



Estimates of apparent survival probability and abundance for juvenile hawksbill turtles (*Eretmochelys imbricata*) in Fernando de Noronha, Brazil

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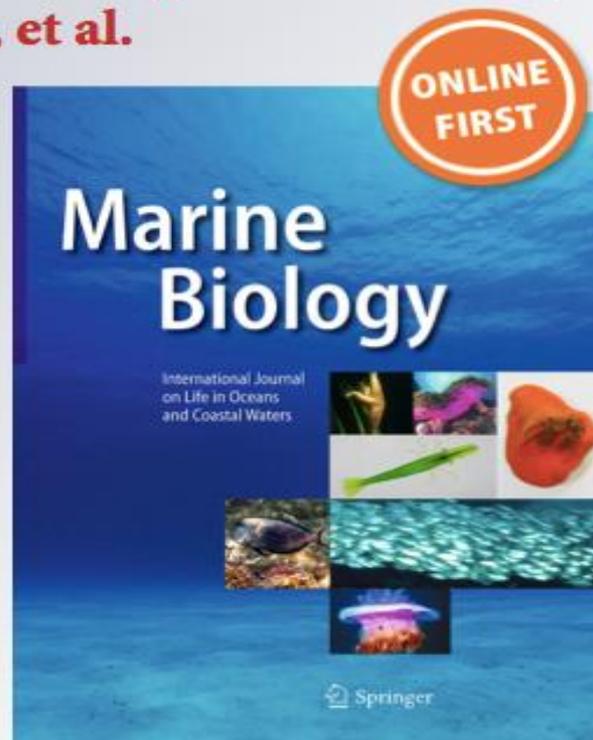
*Long-term growth and survival dynamics  
of green turtles (Chelonia mydas) at an  
isolated tropical archipelago in Brazil*

**Liliana P. Colman, Ana Rita C. Patrício,  
Andrew McGowan, Armando  
J. B. Santos, Maria Ângela Marcovaldi,  
Cláudio Bellini, et al.**

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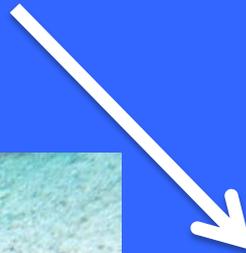


# Context

Effective conservation



Demographic parameters such as survival and abundance



sea turtles:  
long-term studies

# Goals

Better understand the ecology of hawksbill turtles through a long-term tagging program.



# Methods

## Study area – Fernando de Noronha, Brazil

- World Natural Heritage Site (UNESCO).
- Forage site for hawksbill and green turtles (Sanches and Bellini 1999)
- Protected by Marine National Park
- Long term Capture-Mark-Recapture program (Marcovaldi and Marcovaldi, 1999)



# Methods

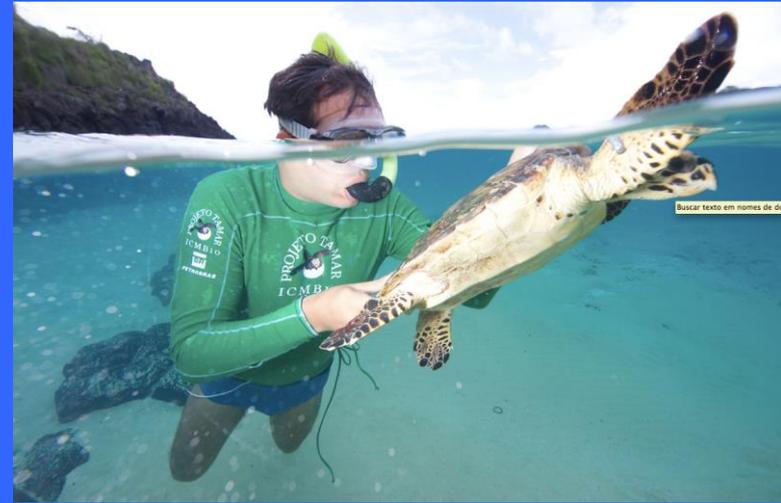
Database analysis of the tagging program and recapture

Turtles previously:

Captured → snorkelling or scuba diving

Tags applied in both fore flippers

CCL using a flexible plastic tape  
(**Marcovaldi and Marcovaldi 1999**)

