Leatherback Sea Turtle

Dermochelys coriacea

www.euroturtle.org

Picture

English - Leatherback turtle
French - Tortue luth
Spanish - Tortuga laúd

Leatherback sea turtle hatchling
illustration: M. Demma © ICRAM

Adult leatherback sea turtle
illustration: M. Demma © ICRAM

Leatherback sea turtle head
illustration: M. Demma © ICRAM

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Size and Body Mass

N.B. All figures are FAO (Food and Agriculture Organisation) unless otherwise stated.

Normal variation in Straight Carapace Length for mature females:

124.0 - 256.5 n=669 (n = number in sample)

131.6 is the mean length; n= 669

World variation: figures, unless stated, are for mature females

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Mexico (Mexiquillo)              129.0-163.0, mean = 145.8, n=85
Costa Rica (Atlantic Coast)      134.6-172.7, mean = 152.1, n=76
Costa Rica (Pacific Coast)       128.0-151.0, mean = 141.0, n=18
Puerto Rico                      153.0-160.0, mean = ?      n=2
Trinidad                         135.0-185.0, mean = 156.5, n=20
Colombia                         140.0-170.0, mean = 155.6, n=7
Guyana                           152.5-162.5, mean = 150.8, n=3
Surinam                          143.3-164.5, mean = 153.8, n=16
Sri Lanka                        147.0-165.0, mean = 155.9, n=4
Australia (Queensland)           150.5-174.5, mean = 162.4, n=9
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Overall body mass in Kg:

World variation:

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Costa Rica              258-506
Surinam                 302-425
Senegal                 200-250
India                   272-365
Sri Lanka               301-448
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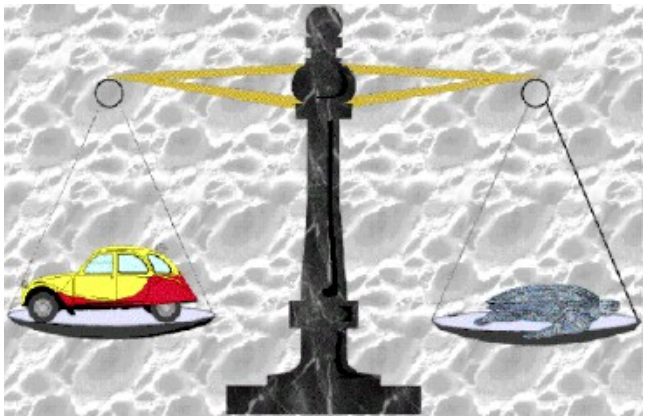
The largest ever recorded leatherback turtle was over 200cm long and weighed 917.7 kg. It was found dead on a beach in Wales in 1988 and is now in the Welsh Museum in Cardiff.

The mass of an average sized leatherback turtle is comparable to a Citroen 2CV!



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Diagnostic Features

- Small head - takes up only 17 - 22.3% of carapace length.
- Beak is weak, but sharp edged, lacking crushing surfaces.
- Upper jaw has two pointed cusps in front.
- Lower jaw has a single central hook that fits in between those of the upper jaw.
- Carapace reduced and formed by a mosaic of small polygonal osteodermic pieces supported by a thick matrix of cartilagenous, oily dermal tissue.
- The carapace has 7 dorsal and 5 ventral keels.
- Flippers large and paddle shaped, in adults they often equal or exceed half the SCL
- Claws may be visible in hatchlings but disappear in subadults and adults.
- Colour:
    - Dorsal side essentially black, with scattered white blotches.
    - White blotches arranged along the keels and concentrate laterally.
    - The underside of the turtle is whitish due to the number of white blotches.
    - Many have pinkish blotches on the neck, groin, shoulders and head.

Geographical Distribution

- The leatherback turtle is much better adapted to temperate climates (a thermoregulator) than any other of the turtles, and is thus the most widely distributed of all the turtles.
- Their breeding grounds are located in the tropical and subtropical latitudes.
- The turtles are regularly seen in the North Sea, Barents Sea, Argentina and Chile.
- The nesting leatherback turtle can be found throughout the Atlantic, Pacific and Indian Oceans, and has been sighted, albeit infrequently, in the Mediterranean. It is thought that the Indo-pacific population is most underthreat.
- As the leatherback turtle spends most of its life in open water, very little is known about the hatchlings after they leave the nests.

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Habitat and Biology

illustration: M. Demma © ICRAM

Typical habitat:

- The Leatherback is a highly pelagic species which in general only approaches the shores during the reproductive season. Small groups of individuals have been sighted moving together in coastal waters, although these have been centred on concentrations of the jellyfish on which it feeds. The leatherback seldom forms large aggregations.

Migrations:

- When travelling, the leatherback turtle swims 'erratically', looking for food. Until recently, there has been no information about the migratory routes of the Leatherback Turtles. Now, electronic tagging techniques are enabling a picture of these routes to be drawn up. This information is still being collected.

