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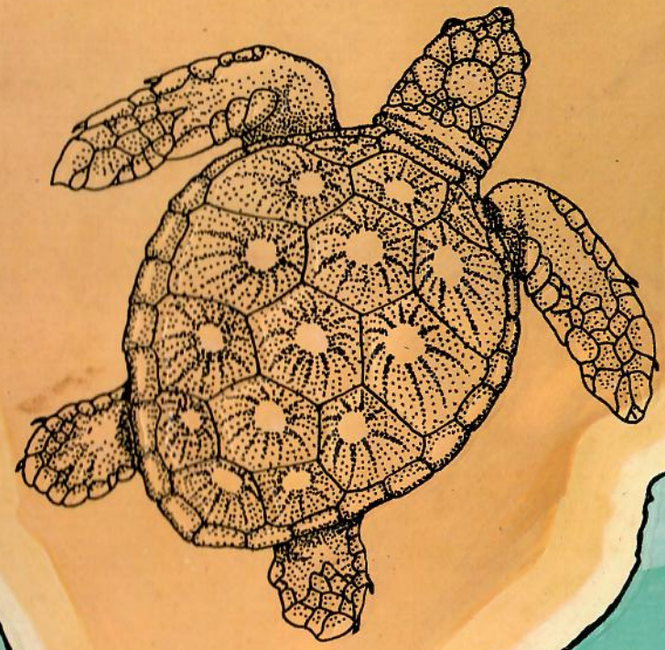
SEA TURTLES:

A GUIDE



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To: George
In return
George.

SEA TURTLES

A simple guide to the Southern African species with notes of interest on their general biology, migrations and conservation status.

by

GEORGE R. HUGHES

ISBN 0 949939 19 6
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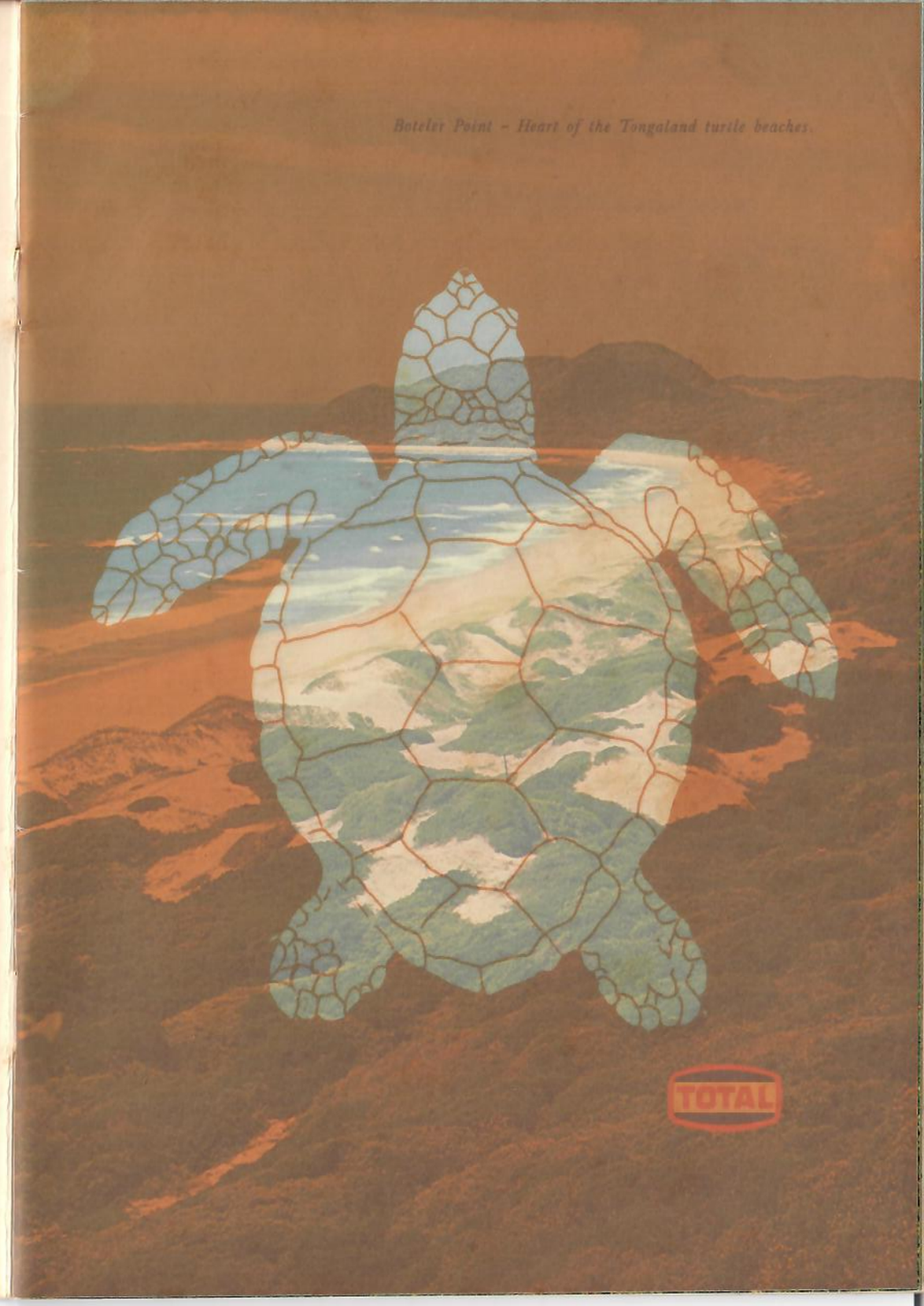

