

How much do reefs really matter to Hawksbill turtles?

Lucy Hawkes

Jesus Tomas

Yolanda Leon

Ohiana Revuelta

Annette Broderick

Marianne Fish

Toni Raga

Matthew Witt

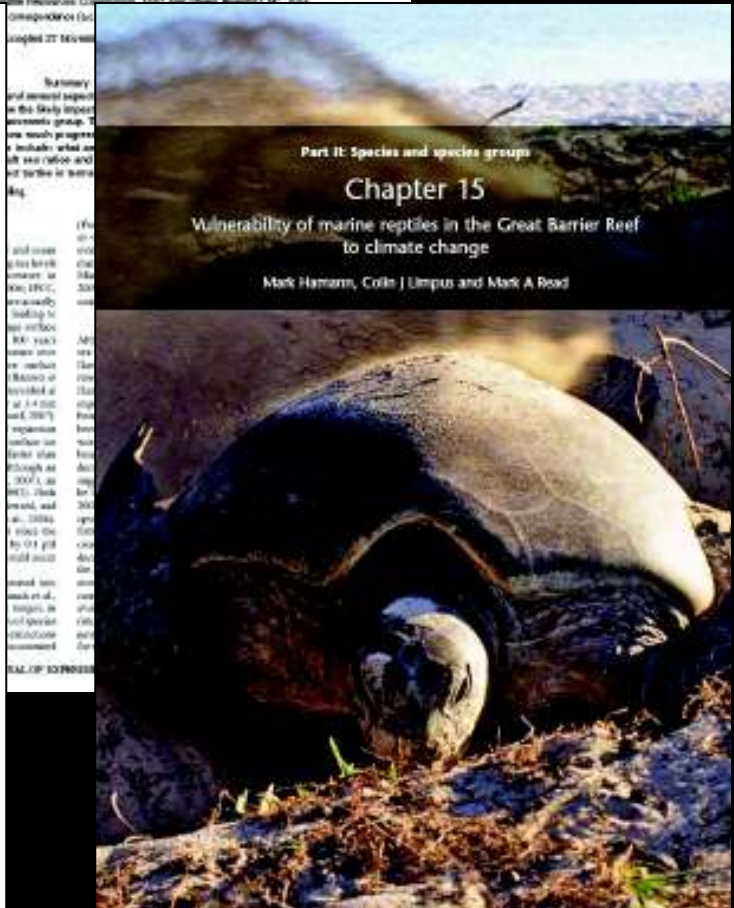
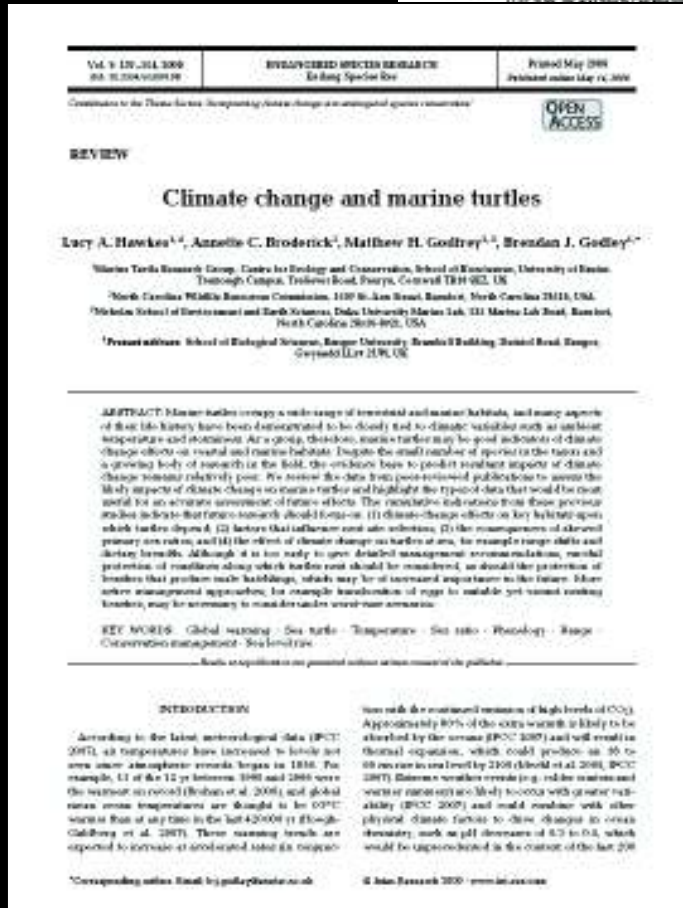
Brendan Godley



Outline

- **home range size**
- **depth preferences**
- **legislation / protection**
- **reefs**

Climate change and marine turtles...



Methods



n = 10



Methods



THEME SECTION

Sex-specific migration patterns of hawksbill breeding at Mona Island, Puerto Rico

Robert P. Van Dam^{1,*}, Carlos E. Diaz², George H. Rodriguez³, Le W. Owen McMillan⁴, Barbara Schroeder⁵

¹Florida, PO Box 901096, San Juan, Puerto Rico 00901
²Departamento de Recursos Naturales y Ambientales, PO Box 384627, San Juan 00931
³NOAA / National Marine Fisheries Service, Pacific Islands Fisheries Science Center, 10101
⁴Departamento de Ciencias de Computación, Universidad de Puerto Rico en San Juan, Puerto Rico 00931
⁵Department of Genetics, North Carolina State University, PO Box 7617, Raleigh, NC 27695
⁶NOAA / National Marine Fisheries Service, Office of Protected Resources (FWS), 1111 E. Mayfield 29015, USA

ABSTRACT. Detailed post-breeding movement data is presented for hawksbill turtles from Mona Island, Puerto Rico. Sixteen nesting females and 2011 non-nesting males (n = 21) at average speeds of 23.8 to 30.7 km d⁻¹ (n = 21, 22 d), covering distances of 22 to 228 km (mean 121 km, n = 21) at average rates of 1.5 to 1.9 km d⁻¹ (n = 21) from their nesting grounds to their foraging grounds was also documented. Diurnal habitat used by these adults was also provided. The significant differences range between males and females are interpreted as an evolutionary response to sex-specific, or alternative, hypotheses of geographic variation in mortality rates.

KEY WORDS: Hawksbill turtle, *Eretmochelys imbricata*, Migration, Mona Island

INTRODUCTION

Multiple studies have long been known to track tracks from nesting beaches upon completion of breeding activities, but only in the past 30 to 15 yr have the remarkable details of these migrations become clear with the advent of satellite telemetry technology. Early marine turtle researchers agreed that satellite tracking was the most important tool for understanding the movements of marine turtles (Carr 1978, Hamner and Hamner 1980, Hamner and Hamner 1981, Hamner and Hamner 1982).

Actual movement of adult documented (Miller et al. 2005), genetic studies to understand stock, tracking during a later stage in life than breeding grounds (Miller et al. 2006). Published studies of adult hawksbill turtles with post-breeding movements have been limited to the Hawaiian Islands (Hamner and Hamner 1980, Hamner and Hamner 1981, Hamner and Hamner 1982).

15 AUGUST 2008

Migration of hawksbill turtles *Eretmochelys imbricata*, Costa Rica

Yessica A. Soto, F. H. ...

Yessica A. Soto, F. H. ...

ABSTRACT. The hawksbill turtle (*Eretmochelys imbricata*) is a species with a circumglobal regional distribution including the Caribbean and Eastern Pacific. The hawksbill turtle has primarily an oceanic species of marine species and endemics (Meylan 1998, Lutz and Bjorndal 2001). It fills an important ecological role in the coastal reef systems by enhancing secondary diversity and structure through selective feeding, reducing the amount of certain species of algae and crustaceans and lowering their species' ability to colonize adjacent reef systems (Lutz and Bjorndal 2001).

