

CAN SEA TURTLES BE TRACKED?

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The determination of a strategy for the protection and conservation of sea turtles requires a thorough understanding of their biology. This is true also for the development of a sea turtle farming industry. However, research in the biology of several aspects — of all species of sea turtles — has come to a virtual standstill, because of the lack of data on the life-cycles of young turtles, up to three years old.

To date, information on young turtles, is almost non-existent. Surprisingly few young individuals have been captured at sea all over the world, and even from these, very little can be gleaned since two basic facts cannot be ascertained: their age and provenance.

Precarious survival

What is known about about the life of young sea turtles can be summarized in a few sentences.

1. After emerging from their eggs, the turtles enter the sea as quickly as possible.

2. During their first few hours in the water, they gain proficiency at diving. Their specific gravity is quite low, and only after 30-50 hours of practice do the little turtles gain enough practice in diving techniques.

3. During the first hours they probably stay in coastal waters, and much of the time on or near the surface of the water.

4. This is apparently the decisive stage in the survival of sea turtles, since the greater part are killed by falling easy prey to fish and sea birds.

5. The remaining turtles — very likely, far less than one per cent — disappear from sight for a year, two years, or three, to reappear as anonymous juveniles weighing 3 kilograms and more, without giving us a clue to their movements during that time



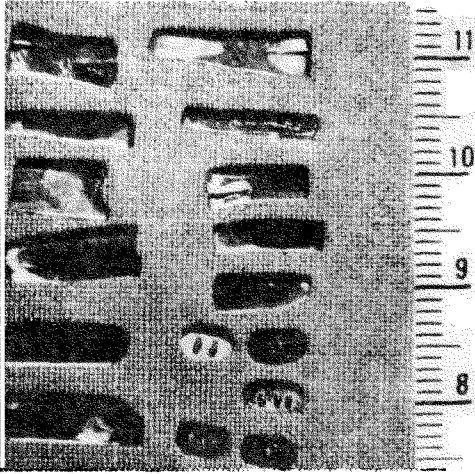
Small loggerhead turtles found on Israeli beach on 3 March 1980. (Photo: Yigael Sella)

So far, there is no way of monitoring the movements of young turtles at sea. No method of marking day-old turtles has been devised that permits their identification as adults. Nor is raising the little turtles for two or three years and releasing them thereafter when marked feasible.

The same problems of marking day-old turtles apply also to one or two year-old ones. But the weightiest reason why this cannot be done is that raising them artificially may affect their natural development and behavior — especially their imprinting on the nesting beach and on the specific population to which they belong.

All the evidence so far, points to the existence of separate populations, even when these live in a continuous region such as the Mediterranean Sea. It may well turn out some day that these different populations are, in effect, different subspecies — if not new species altogether

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Stainless steel identification tags implanted in baby turtles on 6 March 1979.

Marking problems

Most leading experts agree that the fear of genetic contamination through release of non-imprinted turtles is very real. Ideally, therefore, a suitable marking system should be applied to one day-old turtles and remain on the animal to maturity.

Various scientific methods are employed today to mark and identify animals: by painting on numbers; by damaging an external, non-essential member such as an ear or toe; attaching a numbered tag by means of a band or by directly clipping it to an external member; implanting of internal markers; by radio-active devices and in other ways.

All of these methods have such serious limitations when applied to sea turtles, as to preclude their use. Some markers wear out too rapidly, and there always remains the difficulty of capturing the same animal for renewed marking.

Newly-hatched sea turtles, weighing 20-40 grams, can grow a thousandfold in a few years. This makes the use of external markers absolutely impossible, and points to internal markers as the method most likely to succeed.

Experiments to this end are being conducted in Israel.¹ As a first trial, tiny stain-



X-ray photo of small turtle showing implanted i.d. tag.



Stainless steel i.d. tag in advanced state of rejection by the body (Photos: Yigael Sella)

less steel tags were implanted in 16 turtles selected from a large group raised in the Shiqmona marine research station² [G-6] by the Nature Reserves Authority.

The tags were implanted in the abdominal carapace above the rear leg so that

1) Full details of these experiments may be obtained from the author, Yigael Sella, Bustan ha-Galil, Asher at Mobile Post, 25213, Israel

2) Israel Oceanographic and Limnological Research Ltd, Tel Shikmona, P.O.B. 8030, 31080 Haifa, Israel

Juvenile sea turtles, weighing up to 3000 grams, found on Israel's coasts in the period 1956-1981, according to the months of the finds. In most cases the weights given are only approximate. Ca represents loggerhead turtles (*Caretta caretta*), Ch green turtles (*Chelonia mydas*).

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Ca 120	Ca 500 Ca 150 Ch 2000 Ch 2000 Ch 2000 Ch 3000	Ca 100 Ca 35 Ca 115	Ca 70 Ca 40					Ch 2000		Ca 1000	

N^o 55 Ca
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they could be detected by x-ray. In some cases, the steel tags were rejected by the body and expelled within 1-2 months. All of these had been implanted directly on the bone. Others, implanted under the bone, remained there.

Nevertheless, despite these initial failures, the techniques of implanting tags can probably be perfected to make this a feasible means of identification. Assuming that this can indeed be done, there remain many practical problems to be solved before young sea turtles can be effectively marked for tracking.

Identifying marked turtles

Even after internally-implanted markers are installed, means must still be found to identify the marked turtles on sight, so that it will not be necessary to x-ray large numbers of turtles. One possibility is to amputate a toe, or damage one leg slightly in some other way.

Nearly mature individuals can, of course, be equipped with an external tag attached to a leg; or the carapace can be marked by laser beam, for example. The preparation of tiny, inscribed stainless steel markers for implanting will remain very expensive until mass-production by machine is justified.

On the other hand, the chance of recapturing marked turtles is not as far-fetched as it may seem, for we are probably fairly safe in assuming that young turtles imprinted on their entry to the sea, return to

their native beaches as adults for mating and egg-laying.

As stated at the outset, the main problem is to find and identify the juveniles, but we feel quite confident of coming up with some answers in the future. During the years of research on sea turtles conducted in Israel, a relatively large number (to records elsewhere) of small sea turtles, weighing up to 3 kilograms were found along the shore of Northern Israel. The estimated ages were between one and three years. This may indicate that Israel's coasts serve as habitats for juvenile turtles that probably hatched on our beaches.

Some practical steps

In order to advance the state of knowledge about juvenile sea turtles, I recommend the following measures:

1) Gathering eggs and hatching them under natural or artificial conditions.

2) Erection of extensive floating nets offshore, where the newly-hatched turtles will spend their first few days without affecting their imprinting on the beach and on their group. Turtles, gathered in these netted areas can be marked and released immediately, or they can be raised under controlled conditions, and marked and released after one year.

3) Exchange and dissemination of information, and coordination of tracking, with the other countries of the Eastern Mediterranean, such as Turkey, Cyprus, Egypt and possibly also Greece.