Comparison of Redfin Darter (*Etheostoma whipplei*) Diets from Two Spatially Distinct Streams in the Arkansas River Valley.

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Background

- Diet-data collection is increasingly difficult for darters, as most methods require the dissection of each specimen and the removal of the digestive tract, which is fatal (Cordes and Page 1980). Alternatively, darter feeding behavior can be determined with visual observation (Greenberg 1991).
- In result, the diets of many darter species have been relatively understudied (Robison and Buchanan 2020).
- The Redfin Darter (*Etheostoma whipplei*; Girard 1859) is one species where there is very little information on its diet.
- A new study was needed to determine the diet of Redfin Darters.
- Results will be useful in determining the diet composition of Redfin Darters across its range.

Objectives of Study

- *Objective 1:* To determine the diet of Redfin Darters.
- *Objective 2:* To assess spatial differences in Redfin Darter diets.

FIGURE 1: A Redfin Darter (*Etheostoma whipplei*), observed during sampling.

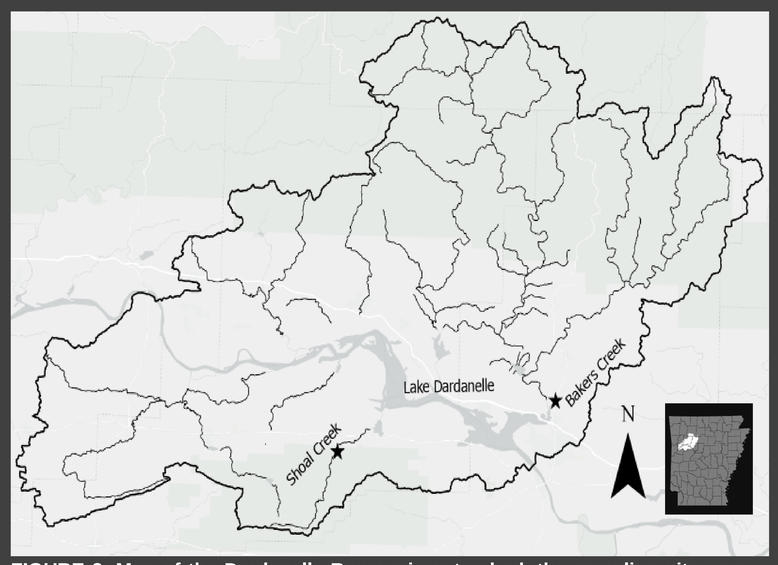

FIGURE 2: Map of the Dardanelle Reservoir watershed, the sampling sites are identified by solid black stars.

Methods

- Redfin Darters were collected from two streams (Bakers Creek and Shoal Creek) that are tributaries in the Dardanelle Reservoir watershed during October 2022 (Figure 2).
- Fish were collected using d-frame dipnets, a standard sampling gear for sampling darters in small streams (Bonar et al. 2009). Sampling took place for 1-hour at each stream. There were three people sampling per sampling period. A total of 20 fish were targeted for each stream.
- Gastric lavage techniques (Giles 1980; Garvey and Chipps 2012) were used, by employing a medical grade plastic syringe (12 mL) and 1.6 mm medical grade tubing. Water was flushed into the stomach of each individual fish at a rate of 1 mL/sec. Gastric lavage was performed two times for each individual fish. Fish were allowed to recover for 30-min. in aerated water before being released back into the respective stream.
- All flushed prey items were preserved in 70% ETOH in 25 mL specimen jars. All prey items were identified down to genus (if possible), using macroinvertebrates.org (Kautz et al. 2022).
- Relative abundance (%) was estimated for the prey items from Redfin Darters at each site. Bray-Curtis dissimilarity was used to assess the composition of prey items in fish from the two streams. All statistical analyses were completed in RStudio (2022). Alpha levels of 0.05 were used for significance testing in all analyses.

Results

- A total of 176 different prey items from 17 fish (37-69 mm), covering 10 orders were extracted from Redfin Darters sampled in Bakers Creek during October (2022). During January, a total of 227 different prey items from 20 fish (36-68 mm), covering 7 orders were extracted from Redfin Darters in Bakers Creek.
- In Shoal Creek, a total of 187 different prey items from 18 fish (32-67 mm), covering 10 orders were extracted from Redfin Darters sampled. During February, a total of 227 different prey items from 16 fish (33-70 mm), covering 8 orders were extracted from Redfin Darters in Bakers Creek.
- The composition of prey items from the two streams were relatively similar during October (Bray-Curtis distance = 0.125) and January/February (Bray-Curtis distance = 0.353). Diets were also relatively similar on a temporal scale at Bakers Creek (Bray-Curtis distance = 0.353; October to January) and Shoal Creek (Bray-Curtis distance = 0.335; October to February).

FIGURE 3: Example prey items from Redfin darters: Chironomidae-Tanypotidae midge (Diptera, A); Heptageniidae *Stenacron* mayfly (Ephemeroptera, B). Pictures are from Kautz et al. (2022).

Discussion

- Diets from both streams were comprised mostly of Chironomids, suggesting that this prey item is an important part of Redfin Darter diets. There appears to be no spatiotemporal differences in Redfin Darter diets between these two streams, suggesting that these two streams support similar aquatic-macroinvertebrate communities.
- Diets appear to be similar between the two streams. However, more unique prey item types were observed from Redfin Darters in Shoal Creek (15) compared to Bakers Creek (12).
- Differences may exist with a larger sample size, which might reflect the spatial differences of the streams
- This research will aid in the understanding of Redfin Darter biology and feeding ecology.

Literature Cited

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