



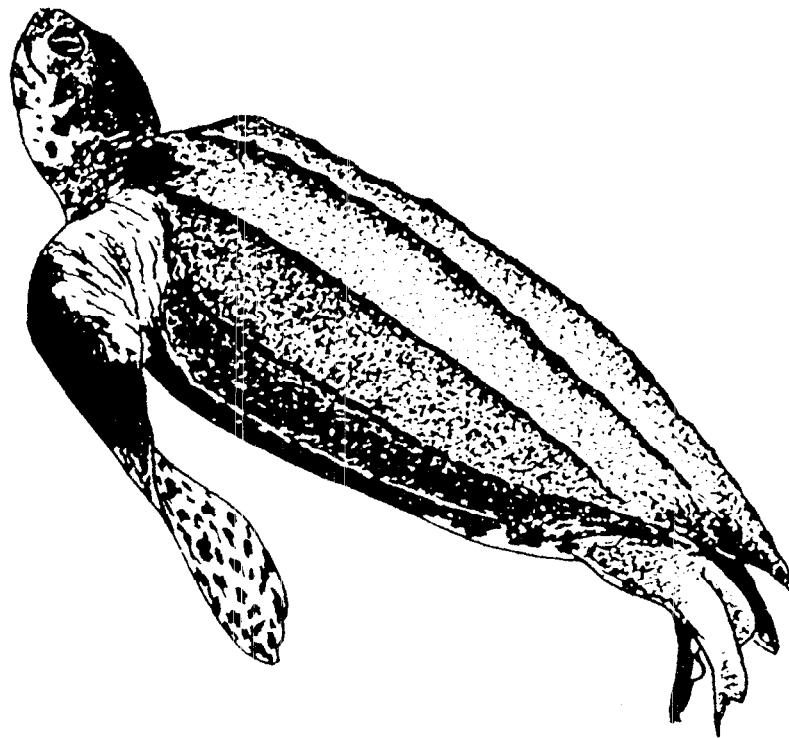
NOAA Technical Memorandum NMFS-SEFSC-387

**PROCEEDINGS OF THE FIFTEENTH ANNUAL SYMPOSIUM ON
SEA TURTLE BIOLOGY AND CONSERVATION**

**20-25 February 1995
Hilton Head, South Carolina**

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June 1996

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PREDATION OF ADULT LOGGERHEADS BY MEDITERRANEAN MONK SEALS

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The Mediterranean monk seal Monachus monachus is considered the most endangered mammal in Europe with a world population estimated from 400 to 600 individuals. Monk seals live mainly in the central and eastern Mediterranean and also along the Atlantic coast of Africa from Morocco to Mauritania.

Mediterranean monk seals have an average body length of 2.75 m and weigh about 250 kilos. They are very intelligent animals and well adaptive to changing conditions. Possibly in response to human persecution monk seals have changed their habits and instead of using open beaches, as they did in the past, they have retreated to remote caves, sometimes with underwater entrances, where they give birth and raise their young or use as hauling out (resting) sites. Monk seals feed mainly on fish and cephalopods. Monk seals are often killed by fishermen who blame them for taking fish from nets and damaging their equipment.

On the island of Zakynthos, western Greece, a large nesting aggregation of loggerhead turtles Caretta caretta has been documented since 1977 (Margaritoulis, 1982). Nesting occurs mainly on the beaches fringing Laganas Bay, a semicircular bay with a 12-km opening at the southern coast of the island (Fig.2). Turtle nesting in the Bay is systematically monitored, by the Sea Turtle Protection Society of Greece (STPS), since 1984; the total number of nests recorded per season fluctuates from 857 to 1,822 depending on the season (Margaritoulis and Dimopoulos, 1995).

Zakynthos island hosts also a colony of the Mediterranean monk seal. According to monitoring work carried out by WWF Greece, a minimum population of 8-10 individuals inhabits the many caves mainly along the western and northern coasts. Monitoring is conducted by visiting the caves at regular intervals and recording the occurrence of seals or traces of them in the form of tracks, scats or hair (Karavellias, 1995).

