Interstate Early Detection and Rapid Response

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Interstate early detection and Rapid Response

Phase IV

i. Facilitate regional surveillance programs
ii. Refine Great Lakes site prioritization
iii. Develop inland lake site prioritization
iv. Inland lake aquatic plant surveillance methods

Obj ii. Great Lakes surveillance site prioritization

- The Great Lakes AIS surveillance site prioritization system is based on an additive model that combines surrogates for propagule pressure of the major pathways of invasion to predict the likelihood of AIS introduction at coastal sites spanning the U.S. waters of the Great Lakes

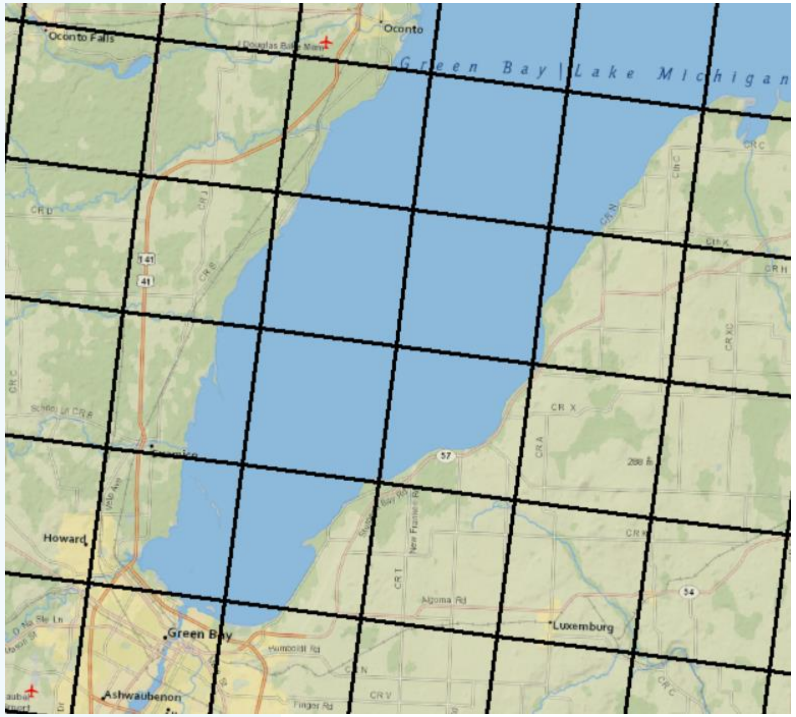
Tucker AJ, et al (2020). Management of Biological Invasions 11:607-632

Great Lakes AIS Risk

- Tucker et al 2020
- Based on the GLAHF 9x9km regular grid cells
- However, grid cells often are not centered on sites of interest like harbors
- A larger grid cell would mitigate this issue

