

Intraspecies and Interspecies Interactions of the Male Bluehead
Wrasse, *Thalassoma bifasciatum*, at Champagne Bay and
Scott's Head, Dominica

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Abstract

A three week study was conducted to find and compare the interspecies and intraspecies interactions of the Bluehead Wrasse supermale, *Thalassoma bifasciatum*. The location of this study is the Caribbean island of Dominica. Data were recorded from two points; the western coast known as Champagne bay and the southernmost tip of the island known as Scott's Head. Samples were taken at each point and a list of both intraspecies and interspecies interactions was compiled. Each sample was compared, leading to results which were then synthesized into individual tables to produce an overall view of interspecies and intraspecies interactions of the supermale *T. bifasciatum*.

Introduction

The open oceans of this planet are complex and are full of ecosystems which are equal to if not greater in complexity than the pelagic ocean. One of these ecosystems is the coral reef environment in which lives Bluehead Wrasse, *Thalassoma bifasciatum*. Bluehead Wrasse is a brightly colored species of reef fish between 1 and 5 inches in length. While some individuals are born male and remain a bright yellow throughout their life, most individuals are born female (also yellow, but with a small black dot on the dorsal fin) which may or may not transition into the supermale. This transformation is represented by the protogynous hermaphrodite trait found in this species (beautifuloceans.com). Supermales of *T. bifasciatum* are distinctly different in color, particularly known for their blue head separated from their yellow-green body by a black-white-black line pattern which can be observed in Figure 1.

While *T. bifasciatum* is primarily carnivorous, usually feeding on smaller invertebrates as well as phytoplankton, this species also participates within the reef ecosystem as a cleaner, in which individuals clean ectoparasites from other fish (Jones, 2002). Previous studies have shown that the supermales of *T. bifasciatum* are not usually prone to high amounts of aggression but that habitat complexity and priority can play a role in influencing interactions (Geange, 2010). This study examined how supermales will interact both intraspecifically and with other species. I hypothesize that the subject will interact most with species other than it's own, specifically, various groups of parrotfish (Figure 2). This idea is based on the fact that *T. bifasciatum* has been known to participate in mutualistic relationships with the parrotfish; parrotfish receive cleaning while *T. bifasciatum* are provided with cover during feeding in return. *T. bifasciatum* has also been known to roam independently for most hours of the day other than those spent breeding, giving it more time to partake in more interspecific interactions.

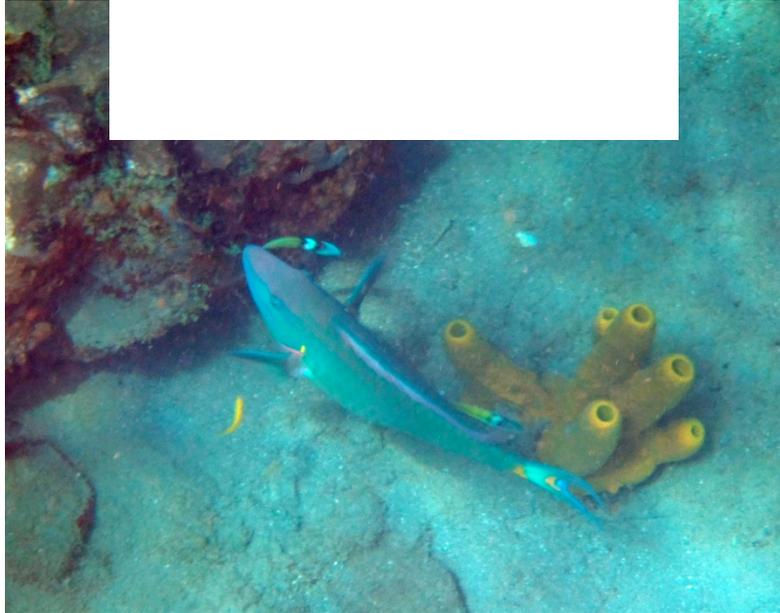
Figure 1

Thalassoma bifasciatum, supermale



Figure 2

Thalassoma bifasciatum, supermale
cleaning a parrotfish



Materials and Methods

To conduct this experiment, a mask, snorkel, bathing suit, defog, booties and fins were used. Underwater slates and pencils were used to record all data and an Olympus Stylus Tough camera, viable up to 33 feet in depth, was used to provide visuals for better identification.