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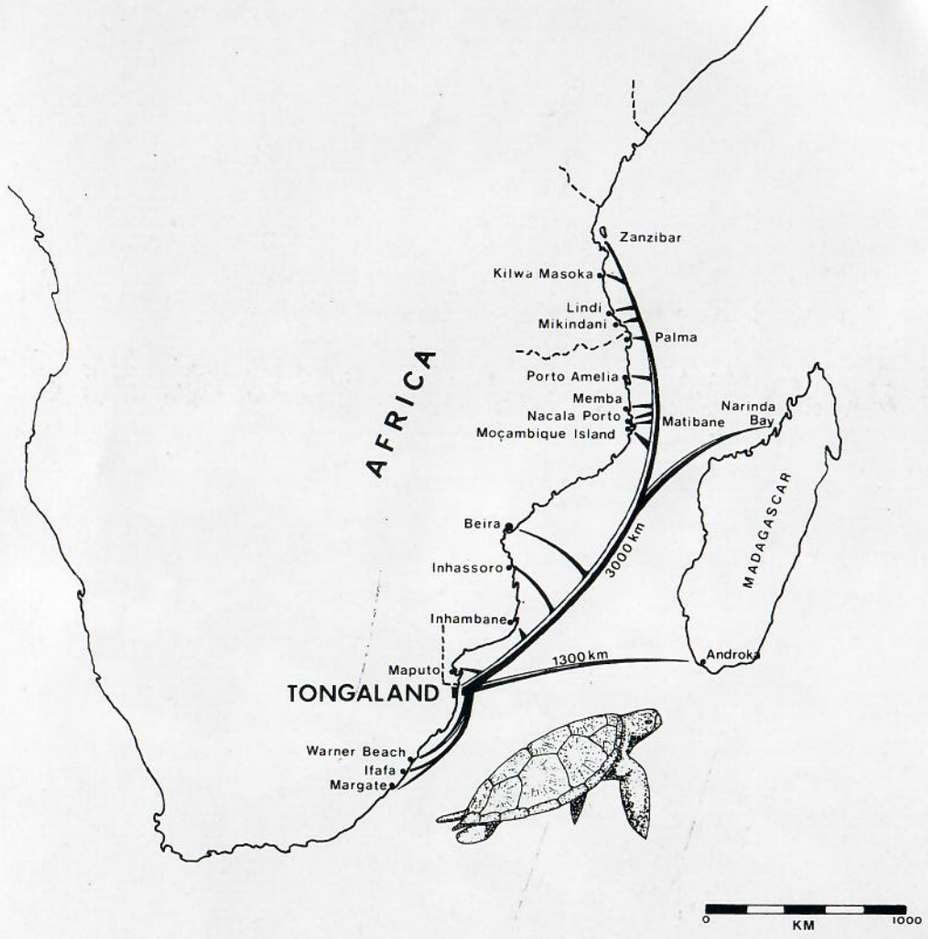
Boteler Point – Heart of the Tongaland turtle beaches.

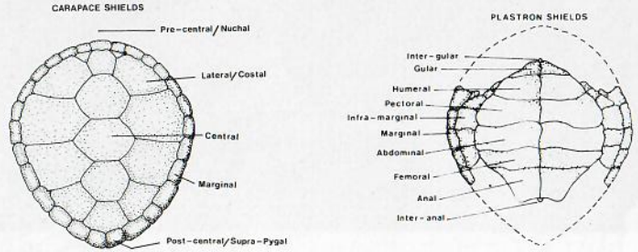


Long distance recoveries of loggerhead turtle females tagged in Tongaland. One leatherback female has been recovered from Beira

THE SEA TURTLES OF SOUTH EAST AFRICA : KEY

1. Upper jaw conspicuously bicuspid at symphysis; upper shell (carapace) covered with smooth skin (or small scales in hatchlings) overlying a mosaic of small bones and showing 7 prominent longitudinal ridges; limbs clawless ..... *Dermochelys coriacea L.* The leatherback turtle

   Upper jaws not bicuspid; upper shell covered with large horny shield overlying large bony plates; limbs with one or two claws: 2



2. Upper shell with 4 pairs of costal shields (see sketch) of which the foremost pair is never the smallest and is separated from the nuchal shield 3

   Upper shell with 5 or more pairs of costal shields of which the foremost pair is the smallest and normally in contact with the nuchal shield- 4

