LADY MUSGRAVE REEF FACTS

The Best Experience on the Great Barrier Reef

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ORIGIN OF THE GREAT BARRIER REEF

The Great Barrier Reef is one of the world’s most complex and biologically diverse ecosystems. The reef stretches for 2,300 kilometres along most of the Queensland coast, starting at Cape York in the north to just north of Bundaberg in the south. The reef, however, as the name suggests is not one continual barrier but is made up of over 2,700 individual reefs with almost as many islands and cays.

The first reef systems began to grow in this area some 2 million years ago when Northern Australia drifted into the tropics. Due to tides and currents many different organisms drifted down from the surrounding areas of Malaysia and Indonesia where they were able to establish and grow in this new environment. Since this time several ice ages have occurred resulting in dramatic sea level changes. During each ice age, sea levels subsided leaving large reef areas exposed. It is during these times that the wind eroded large gullies and ridges amongst the coral. When the polar caps melted and sea levels rose, what was once dry limestone bedrock once again supported coral growth. This process of sea level change has occurred many times in the last 2 million years since the reef formed.

Due to this continual growth of new coral over the old skeleton as the sea level rose and fell, the Great Barrier Reef today in most places is a maximum of 300 metres thick. The present day Great Barrier Reef is around 8000 years old with much of this growth taking place in a period of relatively stable sea levels.

REEFSCAPES

Lady Musgrave’s story began 2 million years ago when coral reefs first began to form in this area. Following their formation, reefs have been flooded and stranded as sea levels have risen and fallen. When reefs are exposed as limestone hills at times of very low sea level, they are eroded by wind and rainwater but maintain their basic shape. After rising sea levels submerge them again, new coral grows over the ancient structure.

Sea level reached its lowest (about 120m below the present level) in the last ice age some 18,000 years ago. At that time land reached out to the edge of the continental shelf. The polar icecaps began to melt, and for 10,000 years the sea level rose. Coral grew on the mounds of the old reefs as they were submerged, but could not keep up with the rising sea. About 6,000 years ago, the sea level stabilised, and reefs grew closer to the surface. Some have now reached sea level, while others are still well below it.
At the southern end of The Great Barrier Reef, close to the Tropic of Capricorn, lies a string of islands and reefs known as “Capricornia” the Capricorn and Bunker Group. Capricornia’s 22 reefs, 13 of them with islands, are about 80km from the mainland, in the shallow seas above the continental shelf. Capricornia is an important conservation area and is part of the World Heritage Site declared over the Great Barrier Reef.

Eighteen thousand years ago, the reefs of Capricornia were limestone hills on a coastal landscape. Aboriginal family groups painted in the caves and harvested rich food supplies from the coastal plains and fringing reefs. Then, generation after generation, the tribes traditional hunting grounds were flooded by a slowly rising sea. The cays which developed in Capricornia were a long journey across often rough water and there is no evidence that they were visited by Aboriginals.

In 1770, Captain James Cook travelled up the Queensland coast close to the mainland, out of sight of the islands of Capricornia. Flinders in 1802 may have seen Masthead Island but the first definite sighting of the Capricornia cays was by Captain Bunker in 1803. The southernmost cay on the reef, Lady Elliott Island was named after Lady Elliot which sailed past in 1816. The island’s position was fixed three years later by Phillip Parker King, on the first of his 3 voyages to the southern reef. On his second voyage in 1820, King named the island and in 1821 he observed several other Capricornia Islands. Masthead Island was named in 1839 by Wickham and Stokes in the Beagle, then in 1843 Captain Blackwood in H.M.S. Fly, accompanied the Bramble and surveyed all the islands and reefs. The party visited North West Island and named Wreck Island (after the America which was wrecked there in 1831), Heron Island (named after the graceful egrets) and One Tree Island. Jukes also wrote about Lady Musgrave, calling it "The First Bunker Island". Lady Musgrave Island was named after Jeannie, the American born wife of a Queensland Governor, Sir Anthony Musgrave.

