



Using boater  
surveys to inform  
invasive species  
early detection  
and rapid  
response  
programs

GLRI #GL00E01152-0, October 2012-2014

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# Invasive plants in inland lakes

- Well-recognized threat to lake health
- 33-45% of boats travelling in Michigan carry at least one plant fragment







# Invasive plants in inland lakes

- Management involves
  - ✓ prevention
  - ✓ EDRR (early detection and rapid response)
  - ✓ control
- EDRR uses risk estimates to prioritize active monitoring and other management actions



# Invasive plants in inland lakes

- MI DNR leading EDRR efforts for European frog-bit
- Found in SE Lower Peninsula until recently
- Detected in Saginaw Bay, Alpena, and Munuscong Bay
- Physical removal and trial treatments with herbicides



# Our project

- Boater surveys to identify lakes that may have increased chance of introductions
- Help agencies prioritize monitoring locations
- Support EDRR programs' efficient use of scarce resources

# Factors included in survey

- Trip logistics:
  - Number of days spent on the water body
  - Number of trips between same two water bodies
  - Number of different water bodies visited



# Factors included in survey (cont.)

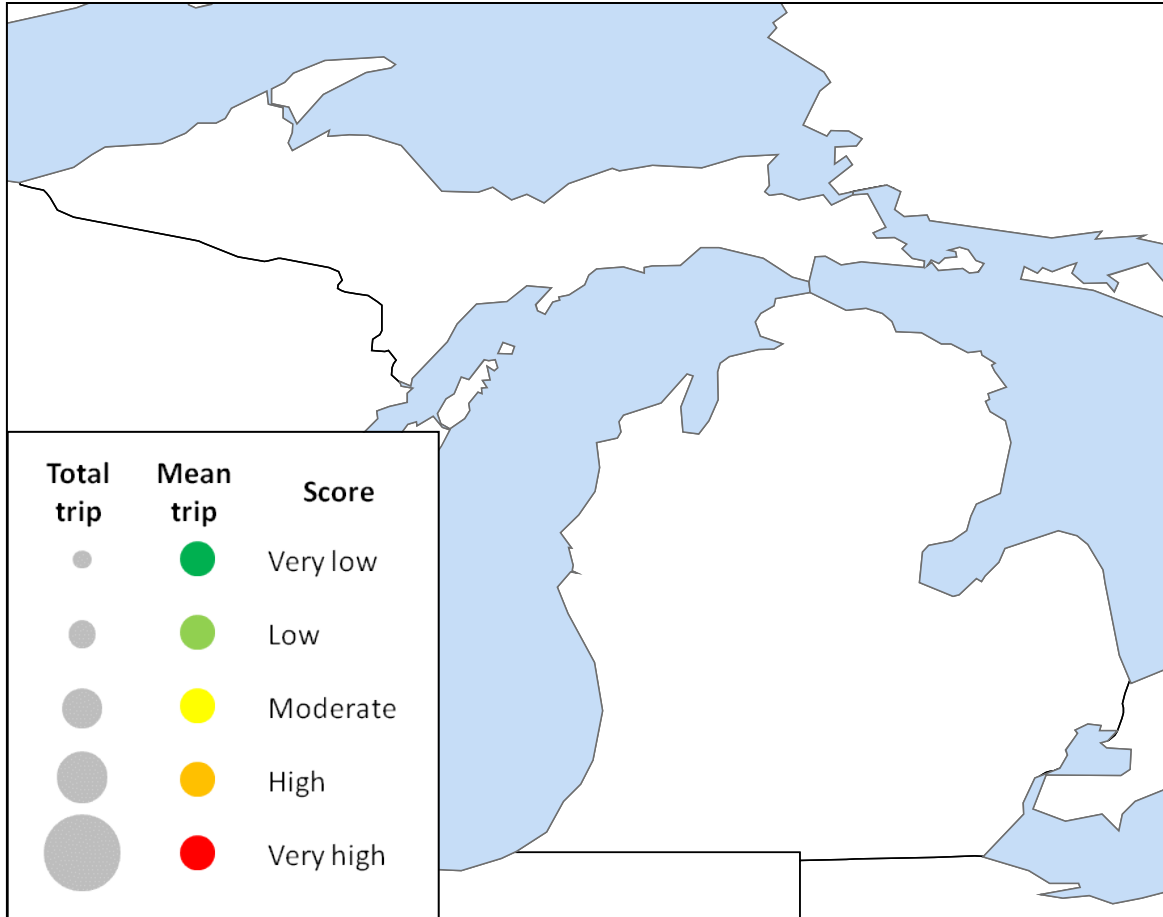
- Removing visible mud, plants, animals from boat, trailer, and equipment
- Emptying all water
- Allowing boat and equipment to dry  $\geq 5$  days
- Completing at least one recommended wash method

