# Marine turtles — connecting and reflecting our actions across the Earth

This booklet celebrates Danielle Simmon's abiding passion for marine turtles and their conservation. We offer it to you in her memory and trust that her work will be continued through you.

This information has been researched and prepared to further the work of Danielle Simmons (1966 to 1997). Through their generous Memorial Gift, Dani's family have enabled this publication to be brought to you. Dani was a talented medical researcher, a keen scuba diver, and a member of AMCS. She was dedicated to the conservation of marine life and appreciated the importance of research in decision making. As you learn more about marine turtles from this booklet, please remember the work of all those who have gone before you and build on their efforts to change the world.

*"For the animal shall not be measured by man. In a world older and more complete than ours they move finished and complete, gifted with extensions of the senses we have lost or never attained, living by voices we shall never hear. They are not brethren, they are not underlings, they are other nations caught with ourselves in the net of life and time, fellow prisoners of the splendour and travail of the earth."*

Henry Beston

Green turtles basking in French Frigate Islands, Northern Pacific Ocean.

*George Balazs*

## Marine turtles — an introduction

These ancient creatures have swum the oceans of this earth for over a 100 million years. As they lived in the warmer oceans, the very surface of the earth changed around them: tectonic plates moved; ice ages came and went; oceans, rivers, estuaries formed and reformed and the sea turtles swam on. Today they face another threat to their survival — us.

There are seven species of sea turtle plying the oceans today. They are known as the loggerhead turtle (*Caretta caretta*), the green sea turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imrricata*), olive ridley turtle (*Lepidochelys olivacea*), Kemp's ridley turtle (*Lepidochelys kempii*), and the flatback turtle (*Natator depressus*). Turtles generally live in tropical and subtropical waters, although some species are found in temperate waters, with the leatherback turtle found farther north than any other reptile. Oh ancient reptile, we sing your praises.

Sea turtles begin their lives on some sandy shore, a place where apparently their foremothers may have nested for millennia. They may end their lives on land, washed up after being drowned in a fishing net, run into by a boat or from eating plastic or some other human derived debris.

After breaking out of their egg shells and digging up through their protective sand nest, hatchlings in the cover of darkness, rush towards the more intense light on the horizon, imprint on the dip and strength of the earth's magnetic field, dive into the surf where they ride the undertow and frantically head out to sea not to be seen again for years (the 'lost years').

This is one of the great turtle mysteries - where do hatchlings go? Juvenile and adult turtles can be found living in reefs, seagrass beds in and around the continental shelf, but where are the hatchlings? Female hatchlings return as adults apparently to the very same nesting grounds to lay eggs many years later. The time of return depends on the time it takes each species to reach sexual maturity and can be anywhere from 3-50 years later.

What do we know about the life of the missing hatchling? We know that hatchlings, once they leave the beach swim with all their might for up to 48 hours. After this super effort the hatchlings are in deeper and safer waters where they are less vulnerable to predators. There have been reports of swimming hatchlings diving deep into the water when a bird or plane flies overhead. Out in the ocean, it is thought that hatchlings take up a life of oceanic travel drifting with the currents. Here they feed on macro

Turtle nesting

GBRMPA

zooplankton including medusae, hydrozoans, crustaceans and mollusca. These young turtles may be swept through an entire ocean gyre (see Box "Places hatchlings may go" on page 3). So a green turtle hatchling leaving the eastern shores of Australia may be swept around the Pacific and another hatching on the west coast swept around the Indian Ocean.

These tiny creatures, ranging from about 14 grams to 47 grams in weight and around 4 to 6 cm (depending on the species), are at the beginning, albeit over a number of years, of an enormous 'growth spurt'. Adult turtles range from 1.9 metres and 500 kg (leatherbacks) to 65 cm and 50 kg (Kemp's and olive ridley turtles). The largest turtle thus far reported was a leatherback washed up in Wales. It weighed 916 kg.

Young turtles (other than flatback turtle hatchlings) travel the ocean waves until they are partially grown immature turtles when they change life styles and complete their development to an adult. Loggerhead, green, hawksbill and flatback turtles take up residence in the subtidal and intertidial zone of the continental shelf, ridley turtles live in the waters of the continental shelf.

Adult and sub-adult leatherback turtles frequent temperate and tropical waters feeding on jellyfish and other soft bodied animals. These are an oceanic species feeding within the water column. Leatherback turtles dive and forage on a cycle that follows the daily migration of plankton and jellyfish through the water column. They feed in the upper levels of the water column during the night and bask on the surface at midday when the plankton and jellyfish have moved down to greater depths.

Loggerhead and ridley turtle jaws are adapted for crushing and grinding and they crush and grind mollusca, crustacean, echinoderms, jellyfish and vegetation. Loggerheads and ridley turtles are generally benthic. There have been reports of ridley turtles feeding in the water column.

Hawksbill turtles are generally found in subtidal and intertidal coral where they are adept at getting food such as sponges soft corals, prawns, squids and beche de mer from crevices in the coral reefs.

