
Welcome to
The Great Barrier Reef

ACKNOWLEDGEMENT OF COUNTRY

REEF DAYTRIPPER ACKNOWLEDGES THE YIRRGANYDJI, MANDINGALBAY-YIDINJI AND GUNGANDJI PEOPLE AS THE TRADITIONAL CUSTODIANS OF THE LAND AND SEA, AND RECOGNISE THEIR ONGOING CONNECTION TO UPOLU REEF.

WE PAY RESPECT TO ELDERS BOTH PAST AND PRESENT AND PROUDLY STAND UNITED WITH THE FIRST NATIONS PEOPLE OF TODAY, TOMORROW AND ALWAYS.

Upolu Reef Cultural Heritage

The Yirrganydji, Mandingalbay-Yidinji and Gungandji people are the traditional custodians of Michaelmas and Upolu Cay, their fringing reefs, and the traditional use of the cays continues in accordance with the provisions of current legislation regulating such activities in protected areas.

Proposed guidelines, policies and actions to preserve the cultural use of these areas includes documenting the cultural and heritage of these areas where appropriate, and involving the traditional custodians in the management of the cays & reefs, along with the active involvement of community rangers.

For more information please visit:
https://soe.dcceew.gov.au/biodiversity/management/indigenous-knowledge-and-land-and-sea-management

Reef Daytripper

Jedess & David Hudson, 2020. “Ancient Stories of Our Land.”

The Great Barrier Reef

The Great Barrier Reef is the largest reef system in the world, spanning 2,300 kilometers from the southern islands of Papua New Guinea, which is located above the northern most point in Australia, to Bundaberg in Southern Queensland, located 159 kilometers from the Tropic of Capricorn. This is an example of the diversity of the Great Barrier Reef, existing in both tropical and sub tropical waters.

The Great Barrier Reef is approximately 500,000 years old and has 'dried out' since as a result of the ice ages it has experienced. Its current shape and form is largely due to periods of growth and erosion. After the end of the last ice age (approximately 10,000 years ago), the sea level has risen by 130m.

The Great Barrier Reef has been World Heritage registered area since 1981 and is under the management and protection of the Great Barrier Reef Marine Park Authority (GBRMPA) a government body formed in 1975.

The area covered by the Great Barrier Reef is approximately 344,400 squared kilometers and supports approximately; 650 mainland Islands, 350 coral islands – 250 of which are vegetated, 360 hard coral species, 60 known soft coral species, 1500 fish species – including 150 known species of sharks and rays, 6 of the 7 species of sea turtles, 22 species of sea birds, over 15 species of sea snakes, 30 different marine mammals and over 800 different species of echinoderm – this encompasses sea stars, sea cucumbers and urchins.

Upolu Reef

Upolu Reef is located approximately 30 kilometers North East of the city of Cairns, and is where Reef Daytripper will travel to today. Upolu reef is home to Upolu Cay which is a tidal dependent coral cay or sand bar, which means it is not always exposed above the water line. Sand bars such as Upolu Cay are due to coral erosion building up on the leeward side of reef platforms. Once large enough will serve as a nesting site to sea birds. As Upolu Cay is tidal, it is not able to support plant life. As more erosion occurs this will eventually mean that Upolu Cay may be permanently expose above the waterline. As it is nestled behind much larger reef platforms that absorb open ocean swell, this generally means the sea conditions at Upolu Reef are much calmer than many other outer reef locations .This offers ideal conditions for snorkelling and SCUBA diving. Passengers visiting Upolu Reef are given the experience of an outer reef location while experiencing the calm sea conditions of inner reef locations such as Green and Fitzroy Islands.

Upolu Cay during low tide:

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Symbiosis

It goes without saying that the Great Barrier Reef is a highly interactive environment and is vital to the survival of many different species. So how do all these life forms all share the same environment? The answer is symbiosis. ***What is symbiosis?*** Symbiosis refers to a relationship between 2 or multiple species living in close proximity. The relationship can be beneficial, harmful or indifferent.

Mimicry: this is where an animal will take on the appearance of another to reap the benefits of that animal. An example of this is the Banded Snake Eel, although not venomous it takes on the appearance of the highly venomous Banded Sea Snake. This is a defence mechanism which wards off potential threats.

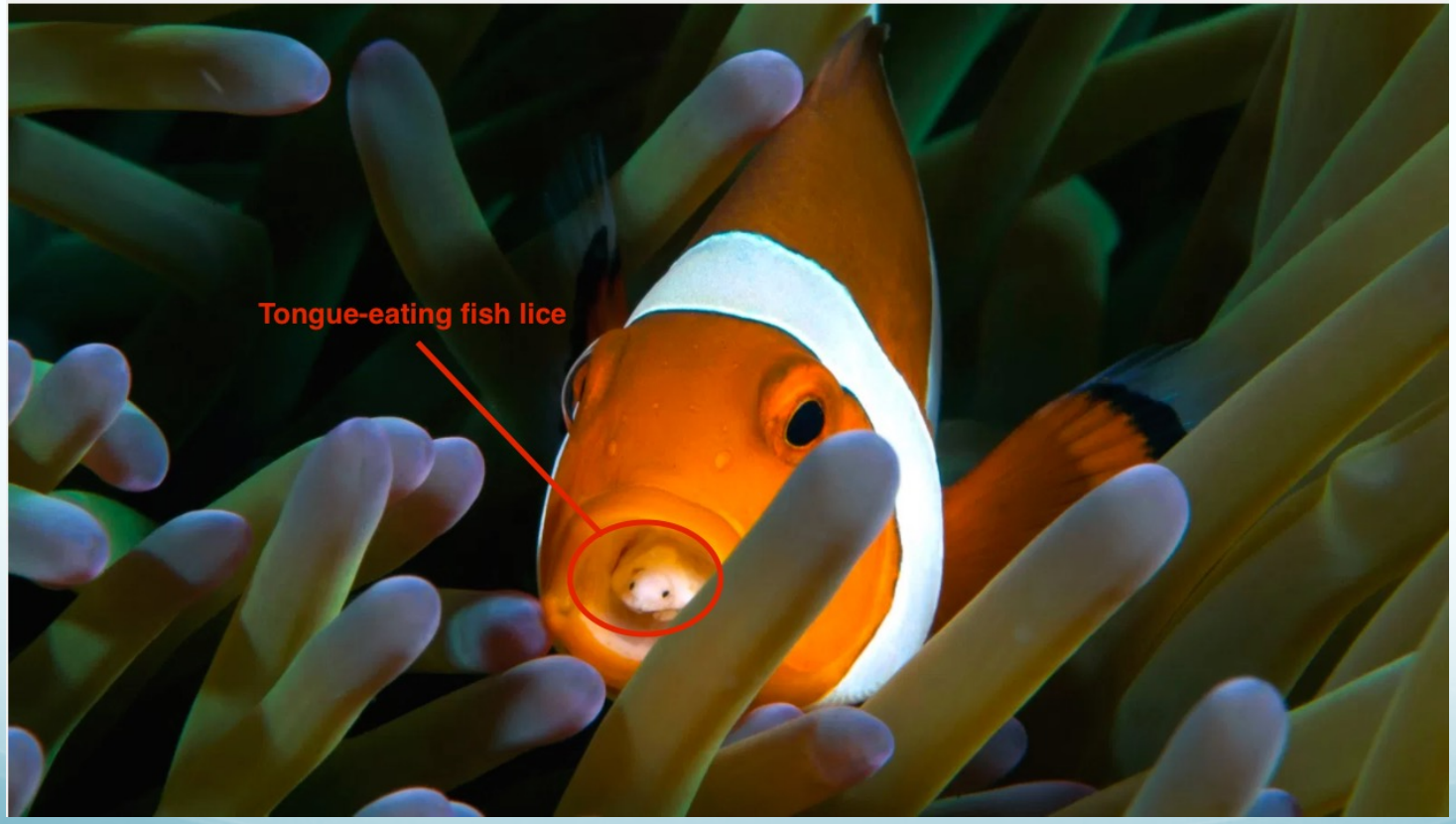
Banded Snake Eel:

Banded Sea Snake:

Symbiosis: Parasitism

Parasitism: This describes a harmful relationship in which one species will gain a benefit and the other is harmed in the process. An example of this on the Great Barrier Reef is the tongue-eating louse of the species *Cymothia exigua* or commonly referred to as fish lice. The louse will remove the tongue of its host by extracting blood and will replace the tongue ultimately stealing food from the host. This is not always fatal for the host species but is harmful in the sense that the nutrition and food supply is compromised.

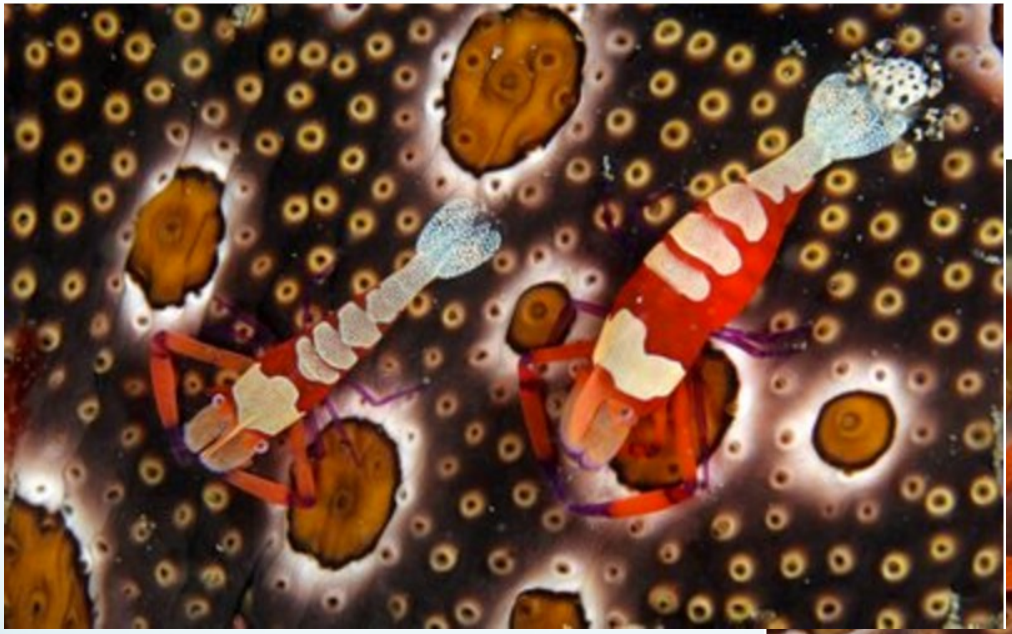
Clown Anemone Fish with Fish lice parasite:



Symbiosis: Commensalism

Commensalism: This describes a relationship that will benefit one species and other may be unaffected. An example of commensalism is the relationship that exists between Sea Cucumbers, an invertebrate living on the ocean floor, and various species which utilise the Sea Cucumber as a source of transport. There are many species of shrimp, such as the Imperial Shrimp known to travel this way, as it will allow them to conserve energy and gain the benefit of easily finding new food sources.

Imperial Shrimp with Sea Cucumber:



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Symbiosis: Mutualism

Mutualism: This is a relationship between two species where both will benefit. This can also occur between multiple species simultaneously. Mutualism is an integral relationship for species living in close proximity as it enables a degree of cooperation. The Great Barrier Reef serves a very important purpose not only for home ranging species but for pelagic and migratory animals utilising the reef as a cleaning station. Animals such as Manta Rays and Sharks spend a majority of their time in the open ocean and travel to the reef to take advantage of the many species of fish and shrimp willing to clean parasites and/or diseased tissue. This is an important food source for many reef fish such as the cleaner wrasse and helps to maintain the health and hygiene of open ocean dwellers. Another well known form of mutualism is the relationship between Clown Anemone Fish and the host anemone. The Clownfish will help to keep the filtration system of the anemone clean and free from debris while seeking refuge in the stinging tentacles of the anemone. The Clownfish is not stung by the tentacles as it has developed a specialised mucous layer.

Reef Shark cleaned by Cleaner Wrasse:

Clownfish inside anemone:

Symbiosis: Mutualism

Mutualism is considered the lifeblood of the reef, and the most prominent example of mutualism is the relationship between the coral polyp and the algae living within it. To understand how this relationship works, it is important to understand what coral is, a basic description is; plant, animal & mineral, and indeed coral encompasses all of these.

Coral begin as a worm-like free-swimming larvae called planula, which once settled on a bare patch of reef, will begin to produce multiple copies of itself in a process known as budding. This is where the planula will metamorphose into a coral polyps. The polyps will clone many copies, forming a colony of jellyfish-like animals which are all connected to a central stomach. The calcium carbonate, which is part of the waste secreted by the stomach, is utilised by the polyps to form a hard protective exoskeleton which is the mineral part of the reef. This is known as calcium carbonate or limestone. The limestone exterior serves an important purpose offering shelter and refuge from predators. Coral polyps live a unique existence as they are essentially an individual connected to other coral by living tissue forming a colony. Coral polyps can range in size from a few millimetres to a few centimetres in size. Coral belongs to the *Cnidaria* phylum which is the scientific name given to oceanic invertebrates.

