

# New Hope for Sea Turtles in Honduras

*Presented to WIDECAST 2015*



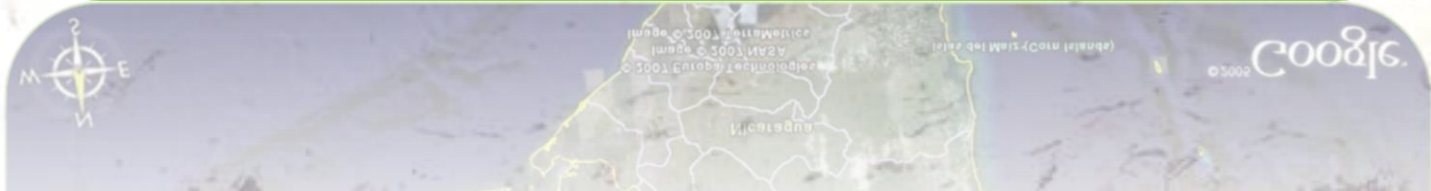
Lidia Salinas<sup>2,3</sup> & Stephen G. Dunbar, PhD<sup>1,2,3</sup>

<sup>1</sup>Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA

<sup>2</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Inc., Colton, CA

<sup>3</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Honduras, Tegucigalpa, Honduras.





# Roatán, Bay Islands, Honduras




# *What we want to know?*

- *Species Diversity and Distribution*
- *Habitat Distribution and Use by Sea Turtles*
- *Habitat and Turtle Health*
- *Population Dynamics of Resident and Transient Turtles*
- *Genetic Diversity of Turtles*
- *Migratory and Resident Turtle Interactions with Fisheries*

# automated digital search system


I3S: Compare results

Images Unknown individual Found individual Spot cloud



Nr of spot pairs: 22 Score: 0

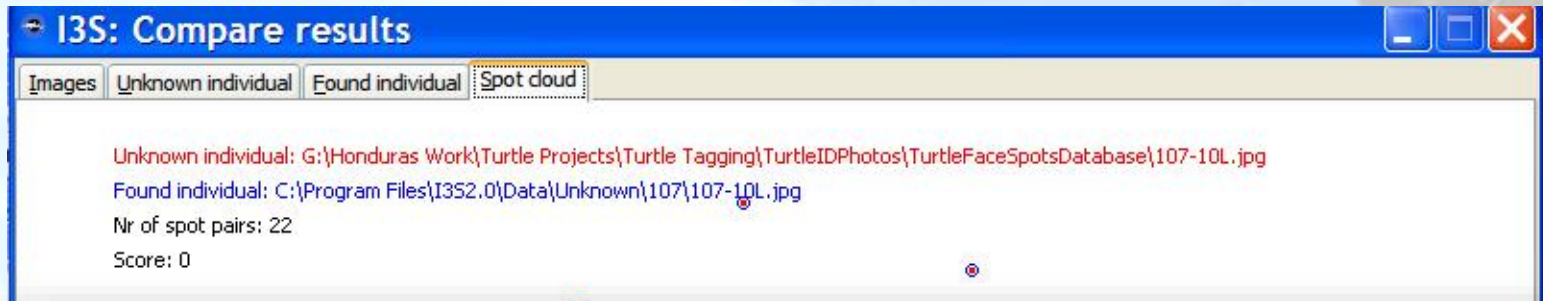
Unknown individual: ...eIDPhotos\TurtleFaceSpotsDatabase\107-10L.jpg



Found individual: ...ram Files\I3S2.0\Data\Unknown\107\107-10L.jpg

The image shows a software window titled "I3S: Compare results" with a blue title bar and standard window controls. It features a tabbed interface with "Images", "Unknown individual", "Found individual", and "Spot cloud" tabs. The "Images" tab is active, displaying two side-by-side photographs of a turtle's head. The top photograph has a red dotted line tracing the outline of the turtle's face, and the bottom photograph has a blue dotted line tracing the same outline. To the right of the images, there is a text area with red text indicating "Nr of spot pairs: 22 Score: 0" and "Unknown individual: ...eIDPhotos\TurtleFaceSpotsDatabase\107-10L.jpg". Below this, in blue text, it says "Found individual: ...ram Files\I3S2.0\Data\Unknown\107\107-10L.jpg". The background of the entire slide is a blurred image of a beach with waves and palm trees.

