Behavioral study of *Sicydium punctatum* in the Checkhall River

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Abstract

The goal of this report is to document the behavior of *Sicydium punctatum* and how it changes based on variability in habitat characteristics. Gobies were observed in 4 different sites on several occasions. Gobies displayed territorial behavior when there were few individuals of other species present, but exhibited grouping and schooling behavior when there were many individuals of other species present. Gobies never showed territorial behavior to species other than their own. Goby behavior varied quite a bit depending on the visibility and presence or absence of individuals of additional species in the area.

Introduction

The largest family of fishes, Gobiidae includes at least 212 genera and 1875 species. Members of Gobiidae are predominantly located in marine and brackish waters. Some species are catadromous or anadromous. They are frequently the most common species of fish in the streams, rivers, and lakes of volcanic, tropical and subtropical islands. The pelvic fins of well-developed gobies are fused together into an adhesive disc (Fishbase 2013). In areas with currents or other strong water flow, these adhesive discs are used to secure the fish to rocks and allow the fish to feed without being swept away or shifted unnecessarily. The majority of goby species are carnivores, preying on small bottom dwelling invertebrates. Other feeding habits for the family include plankton eating fishes and algae eating fishes. Rarely growing larger than 10 cm, the family Gobiidae has the smallest species of fish in the world. This species is also the smallest species of vertebrates in the world (Fishbase 2013).

Dominica is home to two genera and three species of goby (Burback 2010). The most common species, and the one on which this study is focused, is *Sicydium punctatum*, commonly

referred to as the tritri or the Spotted Algae-eating goby. *S. punctatum* is common in the rivers of Dominica because of the island's coastal volcanic topography (Fishbase 2013). They usually travel far upstream, often by using their adhesive discs to climb up the cliffs on the sides of waterfalls (Evans and James 1997). Female *S. punctatum* have brown coloration and males have iridescent blue coloration. *S. punctatum* is an anadromous species. Adults spawn in the rivers, when the larvae hatch, they are swept downstream to the sea, where they spend their postlarvae stage before returning to the streams, moving their way back upstream (Bell 1999).

The goal of this report is to document the behavior of *Sicydium punctatum* and how it changes based on variations in the habitat.

Materials and Methods

Goby behavior was observed in the Checkhall River using a mask and snorkel. Sites were selected to encompass a variety of habitats and possible accompanying species of aquatic organisms. Site 1 was a very large rock with a moderate current and few to no additional species. Site 2 was an area of mostly still water with many small to medium rocks and 2 large rocks. Site 2 also had very few additional species. Site 3 was an area that had a high number of prawns. Site 3 was a low current area with several medium rocks, one large rock, and one very large rock the face of which was mostly vertical under the water. Site 4 was behind the bottom a small waterfall. There was a small cave with additional species and was partially shielded from the current. Inter- and intraspecies interactions were recorded in a notebook.

Results

Site 1 – 26 May, 2013

The current was relatively weak on the rock this day. During the observation period, there were no additional species in the area. The rock had one large female goby (Goby 1) defending an area of approximately 50 sq cm. For about 5 minutes, Goby 1 spent its time chasing away a small female goby (Goby 2). During this time, a small male goby (Goby 3) gradually made into Goby 1's territory. For the 5 minutes that Goby 1 was busy with Goby 2, Goby 3 was primarily skirting the edges of the defended area, only venturing about 10 cm in, and went unnoticed until it tried to steal the center of the spot after Goby 1 chased Goby 2 about 15 cm away from the rock. Goby 1 then took notice of Goby 3 and chased him away as well. While Goby 1 chased away Goby 3, a new large female goby (Goby 4) tried to steal the rock. Goby 1 chased away Goby 4. Goby 4 did not return for the rest of the observation period. Goby 1 spent the remaining 5 minutes of observation splitting its time between chasing off Goby 2 and chasing off Goby 3.

Site 1 – Observation periods 2 and 3

During subsequent observations goby behavior barely varied.

During Observation period 2, it had been raining a lot prior to the observation period and the water level was higher and the current was stronger. There were two large gobies, each defending an approximately 40 cm area at opposite ends of the rock. There were two prawns in the area during the observation period. They were largely ignored by all gobies, whether defending or invading territories of other gobies.

During observation period 3, the current was about where it had been during the first observation period. There was only one large goby defending an area on the rock approximately 60 cm. there was one prawn in the area. It was ignored by all gobies in the area.

Site 2 – 26 May, 2013

The current was relatively weak on the rock this day. During the observation period, there were no additional species in the area. The rock had one large female goby (Goby 1) defending it. Goby 1 was defending only the rock, which was about 30 sq cm. For about 5 minutes, Goby 1 and the rock were undisturbed. Goby 1 left the rock to try to steal another rock from a goby in another site. Goby 1 was chased away and returned to the first rock. A small male goby (Goby 2) followed Goby 1. Goby 1 spent the next 5 minutes chasing away Goby 2.

Site 2 – Observation period 2

During observation period 2, goby behavior varied little. Water level was higher than in previous observation period, current was about the same as before. There were three prawns in the area. They were ignored by all gobies. One large female goby defended rock from first observation. Another large female goby defended a cluster of three medium rocks.

Site 3 – 26 May, 2013

The current was relatively weak on the rock this day. During the observation period, there were a lot of prawns and one crab in the area. Site 3 was observed for about 10 minutes. There were two large gobies, 4 medium gobies, and nine small gobies. During the entire observation period, no gobies displayed territorial behavior. The gobies tended to stay grouped by approximate size, and tried to keep their distance from the prawns and crab. The small gobies exhibited schooling behavior, following each other from rock to rock.

Site 3 – Observation period 2

The current was stronger on this day and visibility was only about 30 cm. There were fewer gobies during this period, but about the same number of prawns as there had been in the previous observation period. The large and medium gobies were still huddling together and keeping their distance from the prawns, though that distance was shorter than before. There was

a group of about five small gobies exhibiting the schooling behavior, but there were also two small gobies with the one large goby.

Site 4 – 02 June, 2013

The current was very weak in the small cave. There was one large prawn in the cave. There were 4 gobies in Site 4. Two were massive (approximately 20 cm and 16 cm) gobies and two large gobies. No gobies were demonstrating any territorial behavior, nor did they pay any attention to the prawn.

Discussion

Gobies display different behavior in the presence or absence of prawns in the area. This shift in behavior does not occur, however, until there are a significant number of prawns in the area.

In conditions where there are few prawns, gobies exhibit very territorial behavior. Gobies only display this behavior toward other gobies. When prawns are present in small numbers, gobies will ignore them. Gobies seem to prefer to defend one rock rather than multiple rocks, but will do so if no sufficiently large single rocks remain unguarded. Areas with low visibility will reduce the size of the area guarded by gobies. Small male gobies will, as a rule, attempt approaching guarded areas more carefully than will small female gobies. They will also go unnoticed for longer. Small male gobies are also more likely to move between multiple guarded areas to find openings. This behavior seems to indicate that male gobies are actively exploring access, possibly to females, than was the case with their female counterparts. The females have the territories, not the smaller males. This implies that either the females are more intelligent or

that the males prefer to wander. Beyond a certain size, or in small areas, gobies no longer show territorial behavior.

In conditions where there are many individuals from other species, gobies do not display territorial behavior. Large numbers of prawns make gobies submissive and cause them to group together, likely for protection.

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