KEY WORDS: Hawksbill turtle, *Eretmochelys imbricata*, Migration, Costa Rica



Post-nesting migratory movements of hawksbill turtles *Eretmochelys imbricata* in waters adjacent to the Yucatan Peninsula, Mexico

Eduardo Cuevas^{1,*}, F. Alberto Abreu-Grobois², Vicente Guzman-Hernandez³, M. A. Liceaga-Correa⁴, Robert P. van Dam⁵

¹CONSEVATUR, Box 5, La Joya Carr. Progreso, A.P. 23, Campeche, Yucatán, México
²Unidad Académica Maritima, Instituto de Ciencias del Mar y Limnología, USAMM, Calle José Matos Tzucucuc, C.P. 91200, Mérida, Yucatán, México
³Centro de Protección de Flora y Fauna Lagunas de Trinitas, Comisión Nacional de Áreas Naturales Protegidas, Av. Adolfo López Mateos, Prologacion Playa, No. 5, C.P. 24100, Ciudad del Carmen, Campeche, México
⁴Cholula Inc., PO Box 80106, San Juan, Puerto Rico 00901-0106, USA

ABSTRACT. The Yucatan Peninsula harbors the largest nesting population of hawksbill turtle *Eretmochelys imbricata* in the Atlantic Basin. In Mexico, one of the most significant conservation problems for this species is the lack of knowledge on migratory patterns and the location of feeding grounds for post-nesting hawksbill females. The main goal of this study was to gather information on the hawksbill's migratory patterns and the location of their feeding grounds by tracking 5 post-nesting females from Campeche state, Mexico. We attached satellite transmitters and tracked the females for 196, 146, and 120 d, respectively. The turtles remained within Mexican territorial waters, tracking separate feeding grounds off the coast of Campeche and in the Mexican Caribbean. No significant relationships were observed between further ranging behavior and sea surface temperature or geographic current. Spatial analysis of the data recorded in this study has generated novel information on hawksbill turtle migratory patterns and feeding grounds, which will aid in determining the hawksbill turtle conservation in the Yucatan Peninsula.

KEY WORDS: Hawksbill turtle, Yucatan Peninsula, Migration, Post-nesting

INTRODUCTION

The hawksbill turtle *Eretmochelys imbricata*, like other sea turtles, has a complex life cycle that includes use of various terrestrial and marine habitats, including beaches, shallow coastal waters, coral reefs and oceanic waters. These turtles are also long-lived, taking decades to reach sexual maturity. Together, this spatial and temporal complexity requires more, to increasing anthropogenic threats on critical nesting, feeding, mating and breeding habitats, rendering them highly vulnerable to extinction. Particularly as a result

of unsustainable exploitation for food and tortoiseshell, this pan-tropical species is listed globally as critically endangered on the International Union for Conservation of Nature Red List (IUCN 2007), and highly protected by various international (Convention on International Trade in Endangered Species of Wild Flora and Fauna, Protocol of Specially Protected Areas and Wildlife of the Wider Caribbean Region, Inter-American Convention for the Protection and Conservation of Sea Turtles) and national legislation (e.g., Endangered Species Act of 1973, NOAA, 1973).

*Email: ecuevas@univnet.cu

© 2008 The Authors. Journal compilation © 2008 Society for Conservation Biology

Migration Routes and Destination of Satellite-Tracked Chelonia mydas

JULIA A. HODRICKS¹, LOTUS A. VAN BARKER A. SCHROEDER²

¹Department of Biological and Chemical Sciences, P.O. Box 246-47-4397, 2
²Behavior Research Division of NOAA, NMFS, National Centers for Coastal Ocean Science, National Marine Fisheries Service, Office of Protected Resources, National Marine Fisheries Service, 2570 G

ABSTRACT. Four post-nesting hawksbill turtles with satellite transmitters during the 1998 research satellite tracking project to investigate migrations between their nesting and foraging immediately following their final nesting on 7 and 18 days to reach foraging grounds respectively. Straight-line travel distances were influenced by water depth and geostrophic generally travelled through shallow water currents. In places where the turtles encounter their travel speeds increased markedly. For and were positively correlated with the average water foraging areas may have to forage over turtles settled at locations where sea conditions this may be a key to their survival in countries that adult females nesting in Barbados, where their lives in waters where they are only part

Key Words. – Reptilia; Testudines; Chelonia foraging habitat; satellite telemetry; Barbados

The hawksbill turtle (*Eretmochelys imbricata*) is generally declining in the Caribbean, largely as a result of over-harvesting (Meylan, 1989a), and is considered Critical Endangered by IUCN (Meylan and Donnelly, 1999). Juvenile and adult hawksbills forage in a wide variety of coastal and open ocean habitats, including coral reefs, seagrass beds, and other hard-bottom habitats. They are primarily opportunistic (Meylan, 1988), and the role in regulating sponge growth on reefs may be significant (Hill, 1998). Hawksbill nesting seasons are generally in 2-3 year intervals, and they usually make 3-5 nests per season (see Cousteau, 1999). Nesting is widely distributed throughout the Caribbean, but with the exception of Cuba and the Yucatan, Mexico (Castro et al., 1999; Maccubbin et al., 1999; Gardner-Whitcomb et al., 1999). The majority of counted record low numbers nesting. For example, in the Lesser Antilles, only 30-50 females are estimated to nest on each island annually (Meylan, 1998a).

Adult females have high reproductive value and are considered management of this population is of considerable importance. Since decreases in numbers of females in a population decline, many countries