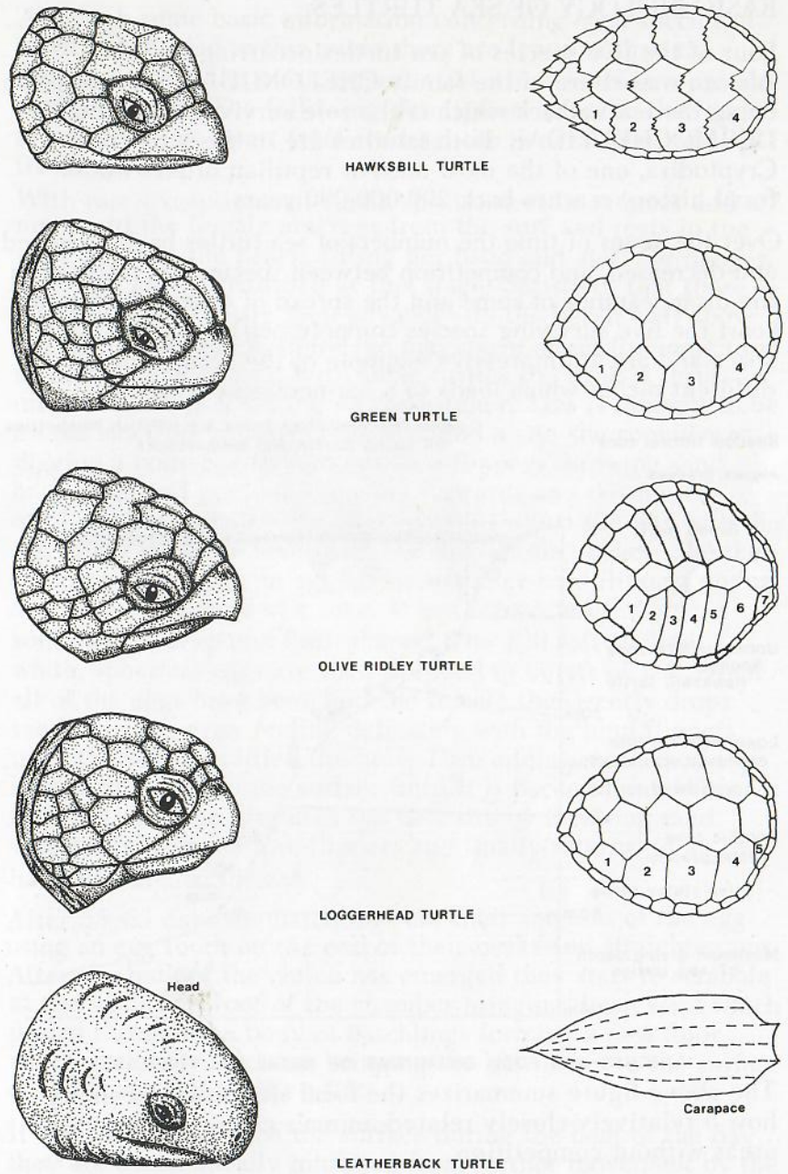
3. Snout not compressed; 2 prefrontal shields on head; shields of upper shell not overlapping (except in hatchling); usually a single claw on each limb ..... *Chelonia mydas L.* The green turtle

   Snout compressed; 4 pre- frontal shields on head; shields of upper shell strongly overlapping (except in hatchlings); usually two claws on each limb ..... *Eretmochelys imbricata L.* The hawksbill turtle

Nesting leatherback female – scale given by African guard

4. Upper shell normally with only 5 pairs of costal shields; bridge on either side of lower shell with 3 enlarged inframarginal shields without pores; colour predominantly red-brown ..... *Caretta caretta L.*
The loggerhead turtle

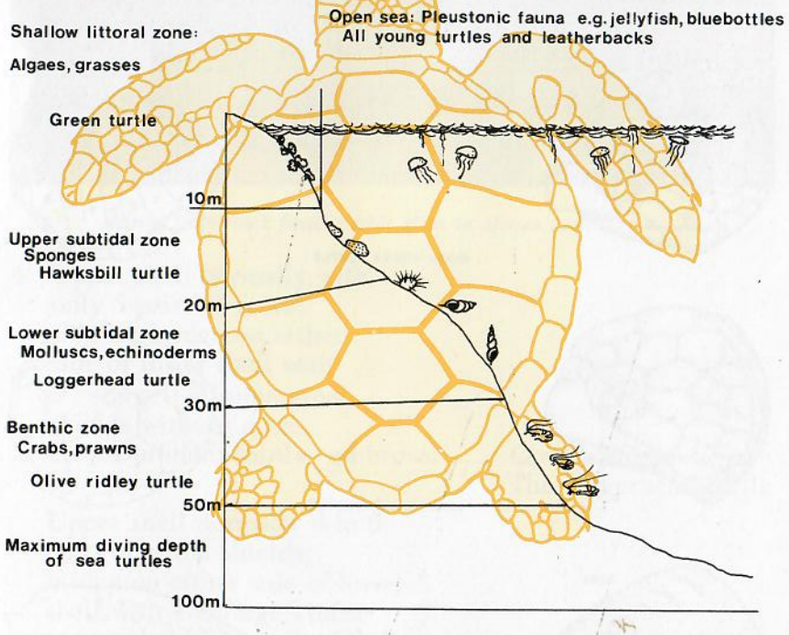
Upper shell normally 6 to 9 pairs of costal shields; bridge on either side of lower shell with 4 enlarged inframarginal shields; each with or without a pore; colour of adults predominantly olive-grey ..... *Lepidochelys olivacea E.*
The olive ridley turtle



BASIC BIOLOGY OF SEA TURTLES:

Four of the five species of sea turtles occurring in South African waters are of the family CHELONIIDAE, the exception being the leatherback which is the sole survivor of the family DERMOCHELYIDAE. Both families are in the sub-order Cryptodira, one of the most ancient reptilian orders whose fossil history reaches back 200,000,000 years.

Over the aeons of time the numbers of sea turtles have increased and decreased, and competition between species has resulted in the disappearance of some and the spread of others. Along our coast the five surviving species compete neither for food nor space and are an impressive example of the occupation of different niches which leads to a harmonious existance.



NICHES AND FOOD ORGANISMS OF NATAL SEA TURTLES

The above figure summarizes the local situation and shows how 5 relatively closely related animals can occupy the same areas without competition.

Although some basic information concerning each species of turtle is included in this guide there are features that are common to all; the most important of which is their reproductive behaviour. The following description refers to the loggerhead turtle but, apart from feeding, the general plan would fit all species.

