Marine Reptiles

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MARINE REPTILES

- **Marine reptiles** are reptiles which have become secondarily adapted for an aquatic or semi-aquatic life in a marine environment

- The earliest marine reptiles arose in the Permian period during the Paleozoic era (542-251 million years ago).

- During the Mesozoic era (251-65.5 million years ago), many groups of reptiles became adapted to life in the seas, including such familiar clades as the ichthyosaurs, plesiosaurs, placodonts, and mosasaurs.

MARINE REPTILES

- After the first mass extinction at the end of the Cretaceous period (145.5-65.5 million years ago), marine reptiles are less numerous, consisting largely of sea turtles, sea snakes, marine Iguanas and some species of crocodylians.

- Some marine reptiles, such as ichthyosaurs and mosasaurs, rarely if ever ventured onto land and gave birth in the water. Others, such as sea turtles and saltwater crocodiles, still return to shore to lay their eggs.


SEA TURTLES

Green turtle *(Chelonia mydas)*

Green turtles are the largest of all the hard-shelled sea turtles, but have a comparatively small head.

Hatchlings are just 2 inches long, adults can grow to more than 3 feet long and weigh 136-159 kg.

Green turtles are herbivorous, feeding primarily on seagrasses and algae. This diet is thought to give them greenish colored fat, from which they take their name.

A green turtle's carapace (top shell) is smooth and can be shades of black, gray, green, brown, and yellow. Their plastron (bottom shell) is yellowish white.

Reach sexual maturity anywhere between 20 and 50 years. Females lay their eggs every 2-4 years.

Green turtle *(Chelonia mydas)*

Green turtles primarily use three types of habitat: oceanic beaches (for nesting), convergence zones in the open ocean and benthic feeding grounds in coastal areas.

Adult females migrate from foraging areas to mainland or island nesting beaches and may travel hundreds or thousands of kilometers each way. After emerging from the nest, hatchlings swim to offshore areas.

The green turtle is globally distributed and generally found in tropical and subtropical waters along continental coasts and islands between 30° North and 30° South.

Nesting occurs in over 80 countries throughout the year. Green turtles are thought to inhabit coastal areas of more than 140 countries.

Green turtle *(Chelonia mydas)*

In U.S. Atlantic and Gulf of Mexico, green turtles are found in inshore and nearshore waters.

In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska, but most commonly occur from San Diego south.

In the central Pacific, green turtles occur around most tropical islands, including the Hawaiian Islands.

In India, found in Andaman Nicobar islands, Gulf of mannar islands and Gulf of Kutchh.

The principal cause of the historical, worldwide decline of the green turtle is long-term harvest of eggs and adults on nesting beaches and juveniles and adults on feeding grounds.

Incidental capture in fishing gear, primarily in gillnets, but also in trawls, traps and pots, longlines, and dredges is a serious ongoing source of mortality that also adversely affects the species' recovery. Green turtles are also threatened, in some areas of the world, by a disease known as fibropapillomatosis (FP).


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Hawksbill (*Eretmochelys imbricata*)

The hawksbill turtle is small to medium-sized compared to other sea turtle species.

Adults weigh 45 to 68 kg on average, but can grow as large as 91 kg. Hatchlings weigh about 14 g.

The carapace (top shell) of an adult ranges from 25 to 35 inches (63 to 90 cm) in length and has a "tortoiseshell" coloring, ranging from dark to golden brown, with streaks of orange, red, and/or black.

The shells of hatchlings are 1-2 inches (about 42 mm) long and are mostly brown and somewhat heart-shaped. The plastron (bottom shell) is clear yellow.

Male hawksbills mature when they are about 27 inches (69 cm) long.

Females mature at about 31 inches. Female hawksbills return to their natal beaches every 2-3 years.


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Hawksbill (*Eretmochelys imbricata*)

A female hawksbill generally lays 3-5 nests per season, which contain an average of 130 eggs.

Hawksbill turtles usually nest high up on the beach under or in the beach/dune vegetation on both calm and turbulent beaches.

Hawksbill turtles use different habitats at different stages of their life cycle, but are most commonly associated with healthy coral reefs.

Feeding primarily on animals associated with coral reef environments. Here, juveniles begin feeding on a varied diet.

In the Caribbean, as hawksbills grow they begin exclusively feeding on only a few types of sponges. However, in the Indo-Pacific, hawksbills continue eating a varied diet that includes sponges, other invertebrates and algae.

