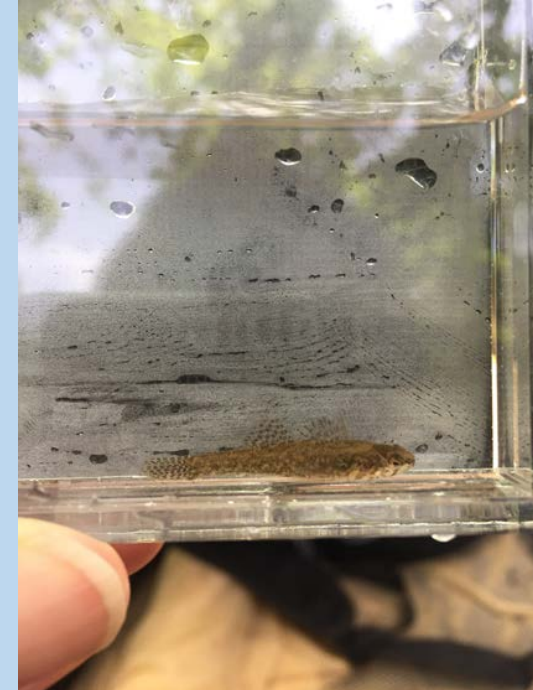


Estimating detection probability using multiple gears for Least Darter and sympatric darter species

Dusty Swedberg¹, Robert Mollenhauer¹ and Shannon Brewer²

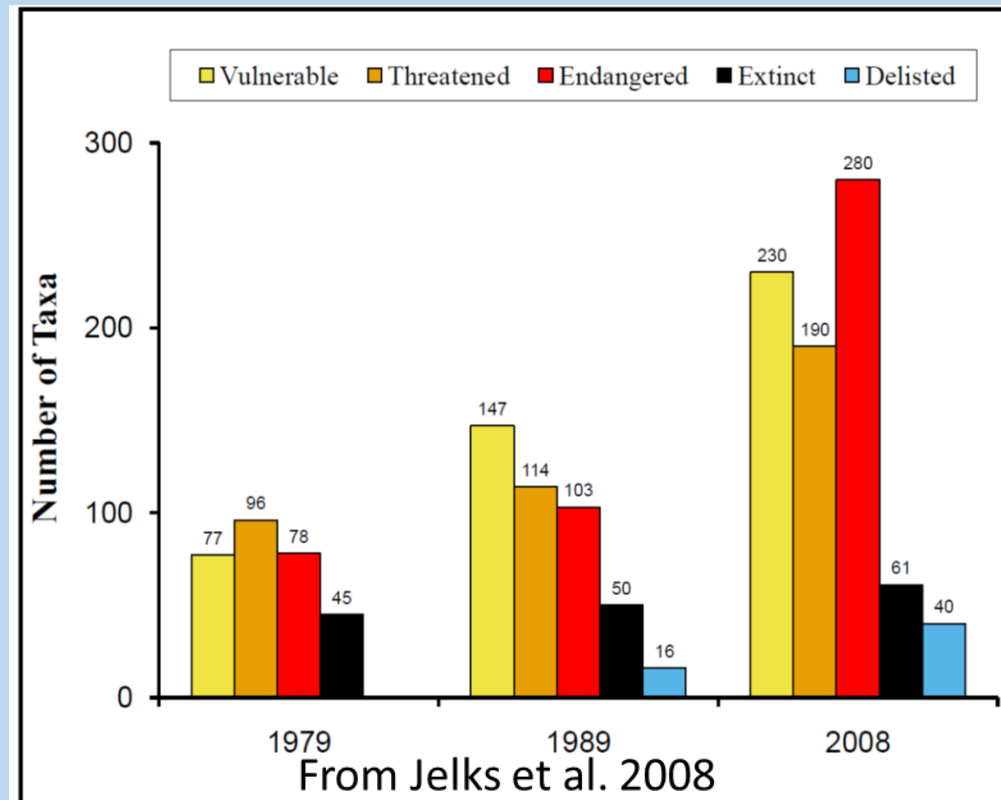
¹Oklahoma State University, Oklahoma Cooperative Fish and Wildlife Research Unit

²U.S. Geological Survey, Oklahoma Cooperative Fish and Wildlife Research Unit



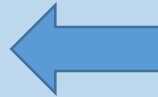
Freshwater Fish

- 700 species vulnerable, threatened, or endangered
- 44% of the Percidae Family
- 28% of fish in Southern U.S.