n = 15

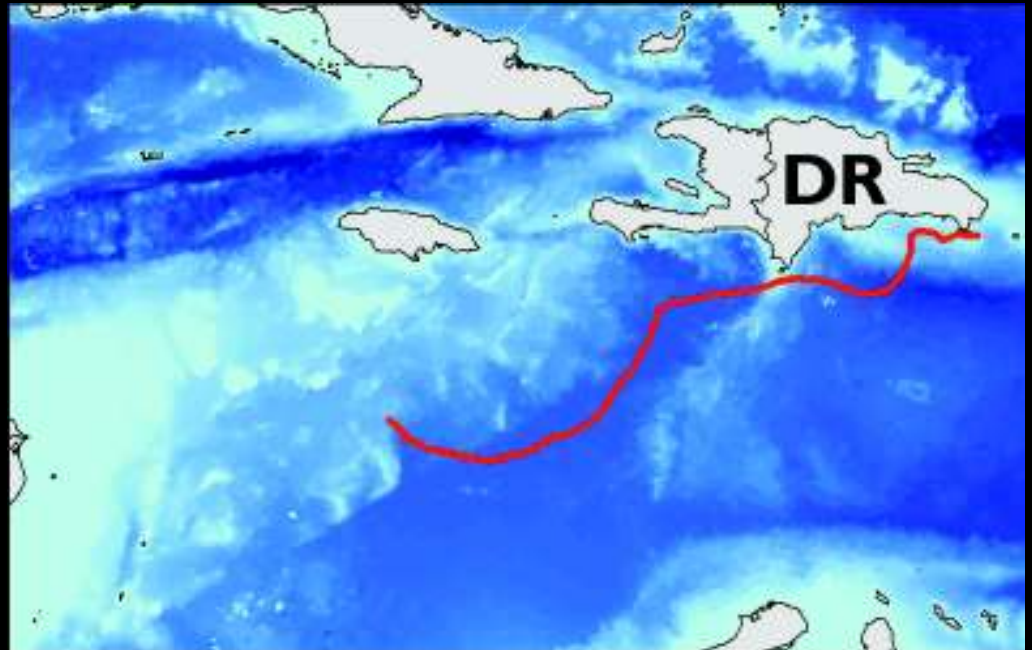
n = 3

n = 4

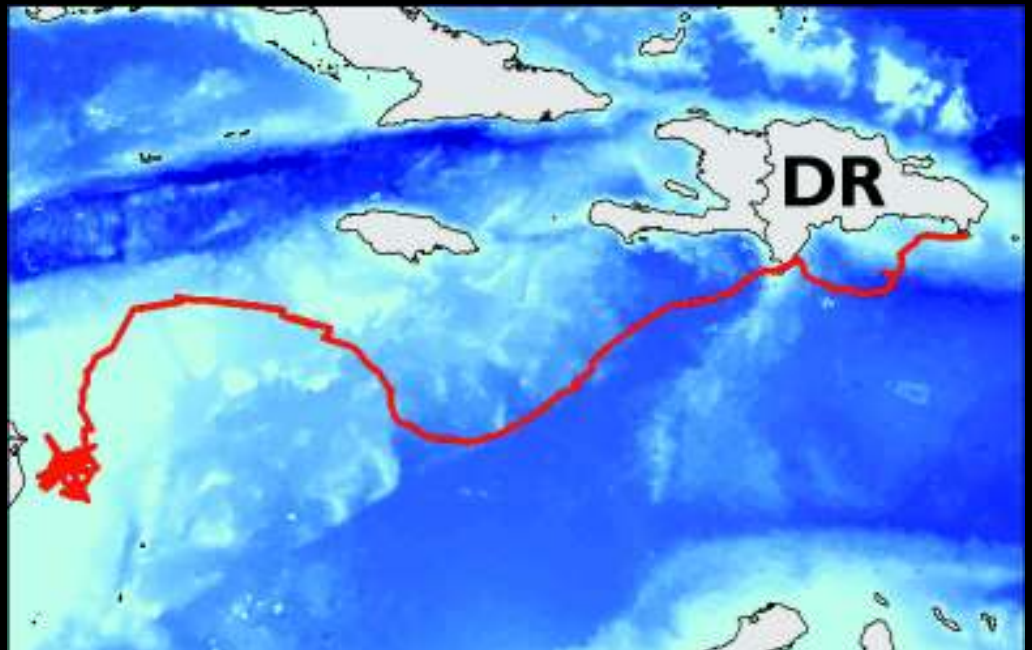
n = 2

Methods

n=21

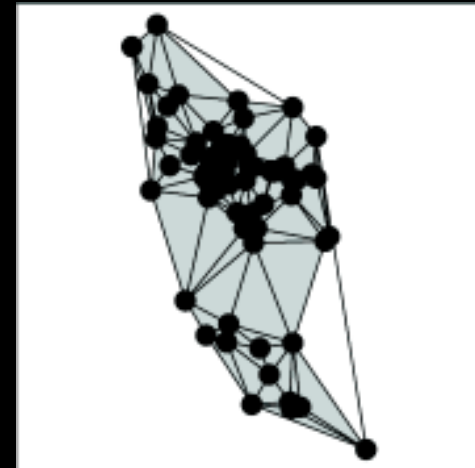
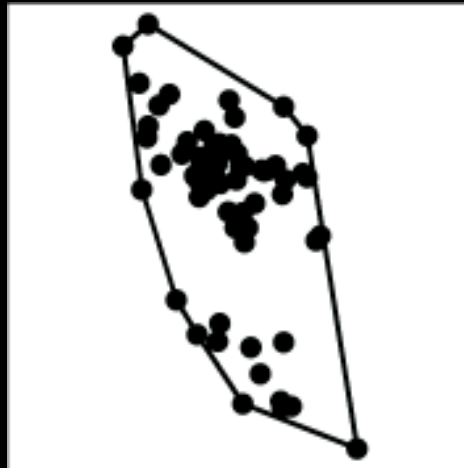


