

Genetic analysis of the rapid expansion of Banded Killifish (*Fundulus diaphanus*) in Illinois.



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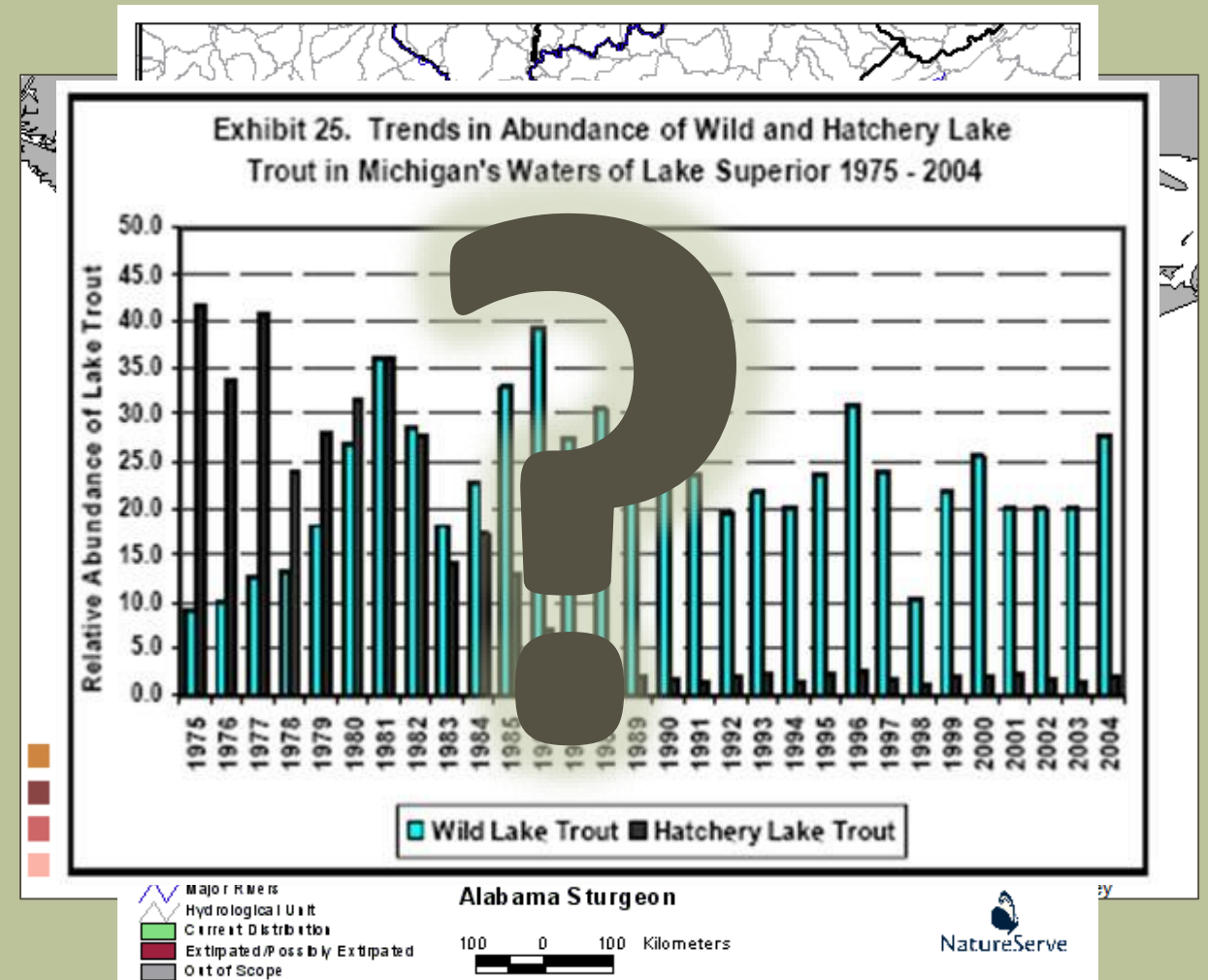
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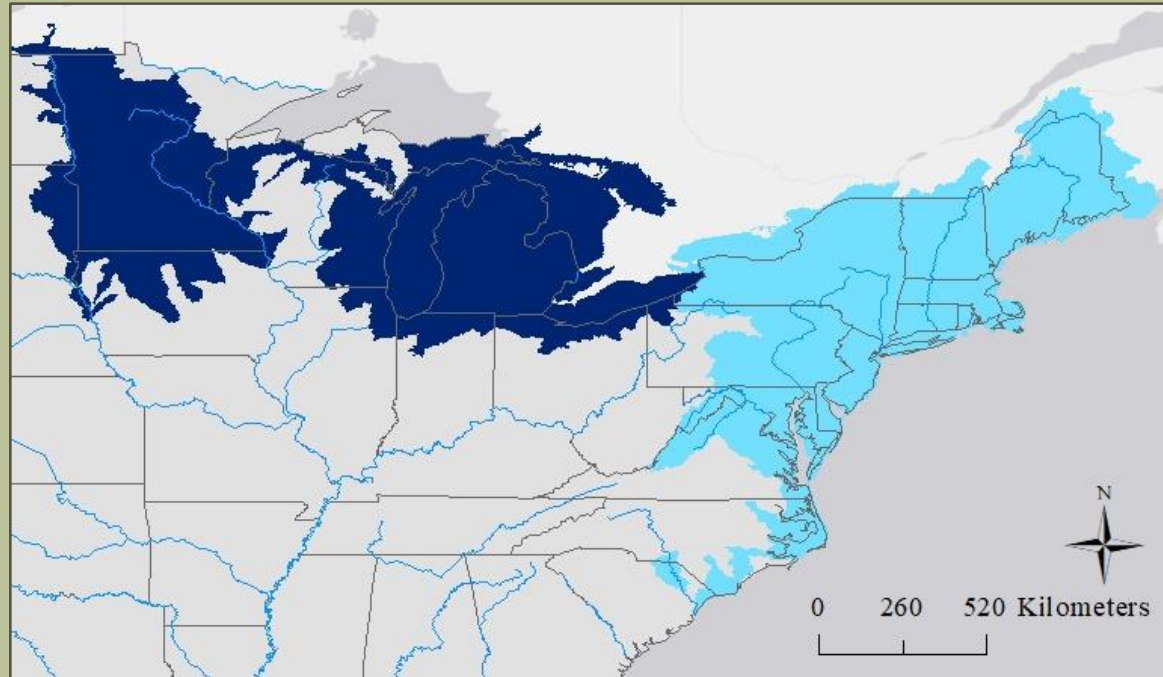


