



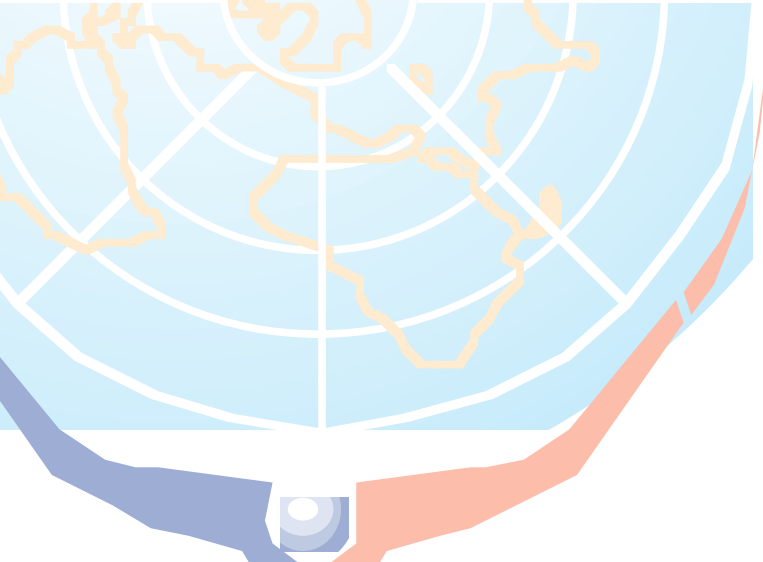
EARTHDIVE

“The health of our oceans is intrinsically linked to the future of life on this planet”

PRE-DIVE BRIEFING PACK

Eco-Region 9 Tropical Caribbean





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1.0 General Information

This booklet is a **pre-dive briefing pack** for the **Tropical Caribbean** eco-region. Please feel free to print it and take it with you as an 'aide memoir' for your dive. It contains all the information you need to contribute to the **EARTHDIVE** Global Dive Log.

1.1 Introduction

The **EARTHDIVE Global Dive Log** is a pioneering methodology that has been developed in partnership with **UNEP-WCMC** and marine scientists from around the world. These marine scientists helped establish thirty **EARTHDIVE** eco-regions - areas of water that share a relatively similar climate and contain a common assembly of natural habitats and species. They then identified key indicator species for each region - an important set of marine animals whose numbers and changing population can tell us a lot about the changing state of our oceans.

You can help observe and record sightings of these marine animals during a dive or snorkel trip and enter observations into the **Global Dive Log**. You can also record evidence of key anthropogenic pressures - changes in the marine environment brought about by human activity such as pollution and overfishing. Any data you enter onto the **EARTHDIVE** website can be viewed by you and other visitors.

The **EARTHDIVE** eco-regions span all of the world's oceans - not just those areas with warm water and coral reefs. Whether you are diving in Scotland or Saint Lucia, Connecticut or Cocos, Denmark or Dominica, your data collection is equally valid and valuable. So you don't have to wait for the next exotic dive trip - home waters are just as important!

Each eco-region also has its own types of megafauna, from dolphins to whale sharks, from whales to polar bears (if you like really cold water) and provision is also made in the Global Dive Log to record sightings of these exciting animals.

Collecting this valuable information for **EARTHDIVE** helps create a **Global Dive Log** - a valuable research tool.

This briefing pack lists the indicator species and anthropogenic pressures for the **Mediterranean** eco-region.

Thank you for recording scientific information for **EARTHDIVE**.

1.2 How to record your observations into the Global Dive Log

When recording scientific information for **EARTHDIVE**, divers are recommended to follow our 7 Point Plan. You will find the use of a slate or some other method of taking notes underwater, such as a laminated fish identification card, invaluable. Always try to transfer your data to the **EARTHDIVE** website as soon as possible following your dive. Let dive buddies and dive leaders know what you are measuring, as they may be able to help with some post-dive questions on identification.

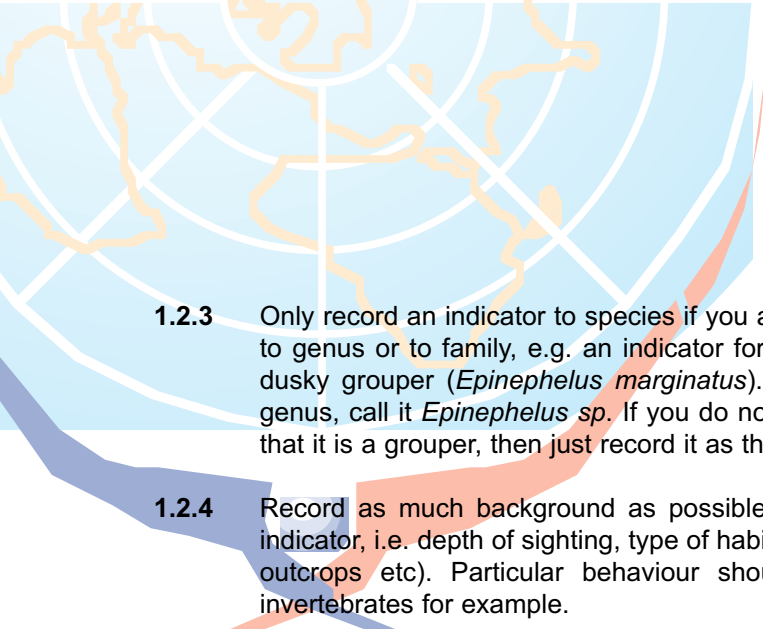
1.2.1 Try and ensure that the time of the underwater recording session is accurately noted. The length of the session can be all of the dive or just a period during the dive e.g. 10 minutes. You may even spend periods of time recording different indicators. For example there may be a dense aggregation of drums, which you count for 10 or 15 minutes. On the other hand you may look for other species such as groupers for most of the dive. Whatever your choice, the data is important so try to add the recording time in the notes for each indicator.

1.2.2 When possible always record **actual** counts of indicator species. If this is too difficult on the dive then enter your data into the abundance scale in the Global Dive Log as an estimate.



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- 1.2.3 Only record an indicator to species if you are 100% certain that it is that species. Otherwise record to genus or to family, e.g. an indicator for the sub-tropical Atlantic Coast of South America is the dusky grouper (*Epinephelus marginatus*). If you are uncertain of the species but recognise the genus, call it *Epinephelus sp.* If you do not have time to recognise it, or do not know it apart from that it is a grouper, then just record it as that - it's just as important!
 - 1.2.4 Record as much background as possible in the notes section of the Global Dive Log for each indicator, i.e. depth of sighting, type of habitat (lower reef slope, kelp bed, sand with scattered rocky outcrops etc). Particular behaviour should also be noted - spawning behaviour in fish or invertebrates for example.
 - 1.2.5 When recording always fin slowly and evenly with minimal sudden movements. Moving rapidly will disturb resident fish causing them to hide from view more quickly. By moving slowly and evenly you have more chance of seeing indicator species and recording their presence/absence more accurately. Always look carefully for particular indicators such as lobsters, which are often under overhangs or in crevices.
 - 1.2.6 On your way to and from your dive site, record any observations you have made regarding the listed anthropogenic pressures for this eco-region.
 - 1.2.7 Following your dive, make notes from your slate or memory and keep them in a safe place. Add any further comments within 24 hours before you lose some of the detail from your memory.