n=13



Methods

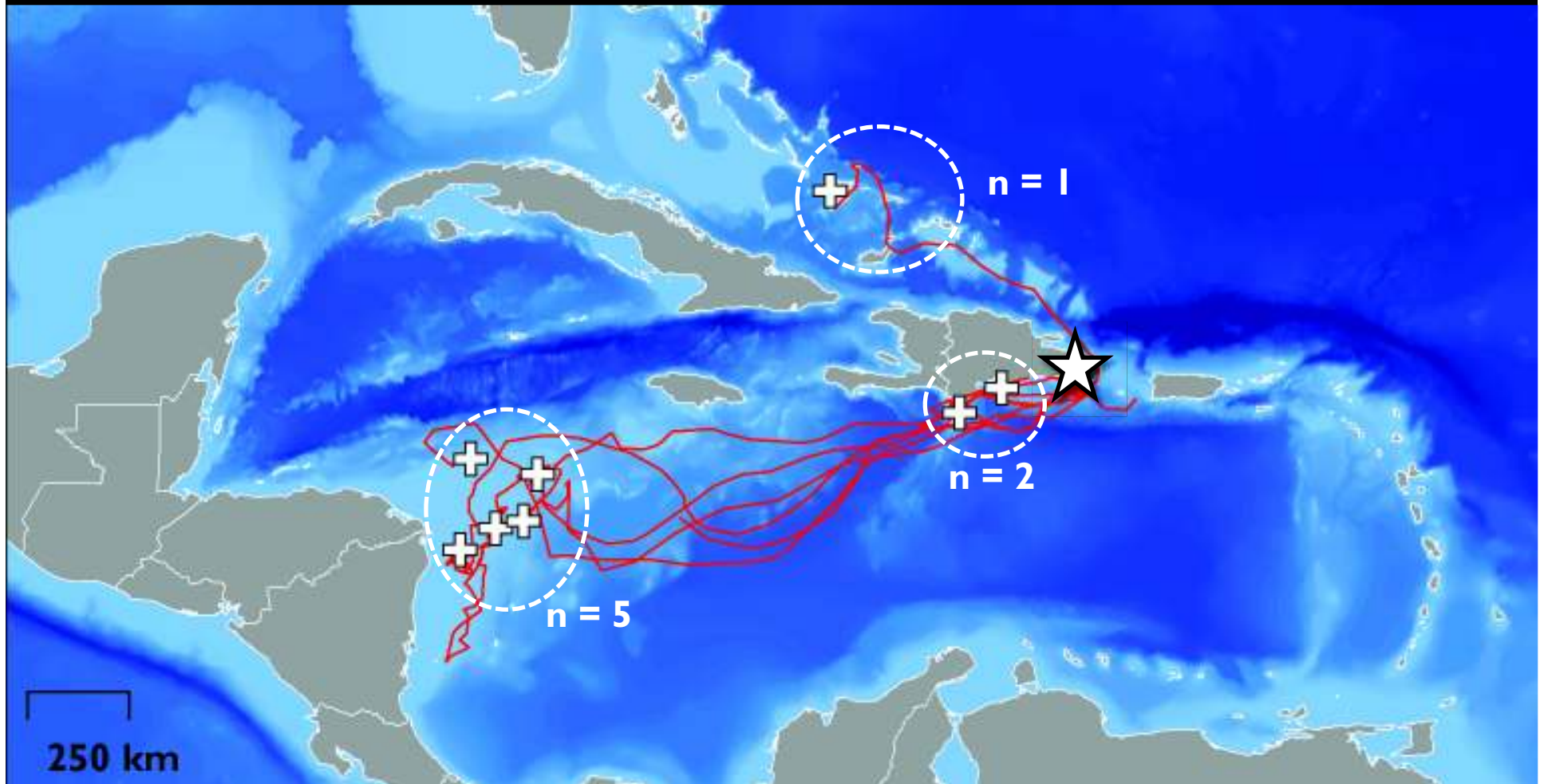
- Home ranges
MCPs
 α -hulls



Methods

- **depth**
- **national jurisdictions**
- **MPAs**
- **coral reefs**

Results - DR tracking

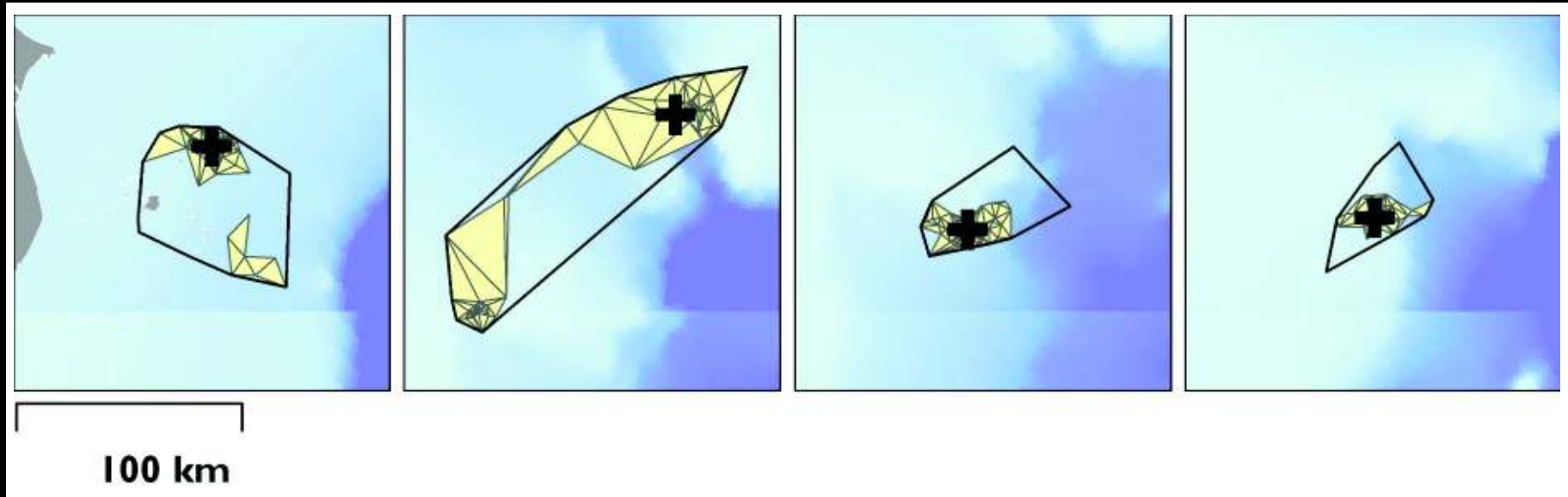


Results – previously published



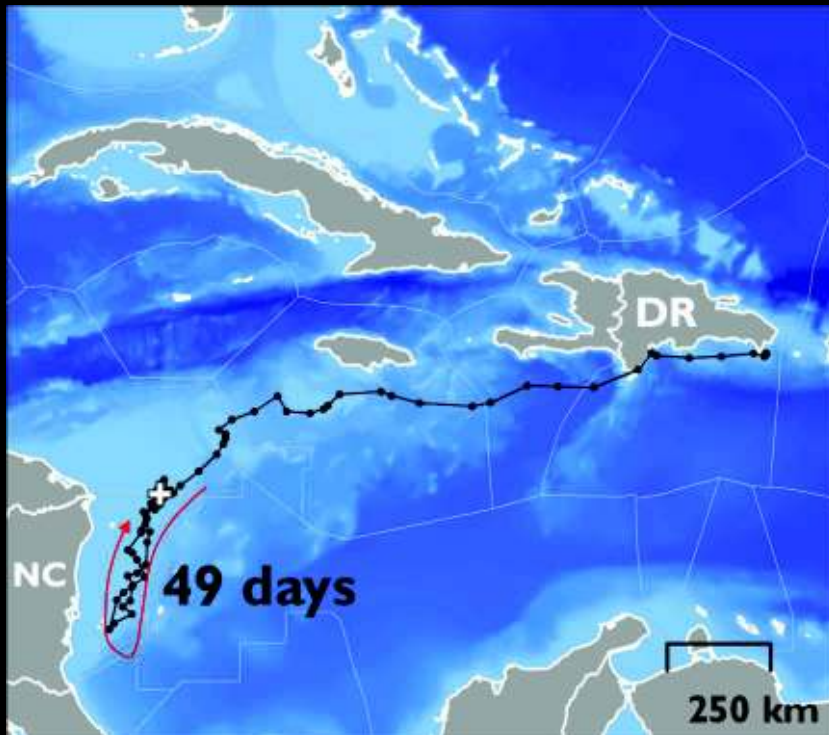
Results

- foraging hawksbills (n = 13)
median 480 km² (IQR 104 – 1,328)