Species Range Changes

- Increasing range of invasive species
- Decreasing range of sensitive species
- Increasing range of sensitive species



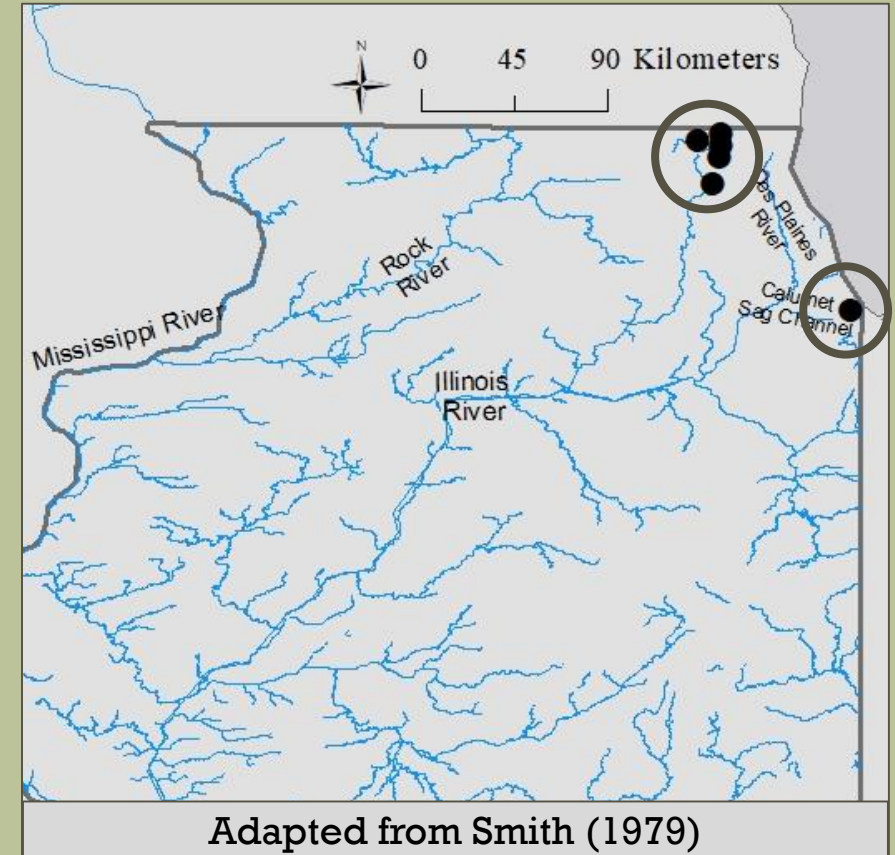
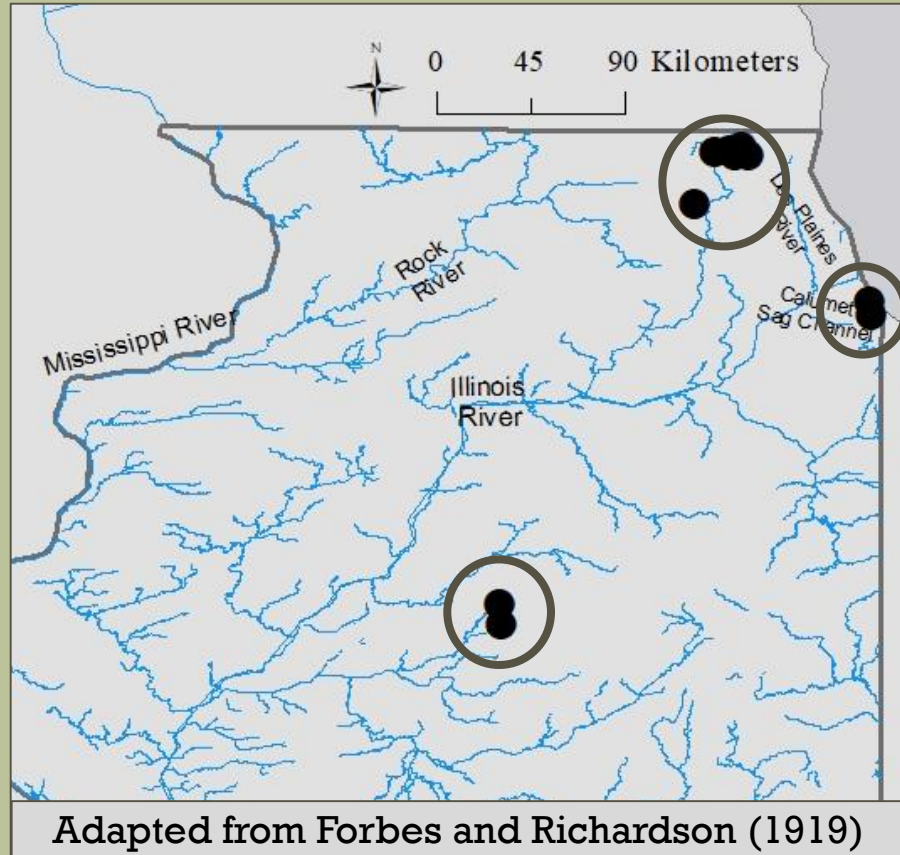
Banded Killifish (*Fundulus diaphanus*)



