Habitat Characterization of Seamounts in the Central and Western Pacific

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Introduction

- Seamounts are largely unexplored areas of the deep sea, known for being crucial habitats for various benthic megafauna such as deep-sea corals and sponges.
- Seamount benthic megafaunal communities are dependent on factors such as depth, rugosity, relief type, and substrate composition. (Long & Baco, 2014; Morgan et al., 2019; Parrish, 2007).
- While the distributions of Necker Ridge and the Northwestern Hawaiian Islands seamount fauna have been studied, less is known about the relationship between biodiversity and substrate composition.
- The data presented characterized the substrate makeup across 7 different sites within the Mid-Pacific Mountains, Necker Ridge, and the Northwestern Hawaiian Islands.
- This work will provide insight into the significance of substrate composition—and seamounts—to biodiversity in the ocean, and provide critical environmental data for comparisons of faunal communities across the three regions.

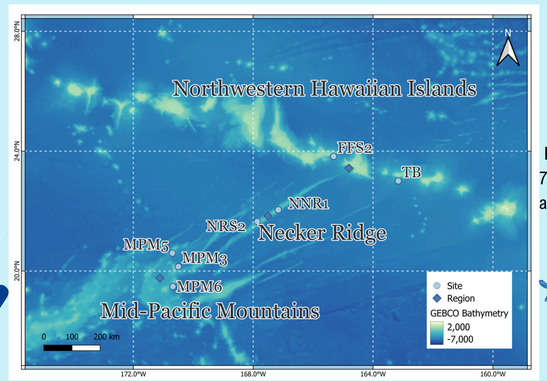

Fig 1. Map marking 7 sites studied across 3 regions.

Methods

- The remotely operated vehicle (ROV), *SuBastian,* surveyed 7 sites and recorded replicate quantitative video transects of approximately 500m length at a depth of 1500m.
- The video footage was then converted into images taken at 30-second intervals that were uploaded into BIIGLE (Bio-Image Indexing and Graphical Labelling Environment).
- A specialized label tree, including color-coordinated points for laser points, biology, substrate sizes, substrate composition, and area was used for annotation.
- 15 randomly generated points were annotated for substrate size and composition, additionally, image area and rugosity were noted.
- The substrate sizes were annotated on the Wentworth scale from sand to hardpan.
- The substrate composition ranged from grey sand, white sand, carbonate, or manganese/basalt.

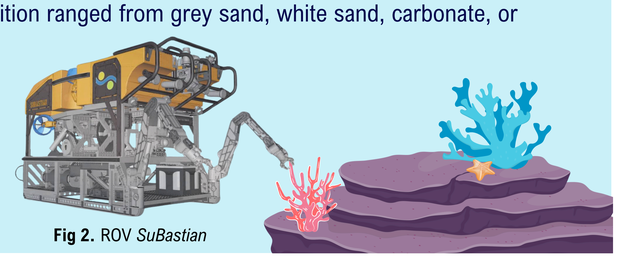

Fig 2. ROV *SuBastian*

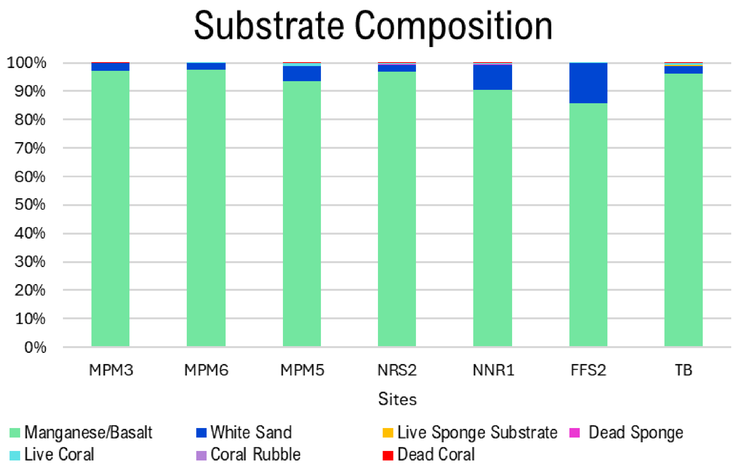

Fig 3. Stacked bar chart showing the average percent composition of the substrate composition by site.

