ESP on Assignment: Field Guide/Scientific Research

Overarching Theme: Sustainability

1. Research ESP Location ([ESP on JIS Net](https://jusies.jisc resp. net)):
   - Use Google Earth and other sources to find your ESP location/s.
   - Add screenshots of your location/s (satellite images and maps).

2. Research what you likely will encounter at your ESP location:
   - Choose **ONE** [ECOSYSTEM](https://www.example.com) to focus your field guide on, one that you will likely spend a good deal of time at.
   - Identify the key [abiotic](https://www.example.com) factors in that ecosystem.
   - Identify and create a "field guide" to the **flora** (plants) and **fauna** (animals) of that ecosystem.
   - Identify a keystone species in the ecosystem
     - The Whitetip reef shark uses the coral reefs as a habitat, as well as a source of food. They are a keystone, and significantly important predators in reef ecosystems. The sharks' predation of fishes may serve as a sort of population control. This is particularly important in those fishes, such as the parrotfish, who tends to feed and consume corals uncontrollably. Sharks have evolved in a tight "inter-dependency" with their ecosystem. Sharks play a crucial role in keeping it's prey species into control, so that it doesn't overfeed on producers. They consume species in order to keep the population numbers of marine species in proper balance by consuming them as prey. Extinction in this apex predator would have fatal impacts in the ecosystem, and would cause a immense abundance in secondary consumers, which causes further disruption and loss to an ecosystem.
     - Include details such as: taxonomy, photos, characteristics, behavior, [habitat](https://www.example.com), diet, range, protection status/endangered, etc.

3. Identify [relationships](https://www.example.com) within your ecosystem:
   - **Commensalism**
   - **Mutualism**
     - Spinecheek anemonefish and their host anemones have a mutualist relationship. *Entacmaea quadricolor* benefits from having spinecheek anemonefish protect them from butterflyfish (*Chaetodonidae*), which would otherwise eat their tentacles. Spinecheek anemonefish also clean away debris and parasites from the anemone. Spinecheek anemonefish are protected from most predators through their association with venomous anemones.
     - *Calliactis parasitica* which lives on the shell of the hermit crab, and provides increased protection against predators. Both parties benefit which is known as a symbiotic relationship.
     - The corals and algae have a mutualistic relationship. Most reef-building corals contain photosynthetic algae, called zooxanthellae, that live in their tissues. The coral provides the algae with a protected environment and compounds they need for photosynthesis. In return, the algae produce oxygen and help the coral to remove wastes.
- **Parasitism**
  - Linckia laevigata is an obligate host for the limpet *Thyca crystallina*, which feeds on the hemolymph of the sea star. The shrimp *Periclimenes soro*, is also parasitic on *L. laevigata*. Blue Linkia is also highly prone to parasitization by a species of the parasitic gastropod, *Thyca crystallina*.

- **Competition**
- **Predator-Prey**
  - Charnia species (triton shells), harlequin shrimp (*Hymenocera spp*), even some sea anemones, and damselfish (*Dascllusaranus spp*) have been observed to eat whole of parts of the sea stars.
  - This flora and fauna identified in the field guide below are all interrelated by numerous predator-prey relationship. This is a type of symbiotic relationship between two organisms of unlike species in which one of them acts as predator that captures and feeds on the other organism that serves as the prey.

4. Produce a [food web](#) diagram of the ecosystem that includes: trophic levels, predator, prey, producers, consumers, and decomposers.
5. Biological Sketch (with labels and to scale)

Green Sea Turtle
Toucans are small birds with large beaks.

Fisheye that resemble paddles, makes them poorly swimming.

Irregularly small head (non-radiate)

Spine (A hard protective covering of bone, especially one that covers the dorsal of an animal)

Tail
6. Keep a bibliography of resources.
7. Checklist/Self Assessment

Complete this table before starting your research:

<table>
<thead>
<tr>
<th>Your Name</th>
<th>Devina Bharwani</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Your ESP Trip</td>
<td>Coastal Environments</td>
</tr>
</tbody>
</table>
| Ecosystems you likely will encounter on your trip | ● Gili Nanggu Resort (Marine)  
  ● Gilli Layar  
  ● Gilli Ringit |
| Ecosystem Focus for ESP on Assignment Project | Coral Reef Ecosystem |

Maps
Satellite Images
**Abiotic Factors:**
- PH of Water
- Temperature
- Amount of Sunlight
- Moisture Level
- Wind or water currents
- Sand Type
- Oxygen
- Salinity
- Nutrient availability

**Biotic Factors**
- Plants
- Animals
- Fungi
- Algae
- Bacteria

My field guide is a list of (flora and fauna) which are both factors of ecosystems.

<table>
<thead>
<tr>
<th>Species</th>
<th>Photos</th>
<th>Information</th>
<th>Sources</th>
</tr>
</thead>
</table>
| **Scientific name:** Chelonia mydas | ![Green Sea Turtle](http://www.arkive.org/green-turtle/chelonia-mydas/) | **Taxonomy:**
- Kingdom Animalia
- Phylum Chordata
- Class Reptilia
- Order Testudines
- Family Cheloniidae

| **Common Names:** Green Sea Turtles | ![Green Sea Turtle](http://www.arkive.org/green-turtle/chelonia-mydas/) | **Characteristics:**
The common name *Green turtles* are named after their green colored fats and connective tissues. The green turtle is a large, weighty turtle with wide, and smooth carapace (A hard protective covering |

of bone, especially one which covers the dorsal part of an animal). This particular species of turtle can weigh up to 700 lbs which is approximately 317.5 kilograms. Green turtles are among the largest sea turtles in the world. Their proportionally small head is non retractable (meaning that like other sea turtles, the green sea turtle cannot pull its head into its shell).

**Behavior:**

Green Sea turtles undertake lengthy migrations from their feedings sites to nesting grounds. Every two to four years, mating occurs in shallow waters close to shore. To nest, females leave the sea, and choose an area to lay their eggs. Using their flippers, they dig a pit where they fill it with a clutch of 100 to 200 eggs. They leave their eggs to hatch after about two months, and make their way back to the sea.

**Trophic Level:**

They are herbivores as they feed on primary producers, and are at the second trophic level of the marine food web. Herbivores eat plants such as seagrass, and other photosynthetic organisms such as algae.

**Diet:**

The endangered green sea turtle feeds on seagrass and algae. However, juvenile green turtles also eat invertebrates like crabs, jellyfish, and sponges.

**Habitat:**

Normally lives in shallow development areas, that are rich in sea grass or marine algae. Its range extends throughout the tropical and subtropical coastal waters, and have been observed “clambering onto land to sunbathe”. It is also known as one of the few marine turtles who leave
the water other than their nesting times.

**Threats:**

- Overexploitation
- Disease
- Development
- Habitat Loss
- Global Warming

One of the major threats to the population of Green Sea Turtles is overharvesting. The green turtle is overharvested in many areas for both its meat and eggs. Their meat is highly valued, and their ‘calipee’ is used in the production of turtle soup. Fisheries, habitat degradation, and disease, are other threats to their declining population. Construction, beach armouring (process which reshapes shoreline), and sand extraction are held responsible for the degradation of nesting habitat. Furthermore, pollution at nesting beaches have detrimental effects on green turtle hatchlings. Contamination from coastal development and the over harvesting of algae in the marine environments negatively impact their habitat. Based on studies, the degradation of marine habitats are connected to the increase of fibropapillomas (a fibrous tumor that can grow on a turtles body, “impeding movement or sight, and often having fatal consequences).

**Predators:**

Once the baby turtles hatch they must crawl to the water to avoid a multitude of predators (sea birds, ghost crabs, gulls on the beach to sharks and dolphins in the water)

Adult sea turtles have very limited predators because of their size. Their top predator are humans. Besides humans, large sharks are Green Sea Turtles natural predator.
<table>
<thead>
<tr>
<th>Scientific name:</th>
<th>Plerogyra sinuosa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Names:</td>
<td>Bubble Coral, Bladder Coral, Green Bubble Coral, Grape Coral, Rounded Bubblegum Coral</td>
</tr>
</tbody>
</table>

**Protected Status:**
The green turtle is currently classified as Endangered on the IUCN Red list. Green turtles are hunted and their eggs are collected by humans which is a legal practice in some countries. Green turtles are also threatened by destruction of nesting areas in the sea. At other instances, they are accidentally caught in fishing nets, further declining their population. Therefore, human impacts on the green turtle are a significant concern.

**Scientific name:**
Plerogyra sinuosa

**Common Names:**
Bubble Coral, Bladder Coral, Green Bubble Coral, Grape Coral, Rounded Bubblegum Coral

**Taxonomy:**
- **Kingdom:** Animalia
- **Phylum:** Cnidaria
- **Class:** Anthozoa
- **Order:** Scleractinia
- **Family:** Euphyllidae
- **Genus:** Plerogyra

**Characteristics/Behavior:**
The Bubble Coral is a species of coral originating from the reefs of the Indo-Pacific. Most bubble corals have a green or white-ridged hard skeleton that can be seen when the polyps are deflated. Their color can range from white, to cream, to shades of gray or green and is semi-translucent. Bubble Coral looks significantly strange, and is definitely one of the most unique in appearance. It is named after its grape-sized bubbles that enlarge its surface area.

These bubbles expose the *zooxanthellae* (a single-celled organism that lives in symbiosis with marine invertebrates ex. corals, jellyfish, sea anemones) to more light. The bubbles protrude and extend during the day, but shrink during the night when the tentacles expand to capture food. As previously stated, the bubbles are inflated during the day and deflate at night.


[http://reefguide.org/plerogyrasinusoua.html?search=bubble&area=all](http://reefguide.org/plerogyrasinusoua.html?search=bubble&area=all)


The Bubble Coral is composed of numerous small soft-bodied anemone-like animals called polyps. Despite having numerous polyps, the bubble coral only has one large oral opening, where the food is digested in a sac-like cavity.

**Diet:**
Bubble corals are photosynthetic which takes care of most of their nutritional needs, especially, and best when they are placed under moderate to strong lighting. This is because they contain photosynthetic algae, called zooxanthellae, that live in their tissues. The corals and algae have a mutualistic relationship. Corals also eat by catching tiny floating animals called zooplankton.

They also consume many foods such as Mysis shrimp and other fishes. This is true in low light conditions where photosynthesis alone may not meet all their nutritional requirements.

**Trophic Level:**
The bubble corals, along with all the other corals, are primary consumers.

**Habitat:**
The bubble coral is most frequently found on protected reefs in lagoons (a shallow body of water separated from a larger body of water by barrier islands or reefs). It grows on “vertical faces or under overhangs”. Large colonies (group of organisms living together) of bubble corals are often and most commonly found on flat surfaces in turbid (murky) waters. It is known to be found between depths of 3 and 35 meters.

**Range:**
The bubble coral is found and located in the Indian and Pacific Oceans, ranging from the Red Sea, Gulf of Aden and southwest Indian Ocean, across
the northern Indian Ocean to Southeast Asia, Japan and the East China Sea, and into the West and Central Pacific Ocean.

**Threats:**

One of the threats on the bubble coral is the human population growth and development. As a result of this rapid increase, there has been an significant increase in domestic and agricultural waste in the oceans, poor land-use practices that result in an increase in sediment running onto the reefs, and overfishing.

However, the major threat to the bubble coral species is global climate change. The expected rise in ocean temperature increasing the risk of 'coral bleaching' in which the stressed coral expels its algae (zooxanthellae) living in their tissues, resulting in the death of the coral.

In the long run, climate change may also lead to more frequent, severe storms, which can damage reefs, and rising carbon dioxide levels may make the oceans increasingly acidic. These stressors can make corals more susceptible to disease, parasites, and predators.

Other threats include:

- Invasive Species
- Dynamite Fishing
- Chemical Fishing
- Pollution from Agriculture
- Domestic Pollution
- Sedimentation
- Tourist activities

**Predators:**

One of the predators of the bubble coral is the crowns-of-thorns starfish (*Acanthaster planci*).
Humans are also a major threat to this species.

**Protected Status:**
The bubble coral is classified as Near Threatened or “NT” on the IUCN Red List.

**Conservation:**
The Convention on International Trade in Endangered Species (CITES) makes an offence to trade this species. The Bubble Coral also forms part of the reef community in numerous Marine Protected Areas. To conserve this coral, there have been many studies into aspects of its biology, population status, habitat, and threats to survival.

<table>
<thead>
<tr>
<th>Scientific name:</th>
<th>Acanthaster planci</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name:</td>
<td>Crown-of-thorns Starfish</td>
</tr>
</tbody>
</table>

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Echinodermata</td>
</tr>
<tr>
<td>Class</td>
<td>Asteroidea</td>
</tr>
<tr>
<td>Order</td>
<td>Valvatida</td>
</tr>
<tr>
<td>Family</td>
<td>Acanthasteridae</td>
</tr>
<tr>
<td>Genus</td>
<td>Acanthaster</td>
</tr>
</tbody>
</table>

**Characteristics:**
The Crown of thorns starfish has a great appetite and is well-known of being one of the largest predators of corals. It is proven that they have a reputation of having a devastating and terrible impact on coral reef systems. Its weird name originates from their long, sharp, poisonous spines that cover their entire upper surface of their body. This particular specie of starfish is unique as it is incredibly and terrifyingly large; it grow to about more than one meter in diameter. Their arms are covered in rather soft, membranous skin, which is “armed with hundreds of stout, hinged, elongate spines” that usually and may grow to five centimeters in length. This species are surprisingly able to bend and twist and fit in unique contours of the corals in which it feeds on. This shocks many
as they have a rather stiff appearance. They range in color from blue to reddish-grey to green.