- Inhabit vegetated glacial lakes and slow moving streams

- Subspecies –
 - Western (*F. diaphanus menona*)
 - Eastern (*F. diaphanus diaphanus*)

Banded Killifish declines...

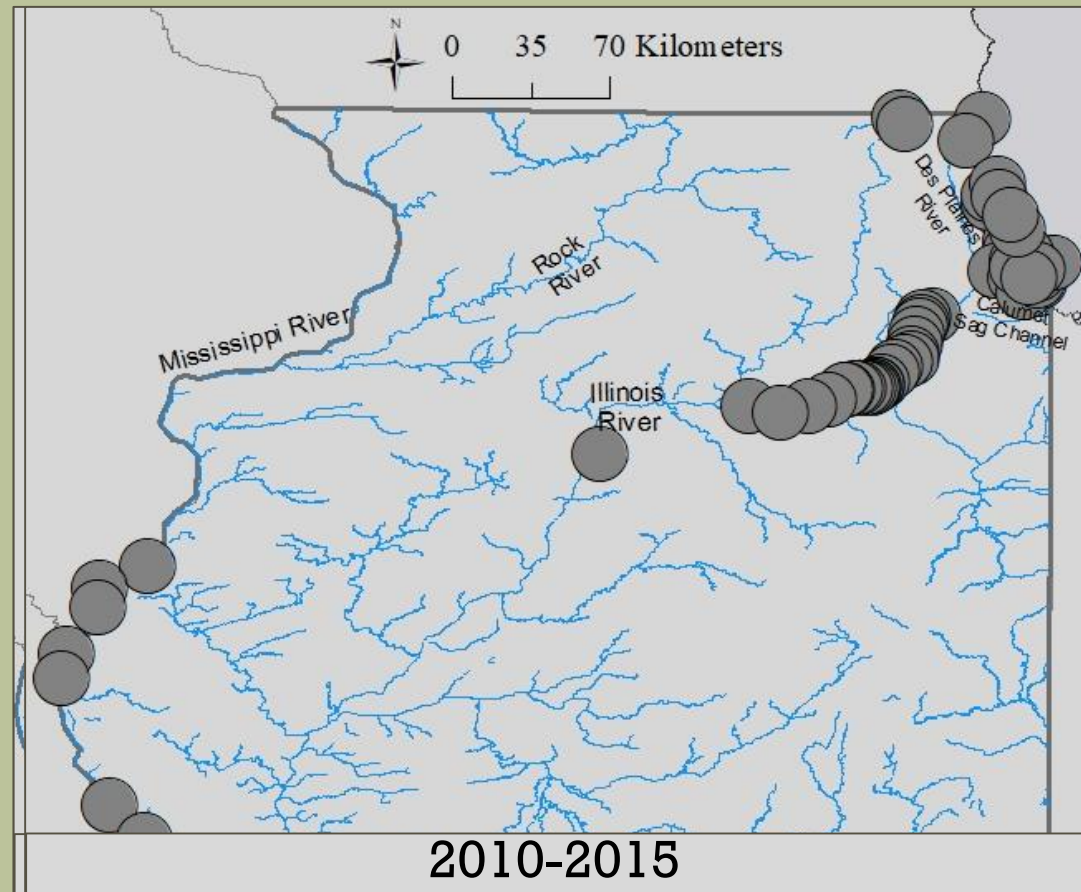


- Illinois state-threatened in 1989

- Reduction in aquatic vegetation*
 - Urbanization
 - Pollution
 - Channelization
 - Siltation

*Smith (1979)

... and recovery?

