A Study of the Comparative Densities of Parrotfish on the North and South Side of Rodney's Rock.

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Abstract

This is a study of the densities of parrotfish along the reef known as Rodney's Rock. We speculated that the density of parrotfish would be higher on the North side of Rodney's rock. Our data supports the hypothesis that parrotfish density is higher on the north side of Rodney's Rock than on the south side

Introduction

One method of characterizing an ecosystem is to look at certain indicator families to assess the condition of the environment. In 2001 a group of Texas A&M University students conducted a research project which focused upon identifying various species present on Rodney's Rock located in Dominica, W.I. (Hoffman et al., 2001). Shortly thereafter, another group worked to identify and look at populations of fish including parrotfish around Champagne Reef (Koehler et. al., 2003). Rodney's Rock is a dike coming from the shore and jutting into the water about 50 meters. The rock is relatively vertical in places hence the "wall" designation. Parrotfish (Figure 1.) are common around the rock because of the associated coral around it. Our study has chosen to look at the family, Scaridae, and look at its population dynamics.

Figure 1: Stoplight Parrot Fish (*Sparisoma viride*)

Scaridae, better know as parrotfish, are a tropical reef fish commonly seen throughout the world in shallow reefs. The family Scaridae contains ten genera and just over 90 species. Following the death of a large percentage of sea urchins in the

Caribbean, parrotfish have become the main grazers. Previously the most common of the parrotfish are *Sparisoma viride* and *Scarus iseri* (Mumby and Wabnitz, 2001).

The name parrotfish was coined due to the family's numerous teeth that are tightly arrange along the external surface of their jaw bones, forming a "parrot-like" beak. This beak is used to feed upon algae located on various surfaces, most notably coral. Parrotfish vary in size with species ranging from 20 cm in the smaller species, such as *Leptoscarus viagiensis,* to 1.5 meters in the larger species, such as *Bolbometopon muricatum*. Parrotfish can consume a rather large variety of organisms known to reside among coral reefs, but they are mostly recognized as being herbivores. The feeding patterns of Scaridae are credited for the production of coral sands through the consumption of coral polyps in their diet.

Preliminary observations at Rodney's Rock indicated that water clarity was higher on the north side of the rock. The objective of this study was to test the hypothesis that the North side of Rodney's Rock will have a higher density of parrotfish because of the higher clarity of the water.

Materials & Methods

Parrotfish counts were censused using rectangular transects. These transects consisted of a 30m x 5m rectangle bordered by 1cm thick yellow nylon rope. To calculate these densities, we set up transects at locations selected by accessibility. The transects were 30m x 5m as well as a single transect of the rock itself. At each corner of the rectangle a 5m piece of rope was attached with a 1 Kg weight used to anchor the rectangle to the reef floor. Flotation devices, either inflated Trojan™ non-lubricated condoms or hard foam, were tied to each corner to keep the apparatus afloat. Each

student swam down the middle of the rectangle using snorkeling gear (mask, fins, and snorkel) and counted any parrotfish seen from the surface to the ocean floor on an underwater tablet.

Four transects were taken over 3 days. The rectangles were positioned so that one end was near the beach and it extended out into the open water. On 28 May 2007 2 different transects were taken with each or the four students running it 3 times. On 30 May 2007 and 1 June 2007 only 1 transect was used with each student surveying it 3 times. Also on these 2 dates each student took 1 count on each side of the wall face of Rodney's Rock. The data were then entered into an excel file and means were calculated.

Results

Parrotfish densities based on transect censuses are shown in tables 1-4. The results indicated that the density of parrotfish on the northern side of Rodney's rock was higher than that of the south side. Only one count yielded higher numbers on the south side and was probably due to misidentification. As these densities and line counts illustrate the number of fish increase on the northern side.

Table 1. Transect 1 5/28/2007

	1st Census	2nd Census	3rd Census	Average
Student 1	9	5	9	
Student 2	12	19	16	
Student 3	11	12	n/a	
Student 4	11	12	13	11.375

Table 2. Transect 2 5/28/2007

	1st Census	2nd Census	3rd Census	Average
Student 1	8	8	n/a	
Student 2	10	12	11	
Student 3	6	5	8	
Student 4	11	14	13	9.25

Table 3. Transect 3 5/30/2007

	1st Census	2nd Census	3rd Census	Average
Student 1	2	3	4	
Student 2	2	2	3	
Student 3	15	5	7	
Student 4	4	3	4	4.5

Table 4. Transect 4 6/1/2007

	1st Census	2nd Census	3rd Census	Average
Student 1	8	10	6	
Student 2	5	3	4	
Student 3	5	4	5	
Student 4	6	5	6	5.75

Table 5. Density

Fish/m2	North	South
Transect 1	0.0782	0.03
Transect 2	0.06424	0.037222

Table 6. Line Counts

Average	North	South
5/30	19.75	16.25
6/1	23.25	13.25

Discussion

The results of our study show that the north side of Rodney's Rock has both a higher density and count than the southern side. This could be due to the fact that the north side has better clarity and therefore better production of plankton which feed both coral and jellyfish. A larger amount of production leads to more coral which allows more parrotfish to feed in the area.

Figure 2. Picture of juvenile *Sparisoma viride* By Rickey Wallace

We used a 30m x 5m rectangle for our transect. This was beneficial in the fact that it allowed for better visuals of where the counting boundaries were located. However, some difficulties arose with this particular method. The nylon rope moved about with the wave action even with the weights and floats. Often times the area was wider or thinner in the middle than 5 meters. Also, Trojan condoms have a tendency to pop when they come in contact with floating sea grass and protruding rocks. Another difficulty with the shaped transect was construction. Assembling transects each day took time and the rope often crossed or became entangled. There was some inconsistency in identification of the parrotfish among members of the study group. The

juvenile fish (Figure 2) tended to be harder to spot since they stayed close to shore and rocks. The south side also had less clarity and the fish were harder to see. This may have introduced other factors like whether the clarity was the cause of less parrotfish or we were just unable to see them.

Conclusion

This type of study is important because of the need to know the direction of ever-fluctuating fish densities. Our data shows that for some reason there is a difference in densities between North and South of Rodney's Rock. All of the data collected over our 3 day study period supports our hypothesis that the density of parrotfish is greater on the North side of Rodney's Rock. This can help future research determine the reason for disparities in fish populations.

Works Cited

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