Thank you

2.0 The Tropical Caribbean Eco- Region

This region comprises those countries, states and islands whose shores border the tropical Caribbean and the Gulf of Mexico.

This includes the US states of Alabama, Louisiana, Mississippi, Texas and the western coast of Florida. It also includes the countries of Belize, Columbia (Caribbean Coast), Costa Rica (Caribbean coast), Guatemala (Caribbean Coast), , Honduras (Caribbean Coast), Mexico (Caribbean Coast), Nicaragua (Caribbean Coast), Panama (Caribbean Coast) and Venezuela. The following island groups are also included here: Anguilla, Antigua and Barbuda, Aruba, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Haiti, Jamaica, Martinique, Monserrat, Navassa Island, Netherlands (Dutch) Antilles, Puerto Rico, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos Islands and the US Virgin Islands.

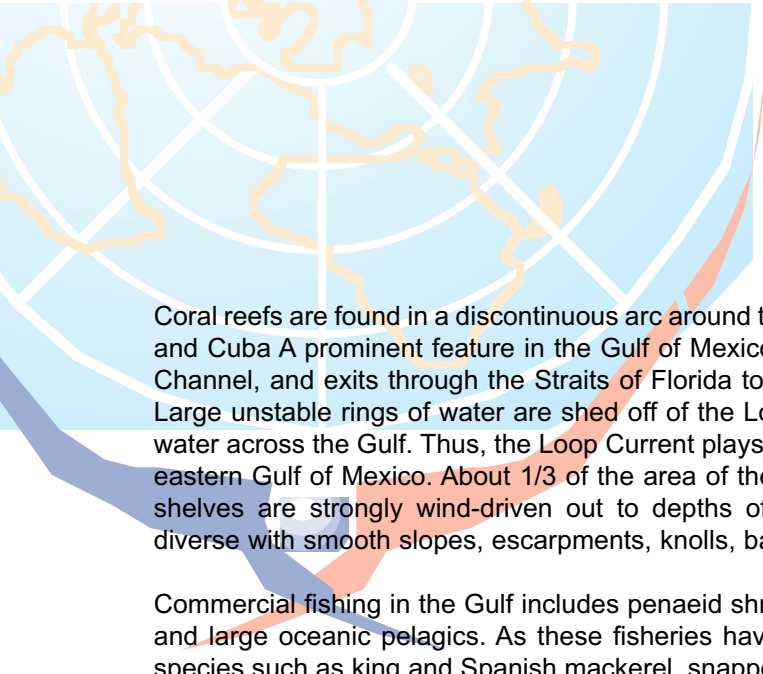


The Gulf of Mexico is a deep marginal sea, and the ninth largest body of water in the world. It lies south and west of the continental US east and north of Mexico, and northwest of Cuba. It is bounded by five US states, six Mexican states, and the island of Cuba. Water enters the Gulf through the Yucatan Channel of Mexico, and exits through the Straits of Florida. An additional major water source is fresh water from US and Mexican rivers. The Mississippi River alone drains over 40% of the United States, and has the seventh largest discharge of world rivers!



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Coral reefs are found in a discontinuous arc around the Gulf with greatest development along the Florida Keys and Cuba. A prominent feature in the Gulf of Mexico is the Loop Current, which enters through the Yucatan Channel, and exits through the Straits of Florida to become the Florida Current, and later the Gulf Stream. Large unstable rings of water are shed off of the Loop Current, bringing massive amounts of heat, salt and water across the Gulf. Thus, the Loop Current plays an important role in shelf nutrient balance, at least in the eastern Gulf of Mexico. About 1/3 of the area of the Gulf of Mexico is continental shelf. The broad, shallow shelves are strongly wind-driven out to depths of approximately 50-60 meters, and are topographically diverse with smooth slopes, escarpments, knolls, basins and submarine canyons.

Commercial fishing in the Gulf includes penaeid shrimp, menhaden, reef fish, coastal migratory pelagic fish, and large oceanic pelagics. As these fisheries have reached their harvesting limits, smaller, lesser known species such as king and Spanish mackerel, snappers, groupers, yellowfin tuna, swordfish, and sharks have also been targeted.

The Gulf of Mexico is showing signs of ecosystem stress, mostly in bays, estuaries, and coastal regions, that can be directly related to toxic chemicals, physical restructuring of the coast, local harvesting of preferred species, and nutrient loading from rivers. Oil and gas production in the Gulf adds to the ecosystem stress.

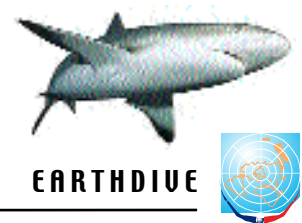
The Caribbean Sea is a semi-enclosed sea located between North and South America, and bounded by Central America to the west. It is the second largest sea in the world and is noted for its many islands, including the Leeward and Windward Islands situated on its eastern boundary, Cuba, Puerto Rico, Jamaica and the Cayman Islands. It comprises four deep basins: the Venezuelan Basin in the east, the Colombian Basin in the west, the Cayman Trough in the northwest, and the Yucatan Basin in the north. There is little seasonal variation in surface water temperatures, with these ranging from 25.5° C in the winter to 28 ° C in the summer.

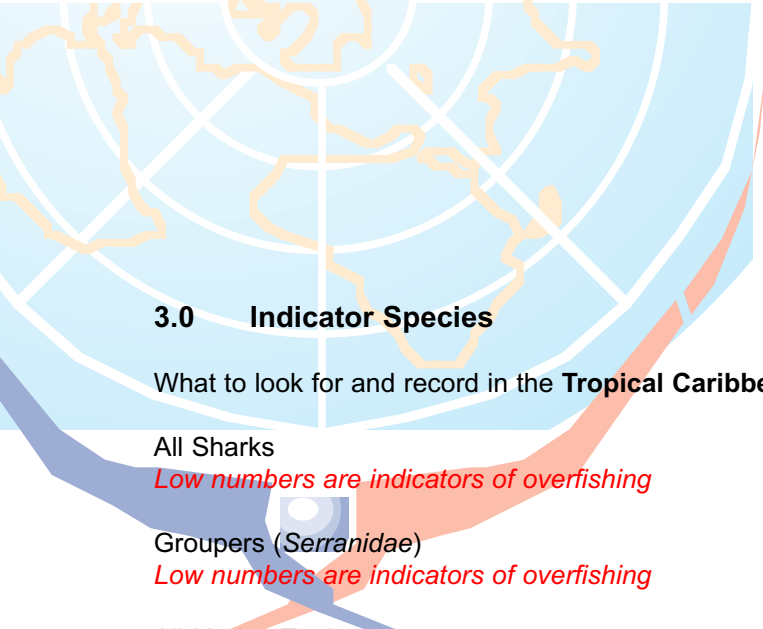
The coral reefs of the Caribbean Sea are a key component of the shallow water ecosystem, but are unfortunately showing signs of stress. Living corals are made mostly by calcium-secreting corals and thrive in clear, oceanic, shallow, low-nutrient waters, with plenty of sunlight and warm temperatures. There have been unexplained episodes of large-scale coral bleaching and coral deaths. Bleaching may be due to an increase in water temperatures, and occurs when the coral expels its resident symbiotic algae. Coral reef degradation is caused by increased sedimentation, excess nutrients, ship groundings, storms, hurricanes, anchor damage and diver contact.