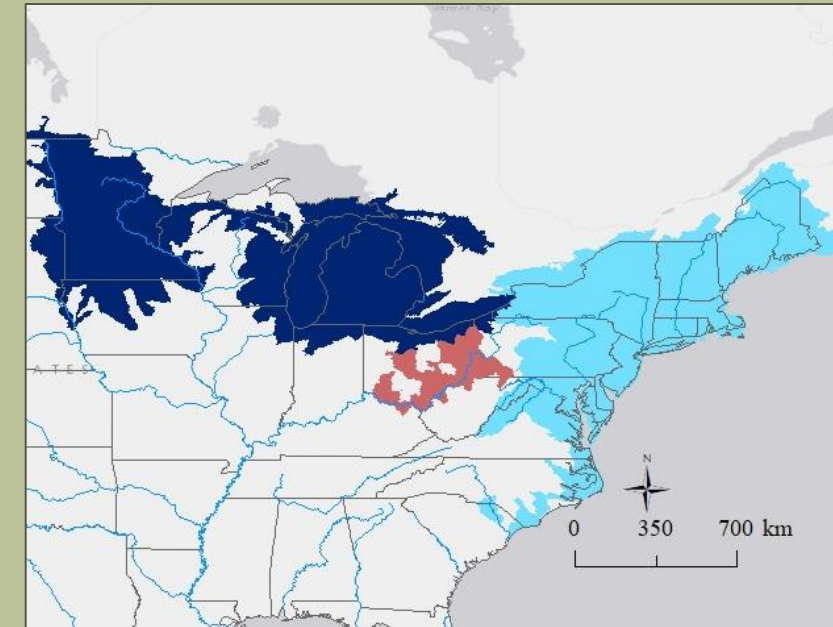


Project Goals

- Assess reasons for distributional changes
- Determine which subspecies are where
- Better understand ecological and functional differences between the subspecies and their hybrids

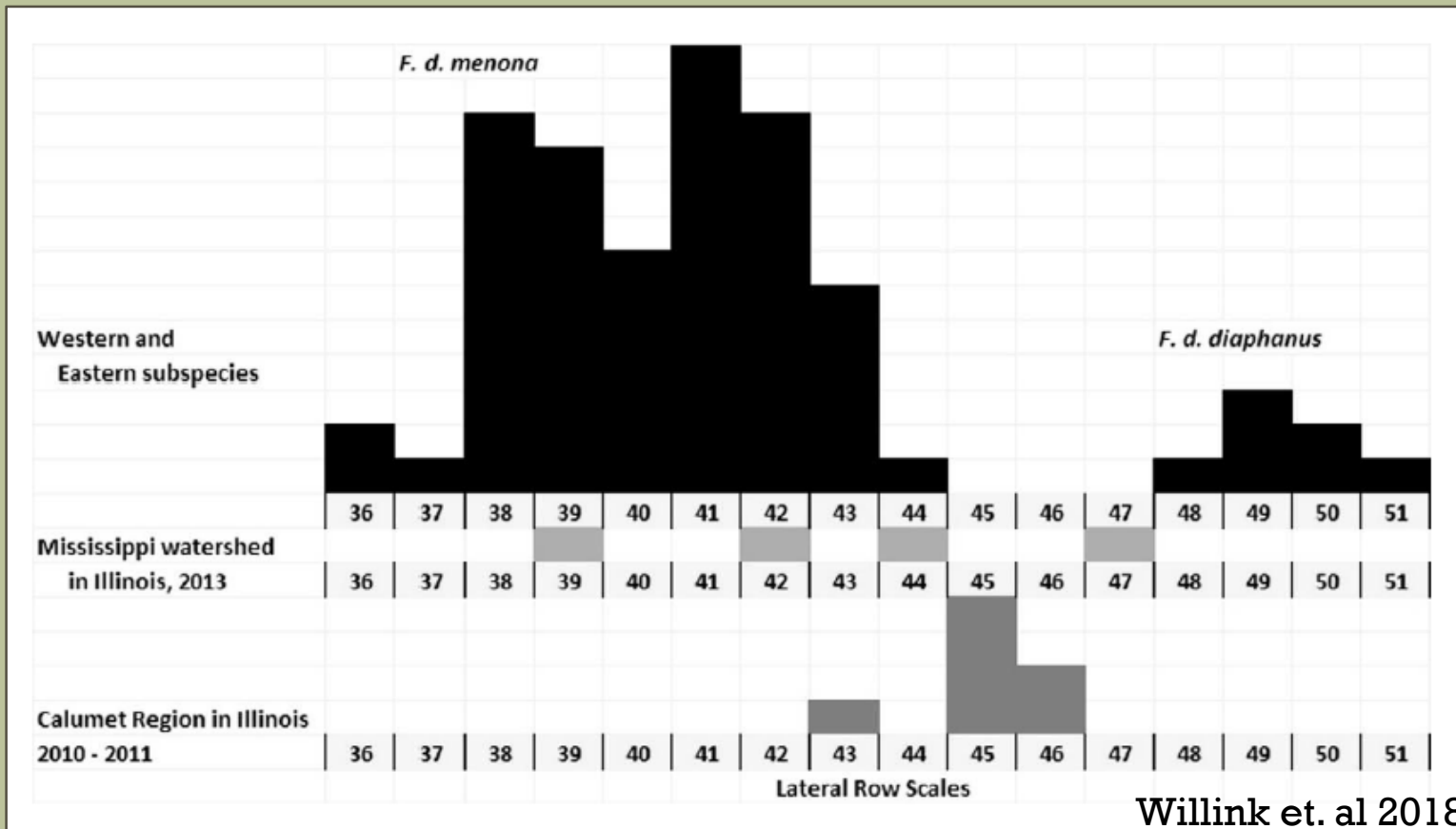
Project Goals

- Assess reasons for distributional changes*
 - Improved water quality
 - Asian carp sampling
 - Invasive (sub)species