Threats

- Over-exploitation
- Water pollution
- Habitat degradation
- Species invasions
- Flow modification

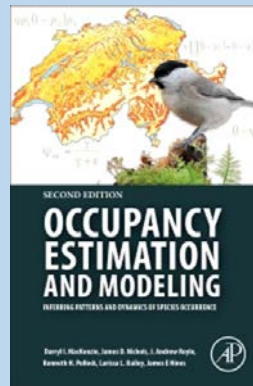


Detection Probability

- Establishing distributions and habitat associations fundamental to ecology
- The probability of observing a species when the species is occupying a site
- Presence-only and presence-absence approaches disregard imperfect and variable detection
- Detection-nondetection approaches, absence can be inferred



Rare

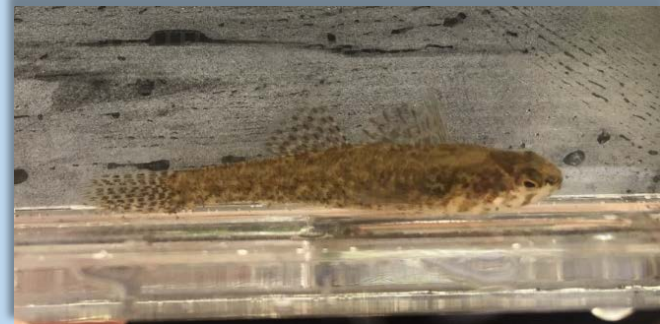
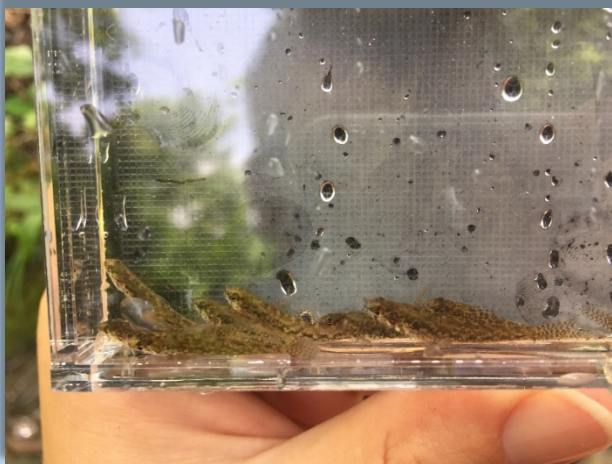


Locally Abundant

Least Darter

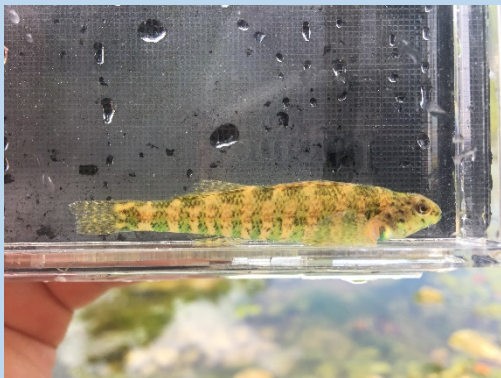
Etheostoma microperca

- Geographically isolated species
 - Ozark Highlands and Arbuckle Uplift
- Southernmost populations
- Species of Conservation Concern