- hot H<sub>2</sub>O
- vinegar/salt
- bleach
- high pressure



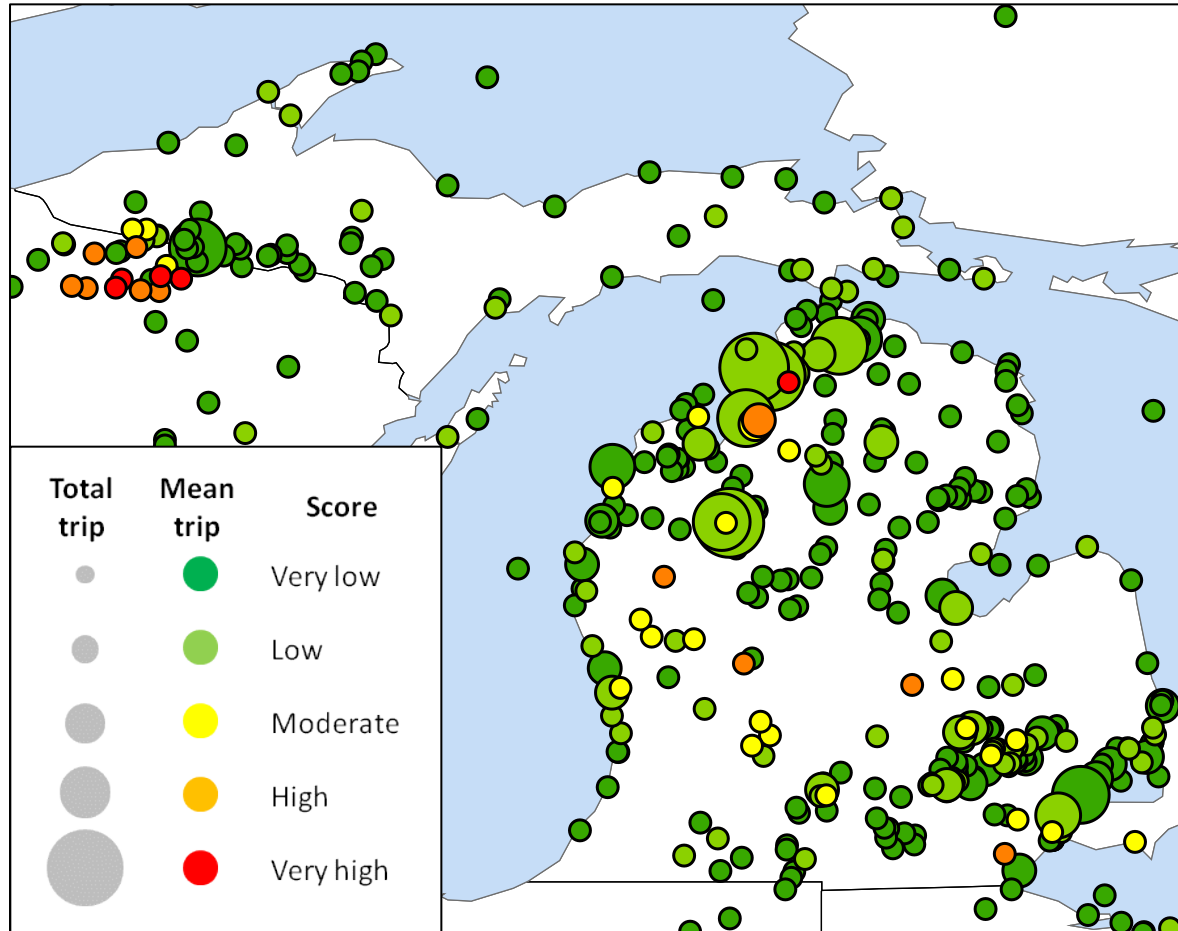