*Willink et. al 2018

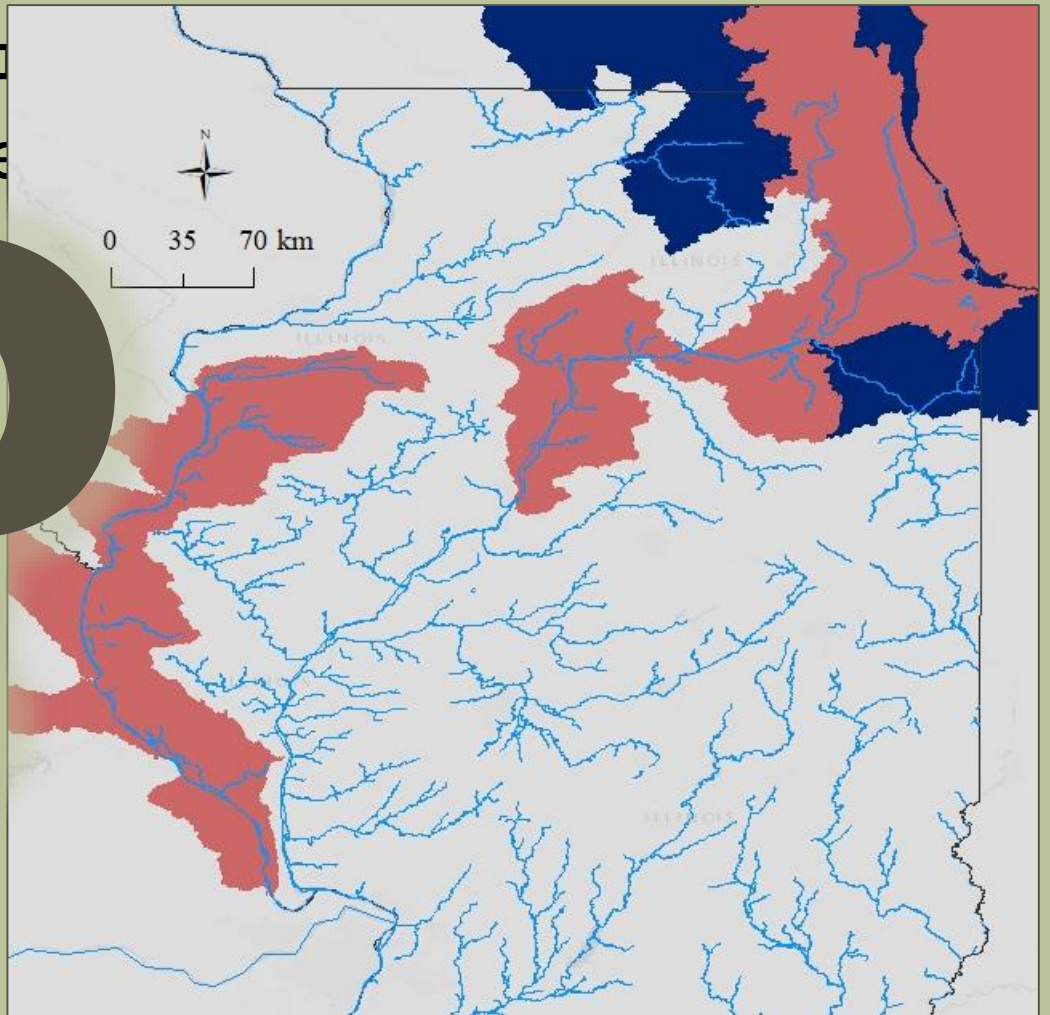
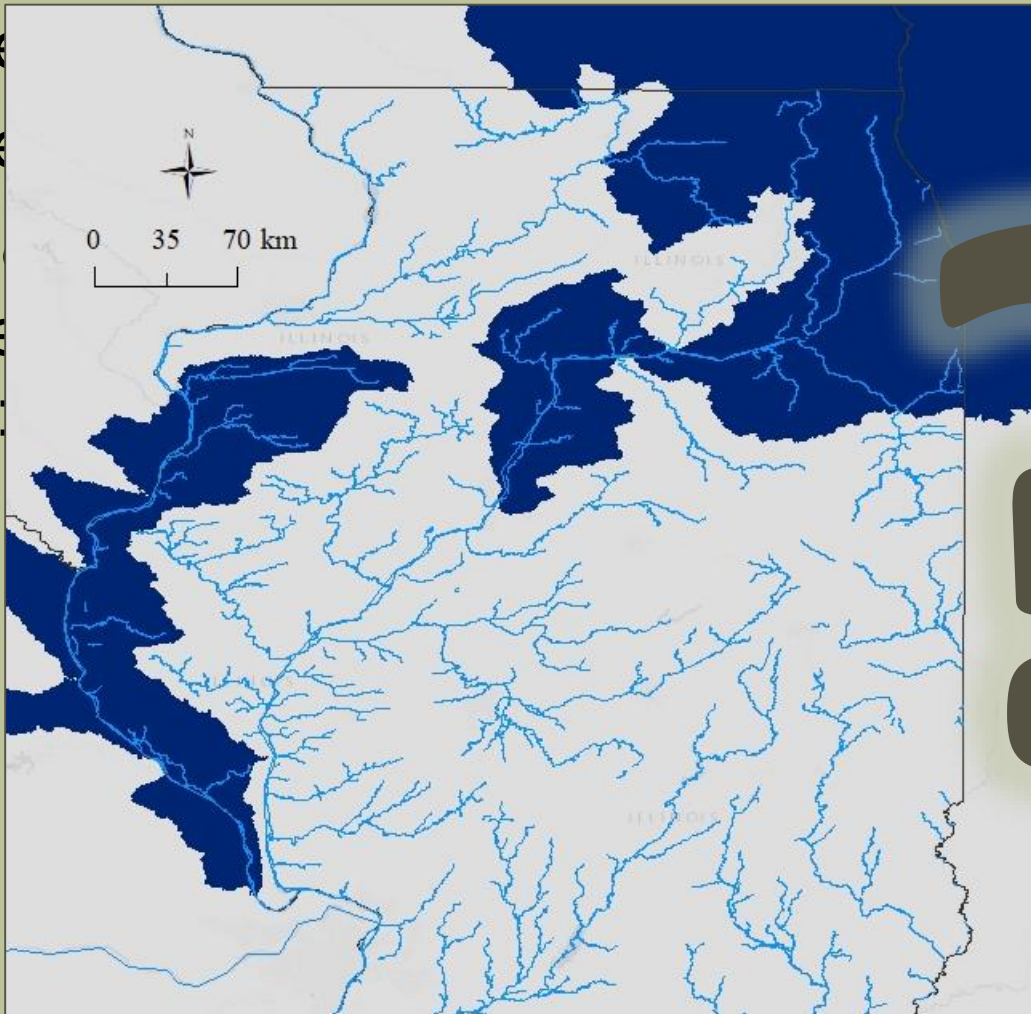
Invasive (sub)species



