

**Frequency of *Percnon gibbesi* in relation to
Diadema antillarum at Rodney's Rock**

By: Rickey Wallace

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Texas A&M University

Dr. Bob Wharton

Dr. Jim Woolley

Abstract

The nimble spray crab (*Percnon gibbesi*) and the long-spined black sea urchin (*Diadema antillarum*) live together, one as the resident the other as the home. Of 1200 urchins surveyed over 4 days 591 crabs were recorded. The data shows that the North side of Rodney's Rock has a density of 0.38 crabs per urchin, while the South side is 0.6 crabs per urchin. I hypothesized that there would be a higher density of crabs on the North side, but the data suggest that the reverse is true. There is a much better chance of seeing a crab on the South side where the wave action is the greatest.

Introduction

A coral reef is an ecosystem that has many plants and creatures relying on one another to survive. At Rodney's Rock, Dominica, WI, there is one such relationship that I chose to study, and that is the way that the long-spined black urchin

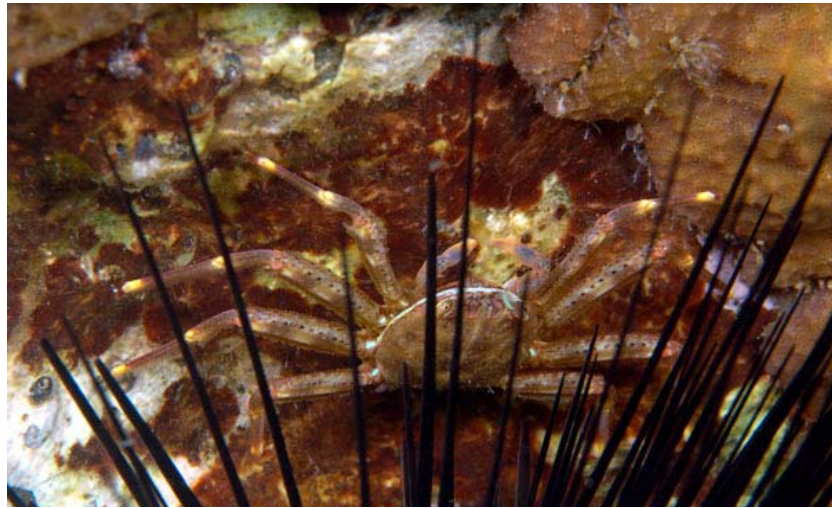


Figure 1. Picture of *Percnon gibbesi* under *Diadema antillarum* spines.

(*Diadema antillarum*) protects the nimble spray crab (*Percnon gibbesi*) from predators (Figure 1). The Long-spined urchin is a grazer that feeds on the algae associated with coral reefs. It can be identified by its long black colored spines (up to 30 cm). This role as a grazer is very important for coral reefs because they reduce the amount of algae growth and create places for new life to start (Toller 2003).

In the early 1980's 95% of the urchins died in the Caribbean and this in turn created a major decline in coral (Toller 2003). This represents how vital the long-spined sea urchin is to the reefs and fortunately their numbers have rebounded over recent years. To the nimble spray crab the urchin is important for another reason and this is to provide protection from predators (Debelius 2001). The nimble spray crab, also known as the Sally lightfoot crab is also an algae feeder on the reefs of the Caribbean. It is a flattened crab, with long legs with yellow stripes and a brownish body. The nimble spray crab is also an invasive species in other parts of the world. In the Mediterranean, large ships have unknowingly deposited spray crabs that have been catching a ride on their hulls (Legaki 2006). The crabs have been showing up on the coral reefs from Italy to Turkey in the past couple of years. On the reefs around Rodney's Rock, however, it is a native species.

Rodney's Rock is a rocky outcropping from the Eastern shore of Dominica. The rock protrudes from the water and creates an underwater wall. The rock starts at the beach and extends to an approximate depth of 15m. The South side of the rock is open to constant surf, while the North side is a fairly protected cove. During my first survey of the reef I decided to determine the ratio of crabs to urchins on both the North and South sides of Rodney's Rock. I hypothesize that the crab to urchin ratio will be higher on the North side because of better protection from the surf.