Flatback turtles are generally benthic feeders eating soft corals, sea-pens and holothurians although at times they eat plankton especially jelly fish. Flatbacks are reported to spend considerable time floating on the surface perhaps asleep or sunbaking, at any rate they provide useful perches for visiting sea birds. These denizens of the Australian continental shelf apparently remain within these waters never venturing into the ocean at any stage in their life cycle. Hatchlings spend their "lost years' as a surface feeding stage within continental shelf waters rather than travelling the ocean gyres as other turtles do.

Unlike the other turtles, the green turtle is vegetarian eating sea grass, algae and mangrove seeds. Green turtles have been reported to eat the leaves of mangroves (*Avicennia marina*). Like other turtles, green turtles are considered to be solitary, however they do congregate in shallow waters where seagrass and/or algae are abundant.

Most subadult and adult turtles tend to live a settled life and can be found at home (unless migrating to breed) within an area of a few square kilometres. Some sea turtles nest and breed in the same area, while others travel thousands of kilometres to breed. (See Box "Turtle migration" on page 3.)

Breeding takes place at intervals (2-4 years) once turtles become sexually mature and a female may breed for decades. Before breeding takes place male and female turtles travel from their feeding grounds to the waters adjacent to the nesting beach or rookery. For most turtles this usually happens at the warm time of the year.

Kemp's ridley and the olive ridley travel to their nesting sites in huge numbers – this is another turtle mystery. They have been seen floating in huge rafts offshore of nesting beaches. In Orissa, on the east coast of India, rafts of hundreds of thousands of egg bearing olive ridley turtles (called 'arribadas') are reported in mass nesting events that may last for a week. In 1966, on one day an estimated 40,000 female Kemp's ridley turtles were filmed at the main Kemp's ridley nesting beach, Rancho Nuevo, in Mexico.

Courtship and mating generally occur several weeks before the nesting season. Females may be fertilised by more than one male. Fertilisation is internal and it is possible that the female only needs

to mate once, as she may be able to store sperm. As each female lays a number of clutches she remains within the waters adjacent to the beach for some months. During this time she does not eat or eats very little.

When each clutch is ready for laying the female comes ashore to lay her eggs. At night, alone and usually on the high tide she crawls onto the beach and to the zone above the high tide mark, where she selects a site and digs out a 'body pit' with her front flippers. Then she digs an 'egg cavity' with her hind flippers. She then lays, depending on the species, 50–200 eggs. The eggs are soft shelled and encased in a thick mucous. Once the eggs are laid the female, with her hind flippers, covers the nest with a protective layer of sand and makes her way back to the water. And here is another turtle mystery. It seems that the temperature of the sand influences the sex ratio of the hatchlings. On warmer beaches there are more female hatchlings, while cooler beaches produce more male hatchlings.

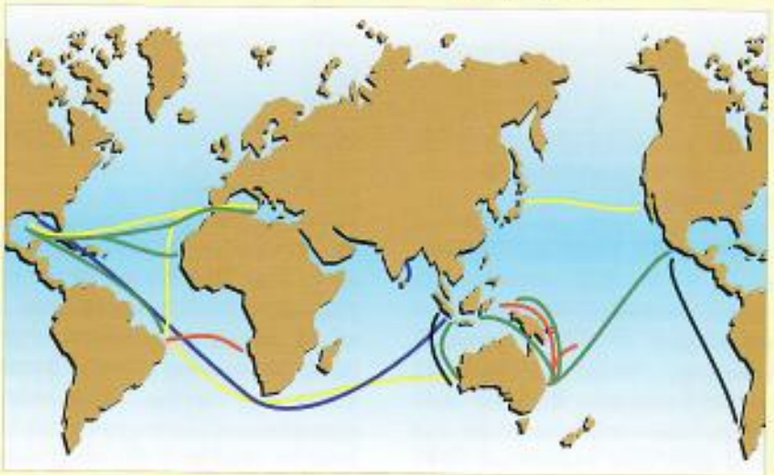
When females have laid their clutches they return to their feeding grounds, sometimes a few kilometres away, often thousands. Another mystery, how do they know where to go? And of course will they get there or will they be inadvertently caught or drowned in some great human oceanic fishing venture?

Places hatchlings may go

This map shows the major tropical and subtropical surface currents (gyres) of the Pacific Ocean, the Atlantic Ocean and the Indian Ocean (After J.R. Apel (1987). 'The Principles of Ocean Physics'. Academic Press.)

Turtle migration

This map shows a selected number of migration routes of tagged turtles. The routes shown on the map are the shortest distance and do not necessarily reflect the actual migration route. Comparatively little is known about the life of turtles when they are not visiting their breeding sites. More recent research has identified a number of distinct genetic populations, which are associated with specific geographic regions and particular breeding sites. For example, the Australian nesting populations of loggerhead turtles differ genetically from those of other countries and the eastern Australian loggerhead population is the significant population for the South Pacific Ocean. Key: Red, hawksbill turtles; green, green turtles, yellow, loggerhead turtles; black, leatherback turtle; blue, olive ridley turtle.