Project Goals

- Assess
- Determine
- Better understand their

What
where
es



Methods

- **Sample collection**

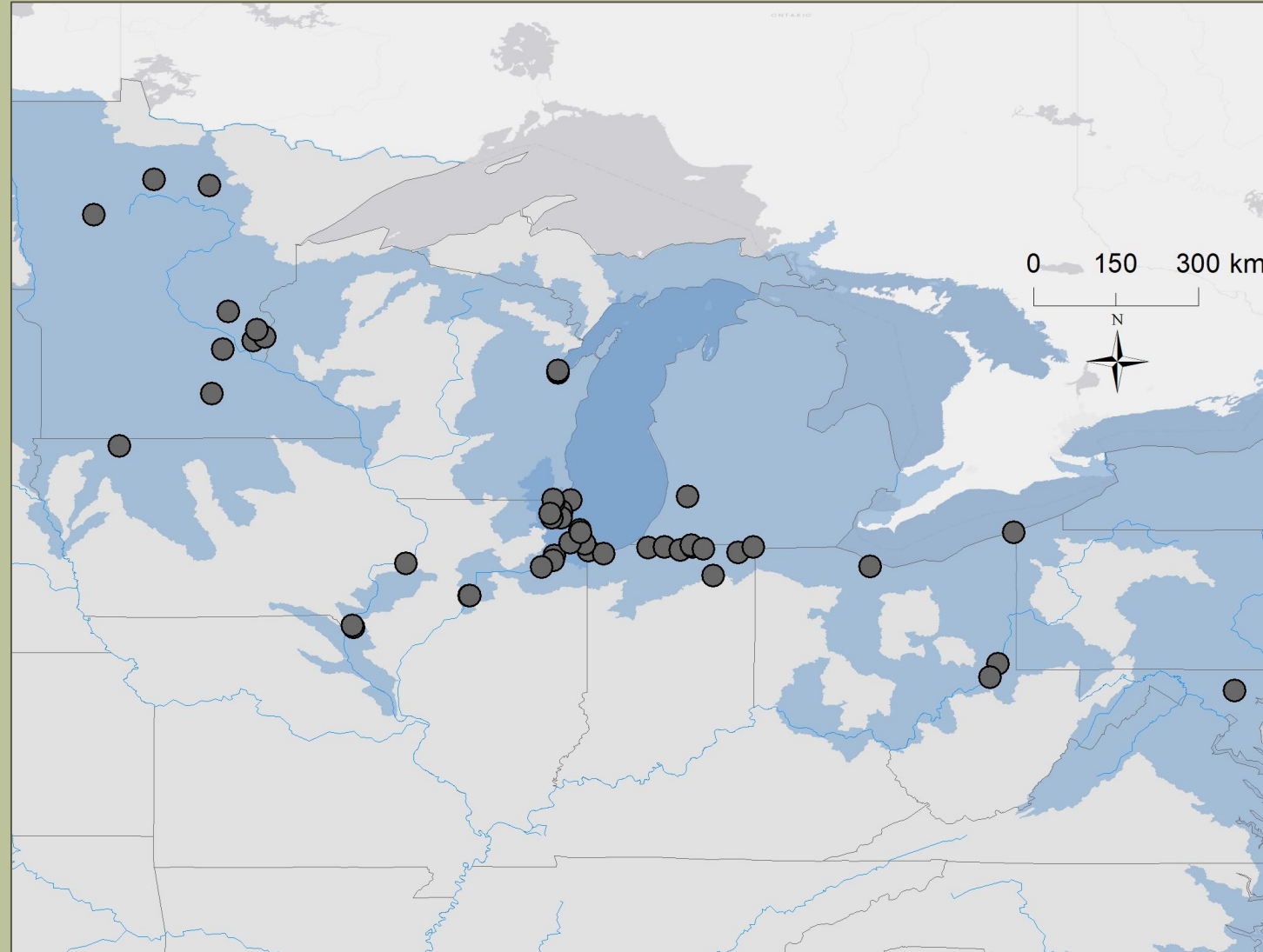
- Maryland
- Indiana
- Michigan
- Wisconsin
- Ohio
- Iowa
- Illinois

