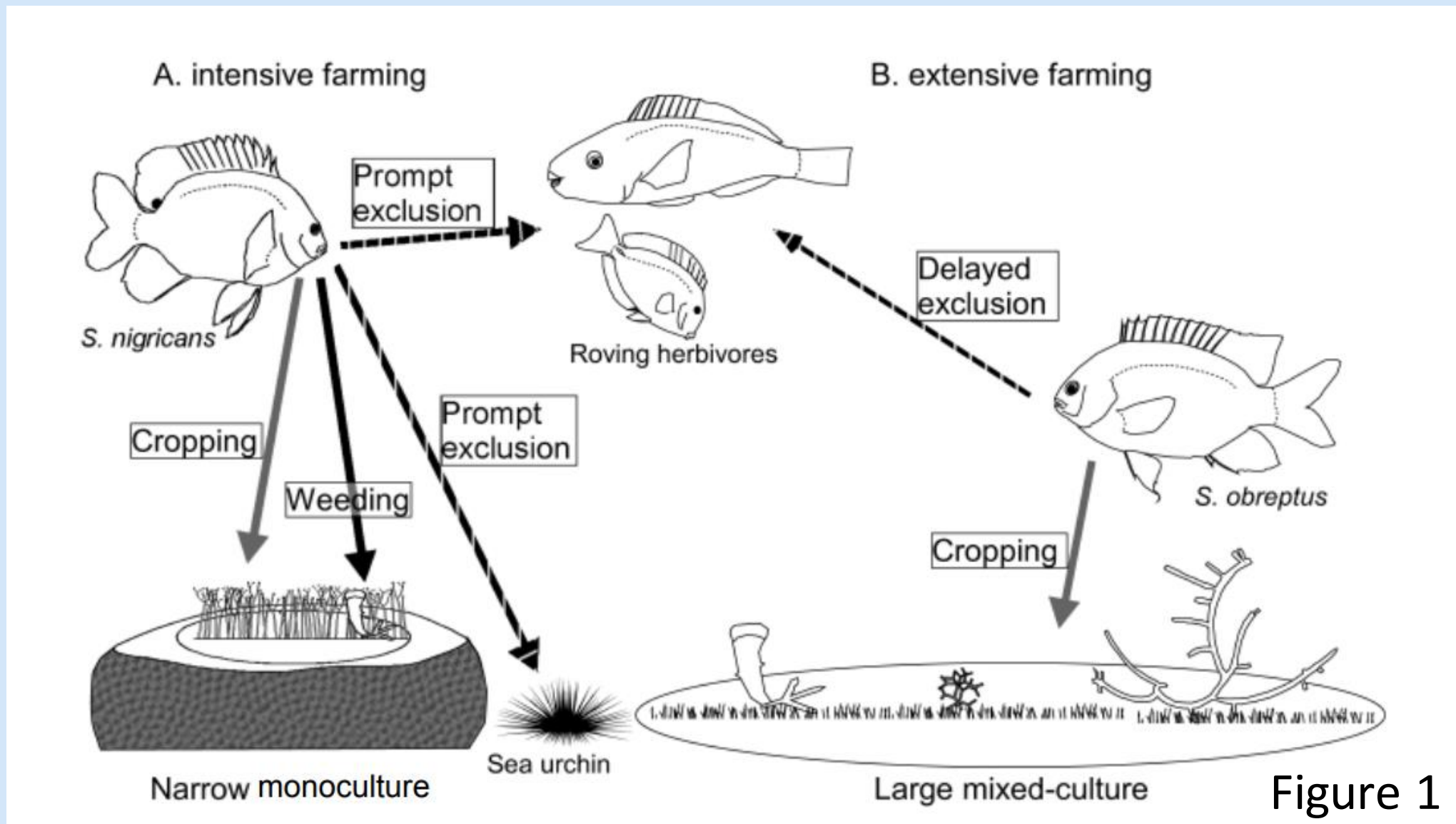


Comparing threespot damselfish behavior on coral types *Acropora cervicornis* and *Orbicella* spp.