**Behavior:**
The Crown-of-thorns starfish breeds typically between the months December and April. It releases eggs or sperm into the water through their pores located on top of the central disc in order to reproduce. On average, a single female can produce up to 60 million eggs in a breeding season. Surprisingly, the Crown-of-thorns species is scientifically proven to have one of the highest rates of fertilization recorded in any invertebrate. This is very unique as this means that although only a limited population of this particular species exist, they have the potential to produce a significantly large number of offspring.

**Predators:**
Some predators of the Crown-of-thorns starfish includes some species of carnivorous fish such as the humphead wrasse (*Cheilinus undulatus*) and the starry pufferfish (*Arothron stellatus*) which is also known and proven to prey on adult Crown-of-thorns starfish. Other predators of this species include the Giant Triton Snail and the Titan triggerfish. Although, once they reach a certain age of maturity, they have very few predators. Most commonly, juvenile Crown-of-thorns starfish are preyed on by crabs, shrimps, annelid worms, and fish, as they are more vulnerable due to the lack of their characteristic spines of the adult; more prone to predation.

**Threats:**
According to Archive, Crown-of-thorns starfish is not currently considered at risk of extinction.

**Diet:**
The Crown-of-thorns starfish preys on nearly all corals including both hard and soft corals. In addition to consuming this, the Crown-of-thorns
The Crown-of-thorns starfish is a secondary consumer as it feeds primarily on corals which are considered to be a primary consumer.
understand the reasons behind their outbreaks, and to “assess its long-term impacts on coral reefs”.

<table>
<thead>
<tr>
<th>Scientific name: Pagurus bernhardus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Names: Hermit Crab</td>
</tr>
</tbody>
</table>

| Characteristics: |
| The common hermit crab is more related to the family of crabs and lobsters compared to the other species of crabs. They have a hard carapace (top shell in arthropods). Without its shell, the hermit crabs soft abdomen is twisted. The common hermit crab is typically reddish or brownish in color, and have two pincers on the first pair of its walking legs. The right pincer however, is larger than the left, but both have a rough, granular surface. Its carapace length can average up to 35 cm. |

| Behavior: |
| The common hermit crab is a scavenger, and can obtain food by filtering organic particles from the water. Their reproduction activity peaks in January and February. The female hermit crabs living in deeper water are proven to be found carrying eggs throughout the year. On average, it carries the eggs for approximately two months. Maturity of this hermit crab is typically reached before one year of age. |

| Diet: |
| The hermit crab is an omnivorous animals that eats mostly everything they find in the surrounding water. Small fish and invertebrates including words, are the most common prey for the hermit crab along with plankton and other food particles in the |

| Taxonomy: |
| Kingdom: Animalia |
| Phylum: Arthropoda |
| Class: Crustacea |
| Order: Decapoda |
| Family: Paguridae |
| Genus: Pagurus |


https://a-z-animals.com/animals/hermit-crab/ (Webpath express)
<table>
<thead>
<tr>
<th>Trophic Level:</th>
<th>Secondary consumers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predators:</td>
<td>Hermit crabs have a lot of predators due to their incredible small size. This includes sharks, fish, cuttlefish, squid and octopuses. It believed that hermit crabs often hide amongst other animals such as sea anemones particularly, <em>Calliactis parasitica</em> which lives on the shell of the hermit crab, and provides increased protection against predators. Both parties benefit which is known as a symbiotic relationship.</td>
</tr>
<tr>
<td>Habitat:</td>
<td>Typically inhabits both rocky and sandy areas from the shore to depths of 140 m.</td>
</tr>
<tr>
<td>Status:</td>
<td>Common and widespread.</td>
</tr>
<tr>
<td>Threats:</td>
<td>Not currently threatened.</td>
</tr>
<tr>
<td>Conservation:</td>
<td>According to Arkive, specific conservation action has not been targeted at this species.</td>
</tr>
<tr>
<td>Range:</td>
<td>Common and widespread on all coasts. Found worldwide.</td>
</tr>
</tbody>
</table>
**Common Names:**  
Pufferfish  
Blowfish  

**Scientific Name:**  
*Takifugu poecilonotus*

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Actinopterygii</td>
</tr>
<tr>
<td>Order</td>
<td>Tetraodontiformes</td>
</tr>
<tr>
<td>Family</td>
<td>Tetraodontidae</td>
</tr>
<tr>
<td>Genus</td>
<td>Takifugu</td>
</tr>
</tbody>
</table>

**Characteristics:**

Almost all pufferfish contain tetrodotoxin, a substance that makes them foul tasting and lethal to fish. To humans, this substance is extremely deadly, up to 1,200 more poisonous than cyanide. There is enough toxin for one pufferfish to kill 30 adult humans. Some species of pufferfish have spine on their skin which makes them less attackable to predators. The pufferfish alone can have a size relatively high to 3 feet (equivalent to 1 meter). The average pufferfish has an average lifespan of 4-8 years. The pufferfish species distinctive features are its highly inflatable body and sharp poisonous spikes. They have long, tapered bodies with bulging heads.

**Behavior:**

The average pufferfish has a slow, and a somewhat clumsy swimming style which makes them vulnerable to higher predators. Pufferfish use their highly elastic stomachs and to quickly digest large amounts of water to turn themselves into a “Virtually inedible ball several times their normal size”. Other pufferfishes are known to your coloring to blend in with their environment, and protected themselves for predators.

**Trophic Level:**

Secondary consumer

**Habitat:**

The pufferfish is known to live in shallow water and
closeby to coral reefs. They live in tropical and subtropical waters, while other species require fresh, brackish, and even salt water types. Based on studies, they are most likely found near shore on rock bottoms.

**Diet:**
The diet of the pufferfish is carnivorous, with a preferred diet consisting of invertebrates and algae. Large specimens will even crack open and consume clams, mussels, and shellfish with their hard peaks. Poisonous puffers are believed to synthesis their deadly toxin from the bacteria in the animals they eat.

**Range:**
This specie is abundant in mostly all tropics (equator).

**Threats:**
Some of the threats to this common pufferfish is predicted and assumed to be caused environmental degradation due to pollution and coastal production is of particular concern. Many oceans are being heavily overfished reducing the species diversity of our marine life, and are declining all ecological indexes. However, these populations are considered mostly stable.

**Predators:**
The predators of the this poisonous pufferfish are tiger sharks, sea snakes, which are completely unbothered by the pufferfish’s natural toxins. Other known large predators of this particular species include humans, sharks, and large fish.

**Status:**
The pufferfish is classified as of Least Concern or “LC” on the IUCN Red List.

**Conservation:**
There are currently no-known species conservation
measure in place for *Takifugu poecilonotus*, however it is possible that management efforts aimed and sustained *T.rubripes* fisheries have benefited the *T.poecilonotus*.

| Common Names: | Olive-brown sea snake  
Olive Sea Snake  
Scientific Name:  
*Aipysurus laevis* |
|---------------|----------------------------------|
| Taxonomy:     | Kingdom Animalia  
Phylum Chordata  
Class Reptilia  
Order Squamata  
Family Elapidae  
Genus *Aipysurus* |
| Characteristics: | The Olive-brown sea snake is the bulkiest and largest member of its genus. It has a stout, rounded body, and has a flattened, paddle-like tail suited to swimming. As apparent, its head is not distinct from the body, giving this species close to a worm-like appearance. Its name originated from the latin word, laevis, which refers to its smooth skin. This species is highly variable in color-ranging from plain brown to olive-brown, purplish-brown or greys on the underparts and becoming paler on the underside. Its head is often olive-colored while its tail is a creamy white. |
| Behavior:     | A surprising fact is that although this types of sea snake is a highly poisonous species, is known to be manageable, and inquisitive. It hunts for food by weaving among large corals on the reef, searching for prey. It remains within a small patch of coral, and rarely ventures out into the open |

- Juvenile olive-brown sea snake is less uniform in color  
- Nostrils of sea snakes are located at top of the snout  
- Length: 1-2.2 m  
- Weight: up to 3 kg |

http://www.inaturalist.org/places/lombok-barat  
water. The breeding season of this species generally runs from May to July where mating takes place on ocean floors. Females do not mature until they are 4-5 years old.

**Range:**
The olive-brown sea snake is a common and widespread species. Its distribution encompasses the waters around eastern Indonesia and New Guinea, and extends throughout tropical waters. It is commonly found in the eastern Indian Ocean and the western Pacific Ocean.

**Diet:**
The olive-brown sea snake feeds on a variety of prey including fish, fish eggs, crustaceans, and molluscs by using venom to capture victims. Its venoms contain enzymes that break down prey from the inside, making it easier for the sea snake to digest prey when swallowed.

**Habitat:**
The olive-brown sea snake is found around coral reefs and tropical coastal shallows. Around coral reefs, this species occur in a variety of habitat reefs including the reef edge and sandy bottoms.

- Recorded of being spotted in depths of up to 68 meters
- Generally are in reef waters (between 4 and 45 meters deep)

**Trophic Level:**
Tertiary Consumers

**Status:**
The olive-brown sea snake is classified as Least Concern, or “LC” on the IUCN Red List.

**Predators:**
The predators of this olive-brown sea snakes is sea eagles, sharks, large predatory fish, and eels.
**Threats:**  
The threats to this specific species includes the loss and degradation of its habitat, and being accidentally capture in trawl fisheries throughout its range. Climate change causes alterations to coral reef habitats, which in return, leads to a reduced abundance of prey, and reduction in suitable habitat for this olive-brown sea snake.

**Conservation:**  
Recommendations have been made to monitor bycatch of this species, and for fishes to reduce the levels of incidental catch. All snake species in Australia are protected under their classification by the Department of Environment and Water resources as “Listed Marine Species” and are protected under the Environment Protection and Biodiversity Conservation Act 1999.

<table>
<thead>
<tr>
<th><strong>Common Names:</strong></th>
<th><strong>Scientific Name:</strong> Gibsmitthia hawaiensis</th>
</tr>
</thead>
</table>

**Taxonomy:**  
Kingdom: Plantae  
Phylum: Rhodophyta  
(The others are not listed)

**Characteristics:**  
The result of the red color in the Red algae s the masking of chlorophyll by phycobilin pigments. They a number of general characteristics that distinguish them from other eukaryotic groups. Red algae species range from simple one-celled organisms to complex, multi-celled, plant-like organisms. Red algae get their energy from photosynthesis. One thing that distinguishes red algae from other algae is that their cells lack flagella.

**Behavior:**  

http://www.seaweed.ie/algae/phaeophyta.php  
http://www.ucmp.berkeley.edu/protista/rhodophyta.html  
http://eol.org/pages/4524/hierarchy_entries/24914686/overview  
https://www.inaturalist.org/taxa/57774-Rhodophyta  
http://reefguide.org/indopac/gibsmithiahawaiiensis.html  
The pigments allow the red algae to photosynthesize. They reproductive bodies of red algae are non-motile meaning...The female sex organ called carpogonium consists of a uninucleate gion that functions as the egg, or projection, to which gametes become attached. The non-motile male gametes (spermatia) are produced singly in male sex organs, the spermatangia.

**Range:**
Exist in coastal and continental shelf areas of tropical, temperate and cold-water regions.

**Distribution:** Indo-Pacific, Hawaii, Australia, Polynesia

**Trophic Level:**
Red algae are ecological primary producers that provides a structural habitat for other marine organisms, and their important role in the maintenance of coral reefs.

**Diet:**
Red Algae employs a process known as photosynthesis to convert sunlight into energy. Algae are other photosynthetic organisms are known as photoautotrophs.

**Habitat:**
Red Algae is more typically found in sulphuric hot spring and other acidic environments. The remaining of this specie is found marine and freshwater environments. Freshwaters species account for 5% of red algae diversity, A few freshwater species are found in black waters and sandy bottoms. They are found at greater depths compared to other seaweeds.

These are found in the intertidal and in the subtidal to depths of up to 40, or occasionally, 250 m.

**Threats:**
Several species of red algae are important food crops for human consumption. These foods are high in vitamins and protein and are easily grow. In East and Southeast Asia, agar is most commonly produced from *Gracilaria*, *Gelidium*, *Pterocladiad*, and other red algae are used in the manufacture of all-important agar. This is a commonly used ingredient in food, particularly yogurts, chocolate milk, and repared puddings.

**Predators:**
The animals that eat red algae in the ocean include krill, shrimp, surgeonfish, and turbine/netile snails. Additional creates include sea urchins, blennies, and some species of crab. Red algae are eaten by fish, crustaceans, worms, and gastropods.