- **Taxonomic analysis**

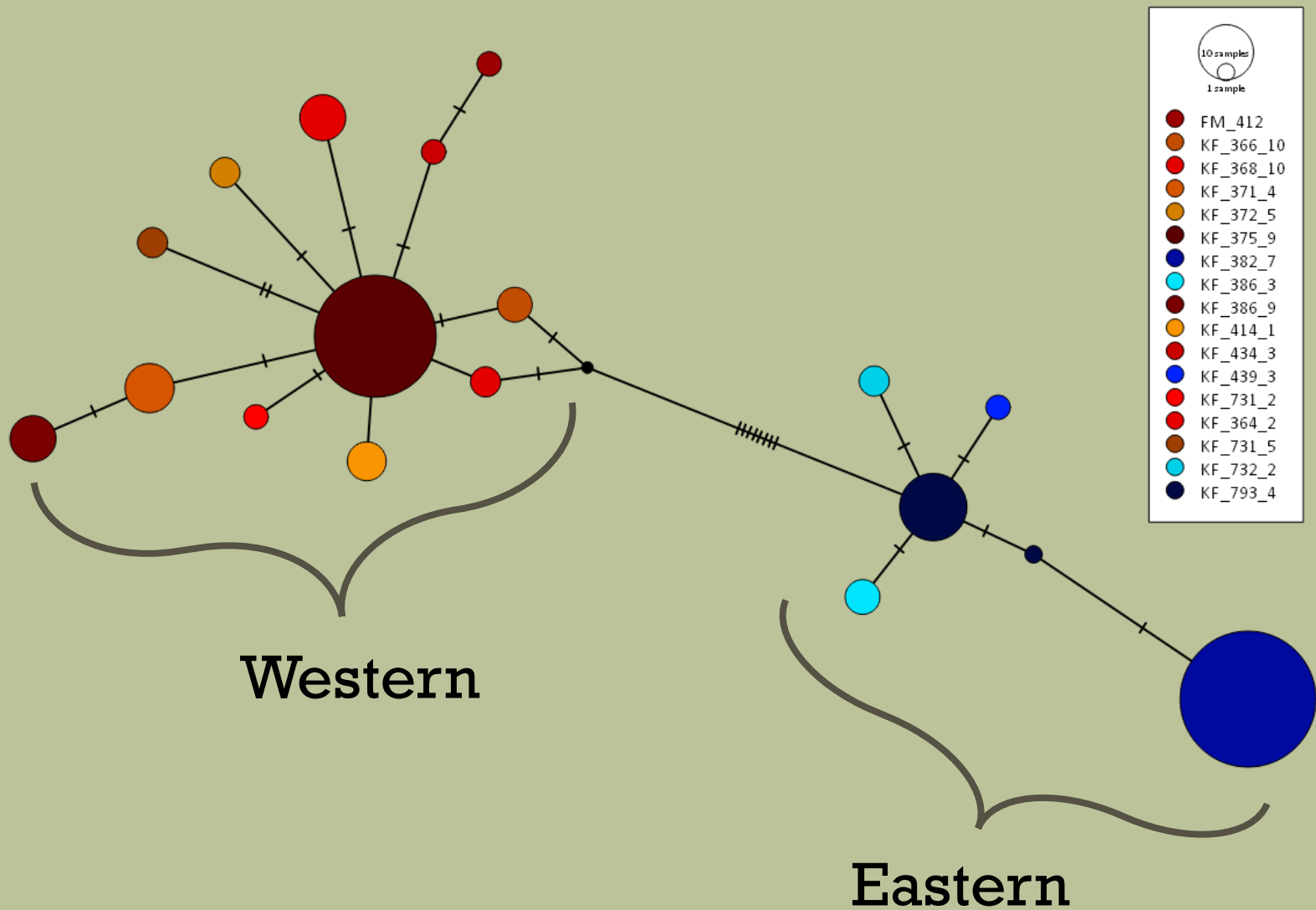
- Target loci:
 - Mitochondrial D-loop
- Haplotype networks
 - Referred to individuals representing known western (from Minnesota) and eastern (from Maryland) subspecies

