

USFWS AIS Early Detection and Monitoring Program in the Great Lakes



- 2014 Targeted Sampling
- 2013 Summary Information

eDNA Program

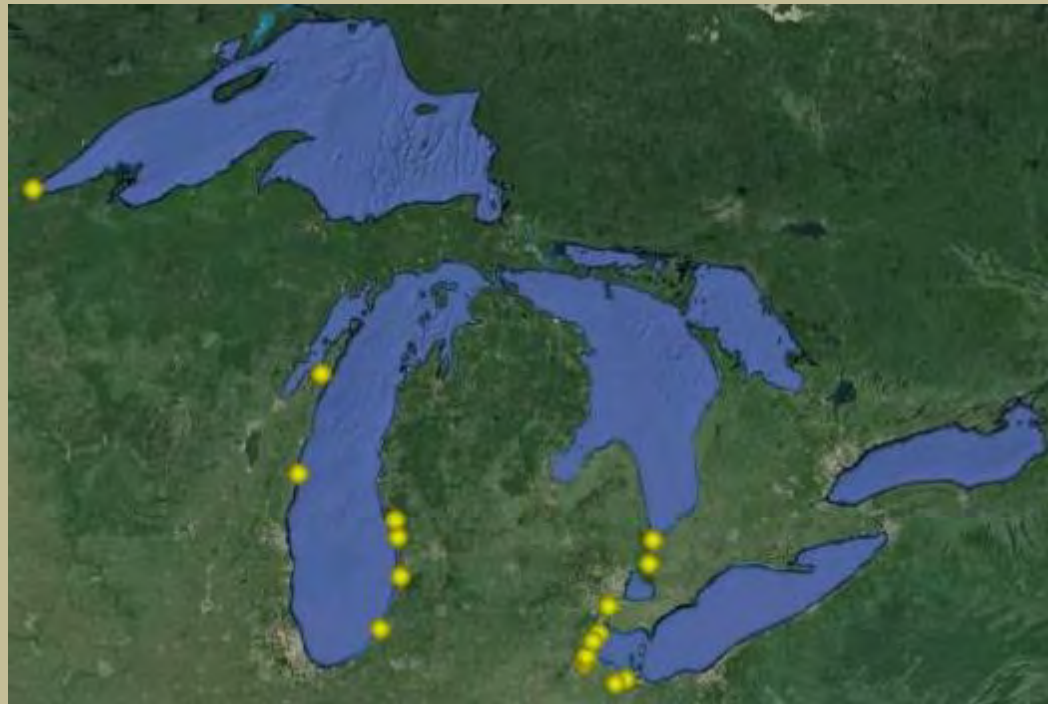
- Expanding Program
- QAPP Living Document
 - Two positive controls (2013)
 - Additional decontamination procedures
- WGL, UMESC, and EDRC
 - 8 qPCR markers
 - 5 cPCR markers
 - Black carp marker
- Additional research on methodologies
- Partner Meeting 4/16 – Finalized Sites
- High Priority Sites Sampled Twice

2013 eDNA Surveillance: Results

➤ Total eDNA Samples Collected Great Lakes – 1481 (1600*)

➤ All results posted on USFWS Region 3 website:

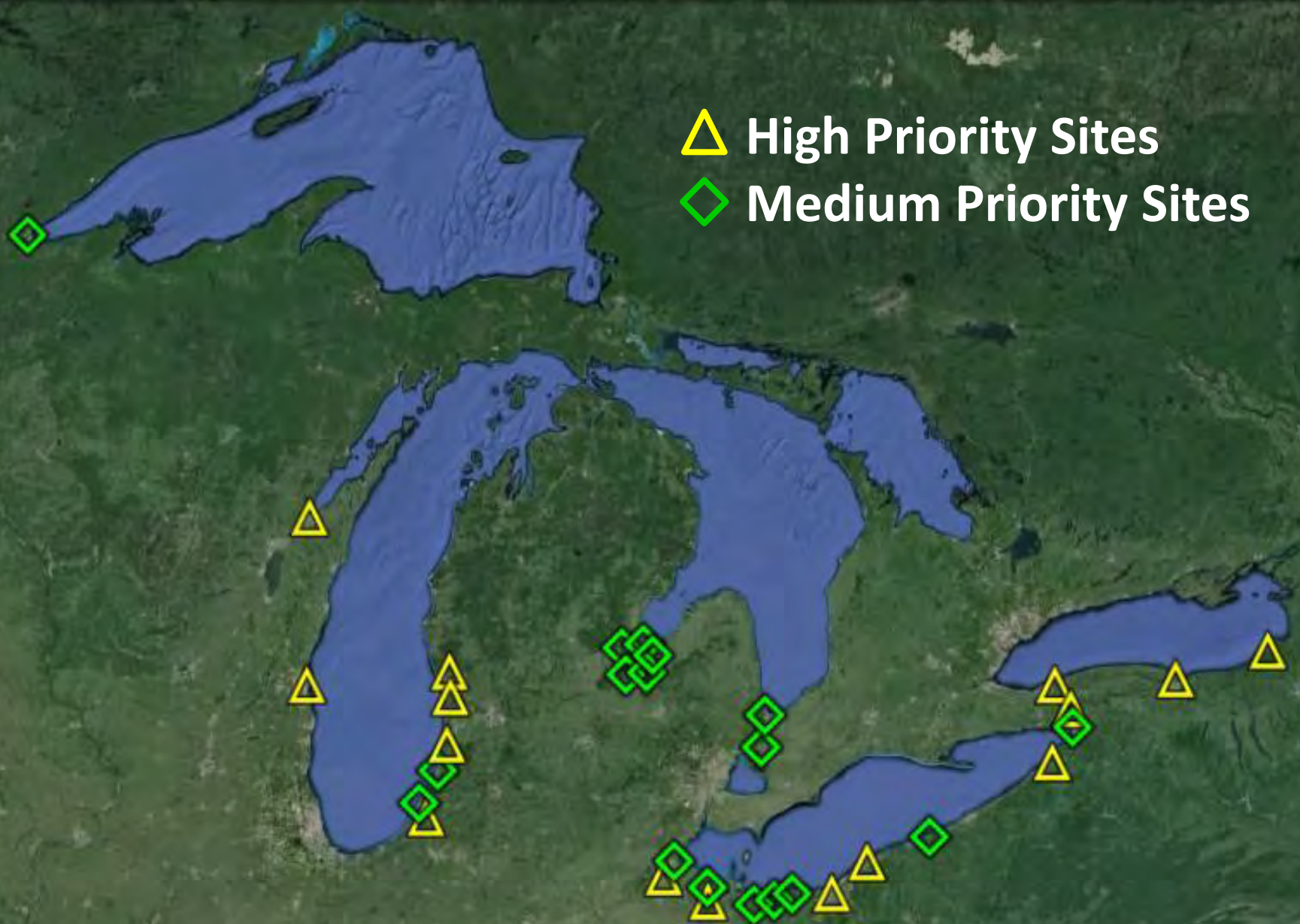
<http://www.fws.gov/midwest/fisheries/eDNA.html>



