RESEARCH AND CARE CENTRE FOR SEA TURTLES

C.E.S.T.M.

SEA TURTLES

IN FRENCH POLYNESIA

AQUARIUM

LA ROCHELLE

Te mana o te mana

Preface

There are seven species* of sea turtles around the world. Amongst the five species* present in French Polynesia, two can be easily observed.

Since 2004, the non-profit association Te mana o te moana (the spirit of the ocean) welcomes and takes care of sick or injured turtles in its specialized clinic. This association has been educating more than 40 000 pupils about sea turtle protection through specialized educational programs and the distribution of pedagogic materials in schools. In 2011, it created the Observatory of sea turtles. Despite these efforts, it is hard to know exactly how many turtles cruise in our waters. This number seems to have been decreasing over the last hundred years.

After surviving the big extinction responsible for the decline of dinosaurs, sea turtles now face many threats: pollution, non-selective fishery*, poaching* and destruction of their feeding or nesting areas. Today, six species* of sea turtles are threatened by extinction. Now is the time to take action! The first step is to understand these beautiful creatures better...

Contents

Did you know?

There are around **300** different kinds of species* of turtles around the world; **7** of them are sea turtles.

When they are under the water, sea turtles can only perceive low sound frequencies. They detect vibrations when they are on land.

Sea turtles are fast, they can swim up to **35** km/h (= 22 mph)!

The largest species* of turtle, the leatherback sea turtle, eats jellyfish.

Only 1 egg out of **1000** will become a mature adult turtle that can reproduce.

The hawksbill turtle is one of the few marine animals that mainly live on eating sponges.

The green turtle feeds mostly on seaweed.

Sea turtles have **3** eyelids.

The turtles' eyesight is good under the water and they can even distinguish colours, but they are myopic on land.

The shape of the beak of a turtle is adapted to its diet*: round for herbivores* and pointy for carnivores*.

Marine turtles have an excellent sense of smell that they use to find the beaches where they were born.

The loggerhead turtle can stay under the water without breathing for more than 10 hours!

Let's go back in time... the dinosaurs era!

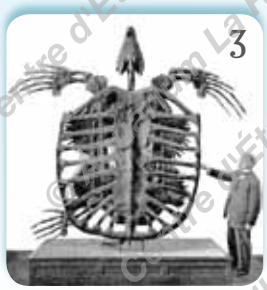
Ancestors of turtles appeared around 220 millions of years ago. *Odontochelys* was cruising in East Asian coastal waters, as *Proganochelys* was developing in Western Europe.

Odontochelys {1} had a jaw with teeth, a very long tail, and only its belly was protected with a shell.

Proganochelys {2} had small teeth located on the roof of its mouth; a long spiny tail shaped like a bludgeon, and its entire body was protected with a shell.

The presence of spines on his neck indicates that it could not retract its head inside the shell.

Turtles then evolved into two groups: the "hidden neck" turtles that can retract their neck in their shell, and the "side neck" turtles that cannot.

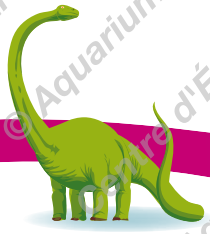


110 millions of years ago, they conquered oceans. Their very long fingers became efficient flippers. The biggest marine turtle, *Archelon* {3}, was around 4 meters long (12 feet) and weighed 2 tons (4400 pounds).

Only 4 groups of turtles survived the big extinction that occurred 65 millions of years ago.

Today, 2 groups can still be found: the Dermochelydae (1 species*) and the Cheloniidae (6 species*).