Later as ports of central and northern Queensland became established, shipping in the vicinity of Capricornia increased. In 1866 a temporary lighthouse was erected on Lady Elliot Island and a more permanent structure was built in 1873. North reef lighthouse followed in 1878. A lighthouse was placed on Lady Musgrave Island in 1974. In spite of these beacons, there have been numerous shipwrecks over the years. (In 1983 a large bulk carrier, the TNT Alltrans grounded on Lady Musgrave Reef, but was refloated). Capricornia’s peace was shattered in the late 19th Century with the arrival of miners seeking phosphate rock or guano. They began on Lady Elliot Island in 1863 and left a devastated landscape stripped of trees and topsoil. Grazing goats aggravated the damage and only in the last 20 years has the island begun to recover. Fairfax and Lady Musgrave Islands were mined at the end of the 19th Century, and on both these islands, goats also caused extensive damage.

Lady Musgrave Island was the site of Capricornia’s second tourist resort, established in 1939, but this soon closed due to financial troubles. (The first tourist resort was established in 1932 on Heron Island, utilising the old turtle soup cannery). Canneries were established on both Heron and North West Islands in the early 1900’s. Harvesting ceased by 1930 due to over exploitation and 20 years later turtles were protected. Half of Lady Musgrave Island was declared a national park in 1938 with the remainder declared in 1967.

**LADY MUSGRAVE ISLAND WAS NAMED AFTER THE QUEENSLAND GOVERNOR SIR ANTHONY MUSGRAVE’S WIFE**
Lady Musgrave Island is the southernmost island in the Bunker Group. The island is a 14-hectare coral cay with a 1192 ha surrounding reef, occupied by a large sheltered lagoon. Cays in Capricornia such as Lady Musgrave are low, flat islands which have never been connected to the mainland but have formed from the reef which surrounds them. They develop as fragments of coral, algae and other reef inhabitants are deposited on one part of the reef, (usually the leeside) by waves and storms. This process has resulted in the formation of Lady Musgrave Island. The surrounding beaches are mostly sandy. Conglomerate and beach rock outcrops which can be seen on the island, have been formed by chemical processes which cement the coral shingle and sand.

The platform reef of Lady Musgrave has distinct natural zones and includes a deep lagoon. The windward reef slope is steep, with a “spur and groove” structure. On the spurs are beautiful branching staghorn corals whilst the grooves that are scoured by tides and currents, are relatively bare. The reef crest, a rocky rim, is the highest point on the reef and is covered with cemented encrusting algae.

The outer edge of the reef flat boasts many coral varieties, whilst sand dominates the bottom, inside the lagoon. The sheltered lagoon is up to 8 metres deep with intermittent patch reefs. The lagoon provides an excellent anchorage and is connected to the sea through a steep sided channel. The lee reef slope is gentle and supports an interesting variety of corals, which are not exposed to the strong seas of the windward slope. Large coral heads or bommies (abbreviation of aboriginal word “bombora”) are home to countless fish and other marine life.

Much of the island has been formed from coral shingle, and its shallow soils, along with strong winds, have influenced the vegetation.

The tree canopy is low compared to sandy cays further north, rising from 6 – 8 metres on the southern side to a maximum of about 15 metres. The open vegetation of the southern eastern side of the island gives way to rambling stands of Pisonia and sandpiper fig in the centre. The Pisonia forest gradually increase in height and density towards the sheltered north western side.

The island tree Pisonia (Pisonia grandis) is well adapted to island life, and often grows in dense forests which allows little light to penetrate the forest floor, thus excluding most other plants. Pisonias flourish in the calcium rich cay soils and in dry times survive by shedding leaves. Branches blown down in storms sprout new leaves and roots. The sticky seeds are dispersed by seabirds, especially the black noddies that nest in the Pisonias.

The beach on the lee side of Lady Musgrave is backed by stands of the graceful coastal sheoak and on the windward side by pandanus trees. On the beach, creepers, herbs and grasses, such as the green, pincushion like beach carrot are abundant.