# Now using automated digital search system



PROOF ONLY  
Not for redistribution

Vol. ■ ■  
doi: 10.3354/esr00637

ENDANGERED SPECIES RESEARCH  
Endang Species Res

Published ■ ■



## Recognition of juvenile hawksbills *Eretmochelys imbricata* through face scale digitization and automated searching

S. G. Dunbar<sup>1,2,3,\*</sup>, H. E. Ito<sup>4</sup>, K. Bahjri<sup>5</sup>, S. Dehom<sup>5</sup>, L. Salinas<sup>6</sup>

<sup>1</sup>Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350, USA

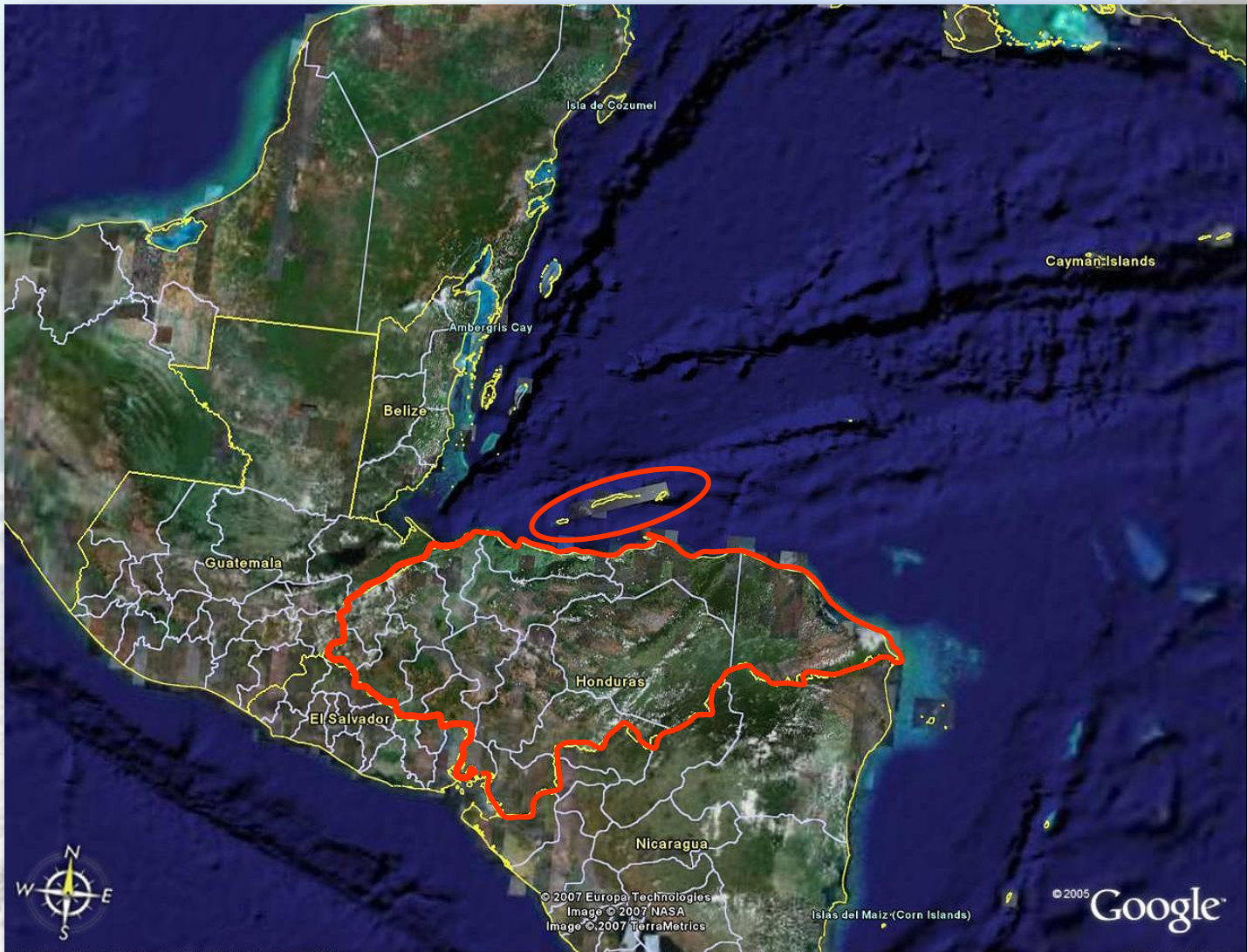
<sup>2</sup>Protective Turtle Ecology Center for Training, Outreach, and Research (ProTECTOR), Colton, CA 92324, USA

<sup>3</sup>Turtle Awareness and Protection Studies Project (TAPS), Oak Ridge, Roatán, Honduras

<sup>4</sup>Department of Biology, Pacific Union College, Angwin, CA 94508, USA

<sup>5</sup>Research Consulting Group, Loma Linda University, Loma Linda, CA 92350, USA

<sup>6</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Honduras (ProTECTOR Honduras), Tegucigalpa, Honduras