Advantages of a Larger Grid Cell

GLAHF 9x9 km grids

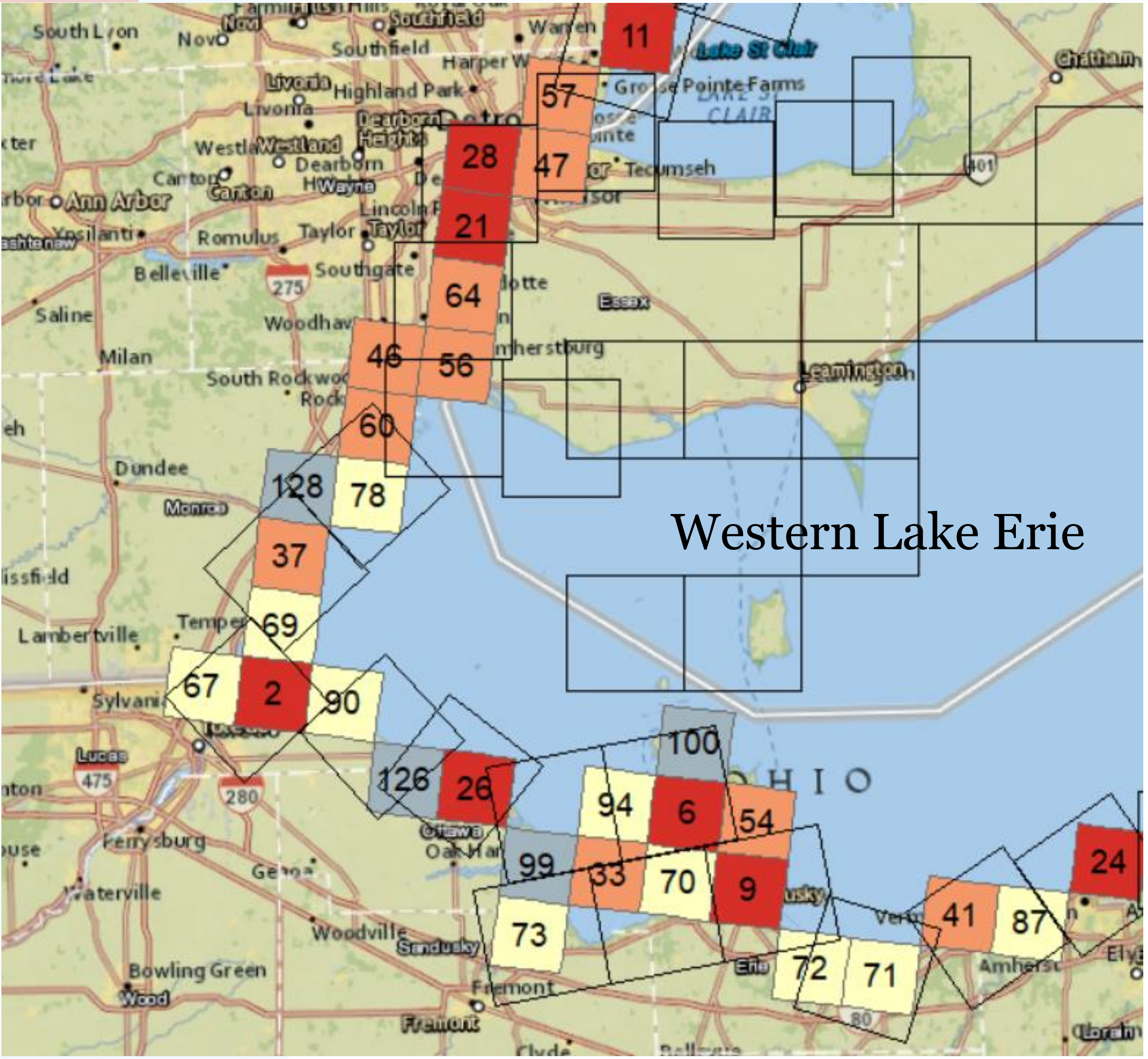


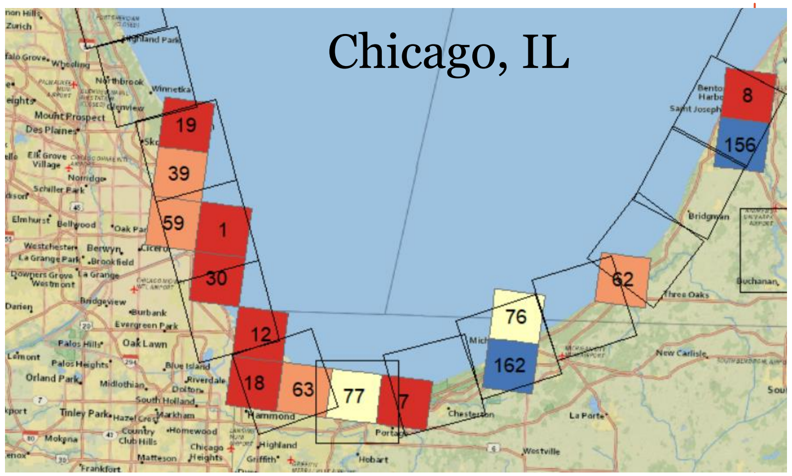
Green Bay, WI

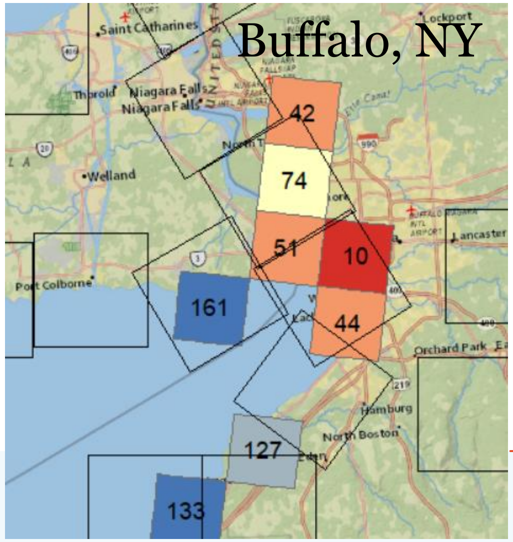
Manual 15 km grids

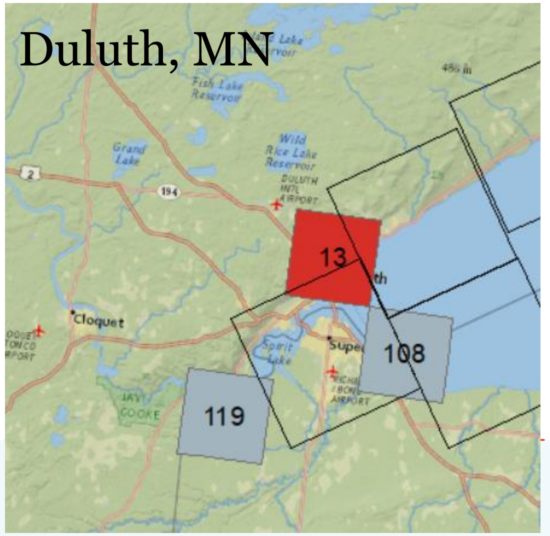
Green Bay, WI

Centered on High-Risk Sites

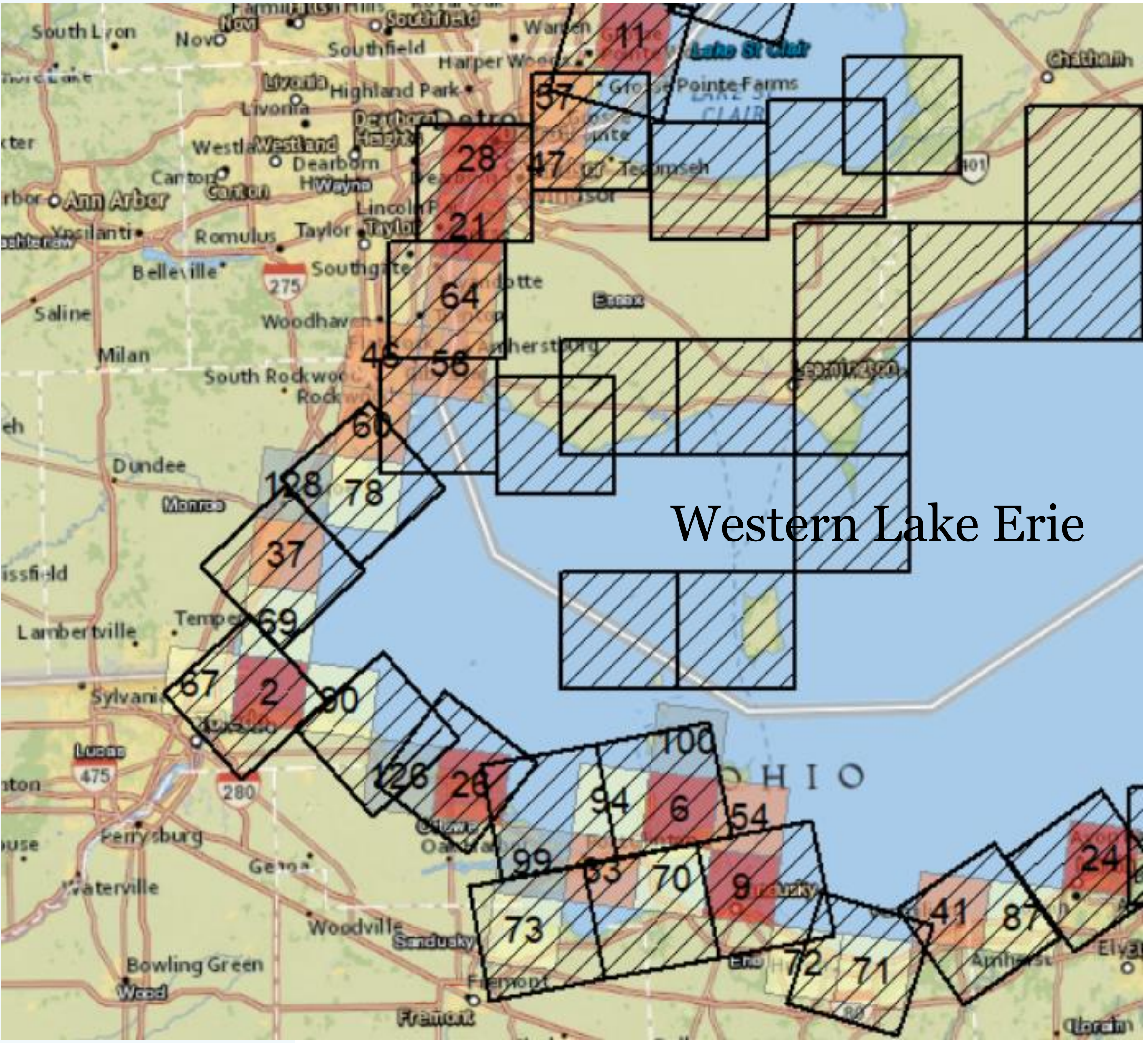


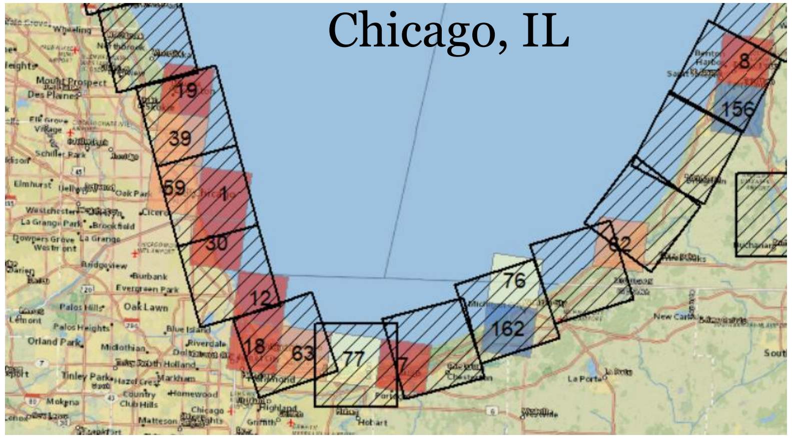


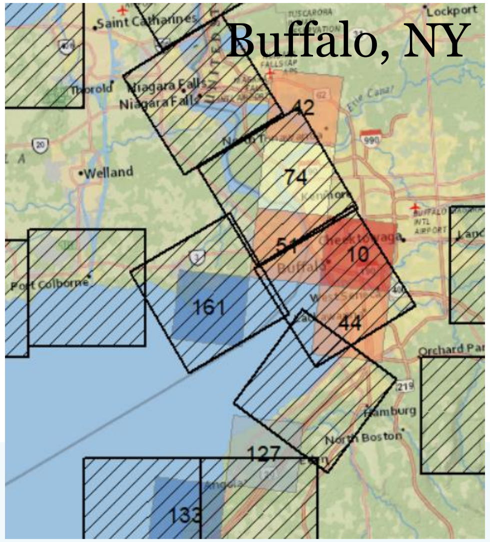


