Methods:

**Experimental Design**

A raceway tank (242.5 x 50 x 30 cm) was divided into a 30-square quadrat. There were three sides of the tank, which served as the shelter. A GoPro was suspended above the tank to record the trial. For the initial acclimatization stage, a divider was used to separate the snapper and lionfish for five hours.

![Image 1: Lionfish amongst mangrove roots in Rollins Creek](image1.png)

**Experimental Stages**

- Video analysis was used to avoid human interference.
- Videos were analyzed by stopping every two minutes (Fig. 4).
- For each trial, the position of both individuals and whether it was inside or outside the mangrove was noted (Table 1).
- From these values, percentage occurrence of each individual in the mangrove was calculated for both solo and interaction trials.

![Image 2: Aukai Elkaslasy](image2.png)

**Data Collection**

- Video analysis was used to avoid human interference.
- Videos were analyzed by stopping every two minutes (Fig. 4).
- For each trial, the position of both individuals and whether it was inside or outside the mangrove was noted (Table 1).
- From these values, percentage occurrence of each individual in the mangrove was calculated for both solo and interaction trials.

![Image 3: Lionfish](image3.png)

**Table 1: An example of data collected from video trials, used for calculating percent occurrence.**

<table>
<thead>
<tr>
<th>Solo</th>
<th>Interaction</th>
<th>Solo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snapper</td>
<td>Snapper</td>
<td>Lionfish</td>
</tr>
<tr>
<td>In</td>
<td>Out</td>
<td>In</td>
</tr>
<tr>
<td>In</td>
<td>In</td>
<td>Out</td>
</tr>
<tr>
<td>In</td>
<td>Out</td>
<td>In</td>
</tr>
</tbody>
</table>

Results:

After collecting data on a table (Table 1), and recording whether the snapper or the lionfish was either “IN” or “OUT” of the mangrove, the percent occurrence in the mangrove for the solo and interaction trials was calculated. A Wilcoxon signed-rank test was conducted with these percent occurrence dates. Between the snapper solo and interaction trial, a significant difference in the percent occurrence in the mangrove was found (W = 34.5, p = 0.01307). The lionfish showed no significant difference in percent occurrence in the mangrove between the solo and interaction trial (W = 18, p = 1).

![Image 4: Data was collected using video analysis](image4.png)

Discussion:

From the results, we can draw two conclusions. Firstly, the snapper’s use of the mangrove changed in the interaction trial compared to the solo trial. Secondly, the amount of times the lionfish used the mangrove did not change between the solo and interaction trials. Therefore, we can conclude that snappers use the mangrove system less frequently when in the presence of lionfish. As a result of this, it could cause them to move into the flats, potentially leaving them at a higher risk of predation from birds and other larger marine predators.

![Image 5: The percent occurrence in the mangrove for the lionfish and the snapper for the solo and interaction trial.](image5.png)

Future Research:

As observed, no predator behaviors from the lionfish, we can assume their threat is territorial, and therefore, an investigation of the long-term behavioral impacts of lionfish on snapper could be beneficial. The snapper may become accustomed to the presence of the lionfish and eventually re-enter the mangrove. Another study could investigate the effects of lionfish on different mangrove species, as they may use the mangrove differently and have different reactions to the lionfish.

![Image 6: Literature Cited](image6.png)

**Literature Cited:**