Hawksbill (*Eretmochelys imbricata*)

Hawksbills are also found around rocky outcrops and high energy shoals, which are also optimum sites for sponge growth.

They are also known to inhabit mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent.

Hawksbills are widely distributed throughout the Caribbean Sea and western Atlantic Ocean, regularly occurring in southern Florida and the Gulf of Mexico (especially Texasand) along the Central American mainland south to Brazil. Hawksbills do not occur in the Mediterranean Sea.

Hawksbill turtles are circumtropical, usually occurring from 30° N to 30° S latitude in the Atlantic, Pacific, and Indian Oceans and associated bodies of water.

Hawksbill Sea Turtle

Hawksbill (*Eretmochelys imbricata*)

Within the U.S., hawksbills are most common in Puerto Rico and its associated islands and in the U.S. Virgin Islands. In the continental U.S.

The species is recorded from all the Gulf States and along the east coast as far north as Massachusetts, but sightings north of Florida are rare.

Hawksbills rarely occur along the Pacific Central American coast; limited nesting has been documented on the Pacific coast of Costa Rica (Gaos et al. 2006).

The largest concentrations of nesting hawksbills in the Pacific occur on remote oceanic islands of Australia and in the Indian Ocean.
Foraging hawksbills have been reported from the island groups of Oceania and from the Galapagos Islands in the eastern Pacific to the western Pacific.

Hawksbills nest on islands and mainland Asia from China and Japan, through the Philippines, Malaysia, and Indonesia


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Kemps ridley

Kemp's ridley sea turtles live primarily in the coastal waters and bays of the Gulf of Mexico and the northern Atlantic Ocean.

They are most common along the Gulf coasts of Mexico, Texas, Louisiana and Florida, and are also found in large number on the Atlantic coast of Florida, Georgia, and even as far north as New England during the summer and fall!

The Kemp's ridley sea turtles prefer **shallow** waters where they can find food on the sandy or muddy bottom.

Kemp's ridleys reach **maturity** at about 12 years of age.

It is unknown how long Kemp's ridley turtles live, but like other sea turtles, they are likely long-lived.

Kemps ridley

Kemp's ridley turtles live their first years well offshore in the Gulf of Mexico, where they feed on small animals and plants they find in the mats of floating **algae**.

After returning to shallow coastal areas, crabs become their preferred food.

Female Kemp's ridleys nest from April to July, during the day.

Kemp's ridleys are the only sea turtles to nest during the day. Kemp's ridleys lay an average of 2-3 **clutches** per season and return to the beach to nest every 1-3 years.

LEATHERBACK TURTLE

- The leatherback is the largest turtle and the largest living reptile in the world.
- Mature males and females can be as long as six and a half feet (2 m) and weigh almost 900 kg.
- A leatherback's carapace is approximately 1.5 inches (4 cm) thick and consists of leathery, oil saturated connective tissue overlaying loosely interlocking dermal bones. The carapace has seven longitudinal ridges and tapers to a blunt point.

LEATHERBACK TURTLE

- Adult leatherbacks are primarily black with a pinkish white mottled ventral surface and pale white and pink spotting on the top of the head.
- The ridged carapace and large flippers are characteristics that make the leatherback uniquely equipped for long distance foraging migrations.
- Female leatherbacks lay clutches of approximately 100 eggs on sandy, tropical beaches. Females nest several times during a nesting season, typically at 8-12 day intervals.

LEATHERBACK TURTLE

- After 60-65 days, leatherback hatchlings emerge from the nest. Hatchlings are approximately 50-77 cm (2-3 inches) in length, with fore flippers as long as their bodies, and weigh approximately 40-50 grams (1.4-1.8 ounces).

- Leatherbacks lack the crushing chewing plates characteristic of sea turtles that feed on hard-bodied prey.

- Instead, they have pointed tooth-like cusps and sharp edged jaws that are perfectly adapted for a diet of soft-bodied pelagic prey, such as jellyfish and salps.

LEATHERBACK TURTLE

- A leatherback's mouth and throat also have backward-pointing spines that help retain such gelatinous prey.

- Leatherbacks are commonly known as pelagic animals, but also forage in coastal waters. In fact, leatherbacks are the most migratory and wide ranging of sea turtle species.

- Thermoregulatory adaptations such as a counter-current heat exchange system, high oil content, and large body size allow them to maintain a core body temperature higher than that of the surrounding water, thereby allowing them to tolerate colder water temperatures.

