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## High resolution mapping of reef utilisation by humans in Ningaloo Marine Park

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Understanding where, when, and how many people use the coast is imperative for management of natural coastal assets, conservation of marine biodiversity and location of appropriate infrastructure. This CSIRO Wealth from Oceans National Research project is aimed at determining the spatial and temporal distribution of recreational activities within the reef lagoon system at Ningaloo Marine Park (NMP), and relating these patterns to factors such as biodiversity, geomorphology, park zoning, access roads and accommodation nodes. During 2007, 34 geo-referenced aerial surveys conducted throughout the year along the entire 300 km length of the NMP identified a clear seasonal pattern of boating and coastal use with well-defined expansion and contraction of the spatial extent of recreational activities from nodes like Exmouth and Coral Bay. Similarly, 192 land-based surveys provided high resolution geo-referenced data on the recreational activities undertaken by the visitors in the NMP (32% were relaxing on

the beaches, 15% walking, 11% snorkelling, 8% shore-fishing, 7% swimming and the remainder involved in a wide range of other pursuits). While some activities were ubiquitous throughout accessible areas of the NMP, others were dependent on the biophysical attributes of particular sites. In addition, interviews with >1 200 people engaged in recreational activities in the NMP allowed identification of travel networks and site-specific usage patterns. Indicators that could be used by managers to monitor usage of the NMP have been explored with due regard to existing management protocols. These include surrogates like cars parked adjacent to the NMP, occupancy of campsites and numbers of boat trailers at boat ramps. The quantitative information from the mapping project provides a robust baseline of human usage of the NMP under the 2005-2015 management plan and has potential for assisting in predicting response to changes in coastal infrastructure and management policy.