Red algae are also consumed by humans. Two examples are nori, which is used in sushi, and Irish moss, which can be made into pudding.

**Status:**
Vulnerable

---

**Common Names:**
Undulated moray eel

**Scientific Name:**
*Gymnothorax undulatus*

![Undulated Moray Eel](https://a-z-animals.com/animals/moray-eel)

**Taxonomy:**
- **Kingdom:** Animalia
- **Phylum:** Chordata
- **Class:** Actinopterygii
- **Order:** Anguilliformes
- **Family:** Muraenidae
- **Genus:** *Gymnothorax*

**Characteristics:**
The undulated moray eel is a type of moray eel. They are dark green to black brown in color, and its head is bright yellow. It has a pattern of light “undulating” lines that form a faint net-pattern along its body. The undulated moray has large, elongated
jaws, with the lower jaw being slightly hooked. Their mouth is armed with rows of long, thin, fang-like teeth. Their lengths are up to 150 cm. Despite their snake-like appearance, this species of eel is in fact fish, and not reptiles.

**Behavior:**
They are a nocturnal species and uses its keen sense of smell to aggressively hunt for fish, octopus,, and crustaceans consuming everything that can fit in its mouth. When the prey is captured, it uses their specialized jaws within their throat to grasp onto the prey and drag it to the back of their throat. They spend a majority of their time hiding, and remaining out of sight of predators, while still being able to ambush any unsuspecting prey that passes.

Not much is known regarding the specific specie of moray eel, however the general moray eel tends to mate when water is the warmest throughout the end of summer. Moray eel fertilisation is oviparous meaning that eggs and spen are fertilized outside the womb, in surrounding water. More than 10,000 eggs can be released at one time, which develops into larvae, and become part of the plankton. It takes up to a year for a moray eel larvae to mature into a size to be able to swim down to the ocean floor.

**Range:**
The greatest density of undulated moray eels occur in warm coastal areas throughout southeast Asia, from Indonesia and the Philippines southwards to northern Australia.

**Habitat:**
They are commonly found on reef flats in lagoons. The under moray eels hides amongst rocks, rubber or debris down to depths of 30 meters.

**Diet:**
| Common Names: | Blue Linckia (Starfish)  
| Blue Sea Star  
| Blue Starfish |
| Scientific Name: | *Linckia laevigata* |
| Taxonomy: | **Kingdom** Animalia  
| **Phylum** Echinoderms  
| **Class** Sea stars  
| **Order** Valvatida  
| **Family** Ophidiasteridae  
| **Genus** *Linckia* |
| Characteristics: | Linckia laevigata (sometimes called “blue Blink” or blue sea star) is a species of sea stars (commonly known as starfish). The variation of colors of this | http://eol.org/pages/4704718/details  
http://www.inaturalist.org/taxa/57745-Linckia-laevigata

The moray eel is a carnivorous animal surviving on a diet consisting of only meat. Fish, molluscs, squid, cuttlefish, and crustaceans such as crabs are the main source of food for the moray eel.

**Trophic level:**  
Secondary consumers.

**Status:**  
The undulated moray has yet to be classified by the IUCN.

**Threats:**  
The undulated moray does not appear under serious and any immediate threat of extinction, although it is occasionally targeted by commercial fishes and is also captured for aquariums.

**Predators:**  
The moray eel is often one of the “most dominant predators within its environment”, although are hunted by large fish, barracuda, sharks, and humans.

**Conservation:**  
There are currently no known conservation plans targeting the undulated moray.
organism is dark, or light blue. These stars may grow up to 30 cm (11.8 in.) in diameter with rounded tips at each of the arms. Individual specimens are typically firm in texture, and have slightly tubular, elongated arms common to most of the other members of the family Ophidiaster. Some individuals are noticed to have lighter or darker spots along each of their arms. They move relatively slow (an approximate locomotion rate of 8.1 cm/min).

**Behavior:**
The genus, Linckia, is recognized by scientists as being "possessed of remarkable regenerative capabilities", and "endowed" with defence autonomy against predators. Although it hasn't been documented, according to inaturalist.org, Linckia laevigata may be able to reproduce asexually. Many individuals observed in nature are missing arms, and are sometimes, in the cmet form. The Blue Linckia Sea Star is capable of regenerating a new starfish from almost any portion of its body that might break off. Seastars lack a brain and do not possess well-defined sensory work.

**Habitat:**
The Blue starfish is relatively common and typically found in sparse density throughout its range; lives where coral reefs and seagrass beds are present. Blue stars live "subtidally", or sometimes "Intertidally", and on fine sand.

**Diet:**
Linckia laevigata, like other sea stars, are "opportunistic predators" and scavengers. They invert their stomach to digest food externally. Food items include dead animals, small invertebrates and detritus. They also consume aquatic and marine worms, and algae. Carnivore (Eats other marine invertebrates, Scavenger); omnivore; detritivore.
**Common Names:** Harlequin Shrimp  
**Scientific Name:** Hymenocera

| **Taxonomy:** | http://eol.org/data_objects/31897113  
| http://www.inaturalist.org/taxa/49718-Hymenocera-picta  
| http://marinebio.org/species.asp?id=1624 |
| **Kingdom** | Animalia |
| **Phylum** | Arthropoda |
| **Class** | Malacostraca |
| **Order** | Decapoda |
| **Family** | Hymenochirus |
| **Genus** | Hymenocera |

**Characteristics:**

*Hymenocera picta,* commonly known as the harlequin shrimp, is a species of saltwater shrimp found at corals reefs in the tropical Indian and...
Pacific oceans. They reach about 5 centimetres (2.0in) in length and live in pairs. They are usually cream colored or white with occasional spots. Around the Pacific Ocean, many of these shrimps will have red spots while the Indian Ocean shrimp typically have purple spots. The shrimp has two walking legs on each site, and large claws, or cheliped. The claws and eyes appeared to look flattened and thin. On its head, the shrimp has “petal-like sensory antennules” to smell out their prey. The male’s average maximum size is proven to be a little bit smaller to those of the female.

**Behavior/Reproduction:**
The Harlequin moves at a very slow pace and in ways. It also has toxins from its prey (the starfish) which is potentially dangerous for their predators. The shrimp also moves its claws constantly. Females have larger and have colored abdominal plates unlike males. On average, the female produces between 100 to 5,000 eggs per season depending on environmental factors. The male and female are usually noticed and spotted together to not only reproduce, but also eat food.

**Range:**
This specie of shrimp is typically found in Hawaii through the Indo-Pacific below the intertidal zone on coral reefs.

**Habitat:**
The harlequin shrimp prefer temperatures of 72-82 degrees Fahrenheit, but are sometimes rate because of the changing coral reefs. Many people are now using these shrimps as pets because of their colorful bodies, so future pet owners must be aware to their sensitivity to changes in temperature, water chemistry, and salinity can be detrimental. They are typically found with their mate in their natural habitat.

**Diet:**

http://marinebio.org/species.asp?id=1624
Harlequin shrimp only source of nutrition comes from the starfish. They are very skilled and flipping over the slow starfish on its back and eating the tube feet and soft tissues until it reaches the central disk. They use their claws to “pierce” the tough skin and feeding legs to help them maneuver the starfish. Sometimes this starfish will shed the arm the shrimp attacked and regrow (meaning that the shrimp re-eats it), but are usually too wounded to regrow. They may also feed on sea urchins, because they have tube feet as well, but this is rare and only occurs if they’re very hungry.

**Trophic Level:**
Secondary consumers. (third trophic level)

**Predators:**
Despite their small size, they have only a few natural predators. Wrasses and triggerfish consume the harlequin shrimp.

**Threats, Status, Conservation:**
There is no current evaluation for this species on the IUCN Conservation of Harlequin Shrimp.

### Common Names:
- Scribbled Puffer
- Map Puffer
- Map Toado
- Scribbled Pufferfish
- Toadfishes, Blowfishes, Mappa Pufferfish, Arothron puffer

### Scientific Name:
*Arothron mappa*

### Taxonomy:
- **Kingdom:** Animalia
- **Phylum:** Chordata
- **Class:** Actinopterygii
- **Order:** Tetraodontiformes
- **Family:** Tetraodontidae
- **Genus:** Arothron

### Characteristics:
*Arothron mappa* is a medium sized fish which grows up to 65 cm in length. Its body is a oval shape, elongated, and has a spherical yet shape. The skin is not covered with scales. The fish has no pelvic fin and no lateral line. The dorsal fin and the anal fin are small, symmetrical, and located at the end of the body. Its snout is short with two pairs of nostrils.
of nostrils and its mouth consists of four reasonable strong teeth. Some yellow blotches can occur around their mouth, their symmetrical anus, fins, or anywhere on the body.

**Behavior:**
When threatened or stressed, The Scribed Mappa Puffer has the quality of doubling its original size to protect itself from predators. Its also known to be rather aggressive. Furthermore, this specific specie of puffer fish has a diurnal activity. This means that the animal switches from nocturnal to diurnal depending on the environmental temperature.

**Range:**
This species is found in tropical subtropical waters from the Indian Ocean to the Western Pacific Ocean. It is distributed throughout the Indo-Pacific. There are a abundance of this species in Indonesia, and most specifically lombok.

**Habitat:**
It lives close to reef-drop off and sheltered lagoons from the surface to 30m depth. Its habitat includes a marine reef biome and seawater environments. It is associated with coral reefs and seagrass beds.

**Diet:**
The Arothron mappa typically feeds on:
- Benthic invertebrates
- Sponges
- Algae
- Hard Shelled Shrimp
- Squid
- Krill
- Clams

The Scribbled Mappa Fisher needs a varied diet of meaty foods.

**Trophic Level:**
Tertiary Consumer
Status:
This species is classified as Least Concern, or “LC” in the IUCN Red List.

Threats:
There have been no confirmed population declines in A.mappa. However because of its affinity with coral reefs and seagrass beds, its high value in the marine aquarium trade, and possible exploitation in the international pufferfish trade, IUCN infers that they have been experiencing population declines due to habitat loss and harvesting in parts of its range. In the year 2008, fifteen percent of the world’s coral reefs were considered under threat of being “Effectively Lost” (with 90% of the corals lost, unlikely to recover soon). Southeast Asia is being the most highly threatened. One third of global seagrass species are currently experiencing declines, and 21% of global assessed seagrass species are in threatened or near threatened categories due to coastal development.

Conservation Actions:
Highly-effective fishing gear, including modified longlines and nets with small “mesh sizes”, rather than excessive fishing effort have been instilled in the depletion of Takifugu pufferfish resources in parts of East Asia. Recommendations including gear restrictions, and several of these have been made to insure its continued existence.
**Common Names:**
Giant Barrel Sponge
Barrel Sponge

**Scientific Name:**
*Xestospongia Muta*

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Porifera</td>
</tr>
<tr>
<td>Class</td>
<td>Demospongiae</td>
</tr>
<tr>
<td>Order</td>
<td>Haplosclerida</td>
</tr>
<tr>
<td>Family</td>
<td>Petroicidae</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Xestospongia</em></td>
</tr>
</tbody>
</table>

**Characteristics:**
- Typically maroon to pink, with the opening of the barrel pale white.
- Can also be brownish-red to brownish gray in color, with a shard or stony texture
- Can reach up to a diameter of 1.8 meters
- Often referred to as "reedwood of the reef" because of its incredibly large size (often greater than a meter in height and diameter)
- Their estimated lifespan (of hundreds to a thousand or more years) is one of the reasons they also called it this name
- Their sizes vary up to 6 ft (2 meters).
- It has a very large and firm and is variable in form
- Is typically barrel-shaped with a cone-shaped cavity at the apex known as "osculum"
- Surface can range from smooth to rough, rugged, and irregular
- Tissues of the giant barrel sponge contain photosynthetic symbiotic "cyanobacteria" which give the sponge its color

**Behavior:**
The giant barrel sponge spawns its eggs or sperm directly into the water column. Sperm from males are emitted from the osculum, while females produce "flocculent" masses of eggs. This occurs and can...
The Giant Barrel Sponge is a filter feeder. Filter feeders are a subgroup of “suspension feeding animals” that feed by straining suspended matter and food particles from the water. Water is continually pumped into the sides of the sponge, through the sponge body. An individual may filter up 50,000 times its own volume of water every day. Choanocytes lining the inner chambers of the sponge filter out bacteria-sized food particles. Food particles are then transported to the mesohyl where archaeocytes are responsible for processing food particles for energy.

- Primary Diet: planktivore
- Animal foods: zooplankton
- Plant foods: phytoplankton
- Foraging Behavior: filter feeding

**Trophic Level:**
Sponges are primary consumers as they are heterotrophic, herbivores, consume primary produces, and are commonly filter feeders.

**Range:**
The Giant Barrel Sponge is typically distributed in the West Pacific, and particularly in Indonesia.

**Habitat:**
This specific specie is common at depths greater than 10 meters (33 ft) down to 120 meters (390 ft). It is also common in hard bottom areas., and grows on any hard surface.

