

Status survey and conservation genetic assessment of the Paleback Darter



Etheostoma pallididorsum

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Aquatic biodiversity of the Ouachita Mountains



Ouachita Shiner ©FishBase



Peppered Shiner ©NANFA



Ouachita Madtom ©NANFA



Caddo Madtom



Paleback Darter

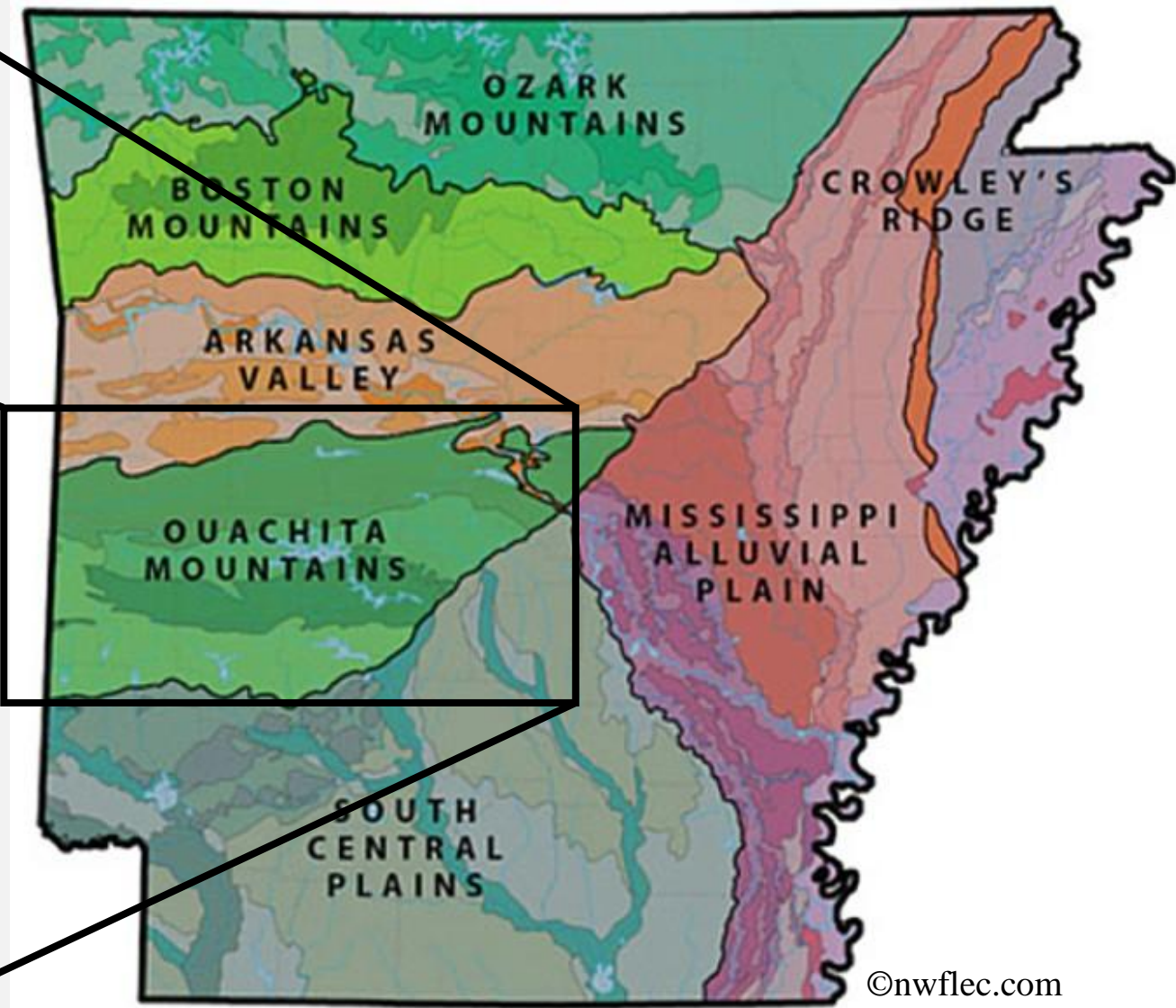


Orangebelly Darter



Ouachita Darter ©NANFA

*Not pictured: Leopard Darter



Paleback Darter (*Etheostoma pallididorsum*)

- Paleback Darter described in 1962
- Range expansion in 1972
- Prior allozyme-based studies evidence of low gene flow and small effective population sizes