LEATHERBACK TURTLE

- Nesting female leatherbacks tagged in French Guiana have been found along the east coast of North America as far north as Newfoundland.
- Leatherbacks mate in the waters adjacent to nesting beaches and along migratory corridors.
- After nesting, female leatherbacks migrate from tropical waters to more temperate latitudes, which support high densities of jellyfish prey in the summer.

LEATHERBACK TURTLE

- Leatherback turtle nesting grounds are located around the world, with the largest remaining nesting assemblages found on the coasts of northern South America and west Africa.

- The U.S. Caribbean, primarily Puerto Rico and the U.S. Virgin Islands, and southeast Florida support minor nesting colonies.

LEATHERBACK TURTLE

- Leatherback turtles face threats on both nesting beaches and in the marine environment.
- The greatest causes of decline and the continuing primary threats to leatherbacks worldwide are long-term harvest and incidental capture in fishing gear.
- Harvest of eggs and adults occurs on nesting beaches while juveniles and adults are harvested on feeding grounds.

LOGGERHEADS TURTLE

- Large heads, which support powerful jaws and enable them to feed on hard-shelled prey, such as whelks and conch.
- The carapace is slightly heart-shaped and reddish-brown in adults and sub-adults, while the plastron (bottom shell) is generally a pale yellowish color.
- The neck and flippers are usually dull brown to reddish brown on top and medium to pale yellow on the sides and bottom.

LOGGERHEADS TURTLE

- Mean straight carapace length of adults is approximately 36 in (92 cm); corresponding weight is about 113 kg.
- Loggerheads reach sexual maturity at around 35 years of age.
- Mating occurs in late March to early June and females lay eggs between late April and early September.
- Females lay three to five nests, and sometimes more, during a single nesting season.

LOGGERHEADS TURTLE

- The eggs incubate approximately two months before hatching sometime between late June and mid-November.
- Found in the Atlantic, North Carolina, Florida, Texas, southern Virginia, Gulf of Mexico, Bahamas, Greater Antilles and Yucatán.
- Adult loggerheads are known to make extensive migrations between foraging areas and nesting beaches.

OLIVE RIDLEY

- Olive ridley is considered the most abundant sea turtle in the world, with an estimated 8,00,000 nesting females annually.

- The olive ridley gets its name from the grayish green coloration of its heart-shaped carapace (top shell).

- Adult turtles are relatively small, weighing on average around 100 lbs (45 kg). The size and morphology of the olive ridley varies from region to region.

OLIVE RIDLEY

- Nesting females vary in size between 22 and 31 inches (56-79 cm), with the largest animals being observed on the Pacific coast of Mexico.

- The olive ridley is mainly a pelagic sea turtle, but has been known to inhabit coastal areas, including bays and estuaries.

- Olive ridleys mostly breed annually and have an annual migration from pelagic foraging, to coastal breeding and nesting grounds, back to pelagic foraging.

OLIVE RIDLEY

- The olive ridley is omnivorous, meaning it feeds on a wide variety of food items, including algae, lobster, crabs, tunicates, molluscs, shrimp, and fish.

- Olive ridleys dive to depths of about 500 feet (150 m), to forage on benthic invertebrates. Globally distributed in the tropical regions of the South Atlantic, Pacific, and Indian Oceans.

- They are found along the Atlantic coasts of West Africa and South America. In the Eastern Pacific, they occur from Southern California to Northern Chile. Also found in Mexico, Nicaragua, Costa Rica , Panama and the coast of India.

- Olive ridleys often migrate great distances between feeding and breeding grounds.


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SALT WATER CROCODILE

SALT WATER CROCODILE

- The Saltwater Crocodile is the world's largest reptile. These amazing creatures are found on the coast and inland for up to 100 kms or more.

- The Saltwater Crocodile has been reported to grow to lengths of 7 metres!, but the average size of a Saltwater Crocodile is 4 metres long.

- They reproduce in the wet season, with the female crocodile laying up to 60 eggs at a time. When the crocodiles are born, only a very small number of these survive in the wild and grow to be adult crocodiles.

SALT WATER CROCODILE

- The **Saltwater** or **Estuarine Crocodile** (*Crocodylus porosus*) is the largest of all living reptiles.
- It is found in suitable habitat throughout Southeast Asia and northern Australia.
- Saltwater crocodiles are known in the Northern Territory of Australia 'salties'.