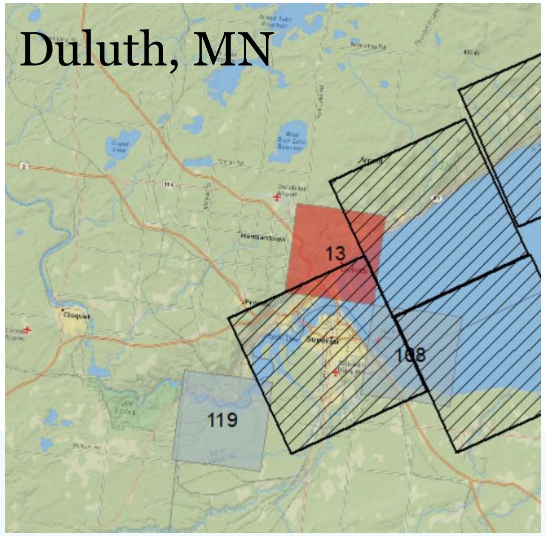


Centered on High-Risk Sites



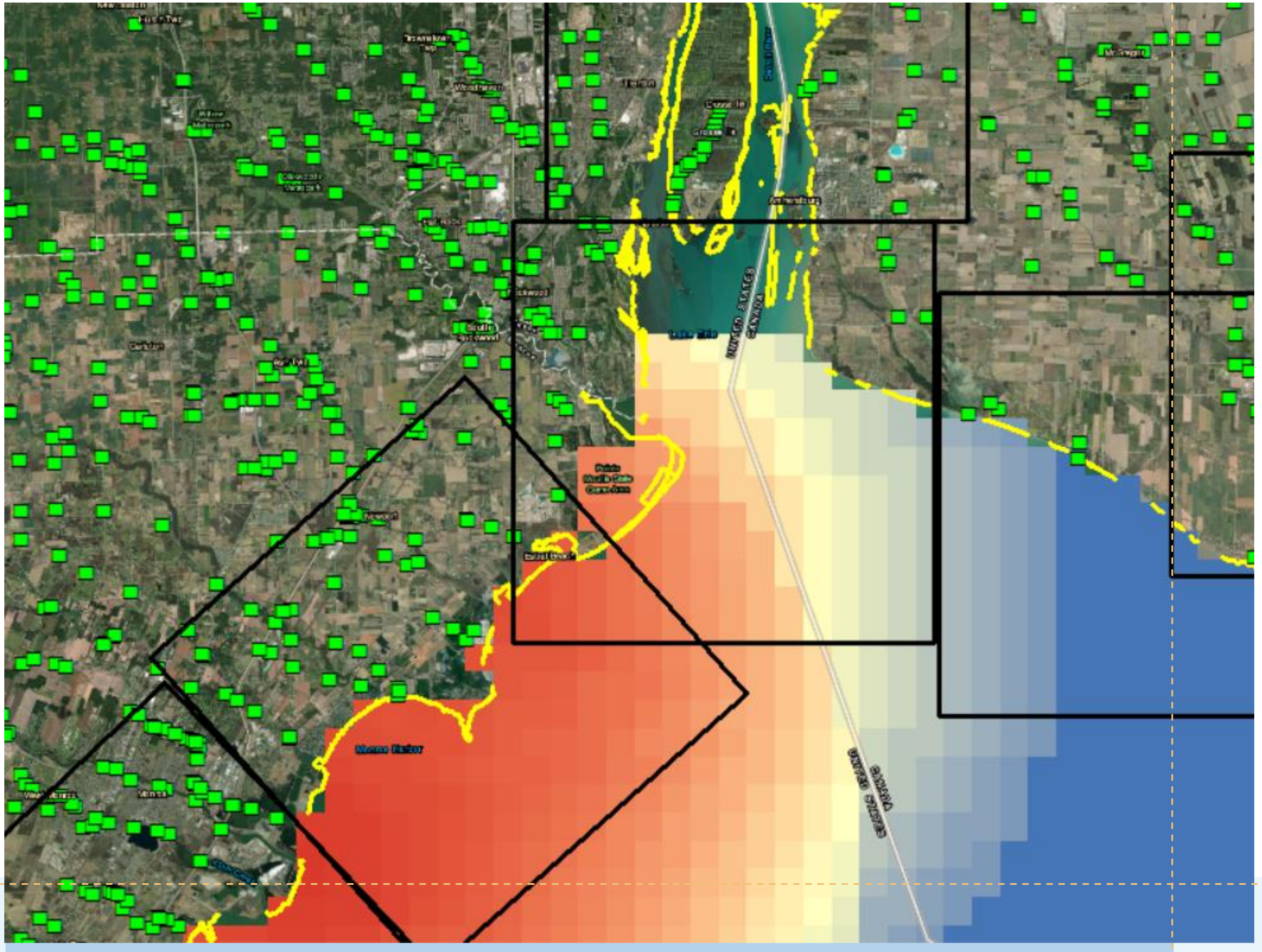






Great Lakes Aquatic Invasive Risk and Anthropogenic Disturbance

- Large grid cells centered on ‘sites’ better (i.e. harbors, river mouths, etc.)
  - Prioritized by the highest risk sites
- Grids attributed with AIS Risks similar to previous methods
- Grids attributed with anthropogenic disturbance