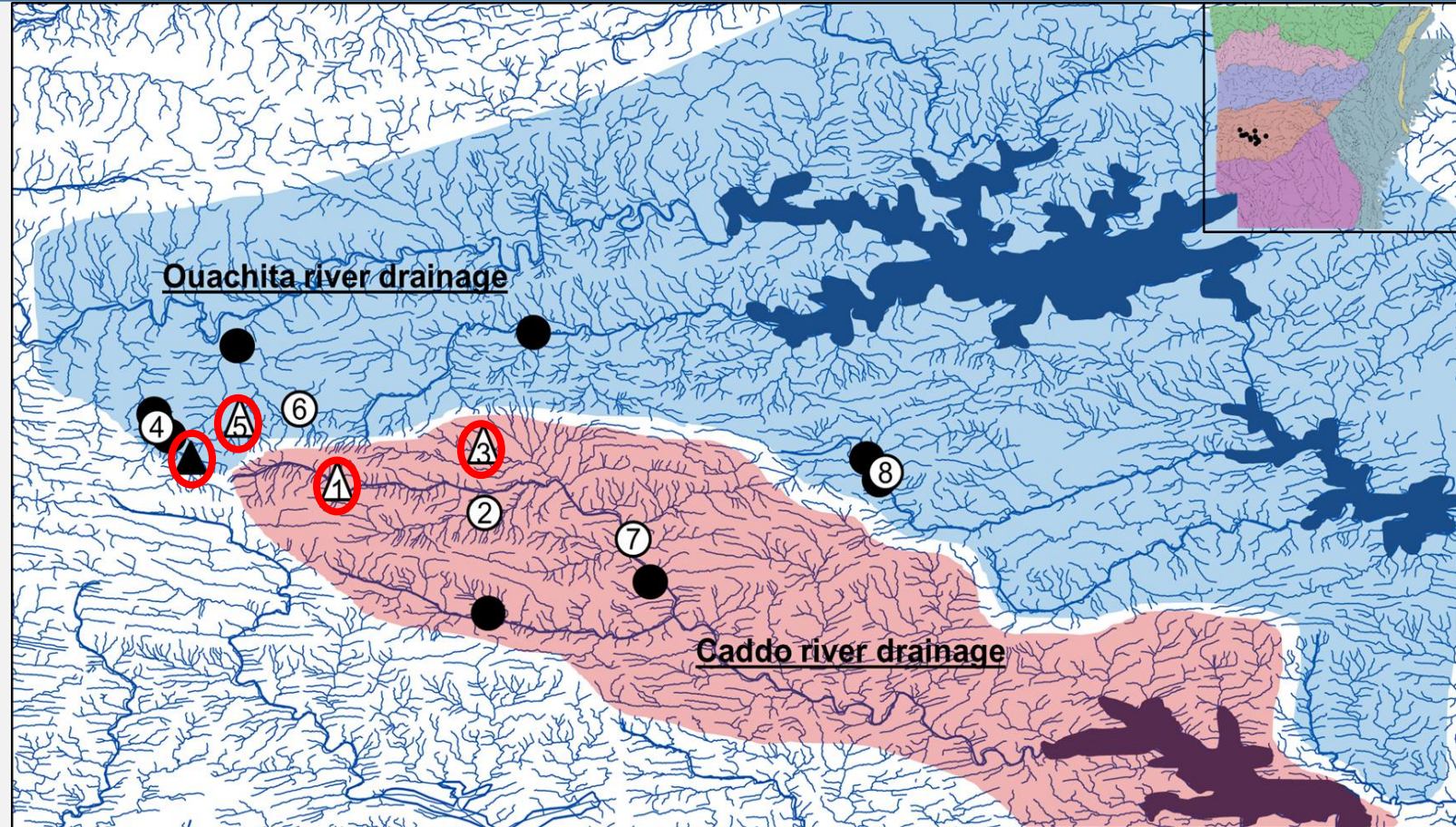
Objectives

Aim: update the status of the Paleback Darter

- Survey historic localities determined by prior surveys and fish databases
- Estimate relative abundance and size class distribution on a seasonal basis
- Assess population dynamics and phylogeographic history with microsatellite DNA loci and mitochondrial cytochrome *b* DNA sequences

