

Leatherback turtle captured by ingestion of squid bait on swordfish longline

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The leatherback turtle *Dermochelys coriacea* is the only species of the family Dermochelyidae. The other six extant marine turtles are hard-shelled members of the family Cheloniidae. The leatherback inhabits the pelagic marine environment, apparently only leaving to breed in coastal waters. With recorded dives to 475 m, it is among the world's deepest-diving vertebrates (Eckert et al. 1986). With weights up to 916 kg, it is the world's largest turtle (Eckert and Luginbuhl 1988). The leatherback is listed as endangered under the U.S. Endangered Species Act, the International Union for Conservation of Nature, and the Convention on International Trade in Endangered Species. Consequently, fishery interactions involving the leatherback are of concern. This paper reports an interaction with longline gear while fishing for swordfish.

Leatherbacks ingest and become entangled in marine debris (Balazs 1985), and they are taken by operative fishing gear (Nishemura and Nakahigashi 1990). Entanglement has been reported with lobster pot lines (Lazell 1976), drift nets (Balazs 1982, Wetherall et al. In Press); pelagic longline (Witzell 1984, Tobias 1991); gillnets (Margaritoulis 1986); and swordfish *Xiphias gladius* tangle nets (Frazier and Brito Montero 1990). Interactions with tuna and swordfish longline fishing have involved entanglement and foul-hooking, particularly with the leatherback's long flippers

(Honolulu Star-Bulletin 1935, Witzell 1984, Dollar 1991, Tobias 1991, USFWS 1969). In the Hawaii swordfish fishery, sightings of leatherbacks and reported interactions are not rare, particularly in the area of the seamounts above the Northwestern Hawaiian Islands (Robert Dollar, NMFS Honolulu Lab., pers. commun.). It is not uncommon for leatherbacks to become entangled in driftnets set north of Hawaii between 30° and 45°N. However, virtually nothing is known about their overall distribution, abundance, and life history including stock structure (Wetherall et al., In press). The nearest colonies of nesting leatherbacks occur in the eastern Pacific along the coast of Mexico and Costa Rica and in the western Pacific in peninsular Malaysia. To our knowledge, ingestion of baited hooks has not been reported in the literature.

Leatherbacks are known to feed on gelatinous, pelagic animals. These include the medusa of sycozoan coelenterates (true jellyfish) (Bleakney 1965, Brongersma 1969) and hydrozoan coelenterates (Portuguese man-of-war *Physalia physalis*) (Bacon 1970). Davenport (1988) and Davenport and Balazs (1991) have suggested the potential importance of bioluminescence in the predation of free-swimming colonial tunicates (pyrosomas) by leatherbacks during the night or on deep dives. Neither fish (tuna bait) nor squid (swordfish bait) have been cited in the literature as prey of

leatherbacks. Accordingly, Witzell (1984) stated that leatherbacks are not likely to be taken on a baited hook.

The present paper presents documentation of a leatherback captured after ingesting squid bait on swordfish longline gear. The chemical light sticks used to attract swordfish may have attracted the leatherback to the gear.

On 24–25 January 1991, while experimental longline fishing operations were being conducted for swordfish from the NOAA research ship *Townsend Cromwell*, a leatherback turtle was hooked and released alive at lat. 26°58.3'N, long. 168°53.5'W. The turtle swam vigorously while being hauled next to the research vessel and after being released. The hook line could be seen coming from the turtle's mouth, but the exact location of the hook was not apparent. No blood or external injuries were apparent. A tree branch lopper on the end of an extendable fiberglass pole was used to cut the hook line a few centimeters from the turtle's mouth. The estimated carapace length of the turtle was 170 cm. The turtle was too large to haul on board, and the prevalence of sharks, including blue shark *Prionace glauca*, made it impossible to enter the water for accurate measurement or tagging. Other site specifics included the following: 2400 m bottom depth, 21.4°C sea surface-water temperature, 18.9°C air temperature, 150–180 cm sea swells, northeasterly trade winds at 15 kn, and approximate depth of the upper mixed layer at 85 m.

Details of the set and gear are as follows. The longline gear consisted of ~16 km of 4.0 or 3.2 mm monofilament main line suspended with floats every 3 hook lines. The gear, with 206 hooks, was set on 24

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January 1991 starting at lat. 27°01.720'N, long. 168°56.153'W, in the vicinity of an unnamed seamount some 940 km east of Midway Is. and 150 km north-northeast of Raita Bank, Northwestern Hawaiian Is. The gear was hauled on 25 January beginning at lat. 26°59.094'N, long. 168°57.810'W. The turtle was taken on the first hook of a 3-hook basket located about mid-set. This hook was set at 1818h and hauled at 0907h the next day, for a soak time of 14h 49 min. Because the hook timer (a 7.5 × 3 cm cylinder of clear plastic resin with an embedded clock chip; Somerton et al. 1988) on that line was lost, an estimate of the time of hooking is not available. The hook timer on the second hook-line, with full bait remaining, was set off at 0511h; the hook timer on the first hook of the previous basket, with the bait missing, was set off at 0159h. The float lines, made of polypropylene rope, were 9 m long. The hook droppers, made of 2.1 mm monofilament, were 13 m long with a 60 g weighted swivel 4 m from the hook. Thus, the depth of hook 1 was nominally ~22 m, unless altered by currents, since the first hook-line of each basket was attached within 3 m of the float. Green, 12 h chemical light sticks were placed ~2 m above each of the 206 hooks (the light sticks still glowed weakly at the time of hauling). Each hook was baited with a whole, previously-frozen Argentinean squid (*Illex* sp.), weighing ~0.34 kg.

While entanglement of leatherbacks in pelagic longline and other gears has been described, ours is apparently the first report of a hook and bait being eaten. Chemical light sticks used on swordfish longline may impose an added hazard for leatherbacks by simulating natural prey. The magnitude of the take, the level of mortality or serious injury, and the impact on the leatherback stock are unknown. Additional data on the take by pelagic fisheries as well as information on leatherback feeding habits, stock structure, and population dynamics would be needed to evaluate the impact of the take.

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