- Giant barrel sponges are found in coral reef environments in tropical coastal locations

**Predators:**
The predators of giant barrel corals are fishes and turtles. Sponges that have been bleaches are
particularly vulnerable to damage by parrotfish. These animals primary protect themselves from fish predations by chemical defences.

**Known Predators:**
- Sergeant major (*Abudesuf sp.*)
- Yellowtail snapper (*Ocyurus chrysurus*)
- Wrasse (*Halichoeres sp.*)
- Wrasse (*Thalassoma sp.*)
- Turtle (*Chelonioides sp.*)
- Nudibranch (*Class Gastropoda, Phylum, Mollusca*)

**Status:**
The Giant Barrel Sponge has not been evaluated by the International Union for the Conservation of Natureal and Natural Resources, and are not currently considered threatened or endangered by any agency.

- IUCN Red List: Not evaluated
- CITES: No special Status

**Threats:**
Despite not being endangered, there are a number of potential threats to their survival. Sponge orange band (SOB) is a fatal disease, beginning with lesions on the sponge pindoderm which spread, producing a transitional band, and ultimately resulting in total bleaching of the sponge. Most sponge disease is reported in sponges that are under stress due to environmental factors.

**Conservation:**
There hasn’t been reported successful conservation methods, but NCBI has done a study aimed to examine sponge orange band (SOB) disease affecting sponge, *Xestospongia muta*.
<table>
<thead>
<tr>
<th><strong>Common Names:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Savignyi Longspine Urchin</td>
</tr>
<tr>
<td>Longspine Sea Urchin</td>
</tr>
<tr>
<td>Black Longspine Urchin</td>
</tr>
<tr>
<td>Banded Diadem</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Scientific Name:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Diadema savignyi</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Taxonomy:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kingdom</strong></td>
</tr>
<tr>
<td><strong>Phylum</strong></td>
</tr>
<tr>
<td><strong>Class</strong></td>
</tr>
<tr>
<td><strong>Order</strong></td>
</tr>
<tr>
<td><strong>Family</strong></td>
</tr>
<tr>
<td><strong>Genus</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Characteristics:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Has a usually black, spherical, slightly-flattened test (hard shell up to about 9 cm (3.5 inches))</td>
</tr>
<tr>
<td>- Brittle, thin, hollow spines grow in tufts and can be as long as 25 cm (10 in.)</td>
</tr>
<tr>
<td>- Usually black in color but can also range to grey, dark brown, and purple</td>
</tr>
<tr>
<td>- Has a round body with tube feed, a dark anal sac, and many long spines</td>
</tr>
<tr>
<td>- Can grow up to 90 mm in diameter</td>
</tr>
<tr>
<td>- Has a solid iridescent blue or sometimes green lines that run along the area surrounding anus</td>
</tr>
<tr>
<td>- Radial symmetry</td>
</tr>
<tr>
<td>- ‘Exothermic’ and ‘heterothermic’</td>
</tr>
<tr>
<td>- Range length: 61 to 90 mm (approximately 2.40 to 3.54 inches)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Behavior:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>This species of urchins are solitary. It hides most of the day and moves at night to forage algae to eat. The female releases her eggs in water columns on the same day the males release sperm. The eggs are fertilized and develop into pluteus larvae. Sea urchins spawn by gathering together and releasing millions of eggs and sperm into the water column. An urchin does not have a specific mate or a “social structure”. This species, <em>Diadema savignyi</em>, has separate sexes that show no external differences. It reproduces throughout the year and reproduction peaks at different times.</td>
</tr>
</tbody>
</table>

http://animaldiversity.org/accounts/Dia
dema_antillarum/  
https://reefguide.org/diademasavignyi.htm
l  
http://animaldiversity.org/accounts/Diade
ma_antillarum/  
demasavignyi%7CTessaJones.aspx?P ageContentID=2999
**Range:**
Diadema savignyi lives in shallow waters. It is found widespread across the Indo-Pacific region.

**Habitat:**
This species lives in sand flats and coral reef areas, which are warm shallow areas near coasts. This urchin lives successfully in crevices, but is also found on the sandy ocean floor, or individual hidden under the heads of coral.

- Habitat Regions: tropical; saltwater or marine.
- Aquatic Biomes: reed; coastal
- Other Habitat Features: intertidal
- Range Depth: 1 to 10 m

**Diets:**
Diadema savignyi grazes on algae. It uses teeth to scrape the algae off of hard substrate such as rocks or dead coral substrate.

- Primary Diet: herbivore (algivore)
- Plant Foods: algae
- Other foods: detritus
- Foraging Behavior: stores or caches food

**Trophic Level:**
Primary Consumers

**Predators:**
This species of Diadema is predated upon by 15 species of finfish, the spiny lobster, and two species of gastropods.

**Known Predators:**
- Filefishes and triggerfish, *Balistidae*
- Burrfishes and porcupinefish, *Diodontidae*
- Spiny Lobsters, *Palinuridae*

**Status:**
Diadema savignyi is not listed on the Red List, CITES appendices, or Endangered Species Act List

**Threats:**
According to GBRI.org.aw, increased demand of sea urchins for human consumption in recent years has led to overfishing and diminishing stocks. However, it is not listed on the IUCN Red List which suggests that it is not currently under threat.

**Conservation:**
Although these type of sea urchin is not under threat, gbri.org.au suggests that this should be continued to be closely monitored to ensure that these urchins don't become threatened.

### Common Names:
- Humphead wrasse
- Giant wrasse
- Humphead
- Maori wrasse
- Napoleon wrasse
- Truck wrasse
- Undulate wrasse

### Scientific Name:
*(Cheilinus undulatus)*

### Characteristics:
- Is one of the largest largest reef fishes in the world
- Largess member of wrasse family (Labridae)
- Their length can vary up to 2.3 m
- They have prominent hump that develops on their forehead, and where they earn their common name
- Mature adults have trick lips
- Juveniles can be identified by their pale greenish color and two black lines behind their eye
- They weight up to 180 kg

### Taxonomy:
- **Kingdom:** Animalia
- **Phylum:** Cnidaria
- **Class:** Actinopterygii
- **Order:** Perciformes
- **Family:** Labridae
- **Genus:** Cheilinus

See more details at:
- [http://www.inaturalist.org/taxa/82355-Cheilinus-undulatus](http://www.inaturalist.org/taxa/82355-Cheilinus-undulatus)
- [https://a-z-animals.com/animals/wrasse/](https://a-z-animals.com/animals/wrasse/)
The color of the humphead wrasse can vary between a dull blue-green to more vibrant shades of green and purplish-blue.

**Behavior:**

The humphead wrasse is long-lived, but has an extremely slow breeding rate. Individuals become sexually mature at four to six years. They are known to survive for at least 30 years. Adults are usually solitary, spending the day roaming around reef and returning to particular caves to rest at night. Very little not about these fish. Pairs spawn together as part of a larger mating group that is composed of over 100 individuals. The planktonic eggs are released into the water and once the larvae have hatched, they will settle out on the substrate.

**Diet:**

Humphead wrasses use their tough teeth to consume hard-shelled species such as mollusks (particularly gastropods and pelecypods), echinoderms, and crustaceans. They are one of the few predators of species that destroy coral reefs such as the infamous crown of thorns starfish. They prey primarily on invertebrates.

- Heterotrophic
- Carnivorous
- Consumes primary consumers
- Including sea urchins, mollusks, reef fish, box fish, starfish, etc.

**Trophic Level:**

Secondary consumers.

**Range:**

The humphead wrasse is found throughout the Indo-Pacific Oceans, from the Red Sea and the coast of east Africa to the central Pacific, south from Japan to North Caledonia,
<p>| <strong>Habitat:</strong> | The adult humphead wrasse inhabit the other reeds slopes and drop-offs, showing “fidelity” for particular sites. Juveniles are usually found amongst thickest of living staghorn coral (Acropora spp.) |
| <strong>Status:</strong> | The humphead wrasse is classified as Endangered or “EN” on the IUCN Red List, and is listed on Appendix II of CITES. |
| <strong>Predators:</strong> | Due to their small size, this species of wrasse has numerous predators in their natural environment. This includes: |
| | - Lionfish |
| | - Dogfish |
| | - Barracudas |
| | - Smaller species of sharks |
| <strong>Threats:</strong> | Although this species has a widespread distribution, it has never been common in its range and reports have revealed surprising decline in populations. This species are extremely vulnerable to overexploitation and the population can only sustain light levels of fishing. Traditionally, the flesh of this fish has been highly prized and more recently this species has become one of the most highly searched for species of the Live Reef Food Fish Trade (LRFFT), which is a luxury food industry that has gained popularity in Asia. Humphead wrasse can fetch up to US $100 per retail which is why they use sustainable fishing methods such as cyanide fishing. A practice that also devastated coral reefs. |
| <strong>Conservation:</strong> | The World Conservation Union’s (IUCN) Groupers and Wrasses Specialist Group is working to collect |</p>
<table>
<thead>
<tr>
<th>Common Names: Flamboyant Cuttlefish</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scientific Name:</strong> <em>Metasepia pfefferi</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Taxonomy:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kingdom</strong></td>
</tr>
<tr>
<td><strong>Phylum</strong></td>
</tr>
<tr>
<td><strong>Class</strong></td>
</tr>
<tr>
<td><strong>Order</strong></td>
</tr>
<tr>
<td><strong>Family</strong></td>
</tr>
<tr>
<td><strong>Genus</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Is a robust-looking species</td>
</tr>
<tr>
<td>- Their arms are broad and blade, and have four rows of suckers</td>
</tr>
<tr>
<td>- The oral surface of the modified arm of a male cephalopods (hectocotylus) is wide, swollen, and fleshy</td>
</tr>
<tr>
<td>- <em>M. pfefferi</em> grows to 8 cm (3.1 in.) in mantle length</td>
</tr>
<tr>
<td>- The texture of the dorsal surface is smooth, lacking bumps of pustules</td>
</tr>
<tr>
<td>- The base color of this species is dark brown</td>
</tr>
<tr>
<td>- Individuals that are disturbed or attacked quickly change colour to a pattern of black, dark brown, white, with yellow patches around the mantle</td>
</tr>
<tr>
<td>- Arm tips display red coloration to ward off predators</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavior:</th>
</tr>
</thead>
<tbody>
<tr>
<td>This species of <em>M. pfefferi</em> are reasonably active during the day. Their reproduction method is very unique. Copulation occurs face-to-cae, with the</td>
</tr>
</tbody>
</table>

* [http://reefguide.org/indopac/flamboyant-cuttlefish.html](http://reefguide.org/indopac/flamboyant-cuttlefish.html)  
* [http://animaldiversity.org/accounts/Metasepia_pfefferi/](http://animaldiversity.org/accounts/Metasepia_pfefferi/)
male inserting a packet of sperm into a pouch on the underside of the female’s mantle. The female fertilizes her eggs with the sperm, and are placed by the female in crevices or ledges in coral and rocks. Freshly laid eggs are white, but slowly turn translucent with time, making the development of cuttlefish clearly visible. Juveniles are capable of the same camouflage pattern as adults.

**Range:**
The natural range of this species extends from the West Pacific, Indonesia, and Western Australia. It has been proven to be found on numerous islands in Indonesia.

**Habitat:**
This species of cuttlefish is found in sand and mud substrate in shallow waters at depths of 3 to 86 meters.

**Diet:**
Cuttlefish are carnivorous animals. They feed primarily on crustaceans and bony fish. The beak is used to capture prey.

- Primary Diet: carnivore (piscivore, eats non-insect arthropods)
  - Small molluscs
  - Crabs
  - Shrimp
  - Fish
  - Octopus
  - Worms
  - Other cuttlefish
- Animal Foods: fish; aquatic crustaceans

**Predators:**
In general, cuttlefish are preyed upon by

- Seals
- Dolphins
- Fish
- Seabirds
- Sharks

When Metasepia pfefferi is threatened, it quickly
### Common Names:
Staghorn Coral

### Scientific Name:
*Acropora formosa*

### Taxonomy:
- **Kingdom:** Animalia
- **Phylum:** Cnidaria
- **Class:** Anthozoa
- **Order:** Scleractinia
- **Family:** Acroporidae
- **Genus:** Acropora

### Characteristics:
- Among the fastest growing corals on reefs and are excelled reef-builders
- The name *Acropora* literary originates from the meaning of a porous stem or branch
- Staghorns can grow up to two meters tall
- They form “bush like” structures with some short non-dividing branches just like the fingers of a hand
- Their speed of growth averages out to 10 to 20 centimeters in a single year
- This species of corals are immensely

### Trophic Level:
Secondary Consumers

### Threats:
There are no human threats as a toxicology report has found and confirmed that the muscle tissue of *glamb9unt* cuttle fish is highly toxic. He had identified the toxic as being as lethal to that of the blue-ringed octopus. This species, *M.pfefferi* represents no interests to fisheries as food for the reason stated above.

