

Aquatic Invasive Species- Tools for Prevention & Surveillance



NOTRE DAME **ENVIRONMENTAL CHANGE INITIATIVE**

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NOTRE DAME

ENVIRONMENTAL CHANGE INITIATIVE

Personnel



David Lodge, Director

+

57 faculty

+

staff for
grant-writing
& outreach

+

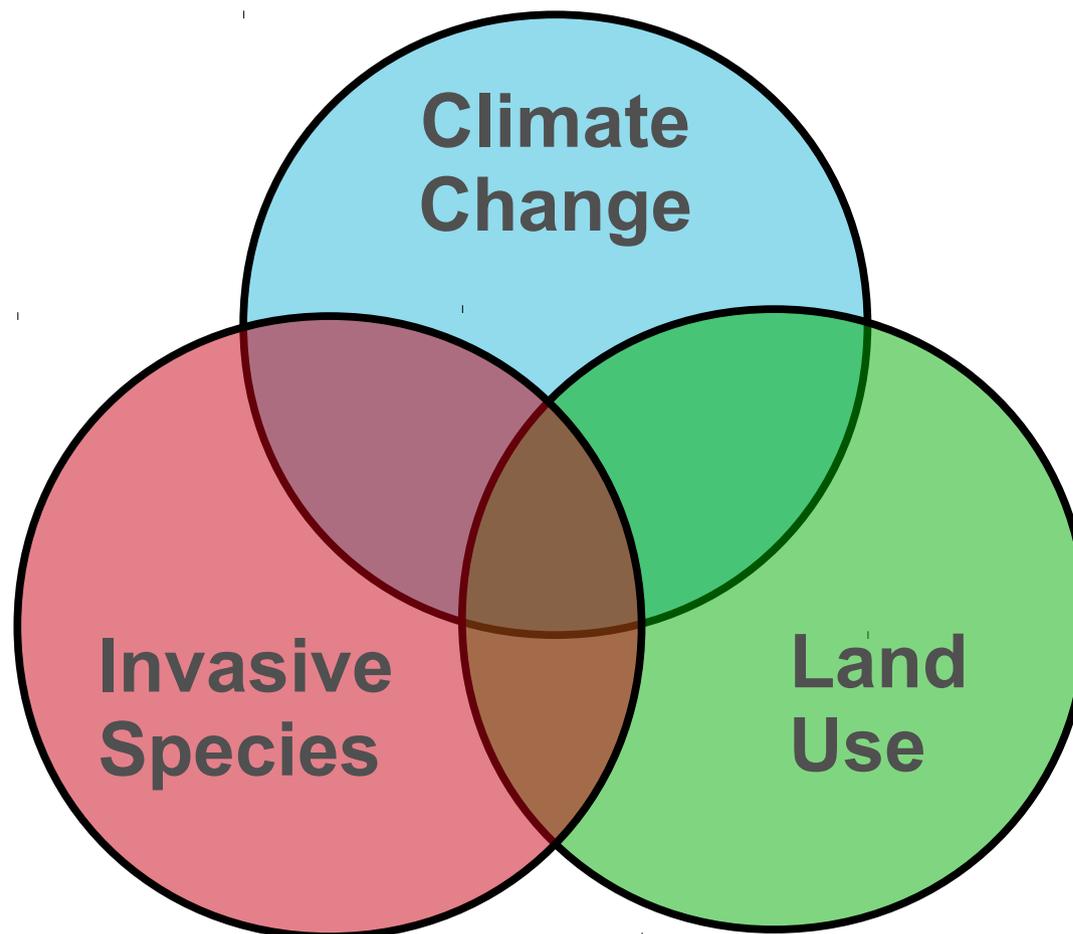
postdocs

+

students

Strategic Research Investment

Mission: “Science Serving Society”