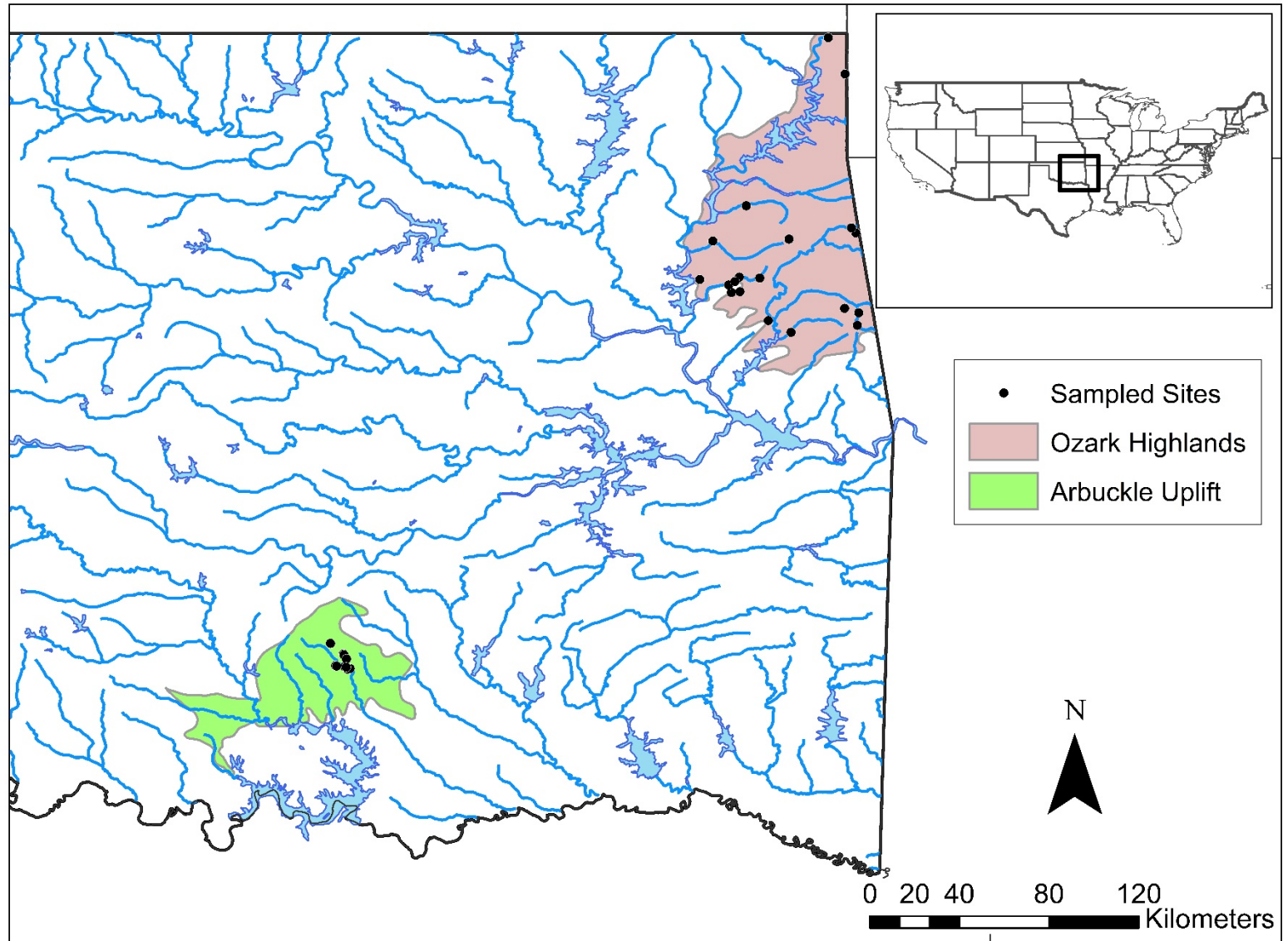


Objective

- Determine factors related to the detection of Least Darter and sympatric darter species (i.e. Orangethroat Darter, Fantail Darter, Sunburst Darter, Banded Darter, Greenside Darter, and Log Perch) in the Arbuckle Uplift and Ozark Mountain ecoregions of Oklahoma