# Survey overview



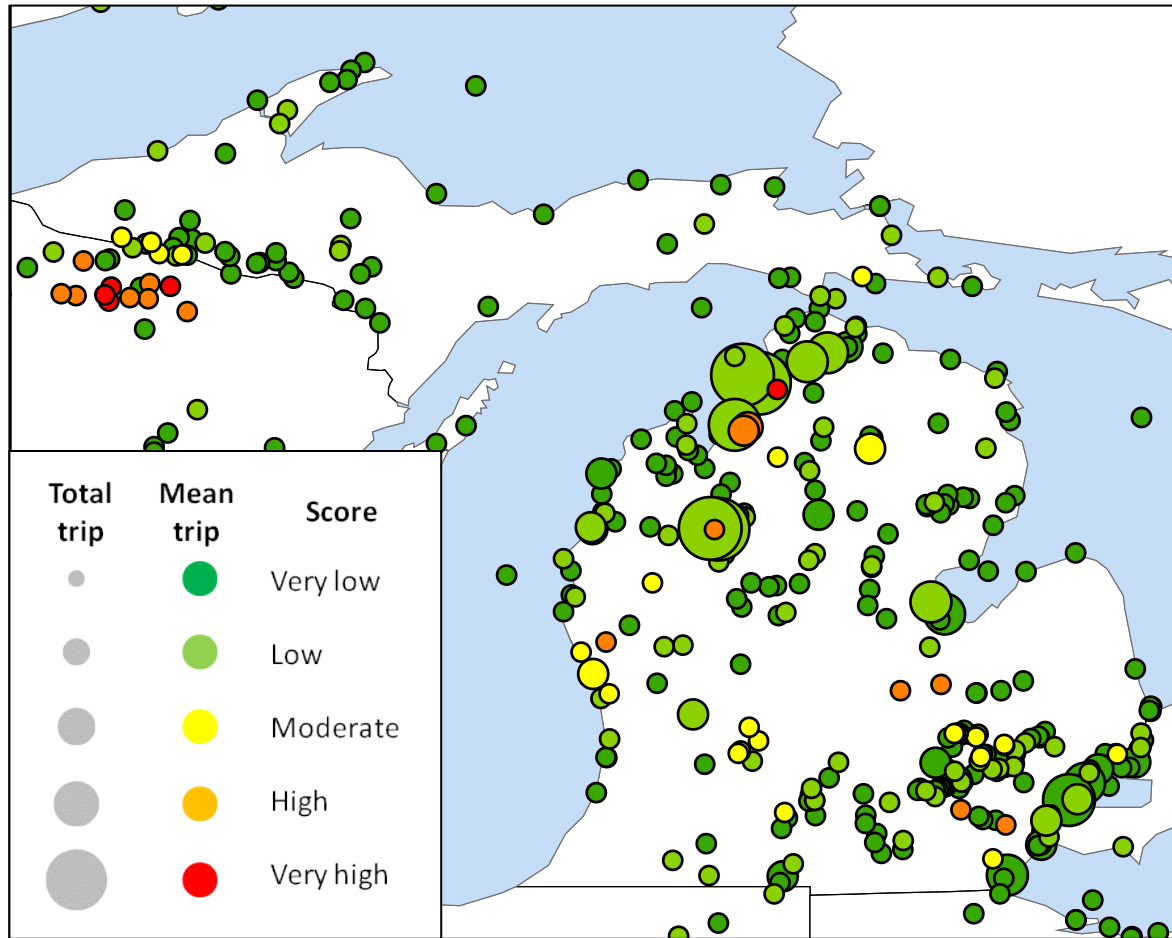
- 1032 surveys
- 396 water bodies
- 1113 trips