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# 'And they have tears in their eyes'

## Threats to marine turtles

*"(Sailors) turn them by surprisal on their backs, which is a posture they are utterly unable to recover from, and are thereby frustrated of all defence or escape, and are a ready prey to any that resolve to seize them. When the sensible creatures find themselves in this desperate posture, by which they know themselves to be in a lost and hopeless state, they then begin to lament their conditions with heavy sighs, and mournful groans, and shed abundance of water from their eyes, in hopes, if possible, to secure their safety with their tears, and mollifie the cruel assaults upon their lives"* John Ovington 1691, Ascension Island South Atlantic quoted from Huxley (1999).

All marine turtle species are threatened with extinction (see Box "Sea turtle numbers are in decline" on page 4). Turtles may die from natural causes or they may suffer threats to their livelihood, and at times their lives, from a range of human activities.

## Natural causes of turtle deaths

Predation is a major natural threat to turtles through their entire life cycle. Predators such as ants, crabs, dingos, foxes, pigs, goannas, jaguars, raccoons, skunks disturb and eat eggs on the beach. A wide range of birds and fish prey on hatchlings and large predatory fish may take juveniles and adults.

Turtles suffer from a range of diseases and parasites. These include cutaneous fibropapillomatosis or fibropapilloma tumours, roundworms, blood flukes and encrusted barnacles. Bacteria and fungi are also implicated in the death of eggs and individual olive ridley turtles.

Fibropapilloma tumours can infect all the soft parts of a turtle's body and grow mainly on the skin, but they also appear in the mouth, eyes and internal organs. The United States Turtle Recovery Plan identifies fibropapilloma tumours as the greatest single treat to green turtles. In the past this disease appeared to be confined to green turtles, now it is recorded on other sea turtle species in increasing numbers (see Box "Fibropapilloma tumours" on page 6).

At times plant roots invade and destroy eggs in nesting sites. As well incubating eggs may be disturbed by later arrivals of turtles preparing to lay their eggs.

Eggs may be lost as beaches erode, or as sand accretes or through tidal inundation and heavy rain.

Morning water temperatures below 8°C have caused hypothermic stunning of turtles in Florida and deaths due to hypothermia have been reported elsewhere in the United States of America.

## Human threats to turtles

### *Loss of nesting habitat*

A major reason for the worldwide decline of turtles is the loss of nesting habitat. Beaches are suffering from a number of assaults, such as more people wanting to live close to beaches and recreate on beaches.

In the nesting season turtles suffer from the activities of people on the beach; lights on the beach and roads and buildings near the beach, compaction of sand, formation of tracks, visitors' dogs, recreational furniture and recreational vehicles. Beach cleaning equipment disturbs nests (see Box "Beach cleaning" on page 7). These impacts may cause adult females to move to a less desirable nesting place and possibly abort egg laying. Eggs may be disturbed or destroyed. Hatchlings may be unable to dig their way out of compacted sand, they may become disoriented by lights and have difficulty negotiating tracks as they make their way to the sea.

Beaches are subject to a range of human developmental activities, groynes are built, beach erosion occurs, sand is added to beaches, sand is taken away from beaches,

## Sea turtle numbers are in decline

There has been a noticeable and generally drastic global decline in the numbers of marine turtles. For example in Australia there has been an estimated decline of 50 to 80% in the numbers of loggerhead turtles between 1970 and 1990.

Flatback turtle, Wild Duck Island Great Barrier Reef.
*Don Henry.*

The International Union for the Conservation of Nature (IUCN) regards hawksbill turtles as a critically endangered species, while the remaining six (6) marine turtle species are regarded as being endangered. Both the Convention for the Protection of Migratory Species (CMS) and the Convention on International Trade in Endangered Species (CITES) have listed marine turtles. This provides some protection for marine turtles but only by those nations who have signed these conventions.

Kemp's ridley turtle.
*Peter Bennett and Ursula Keuper-Bennett*

Five of the marine turtle species occurring in Australia are listed as threatened under the Commonwealth Endangered Species Protection Act (1992). The loggerhead turtle and olive ridley turtle are listed as endangered; the green turtle, hawksbill turtle; leatherback turtle and the flatback turtle are listed as vulnerable (Schedule 1, 15 May 1999).

rock walls are built, jetties are installed. All these activities environmentally damage and change the nature of the beach. A beach, which was once suitable for turtle nesting, may be lost.

### *Poaching and hunting*

Turtle eggs are regarded as highly desirable and are collected in many parts of the world. In northern Australia, Papua New Guinea, Asia and the Pacific islands turtle eggs are an important source of food for many people. In the United States of America turtle eggs are said to be superior to chicken eggs. As well females may be captured for their meat and shells when they leave the ocean to breed.

Turtles and turtle products are being harvested in an unsustainable fashion throughout the world. This is a major threat to the survival of sea turtles. (See Box "What happens to turtle populations when over harvested?" on page 8.)

