Collect data to evaluate the status of benthos and plankton communities in selected Lake Michigan Areas of Concern (AOCs) in comparison with non-AOC comparison sites.

Compare benthos and plankton communities at each AOC with communities at comparison paired non-AOC comparison sites and, for WI only, non-AOCs as a group.

Provide input to the decision-making process for each AOC regarding whether the communities do not significantly differ from paired-non AOCs.

- **Wisconsin AOCs**
  - Lower Menominee River
  - Fox River/Green Bay
  - Sheboygan River
  - Milwaukee Estuary
  - Coop with WI DNR/GLRI

- **Illinois AOC**
  - Waukegan Harbor
  - Coop with IL DNR/GLRI
USGS Sampling – Benthos & Plankton

Wisconsin AOC Sites
1. Lower Menominee River (5,6)
2. Green Bay-Fox River
   - Green Bay
   - Fox River (7,8)
3. Sheboygan River (8,9)
4. Milwaukee Estuary
   - Milwaukee River (9,10)
   - Menomonee River (9,10)
   - Milwaukee Harbor

Illinois AOC Site
11. Waukegan Harbor (12)

Non-AOC Comparison Sites
5. Escanaba River
6. Oconto River
7. Ahnapee River
8. Kewaunee River
9. Manitowoc River
10. Root River
12. Burns Harbor-Port of Indiana

Boat required!
All sites are non-wadable
Data collection

• **BENTHOS**
  - Ponar Dredge
    - Benthic invertebrates (>500 micron)
    - Sediment percent sand/silt/clay
    - Sediment volatile loss-on-ignition (~organic carbon)
  - “Hester Dendy” (HD) Artificial substrate deployed for 6 weeks
    - Benthic invertebrates (>500 micron)

• **PLANKTON**
  - Plankton Net
    - Zooplankton (microcrustaceans and rotifers >63 micron)
  - Whole Water Sampler (Kemmerer)
    - Phytoplankton (diatoms and non-diatoms or “soft algae”)
    - Chlorophyll-a, ash-free dry mass

• **WATER**
  - Multi-Parameter Sonde
    - Temperature, pH, DO, and Specific Conductance at 1m depth

WI: 3 visits (May/June, July, August)
IL / IN: 2 visits (June and August)
BENTHOS
Ponar Dredge

Hester-Dendy (HD) Artificial Samplers
PLANKTON

Plankton Net - Zooplankton

Depth Profile/ Water Column - Phytoplankton
Data Analysis

- Biological data were analyzed in two primary ways:
  - **Metrics** – using standard statistical tests
    - Richness (number of taxa)
    - Diversity
    - Index of Biotic Integrity (IBI; benthos HD samples only)
  - **Relative Abundance** – using PRIMER software
    - Count for each taxon standardized to total sample count
    - Taxa which accounted for the majority of the variability in site differences were determined.
Points to Ponder

- Sampling plan
  - Number of samples per site (statistics & cost)
  - Sampling location(s) within site
  - Season(s) and year(s)
  - Depth (wadable or non-wadable)
- Field logistics
  - Contact list
  - Plan B for sampling schedule (wind, storms)
- Laboratories
  - Lab evaluation, contracts
  - Containers, sample volumes, preservative, shipping/hold times, etc.
  - Time for data return (minimum of 6-9 months)
- Data Quality Assurance
  - Checks at lab AND checks upon receipt of data