Results

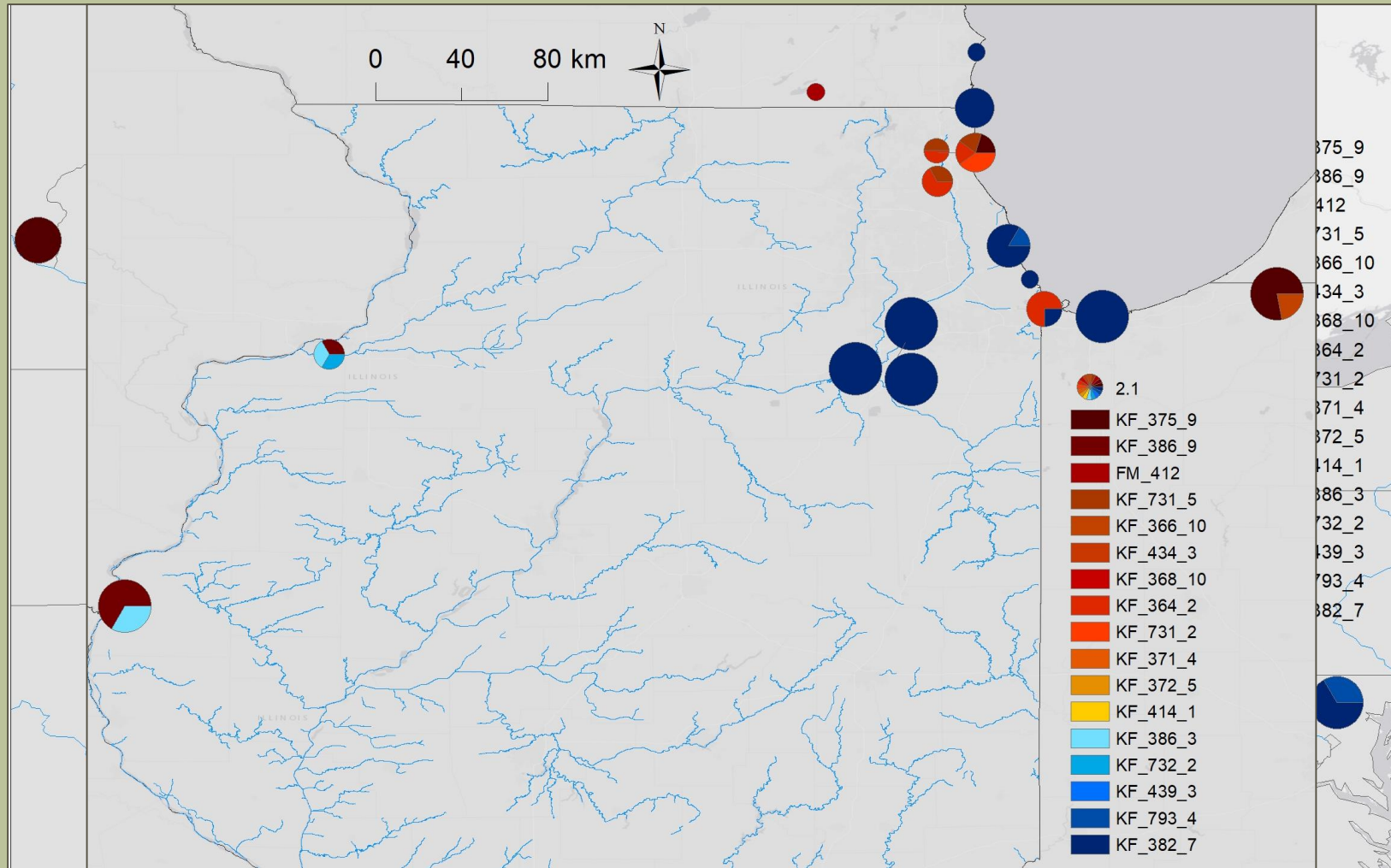
- 54 sites
- 190 banded killifish
 - 100 western banded killifish
 - 90 eastern banded killifish



Results – mtDNA D-Loop



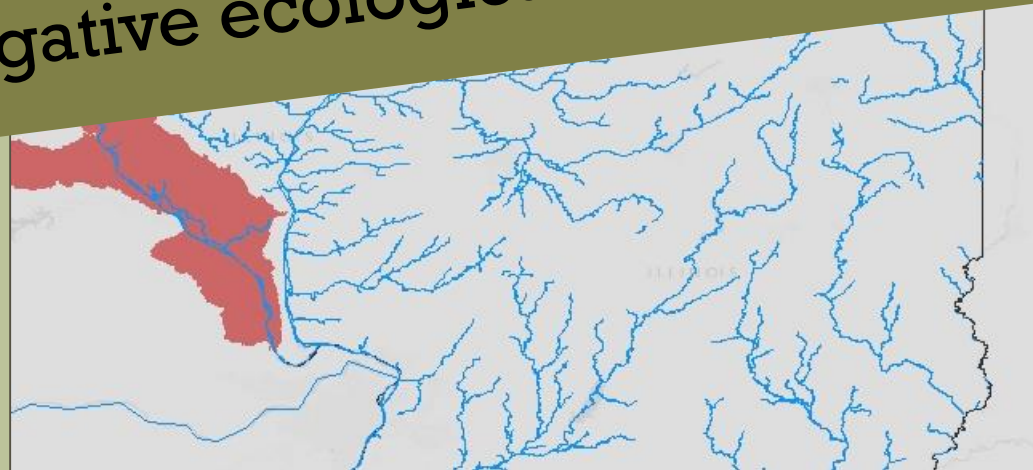
Results - mtDNA D-Loop



Implications



Native invasive species: A species – or subspecies – that becomes increasingly dominant in their native ranges and causes negative ecological and economic impacts



Moving forward

- Taxonomic assignments
 - mtDNA analysis
 - Meristic counts*
 - Nuclear markers
- Ecological and functional roles
 - Habitat preferences
 - Stable isotope analysis



Western: Scales ≤ 44



Eastern: Scales ≥ 48

*Hubbs & Lagler (1947)

Questions?



Acknowledgments

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