### *Threats in the marine environment*

Most marine turtles (with the exception of leatherbacks) leave the ocean currents and live in shallow coastal waters. Here they are particularly subject to a number of threats; including commercial fisheries, dredging, collision with boats, mining and exploration, ingestion of marine debris and general degradation of their feeding areas by heavy sediment loads, sewage outflows and toxic matter.

### *Commercial fisheries*

Commercial fishing is a very serious threat to turtles (see Box "Turtle decline and ocean fishing" on page 7). Fishing mortality includes hunting for food and shells, however probably the greatest threat is the incidental capture of turtles during other fishing operations prior to the introduction of Turtle Extractor Devices (TEDs). Prawn (or shrimp) fishing is considered to be the most problematic.

In the United States of America there are estimates of 5,000–50,000 loggerheads and 500-5000 Kemp's ridley turtles killed annually through accidental capture in shrimp nets. In addition gill nets, traps, longlines and entanglement in fishing gear are responsible for additional deaths — up to 5000 loggerheads and 500 Kemp's ridley turtles per annum (National Research Council (USA), 1990 page 5).

Trawler streaming nets off Bundaberg Queensland.
*GBRMPA S.Browne*

Typical inshore prawn trawler catch with a still living turtle.
*GBRMPA D. Moore.*

Prawn (shrimp) nets without Turtle Excluding Devices (TEDs) trap and drown turtles. While turtles can stay underwater for long periods they need to return to the surface to breathe. Observations show that the number of dead turtles increases with the time of the trawl.

In Australia, the Draft Recovery Plan for Marine Turtles in Australia stipulates that, Turtle Excluding Devices (TEDs) will be mandatory in 2000 in the northern prawn fishery. It is mandatory for trawlers working the waters of the Great Barrier Reef Marine Park (GBRMP) to have Turtle Excluder Devices (TEDs) and Bycatch Reduction Devices.

Many turtles drown once they become entangled in nets, lines, ropes and other floating fishing gear.

### *Shark control*

Turtles may be killed in netting set up to protect beaches from sharks.

## Fibropapilloma tumours

Fibropapillomatosis (or fibropapilloma tumour) was first reported in the 1930s on the occasional green turtle in Florida. It has since been reported worldwide (see Map). Tumours have also been seen on loggerhead turtles, olive ridley turtles, Kemp's ridley turtles and flatback turtles. In some places it is present in a small proportion of the population, as low as 1.4%, while in others there may be as many as 90% of turtles with the tumours. Several viruses (including a herpes virus) are known to be associated with the tumours, however the actual cause of the tumours is as yet unknown. A mid-June 1998 survey of turtles in Moreton Bay, southeast Queensland found 17% of the green turtles and 8% of loggerhead turtles had tumours.

Tumours usually occur near the eyes, throat and often internally. As they get larger the turtle has difficulty seeing, eating and breathing. The turtle wastes away. In green turtles the tumour affects predominantly younger sexually immature turtles and females appear to be more vulnerable than males. There are suggestions that the disease is most often found in areas with high densities of algae, which in turn support high densities of turtles. This profusion of seaweed appears to be due to nutrient overload from local outflows of sediments and sewage. (This is certainly the case in areas where medium to high numbers of turtles are infected; eg Honokowai, Hawaii; Sebastian Inlet, Indian River Florida; and Moreton Bay, southeast Queensland). In these food rich sites turtles gather together in apparently social groupings known in Hawaii as 'turtle houses'. Female turtles appear to be more social than males, and form these aggregations in the company of juveniles. The sites of these aggregations become 'cleaning stations' for cleaner fish, which work over the turtles removing parasites, algal growth and the like. There are suggestions, at this stage unproven, that the disease is passed from turtle to turtle through the actions of cleaner fish, which pass the infection on from infected to uninfected individuals.

Places around the world where sea turtles with fibropapillomas have been found.
*Prepared by Dr H Herbst and used with permission from Ursula Keuper-Bennett and Peter Bennett*

Green turtle with tumours.
*Ursula Keuper-Bennett and Peter Bennett*

The Marine Turtle Recovery Plan notes with concern the impact of shark control measures upon turtle mortality in Queensland. Monitoring the impact of shark netting protecting Queensland beaches has been undertaken for many years but Queensland authorities have been reluctant to adapt less harmful practices.

### *Dredging and collisions with boats*

In Australia, particularly in Moreton Bay and Hervey Bay (Queensland), there are reports of a number of turtle deaths due to boat collisions. The Marine Turtle Recovery Plan recommends that where there are high levels of boat strikes some 'thought should be given to restricting speed in those areas'.

In the United States of America an estimated 400 turtles are killed annually by collisions off the coast (National Research Council (USA), 1990 page 8). In addition USA estimates suggest that dredging operations can cause 0.001 to 0.1 turtle deaths per hour. This means that if it takes 1,000 hours to undertake maintenance dredging for channel 100 turtles could be killed.