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Introduction

- Damselfish are highly territorial herbivorous farming coral reef fish (family: *Pomacentridae*)²
- Damselfish bite live coral tissue and cultivate algae other herbivores³
- *Acropora cervicornis* is a Caribbean endangered branching coral and considered the threespot damselfish's (*Stegastes planifrons*) preferred habitat⁴
- Damselfish are important for the reef community because they influence herbivore behavior and benthic cover of their reef habitats³
- Damselfish can vary in how they farm in two different ways: they can be extensive farmers or intensive farmers² – Figure
- Damselfish can also vary in their aggressive behavior to defend their territories based on habitat quality¹



Research Objectives

1. To compare the threespot damselfish (*Stegastes planifrons*) farming behavior (chasing and farm maintenance), on two different coral species: *Acropora cervicornis* and *Orbicella* spp.
2. To analyze the relationship between damselfish density and farming behavior



Figure 3

Methods

Field Data Collection

- Location: Bonaire, Caribbean Netherlands (9 sites) - Figure 2
- Focal damselfish species: *Stegastes planifrons* (threespot damselfish) - Figure 3
- At each site: SCUBA divers assessed one patch of coral dominated by branching *A. cervicornis* coral and one patch dominated by non-branching *Orbicella* spp. coral
- At each coral patch: SCUBA divers placed 2-4 cameras 1m away from threespot damselfish territories to record 30 minute videos of behavior data and used transects to assess threespot damselfish density
- 30 videos in *Acropora*, 24 videos in *Orbicella*.

