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Stream Fish Assemblages Around the Clemson Experimental Forest

Ryan Medric
Clemson University

Benjamin Lam
Clemson University

Joshua Cary
Clemson University

Jesse Duvall
Clemson University

Yoichiro Kanno
Clemson University

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Ryan Medric, Benjamin Lam, Joshua Cary, Jesse Duvall, and Yoichiro Kanno

Department of Forestry and Environmental Conservation, College of Agriculture, Forestry and Life Sciences, Clemson University, Clemson, SC

Abstract:

The southeastern USA harbors high aquatic diversity in the temperate region. Yet, stream fish suffer high imperilment rates due to anthropogenic activities such as habitat loss and water quality degradation. From the biodiversity conservation perspective, it is important to document what and where species occur in a landscape. The purpose of this Creative Inquiry project was to survey stream fish assemblages in and around the Clemson Experimental Forest. We surveyed local streams using electrofishing and seining techniques in Fall 2014 and recorded abundance of fish species captured. We collected common species such as bluehead chub (*Nocomis leptocephalus*) and yellowfin shiner (*Notropis lutipinnis*), as well as locally rare species such as blackbanded darter (*Percina nigrofasciata*). Although we hypothesized that larger streams would contain higher species richness than smaller streams, our data did not support this hypothesis based on a linear regression analysis. Our study showed that fish fauna around campus is diverse and we should be aware of these important water resources for conservation.

Introduction:

In the Upstate of South Carolina, much research has been completed on game fish species due to the high amount of public interest. The non-game species, however, have not been well studied despite their high diversity in the southeastern United States and imperilment of many species. We set out to study non-game species such as minnows (Cyprinidae), darters (Percidae) and suckers (Catostomidae). Our goal was to provide an account of fish diversity in the streams surrounding Clemson University to uncover a correlation in stream size and fish distribution. This information will be used to determine the distribution of non-game fish in the Upstate of South Carolina.

Plate 1: Bluehead Chub (*Nocomis leptocephalus*)

Plate 2: Yellowfin Shiner (*Notropis lutipinnis*)

Study Area:

- Twelve sites in seven wadeable streams in and around the Clemson Experimental Forest (Figure 1).

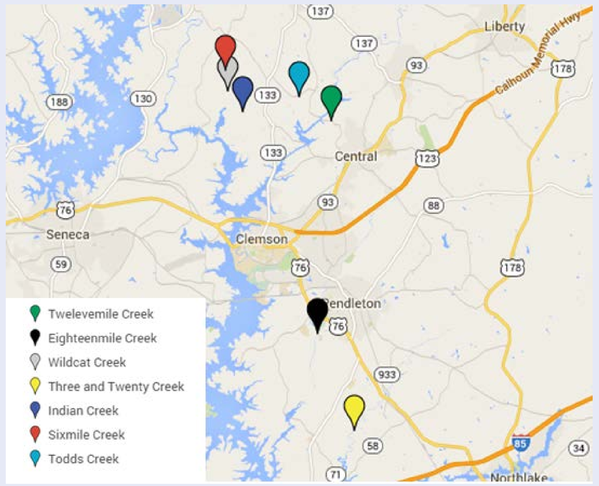

Figure 1. Map indicating sampling locations of seven study streams

Methods:

- Electrofishing surveys were conducted during the fall of 2014;
  - Each site was sampled by a crew of 3-5 people
  - Single-pass electrofishing spanning 20 times the mean width of the stream, or
  - 20-seine set samples with the electro-shocker 3 meters upstream of the seine shocking towards the net where the fish would be collected
- The number of individual species collected at each stream was displayed using a stacked bar graph
- A simple linear regression model was used to examine a relationship between wetted stream width and species richness with the alpha = .05 level
  - Null hypothesis = stream width does not affect species richness
  - Alternative Hypothesis = species richness increases with stream width

Plate 3: (Left to right) Jonathon, Ryan and Joseph measuring collected fish

Plate 4: Todds Creek

Plate 5: Blackbanded Darter (*Percina nigrofasciata*)