2014 eDNA Sampling Overview

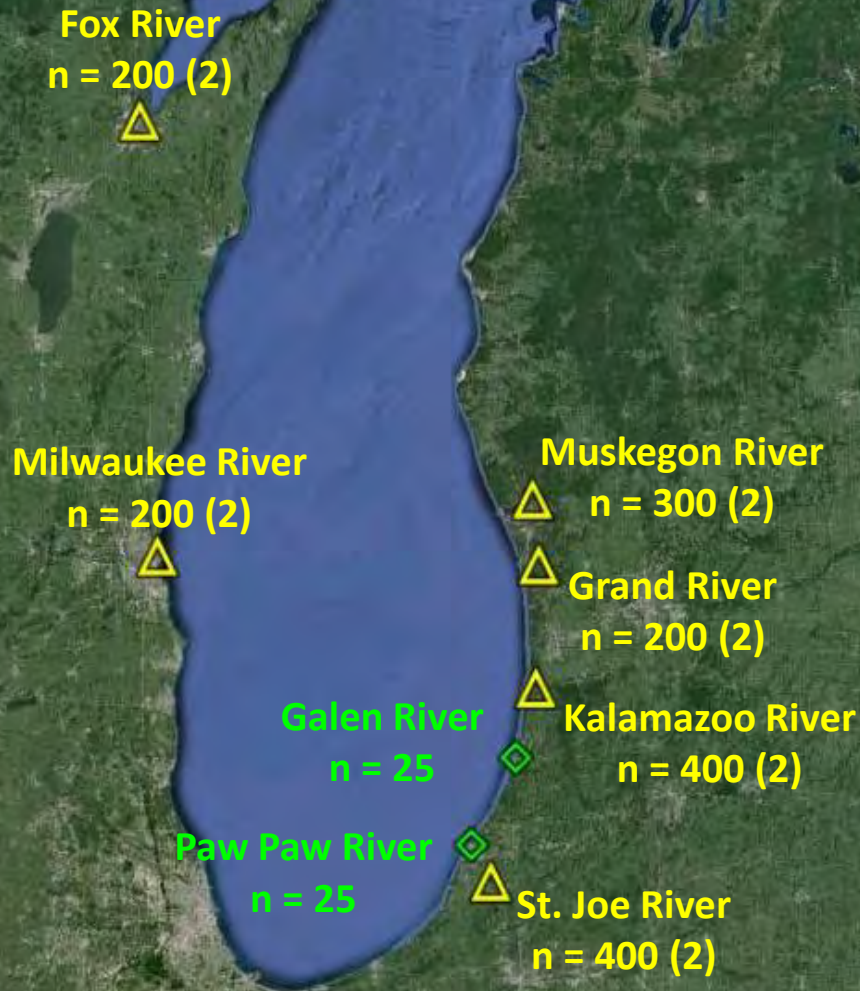
Basin	High Priority Sites	Number of Samples	Medium Priority Sites	Number of Samples
Lake Erie	6	1500	9	525
Lake Michigan	6	1700	2	50
Lake Ontario	5	800	0	0
Lake Huron	0	0	5	225
Lake Superior	0	0	1	100
CAWS	1	480	0	0
Ohio River	1	125	12	800
Upper Miss	TBD	600	TBD	TBD
Total		5355		1700
<i>Reserve</i>		<i>1000</i>		