© 2007 Europa Technologies  
Image © 2007 NASA  
Image © 2007 TerraMetrics

© 2005 Google

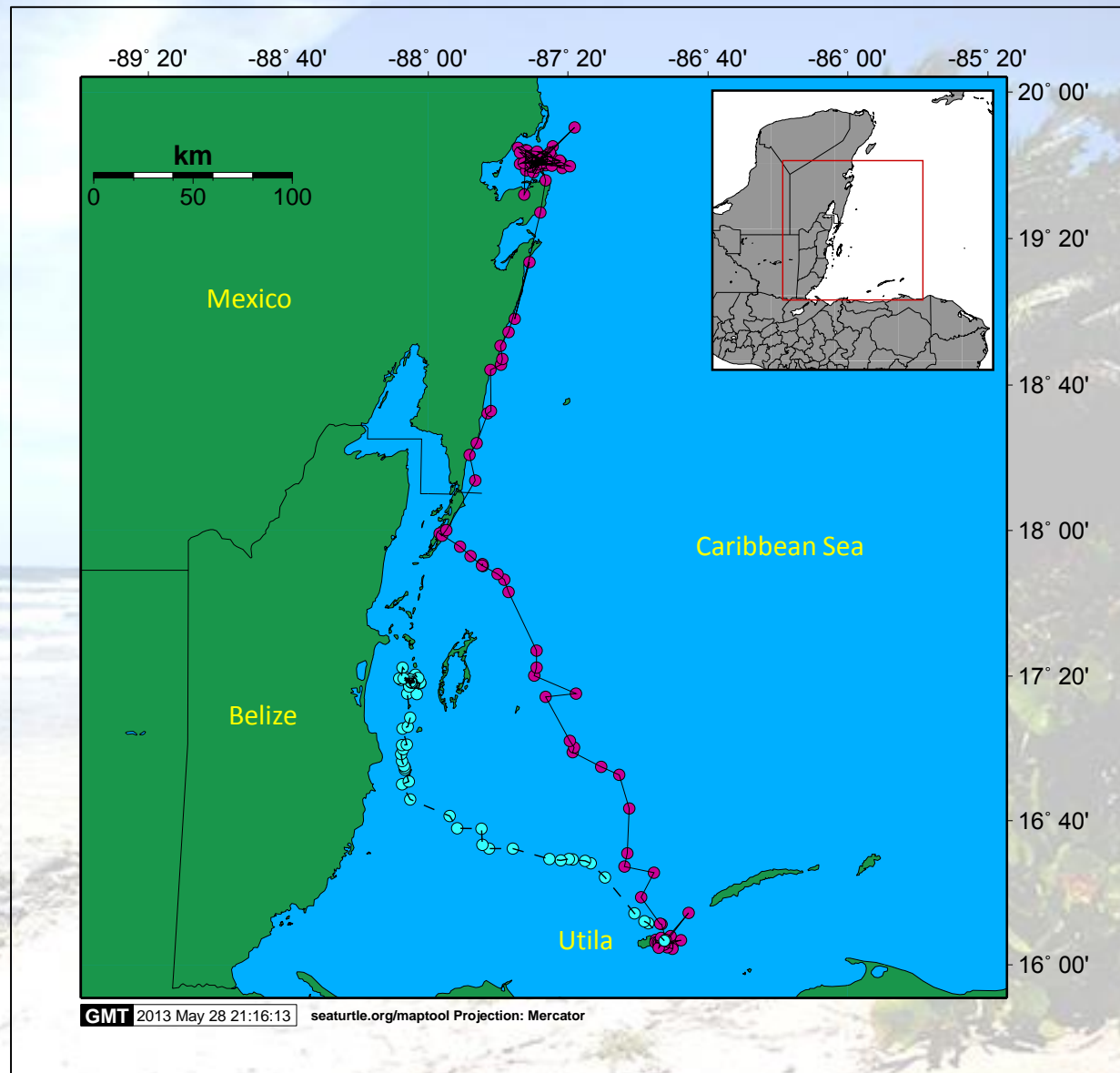
# First hawksbill turtles tagged in Honduras



“Chel”



“Ginger”



Chel: Magenta dots, solid line

Ginger: Light blue dots, dashed line

Utila supports nesting females from varying distances and countries





Pollution along Pumpkin Hill Beach



... or could become trapped in plastic and never make it to the water.



