

# Using Satellite Telemetry to Identify Foraging Grounds

**WIDECAST AGM March 2018 – Matura, Trinidad**  
**Belize Country Coordinator**  
**Linda Searle**





# Developing a WIDECAST Satellite Telemetry Database

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# OVERVIEW

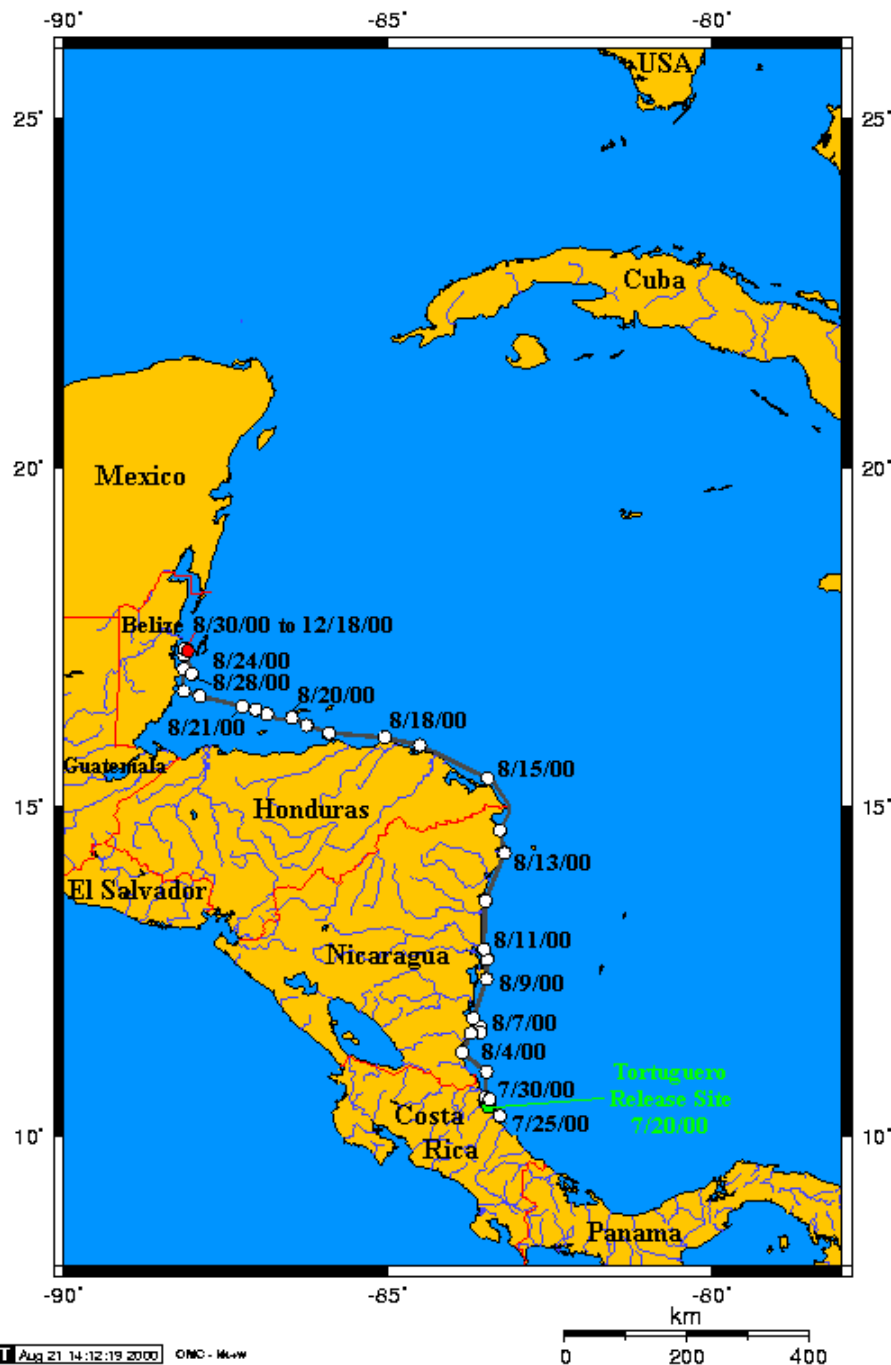
- Background
- Pros & Cons
- Mapping Methods
- Attributes
- Data Sharing
- Benefits
- Next steps



# BACKGROUND

- Fish markets surveyed 2000-2001
- Measured & identified turtles harvested
- Fishermen reported area where there were a lot of turtles = Robinson Point