  - Human abiotic disturbance measures
  - Abiotic cumulative stress/pressure



Anthropogenic Disturbances

data layers sourced

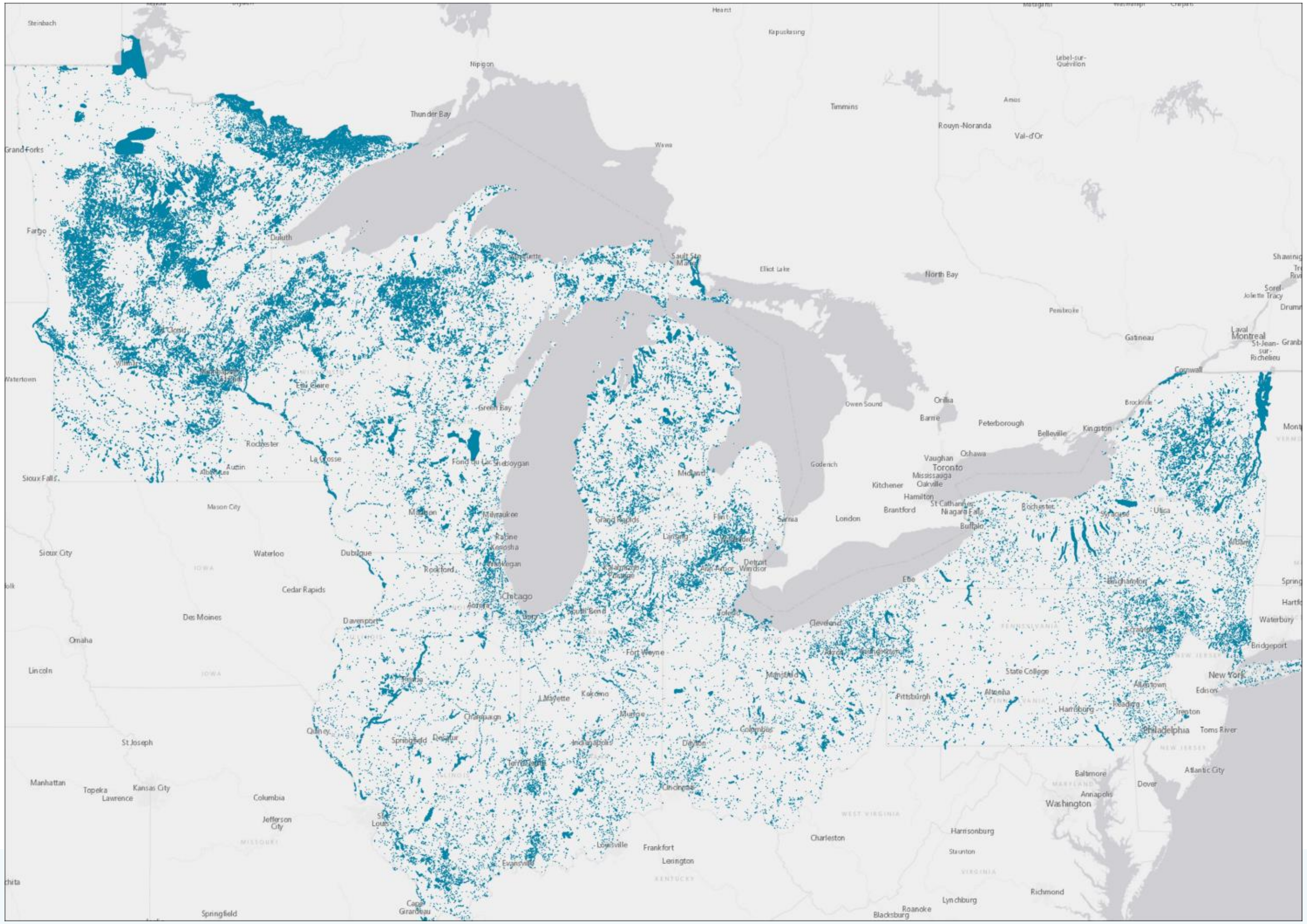
- Shoreline hardening
- Shoreline extensions
- Suspended sediments
- Phosphorus loading?
- PCBs
- AOCs
- Nitrogen loading
- Marinas
- Dams
  - Distance from river mouth to dam
- Coastal mining & Industry
- Dredge channels
- SAV

