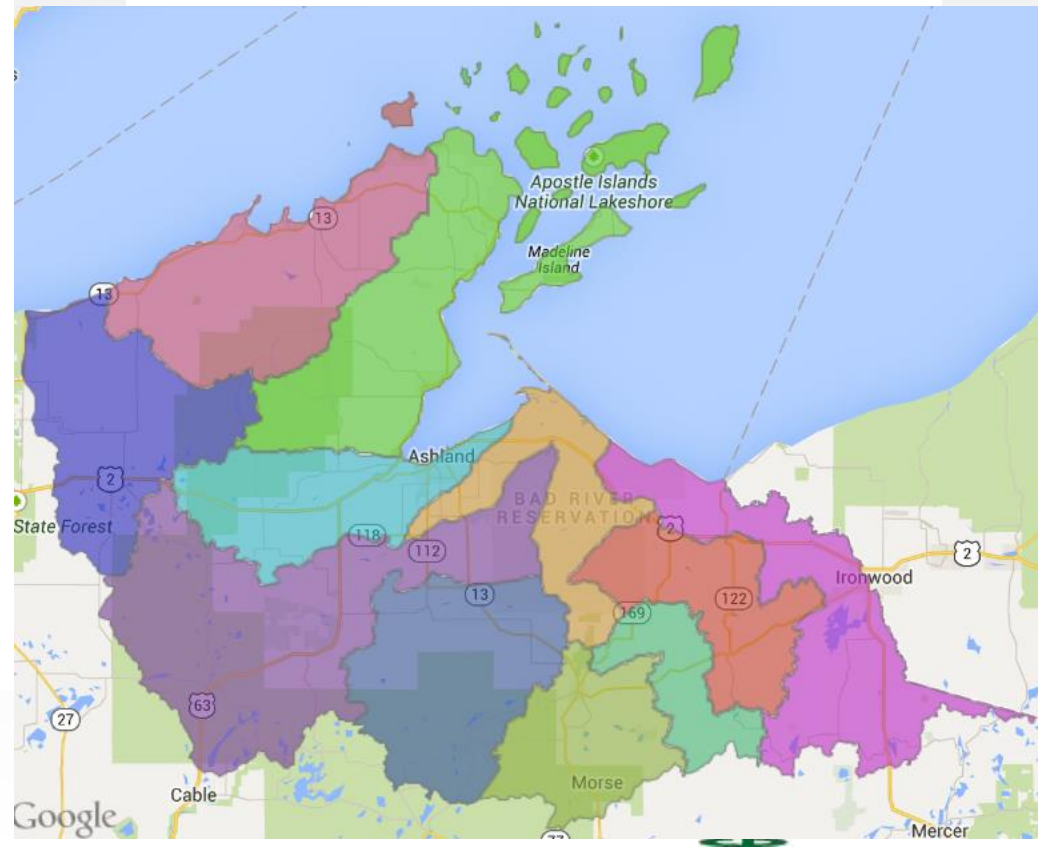
Annual Stream and River Flow Trends and Precipitation Change 1950 - 2006



Climate Change Impact Assessment

- Magnitude
 - Changes in chlorophyll concentration/water clarity
- Mechanism
 - Temperature vs. altered hydrology

