Michigan's Aquatic Invasive Plant Methods

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Aquatic invasive plant monitoring in Michigan

- Early detection may be a primary or secondary goal
    - •AIS monitoring vs. Plant community or general lake monitoring
- Monitoring methods tailored to project objectives
    - -Recognize trade-offs between level of effort and detection probability
    - -Examples
        - Qualitative snorkeling and meanders
        - Quantitative point sampling with various point densities

Monitoring types

- Ongoing
  - Annual monitoring with long term funding support
- Advancing monitoring
  - Building capacity and understanding
- Short-term
  - 1 or 2 year duration
- Regulatory
  - Evaluate regulated activities and inform decisions

Ongoing

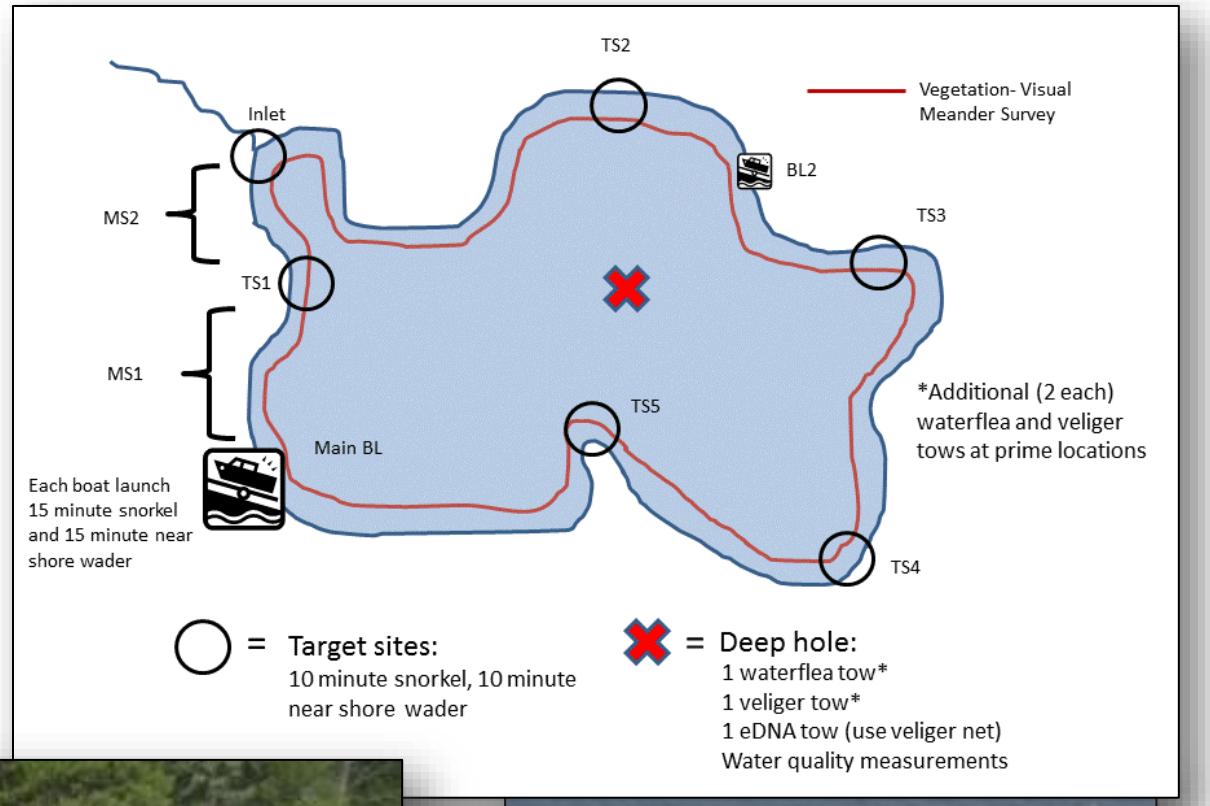
Inland Lake AIS Early Detection Monitoring

Billy Keiper and Tom Alwin,
EGLE Water Resources Division

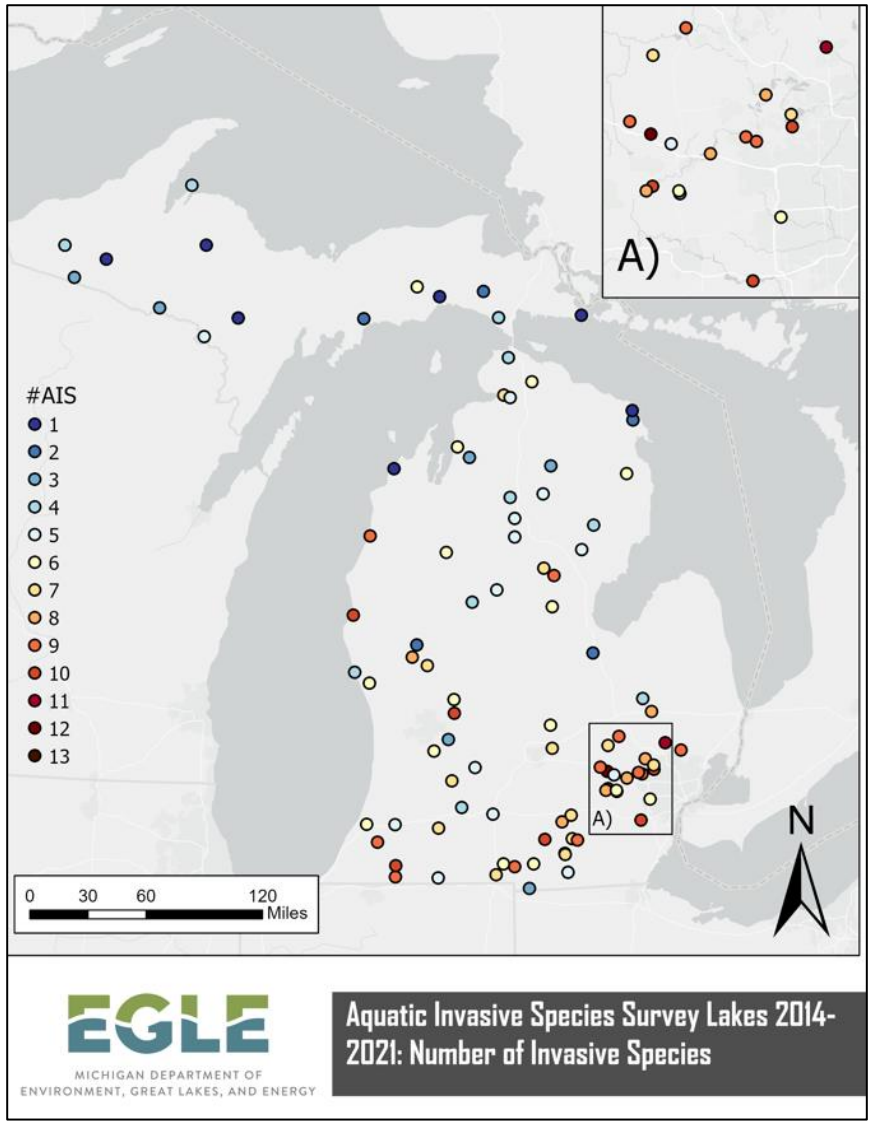
Inland lake AIS surveillance

- EGLE WRD Routine monitoring since 2014
- Goal: Early Detection
- Combination of techniques to increase detection probability for various taxa in different habitats
  - Entire shoreline meander
  - Rake tosses in aquatic plant beds
  - Shoreline wading
  - Snorkeling
- Documents all AIS and native taxa
- Qualitative, lacking measures of detection probability

Routine: Inland lake AIS surveillance



Inland lakes 2014-2022



- > 100 lakes surveyed
- 10-20 surveyed/year
- Heavily weighted towards aquatic plants
- 2022 first lake found without AIS present
  - 3 Remote UP lakes