Native animals living on the island arrived by flying, drifting or swimming, or by clinging to floating plants, flotsam or other animals. To be permanent residents, they must be able to survive on the island through drought and cyclone. Insects, spiders and other arthropods are common on Lady Musgrave, but there are no mammals or reptiles (except visiting turtles) and only a few resident land birds. Many more land birds visit the island to feed, roost or breed, but do not stay permanently.
WHAT WILL I SEE WHEN SNORKELLING AT LADY MUSGRAVE

When snorkelling around the large coral bommies adjacent to the boat, you will get the most out of your snorkelling experience by following the reef edge and around the bommies, where you will encounter the greatest diversity of life. While approaching the reef edge and coral bommies you will see large sea cucumbers laying on the lagoon floors. A part of the starfish family, sea cucumbers are known as the vacuum cleaners of the reef because of the way they clean the sand of fish waste and bacteria. The lagoon has large formations of staghorn coral. These are normally very brightly coloured, however some have colouration only on the tips. The blue blanket coral is commonly found growing up the reef edges. Mushroom corals are the only corals that will move with the tide or current, looking like a grooved “frisbee”. When the feeding tentacles are extended they resemble small anemones.

Close to the boat on the reef edge there are some giant clams. The clams’ hard shell is open when in feeding mode and will gently close as its primitive eye detects changes in light. Another type of clam can also be seen amongst the coral, the burrowing clam – buries itself in the coral.

In strategic positions around the lagoon are “cleaning stations”, managed by the cleaner wrasse, a small blue and white fish. The cleaner wrasse waits for the other fish to pass through this area, when they do they will pause while the cleaner wrasse passes over their body eating ectoparasites and mucus off the fish. The cleaner wrasse will actually enter the mouth and gill cavities of some of the larger fish to complete a more thorough job.

THE GREAT 8

The Great 8 is a variety of special animals only seen here in their natural habitat. Each iconic animal is selected because of its connection to the Great Barrier Reef, importance to the marine eco-system and you guessed it, location.

WHALES
The Humpback whales arrive in the Southern Great Barrier Reef as part of their winter migration to calve, mate and socialise. Best seen during June to October.

TURTLES
Turtle nesting from October to February and hatching from January to March of each year is an amazing experience that you will remember for many years to come.

SHARKS
When snorkelling around the large coral bommies adjacent to the boat you’ll see many species of sharks.

CLOWNFISH
If you have seen the movie Finding Nemo, you would already know just how cute and illusive this little guy can be.

GIANT CLAMS
If you have never been to the Great Barrier Reef, these animals will really blow you away. Growing up to 1.5 metres in length and weighing up to 200kg and like a hand-print, it has a mantle pattern and colour unique to itself.

POTATO COD
This giant grey-brown cod can grow up-to two metres in length and weigh in at 100kgs. Many divers have close encounters with the fish due to its friendly nature and inquisitive personality.

RAYS
It is well documented that Manta Rays will actually seek out and play around Scuba Divers and Snorkellers making diving or snorkelling with Manta Rays a truly unique experience.

MAORI WRASSE
This distinctive fish has thick fleshy lips and a bump that juts out from its forehead. What it lacks in looks it makes up in personality.
THE FORMATION AND GROWTH OF CORAL REEFS

The Great Barrier Reef is the largest structure made by living animals, however, the builders are amongst the smallest and simplest of organisms. These animals are coral polyps and each one resembles an upside-down jellyfish. The polyps consist of a simple cup shape body with an opening surrounded by a ring of tentacles at the top.

There are a number of different varieties of coral however only one particular type, the scleractinian or hard coral, is responsible for building coral blocks or bommies.

Coral polyps have a special symbiotic relationship with a tiny plant or algae called zooxanthellae. These single-celled algae are usually only found in corals growing 30 degrees north and south of the Equator, where the water temperatures are warmer. It is this algae that gives the coral its different colours.

This microscopic algae lives inside the coral's tissue and it uses the sun's energy to photosynthesize, a process in which organic carbon is produced. Between 95 – 98% of this carbon leaks from the algae and is a valuable food source for the coral polyp. Additionally, those corals in rich, sunlit areas are able to deposit their limestone skeletons 2 – 3 times faster than those that don't undergo photosynthesis. It is this limestone skeleton that gives the coral colonies their rigid framework.

When corals actively feed as opposed to obtaining their food through photosynthesis, the polyp extends it's tentacles into the water column. Each tentacle is armed with stinging cells called nematocysts. Certain groups of the stinging cells ensnare the prey while others will paralyse it. The struggling prey activates other cells which aid in passing the prey to the mouth. The polyp will catch minute zooplankton (a combination of microscopic organisms and larvae).

