Recommendations for Eliminating Incidental Capture and Mortality of Leatherback Turtles, *Dermochelys coriacea*, by Commercial Fisheries in Trinidad and Tobago:

A Report to the Wider Caribbean Sea Turtle Conservation Network (WIDECAST)

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WIDECAST Information Document 1999 - 001
January 1999

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Executive Summary

Trinidad supports the second largest nesting assemblage of leatherback sea turtles in the Western Hemisphere. An estimated 600 - 1000 leatherbacks nest each year at Matura Beach on the east coast, and an equal number probably nest at Grande Riviere Beach on the north coast. These estimates will improve in accuracy later this year with the initiation of a comprehensive leatherback tagging program. At least a dozen beaches support lower density nesting. The population is threatened by gillnetting in coastal waters during peak nesting season, a fishing practice which may capture, by accident, more than 1000 leatherbacks (all egg-bearing females) each year. Most of these are killed, typically to disengage them from the net. We recommend that working collaboratively with fishermen to provide alternatives to gillnetting be a top priority for resource managers and policy-makers in the country.

Biology and Status of Leatherbacks

Leatherback turtles (Dermochelys coriacea) are the oldest and largest of the seven species of living marine turtles. Evolved during the Cretaceous era, leatherbacks are in excess of 90 million years old. Mature females average 350 kg in the Caribbean Region, but the largest male on record weighed over 900 kg. As the only pelagic species of turtle, they are exceptionally well adapted for life in the open ocean. Their body form is a prime example of perfect hydrodynamic form, including broad shoulders, long front flippers for propulsion, and a posteriorly tapered body shape. Dorsal longitudinal ridges improve laminar flow and increase swimming efficiency. Leatherbacks expend three times less energy during swimming than any other turtle species (Wyneken and Salmon, 1992).

Geographic distribution of the species is the greatest of any reptile, as leatherbacks are found from 47°N to 71°S (Pritchard, 1973). For populations inhabiting the North Atlantic basin, satellite telemetry data indicate that adults make annual north-south migrations, presumably to optimize foraging (Eckert, 1998). Mating most likely occurs in temperate latitudes and females journey into Wider Caribbean waters every 2-3 years for egg-laying (Eckert and Eckert, 1988). Gravid females remain at the nesting grounds for 1-4 months, depositing as many as 11 clutches of eggs (Eckert,

1987). During the 10 day intervening period between nestings (referred to as the "inter-nesting interval"), there are indications that females feed on jellies and related animals, perhaps primarily at night (Eckert et al., 1986, 1989). Such behavior is intriguing, as sea turtles in general do not feed during the nesting season.

Atlantic leatherbacks leave North Atlantic waters (Canada and northern Europe) and arrive in the early spring at their primary nesting beaches in French Guiana and Trinidad, the largest and second-largest nesting colonies, respectively, for this species in Western Hemisphere. Nathai-Gyan et al. (1987) estimated that 500-900 turtles nested each year in Trinidad alone. We now believe this was an underestimate, as more current data show 60 turtles nesting per night during peak season at Matura Beach and 100 or more per night at Grande Riviere. While current data is not rigorous enough to critically assess population size, a comprehensive tagging program will begin this nesting season at Matura Beach and shortly thereafter at Grande Riviere. It is anticipated that this effort will significantly enhance population estimates of Trinidad leatherbacks.

Matura Beach and Grande Riviere sustain the highest density nesting in Trinidad. Lower density nesting occurs along the north and east coasts at Fishing Pond, Paria Bay, Murphy Bay, Petite and Gran Tacarib, Madamas, Cochipa, Manzanilla, and Mayaro (see Figure 1). There is also some nesting on the south coast at Guayaguayare and Moruga, as well as on the Caribbean coast of Tobago. At a minimum, there were 3,523 nests at Matura Beach and adjacent Fishing Pond Beach in 1994 (Fournillier and Eckert, 1998), suggesting that approximately 629 turtles nested on those beaches alone (at 5.6 nests per turtle per season; cf. Tucker and Frazer, 1994). The nesting season for Trinidad and Tobago begins in early March, although isolated nesting events are documented in February.