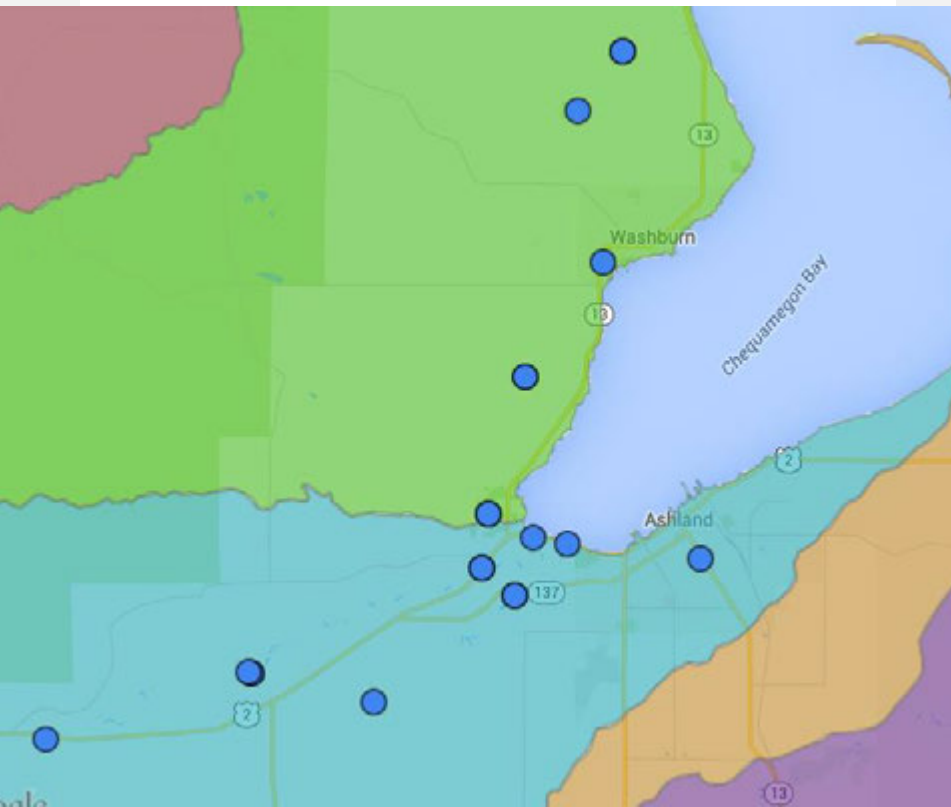
- Integrated Approach
 - Monitoring
 - Modeling



Watershed/Tributary Monitoring

- Input Data Sets
- Condition and open land assessments

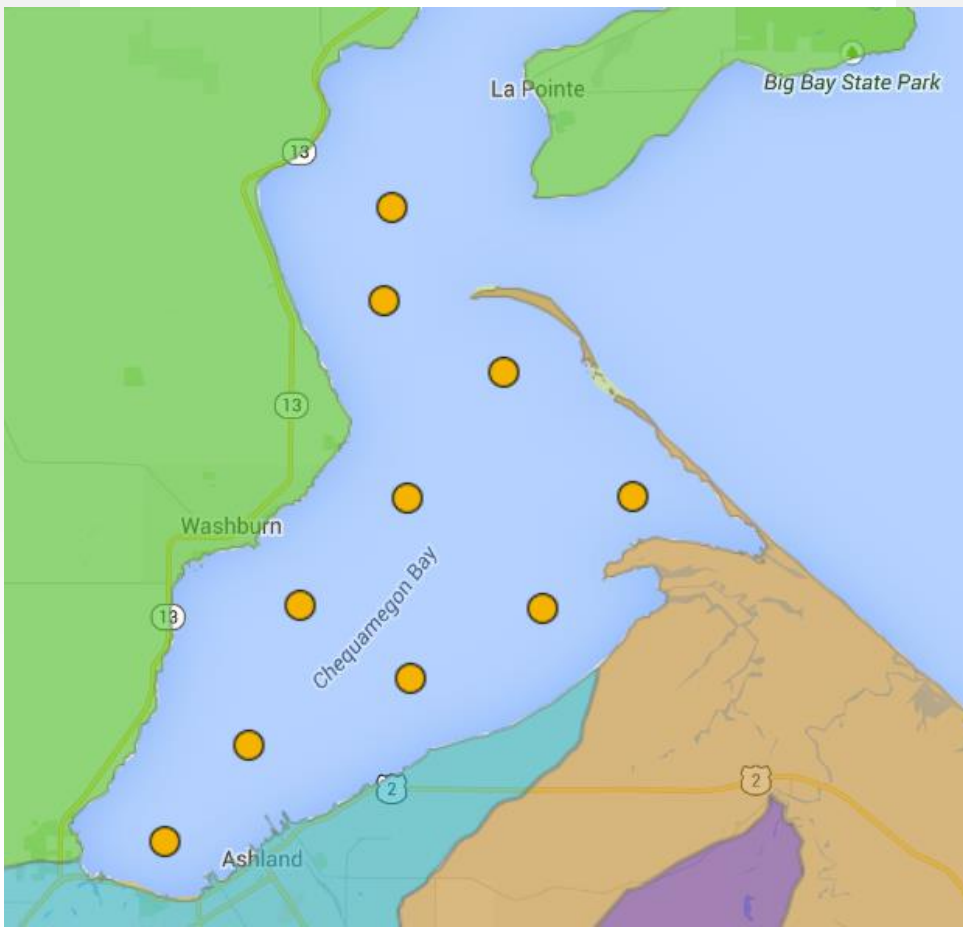
- Continuous discharge gage stations
 - 15-minute water levels
- Continuous data
 - Temp, SpCond, TSS
- Parameter loads (Grab/integrated samples)
 - TP, SRP, TN, NO₃, TOC, DOC, TSS, SSC, E. Coli, DO