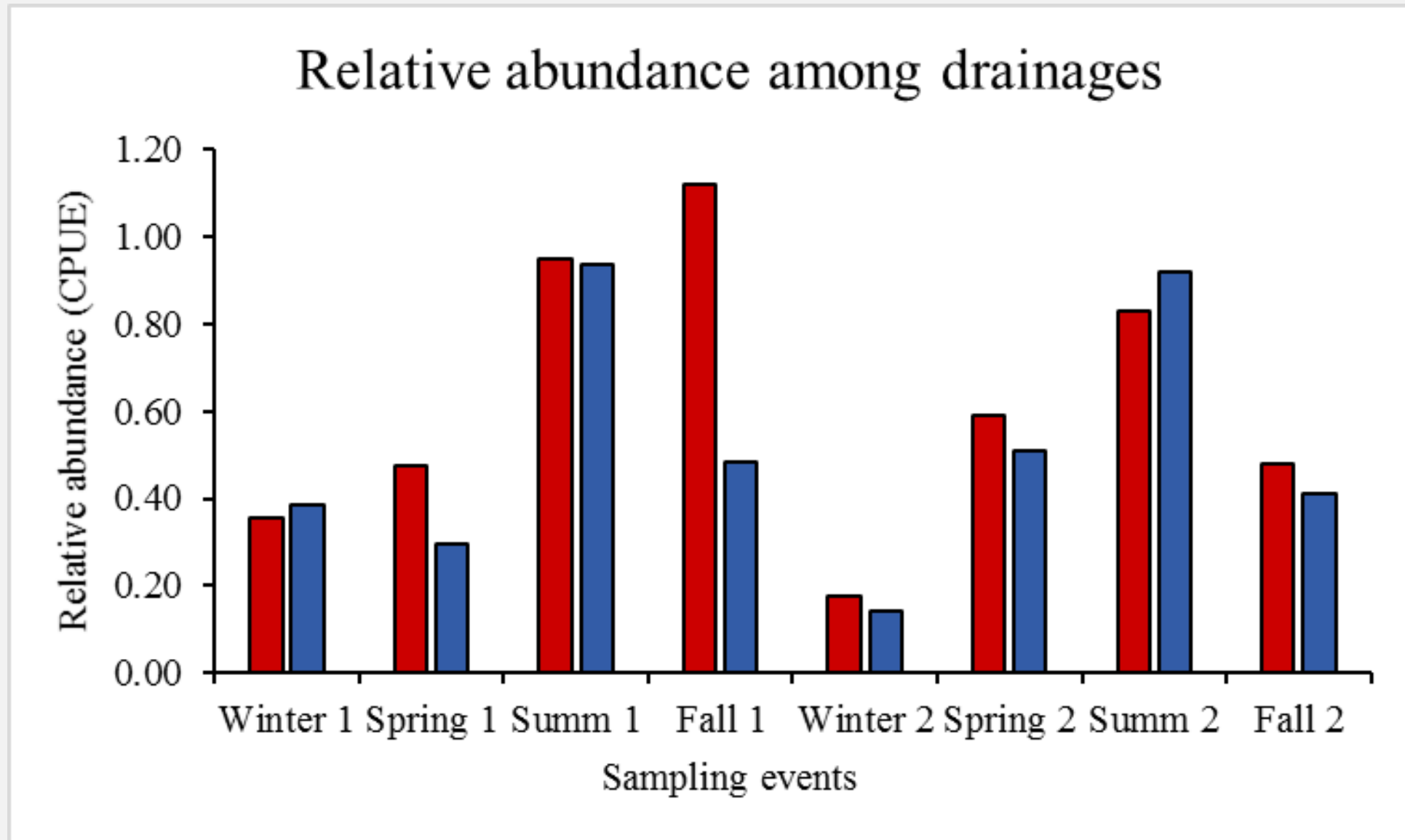
Study area and collection methods

- 17 localities surveyed
- 8 fin clipped localities
- 4 seasonal localities
 - 1-hr collection surveys
 - 75-m stream reach
 - Backpack electroshocked

