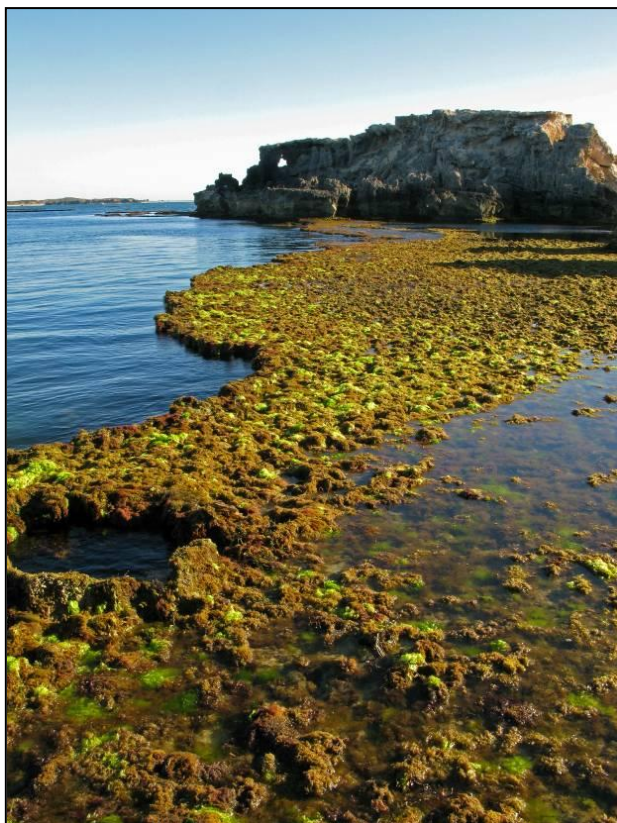




Intertidal reef communities of the Marmion & Shoalwater Islands marine parks

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Background

Intertidal platform reefs are a distinctive feature of the Perth coastline. Occurring adjacent to shoreline beaches and also as isolated offshore reefs, these limestone platforms have been formed by wave action over many centuries.

Left: An intertidal reef during low tide at Cape Peron in the Shoalwater Islands Marine Park (Photo: John Huisman).

Rising and falling tides exert a major influence on the structure of intertidal reef communities, and this influence typically results in a distinctive distribution of organisms based on their tolerance to being exposed to the air when the tide is low. Those inhabiting the highest part of the rocky shore, and therefore exposed more often and for longer periods, are typically hardy, desiccation-resistant species. Those living further seaward are more frequently submerged, although even these organisms may be exposed to the drying sun during particularly low tides, or can be periodically buried by the deposition

of shifting beach sand. During winter storms, large waves may crash onto these reefs, stripping away algae and dislodging animals. Yet despite such harsh conditions, intertidal reefs can support a diverse assemblage of algae and invertebrates.

Intertidal reefs are recognised as key ecological values of the Marmion and Shoalwater Islands marine parks that are located adjacent to the Perth metropolitan area. Between 2009 and 2012, marine scientists from DEC's Marine Science Program and the WA Herbarium worked with local marine park staff to survey some of the numerous intertidal reefs in these marine parks to improve our understanding of the communities they support.

Right: An eleven-armed starfish *Coscinasterias muricata* (Photo: John Huisman).

Findings

This study has identified over 100 species of algae and over 100 species of invertebrates on intertidal reefs of the Marmion and Shoalwater Islands marine parks. The distribution of this highly diverse assemblage of algae and invertebrates on the reefs varied markedly in relation to factors like exposure to wave action. More sheltered reefs commonly supported a dense canopy of algae, often dominated by the large brown *Sargassum*. The invertebrate community on these relatively



sheltered reefs included sea stars, sea urchins and various small gastropods that live amongst the fronds of algae. In such low energy areas, accumulations of sand in holes on the reef hosted burrowing molluscs that did not occur at other locations.

In contrast, high energy reefs tended to support a relatively sparse algal assemblage, often dominated by short turf and encrusting coralline species. Here also, the invertebrates were more likely to be hardy species such as abalone, chitons, anemones and limpets that can adhere strongly to the rock surface and are not easily dislodged by wave action.



Common intertidal reef species. **Left to Right:** a cart-rut shell *Dicathais orbita*, two sea anemones (*Actinia tenebrosa*) and a purple sea urchin (*Heliocidaris erythrogramma*) (Photos: John Huisman).

Management Implications

- This study has found that intertidal reefs of the Marmion and Shoalwater Islands marine parks support a diverse assemblage of algae and invertebrate species.
- The abundance and occurrence of some key species differed markedly between the two marine parks, despite their close proximity on the Perth metropolitan coast. The purple sea urchin *Heliocidaris erythrogramma*, for example, was quite common on reefs at Shoalwater Islands, but was rarely seen at Marmion. Such differences may be partly a consequence of the intertidal reefs at Shoalwater Islands being sheltered more often from wave action than those at Marmion.
- In addition to documenting the biological communities associated with these intertidal reefs, this study will assist in developing methods and indicator species that will be used for long-term monitoring. Periodic monitoring of intertidal reefs in the Marmion and Shoalwater Islands marine parks will enable DEC to continually assess their condition as human use of Perth's coastline continues to grow.
- The outcomes of this study will also be compared to surveys of intertidal reef communities across other marine parks and reserves in WA to develop a state-wide understanding of this often poorly understood aspect of WA's marine biodiversity.



Above: DEC staff surveying a reef in the Marmion Marine Park (Photo: John Huisman).