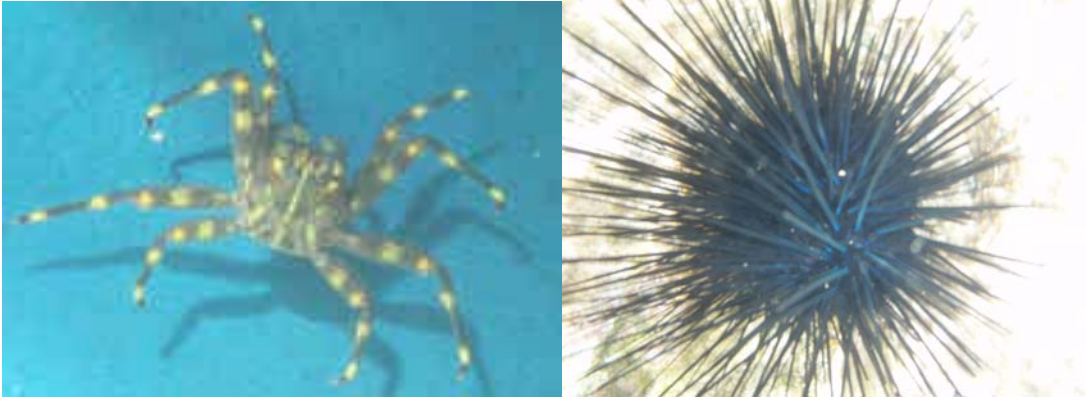


Figure 2. Pictures of *Percnon gibbesi* (Left) and *Diadema antillarum* (Right)

Materials & Methods

On 4 separate days I counted 300 *Diadema antillarum* and recorded the number of *Percnon gibbesi* under them. Each day consisted of 3 counts: 1 on submerged rocks off the beach, 1 on the wall of Rodney's Rock starting from the deep end and headed towards the shallow, and the last count was on the wall from the shallow to the deep. I would float on the surface using snorkeling gear (mask, fins, and snorkel) and locate urchins. I would then dive down if necessary to look under the spines for crabs. Any crabs located would then be recorded as tick marks on the underwater tablet. This would continue at each site until 100 urchins counted. Urchins and crabs were surveyed on the North side of Rodney's Rock on 28 May 2007 and 1 June 2007. On 30 May 2007 and 4 June 2007 the surveys were conducted on the South side of Rodney's Rock. Over the four days a total of 1200 urchins and their inhabitants was counted.

Results

Crab census data are shown in Table 1. Day 2 and day 3 had the most crabs seen. There were 229 crabs recorded from the North side and 362 from the South side. I counted 600 urchins at each side giving you a 38% chance to see a crab per urchin on the North side of Rodney's Rock. The South side has a 60% chance to see a crab per urchin.

The rocks were the preferred habitat for crabs at Rodney's Rock (Figure 4). The preferred habitat for the North side crabs was the deep wall (Figs 5, 6). Crabs on the South side preferred the rocks followed by the shallow wall (Figs 7, 8). The rocks on the South side of Rodney's Rock are the best place to see a nimble spray crab at a 75% chance per crab.

Discussion

The results show a definite trend with the South side of Rodney's Rock containing more nimble spray crabs. There are many factors that could effect this distribution. First, it's possible that the wave action creates more feeding opportunities for the crabs and this is why they choose the south side more often. The water is definitely less clear on the south side than the protected North side. For example, the visibility was so poor on one of the census days that it was difficult to get an accurate count of the crabs on the South side.

On the North side the rocks are the preferred habitat for crabs especially when the urchins were clustered together. This could be because the groups of urchins offer more protection in the clearer water. The habitat of the urchin seemed to affect the amount of crabs that took up residency with the urchins in that area. Crabs on the North side seem to prefer the deep wall. This could be because of good nutrient flow from the waves. Crabs on the South side seemed to prefer the shallow rocky areas. I think this is because they have plenty of wave action and nutrients on that side but shallower offers more protection. A separate paper suggests that the selection of urchins is random by the spray crabs (Hayes 1998), but the fact that the habitat seems to matter when there is an abundant number of urchins to choose seems to contradict this. Overall there is a

difference in nimble spray crab density between the North and South sides of Rodney's Rock. The data did not however support my hypothesis.