The principal species commercially harvested in the Caribbean Sea are spiny lobster (*Panulirus argus*), coral reef fishes, and conch. The spiny lobster is one of the most valuable species of the Caribbean and there is concern over its long-term sustainability as a result of increased activity.

In addition to coral reefs, there is a diversity of habitat types including mangroves, seagrass beds, and upwelling areas. Within the region, the Belize Barrier Reef is recognised as a regional centre of marine endemism, particularly for fish and invertebrates. With a length of 720 km., this is the second largest barrier reef in the world, after Australia's Great Barrier Reef. The reef system is also unique in featuring three atolls, one of which, the Turneffe Atoll, is considered to be the best example of an atoll in the Caribbean. Associated with the reef are extensive areas of relatively pristine coastal wetlands, lagoons, seagrass beds, and mangrove forest, which provide critical habitats for threatened species such as sea turtles and manatees.

This eco-region also includes the Andros Barrier Reef, located 2-5 km. offshore of the island of Andros in the western Bahamas. The reef is considered one of the finest barrier reefs in the Caribbean and is the third largest reef system in the world. It is an extremely important resource for the fishing industry, and provides habitat for conchs, sea turtles, and seabirds.





3.0 Indicator Species

What to look for and record in the **Tropical Caribbean** eco-region:

All Sharks

Low numbers are indicators of overfishing

Groupers (*Serranidae*)

Low numbers are indicators of overfishing

All Marine Turtles

Target of exploitation – low numbers are indicative of exploitation

Long Spined Sea Urchins (*Diadema spp.*)

High numbers or population outbreaks are indicative of eco-system damage

Butterfly Fish (*Chaetodontidae*)

High numbers are indicative of good eco-system health



The International Union for Conservation of Nature and Natural Resources (IUCN) provides a listing of species that are at risk of global extinction. The 'IUCN Red List Categories and Criteria' are intended to be an easily and widely understood system and can be found at <http://www.redlist.org> The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk. If any of the indicator species for this Eco-Region have been classified as Critically Endangered, Endangered or Vulnerable on the list, then we have included that information below.

3.1 Sharks

Identifying sharks in the wild is a great challenge! While scientists can spend weeks examining every detail of a species, divers may encounter a shark for only a few seconds or minutes. Many species look alike and one individual may not be identical to the next. There are, however, relatively few species in any one specific dive site and with some preparation and a little practice it is possible for all of us to recognise the more common and distinctive species.



Blue Shark



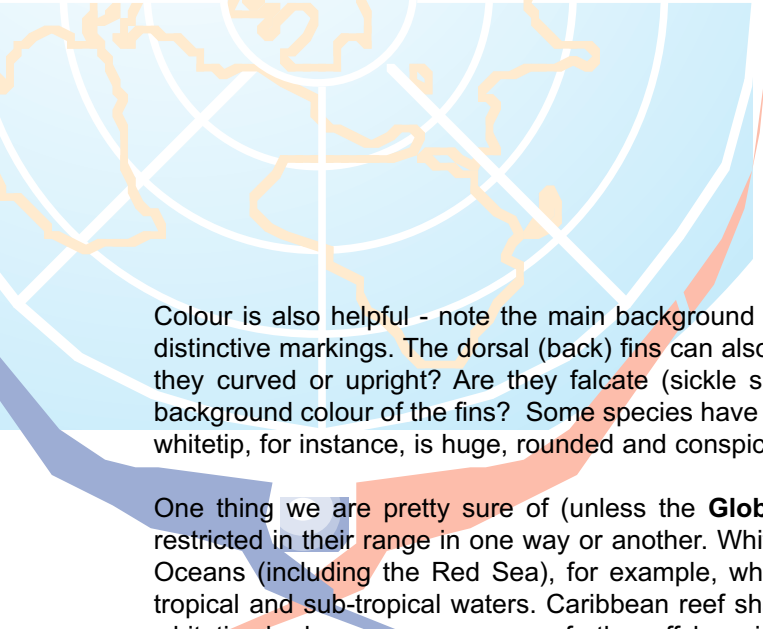
Whale Shark

The key to successful shark identification underwater is a process of elimination, based on a mental checklist of the main features to look for in every animal encountered. One feature alone is rarely enough for a positive identification, so gather as much information as you can before drawing firm conclusions.

EARTHDIVE wants you to record sightings of sharks. That in itself is valuable. A total count of all species and the time duration of the count is important information in itself and you can record this data in the Global Dive Log.

However, identifying the actual species is even more important. If you do not recognise a species, ask your buddy, dive leader or other divers in the group, who may have seen it also. Or, record unusual features like, needle sharp teeth, incredibly long tail, diamond-shaped open mouth or a flattened hammer-shaped head. All these observations are sufficiently distinctive to help us and others make an identification. Record these details in the notes section for each indicator in the Global Dive Log.





Colour is also helpful - note the main background colours of both the upperside and underside as well as distinctive markings. The dorsal (back) fins can also tell us a lot. Do they have a broad or narrow base? Are they curved or upright? Are they falcate (sickle shaped)? Are the tips rounded or pointed? What is the background colour of the fins? Some species have very distinctive dorsal fins - the first dorsal of the oceanic whitetip, for instance, is huge, rounded and conspicuously marked with a mottled white tip.

One thing we are pretty sure of (unless the **Global Snapshot** proves us wrong!), is that all sharks are restricted in their range in one way or another. Whitetip reef sharks are only found in the Pacific and Indian Oceans (including the Red Sea), for example, while bull sharks are found virtually worldwide but only in tropical and sub-tropical waters. Caribbean reef sharks occur mainly around island reefs, whereas oceanic whitetip sharks are more common farther offshore in oceanic waters.