2014 eDNA Sampling Overview

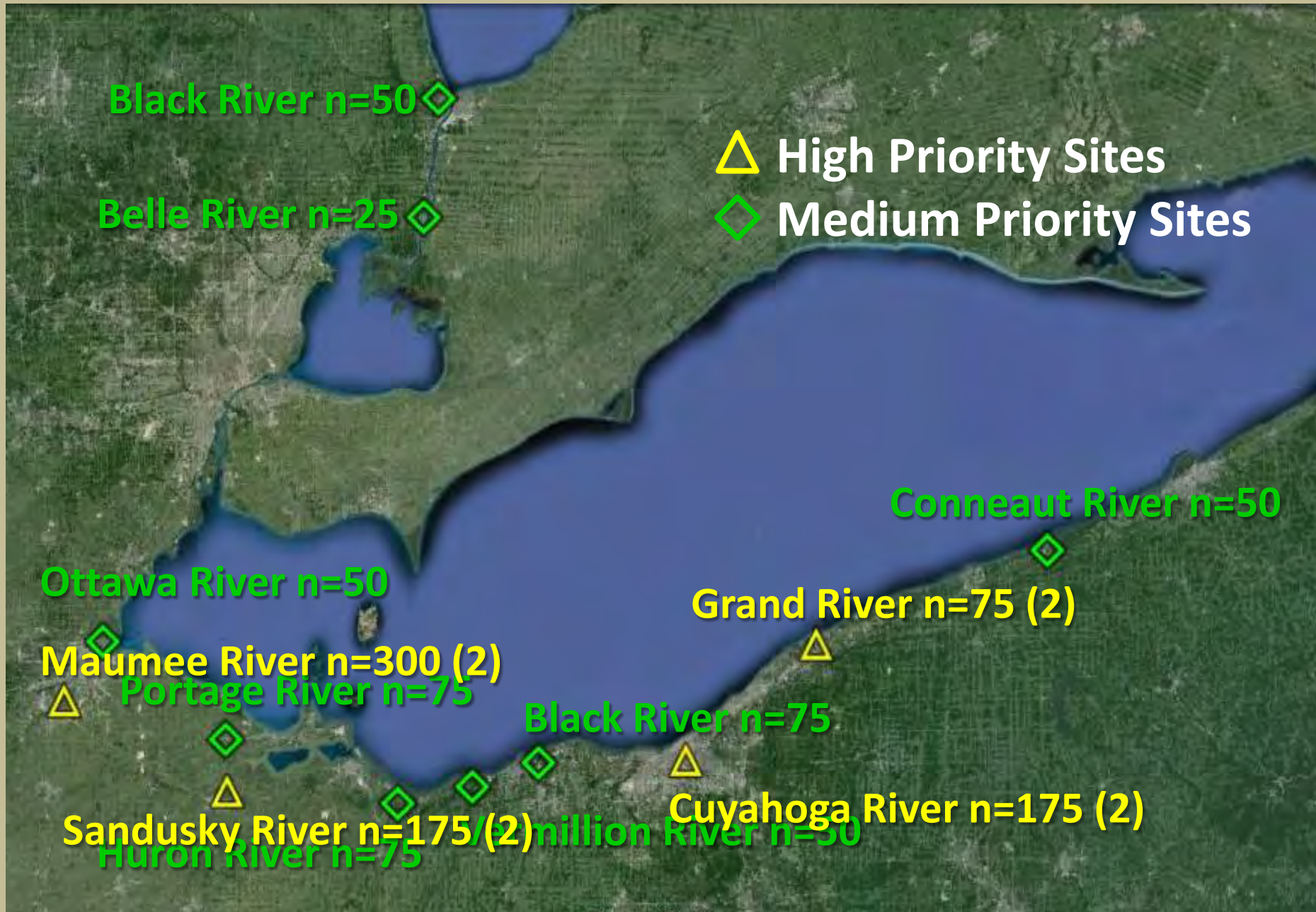


2014 eDNA Sampling Overview

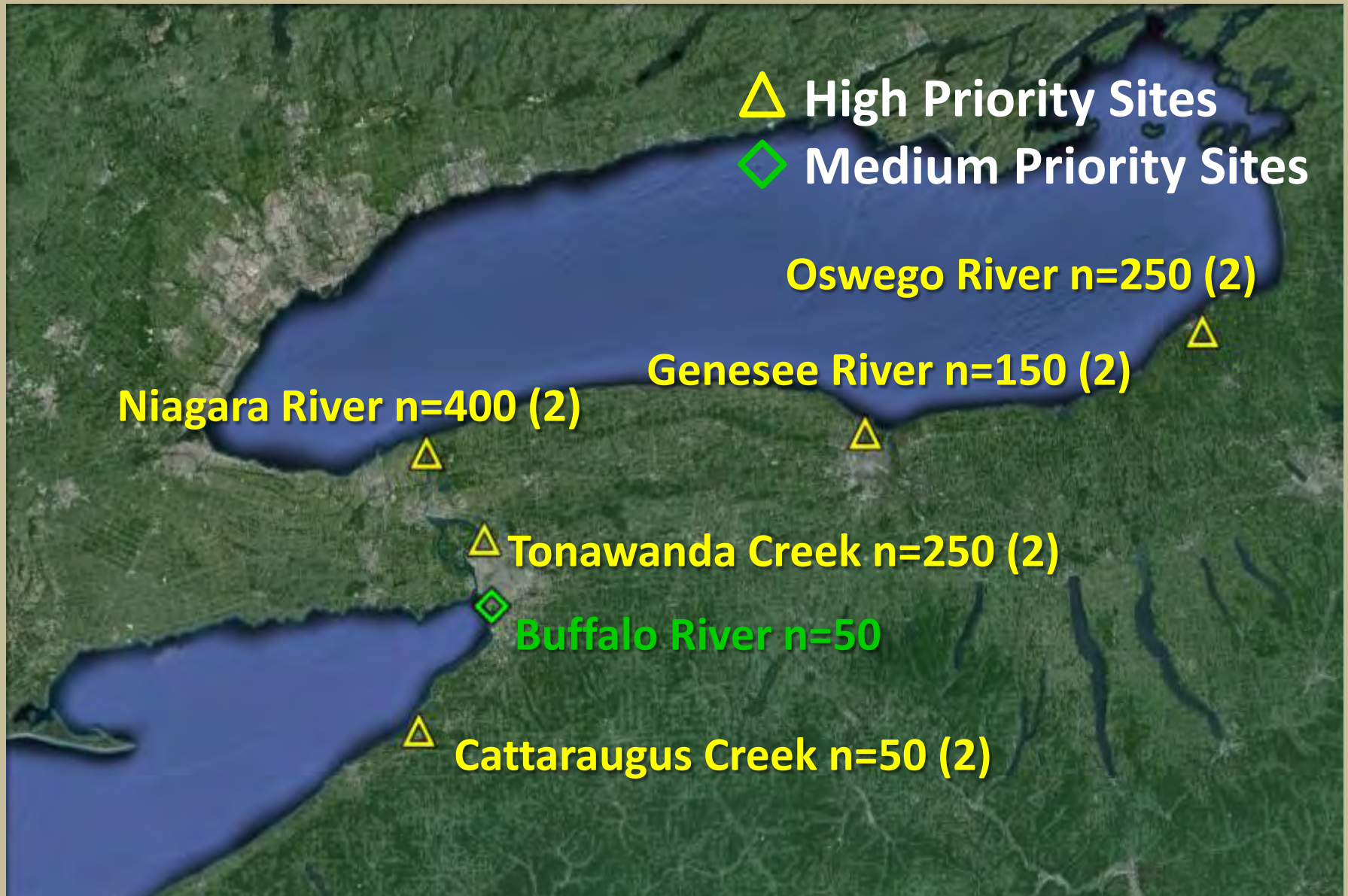
- △ High Priority Sites
- ◇ Medium Priority Sites



