

The Recherche Archipelago is regarded one of Australia's most spectacular seascapes. Now, after the community of Esperance stood up to initiate a major scientific investigation of its vulnerable underwater habitats, this rugged chain of landmasses off Western Australia's southeast coast is becoming noted for its remarkable biodiversity.

Mondrian Island lies at the heart of the Recherche Archipelago and is typical of the granite islands in being surrounded by stunning sea life. Justin McDonald Formed many millions of years ago by volcanic activity, the Recherche Archipelago meanders into the Southern Ocean mostly eastwards from the port of Esperance. It comprises more than 100 low-lying, sparsely vegetated islands as well as many hundreds of largely submerged reefs and islets. Known as the Bay of Isles, the area is renowned for its pristine environment, crystal-clear turquoise waters and expansive white-sand beaches.

For 50 years it has supported a modest fishing industry that exploits abalone and rock lobsters as well as several species taken by gillnet, longline and trawl fisheries. But it's also popular with recreational boaters, fishers and divers and the Esperance community has, in recent years, been steadily growing a low impact tourist industry based on the area's natural splendour.

University of Western Australia (UWA) marine scientists Dr Gary Kendrick and Dr Euan Harvey were first approached by the people of Esperance in the late 1990s to undertake a study of the archipelago.





A colonial ascidian (*Botrylloides* sp.) growing over a solitary *Herdmania* species. Justin McDonald

Their three-year investigation to identify and document its underwater habitats began in 2001.

Until this research the archipelago has been, like much of the Western Australian coastline, largely undiscovered and unexplored.

Its islands are visited by seabirds, seals and sea lions, and snakes and lizards also occur on several islands. Temperate shallow-water reef communities featuring a range of algal species and invertebrate animals such as soft corals, sponges and bryozoans fringe many of the islands, including some located well offshore. The surrounding water is stunningly and famously clear due to very low levels of dissolved nutrients caused by a combination of factors, including oceanic current patterns and limited runoff from the land.

The fish life, Harvey enthuses, is 'fantastic'. The diversity is extraordinary, ranging from small and delicate leafy sea-dragons hovering in near-perfect camouflage against algae and seagrass, to huge blue gropers of a size not seen elsewhere.



realms of 1.6 m.

these fish swim in what appear to be family groups, with individuals ranging upwards from 40 cm. 'You don't see that elsewhere, probably because they've been fished out,' says Harvey. Despite the beauty and diversity of the fish life,

'In theory, they're only meant to reach about 1.2 m,'

comments Harvey. 'But we were recording them in the

The blue groper is also not normally noted for its

tight social structure, and yet around the Recherche

Despite the beauty and diversity of the fish life, invertebrate groups have delivered some of the study's most unexpected findings. The sponge life, in particular, has proved to be incredibly diverse and accounts for more than 70% of the invertebrate fauna.

Although the laborious task of species identification will take many more months to complete, already 11 of the world's 14 orders of sponges have been recorded from the archipelago; a level of diversity experts say would normally be expected in the tropics.

'We've also found a completely new genus ... and we don't know yet exactly how many new species but we've got a fair few,' says marine ecologist Dr Justin McDonald. 'There are also a lot of range extensions because we've found families that haven't been found in Australia before.'

The diversity of bryozoans has also been surprising. This largely marine group, occasionally known as 'moss animals' and sometimes mistaken for coral or algae, range from small and 'fluffy' to large, plate-like colonies 20 cm in diameter. Few people are skilled at species identification for this group and so samples are presently with an Australian-based international expert in NSW. The WA scientists originally thought they had about 20 species but already the number is up to over five times that.

Perhaps the most startling underwater features of the archipelago are huge rhodolith beds, some stretching for kilometres and covering what many locals had believed to be exposed sandy plains. Rhodoliths are calcium carbonate-hardened gravel-like balls of red algae that form a supportive substrate for other algae species, sponges, soft corals and large invertebrates such as octopuses and starfish. They've been recorded from other parts of the WA coast. Top left: A solitary (non-reef forming) coral, *Scolymia australis*. Justin McDonald

Top right: A longsnouted boarfish (*Pentaceropsis recurvirostris*), one of the few fish species that feeds on brittle stars.

Bottom left: The leafy sea-dragon (*Phycodurus eques*) is custom-made to blend well with seaweed habitat.

Bottom right: The seastar *Fromia polypora*, a common, highly conspicuous, species believed to feed on invertebrates such as sponges and ascidians.









Top left: Red snapper, a highlyprized eating fish.

Top right: UWA researchers David Abdo and Nicole Harman collecting samples. Justin McDonald 'But it's strange no one's noticed them here before,' comments marine ecologist Nisse Goldberg.

Rhodoliths are particularly slow growing and Goldberg has recently secured a grant to identify the age of the Recherche beds. Carbon dating has already identified one specimen as being over 200 years old, suggesting that if these habitats were disturbed they could take centuries to recover.

Elsewhere in the world, rhodolith beds support large numbers of larval and juvenile fishes and invertebrates to play an important role as marine nurseries, particularly for commercially exploited species. It's thought they may perform a similar function off Esperance.

Goldberg's work on the archipelago has also identified more than 200 different species of algae.

Like the other researchers in the UWA team, Goldberg has been impressed, during the study, by the support and interest that's come from the Esperance community.