In this way we can tell you which sharks you are most likely to encounter in the Tropical Caribbean eco-region:

- | | |
|---|---|
| ● Atlantic Sharpnose Shark | <i>Rhizoprionodon terraenovae</i> |
| ● Blacktip Shark | <i>Carcharhinus limbatus</i> |
| ● Blacktip Reef Shark | <i>Carcharhinus melanopterus</i> |
| ● Blue Shark | <i>Prionace glauca</i> |
| ● Bluntnose Sixgill Shark | <i>Hexanchus griseus</i> |
| ● Bonnethead Shark | <i>Sphyrna tiburo</i> |
| ● Bull Shark | <i>Carcharhinus leucas</i> |
| ● Caribbean Reef Shark | <i>Carcharhinus perezii</i> |
| ● Copper Shark | <i>Carcharhinus brachyurus</i> |
| ● Finetooth Shark | <i>Carcharhinus isodon</i> |
| ● Great Hammerhead Shark | <i>Sphyrna mokarran</i> <i>Carcharhinus perezii</i> |
| ● Grey Reef Shark | <i>Carcharhinus amblyrhynchos</i> |
| ● Lemon Shark | <i>Negaprion brevirostris</i> |
| ● Nurse Shark | <i>Ginglymostoma cirratum</i> |
| ● Oceanic Whitetip Shark | <i>Carcharhinus longimanus</i> |
| ● Sandbar Shark | <i>Carcharhinus plumbeus</i> |
| ● Scalloped Hammerhead Shark | <i>Sphyrna lewini</i> |
| ● Shortfin Mako Shark | <i>Isurus oxyrinchus</i> |
| ● Silky Shark | <i>Carcharhinus falciformis</i> |
| ● Silvertip Shark | <i>Carcharhinus albimarginatus</i> |
| ● Smalltooth Sawfish Shark – Endangered | <i>Pristis pectinata</i> |
| ● Smooth Hammerhead Shark | <i>Sphyrna zygaena</i> |
| ● Snaggletooth Shark | <i>Hemipristis elongata</i> |
| ● Tiger Shark | <i>Galeocerdo cuvier</i> |
| ● Whale Shark – Vulnerable | <i>Rhincodon typus</i> |

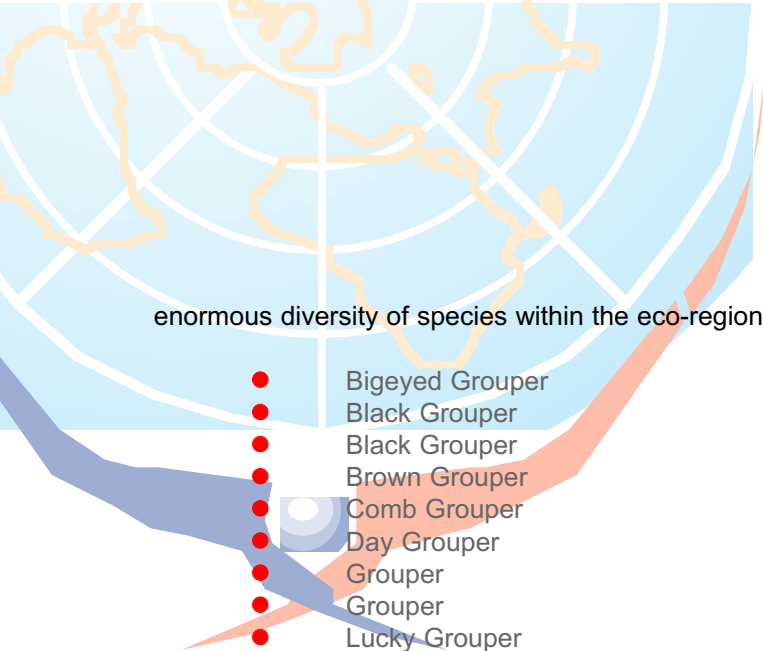
3.2 Groupers (*Serranidae*)



When people talk about coral reefs, fishermen tend to shrug their shoulders and complain about snagged lines and torn nets. But when you talk about groupers, they suddenly sit up and pay attention. Groupers are among the economically most important fishes of the coral reef, because of their popularity as food. Yet without the coral reef there would probably be no groupers. For this reason, groupers are an extremely important indicator species and your record of their existence or non-existence during your dive tells us a lot.

Like all indicators, it is valuable if you can record the particular species you sight. However, recording the total number of groupers is just as important. The species that you are most likely to encounter are listed below, but given the





enormous diversity of species within the eco-region, this list may not be all-inclusive:

- Bigeyed Grouper
- Black Grouper
- Black Grouper
- Brown Grouper
- Comb Grouper
- Day Grouper
- Grouper
- Grouper
- Lucky Grouper
- Marbled Grouper
- Misty Grouper
- Mossy Grouper
- Nassau Grouper
- Poey's Grouper
- Red Grouper
- Rock Grouper
- Salmon Grouper
- Stinging Grouper
- Small Grouper
- Snowy Grouper
- Spotted Grouper
- Small Grouper
- Tiger Grouper
- Yellowfin Grouper
- White Grouper
- White Grouper
- Yellowfin Grouper
- Yellowmouth Grouper

- Epinephelus mystacinus*
- Epinephelus mystacinus*
- Mycteroperca bonaci*
- Epinephelus morio*
- Mycteroperca rubra*
- Epinephelus striatus*
- Epinephelus flavolimbatus*
- Epinephelus itajara*
- Epinephelus guttatus*
- Dermatolepis inermis*
- Epinephelus mystacinus*
- Alphesthes afer*
- Epinephelus striatus*
- Epinephelus flavolimbatus*
- Epinephelus morio*
- Epinephelus adscensionis*
- Mycteroperca interstitialis*
- Scorpaena plumieri plumieri*
- Alphesthes afer*
- Epinephelus niveatus*
- Epinephelus niveatus*
- Cephalopholis fulva*
- Mycteroperca tigris*
- Epinephelus flavolimbatus*
- Epinephelus striatus*
- Epinephelus flavolimbatus*
- Mycteroperca venenosa*
- Mycteroperca interstitialis*

3.3 All Marine Turtles

They have travelled the oceans and have outlived the dinosaurs. They have become an integral part of the traditional culture of many coastal indigenous peoples throughout the world. Today, all but one of the species features on the **IUCN RED List** as endangered or critically endangered. Extinction looms!



There are only a few large nesting populations of the green, hawksbill and loggerhead turtles left in the world. There are no large nesting populations of Kemp's ridly turtle.

Until fairly recent times, their long presence in the tropical and sub-tropical seas and beaches of the planet seemed set to continue. However, a myriad of threats such as hunting for meat, shell and eggs; fisheries bycatch; pollution; boat strikes; and introduced predators have had the effect of wiping out entire turtle populations, or at the very least reducing them significantly. changes to important turtle habitats, Habitat change and destruction, especially of coral reefs, seagrass beds, mangrove forests and nesting beaches compounds their problems.

Marine turtles are one indicator species that is very difficult to miss. The most unique and recognizable feature of a turtle is its shell, the design of which has changed little in almost 200 million years and which comprises many separate bones. There are two parts of the shell, the upper part called the carapace, and a lower part known as the plastron. The carapace and plastron of most turtles are joined at the sides by a bridge. Hard scales (or scutes) cover all but the leatherback, and the number and arrangement of these scutes can be used to determine the species. They have four strong, paddle-like flippers and like all



reptiles, air-breathing lungs. The characteristic beak-like mouth is used to shear or crush food.