The leatherback turtle is classified as "Endangered" at a global scale (Baillie and Groombridge, 1996), where taxa so classified are considered to be "in danger of extinction and whose survival is unlikely if the causal factors continue operating."

Leatherbacks are included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which bans all international trade in parts or products. Trinidad law provides complete protection for the leatherback under both the Conservation of Wildlife Act (as amended in 1963) and the 1975 Protection of Turtles and Turtle Eggs Regulations. Further, international agreements to which Trinidad is a Signatory include the SPAW Protocol to the Cartagena Convention, which prohibits taking, possession, killing (including incidentally), and commercial trade in listed species. Significantly, the Protocol also prohibits the "disturbance" of listed species during periods of breeding, incubation, estivation or migration and other periods of biological stress.

Leatherback population status has become a topic of great concern recently as surveys of the largest nesting colony of leatherbacks in the world indicate that this population has been reduced more than 90% in the last 10 years (Sarti et al., 1996). The decline is attributed mainly to the killing of leatherbacks incidentally in gillnet and longline swordfish fisheries thousands of kilometers

distant to the nesting beaches (Eckert and Sarti, 1997). In the Atlantic basin, leatherback population status is less clear. However most scientists agree that the Atlantic population, overall, is also in decline.

Incidental Capture in Trinidad: A Threat to Global Survival of Leatherbacks

The following narrative and recommendations are based on interviews conducted by the authors during a site visit to Trinidad in 1998 (26 June - 10 July), a review of current literature, and information provided by local biologists, resource managers, and community-based conservation organizations.

The most important conclusion, and one that is undisputed among stakeholders, is that *incidental capture is the largest single source of mortality to leatherbacks in Trinidad and Tobago, killing more turtles than all other factors combined.* Because of the unique role that Trinidad plays in the survival of this species on a global scale (supporting the second largest nesting aggregation in the greater Atlantic basin), incidental capture and mortality to leatherbacks in waters under the jurisdiction of Trinidad and Tobago constitute a major threat to species survival.

In interviews with Matelot fishermen in April and May of 1992, it was reported that the leatherback capture rate was 10 leatherbacks per 61 m of net. Between March and August 1995, seven Matelot fishermen documented the capture of 139 leatherbacks in their nets (Fournillier and Eckert, 1998). During interviews by the authors in 1998, one Matelot fisherman reported that each of the 25 boats (operating out of Matelot) average 1-2 turtles per fishing trip (i.e. per day).

In 1997, it was estimated that between 200-450 leatherbacks were captured in gillnets between Balandra Bay and Salybia on the east coast of Trinidad, and it was suggested that the leatherback take off Toco Point is so high that the total for the northeast region probably exceeds 1,000 leatherbacks annually (Fournillier and Eckert, 1998). Such results are indicative of the very high incidental capture rate of leatherbacks along the north and east coasts (i.e. off the major nesting beaches) and we believe that a large portion of all leatherbacks nesting in Trinidad are captured at least once during the nesting season!

Other areas of Trinidad also exhibit high capture rates of leatherbacks. During interviews in 1998, fishermen from Manzanilla (3 boats) reported catching 1 leatherback per day (5 days each week) from January - April, with a 50% mortality. In Mayaro, where 50 boats operate (25 from Mayaro, 50 are from other ports), each boat reportedly catches 5 leatherbacks between January and April. Mortality is reported to be in excess of 95% due to an illegal black market sale of leatherback meat in that area.

Further evidence that the leatherback capture rate is high comes from studies in which turtles carrying radio transmitters have either been captured or disappeared for inexplicable reasons. In 1995, three leatherbacks were equipped with satellite transmitters at Matura Beach. One of the three

(30%) was captured and released by a gillnet fisherman in Toco. In a follow-up telemetry study in 1996, six leatherbacks were equipped with VHF radios for tracking purposes, and all (100%) disappeared abruptly. Wholesale equipment failure is unlikely, and radio range and coverage were extensive enough to preclude the idea that the turtles simply left the area.

