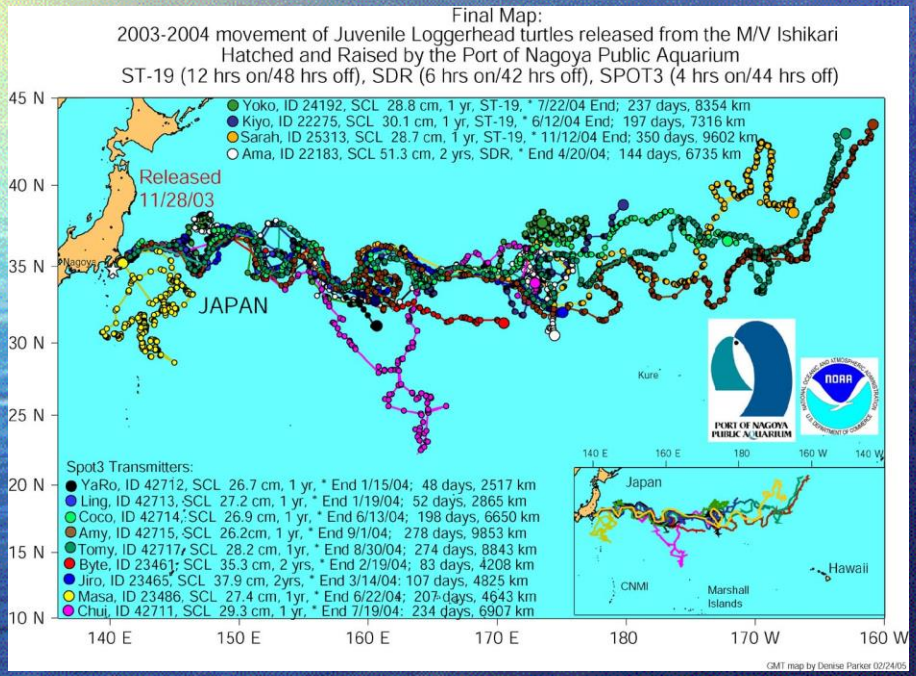
PIFSC MARINE TURTLE RESEARCH

Focus of Investigations and Activities

1. Pacific Islands sea turtle biology, ecology and life history

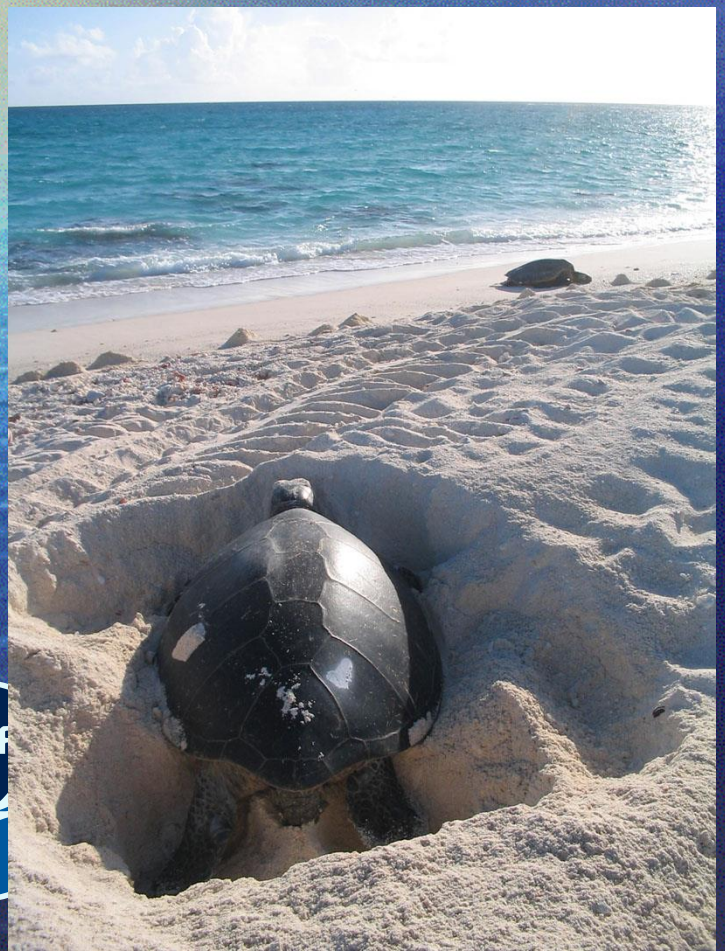
PIFSC MARINE TURTLE RESEARCH

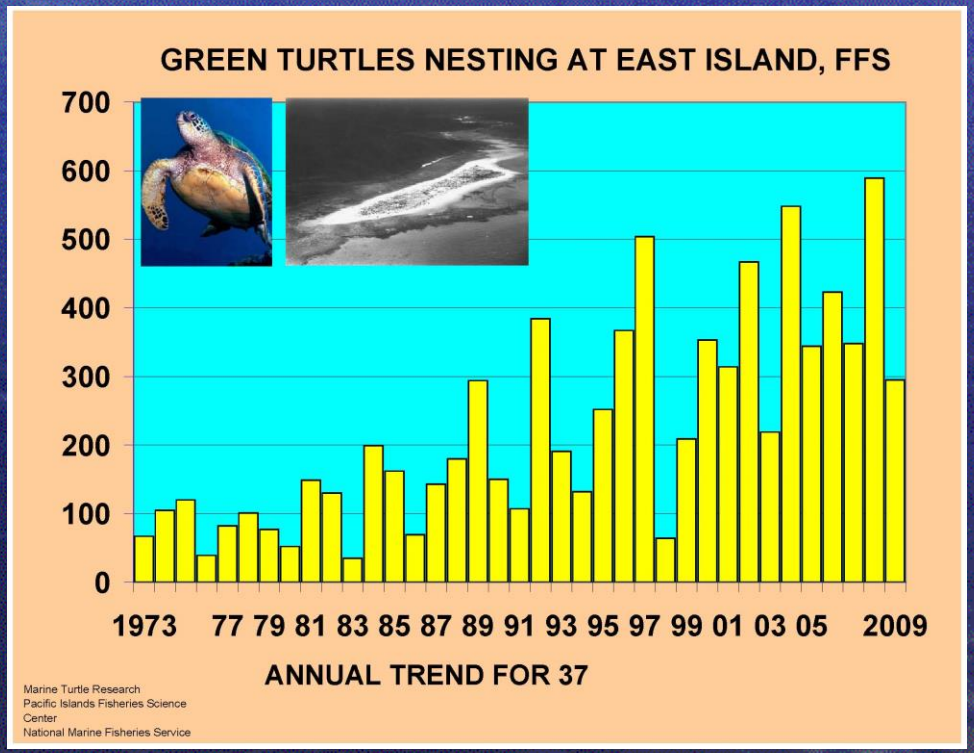
2. Pelagic ecology of Japanese loggerheads for bycatch reduction



PIFSC MARINE TURTLE RESEARCH

3. Monitoring long term trends at nesting beaches and in foraging areas





