

All at sea

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Turtles have been at home in our oceans for millions of years, but these mariners now face extinction. Heather McLean reports

Sea turtles have been swimming the oceans of earth since the time of the dinosaurs. In their current forms, they are thought to have remained relatively unchanged for about 110 million years. Yet little is known about them. This has made sea turtles a subject of fascination for scientists and marine life watchers for decades. As a result of this popularity and mystery, these charismatic creatures number among the linchpin celebrities for marine life conservation. Conservation is an area that is extremely important to all seven species of sea turtle, as all are endangered and three species are critically endangered, facing a real risk of extinction in the wild.

Before humans arrived, all adult sea turtles really had to worry about were predatory sharks. However, since the 16th century as the New World opened up and great armadas roamed the seas, turtles have been used as "long life" food on board the huge vessels that stayed at sea for months at a time. From then on, turtle population numbers were not just damaged, but often completely wiped out. Turtles have been eaten, their eggs harvested from nesting beaches, their shells turned into combs and pretty trinkets and their skin into purses and boots. Much of this exploitation continues today on a lesser scale. Turtles are still forming a staple part of the diet of many coastal communities, the trade in tortoiseshell from the backs of Hawksbill (*Eretmochelys imbricata*) turtles is still thriving, and the meat and plastron (lower shell) and callipe (cartilage elements) of the Green turtle (*Chelonia mydas*) still make appearances as stew and turtle soup in restaurants.

Sea turtles that are mainly pelagic (living in open ocean), are dying out because of fishing methods including industrialised long line fishing.

These lines, miles long and covered with thousands of hooks, catch and entangle turtles, which can then drown. Tourism and the ever-encroaching habitats of humans are also causing major damage to sea turtle populations, mainly through light pollution. As soon as they hatch and dig their way through the sand above them, baby turtles have the odds stacked against them, with 1:100 to 1:1000 making it to adulthood, 10 to 25 years later when they are still only the size of a dinner plate. Yet the first obstacle for hatchlings is to make it quickly to the sea before predators eat them or their new shells dry out. To do this, evolution has programmed them to head to the brightest light, which has traditionally been the moon. Now, that bright light is often made by electric bulbs, leading thousands of hatchlings astray.

Dr Brendan Godley is a director of website, www.seaturtle.org, and Natural Environment Research Council (NERC) research fellow in the Marine Turtle Research Group at the University of Exeter in Cornwall's Centre for Ecology and Conservation. He says: "The whole problem for marine turtles is that their biology means if they survive to adulthood, the only thing they should have to deal with is large sharks. But now they have to deal with a host of problems including industrialised tourism and urban expansion."

Global warming is another major threat to the future of sea turtles. The temperature of the sand around a clutch of turtle eggs dictates whether more of those eggs will be male or more female, (the hotter the sand, the more girls hatch). Dr Brendan Godley comments: "The concern with global warming is that we may end up with no males. Some populations are easily 90 to 95 per cent female already, so if the balance is tipped a few extra degrees, it could be terrible."

Little is known about sea turtles, which perplexes and fascinates many.

Scientists are able to follow the movements of turtles through the seas by fitting them with small devices attached to their shells that can be tracked by satellite. The satellite picks up a signal from the tracking device when it passes overhead, if the turtle happens to have come up for air. This means that scientists are able to get a data location reading from the satellite on a particular turtle every two to four days. As well as this method, scientists study the number of female turtles coming onshore to nesting sites, the frequency that they come on land to lay, and the number of eggs they bury in the sand.

It is now known that some species of sea turtle perpetually travel the oceans in search of food (these are Leatherbacks (*Dermochelys coriacea*), Olive ridleys (*Lepidochelys olivacea*), and some Loggerheads (*Caretta caretta*)), moving as much as 10s of thousands of miles per year. Others move annually between summer and winter foraging grounds (Green turtles, Kemp's ridleys (*Lepidochelys kempii*), and some Loggerheads).

However, all sea turtles migrate short to extremely long distances from foraging areas to their nesting beaches. Female turtles return to the beaches they were born on, typically nesting every two to four years. One of the best known nesting migrations is that of a population of Green turtles that migrate from the coast of Brazil to their breeding grounds on tiny oceanic Ascension Island in the South Atlantic, and back. This journey is a 4000 mile round trip that takes up to six months. During the long swim they do not eat, making it an astounding feat of stamina.

There is still a lack of data on the population numbers of some turtles, such as the Australian Flatback (*Natator depressa*), which nests on remote beaches that are difficult for scientists to observe. There is not enough data on this species to list it as definitely endangered, yet the general consensus among the scientific community is that it is. This species has a flat shell and lives around the northern shores of Australia and nearby Papua New Guinea. It grows up to 990mm long and weighs around 90kg. It likes to live close to the shore in bays, costal coral reef and grassy shallow waters, as it eats the seaweed, sea cucumbers, jellyfish and molluscs that like this habitat.

The Leatherback turtle is critically endangered and may face extinction.

Leatherbacks living in the Pacific ocean have been known to migrate over 10,000km to get to breeding grounds. "Leatherbacks can dive deeper than a mile," says Dr Brendan Godley. "They cruise around on ocean currents like Crush, the turtle in Finding Nemo." These turtles are particularly in peril because of pelagic long fishing lines, which are miles long, criss-crossing the ocean, covered in thousands of fish hooks to catch Swordfish and Tuna.