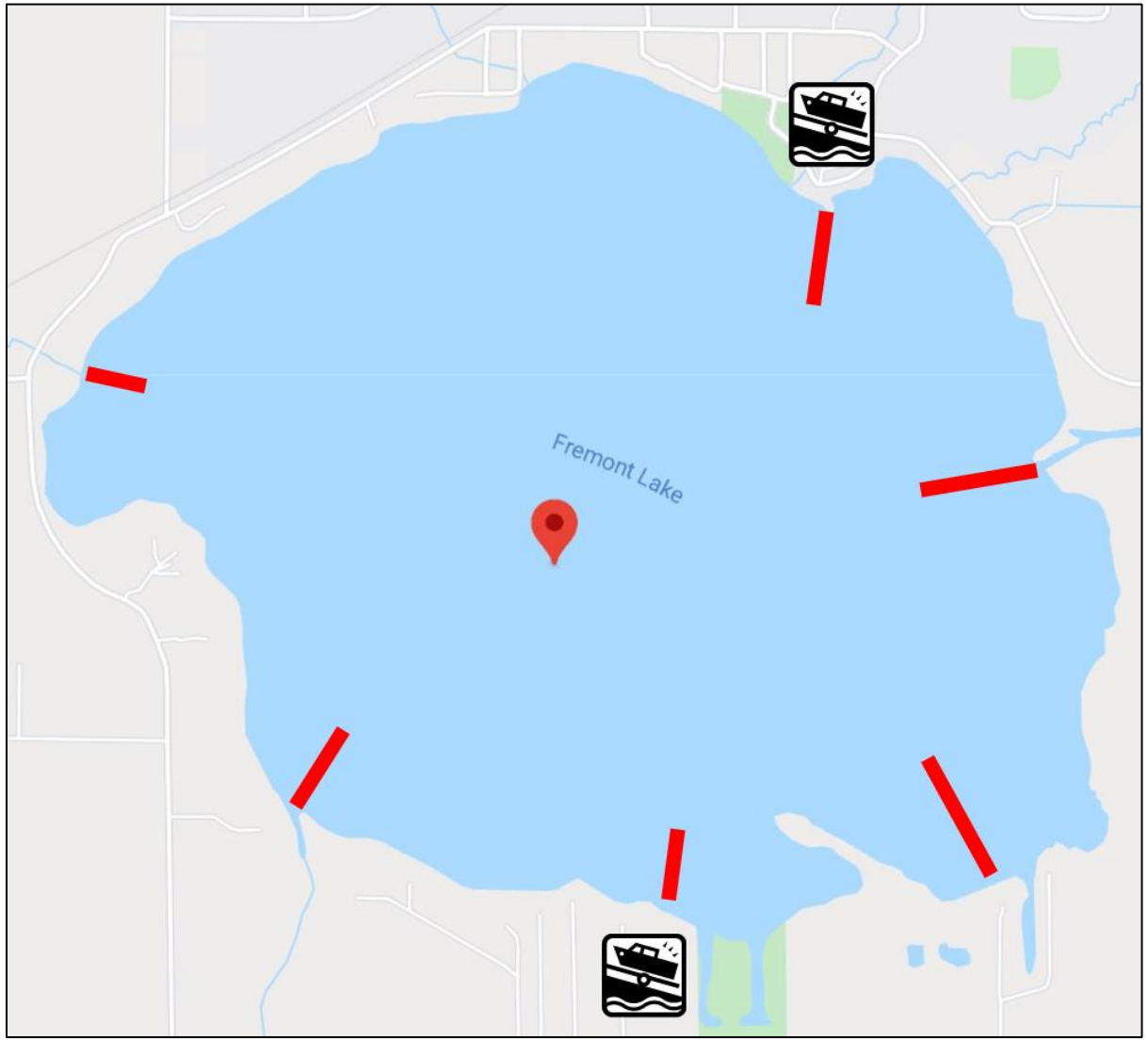
Great Lakes RESTORATION

Citizen Science: Exotic Aquatic Plant Watch

Jo Latimore and Erick Elgin, MSU

Overview of Program

- Part of MiCorps Cooperative Lakes Monitoring Program
  - MiCorps.net
- Goal: Early detection and education
- Focus on most probable invaders
- Annual monitoring encouraged
- Annual training focuses on identification and protocol



Overview of Method

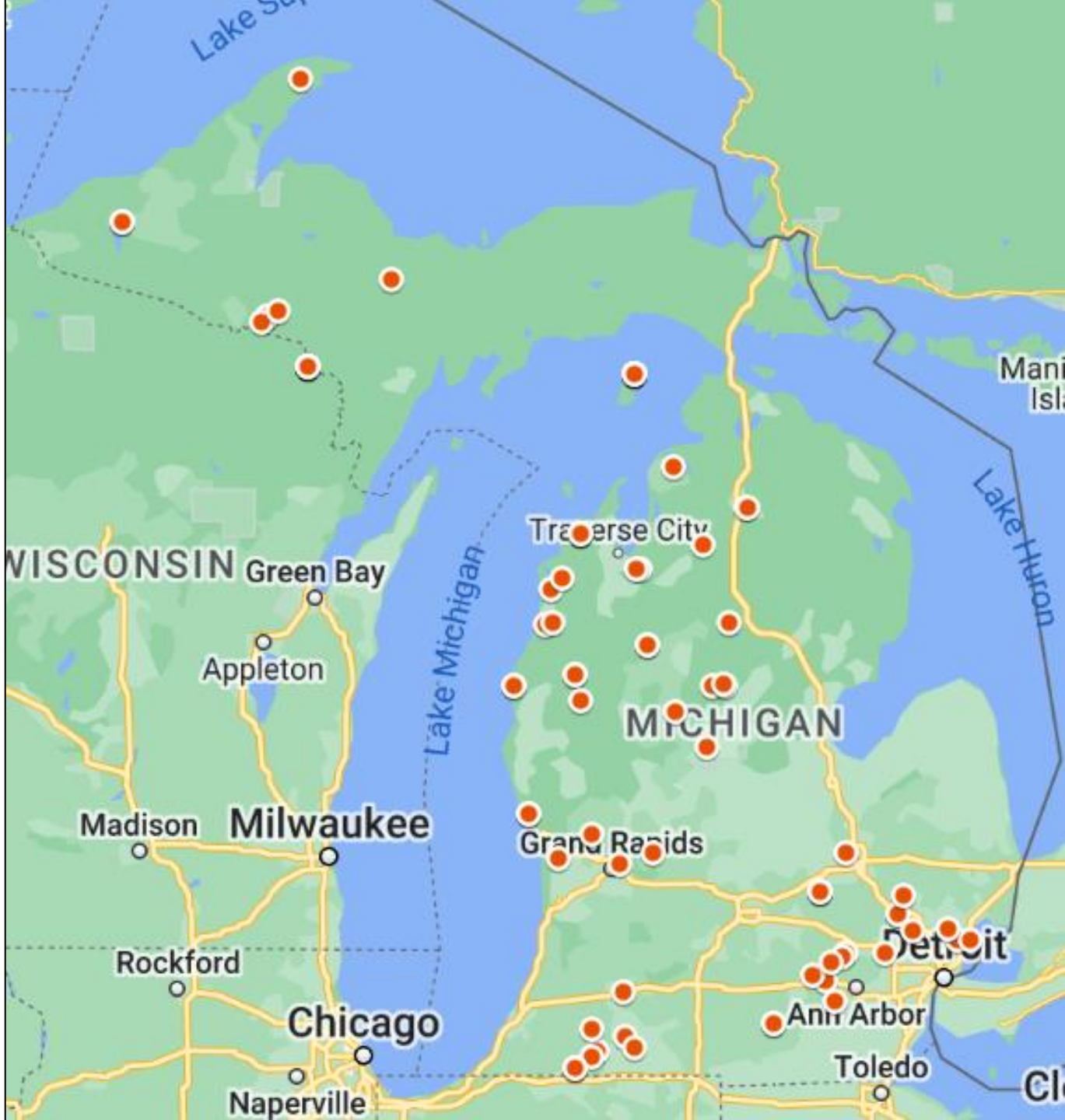
- Transects placed perpendicular to shore in areas of high invasion risk (public access)
- One or more rakes are tossed in three locations along the transect line – shallow, mid-depth, and deep extent of littoral zone
- Only invasive species are documented
- Photos are used to verify identification
- Data added to public MiCorps database and MISIN