Aquatic Invasive Species

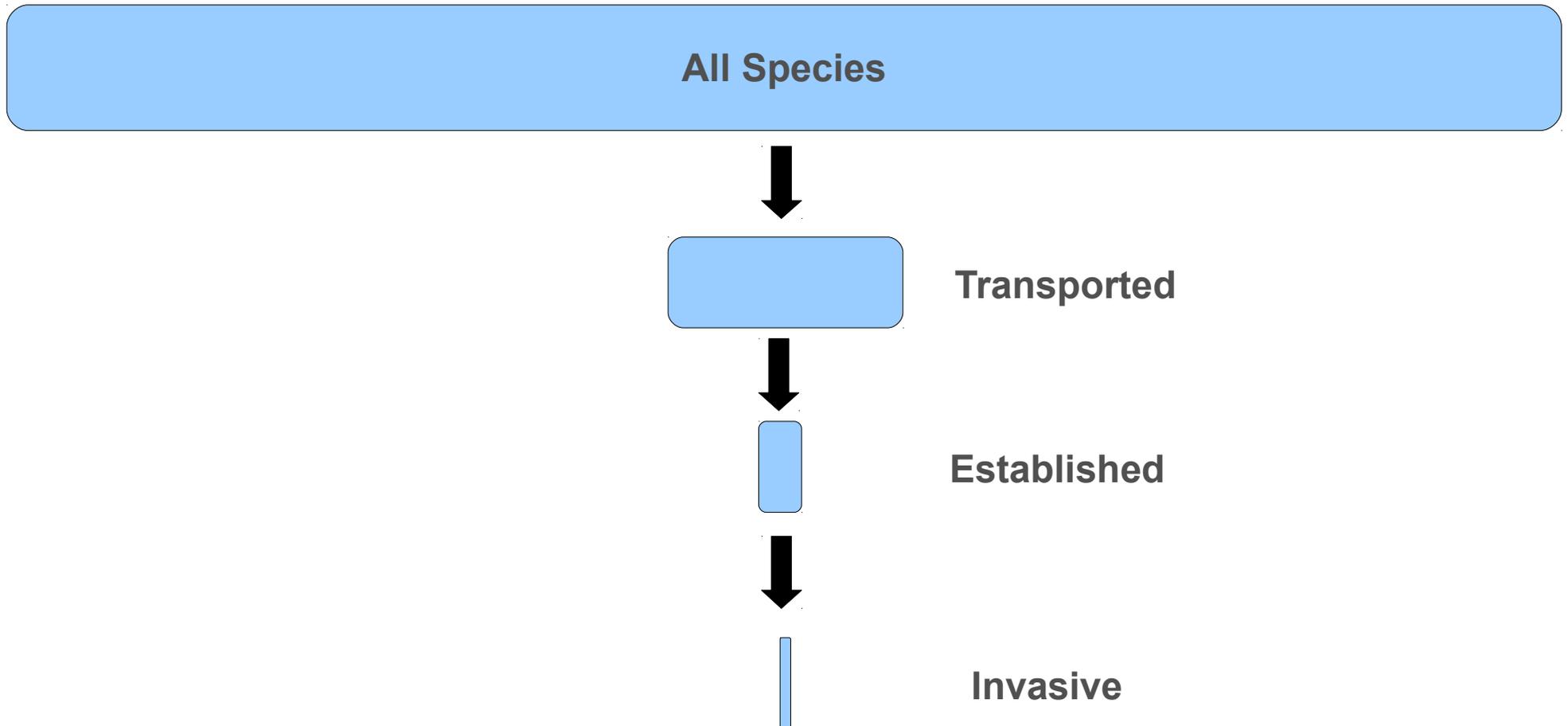
Harmful species introduced by humans



- Prevention & Early Detection are key

Prevention Challenge: Identify risky species *beforehand*

