Interspecific Competition of *Stegastes fuscus*

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Abstract:

Tarou Point, also known as Rodney's Rock, is framed by a variety of coral and marine life. One commonly found fish is the Dusky Damselfish, *Stegastes fuscus*. Territories were measured and monitored for three days, and aggressive interactions recorded. There were a few fish that *S. fuscus* tolerated, along with a number that they chased away. This research can serve as a baseline for future monitoring of *S. fuscus*.

Introduction:

Dominica, also known as the "Nature Isle", is of volcanic origin located between Martinique and Guadelupe in the West Indies. Along with it's mountainous landscape, Dominica has a variety of rich dive sites; one of these being Rodney's Rock, located about 2.5km from Roseau. Rodney's Rock is noted for its thick growth of algae, hard corals, sponges, and schools of fish (Evans 1997). The Dusky Damselfish, *Stegastes fuscus*, is one of the most commonly encountered fish at Rodney's Rock (May 28, 2001; pers. Observations). This species belongs to a group of reef fishes known to be territorial (Humann 1999). It is likely, therefore, that *S. fuscus* is territorial and may be involved in interspecific competition for food or other resources. In order to test these hypotheses three questions were posed. The first question asked the size of the *S. fuscus* territories, the second determined the distance between two adjacent territories, and the third identified which fish they would chase and tolerate in their territory. This research was conducted at Rodney's Rock between May 28 and June 1, 2001. These observations could be a baseline for further research concerning the Dusky Damselfish.

Methods and Materials:

The first set of observations were made to assess the size of the Dusky Damselfish's territory as determined by the aggressive pursuit of invading fish. We observed various sites and determined the size of each territory. Once we saw a fish committed to a certain area, we used a premeasured string to determine the area of their territory. With each site determined, we measured the distance that *S. fuscus* would chase other fish away. All measurements were taken with a pre-measured string and recorded on an underwater tablet.

The second set of observations were to determine the distance between territories. After originally measuring the site and counting the number of fish at each site, we were able to determine the distance between each territory. We did this with the same procedures as the first observation. In addition, we counted the number of Dusky Damselfish in each territory.

Finally, in our last set of observations of the Dusky Damselfish, we were interested in the species they would tolerate and not tolerate. We accomplished this by returning to the previous sites and observing the behavior of the fish at each site. We noted on our tablet which species the Dusky Damselfish would chase off and which they would tolerate in their territory.

Results:

The results are presented below. Table 1 represents data from two days of observations, showing the number of fish in a given area. Fig. 1 is the corresponding chart. Table 2 represents the size of a single fish's territory.

Distances between territories ranged from 1m to 8m. The mean distance between territories was 4 meters with a sample size of twelve territories.

Dusky Damselfish were observed aggressively defending their territories against eighteen other species. Table 3 is a representation of the fish tolerated and not tolerated by the Dusky Damsel. Fig. 2 is the chart that represents the chase distance versus the size of the territory.

Table 1 – Number of fish in relation to the size of their territory

Size of area (m^2)	# of fish
1	1
1	1
2	1
2	1
4	1
6	1
6	1
7	1
16	3
36	5
49	8
1	1
2	1
3	1
4	2
5	1
10	3
10	3
15	4
15	5
25	7
48	7