Benefits:

- Landscape level monitoring
  - 84 participating lakes in 2022
- Creates an educated population
- Helps individual lakes take quick action

Shortcomings

- Survey may miss rare occurrences
- Possible higher chance of mis-identification



Advancing aquatic plant monitoring

Using point intercept to monitor EFB and plant community changes

EGLE Water Resources Division

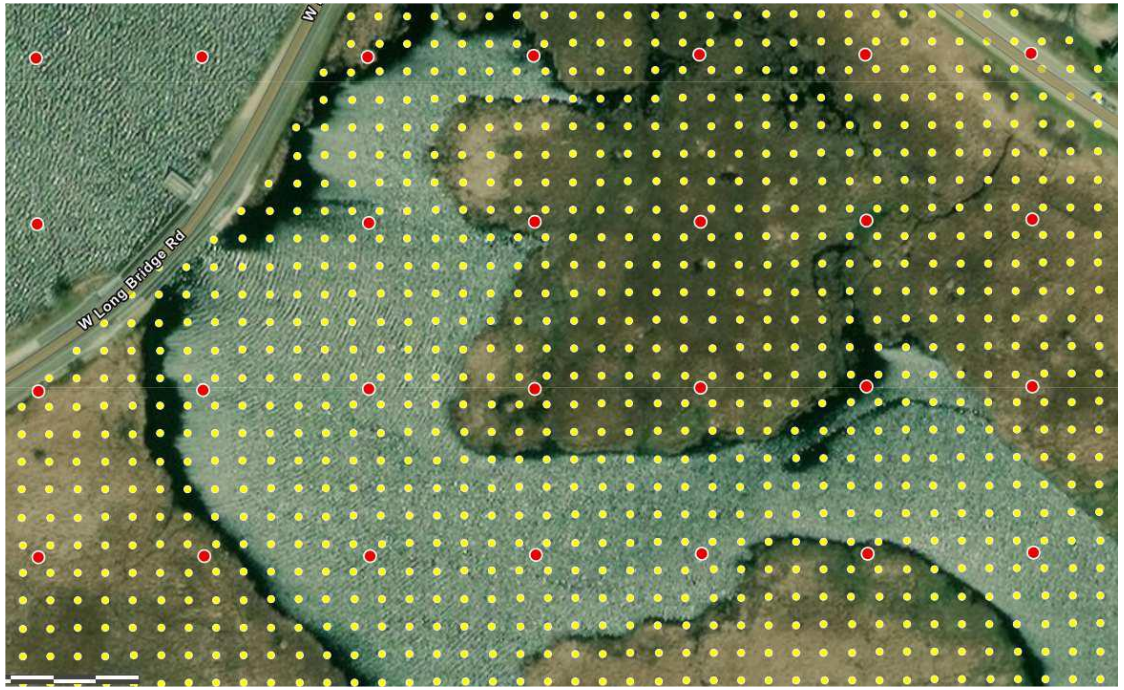
Great Lakes Environmental Center

Pentwater Lake, Oceana County

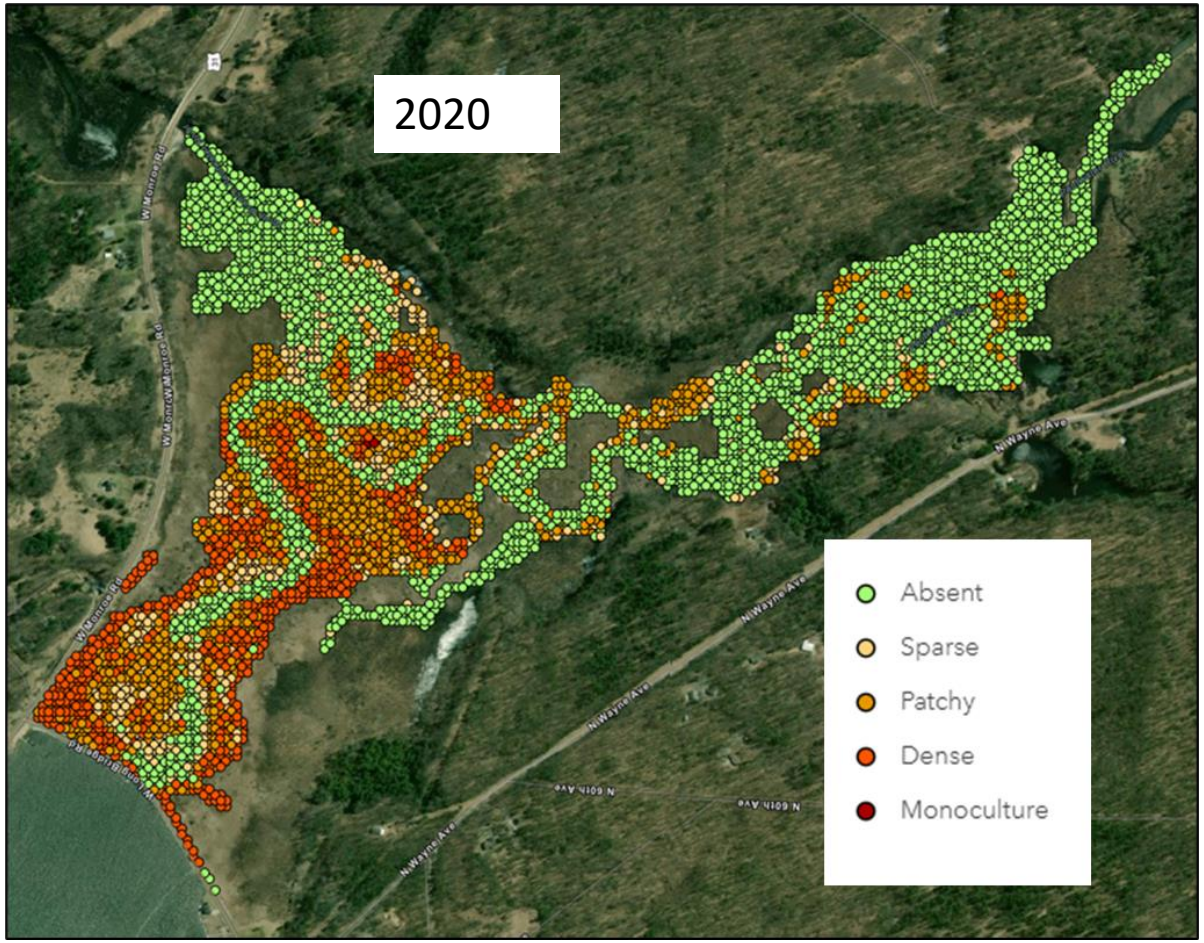
EGLE WRD 2020 and 2021

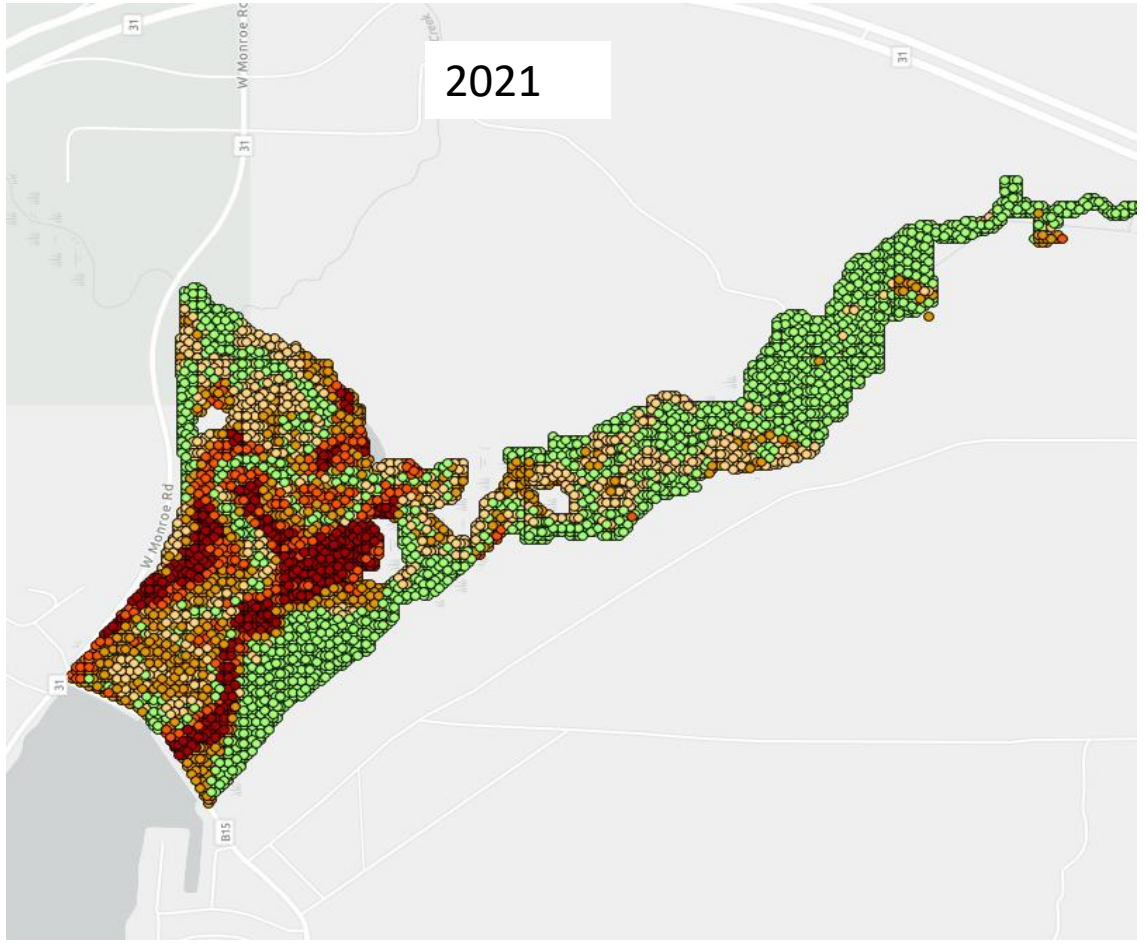
Goals:

- Changes in EFB population (10m grid)
- Quantify macrophyte inter-annual variation (60m grid)
- Quantify EFB control efforts
- Gain experience with point intercept