2014 eDNA Sampling Overview



2014 eDNA Sampling Overview



Questions?

Outline

- Basis for Early Detection Program
- USFWS Early Detection Framework
- Methodology
 - Ichthyoplankton
 - Macroinvertebrates
 - Fishes
- 2013 Results & Proposed 2014 Sampling Sites

Basis for Early Detection Program

- National Invasive Species Council (2001 & 2008)
- Nonindigenous Aquatic Nuisance Prevention and Control Act (1990 & 1996)
 - Aquatic Nuisance Species Task Force
 - Great Lakes Panel on Aquatic Nuisance Species (1991)
- Great Lakes Regional Collaboration (2004)
- Great Lakes Restoration Initiative Action Plan (2010)
- Great Lakes Water Quality Agreement Annex 6 (1972, 1990 & 2012)

USFWS Early Detection Framework

1. Conduct risk assessments
2. Select the sampling location
3. Identify a suite of sampling gears
4. Distribute sampling effort
5. Experimental sampling phase
6. Evaluation and modification of field methods

Ichthyoplankton Analysis

- Samples will be preserved in 95% ethyl alcohol
- Genetic barcoding of light trap and 50% of bongo net samples
 - Next-Gen Sequencing (faster, more efficient)
 - Cannot calculate abundance but can determine biomass
- Remaining preserved samples will be identified via microscopic taxonomy
 - Referencing Nancy A. Auer - *Identification of larval fishes of basin with emphasis on the Lake Michigan drainage*. Vol. 82. No. 3. Great Lakes Fishery Commission, 1982.
 - Able to calculate density (number of fish per cubic meter)



Macroinvertebrate Sampling

- Expand to include other “high risk” areas
- Additional focus on new mussels and Amphipods
- Hester-Dendy and Amphipod trap deployment
- Benthic sled and grab samples
- Refine methodology

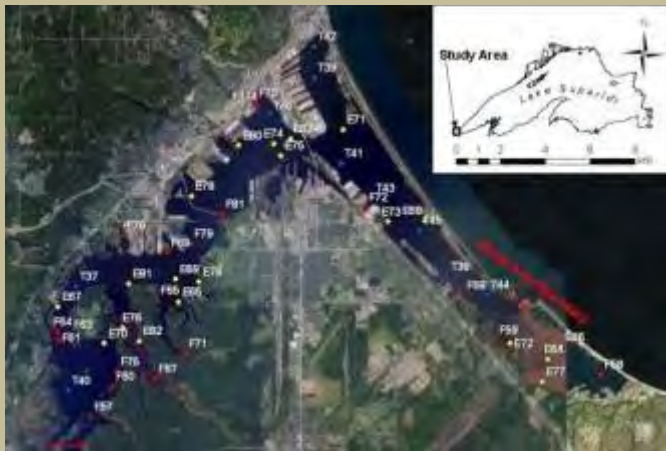


Fig. 4 Adult *Limnoperna fortunei*.
(<http://biolo.bg.fcen.uba.ar/primerapagina.htm>)