Leatherback with satellite tracking device.

Nesting areas:

- Although there have been a few records of leatherback turtles nesting in the Mediterranean, it is not thought to be a regular occurence there. The Eastern Pacific Ocean has the highest number of nesting sites, particularly on the Western coast of Mexico, where, in the past, 80,000 nests have been recorded in one year. Some nesting also occurs on Costa Rica, Panama, the West coast of Columbia, Ecuador and Peru, but with no more than 500 nests per year per site. In the Western Atlantic Ocean, the main nesting sites are Trinidad and Tobago, Windward Islands, Leeward and the Virgin Islands, Costa Rica, the East coast of Puerto Rico,Surinam and French Guiana, Brazil, and Guyana.
  In the Eastern Atlantic Ocean very little recording has been carried out.

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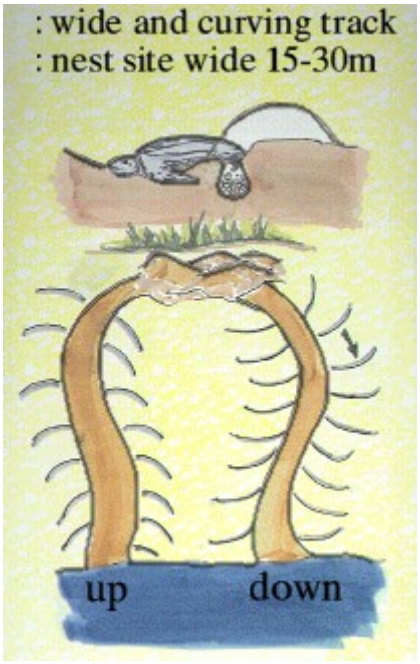
In the Indo-pacific region virtually every coastal area has some record of nesting but at very low density. There are a few sites with high nesting concentration, such as Irian Jaya and Western Sumatra. There are no known nestings on central pacific islands, but nesting has been recorded on South Pacific islands.

Nesting Periods

Eastern Pacific:	October to March
Western Atlantic:	January to July
Caribbean:	April to October
Eastern Atlantic:	Dependent on latitude
Indian Ocean:	December to April
Western Pacific:	Dependent on latitude



Nesting behaviour:

illustration: M. Demma © ICRAM

- They nest only on beaches immediately adjacent to deep water and so quite steeply shelving, and where there are no fringing reefs. Such situations are subject to high-energy wave action and so liable to flood damage. Nests are sited on, or just above the high water mark: flooding can cause the whole clutch to fail. Little scientific data has been collected which describes the exact nature of the leatherback nest, or the time taken and techniques used to construct it.

Egg number, size and weight:

- The Leatherback Turtle has a cycle of 2 to 3 years. Females usually lay 4 or 5 times a season. Each clutch of eggs is between 60 and 125 eggs. Approximately a third of these tend to be small yolkless eggs.

	Clutch size		
	Normal Eggs	Yolkless eggs	Sample size
Mexico:	mean = 66.1	43.4	(n=758)
Puerto Rico:	mean = 78.5	30.8	(n=9)
Costa Rica Pacific Coast:	mean = 81.6	29.8	(n=46)
Costa Rica Atlantic Coast:	mean = 65.5	31.5	(n=6)
South Africa:	mean = 103.9	30.0	(n=252)
French Guiana:	mean = 88.1	29.1	(n=19)

- Mean diameter of normal egg ranges from 51.0 to 54.4 mm; mean diameter for yolkless egg ranges from below 40mm to above 55mm. The mass of the eggs varies form 70.0 to 103.6g. Data on egg sizes and weights is scarce.

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Size and weight of hatchlings:

- The size and weight of the hatchling depend on the egg size. They also vary considerably between nesting sites, seasons and years. The SCL varies between 50 and 70mm and the mass of the hatchlings can be between 35 and 50g.

Incubation period:

- Incubation period varies from a minimum of 50 to a maximum of 78 days. Due to the fact that the leatherback turtles lay their eggs so close to the high tide mark, conservationists often transfer the nests so they are not innundated by the tide. Incubation time in transplanted nests is shorter than in undisturbed nests. Exact data is scarce for non transferred nests. Some incubation periods follow:

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Mexico:              mean =65.2,          (n=12)   transplanted
Puerto Rico:         mean =57.6,          (n=9)    transplanted
Costa Rica
   Pacific Coast:    mean = 61.5,         (n=?)
Costa Rica
   Atlantic Coast:   60.3 to 63.9 days
South Africa:        56.0 to 72.0 days
French Guiana:       62.0 to 72.0 days
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Maturity:

- No data

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Courtship and Mating:

- Very little is know about the reproductive cycle of the leatherback turtle. The age at which they become sexually mature is estimated to be anything between 8 and 15 years. It is believed that mating occurs offshore and comprises of two phases: courtship and copulation. The courtship lasts for approximately twenty minutes after which the female accepts the male and he mounts her carapace, embracing her with his flippers.