Invasion Stages



Risk assessments are worth it

Zebra mussel

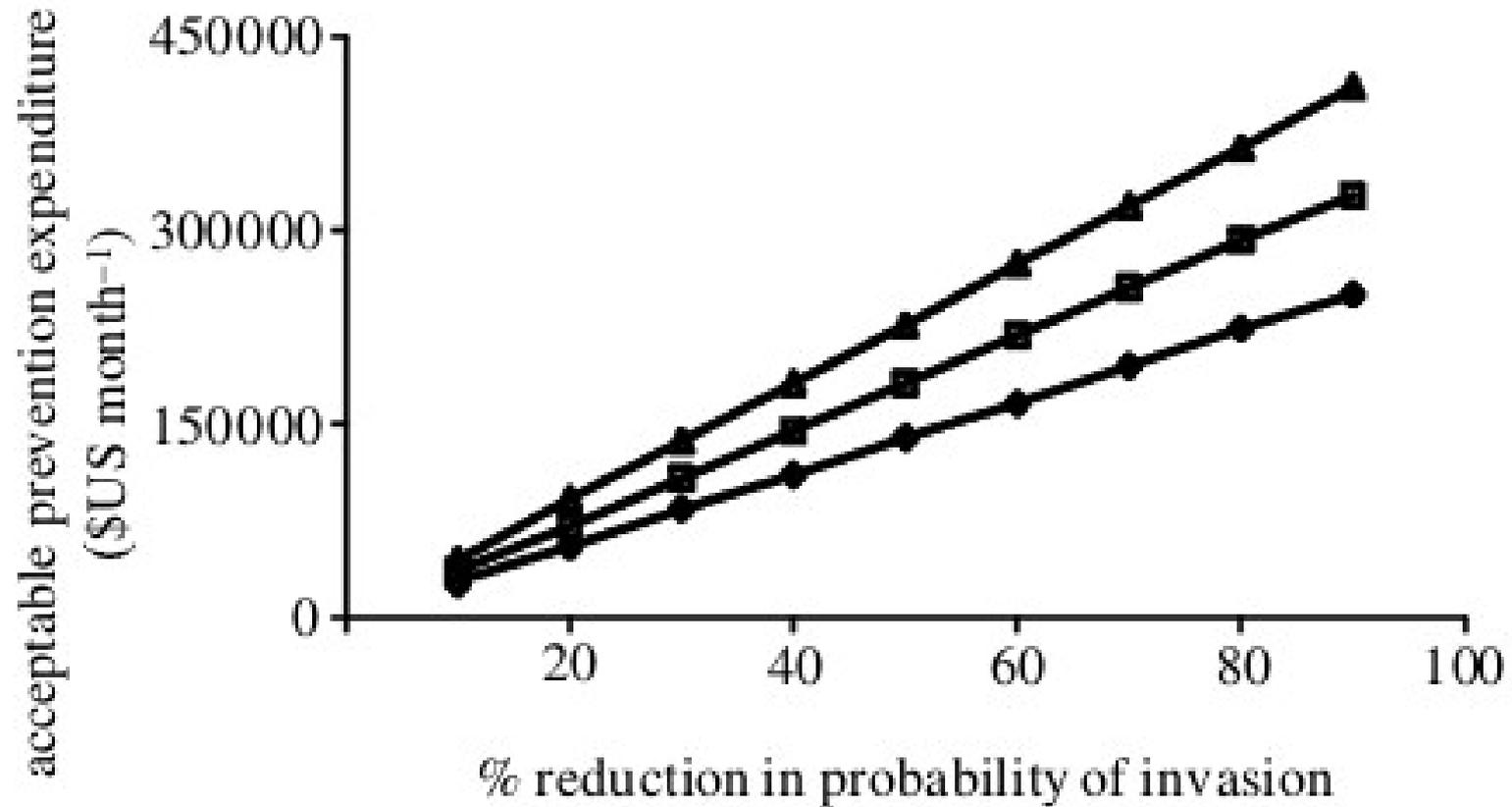


Invasion probability

20% ▲

10% ■

0.7% ◆



Leung, Lodge *et al* 2002 *Proc. Royal Society B*