To begin this study, two days were taken to make observations of where groups of *T. bifasciatum* seemed to be concentrated and to make approximations of how close to the species a diver could be without interfering with possible results of the study. An additional three days were spent studying the interactions of the supermale *T. bifasciatum*. From those three days, three different interspecific interactions varying in manner as well as four different intraspecific

interactions, which also varied, were identified. This was done by creating a chart on the underwater slate showing tally marks for the number of interactions and space next to the tallies designated for notes on the type of interactions observed. Times entering and exiting the water were also noted. The interspecific species observed consisted of various parrotfish, Long Fin Damselfish, and Sergeant Majors. Interactions within species were associated with other supermales, females, intermediates (females in transition) and initial phase (I.P.) males. These data were filed into tables of an Excel worksheet and copied to a Word document.

Results

Table 1

Interactions		Champagne Bay				Scott's Head		Total
		5/31/2011 9:50AM- 11:25AM	Behavior	6/5/2011 2:00PM- 3:26PM	Behavior	6/3/2011 11:00AM- 12:30PM	Behavior	
Interspecific	Parrotfish	17	Mutualistic	2	Mutualistic	0	none	19
	Longfin Damselfish	15	Aggressive	2	Aggressive	0	none	17
	Sergeant Major	10	Aggressive	1	Aggressive	0	none	11
Intraspecific	Supermale	8	Nonviolent	9	Nonviolent	3	Nonviolent	20
	Female	16	Pursuit	33	Pursuit	13	Pursuit	62
	Intermediate	7	Nonviolent	7	Nonviolent	8	Nonviolent	22
	I.P. Males	8	Nonviolent	14	Territorial	30	Territorial	52

The results can be seen in table 1. Rows represent the number of each species interaction observed while columns represent dates the data were taken and behaviors observed. Note that Champagne Bay has two sets of data while Scott’s Head has one. The timeline for data collected from Scott’s Head was on the boundary of late morning/early afternoon rather than strictly one

or the other, and observations of interspecific interactions is lacking. The number of interspecific interactions is highest in the morning hours, the time most associated with *T. bifasciatum* feeding, while intraspecific interactions tend to dominate the afternoons, primarily noted as a time of mating.

Discussion

After concluding analysis of the results, I have found that my hypothesis is not well supported. While mornings seem to be the primary time for interspecific interactions, the total number of these interactions observed overall doesn't exceed those of the intraspecific interactions (specifically with females) observed in the afternoon (table 1).

Interspecific relationships were highly observed in morning periods. Interactions with parrotfish specifically were observed as mutualistic; while the supermale cleansed the parrotfish of ectoparasites, it received protection and food in return. The aggressive relationships observed in Longfin Damselfish and Sergeant Majors represent the behavior of each fish as the supermale entered their territory to feed. These data show that though the supermale is not aggressive in nature, it tends to feed in habitats of more territorial species (table 1).

Intraspecific interactions varied from morning to afternoon as well. While the morning data was rather low for most of these interactions, later afternoon data showed a general increase in the pursuit of females and chase of intermediate and initial phase males. No aggression was observed between supermales during any observation period.

The foremost factor interfering with the number of interspecific interactions is the time of day and what activities supermales of *T. bifasciatum* participate in during those hours. While morning feedings are important, organisms must ensure high numbers of offspring as well as a

substantial amount of genetic diversity. Therefore, even though spawning only occurs within a couple of hours each afternoon, the level of intraspecific activity generally increases during this time, decreasing the level of interspecific interaction accordingly (Petersen, 2001).

There are three key differences that I would make in this experiment should I or someone else choose to perform it again. First I would ensure that my time in the water was more consistent. For example, rather than using a time slot such as 2PM-3:26PM as seen in table 3, I would devote a strict two hour slot to each observation period. Secondly, I would make certain that I was able to obtain both a morning and afternoon sample from both locations. Along with that, I would acquire data for the same number of days at each location. I believe that these changes would dramatically increase the accuracy of the results presented.

Works Cited

Bluehead Wrasse - *Thalassoma bifasciatum*. *Beautiful Oceans*. Retrieved from beautifuloceans.com

Geange, Shane W., Stier, Adrian C. Priority effects and habitat complexity affect the strength of competition. *Oecologia* 163:111–118, 2010.

Jones, M., Martha, K. Behavioural overlap in six Caribbean labrid species: intra- and interspecific similarities. *Environmental Biology of Fishes* 65: 71–81, 2002.

Petersen, Christopher W., Warner, Robert R., et al. Components of fertilization success in the bluehead wrasse, *Thalassoma bifasciatum*. *Behavioral Ecology* Vol. 12 No. 2: 237–245, 2001.