Results

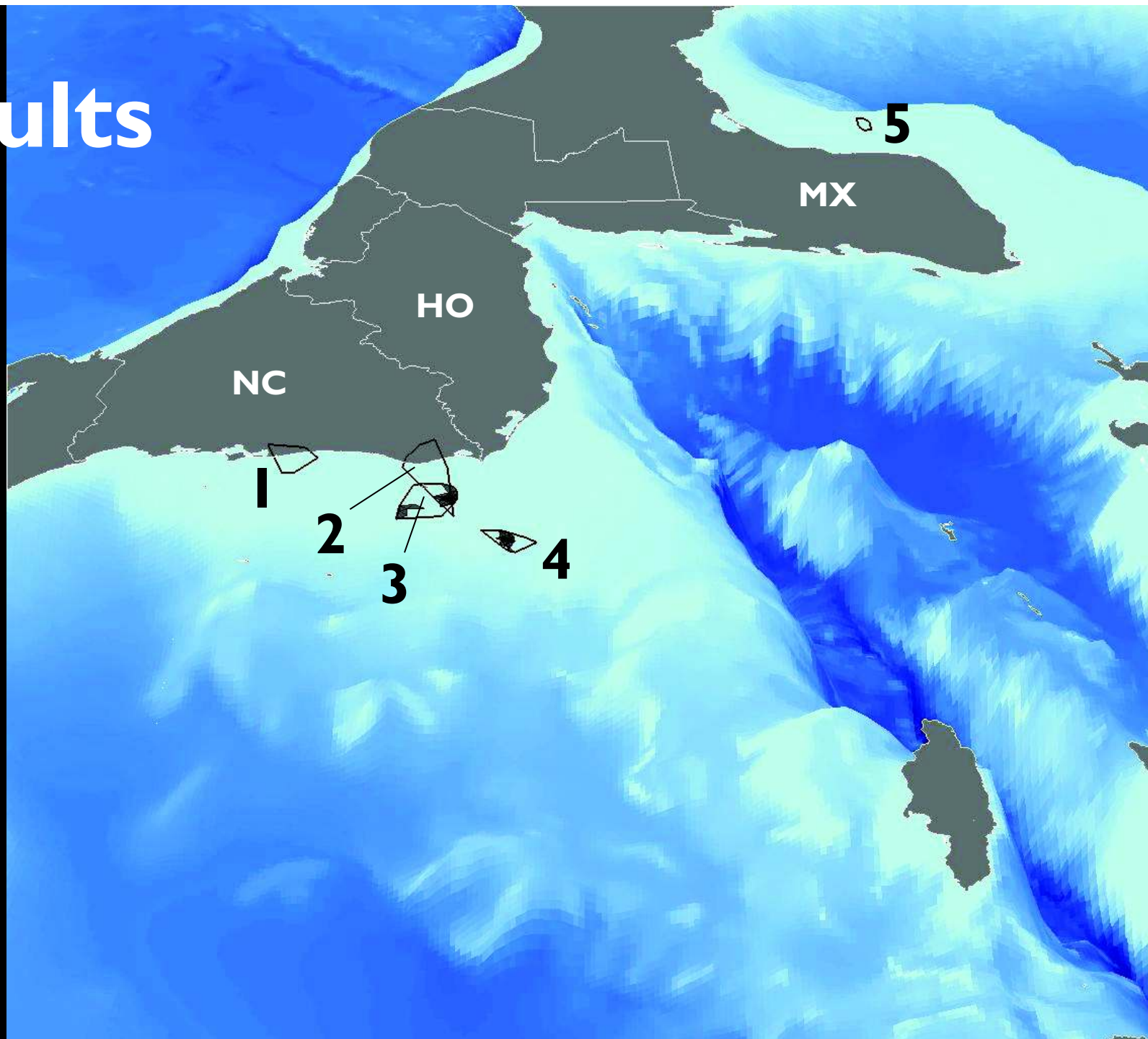
- **Plasticity**



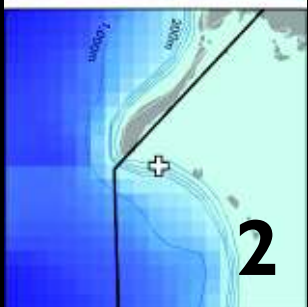
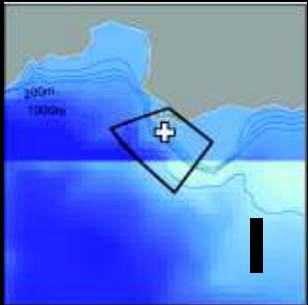
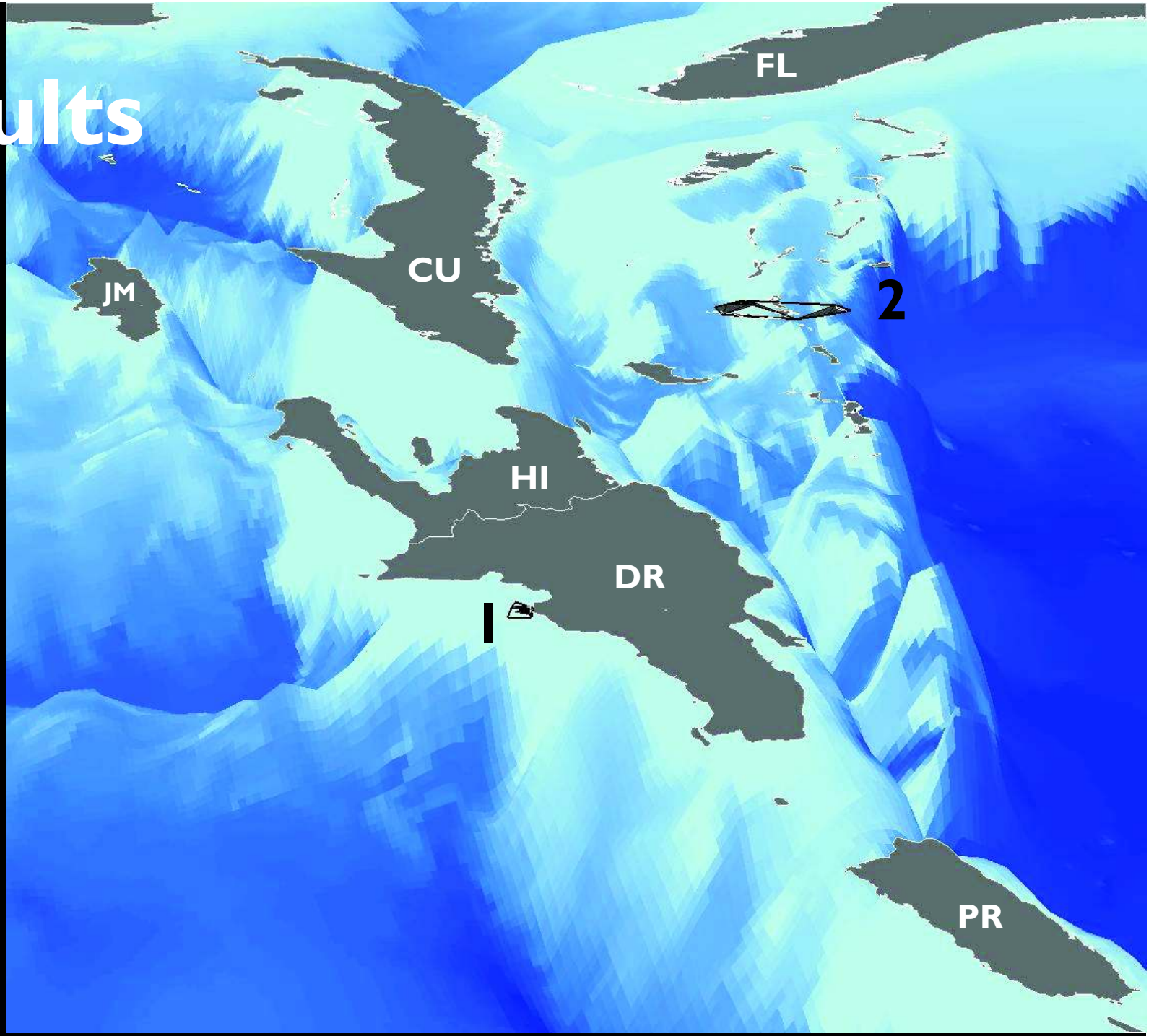
Results

- **Median depth per home range (for all pts)**
 - **66.5m (median, range 3 - 217)**
- **3 types: shallow / wall / deep**