Testing impacts of pollution density on hatchling running speed

# Turtle Habitat Utilization



Dustin Baumbach



Roatán Marine Park



# Turtle Responses to Divers



Christian Hayes



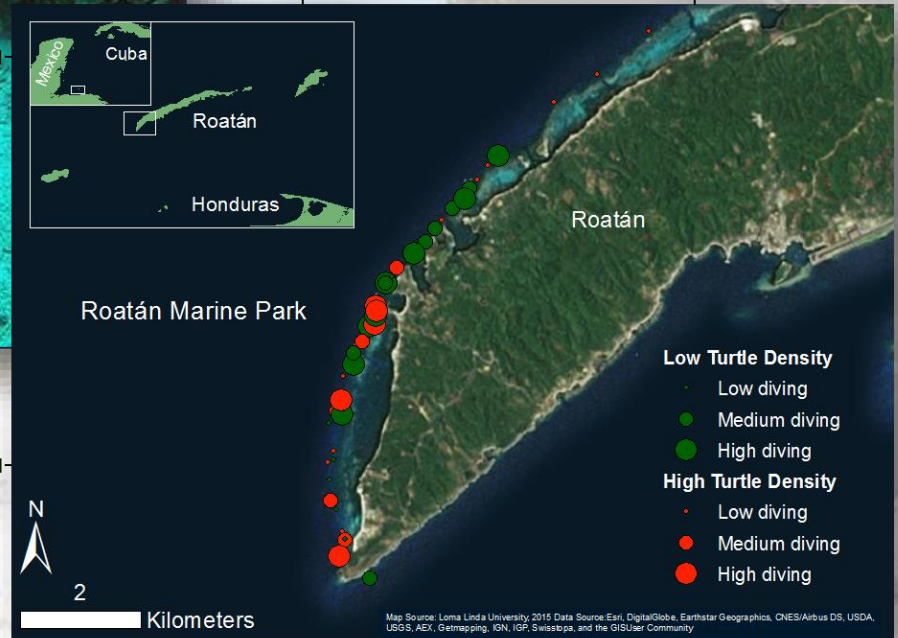
16°21'N

86°36'W

86°33'W

Roatán Marine Park

16°17'N



2 Kilometers

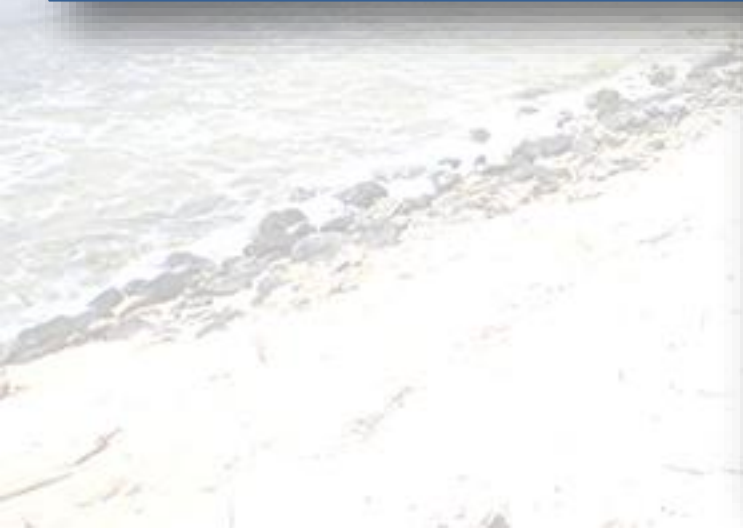
Map Source: Loma Linda University, 2010 Data Source: Esri, DigitalGlobe, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEI, Getmapping, IGN, IGP, Swisstopo, and the GISUser Community

# Calitan 2009 - 2015

Community outreach  
connecting health and  
marine conservation



# Calitan 2010





LLU SIMS 2012 - 2014  
Working with the community  
of El Venado (Pacific) to  
integrate community health  
with marine conservation.







