Coloration and movement of trumpetfish at Discovery Bay

R. Scott Cushman, Stephen T. Weller and Paul A. Marino

Abstract: The trumpetfish (*Aulostomus maculatus*) is a common piscivore in the back reef at Discovery Bay, Jamaica. As a roaming predator, their cryptic coloration and behavior help them blend in with their habitats and ambush prey. Based on results from this observational study, trumpetfish do not often change color, but do vary their patterns of banding with movement and substrate. Energy costs associated with frequent color changes maybe greater than any additional cryptic benefits that might be gained. The movement of trumpetfish varied, with juveniles exhibiting little to no movement, and adults ranging in movement from 0 to 28 m. While trumpetfish showed no reaction to conspecifics, their interactions with other fish ranged from predation events to being chased by two species of damselfish.

Key words: color change, crypsis, interactions, movements

Introduction

The trumpetfish (*Aulostomus maculatus*) is a common piscivore in the back reef at Discovery Bay, Jamaica. These elongate, well-camouflaged predators exhibit varying colorations, patterns, and orientations in the water column (Aronson 1983). Aronson (1983) postulated that the frequency of color morphs in a trumpetfish population will be evenly distributed throughout the population; this theory has been supported in more recent studies (e.g., Braman and Ungerer 1998). Trumpetfish benefit from their varying cryptic morphologies; however, if one were more common than others, Aronson (1983) suggests that prey would learn to avoid the more abundant morph, and thus a negative selection pressure would be placed on that color morph. The ability of trumpetfish to change both their color and their banding patterns while traveling across microhabitats on a reef should allow them to blend in with their surroundings and ambush prey undetected. Despite the potential importance of color and pattern change in trumpetfish, however, little is known about the extent to which individual trumpetfish change coloration or color pattern over time.

We examined the coloration and patterning of trumpetfish, their movement on the reef crest, as well as their interactions with both heterospecific and conspecific fish. We observed trumpetfish through focal studies, and hypothesized that they would exhibit frequent changes in coloration and patterning as they move over varying substrate types on the reef crest. Additionally, we hypothesized that although they are roaming predators (DeLoach 1999), trumpetfish would have relatively small home ranges due to their high density in the back reef and the high abundance of prey species. Finally, we observed interactions of trumpetfish with both conspecifics and other fishes, such as damselfish and potential prey species.

Methods

We conducted our study from 3 - 9 March 2004 in the west and east back reef at Discovery Bay, Jamaica. Trumpetfish can generally be located at the reef crest in Discovery Bay, most often near edge habitats and over-hanging reef structures. Using small floats, we marked locations of trumpetfish on the reef crest and returned several times over one week to determine possible territory ranges. We followed 17 trumpetfish for a period of 30 min each, recording their size, changes in coloration and

markings, approximate territory size, and interactions with conspecific and heterospecific fish. We observed an additional 22 trumpetfish for less than 30 min each but more than 10 min each, and recorded the aforementioned characteristics except for territory size. Because we had no reliable way to mark and identify individual trumpetfish, we cannot say if we saw 39 unique fish or if some were repeated observations.

Results and Discussion

Coloration and patterning

Fish ranged in size from juveniles of < 20 cm to the largest adult of 80 cm. Three color morphs were observed: green, red-brown, and tan, the latter being the most common among adult fish. Of adult fish (> 45 cm), one was green, three were red-brown and 19 were tan colored. Of juvenile fish (< 45 cm), eleven were green, none were red-brown, and five were tan.

In seventeen 30-min observations, only three color changes occurred. While positioned over a patch of red algae, an individual exhibited a red-brown hue, but changed to tan upon relocating to a sandy area. Similarly, a trumpetfish changed from tan to green after moving from the reef to a stationary position over a small patch of turtle grass (*Thallassia testudium*). Another fish shifted from red-brown to tan while moving over the reef structure.

While color changes were rare, trumpetfish often demonstrated changes in pattern by displaying dark vertical bands. Observed fish always displayed bands when stopped over turtle grass and never when in motion. Bands were rarely displayed when fish were stationary over the reef or under reef structure. Bands seemed to provide crypsis over turtle grass, while lack of banding seemed to facilitate crypsis over sand and other substrate. In one instance, a trumpetfish nearly matched a sea rod in coloration, pattern and movement. The juvenile (< 20 cm), tan and lacking banding, mimicked the sea rod by positioning itself vertically with the upright fingers of the gorgonian, and swayed synchronously with the gorgonian.