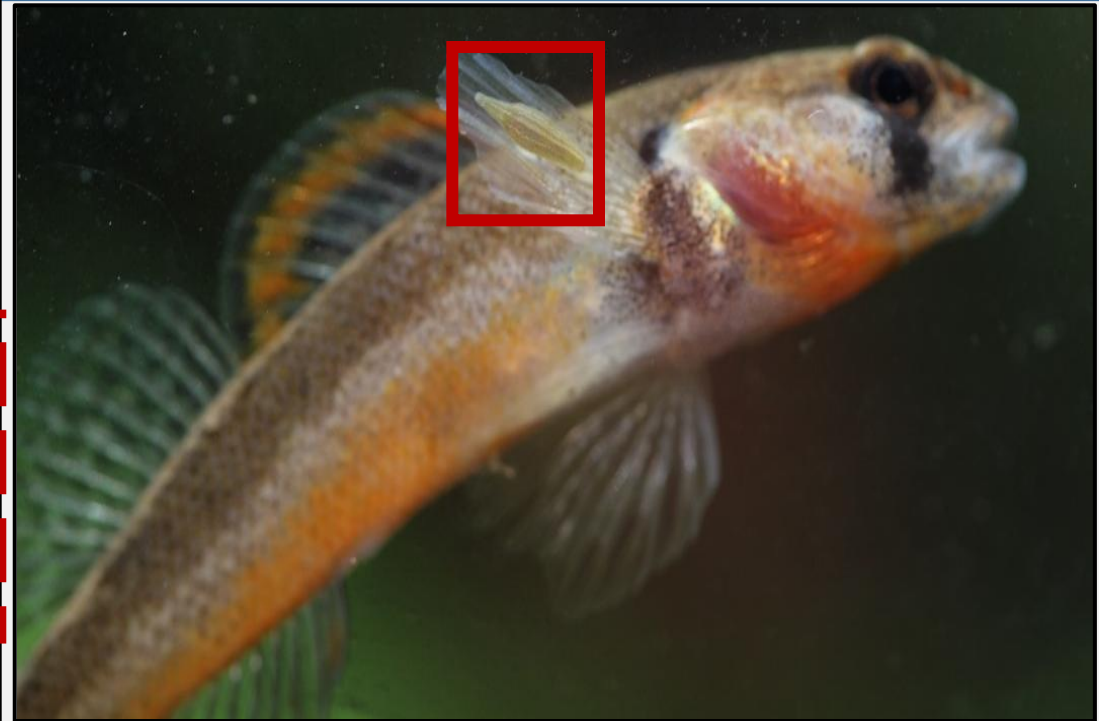
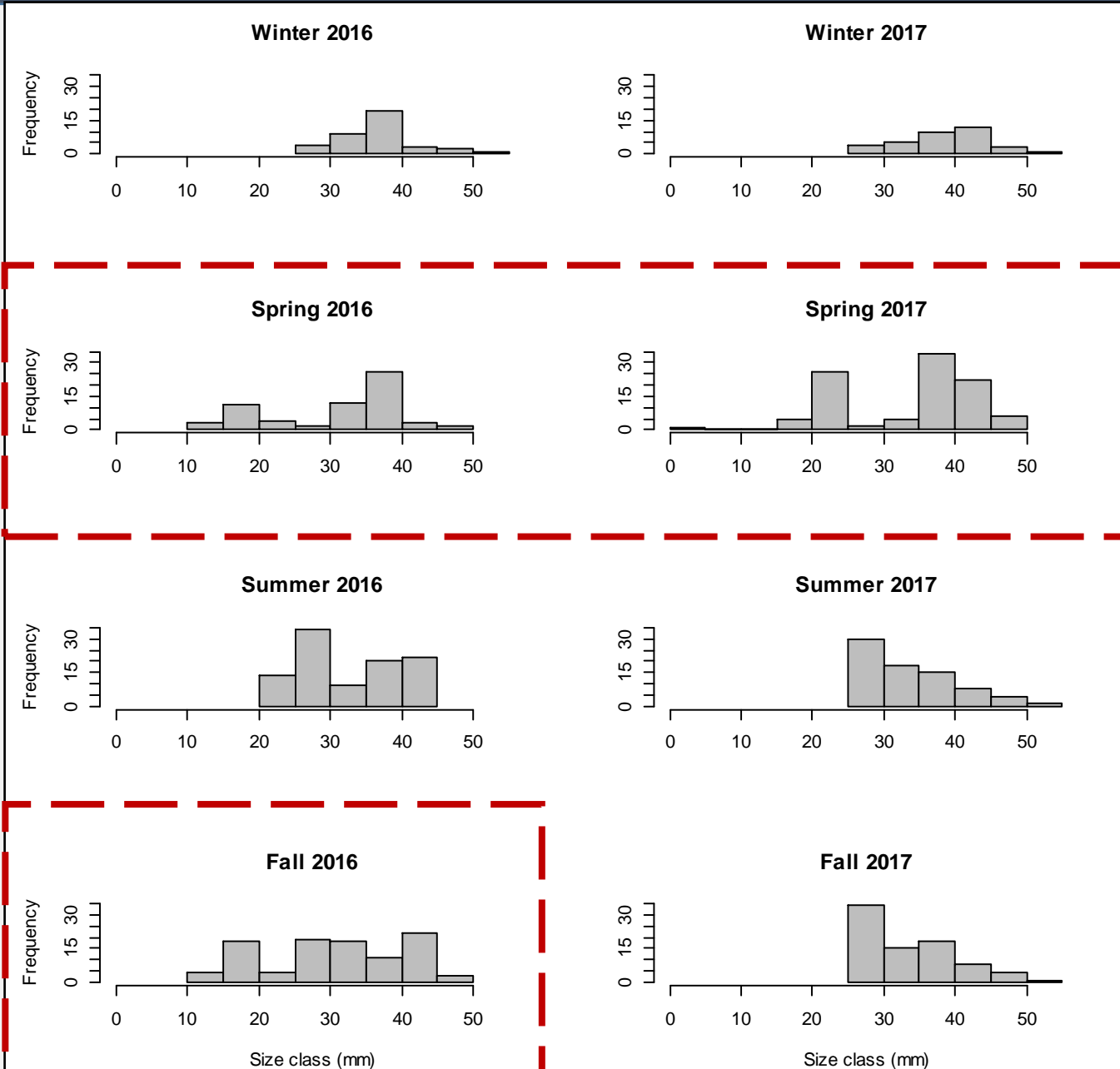


▲=seasonal localities # localities=genetic collections

Relative abundance



Size class distribution patterns



Future studies

What habitat is suitable for spawning?