Nutrition education in El Venado

# ProTECTOR 2014 Interns



**Marsha Wright, TN**



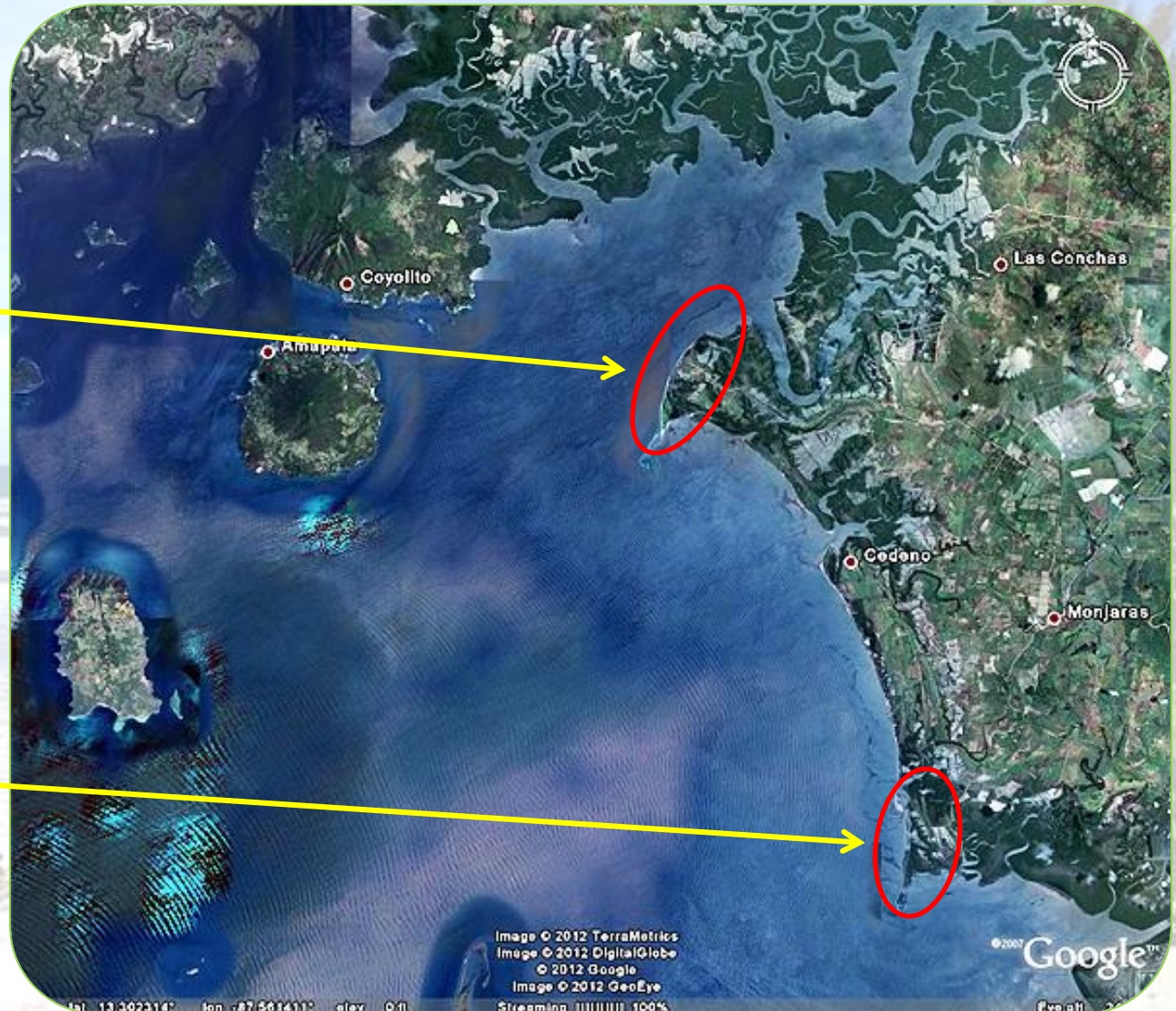
**Linda Baeza, CA**



**Rodney Smith, WA**

Punta Ratón

El Venado





1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24

1 RIDING THE TIDES: OFFSHORE MIGRATIONS OF OLIVE RIDLEY HATCHLINGS ARE  
2 INFLUENCED BY TIDAL CURRENTS IN PACIFIC HONDURAS

3 Duran, N.<sup>1,2,\*</sup> and Dunbar, S. G.<sup>1,2,3</sup>

4 <sup>1</sup>Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University,  
5 Loma Linda, CA 92350

6 <sup>2</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR),  
7 Colton, CA 92324

8 <sup>3</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Honduras  
9 (ProTECTOR-H), Tegucigalpa, Honduras

10 \*Corresponding Author E-mail: nduranroyo@llu.edu

Releas  
outgo

Kilometers



Noemi Duran



Contents lists available at ScienceDirect

# Journal of Experimental Marine Biology and Ecology

journal homepage: [www.elsevier.com/locate/jembe](http://www.elsevier.com/locate/jembe)



## High frequency of multiple paternity in a solitary population of olive ridley sea turtles in Honduras



N. Duran<sup>a,b,\*</sup>, S.G. Dunbar<sup>a,b,c</sup>, R.A. Escobar III<sup>a</sup>, T.G. Standish<sup>a</sup>

<sup>a</sup> Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350, United States

<sup>b</sup> Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR), Colton, CA 92324, United States

<sup>c</sup> Protective Turtle Ecology Center for Training, Outreach, and Research (ProTECTOR) Honduras, Tegucigalpa, Honduras