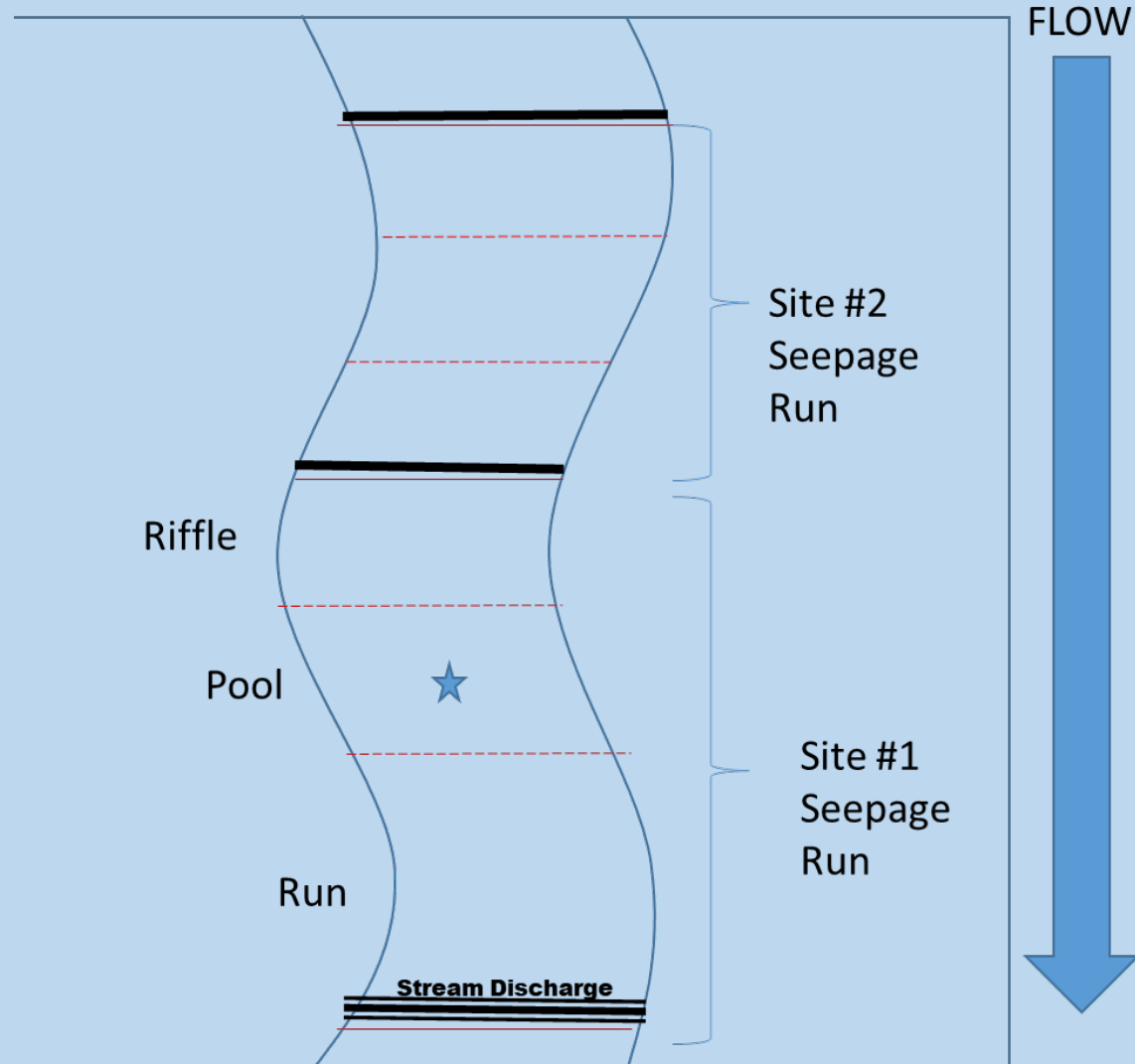


Study Area



Sampling Methods

- Riffle-Run-Pool Sequence (site) → Reach
- Snorkel Surveys
- Seining



Design

- **Study Season**
 - July through October
 - Baseflow conditions, spring influence important
- **Approach**
 - Four temporally replicated surveys (account for imperfect detection)
 - Two snorkel passes and two seines
 - Two snorkelers
 - Seining-snorkeling combination occurred on different days
 - Allows for changes in sampling conditions



Detection Covariates

- Gear type
- Water Velocity
- Coarse Structure
- Depth
- Coarse Substrate
