Exploring the Mesophotic Zone: Lionfish, Targeted Fish, and the Goldface Toby

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The Mesophotic Zone: A Refuge?

- 30-150 meters in depth
- Extensions of shallow coral ecosystems
- *Do MCEs serve as potential refuges for impacted shallow-water populations?*
  - Lionfish
  - Fisheries’ targeted fish
  - Goldface toby
- **Goal:** To validate and expand existing dataset
Data Collection: BRUVS

Source: Diana Yeh
Data Analysis: EventMeasure
Lionfish Distribution

Lionfish Distribution

- BRUVs
- Darwin
- OSF

Kilometers

3.75
2.5
30
Lionfish Abundance

BRUVs:
- 2014 maxN: 4
- 2015 maxN: 8
# Targeted Species’ Abundance

<table>
<thead>
<tr>
<th>Species</th>
<th>maxN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black grouper</td>
<td>1</td>
</tr>
<tr>
<td>Yellowmouth grouper</td>
<td>1</td>
</tr>
<tr>
<td>Creolefish</td>
<td>6</td>
</tr>
<tr>
<td>Graysby</td>
<td>3</td>
</tr>
<tr>
<td>Red hind</td>
<td>7</td>
</tr>
<tr>
<td>Coney</td>
<td>9</td>
</tr>
<tr>
<td>Almaco jack</td>
<td>5</td>
</tr>
<tr>
<td>Bar jack</td>
<td>1</td>
</tr>
<tr>
<td>Black jack</td>
<td>1</td>
</tr>
<tr>
<td>Greater amberjack</td>
<td>1</td>
</tr>
<tr>
<td>Horse-eye jack</td>
<td>1</td>
</tr>
<tr>
<td>Grey triggerfish</td>
<td>8</td>
</tr>
<tr>
<td>Blue striped grunt</td>
<td>2</td>
</tr>
<tr>
<td>French grunt</td>
<td>9</td>
</tr>
<tr>
<td>Spanish grunt</td>
<td>1</td>
</tr>
<tr>
<td>Tomtate grunt</td>
<td>1</td>
</tr>
<tr>
<td>Hogfish</td>
<td>1</td>
</tr>
<tr>
<td>Lane snapper</td>
<td>2</td>
</tr>
<tr>
<td>Mutton snapper</td>
<td>1</td>
</tr>
<tr>
<td>Yellowtail snapper</td>
<td>2</td>
</tr>
<tr>
<td>Jolthead porgy</td>
<td>2</td>
</tr>
<tr>
<td>Saucereye porgy</td>
<td>2</td>
</tr>
</tbody>
</table>
What factors affect species abundance?

- Depth (m)
- Surface temperature (°C)
- Bottom temperature (°C)
- Distance to land (km)
- Habitat Type
- Relief
- Presence of lionfish/Presence of other 23 targeted species
  - Is there a correlation between lionfish abundance and midlevel predator abundance?
Results, Pt. 1

- No relationship between lionfish and any environmental factor

- No relationship between lionfish and any fisheries’ targeted species abundance

- No relationship between lionfish and midlevel predators abundance
  - Midlevel predators: coney, graysby, red hind
  - BUT perhaps positive correlation between graysby and lionfish abundance (p-value = 0.0646)
Results, Pt. 2

- Correlation between coneys, distance from land, and certain habitats.
  - As distance from land increases, coney RA increases. (p-value = 0.0289)
  - Coneys are associated with rubble, sand and algae. (p-value = 0.0237)

- Correlation between red hind, grey triggerfish, and graysby abundance.
  - As grey triggerfish and graysby RA increases, redhind RA increases. (p-values= 0.0354, 0.0452)
Goldface Toby: Waif Occurrence or Established Population?
Going Forward

- More videos fully annotated! Need a larger sample size in order to do more robust statistical analysis
- StereoBRUVS – fish length and estimation of fish biomass
- More environmental data (quantifiable habitat data, etc.)
- Confirmation of species IDs through having specimens
- Deploy deeper BRUVS (down to 150m mesophotic zone boundary) with minimal equipment loss
- Lights for BRUVS – better fish identification (nighttime drops)
- Shallow reef data comparison
Acknowledgements