Multiple

### ARTICLE INFO

**Article history:**

Received 5 July 2014

Received in revised form 24 October 2014

Accepted 25 October 2014

Available online xxxx

**Keywords:**

Inter-beach movement

*Lepidochelys olivacea*

Maternal samples

Microsatellites

Nest-site fidelity

Pooled samples

### ABSTRACT

Females of all seven living species of sea turtles are known to be polyandrous and show multiple paternity. The frequency of multiple paternity varies among species, and among populations of the same species. In the olive ridley sea turtle (*Lepidochelys olivacea*), multiple paternity levels correlate with the abundance of individuals in the mating system, being much higher in arribada rookeries than in solitary nesting sites. We used two highly polymorphic microsatellite markers (Cm84 and Or1) to assess the level of multiple paternity in an olive ridley solitary population nesting in the Gulf of Fonseca, Honduras. We found evidence of multiple paternity in 6 out of 8 clutches (75%), with a minimum number of two fathers in four clutches, and a minimum of three in the remaining two clutches. This high level of multiple paternity in a small solitary population suggests that some of the females nesting in Honduras may be coming from proximal Nicaraguan arribada nesting beaches. Historical evidences and recent satellite telemetry data support this hypothesis. In addition, we show that multiple paternity studies can be effectively performed in the absence of maternal samples, and that pooled DNA samples can be used with results comparable to individual hatchling sampling in multiple paternity analyses.





Working with community members and tourist visitors in El Venado

1 RIDING THE TIDES: OFFSHORE MIGRATIONS OF OLIVE RIDLEY HATCHLINGS ARE  
 2 INFLUENCED BY TIDAL CURRENTS IN PACIFIC HONDURAS  
 3 Duran, N.<sup>1,2,\*</sup> and Dunbar, S. G.<sup>1,2,3</sup>  
 4 <sup>1</sup>Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University,  
 5 Loma Linda, CA 92350

# ProTECTOR's Efforts

RUNNING OUT OF TIME: BEACH POLLUTION DENSITY IMPACTS ON

HAWKSBILL (*Eretmochelys imbricata*)

Dunbar, S. G.<sup>1,2,3,\*</sup>, Sung, K.<sup>4</sup>, Cole, L.<sup>5</sup>, Smith, R.<sup>1</sup>,  
 Bahjri, K.<sup>6</sup>

# SWOT

report

Volume IV

The State of the World's Sea Turtles

Volume I

# SWOT

report

The State of the World's Sea Turtles

## United States Fish and Wildlife Services

the Web: Wildlife Trade on the Internet. International Fund for Animal  
 Welfare. London. 413 pp. www.ifaw.org  
 KOCH, V., W.J. NELSON, H. PECKHAM, & V. DE LA TOBA. 2006.  
 Estimates of sea turtle mortality from poaching and bycatch in Bolivia  
 Magdalena Bay, California Sea Mexico. Biological Conservation 128:  
 337-344.  
 MARROQUEAN, R. 1990. FAO species catalogue Vol. 11: Sea Turtles of  
 the World. FAO Fisheries Synopsis. FAO, Rome. 81 pp.  
 MCCLENNAGHAN, L., J.B. JACKSON & M.J. NEWMAN. 2006.  
 Conservation implications of bycatch in turtle nesting beach lines.  
*Frontiers in Ecology and the Environment* 4: 290-296.  
 PEZZE GONZALEZ, M.F. 2009. Preventing illegal trade of hawksbill  
 sea turtle products: a survey on public awareness progress in the wider  
 Caribbean region. M.G. Thesis, University of Minnesota.  
 ROSE, D., T. MULLER, and J. HERRING. 2002. A  
 GRIGG-GRIFFIN  
 turtle, including  
 Issues No. 6, Jan  
 and TRAFFIC. 3

MINISTRY OF EN  
DIGEPESCA, HON

MINISTRY OF ENVIRONMENT,  
DIGEPESCA, HONDURAS

REPORT OF THE GULF OF FONSECA  
HAWKSBILL PROJECT IN PACIFIC  
HONDURAS

Stephen G. Dunbar, Lidia Salinas, and Samaria Castellanos

INSIDE:  
CONFRONTING CLIMATE CHANGE  
STUDYING HAWKSBILLS IN THE DEEP  
MINIMIZING LOGGED AND  
LONGLINE INTERACTIONS



### Home Range and Foraging Ecology of Juvenile Hawksbill Sea Turtles (*Eretmochelys imbricata*) on Inshore Reefs of Honduras

MELISSA D. BERUMI<sup>1,3</sup>, STEPHEN G. DUNBAR<sup>1,2,3</sup>, KLAUS RÜTZLER<sup>4</sup>, and WILLIAM K. HAYES<sup>1</sup>