Corals show great inventiveness in their reproductive abilities and it's quite possible that many modes of reproduction are yet to be discovered. The most common form of reproduction – coral spawning, is also the mechanism that allows for greatest dispersal and genetic mixing. This annual occurrence is one of the reefs most dramatic events. The difficulties involved in external fertilisation of corals have led many colonies to synchronise their spawning. This process takes place in Spring just after sunset whilst the moon is full. The tides need to be at their weakest so drift is minimal. This spectacular event was only discovered in 1982 and overcomes the problem of uniting sperm and eggs from sparsely separated colonies.

This form of reproduction is sexual as opposed to asexual in which the colonies “bud” off new polyps.

A living coral reef would not be complete without the encrusting coralline algae which cements the colonies together. Beneath ledges and in crevices lay countless animals such as bryozoans, soft corals and sponges. This unique environment supports an amazing array of fish and other vertebrates.
REEF TYPE

The three main types of reefs present in the Great Barrier Reef region are ribbon, fringing and platform reefs. In the Capricornia region platform reefs are common. Platform reefs are known for their variety of shape and form. Some may be immense – stretching over 22 kilometres across. In all cases their geological history can be varied. Reefs can be classified according to their age and coral growth rate. Juvenile reefs are those whose coral colonies are still growing towards the surface. Mature reefs have well developed reef flats and sheltered lagoons. Senile reefs occur in areas in which the lagoon is largely filled in with sand and cays may develop. Northern areas tend to have ribbon reefs with few lagoonal areas.

CORAL BIOLOGY

Over 600 different species of corals are present on the Great Barrier Reef. Due to the numerous species of hard corals, they are normally classified into three main groups depending on their growth form. The first group are perhaps the most prolific on the reef and certainly the most opportunistic. They are branching corals otherwise known as staghorn coral. These colonies resemble the antlers of a stag deer, hence their name. In ideal conditions these corals can grow up to 20 centimetres per year. These colonies are however the most susceptible to strong winds and storms with large branches breaking easily. This opportunistic family of corals tend to be the first to colonise barren areas with lagoons and on reef flats.

The second group – the plate corals, form large ‘table top’ or plate-like structures on the sides of coral platforms. Many of the plate corals belong to the same family as the branching corals but have dramatically different growth forms. Plate corals grow about 8 – 10 centimetres per year and provide excellent shelter for fish such as the coral cod and butterfly cod.

The third group of corals are the boulder. These include brain and honeycomb corals (all of which resemble their name) along with the porites coral. On average these corals usually only grow 3 – 4mm per year. It is these colonies however that can withstand the force of storms and cyclones.

Hard corals all consist of a calcium carbonate or limestone skeleton. This skeleton is relatively porous and care must be taken when approaching the colonies. Branches of staghorn coral are very easily broken and soft tissue can be damaged if the boulder corals are lent on.

CORAL SPECIES:
- STAGHORN CORALS
- PLATE CORALS
- BOULDER CORALS
FISH OF THE GREAT BARRIER REEF

The Great Barrier Reef supports over 1500 species of fish ranging from large predatory varieties through to delicate coral fish. A majority of the fish species are found within Lady Musgrave lagoon. Although identification may be seen daunting at first, it is possible to become familiar with the majority of reef fishes. The bulk of the fish species found on the coral reef belong to relatively few families. Below are 4 of the most common families together with identifiable behavioural themes.

**DAMSELFISH**
These fish are perhaps the most prolific of all reef fish. They feed solely on plankton and form large swarms in the main snorkelling area. Included in this family are the black and white striped Sargent Majors and the brilliant coloured Blue Chromis.

**BUTTERFLYFISH**
Perhaps the best known of all the reef fish, the butterflyfish are epitomised by their graceful movements and intricate colour patterns. Most species feed partly or exclusively on coral tissue. Territoriality is fierce and these fish are often sighted in pairs which are thought to be lifetime bonds.

**PARROTFISH**
Being a close relative of the wrasse, the parrotfish can also display amazing colouration. It is only the males however that are usually a bright blue or green colour. These fish are well known for the harems they form. Groups of 8-9 females with one male leader can often be observed grazing on algae and coral. The females are normally a drab grey or brown colour and possess the ability to change sex to a male. This change normally occurs if the dominant male in the group dies. The Parrotfish are so important to the reef because they keep the delicate balance between algae and coral in check. They’re vital in clearing algae away so that new baby corals have a clean slate to settle and grow on.