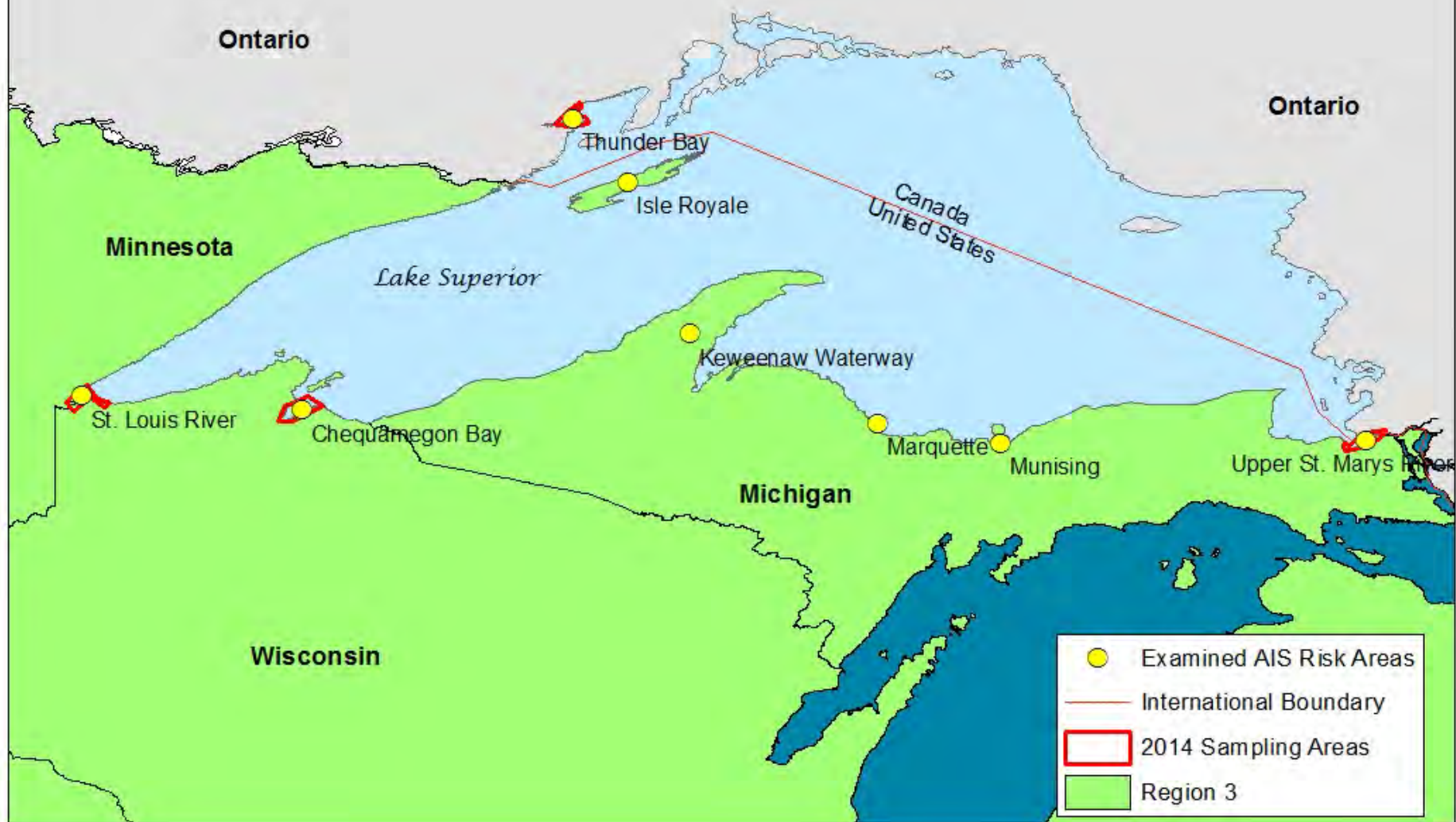
Nearshore Fishes: Traditional Gears

- Hoffman et al. 2011; Schloesser et al. 2012
- Risk Area Identification
- Sampling Strategy
 - Identify appropriate suite of gears (depth strata)
 - Distribute effort (randomly for experimental phase)
 - 0 to 1 m: Seines/Mini-fyke Nets/Fyke Nets/Minnow Traps
 - 1 to 2 m: Boat Electrofishing/Minnow Traps
 - > 2 m: Otter Trawls/Gillnets/Minnow Traps
- Evaluate and modify field methods (after 3 years)



Location	# Species observed	# Species estimated	Additional Samples	
			100%	95%
St. Louis River	40	42	89	2
Upper St. Marys	31	35	112	26
Thunder Bay	31	31	0	0

AIS Early Detection Survey 2014 Target Locations



2014 Lake Superior AIS Early Detection Survey

Goal: Monitor for the presence of new non-indigenous and known invasive fishes in Lake Superior.

Approach: Rare species detection strategy. Multi-year effort.

Lead Office: Ashland FWCO

Collaboration: Ontario Ministry of Natural Resources, Fond Du Lac Natural Resources Department, 1854 Treaty Authority, EPA Mid-Continent Ecology Division