Various coral species found at Upolu Reef:

Image courtesy of Reef Daytripper

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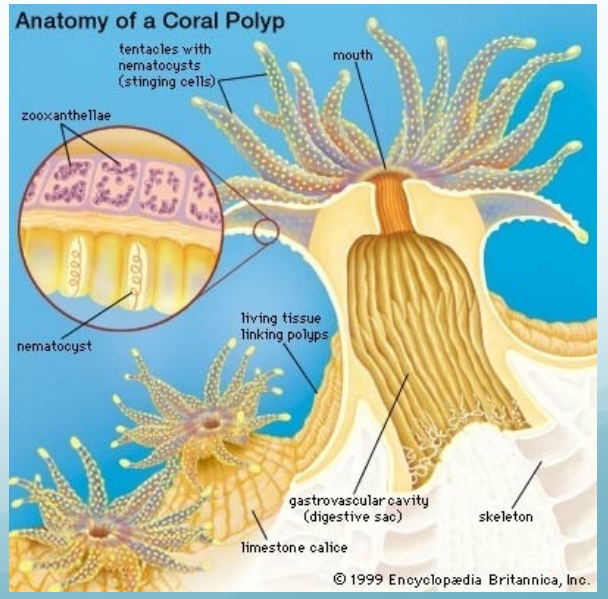
Symbiosis: Mutualism

Corals are closely related to jelly fish boasting the same ability to catch food with tentacles or stinging cells called nematocysts. Once food is caught the tentacles will pass the food to the mouth of the coral polyp, and each polyp within the colony will do this until the food reaches the central stomach where nutrient is distributed to the entire colony.

This method of food collection will provide coral with close to 2% of their overall nutrition. Corals have a much larger food source, the Sun. Living inside each coral polyp are microscopic algae known as zooxanthellae. Basically, this refers to a plant living within an animal. Many of the corals found on the Great Barrier Reef grow in waters ranging from 5 to 30 meters in depth. This is due to the fact sunlight is required for photosynthesis, and corals being situated where sunlight is the most abundant. This process of the sun converting carbohydrates into food and energy will provide up to 99% of the food a coral requires to survive. The type of algae living within the coral polyp will also determine the colour of the coral.

The algae is a vital food source for the coral polyp, and in return the algae is given a place to live. This makes the mutualism between the coral polyp and its algae the most wide-ranging example on the entire Great Barrier Reef. This relationship is so impressive it makes the Great Barrier Reef the largest living organism visible from outer space.

Close up of coral polyp:



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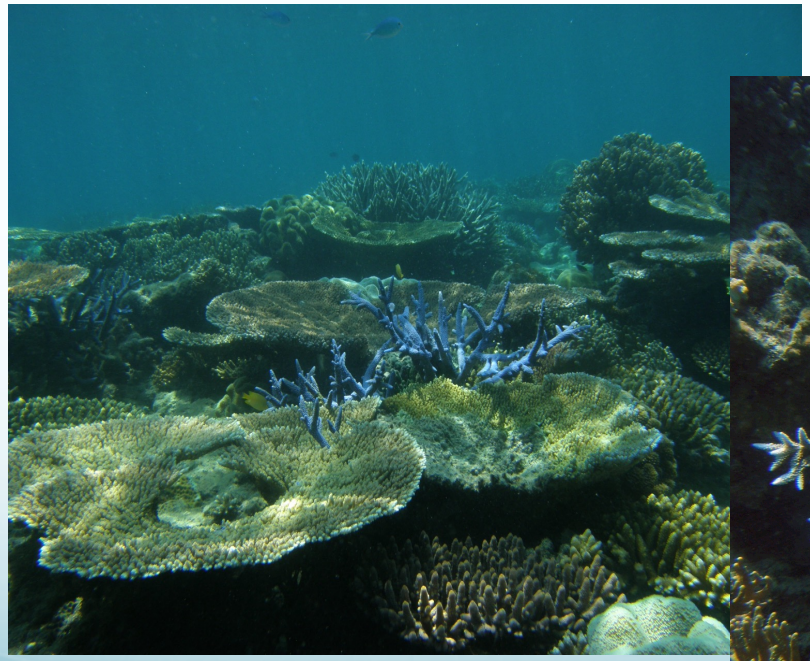
Corals: Hard coral

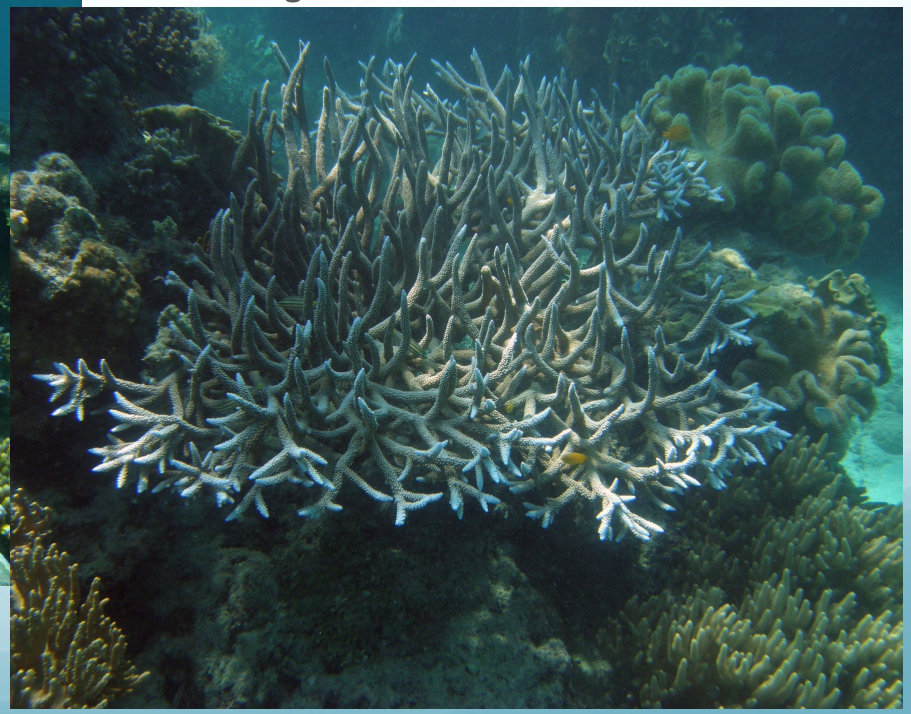
Stony corals, or hard coral species are the most abundant corals found on the Great Barrier Reef. They are commonly referred to as the building blocks of the reef and are responsible for the shape and structure of the reef.