-4.5 billion years
The Earth's formation



-230 million years
Emergence of dinosaurs

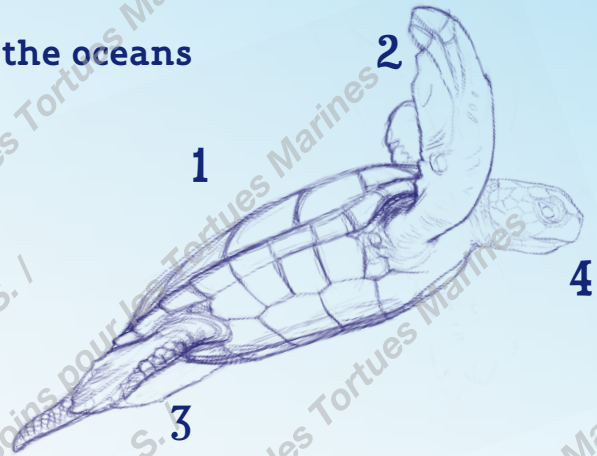
-220 million years
Emergence of turtles

A close up on marine turtles...

Remarkably well adapted to the aquatic life, sea turtles still maintain characteristics inherited from their land ancestors: they breathe air with their lungs and they lay their eggs on land.

Well equipped to cross the oceans

1. A flat and tapered shell for good hydrodynamics
2. Flattened anterior members used as paddles and wings to raise themselves
3. Short and round posterior members used as radar in the water and as a shovel for the females to dig nests on land.
4. A powerful bony beak, adapted for capturing preys, cutting plants or sponges.



Funny camouflage!

Thanks to the colour of their shell, dark on top and light underneath, sea turtles mimic the colour of the depths or the surface of the oceans. This makes it harder for their predators to notice them.

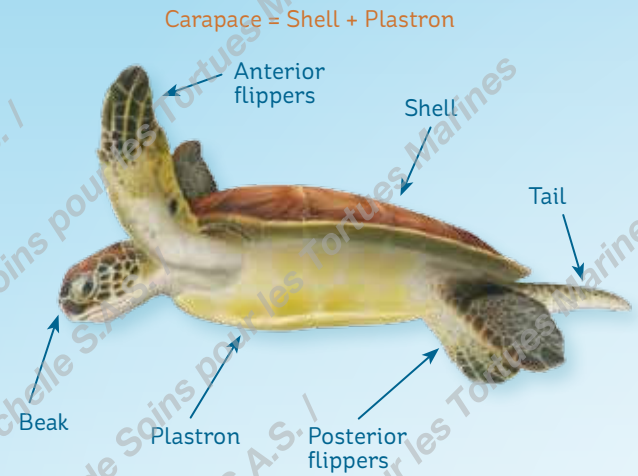
Why sea turtles prefer warm waters?

They are heterothermic* meaning that their body temperature depends on the outside temperature. This is why they prefer to be in warm and tropical waters around the globe.

-110 million years
Apparition of sea turtles

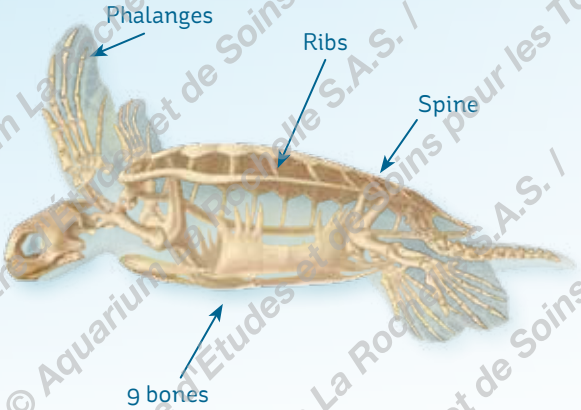
-65 million years
Disappearance of dinosaurs

-1 million years
Apparition of humans



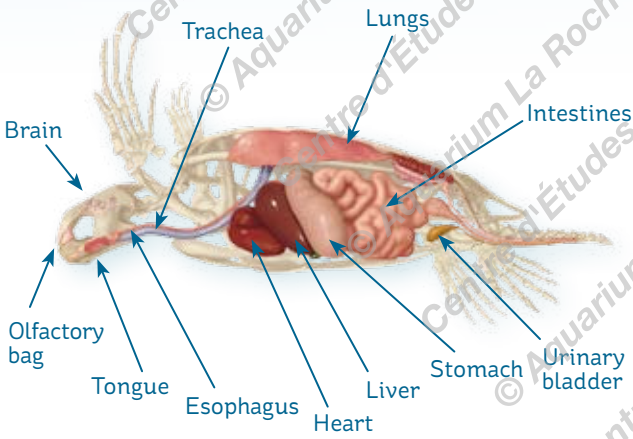
Record diving

Sea turtles are really good divers and can go very deep. The record goes to a leatherback turtle who dove down to 1280 m (4200 feet)! Their plastron, the underside of their body, is made of bones that are separated by cartilage, which makes their shell more flexible. This allows them to support high pressure during deep dives.