### *Plastic, other marine debris (including oil spills, shipping discharges)*

A large amount (around 24,000 metric tons) of plastic material finds its way into the world's oceans each year. Plastic material is commonly found in the guts of stranded turtles. Because of the food preferences of leatherback turtles (jellyfish) and green turtles (bottom dwelling plants) these species are particularly susceptible to mistaking plastic bags for food and eating them. Once swallowed plastic bags may obstruct the stomach, interfere with respiration and buoyancy and eventually lead to a slow and lingering death. Floating plastic debris and other debris such as oil residues drift on the surface of the water and have the potential to effect the hatchlings living there.

Green turtle.
*Peter Bennett and Ursula Keuper-Bennett*

### *General degradation of turtle habitat*

Most turtles feed in coastal waters of the continental shelf. Current land based activities such as agricultural, residential developments and industry are having sustained and noticeable impacts on these waters. These include: sediment from agricultural and residential development, chemicals used by industry, agriculture and household gardens and sewage outflows via rivers and creeks into estuaries and associated waters. Such pollutants have severe impacts on sea grasses, benthic feeding habitats and coral reefs. Large areas of sea grass are being lost. For example, in Moreton

Bay (Queensland) there have been considerable losses of sea grass beds due to increase sedimentation (*Bulletin* 1999 this issue). Coral reefs and seagrass beds are threatened with sea temperature change as well as the additional sediments and nutrients, which promote the growth of algae and the decline of hard corals.

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Why Howzit is Dying www.turtles.org./why.htm


## Beach cleaning

In northeast Arnhem Land, the Yolngu people through their land management agency, the Dhimurru Land Management Aboriginal Corporation, turned down an offer to clean up the rubbish on their local beach with a mechanical cleaner. They were concerned about the damage such a device would cause to turtle nesting habitat. Concerns included the destruction of the littoral vegetation and the potential problems with replanting eroding areas. To get support for their position Dhimurru contacted the global electronic turtle network CTURTLE. In next to no time people responded with information supporting the Dhimurru's contention that mechanical beach cleaners are not a good idea for sea turtle nesting beaches. Alternative strategies are being developed to reduce the amount of litter on the beach. These include hand collection of rubbish and reducing the amount of alcohol consumed on the beach.

## Turtle decline and ocean fishing

Leatherback turtles nest in profusion on Pacific beaches of west Mexico. In 1982 the population was estimated to be in the tens of thousands or about 50% or more of the world's population of leatherbacks. The first systematic survey of leatherbacks nesting on the Pacific coast beaches was undertaken in 1996 and no fewer than 100 females came ashore to lay their eggs. So since 1984 there had been an estimated annual decline of 22.7 % in the number of adult females nesting on these beaches.

What was the cause of this drastic decline? No one knew.

In 1997 nine (9) leatherbacks were equipped with satellite transmitters while nesting at Mexiquillo beach. The results of the first nine months of tracking showed that the Mexican leatherback turtles after laying set out on a long migration to South American waters.

South American waters can be problematic for turtles because of a growing fishing industry, which has not been curtailing its impact on turtles. Chile supports the largest gillnet and longline swordfish fishery in South America. This fishery is growing at a rapid rate. In 1987 the gill net fleet spent 4,777 days at sea while in 1993 they spent 40,692. The gillnet fleet working out of Chile may have killed as many as 1660 leatherbacks in 1997 and swordfish fisheries of Chile and Peru may kill a minimum of 2,000 turtles annually.

These figures are estimates and only take into account the swordfish fisheries. They do not include the growing number of longline fleets operating in these waters.

Leatherbacks are also being killed by driftnet fleets, which target squid and tuna in the North Pacific. 1000 leatherbacks were captured in 1990-1991. It is not known how many died after capture. Many leatherback turtles break free of the net but remain entangled in bits of the net and there are estimates of up to 100% mortality due to entanglement.

It seems that the incidental killing of leatherbacks by fishing fleets may be seriously implicated in the rapid and alarming decline of what was once the largest leatherback turtle population in the world.

## What happens to turtle populations when over harvested?

Sea turtles are long lived and reach sexual maturity within 3–50 years depending on the species. Over harvesting of either the eggs or nesting females can occur for years before there is an obvious drop in females coming ashore to lay.

**Hypothetical — 100% egg harvest**

In many parts of the world eggs of marine turtles are collected from nesting sites. If we assume that female green turtles take 20–50 years to reach adult hood and continue to lay eggs for 20 years what would happen if all the eggs on a nesting beach were harvested for 10, 20, 50 and 70 years?