Depending on its location relative to sunlight, will determine how the corals will grow. Certain species such as staghorn or branching coral will grow in the shallowest depths of the reef where the most sunlight reaches. These corals can grow up to 15 centimeters per year and this also indicates they are generally quite fragile and break easily. Staghorn coral also boasts the ability to graft broken coral to living coral, meaning the broken corals can continue to grow if they remain in constant contact. Other fast growing stony corals include the plate top corals which can grow at rates exceeding 5 centimeters per year and can range in size from the size of hand to 3+ meters in diameter.

Plate Top Coral:



Branching Coral:

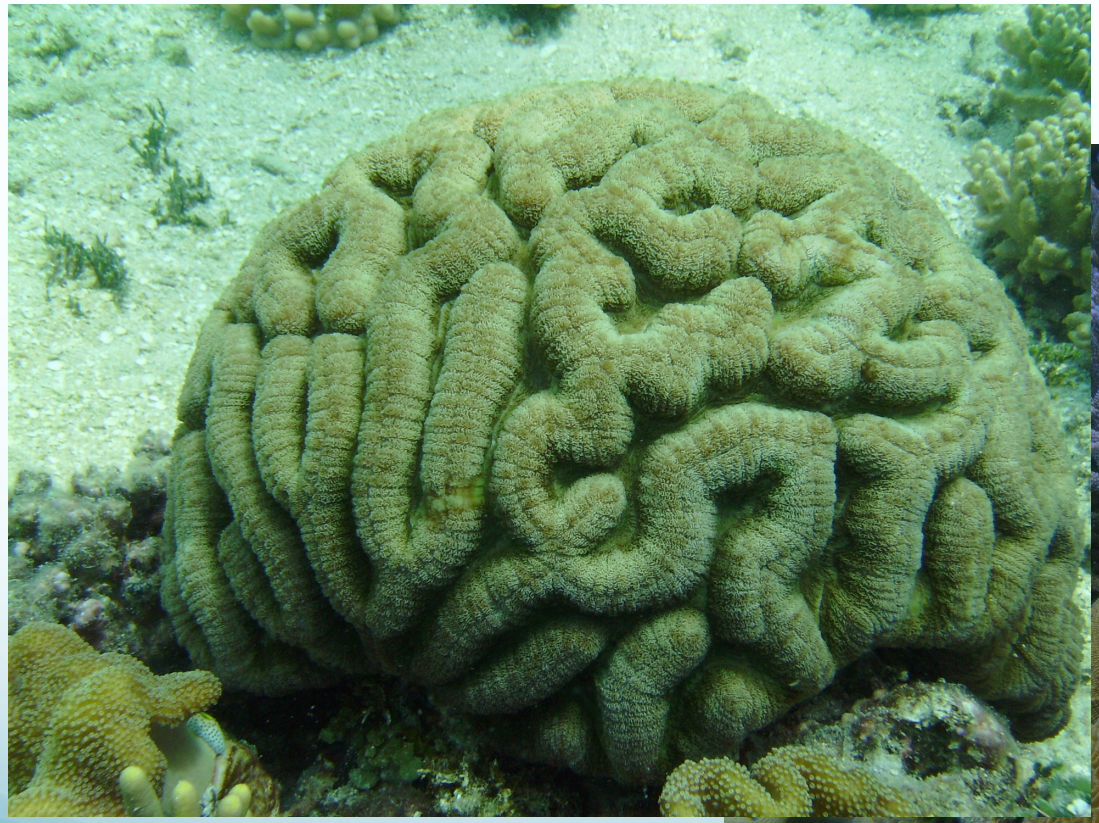


Images courtesy of Reef Daytripper

Corals: Hard Corals

Stony coral species such as brain coral and boulder coral grow much slower than branching and plate top coral species. Slow growing corals generally grow at a rate of 1 to 2 millimeters per year and can grow up to 2 meters in size. The average lifespan of a typical brain coral found on the Great Barrier Reef can exceed 1000 years. This makes slow growing stony corals amongst the oldest living organisms on the planet.

Brain corals growing at Upolu Reef:



Images courtesy of Reef Daytripper

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Corals: Soft Coral

Octocorallia, is the scientific name given to species of coral which don't produce a hard limestone outer layer, instead produce an internal skeletal structure comprised of a silicone based substance. The name Octocorallia is relating to the fact that soft coral polyps produce eight tentacles as opposed to the 6 tentacles which hard corals are renowned for. Soft corals protect themselves from predators and perceived threats by producing a specialised mucus-like metabolites or feeding deterrents. This means that any animals likely to feed on soft corals may avoid them as they may taste foul or be toxic and, therefore, not suitable for consumption. Although soft corals are not considered reef-building corals, as they do not produce the hard limestone exterior, they are still vital to maintain various symbiotic relationships between many different species. Octocorallia includes many soft corals, sea fans and gorgonians.

Diver with sea fans & soft corals:

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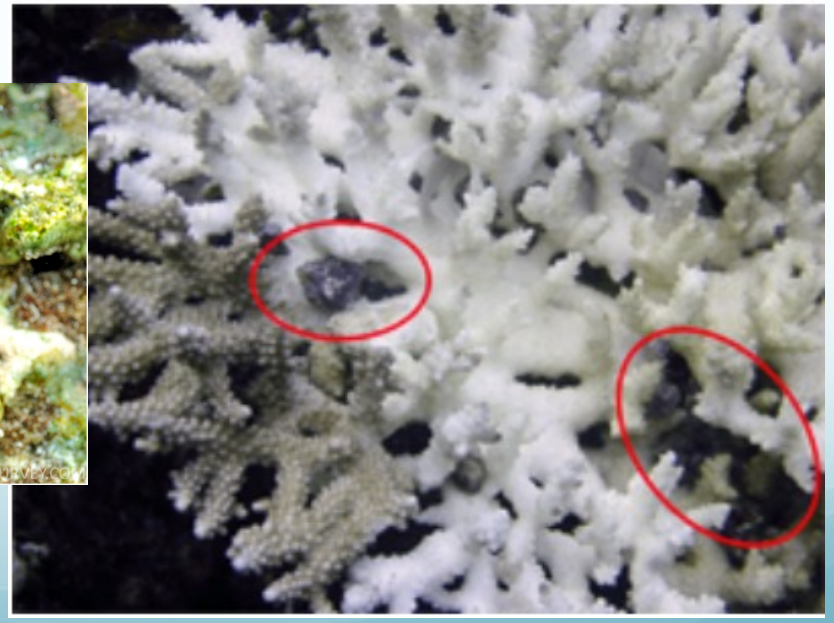
Corals: threats to the reef

Although coral reefs are very resilient and have grown, and survived through various geological phases and extreme weather patterns, the balance within which they exist is indeed delicate and increasingly under threat. Global warming, pollution, over-fishing, farming and the effects of the industrial world are contributing factors to the challenging conditions coral reefs are facing, along with other natural phenomena and certain marine life.