A. Juvenile and Adult Fish Sampling

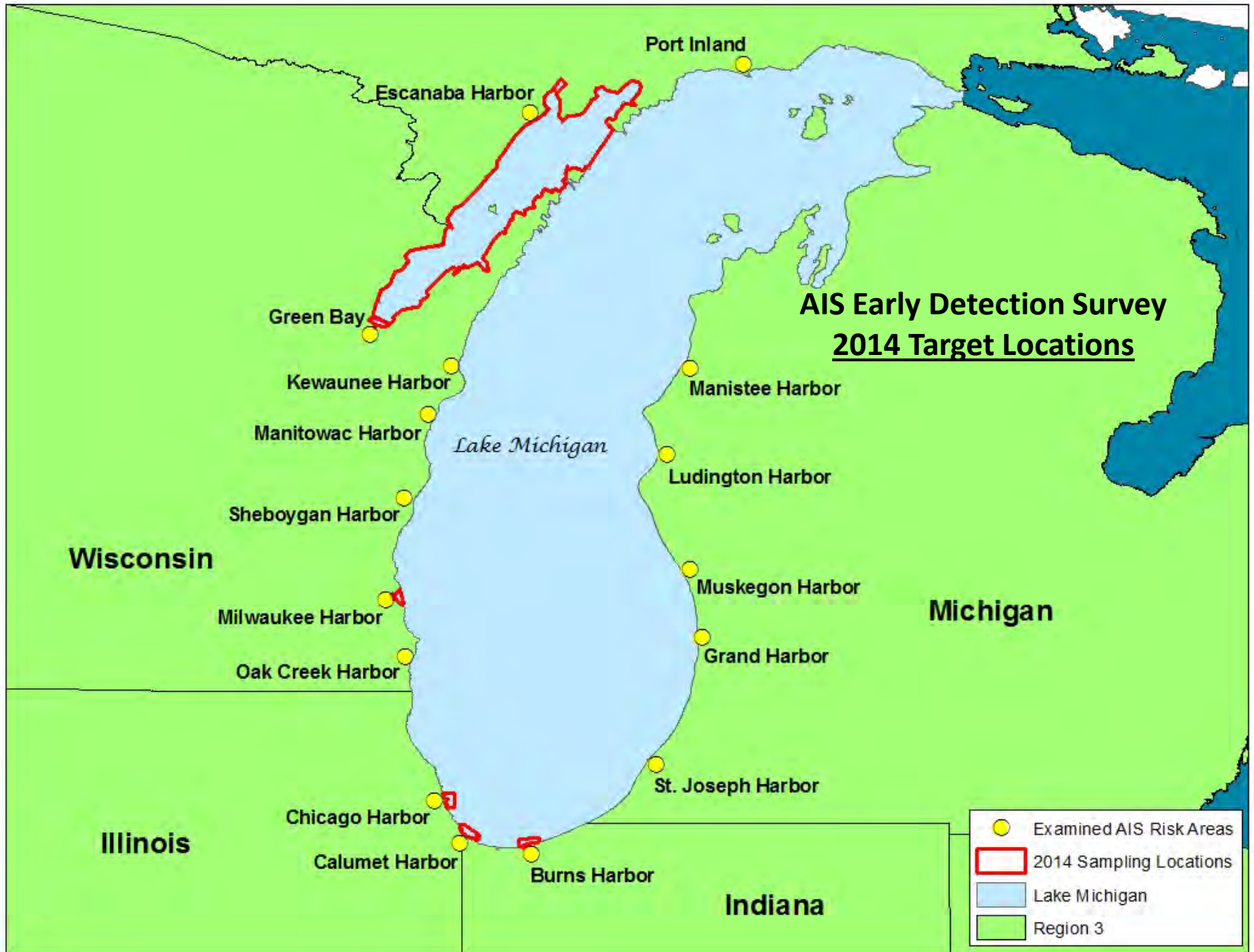
- Four Locations: St. Louis River (SLRE), Upper St. Marys River (USMR), Thunder Bay (TB), and Chequamegon Bay (CB)
- Boat electrofishing (10 minute transects, day at SLRE and TB, night at USMR and CB)
- Paired fyke net (overnight sets)
- Bottom trawl (5 minute tows. daytime)
- 50 sites at SLRE, USMR, and TB. 20 Electrofishing, 20 paired fyke net, and 10 trawl. August – September
- 45 sites at CB. 15 Electrofishing, 15 paired fyke net, and 15 trawl. September

B. Ichthyoplankton Sampling

- One Location: St. Louis River
- Bongo net - 500 micron (nighttime - 5 minute tows)
- Light traps (6-8 hr sets)
- 60 sites at SLRE. May – July

C. Benthos Sampling

- One Location: St. Louis River
- Benthic sled (nighttime – 2 minute tows)
- Hester-Dendy samplers (2-6 traps)
- Zebra mussel traps (2-6 traps)
- Amphipod traps (overnight sets - baited with fish)
- 60 sites at SLRE. May – October



2014 Lake Michigan AIS Early Detection Survey

Goal: Detect Asian carp or new fish and benthos species not currently found in the Great Lakes ecosystem.

Approach: Rare species detection strategy. Multi-year effort.

Lead Office: Green Bay FWCO

A. Juvenile and Adult Fish Sampling

- Five Locations: Burns Harbor, Calumet Harbor, Chicago Harbor, Green Bay, and Milwaukee Harbor
- Bottom trawl (daytime - 5 minute tows)
- Paired fyke net (overnight sets)
- Boat electrofishing (nighttime - 10 minute transects)
- Micromesh gillnets
- Minnow Trap Arrays/Perch Traps / Windermere traps
- 50 sites per location, conducted July – October, counts by species