With rare exceptions all turtle species nest in summer and at night and the female emerges from the surf and rests in the wash zone on the beach, lifting her head and alert for danger. They are easily disturbed at this stage. Satisfied that there is no danger the female then advances up the beach well above the high water mark where she may move about for some time to find a suitable site. With some turtles the beak is thrust into the sand as if testing its consistancy. This is thought to be a sand smelling activity. Having found a site she commences digging a body cavity with her fore-flippers throwing sand backwards and gradually moving forwards and downwards until she has completed a depression in which she lies with the top of her carapace level with the surrounding beach. She then commences digging an egg cavity with her hind flippers taking out a cupful of sand at a time. When completed the hole is some 45 cm deep and flask shaped. The 120 soft-shelled, white, spherical eggs are then dropped in bursts of 1-4. When all of the eggs have been laid the female then gently drops sand onto the eggs, feeling delicately with the hind flippers until the sand has filled the hole. Then adding more sand she kneads and presses the surface until it is packed hard. When satisfied she then disguises the nest site by throwing sand vigorously with the fore-flippers and finally returns, in an exhausted state, to the sea.

After 55–65 days the hatchlings cut their way out of the egg using an egg tooth on the end of their beaks and straighten out. After the bulk of the clutch has emerged they start to scrabble at the walls and roof of the chamber bringing down sand which passes through the body of hatchlings forming a new floor which gradually thickens, bringing the hatchlings to the surface of the beach rather like a lift.

If the hatchlings reach the surface during the heat of the day they are automatically inhibited from further movement by the

heat of the surface sand and will wait until the temperature drops before bursting out and running for the sea. They guide themselves by sight heading for the exact centre of the light zone which is almost always to be found over the sea horizon.

During the run to the water up to twelve percent of the hatchlings may be taken by ghost crabs *(Ocypode spp.)* and once in the sea predation on the hatchlings during their first few months of life is intense and it has been estimated that only 1 or 2 hatchlings from every thousand that enters the sea will reach maturity.

Once clear of the beach the hatchlings swim steadily for some days and enter the Agulhas Current and then are swept down the east and south coasts of South Africa as far as Cape Agulhas and some even into the Atlantic. Most are swept back into the southern Indian Ocean where they will spend anything up to three years drifting in the open sea. During this time the young sea turtle feeds on floating organisms such as bluebottles *(Physalia sp.)* and purple storm snails *(Ianthina sp.)* Following the ocean gyrals they are eventually brought back to the coasts where they start feeding on sub-tidal fauna such as molluscs and mussels.

Female loggerhead turtles can attain nesting maturity at only four years of age and it has been demonstrated that they return to the beaches on which they were hatched.

A ghost crab holds an unlucky loggerhead hatchling.

The typical turtle survey team in Tongaland:- two Kwa Zulu Couservation Officers, two students from Natal University and the Parks Board officer-in-charge; Mr Garnet Jackson.

A green turtle female makes her way to the sea

BASIC FACTS CONCERNING THE SEA TURTLES:

A. THE LEATHERBACK TURTLE - *Dermochelys coriacea:*

Dimensions:

50 – 60 mm at birth reaching adult sizes of 2,5 metres. Mass increase from 40 grams to 750 kilograms. South African record 646 kg (1420 lbs.)

Distribution:

Found in every major ocean and more widely distributed than any other species due to its ability to maintain heat when in very cold water such as that found off our west coast.

Migrations:

Ranges widely over the major oceans. Longest tag recovery record from an animal tagged in French Guiana,South America. It was caught in Ghana 10 months after tagging having travelled at least 6080 km (3800 miles).

As yet although we have tagged 355 females in Tongaland we have had only one recovery from Beira, Moçambique, 1000 km from where she was tagged.

Nesting Areas:

In our eastern area the leatherback nests along a 600 km region from the St. Lucia mouth to Inhambane in Moçambique. The population is, however, modest in Tongaland, there being approximately 50 females nesting each season.

The largest nesting areas in the world are found in French Guiana where 400–500 nest per night during the peak of the season (an annual nesting population of 4000 females) and in Malaya where 2500 females nest per season.

Reproduction:

During a nesting season each female lays up to 1000 billiard ball sized eggs in batches of 100–120 eggs. Each batch is laid at 9 or 10 day intervals depending on sea temperatures. During her lifetime a female can return up to three times to the nesting beaches. Intervals between nesting seasons can vary from one

to five years.

Eggs have high fertility (90.0%) and take up to 70 days to hatch.

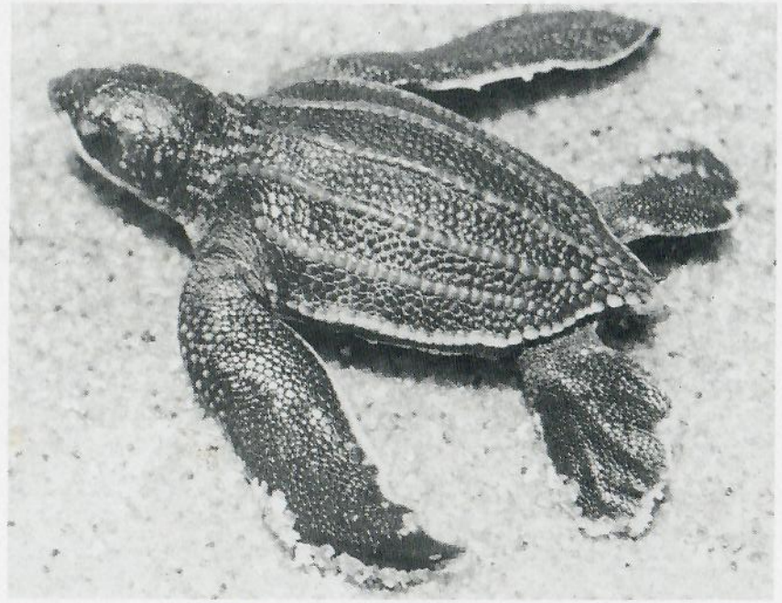
Food Organisms:

Mainly floating food at all stages of life cycle. As hatchlings; bluebottles, pteropods and other small pleustonic fauna. Adults appear to feed almost exclusively on jellyfish.