- Proportion Vegetation
- Water Clarity



Sampled Sites

- Site = Riffle-Run-Pool Sequence
- 75 sites were sampled within 30 different reaches
 - Sites nested within in a stream reach
- Limited to wadeable streams



Analysis

- Occupancy estimation and modeling
- Package “unmarked”
- Occurrence fixed at 1

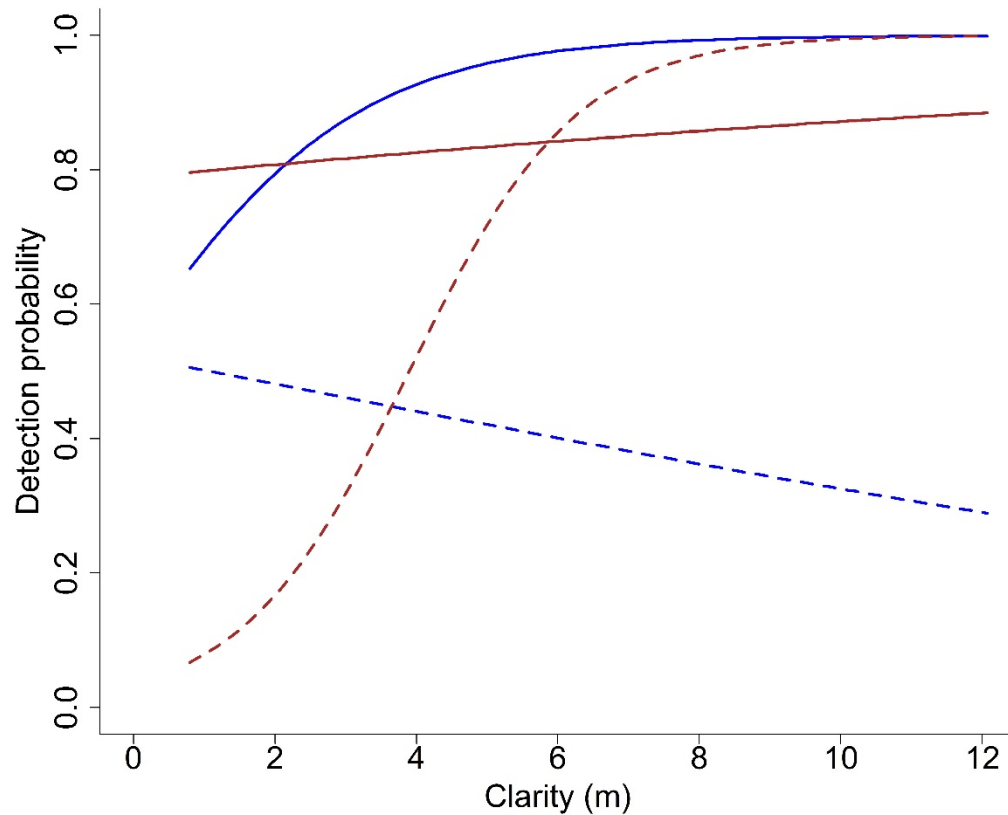


Overall Detection Probabilities

	Seine Detection Probability	Snorkel Detection Probability
Least Darter	0.70	0.83
Orangethroat Darter	0.60	0.98
Fantail Darter	0.42	0.85
Greenside Darter	0.10	0.83
Banded Darter	0.20	0.74
Sunburst Darter	0.03	0.69
Log Perch	0.14	0.79

