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**STOCK ASSESSMENTS OF LOGGERHEAD AND
LEATHERBACK SEA TURTLES**

AND

**AN ASSESSMENT OF THE IMPACT OF THE PELAGIC LONGLINE
FISHERY ON THE LOGGERHEAD AND LEATHERBACK SEA
TURTLES OF THE WESTERN NORTH ATLANTIC**

March 2001

**U. S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
75 Virginia Beach Drive
Miami, FL 33149**



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**U. S. DEPARTMENT OF COMMERCE
Donald L. Evans, Secretary**

**NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Scott B. Gudes, Acting Administrator**

**NATIONAL MARINE FISHERIES SERVICE
William T. Hogarth, Acting Assistant Administrator for Fisheries**

March 2001

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National Marine Fisheries Service
Southeast Fisheries Science Center
75 Virginia Beach Drive
Miami, FL 33149
(305) 361-4285

or

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 605-6000 or (800) 553-6847 (rush orders)

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STOCK ASSESSMENTS OF LOGGERHEAD AND LEATHERBACK SEA TURTLES AND AN ASSESSMENT OF THE IMPACT OF THE PELAGIC LONGLINE FISHERY ON THE LOGGERHEAD AND LEATHERBACK SEA TURTLES OF THE WESTERN NORTH ATLANTIC

Preface

On September 7, 2000 the National Marine Fisheries Service announced that it was reinitiating consultation under Section 7 of the Endangered Species Act on pelagic fisheries for swordfish, sharks, tunas, and billfish.¹ Bycatch of a protected sea turtle species is considered a take under the Endangered Species Act (PL93-205). On June 30, 2000 NMFS completed a Biological Opinion on an amendment to the Highly Migratory Pelagic Fisheries Management Plan that concluded that the continued operation of the pelagic longline fishery was likely to jeopardize the continued existence of loggerhead and leatherback sea turtles.² Since that Biological Opinion was issued NMFS concluded that further analyses of observer data and additional population modeling of loggerhead sea turtles was needed to determine more precisely the impact of the pelagic longline fishery on turtles.^{3,4} Hence, the reinitiation of consultation.

The documents that follow constitute the scientific review and synthesis of information pertaining to the narrowly defined reinitiation of consultation: the impact of the pelagic longline fishery on loggerhead and leatherback sea turtles. The document is in 3 parts, plus 5 appendices. Part I is a stock assessment of loggerhead sea turtles of the Western North Atlantic. Part II is a stock assessment of leatherback sea turtles of the Western North Atlantic. Part III is an assessment of the impact of the pelagic longline fishery on loggerhead and leatherback sea turtles of the Western North Atlantic.

These documents were prepared by the NMFS Southeast Fisheries Science Center staff and academic colleagues at Duke University and Dalhousie University. Personnel involved from the SEFSC include Joanne Braun-McNeill, Lisa Csuzdi, Craig Brown, Jean Cramer, Sheryan Epperly, Steve Turner, Wendy Teas, Nancy Thompson, Wayne Witzell, Cynthia Yeung, and also Jeff Schmid under contract from the University of Miami. Our academic colleagues, Ransom

¹ NMFS Reinitiates Consultation Under the Endangered Species Act (ESA) on the Pelagic Fisheries for Swordfish, Sharks, Tunas and Billfish. Press release from Bruce C. Morehead, Acting Director, Office of Sustainable Fisheries, National Marine Fisheries Service, Silver Spring, Md., September 7, 2000, 1 pp.

² Endangered Species Act - Section 7 Consultation Biological Opinion. Reinitiation of Consultation on the Atlantic Pelagic Fisheries for Swordfish, Tuna, Shark and Billfish in the U.S. Exclusive Economic Zone (EEZ): Proposed Rule to Implement a Regulatory Amendment to the Highly Migratory Species Fishery Management Plan; Reduction of Bycatch and Incidental Catch in the Atlantic Pelagic Longline Fishery, 118 pp. Consultation conducted by National Marine Fisheries Service, Office of Protected Resources, Silver Spring, Md., June 30, 2000.

³ Memorandum from Bruce Morehead, Acting Director, Office of Sustainable Fisheries to Donald R. Knowles, Director, Office of Protected Resources, National Marine Fisheries Service, Silver Spring, Md., September 7, 2000.

⁴ Memorandum from Donald R. Knowles, Director, Office of Protected Resources to Bruce Morehead, Acting Director, Office of Sustainable Fisheries, National Marine Fisheries Service, Silver Spring, Md., September 7, 2000.