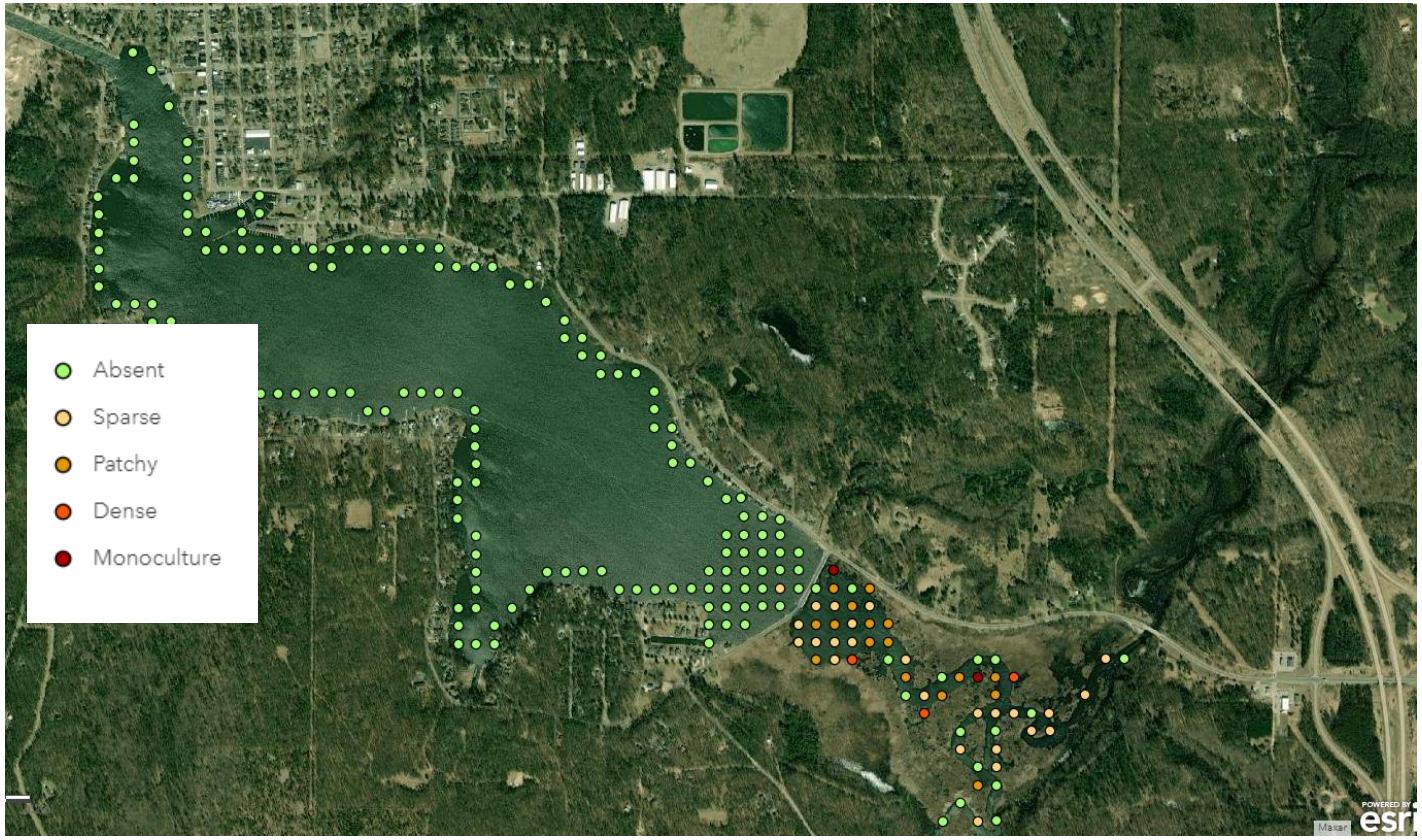


Results: EFB in 2020 vs 2021





Aquatic plant community

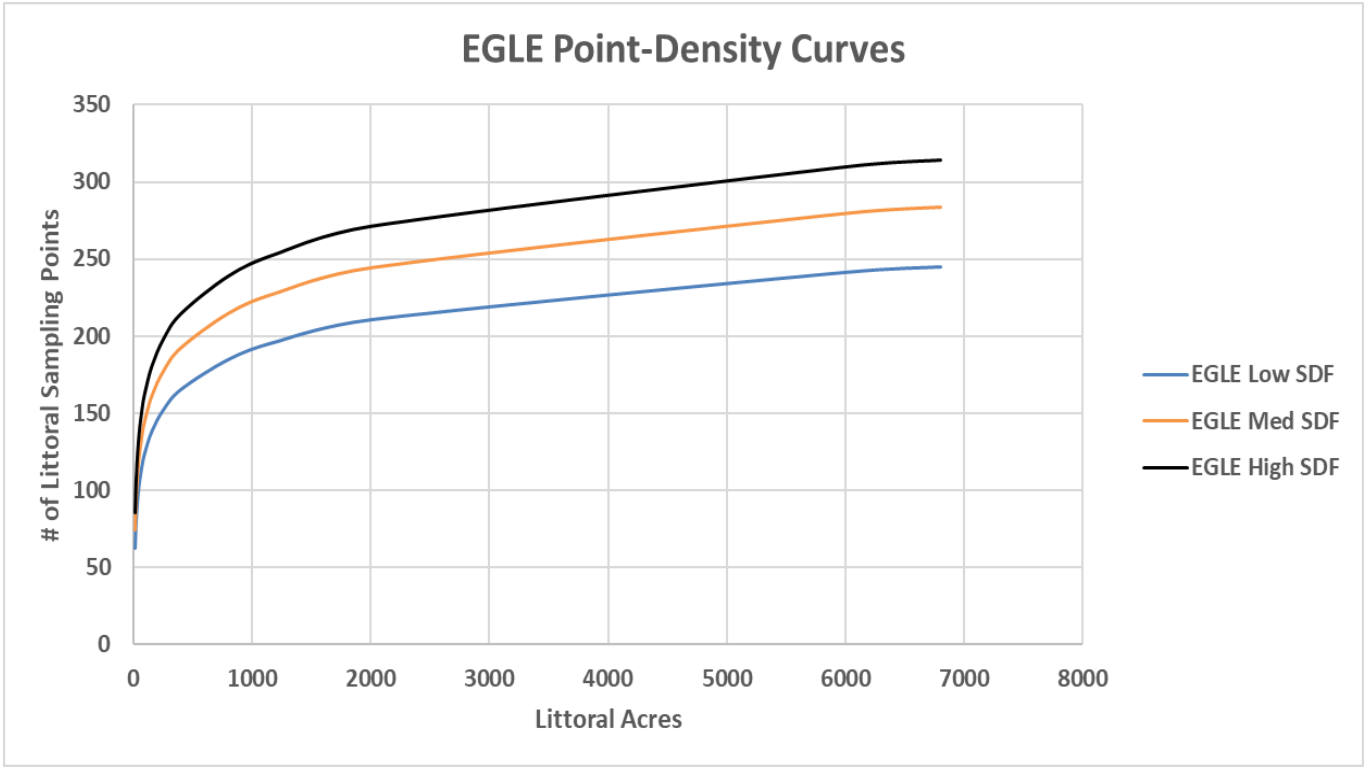


Result: Questions about sampling design

- # of rake tosses
- Point density
- Level of effort
- Taxonomic resolution

Point-Intercept Grid Density

- Grid density (i.e., optimal # of points) defined by shoreline complexity and size of the littoral zone
- Separate equations dependent on SDF (shoreline development factor) value
- A higher SDF means a more complex (less rounded) shoreline profile



Ex.)

Low SDF equation: $\#\ littoral\ points = 28 * \ln(littoral\ acres) - 2$

Project expansion in 2022

Surveyed 20 Lakes (10 with EFB, 10 without)
Repeat in 2023

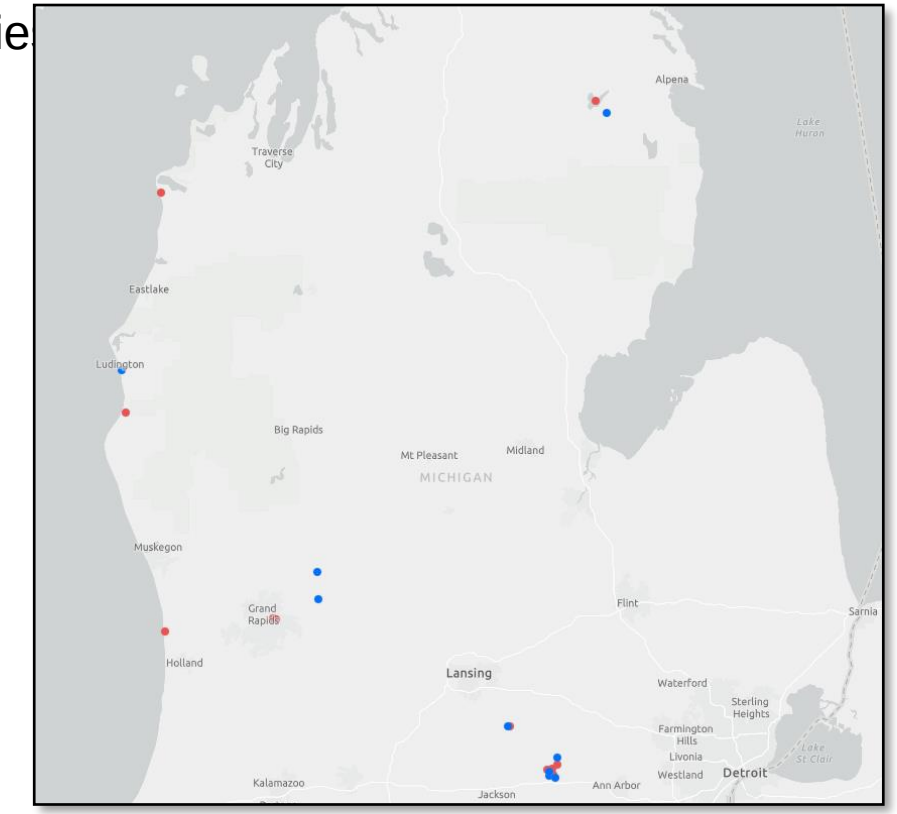
Goals:

- Assess the impacts of EFB on aquatic macrophyte communities
- Detect new EFB incursions in priority lakes.

Methods: Point intercept and Meander survey

Trade-offs: Repeatability vs. detectability

Level of effort



On Developing an Aquatic Macrophyte Survey Protocol for Michigan Inland Lakes

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MSU Point-Intercept approach overview

- Goal: Survey 80 – 100 sites to provide baseline information on the macrophyte community in Northern Michigan inland lakes
- 2 rake tosses per point
- Approx 100 points in littoral zone (0 – 25 ft) along a systematic grid
- Approx 150 points for lakes > 1,000 acres
- Approx 300 points for very large lakes > 10,000 acres (e.g., Black, Burt in Michigan)
- Data recorded by each rake toss and sample point