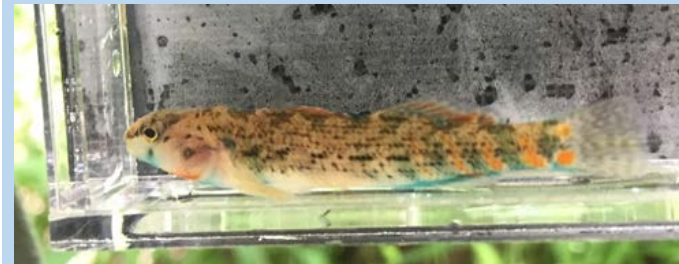
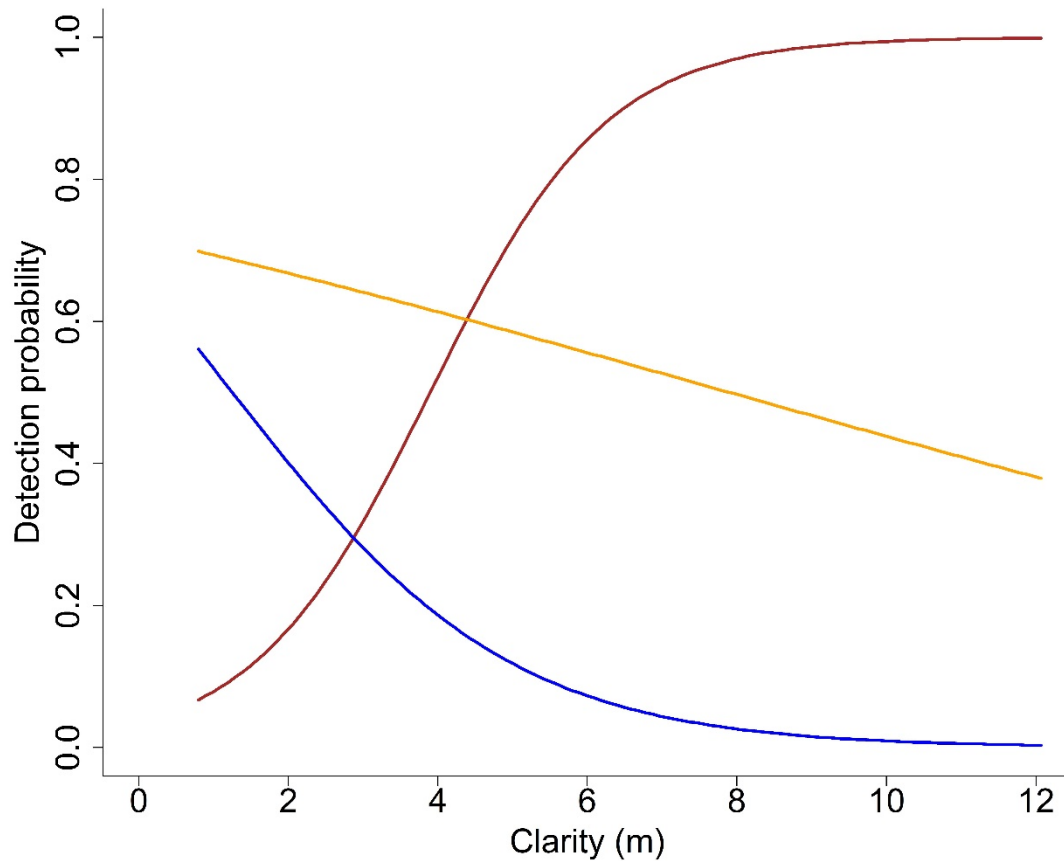
Clarity Detection Probability