We suspect that these turtles were killed in fishing operations south of Fishing Pond Beach. During interviews in 1998, a fisherman from Manzanilla reported capturing a "turtle tagged in Africa". It is likely that this was one of the instrumented turtles from 1996. Since a satellite tracking study in 1995 demonstrated that leatherbacks from Trinidad will swim to Africa, there is a common misconception by the public in Trinidad that all instrumented turtles are "from Africa".

It is clear from the interview data that a large portion of the annual nesting population in Trinidad is subject to entanglement in gillnet fisheries. Mortality of caught turtles seems to vary, and two primary factors influence the outcome.

The first variable is gear type. Fishermen report that monofilament nets sustain higher incidental mortality than woven nylon "green nets". During 1998 we had the opportunity to observe a green-net entangled turtle off Madamas Beach. The turtle was alive and able to drag the net to the surface to breath. It exhibited a very distinctive net imprint scarring that is often seen on nesting females. It appears that the 4.25" mesh net does not entangle the turtle sufficiently to cause drowning; however, escape is prevented. Apparently the relatively coarse line of the nylon nets does not foul the turtle as seriously as the monofilament, resulting in a lower acute mortality rate.

The second variable is how the turtle is treated after capture. Leatherbacks are regularly killed either to simplify their release from the net or, as in the case at Mayaro, to support an illegal market in sea turtle meat. On a number of occasions turtles which have been severely cut by fishermen have appeared on the nesting beaches, having successfully escaped the net. Fishermen report that they believe killing the turtle quickly prevents further damage to the net, and that dismembering the turtle simplifies its removal.

To encourage fishermen to untangle the turtles rather than dismember them, and to compensate the fishermen for damage caused by the incidental capture of leatherbacks, the United Nations Development Program (UNDP)/GEF Small Grants Programme provided a grant to the Grande Riviere Environmental Action Trust (GREAT) to refund fishermen the cost of net repair when damage was caused by a turtle that was released alive. The program was to be a pilot project, with intentions of replication if the project was successful. It was acknowledged that the pilot project represented at best a "stopgap" measure and not a final solution to the problem of incidental fishing mortality, since there was no attempt to prevent capture in the first place.

Recommendations

Despite relatively limited quantified data on leatherback mortality due to incidental take in gillnets in Trinidad, all available information indicates that the current level of mortality is high and

we consider it to be unsustainable. Management intervention with an aim to reduce or eliminate this mortality should be a priority. No one mitigation option is likely to be adequate, given the level of variation in techniques used among fishing areas and villages. Ideally, each village or fishing co-operative should be offered a choice of mitigation methods. Further, to increase the chance that fishermen will adopt these methods, training and other support (financial or otherwise) should be provided. We propose the following:

Seasonal gillnet ban

Leatherbacks begin arriving in Trinidad and Tobago in early February and typically remain through August. Gillnetting should be banned everywhere within Trinidad and Tobago's EEZ during these seven months (February-August). Enforcement should be applied to local fishing operations, as well as foreign vessels working within the EEZ. While such a ban might be considered extreme, with current fishing practices it is the only solution to the high rates of capture and mortality to egg-bearing leatherbacks. Further, a complete ban simplifies enforcement - any gillnet observed in the water or on a boat during the 7-month closed season would be illegal and could be confiscated and the operator fined. A seasonal gillnet closure such as we propose is not likely to succeed without a concurrent effort to replace this type of fishing with alternate, less harmful methods.

Alternative fishing methods

Alternatives to gillnetting should be considered, and should be based on sound scientific design and testing. In particular, we suggest the following alternatives. Options should be selected in collaboration with fishermen, and tailored to meet local circumstances and economies:

- Live-bait line fishing. In many areas of Trinidad, including Matelot, fishermen report that they prefer live-bait line fishing to gillnetting. However they are unable to obtain a sufficient volume of live-bait during the sea turtle [nesting] season and therefore they rely on gillnets. Methods to provide a reliable source of live-bait should be investigated. This may require year around bait rearing or holding facilities, or finding alternate and reliable sources of live-bait supplies.