SALT WATER CROCODILE

- An average adult male saltwater crocodile is typically 4-5 meters (13-17 feet) long, and weighs around 1,100 lbs.
- However the maximum size of the saltwater crocodile is well over 7m (23ft) in length and over 3,300 lbs.
- The largest living saltwater crocodile is a 7.1m (23.3ft) crocodile in Orissa, India.
- The largest confirmed estuarine crocodile is a 8.6m (28.3ft) crocodile shot in Australia,, with larger records unconfirmed.

SALT WATER CROCODILE

- Females are much smaller than males, with typical female body lengths in the range of 7-9 FT. The saltwater crocodile has fewer armor plates on its neck than other crocodilians.

- Saltwater crocodiles are severely depleted in Thailand, Cambodia, Laos and Vietnam becoming extremely rare and the species may in fact even be extinct in one or more of these countries. Present in very limited portions of the South Pacific.

- In India this crocodile is extremely rare in most areas but is very common in the north eastern part of the country (mainly Orissa and the Sunderbans).

SALT WATER CROCODILE

- Saltwater crocodile speed underwater can be 15 to 18 miles per hour in short bursts, but when cruising can go 2 to 3 miles.
- Capable of taking animals up to the size of an adult male water buffalo, either in the water or on dry land.
- Juveniles are restricted to smaller items such as insects, amphibians, crustaceans, small reptiles and fish.
- Saltwater crocodiles can take monkeys, kangaroo, birds, water buffalo, leopards, sharks, and humans.

SEA SNAKES

SEA SNAKES

- **Sea snakes** are venomous elapid snakes that have left the land and adapted to a marine environment.
- They are found in warm coastal waters from the Indian Ocean to the Pacific.
- All have paddle-like tails and many have laterally compressed bodies that give them an eel-like appearance. However, unlike fish, they do not have gills and must come to the surface regularly to breathe.
- Nevertheless, they are among the most completely aquatic of all air-breathing vertebrates.

SEA SNAKES

- Among this group are species with the most potent venoms of all snakes. Some have gentle dispositions and bite only when provoked, while others are much more aggressive.

- Currently, 17 genera are described as sea snakes, comprising 62 species.

- Adults of most species grow to between 120-150 cm in length, with the largest, *Hydrophis spiralis*, reaching a maximum of 3 m

- Their eyes are relatively small with a round pupil and most have nostrils that are located dorsally.

SEA SNAKES

- The skulls do not differ significantly from other terrestrial elapids, as many as 18 smaller teeth behind them on the maxilla.
- Most sea snakes are completely aquatic and have adapted to their environment in many ways, the most characteristic of which is a paddle-like tail that has increased their swimming ability.
- To a varying degree, the bodies of many species are laterally compressed, especially in the pelagic species.

SEA SNAKES

- The only species that have retained their enlarged ventral scales are the sea kraits, represented by the genus *Laticauda*, with only five species.

- This is considered to be a more primitive group, as they still spend much of their time on land where their ventral scales afford them the necessary grip.

SEA SNAKES

- Sea snakes in general are able to respire through their skin. This is unusual for reptiles, because their skin is thick and scaly.

- However, the geographic range of one species, *Pelamis platurus*, is wider than that of any other reptile species.

SEA SNAKES

It extends from the east coast of Africa, from Djibouti in the north to Cape Town in the south, across the Indian Ocean, the Pacific, south as far as New Zealand, all the way to the western coast of the Americas, where it occurs from the Gulf of California in the north to northern Peru in the south (including the Galapagos Islands).