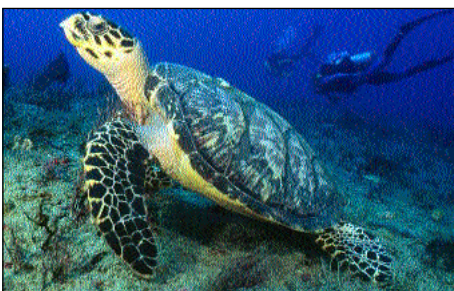
Young marine turtles drift and feed in the open ocean until ready to settle near inshore feeding grounds. They grow slowly and take between 30 and 50 years to reach sexual maturity. They live for years in the one place before they are ready to make the long breeding migration of up to 3000 kilometres from the feeding grounds to nesting beaches. Nesting females return to the same area, believed to be in the region of where they were hatched. Courtship and mating take place in shallow waters near the nesting beach. Females often mate with more than one male. After mating, the males return to the feeding grounds.

Our **earthdive** partner, UNEP-WCMC have developed a Marine Turtle Interactive Mapping System which provides a wealth of information on the various species, and it can be accessed [here](#)

Most experts recognize seven species of marine turtles: the green, hawksbill, loggerhead, Kemp's ridley, olive ridley, leatherback, and flatback. All but one - the flatback - can be found in the Latin American and Caribbean region, and all are threatened by extinction.

The **Green Turtle** (*Chelonia mydas*) can be found in warm tropical waters from New England to South Africa and in the seaweed-rich coral reefs and inshore seagrass pastures in tropical and subtropical areas of the Indo-Pacific region. When immature, green turtles are carnivorous with adults mostly herbivorous, feeding principally on seaweeds and seagrasses

Green turtles are the largest of the sea turtles with a highly domed carapace growing to approximately 100cm. The shell is typically smooth. The carapace colour varies from olive through shades of brown to black. Overlying this base colour are complete or broken lines of buff or reddish brown. The head is relatively small. The plastron is white or cream. The name 'green' turtle is thought to derive from the green coloured fatty flesh beneath the carapace. The species is classified as endangered on the IUCN Red List



The **Hawksbill Turtle** (*Eretmochelys imbricata*) occurs in tropical and subtropical seas of the Atlantic, Pacific and Indian Oceans. They are particularly fond of clear water coral reefs ecosystems, but may also be found in shallow rocky inland waters and mangrove-edged inlets and bays.

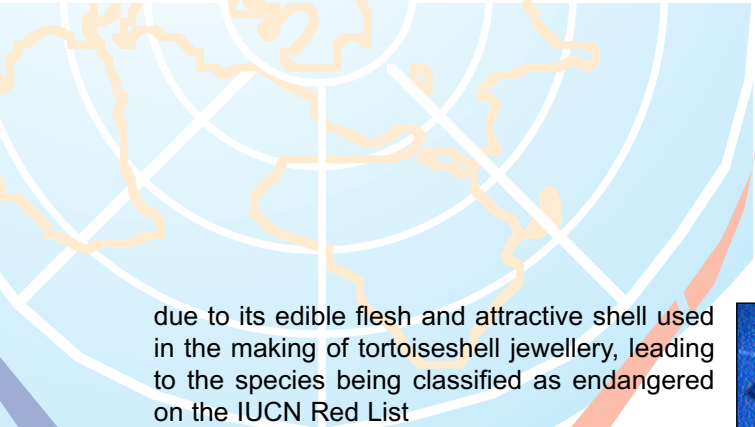
The hawksbill is one of the smaller species of sea turtle, growing to a maximum 90cm in carapace length and weighing up to 80kg. They have typical hard shells with unique features such as large thick, overlapping costal scutes (the shell plates which lie one row inwards from the edge of the carapace). The species name is reflected in the beak-like mouth. Its main identifying feature is the posterior edge of the carapace, which is serrated

The scutes are dark reddish-brown or black on a cream to amber background. Many hawksbills have barnacles attached to their shells. The plastron is generally a light cream to amber colour.

The diet of the Hawksbill comprises of fish, gastropods, echinoderms, coelenterates, bryozoans, and in particular – and surprisingly - sponges. Very few vertebrates other than a few fish species are known to consume sponges, which contain spicules that would lacerate the lining of the alimentary tract of most animals.

The hawksbill is one of the most sought after species of marine turtles world wide





due to its edible flesh and attractive shell used in the making of tortoiseshell jewellery, leading to the species being classified as endangered on the IUCN Red List

The **Leatherback Turtle** (*Dermochelys coriacea*) is possibly the most highly evolved and specialized of all the sea turtles. It is certainly largest, with an average curved carapace length of 155cm and weighing up to 700 kg.



Leatherbacks are nomadic, pelagic creatures distributed worldwide in all tropical seas, possibly travelling between oceans. They are quite cold water tolerant and have frequently been observed in the temperate waters of the north Pacific and Atlantic oceans.

As the common name leatherback implies, this turtle lacks a hard shell. Instead, the deeply fluted and fusiform (spindle-shaped) shell and flippers are covered with soft skin. Colouring is dark gray to black with whitish or pinkish spots covering the shell and limbs. There is usually a large, often pinkish prominent spot on top of the head. Which is large, rounded and grades smoothly to the neck and shell. The front flippers are very large, measuring up to 300cm. from tip to tip.

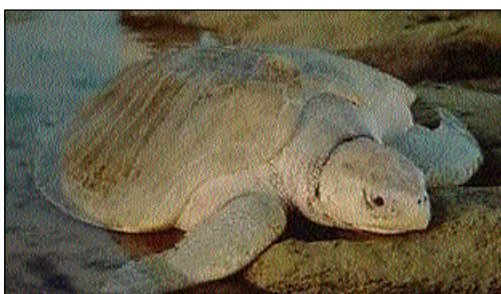
The leatherback turtle is carnivorous and feeds mainly in the open ocean on jellyfish and other soft-bodied invertebrates. The species is classified as critically endangered on the IUCN Red List.



The **Loggerhead Turtle** (*Caretta caretta*) is found in temperate and subtropical waters throughout most of the world, occurring in an enormous range from north to south. In the Western hemisphere they are found as far north as Newfoundland and as far south as Argentina, inhabiting subtidal and intertidal coral and rocky reefs and seagrass meadows in addition to deeper soft-bottomed habitats of the continental shelf.