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Sex determination:

- There is evidence to show that the sex determination is male-biased in cool temperatures and female-biased in warmer ones. The temperature at which a 1:1 male:female ratio is achieved is between 29°C and 29.95°C.

Hatchling:

- When the hatchlings reach the surface of the nest on the beach, they pause for a short time semi-emerged before racing down the beach and into the sea.

Hatchling mortality and predation:

- Predation, as with all sea turtles, is highest during incubation and emergence periods. The predators of leatherback hatchlings are largely the same for smaller turtle species, but they are too large for smaller predators. Ghost crabs feed on eggs and embryos in the nest and attack the emergent hatchlings as they move down to the sea at night. Ants and fungi also destroy nests, as do domestic and feral dogs. Vultures, monitor lizards, racoons, opossums, coatis, genet cats and jaguars have all been recorded preying upon hatchlings and their nests. In the water, they are eaten by sea birds, such as gulls and frigate birds, carnivorous fish, and squid. Adult leatherbacks are attacked by sharks, and their bones have been found inside a killer whale.

Commensals and disease:

- Parasites such as trematodes (*Astrorchis renicapite*) and amoeba (*Entamoeba sp.*) are found in the intestines. The surface of the turtle is often covered in epibiontic organisms, for example barnacles such as *Chelonibis sp., Chonchorderma sp., Lepas sp.;* and parasitic isopods: *Excollarana sp.*.

Feeding:

Fish | Worms | Crustaceans | Sponges | Jellyfish | Molluscs | Tunicates

Illustrations (except first and second from left): M. Demma © ICRAM

- The leatherback turtle feeds mainly on pelagic invertebrates, such as jellyfish and tunicates, pelagic crustaceans (*Libinai sp.*, *Hyperia sp.*) and juvenile fish (*Trachurus sp., Urophycis sp.*). Marine plants are often ingested accidentally. The feeding behaviour of juveniles and hatchlings is unknown, but it is thought that they are pelagic and follow warm currents and eddies offshore in search of food.

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Temperature control:

- The Leatherback forages for food in temperate waters, being able to withstand temperature from 15ºC to 6ºC. It has also been shown that the Leatherbacks can dive as deep as 1200m below the sea level. At such depths, the water is rarely above 5ºC, even in tropical regions.
- Unlike almost all other living reptiles, the leatherback turtle is an endotherm, maintaining a core body temperature of around 25ºC. Although this is not as high as marine mammals (38ºC) or birds (40ºC), there is still a considerable temperature difference between the core (heart, lungs and brain) and the ambient water temperature.
- This temperature control depends on several physiological adaptations:
    - It is large - only adult leatherback turtles venture into cool waters - with a low surface area to volume ratio, so heat loss is slow.
    - It has a thick layer of blubber under its leathery skin. This layer surrounds its liver, heart and gut. No other reptile has this extra insulative layer. A thick pad of fat insulates the windpipe, neck arteries and veins from the cold.
    - There are 'countercurrent heat exchangers' (Davenport 1995) in the roots of the fore flippers and hind limbs. The arteries supplying warm blood to the limbs break up over a short distance into hundreds of smaller vessels. These are closely associated with hundreds of small veins bringing cold blood back from the limbs. The heat energy flows from the warm arterial blood into the cold venous blood. This minimises heat loss to the flippers, which are kept approximately at the temperature of the surrounding water.
    - The metabolic rate of the leatherback turtle is much greater than any other reptile. The liver is especially important in breaking down nutrients to release heat energy. There is also reason to believe that there are deposits of brown fat (Brown Adipose Tissue), which can generate large amounts of heat if required.
    - The leatherback turtle‘s blood contains amongst the highest levels of haemoglobin and myoglobin for any reptile. It is thought that this enables the turtle to dive to such great depths in such extreme temperatures.

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Threats to Survival

The threats to the Leatherback Turtle vary from region to region, but four key areas can be identified:

Loss of habitat due to commercialisation of tropical beaches (particularly tourism) and industrialisation

Accidental capture by fishing activities, due to trawl net fishing

Pollution caused by industries in tropical waters, and heavy industry in temperate migratory waters

Human predation

Animal predation

Illustrations: M. Demma © ICRAM

Human Predation

-In many countries the Leatherback Turtle population has been threatened by the unregulated harvesting of eggs. This is due to various cultural beliefs surrounding the properties of the eggs. Populations have been decimated in countries such as Malaysia, Surinam, the Guianas, and Costa Rica.
-In a smaller number of countries, the Leatherback Turtle is hunted for food. In the Kei Islands (South West of New Guinea, in the Maluku province of Indonesia), for example, leatherback turtles are hunted regularly as a source of food.

Leatherbacks are now considered an 'endangered species' throughout their distributional range. The species included in Appendix 1 of the CITES and in the Red Data Book of the IUCN.