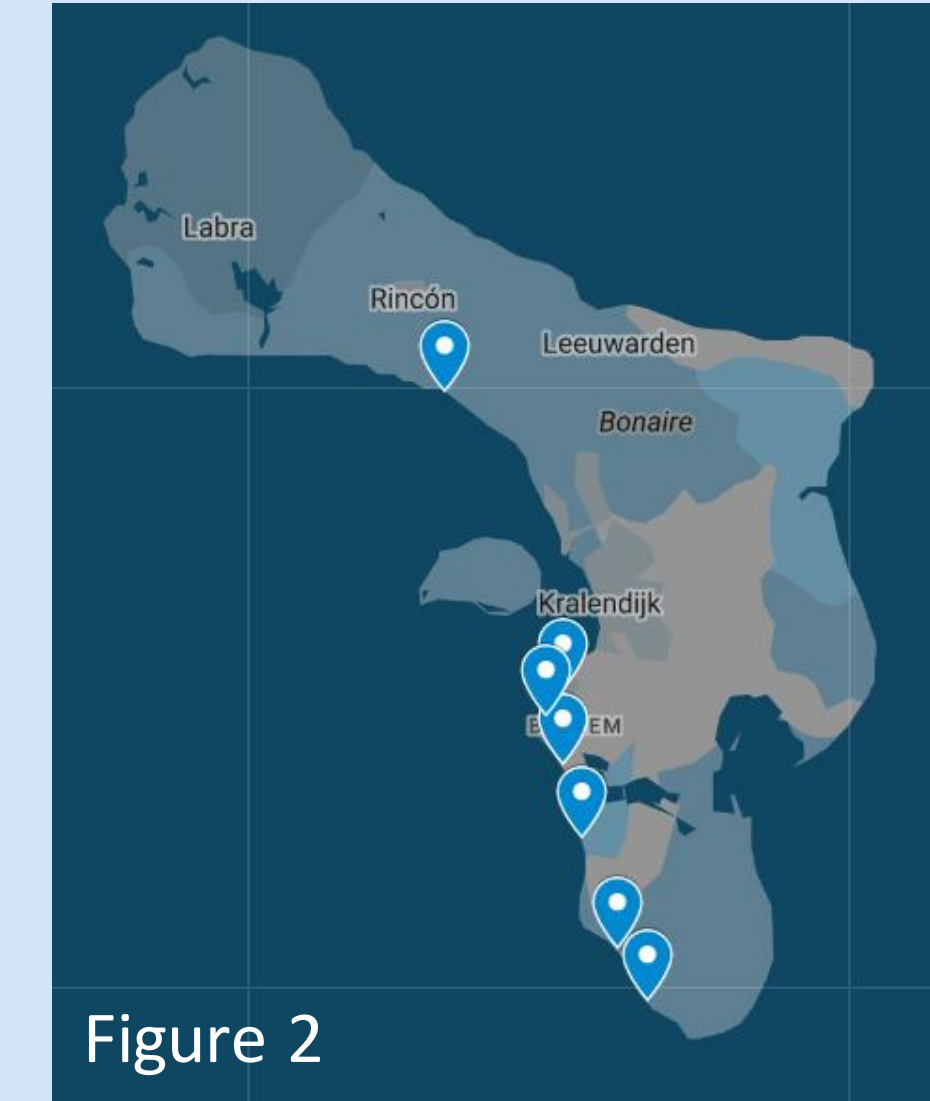
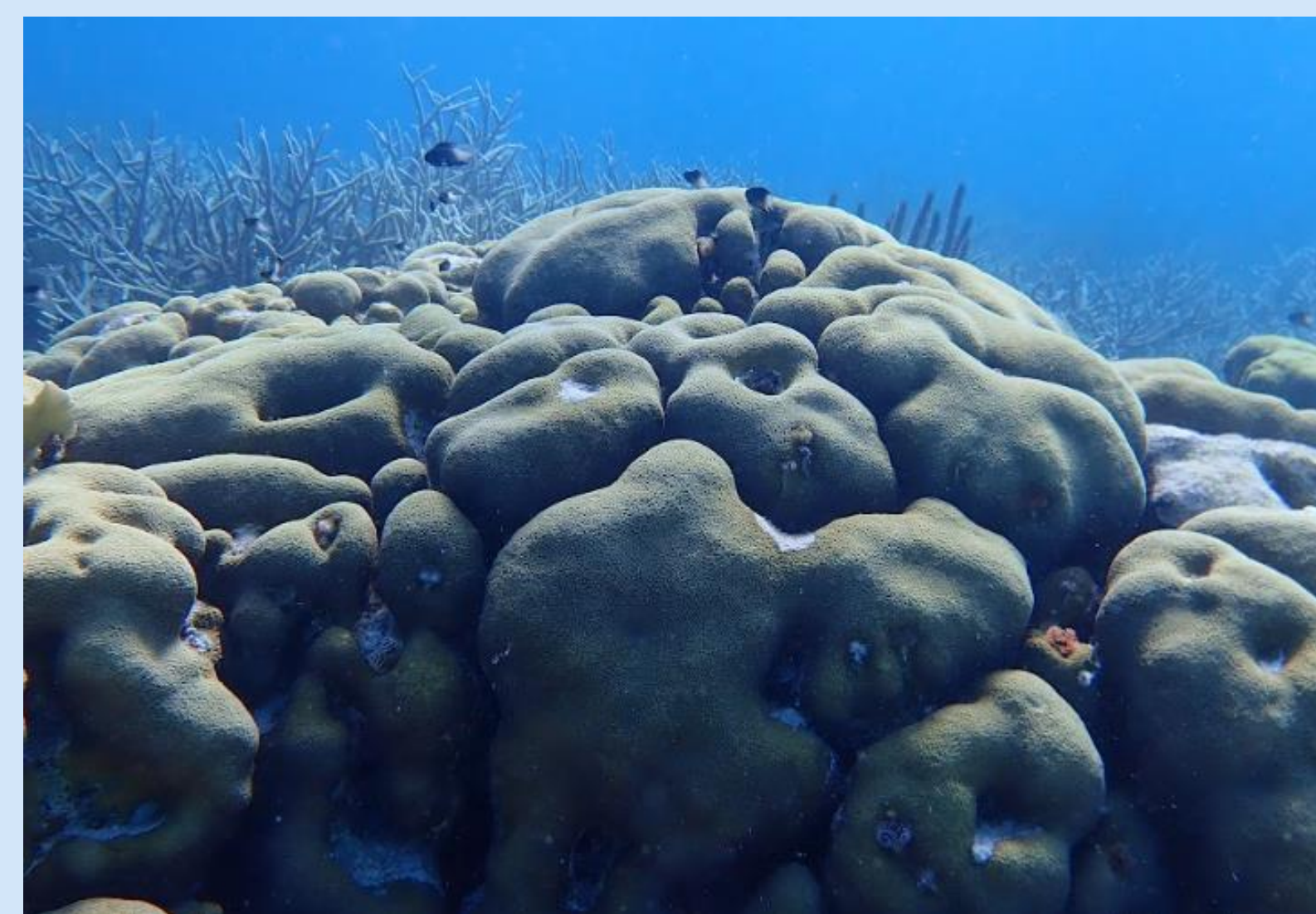