Conclusion

The need for this type of research is fairly obvious to me. The data I have collected could be invaluable to the Mediterranean when there are trying to control an invasive species. The Caribbean communities could use my data to improve the habit of the nimble spray crab, a native species. In this situation I am as happy with the results of this study as I would be if it had supported my original hypothesis.

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Department of Planning and Natural Resources Division of Wildlife and Fisheries

Appendix

Table 1. All census data collected for *Percnon gibbesi* at Rodney's Rock

Site	Day 1	Day 2	Day 3	Day 4	totals
Rocks	33	102	51	48	234
Wall Shallow	8	86	34	46	174
Wall Deep	27	44	76	36	183
Totals	68	232	161	130	591

Figure 3. All census data collected for *Percnon gibbesi* at Rodney's Rock

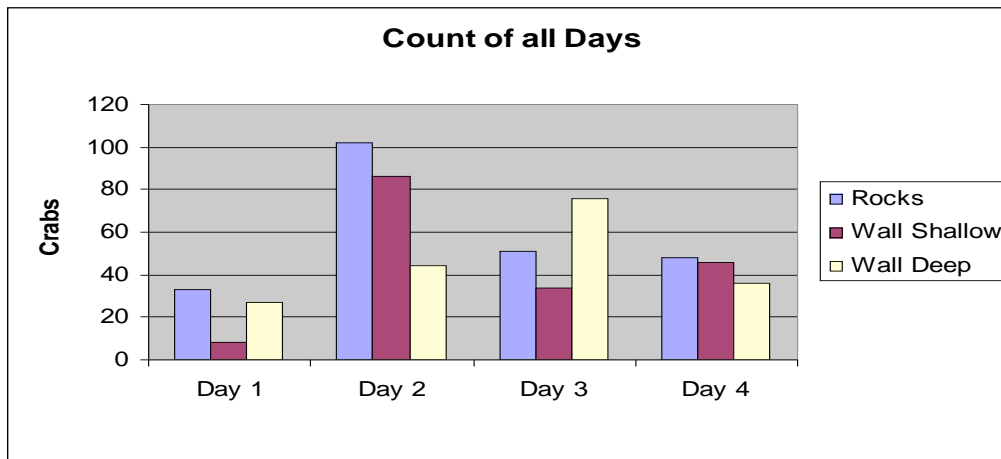


Figure 4. Habitat ratio Rodney's Rock

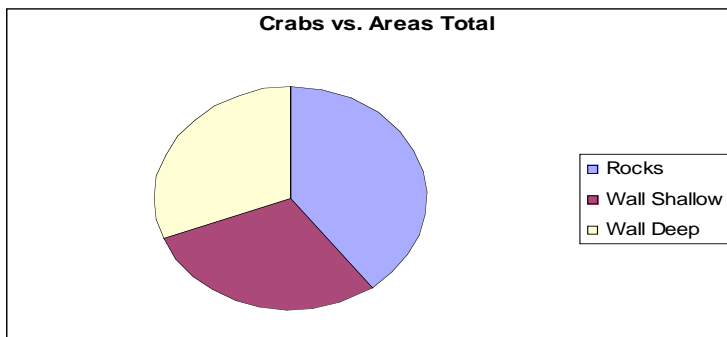


Table 2. Census data for North side of Rodney's Rock

Site	Day 1	Day 3	Totals
Rocks	33	51	84
Wall Shallow	8	34	42
Wall Deep	27	76	103
Totals	68	161	229