Establishment/Invasion Stage

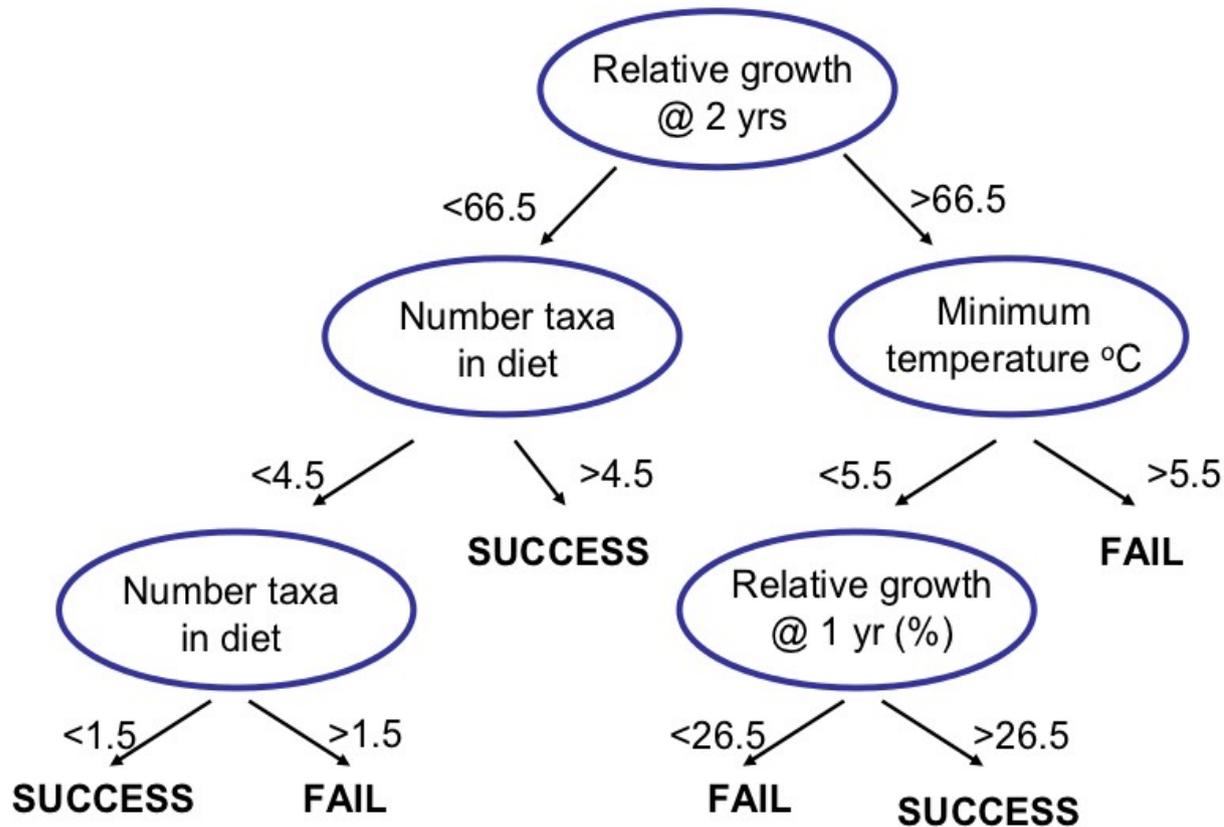
Risk Assessments

- Look at successful invasive species
- Identify traits associated with invasions
- Screen potential invaders for risk

