

CHRISTMAS ISLAND

BY JUSTIN GILLIGAN

BELOW THE SURFACE OF THE INDIAN OCEAN, I WATCH A LARGE TIGER SHARK *GALEOCERDO CUVIER* MAKES ITS WAY UP A VERTICAL REEF WALL TOWARD MARINE BIOLOGIST JAY HENDER AND ME. FIVE METRES AWAY THE BULK OF THE MASSIVE SHARK IS CLEAR AND UNTHREATENING. IT FLICKS ITS HEAD SEVERAL TIMES AND CONTINUES ALONG THE REEF WALL. I LOOK UP AT OUR THIRD TEAM MEMBER, JP HOBBS, IN THE SHALLOWS OBSERVING ANGELFISH OF THE FAMILY CENTROPYGE, OBLIVIOUS TO THE SHARK'S PRESENCE.

The dramatic cliffs of the Christmas Island coast plunge into the sea and support the growth of hard corals in shallow water

Snapshot a remote territorial jewel

Return to the scene in front of me and compose the large gorgonia fan corals hanging off the walls surrounded by bright pink anthias and a large territorial yellow damselfish (*Amblyglyphidodon aureus*). As the light filters down through the thermocline and into the indigo depths, I reflect on the past three months in this remote Australian territory and push the shutter release.

We arrived on Christmas Island as a team of young marine biologists aiming to complete a baseline assessment of the marine environment and fish stocks with the assistance of Parks Australia. Since only limited research had been done on the Christmas Island marine environment, we wanted to obtain a snapshot of the current state of reef health in a single moment in time. Such studies are useful for general reef health monitoring and for assessing risks to the marine environment from a range of impacts.

Christmas Island is a remote Australian Territorial jewel located approximately 360 kilometres due south of the Indonesian Island of Java and about 2600 kilometres northwest of Perth. It is a mere edifice in the Indian Ocean rising steeply, almost vertically from the seafloor at 5000 metre's depth. Substrate suitable for coral to colonise on Christmas Island is restricted to a shallow platform of limestone surrounding the island to a depth of 20 metres. This physical limitation restricts the total abundance of aquatic resources, which contributes to their susceptibility to over-exploitation – a key reason why baseline data is so important to determine effects of pressures over time.

Parks Australia have developed and implemented a Christmas Island National Park Management Plan, which contributes to maintaining the overall health of the marine environment here. In 1980

sections of the Island were declared a National Park, including an area extending 50 metres seaward of the low water mark along the island's coastal fringe. The park was expanded in 1986 and 1989, as was the corresponding seaward section of the park. The marine park area currently incorporates 46 kilometres of the island's 73 kilometre coastline.

Our survey sites were restricted to the northern portion of the island between Egeria Point and Ethel Beach due to a consistent southeast trade wind. Generally we found that the marine environment in the waters surrounding Christmas Island is quite healthy compared to similar isolated aquatic environments.

Our daily routine would see the team meet at the Parks Australia's office, which overlooks Flying Fish Cove to the north.



A pink leaf scorpion fish amongst the corals



A longnose hawkfish in its seawhip home



There are several species of clownfish on Christmas Island; during our stay we observed many anemones that were bleached



We'd assess ocean conditions with Max Orchard, the skipper of the Parks Australia vessel, and agree on which predetermined survey site would be most comfortable to survey – based on the weather conditions.

Christmas Island has a low diversity of marine species, which is attributed to the small size of the island, its isolation from sources of planktonic larvae and the limited range of suitable habitat present. Even with these restrictions, it was

In the cave, horny corals grow without light and contrast against the dappled blue surface of the cave.

surprising that each site had a unique assemblage of organisms and demonstrated its own individualities that separated it from other sites around the island. This was most likely due to variable wind, wave and current conditions in different sections of the island.

A small-scale bleaching event affecting anemones and hard corals was occurring on the northern portion of the island. The cause of this was most likely a prolonged doldrums period, with warmer water temperatures experienced for a longer period than usual over the summer period. Anemones at Ethel Beach were common; but it was unusual to watch the resident skunk clownfish *Amphiprion perideraion* move about in their bleached white homes that were usually green and brown in colour!

