

Ningaloo

Collaboration Cluster

Scientists have been working to test the concept of habitat surrogacy, and its use in decision-making for marine parks.

Assessing measures of biodiversity in the shallow-water lagoon

Effective management and monitoring of large marine protected areas is often based on detailed information about the distribution of marine habitats. This information has the potential to enable effective management, but only if it is actually a reliable indicator of marine biodiversity.

The concept of habitat surrogacy, or developing simplified measures of habitat to provide an indicator of habitats and their associated biodiversity, is widely established in terrestrial reserve planning and has also been applied in marine reserve planning, despite a lack of testing of the concept. However, if surrogates of habitat do not represent the habitats and their biodiversity in the field i.e. the surrogacy hypothesis is not upheld, decisions for the management and monitoring of the marine park, based on habitat information alone, may fail to protect a large proportion of the reef biodiversity. This may be a problem where the maps of habitat fail to reflect the distribution of rare and uncommon species.

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Testing the habitat surrogacy hypothesis

High-resolution, geo-referenced habitat maps were developed as part of research on classifying habitats from remote sensing. These maps were used to identify specific combinations of habitats. Habitat maps are meant to provide the basis for identifying different areas of biodiversity. The development of zoning plans or other management actions are then, theoretically, able to make decisions on which areas to protect using information on habitat diversity and distribution. This is especially important for regions such as Ningaloo, where little detailed information is available for the distribution and abundance of most species.

Based on preliminary analyses of the data, these habitat maps failed to provide a reliable surrogate for the composition of the (i) habitat-forming hard corals and macroalgae and (ii) the animals living on the seafloor. Hence, maps depicting the distribution of major habitat types and the resultant mosaics (consistent and repeated combinations of particular groupings of habitats) may not at this stage provide adequate, reliable and repeatable representations of biodiversity within the shallow water lagoon.

Given the lack of detailed information about biodiversity in the shallow water lagoon along Ningaloo Reef, the high resolution maps still provide the best possible information currently available for input into management and planning decisions. These results show that the maps need to be used cautiously and zoning plans based solely on these maps should not be considered to represent all biodiversity on the reef.

Continuing the work

Continued detailed sampling of different mosaics to test the surrogacy hypotheses would be valuable. Now that appropriate tests of these hypotheses have been devised and the methods developed for collecting the appropriate data, it would be extremely cost-effective to continue this component of the project.

Further detailed analysis of the relationship between the distribution of other groups of organisms (i.e. other components of biodiversity) and the different habitats and fine resolution analyses to generate the mosaics, incorporating factors such as depth and aspect into the selection of patches to be sampled would also be valuable future work.