Fish Risk Assessment

- “Classification tree” identifies nuisance fish with 94% accuracy

Statistical model built from known invasions



Screen for Risky Fish



Black sea sprat



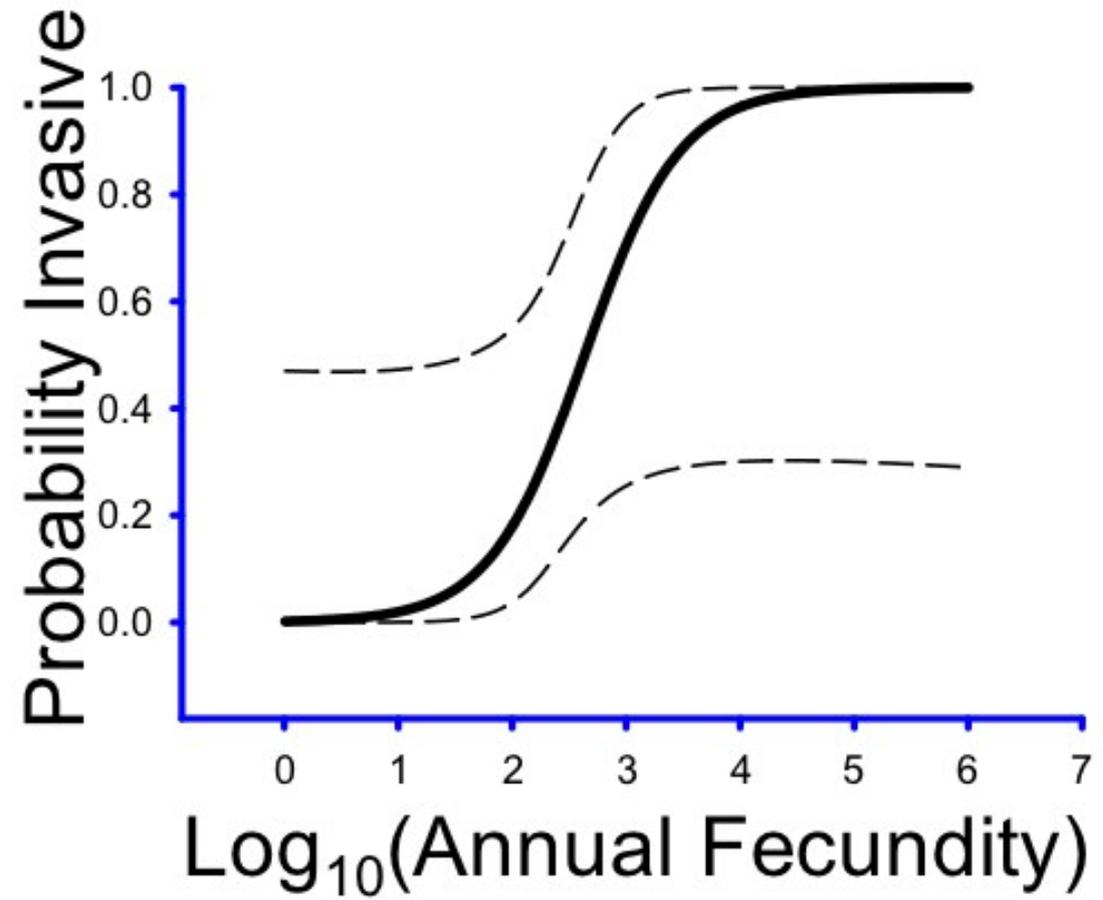
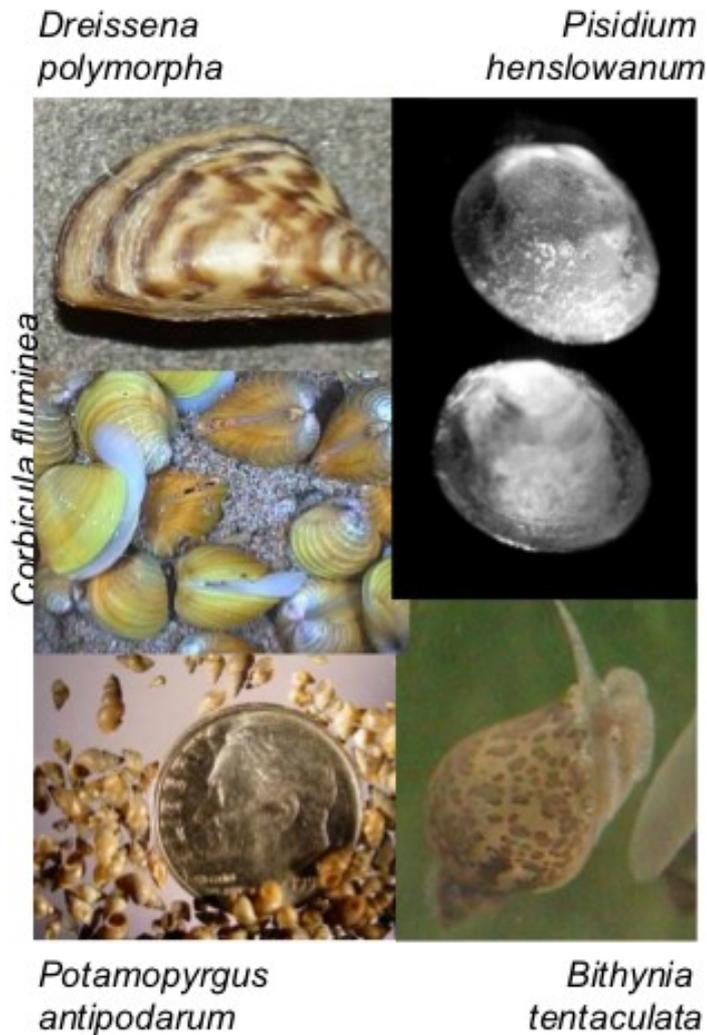
Eurasian minnow



Monkey Goby

Mollusk Risk Assessment

- Fecundity explains invasion success well



Aquatic Plant Risk Assessment

- Modified New Zealand Aquatic Weed Risk Assessment
- Tested in the US
- 38 questions
- 91% accurate!



