National Research Priority 1: An Environmentally Sustainable Australia

WA MARINE ECOSYSTEMS DISRUPTED BY 2011 HEATWAVE

An unprecedented heat wave in early 2011 saw sea temperatures off the coast of Western Australia reach their highest levels in 140 years and remain up to five degrees warmer than normal for more than 10 weeks. A paper published in Nature Climate Change[1] has shown that this event had a significant impact on marine ecosystems.

The study, an international collaboration led by researchers from the Oceans Institute and School of Plant Biology at The University of Western Australia, compared the impacts of the heat wave on biodiversity in two Indian Ocean locations: Jurien Bay and Hamelin Bay, 500km further south. The coastal margins along Australia's western coast, including Jurien Bay, form a biodiversity hotspot and transition zone between tropical and temperate ecosystems.

Following the heat wave, the Jurien Bay area experienced a reduction in large cool-water seaweeds and an increase in tropical fish species. The ratio of tropical fish to other species increased from 5–10 per cent to up to about 20 per cent. The reduction in seaweeds allowed the proliferation of turf-forming algae and, as a consequence, a loss in encrusted coralline algae and sponges. The long-term impact of the event at Jurien Bay is not known. By comparison, in the cooler region of Hamelin Bay, the heatwave did not affect the marine ecosystem.

Predictive modelling of the impact of climate change on ecosystems is usually largely based on gradual warming scenarios. This research suggests that discrete extreme climate events can have a significant impact on marine ecosystems and that this should be studied further.

The leader of the research program and lead author of the paper, Associate Professor Thomas Wernberg, is the recipient of an ARC Future Fellowship.

A lined dotty back (*Labracinus lineatus*), one of the warm-water fishes to increase in abundance in Jurien Bay after the heatwave. Photo: T. Wernberg

1 Thomas Wernberg, Dan A. Smale, Fernando Tuya, Mads S. Thomsen, Timothy J. Langlois, Thibaut de Bettignies, Scott Bennett & Cecile S. Rousseaux 'An extreme climatic event alters marine ecosystem structure in a global biodiversity hotspot' *Nature Climate Change* (2012) doi:10.1038/nclimate1627