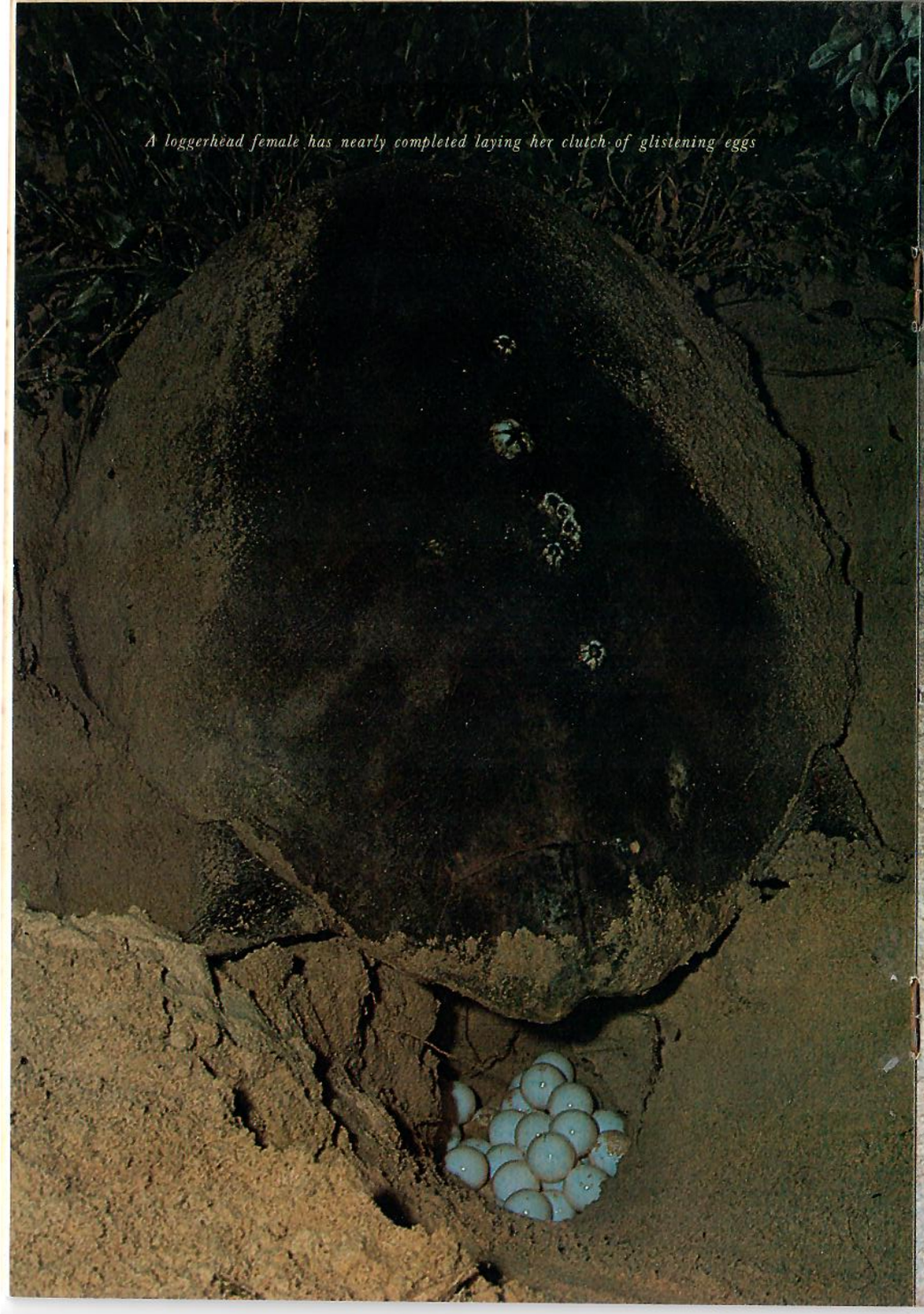
Status:

In our area the nesting leatherbacks are as well protected as possible but their outlook is gloomy in Moçambique where nesting animals are slaughtered.

Not being in demand for any particular product (except their eggs) there are some local areas where they are safe, however, they are still vulnerable and as yet no specific reserve exists for the leatherback turtle. The population in Tongaland is increasing after 14 years of protection.



A newly hatched leatherback races for the sea.



A loggerhead female has nearly completed laying her clutch of glistening eggs

Digging the nest hole, note the sand sent flying by the hind flippers

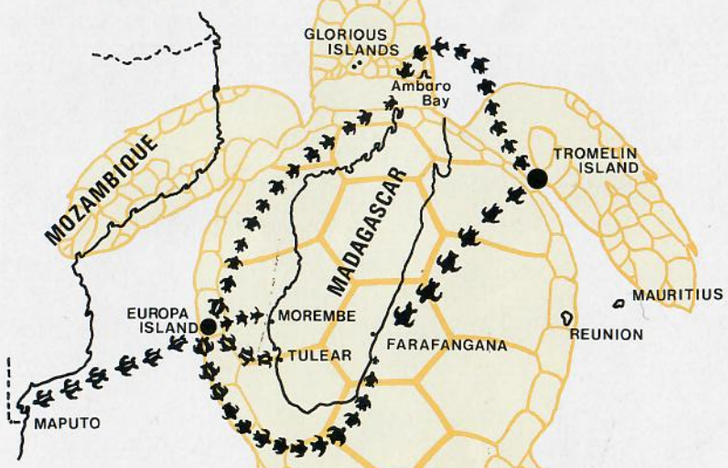
B. THE GREEN TURTLE – *Chelonia mydas:*

Dimensions:

40 – 50 mm at hatching reaching adult sizes of 120 – 150 cm with a maximum mass of 275 kg (600 lbs). The largest recorded in the South East African region is 227 kg (500 lbs).

