Habitat Effects on Electrofishing of White Sucker, Longnose Dace, and Satin fin Shiner in Hazel Run, VA

Mariana Lira

University of Mary Washington

Background

Monitoring stream fish communities is essential for tracking ecological changes, assessing habitat conditions, and detecting periods of environmental stress (Karr 1986). Electrofishing involves using a mild electrical current to briefly stun fish for capture and is a widely used technique for evaluating stream assemblages, but its efficiency varies with species behavior and habitat features such as depth, width, clarity, and substrate (Hense et al. 2011). This study examines how stream depth, width, and dominant substrate influence electrofishing capture rates of White Sucker (*Catostomus commersonii*), Longnose Dace (*Rhinichthys cataractae*), and Satin fin Shiner (*Cyprinella analostana*) in Hazel Run, Fredericksburg, Virginia..

Hypothesis

Electrofishing capture abundance will be significantly correlated with stream depth, width and substrate

Methods

Habitat and electrofishing data from 2016–2025 were used, excluding fish records lacking matching habitat measurements. Each sampling event targeted an ~85 m reach of Hazel Run, blocked downstream with a net. Stream width, depth, and substrate type were measured every 5 m at five transect points across the channel. Three backpack-electrofishing passes were completed per site, and stunned fish were collected with dip nets. Species abundances were then correlated with mean width, depth, and substrate using Pearson's correlation in Microsoft Excel.

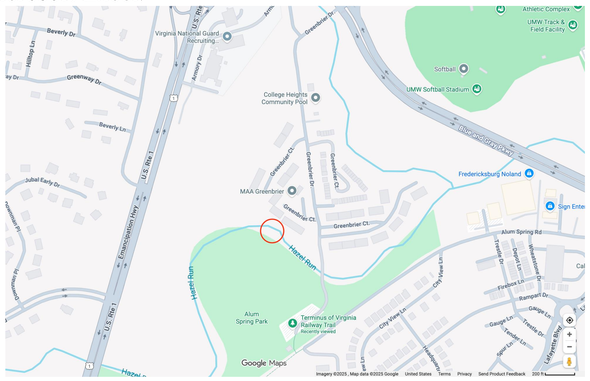

Figure 1. Approximate sampling location at Hazel Run. The sampling area included ~85 meters of the stream. Image sourced from Google Maps

Figure 2. Sampling event on 10/09/2025. Depicted are the sampling crew at the site with the equipment used for collection.

Results

	White Sucker	Longnose Dace	Satin fin shiner
Average depth (cm)	**-0.818**	-0.007	**-0.684**
Average width (m)	**0.854**	**-0.501**	0.203
Average substrate diameter (cm)	-0.432	0.175	-0.410

Figure 3. Table of the Pearson's correlation coefficient for each species abundance and habitat measurement (depth, width and substrate). Significant values are in bold.

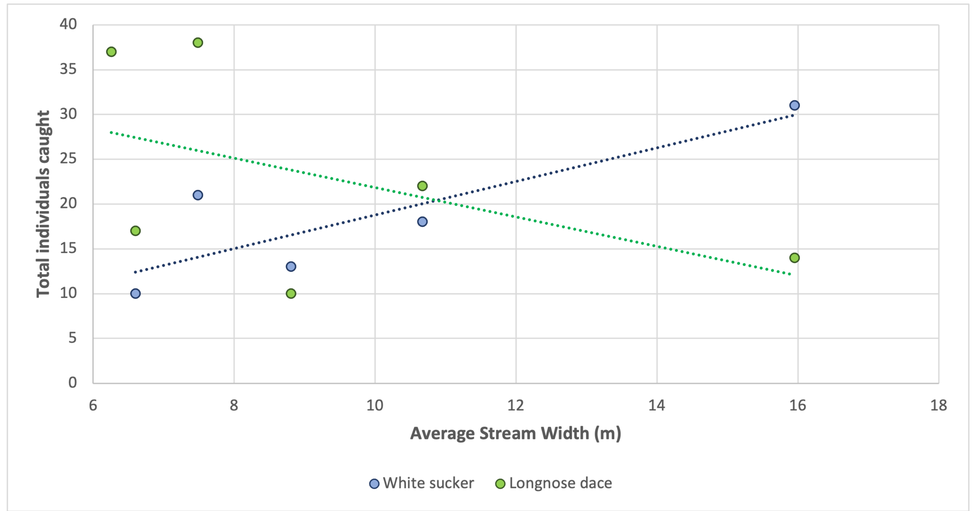

Figure 4. Scatterplot with linear trendlines depicting the relationship between the total number of white suckers (blue) and longnose dace (green) caught electrofishing and the average stream width in meters at the time of each capture event

