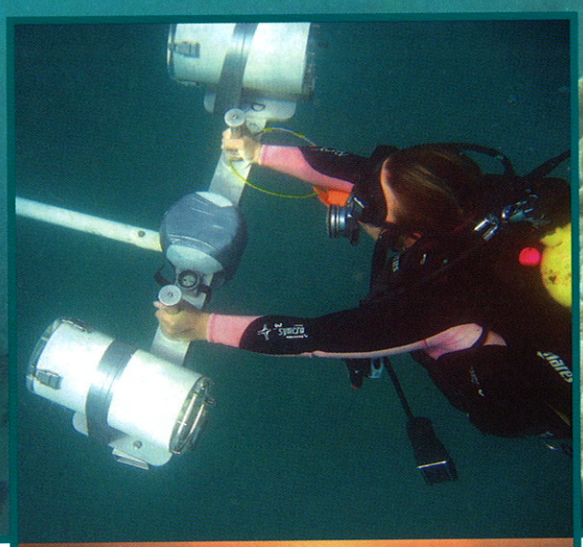
Science in the sea

by Carolyn Thomson-Dans and Shannon Armstrong

When celebrated navigator and buccaneer William Dampier visited the archipelago now named in his honour during the seventeenth century, the astute observations and intriguing sketches in his journal brought the area's natural history to the attention of the world. It is fitting then that, with the imminent declaration of the Dampier Archipelago Marine Park, a long-term scientific monitoring program has now been established for its very special suite of marine plants and animals.



The Dampier Archipelago—42 islands, islets and rocks, all lying within a 45-kilometre radius of Dampier—is the richest area of marine biodiversity known in Western Australia, comparable to that of the Great Barrier Reef (see 'Dampier Down Under', *LANDSCOPE*, Summer 2003-2004). The archipelago's waters will soon be protected by two important marine conservation reserves.

The proposed Dampier Archipelago Marine Park will cover about 122,000 hectares and protect the waters around most of the islands in the archipelago. The diversity of fish and corals in the Dampier Archipelago is comparable to other parts of the Indo-Pacific and many of the species are common to several areas. However, peculiarities in the structure of the islands mean these coral reefs are unique. More than 215 species of corals, many of which occur both inshore and offshore, have been recorded. In inshore waters, corals grow prolifically on rocky slopes but generally do not form reefs. Most of the coral reefs in the archipelago are fringing reefs.

The proposed Regnard Marine Management Area will straddle the mainland coast west of Dampier and cover an area of approximately 62,000 hectares (see 'Marvellous mangroves and mud', *LANDSCOPE*, Spring 2007). It will extend from Eaglehawk and West Intercourse islands eastwards to South West Regnard Island.

The Dampier Archipelago has exceptional natural beauty and high conservation values. Several of the beaches are important nesting sites for hawksbill, flatback and green turtles, with Rosemary Island having the largest hawksbill turtle rookery in the Indian Ocean. More than 40 species of shorebirds and migratory waders use the saltmarshes, mangroves, extensive mudflats and intertidal reefs, and some of the small, outer islands and rocks support large seabird colonies. The proposed Dampier Archipelago Marine Park is also an important area for migratory humpback whales and dugongs graze on the seagrass meadows.

Zoning in on conservation

Like most other marine parks and reserves in WA, the proposed Dampier Archipelago Marine Park will be a multiple-use reserve that caters for a wide range of activities. Multiple-use reserves reflect a balanced approach to conserving the natural environment and providing opportunities for people to enjoy and appreciate it.

Previous page
Main *Pavona decussata* corals are commonly found in turbid waters of the proposed Dampier Archipelago Marine Park.
Photo – Suzanne Long/DEC
Inset Recording the abundance and length of fish along a monitoring transect using underwater stereo video equipment.
Photo – Alicia Edwards/DEC