### Status:
There has been little or no research into the status of the *Metasepia pfefferi* in the wild. IUCN red list has not evaluated this species, along with CITES, and the US Federal List.


fragile and are easily damaged during storms
- There are over 368 Acropora species that have been currently discovered

**Behavior:**
Staghorn corals reproduce sexually or asexually. Sexual reproduction occurs via the release of eggs and sperm into the water. Most of the staghorn corals sexually reproduce from October to December. When water turns milky from all the eggs and sperm released from thousands of colonies. Some of the resulting larvae settle quickly on the same reef, while others drift around for months, and finally settle on reefs hundreds of kilometers away. Asexual reproduction occurs via fragmentation. This occurs when a branch breaks off a colony, reattaches to the substrate and grows.

**Range:**
*Acropora* species are the most abundant coral of most reefs located in the Indo-Pacific region.

**Habitat:**
Staghorn corals occur in tropical reef environments, down to a depth of 30 meters. The upper depth is defined by wave action, whereas, the lower limit at which *Acropora* can inhabit is determined by light availability and the amount of suspended sediments. Staghorn corals require normal marine salinity.

**Diet:**
Staghorn corals have a special **symbiotic** relationship with algae called *zooxanthellae*. The *zooxanthellae* lives inside their tissues of the coral provide the coral with food, which it produces through photosynthesis, and therefore requires sunlight. In return, the coral provides the algae with protection and access to sunlight.

**Trophic Level:**
<table>
<thead>
<tr>
<th><strong>Common Names:</strong></th>
<th><strong>Taxonomy:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant Clam</td>
<td>Kingdom: Animalia</td>
</tr>
<tr>
<td></td>
<td>Phylum: Mollusca</td>
</tr>
<tr>
<td></td>
<td>Class: Bivalvia</td>
</tr>
<tr>
<td></td>
<td>Order: Veneroida</td>
</tr>
<tr>
<td></td>
<td>Family: Tridacnidae</td>
</tr>
<tr>
<td></td>
<td>Genus: Tridacna</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Characteristics:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Heaviest of all the living molluscs (can</td>
</tr>
<tr>
<td>- <a href="https://a-z-animals.com/animals/giant-clam/">https://a-z-animals.com/animals/giant-clam/</a></td>
</tr>
<tr>
<td>- <a href="http://animaldiversity.org/accounts/Tridacna_gigas/">http://animaldiversity.org/accounts/Tridacna_gigas/</a></td>
</tr>
<tr>
<td>- <a href="http://www.inaturalist.org/taxa/114396-Tridacna-gigas">http://www.inaturalist.org/taxa/114396-Tridacna-gigas</a></td>
</tr>
</tbody>
</table>
- The shell of the giant clam consists of two valves, although in giant clams these cannot close completely
- Shell is extremely thick and lacks bony plates
- The mantle of the giant clam is visible between the two shells that is golden brown, yellow, or green
- They measure as much as 120 cm (47 in) across, and have an average lifespan in the wild of 100 years
- Are proven to have 4 to 5 large inward facing triangular projects of shell aperture
- One of their special and unique features are their large, zigzag edged shell

Behavior:
Adult clams are completely sessile, unable to move from their position of the coral reefs. They reproduce by expelling sperm and eggs into the sea, where fertilization most commonly occurs. They release more than 500 million eggs at once, The fertilized eggs quickly enter a swimming stage before entering a planktonic stages. If disturbed, the brightly colored mantle tissue (containing zooxanthellae) is restricted and the shell valves are closed.

Diet:
Like the majority of other bivalve mollusks, *tridacna gigas* can filter food including microscopic marine plants (phytoplankton) and animals (zooplankton).

However, the majority of the clam’s nutrients, are obtained by a mutually beneficial relationship with a type of algae known as zooxanthellae. These plant-like algae exist in extension of the stomach. The algae gains protection from predation by being associated with such a large organism, while the clam obtains the “carbon-by-products of photosynthesis”.

http://reefguide.org/indopac/tridacnagigas.html
Are omnivorous animals and therefore eats a mixture of both plant and animal matter
- Nutrients provided by Algae provides main source of food for giant clam
- Known to eat small food particles and animals present in surrounding water
- Main Prey: Algae, Phytoplankton, Nutrients in Water

**Trophic Level:**
Primary Consumers (bivalves)

**Range:**
Giant clams are found throughout the tropical Indo-Pacific oceanic region, from the south China seas in the north to the northern coasts of Australia.

**Habitat:**
Giant clams are "founded anchored" to the coral reefs in warm, tropical waters. They occupy coral reef habitats. They are most commonly found in shallow lagoon to a depth of up to 20 meters, reef flats, and are typically embedded in sandy substrates.

**Predators:**
Despite the vast size of the giant clam, they are preyed upon by a number of marine predators, many of which are actually much smaller in size than the giant clam itself.
- Eels
- Snails
- Fish
- Starfish
All of these are known to snack on small parts of the giant clam.

**Status:**
The giant clam is classified as Vulnerable or “VU” on the IUCN Red List.
| Threats: Giant clams are preyed upon by humans who capture the giant clam as they are seen as a culinary delicacy in many countries. Unable to sustain this overexploitation, rapid declines in the world’s giant clam population is evident. This is primarily as a result of past over-collection for food. |
| Conservation: The Convention on International trade in Endangered Species (CITES) requires a permit to be granted before giant clams can be exported. This has yielded successful and prosperous results on their population. Furthermore, the Australian Centre for International Agricultural Research and James Cook University Clam’s project have proven to be beneficial to the rapidly declining population. |

<table>
<thead>
<tr>
<th>Common Names:</th>
<th>Ruddy Turnstone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxonomy:</td>
<td></td>
</tr>
<tr>
<td>Kingdom</td>
<td>Animalia</td>
</tr>
<tr>
<td>Phylum</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Aves</td>
</tr>
<tr>
<td>Order</td>
<td>Charadriiformes</td>
</tr>
<tr>
<td>Family</td>
<td>Scolopacidae</td>
</tr>
<tr>
<td>Genus</td>
<td>Arenaria</td>
</tr>
<tr>
<td>Scientific Name:</td>
<td>Arenaria interpres</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small, stocky, brightly-patterned shorebird</td>
</tr>
<tr>
<td>This species usually has short, orange red legs, with unwebbed toes</td>
</tr>
<tr>
<td>Their beak is reasonably short, dark, and wedge shaped with a slightly upturned tip</td>
</tr>
<tr>
<td>Juveniles resemble the non-breeding adult but are browner with a paler head</td>
</tr>
<tr>
<td>Has mostly dark upper parts</td>
</tr>
<tr>
<td>Females can be distinguished from males by their streaked crowns and slightly duller upper parts</td>
</tr>
<tr>
<td>One of the two species of turnstones</td>
</tr>
<tr>
<td>Wingspan: 50-57 cm</td>
</tr>
<tr>
<td>Weight: 84-190 g</td>
</tr>
</tbody>
</table>

http://eol.org/pages/1049367/overview
http://www.biokids.umich.edu/critters/Arenaria_interpres/
**Behavior:**
The ruddy turnstone is an efficient and "opportunistic forager" according to Arkive, and is known to scavenge. This species typically breed from around May to early August, in solitary, monogamous (having only one mate in a breeding season) pairs. Up to four eggs are laid and incubated for around 22 days, mainly by the female. The chicks are able to leave the nest and feed themselves within a day of hatching. Although the adults continue to guard their young for a time, the female leaves after a week or two, leaving the male to remain with the young until fledging (the state in a young bird's life when the feathers and wing muscles are sufficiently developed for flight) occurs. This happens at around 19 to 21 days after hatching.

**Diet:**
The Ruddy Turnstone has a varied diet, but mainly feeds on:

- Marine Invertebrates
- Crustaceans
- Molluscs
- Worms
- Small Fishes
- Bivalves
- Barnacles

They engage in a variety of behaviors to locate and capture prey.

- Primary Diet: carnivore (insectivore, eats non-insect arthropods, molluscivore)
- Animal Foods: fish, eggs, carrion, mollusks, aquatic or marine worms, aquatic crustaceans, and other marine invertebrates

**Trophic Level:**

| - Length: 21-26 cm | }
### Secondary/Tertiary consumers

**Range:**
The ruddy turnstone is one of the most northerly breeding shorebird species, with a wide breeding range in mostly every region. They are widespread species in on coasts in almost everywhere in the world, including Indonesia.

**Habitat:**
This species breeds on stony plains near water. The ruddy turnstone usually inhabits coastal areas, typically on rocky or stony shores, and is sometimes can be found on sandy beaches.

**Predators:**
Most predation on Ruddy Turnstone species is on their eggs and hatchlings. Predators include:
- Merlins (*Falco columbarius*)
- Owls (*Strigiformes*)
- Glaucous Gulls (*Larus hyperboreus*)
- And in North America, the Peregrine falcons (*Falco peregrinus*)

Ruddy Turnstones place their nests far away from others in order to avoid being found by predators. Adults are only occasionally preyed on by birds of prey.

**Status:**
The Ruddy Turnstone is classified as Least Concern or "LC" on the IUCN Red List.

**Threats:**
The ruddy turnstone has a significantly large range and is not currently considered at risk of extinction. However, this species may face localised threats from pollution, habitat loss through coastal development, and recreational activities. Overexploitation of horseshoe crabs in North America is also affecting the critical food supplies. Climate change poses as a potential future threat.
as it is possible affecting the ruddy turnstone habitat or food supplies.

**Conservation:**
The African-Eurasian Waterbird Agreement (AEWA) calls upon parties to undertake conservation actions to protect bird species that are dependent on wetlands for at least part of their annual cycle. It also aims to conserve migratory species throughout their range.

| Common Names: |
| Bubble-tip Anemone |
| Bulb Tentacle Anemone |
| Bulb Tip Anemone |
| Bulb Anemone |

| Scientific Name: |
| *Entacmaea quadricolor* |

| Taxonomy: |
| **Kingdom** | Animalia |
| **Phylum** | Cnidaria |
| **Class** | Anthozoa |
| **Order** | Actiniaria |
| **Family** | Actiniidae |
| **Genus** | *Entacmaea* |

| Characteristics: |
| - Given its common name due to the bulbous tips on its tentacles |
| - Can grow up to 12 in. (30 cm) in size |
| - Bubble Tip Anemones are generally brown, tan, green, or bluish greens, but can also be cream pink, red, and brick red |
| - Are known to live for 80 years or more in captivity, and hundreds of years in the wild |
| - Have a pedal column with a sticky foot at the bottom which they utilize to be attached to various surfaces |
| - The pedal column has rows of small bulges, called verrucae that has stinging cells |
| - The column may have flicks, lines, and spots on it |
| - The tentacles can be bulbous, usually with a par-shape, or smooth and tapered |
| - The mouth, also the anus of the sea anemone is in the middle of the oral disc |

http://animal-world.com/Aquarium-Coral-Reefs/Bubble-Tip-Anemone

http://www.inaturalist.org/taxa/179897-Entacmaea-quadricolor

- The tentacle color is dependant on the concentration of the zooxanthellae

**Behavior:**

The Bubble Tip Anemone is one of the most popular of the clown-hosting anemones. A contented Bubble Tip Anemone will usually stay put once it has a place to settle. They need to have their own space, otherwise there can be a “chemical” warfare between species. A characteristic of _E. quadricolor_ is the ability to maintain a symbiotic relationship with the anemonefish, which can be “hosted by the anemone”.

**Range:**

_Entacmaea quadricolor_ is widespread throughout the tropical waters of the Indo-Pacific area including the Red Sea.

**Habitat:**

Large adults with tentacles that are more stringy are often found in deeper waters with more dimly lit conditions. On the other hand, young specimens are often located in groups or colonies nearer to the surface, in bright sunlight. Their habitat regions are tropical, saltwater or marine. Their aquatic biomes is reef, and coastal.

**Diet:**

The Bubble Tip Anemone is a carnivore, but these anemones are well-equipped with nutritional alternative for their wellbeing. They derive daily nutrition from their symbiotic algae, _zooxanthellae_ that dwells within their issues. They absorb nutrients from the water around them and consumes waste from resident animals like clownfish. Eats small fish and shrimp.

Food is captured in three ways:
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Filter feeding</td>
</tr>
<tr>
<td>2.</td>
<td>Raptorial capture</td>
</tr>
<tr>
<td>3.</td>
<td>Passive Capture</td>
</tr>
</tbody>
</table>

**Trophic Level:**
Secondary Consumers

**Predators:**
- Large Wrasses
- Nudibranchs
- Sea Stars
- Angelfish
- Triggerfish
- Large Wrasses
- Bristle worms are also known to irritate and chew on *E.quadricolor*.

**Status:**
This species has not yet been analyzed by the IUCN red list.

**Threats:**
Commercial harvest and warming oceans have posed as a serious threat to this species of anemone. The warming of our oceans temperatures has been linked with the increased frequency of storms which harm anemones.