Do they return to spawn sites?

What is the effect of the parasites?

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Microsatellite genotyping and DNA sequencing

Microsatellite genotyping

- ≥ 25 individuals for microsatellite genotyping
- 8 loci [EosC112, Ebl7, Esc26b, Eca46, EosD107, Esc132b, Ebl3, Etsp208]

DNA sequencing

- ≤ 10 individuals for sequencing
- Mitochondrial cytochrome *b*; SONG

Greenside Darter
©NANFA



Rainbow Darter
©NANFA



Candy Darter
©Noel Burkhead



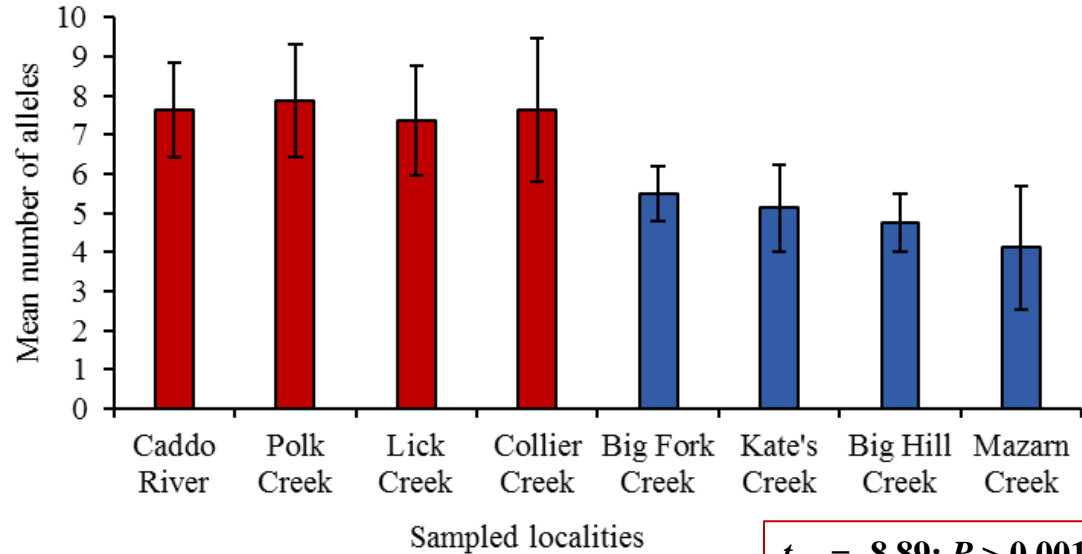
Cherokee Darter
©Noel Burkhead



Orangethroat Darter
©NANFA

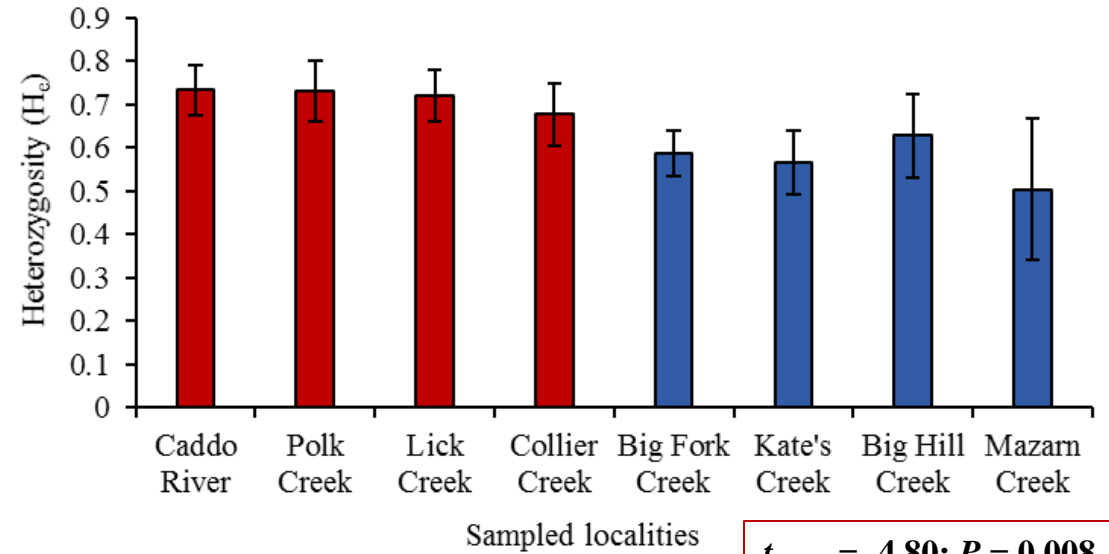
Population genetic diversity

Mean allelic variation



$t_{df6} = -8.89; P > 0.001$

Expected heterozygosity



$t_{df4,10} = -4.80; P = 0.008$

- Overall, genetic diversity low but no evidence of a recent bottleneck
- Ouachita River significantly lower genetic diversity
- Genetic diversity comparable to other headwater darter species