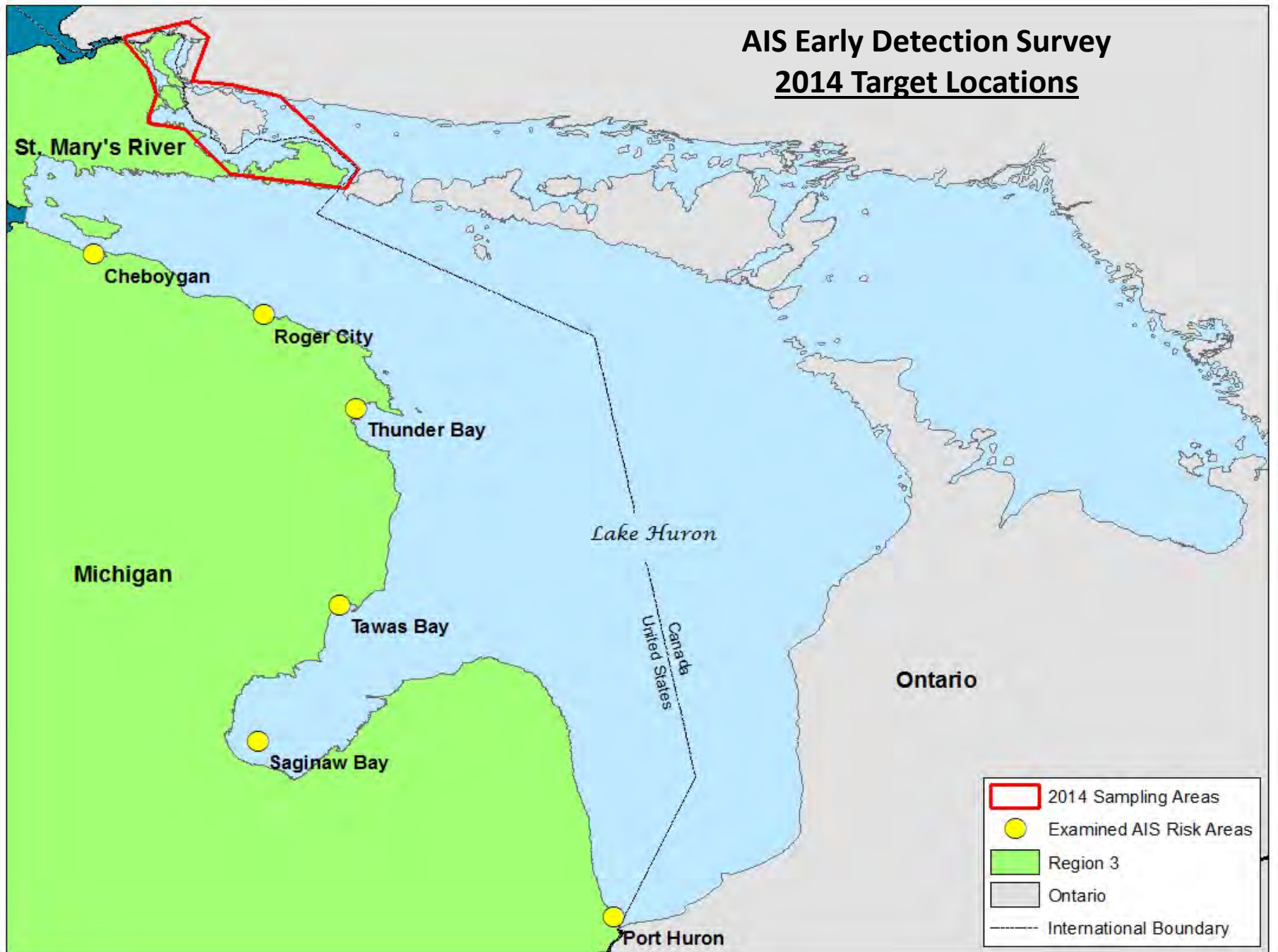
B. Ichthyoplankton Sampling

- Multiple Locations: Green Bay (both upper and lower)
- Bongo net - 500 micron (nighttime - 5 minute tows)
- Light traps (6-8 hr sets)
- 280 lower and 80 upper sites, conducted May – August

C. Benthos Sampling – Pilot Program

- Two Locations: Green Bay and Milwaukee Harbor
- Benthic sled (nighttime – 2 minute tows)
- Hester-Dendy samplers (2-6 traps)
- Zebra mussel traps (2-6 traps)
- Ekman/Ponar Grabs (20 Grabs)
- Amphipod traps (overnight sets - baited with fish)
- May – October

AIS Early Detection Survey 2014 Target Locations



2014 Lake Huron AIS Early Detection Survey

Goal: Detect Asian carp or new fish and benthos species not currently found in the Great Lakes ecosystem.

Approach: Rare species detection strategy. Multi-year effort.