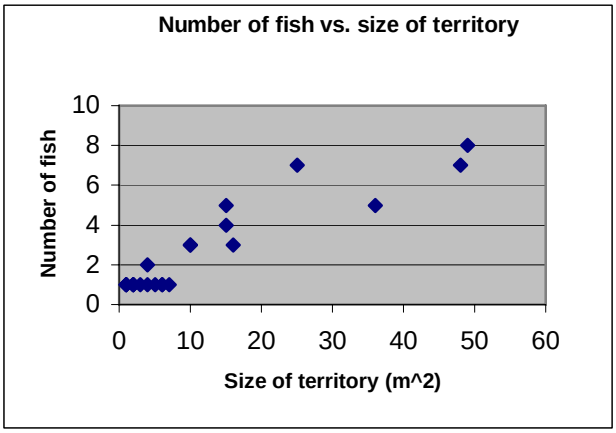

Fig. 1 – Number of fish vs. size of territory

Table 2 – Average area for single and group fish

	Single fish area (m^2)		Group fish area per 1 fish
Site 1	1	Site 13	5.333333
Site 2	1	Site 14	7.2
Site 3	2	Site 15	6.125
Site 4	2	Site 16	2
Site 5	4	Site 17	3.333333
Site 6	6	Site 18	3.333333
Site 7	6	Site 19	3.75
Site 8	7	Site 20	3
Site 9	1	Site 21	3.571429
Site 10	2	Site 22	6.857143
Site 11	3		
Site 12	5		
Avg. area	**3.333333333**		**4.450357**

Table 3 – Fish tolerated and not tolerated in the Dusky Damsel's territory

# of fish	Fish chased from area	# of fish	Fish tolerated in area
1	*Scarus taeniopterus*	1	*Diodon hystrix*
1	*Pseudupeneus maculatus*	1	*Aulostomus maculatus*
2	*Synodus intermedius*	1	*Thalassoma bifasciatum*
3	*Thalassoma bifasciatum*	2	*Sparisoma viride*
4	*Ophioblennius atlanticus*	4	*Pseudupeneus maculatus*
5	*Thalassoma bifasciatum juv*	4	*Stegastes partitus*
7	*Acanthurus bahianus*	5	*Microspathodon chrysurus*
7	*Scarus croicensis*	6	*Sparisoma rubripinne*
10	*Chromis multilineata*	9	*Stegastes fuscus*
15	*Halichoeres poeyi*		

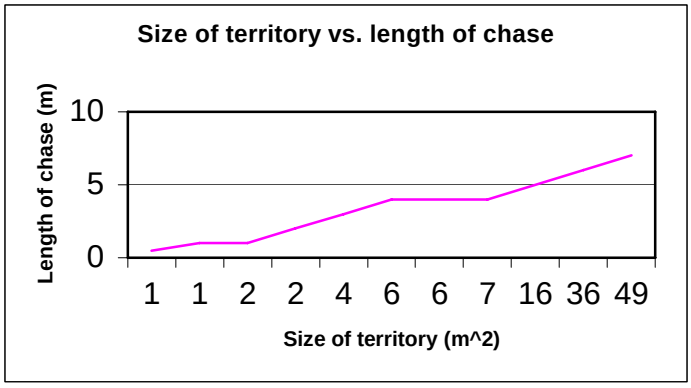

Fig. 2 – Size of territory vs. length of chase

Discussion:

Through our observations at Rodney's Rock, it was seen that the *S. fuscus* was extremely territorial. After examining the territories, it was determined that the more *S. fuscus* there were in an area, the larger the individual's territory. Also, as the territory size increased, so did the distance the *S. fuscus* was willing to chase threatening fishes away. Because there was more area to protect, it had to keep other fish further away. The *S. fuscus* is classified as a grazer, which means it often feeds on algae. Hence, it was determined that the Dusky Damselfish was more aggressive and willing to protect an area where it was feeding. These areas appeared to be the largest and were also a territory the *S. fuscus* were willing to chase fishes away for farther distances. The types of fish the *S. fuscus* would tolerate and the type of fish it would chase away were also noted.
The data suggested that the *S. fuscus* was more likely to chase away other grazers and tolerate non-grazing fish. The grazers posed a threat to *S. fuscus'* food supply and had the ability to invade and take over their territory. However, there were a few cases in which a grazer was tolerated and there were no obvious reasons to why this occurred. The data presented here can serve as a baseline for future observations of the Dusky Damselfish's behavior at Rodney's Rock or other similar habitats.

References:

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Humann, Paul 1999. Reef Fish Identification. New World Publications, Inc. Florida