Distribution:

Tropical throughout the world although they are found down our east coast due to the penetration of warm Agulhas Current water.



Note how Europa and Tromelin Island migrants completely bracket Madagascar.

Migrations:

Range over tropical waters travelling long distances to nesting areas. Most spectacular migration records are from the mid-Atlantic ocean where turtles nesting on Ascension Island swim across 2240 km (1400 miles) of open sea to the Bulge of Brazil where they spend their non-nesting lives.

Several thousand females have been tagged on Europa, Tromelin and the Glorious Islands. Europa and Tromelin provide many females to Madagascar and from Europa one female has been recovered in Moçambique.

Nesting Areas:

Once virtually every tropical island and mainland beach provided nesting sites for green turtles. Man's predation has reduced the number of nesting areas drastically. For example out of 15 major areas in the Caribbean in the 17 th century, only 2 remain and both are threatened.

In South-east Africa the most unspoilt nesting area extant is Europa Island with an annual nesting population of between 5 000 and 10 000 females; around 700 per night.

Most green nesting beaches consist of fine grained coral sand, although some nest on silica and others on black volcanic sand.

Reproduction:

The green turtle has a high reproductive potential, laying upwards of 600 eggs per season in batches of 150 on average every 12 days. Nesting takes place at varying intervals of at least one year between seasons. Reproductive life-time unknown.

Eggs have high fertility and take about 50 days to hatch.

Food Organisms:

Although carnivorous during the first 6–12 months of life, the green turtle is a herbivore feeding mainly on marine grasses and algaes. On the Natal coast the main food organisms are *Caulerpa filiformis, Gelidium cartilagineum, Codium manzii* and *C. dutheii*. In the more tropical areas *Cymodocea ciliata* and *Halodule uninervis*.

Status:

Still common in our area but under heavy pressure elsewhere due to their being a source of excellent quality meat and oil. In our area they are protected on Europa Island, Juan de Nova, the Glorious Islands and Tromelin Island.

Other nesting areas are the Primeira Islands in Moçambique and Moheli Island in the Comores.

C. THE LOGGERHEAD TURTLE – *Caretta caretta:*

Dimensions:

40 mm at hatching reaching 100–120 cm with a total mass of 160 kg (350 lbs). Largest recorded in our area 140 kg (305 lbs).

Distribution:

Found throughout the tropical and temperate littoral zones extending as far south as Cape Town in Africa. More common on east coast than west.

Migrations:

Range widely from nesting areas. Record tag returns are from Tongaland nesting beaches with a total distance of 2640 km (1650 miles). One female executed this voyage in 66 days an average daily swim of 40 km (25 miles). Long distance recoveries indicate that the Tongaland beaches draw female loggerheads from over 3000 km of the African coast and from Madagascar.

A newly tagged loggerhead sub-adult, note the characteristic general orange brown colour. The monel metal tag is common to all tagging programmes

Nesting Areas:

Normally in temperate zone using medium grain silica sand beaches. Three major areas are Tongaland, Natal; Japan and the south east Atlantic coast of the United States. Up to 500 females a year nest in Tongaland.

Reproduction:

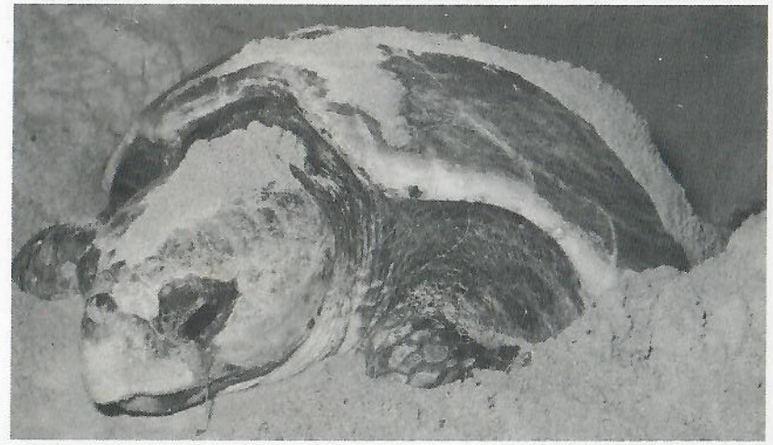
Loggerheads lay an average of 500 eggs per season in batches of 100–120 at 15 day intervals. Periods of absence from the nesting beaches vary from turtles laying in consecutive seasons to those not returning in 8 years. They can nest at least five times in their lifetime, but as yet their full reproductive lifetime is unknown.

Eggs are highly fertile (average 90.0%).