The head is very large with strong, heavy jaws. The carapace is heart-shaped and a reddish-brown with and typically 82-105cm long. The plastron is yellowish-brown. The front flippers are short and thick with 2 claws, while the rear flippers can show 2 or 3 claws

Loggerheads are carnivorous, feeding feed on benthic gastropod and bivalve molluscs, crabs, sea urchins, shellfish and jellyfish. The species is classified as endangered on the IUCN Red List

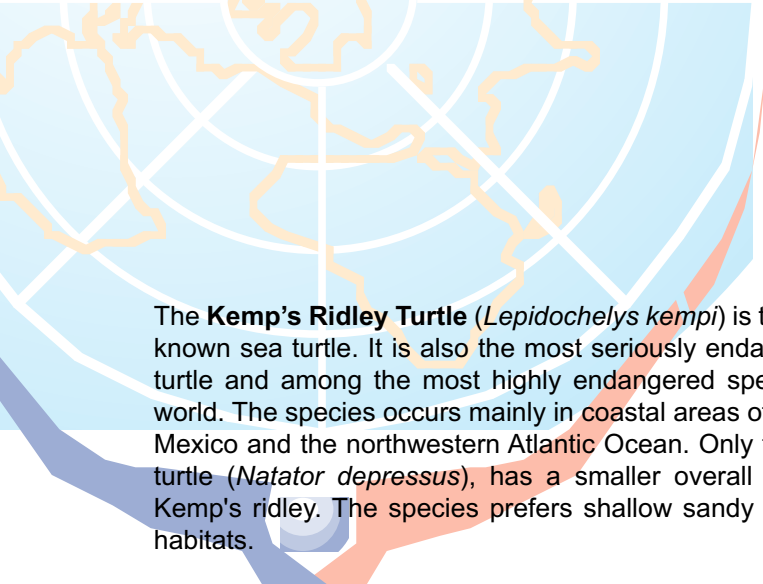


The **Olive Ridley Turtle** (*Lepidochelys olivacea*) has a worldwide tropical and subtropical distribution, and can be found in shallow, protected waters, especially in soft-bottomed habitats. For some reason as yet unknown, they do not enter the Caribbean Sea.

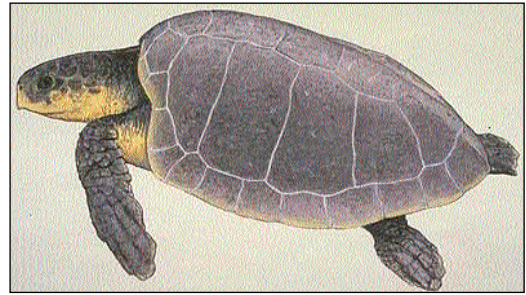
The olive ridley, with its near cousin, Kemp's ridley, is the smallest of the sea turtle species with a carapace length of only 70-80cm. The species name derives from the olive color of its heart-shaped shell It may be identified by the uniquely high and variable numbers of vertebral and costal scutes or shell plates.

Olive ridleys consume a variety of food including small shrimp, jellyfish, crabs, snails fish, and in some populations, algae also forms part of the diet. The species is classified as endangered on the IUCN Red List





The **Kemp's Ridley Turtle** (*Lepidochelys kempii*) is the smallest known sea turtle. It is also the most seriously endangered species of the world. The species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Only the flatback turtle (*Natator depressus*), has a smaller overall range than Kemp's ridley. The species prefers shallow sandy and muddy habitats.



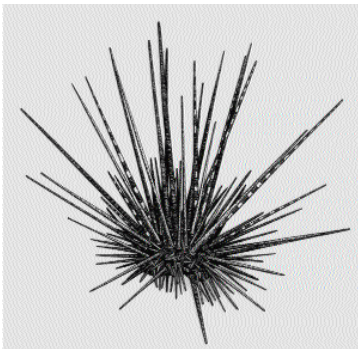
The nesting range stretches from a few northerly nests in Texas to the few southerly nests found in the state of Veracruz, Mexico. The major concentration of nests, however, is found at Rancho Nuevo in the state of Tamaulipas, Mexico, along some 30km of beach.

The colour changes significantly as they mature. Hatchlings are grey-black top and bottom, while adults have a lighter grey-olive carapace and cream-white or yellowish plastron. Their large head has a prominent "beak" used to grab and break up the crabs, shellfish and other hard-shelled prey that comprises their diet.

Adults generally weigh less than 45 kg. The straight carapace measures around 65 cm, and is nearly as wide.

The species is classified as critically endangered on the IUCN Red List. Today, under strict protection, the population appears to be in the earliest stages of recovery. The increase can be attributed to two primary factors: full protection of nesting females and their nests in Mexico, and the requirement to use turtle excluder devices (TEDs) in shrimp trawls both in the United States and Mexico.

3.4 Long Spined Sea Urchins (*Diadema spp.*)



Sea urchins are often used as indicator organisms in public aquariums to determine whether the system is functioning properly. These organisms are extremely sensitive to water conditions and are first to show signs of stress, seen when their spines are laid down or are shed.

Warning! Some sea urchins are covered with sharp venom-filled spines that can easily penetrate and break off into the skin – even through a wetsuit. The DAN (Divers Alert Network) website contains useful information on how to handle the unfortunate effects of accidental brushes with these and other poisonous marine organisms. Check out www.diversalernetnetwork.org for any information that you need.

Sea urchins (*echinoderms*) are a group of marine invertebrates that can be found in almost every major marine habitat from the poles to the equator and from the inter-tidal zone to depths of more than 5,000 metres. There are around 800 extant species and the group has a long and detailed fossil record stretching back many millions of years. All echinoderms have tube-feet and these play a very important role in feeding and respiration. Echinoderms move by means of spines and climb and cling on to hard substrata by means of their tube-feet. The spines also offer the primary means of defence. Sea urchins feed in a variety of ways. They have a powerful internal jaw and graze on algae or sedentary organisms.

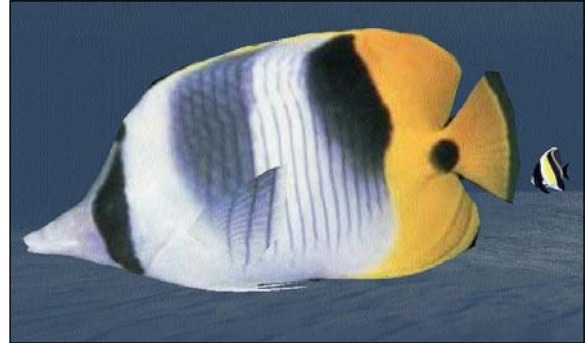
Long spined sea urchins are found on reef flats and shallow reef slopes, where they are often wedged into crevices in the coral framework. Well protected from nearly all reef predators, their calcite limestone skeleton, or test, bears two kinds of moveable spines, some up to six inches long. Both the longer, primary spines (which are hollow) and the smaller, secondary spines are brittle and break off after puncturing the skin. The smaller spines bear toxin-producing tissue, and contact with them causes burning pain in the wound. Light-sensitive nerves in the urchins' skin detect the shadows of potential predators and the spines can be coordinated and directed toward the threat. The spines are attached to the skeleton by skin and muscle tissue and do not easily detach.





3.5 Butterfly Fish (*Chaetodontidae*)

Found in most oceans of the world, butterfly fish are small, thin, disk-shaped fish with pointed noses. There are many varieties, the four-eyed butterfly probably being the most common from New England to the Caribbean. Others include the spotfin, the banded, and the reef butterfly. Many of these fish have a dark band running vertically through each eye. This helps the fish camouflage themselves on the coral reefs where they live. Most butterfly fish have pointed snouts, very useful for plucking out the small coral animals and getting into small crevices for tiny invertebrates which they feed on.



