

## **A review of cold stun strandings on Cape Cod, Massachusetts from 1979-2003**

**Kara Dwyer Dodge<sup>1</sup>, Robert Prescott<sup>2</sup>, Don Lewis<sup>2</sup>, Dennis Murley<sup>2</sup>, and Constance Merigo<sup>3</sup>**

<sup>1</sup> NMFS Northeast Regional Office, Gloucester, MA, USA

<sup>2</sup> Massachusetts Audubon Wellfleet Bay Wildlife Sanctuary, South Wellfleet, MA, USA

<sup>3</sup> New England Aquarium, Boston, MA, USA

---

Cold-stunning of sea turtles in Cape Cod Bay was first recognized in the mid 1970s and has been documented for the last quarter century by rescuers organized by Massachusetts Audubon under the auspices of the NMFS and USFWS. Each fall and winter, juvenile and subadult sea turtles strand after experiencing cold-stunning. Sudden cooling of ocean water temperatures leaves the turtles torpid and allows them to be tossed by strong sustained storm winds onto the lee shore.

From 1979 to 2002, 1,289 cold-stunned sea turtles were stranded on Cape Cod beaches. Kemp's ridleys account for 76.3% of these strandings, followed by loggerheads (21.1%), greens (2.3%), and hybrids (0.3%). Averaging in the mid-teens to the high-twenties throughout the 1980s, the number of cold-stun strandings rose markedly to an average of 61 turtles in the mid 1990s. Strandings have continued to increase from 1998 to 2002, climbing dramatically to a 5-year average of 133 turtles a year. In recent years, the percentage of Kemp's ridleys has reached over 90% of all cold-stunned turtles, rising in numbers in proportion to the number of hatchlings released from nesting beaches two years earlier. Most of the Kemp's ridleys are comparably sized to two-year old Kemp's ridleys of known age based on wire tags found in their flippers. Live turtles are taken to New England Aquarium for rehabilitation, and most are transported south for release into warmer waters. Of the sea turtles recovered, rehabilitated, tagged and released, none have stranded a second time in Cape Cod.

## **Evaluation of incubation temperatures in green turtle nests at French Frigate Shoals, northwest Hawaiian Islands**

**Jennifer Estes<sup>1</sup>, George Balazs<sup>2</sup>, and Thane Wibbels<sup>1</sup>**

<sup>1</sup> University of Alabama at Birmingham, Birmingham, Alabama, USA

<sup>2</sup> National Marine Fisheries Service, Honolulu, Hawaii, USA

---

The green sea turtle, *Chelonia mydas*, possesses temperature-dependent sex determination (TSD) in which the incubation temperature of the egg determines the sex of the hatchling. This form of sex determination is of evolutionary significance because it has the potential of producing a wide variety of sex ratios that do not always conform to a 1:1 sex ratio. Hatchling sex ratios resulting from TSD are also of conservational and ecological interest, since they can affect the recovery of endangered populations. French Frigate Shoals (FFS) is an atoll located approximately 800 km northwest of Oahu in the Hawaiian Archipelago. Over 90% of Hawaiian green turtle nesting occurs on FFS. The purpose of this study was to evaluate nest temperatures in an effort to estimate sex ratios. Sand and nest temperatures were monitored on FFS during the 1998-2002 nesting seasons. The average incubation temperatures during the middle third of incubation were used to predict sex ratios. The pivotal temperature of sex determination for Hawaiian green turtles is unknown. If the pivotal temperature for Hawaiian green turtles is similar to that of green turtles in Suriname and Costa Rica, where the pivotal temperatures have been estimated, then the majority of temperatures recorded in this study would be below the pivotal. This would suggest an overall male-bias. Alternatively, the Hawaiian green turtles may have evolved a lower pivotal temperature, which could result in unbiased or even female-biased sex ratios at these temperatures.



PROCEEDINGS  
OF THE TWENTY-FOURTH  
ANNUAL SYMPOSIUM ON SEA TURTLE  
BIOLOGY AND CONSERVATION



22 to 29 February 2004  
San Jose, Costa Rica

Compiled by:  
Roderic B. Mast  
Brian J. Hutchinson  
Alec H. Hutchinson

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 USA

January 2008

## NOTICE

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary produce or material mentioned in this publication. No reference shall be made to NMFS, or to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends, or endorses any proprietary produce or material herein or which has as its purpose any intent to cause directly or indirectly the advertised product to be used or purchased because of NMFS promotion.

For bibliographic purposes, this document should be cited as follows:

Mast, R.B., Hutchinson, B.J., and A.H. Hutchinson, compilers. 2007. Proceedings of the Twenty-Fourth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-567, 205 p.

<http://www.sefsc.noaa.gov>

Technical Editor: Lisa C. Belskis

Copies of this report may be obtained from:

National Marine Fisheries Service  
Miami Laboratory  
Sea Turtle Program-Proceedings  
75 Virginia Beach Drive  
Miami, FL 33149 USA

or

National Technical Information Service  
5258 Port Royal Road  
Springfield, VA 22161  
(800) 553-6847 or (703) 605-6000  
<http://www.ntis.gov>