Drupella Snails

Drupella Snails are a small species of marine *gastropod,* characterised by small cone-shaped shells with a spikey or bumpy texture, growing up to 5cm in length. The colour of the shell is commonly a beige or off-white colour, but as they are commonly found amongst living corals the shell can be subject to algal growth, helping the shell to obtain camouflage, and essentially, protection from predators. Drupella snails eat live coral tissue by extracting live coral tissue from the coral structures, leaving behind bare coral skeletons. This process leaves behind feeding scars which leaves corals vulnerable to algal growth. This is not normally considered problematic, but as over-fishing has seen the decline of many natural predators, Drupella Snails are currently considered a threat to coral reefs.

Drupella Snail & feeding Scars:



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Corals: threats to the reef

Crown of Thorns Star fish:

The Crown of Thorns Starfish or COTS as it is commonly referred to, is a current natural predator of the Great Barrier Reef and Indo-Pacific regions. COTS ingest coral tissue by attaching themselves with their many tub-like feet, and releasing their stomachs through a mouth-like opening, digesting coral tissue as they travel over the reef. Many COTS will indiscriminately feed on any coral species. They are a highly resilient species of invertebrate which can; grow up to 80 cm in diameter,, grow up to 21 arms, have an average life-span of 7 years, cover approximately 20 meters per hour and are covered in extremely sharp venomous spines. They also reproduce and thrive very successfully with a single COTS able to produce up to 60 million eggs per year. In small controlled numbers, COTS can actually help to maintain coral diversity, as they consume many fast growing species, which may prevent neighbouring corals from growing. However, this is only desirable if there are smaller numbers per reef system. When their numbers are in excess of 30 per hectare, it is considered an outbreak of COTS, as they can consume coral tissue faster than it is capable of growing. For this reason large numbers of COTS present a significant threat. The Giant Triton Snail is one of the only predators of the COTS and due to the popularity of their beautiful shell, their numbers on coral reefs are diminishing as excessive numbers of Giant Triton Snail are removed from reef systems globally.

There are measures in place on the Great Barrier Reef to control numbers of COTS which include; monitoring programs, removing COTS when there is a population outbreak, and injecting COTS with Sodium Bisulfate, which will cause the COTS to die within 24 hours. Programs and control measures are focused on areas of reef considered to bear socioeconomic impacts such as tourism.

Crown of Thorns Starfish & Giant Triton Snail:

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Corals: threats to the reef

Coral diseases:

Just like other animals, corals are subject to bacterial and viral infections. It is not unusual for corals to be affected by diseases, and they become vulnerable under stressful conditions. Roughly 6.5 per cent of coral mortality on the Great Barrier Reef is attributed to coral diseases. Disease outbreaks on the great barrier reef are more prominent following natural disasters such as tropical cyclones, heavy rainfall, and nutrient/sediment and or pesticide run off from agricultural activities. Rising sea surface temperatures is another factor which causes corals to become stressed. As costal communities become more populated, average ocean temperatures rising each year and other natural phenomena compromising the delicate balance on the reef, disease outbreaks are becoming more of a threat than ever before.

Black Band Disease:

An example of a disease which affects coral species is Black Band Disease (BBD) which consists of what is referred to as filamentous cyanobacteria. BBD is a bacterial infection which affects a large number of coral species and is quite easy to determine which corals are affected as the disease leaves a distinct black ring or band as it spreads across coral leaving a bare skeleton in its wake. These disease lesions measure approximately 1 mm in thickness and the microbial mat can migrate up to 1 cm per day. The disease causes necrosis in corals which essentially means all of the affected cells will die. It is unknown what is the catalyst for the disease as cases are mostly observed in the later stages once the signs are visible.

Black band disease affecting hard corals:

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Corals: threats to the reef

Coral Bleaching:

One of the biggest threats to the Great Barrier reef is global warming. During warmer periods, mostly during El Niño periods, Ocean surface temperatures are warmer than normal and for longer periods of time. This places corals under stress and the symbiotic algae within the coral tissue will produce an irritant as opposed to converting sunlight into carbohydrates or food for the coral colony. The corals respond to this process by expelling the algae as a survival technique. As the algae is responsible for the vibrant colours seen in coral species, by expelling the zooxanthellae the corals appear stark white, which is the reason this process is referred to as coral bleaching. Bleaching does not imply the coral has died, however, it has lost is main food source and becomes vulnerable to algal growth and disease outbreaks. It is also possible for coral bleaching to occur in cooler than average temperatures and due to excessive fresh water exposure. The optimal temperature for coral to thrive is between 23 and 29 Degrees Celsius. This is a very important reason why most coral species are only found in tropical and sub-tropical waters.

Bleached finger coral:

Healthy vs. bleached coral:

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Corals: Threats to the reef

Mass coral bleaching events:

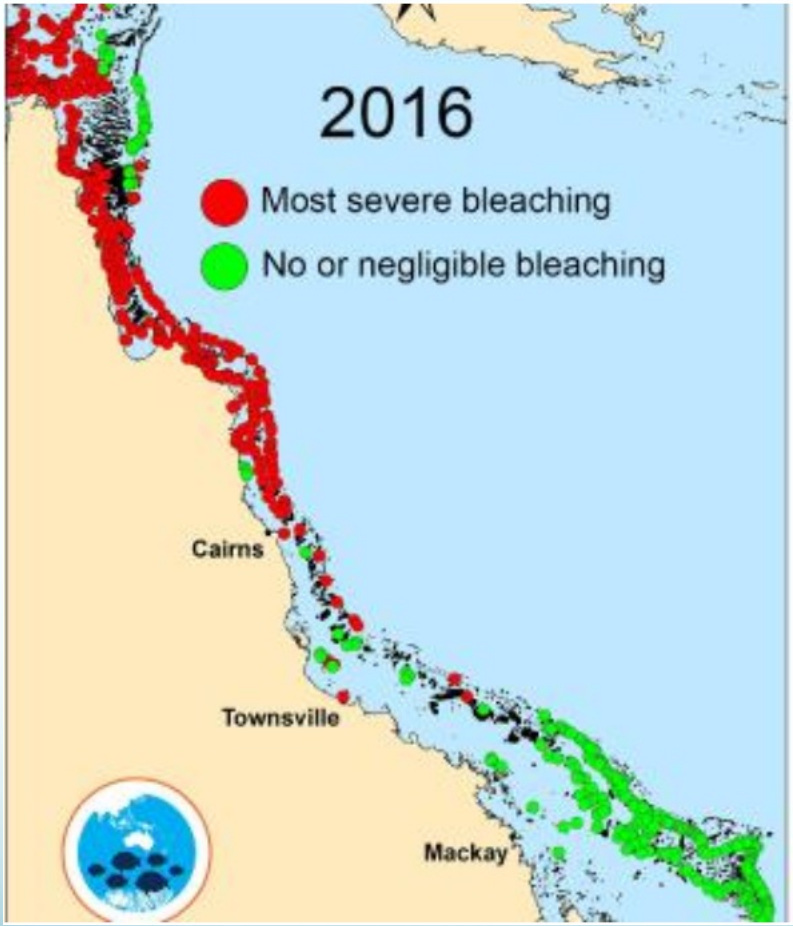
The Great Barrier Reef has endured mass bleaching events throughout recorded history, and in the last two decades there have been bleaching events in; 1998, 2002, 2006 and back to back events in 2016 and 2017. During February and March of 1998 record temperatures saw ocean surface temperatures remain hotter for longer than usual which was responsible for the mass bleaching event. The bleaching event which occurred during January 2002, subsiding by April, was considered greater in severity than the 1998 mass bleaching and in response to this the Great Barrier Reef Marine Park Authority implemented the worlds most comprehensive survey of coral bleaching, and is the first time data collection of such magnitude was conducted. The mass bleaching during January and February 2006 was more localised affecting a southern section of the Great Barrier Reef which resulted in up to 98 per cent of the affected corals experiencing 39 per cent mortality in shallow sections of reef flats. From 2008 through to 2011 significant coral bleaching was attributed to heavy rainfall and led to the reef being exposed to excessive amounts of fresh water. This was a a well documented account of freshwater bleaching.

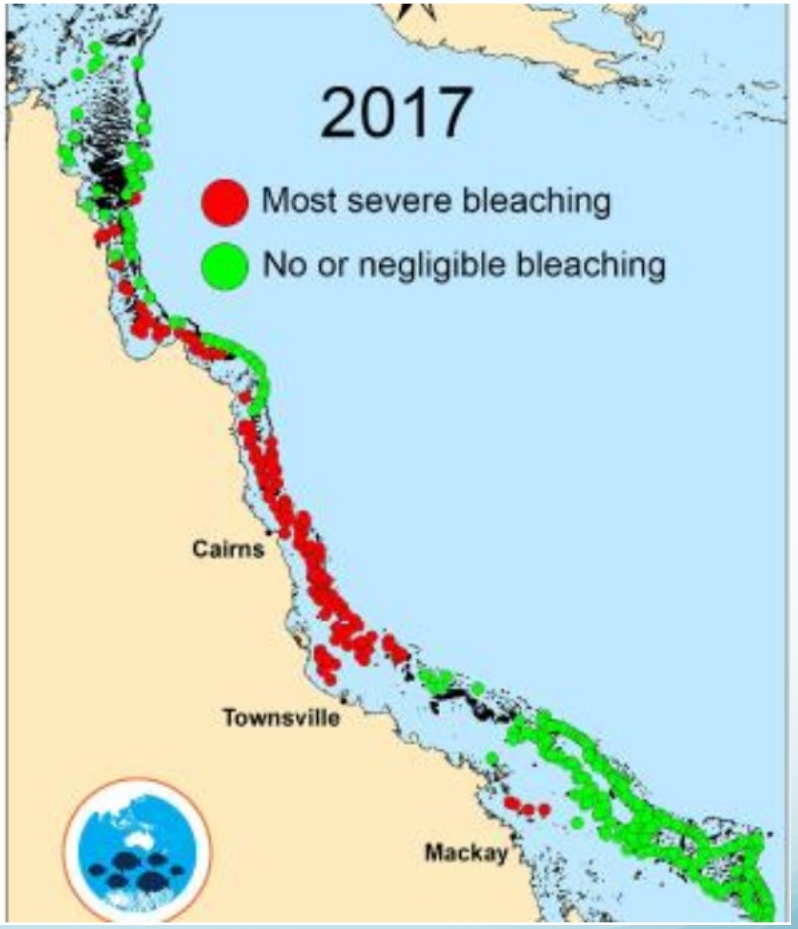
Beginning in 2015 the world experienced the effects of El Niño which is a natural weather phenomena that causes ocean temperatures to rise above average and is characterised by a combination of rising ocean temperatures and rainfall from storms moving in an easterly direction. Typically, equatorial trade winds blow from east to west across the Pacific Ocean, and during El Niño these patterns weaken or reverse prevailing trade winds. This saw the Northern Areas of Australia see reduced rainfall and warmer than average temperatures for an extended period of time. El Niño is considered neutral as of 2017. Although El Niño has been a leading cause of global warming and thus, coral bleaching events in the past, the back-to-back events of 2016 & 2017 is the first time in recorded history that two events have been reported in two consecutive years. El Niño generally appears in 8-year cycles.

The 2016 and 2017 mass coral bleaching events have garnered much attention around the world and has brought into question the future health of the Great Barrier Reef.

Corals: Threats to the reef

The following maps show the areas of the Great Barrier Reef which were greatly affected by the 2016 & 2017 mass coral bleaching events. It can be noted that during 2017 more of the central to southern areas of the reef were affected.





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How can you help to protect the Great Barrier Reef?

1. **Conserve water:** The less water you use the less wastewater will end up in the ocean.

2. **Reduce Pollution:** consider commuting options which eliminate or reduce carbon emissions. i.e. walk, bike or use public transport.

3. **Research what you put on your lawn:** try to opt for chemicals which may not be harmful if washed into waterways. Remember all streams lead to the ocean.

4. **Dispose of trash properly:** this includes single use plastic bags which quite often end up in the ocean. The main ingredient in plastic is oil after all.

5. **Support eco tourism and reef-friendly businesses:** Reef Daytripper is the most eco-friendly tour departing from Cairns as we only accommodate a maximum number of 20 guests and use only 60 litres of fuel per day.

6. **Plant a tree:** There are many benefits to humans and the environment from planting trees and they help to reduce runoff into waterways. Consider donating to organisations like Reforest: https://reforest.com.au7

7. **Practice responsible diving and snorkelling:** by achieving neutral buoyancy and avoiding touching any marine life, this minimises human impacts on the reef.

8. **Volunteer for a reef clean up:** if you don't live near a coral reef, then choosing eco-friendly tours when on holiday is a great way to experience the beauty of the reef.

9. **Put pressure on governments:** Put pressure on governments to act in favour of sustainable policies aimed at reducing the human impacts on global warming.