Made of bones and scales...

The skeleton of turtles is made of bones. On the back, the ribs and spine join to form a solid structure covered with scales. Those scales are made of keratin, just like our nails.



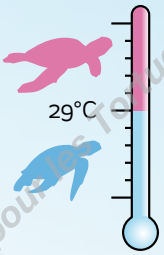
Aerial respiration

Sea turtles have lungs located just underneath their shell. They need to come back to the top of the water to breathe. Thanks to their amazing capacity to store oxygen, they just need short respirations of 2 or 3 seconds to be able to hold their breath from 20 minutes up to a couple of hours when they aren't active!

Turtles lay eggs!

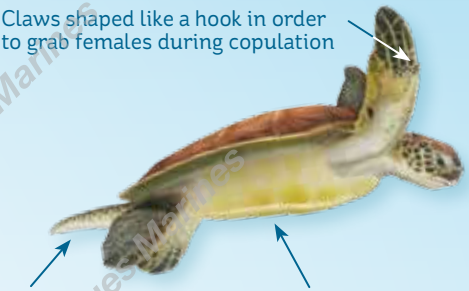
Females dig a nest on the beach in order to lay their eggs. They do it mostly during the night in order to avoid the daytime heat and dehydration. Depending on the species*, the nest will vary from 40 cm (1.3 feet) (Kemp's ridley turtle) up to 80 cm (2.7 feet) (leatherback turtle) deep.

The temperature during incubation will be what determines the sex of the babies. Cool temperatures, under 29°C (84°F), will give males, and warm temperatures above 29°C will give females. The position of the nest and other factors, such as shade and colour of the sand, also contribute to the gender of the babies.



Male or female, how to tell them apart?

Simple observation is enough to determine the sex of an adult turtle.
Male characteristics:



An amazing sense of direction!

1 Most of the time, baby turtles get out of the nest during the night. They will orientate themselves toward the most luminous horizon and quickly reach the sea.

2 Once in the water, they will fight against the waves to quickly take distance from the shore.

3 After they have arrived in the deeper sea they will orientate themselves thanks to earth's magnetic field. There are no road signs in the sea!

Drinking salty water without suffering of dehydration

While feeding under the water, turtles will swallow a lot of salty water. In order to evacuate the excess of salt in their body, they produce salty tears. Those tears will also help them to lubricate their eyes while on land.
In addition, their esophagus contains around 100 cones made of keratin that are directed towards the stomach. By contracting muscles around the esophagus, those cones will help hold the food while expelling the water out.

The sea turtle life cycle

Throughout their life, sea turtles will go through different phases, changing feeding habits, habitats and behaviours.

Besides when they are born or go to lay eggs, sea turtles migrate in the ocean. They travel between feeding zones and reproductive zones (which are usually close to the area where they were born).

Pelagic feeding area*

Juvenile turtles will spend a few years cruising the open ocean, carried by the current, focusing on finding food.

The hatchlings head to the water: this is the emergence*.

After 2 months of incubation, turtles hatch and get out of the nest.

Benthic feeding area*

After several years spent in the ocean, turtles come back closer to the shore and get attached to a feeding area.

Males go back to their feeding area

Females go back to their feeding area

Nesting site

Females come on the land in order to dig a nest in the sand and lay around 100 eggs.

A female can lay eggs 3 to 8 times during the same season; with a minimum of 10 to 15 days in between each lay.

Reproduction area

Adult male and females meet close to hatching beaches. Mating takes place in the water and can last several hours.

Threatened turtles...

During their life, sea turtles have to face many predators, such as birds, crabs, fish and carnivorous* mammals. But, if populations* are endangered today, it is mainly because of human activities.

On land...