Food Organisms:

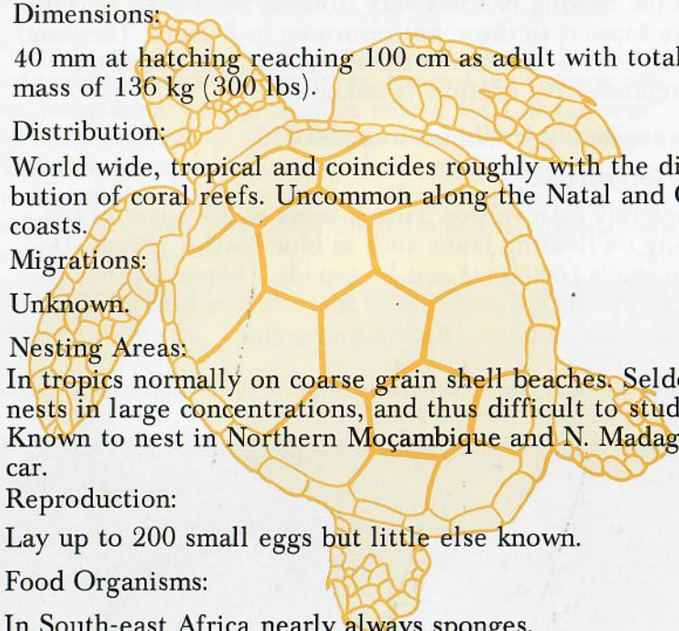
Completely carnivorous. First 3 years of life spent at sea feeding on floating fauna such as blue bottles *(Physalia),* storm snails *(Ianthina)* and Pteropods. Thereafter they return to the littoral and change their diet to Echinoderms (sea urchins), molluscs and hermit crabs.

Laying loggerhead female. Note the 'teardrops' of liquid sodium chloride exuding from the salt gland adjacent to the eye.



Status:
Not widely used in the western world but still important to littoral people who eat them. Well protected here in Natal, much less so in Moçambique and Madagascar. Only four documented nesting grounds in the Indian Ocean: Tongaland, S.E. Madagascar, Oman and Burma and only the Tongaland population receives protection. No loggerhead nesting colony falls within a nature reserve.

D. THE HAWKSBILL TURTLE – *Eretmochelys imbricata*



Dimensions:

40 mm at hatching reaching 100 cm as adult with total mass of 136 kg (300 lbs).

Distribution:

World wide, tropical and coincides roughly with the distribution of coral reefs. Uncommon along the Natal and Cape coasts.

Migrations:

Unknown.

Nesting Areas:
In tropics normally on coarse grain shell beaches. Seldom nests in large concentrations, and thus difficult to study. Known to nest in Northern Moçambique and N. Madagascar.

Reproduction:

Lay up to 200 small eggs but little else known.

Food Organisms:

In South-east Africa nearly always sponges.

Status:

As it is the source of tortoiseshell it is in heavy demand throughout the world.

Quite likely the most endangered species because the finest shell comes from the female and there is, therefore, great incentive for hunters to take nesting females. There are no protected areas for this species except Cousin Island in the Seychelles.

E. THE OLIVE RIDLEY TURTLE – *Lepidochelys olivacea:*

Dimensions:

40 mm at hatching; reach 80 cm as adult with a mass of 46 kg (100 lbs). The smallest of the local sea turtles.

Distribution:

Throughout the tropics only very rarely venturing into temperate waters. Extremely rare in Natal.

Migrations:

Unknown.

Nesting Areas:

These vary tremendously from the massive concentrations in Mexico (80,000 females nesting at the same spot) to widely scattered individual nesting such as occurs in Northern Moçambique and Madagascar.

Reproduction:

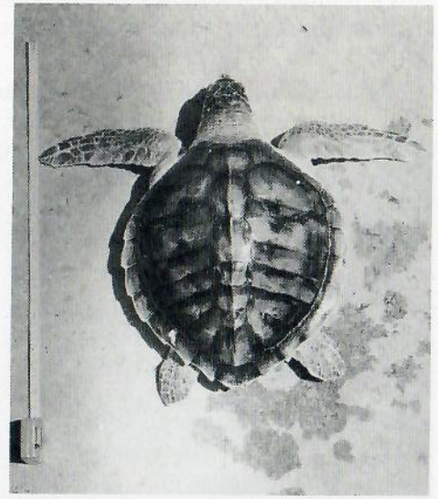
They lay between 300 to 400 eggs per season; in batches of 100–120 at intervals of up to 20 days.

Food Organisms:

Normally neritic crustacea; crabs and prawns.

Status:

Difficult to access in our region but clearly endangered in other parts of the of world. For example in Mexico in 1969 alone over 500,000 ridleys were slaughtered for their hides.



Juvenile ridley turtle; note the numerous costal shields.

SOUTHERN AFRICAN RESEARCH ON SEA TURTLES

The Republic of South Africa was the third country to instigate a comprehensive study of sea turtles. The work was initiated by the Natal Parks Board and as the interests of this body were centred on Natal, other organisations such as the Oceanographic Research Institute, Durban; the Southern Africa Nature Foundation (South African Appeal of the World Wildlife Fund), and the Gulbenkian Foundation, Lisbon generously contributed to more extensive work eventually covering the whole south-western Indian Ocean.

The most valuable tool in the research worker's kit is the tag, a small monel metal object designed to lock into the flippers of sea turtles. The tag has inscribed upon it a letter (A,B,C, etc.) which depicts the season in which it was attached to a turtle, and a number which identifies the turtle specifically. On the reverse side of the tag are the words:

"Reward Recompense"
O. Research Inst.
Box 736 Durban
Sou. Africa.

Once a turtle has been identified by tagging it is then possible to learn more about its migrations, its movements within a season, how many eggs it lays and eventually how old it may live to. This knowledge is invaluable as no successful protection or exploitation programme can operate without a deep understanding of these aspects of the animal's biology.

Of the three species of sea turtle which have been extensively tagged in South east Africa; the leatherback turtle has had only one recovery away from the beaches. The green turtle has been tagged on Europa Island, Tromelin Island and the Glorious Islands and recoveries indicate that Madagascar draws a large proportion of its exploitable stocks from Europa and Tromelin.

An olive ridley sea turtle.