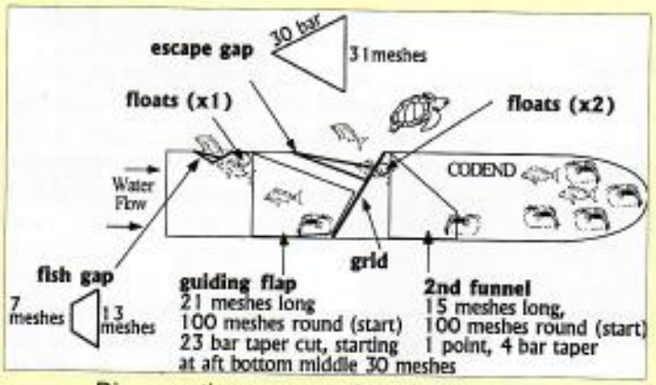
After 10 years of 100% egg harvest, females would still be visiting the beach but no hatchling turtles would remain in the population and the number of juveniles would be reduced. In twenty years adult females will visit the beach but the numbers of juveniles and subadults at feeding grounds would be falling. After 50 years adults would still visit the beach however there would be no juveniles or subadults present at the feeding grounds. By seventy years no turtles would visit the beach, as all the adults would have died.

**Hypothetical — 100 % adult female harvesting before laying**

What would happen if all the nesting females were harvested from a nesting beach from 1975 till into the next century? Such harvesting has been reported for instance in the 1980s in the Seychelles where 100% of turtles were captured on nesting beaches before they laid their eggs. In our hypothetical example we assume that from 1975 all adults females reaching the nesting beach are captured prior to egg laying and no hatchlings enter the population. Hatchlings of 1974 grow and become mature in about 25 years, and juveniles and subadults, which were hatchlings before 1975 mature thus adult turtles, keep entering the population. If the adult female harvesting continues, the hatchlings of 1974 will enter the population as adult females in about 2000. This will be the last of the turtles coming to this beach and if adult females continue to be harvested after 2000 this turtle population will be extinct around 2030.

### An example of a TED

The AusTED (illustrated below) has been used along the Queensland coast and the Gulf of Carpentaria. In general the AusTED reduces bycatch without prawn loss on clean grounds but doesn't work so well on dirty ground. No single TED works well in all fishing conditions. (Source — Bycatch Newsletter 1997, 2: 3.)




Diagramatic representation of an AusTED.

*QDPI*

Hatchlings climbing out of a nest on Heron Island, Great Barrier Reef.

*GBRMPA – R.Fitzpatrick*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Kris Plowman, Editor.

## What can I do?

You can help conserve marine turtles by:

### Caring for turtles

- Join a turtle watching and monitoring group; join a conservation group or local community group with an interest in marine turtle conservation.
- If you are interested in volunteering in turtle research contact:
  Queensland: Dr C Limpus, Turtle Research Program, EPA, Box 155 Albert Street, Qld 4002;
  Western Australia: Dr Bob Prince, Turtle Monitoring Program, Wildlife Branch, CALM, PO Box 51, Wanneroo 6065;
  Northern Territory: Turtle Monitoring Program, Northern Territory Department of Parks and Wildlife, PO Box 496, Palmerston, NT 0831.
  To become a volunteer you will need to undertake a training program.
- Never discard old fishing lines, plastic or other rubbish on the beach or into the sea.
- When boating always be on the lookout for turtles and avoid collisions.
- Help control foxes, pigs, dogs and people near nesting beaches. Do not light fires, use torches, vehicles or boats on or near nesting beaches and resist walking on the beach and/or disturbing nesting turtles.
- Encourage local councils to develop planning schemes to ensure that nesting beaches are not disturbed by human activities.

### Fishing carefully

- Check longlines, gillnets and lobster/cray pots frequently and disentangle any turtles caught accidentally. If an accidentally caught turtle is in a coma keep it on board belly down and head sloping downwards until it revives. If turtles are accidentally killed return the turtle tag to the address on the tag noting the date, species, size, sex and location of the take.
- Use Turtle Excluding Devices (TEDs) when trawling or fish netting.
- Avoid trawling near turtle rookeries and avoid collisions with turtles.

### Coastal and ocean care

- Dispose of your waste carefully no matter where you live. Some materials should be used sparingly and never end up in stormwater, streams or the sea. These include:
  - ✧ Petrol, diesel, motor oil, coolants
  - ✧ Furniture polish, metal polish, nail polish
  - ✧ Use detergents, cleaning agents and washing powders low in phosphates; use these products sparingly.
  - ✧ Batteries — dry cell contain mercury, cadmium. Wet cell batteries can be recycled.
  - ✧ Household paints — Don't rinse paintbrushes etc near drains.
  - ✧ Fertilisers and pesticides — most contain toxic substances, where possible use composts.
  - ✧ Swimming pool backwash waters, leaves, grass, garden clippings, animal droppings, plastic, plastic bags, bottles and paper.
- Use all products derived from fossil carbohydrates (eg fossil fuels) sparingly and assist in reducing global warming.
- Encourage your local council and State Government to ensure that sewage with high nutrient loads is not emptied into streams or the oceans. Insist that your council puts in place plans to reduce the nutrient loads in sewage and to explore safe alternative methods of processing human waste such as composting toilets.
- Encourage your local council and State Government to work with developers and business including agriculturists to reduce the amount of sediments being washed off the land and into the coastal seas.

### Traditional indigenous turtle care

- Take immature turtles rather than adults, and in the mating and nesting season take males rather than females.
- Collect eggs from nests that are threatened by the tide.