Yellow, white, and black are the most common colours for butterfly fish. The four-eyed is pale yellow or whitish, with a dark eye band and a large dark spot on the tail. To a predator, the tail appears to be the fish's head and often allows the butterfly to escape being the "blue plate special" of the day. The spotfin is also yellowish and has a small dot at the base of its dorsal fin. The banded butterfly looks like a zebra, having alternating black and white stripes running vertically the length of its body. The reef butterfly starts with yellow at the top and fades to white on its belly. Most butterfly fish mate for life and raise their young together. Sometimes, if one dies, the other may also perish. Occasionally, there may be three to six in a small group. These little fish are a delight to visit on a coral reef. They are usually busy pecking away at the coral and scurry quickly if disturbed; however, if you move slowly, it is possible to follow - and count them. One species resident in the area that you are unlikely to see, because of its preference for deep-water habitats, is the French Butterflyfish (*Chaetodon guyanensis*).

Species that you may see are as follows, with the list showing their maximum adult size:

●	Banded Butterflyfish	<i>Chaetodon striatus</i>	16cm
●	Bank Butterflyfish	<i>Chaetodon aya</i>	15cm
●	Foureye Butterflyfish	<i>Chaetodon capistratus</i>	7.5cm
●	Longsnout Butterflyfish	<i>Chaetodon aculeatus</i>	9cm
●	Reef Butterflyfish	<i>Chaetodon sedentarius</i>	15cm
●	Spotfin Butterflyfish	<i>Chaetodon ocellatus</i>	20cm

Note: Many species of fish and plants are known by different names in different locations. Where appropriate, we provide the recognised scientific name, but in the case of common names, for the sake of consistency, we have used the common names as they appear in the fishbase.org database as our default name.

4.0 Anthropogenic Pressures

EARTHDIVE is recording five different types of anthropogenic pressures (effects resulting from the actions of humans). Collection of this data enables us to establish an ever-evolving **Global Snapshot** of our oceans.

The types of anthropogenic pressures are the same for each region and are:

- Surface Pressures paper, wood, plastic and any other man-made debris
- Boat Activity pleasure, fishing, commercial
- Subsurface Pressures litter, sediment, physical damage
- Evidence of Fishing pots, traps, discarded nets, blast damage, cyanide damage, other etc.



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Coastal Development resorts, villages, towns, distance from the dive sites etc.

Please note any information you feel is relevant and record the data in the notes section for each impact in the Global Dive Log.

Thank you.

5.0 eCORD

EARTHDIVE asks all scuba divers to subscribe to the principles of **eCORD** - the **EARTHDIVE** Code of Responsible Diving - and to encourage others to practice them. **eCORD** is a straightforward 7 Point Plan which will help divers to limit the anthropogenic impact of recreational diving - while at the same time making their diving experiences more rewarding and enjoyable. Be sure to incorporate the 7 points in your dive planning!

1. Know your limits.

Every dive is different and every diver is different. Always ensure that you dive within the limits of your training and experience, whilst taking due account of the prevailing conditions. Take the opportunity to advance and extend your skills whenever that opportunity arises. In particular, buoyancy skills can become a little rusty after any prolonged absence from the water. If you can't get pool or confined water practice before your trip, get your buoyancy control checked out by a qualified instructor on your first dive! There are many national and international dive training organisations which offer a comprehensive range of courses and instructional material beyond basic skills level. Take advantage of them!

2. Be aware of the marine environment and dive with care.

Not surprisingly, many dive sites are located where the reefs and walls play host to the most beautiful corals, sponges and fish - fragile aquatic ecosystems! Starting with your point of entry, be aware of your surroundings: never enter the water where there are living corals, water plants or reeds. Once underwater, it only takes one unguarded moment - a careless kick with a fin, an outstretched hand, a dragging gauge or octopus - to destroy part of this fragile ecosystem. Even fin kicks too close to the reef or sand can have an adverse effect - so dive with the utmost care. Photographers in particular need to take greater care as they strive for that best-yet shot! Don't let your dive become an adverse anthropogenic impact! And remember that these rules apply just as much to 'hard' dive sites - such as wrecks, which have become the home of diverse marine life - as well as fresh-water and other sites.

3. Understand and respect marine flora and fauna.

A large part of the joy of diving is in learning more about the plants and animals who live in this unique underwater environment. In order to survive and thrive, many living creatures disguise themselves to look like plants and inanimate objects, or develop defence mechanisms such as stings. Some even do both! (Have you seen a stonefish lately?) The **EARTHDIVE** briefing packs (available by download only) provide information about indicator species for the region in which you are planning to dive. In addition, dive training organisations run marine naturalist and identification courses. The more that you learn, the more that you will see, the more that you will derive pleasure from your underwater experience - and the safer you will be for yourself, other divers and the marine environment!

4. Don't interfere.


First and foremost, be an observer in the underwater environment. As a general rule, look don't touch. Remember that polyps can be destroyed by even the gentlest contact. Never stand on coral even if it looks solid and robust.

Always resist the temptation to feed fish and discourage others from doing so. You may interfere with their normal feeding habits, damage their health and encourage aggressive behaviour. Leave only your bubbles!



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5. Take only what you need.

The marine environment is a valuable source of food for mankind and it is important that it remains so into the future. If you are among those divers who enjoy taking food from the sea, observe some simple rules:

- Obtain any necessary permits or licenses.
- Comply with all relevant fish and game regulations. These are designed to protect and preserve fish stocks, the environment and other users.
- Only take what you can eat. If you catch it and can't eat it, put it back.
- Never kill for the sake of 'sport'.
- Avoid spear fishing in areas populated by other divers or visitors to the area, or where you might cause collateral damage.

Don't be tempted to collect shells, corals or other mementos of your dive. If you want a souvenir, take a photograph!

6. Observe and report.

As an **EARTHDIVE** member, you will be in a unique position to monitor and report on the health, biodiversity and any obvious damage to dive sites using the **EARTHDIVE** Global Dive Log. In addition, we would encourage you to report anything unusual to the appropriate local marine and environmental authorities, or if this is difficult, get your dive centre to do it for you. They have a vested interest in a healthy marine environment, and will normally be more than willing to help. Always be on the lookout for physical damage, fish stock depletion, pollution and other environmental disturbances. If the dive operation itself is causing damage -say by anchoring to the reef - then let them know how you feel in no uncertain terms!