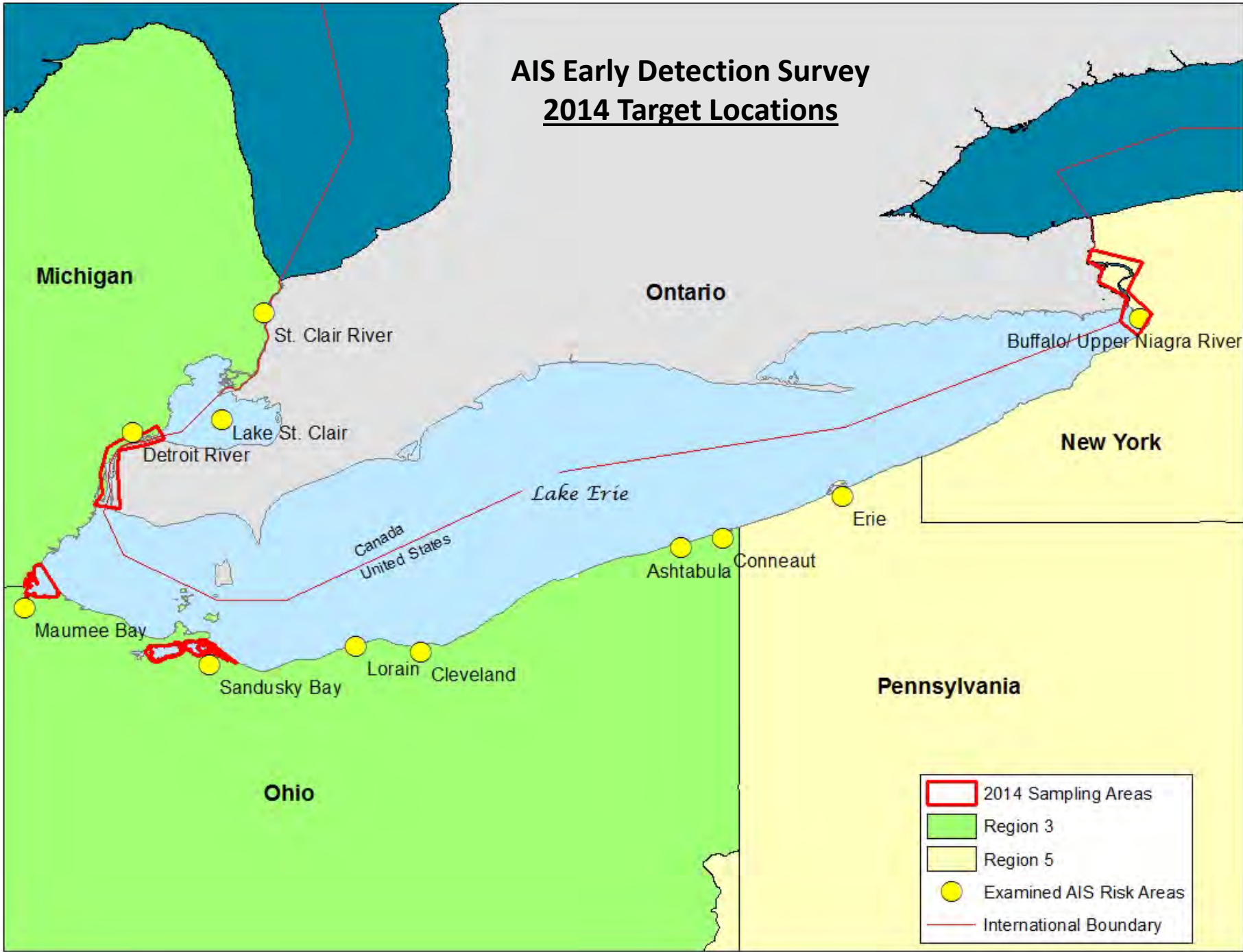
Lead Office: Alpena FWCO

A . Juvenile and Adult Fish Sampling

- One Location (see note below): Lower St. Marys River
 - Bottom trawl (daytime - 5 minute tows)
 - Paired fyke net (overnight sets)
 - Boat electrofishing (nighttime - 10 minute transects)
 - 45 sites per location, conducted Aug – Oct, counts by species

In an analysis of vectors for invasive species introduction and examining high risk species that may become introduced, we identified and ranked sampling priority for seven locations of concern within the Lake Huron watershed. One high priority location is targeted in 2014 due to risk, available time, and staffing.

AIS Early Detection Survey 2014 Target Locations



2014 Lake Erie AIS Early Detection Survey

Goal: Detect Asian carp or new fish and benthos species not currently found in the Great Lakes ecosystem.

Approach: Rare species detection strategy. Multi-year effort.

Lead Offices: Alpena FWCO and Lower Great Lakes FWCO

A. Juvenile and Adult Fish Sampling

- Four Locations: Detroit River, Maumee Bay, Sandusky Bay, and Buffalo/Upper Niagara River
- Bottom trawl (daytime - 5 minute tows)
- Paired fyke net (overnight sets)
- Boat electrofishing (nighttime - 10 minute transects)
- 45 sites per location, conducted August – October, counts by species

B. Ichthyoplankton Sampling

- Three Locations: Maumee Bay, Sandusky Bay, and Buffalo/Upper Niagara River
- Bongo net - 500 micron (nighttime - 5 minute tows)
- Light traps (6-8 hr sets)
- 60 sites per location , conducted May – July

C. Benthos Sampling – Pilot Program

- Two Locations: Maumee Bay and Buffalo/Upper Niagara River
- Benthic sled (nighttime – 2 minute tows)
- Hester-Dendy samplers (2-6 traps)
- Zebra mussel traps (2-6 traps)
- Amphipod traps (overnight sets - baited with fish)
- 60 sites per location, conducted May – October

AIS Early Detection Survey 2014 Target Locations

Ontario



Canada
United States

Lake Ontario

Lower Niagara River

Rochester

Oswego

New York

- Examined AIS Risk Areas
- International Boundary
- ▭ 2014 Sampling Areas
- ▭ Region 5

2014 Lake Ontario AIS Early Detection Survey

Goal: Detect Asian carp or new fish and benthos species not currently found in the Great Lakes ecosystem.

Approach: Rare species detection strategy. Multi-year effort.

Lead Office: Lower Great Lakes FWCO

A. Juvenile and Adult Fish Sampling

- Two Locations: Lower Niagara River and Rochester (including Irondequoit Bay)
- Bottom trawl (daytime – 5 minute tows)
- Paired fyke net (overnight sets)
- Boat electrofishing (nighttime – 10 minute transects)
- 45 sites per locations, conducted August – October, counts by species, TL of first 50 of each species

B. Ichthyoplankton Sampling

- Two Locations: Lower Niagara River and Rochester (including Irondequoit Bay)
- Bongo net – 500 micron (nighttime – 5 minute tows)
- Light traps (6-8hr sets)
- 60 sites per location, conducted May – July

A. Benthos Sampling

- Two Locations: Lower Niagara River and Rochester (including Irondequoit Bay)
- Benthic sled (daytime – 2 minute tows)
- Ponar grabs
- 30 sites per location, conducted May – October

Questions?