Figure 5. North side totals

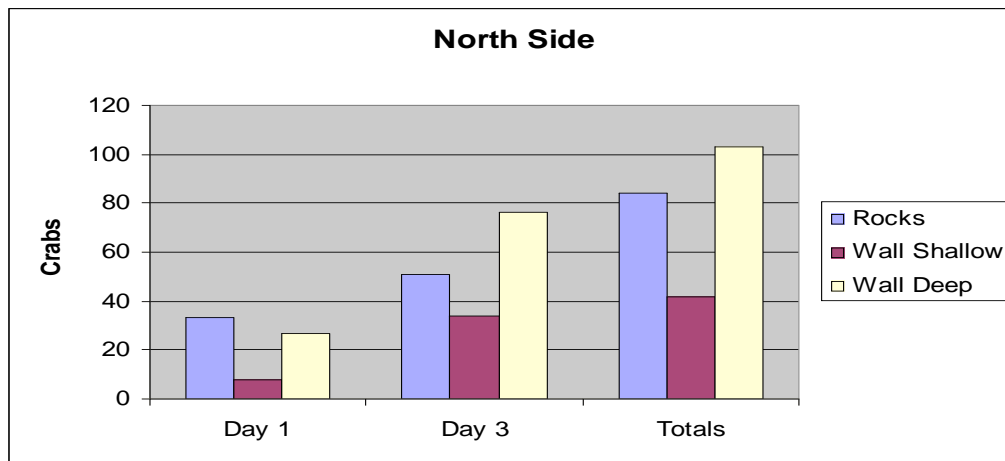


Figure 6. Habitat ration North side

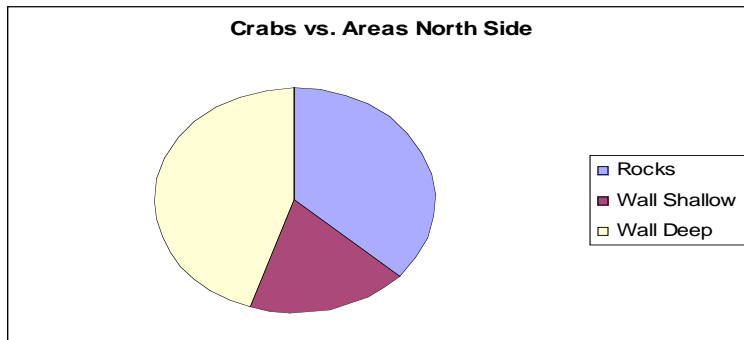


Table 3. Census data for South side of Rodney's Rock

Site	Day 2	Day 4	Totals
Rocks	102	48	150
Wall Shallow	86	46	132
Wall Deep	44	36	80
Totals	232	130	362

Figure 7. South side totals

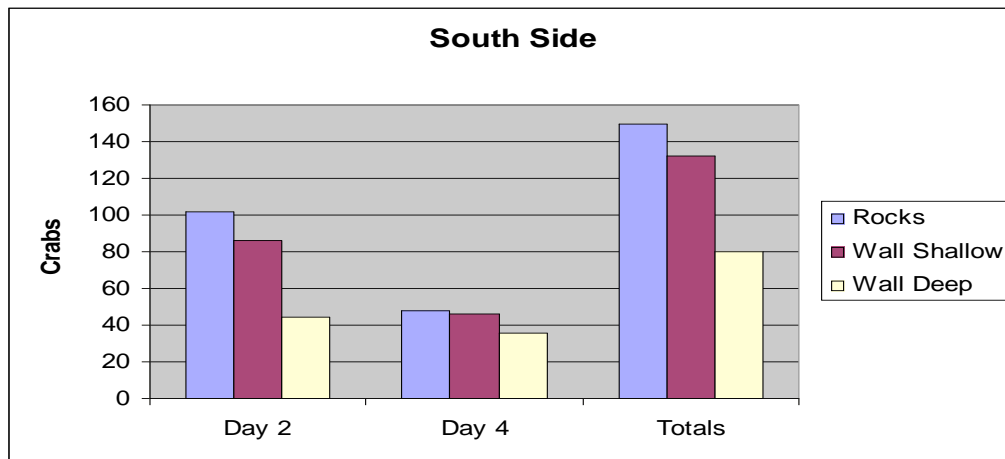


Figure 8. Habitat ratio South side