- Human construction gains ground on nesting beaches.
- Eggs and turtles are poaching* victims.
- Stray dogs attack female turtles laying eggs and hatchlings.

...and in the water

- Sea turtles get accidentally caught by non-selective fishing gears*...or intentionally by poachers using various devices such as spear fish guns.
- Recreational boats collide with sea turtles in their feeding areas.
- Pollution (trash, oil...) degrades the habitat of sea turtles.

...and protected

International, national and local laws have been voted in order to limit the disappearance of sea turtles. They tend to aim to reduce the impact of human activities on populations*.

The International Convention of Washington* forbids any trade of sea turtles or of any of their body parts (scales, etc...).

According to the Environment code of French Polynesia, all sea turtles species* are protected.

Harming them is strictly prohibited and punishable by fine, imprisonment and would lead to the seizure of transportation and fishery devices.

But laws alone cannot ensure survival of the species*. In parallel, we need to help the population* of turtles to re-grow by offering them a safer environment.

Some examples:

- Development of research programs focused on understanding more about migrations and habitats of sea turtles.
- Creation of hatcheries and protection of the nesting sites.
- Development of fishery devices preventing accidental turtle captures.
- Awareness of local populations and tourists about the protection of sea turtles.

Harming a sea turtle, its eggs or its habitat is punishable by a fine of 980 000 XPF (1100 dollars) and/or a 1 year prison sentence.

A turtle clinic in Mo'orea, what for ?

1 WELCOMING

Washed up sea turtles on the shore, or turtles showing signs of distress in the sea, are often collected by local populations, diving centers or administration agents. Then, depending on their health, they are transferred to the Mo'orea Turtle Clinic.

2 DIAGNOSTIC

The turtles that arrive in the clinic (mostly green or hawksbill juvenile turtles) are taken care of by the team of care keepers, biologists and veterinarians. After being photographed, weighted and measured, they undergo a close medical examination.

3 TREATMENT

Turtles will be treated depending on their problems. Vitamins will be added to their food, to prevent nutritional deficiency, and antibiotics injected to heal infections. Very often, incoming turtles suffer from injuries located around their head, neck, flippers or shell. These are typical injuries caused by poachers using spear guns.

4 RELEASE

As soon as turtles are back in shape, they are tagged with a metallic ring showing a unique number and then, released in the water. Some of them are tagged with a satellite device to track their migrations.

In order better understand the turtles in Polynesian waters, the association Te mana o te moana has created the "Observatory of sea turtles" which realizes multiple actions:

- Distribution of information to the public;
- Asking people to share their observations of turtles in sea or on land;
- Collecting small samples of skin to be able to determine the genetic composition of populations* more precisely;
- Keeping track of released turtles with satellite devices. These devices send signals when turtles come back top of the water to breathe so that maps can be traced to follow their migrations.

Sea turtle identification guide

When I observe a sea turtle, I have a look at its shell

If the shell is not made of scales, but looks like leather

If the shell is made of scales, I count them to know how many scales are on the sides.

If I count more than 4 scales, I count the number of scales in between the eyes

The shell is large and almost circular

If there are more than 4 scales, I have a look at the shape of the shell.

The shell is not circular shaped

LEATHERBACK TURTLE

1 pair of scales in between the 2 eyes

GREEN TURTLE

FLATBACK TURTLE

Only observed in tropical coasts of Australia), the shell is curved on the sides

2 pairs of scales in between the 2 eyes

HAWKSBILL TURTLE

5 pairs of scales on both sides

KEMP'S RIDLEY TURTLE

OLIVE RIDLEY TURTLE

6 pairs of scales or more on both sides

5 pairs of scales on both sides

LOGGERHEAD TURTLE

Sea turtles around our islands

Green turtles

They often lay eggs in French Polynesia (major nesting sites are thought to be located in the most western atolls: Scilly, Mopelia, Bellinghausen). Some nesting sites like Tetiaroa are studied all throughout the year. Satellite devices and marking done on nesting females show that the migratory road of adult sea turtles is orientated toward the West and toward feeding areas in Pacific islands (Fiji, Tonga or New Caledonia). Additionally, French Polynesia seems to be a favored feeding site for juveniles.