Myers, Keith Bowen, and Leah Gerber from Dalhousie University and Larry Crowder and Melissa Snover from Duke University, also recipients of a Pew Charitable Trust Grant for a Comprehensive Study of the Ecological Impacts of the Worldwide Pelagic Longline Industry, made significant contributions to the quantitative analyses and we are very grateful for their collaboration. We appreciate the reviews of the stock definition sections on loggerheads and leatherbacks by Brian Bowen, University of Florida, and Peter Dutton, National Marine Fisheries Service Southwest Fisheries Science Center, respectively, and the comments of the NMFS Center of Independent Experts reviewers Robert Mohn, Ian Poiner, and YouGan Wang on the entire document. We also wish to acknowledge all the unpublished data used herein which were contributed by many researchers, especially the coordinators and volunteers of the nesting beach surveys and the sea turtle stranding and salvage network and the contributors to the Cooperative Marine Turtle Tagging Program.

Nancy B. Thompson and Sheryan P. Epperly

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Executive Summary

Along the North American coast, the loggerhead sea turtle population structure is described by nesting subpopulations consisting of a northern subpopulation, which extends from northeastern Florida coast northward, a south Florida subpopulation from the central Florida east coast southward, a Dry Tortugas subpopulation, a Florida Panhandle subpopulation, and a Yucatán subpopulation in Mexico. Nesting trends are only available for the northern and south Florida subpopulations.

Trend analyses of the number of nests from sampled beaches from these two subpopulations show that from 1978-1990, the northern subpopulation has been stable at best and possibly declining (less than 5% per year). From 1990 to the present the number of nests has been increasing at 2.8-2.9% annually. Over these same periods, the Florida subpopulation had been increasing at 5.3-5.4% per year, but since 1990 this rate appears to be slowing (3.9-4.2%).

Authorized takes of turtles continue and include several fisheries and other anthropogenic sources. For the longline fishery, it is estimated that between 293 to 2439 loggerhead turtles are taken annually based on observer data from 1992-1999. If 50% of these animals are killed then the mortality from this fishery is estimated to be from 147 to 1220 per year.

The U.S. and 26 other nations participate in longline fishing throughout the western North Atlantic Ocean and the relative proportion of total hooks fished by the U.S. fleet is small as compared with the foreign fleets. However, the relative efficiency of the U.S. fleet as compared with the foreign fleets is high but how this translates into catches of non-target species is not known but clearly turtles are bycatch in the foreign fleets.

To evaluate the magnitude of change in pelagic survivorship (the life history stage longline fishing impacts) required for the northern nesting subpopulation to meet recovery criteria, a female only model was developed based on four different stage length scenarios and applying three different population growth rates with three different sex ratios all derived from empirical studies.

Modeling results indicate that the population growth rate is most sensitive to survivorship in the life history stages with the longest durations. Cumulatively, these are the juvenile stages. Efforts to maximize the survivorship in all of the juvenile life history stages would include evaluating takes from all sources. In particular it is noted that large juvenile turtles are yet to be excluded from current Turtle Excluder Devices.

It is unlikely that any loggerhead nesting subpopulation under the status quo will be extirpated over the next few years. It is recommended that actions to reduce juvenile mortality be identified through research and implemented as soon as feasible.

Genetic analyses indicate that female leatherback turtles nesting in St.Croix/Puerto Rico and those nesting in Trinidad differ from each other and from turtles nesting in Florida, French Guiana/Suriname and along the South African Indian Ocean coast. Turtles nesting in Florida, French Guiana/Suriname and South Africa cannot be distinguished at this time with mtDNA.

The largest known nesting aggregation of the leatherback turtles in the western North Atlantic Ocean occurs in French Guiana. This may be the largest nesting aggregation of leatherback turtles in the world and has been declining at about 15% per year since 1987. From the period 1979-1986, the number of nests was increasing at about 15% annually.

The number of nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980's but the magnitude of nesting is much smaller than that along the French Guiana coast.

Based on observer data from 1992 to 1999 the takes of leatherback turtles from the U.S. longline fishery range from 308 to 1054 annually. If 50% of these turtles die, then the mortality ranges from 154 to 527 per year.

It has been estimated that the U.S. commercial shrimp trawl fishery takes 650 leatherback turtles annually.

It is expected that longline fishing would not be able to discriminate among turtles by nesting beach origin. Assuming that Atlantic Ocean subpopulations exhibit the same life history characteristics, then it is expected that if longline fishing were causing the declines in French Guiana, declines would be measured in other nesting subpopulations.

While the longline fishery, both U.S. and foreign, and the U.S. shrimp trawl fishery may not be the immediate cause in declines in nesting in French Guiana, they could be contributing to these declines.

Four hypotheses are offered to determine the cause of the decline in nesting in French Guiana and all suggest that activities off the coast, such as fishing, likely are causing the decline in nesting. The causes for the observed decline must be identified and actions pursued immediately if the declines are not part of a natural nesting cycle.

It is recommended that research begin immediately to identify and quantify the rate of mortality from the longline fishery, both U.S. and foreign, as well as mortality rates from other fisheries.

A mechanism to initiate discussions with foreign nations relative to fishing activities outside of U.S. waters needs to be immediately identified.