- Pot-fishing. As in the case of live-bait fishing, many fishermen apparently prefer pot-fishing over gillnetting. Pot-fishing can be very detrimental to reef fish communities, and may also threaten leatherbacks due to buoy-line entanglement. However, if managed carefully, including the use of area closures and mesh size restrictions (to prevent the retention of undersized reef fishes), this option has potential.

- Line trawling. The cost of line trawling is higher due to the increased use of fuel and higher maintenance demands on the trawling boats, but the method yields a high value catch and is very appealing to some of the fishermen we interviewed.

Literature Cited

Baillie, J. and B. Groombridge. 1996. 1996 IUCN Red List of Threatened Animals. World Conservation Union (IUCN), Gland, Switzerland. 368 pp. + annexes.

Eckert, K. L. 1987. Environmental unpredictability and leatherback sea turtle (Dermochelys coriacea) nest loss. Herpetologica 43:315-323.

Eckert, K. L. and S. A. Eckert. 1988. Pre-reproductive movements of leatherback sea turtles (Dermochelys coriacea) nesting in the Caribbean. Copeia 2:400-406.

Eckert, S. A. 1998. Perspectives on the use of satellite telemetry and other electronic technologies for the study of marine turtles, with reference to the first year long tracking of leatherback sea turtles, p.294. *In*: S. P. Epperly and J. Braun (compilers), Proceedings of the 17th Annual Sea Turtle Symposium. NOAA Tech. Memo. NMFS-SEFSC-415. U. S. Dept. Commerce.

Eckert, S. A. and L. Sarti M.1997. Distant fisheries implicated in the loss of the world's largest leatherback nesting population. Marine Turtle Newsletter 78:2-7.

Eckert, S. A., K. L. Eckert, P. Ponganis and G. L. Kooyman. 1989. Diving and foraging behavior of leatherback sea turtles (Dermochelys coriacea). Can. J. Zool. 67:2834-2840.

Eckert, S. A., D. W. Nellis, K. L. Eckert and G. L. Kooyman. 1986. Diving patterns of two leatherback sea turtles (Dermochelys coriacea) during inter-nesting intervals at Sandy Point, St. Croix, U. S. Virgin Islands. Herpetologica 42:381-388.

Fournillier, K. and K. L. Eckert. 1998. *Draft* WIDECAST Sea Turtle Recovery Action Plan for Trinidad and Tobago. UNEP Caribbean Environment Programme, Kingston, Jamaica.

Nathai-Gyan, N., C. James and G. Hislop. 1987. National Report for Trinidad and Tobago. Presented to the Western Atlantic Turtle Symposium II, Puerto Rico. Forestry Division, Ministry of Food Production, Marine Exploitation, Forestry and Environment. 228 pp.

Pritchard, P. C. H. 1973. International migrations of South American sea turtles (Cheloniidae and Dermochelyidae). Anim Behav 21:18-27.

Sarti, L. M., S. A. Eckert, N. T. Garcia and A. R. Barragan. 1996. Decline of the world's largest nesting assemblage of leatherback turtles. Marine Turtle Newsletter 74:2-5.

Tucker, A. D., and N. B. Frazer. 1994. Seasonal variation in clutch size of the turtle, Dermochelys coriacea. J. Herpetol. 28:102-109.

Wyneken, J. and M. Salmon. 1992. Frenzy and post-frenzy swimming activity in loggerhead, green, and leatherback hatchling sea turtles. Copeia 1992, 478-484.

This report should be cited:

Eckert, S. A. and J. Lien. 1999. Recommendations for Eliminating Incidental Capture and Mortality of Leatherback Turtles, Dermochelys coriacea, by Commercial Fisheries in Trinidad and Tobago: A Report to the Wider Caribbean Sea Turtle Conservation Network (WIDECAST). WIDECAST Information Document 1999 - 001. Duke University Marine Laboratory, Beaufort, NC. 7 pp.

Figure 1 - Leatherback sea turtle nesting areas on the island of Trinidad.