Submerged caves are common around Christmas Island. These are formed by freshwater leaching from the upper reaches of jungle through the island's weak

limestone core all the way through to the Indian Ocean. Such caves increase the habitat complexity of the substrate and in turn increase reef fish densities and the area that benthic organisms can colonise. On a surface interval at a site near Thunder Cliff Cave, Max suggested that we should snorkel around the entrance. From inside the cave looking out towards the open sea, shafts of white sunlight made stark contrast to the deep indigo of the sea and the jet black cave walls.

There's a shore entry to one site that we surveyed near the main township, to the east of Flying Fish Cove. Deep down the reef slope, large and dense fields of gorgonia seaweeds and seawhips flourished. Longnose hawkfish *Oxyrrhites typus* darted in and out of their seawhip and gorgonia homes. I watched as one hawkfish darted out of a seawhip and snatched a juvenile damselfish *Chromis* sp. in mid water. In the shallows, a colony of blue ribbon eels *Rhinomuraena quaesita* lunge out of their holes, mouths gaping wide as a territorial defence. This healthy presence of macro organisms is an indication of an overall healthy reef ecosystem.

On the western coast of the island near the Dales there've been reports of ciguratera toxin from islanders who have eaten red bass *Lutjanus bohar* caught in this region. Therefore fishers tend to avoid this area, which in turn creates natural marine reserves and seeding areas for other fished areas around the island. Manta rays *Manta birostris* were frequently seen around this

area plus large numbers of bluefin and giant trevally *Caranx ignobilis*, red bass, green jobfish *Aprion virescens*, barracuda *Sphyrna barracuda* and other large predatory species such as grey reef sharks *Carcharhinus amblyrhynchos* and sleepy whitetip reef sharks *Triaenodon obesus*.

On the northwest coast, we surveyed an interesting site called The Boat Cave. Beneath the boat, the cave is actually a large open cavern that creates a consistently dark habitat influencing the benthic and fish assemblages in the region. Rare species of angelfish frequent the site and species usually found in deep water live shallower on the steep reef slope outside the cave. In the cave, horny corals grow without light and contrast against the dappled blue surface of the cave.

Angelfish of the Centropyge family were common around The Boat Cave. This was particularly interesting to one of our team members, a PhD candidate from James Cook University, Jean-Paul Hobbs. Mr Hobbs is currently undertaking a research project to examine the isolation of Christmas Island. By comparing distinctions between members of the Centropyge family found at different locations around the world, Mr Hobbs hopes to determine the

fishes' susceptibility to extinction and their ability to adapt to change.

Even though the island is isolated from coral larvae sources, the overall density of hard coral cover surrounding the island is very good. Flying Fish Cove had the best hard coral cover and is one of the most accessible snorkeling sites, with limited anchor damage thanks to the presence of moorings. The steep dropoff is reachable from shore and Smith Point, the western extremity of the cove has a number of large fan corals. While exploring the waters of Flying Fish Cove, it wasn't uncommon for us to find leaf scorpionfish *Taenionotus triacanthurus*, false stonefish *Scorpaenopsis diabolus*, morays *Gymnothorax* sp, resident cleaner shrimp and bubble coral shrimp.

I'd like to thank Parks Australia, Christmas Island dive operators, the Christmas Island Tourism Association and the dive and fishing community of Christmas Island, who all provided us with useful information and assistance throughout our survey.



WEATHER Wind patterns separate two distinct seasons known as the doldrums and the trade wind seasons. The doldrums occur from November through to March and are characterised by limited wind in the absence of cyclones. Launching facilities may be restricted during the doldrums. The trade wind season is named after the persistent trade wind that blows from June to September. This wind provides optimum conditions to the sites on the northern side of the island. The water temperature averages between 26 and 28 degrees Celsius year round.

GETTING THERE Christmas Island is serviced twice weekly from Perth International Airport. A baggage limit of 20 kilograms with 5 kilograms of hand luggage applies, so divers and photographers should organise excess baggage prior to departure. Extra services may also be available during peak holiday periods.

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CURRENCY Australian dollars (AUD), EFTPOS facilities are also available at a number of small retail outlets.

ELECTRICITY Standard Australian three-pin plugs are used on all outlets, the current is 240V/50hz.



A juvenile golden damselfish; A cocos angelfish only known to occur on Christmas & the Cocos (Keeling) Islands; Snorkeller; Blue ribbon eel;

A moray eel & cleaner shrimp; Angelfish; Diver with a large gorgonia fan in the deeper waters