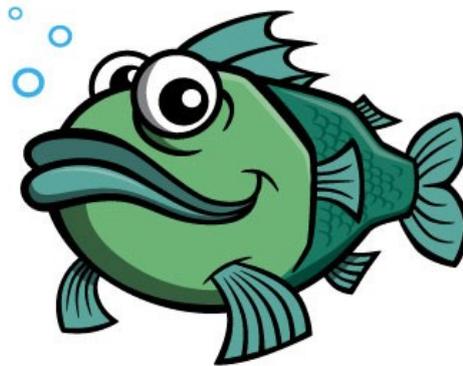
Coming soon...

- Fish 2.0
- Crayfish
- Reptiles & Amphibians



Surveillance Challenge

- Early detection is key.. but also difficult and costly
- Environmental DNA is a solution.



} DNA pieces

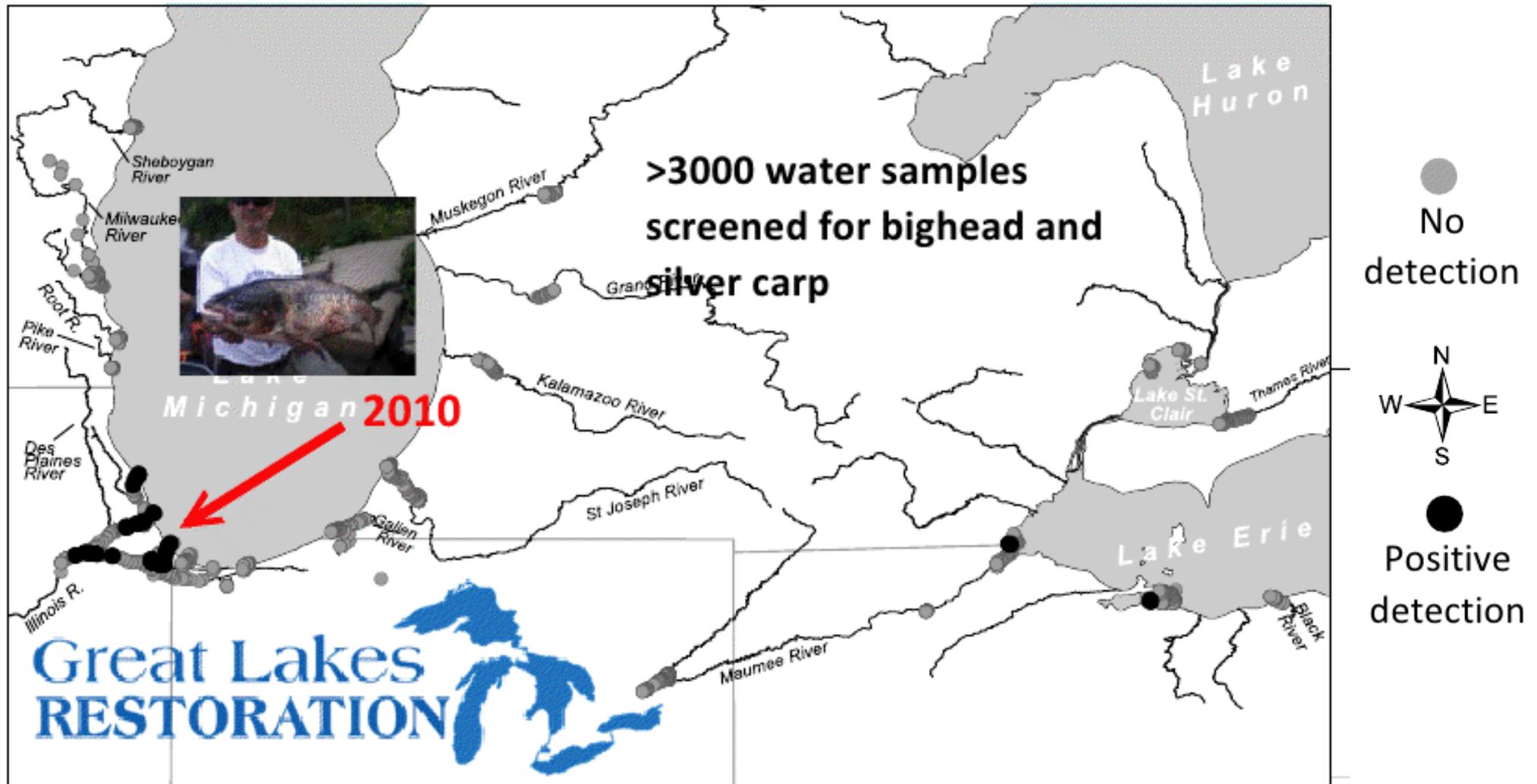
eDNA Technology

- Traditional eDNA method



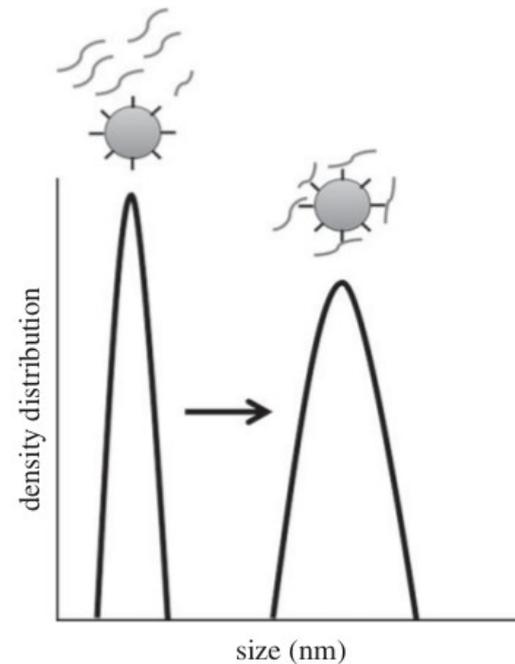
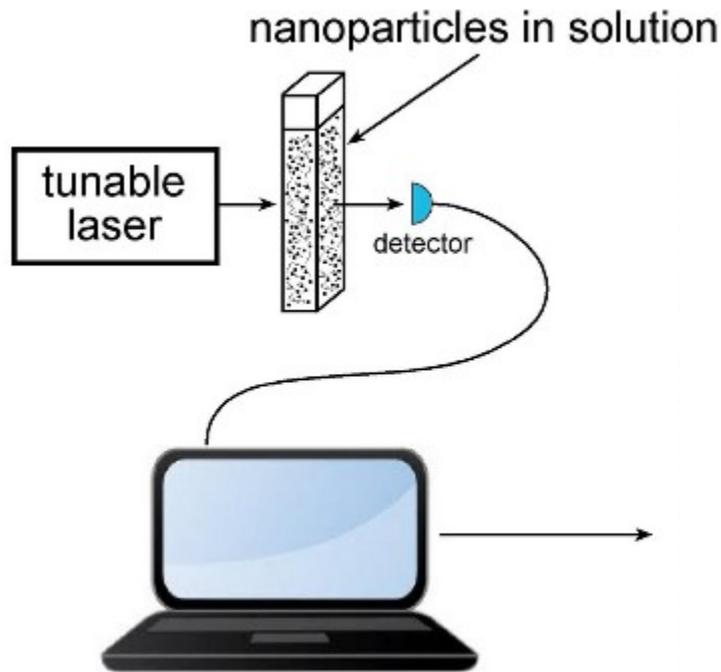
- Is species present? – YES/NO
- Asian carp, Golden mussel, *Hydrilla* and others

eDNA Asian Carp Results



Cutting-edge eDNA Technology

- Laser Spectroscopy Transmission



- Benefits:
 - Faster, easier
 - Reduce/skip PCR step
 - Potentially quantitative

Funding

- Great Lakes Restoration Initiative
- Army Corps of Engineers
- NOAA Center for Sponsored Coastal Ocean Research
- Department of Defense SERDP



Center for
Sponsored Coastal
Ocean Research



Outreach

- Lindsay Chadderton, The Nature Conservancy
- Pat Charlebois, Illinois-Indiana Sea Grant
- LightSprite, LLC