Preferences of Two Stream Salamanders for Position in a Stream

Ian D. McMillan

Field Biology and Ecology

Dr. Baranski

Summer Ventures in Science and Mathematics

The University of North Carolina Charlotte

Abstract

In this study, I examined data from stream salamander studies over a period of three years (2010-2012) to determine if there was any preference of two specific species (Spring and Blackbellied Salamanders) for position in the stream. I used Microsoft Excel to enter and create regressions and scatter plots for the data for both of the species. When examining the charts, I concluded that my hypothesis was supported by the data. The numbers of salamanders found at certain distances showed up very well in both the scatterplots and in the distance value regressions. I concluded that both Blackbellied and Spring Salamanders prefer to reside near the edges of streams.

Introduction

During my trip to the North Carolina Mountains with the Field Biology and Ecology class at UNCC Summer Ventures 2012, I participated in a salamander study in a stream on Mt. Mitchell. The more salamanders I collected, the more I started to notice a trend in the location of the larger salamanders. It appeared to me that most, if not all, of the non-juvenile salamanders we caught were located within the outer quarter of the stream's width. I decided that this may be the reason I caught many more salamanders than the students in the middle of the stream; I was in the prime habitat. I knew I was going to have to do a research project soon and this idea was intriguing. The class had data for this experiment going back many years, so I knew I would be able to come up with results. No one had analyzed this data for these variables yet and the results could help biologists determine which parts of streams need to be protected most. If my hypothesis is supported by my research, it would reinforce the importance of riparian buffers in the protection of salamander habitat from erosion.

Methods

On all three years (2010, 2011, 2012), this experiment took place in Lower Creek, Mount Mitchell State Park, Yancey County, North Carolina (See Fig. 1). The stream is approximately 3.6 meters in width, with variable depth. The stream bed consists of an estimated forty percent cobble stone, ten percent boulder, five percent sand, five percent gravel, and forty percent pebble. The water condition was very good during all three years the creek was sampled, with zero turbidity. pH varied from 5.0 to 6.6 depending on the year. Temperature also varied, ranging from 10.5° to 13° Celsius. The sample areas were as follows: 13.0 meters long in 2012 and 10.4 meters long in 2011 (there

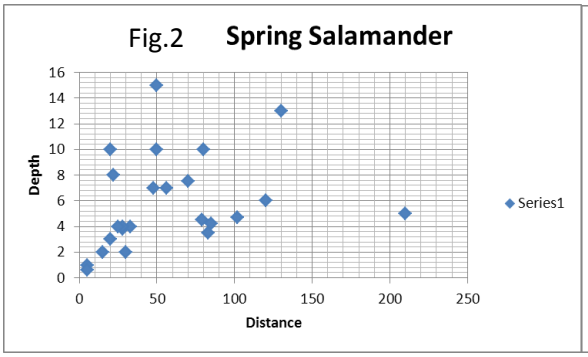
>Fig. 1: Lower Creek, Mt. Mitchell

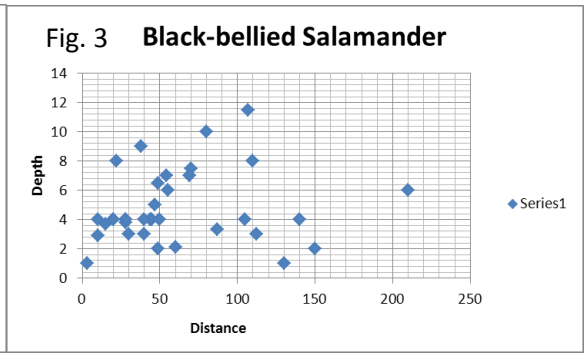
was no record of plot length in 2010). Plots were laid out by the students using a metric distance tape. Orange flags were placed at the corners and sides of the plot so the students would know where to stop. To collect data, three students walked parallel in the stream, turning over all rocks and collecting salamanders they found with small nets or their hands. The specimens were then placed in plastic bags filled with water (so the salamanders could breathe) and transported by another student to the area where they were measured using a ruler, weighed with an electronic scale, and recorded by species. Whenever a salamander was found, one student would record how far it was from the side of the stream and how deep the water was where it was found, using and meter stick. Juvenile salamanders were not included in this study, and were only recorded as "Des. Juvenile" and were not identified or used in this analysis. This study will only include members of Gyrinophilus porphyriticus (commonly known as the Spring Salamander) and Desmognathus quadramaculatus (commonly known as the Black-bellied or Blackbelly salamander). These were the two salamander species most commonly found in the stream throughout the three years it was sampled, and abundant data on location in the stream was available.