PIFSC MARINE TURTLE RESEARCH

4. Simulation modeling of population dynamics for stock assessment

PIFSC MARINE TURTLE RESEARCH

5. Health assessments including fibropapilloma disease complex

PIFSC MARINE TURTLE RESEARCH

6. Stranding, salvage and necropsy research for long term population dynamics data collection

PIFSC MARINE TURTLE RESEARCH

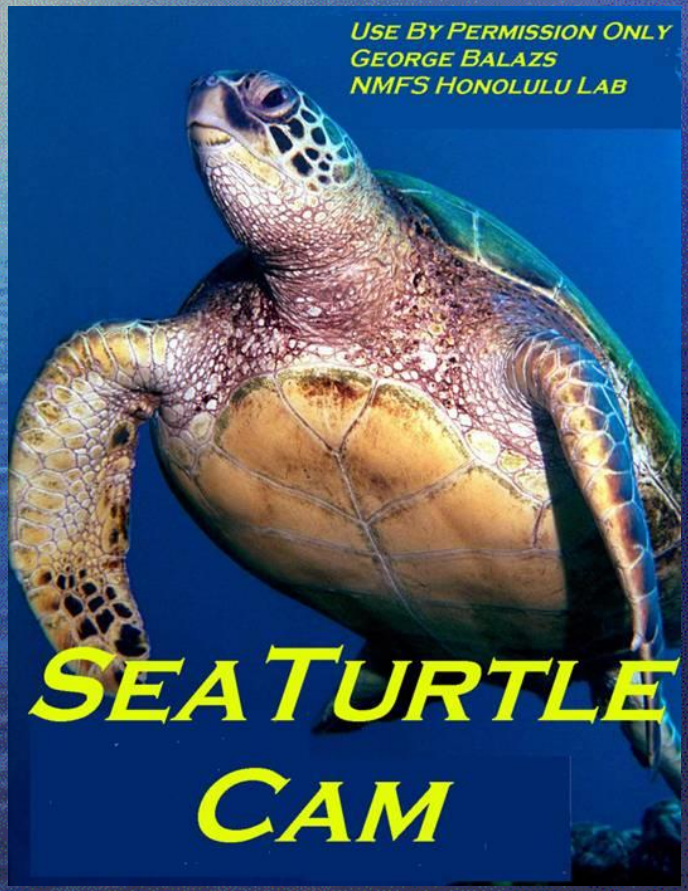
7. Fishery observer training for pelagic data collection