In the course of the turtle monitoring work at Zakynthos, all dead turtles that appear either on the beaches or are found floating in the Bay are inspected, measured and buried. During the turtle nesting season of 1994 (beginning of June - middle of August) five adult loggerheads were found dead in the Bay (mostly at its western part) with an apparently similar injury: their plastrons were snapped off towards the rear. In two cases, conspicuous marks of canine teeth were found at the plastron scutes in close proximity to the injury. From the size and shape of teeth marks (approx. bite distance: 7.5 cm, hole diameter: 8 mm) and the absence of any terrestrial mammal on Zakynthos larger than martens, it was originally suspected that the turtles had been preyed upon by monk seals.

However, direct evidence came later. On 31 August 1994, Italian tourists travelling in an inflatable boat along the southwestern coast of Zakynthos, witnessed and videotaped monk seals, probably two, attacking an adult loggerhead. The tourists scared away the seals and transported the injured turtle to the STPS base station in the Bay. The plastron was snapped off at its posterior edge and a large part of the entrails were protruding from the opening. Despite efforts for treatment, the turtle, a male with a SCL of 77 cm, died soon.

On 18 October 1994, two more turtle carcasses (SCL: 62 and 83 cm), in advanced decomposition, were found stranded in a small cove at the western boundary of the Bay. Both specimens bore the same telltale injury on their plastrons. The last finding raises the total observed number of predated turtles to eight. But the actual number is probably higher.

It is worth to note that the absence of any similar observation elsewhere in the Mediterranean and specifically on Zakynthos where the turtle monitoring project runs its 12th season, as well as in the Hawaiian archipelago where turtles and Hawaiian monk seals (Monachus schauinslandi) coexist peacefully (Balazs, pers. comm.), lead us to conclude that we might be facing a major local disruption of the natural balance.

During 1994, available evidence seems to indicate a dramatic decrease of fish stocks at Zakynthos. This was supported by fishermen reports on exceptionally small fish catches from May 1994 onward, which coincides with the onset of attacks. Another possible indication of fish depletion was the observed increase of damage caused to nets by monk seals. Damage of fishermen nets, recorded systematically by the monk seal monitoring team, seems to be negatively correlated to fish catches (Karavellas, 1995). A coastal fisheries survey is under way by WWF in order to quantitatively assess the state of fish resources.

Local depletion of fish stocks is, at least partly, attributed to the excessive use of dynamite for fishing during the spring of 1994 at Zakynthos. Dynamite fishing increased in spring 1994 due to the absence of Port Police patrols. Patrols were started later in the season after enormous pressure exerted by environmental organizations, hoteliers and divers.

It is interesting to note that, as derived by examination of the carcasses and also by the videotape, the seal approaches from underneath and presumably behind when the turtle is basking on the surface. The seal grasps the plastron in the region of the anal/femoral scutes, which is the only place to get a good hold. A part of the plastron is then snapped off and discarded. The broken edge can then be bitten again and snapped. The process is repeated until the entrails can be eaten (Fig. 1). Five of the turtles had been cleaned out completely. Monk seals do not seem to consume other turtle parts; all eight carcasses but the first one, which was in a decomposed state, had all their flippers and tails intact.

Of the eight predated turtles, five (62.5%) were recognized as males. This can possibly be attributed to the fact that male turtles generally avoid entering the shallow Bay waters which constitute the main interesting area of the breeding females and, thus, males are more likely to be attacked by the monk seals living outside the Bay and especially at its western boundary where most of the incidents occur. This recently documented change in the behaviour on the part of the monk seal bears substantial importance because Monachus monachus and Caretta caretta are listed as endangered in the boundaries of the European Union. In the case of Zakynthos, both species possess, at least during the turtle nesting season, adjacent and partly overlapping habitats and this might create additional implications to on-going conservation efforts (Fig. 2).

We thank Giorgos Pologiorgis, monitoring leader of the Sea Turtle Project on Zakynthos, for providing information on the dead turtles.