Slackwater Darter
©TNACI



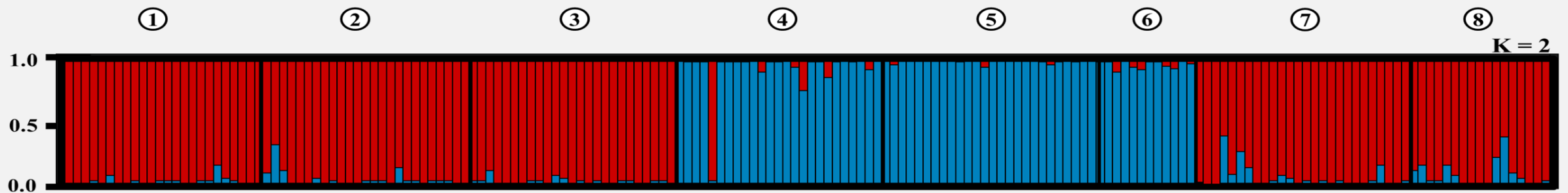
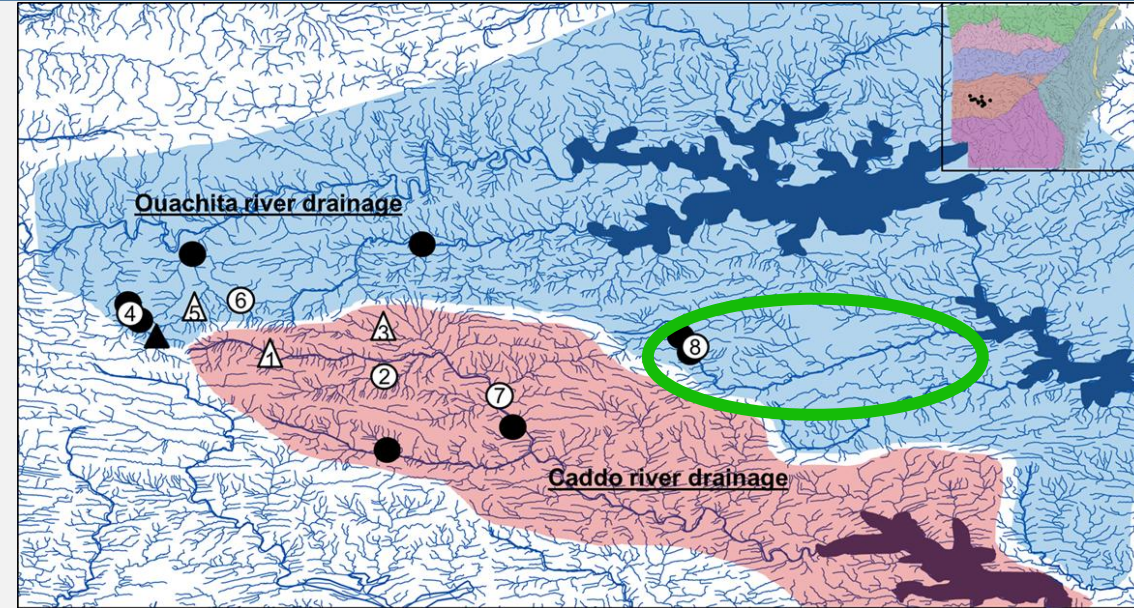
Effective population size

Population	Historic N_e		Contemporary N_e	
<i>Caddo River</i>				
Headwaters	633	(574 - 701)	93	(66 - ∞)
Polk Creek	545	(499 - 597)	82	(58 - ∞)
Lick Creek	755	(698 - 819)	-29	(-179 - ∞)
Collier Creek	274	(250 - 302)	-11	(-13 - ∞)
<i>Ouachita River</i>				
Big Fork Creek	191	(177 - 207)	36	(9 - ∞)
Kate's Creek	637	(590 - 688)	1041	(24 - ∞)
Big Hill Creek	159	(142 - 177)	108	(15 - ∞)
Mazarn Creek	313	(278 - 353)	42	(12 - ∞)