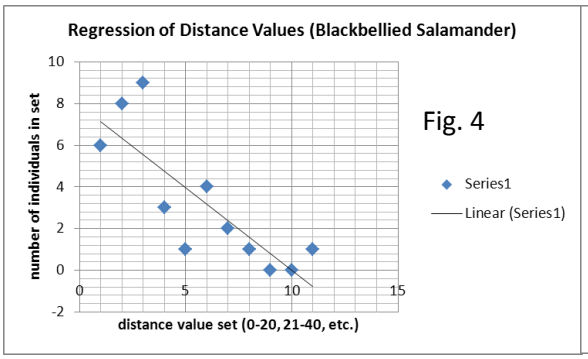
To analyze the data from the three studies, I entered the data for depth and distance from shore for the salamanders into Microsoft Excel in a spreadsheet, one for each species. I then used the program to create a scatter plot for each species, using the data for depth and distance from shore. I also calculated the averages for depth and distance from shore for each species.

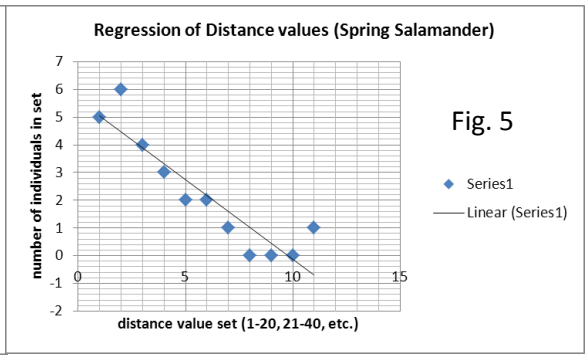
Results:

The averages of both depth and distance from shore for both species were very close; both species of salamander were most commonly found within 62 centimeters of shore and in less than six centimeters of water. See Figures 2 and 3 for the scatterplots for both species below:









As you can see from theses graphs, most of the data points are concentrated towards the lower left-hand side of the plot. This shows that the salamanders prefer shallower areas that are close to shore. This can be further seen in the regressions of depth values for both species (Figures 4 and 5). There are outliers but there is also an obvious trend in the data for both species, you can see how the number of individuals living further from the edge is much less than the number living closer to shore.

Discussion

The results of my analysis were not as strongly in support of my hypothesis as I had predicted, but the correlation is still there. There is no doubt when looking at the scatter plots that the members of the two species most often resided near the edges of streams. I was very interested to see how this analysis turned out and there is a lot of room to continue the research. This study only analyzed the location of adult (or sub-adult aquatic form) salamanders and to further elaborate on this research, someone could compare the habitats of the juveniles to the non-juveniles. Another possible continuation

could be to see if the salamanders preferred locations in the stream had anything to do with the speed of the water in the center versus the speed of the water near the sides.

Conclusion

My hypothesis that adult/sub-adult members of the species Gyrinophilus porphyriticus and Desmognathus quadramaculatus most often live near the shore line in a stream or creek was supported by this research. The regression of the distance values for each species showed an obvious favoritism for the areas closer to the edge of the stream. With this knowledge, herpetologists can work with conservation specialists to preserve these amphibian's natural habitat with more accuracy. There were many options for continued research in relation to my analysis and I definitely hope someone will take a more in-depth look at this topic, it's worth the time spent.