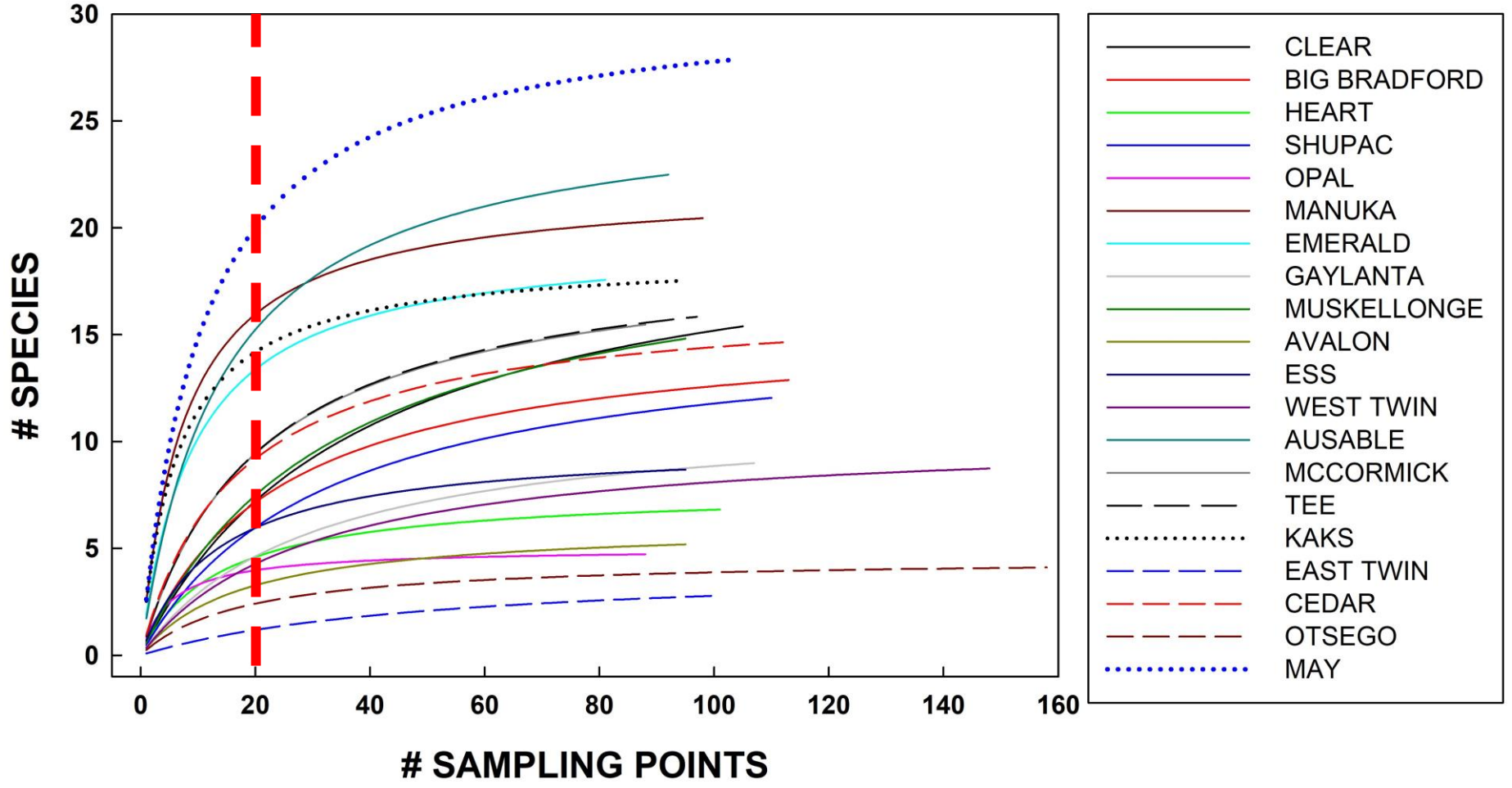
Point-Intercept approach: Why

- 2 rake tosses per point allows an unbiased estimate of occurrence when detection is <100%
- Point-intercept allows for robust estimation of precision of occurrence, and species accumulation curves to evaluate effectiveness of sampling
- Sampling at equidistant intervals is useful for spatial analyses
- Pretty rapid – can do within 1 day for modest size lakes
- Provides robust data for comparison over time or across lakes
- Shortcoming – for easily visible plants or for plants that have specific habitat needs, it may not be most time efficient/ effective approach
- Shortcoming – at larger lakes, increased distance between points results in plant distribution maps with larger gaps

Summary of some outputs and results

A preliminary analysis on 20 Northern Michigan lakes sampled in summer 2022

- Is 100 points per site enough to estimate site richness?
- Species accumulation curves suggest yes

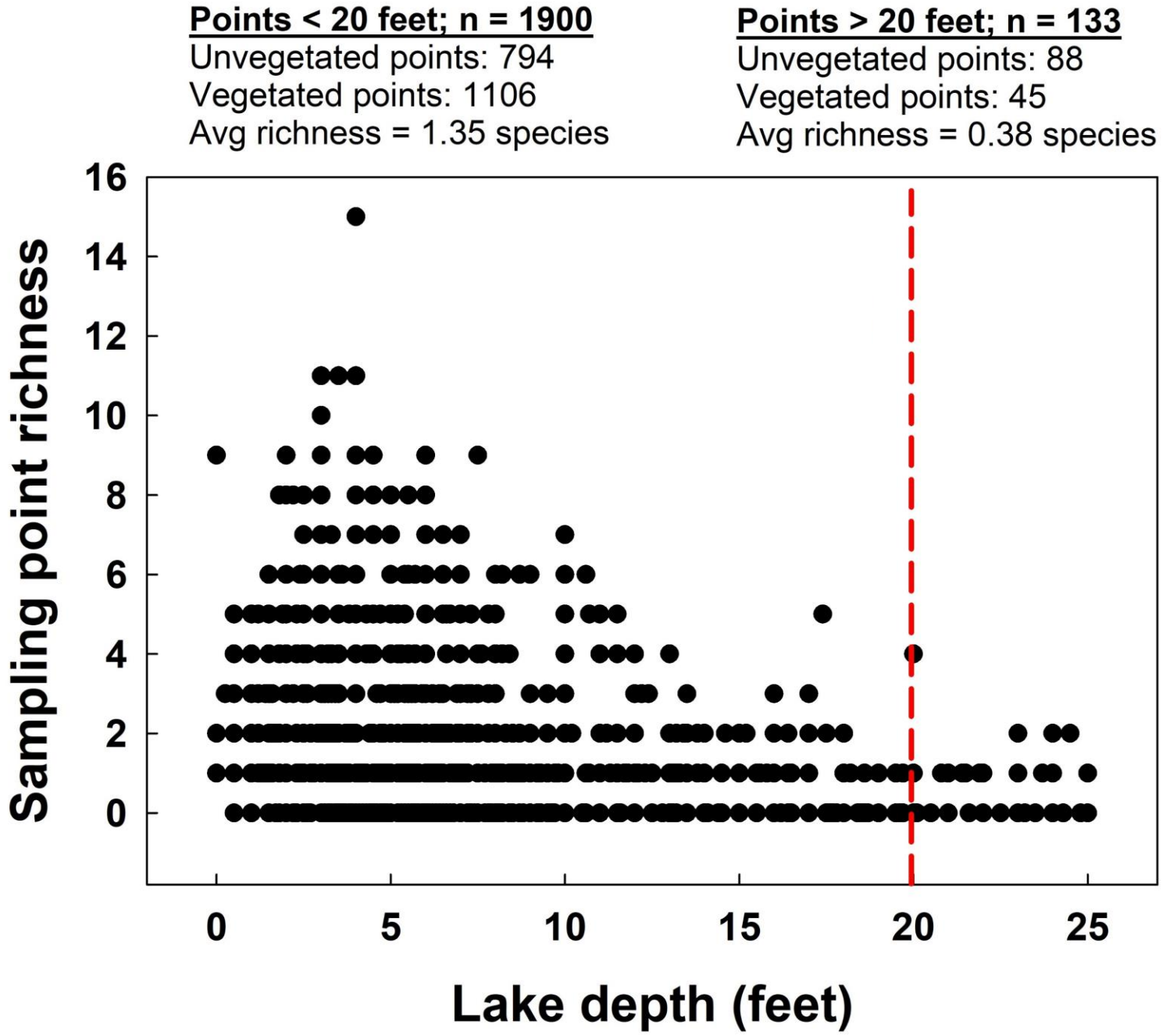


- Based on 20 lakes surveyed, 50 % of modelled site richness was accounted for after sampling 20 points [Range: 5 points (Opal) to 51 points (East Twin)]

Is 0 – 25 feet a good range to sample?

