

Introduction

- North America is home to the world's richest freshwater mussel fauna. Arkansas alone contains an estimated 85 native mussel species.
- Anthropogenic influences such as mining and water quality degradation from wastewater effluents and agricultural runoff negatively impact freshwater mussel communities. The South-Central Plains (SCP) ecoregion in Arkansas has been exploited for its oil for around a century.
- Historically, tributaries of the Saline and Ouachita Rivers are undersampled, resulting in little knowledge of these mussel communities.
- To address a portion of this data gap, we sampled Smackover and Hurricane Creeks, tributaries of the Ouachita and Saline Rivers.

Methods

- One-hour broad search via snorkeling, grubbing, and raking followed by a 30-minute focused search in the area of highest abundance of mussels found in the one-hour search. Sampled 7 sites in Hurricane Creek and 5 sites on Smackover Creek in the summer of 2023. Each mussel was identified, measured (mm), and released.
- Water quality characteristics were collected with the Oakton PCTS Tester 5 (pH, Conductivity, Total Dissolved Solids (TDS), Salinity, Temperature (°C)).
- Water quality characteristics against drainage area (km²) were analyzed using linear and exponential regression in R v4.3.1. Mussel abundances were plotted for visual interpretation of trends against drainage area (km²). Histograms were used to visualize the distribution of lengths in the most common species: Louisiana Fatmucket (*Lampsilis hydiana*).



Figure 1. Assorted mussels from Hurricane Creek.

Figure 2. Smackover Creek

Results

Species	Smackover	Hurricane
Eastern Pondmussel (<i>Sagittunio nasutus</i>)	8	4
Louisiana Fatmucket (<i>Lampsilis hydiana</i>)	34	32
Texas Lilliput (<i>Toxolasa texasiense</i>)	9	44
Tapered Pondhorn (<i>Unioemer declivis</i>)	1	6
Yellow Sandshell (<i>Lampsilis teres</i>)	0	5

Results

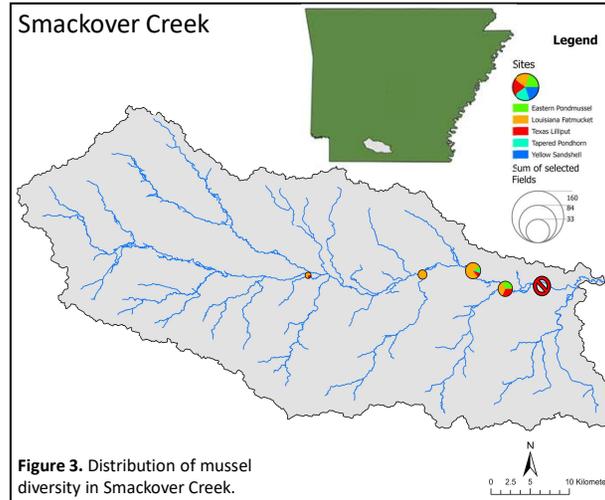


Figure 3. Distribution of mussel diversity in Smackover Creek.

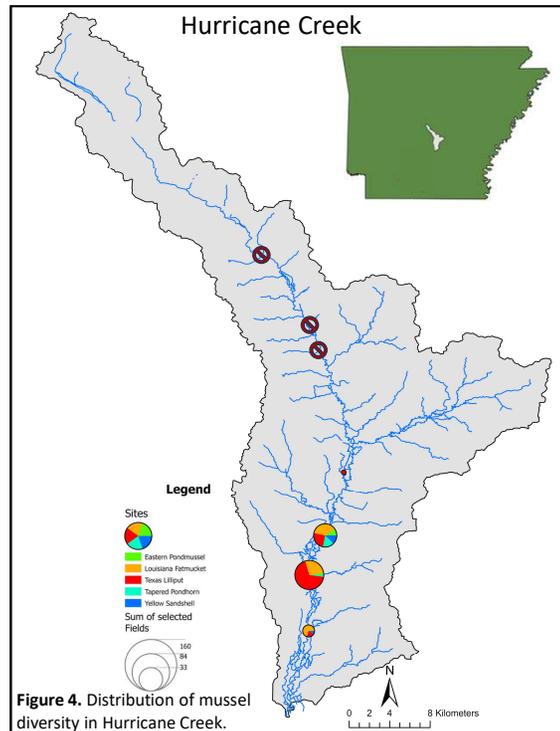
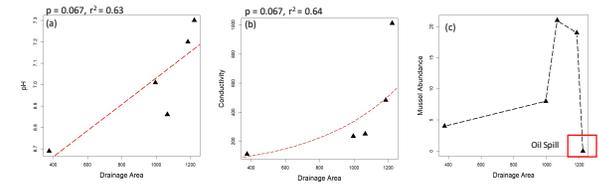


Figure 4. Distribution of mussel diversity in Hurricane Creek.

Smackover Creek



Hurricane Creek

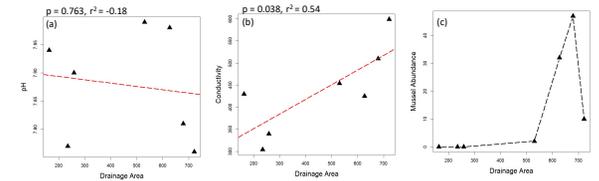


Figure 5. Linear and exponential regressions of water quality parameters in Smackover and Hurricane Creeks; pH (a) and conductivity (b). Scatterplot of mussel abundance patterns against drainage area (c).

- We observed positive relationships in pH and conductivity going downstream in Smackover Creek (Figure 5a). Conductivity increased downstream in Hurricane Creek (Figure 5b).
- Mussel abundances generally increased going downstream except a sharp decline at the lowermost site for both streams (Figure 5c).

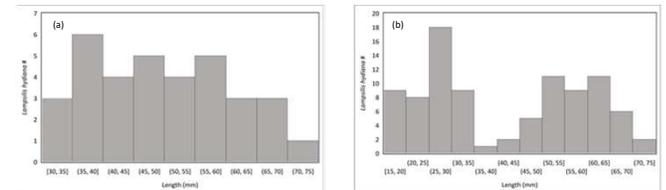


Figure 6. Distribution of *Lampsilis hydiana* lengths (mm) for Smackover (a) and Hurricane Creeks (b).

Discussion

- Our results highlight the importance of tributaries in supporting mussel communities. The presence of 5 species indicates the potential for mussels to recolonize or withstand extreme anthropogenic stressors such as sedimentation and effluent spills.
- Active oil spills in the lowermost reaches of Smackover Creek are potentially negatively impacting mussel communities due to the absence of mussels in this site.
- The presence of small individuals of *Lampsilis hydiana* indicates current recruitment is occurring in these systems, suggesting the potential effects of spills are diminishing in some sections of each tributary.