Figure 2



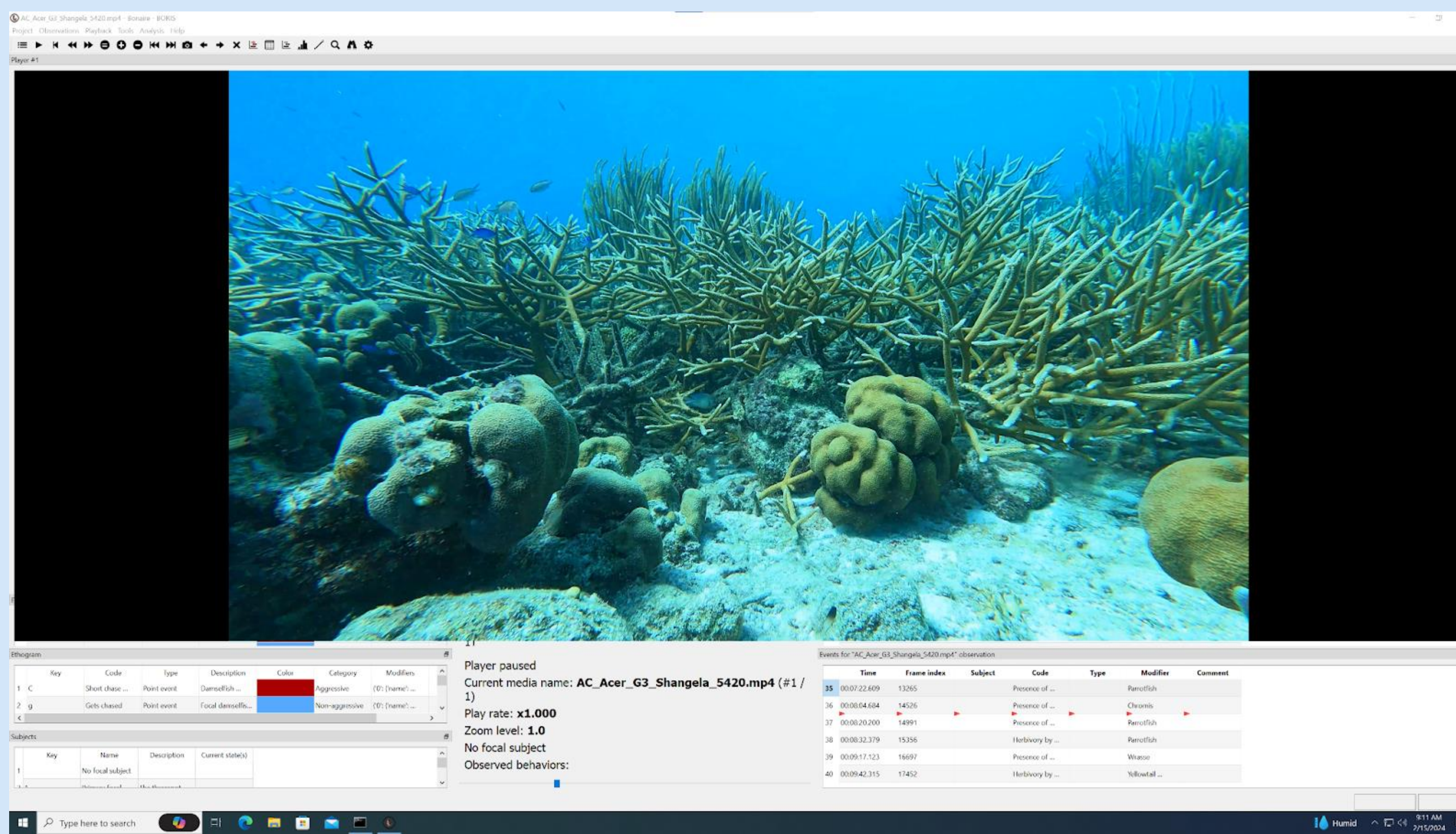
GoPro facing *A. cervicornis* patch for data collection.



