Effect of Fragmentation, Isolation, and Bleaching on Coral Reef Fish Assemblages

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Globally, near shore reefs are being affected by warming oceans, which can cause widespread coral bleaching. The mechanisms of coral bleaching are well understood but less is known about how bleaching affects fish utilization of previously living reefs. This knowledge gap prevents managers from understanding the ecological value of bleached reefs. There is also a need to understand how reef size and location influence fish usage, to inform effective reef restoration. These needs were addressed by taking advantage of a naturally occurring study system at Waialea Marine Life Conservation District (MLCD) in North Kona, Hawaii island, that included 11 bleached coral islands of different size and proximity to main reef areas. For each island, GoPro videography paired with direct measurements of the islands physical characteristics was used to test hypotheses about how island size and proximity to main reef areas affect fish abundance, richness, evenness, and diversity. Bleached coral islands were found to hold significant ecological value to fish, which continued to use them for habitat purposes despite near complete absence of live coral. However, very little foraging was observed. For small islands, diversity tended to decrease with increasing distance from main reef areas. In contrast, diversity of large islands were not influenced by distance from main reef areas. For restoration purposes, the results suggest that large areas of reef are more successful at serving the needs of diverse fish species than small areas of reef. The results may provide practical applications for habitat reconstruction and designing reef restoration areas.

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Third Award of $1,000