**Conservation:**
There hasn’t been any protection of the anemone that been proved scientifically to help with this issue.
**Common Names:**
Whitetip reef shark

**Scientific Name:**
*Triaenodon obesus*

---

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Chondrichthyes</td>
</tr>
<tr>
<td>Order</td>
<td>Carcharhiniformes</td>
</tr>
<tr>
<td>Family</td>
<td>Carcharhinidae</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Triaenodon</em></td>
</tr>
</tbody>
</table>

---

**Characteristics:**
- Earns its common name from the “conspicuous” white tips found on the first dorsal and upper casual fins
- Has a broad and flattened head, rounded snout, down-slanted mouth and large eyes
- Moderately slender (thin, slim)
- Average length: 140-160 cm
- Average weight: 20 kg
- Have scattered dark gray spots along the sides of their bodies
- Teeth are *tricuspidate* (three-pronged with a small secondary cusp on either side of the central blade)

---

**Behavior:**
Despite its “docile” nature during the day, the nocturnal whitetip reef shark can become rather aggressive when hunting at night, thrashing through coral reefs looking for potential prey. It usually hunts alone. The whitetip reef sharks mating season varies with the location. Reproduction is takes place when they have already reached an advanced state of development. The female will give birth to one to five pups which are completely independent at birth. Both sexes seem to reach sexual maturity at approximately five years old, and it is estimated that this species can live to an age of 25 years.

---

**Range:**
The whitetip reef shark is widely found in tropical marine waters in Hawaii, Polynesia, Red Sea, and...
is one of the most frequent sharks in the *Indo-Pacific Region*.

**Habitat:**
As the name “reef shark” indicates, it typically lives among the bottom of clear tropical waters near reefs, where it rests in caves during the day and feeds throughout the night. The whitetip shark prefers shallow waters but has been reported at depths of 330 meters.

**Diet:**
This carnivorous animal feeds primarily on:
- Bottom dwelling octopus
- Lobsters
- Crabs
- Bony Fish
- Spiny Lobsters
These are all benthic animals, and this specie of shark feeds on sleeping prey. They capture prey very aggressively.

**Trophic Level:**
Tertiary consumers

**Status:**
The whitetip reef shark is classified as Near Threatened or “NT” on the IUCN Red List.

**Threats:**
The whitetip reef share has been proven to be fished in the waters along its tropical range, but data is limited to prove this point. The meat and liver are sold for human consumption. This shark is widely distributed but its restricted habitat and late age of sexual maturity means that their reproduction rates are low.

**Predators:**
No predators. They are the apex predators of the ocean. However humans, usually capture this specie in particular.
### Conservation:
There is currently no legislation against the fishing of this animal. However, the Food and Agriculture Organisation of the United Nations (FAO) have been working on an International Plan of Action for the conservation and management of these sharks throughout the world.

### Common Names:
Hawksbill turtles

### Scientific Name:
*Eretmochelys imbricata*

### Taxonomy:

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Actinopterygii</td>
</tr>
<tr>
<td>Order</td>
<td>Tetraodontiformes</td>
</tr>
<tr>
<td>Family</td>
<td>Ballista</td>
</tr>
<tr>
<td>Genus</td>
<td>Balistoides</td>
</tr>
</tbody>
</table>

### Characteristics:
- Its carapace is generally streaked and marbled with amber, yellow, or brown, and often has a serrated edge
- Hooked beak on the narrow head gives rise to hawksbills common name
- Not particularly large compared to other sea turtle
- Grow up to about 45 inches (144 centimeters)
- Young carapace, or upper shell, is heart-shaped and elongates as they mature
- Their strikingly colored carapace is serrated and has overlapping scutes and thick bony plate
- Have long claws and thick nails
- Weight up to 100 to 150 lbs (45 to 68 kgs)

### Behavior:
The hawksbill turtle takes decades to mature, first breeding often occurs at 20 to 40 years of age. The female will typically lay up to five clutches of around 100 to 140 eggs in a single breeding cycle.

http://www.arkive.org/hawksbill-turtle/eretmochelys-imbricata/

http://animals.nationalgeographic.com/animals/reptiles/hawksbill-turtle/
season, and wait a few years before nesting again. Hawksbill hatchling are believed to spend their first few years in the open ocean before returning to more sheltered coastal waters.

**Range:**
The hawksbill turtle is found throughout tropical waters worldwide, and are known to nest on beaches in at least 60 countries.

**Habitat:**
Hawksbill turtles are mainly associated with the clear, relatively shallow water of coastal reefs, bays, estuaries and lagoons, with nesting on remond, isolated sandy beaches.

**Diet:** Hawksbills are omnivorous (consumes both meat and plants), consuming mostly:
- Mollusks
- Marine algae
- Crustaceans
- Sea Urchins
- Fish
- Jellyfish
- Soft corals
- Sea Grasses
- Their favorite; Sponges

**Trophic Level:**
Secondary Consumers

**Threats:**
Global numbers are very difficult to estimate, but it's evident that the hawksbill turtle population has suffered a drastic decline, probably as much as 80 percent over the last century. Major threats to survival come from illegal trade in the turtle's prized shell, known as tortoiseshell, which has been sought for jewellery and ornaments from centuries. There is also a large market for its eggs, meat, and even stuffed juveniles as exotic gifts in some parts of the world. Additional pressure on the global
population of this species comes from harvests to support traditional customs

**Conservation:**
International trade in specifically the hawksbill turtle is banned amongst the Convention on International Trade in Endangered Species (CITES), but extensive illegal trafficking still occurs. Preventing this black market key is key and essential to save this species.

**Common Names:**
Cauliflower Coral
Antler Coral
(identical scientific name)

**Scientific Name:**
Pocillopora eydouxi

http://www.arkive.org/cauliflower-coral/pocillopora-eydouxi/

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Cnidaria</td>
</tr>
<tr>
<td>Class</td>
<td>Anthozoa</td>
</tr>
<tr>
<td>Order</td>
<td>Scleractinia</td>
</tr>
<tr>
<td>Family</td>
<td>Pocilloporidae</td>
</tr>
<tr>
<td>Genus</td>
<td>Pocillopora</td>
</tr>
</tbody>
</table>

**Characteristics:**
- This hard, widespread common coral is easily identified by the presence of wart-like growths
- Colonies are fairly solid, and are dome-shaped, or branching with branches that are either flattened or blade-like, or fine and irregular
- Colony is up to 2 to 3 ft (0.5 to 1m)
- Are found in depths of 20-150 ft (6-45 m)
- Their colors usually vary from pale to dark green and brown
- Are stout, upright, flattened branches
- Colonies are often over one meter across from each other
- Branches may be widely separated or may be compact, especially where currents are strong

**Behavior:**
The polyps of Pocillopora are hermaphrodite (possessing both male and female organs). They

http://www.arkive.org/cauliflower-coral/pocillopora-eydouxi/
http://www.inaturalist.org/taxa/109866-Pocillopora-eydouxi
http://www.iucnredlist.org/details/133407/0
http://reefguide.org/indopac/antlercoral.html
http://www.pbs.org/wgbh/evolution/survival/coral/predators.html
can reproduce asexually as well as sexually. Unlike many corals, larvae develops inside the polyps rather than in the water column. When the mature larvae is released into the water, they remain free-swimming for several weeks before settling.

Diet:
Through photosynthesis, microscopic and symbiotic algae (zooxanthellae) living in their tissues produces energy rich molecules that the coral polyps cans use as nutrition. In return, the coral provides the zooxanthellae with protection and access to sunlight. The polyps can also obtain nutrition by capturing tiny prey using their tentacles.

- Depend greatly on symbiotic algae

Trophic Level:
Primary Consumers

Range:
The species of Pocillopora eydouxi is distributed widely in the Indian and Indo-Pacific regions.

Habitat:
Cauliflower corals occur in habitats ranging from exposed reef fronts to protected lagoons and lower reef slopes. This species is exposed in more marine environments and has been reported to be found in rocky substrata and in depths from 2 to 2 meters.

Predators:
- Parrotfishes
- Butterflyfishes
- Sea Stars
- Crowns of thorns starfish

Status:
Pocillopora eydouxi is classified as Near Threatened or "NT" on the IUCN Red List.
### Threats:
24% of the world’s reefs are under imminent risk of collapse due to human pressures. Overfishing has direct effects that result in the increase of macroalgae that can outcompete and smother corals, and using destructive fishing methods have proved to be significantly harmful to their species.
- Climate change leads to bleaching impacts
- Overharvesting

### Conservation:
Pocillopora corals are listed on the Convention on International Trade in Endangered Species (CITES) which means that this species needs immediate action. Pocillopora is one of the genera that can be fairly successfully cultivated due to its rapid growth rate. There has been efforts from non-governmental organizations addressing this issue to ensure the persistence of this species.

### Common Names:
- Spine-cheek clownfish
- Gold Stripe Maroon clownfish
- Lightning Maroon clownfish

### Scientific Name:
*Premnas biaculeatus*

---

### Taxonomy:
- **Kingdom**: Animalia
- **Phylum**: Chordata
- **Class**: Actinopterygii
- **Order**: Perciformes
- **Family**: Pomacentridae
- **Genus**: *Premnas*

### Characteristics:
- They are bright red with 3 bars (stripes) in bright white in males and grey in females
- Individuals may become bright yellow if provoked
- The color of the body and bars varies according to sex and geographical location
- Despite the common name of Maroon clownfish, only some females have a maroon body color
- The size of females in any group of anemonefish is always larger than the male

---

[Link to animaldiversity.org](http://animaldiversity.org/accounts/Premnas_biaculeatus/)
There is a significant difference in size for this species, with females being one of the largest anemone fish, growing up to 6.7 inches, which males are much smaller (2.4-2.8 in.)

**Behavior:**
- The anemonefish lives in mutualism with their host, sea anemones, particularly, *E. quadricolor.*
- Spinecheek anemonefish spawn throughout the year in tropical areas.
- They have a monogamous mating system.
- The range number of spring created can vary from 100 to 100.
- Spinecheek anemonefish have a social hierarchy in which fish that occupy the same patch of anemones are ordered by size.
- Generally active during the day.
- Once they settle onto an anemone as juveniles, and then as adults, they remain in the same area throughout their life.

**Diet:**
Spinecheek anemonefish have a diet rich in copepods and planktonic, larval tunicates. They also eat other kinds of plankton and algae.
- Primary Diet: Carnivore (eats non-insect arthropods, eats other marine invertebrates)
- Animal Foods: aquatic or marine worms; aquatic crustaceans; zooplankton
- Plant Foods: algae; phytoplankton

**Trophic Level:**
Secondary Consumers

**Predators:**
The most vulnerable stage for spine check anemonefish is during the egg and larval stage when they are not protected by a host anemone.
and float freely in the water column. As settled adults, *Entacmaea quadricolor* protects these symbiotic fish because of their ability to deliver a venomous sting.

**Known predators:**
- Wrasses (*Labridae*) are known to prey on eggs
- Other fish predators are likely predators of eggs, larva, and unsettled juveniles

**Threats, Conservation, Status:**
This taxon is yet to be assessed for the IUCN Red list.

<table>
<thead>
<tr>
<th>Common Names:</th>
<th>Taxonomy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lace Coral</td>
<td>Animalia</td>
</tr>
<tr>
<td>Scientific Name:</td>
<td>Cnidaria</td>
</tr>
<tr>
<td>Distichopora vervoorti</td>
<td>Hydrozoa</td>
</tr>
<tr>
<td></td>
<td>Stylasterina</td>
</tr>
<tr>
<td></td>
<td>Stylasteridae</td>
</tr>
<tr>
<td></td>
<td>Stylaster</td>
</tr>
</tbody>
</table>

**Characteristics:**
- Form ornate tree-like structures
- Have fine, tapered branches growing in one plane
- These delicate “fan-like corals” are remarkable for their bright colors
- Their color is stored within the limestone skeleton that remains after the animal tissue is gone, unlike reef building corals
- A bunch of small pores, gastropods and dactylo pore can be seen on alternating sides of the branches
- Tubes allow polyps to catch food, reproduce, and defend the colony.
- Varied colors from pink, purple, orange, and tan prances
- Are known for their spectacularly colored skeletons

**Behavior:**
Lace corals are not dependent on light thus can live where the reef-building corals, who are dependent on photosynthetic algae, can not. Reproduction in lace corals are more complex than reef-building corals. The polyps reproduce asexually, producing “jelly-fish like medusae” from the ampullae (which is known as a special cup-like structure”. This ‘medusae’ contains reproductive organs which realise eggs and sperm into the water. Fertilised eggs develop into larvae which eventually settles on the substrate and forms colonies.

**Diet:**
They have hairs that are composed of stinging cells and are used to capture prey such as
- Shrimps
- Worms

Carnivorous diet as all of their diet consists of meat.

**Trophic Level:**
Primary Consumes and often Secondary Consumers

**Range:**
Stylaster species are found throughout the Indo-Pacific and Atlantic Ocean.

**Predators:**
- Eels
- Sea stars
- Barracuda
- Parrotfish

**Habitat:**
This species are most commonly found in tropical latitudes, and occur at abyssal depths (usually
depths below 2000 meters. There are also likely to be found in caverns where it may occur as clumps, and “under overhangs” in shallow reef environments.