Example of *Orbicella* spp. coral type

Video Annotation and Analysis

- We annotated behavioral videos in the software BORIS
- Threespot damselfish behaviors logged:
 - Territory maintenance (biting at algae or other sessile organisms)
 - Chasing other species
- We used R to analyze our data
 - Used a t-test to compare behaviors between the two coral types (*A. cervicornis* and *Orbicella* spp.)
 - Ran a regression analysis to assess the relationship between threespot damselfish density and chase/territory maintenance behaviors



Screenshot of BORIS software used for behavioral observation annotation capturing an *A. cervicornis* patch

Results

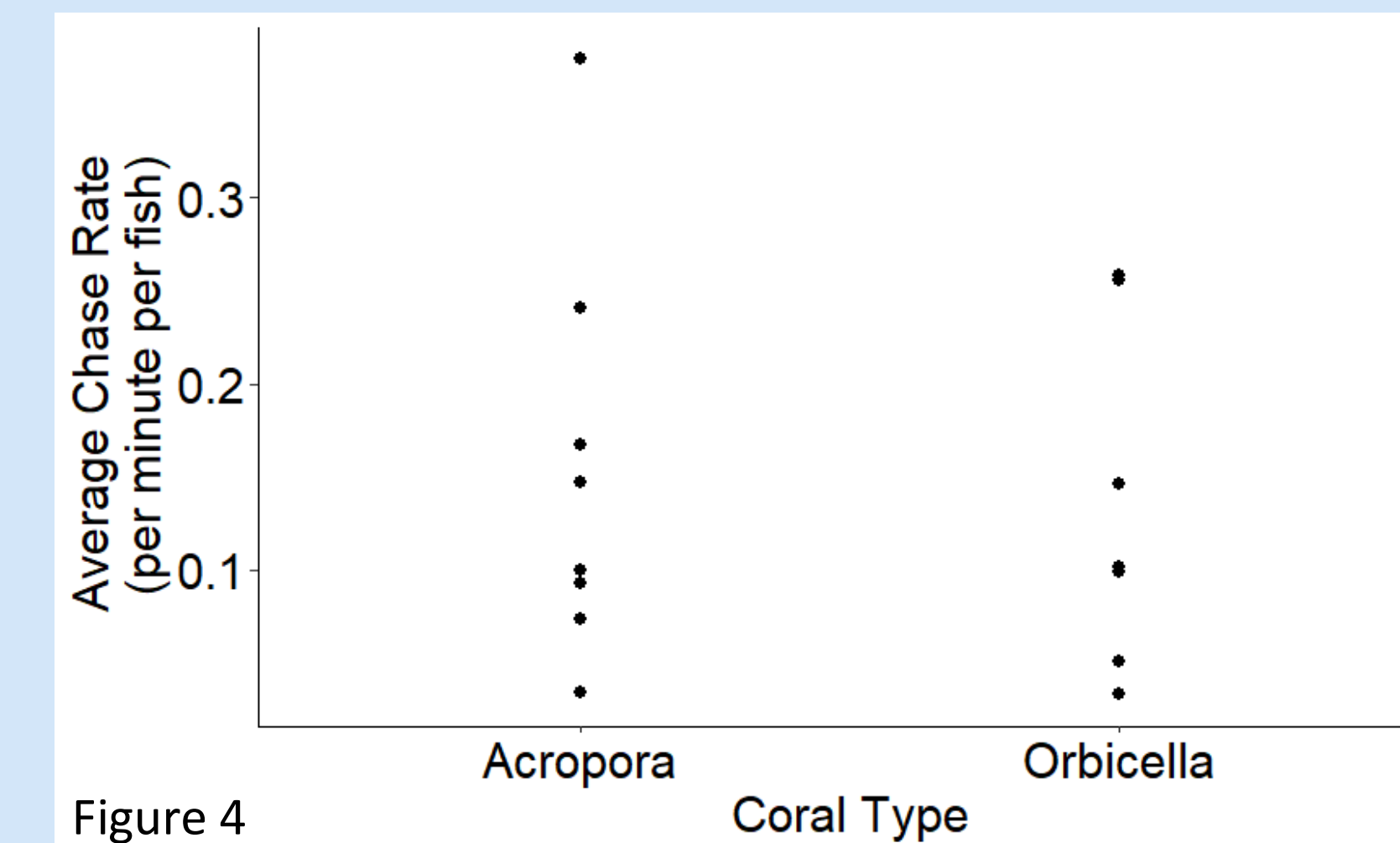


Figure 4

Figure 4: We found no significant difference in the threespot damselfish chase behavior between coral types ($t = -0.409, p = 0.689$).