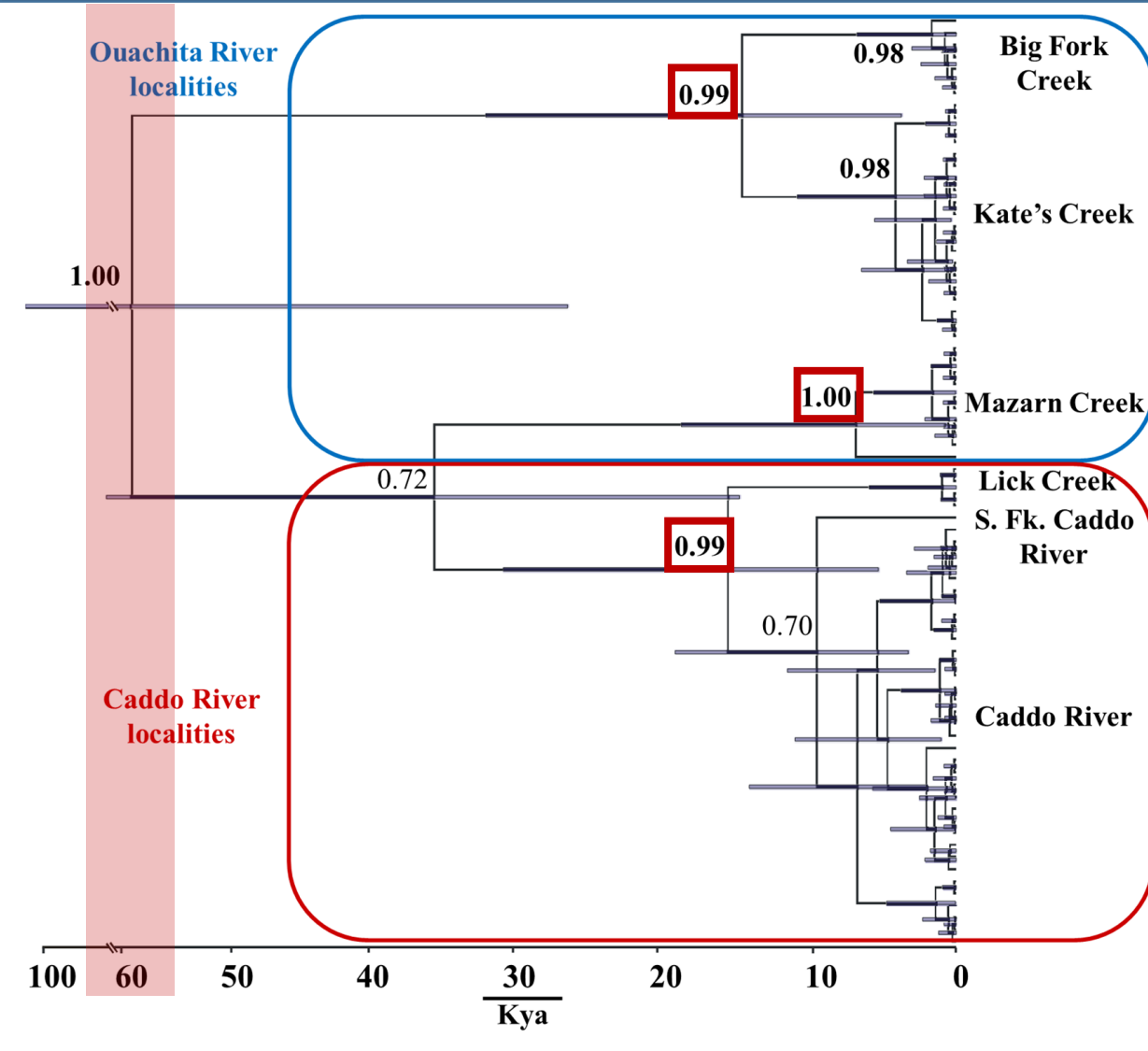
Effective population size \neq Census population size
Model population of reproductive individuals

Population genetic structure

- Most probable genetic clusters $K = 2$
- $K = 3$ was the prediction based on geographic location



