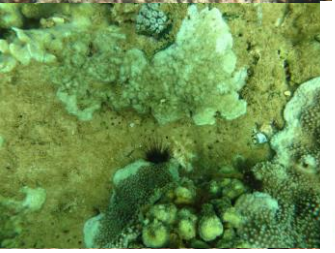
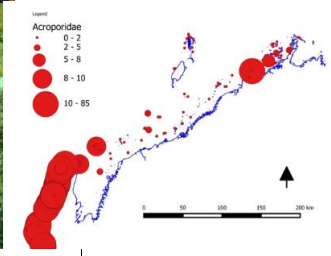
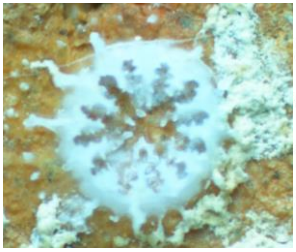
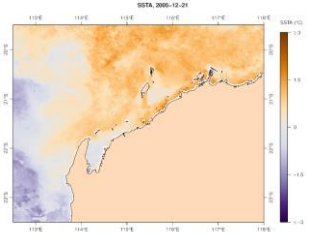




Pilbara Marine Conservation Partnership

Coral Reef Health – Coral Community Dynamics

The Pilbara shelf in Western Australia supports a wide range of marine life including coral reef systems which contribute to the area's productive fisheries. Operating in close proximity to these important natural assets are some of Australia's largest offshore gas and petroleum production activities and the state's largest bulk export port. Planning, assessment and management in the Pilbara's marine environment requires a robust level of understanding about the distribution of coral reefs and their ability to withstand and recover from impacts, both natural events like cyclones and more localised effects such as port developments. The Pilbara Marine Conservation Partnership (PMCP) have worked closely with researchers from Western Australia's statutory agencies to deliver a broad scale understanding of coral reefs in the Pilbara in order to help deliver better conservation outcomes both now and into the future.

Background

The coastal bioregions of the west Pilbara (in Western Australia) comprise globally-significant fringing coral reef ecosystems, characterised by species from both Indonesian and Pacific origins. The region is also adjacent to the world's largest fringing coral reef system, Ningaloo Reef, which was declared a World Heritage Area in 2011.

These ecosystems are unique, because of their location adjacent to an arid coast that receives very little terrestrial runoff, thereby facilitating high coral growth; exceptional for a continental margin.

In recognition of the conservation value of the area a number of marine parks and marine management areas have been declared and are managed by Parks and Wildlife (Western Australia). A base level of understanding about the distribution of coral reefs and their ability to withstand and recover from impacts is required to ensure conservation and economic development aspirations can be balanced.

The Approach

Between 2013 and 2017, the Pilbara Marine Conservation Partnership (PMCP), a partnership between CSIRO and the University of Western Australia, collected data from reefs throughout the west Pilbara region and Ningaloo (Figure 1), to provide an assessment of the condition of the region's reefs and to strengthen the understanding of the processes that affect them. The information gathered on the diversity of reef types and habitats encountered and the challenges faced by reefs in the region will be used to complement existing management and assessment programs to provide ongoing advice in the region. Key objectives for the research included:

- Establishing a monitoring program which was compatiable with other monitoring work occurring in the region;
- Investigating abundances and diversity of coral reef benthos and describing their current condition across regional gradients; and
- Understanding regional patterns and temporal variability in assemblages.