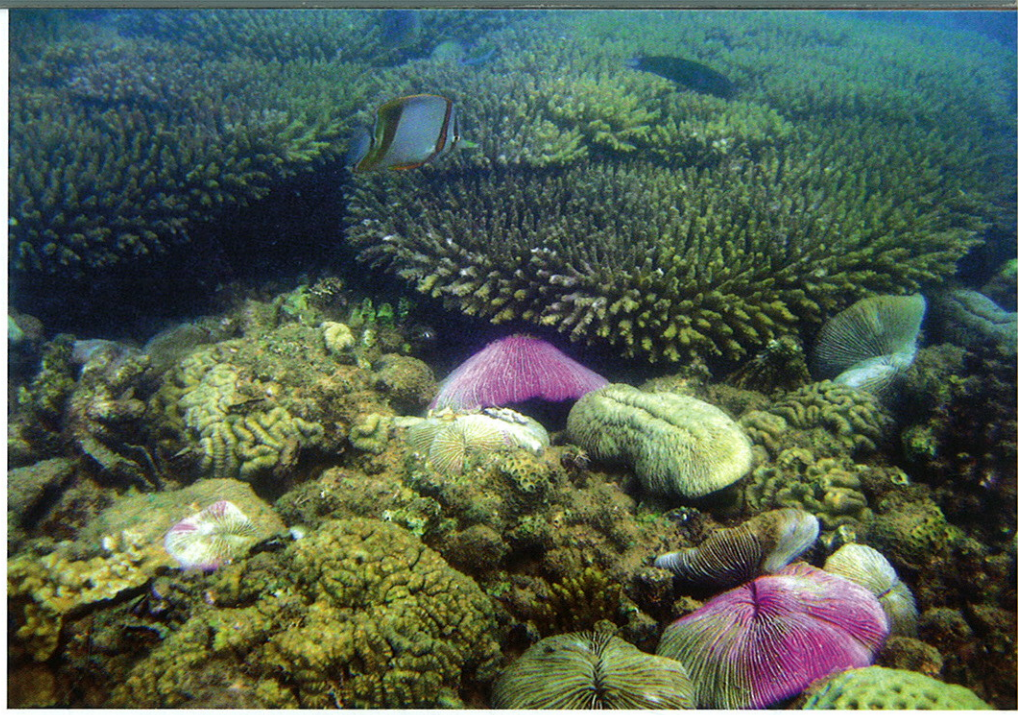
Below Much of Searipple Passage is likely to be a sanctuary zone when the proposed marine park is declared.
Photo – David Bettini

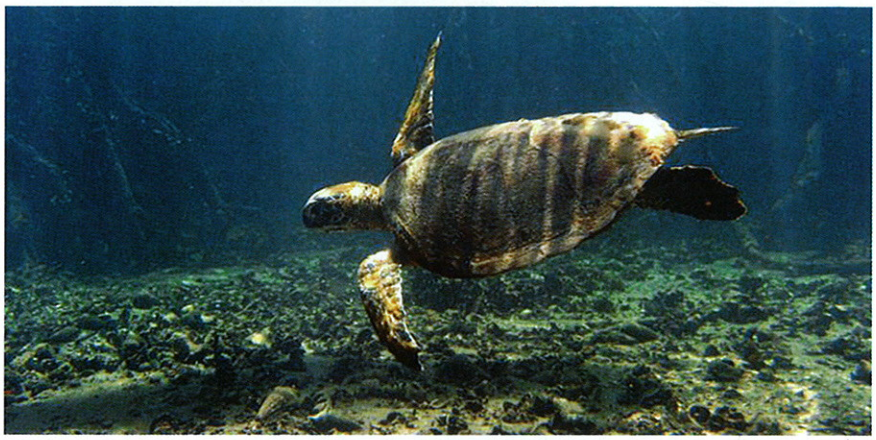
Zoning is an important part of the management framework in multiple-use marine parks and reserves. The establishment of sanctuary zones (or their equivalent) is an integral element of 'best practice' multiple-use marine parks and reserve systems worldwide. Sanctuary zones prohibit all forms of extractive activities, including fishing, so the establishment of sanctuary zones is often the most contentious part of the planning process. Sanctuary zones provide natural refuges for the conservation of marine biodiversity, form reference areas for research and monitoring to help scientists measure the impact of human activity on the environment and are important areas for passive recreation, nature appreciation, tourism and public education.

Sanctuary zones only comprise about seven per cent of the proposed Dampier Archipelago Marine Park. While this percentage is below emerging benchmarks for sanctuary zones in tropical multiple-use marine parks and reserves, it represents the achievable outcome of a protracted community planning process. These processes attempt to balance the best conservation outcomes possible, in terms of marine park and reserve design, while minimising impacts on existing recreational and other uses and hence retaining local community support for the park or reserve to be established. Once the proposed marine park and marine management area have been established, the results of the local research and monitoring studies and public marine education programs will be used to better inform and demonstrate to the local community the numerous benefits of sanctuary zones.