It is of interest to note that the sea turtle is an intensely exploited and highly desired animal in Madagascar. During 1970 in 48 villages along 600 km of the south coast, over 23000 turtles were killed and eaten. The tags have shown how important is the protection of these island nesting areas and the French Government, shortly after the first taggings, declared them Nature Reserves.

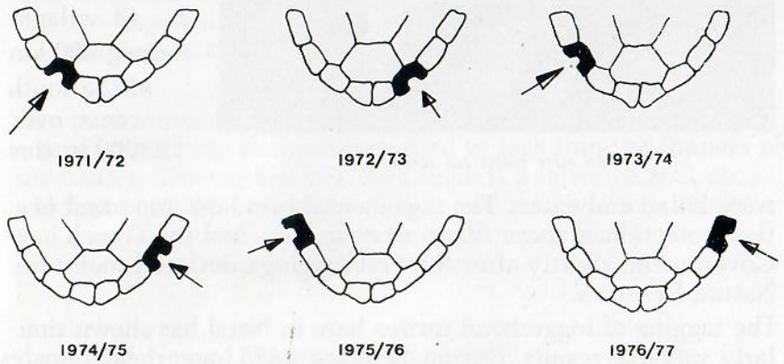
The tagging of loggerhead turtles here in Natal has shown similarly valuable results. During 14 years, 2475 loggerhead females have been tagged and the extra-nesting area recoveries have shown that from Margate, Natal to the Zanzibar Channel, a distance of 3000 km, loggerhead turtles come to the Tongaland beaches for safe nesting.

The hawksbill turtle - this specimen has honey coloured tortoiseshell.

After a nesting season most adult loggerhead females move northwards into the tropical waters of Moçambique, Tanzania, and Madagascar.

If adult tagging takes time and effort the marking of newly born turtles is more difficult. So little was known of the movements of the hatchlings that in 1971 a marking programme was initiated in Natal.

As the hatchling weighs only 20 g it is impossible to attach any form of tag to it and instead a piece of the carapace is notched out - see below:



Since 1971 62000 loggerhead turtle hatchlings have been notched and released. Each year a different notch site is used and these notches are clearly recognisable even at four years of age.

Recoveries of notched hatchlings in company with many unnotched hatchlings up to three months of age have been recorded from Durban, East London, Port Elizabeth, Cape Agulhas, False Bay and Kommetjie. Unmarked hatchlings have been recorded in Western Australia and it is to be hoped that a notched one will eventually turn up there as well.

PUBLIC CO-OPERATION

All tag information and hatchling strandings are seldom recorded by scientists but by the ordinary man in the street, the interested fisherman or beachcomber. All tagging programmes depend on your help and remember that the tag you see or notched hatchling you find is of interest to a scientist.

1.Please notify your nearest institute, university or Natal Parks Board Zone Officer should you find a turtle of interest. If such an opportunity does not exist then please note the following information for labelling the animal or sending to the Natal Parks Board; P.O. Box 662, Pietermaritzburg, 3200, Natal, South Africa:-

Telephone: (0331-) 51221

a. Date of find Tag Number:
b. Locality of find
c. Species involved (if known)
(a photograph showing the head is always appreciated as it makes identification so much easier).

2. If a tagged adult turtle is alive please read the tag number carefully and release the animal as quickly as possible. This action is very much more desirable than the cutting out of the tag as it will allow the turtle to be re-identified if and when she comes back to the nesting ground.

3. All the hatchlings, notched or not, should be sent to the nearest institute or direct (if dead) to the Natal Parks Board. Dead specimens should be placed in a plastic bag with some cotton wool or tissue which has been dipped into methylated spirits or alcohol. The bag should be sealed and posted in an envelope or box.

We trust that you have enjoyed reading this booklet and will find it useful in future. Please remember that it is due to you, the public, that much of this information is available.

Further Reading:

BEAMISH, TONY 1971 — Aldabra Alone
George Allen and Unwin, London

CARR, ARCHIE 1952 — Handbook of Turtles
Ithaca, New York

CARR, ARCHIE 1956 — The Windward Road
Alfred Knopf, New York

CARR, ARCHIE 1967	So Excellente a Fishe Natural History Press, New York
HUGHES, G.R. 1974	The sea turtles of South East Africa. 1 & 2. Investigational Reports of the Oceanographic Research Institute, Durban. Nos. 35 and 36.
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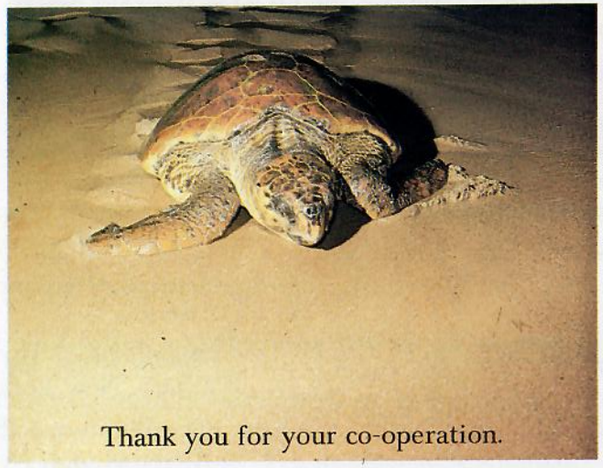
PRITCHARD, P.C.H. 1967	Living Turtles of the World TFH, New York
VEEVERS CARTERS, W.D. 1970	Island Home Random House, New York



Thank you for your co-operation.

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Notes of interest and small specimens should be sent to:

The Director,
Natal Parks Board,
P.O. Box 662,
Pietermaritzburg,
3200, South Africa.

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