Obj iii. Inland lakes surveillance prioritization model

1. Baseline lake and pond dataset
2. Obtain/develop predictors of invasion pressure, likelihood of establishment, and invasion impact
3. Statistical analysis to identify the best-performing predictors
4. Combine best predictors into final model(s) of site surveillance priorities

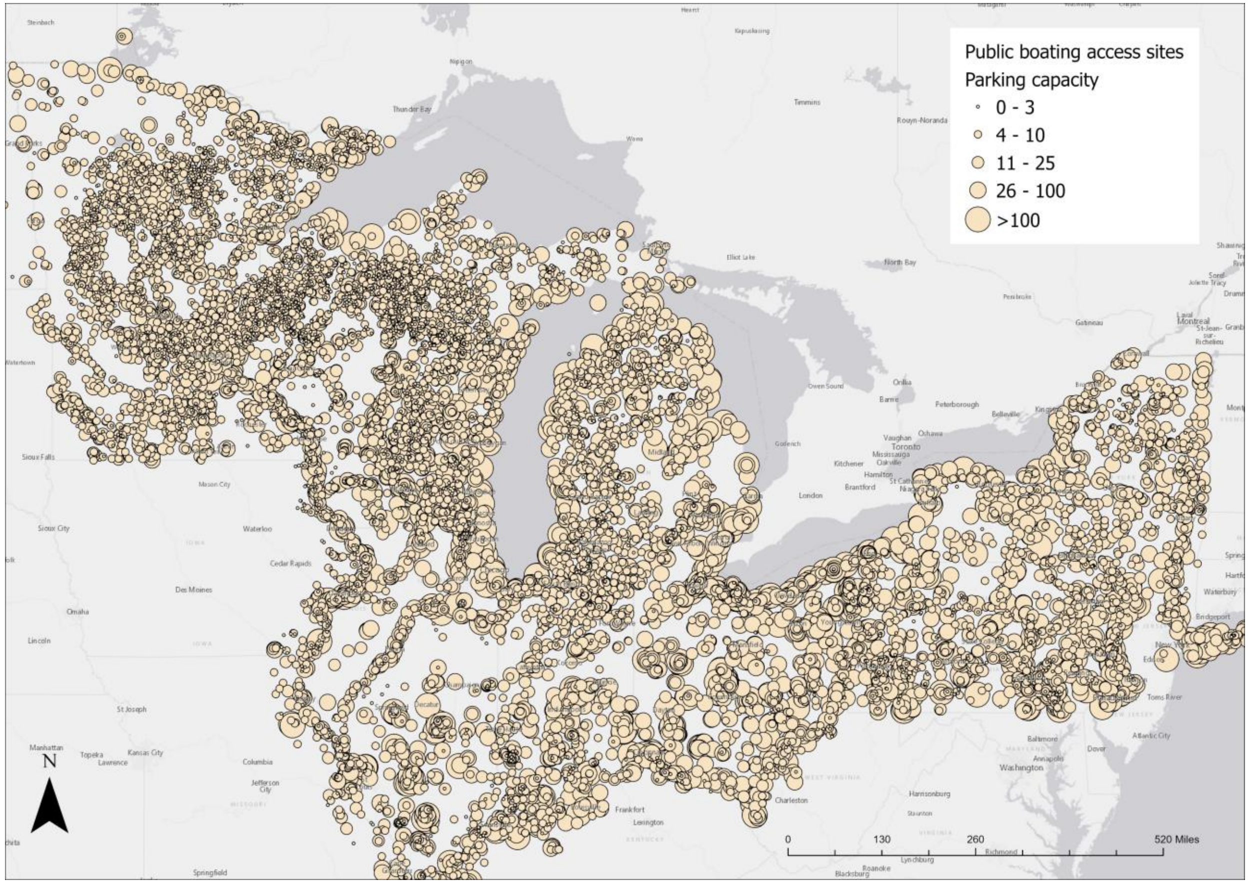
Inland lakes surveillance prioritization model