The proposed Dampier Archipelago Marine Park is popular for a wide range of recreational activities including scuba diving, snorkelling, fishing and boating. The best diving is on the outer islands, such as Delambre, Legendre, Kendrew, Rosemary and Enderby islands, and the reefs that lie between them.

The Dampier Archipelago provides recreational fishing opportunities that are greatly valued by local communities. In fact, the nearby population has the highest level of boat ownership in WA.





Top Diverse coral community near Conzinc Island.

Above Hawksbill turtle in a mangrove creek in the proposed Enderby Island sanctuary zone.
Photos – Shannon Armstrong/DEC

Once the marine park is declared, fishing will still be permitted in most of the park and there will be no restrictions for divers, snorkellers, wildlife watchers and other low-impact users.

Long-term monitoring

Once the marine reserves are established, the only way to tell if the new zoning and management strategies are working successfully is through rigorous and regular scientific monitoring. For this reason the Department of Environment and Conservation's (DEC's) Marine Science Program carried out its first two-week monitoring survey in the Dampier Archipelago area in September 2007.

A previous study in the Dampier Archipelago by Barry Hutchins of the Western Australian Museum had revealed that most recreationally targeted fish species within the archipelago were strongly associated with coral reefs, so DEC's marine scientists decided that the first survey would focus on coral reef habitat (future surveys will target different fish habitats). Survey sites with similar coral cover and coral species were selected to minimise the effects of habitat variability on changes to fish assemblages.

DEC's marine survey team, led by Research Scientist Shannon Armstrong, recorded coral reef communities and their associated reef fish, both within and outside proposed sanctuary zones. Six 50-metre-long transects were surveyed at each of six sites at both Legendre Island and Sailfish Reef. A subsequent survey in mid-2008 will establish sites at Delambre Island, Hamersley Shoals and Kendrew Island to provide baseline data before the creation of the marine park.

These areas were chosen for several reasons. They included areas within proposed sanctuary zones; they offered

Top The proposed Dampier Archipelago Marine Park will protect the richest area of marine biodiversity known in WA.
Photo – Shannon Armstrong/DEC

Above left DEC Research Scientist Shannon Armstrong records the condition of corals using underwater video.
Photo – Alicia Edwards/DEC

Above Edible red jellyfish (*Crambione mastigophora*).
Photo – Suzanne Long/DEC

good stretches of coral reef on which to locate transects; and they will also enable scientists to make comparisons with historic data because past surveys of fish and coral reef communities have been undertaken at several of the sites.

Divers worked in groups of three. The first diver swam along the transect recording the abundance and length of fish using an underwater stereo-video, closely followed by a second diver who recorded transect length. The third diver recorded the cover of corals and other plants and animals attached to the sea floor along the transect again using an underwater video.

Although the scientists undertaking the September 2007 survey were astonished at the large variety of marine habitats, they did not see a lot of large recreationally targeted, site-attached fish species such as coral trout, which indicated that areas within the proposed marine park may be significantly depleted of these species. Given these observations, it will be interesting to see if the general abundance and size of such fish species increase over time within sanctuary zones.

When it becomes available, the information gained from the survey will give invaluable insights into the current health of marine communities of the proposed Dampier Archipelago Marine Park and provide a basis on which to compare the results of future surveys in the area.