**CLOWNFISH**
Clownfish shelter in the tentacles of anemones, immune from their hosts stinging cells. The fish and their eggs gain protection from predators, which would be stung if they brushed against the anemone. Clownfish are never found without their hosts, but the anemones do not rely on the fish and can live well without them.

Other fish commonly encountered are angelfish, cardinalfish, gropers, surgeonfish and biennies.
Fish are an integral part of any reef system with each species having an important role to play in the entire ecosystem. For example, certain types of fish may harvest a specific type of algae. If these fish were removed and the algae no longer had any predators, then the growth of the algae would accelerate dramatically, smothering coral colonies close by.

There are many different feeding modes for reef fish and most are specialised to particular species. Most of the smaller fish which make up the bulk of the daytime reef population are planktivores or herbivores.

A majority of damselfish hang high in the water column and pick off pieces of algae as they float past. Other varieties of damselfish will vigorously defend a patch of “farm” of algae amongst the coral. This so called “land ownership” comes with the added advantage of a protected egg laying site.

Parrotfish, surgeonfish and rabbitfish all feed on the algae that grows on rocky surfaces and coral. It is impossible for these fish whilst they are scraping the algae to separate it from the coral skeleton or rock. Therefore the parrotfish have evolved a beak like structure for a jaw which they use to bite off pieces of coral. Located at the back of their throat are special teeth that grind the coral skeleton to a fine powder which is expelled with the faeces.

It is possible to hear the parrotfish crunching on the coral whilst you are snorkelling.

Behavioural feeding methods vary for some of the larger carnivorous fish species. Some fish are ambush predators that will sit and wait for their prey to swim past. Lightning speed is displayed as the ambush predators ensnare their prey. Other carnivorous varieties such as the reef sharks tend to be open water hunters with specialised teeth to seize and tear the flesh of their prey.

Reproductive methods among reef fish tend to be quite unusual. The vast majority of reef fish are big egg layers, and this usually occurs in one of two elaborate ways.

Frequently spawning occurs at dusk and may not only involve the male and the female but also a group of participating fish. The process begins as both participants swim towards the surface. Spawning culminates as eggs and sperm are released at precisely the same time the fish turns and heads back to the bottom. Parrotfish, wrasse and butterflyfish all exhibit this kind of spawning.

Other species such as gobies, triggerfish and damselfish will lay their eggs on the bottom. Preceding the spawning, the area of coral is cleaned of any algae and detritus. After the eggs have been fertilised one or both parents care for the nest until hatching. One of the more unusual methods of reproduction is found in cardinalfish. In this instance the male will incubate the eggs within his mouth.

Limited information is available on the life span of most reef fish. It is possible that sharks may live to at least 20 – 30 years while large fish such as snapper and gropers can live to around 25 years. Although certainty surrounds the longevity of smaller fish it is thought that species such as Damselfish and Angelfish can live up to 10 years or more.

In the intermediate snorkelling area, you will see sweetlip, coral trout, silver trevally, fusiliers, humbugs, surgeonfish, wrasse, parrotfish and countless other varieties. Blue Linckia starfish, sea urchins and Beche-de-mer are also plentiful. Beche-de-mer aka sea cucumbers are the dark looking sea slugs you will see on the sandy white bottom of the lagoon. These animals should not be handled since they eject sticky white threads in defence. The threads aren’t too harmful but are hard to remove and can leave an irritating rash for a few days. As they feed they also break down the coarse sand on the lagoon floor into a fine sand.
Turtle nesting season occurs along the entire length of the Queensland coast on suitable beaches during the months of November to February. For islands of the Great Barrier Reef the season is extended with laying commencing in mid-October and continuing through to the end of March.

We are fortunate enough to have 6 of the 7 species of sea turtles nesting in Queensland waters. At Lady Musgrave it is mainly the Green turtle that frequents the island although Loggerhead turtles may also be seen. The Green Turtle is the second largest of the 7-species growing to just over a metre in carapace length.

Sea turtles make distinctive tracks as they haul themselves ashore and it’s possible to distinguish each species by their tracks. The Green Turtle moves along with both flippers together in a rowing motion whereas the Loggerhead will move its front flippers alternatively, first left then right and so on. It is only ever female turtles that will come ashore, males will never make their way onto the beach.