## Are You Concerned With Marine Turtle Conservation?

***Join the Australian Marine Conservation Society (AMCS) and make a difference.***

AMCS is a national conservation organisation with branches in Western Australia, South Australia, Victoria, New South Wales and Queensland.

❒ ***Yes,*** I want to join AMCS and help protect our waterways, coasts and oceans.

My name [Mr/Mrs/Ms/Miss]⇩

.....

Address.....

.....

Postcode.....

Phone ( ) .....

E-mail .....

Special conservation interests:

.....

.....

### Membership Options (please select ✓ one)

*Please see donation info below before choosing*

❒$25 Individual ❒$30 Family
❒$35 Overseas ❒$15 Concession
❒$30 Institution ❒$15 Library
❒$450 Life ❒$600 Institutional Life

### Donations

Freecall 1800 066 299 for further information

*Your membership in the form of a donation (monthly or otherwise) will enable us to plan our campaigns more effectively. No further membership payment is required for donations totalling more than $25 annually.*

❒ Yes, I would like to make a donation of:
❒$100 ❒$50 ❒$25 ❒$10 ❒Other .....
Donations of $2 or more are tax deductible.

### Monthly Donations

❒Yes, I am able to give a monthly donation
❒Please debit my credit card once a month until further notice with the amount indicated below:
❒$25 ❒$20 ❒$15 ❒$10 ❒Other .....
Receipts will be issued in June of each year.

### Payment Options (please select one option)

❒I wish to pay by cheque (not for monthly donations, please). Please make cheques payable to "AMCS".

❒Please debit my credit card⇩
❒Visa / ❒Bankcard / ❒Mastercard

Card expiry date ...../.... Card number⇩

_ _ _ _ . _ _ _ _ . _ _ _ _ . _ _ _ _

Name on card⇩

.....

Signature .....

Date .....

Phone ( ).....

Please return this form to:
Reply Paid 1, AMCS, PO Box 3139, Yeronga Qld 4104

# Conservation and management of marine turtles in Australia's region

Conservation and management of marine turtles is problematical because they are no respecters of national boundaries. For example loggerhead turtles breeding in Australia have been recorded in Indonesia, Papua New Guinea, the Solomon Islands and New Caledonia as well as on extensive areas of the Australian coast. Leatherback turtles and olive ridley turtles on the other hand spend their non breeding lives in Australian waters, with the majority breeding in Java, Malaysia, Irian Jaya, Papua New Guinea and the Solomon Islands. The world's largest olive ridley breeding site is on the east coast of India at Orissa. Populations of hawksbill turtles breed in Australia and then take up residence in the coastal waters of the islands of Indonesian and Malaysia, while other populations breed on beaches in Indonesia and feed in Australia waters.

Threats to turtles occur in all waters irrespective of national boundaries. These threats are often more severe in more populated and less developed areas of the region. In many places people, such as indigenous communities in northern Australia, coastal communities in Irian Jaya, Papua New Guinea, some Pacific Islands and a number of local populations in South East Asia, rely on turtle eggs and meat for food.

## Case study — Orissa (east coast of India)

Conservation of sea turtles is difficult worldwide however there are additional problems to be resolved in southeast Asia. Rapid change is under way including increases in population, development of industry and changes in traditional resource use such as fishing. Orissa on the eastern coast of India provides examples of these challenges. The coast of Orissa has nesting sites, which are visited by the largest number of olive ridley turtles in the world. Recently there have been reports of tens of thousands of dead olive ridley turtles stranded along the coast each year.

The increasing number of stranded olive ridley turtles mirrors the increase in motorised fishing. There are reports of dozens of turtles being caught in a single trawl. This is occurring despite fishery laws which when enforced have reduced the number of turtle deaths. Areas offshore of nesting beaches need to be patrolled regularly, the fishing laws enforced and the use of Turtle Excluding Devices (TEDs) encouraged. Local versions of TEDs have been designed in collaboration with local fishers. However there has been little effort by the Indian Government or the Orissa State government, to involve local fishers in turtle conservation through the testing, assembling and distribution of turtle excluding devices. Many local fishers resist the use of turtle excluding devices as they reduce the bycatch of sharks and rays and for the less well off every fish counts.

Difficulties arise with jurisdiction. The Indian State Forest Department (part of the Indian government's Ministry of Environment and Forests) is responsible for, and funded to look after marine conservation matters. This includes protection of sea turtles and the development and implementation of

Flatback hatchling in water.
*GBRMPA – B. Legg.*

Hawksbill turtle.
*Peter Bennett and Ursula Keuper-Bennett*

TEDs. Despite past assurances this work has not been undertaken. The administration of the Orissa Marine Fisheries Act is the job of the Orissa State Fisheries Department and includes issuing licences for gill netting and trawling. There is token funding (1,000 rupees or US$25) provided for sea turtle conservation. Apparently neither department adequately enforces the restriction of vessels entering out of bounds waters (turtle sanctuary) adjacent to nesting beaches or the more general restriction on vessels to sail less than 5 km from the coast.