'Not too many people get excited about seaweed the



The basketstar Astroboa ernae feeds at night, extending its many arms to capture food particles. Justin McDonald



The wandering anemone *Phylctenactis tuberculosa* moves or drifts close to the seabed foraging for food. Justin McDonald



The seastar *Plectaster decanus* is a striking species with a mosaic arrangement of papules. Justin McDonald



The mosaic seastar *Pentagonaster dubeni* is very common and easily identifable. Justin McDonald



way I do!' she comments, recalling her surprise at the enthusiasm of an impromptu gathering of locals who gasped in surprise as they jostled to see and touch samples during one of her experiments. 'These people seem to understand the [ecological] connections in the area ... which tells you how educated they are.'

About 14 000 people live in Esperance and the area boasts a robust economy based largely on surrounding agricultural and mining ventures.

Being more than 700 km east of Perth, the town has something of an isolated frontier feel. Significant growth has really only begun within the last 40 years and many residents have relocated from either many hundreds of kilometres away in Australia, or overseas.

The nature of the local environment has been a major drawcard but it still comes as a surprise to hear non-scientists in the town chatter knowledgeably and proudly about such things as ascidians, sponges and rhodolith beds.

Esperance is also a busy port through which iron ore as well as grains are exported. It was named Australian Port of the Year last year, partly because of its environmental record, a feature behind which the local community was a driving force.

Together, locals fought successfully to overturn a proposal that would have seen iron ore stored in open stock piles and potentially threaten the appearance of the area by creating excessive dust and dirt.

'Now what we do is regarded as world's best practice and we have people visiting from all over the world to look at the way this normally dusty product is handled,' comments long-time resident and local State member for 16 years, Ross Ainsworth.

It was the same dynamism that now ensures Esperance is one of Australia's cleanest and neatest ports that underpinned the UWA project.

The town first became concerned about the future of the archipelago in 1998 when the State government began promoting a trial of tuna cages in the Bay of Isles. The potential visual impact was one concern but the locals were particularly anxious they hadn't been included in discussions.

'The [WA Department of Fisheries] was both the proponent for this trial and the regulator which was a fairly bad situation,' recalls Ainsworth. 'And the community – myself included – was quite agitated about the prospect of something being plonked on our



doorstep with little or no proper consultation.

"More importantly, when we started looking at the documentation fisheries had put forward in their proposal, it became very clear there was almost no scientific data they could use to make a decision on whether a site was appropriate or otherwise ... regardless of anyone's view on tuna [farms], which is quite a separate issue."

With rumour and innuendo flying thick and fast, Ainsworth gathered together a group of locals who represented a wide cross-section of Esperance interests and the delegation flew to South Australia's Port Lincoln to learn more about tuna farming from a town with experience.

While there, they formed the Recherche Advisory Group (RAG) in a determined attempt to ensure appropriate community input to future plans for the archipelago. They identified three primary objectives: encourage and support scientific research; undertake a community education program; and set in place a community-based management plan for the archipelago.

In line with the first objective, the RAG canvassed the Esperance community, raised over \$100 000 (mostly from big business) and approached Drs Kendrick and Harvey.

The researchers secured a further \$500 000 over three years from the federal Fisheries Research and Development Corporation and their team began mapping and exploring the archipelago's submerged environment shortly after.

Almost from its outset the project has attracted attention, both elsewhere in Australia and overseas, for the range of methods it has employed to document the habitats and biological diversity of the archipelago. They include a combination of state-of-the-art video, photographic and sonar technologies developed and applied by the UWA team in conjunction with researchers from RMIT University, Melbourne, the Australian Institute of Marine Science, Townsville, and University College London.

Perhaps just as notable has been the ongoing commitment of Esperance to the project.

'The community has been very supportive in a whole range of ways,' explains Ainsworth. 'Local knowledge from people who have been fishing, diving and boating in the area helped focus some of the research. And there's also been a substantial in-kind commitment from local





people in terms of such things as the provision of vessels and skippers and accommodation for visiting scientists.'

Ainsworth estimates in-kind contributions from the community have been worth hundreds of thousands of dollars.

Developing a local management plan with some grunt might prove to be a little harder than stimulating research. Legally, the plan will not have any standing as government departments oversee the granting of approvals for marine developments. That, however, doesn't seem likely to stop the locals from ensuring that only sympathetic development proceeds.

'We are lucky to have this pristine environment about which we can make decisions before it's too late,' says Ainsworth. 'We don't want to stop development for the sake of it. But what we want to do is to have a community vision which is spelled out in a management framework that can be integrated into any formal assessment process by government agencies.'

'We think it's possible that with a bit of sensible planning and some fairly hard-nosed decisions, the archipelago can provide economic benefits for the area without compromising the pristine nature of our marine environment.'

• Karen McGhee

More information: About the Recherche project: www.marine.uwa.edu.au/recherche/ Contact: Dr Justin McDonald, Ph: (08) 6488 2416, justinmc@cyllene.uwa.edu.au Recherche Advisory Group: Ross Ainsworth, rainswor@mp.wa.gov.au Top left: A large barrel-like sponge belonging to the order Astrophorida. Justin McDonald

Top right: Hula fish over *Turbinarea* plate coral. Justin McDonald

Left: Dr Justin McDonald sorting invertebrate samples after returning to the boat Southern Explorer. Simon Grove