10. **Flash-free photography:** It can temporarily blind and stress marine life, causing them to flee their hunting or hiding spots, which can reduce their survival chances and lead to malnutrition.

11. ***Spread the word! Tell your family and friends about this wondrous place and help to keep awareness and attention on protecting the Great Barrier Reef!***

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Corals: other coral facts

It might seem like the reef is in trouble and the future of the reef looks grim, however, as previously mentioned, that bleached coral is not dead coral and does hold the ability to survive and thrive. An important fact to note is that healthy corals need to be able to bleach in order to survive, as the relationship between the micro-algae and the coral has become compromised, and thus toxic for the corals. But corals do not expel all of the zooxanthellae as when ocean conditions become optimal the situation becomes ideal for the zooxanthellae to reproduce by cell division or reproducing a-sexually. This can happen within a month of corals being bleached. Another important point to note is that when corals are stressed or just before bleaching is likely to occur, corals tend to appear fluorescent or look to be very vibrant in colour.

Another amazing ability of corals is how they can protect other animals and organisms from the potentially harmful effects of UV light emitted from the sun. As the suns rays penetrate through water, reflecting off the reef, corals reduce the impact of the suns rays by absorbing UV light, preventing the effects on other reef species. Thus, coral acts like sunscreen for other species.

Corals also have a unique method of protecting themselves during extreme movements in the tides and during "spring tides" where the shallowest parts of the reef become exposed to air for short periods of time. Corals release a specialised mucus which helps to keep corals moist and protected against UV radiation. Depending on the time of day (day or night), and for the length of time exposed to air will determine if corals become stressed or damaged. Corals also secrete this mucus when fully submerged to protect themselves against pollutants, diseases and excessive UV light.

Coral exposed above waterline:

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Corals: Other coral facts

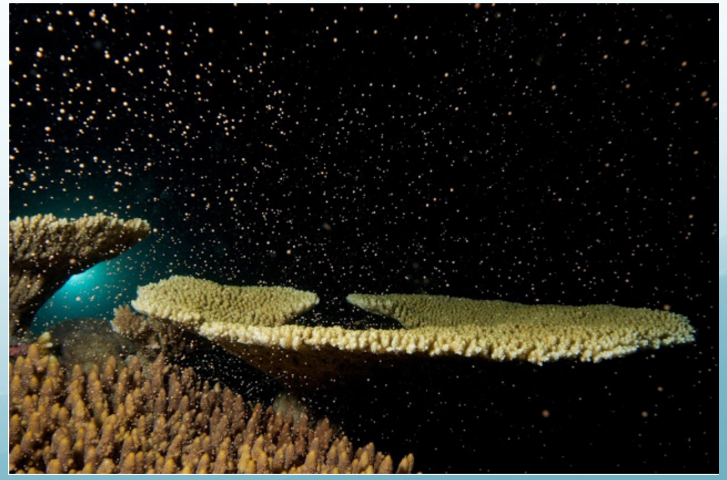
Coral spawning:

One of the most amazing facts about the Great Barrier Reef is how it reproduces. Although corals reproduce as they grow i.e. By dividing and cloning, but one of the most highly anticipated natural phenomena on earth is the coral spawning or broadcast spawning which occurs on a particular night of the year. This event occurs along vast areas of the entire Great Barrier Reef which remains unknown exactly why corals reproduce in this manner.

Hard or stony (reef building) corals reproduce by releasing sperm and eggs simultaneously after taking cues from a particular lunar phase and when the water temperature reaches 27 degrees Celsius, this generally happens in November/December. Depending on the type of coral will also determine if a single coral species is hermaphroditic, meaning that they produce both sperm and egg or if they are gonochoric, which means they produce single sex colonies. By releasing gametes in such large numbers, (gametes is the name for the tiny sperm & egg cells released by corals) this gives the various hard coral species the best chance for the reef to survive. Once eggs become fertilised, a tiny larvae known as a planula will swim to the oceans surface where they remain for a period of time. If the planula survive they will be carried by currents to an ideal location where they can descend to the surface of the reef, attach themselves, and commence to build a coral colony.

It should be noted that only healthy corals are able to spawn, and as this event occurs annually, it is a very good indication that the reef is thriving.

Coral spawning:



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Fishes of the reef

The Great Barrier Reef is home to over 1,500 species of tropical fish, ranging from small home-ranging species, whom seek shelter amongst the protection of coral structures to the largest fish species on earth, which migrate to the Great Barrier Reef to utilise the cleaning service offered by many species of fish and crustacean.

Angelfish:

Angelfish are amongst the most colourful and distinctively patterned fish found on the reef. All juvenile of the genus pomacanthus found in the Indo-Pacific have very similar patterns consisting of concentric lines, however, as they develop each individual species of Angelfish develop characteristic markings unique to each species. One of the most sought after tropical fish by photographers and marine-life enthusiasts alike is the Emperor Angelfish. The Emperor Angelfish live in harem groups, meaning there is a dominant male present at all times. When the dominant male dies, one of the females will change sex to become the dominant male. This ability to change from Female-to-male is known as protogyny and implies that fish can go from producing eggs to producing sperm.

Emperor Angelfish :

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Fishes of the reef

Butterflyfish:

Butterflyfish are another tropical fish renowned for their bright distinctive colours and patterns. During the mating season, males will leave the reef and swim out to open water where they will commence displays specially engineered to gain the attention of potential mates and rival males. Male Butterflyfish have the ability to dilate pigment granules, which are responsible for the various colours found in Butterflyfish. By dilating their pigment they become much brighter in colour. Males are known to fight for the attention of females by engaging in battle with rival males. During fights males hit their tails together sending pressure waves and will communicate through the patterns on their tails. A loser will signal to its opponent by changing the pattern on their tail. The winner can then freely mate with females. Butterflyfish also communicate their intentions to mate with females by using their distinctive patterns. It is very common for a male and female to live together in pairs on the same area of the reef for the duration of their lives.

Butterflyfish are only a few centimetres long and have flat bodies with long snouts, which enable them to move in and out of tight crevices and areas of the reef. They are able to seek protection away from predators easily and get to hard to reach food. Their diet consists of coral polyps and small crustaceans.

Longnose Butterflyfish:

Black-Back Butterflyfish:

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Fishes of the reef

Damselfish:

Damselfish are great protectors of the reef and one of the most abundant groups of coral reef fishes. Most species grow between 4 and 5 inches in length.They are extremely territorial over their selected area of reef, where they help to maintain algal growth over the reef. This helps prevent the reef from becoming overgrown with algae (which compromises the corals ability to photosynthesise). Therefore, the Damselfish has a mutualistic relationship with the reef (shelter and food in exchange for algae maintenance). Damsel fish are known to attack much larger animals that get too close to their territory. Many divers are confronted with these aggressive little fish.