Nearshore Monitoring

- Biweekly sampling

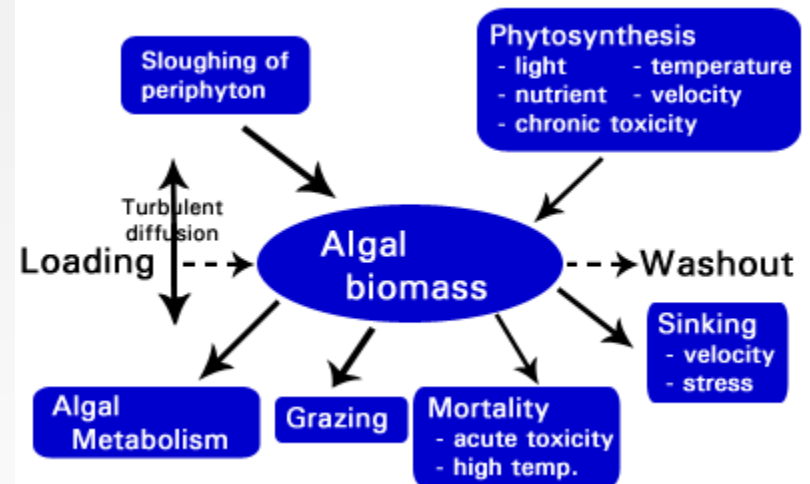
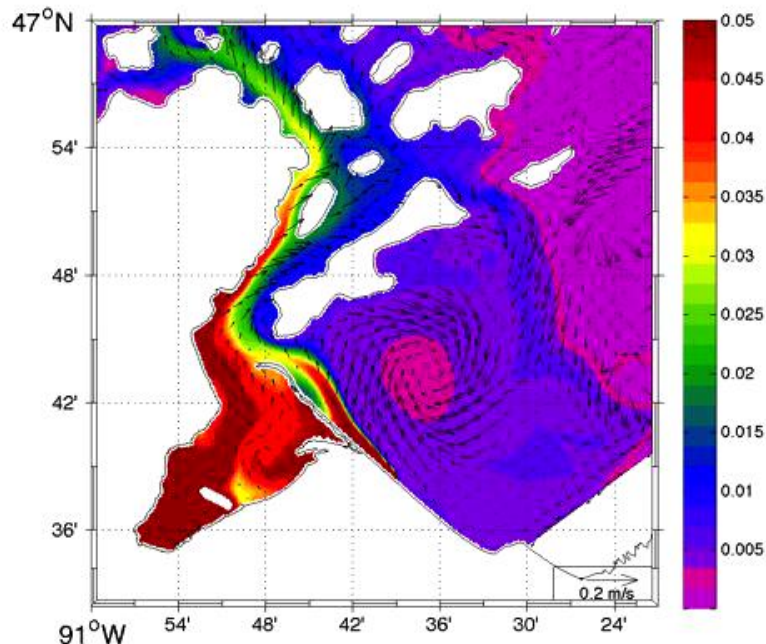
- Physical-chemical measurements
 - Vertical 1-m profiles: Temp, pH, SpCond, DO, chl-a, turbidity, cDOM
 - Vertical profile (SMB):
 - TP, SRP, TN, Chl-a, TSS
 - TP, SRP, TSS
 - TP, SRP, TSS
 - Transect tows
- Monthly plankton tows
- Current profiles
 - ADCP