PIFSC MARINE TURTLE RESEARCH

8. Research training and capacity building of Pacific islanders and Pacific Rim personnel

PIFSC MARINE TURTLE RESEARCH

9. "Remote Viewing" for experimental turtle monitoring using hi-tech cameras



PIFSC MARINE TURTLE RESEARCH

10. Educational outreach using our research results

PIFSC MARINE TURTLE RESEARCH

11. Publish findings in peer reviewed journals

Available online at www.sciencedirect.com
SCIENCE DIRECT
ELSEVIER
Biological Conservation 117 (2004) 491–498
BIOLOGICAL CONSERVATION
www.elsevier.com/locate/biocon

Thirty-year recovery trend in the once depleted Hawaiian green sea turtle stock

George H. Balazs[a], Milani Chaloupka[b,*]

[a]Pacific Islands Fisheries Science Center, National Marine Fisheries Service, Honolulu, Hawaii, 96822, USA
[b]School of Economics, University of Queensland, Brisbane, Queensland, 4072, Australia

Received 6 March 2003; received in revised form 20 August 2003; accepted 20 August 2003

Abstract

The green sea turtle is one of the long-lived species that comprise the charismatic marine megafauna. The green turtle has a long history of human exploitation with some stocks extinct. Here we report on a 30-year study of the nesting abundance of the green turtle stock endemic to the Hawaiian Archipelago. We show that there has been a substantial long-term increase in abundance of this once seriously depleted stock following cessation of harvesting since the 1970s. This population increase has occurred in a far shorter period of time than previously thought possible. There was also a distinct 3–4 year periodicity in annual nesting abundance that might be a function of regional environmental stochasticity that synchronises breeding behaviour throughout the Archipelago. This is one of the few reliable long-term population abundance time series for a large long-lived marine species, which are needed for gaining insights into the recovery process of long-lived marine species and long-term ecological processes.

Keywords: Green sea turtle; Abundance; Population recovery; French Frigate Shoals; Hawaii

1. Introduction

The green turtle (*Chelonia mydas*) has a circumtropical distribution with distinct regional population structures (Bowen et al., 1992) and is the most abundant large marine herbivore (Bjorndal, 1997). Globally, the green turtle has been subject to a long history of human exploitation with some stocks now extinct and others in decline (Frazier, 1980; Witzell, 1994). Yet despite being recognized as globally threatened (National Research Council, 1990) there are few reliable assessments of abundance status and trend of any green turtle stock (Chaloupka and Limpus, 2001). Reliable long-term estimates of population abundance trends are needed to support recovery planning (Foin et al., 1998), model sea turtle demography (Chaloupka, 2002) and are essential for developing a better understanding of long-term ecological processes (Inchausti and Halley, 2001).

For sea turtles, such population abundance estimates are based preferably on foraging ground capture–mark–recapture programs that can provide more detailed sex- and age-class-specific demographic information (Limpus and Chaloupka, 1997; Chaloupka and Limpus, 2001, 2002). However, capture–mark–recapture programs in the marine environment for large and highly mobile species such as sea turtles are very difficult and expensive to conduct and so are rarely undertaken (Limpus and Chaloupka, 1997; Bjorndal et al., 2000). Nearly all assessments of sea turtle population abundance have been based on trawl based catch-per-unit-effort estimation, aerial survey based density estimation or, more commonly, by monitoring the number of females that come ashore each year to nest at stock-specific rookeries (see review in Chaloupka and Limpus, 2001).

Monitoring beach nesting is by far the easiest and least expensive means to assess green turtle population abundance but short-term surveys (<10 years) are inadequate for several reasons (Chaloupka and Limpus, 2001). Most notably because green turtles are long-lived (Limpus and Chaloupka, 1997; Zug et al., 2002) and females skip several nesting seasons due to nutritional constraints (Bjorndal, 1997). Hence, long-term nesting beach surveys are essential if this form of assessment of

* Corresponding author. Fax: +61-7-3365-7299.
E-mail address: m.chaloupka@mailbox.uq.edu.au (M. Chaloupka).

0006-3207/$ - see front matter © 2003 Elsevier Ltd. All rights reserved.
doi:10.1016/j.biocon.2003.08.008