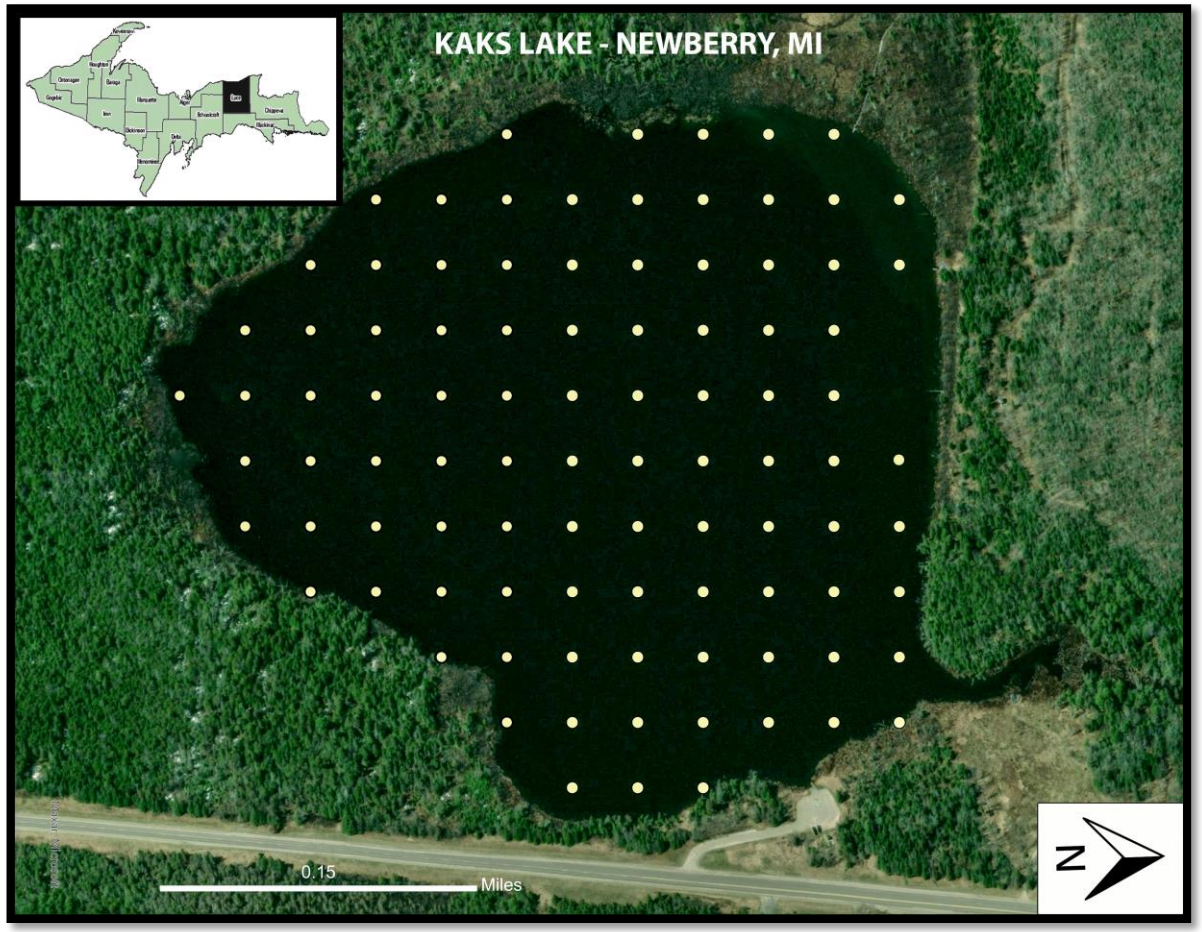
…more observations are needed from UP lakes

From sampling 2,033 points in 2022, few aquatic species were present at depths > 20 feet.

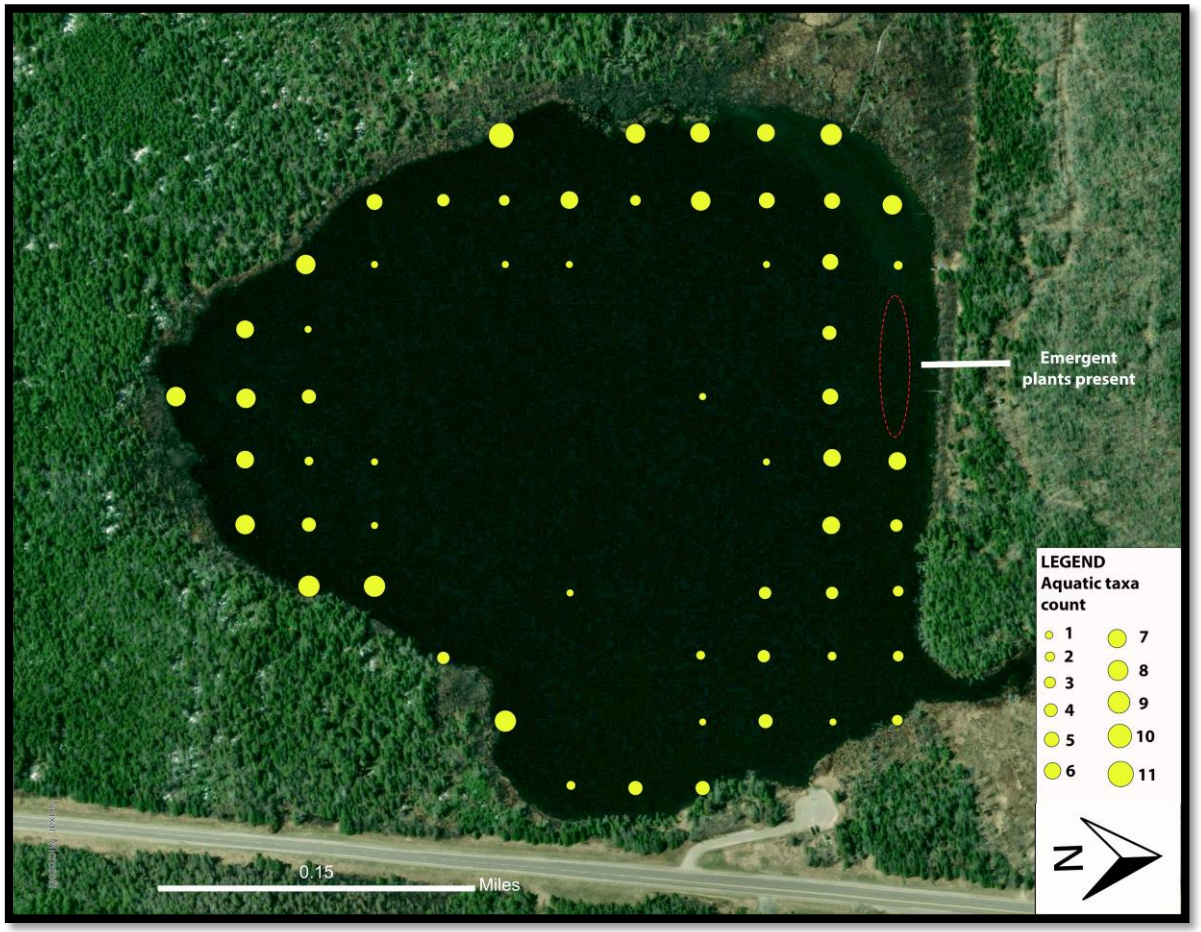


PI works well for visualizing dominant plant distributions

Kaks Lake PI sampling points



Kaks Lake plant occurrences & richness



Comments on outstanding questions, key uncertainties, or research needs *(mostly regarding our own PI protocol)*