Modeling Systems

- Nearshore Hydrodynamics
 - Regional Ocean Modeling System

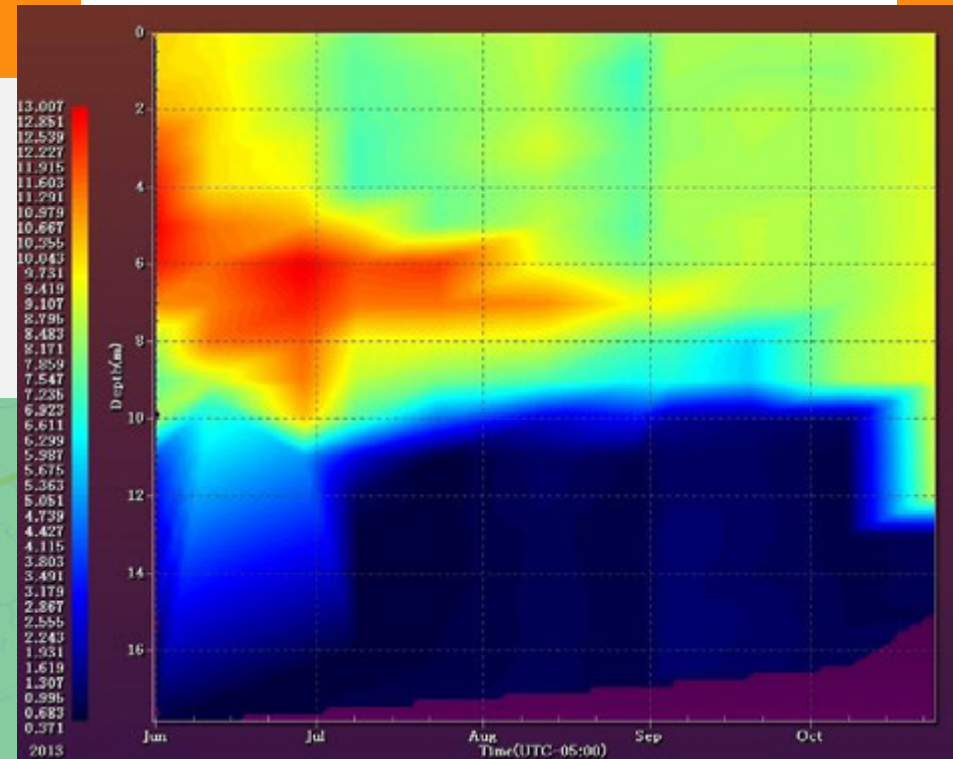
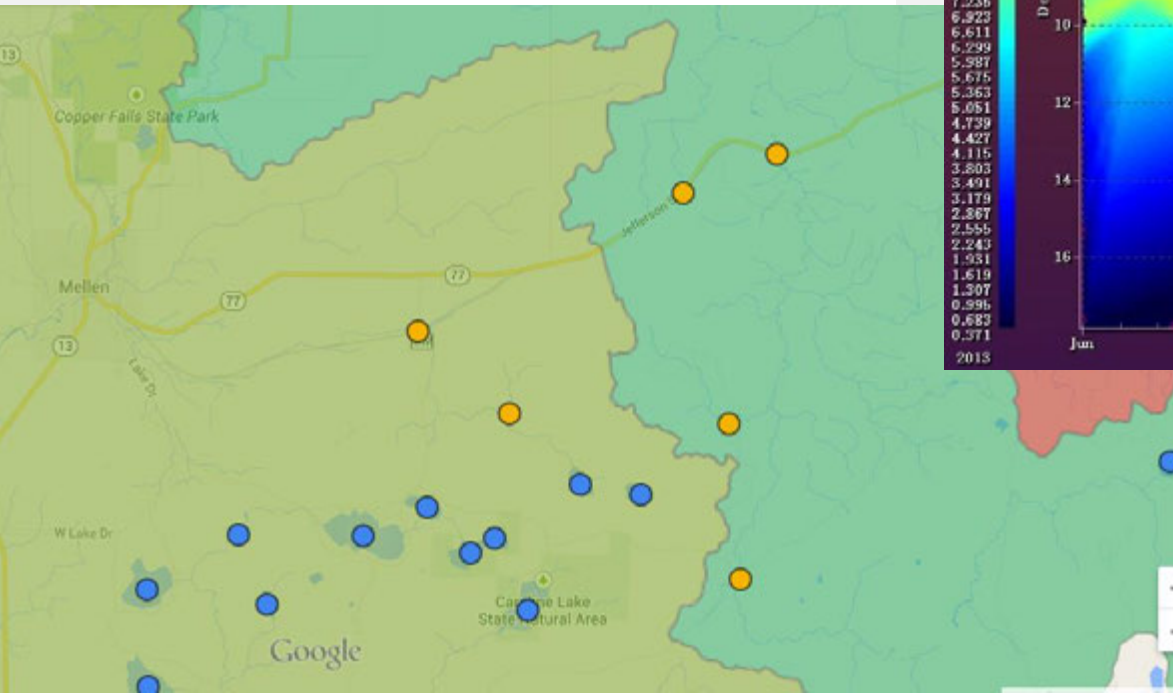
- Food Web Interactions and Aquatic Response
 - AQUATOX