- Baseline dataset of inland lakes/ponds
  - All lake/pond/reservoir waterbodies > 4 ha
  - Sources: NHDPlus V2 + additional water bodies >10 acres from other sources
  - Approx. 78,000 lakes
  - Related each lake to its local catchment, watershed and network



Inland lakes surveillance prioritization model

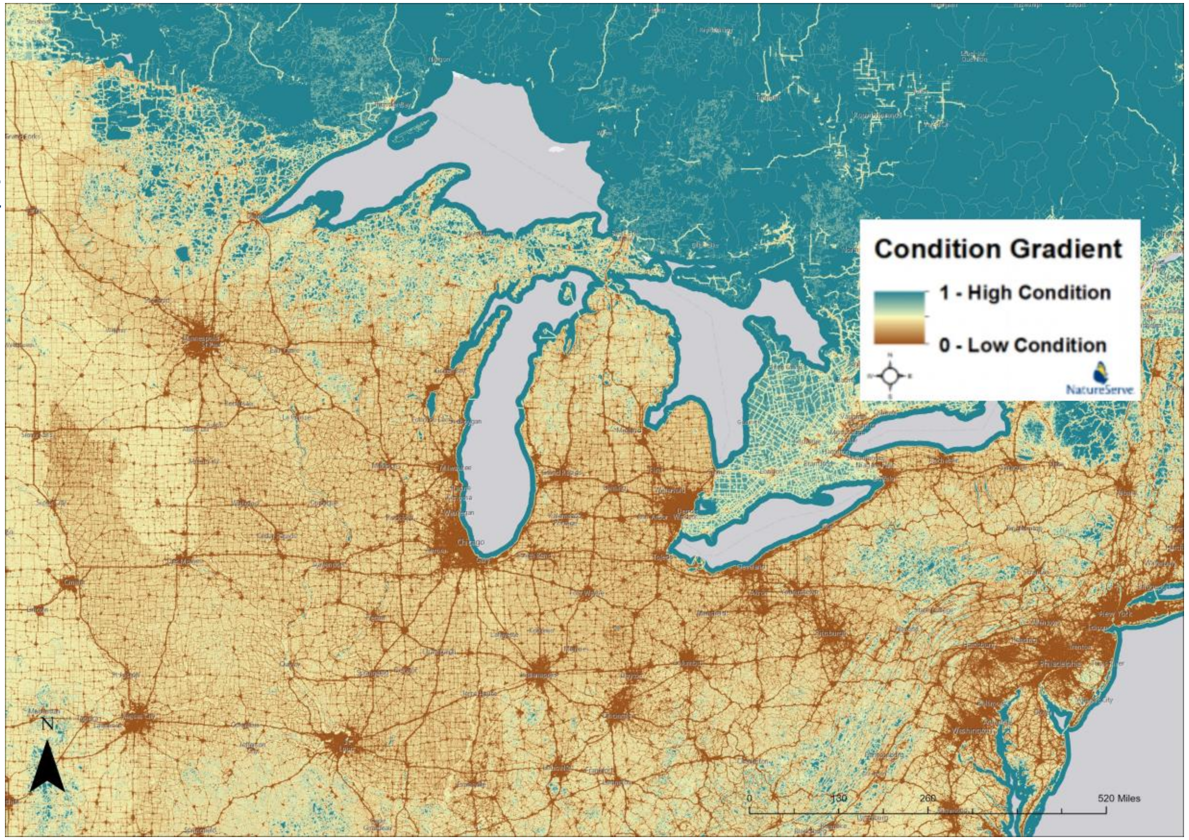
- Model inputs
  - Invasion pressure
    - Locations and size of public boat access sites
    - Population within a radius of the lake
    - Connectivity to waters known to be invaded
    - Recreational boating connectivity model



Locations and sizes of public boating access sites

Inland lakes surveillance prioritization model

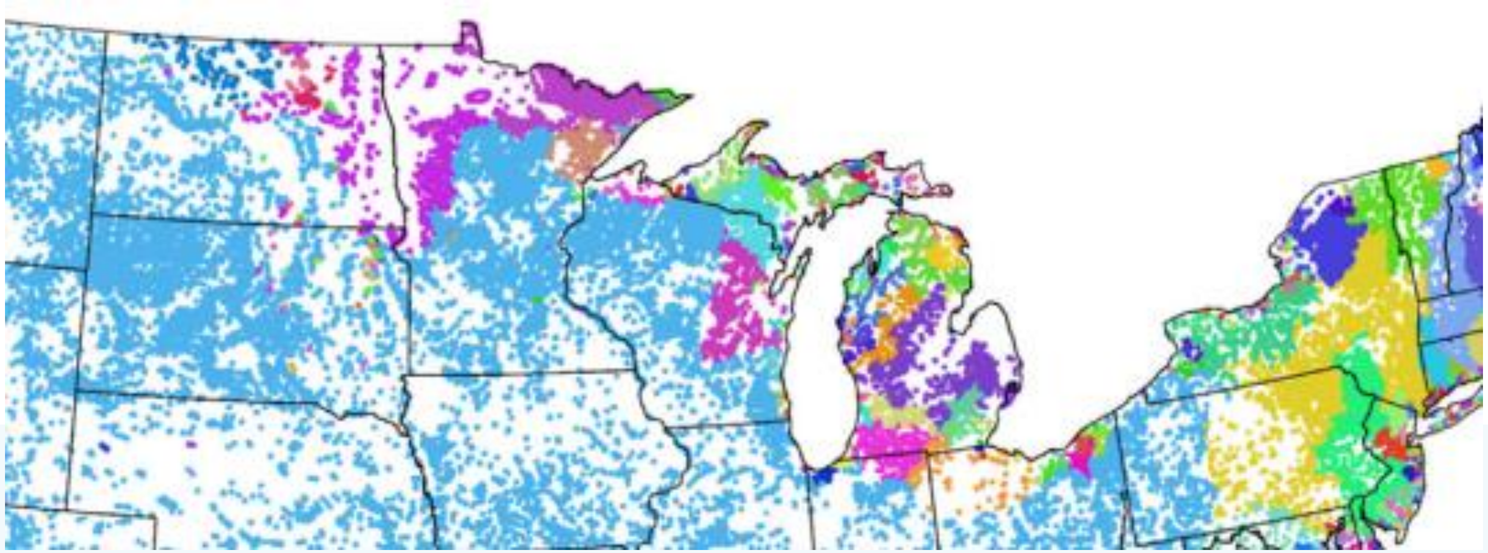
- Model inputs
  - Habitat suitability: How likely is it that an invasive species will become established if it reaches a site?
    - Lake depth
    - Water temperature range
    - Water quality
    - Disturbance level
  - Lake condition: How significant is the potential impact of invasion?
    - Condition of catchment landscape
    - Degree of shoreline development
    - Protection status
    - Recreational value