During mating season, it is possible for a female to mate with several different males over a period of time. She will store this sperm and use it only when required.

Once the female is ready to lay her eggs, she’ll make her way up into the sand dunes above high tide mark. If the eggs were laid below this level, they would spoil as salt water enters the nest. The hole that she digs with her hind flippers is usually 70 – 90cm deep. She will continue to lay between 80 – 200 eggs the size of ping pong balls. It is critical that the female is not disturbed in the time she leaves the water to the time she begins laying. If the female is disturbed she may retreat back to the water often spilling her eggs on the way or in the water. Each female can come ashore 5 or 6 times during the nesting season and will usually return in 2 – 3 years time.

As with all reptiles, the hatching sex is determined by the nest temperature. This is known as the pivotal temp and varies from species to species. Warmer nests produce females while cooler nests produce males. It can be predicted that coastal rookeries with darker sand absorb the suns heat and produce females while Great Barrier Reef islands with their white sand reflect the sun and produce more males.

Turtle hatchlings emerge 7 – 12 weeks later and make their way down to the sea. Hatchlings will navigate to the lightest part of the horizon and any artificial lights from the beach, will confuse them in their direction of travel.

Mystery surrounds the first 10 years of a turtle’s life and is commonly known as the “lost years”. It is thought however that the hatchlings get caught up in the great ocean currents and float around feeding on surface organisms. Once they reach the age between 7 – 12 years they are able to actively swim against the currents and they return to reefal areas to feed. It is at this stage they are around the size of a dinner plate.

Studies indicate that turtles are around 30 – 35 years of age when they reach sexual maturity. It is at this time that they return to their natal beach to lay for the first time. Green Turtles are herbivorous opting to graze on algae and seagrass while Loggerheads are carnivorous feeding on crustaceans, jellyfish and small fish.

Green Turtles can weigh between 110 – 190kg while Loggerheads can weigh between 70 – 170kg. The Capricorn Bunker Group of islands support one of the few remaining large concentrations of nesting green turtles in the world.
Buff Banded Rails may be seen scurrying along the ground, and small, active Silvereyes feed in the trees. Reef Egrets hunt all year on the reef flat and you may also see them roosting and nestling in the trees. Many migratory waders such as Oyster Catchers visit Lady Musgrave during Spring and Summer, leaving in Autumn for their breeding grounds in the northern hemisphere.

The island is very important as a breeding site for seabirds. Wedge-tailed Shearwaters or Mutton Birds nest in burrows in the forest. These burrows are located close to walking tracks so care should be taken. Noises of their courtship and chicks calling fill the night during the summer breeding season. From the beach at dawn you can watch their clumsy takeoffs before they soar over the ocean. Birds in large numbers can be seen flying out to sea to gather small fish, they return in large numbers around 4.00pm and regurgitate partly digested food for their chicks.

Mutton birds dig a deep burrow, about 90cm deep, usually at the base of a Pisonia tree, with the nest constructed at the end of the burrow. One egg is laid in the nest, after hatching the parents feed the chicks with fish. When the chick loses its down and feathers, the parents fill it with food and depart, leaving the chick to teach itself how to fly, thus resulting in many crash landings. Each year the mutton birds will return to the same place to look for the same burrow. With a little renovating the same burrow can be used for years.

The other commonly sighted seabirds are the black noddies, which build messy, flimsy nests in the Pisonia trees. Both the Mutton bird and the Black Noddy will tolerate human presence, but the Roseate, Crested, Black-naped, Bridled Terns and the Silver Gulls which nest on the ground above high tide are easily disturbed.
**SHARKS**

Sharks are important indicators of reef health, sign of a healthy reef!

Top predators: if there are sharks, then there are the fish that they eat, and the fish that they eat, and the fish that they eat, and the plants that they eat, all the way down the food chain.

Sharks (especially reef sharks) are mostly scavengers, so they’re always looking for an easy meal. This means they ‘pick-off’ all the slow, sick fish, leaving the healthiest and strongest to grow up and have lots of babies, passing on ‘big and strong’ genes, and keeping fish populations nice and healthy. This supports not only the ocean ecosystem but also our fisheries.

Most people are afraid of sharks until they find themselves in the water with them for the first time. Experience can change your perceptions, so keep an open mind to the possibility that you may see a shark at some point today.