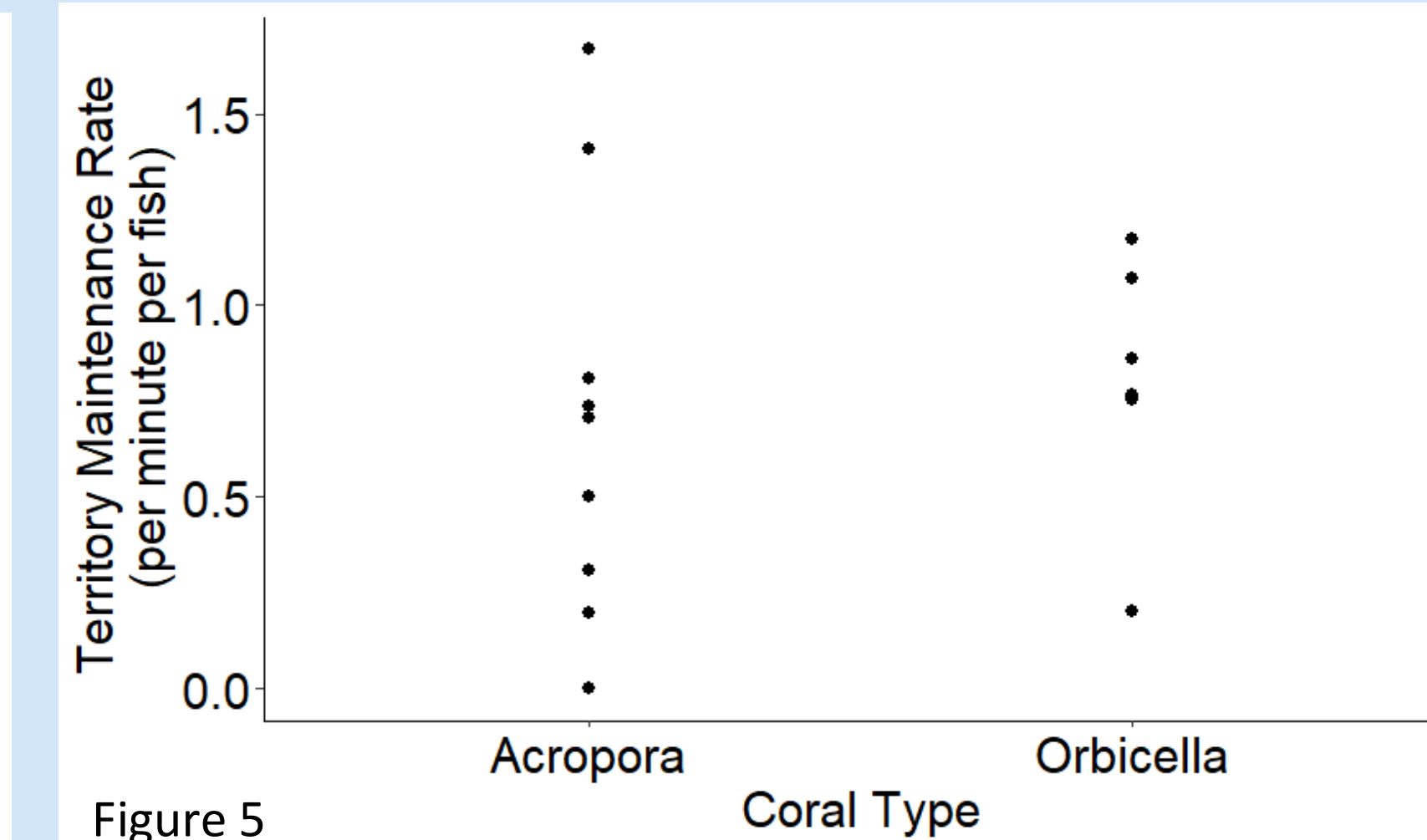


Figure 5

Figure 5: We found no significant difference in damselfish territory maintenance behavior (biting at algae or other sessile organisms) between coral types ($t = 0.411, p = 0.687$).