Hawksbill turtles

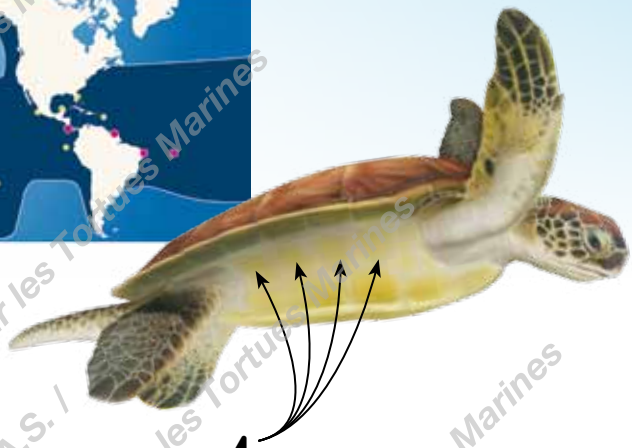
It is very rare that hawksbill turtles nest in French Polynesia. Just one case was reported at the end of 2011 in Reao, an island of the Tuamotu Archipelago. Most of the time, it is sub-adult hawksbill turtles that can are observed around the outside reef and the external slope*. Observing juveniles of this species* under 2 years old is very rare. The use of satellite devices on hawksbill turtles showed that their migrations are very limited and their feeding areas are restricted.

The green turtle

or « Honu »

Chelonia mydas

Migration area
Major nesting sites
Secondary nesting sites



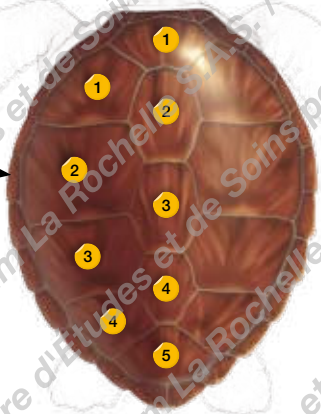
4 infra marginal scales

Its name was given after the colour of its fat. The green coloration comes from the diet* of the turtle, which mostly feeds on algae and other sea plants.

Its beak has a round shape allowing grazing of the underwater grass bed.

1 pair of prefrontal scales

1 claw



12 marginal scales

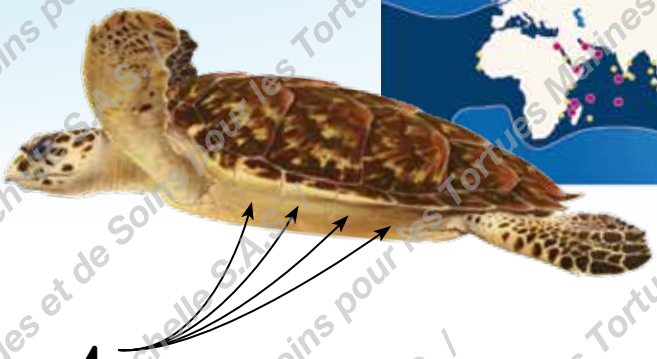
Average length of the shell: 1.10 m (3.6 ft).
Average weight: 120 kgs (260 lbs).
Diet*: mainly carnivorous* during the juvenile stage (small crustaceans, mollusks, invertebrates), the green turtle becomes herbivorous* at the adult age.

Statut: threatened of extinction according to the red list of IUCN*.
Protection: in annex 1 of CITES* and annex 1 and 2 of Bonn Convention*.

The hawksbill turtle

or « Afii moa »