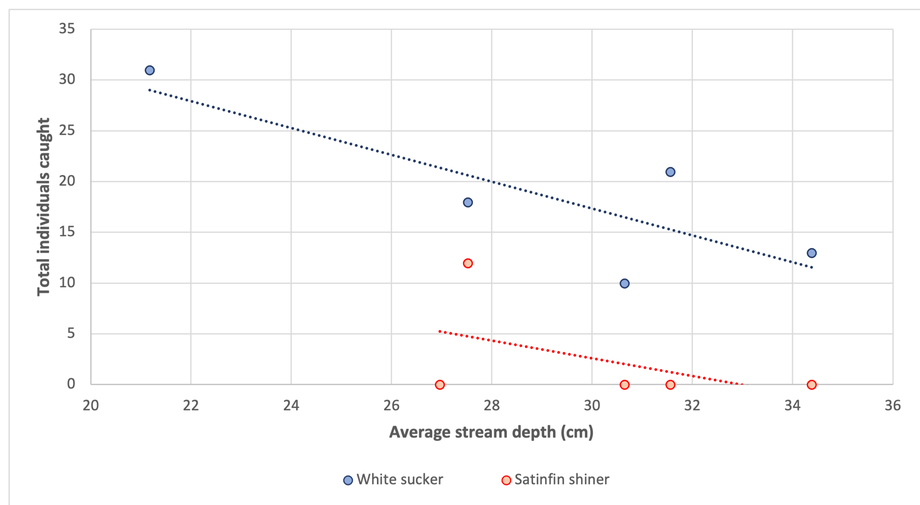

Figure 5. Scatterplot with linear trendlines depicting the relationship between the total number of white suckers(blue) and satin fin shiners (red) caught electrofishing and the average stream depth in centimeters at the time of each capture event.

Results

- The White Sucker and Longnose Dace had significant correlations with average stream width
- The number of white suckers captured electrofishing had a significant positive correlation with average stream width (r= 0.854)
- The number of Longnose Dace captured electrofishing had a significant negative correlation with average stream width (r= -0.501)
- The number of White suckers and satin fin shiners caught electrofishing both had significant negative correlations with average stream depth.
- No species showed correlations with substrate diameter

Discussion

This shows that changes in habitat are related to changes in the number of species that are captured electrofishing. When assessing stream communities and assemblages it is important to consider these conditions to avoid sampling bias due to spatial and temporal changes that interfere with methods of population measurement. Habitat itself also is a key determinant in the presence and abundance of certain species in an area. Fish species diversity in freshwater streams is directly correlated with stream cover, substrate, water velocity and depth (Walrath et. al. 2016). The correlations in this study can also be attributed to the habitat fluctuations themselves affecting species populations.

References

Hense, Zina, Roy W Martin, and J. Todd Petty. "Electrofishing Capture Efficiencies for Common Stream Fish Species to Support Watershed-Scale Studies in the Central Appalachians." *North American Journal of Fisheries Management* 30, no. 4 (2010): 1041–50. https://doi.org/10.1577/M09-029.1.

Karr, James R. "Assessing biological integrity in running waters: a method and its rationale." *Illinois Natural History Survey Special Publication no. 05* (1986).

Walrath, John D, Daniel C Dauwalter, and Drew Reinke. "Influence of Stream Condition on Habitat Diversity and Fish Assemblages in an Impaired Upper Snake River Basin Watershed." *Transactions of the American Fisheries Society (1900)* 145, no. 4 (2016): 821–34. https://doi.org/10.1080/00028487.2016.1159613.