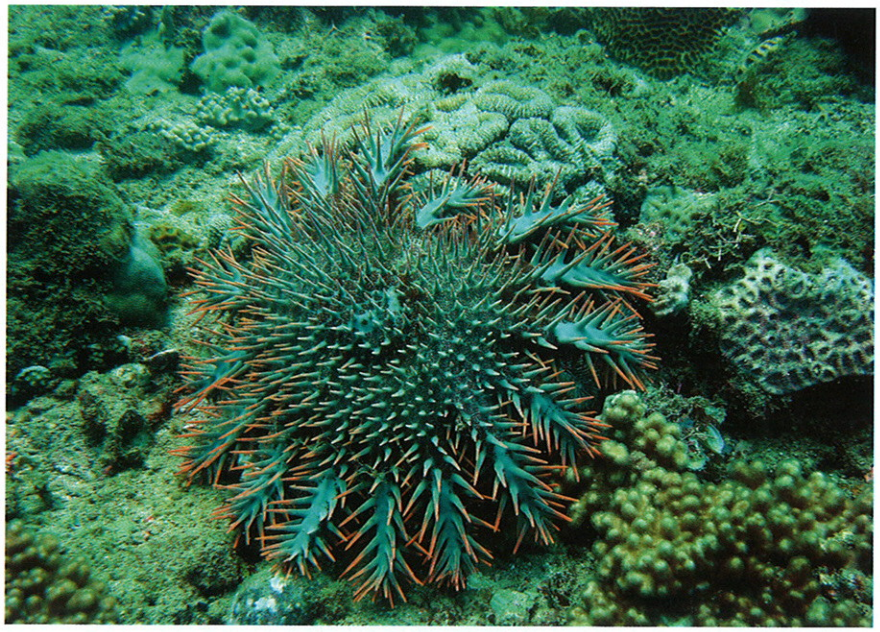
Future surveys

Some larger fish species targeted by recreational fishers may avoid scuba divers but are likely to be successfully sampled using baited remote stereo-video. This technique involves lowering baited video cameras to the seafloor to record the size and numbers of fish during set time intervals. A second survey will be conducted in mid-2008 to collect data on fish abundance and length using this method. The combination of the two different survey techniques will provide more comprehensive information on changes to the abundance and assemblages of fish species in the Dampier Archipelago over time.

The baited remote stereo-video survey will target additional fish habitats to the first survey. Researchers may also establish sites aimed at determining

Above Luxuriant corals at Nelson Rocks in the proposed Dampier Archipelago Marine Park.

Right DEC will monitor crown of thorns sea stars as part of its long-term monitoring program.
Photos – Shannon Armstrong/DEC



whether benthic protection zones within the proposed marine park are effective at protecting bottom-dwelling fish species over time.

Future surveys will also include estimating the size and density of recreationally targeted tropical rock lobsters inside and outside proposed sanctuary zones. DEC researchers will also be keeping a watching brief on the densities of crown of thorns sea stars and drupella snails—which predate on corals and can sometimes reach plague proportions and damage large areas of reef (see 'Snail threat to Ningaloo Reef?', *LANDSCOPE*, Summer 2007-2008).

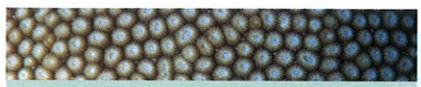
To better understand seasonal variations in fish abundance and length and rock lobster size and density at the Dampier Archipelago, surveys will be repeated during different seasons over the next two years. The data will provide an estimate of the size of such differences against which we can compare the differences between fished and unfished areas.

These surveys will form part of a long-term monitoring program. Monitoring of other key marine ecosystems, such as mangrove communities, which are good indicators of whether marine park management strategies are effective, will be worked into the program at a later date. The baseline data collected during these surveys will serve a critical management function by allowing scientists to determine trends in the condition of these areas over time following the establishment of the park and its zoning scheme.

Future management direction

Information gained from this long term marine research will improve marine management, planning and policy for the proposed Dampier Archipelago Marine Park. Monitoring the condition of the marine environment over time will enable DEC to assess the effectiveness of different management regimes for the proposed marine park.

Monitoring human impacts—manifested in changes in the marine environment over time—will facilitate the best possible management of this important area.



Carolyn Thomson-Dans is the Department of Environment and Conservation's (DEC's) Senior Communications Officer (Marine). She can be contacted on (08) 9336 0121 or by email (carolyn.thomson-dans@dec.wa.gov.au).

Shannon Armstrong is a Research Scientist with the Marine Science Program in DEC's Science Division. She can be contacted on (08) 9219 9794 or by email (shannon.armstrong@dec.wa.gov.au).

Volume 23 Number 3 Autumn 2008

contents

Regulars

Publishing credits
Executive editor Kaye Verboon.
Editors Samille Mitchell, Rhianna King, Carolyn Thomson-Dans.
Scientific/technical advice Kevin Kenneally, Chris Simpson, Keith Morris.
Design and production Natalie Jolakoski, Tiffany Taylor, Gooitzen van der Meer.
Illustration Gooitzen van der Meer.
Cartography Promaco Geodraft.
Marketing Estelle de San Miguel
Phone (08) 9334 0296 *Fax* (08) 9334 0432.
Subscription enquiries
Phone (08) 9334 0481 or (08) 9334 0437.
Prepress and printing Lamb Print, Western Australia.
© ISSN 0815-4465

Please do not send unsolicited material, but feel free to contact the editors.

Visit NatureBase at www.naturebase.net

Published by the Department of Environment and Conservation, 17 Dick Perry Avenue, Kensington, Western Australia.

Department of Environment and Conservation
Our environment, our future