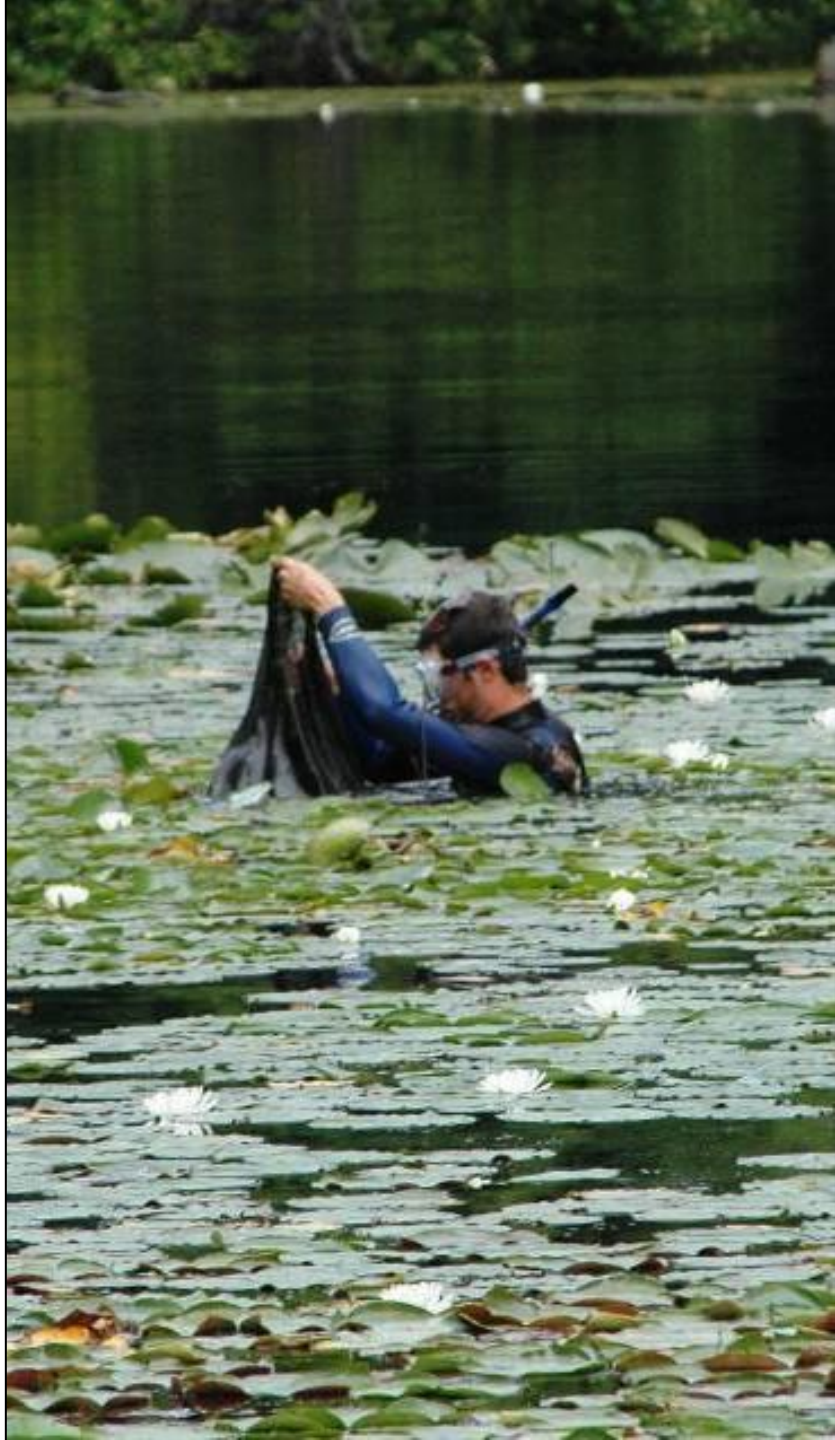
- Benefits of 2-rake throws vs 1
- How many PI sampling points are required to adequately characterize a site?
- What is the “true” littoral zone depth threshold we should be sampling?

In conclusion, the PI approach works well for many things, however, other methods have advantages over PI for locating AIS. After sampling more sites in 2023 (at least 60 more lakes), we will have better answers to the outstanding questions above

Short term

Early detection in the Manistee National Forest with site specific outreach

Jo Latimore and Erick Elgin, MSU



Overview

- 30-minute timed snorkel survey
  - Snorkel survey developed by TNC and University of Notre Dame (2010)
- Survey data was summarized and shared to regionally clustered lakes to help prevent spread between the lakes

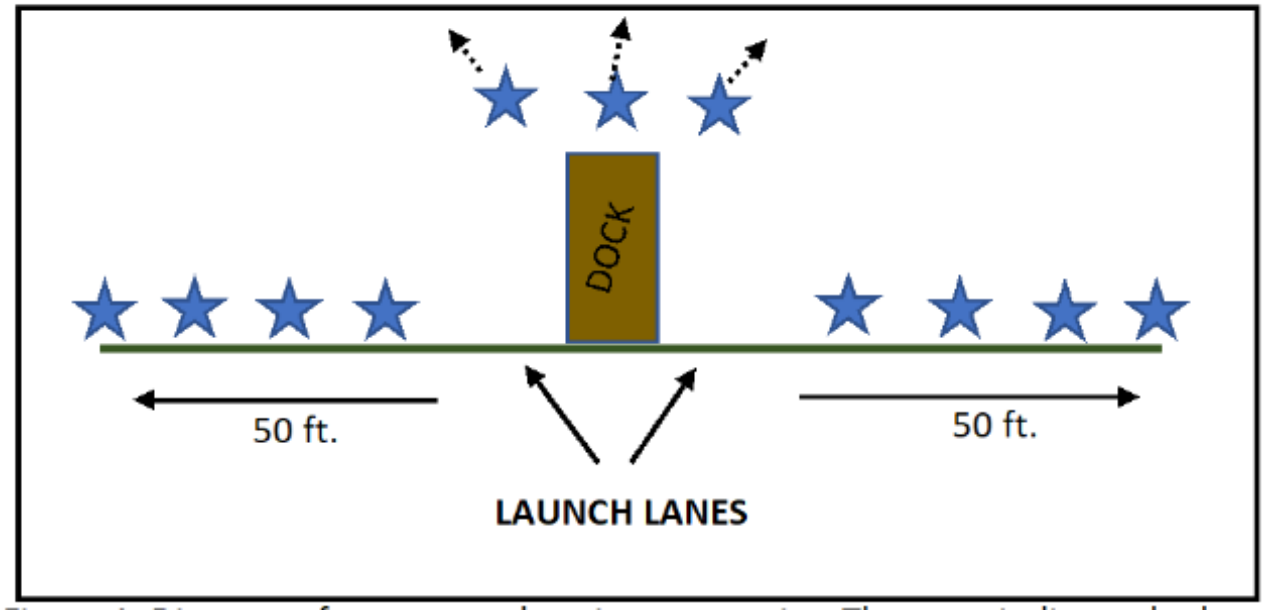
- Benefits:
  - Detects rare species better than rake toss methods
  - Rapid
  - Outreach may improve prevention of secondary spread
- Drawbacks
  - Requires getting in the water
    - Safety, comfort level, gear
  - Outreach takes time

Michigan DNR Boating Access Site Survey

Christina Baugher, MI DNR and Erick Elgin, MSU

Overview

- Rapid shoreline rake toss method
- Visual survey was also included in method
- Goal: monitor boat access sites throughout MI for the presence of aquatic invasive plants and estimate relative abundance directly within boat launch lanes



Benefits:

- Rapid – 157 boat launches sampled in one summer

Shortcomings:

- May miss deeper and rare occurrences
- Limited by shoreline features and presence of docks

Informing management and regulatory decisions

Eric Calabro, EGLE Water Resources Division