
COMPARISON BETWEEN HABITAT TYPE AND BODY SIZE OF THE DECAPOD *C. CARINIROSTRIS*

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ABSTRACT

The size of an animal is a very important physical trait that often plays a key role in many aspects of its life. It is common to see the larger an animal is, the better suited they are to survive adverse conditions in their environment including predators. This study was conducted as a new study that was testing two variables regarding the distribution of *C. Carinirostris* to hopefully find if there is a correlation between the two. I collected 15 crayfish from each of the 3 different habitat types, these habitats are defined in the paper below, for a total of 45 crayfish from different parts of one stream to see the relationship between habitat type and body size. The crayfish were caught in the stream with a handheld net and then organized by the surrounding habitat in the area they were caught in before being measured on shore. The results of the experiment were very encouraging as I saw the statistical analysis calculation support my tested hypothesis and the correlation between habitat type and body size was proven.

Key words: C. Carinirostris, body size, habitat type, stream ecology

INTRODUCTION

Body size is an important trait of organisms that affects many other processes at different hierarchical levels. It is one of the most influential intrinsic effects that plays a role in the animal's ecological distribution. My study evaluates the comparison between the habitat type that crayfish are found in and their body size to determine if they are correlated. This could prove important to show many patterns in the lifestyle of the crayfish such as any possible reasons behind their travel patterns, areas of higher predation that put the animals at a higher risk, or just exactly what habitat is best for the survival of the species. The size of an organism can affect its distribution in a number of ways that I will discuss here.

Cambarus Carinirostris an amphipod crustacean species in the family Cambaridae. The crayfish is a heavily studied organism as of late in

Pennsylvania as a whole, and also at Juniata College I know students and faculty conduct extensive research on them. My study will be specifically experimenting with crayfish found in one stream in Western Pennsylvania and I have not seen any other experiments comparing the two variables that I will be comparing. Through this study, we hope to discover whether or not the habitat type in a stream and the body size of the crayfish found in that stream have a correlation between them. The hypothesis I tested is that the *C. Carinirostris* will display larger body sizes in the areas with more large rocks around them as this works as a layer of protection from predators

FIELD SITE

This study took place at a creek near my house that actually has a large enough section of stream running through my backyard to hold a large amount of life including crayfish, minnows, water

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snakes, and others. The stream is called Buffalo Creek and it is a tributary to the Allegheny River. The stream is located on the border of Armstrong and Butler county and it runs through both counties on its way to the Allegheny. The stream was convenient for this study as it has a very diverse habitat selection as the sections may change from long, open sandy section, to more mildly rocky sections with cobbles and pebbles, and finally sections where the rocks become very large and can be classified as a boulder. There is not much vegetation growing in the stream at all outside of aquatic moss covering most rocks but, the area surrounding the stream is abundant with skunk cabbage, moss, and typical grassy vegetation. two different field sites. The water in the stream is typically rather slowly moving and there has not been heavy rain in the week prior to data collection to throw off the stream environment much.

METHODS AND MATERIALS

I constructed this experiment on my own and it is crucial to first explain my classification guide for the three different habitat types I will be experimenting with. I classified large rock habitats as places where the crayfish were found under or around a rock greater than 10.5 inches in diameter, the habitat range in the middle existing of pebbles and cobbles that has rocks varying from 2.5-10.5 inches in diameter, and finally the open sandy area as this is an area with mostly sand and rocks smaller than 2.5 inches in diameter. So, for this experiment I gathered a 5-gallon bucket, a net, a notepad to record data, and

a ruler for the measurement of both rocks and crayfish. And the methods used were very simple as I just went to different parts of the stream and recorded data for 15 specimens at each of the 3 habitat types that I defined above. After I had collected the crayfish, I would lay them down on a wooden bridge that goes over the stream and flatten them out to record the measurement of total body size. Once the crayfish were straightened out on the bridge, I defined my measure of total body size to be from the tip of their claws to the end of the tail as this standardized the measurement process pretty well, I believe. For the sake of trying to keep the most accurate data I would keep all the crayfish in the 5-gallon bucket until I had caught 15 of them in that habitat type to make sure no crayfish were recorded twice in the data set

RESULTS

After collecting data on the total body size of the cray fish versus the habitat type, they were found in, I put the data into a basic excel chart showing all 45 data points divided up into their 3 categories. As you can see in the table below the mean body size of the crayfish does increase in the habitats with more cover around. I also entered the complete data sets of all 45 values into a one-way ANOVA calculator with each habitat type as a treatment and the calculations showed a p -value of 0.000207 which very easily fits in the desired p -value range of $p < 0.05$.

Habitat type	Mean crayfish size (cm)	Standard Deviation
Large rocks	7.8	1.656157342
Pebbles and Cobbles	6.4	1.594633859
Open sandy area	5.4	0.985610761

Table 1. This table shows the summary statistics, mean size and standard deviation, of the data that was found for each of the 3 sites in the stream.

Habitat type	Crayfish size (cm)	Habitat type	Crayfish size (cm)	Habitat type	Crayfish size (cm)
Large rocks	7	Pebbles and cobbles	4	Open sandy area	6

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Large rocks	6	Pebbles and cobbles	8	Open sandy area	4
Large rocks	8	Pebbles and cobbles	7	Open sandy area	6
Large rocks	11	Pebbles and cobbles	6	Open sandy area	6
Large rocks	9	Pebbles and cobbles	5	Open sandy area	7
Large rocks	5	Pebbles and cobbles	5	Open sandy area	4
Large rocks	6	Pebbles and cobbles	8	Open sandy area	5
Large rocks	9	Pebbles and cobbles	9	Open sandy area	5
Large rocks	8	Pebbles and cobbles	6	Open sandy area	4
Large rocks	7	Pebbles and cobbles	7	Open sandy area	5
Large rocks	8	Pebbles and cobbles	5	Open sandy area	6
Large rocks	9	Pebbles and cobbles	8	Open sandy area	6
Large rocks	6	Pebbles and cobbles	8	Open sandy area	5
Large rocks	10	Pebbles and cobbles	4	Open sandy area	7
Large rocks	8	Pebbles and cobbles	6	Open sandy area	5

Table 2. This table above just goes to show you the raw data that we had used in the experiment to help you better understand the statistical summaries. This can be used to see any outliers that a certain habitat may have had.

DISCUSSION

The goal of this study was to prove a correlation proving that crayfish with larger body sizes would live in areas with more cover around them. There were no previous studies that I could locate to help gauge the experiment off of. The results were very exciting as our p -value of 0.000207 proved by a large margin that the study showed statistical significance, in regard to a p -value <0.05 , to support our starting hypothesis that the areas with more cover would contain larger crayfish. This thinking can make sense when you think about the cover serving to protect the inhabitants from predators and therefore the crayfish will live longer lives which is likely to in turn show a greater body size. This experiment could be manipulated down the road with other experiments to try to find out more about the reasoning behind the correlation displayed or maybe even break the habitats down into more categories and see how exact the trend gets.

LITERATURE CITED

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