Trumpetfish in the back reef at Discovery Bay seemed to rely on changes in banding more often than changes in color. Trumpetfish seemed to prefer hunting near small patches of turtle grass and sand within the reef structure, using banding to contribute to the crypsis of the tan and green color morphs most commonly observed in these microhabitats. It is possible that changes in banding are energetically preferred to color changes.

Movement

Trumpetfish moved between 0 and 28 m during the 30-min observation periods. In five cases fish remained stationary (moving < 2 m) for the entire time period. These fish were under overhead cover of reef or close (< 0.5 m) to reef structure. The other 12 fish traveled a mean distance of 13.8 m (± 9.6 SD). Moving fish often stopped and remained stationary for a variable period of time (between 3 s and a number of minutes) while traveling through reef structure and over patches of turtle grass.

Trumpetfish were frequently found at marked sites where at least one conspecific had been previously observed. It was impossible to know whether these were the same individuals or different fish. A trumpetfish with an isopod located on its tail was observed only once despite this distinctive identifying mark. At one site a fish of the same size and coloration was noted in five observations in three consecutive days; however, on the subsequent day, the site was occupied by a much larger fish.

While trumpetfish did move throughout the area of the reef crest, we observed many cases in which both juvenile and adult trumpetfish were stationary. Stationary trumpetfish

were most often in vertical positions or at a 45 degree incline, typically with the anterior end positioned downward. This stationary position generally occurred at reef structure, especially under a ledge or an arch of the reef.

Most of the observed fish moved relatively little (< 10 m), with almost a third of the fish remaining in the same location for the entire 30 min survey. It may be unnecessary for trumpetfish to travel broadly while hunting; their difficulty may not lie in finding potential prey (that are typically abundant) or competing with conspecifics, but in the surprise necessary to capture the prey. In this case, slow exploration and stationary periods of waiting would likely be the most effective hunting tactics.

Heterospecific fish were considerably more active on the reef crest than were trumpetfish. Because trumpetfish hunt throughout the day (DeLoach 1999), they may spread their periods of high activity over a period of hours, or their prey may be so abundant that trumpetfish do not need to travel very far to satisfy their energetic and nutritional requirements. Other fish may need a larger area to support their resource needs, or may school, and thus move about in a group over a wider range than trumpetfish.

Interaction

Some trumpetfish were observed interacting with conspecifics. In ten cases, two adult trumpetfish were in close proximity (< 1 m) to each other, and in five of these cases fish seemed to positively interact by swimming as a pair, usually one following the other. Other trumpetfish showed no reaction to conspecifics. Three juveniles were seen in close proximity to adults, but there was no apparent interaction between the fish.

We also observed trumpetfish interacting with fish of other species, the nature of these interactions ranging from territory defense to symbiotic cleaning. Trumpetfish were chased by territorial damselfish 11 times. Bicolor damselfish (*Stegastes partitus*) reacted the most aggressively to the presence of trumpetfish, while threespot damselfish (*Stegastes planifrons*) generally ignored trumpetfish roaming through their territory. In one instance a dusky damselfish (*Stegastes fuscus*) chased away a trumpetfish. Perhaps the damselfish were protecting themselves from this potential predator. It is interesting to note that the bicolor damselfish, which reacted most aggressively to the presence of trumpetfish in their territory, are a favored prey of the trumpetfish (DeLoach 1999). Threespot damselfish ignored trumpetfish, perhaps because trumpetfish were seemingly passing through their territories, and were not poised to strike (DeLoach 1999).

In several instances on the east back reef, juvenile angelfish were observed cleaning trumpetfish, generally above or near reef structure. We also observed seven predation events in which trumpetfish made pronounced strikes at heterospecifics. Prey fish were generally too small to be correctly identified with the exception of one juvenile (~3 cm) bluehead wrasse (*Thalassoma bifasciatum*). While we do not know how much a given trumpetfish feeds in one day, their day-long feeding behavior (DeLoach 1999) suggests that predation by trumpetfish may be limited to a few periodic events, and it is possible that we did not observe a representative number of these strikes. The only conspecific interactions of trumpetfish involved two trumpetfish swimming together for a period of time, usually with the smaller fish following the larger. These may have been male/female pairs; alternatively, trumpetfish may benefit in some other way from close association with conspecifics, such as increased hunting efficiency. No juvenile fish were seen interacting with other juveniles or with adult fish, possibly supporting the idea that interacting fish were male/female pairs.

Trumpetfish are a unique contributor to the diverse fish life in many reef ecosystems. While this study has provided some general knowledge on their physical characteristics and behavior, future studies could quantitatively examine their color and banding patterns with respect to substrate type, or examine their social structure to a greater degree.

LITERATURE CITED

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