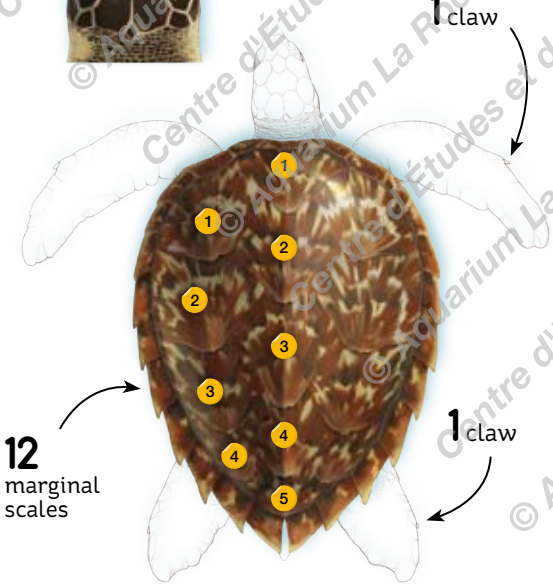
Eretmochelys imbricata



Its name comes from the shape of the superposition of the scales on the shell. In Polynesia, it is also called “rooster beak turtle”.

This turtle has a sharp, hooked, beak used to cut sea sponges found on the coral reef.

The toxicity of its meat is caused by its diet*.



Average length of the shell: 0.85 m (2.8 ft).
Average weight: 60-70 kgs (130-150 lbs).
Diet*: rather omnivorous* when juvenile, then at adult age the turtles become carnivorous* and feed mostly on sea sponges.

Status: critically threatened of extinction according to the red list of IUCN*.
Protection: in annex 1 of the CITES* and in annex 1 and 2 of the Bonn Convention*.

The leatherback turtle

Dermochelys coriacea

This turtle is the biggest one of all the sea turtles; it has no claws, no scales, and its skin, resembling leather, covers all of its shell. Its mouth and esophagus are covered by keratin spines to shred food and expulse seawater. It is the only sea turtle that migrates in cold waters to feed.

Average length of the shell: 1.60 m (5.2 ft).
Average weight: 300-400 kgs (660-880 lbs) with a record weight of 916 kgs (2019 lbs).
Diet*: carnivorous* with a preference for gelatinous organisms like jellyfish.

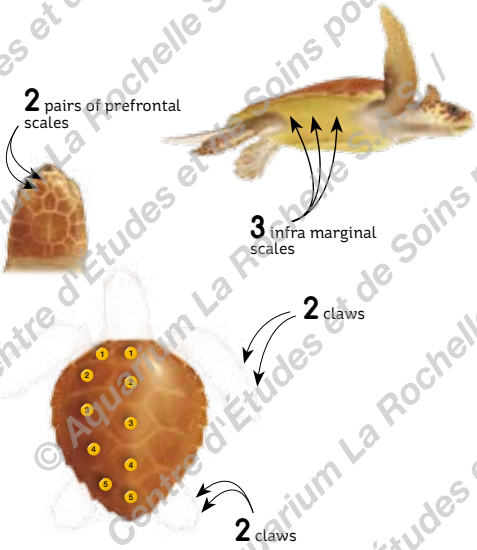
Statut: critically threatened of extinction according to the red list of IUCN*.
Protection: in annex 1 of the CITES* and in annex 1 and 2 of the Bonn Convention*.

The loggerhead turtle

Caretta caretta

Migration area Major nesting sites

The loggerhead turtle or "big head turtle" has a powerful jaw used to break crustacean shells.



Average length of the shell: 0.90 m (3 ft).
Average weight: 120 kgs (260 lbs).
Diet*: carnivorous* (crustaceans, mollusks, fish).

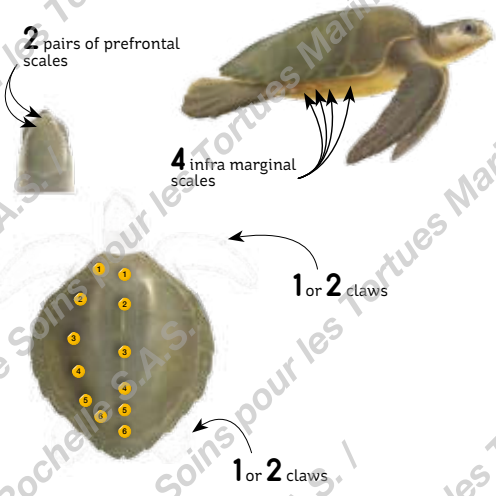
Statut: threatened of extinction according to the red list of IUCN*.
Protection: in annex 1 of the CITES* and in annex 1 and 2 of the Bonn Convention*.