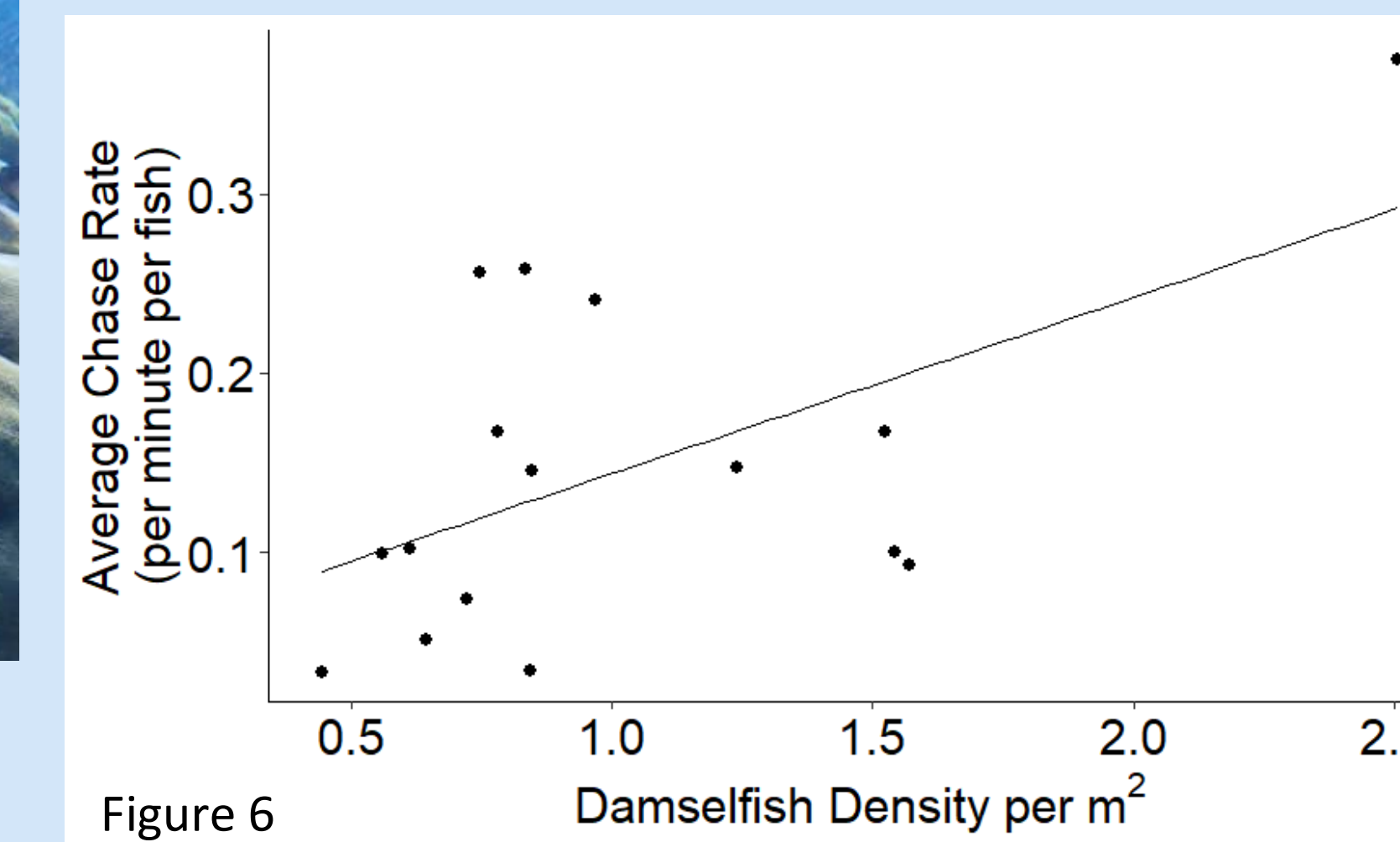


Figure 6

Figure 6: We found a significant positive correlation between damselfish density and average chase rate per fish ($R^2 = 0.25, p = 0.027$).

