

Drowned shorelines and coastal dunes provide important reef habitat: Carnarvon Shelf, WA



Introduction

A new high resolution multibeam sonar map of the seabed along the Carnarvon continental shelf in Western Australia, reveals in unprecedented detail a complex submarine terrain of coral reefs and sandy seabed. These new data collected by the Marine Biodiversity Hub show the area seaward of Ningaloo Reef World Heritage Area where the inner shelf is covered by hundreds of small but often interconnected reefs (bommies) up to 5 m high and ridges up to 20 m high.





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Drowned Coastline

Underwater photography and seabed sampling of this area shows that these patchy reefs and ridges are covered in dense coral and sponge communities, whereas the surrounding seafloor is mostly flat and sandy with few benthic organisms. Some of these reefs look similar in size and shape to the dunes on the adjacent mainland, and are interpreted as dunes that were cemented into hard structures and then drowned as sea level rose. Importantly, these drowned ancient dunes are now alive with diverse and colourful corals and other tropical marine animals. The outer edge of the inner shelf, in 60 m water depth, is marked by well-defined ridges that extend parallel to the shoreline for more than 15 km. These ancient coastal sand deposits were likewise cemented to form limestone prior to sea level rising to its present position and drowning the old coastline.

Location map of areas surveyed along the Carnarvon shelf coast, Western Australia.



Underwater photograph of living reef growing at 40 m water depth on the drowned shoreline ridge offshore from Point Cloates, with coral (top right), coralline algae and bryozoans (bottom left). New high resolution bathymetric map of the continental shelf offshore from Ningaloo reef at Point Cloates.



E A C S T R A L

Significance of Results

These new data and images clearly demonstrate the value of multibeam sonar mapping to resolve and describe critical biological habitats and as a tool for



Typical biogenic reef community on low-lying outcrops at 97 m water depth, with sponges (pink, yellow & tan), gorgonians (dark red) and crinoids (dark brown).



Coral (red brown), sponge (orange) and filamentous red algae growing on a rhodolith bed at 35 m water depth on the Carnarvon shelf.

Enlarged area of the Point Cloates bathymetric map showing ridges and mounds on the inner shelf that provide hardground habitat for coral and sponge communities.



mapping these habitats over large areas of the seafloor. This Marine Biodiversity Hub case study is revealing key physical features that control patterns of biodiversity on a tropical shelf at scales useful for conservation management.

Mixed assemblage of gorgonian (centre left), sponges and ascidians growing at 44 m water depth on a drowned shoreline ridge, Carnarvon shelf. Perspective view of the inner shelf at Point Cloates looking to the northeast, with drowned shoreline and dunes indicated.

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