NatureServe landscape condition index

Inland lakes surveillance prioritization model

- Next steps
  - Finish up collecting/cleaning model inputs
  - Work with the core team to identify the best indicator invasive species to use in empirical models to develop habitat suitability indexes
    - Use regression analysis to select the attributes and model inputs to represent introduction/establishment probability and lake condition



Recreational boater use and connectivity

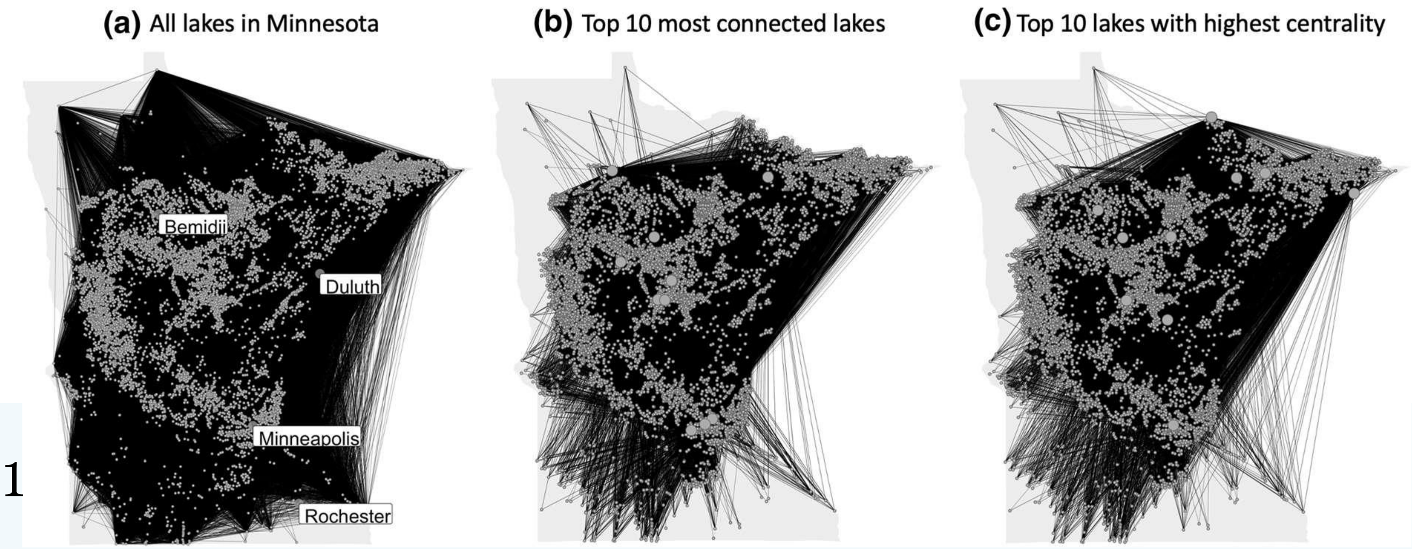
Nick Phelps(UMN)
Amy Kinsley (UMN)
Paul Venturelli (BSU)

University of Minnesota
Ball State University

- Recreational boater use data for data poor states
- Testing to see if we can use phone fishing app data to developing
  - a consistent regional measure of recreational boater use
  - a regional measure of inter-lake connectivity

(*recognizes some lakes pose greater risk of facilitating spread if they become invaded*).