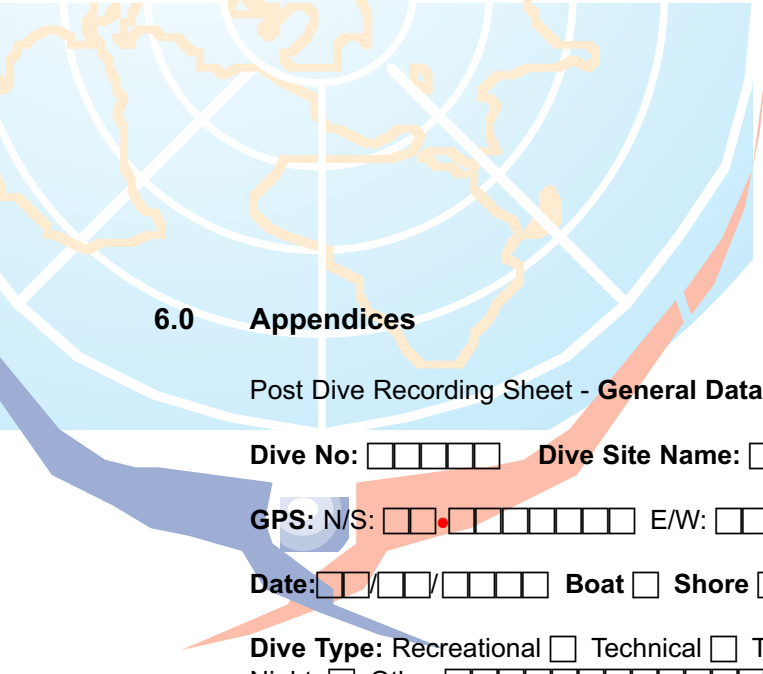
7. Get involved.

No matter where you are diving or snorkelling, be it at home or abroad, there will be at least one (and often many more) marine conservation bodies who are active in the area. Don't be afraid to approach them for information, to offer help, or just to find out what they have to offer. You will receive an enthusiastic welcome! They will provide you with lots of opportunities to contribute to marine conservation.



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6.0 Appendices

Post Dive Recording Sheet - **General Data** (complete/add/delete/tick as applicable)

Dive No: Dive Site Name:

GPS: N/S: E/W: (Decimal Degrees up to 7 decimal points)

Date: / / Boat Shore Water Type: Salt / Brackish / Fresh

Dive Type: Recreational Technical Training Drift Search Wreck Night Other

Time In: : Time Out: : (24 hour clock) Dive Time: : (hr:mins)

Air/Nitrox Start: End: (psi or bar) Max Depth (ft/m)

Visibility: ft/m Temperatures: water: °C / °F air: °C / °F

Current: None Light Medium Strong (tick)


Surface Conditions: Cloudy Sunny Partly Cloudy Rain Variable other

IF DIVING WITH A CLUB/DIVE CENTRE/LIVEBOARD OR RESORT, WERE YOU GIVEN AN ENVIRONMENTAL BRIEFING: YES NO

Please record any other information you normally record immediately following a dive. Add this data to the **earthdive** website via your control panel as soon as possible. **Thank you**

Post Dive Recording Sheet - **Indicator Species**

Important Note: If you allocated some time to looking for one of the indicator species, but didn't find any, please make sure that you record a **0 (zero)** count in the appropriate box, and record how much time you spent looking for the indicator.



All Sharks

How many Sharks did you see? (tick box and/or record actual number)

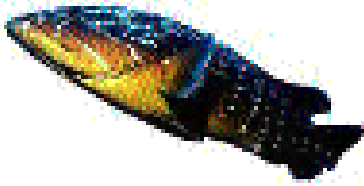
0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? Can you record its species? What was it doing? At what depth did you see it/them?

Additional Information:



All Groupers (*Serranidae*)

How many Groupers did you see? (tick box and/or record actual number)

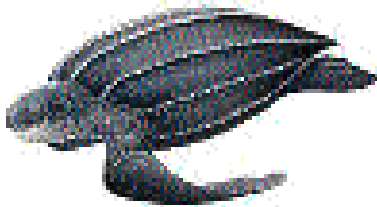
0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? Can you record its species? What was it doing? At what depth did you see it/them?

Additional Information:



All Marine Turtles

How many turtles did you see? (tick box and/or record actual number)

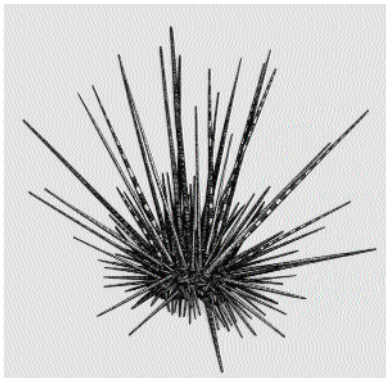
0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? Can you record its species? What was it doing? At what depth did you see it/them?

Additional Information:



Long Spined Sea Urchin (*Diadema spp.*)

How many Long Spined Sea Urchins did you see? (tick box and/or record actual number)

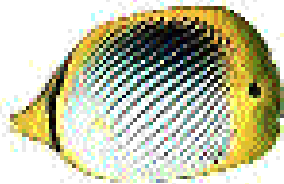
0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? Can you record its species? What was it doing? At what depth did you see it/them?

Additional Information:



Butterfly Fish (*Chaetodontidae*)

How many Butterfly Fish did you see? (tick box and/or record actual number)

0 1 - 5 6 - 20 20 - 50 51 - 250 >250

Actual Number (write actual number)

How long were you looking for this indicator? (minutes)

Add your additional information here. In what type of habitat did you see this indicator? Can you record its species? What was it doing? At what depth did you see it/them?

Additional Information:



Post Dive Recording Sheet - **Anthropogenic Pressures**



Surface Pressures

Did you see any Surface Litter? (tick box)

Yes No Dont Know

If yes please record any details (plastic, wood, paper, other etc.) Please record quantity and any other relevant information.



Boat Activity

Did you see any Boat Activity? (tick box)

Yes No Dont Know

If yes please record any details (i.e fishing boats, pleasure boats, commercial vessels any other etc)

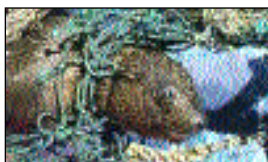


Subsurface Pressures

Did you see any Surface Litter? (tick box)

Yes No Dont Know

If yes please record any details (litter, sediment, physical damage, coral bleaching other etc).



Evidence of Fishing

Did you see any Surface Litter? (tick box)

Yes No Dont Know

If yes please record any details (pots, traps, discarded nets, blast damage, cyanide damage, other etc).



Evidence of Coastal Development

Did you see any evidence of Coastal Development? (tick box)

Yes No Dont Know

If yes please record any details (resorts, villages, towns, distance form the dives site etc).

Evidence of the illegal trade in endangered species

Any observations you make below and record in the Global Dive Log will be passed onto **TRAFFIC**, the world's wildlife trade monitoring network.

TRAFFIC works to ensure that the trade in wild plants and animals is not a threat to the conservation of nature. It has offices covering most parts of the world and works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). **TRAFFIC** is a joint programme of WWF and IUCN-The World Conservation Union.

Evidence of the illegal trade in endangered species

Did you find any evidence at any time during your holiday/dive trip of the illegal trade of endangered species. (tick box)

Yes No Dont Know

If yes please record any details (the species, sale location, and any other available information). Please refer to the **TRAFFIC** Guide for more information concerning species identification, local laws, and contact information of **TRAFFIC** to report offences.

TRAFFIC



© Elizabeth Fleming
Turtle shell ornaments on display