**Status:**
Stylaster has not yet been assessed for the IUCN Red List.

**Threats:**
Lace corals face the many threats that seem to be impacting coral reefs globally. 20% of the world's coral reefs have already been effectively destroyed, and now“show no immediate prospects of recovery”. Humans practice poor land management that are releasing more pollutants into the oceans and are stressing the fragile reef ecosystem. Overfishing and the using of destructive fishing methods impacts the corals severely. A further threat is the increasing of bleaching events, as a result of climate change. Furthermore, lace corals is threatened by global coral trade, for jewellery and ornaments, aquariums.

**Conservation:**
Lace corals are listed on the Convention on International trade in Endangered Species (CITES) which means that trade of this specific species should be regulated carefully. Indonesia and Fiji both have quota systems for corals, including lace corals, motivated through CITES. They are also a part of the marine community in many marine protected areas (MPAs) which provides immense security to their population,
<table>
<thead>
<tr>
<th><strong>Common Names:</strong></th>
<th><strong>Scientific Name:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Banded sea krait</td>
<td><em>Laticauda colubrina</em></td>
</tr>
</tbody>
</table>

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Reptilia</td>
</tr>
<tr>
<td>Order</td>
<td>Squamata</td>
</tr>
<tr>
<td>Family</td>
<td>Hydrophiidae</td>
</tr>
<tr>
<td>Genus</td>
<td><em>Laticauda</em></td>
</tr>
</tbody>
</table>

**Characteristics:**

- Is an amphibious species of snake that spends most of its life at sea but comes to land to reproduce.
- Has retained cylindrical body shape.
- Its tail is paddle-shaped which allows for rapid movement in water.
- Has large lungs so that it can spend long periods under water, as well as valve nostrils that keeps out saltwater while divided.
- Male total length: 87.5 cm
- Female total length: 142 cm
- The females are heavier than males.
- The snout, upper lips and a bar above its eyes are yellow, but the remainder of the head is black.
- The head and tail look similar to confused predators by drawing their tail to attack.
- The small head is slightly distinct from the body and is bluish-grey with smooth, regularly spaced scales.
- Equal sized black bands circle the entire length of the body.

**Behavior:**

The banded sea krait must come ashore on many remote islands to lay its eggs. Females can lay at any time of year, with clutch sizes ranging from 4 to 20 eggs. Juvenile snakes reach maturity due to high levels of predation. Male banded sea kraits reach maturity at around 18 months, but females...
may take 24 months before being ready to breed. Both male and female have been seen actively hunting on the shore.

**Range:**
The banded sea krait is one of the most widespread species in the genus, *Laticauda*. It occurs in the eastern Indian Ocean, east through Malaysia, Indonesia and Papua Guinea to islands of the south-western Pacific and many more.

**Habitat:**
The banded sea krait is usually found in shallow tropical waters surrounding coral islands, coral reefs, and mangroves, to depths of around ten meters.

**Diet:**
Banded sea kraits are considered feeding specialists. Regardless of geographic location, they have a diet consisting of amongst entirely eels. Females are typically larger and eat larger conger eels. Males usually feed on the smaller moray eels.

- **Primary Diet:** carnivore (piscivore)
- **Animals foods:** eels, fish

Although they have been described as strictly eel-eaters, examples of other types of bony fish have been recorded in the stomachs of this species.

**Trophic Level:**
Secondary consumers

**Predators:**
- Crabs (*Portunus*)
- Sea eagles
  - *Haliastur indus*
  - *Haliaeetus leucogaster*
- Sharks
- Tiger Sharks (*Galeocerda cuvieri*)
| **Common Names:** | Humphead Parrotfish  
Bumphead Parrotfish  
Giant humphead parrotfish |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scientific Name:</strong></td>
<td><em>Bolbometopon muricatum</em></td>
</tr>
</tbody>
</table>

**Taxonomy:**

- **Kingdom:** Animalia  
- **Phylum:** Chordata  
- **Class:** Actinopterygii  
- **Order:** Perciformes  
- **Family:** Scaridae  
- **Genus:** *Bolbometopon*

**Characteristics**

- The largest of all parrotfishes, the humphead parrotfish is an olive or blue-green to slate-grey fish, with a yellowish to pink head  
- It is the most distinctive feature, and the reason for its common name is its prominent bulbous forehead which develops in adults  
- Juvenile humphead parrotfish do not have this bulging head and also differ slightly in color, being green or brown with five vertical rows of small, whitish spots  
- They also get their name from their peculiar teeth which are fused into a parrot-like beak

**Anti-predator Adaptations:** Mimicry

**Status:**  
The banded sea krait is classified as Least Concern (LC) on the IUCN Red List.

**Threats:**  
Although widespread and abundant at many locations, the banded sea krait is threatened by climate change, and disturbances in both its marine and terrestrial habitats. Coastal developments have harmed their habitats.

**Conservation:**  
The banded sea krait has not been the target of any known specific conservation measures.

**http://www.arkive.org/humphead-parrotfish/bolbometopon-muricatum/**

**http://animals.nationalgeographic.com/animals/fish/parrot-fish/**

**http://www.arkive.org/humphead-parrotfish/bolbometopon-muricatum/**
- Have teeth at the back of their throat which is used to grind food
- Length: up to 130 cm
- Weight: up to 46 kg

**Behavior:**
Reproduction: Humphead parrotfish spawn at a certain time each month. Spawning often taken place in the early morning when females release eggs to be fertilized in the water by the sperm released by the male. These large spawning “aggregations” may consist of around 100 individuals. These large fish can live to an age of at least 40 years.

**Range:**
The humphead parrotfish can be found in tropical and subtropical coral reefs in the central and western Indo-Pacific, Indian Ocean, and Red Sea.

**Habitat:**
The coral reef fish inhabits shallow barrier depth, in between the depths of 1 and 30 meters. While adult humphead parrotfish are most often found in outer lagoons and seaward reefs, juveniles are more often noticed inside lagoons, in seagrass beds. At night, this parrotfish can be found resting in caves on the sandy flats of shallow lagoons.

**Diet:**
Omnivore- This humphead parrotfish feeds on a diet of live corals and algae that grow on the ocean bottom, uses its bulbous head to break coral into smaller, and more easily digested pieces.

**Trophic Level:**
Secondary Consumers

**Status:**
The humphead parrotfish is classified as Vulnerable (VU) on the IUCN Red List.
<table>
<thead>
<tr>
<th><strong>Threats:</strong></th>
<th>The habit of feeding, spawning, and resting in groups makes this species highly vulnerable to fishing, by spear fishing during the night.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Conservation:</strong></td>
<td>There are currently no protective measures specifically in place for the humphead parrotfish.</td>
</tr>
</tbody>
</table>
**Common Names:**
Loggerhead Sea Turtle

**Taxonomy:**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phylum</td>
<td>Chordata</td>
</tr>
<tr>
<td>Class</td>
<td>Reptilia</td>
</tr>
<tr>
<td>Order</td>
<td>Testudines</td>
</tr>
<tr>
<td>Family</td>
<td>Cheloniidae</td>
</tr>
<tr>
<td>Genus</td>
<td>Caretta</td>
</tr>
</tbody>
</table>

**Characteristics:**
- One of the most widespread of all the marine turtles
- The turtle’s common name comes from its relatively large head, which contains powerful jaws
- The loggerhead sea turtle is the world’s largest hard-shelled turtle
- Divided into two sections: carapace and plastron
- The carapace of the adult turtle is a reddish-brown color
- The plastron (underside) is typically pale yellow
- Adults: 75 - 160 kg
- Recorded Weight: 227+ kg
- Adult males have longer tails and claws than females
- The turtle’s neck and sides are brown on the tops and yellow on the sides and bottom
- The carapace of males are wider and less domed than that of females

**Behavior:**
Loggerheads reach sexual maturity at around 35 years old, and females appear to nest an average of three to five times in one breeding season, returning to breed every couple of years. Nesting occurs most commonly at night throughout the summer; females drag themselves out onto breaches and beyond the high-tide mark and dig nests into which around 100 eggs are laid.
Hatchlings and small juveniles appear to spend time in pelagic environments, often drifting amongst rafts of brown algae.

**Range:**
Found throughout the world is subtropical and temperate waters, loggerheads nest over the broadest geographical range of any sea turtle. It inhabits the Atlantic, Indian, Pacific Oceans, and the Mediterranean sea.

**Habitat:**
Inhabits coastal water, but may also be found on the ocean where they tend to float near the water's surface. Preferred habitat of the loggerhead individuals changes throughout their lifecycle. Older juveniles and adults are most often found in coastal waters and tend to prefer a rocky substrate over a sandy one.

**Diet:**
Loggerhead sea turtles are primarily carnivorous, but will also eat algae (*Ascophyllum*, *Ulothrix*, *Urospora*, *Sargassum* - and vascular plants - *Cymodocea*, *Thalassia*, *Zostera* - making them omnivorous. They are well adapted to eat hard-shell prey such as horseshoe crabs (*Limulus polyphemus*), bivalves, barnacles, and valves. Also eats, sponges, jellyfish, cephalopods, shrimp, jellyfish, sea urchins, etc.

**Trophic Level:**
Secondary Consumers

**Status:**
Classified as Endangered (EN) on the IUCN Red List

**Predators:**
- Sea gulls (Larus)
- Sharks (Chondrichthyes)
- Carnivorous fish
### Threats:
Long-distance migration makes loggerheads particularly vulnerable to accidental capture by commercial fisheries (bycatch), and turtles can become caught in shrimp trawler nets or entangled in longlines, leading to mortal injuries or death by drowning.

### Conservation:
Turtle Excluder Devices (TEDs) have been fitted to shrimp trawlers to help prevent bycatch by only allowing shrimp-sized objects to enter nets, and these are now being adopted by many of the world's fisheries.

<table>
<thead>
<tr>
<th>Common Names:</th>
<th>Big Fin Reef Squid</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scientific Name:</strong></td>
<td>Sepioteuthis lessoniana</td>
</tr>
</tbody>
</table>

![Big Fin Reef Squid](http://www.arkive.org/big-fin-reef-squid/sepioteuthis-lessoniana/image-G145597.html)

<table>
<thead>
<tr>
<th>Taxonomy:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kingdom</strong></td>
<td>Animalia</td>
</tr>
<tr>
<td><strong>Phylum</strong></td>
<td>Mollusca</td>
</tr>
<tr>
<td><strong>Class</strong></td>
<td>Cephalopoda</td>
</tr>
<tr>
<td><strong>Order</strong></td>
<td>Myopsida</td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td>Lolingidae</td>
</tr>
<tr>
<td><strong>Genus</strong></td>
<td>Sepioteuthis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Possess a characteristic cephalopod body, with a large mantle, attached head, and multiple arms</td>
<td></td>
</tr>
<tr>
<td>- The genus name <em>Sepioteuthis</em> is close relatives to the Cuttlefish</td>
<td></td>
</tr>
<tr>
<td>- The mantle is a highly muscular organ that surrounds the entire body of the squid</td>
<td></td>
</tr>
<tr>
<td>- Average Mass: 400 grams</td>
<td></td>
</tr>
<tr>
<td>- Can control pigmented skin cells called, chromatophores, to rapidly change their body color and pattern</td>
<td></td>
</tr>
<tr>
<td>- Eight arms (not generally identical length)</td>
<td></td>
</tr>
<tr>
<td>- Two tentacles are attached to the bottom portion of head primarily for the capture of prey</td>
<td></td>
</tr>
</tbody>
</table>


http://animaldiversity.org/accounts/Sepioteuthis_lessoniana/
| **Behavior:** | When bigfin reef squid enter their reproductive stage, they tend to exhibit the same shoaling behavior exhibited when they first hatched. The group breeds in shoals during the day and separates at night to feed. During mating, male and female reef squid form close pairs that can last up to several days. Matting can occur in two different ways: “head-to-head” or “male-parallel”. They engage in both solitary and shoaling behaviors at various times. |
| **Range:** | The bigfin reef squid is the most widespread species in the genus, Sepioteuthis. It is found in temperate and tropical regions of Indian Ocean and Western Indo-Pacific. |
| **Habitat:** | The bigfin reef squid is a neritic warm-water dwelling squid. They are usually found 0 to 100 m (0 to 328 ft) below the water’s surface. They tend to remain close to the shoreline, near rocks and reefs. |
| **Diet:** | Bigfin reef squid are strictly carnivorous. They primarily feed on other mollusks and fish, but also consume non-insect arthropods, zooplankton, and other marine invertebrates, depending on the prey availability.  
  - Primary Diet: carnivore (piscivore, molluscivore)  
  - Fish; mollusks; aquatic crustaceans |
| **Trophic Level:** | Secondary Consumers |
| **Predators:** | Some common predators of bigfin reef squid are larger fish such as bluefin (thunnus thynnus), and skipjack (Katsuwonus pelamis) tuna. Atlantic blue |
marlin *Makaira nigricans) and sharks as well as birds, whales, and humans are also predators.