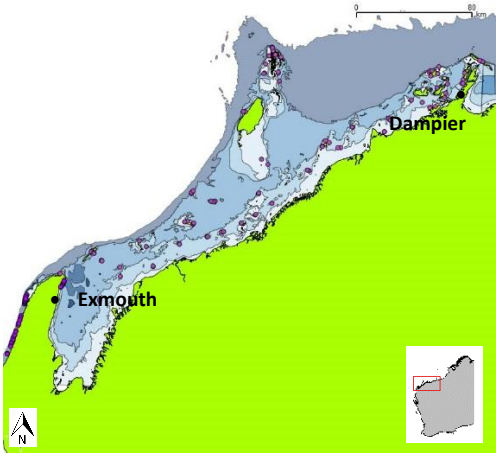
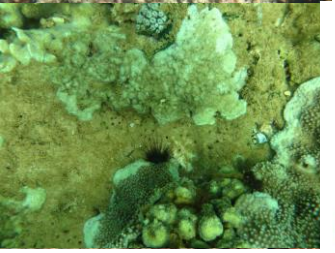
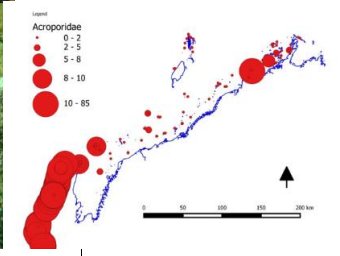
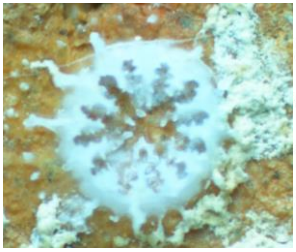
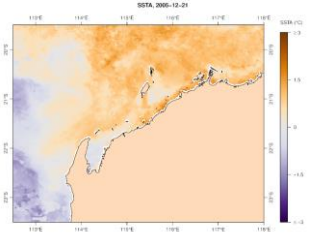


Figure 1: Locations of fifty-five reefs and more than 100 sites sampled by the PMCP team.


Pilbara Marine Conservation Partnership

Coral Reef Health – Coral Community Dynamics

What did we uncover?

Marine heat wave effects

Surveys of reefs from the Dampier Archipelago and Montebello Islands to the Muiron Islands and Northwest Cape in the south, showed the impacts of two separate coral bleaching events which occurred in 2011 and 2013 respectively. In such events, corals lose their colour and are often killed by the unusually high water temperatures which force them to expel their zoozanthellae.

As a result of these heat waves, corals such as branching *Acropora* (the most abundant corals that builds reefs in the region) were decimated in the central west Pilbara (Figure 2). Even mortality of hardy, centuries-old *Porites* bommies was observed in some locations (Figure 3a). The scale of the impact has been documented by PMCP researchers, with little or no recovery observed in the affected reefs monitored post 2013.

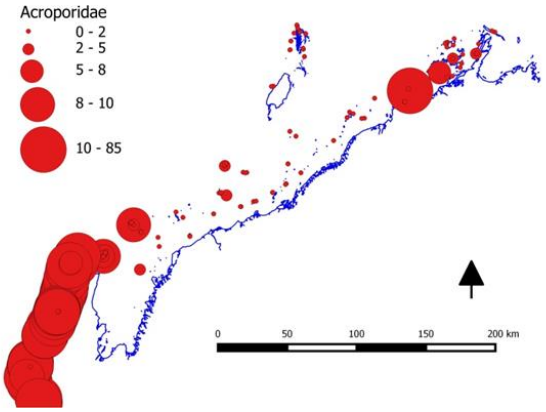


Figure 2: Relative cover of live *Acropora* corals post bleaching in 2013, showing lack of live coral in the central region affected by bleaching.

While cyclone activity in the region has been unusually low since the bleachings, outbreaks of the crown-of-thorns starfish (*Acanthaster*; Figure 3b) have added to the effects of bleaching and slowed or reversed recovery in some areas around the Barrow and Montebello islands.

It is important to document the rate of recovery of these reefs. By doing this can we understand their ability to recover from impacts associated with weather and climatic extremes that are predicted to become even more frequent and severe in the future. Data collected on recovery is also linking into connectivity modelling being undertaken to predict the flow of coral larvae around and between reefs to better understand reef recovery via larvae supply.


Figure 3: (a) A partially bleached massive *Porites* colony (b) *Acanthaster* (crown-of-thorns starfish) feeding on a *Symphyllia* coral.

Who is this information useful to?

The work completed has shown not only the diversity of reef types and habitats encountered but also provided insights into the challenges faced by reefs in the region. It is hoped that information provided directly to marine park managers will translate into actions that help maintain high levels of environmental management effectiveness in the region.

The information will be useful to Marine Parks and Fisheries managers, as well as to environmental regulatory bodies and environmental consultants.

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The Pilbara Marine Conservation Partnership (PMCP), has been a five year program (2012-2017) supported by the Gorgon Barrow Island Net Conservation Benefits Fund, an initiative of the Western Australian Government to provide funding for conservation work at the leading edge of scientific knowledge.

To find out more visit: https://research.csiro.au/pmcp/