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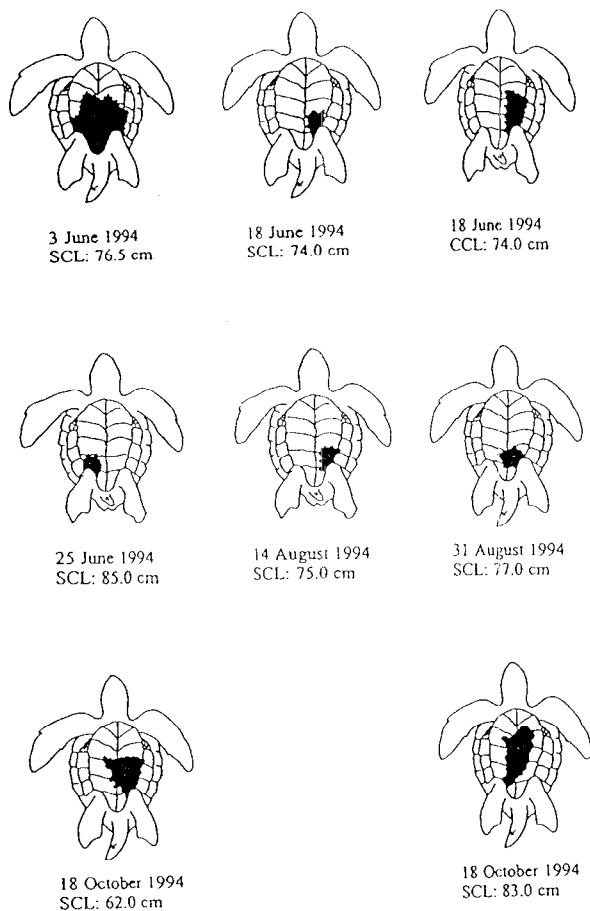


Fig.1. Injuries of turtles predated by monk seals

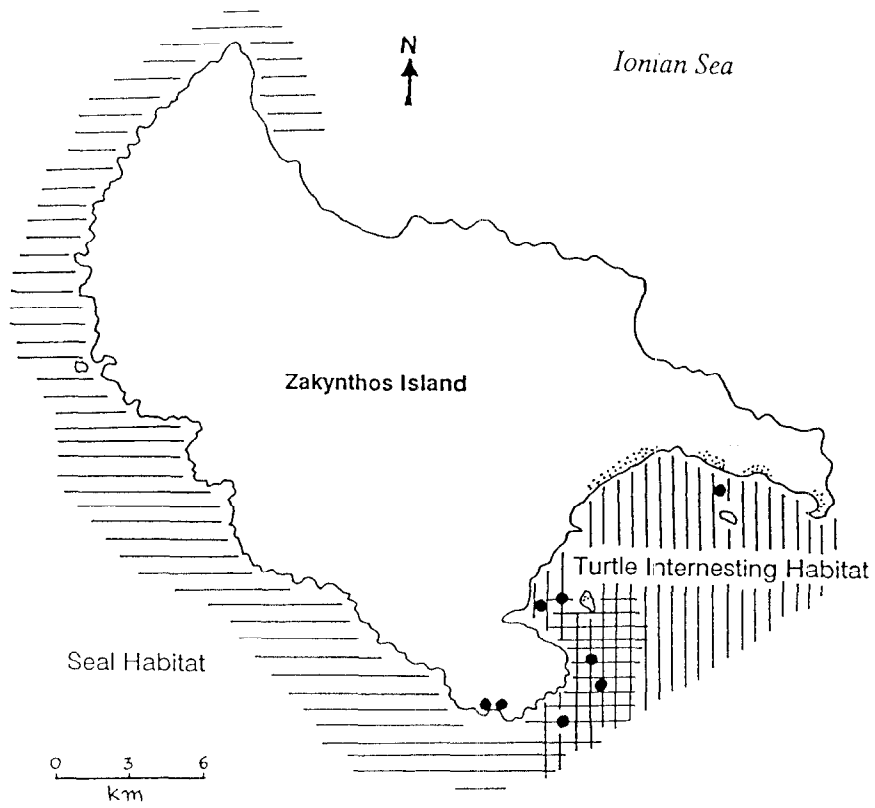


Fig. 2. Sketch map of Zakynthos island showing overlapping monk seal and turtle habitats as well as approximate positions of turtles found predated by monk seals.