**Status, Threats, and Conservation:**
Haven’t been evaluated by the IUCN Red List.

### Common Names:
Vagabond Butterflyfish
(Not to be confused with the Indian vagabond butterflyfish)

### Scientific Name:
*Chaetodon vagabundus*

![Image](http://www.inaturalist.org/taxa/48747-Chaetodon-vagabundus)

### Taxonomy:
- **Kingdom:** Animalia
- **Phylum:** Chordata
- **Class:** Actinopterygii
- **Order:** Perciformes
- **Family:** Chaetodontidae
- **Genus:** Chaetodon

### Characteristics:
- Wear intricate patterns with striking backgrounds of blue, red, orange, yellow
- Known for their bright colors and elaborate markings
- Have dark bands across their eyes
- Have eye-like dots on their flanks to confuse predators
- They have thin-disk shaped bodies that closely resemble their cousins, the angelfish
- Up to 8 in (20cm)
- Small sized species of marine fish
- The butterfly fish has a more pointed than the angelfish which tells them apart as they are similar in color

### Behavior:
The vagabond butterflyfish can live up to 7 years in the wild. They are diurnal animals which means that they feed during the day and rest in the coral during the night. Butterflyfish form mating pairs that they will remain with for life. Butterfly fish release their eggs into the water which form part of the plankton. When the eggs hatch, the baby butterflies, (known as fry) develop armoured plates on their bodies to protect them when they are vulnerable.

http://animals.nationalgeographic.com/animals/fish/butterflyfish/
https://a-z-animals.com/animals/butterfly-fish/
http://www.inaturalist.org/taxa/48747-Chaetodon-vagabundus
http://reefguide.org/vagabondbutterflyfish.html?search=Chaetodon+vagabundus&area=a
| **Range:** | The vagabond butterflyfish is found in the Indo-Pacific region from the Red sea and off East Africa. |
| **Habitat:** | They are most commonly found in: |
| | - Reef flats |
| | - Lagoons |
| | - Seaward reefs |
| | - Turbid Waters subject to freshwater runoff |
| **Diet:** | They are omnivorous and are known to feed on algae, coral polyps, crustaceans, and worms. Other butterfly fish feed on the plankton in water and sea anemones. |
| **Trophic Level:** | Secondary Consumers |
| **Predators:** | There are preyed upon by a number of large predators including: |
| | - Snappers |
| | - Eels |
| | - Sharks |
| They are able to tuck itself into crevices in coral in order to escape danger and avoid being preyed on. |
| **Status:** | Considered as Least Concern or “LC” on the IUCN Red List |
| **Threats:** | - Water pollution |
| | - Habitat Lost |
| | - Coral Reef Destruction from Boats |
| All of these has lowered and threatened the populations of the butterflyfish, and has exposed it to predators. |
### Conservation:
Not conservation measures have been made regarding this species of butterflyfish.

### Common Names:
Spotted Jellyfish

### Taxonomy:
- **Kingdom**: Animalia
- **Phylum**: Cnidaria
- **Class**: Scyphozoa
- **Order**: Rhizostomeae
- **Family**: Mastigiidae
- **Genus**: *Mastigias*

### Characteristics:
- The spotted lagoon jelly is evidently translucent.
- Has a hemispherical shape with eight oral arms that end in a “club-like appendage”.
- Instead of having a single mouth, this jellyfish has multiple mouths on its oral arms.
- Their arms hang down below the bell margin.
- The bell is usually greenish-blue to olive green with yellow, white, and/or brown oval granular spots over the exumbrella.
- Color variation is attributed to the symbiotic zooxanthellae living in the gelatinous mesoglea between the bell’s exterior and interior layers.
- Bell average diameter: 10 centimeters (4 inches) but may grow to about 30 cm.

### Behavior:
The spotted jelly is a true jelly. It has a two-phased reproduction cycle, sexual and asexual. They also respond evolunarily to their specific habitats. Medusas are either male or female. Breeding season is from May to June. Males release sperm that swim towards the eggs within the female where fertilization takes place. The female broods.

---

**http://www.inaturalist.org/taxa/69830-Mastigias-papua**

**http://www.aquariumofpacific.org/onlinelearningcenter/species/spotted_lagoon_jelly**
the fertilized eggs within the oral arms and disk until they hatch into free swimming planula (larva)

**Diet:**
- Have symbiotic algae living within them which are where their main sources of energy comes from
- Delivers energy from the carbon fixed by its symbiotic zooxanthellae
- The energy is directly from the algae that live within the jellyfish tissues
- About 30 percent of the jelly’s nutritional needs are obtained from capturing zooplankton, phytoplankton, and tiny invertebrates

**Trophic Level:**
Primary Consumers

**Range:**
Lagoon jellies subspecies are found in the Indian Ocean, Red Sea, China, sea, and far west to the Indo-Pacific.

**Habitat:**
These species of jellies typically living lagoons, bays, and lakes where they move in the water column to find light for their zooxanthellae

**Protected Status:**
This species has not been evaluated by the IUCN Red List.

**Threats:**
These jellies have been exposed to an increased decline. Palau lake temperatures and saltiness increase are causing a major drop in jelly died. Today its concern is about the impacts of climate change and the invasion of a non-native sea-anemone (Aiptasia) with its mutualistic algae. The anemone which preys on lagoon jellies, is flourishing the shallow waters.
<table>
<thead>
<tr>
<th>Predators:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Other jellyfish</td>
</tr>
<tr>
<td>- Swordfish</td>
</tr>
<tr>
<td>- Sharks</td>
</tr>
<tr>
<td>- Salmon</td>
</tr>
<tr>
<td>- Tuna</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scientific Name:</th>
<th>Madracis auretenra</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Common Names:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pencil Coral</td>
</tr>
<tr>
<td>Yellow finger coral</td>
</tr>
<tr>
<td>Yellow pencil coral</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Taxonomy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingdom</td>
</tr>
<tr>
<td>Phylum</td>
</tr>
<tr>
<td>Class</td>
</tr>
<tr>
<td>Order</td>
</tr>
<tr>
<td>Family</td>
</tr>
<tr>
<td>Genus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Is a colonial species of stony coral</td>
</tr>
<tr>
<td>- Forms hemispherical clumps that can be a metre or more across</td>
</tr>
<tr>
<td>- Each colony is formed or densely packed, cylindrical branches, with blunt, finger-like tips</td>
</tr>
<tr>
<td>- Branches are slender but in back reef and lagoon habitats they are more robust and the clumps are larger</td>
</tr>
<tr>
<td>- Has a hard skeletal material in which the colony is built in most coral species</td>
</tr>
<tr>
<td>- Covered by a layer of living tissue</td>
</tr>
<tr>
<td>- The correlations are from 1.1 to 1.6 mm (0.06 inch) in diameter</td>
</tr>
<tr>
<td>- Have at least ten septa</td>
</tr>
<tr>
<td>- The coral is bright yellow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavior:</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. auretenra reproduces readily by fermentation, a form of asexual reproduction. Even quite small fragments of the coral are able to survive and grow into new colonies. The survival rates in trial studies are varied between 29 and 81% with the rates being highest in fore-reef environments.</td>
</tr>
</tbody>
</table>

http://www.iucnredlist.org/details/133618/0
http://www.inaturalist.org/taxa/105090-Madracis-auretenra
| Range:  | Can be located in tropical oceans all over the world  
|        | There is usually an abundance of this species in the southern hemisphere as they are exposed to warm and tropical weather |
| Habitat:  | This species can be found in fore reef and backreef environments, lagoons, and chells, from 3-40 meters. |
| Diet:  | Madracis auretenra is a zooxanthellae coral, housing symbiotic single-celled protist within its tissues. These provides the product of photosynthesis (energy) to corals. To supplement this food supply, the coral polyps spread their tentacles to catch zooplankton, feeding mostly on the larva of  
|        | - Crusaceans  
|        | - Polychaete worms  
|        | - Arrow Worms |
| Trophic Level:  | Primary Consumers |
| Protected Status:  | It is globally evaluated as Least Concern or “LC” on the IUCN Red List. |
| Threats:  | This particular species of coral is susceptible to disease (white plague), bleaching, hurricane damage, and high sedimentation. Localized mortality events are due to white plague. Localised threats include fisheries, human development, change in dynamics, invasive species, and sedimentation. |
| Conservation Actions:  |  |
In US waters, a regulation has been instilled that states that it is illegal to harvest corals for commercial purposes.

- Recommended measures for conserving this species includes resilience to threats, restoration actions, recovery management, and expansion of protected areas are all important for conserving coral diversity

**Predators:**
- Urchins
- Crowns of thorns starfish (COTES)
- A range of echinoderms and mollusks
- Snails
- Worms
**Common Names:**
- Titan Triggerfish
- Giant Triggerfish
- Moustache Triggerfish
- Blue-finned Triggerfish
- Black-lipped Triggerfish
- Dotty Triggerfish

**Scientific Name:**
*Balistoides viridescens*

*(Additional Specie)*
*(Very limited information about predation)*

**Taxonomy:**
- **Kingdom:** Animalia
- **Phylum:** Chordata
- **Class:** Actinopterygii
- **Order:** Tetraodontiformes
- **Family:** Ballista
- **Genus:** *Balistoides*

**Characteristics:**
- Has a heavily scaled head and body
- There is a deep groove in front of both their eyes
- Have about give rows of spites on either side of the “caudal peduncle”
- Is distinctively coloured and have immensely dark centers
- It has a black region with yellow sports covering the eyes and extending to the pectoral fin basis
- Their dorsal and anal fins have black margins
- The Titan Triggerfish is the largest triggerfish species
- Grows up to a maximum of 75 cm in length

**Behavior:**
The titan triggerfish is diurnal and solitary. It is usually cautious of divers and snorkelers. During the reproductive seasons, female guards its nest, which is placed in a flat sandy area, vigorously against any intruders. They are infamous for their “nasty attitude” and this behavior of theirs around intruders (fishes) and human divers as they tend and are most likely to be bitten.

**Diet:**
These bottom carnivorous dwellers, as national geographic says, dig out prey such as crabs and worms, by flapping away debris with their fins and sandblasting with water squirted from their mouths. They also use their tough teeth and jaws to take on...
sea urchins, and flips them to their bellies, which are then killed with their spines.
- They pick on clams and other animals attached to corals
- Worms and other invertebrates
- Shimp
- Consists of several species of echinoderms, crustaceans, mollusks, tube worms, and living coral

**Trophic Level:**
Secondary Consumers

**Predators:**
Unknown, no sources state this

**Status, Conservation, Threats:**
This species has not been evaluated by IUCN Red List, and there hasn’t been any actions directed into preserving this species.

### Bibliography

7. [http://ocean.si.edu/](http://ocean.si.edu/)
12. [http://animals.nationalgeographic.com/](http://animals.nationalgeographic.com/)
13. [http://www.ucmp.berkeley.edu/](http://www.ucmp.berkeley.edu/)
**Checklist/Self Assessment:**

- Location: Maps & Satellite Images
- Abiotic Factors
- Biotic Factors (Field Guide)
- Interrelationships
- Keystone Species
- Sketch
- Food Web
- Bibliography

**Highlight for self-assessment**

<table>
<thead>
<tr>
<th>Learning goal</th>
<th>Meeting the goal at a high level.</th>
<th>Meeting the goal at a satisfactory level.</th>
<th>Not meeting the goal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can complete open-ended tasks.</td>
<td>I have completed all 8 parts</td>
<td>I have completed 7 parts.</td>
<td>I have completed 4 or fewer of the parts.</td>
</tr>
<tr>
<td>I can collect and combine information from a number of sources.</td>
<td>I listed 10 or more sources</td>
<td>I listed 6 to 9 sources</td>
<td>I listed 5 or fewer sources</td>
</tr>
<tr>
<td>I can distinguish between relevant and irrelevant information.</td>
<td>I included only information that related to my particular ecosystem. I deliberately did not include some of the info I found because it didn’t relate.</td>
<td>I included only information that related to my particular ecosystem. I did not find any information that did not relate.</td>
<td>I know some of the info is unrelated and doesn’t need to be there.</td>
</tr>
<tr>
<td>I can use a range of sources, including databases, to access information.</td>
<td>I used the Library website to access databases like WebPath express, BrainPop, Gales Science and TWIG. My bibliography includes several different kinds of sources.</td>
<td>I used a couple of sources from the Library site, but not all of them. I probably Googled more than I should have.</td>
<td>I only Googled stuff. Most of my information came from sites like YouTube or Wikipedia.</td>
</tr>
</tbody>
</table>
I can summarise information from written secondary sources.
I did not copy and paste any of it. If I copied images, then I gave credit for all of them.

I paraphrased all of the information. I did not copy and paste any of it. If I copied images, then I gave credit for all of them.

I paraphrased most of the information. I copied and pasted a little of it. If I copied images, then I gave credit for some of them.

I copied and pasted most of the information. If I copied images, I gave no credit for them.

Great Research Resources:

**Middle School Library Catalogs** : Gales, ImageQuest, NatGeoKids, etc.

iNaturalist- Indonesia

Endemics - Indonesia

Animals - Indonesia

Ecology Asia

Reefguide.org

Marine Species

Indonesia Species List

Online Field Guide

Arkive

Project Noah
Phochlorooccus sp.
Synechoroccus sp
Sponge parasitic