Team have finished the modeling, now undertaking comparative network analyses

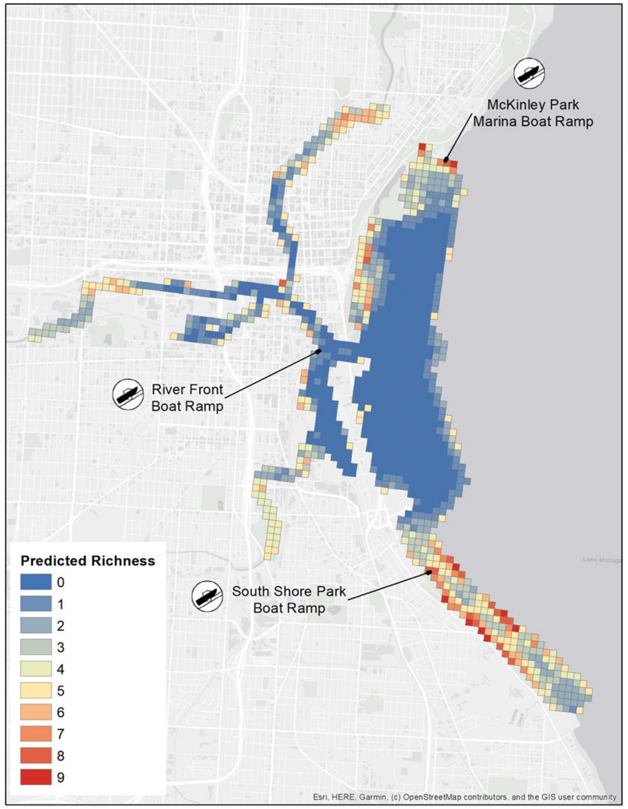


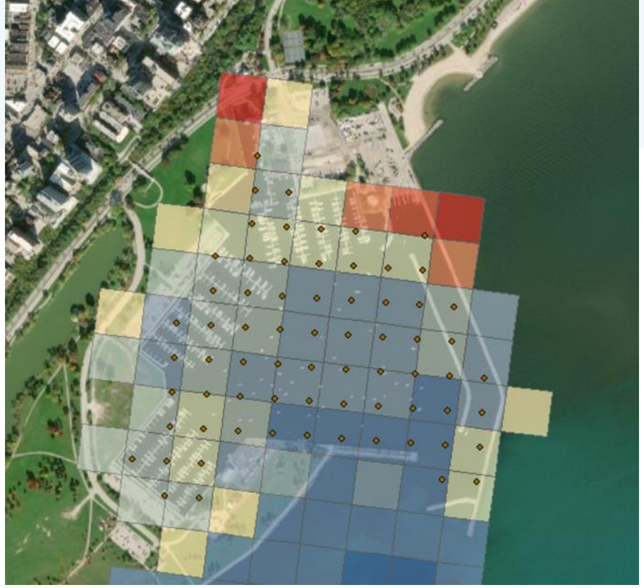
Koa et al 2021

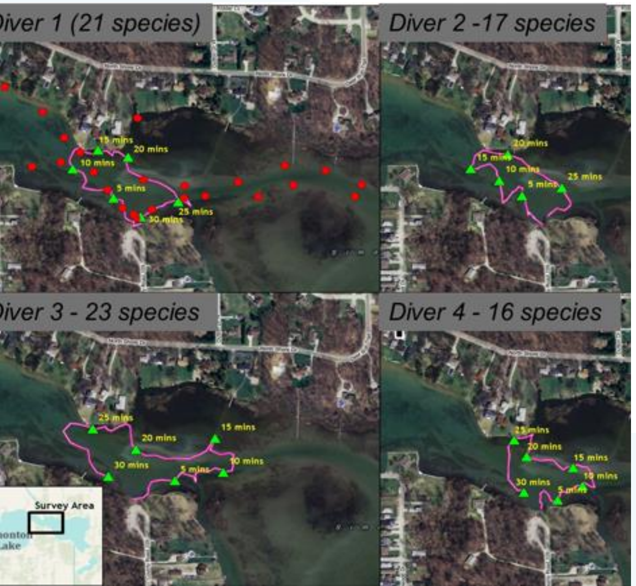
Objective iv. Develop best practice guidance for aquatic plant surveillance methods in inland lakes

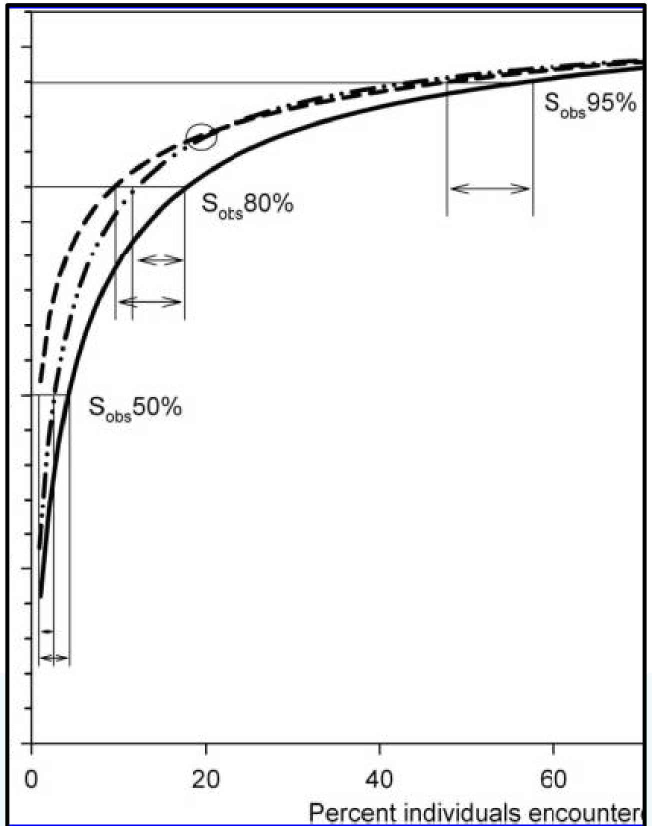
Outputs proposed:

- A **technical workshop** (and associated documentation) on IAP early detection monitoring methods
- An **annotated bibliography** of relevant IAP early detection monitoring methods
- A **best practices guidance document** that summarizes recommendations for early detection of IAP in inland lakes









Feedback from Feb 2022 surveillance meeting

We should aim to…

a. **characterize survey objectives** (to help users evaluate survey efficiency and "value- added" for various protocols; i.e., what can we expect to "get" from a given protocol)

b. **characterize strengths and limitations** of existing protocols

c. **Identify and discuss emerging technologies** that are used to support or supplement surveillance protocols (e.g., eDNA, remote sensing, etc.)

We need your help… pretty please

- Provide names of subject matter experts who could contribute to workshop and project outputs; send to atucker@tnc.org
- 2-3 (or more) people per agency/jurisdiction (practitioners, researchers, coordinators too!)

Looking ahead…

- Pre-workshop (Nov/Dec) –
  - Work with SMEs to add to and refine an "annotated bibliography" of survey methods and identify speakers
- During workshop (Feb) –
  - Information sharing
    - E.g., qualitative designs, quantitative designs, emerging technologies
  - Discuss & Summarize
    - E.g., strengths, limitations, trade-offs, uncertainties, etc.
- Post workshop (by Dec 2023) –
  - Complete annotated bibliography and compile best practices document