<sup>1</sup>Department of Earth and Biological Sciences, Griggs Hall, Loma Linda University, Loma Linda, California 92350 USA (mberumi@llu.edu);  
<sup>2</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR), Colton, CA 92324, USA (sdunbar@llu.edu);  
<sup>3</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR), Colton, CA 92324, USA (sdunbar@llu.edu);  
<sup>4</sup>Department of Invertebrate Zoology, Smithsonian Institution, Washington, DC 20560-0161 (frueder@si.edu)

**ABSTRACT.** – Despite the recognition of the historical importance of hawksbills in the Caribbean region of Honduras, prior sea turtle research in the area has been extremely limited, and little is known about hawksbill turtle (*Eretmochelys imbricata*) ecology from this region. We tracked 6 juvenile hawksbills (28.7–36.6 cm, straight carapace length (SCL)) with radiotelemetry off the coast of Roatan in the Bay Islands of Honduras, conducted habitat assessments at 14 sites, and examined the diet of 5 juvenile hawksbills (19.8–49.7 cm, SCL) using gastric (n = 4) and fecal (n = 1) samples. Home ranges of all 6 turtles were small, with 100% minimum convex polygons from 0.15 to 0.55 km<sup>2</sup>, and a 50% fixed kernel density for all animals pooled of 3.46 km<sup>2</sup>. The habitat assessment showed that common prey items in hawksbill diets were abundant in areas

### DIFFERENCES IN DIURNAL AND NOCTURNAL SWIMMING PATTERNS OF RIDLEY SEA TURTLE HATCHLINGS IN THE GULF OF FONSECA, HONDURAS

Duran, N.<sup>1,2,\*</sup> and Dunbar, S. G.<sup>1,2,3</sup>

<sup>1</sup>Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350  
<sup>2</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR), Colton, CA 92324  
<sup>3</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Honduras (ProTECTOR-H), Tegucigalpa, Honduras

### BEACH AND NEST CHARACTERISTICS OF A HAWKSBILL (*ERETMOCHELYS IMBRICATA*) NESTING SITE IN CARIBBEAN HONDURAS

Submitted to the Journal of Marine Ecology, 2014

Lindsey Eggers Damazo<sup>1,2,\*</sup> and Stephen G. Dunbar<sup>1,2</sup>

<sup>1</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR), Colton, CA 92324  
<sup>2</sup>Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350

\*Corresponding author: Lindsey Eggers Damazo (ledamazo@gmail.com)  
 Second author: Dr. Stephen G. Dunbar (sdunbar@llu.edu)

Address for first author: Department of Earth and Biological Sciences, Griggs Hall, Loma Linda University, Loma Linda, CA 92350

Address for second author: Department of Earth and Biological Sciences, Griggs Hall, Rm 120, Loma Linda University, Loma Linda, CA 92350  
 909-558-1000 ext 48903

PROOF ONLY  
Not for redistribution

Vol. ■ ■ ■	ENDANGERED SPECIES RESEARCH	Published ■ ■ ■
doi: 10.3354/est/00637	Endang Species Res	



## Recognition of juvenile hawksbills *Eretmochelys imbricata* through face scale digitization and automated searching

S. G. Dunbar<sup>1,2,3,\*</sup>, H. E. Ito<sup>4</sup>, K. Bahjri<sup>5</sup>, S. Dehom<sup>5</sup>, L. Salinas<sup>6</sup>

<sup>1</sup>Marine Research Group, Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350, USA  
<sup>2</sup>Protective Turtle Ecology Center for Training, Outreach, and Research (ProTECTOR), Colton, CA 92324, USA  
<sup>3</sup>Turtle Awareness and Protection Studies Project (TAPSP), Oak Ridge, Roatan, Honduras  
<sup>4</sup>Department of Biology, Pacific Union College, Angwin, CA 94508, USA  
<sup>5</sup>Research Consulting Group, Loma Linda University, Loma Linda, CA 92350, USA  
<sup>6</sup>Protective Turtle Ecology Center for Training, Outreach, and Research, Honduras (ProTECTOR Honduras), Tegucigalpa, Honduras

Contents lists available at ScienceDirect  
**Journal of Experimental Marine Biology and Ecology**  
 journal homepage: www.elsevier.com/locate/jembe  
 ELSEVIER

### High frequency of multiple paternity in a solitary population of olive ridley sea turtles in Honduras

N. Duran<sup>a,b,\*</sup>, S.G. Dunbar<sup>a,b,c</sup>, R.A. Escobar III<sup>a</sup>, T.G. Standish<sup>a</sup>

<sup>a</sup> Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350, United States  
<sup>b</sup> Protective Turtle Ecology Center for Training, Outreach, and Research, Inc. (ProTECTOR), Colton, CA 92324, United States  
<sup>c</sup> Protective Turtle Ecology Center for Training, Outreach, and Research (ProTECTOR) Honduras, Tegucigalpa, Honduras