Plate 6: Northern Hogsucker (*Hypentelium nigricans*)

Plate 7: (Left to right) Jonathon, Dr. Kanno and Ryan walking along Twelvemile Creek

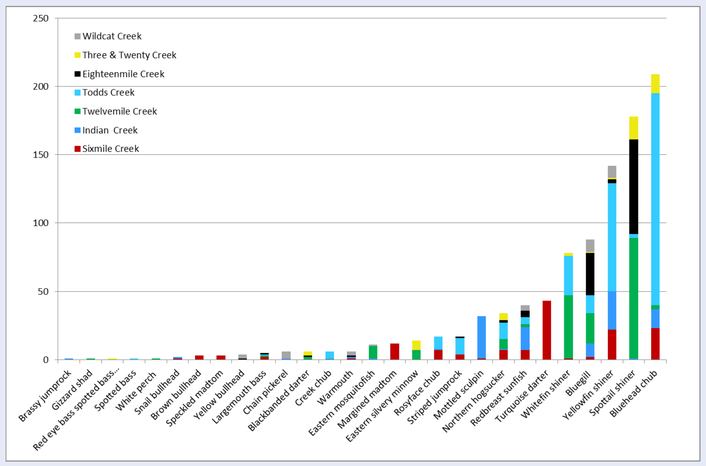

Figure 2. The number of individual species collected at each stream

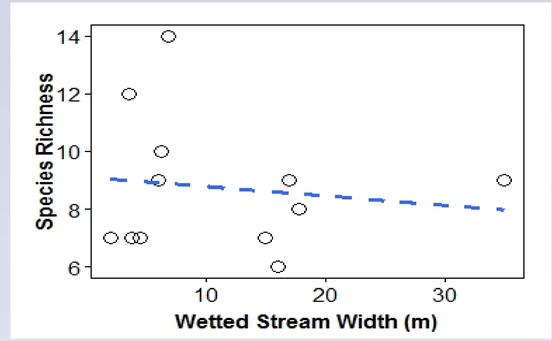

Figure 3. Relationsihp between species richness and wetted stream width at 12 sites

Results:

We collected 28 different species and a total of 961 individual fish (Figure 2). The top five most common species (in descending order) were the Bluehead Chub (*Nocomis leptocephalus)*, Spottail Shiner (*Notropis hudsonius*), Yellowfin Shiner (*Notropis lutipinnis*), Bluegill (*Lepomis macrochirus*), and Whitefin Shiner (*Cyprinella nivea*). The data ranged from 1 individual of a species to 209 of another species. Only half of the species collected had individuals in the double digits or higher and 5 species had only 1 individual collected. Of the 28 species collected, 20 were non-game species, as classified by the SCDNR, accounting for 85% of the total individuals captured. Species richness did not increase with stream wetted width (Figure 3). The relationship was represented by a simple linear regression such that:

Species Richness = 9.11 - .032 x Mean wetted width (p-value = 0.68)

Therefore, we fail to reject the null hypothesis. In other words, there is insufficient evidence to conclude that there is correlation between wetted stream width and species richness .

Discussion and Conclusion:

From our fieldwork and analysis, it shows that there is no relationship between species richness and mean wetted width of a stream. Species Richness = 9.11 - .032 x Mean wetted width and there was a p-value = 0.68. Larger streams typically harbor higher species richness but our result differed from this typical pattern. We consider that more data would be necessary before concluding whether stream size does not affect species richness in our local streams. In addition, other environmental variables need to be taken into consideration.

We did find different species in different streams. One of our goals of this project was to show that our streams are diverse, important, and should be conserved. Fish reside underwater and not many people get to see the many different species that these streams have to offer and usually don't keep them in mind. This project shows that there is surprisingly high biodiversity in even the smallest streams and that we cannot overlook any stream by the size. Each stream serves some ecological importance.

In summary, this project shows that there is no relationship between species richness versus width of a stream. However, these conclusions will need more data to be more valid. There is an array of stream fish species in the Clemson Experimental Forest and that they should be considered in future management plans and conservation efforts.

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