

**Escaping the heat: Range shifts of reef coral taxa in coastal Western Australia**

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One of the most critical challenges facing ecologists today is to understand the changing geographic distribution of species in response to current and predicted global warming. Coastal Western Australia is a natural laboratory in which to assess the effect of climate change on reef coral communities over a temporal scale unavailable to studies conducted solely on modern communities. Reef corals composing Late Pleistocene reef assemblages exposed at five localities along the west Australian coast were censused and the results compared to coral occurrence data published for the modern reefs offshore of each locality. The resulting comparative data set comprises modern and Late Pleistocene reef coral communities occurring over approximately 12° of latitude. This gradient includes the zone of overlap between the modern Dampierian and Flindersian Provinces.

Modern reef coral communities show a pronounced gradient in coral composition over the latitudinal range encompassed by the study, while the gradient in community composition is not as strong for Pleistocene communities. Tropical-adapted taxa contracted their ranges north since Late Pleistocene time, emplacing two biogeographic provinces in a region in which a single province had existed previously.

Beta diversity values for adjacent communities also reflect this change. Modern reefs show a distinct peak in beta diversity in the middle of the region; the peak is not matched by Pleistocene reefs. Beta diversity is correlated with distance only for comparisons between modern reefs in the north and the fossil assemblages, further supporting change in distribution of the biogeographic provinces in the study area. Coral taxa present in modern communities clearly expanded and contracted their geographic ranges in response to climate change. Those taxa that distinguish Pleistocene from modern reefs are predicted to migrate south in response to future climate change, and potentially persist in “temperature refugia” as tropical reef communities farther north decline.