#### ARTICLE INFO

Article history:  
 Received 5 July 2014  
 Received in revised form 24 October 2014  
 Accepted 25 October 2014  
 Available online xxxxx

Keywords:  
 Inter-beach movement  
*Lepidochelys olivacea*  
 Maternal samples  
 Microsatellites  
 Nest-site fidelity  
 Pooled samples

#### ABSTRACT

Females of all seven living species of sea turtles are known to be polyandrous and the frequency of multiple paternity varies among species, and among populations of the ridley sea turtle (*Lepidochelys olivacea*), multiple paternity levels correlate with the a polymorphic microsatellite markers (Cm04 and Or1) to assess the level of multiple paternity in a solitary population nesting in the Gulf of Fonseca, Honduras. We found evidence of 8 clutches (75%), with a minimum number of two fathers in four clutches, and a remaining two clutches. This high level of multiple paternity in a small solitary population of the females nesting in Honduras may be coming from proximal Nicaraguan. Historical evidences and recent satellite telemetry data support this hypothesis. Multiple paternity studies can be effectively performed in the absence of maternal samples can be used with results comparable to individual hatchling sampling in multi

## Acknowledgements

ProTECTOR Interns and Volunteers:

Sabine Dunbar, Haruka Ito, Ken Lindsay, Christina Martin, Tyler dos Santos, Christine Ha, Katelyn Schiller, Larry Williams Bracho, Christi Linardich, Amy Tan, Robin Reeves, Ariana Cunningham, Gabriela Ochoa, Kyungje Sung, Lelyn Castillo, Liesl Cole, Samantha Serna, Marsha Wright, Rodney Smith, and Linda Baeza.

Assistants and supporters:

Angela Randazzo, Melisa Berube, Noemi Duran, Lindsey Damazo, Noel Wingers, Dustin Baumbach, Christian Hayes, Jeff Seminoff, Navia Hybur Shipping, Romeo & Connie Silvestri, Paya Bay Resort, Reef House Resort, Coco View Resort, Fantasy Island Resort, Oak Ridge Community, Camp Bay Community, El Venado Community, Henrique Vijil, Nerys Zelaya, El Venado Cooks Punta Ratón Community, Santiago & Cheri, Cuero y Salado Communities, Roatán Marine Park, Earl Possardt, BICA Utila, FUCSA, DEGAPESCA, SAG, LLU, GHI (LLU), EBS (LLU), SIMS (LLU), MRG (LLU), Jose “Pepe” Herrero, UNAH, UPI, USFWS, SWOT, NFWS.



Noemi Duran



Lindsey Damazo



Dustin Baumbach



Christian Hayes



**ProTECTOR**  
Protective Turtle Ecology Center for Training, Outreach and Research  
(ProTECTOR)

ProTECTOR is an organization with the goal of expanding our understanding of sea turtle biology and ecology in the country of Honduras.

The organization was formed because we recognized that there is great need for research on sea turtles in the region and that research, linked with educational outreach and community involvement, can strongly influence management decisions about these valuable marine residents.

To do this, ProTECTOR oversees the establishment, continuance and completion of numerous research and outreach projects, with the aim of facilitating better decision-making for marine area management, as well as awareness of sea turtles on the part of both local residents and the visiting public.

Projects include the Turtle Awareness and Protection Studies (TAPS), which is tracking juvenile turtles along the coast of Roatan. TAPS also provides opportunities for public support of this research through the Turtle Adoption Program. Other projects include satellite tracking (SatTrack), the development of a national Nesting Beach Monitoring Network (NBMN), Health Monitoring of Captive Sea Turtles (HeMoCaST) and a series of Honduras Sea Turtle Active Research workshops (HSTAR).

Our office is currently located at:  
Department of Earth & Biological Sciences  
Loma Linda University  
Loma Linda, California 92350

[www.turtleprotector.org](http://www.turtleprotector.org)

**Adopt a Sea Turtle or be a ProTECTOR  
Volunteer/Intern**

ProTECTOR  
Non-Profit Organization

360 likes

Reach People Nearby  
Reach up to 630,000 people near Colton

Recognizing turtles through computerized photo identification.

Important information can be gathered about an animals growth and life if the animal can be identified each time it is encountered. For sea turtles this has usually meant havin... See More (4 photos)

0 Page Likes  
121 Post Reach  
UNREAD  
2 Notifications  
0 Messages

<https://www.facebook.com/pages/ProTECTOR/199247040225339?ref=hl>