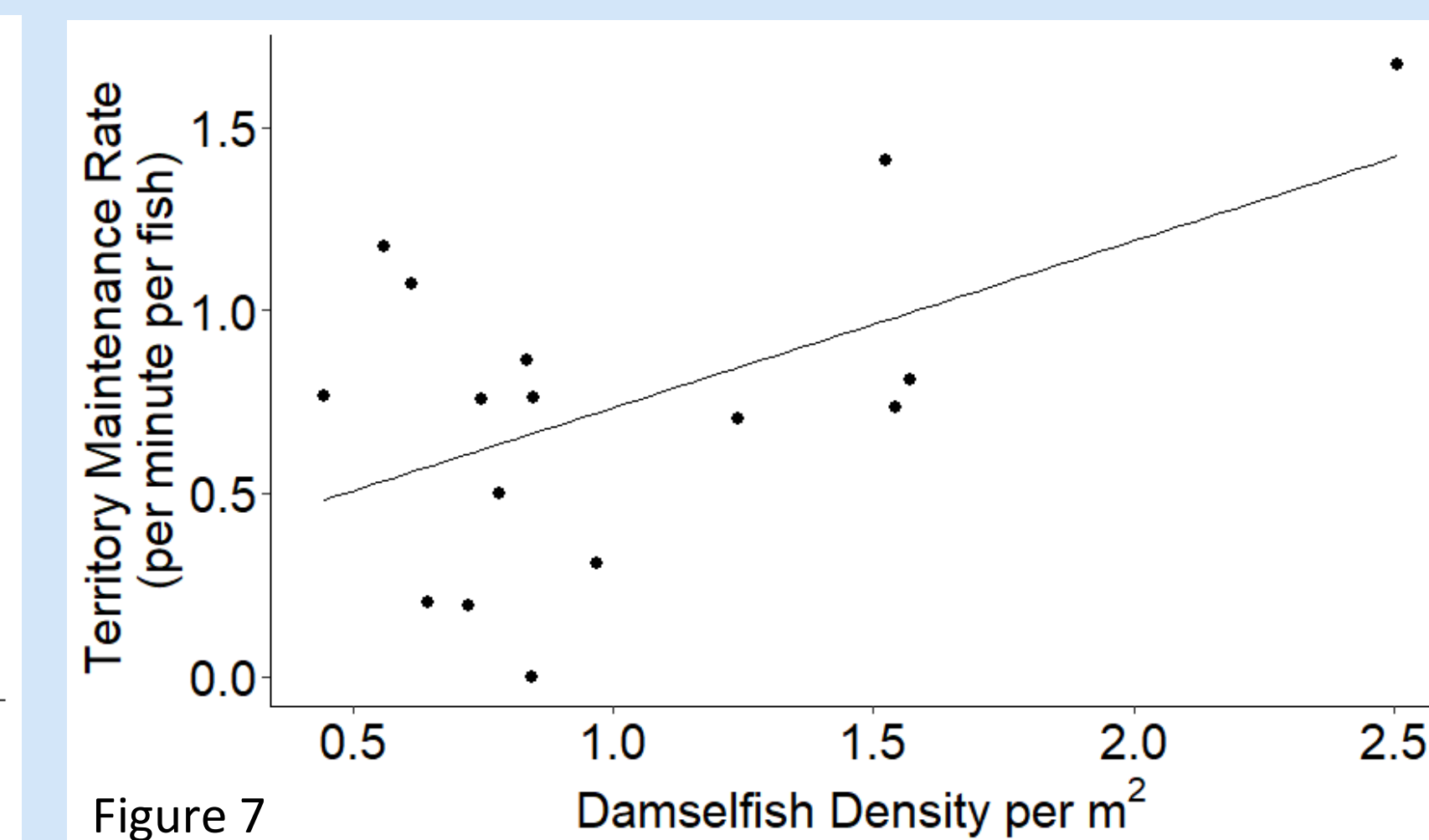


Figure 7

Figure 7: We found a significant positive correlation between damselfish density and average territory maintenance behavior (biting at algae or other sessile organisms) ($R^2 = 0.243, p = 0.030$).

Discussion/ Further Research

- Although damselfish have been found to more aggressively defend higher quality habitat¹, and *A. cervicornis* is thought to be threespot's preferred habitat⁵, we found that the threespot damselfish display no variation in farming behavior based on coral type
- Additionally, conspecific density proved to have significant impacts on damselfish aggression, revealing that an increase in damselfish abundance per patch has a positive correlation to chase rates for fish
- Similar to our results on density-dependent behavior, another species of farmer damselfish has been found to act more aggressively towards conspecifics⁵
- Further research should look into whether aggressive behavior varies depending on heterospecific presence and density, as well as how behavior of the heterospecifics varies
- Overall, our study demonstrates that threespot damselfish respond more to the density of other damselfish than to coral habitat type, which helps us understand the drivers of variation in farmer damselfish behavior

Acknowledgements

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