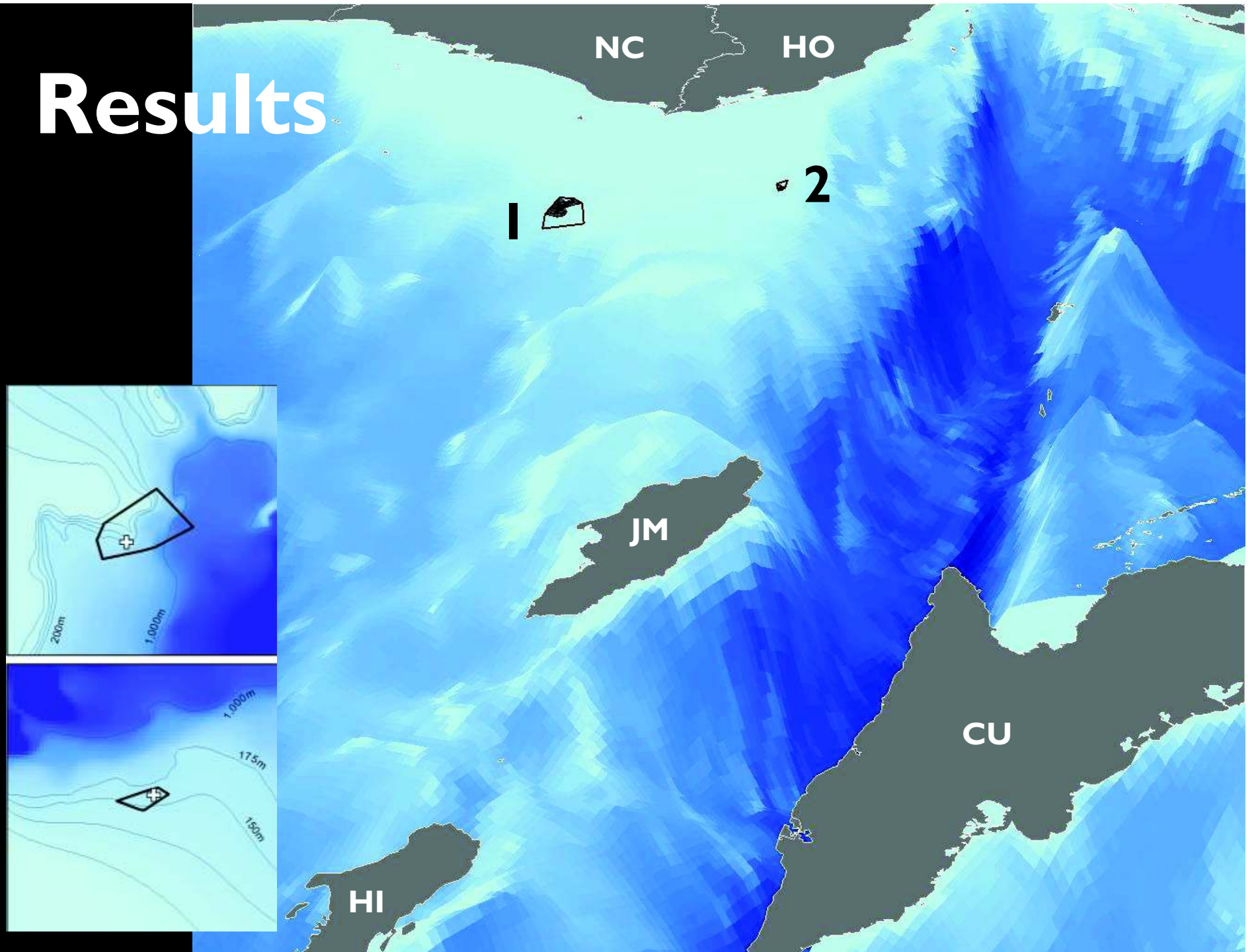
Results



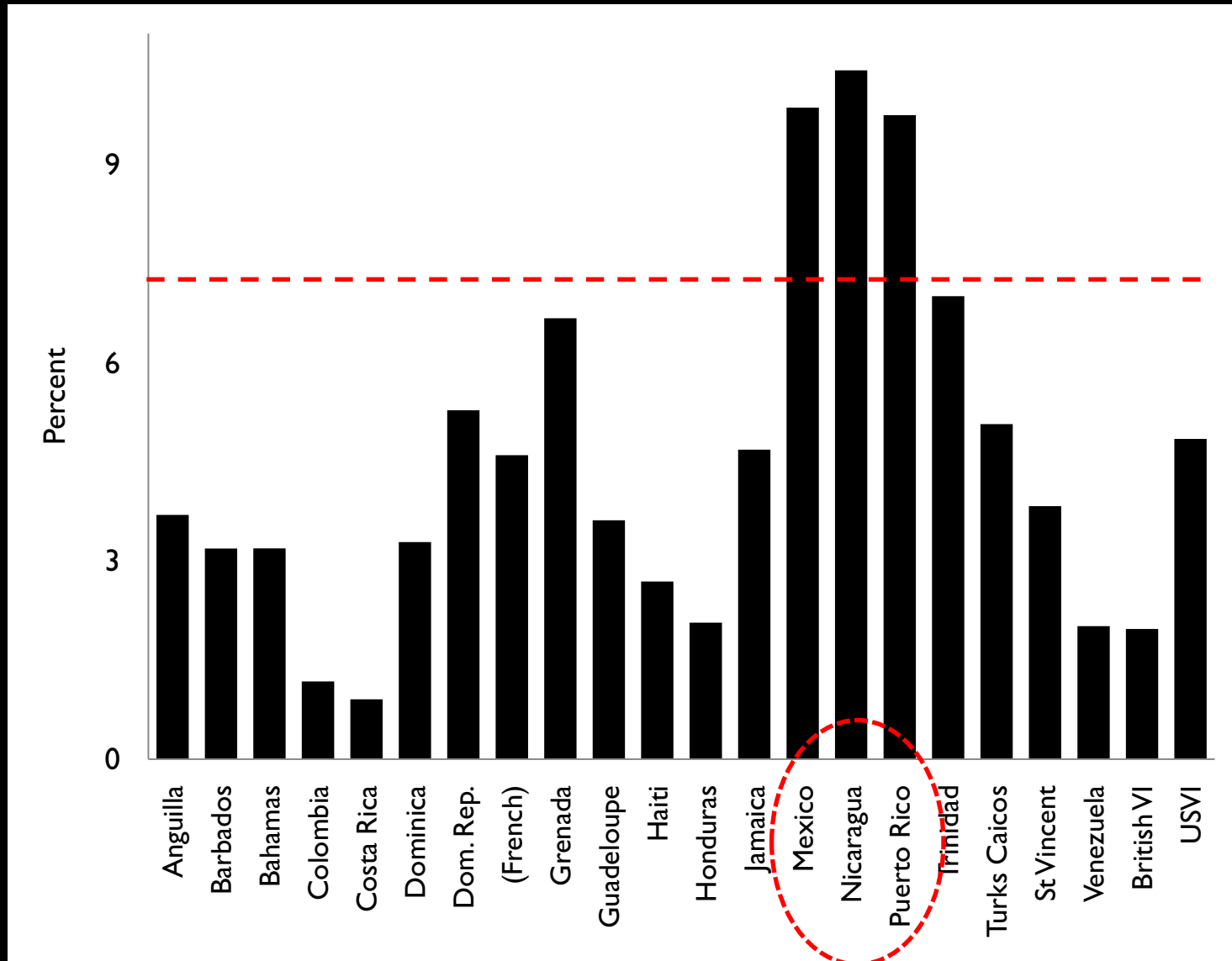
Results



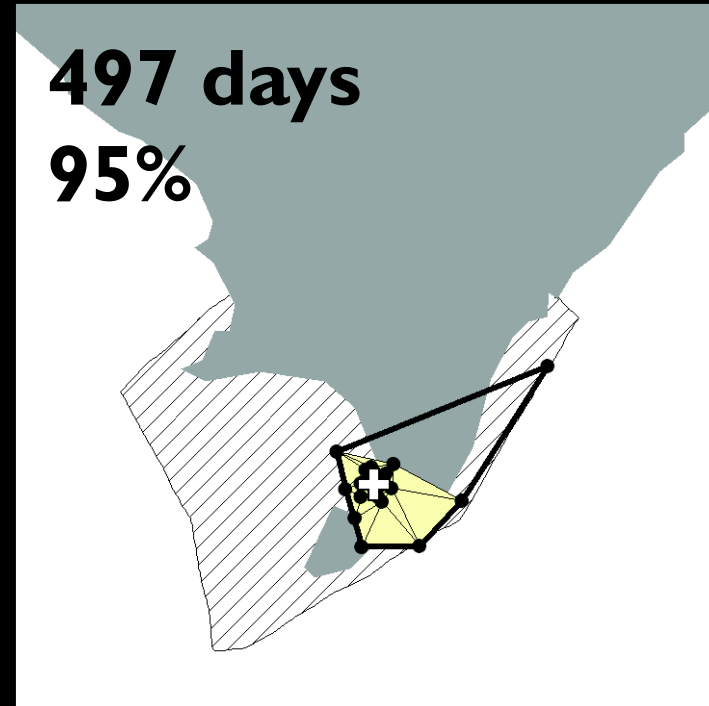
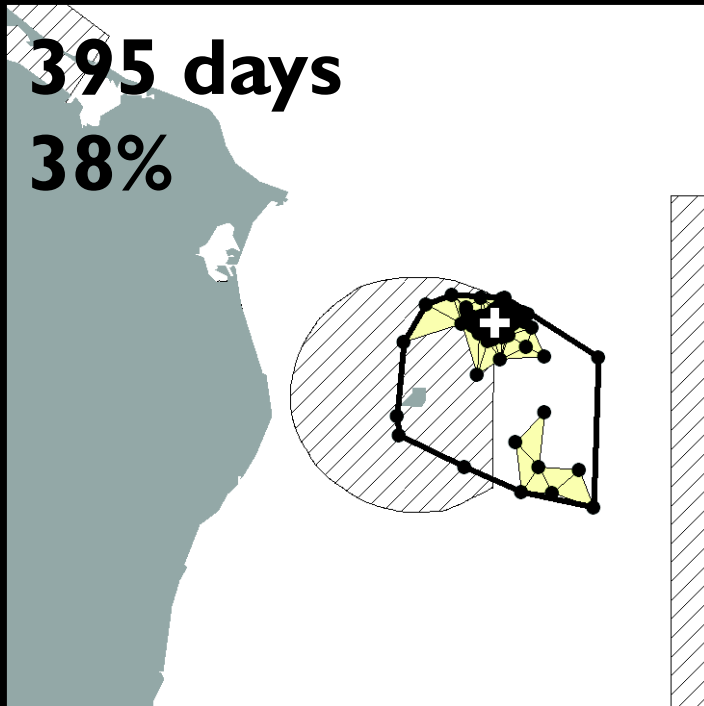
Results