Fantail Detection Probability with Clarity and Gear



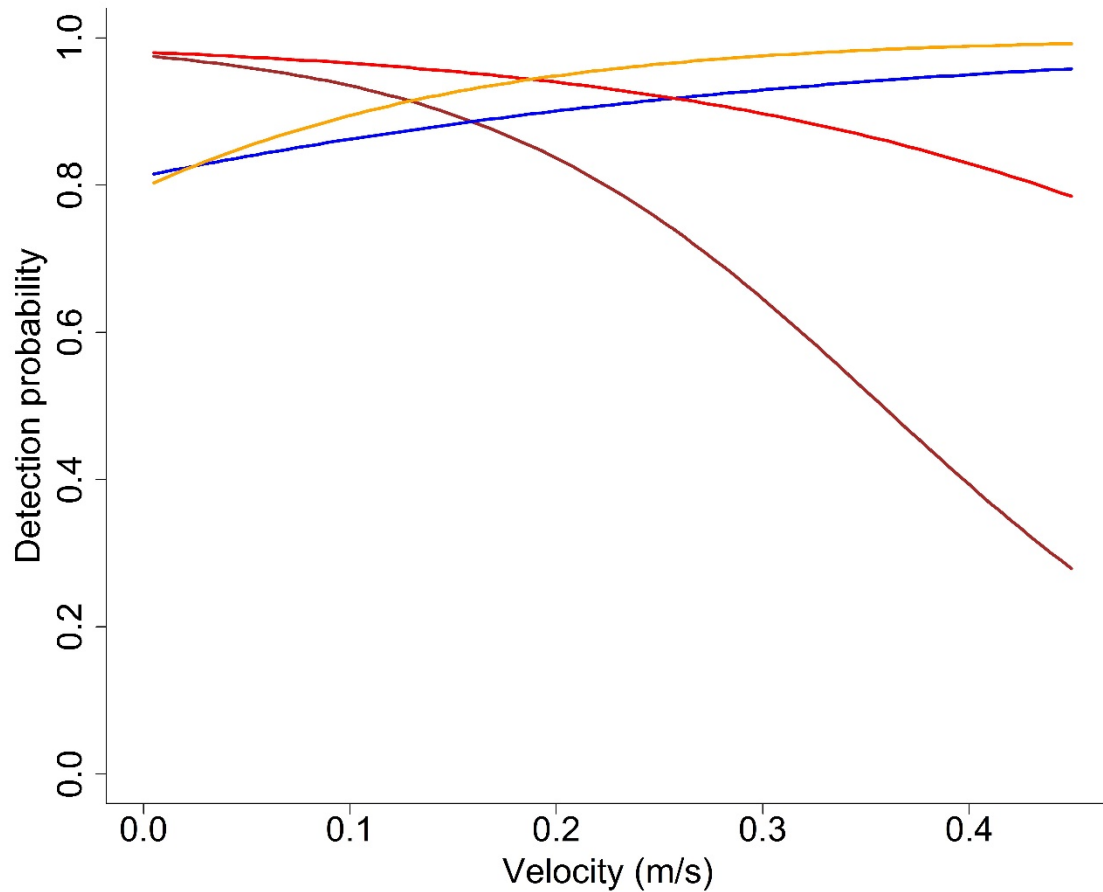
Clarity Detection Probability

Seine Detection Probability in Relation to Clarity



Velocity Detection Probability

Snorkel Detection Probability vs. Velocity



Conclusions

- Snorkeling had high overall detection probability
- Seining was most effective for Least Darter and Orangethroat Darter
- Clarity and water velocity, all affected detection probability with relation to species
- Moving forward we need to incorporate occupancy and see if the increase in detection probability might be related to occupancy covariates as well
- Least Darter detection probability was better than expected (70%)
- 4 surveys seems adequate to differentiate between true and false absences



Acknowledgements

- **Oklahoma Department of Wildlife Conservation**
- **State wildlife grant program**
- **Brewer Lab**
- **Landowners**
- **The Nature Conservancy**



Questions?