Godley says that because of long line fishing, over the last decade Pacific

Leatherback population figures have crashed by 90 per cent.

Leatherbacks are the most widespread of turtle species, as the species can tolerate extremely cold temperatures. It is regularly found around the cool waters of Britain and Ireland as late as November each year. Its shell gives it its name, as instead of scales it is made of a layer of strong rubbery skin, divided into seven ridges running the length of the animal.

It can grow up to a massive 2.4m in length, weighing up to 590kg. It has a very soft mouth, so eats jellyfish, yet because they can look like jellyfish, many Leatherbacks die every year having choked on plastic bags floating in the sea.

The carapace (upper shell) of the Hawksbill turtle is covered in scutes, a substance like finger nails. Hawksbill's are hunted for these scutes, which are known as tortoiseshell and have long been made into expensive trinkets. The critically endangered Hawksbill has a beaky looking head, making it look like a hawk. Coupled with its narrow head, it is shaped perfectly for pulling food like sponges, anemones and squid out of crevices in the coastal coral reefs, rocky outcrops, estuaries and lagoons where it lives. It lives only in the tropical waters of the Atlantic, Pacific and Indian oceans, growing up to 91cm long and weighing up to 60kg.

The Green turtle is so named because of its green body fat, that is thought to stem from its strict vegetarian diet as an adult, of sea grass and algae. It keeps little sea gardens, cropping the sea grasses and waiting for nutritious new growth to show. It is thought to be facing extinction in the near future as it has been hunted severely over recent centuries, and still today, for its flesh. The population that lives in the Mediterranean on nesting beaches in Cyprus and Turkey are critically endangered. The British people can take credit for most of the demise of this species in this area, as around British Palestine and Alexandria in the early 20th century, the hunt for these tasty turtles decimated population figures.

Wherever it lives in warm and tropical waters around the world, Green turtle soup still makes an appearance on local menus. It can weigh up to 204kg and measure 1.3m long, although a giant 295kg Green turtle has been recorded.

The Kemp's ridley turtle species is named after fisherman Richard Kemp, who helped discover the turtle in 1906. It is critically endangered, mainly because of its limited geographic range; adult Kemp's ridley's live mostly in the Gulf of Mexico. The species was subject to high levels of egg harvesting and was nearly extinct, until a recent preservation scheme to protect its nesting beaches allowed population numbers to recover. Adults can reach 70cm in length, and weigh up to 45kg. It reaches the same size and weight as its cousin, the Olive ridley, making these two species the smallest of the sea turtle family. As well as munching on crabs and clams, this turtle also likes to eat sea urchins, squid and jellyfish.

Olive ridley's are so named because of the species' olive green shell. The Olive ridley lives in the warm areas of the Pacific, Indian and Atlantic oceans. It has a little head with powerful jaws for crunching up fish, clams, mussels and shrimp, and can dive down to 150m to reach its prey.

The Loggerhead got its name because it has a very big head. This head encases its strong jaws, that it uses to crush shellfish such as clams and mussels, plus horseshoe crabs. Loggerheads are found globally, swimming a long way north and south. It likes to live in coastal bays, estuaries, shipping channels and shallow water along continental shelves edging the Atlantic, Indian and Pacific

oceans. It has a heart shaped shell that grows up to 1.2m long, weighing up to 227kg. This turtle is also hunted by humans, for its tough, dark coloured skin. This is tanned and used to make expensive boots, wallets and purses, endangering the species further.

Getting off the endangered list is not something that sea turtles look like being able to manage any time soon. Although some populations are doing well as a result of rigorous conservation efforts, others are crashing fast. Michael Coyne, founder of seaturtle.org and research scientist at Duke University, Durham, North Carolina, US, comments on what teachers can do to help sea turtles: "The big thing here is getting the word out about sea turtles to students through educators, to make it easy for people to learn about them. These animals can be used to teach about many subjects, from politics and geography as conservation efforts cross national boundaries, to how big industries like commercial fishing impact the wider picture, to science and biology by studying the turtles themselves. There is plenty for everyone to study, and to keep researchers interested for many years."

Useful websites

Seaturtle.org

Detailed information on sea turtles, including hundreds of internet links, plus teacher resources. Main focus is as a scientific community resource.

www.seaturtle.org/

Also see

www.seaturtle.org/mtrg/, the Marine Turtle Research Group, based at the University of Exeter.

Marine Conservation Society

This UK charity works for the preservation of marine life and works in conjunction with seaturtle.org, supporting its research. It is aimed mainly at the primary education sector and contains a whole section on sea turtles as part of the MCS Marine Turtle Conservation Programme.

www.mcsuk.org/

EuroTurtle

Europe's first sea turtle website for education and conservation. Part of the National Grid for Learning and supported by the University of Exeter.

www.euroturtle.org/

People and Planet

A solid issues resource.

www.peopleandplanet.net

Sea Turtle Species of the World

Provides excellent detail on each species of sea turtle.

www.cccturtle.org/species.htm

Sea Turtle Inc This charity Website lists information about the different sea turtle species in detail. It also explains the work it does with turtles from its base in Texas, US.

www.seaturtleinc.com