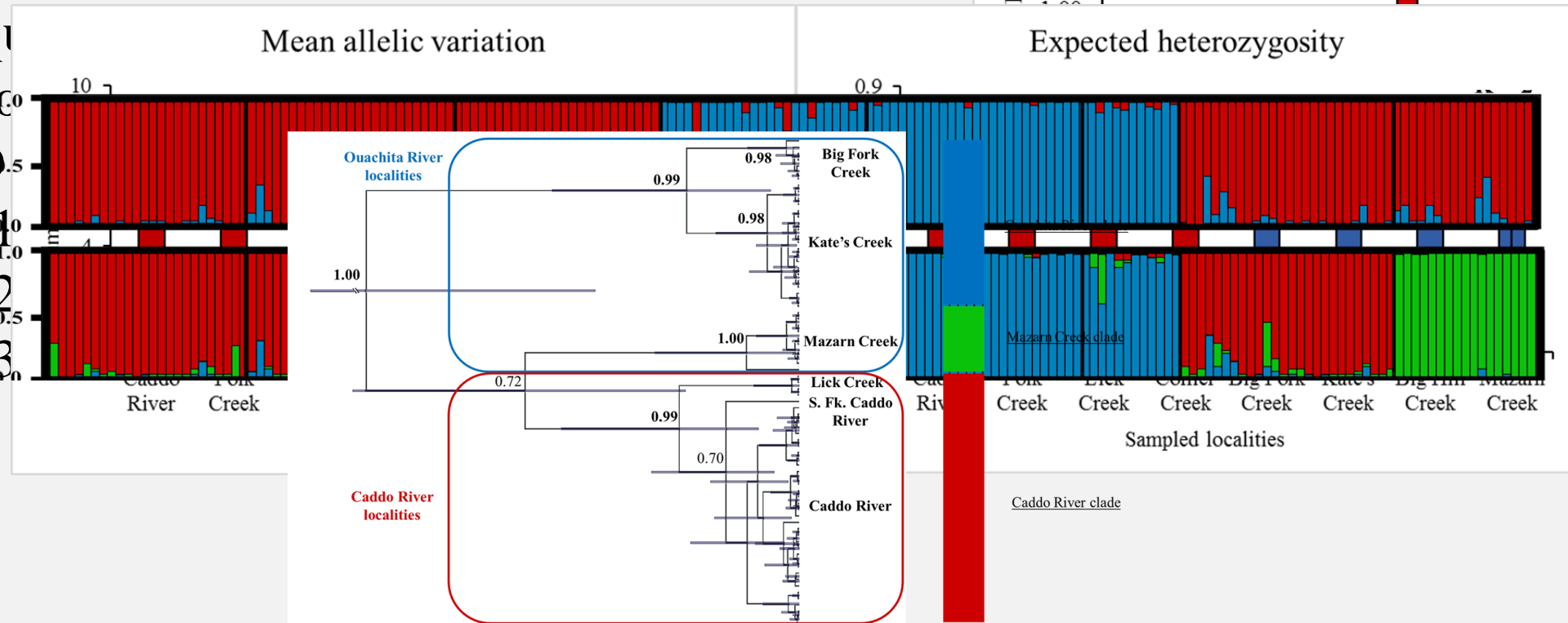
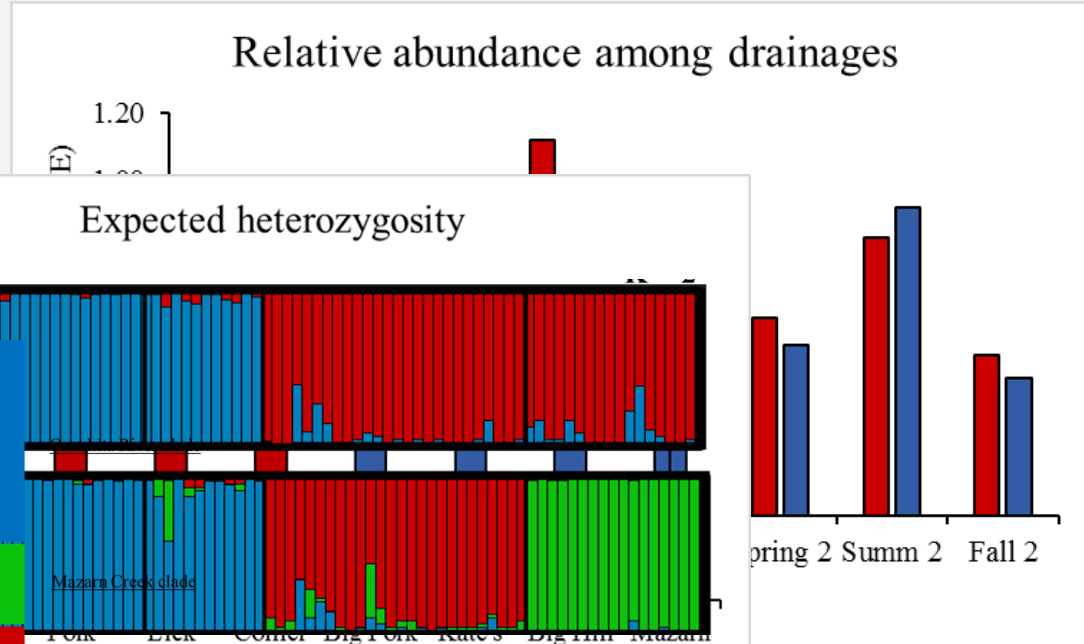
Phylogeographic distribution



Overall conclusions



- Relatively abundant throughout distribution
- Exhibits moderately low genetic diversity and N_e
- Unique
- Phylo
- CBD



Spring 2 Summer 2 Fall 2

Acknowledgements



- **Funding**
- Arkansas State University Biological Sciences Dept.
- Arkansas Center for Biodiversity Collections
- Arkansas Game and Fish Commission
- **Awesome people**
- Hilary Canada
- Kyle Dineen
- Taylor Lee
- Kenny Jones
- Chris Thigpen
- Dustin Thomas; etc.....