The olive ridley turtle

Lepidochelys olivacea

Secondary nesting sites

This turtle, the smallest of the sea turtle family, is very similar to the Kemp's ridley turtle. Its name comes from the grey-green colour of its scales.



Average length of the shell: 0.45 m (1.5 ft).
Average weight: 35 kgs (77 lbs).
Diet*: carnivorous* (crustaceans, mollusks, fish).

Statut: threatened of extinction according to the red list of IUCN*.
Protection: in annex 1 of the CITES* and in annex 1 and 2 of the Bonn Convention*.

I protect sea turtles too!

At sea and on the land, if I observe a sea turtle dead or alive:

1. I don't touch it, but, if I can, I take pictures.
2. I contact the Environment Direction or the Mo'orea Turtle Clinic (715 344 or 56 40 11).
3. I fill in an observation form that I can find on the Te mana o te moana association's website (www.temanaotemoana.org).

I can also help by:

1. When I see a sea turtle in the water, I reduce my boat's speed and I don't try to catch up to avoid injuring it.
2. I don't throw my trash in the water.

On mainland France and overseas territories, if I see a sea turtle, I contact the local network. Network details contacts are available on the website of the Groupe Tortues Marines France (France sea turtle group): www.groupetortuesmarinesfrance.fr

Glossary

Benthic: qualifies a species* living and developing in the depths of the sea.

The Bonn Convention: takes care of conservation of migrating species*. Sea turtles are listed in annex 1 and 2 meaning that any collection is strictly prohibited and measures need to be taken in order to restore populations*.

Carnivorous: an animal feeding mostly on other animals (in their entirety or just some pieces).

The CITES: (Washington Convention) regulates the international trade of wild endangered species*. It is divided into 3 annexes. Sea turtles belong to the annex 1, representing the highest status of protection.

Diet: range of food ingested by an animal.

Emergence: period when hatchlings leave the nest to join the water.

External slope: ocean side of the reef that reaches into the depths.

Herbivorous: an animal feeding mostly on plants.

Heterothermic: is when the internal temperature of an organism depends on the temperature of the environment he lives in and is not controlled by the organism itself.

Non-selective fishery: fishing method that catches any animal, without distinction of species* or size and without regard to endangered status of the animal.

Non-selective fishing gears: fishing tools (nets, spear guns, long lines…) causing important non specific catches (size or non unauthorized / non tradable species*).

Omnivorous: is said for an animal feeding in an opportunistic way on any type of food indiscriminately, mixing plants and animals.

Pelagic: qualifies a species* living at the surface or in mid-water.

Poaching: act of hunting or fishing without respecting the law.

Population: collection of individuals from the same species*, living in the same area.

Red list of IUCN (International Union for Conservation of Nature) is an international inventory of the global state of conservation of animal and vegetal species*. With its red list, goals of the IUCN are to increase public awareness and to encourage international community to act.

Species: population* or group of population* capable of interbreeding and producing fertile offspring.

Games

Crosswords

Using the letters in the orange cases, find what surrounds the turtle's body and protects them.

1	2	3	4	5	6	7	8

1 > species of sea turtles
2 > pollution affecting sea turtles
3 > an herbivorous sea turtle
4 > turtles lay around hundred of them
5 > the biggest of the sea turtles
6 > sea turtles cruise them all throughout their life

A > favorite meal of hawksbill turtles
B > action of deposing eggs
C > almost all turtles have some
D > sea turtles use it to eat
E > act of hunting illegally
F > female turtles dig some to lay their eggs

It adds up!

How many species of sea turtles around the world?

(63 - 35) = ___ ÷ 4 = ___

What is the average number off eggs for a female turtle?

(30 x 2) = ___ + 46 = ___ - 6 = ___

Hunting game

Help Antioche returns back to the beach, escaping dangers.

How many green turtles are taken care of?

ANSWERS / Crosswords: 1-loggerhead 2-plastic 3-green 4-eggs 5-leatherback 6-oceans - A-sponges B-laying C-scales D-beak E-poaching F-nests / It adds up! 7 and 100 / How many green turtles are taken care of? 4

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