Surface-Groundwater Assessment

- Mining and confined animal feeding operations
- Stream and lake sites
 - Metal suite

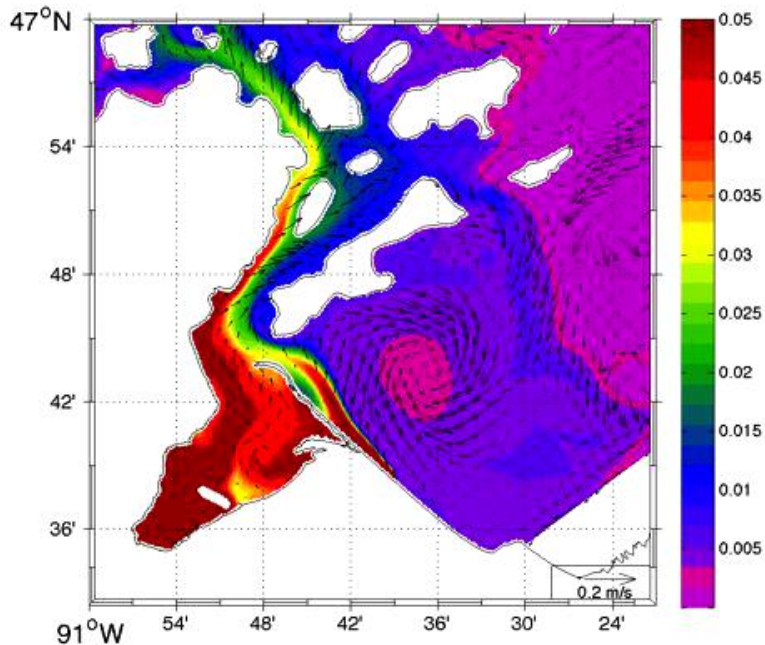
- Headwater lakes



Research and Monitoring Directions

- Hydraulic Retention
- Climate Change Adaptation Planning
- Sediment-water-precipitation interactions

- Mary Griggs Burke Center for Freshwater Innovation



Questions?

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- Chequamegon Bay Research Symposium
– April 14th, 2015

