Appendix S2: Expanded methods

Journal: Ecology

Article Title: Moray eels inconspicuously predominate heavily fished coral reefs.

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Section S1: Methods of measuring habitat complexity

Chain contour rugosity ratio

A 750 cm brass chain with small links (1 cm per link) was draped over the benthos alongside the center of the transect tape that was extended across the diameter of the survey transect. The chain was placed following the contour of the hard surfaces and structures of the seafloor, alongside the extended transect tape. Rugosity was estimated by taking the ratio of the total linear length (750 cm) of the chain to that of its linear length when contoured (Rogers and Miller 2001). Due to logistical constraints in the NWHI, chain rugosity was measured only on Oʻahu and Hawaiʻi. Within the MHI, in situ observer rugosity rating was significantly related to chain rugosity ($\beta = 2.40 \pm 0.60$ SE, $t = 4.00$, $p = 0.0004$, $R^2 = 0.37$). However, chain rugosity was not a significant predictor of eel biomass in the MHI.

Maximum substrate heightbe

The maximum height of the substrate within the survey transect was measured by taking the difference between the lowest (deepest) part of the seafloor and the tallest (most shallow) hard structure, measured from the plane of the seafloor (see Ayotte et al. 2011).

Mean substrate height

Mean substrate height was calculated by taking the weighted mean of the substrate height of the survey transect, generated from categorizing the benthos of the transect into defined height bins: 0.0-0.2 m, 0.2-0.5 m, 0.5-1.0 m, 1.0-1.5 m, and >1.5 m (see Ayotte et al. 2011, Heenan et al. 2017).

Mean substrate height variability

The mean substrate height variability was the weighted average variability among the substrate height bins of the survey transect benthos (see Ayotte et al. 2011, Heenan et al. 2017).

In situ observer rating of habitat complexity

Habitat complexity was evaluated in situ by the same observer (lead author) on a scale of 1-10, where 1 is the lowest and 10 is the highest estimated complexity. This was a holistic rating of the overall complexity, rugosity, and porosity of the survey transect benthos, taking into consideration the characteristics of the surrounding habitat, availability of microhabitats for demersal and cryptic fishes, as well as the biological composition of the benthos. This rating (along with all covariate measurements) was taken prior to baited camera deployment.

Section S2: Methods of measuring water flow

Fluorescein plume diameter

To measure the degree to which prevailing water flow conditions might influence the expansion of a bait plume, a concentrated solution of fluorescein dye (0.5 g of fluorescein powder in 5 mL of water) was released via syringe onto the center of a transect tape spread across the 15 m diameter of the survey transect. Care was taken to minimally disturb the flow dynamics of the surrounding water column during release and observation. Fluorescein dye is a non-toxic, fluorescent dye used to visualize water motion (Smart and Laidlaw 1977, Gansel et al. 2014). The fluorescein plume was observed in situ from all angles by the same observer (lead author) for all surveys. The maximum plume diameter was estimated at one minute and three minutes after its release.

ADCP: current speed of water column

An upward-looking acoustic Doppler current profiler (ADCP) (Nortek Aquadopp Profiler HR 2MHz) was weighted and placed in the survey transect. The ADCP sampled from 0.1 to 2.1 m above the seafloor every 2 minutes for 20-40 minutes depending on the deployment. We calculated current speed as the time-averaged averaged Eulerian velocity of depth-averaged current speed (m/s).

Sucrose clod card dissolution time

Clod cards are uniform objects used to measure localized water movement through the process of dissolution. Using a zip-tie, we attached a dry torus-shaped, sucrose-based candy (a Life Savers™ mint) to each of the three baited camera rigs deployed during our eel-specific BRUV survey so that it was visible on the resulting videos. We recorded the time elapsed after baited camera deployment for the candy to fall off of the zip-tie due to dissolution, averaged across the three cameras (modified from Boizard and DeWreede 2006).

Section S3: Biometric conversions and visual estimation methods

We used allometric conversions to derive moray eel biomass from visual estimates of eel body length (FishBase, Heenan et al. 2017). Often, morays would press their head against the bait box, which had a uniform grid that aided in size estimation. When head size was deemed to be a more reliable visual estimate than body length, we converted the head height at the rictus of the eel to skeletal body length using the equations below, based on measurements taken from preserved moray specimens from the ichthyology collection of the Bernice Pauahi Bishop Museum (Appendix S1: Fig. S7). The linear allometric equations were generated for the four most frequently observed moray eel species. To perform head-to-length conversions for rarer species, we applied the equation of the common species which was most comparable in terms of morphometric characteristics.

Gymnothorax eurostus: $y = 9.17 + 13.2x$, $r^2 = 0.89$ (n = 41 specimens)

Gymnothorax flavimarginatus: $y = 16.8 + 12.5x$, $r^2 = 0.90$ (n = 9 specimens)

Gymnothorax meleagris: $y = 5.57 + 16.1x$, $r^2 = 0.86$ (n = 12 specimens)

Gymnothorax undulatus: $y = 13.1 + 14.7x$, $r^2 = 0.99$ (n = 4 specimens)

Appendix S2 References

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