Other threats to sea turtles in this area (ie Bay of Bengal) are: artificial light on the nesting beaches due to the lights from a missile testing site and a chemical plant; and the development of a major highway along the Bangladesh coast. While Orissa state laws regulate development there are no laws regulating light pollution. The proposed coastal road will cause major environmental problems especially to nesting areas. In this case it appears that government regulations relating to environmental assessment were not followed.

However it is not all bad news. The Indian Government launched 'Project Sea Turtle' in mid 1998 ', which will involve all maritime states. It will include: extension and training programs on the construction, installation, distribution and use of TEDs; the development of adequate legislation for the use of TEDs; investigation of the impact of gill nets and fine filament nets; protection of nesting beaches, and the involvement of

local people in the conservation of sea turtles.

## Conservation within our region

Nine ASEAN (Association of South East Asian Nations) countries headed by Malaysia signed a Memorandum of Understanding after the 1st ASEAN Turtle Symposium to jointly manage and protect sea turtles held in Manila, Philippines 1993. Malaysia is directing its main sea turtle conservation efforts to saving turtle eggs. Since conservation projects began the Fisheries Department has bought 1.5 million eggs for its hatchery. Malaysia and the Philippines are involved in turtle protection and research on nine islands comprising the Turtle Islands Heritage Protected Area on the Philippine-Malaysian border. This area is jointly managed under a Memorandum of Understanding between the Government of Malaysia and the Republic of the Philippines. It is the world's first trans-boundary protected area and the only conservation effort of its kind in the ASEAN region. These efforts were recognised in 1997 with the awarding of the prestigious J. Paul Getty Wildlife Conservation Prize to the Philippine Pawikan Conservation Project and Malaysia's Sabah Parks. They were commended for developing innovative approaches to protecting threatened turtles and their nesting habitats.

In July this year (1999) a 2nd ASEAN Sea Turtle Symposium on Sea Turtle Research was held in Malaysia. The Symposium delegates supported a declaration (now known as the Sabah Declaration) affirming the need for maritime nations of the Indian Ocean/Southeast Asian Pacific region to negotiate and implement a regional agreement for the conservation and management of sea turtles and their habitats.

An agreement of this sort (the Inter-American Convention for the Protection and Conservation of Sea Turtles) exists to encourage the nations of the Americas and the Caribbean to protect and conserve marine turtles throughout their territories.

The work in the Indian Ocean/Southeast Asian Pacific region continues. The Australian Commonwealth Government hosted a technical and policy workshop in October this year (1999) in Perth. This was attended by government representatives of Australia, Bangladesh, Cambodia, Comoros, India, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Oman, Pakistan, Philippines, Reunion (French Department), Seychelles, Sri Lanka, Tanzania, Thailand, United Arab Emirates and Vietnam, assisted by experts from a number of nations, regional and international organisations (ie the Convention on the Conservation of Migratory Species of Wild Animals, the IUCN, the IUCN Marine Turtle Specialist Group, the IUCN Commission on Environmental Law/ Environmental Law Centre, the USA State Department and National Marine Fisheries Service, the ASEAN Marine Turtle Technical Working Group and the South-East Asian Fisheries Development Centre. The workshop set out to identify and consider: regional actions needed to reduce threats to sea turtles; potential regional agreements and to develop a timetable for a more integrated, effective and cooperative management of sea turtles.

The meeting resolved that an Indian Ocean and South-East Asian Regional Agreement on Conservation and Management of Marine Turtles and Their Habitats was necessary. Further consultation is required to reach a consensus on the best way to draw up and implement this agreement. The nations of the Indian Ocean and South-East Asian region have resolved to make every effort to meet next year (2000) to draft and negotiate this agreement.

Unfortunately within the regions there are strong tensions between conservation and economic necessities as the 'Shrimp-Turtle' debate shows. India, Pakistan,

Loggerhead turtle.
*Sandra Edwards*

Malaysia and Thailand challenged the United Sates of America's decision to ban imports from fisheries operating without TEDs. The World Trade Organisation (WTO) upheld the challenge and ruled against the USA restrictions. It is imperative that the Indian Ocean and South-East Asian Regional Agreement on Conservation and Management of Marine Turtles and Their Habitats will include programs (in part funded and supported by developed nations) which initiate, support and encourage alternative ways for coastal people of the region to obtain protein alternatives to the sea turtles which they now harvest. The use of TEDs by fishers must be encouraged.

We look forward to the next step in this saga and trust that sea turtles survive it.

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# Green Turtles

Green turtle swimming.
*Peter Bennett and Ursula Keuper-Bennett*

Cleaner fish 'pleasuring' a green turtle.
*Peter Bennett and Ursula Keuper-Bennett*

Green turtles copulating.
*GBRMPA - M.Simmons*

A green turtle aggregation or 'turtle house' on an Hawaiian reef.
*Peter Bennett and Ursula Keuper-Bennett*

Cleaner fishes tidying up a turtle carapace.
*Peter Bennett and Ursula Keuper-Bennett*

## Want to know more about turtles?


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