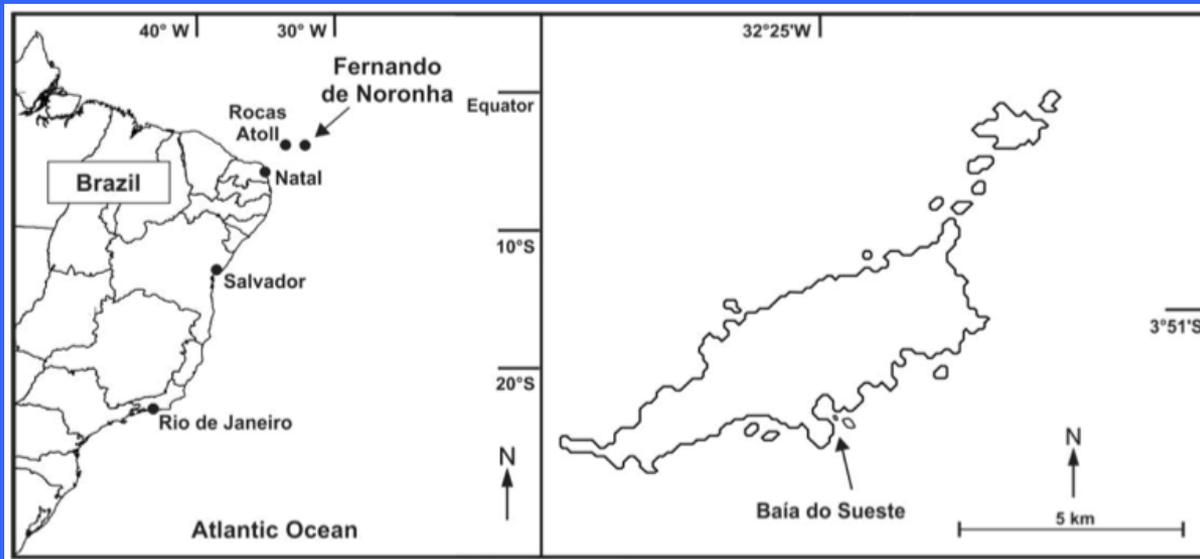


# Methods

## Dataset:

→ 1987 – 2012

→ The main capture site Sueste Bay



# Analysis

Statistical analysis → R Software

**Size distribution:** function of CCL frequencies

**Time of residency:** time interval between the first and last captures

**Survival:** Cormack-Jolly-Seber approach using program MARK



# Results

## Capture-Mark-Recapture Program:



- 2167 captures
  - 461 individual turtles tagged
  - 220 turtles captured more than once
- 
- CCL on first capture ranged of 28 to 84 cm (mean  $\pm$  SD = 44.4  $\pm$  10.0, N = 451)
  - Time of residency varied from two days to 12.5 years (average 3.8 years; N = 220)

# Results



Three recaptures in the main land

# Results



Two recaptures in Africa  
(Equatorial Guinea and Gabon)

# Results

## Survival:

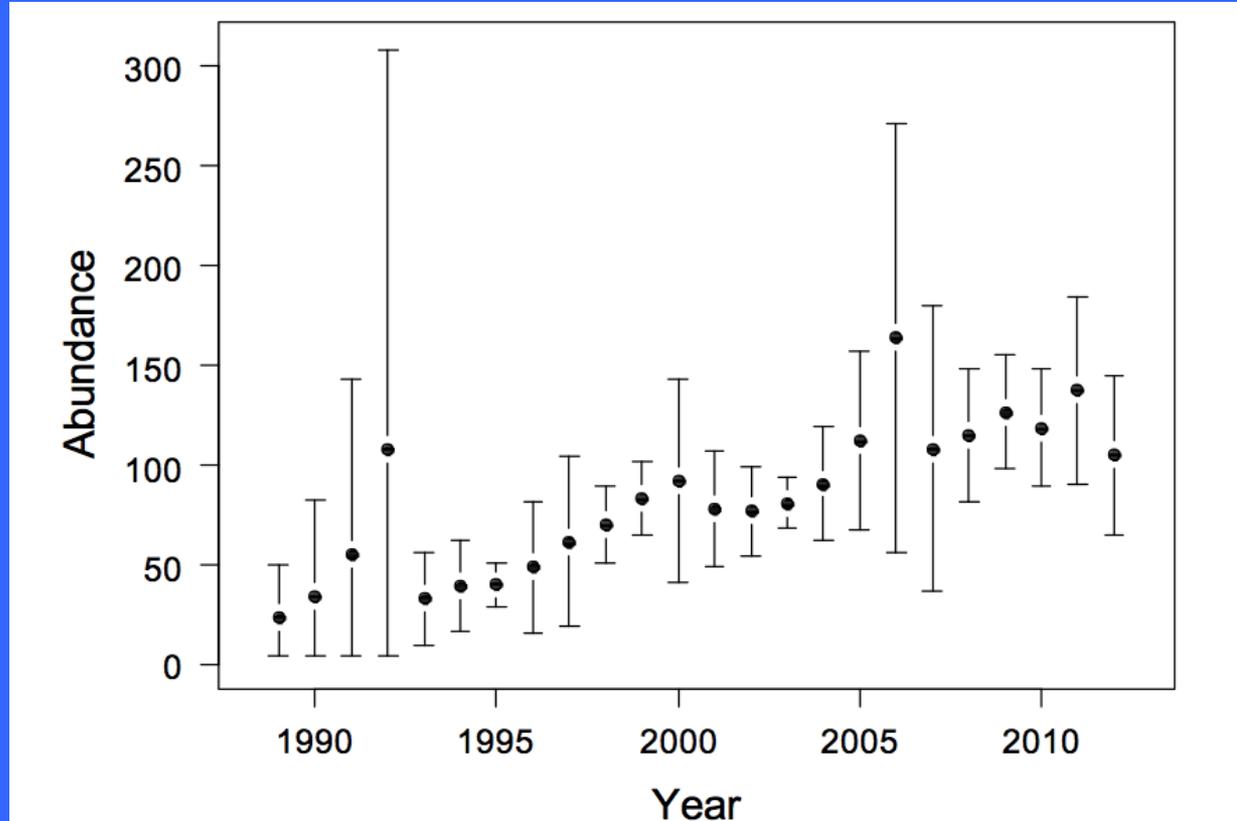
The population of juvenile hawksbills was estimated to have increased in 1989–2012 at around 6.8% per annum (95% CI: 4.8–8.9)

Annual recapture probability with best fit models varied from 0.13 to 0.88 (average 0.54)

Recapture probabilities were used to estimate abundance between 1989 and 2012

# Results

## Abundance:



The estimated annual abundance in 2010–2012 was in the range of 105–138 turtles

# Discussion

- Development area for juveniles (95% < 64 cm CCL)
- Estimates of annual apparent survival probability was relatively high when compared with other juvenile population of sea turtles (Bjorndal et al., 2003)
- Apparent survival probabilities confounds mortality and permanent emigration, being a limitation for real survival probabilities.
- The increasing trend must be interpreted with caution, as the population size is relatively small, suggesting that this population is only part of a bigger population with a wider distribution.

# Thank you!



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