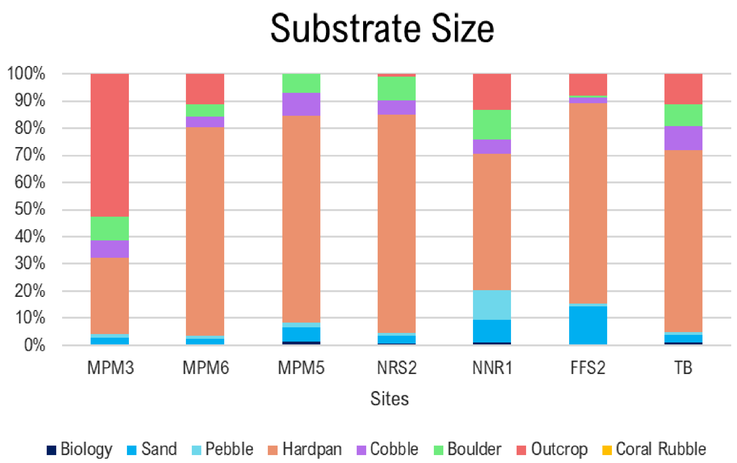

Fig 4. Stacked bar chart showing the average percent composition of the substrate size by site.

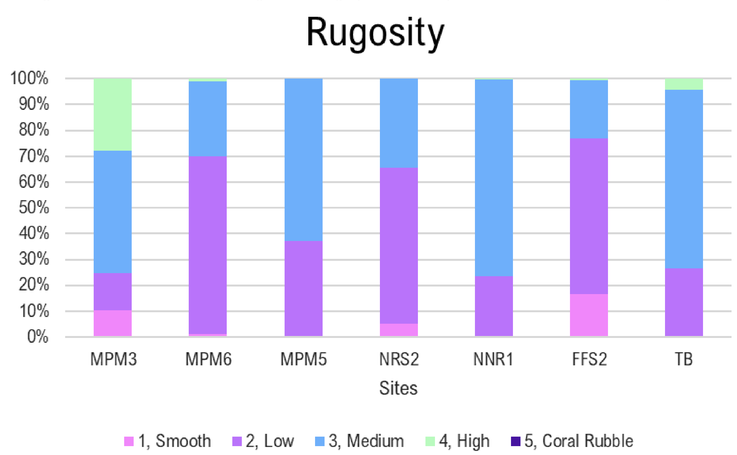

Fig 5. Stacked bar chart showing the average percent composition of the rugosity by site.

Table 1. Table of the number of individuals (N), number of species (S), Pielou's evenness (J'), and the Shannon Index (H') for each surveyed site. Green shading indicated the hightest values in each metric.

Site	N	S	J'	H'
MPM3	227	46	0.8429	3.216
MPM5	310	51	0.7061	2.7978
MPM6	127	34	0.8417	2.962
NNR1	686	61	0.5859	2.437
NRS2	9322	61	0.1336	0.5548
TB	491	53	0.6711	2.6619
FFS2	345	47	0.7362	2.8411

Discussion

- This research aimed to characterize the habitats on different seamounts at a depth of 1500m.
- The majority of the substrate was hardpan that was composed of manganese/basalt across all sites.
- MPM3 has a much higher percentage of outcrop compared to the other locations, as well as has a higher biodiversity.
- This could imply that having variation in substrate sizes may affect the biodiversity of a habitat.
- NRS2 has the lowest biodiversity but the highest species richness, due to high dominance, however, the makeup is similar to MPM6.
- The annotation process minimizes bias, however, human error or inconsistencies in identifying substrate sizes could affect the results.
- It is important to study these seamounts as they are vital habitats influencing biodiversity of the ocean.
- These results emphasize the importance of seamount habitats which may be at risk due to potential deep-sea mining activities.
- This study can be used in future explorations of the impact of substrate on biodiversity.

Acknowledgments

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Works Cited