# Arrivals



**Color represents average boat score, based on boater behaviors; Size represents total boat score.**

# Departures



**Color represents average boat score, based on boater behaviors; Size represents total boat score.**

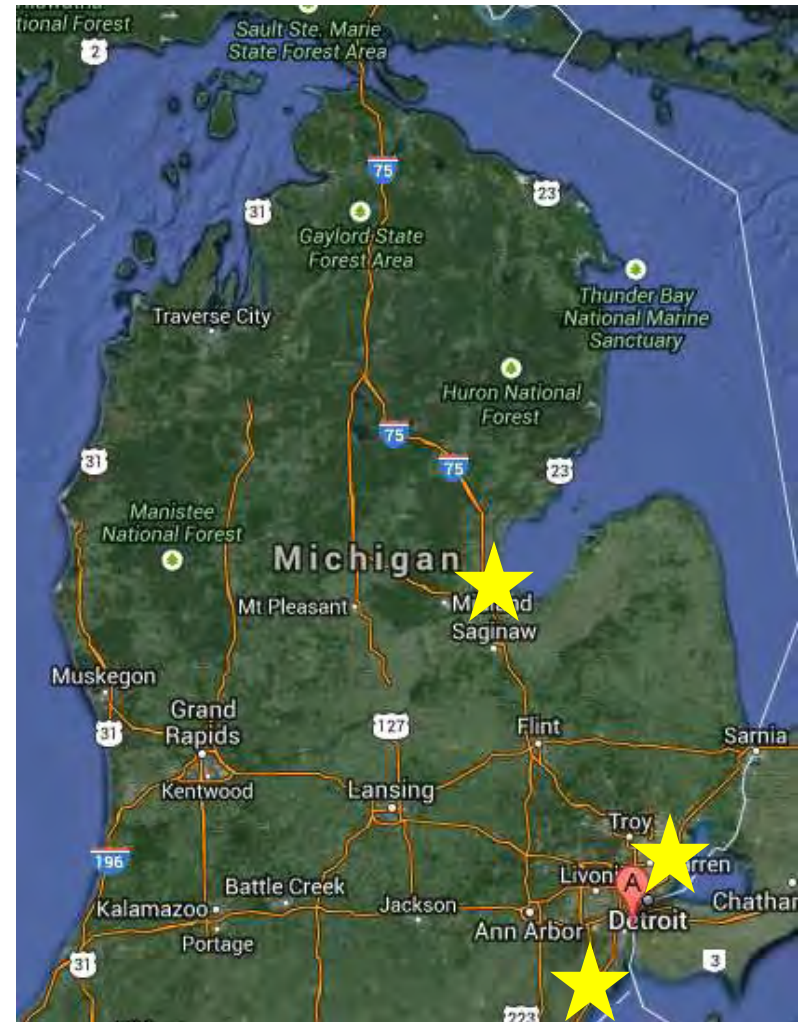
# Boater movement

- 48% of boaters moved between Great Lakes and inland lakes
- 42% of boaters visited > 1 water body
- Average boater had 2.5 connections
- 19.5% of trips made by out-of-state boaters



# Great Lakes connections

- Great Lakes and connecting waterways locations with the most connections:
  - Saginaw Bay (Bay City) (11)
  - Lake St. Clair (Harrison township) (5)
  - Lake Erie (Monroe) (5)



# Boater behaviors

Question	Responses	
	Yes	No
Removed visible mud, plants, or animals from <b>boat</b> and <b>trailer</b>	89%	11%
Removed visible mud, plants, or animals from <b>personal equipment</b>	85%	15%

# Boater behaviors (cont.)

Question	Responses	
	Yes	No
Empty all water from boat	83%	17%
Allow boat to dry at least 5 days	55%	45%
Hot water, vinegar, or salt solution, bleach solution, or high pressure wash	73%	27%

# Angling behaviors

- In major Michigan fishing tournaments last year, nearly 50% of boats were out of state
- 74% of tournament anglers pre-fish tournaments
- 22% of anglers in our survey disposed of bait in the water; 27% disposed on land



# Implications

- Arrivals: None of high-scoring water bodies have known populations of EDRR plant species
- Departures:
  - 16 trips from Lake Erie (Monroe): flowering rush (also Asian clam)
  - 24 trips from Lake St. Clair (St. Clair Shores): starry stonewort
  - Many have Eurasian watermilfoil & curly leaf pondweed

# What now?

- Share our results with the DNR, DEQ, and other groups involved in EDRR efforts
- Work with interested stakeholders from high-scoring lakes, e.g.:
  - Cooperative Lakes Monitoring Program
  - Individual lake associations

# Acknowledgments

- GLRI Environmental Protection Agency grant GL00E01152-0
- NOAA Weather Service
- Outdoorama, Novi Boating Expo, and Detroit Boat Show
- Michigan DNR and DEQ and our advisory board
- Jake Dombroski and Cody Narlock
- Secretary of State
- Michigan and Ohio Sea Grant
- Heather Siersma and F. Gianluca Sperone



European frog-bit



Flowering rush



Water lettuce



Parrot feather



Brazilian elodea



Water hyacinth



Starry stonewort



Hydrilla



# Contacts

## Questions about the project?

Please contact the project PI, Dr. Donna Kashian, at:  
[donna.kashian@wayne.edu](mailto:donna.kashian@wayne.edu) or 313-577-8052

For additional information on state agency work on EDRR:

– Department of Natural Resources (DNR)

[http://www.michigan.gov/dnr/0,4570,7-153-10370\\_59996\\_60406-291333--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10370_59996_60406-291333--,00.html)

– Department of Environmental Quality (DEQ)

[http://www.michigan.gov/deq/0,4561,7-135-3313\\_8314-317689--,00.html](http://www.michigan.gov/deq/0,4561,7-135-3313_8314-317689--,00.html)