Damselfish use their algae patch not only as a food source but also to attract a mate as a thick mat of algae is known to attract more females. It is assumed that this communicates to females the male's skill at taking care of eggs. Unfortunately, the trade-off for letting the algae patch become thick will not benefit the reef as it becomes 'suffocated'.

Damselfish protecting its algae patch:

Spiny Puller Damselfish:

Fishes of the reef

Anemonefish:

Clown fish or Anemonefish as they are also commonly referred, belong to the Damselfish family. There are 28 species of Anemonefish found on coral reefs throughout the world, and the most famous and sought after species is the clown fish. Clown fish are renowned for their appearance which is bright orange with three distinctive white bars edged in black. Clown fish are generally only a few centimetres in length, but there are some species of Anemonnefish which can grow up to 16 centimetres in length. They are generally found dwelling in the top 15 to 20 metres of coral reefs, and are considered to be opportunistic planktovores. The reason they are broadly grouped as Anemonefish is due to the mutualistic relationship with a host anemone. Clown fish are able to withstand the stinging cells of the anemone by coating themselves in the specialised mucus produced by the anemone. The clown fish does get stung by the tentacles of the anemone but this helps to build up the protective mucus coating. Other fish tend to steer clear of the anemone as they lack the protective coating and are likely to get stung if they come too close. The clown fish will fiercely protect the anemone as it offers protection and food as the fish quite often feeds on any left over bit of debris from the anemone's filtration system.

It is possible for many clown fish to live together in the same anemone, and the largest and dominant is female. When a dominant female dies, the most dominant male of the remaining fish will assume custody. Over the duration of typically two-weeks, the male will change sex into a fully functional, fertile female. This type of sequential hermaphroditism is known as protandry (male-to-female).

Clown Fish in host anemone:

Images courtesy of Reef Daytripper

Reef Daytripper

Fishes of the reef

Fusiliers:

Fusiliers are what's referred to as streamlined Perciformes, which means that they have a specially designed body shape, which enables them to swim fast with ease and reduce drag while moving through the water, this is important to conserve energy. Perciformes are a group of vertebrates which account for approximately 41% of all bony fish. Perciformes translates from Latin to mean "perch-like". Fusiliers are a good example of schooling fish. Schooling is an important survival technique as it can help to confuse or deter potential threats or predators. The reason schooling is effective is that aquatic vertebrates possess a system of sense organs used to detect vibration and pressure gradients emitted from any movement in the water. This system of organs is known as the Lateral Line. By moving in a large group offers protection to schooling fish.

Yellowtail Fusilier:

Fishes of the reef

Parrotfish:

There are approximately 30 different species of parrotfish found on the Great Barrier Reef, and most species can grow between 30 to 50 centimetres in length. The most distinctive feature of parrotfish aside from their beautiful colours are their teeth. Parrotfish have evolved from the carnivorous wrasse family and over time their teeth have moved forward on the jawbone where they have eventually fused together, providing a useful beak-like feeding tool. The powerful bite of the parrotfish is forceful enough to bite directly through limestone coral structures but will give them access to adequate amounts of algae for feeding. Parrot will consume any coral they bite through, while they digest all algae and nutrient, the processed coral will be released as a fine sand. Parrotfish are responsible for up to 30% of all coral sand which helps to build up sand bars and coral cays. Parrotfish are protogynous (female-to-male) but depending on the ratio of male to female, they may change sex to suit population dynamics. A single male produces thousands of sperm so there is little reason to have too many males. This is why most parrotfish are female.

Parrot fish also have a unique way to protect themselves at night when nocturnal predators roam the reef. The produce a mucus bubble which encases their entire body and act as a shield by blocking any vibration or movement from the lateral line. The bubble also has antibiotic properties which are beneficial for the parrotfish.

Parrotfish & mucus bubble:

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Predators

Whitetip Reef Shark:

The Whitetip Reef Shark is one of the most frequent sharks found in the Indo-Pacific. They grow up 2.5 meters in length and weigh up to 20 kilograms. Unlike many other pelagic species of shark, which means they will spend a majority of their time in the open ocean only visiting the reef to receive a cleaning service, the Whitetip Reef Shark is found exclusively living on coral reefs. Compared to other species of shark they are quite slow moving, and for this reason they are nocturnal hunters, preying on eels, octopus, lobsters and crabs. They are Viviparous, which means that eggs are held in the placenta of the female fish until birth. Females give birth to 1 to 6 pups, and the gestation lasts for 10 to 13 months.

Great Barracuda:

The Great Barracuda can grow up to 2 meters in length weighing up to 48 kilograms. Their streamlined shape and powerful body can burst in speeds of 56 kilometres per hour, which makes them an ideal ambush predator, taking their prey easily by surprise, they also support a row of razor sharp teeth on the outside of the upper and lower jaw and a large set of dagger-like teeth inside. Great Barracuda can live for up to 14 years reaching sexual maturity between two to four years. Due to their size and speed they have very few natural predators an are only considered to be vulnerable while a small juvenile fish.

Great Barracuda and Whitetip Reef Shark:

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Turtles

Sea Turtles:

Sea turtles are one of the most ancient creatures on earth. There are seven known species found in the oceans today, with six of the seven species found dwelling on the Great Barrier Reef. Two of the species commonly encountered at Upolu Reef are the Green Sea Turtle and the Hawksbill Turtle. Sea turtles have a streamlined shell or carapace as it is also known, which enables them to move easily through the water while conserving energy. Unlike other species of turtle, sea turtles cannot retract their legs and head into their shells. Most species love to feed on jellyfish but their diet may also consist of snails and algae. They are a breath-holding reptile and are able to stay underwater for up to five hours at a time. They are able to do this by slowing their heart rate down to approximately nine beats per minute. Although they do spend a majority of their time in the open ocean, females return to the same nesting sites each breeding season by utilising their eidetic memory to vividly recall every geological point they travel over so they may return to the same nesting site. This can mean females will migrate for thousands of kilometres. Once females arrive on shore they will slowly make their way up the sand and commence digging a pit for their clutch of eggs. Depending on the species females lay between 70 to 190 eggs, and depending on the temperature of the sand will determine the sex. Warmer sand tends to produce more females. Due to the low mortality rates of hatchlings only very few will successfully make it back to the ocean.

Green Sea Turtle & Hawksbill Turtle:

Images courtesy of Reef Daytripper

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This compendium is intended to provide a collection of interesting and relevant facts about the Great Barrier Reef and its inhabitants.

For the latest updates regarding the current health of the Great Barrier Reef head to:

http://www.gbrmpa.gov.au/

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