They’re not man-eaters like the movies and media make them out to be (especially reef sharks!).

The closest most people have ever come to sharks before is at their local fish shop. It’s marketed as ‘flake’. Most shark species are on the endangered species list.

Using the App called the ‘Sustainable Seafood Guide’. Put any fish in and it will tell you with a traffic light system whether a fish is ok to eat or not. *Red* = don’t eat me, our populations are suffering/low/unsustainable, *yellow* = if you have another choice, it’s better to choose that, and *green* means go for it, our populations are healthy and it’s a good sustainable choice. The guide helps you continue to enjoy eating fish in a conscious, responsible way.

**MANTA RAYS**

Manta rays are not only known for their grace and beauty but play an important role in ocean nutrients cycling and control plankton abundance.

Also known as the devil fish because of the horn-like mouth structures called “cephalic lobes” used when filter feeding. Manta rays differ from other ray species in size, distribution, feeding strategies and unlike the stingray do not possess a barbed tail.

There are two species of manta rays; the giant oceanic manta ray (Manta Birostris) and the smaller reef manta ray (Manta Alfredi). The giant manta rays have a maximum wingspan of seven metres while the reef manta’s can reach five and a half metres.

Reef manta rays are found around coastal areas in tropical and subtropical waters, mostly in the Indo-Pacific. The giant oceanica mantas are a circumglobal species found around the equator.

The manta ray is a filter feeder consuming large quantities of zooplankton through plates called gill rakers that are found in their ventral gills.

The manta ray has few natural predators apart from killer whales and larger sharks. However both species are listed as vulnerable due to human activities including pollution, entanglement in fishing nets, and direct harvesting for their gill rakers for use in Chinese medicine.

Manta rays are graceful swimmers but also can be seen jumping out of the water, a behaviour known as breaching. A group of manta rays is known as a squadron of manta ray.
GREEN ZONES

Green zones have bigger fish and more fish! They safeguard protected species.

They support fisheries and are like bank savings accounts – a supply that gets so plentiful that they overflow into places you can take from.

Imagine what the island and lagoon would look like if it wasn’t protected or managed.

We use zoning to manage the reef, but the traditional owners have managed the reef sustainably for thousands of years (through storytelling and living closely with nature).

**During noddy land-mine season:** Dead/dying noddies can come as a shock, probably because most of us live in cities, suburbs, or even on farms, where nature is managed, controlled or even out-of-sight.

This kind of sight is completely normal and natural – it’s how nature regulates itself when it’s left completely untouched. We are so privileged to see a place impacted so minimally by humans. How often do you get to see such a wild and natural site?

**IT’S A PRIVILEGE TO SEE A PLACE IMPACTED SO MINIMALLY BY HUMANS**
REEF FACTS

1. At extreme low tide on the reef flat, many corals are exposed to the drying air and hot sun. So how do many corals survive this prolonged exposure? Corals secrete a mucus coating to protect themselves and have a sunscreen chemical to shield them from the ultraviolet rays. Other more mobile animals retreat or move into pools at low tide while anemones fold their tentacles, molluscs shut their shells tightly.

2. The reef is like a forest surrounded by desert. Tropical waters are generally poor in nutrients (hence that turquoise clarity) and yet the reef itself is a very rich garden. The secret of this incongruity is that nutrients are carefully preserved and efficiently recycled. Very little of value is allowed to drift away in the currents but any nutrient in the incoming water is quickly turned into living tissue. The resultant balance of absorption versus secretion is finely tuned — excess removal of nutrients by overfishing or the increased introduction of nutrients by some forms of pollution will tip the balance and damage the system.

3. It is possible to determine the age of certain coral colonies by taking core samples. Exposing the core samples to UV light shows a varying thickness and colouration in these bands. The bands appear due to the fluorescence of chemical compounds that were deposited in the skeleton during growth. The density and intensity of these fluorescent bands provides a measure of the environmental conditions during the main growth phase of coral. The bands may reflect the amount of freshwater run-off that the respective reef experienced in the past. The chemical compounds responsible for the fluorescence of the layers are organic substances that are being washed into the sea during major flooding events. Given the long-lived nature of Porites, (may reach 1000 years of age) individual colonies of this species may hold a detailed environmental record dating back several hundred years.

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