Results – by country (n=34)

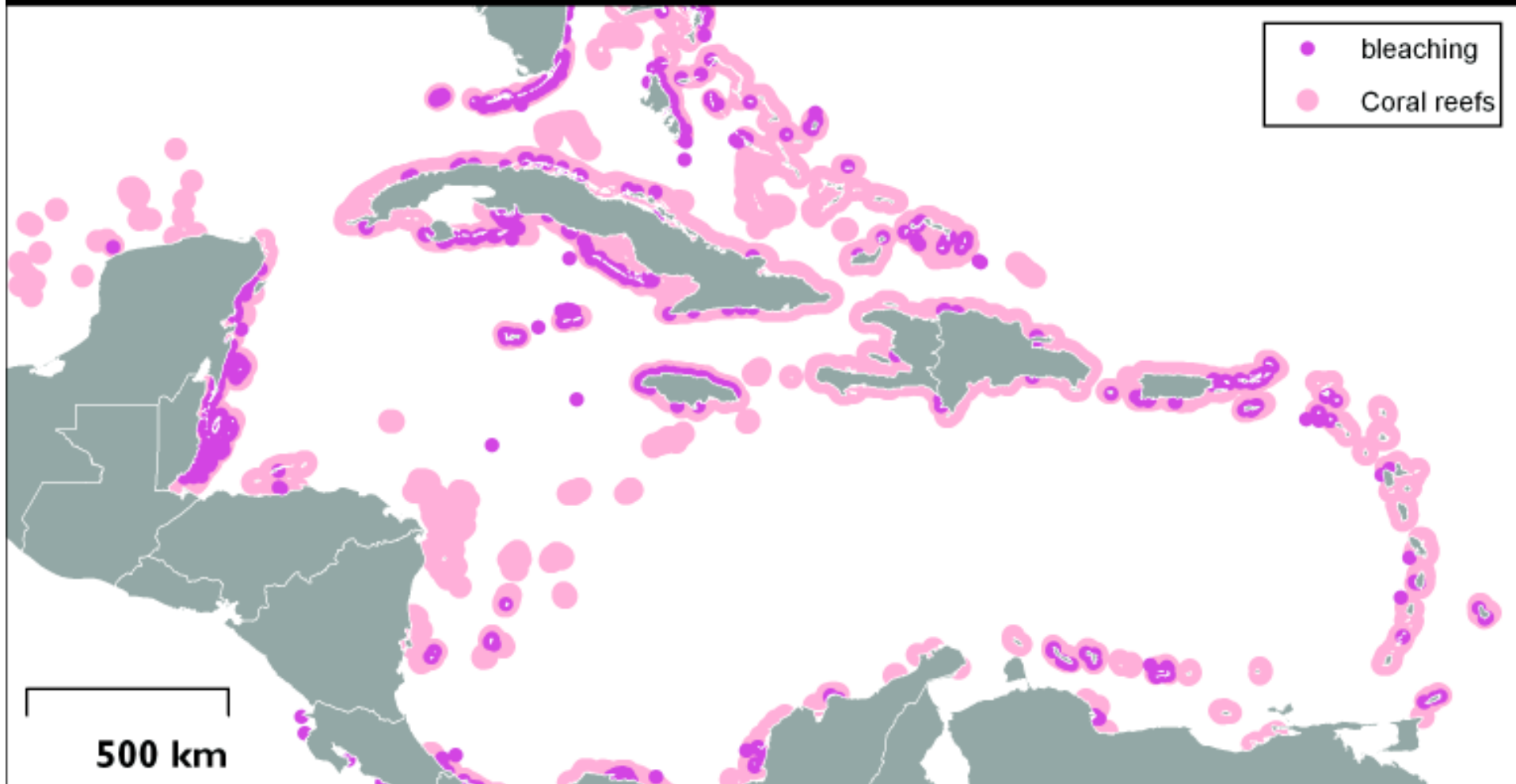


Results – by MPA

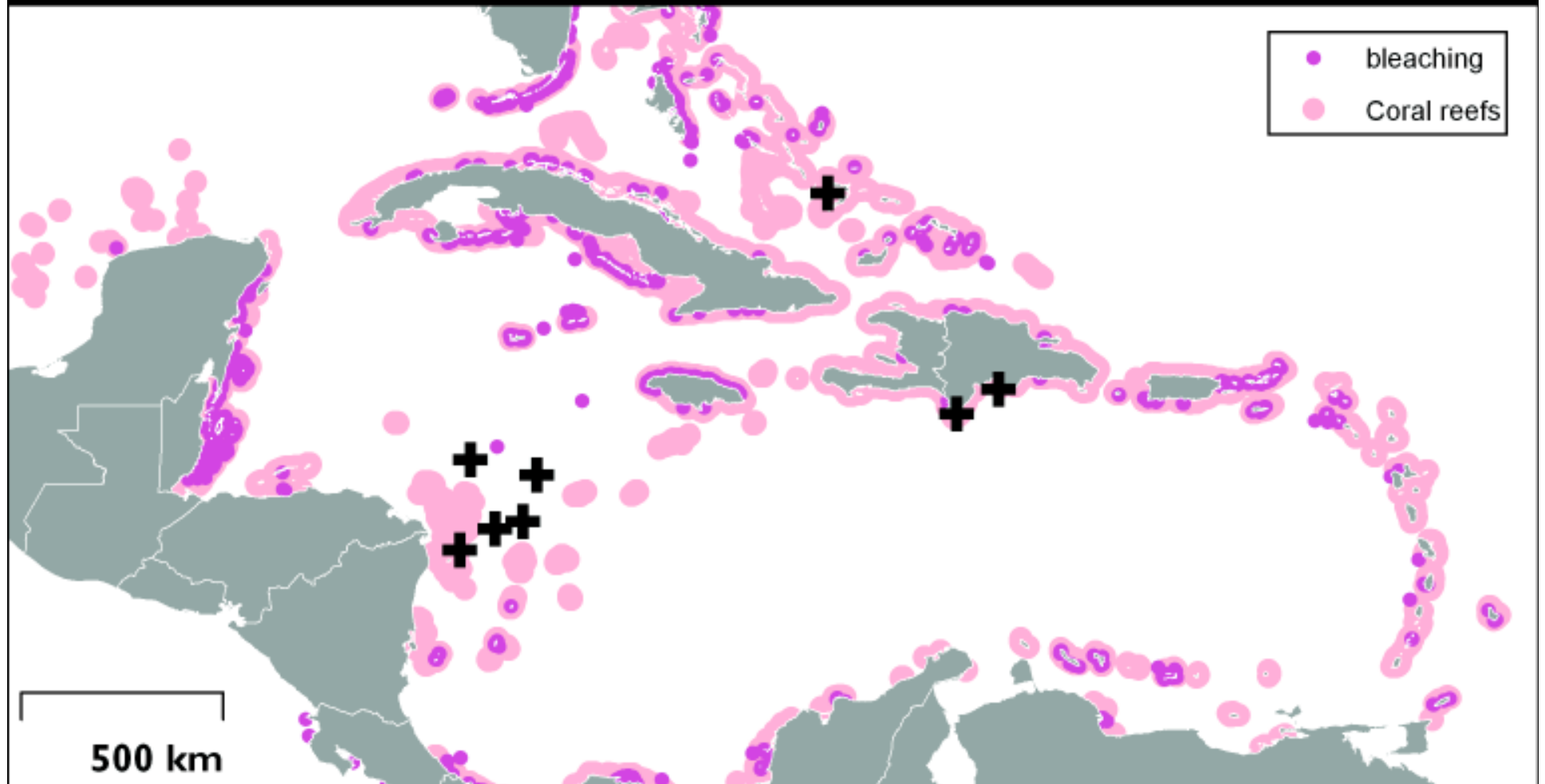


- all locations, all hawksbills (n = 34)
- median 0% (range 0 – 95%)

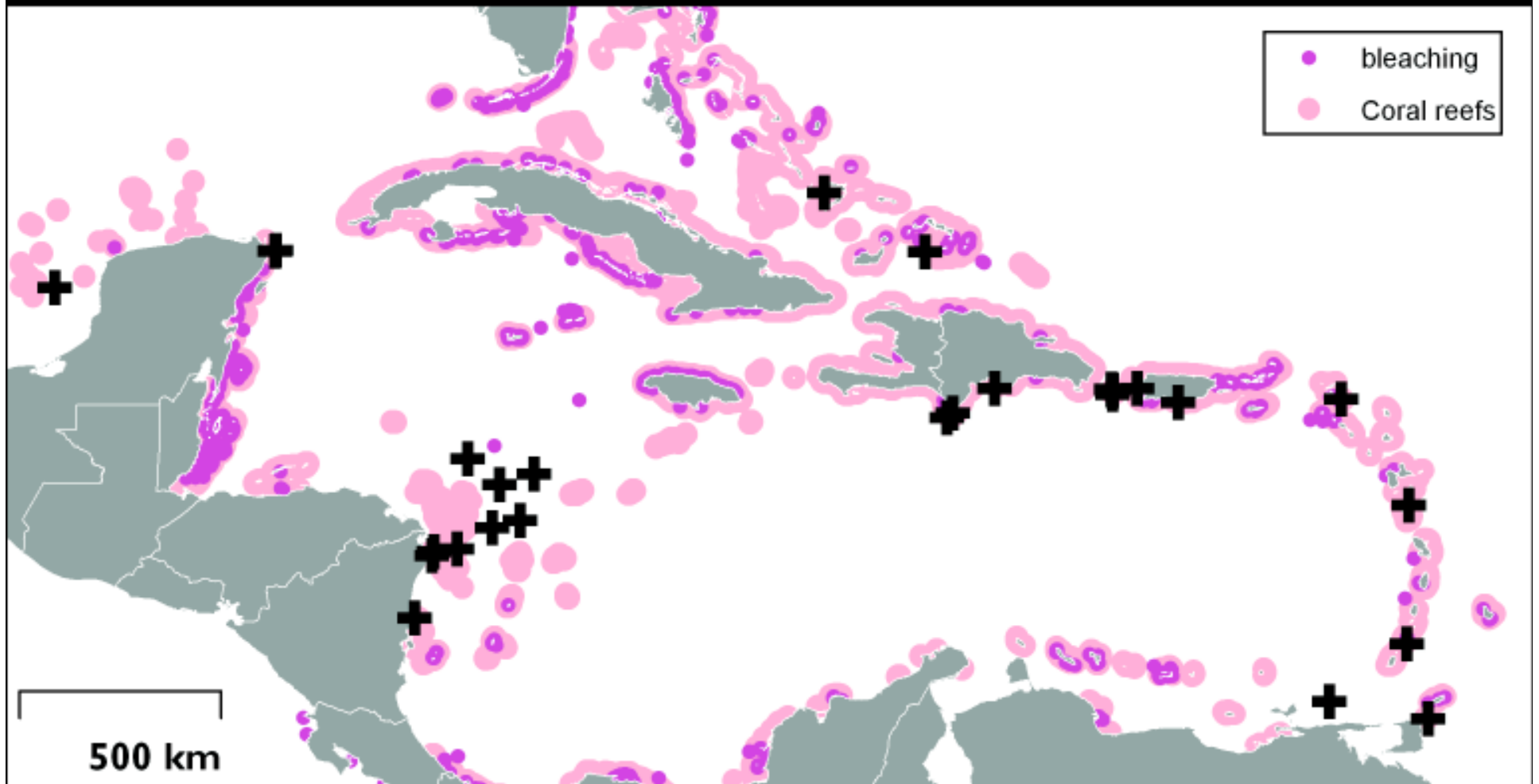
Results – by reefs



Results – by reefs



Results – by reefs



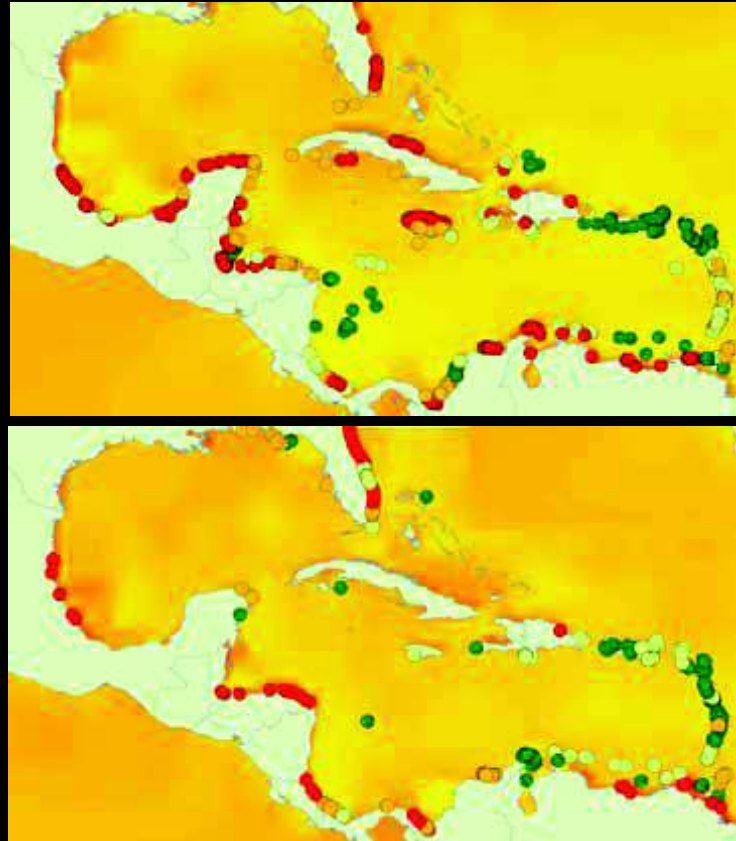
Summary

- home ranges ~ 500km²
- variety of depths
- key hotspots of occurrence
- few hotspots are protected
- reef association
- some buffering from CC impacts

Gracias!



The climate is changing...



Fish et al. (2009) Climate change and marine turtles in the Wider Caribbean: Regional climate projections. WWF report, San Jose, 20 pp.
http://assets.panda.org/downloads/climate_change_and_marine_turtles_in_the_wider_caribbean_1.pdf

...but how much will that matter?