

THESIS SUMMARY

Understanding the demography, habitat use and social structure of wildlife populations, particularly those vulnerable to impacts from anthropogenic activities, is fundamental to their conservation and management (Chapter 1). The paucity of information on Australian humpback dolphins (*Sousa sahulensis*) along Western Australia's coastline has hindered adequate environmental impact assessments, as well as assessment of their conservation status. In this study, I used systematic boat-based surveys and photo-identification of humpback dolphins around the North West Cape (NWC), in the northern section of the Ningaloo Marine Park (NMP), to estimate their: abundance, apparent survival, temporary emigration, site fidelity and residence patterns (Chapter 2); distribution and habitat use (Chapter 3); and social structure (Chapter 4). Surveys were undertaken over three ca. six-month field seasons between May 2013 and October 2015, covering a study area of approx. 130 km². In Chapter 2, using capture-recapture models, I show that humpback dolphin abundance varied from 65 to 102 individuals around the NWC, with a super-population size of 129 individuals. At approx. one humpback dolphin per km², this is the highest density recorded for this species. Temporary emigration was Markovian, suggesting seasonal movement in and out of the study area. Hierarchical clustering showed that 63% of identified individuals exhibited high levels of site fidelity. Analysis of lagged identification rates showed dolphins use the study area regularly, following a movement model characterised by emigration and re-immigration. These patterns of density, site fidelity and residence indicate that the NWC is important habitat toward the south-western limit of this species' range. In Chapter 3, I used an ensemble species distribution modelling approach, combining the results of six modelling algorithms in relation to ecogeographic variables to identify areas of high probability of humpback dolphin occurrence in the waters of northern NMP. Water depth and distance to coast were identified as important variables influencing humpback dolphin presence, revealing a preference for shallow waters (5-15 m), less than 2 km from the coast. There were areas of high occurrence throughout northern NMP, but they were predominantly outside sanctuary (no take) zones, indicating the need to reconsider zoning boundaries to effectively protect important dolphin habitat. In Chapter 4, I investigated the social structure of humpback dolphins using generalised affiliation indices, and social network techniques to assess dyadic relationships, assortative interactions and social clustering. Results indicated humpback dolphins live in a fission-fusion society, characterised by non-random dyadic relationships. Assortative interactions were identified both within and between sex classes, and were higher amongst members of the same

sex, indicating same-sex preferred affiliations and evidence of sexual segregation. Modelling of temporal patterns of association indicated individuals had both strong, long-term preferred associates, as well as casual associates. In Chapter 5, I discuss the implications of these results for the conservation and management of humpback dolphins in the NWC region, and outline future research directions. The NWC represents an important habitat for this population, the methods presented provide a methodological framework for future impact assessments, and the results provide a strong platform for conservation of Australian humpback dolphins.