SEA SNAKES

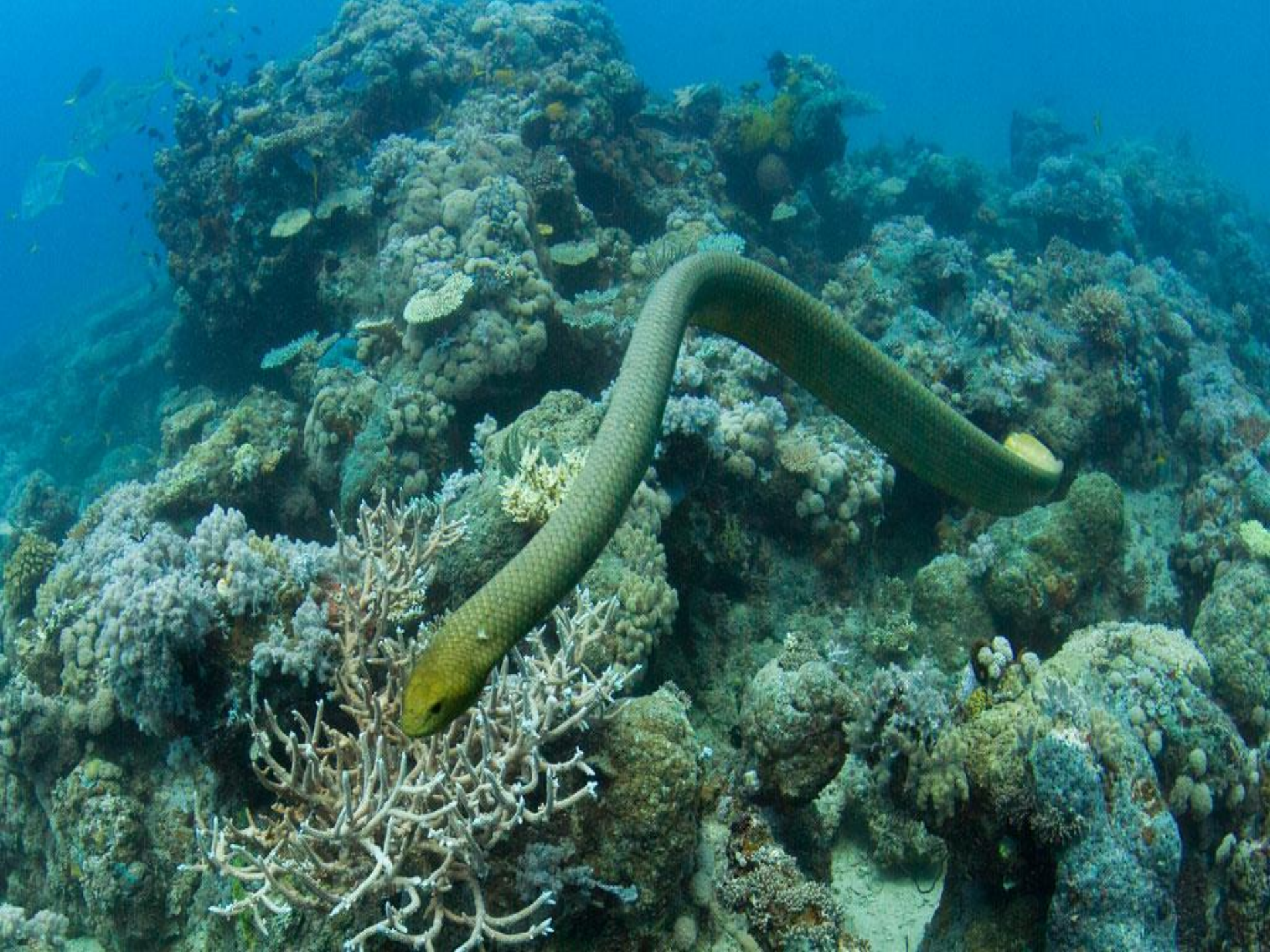
- Sea snakes do not occur in the Atlantic Ocean, although *Pelamis* would doubtless be found there.

- Sea snakes do not occur in the Red Sea, possibly because of its increased salinity, so there is no danger of them crossing through the Suez Canal.

SEA SNAKES

- They may swim up rivers and have been reported as much as 160 km from the sea.

- Some species inhabit mangrove swamps and similar brackish water habitats and there are even two landlocked fresh water forms: *Hydrophis semperii* occurs in Lake Taal in the Philippines, and *Laticauda crockeri* in Lake Te Nggano on Rennell Island in the Solomon Islands.



SEA SNAKES

- Feed by simply gulping down their prey, are more likely to bite when provoked because they seem to use their venom more for defense.

- This is in contrast to others, such as *Laticauda*, that use their venom for prey immobilization; these snakes are frequently handled with impunity by local fisherman.

- Species that have been reported as much more aggressive include *Aipysuruslaevis*, *Astrotia stokesii*, *Enhydrina schistosa* and *Hydrophis ornatus*.

SEA SNAKES

- Most species prey on fish, especially eels. The latter, when bitten, stiffen and die within seconds. One species prefers molluscs and crustaceans, such as prawns, while a few others feed only on fish eggs, which is unusual for a venomous snake.

- Some reef dwelling species have small heads and thin necks, making it possible for them to extract small eels from the soft bottom that they hide in.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