# ROBINSON POINT

## Zenit – 2000

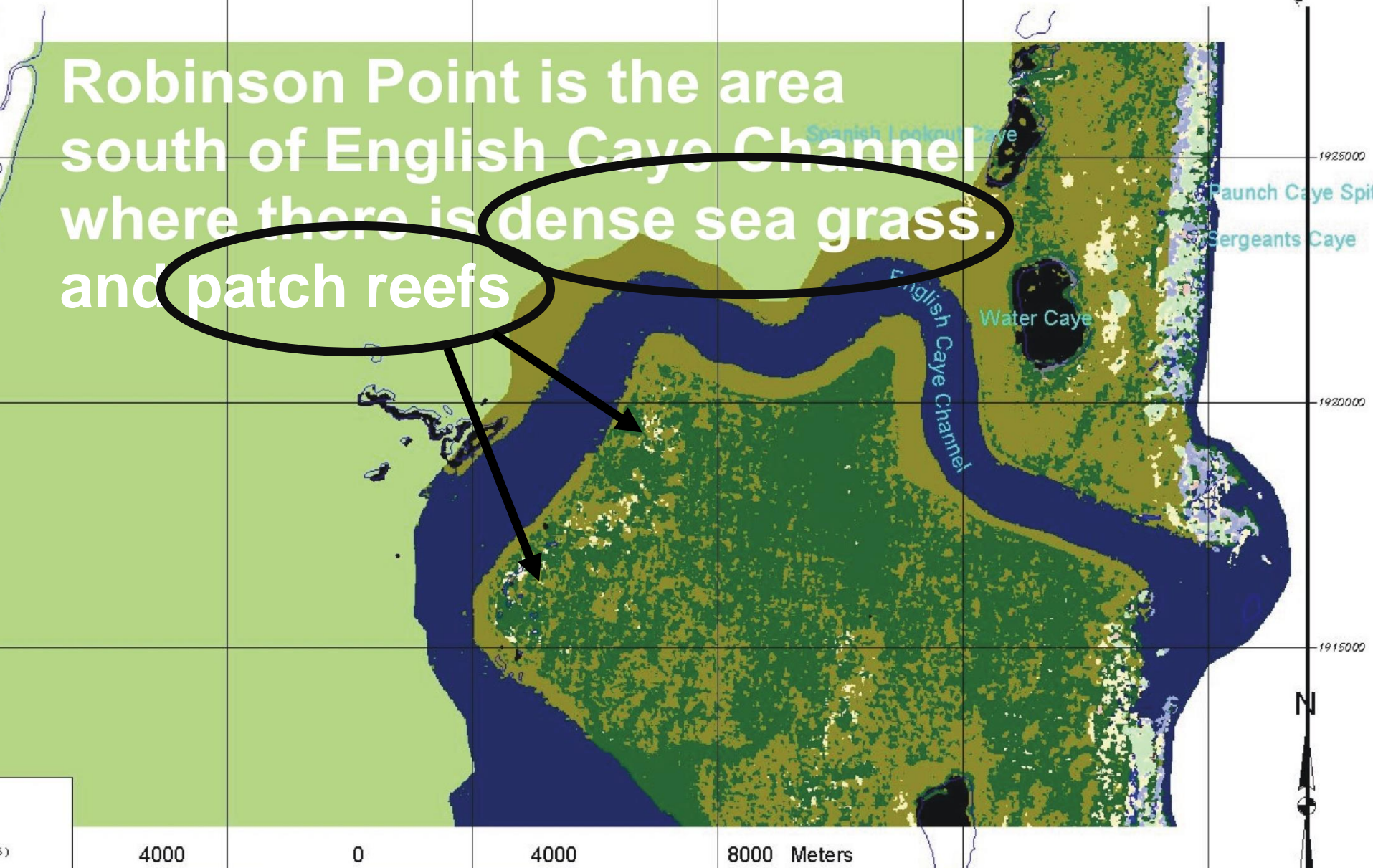
- 1<sup>st</sup> green turtle sat tracked to Belize
- 5 weeks migration from nesting beach in Costa Rica to foraging ground in Belize at Robinson Point



# Belize Marine Habitat Map SouthEast of Belize City



Robinson Point is the area south of English Caye Channel where there is dense sea grass and patch reefs



# ROBINSON POINT FORAGING GROUND

Belize City

English Caye  
Channel

2008-2009  
Study Area

Robinson  
Point  
Study Site

Data U.S. Navy

Image © 2009 DigitalGlobe

©2009 Google

6.41 mi

Image Dates: Dec 13, 2002 - Mar 13, 2006

17°23'26.25" N 88°08'12.95" W

Eye alt 22.15 m





# IN THE FIELD

## Setting Nets



## Measuring Turtles





# Tagging Turtles



DNA Tissue

Disease







# TURTLES TRACKED TO ROBINSON POINT

## 2009

**San Lorenzo  
Campeche, Mexico**

**LUCILLA**

**Hawksbill Turtle**

**Flipper Tagged JUN 15 '08**

**Captured & Released  
in Belize FEB 8 '09**

**ROBINSON  
POINT  
FORAGING  
GROUND  
BELIZE**

**Grand Cayman  
Cayman Islands**

**CAY TRAVELER**

**Green Turtle**

**Satellite Tagged JUL 24 '05**

**Arrived in Belize on AUG 31 '05**

**ZENIT**

**Green Turtle**

**Satellite Tagged JUL 20 '00**

**Arrived Belize AUG 30 '00**

**Tortuguero  
Costa Rica**

# ROBINSON POINT

636 mi

Image © 2009 TerraMetrics  
Image © 2009 DigitalGlobe  
Data U.S. Navy

16°21'13.87" N 81°45'56.24" W

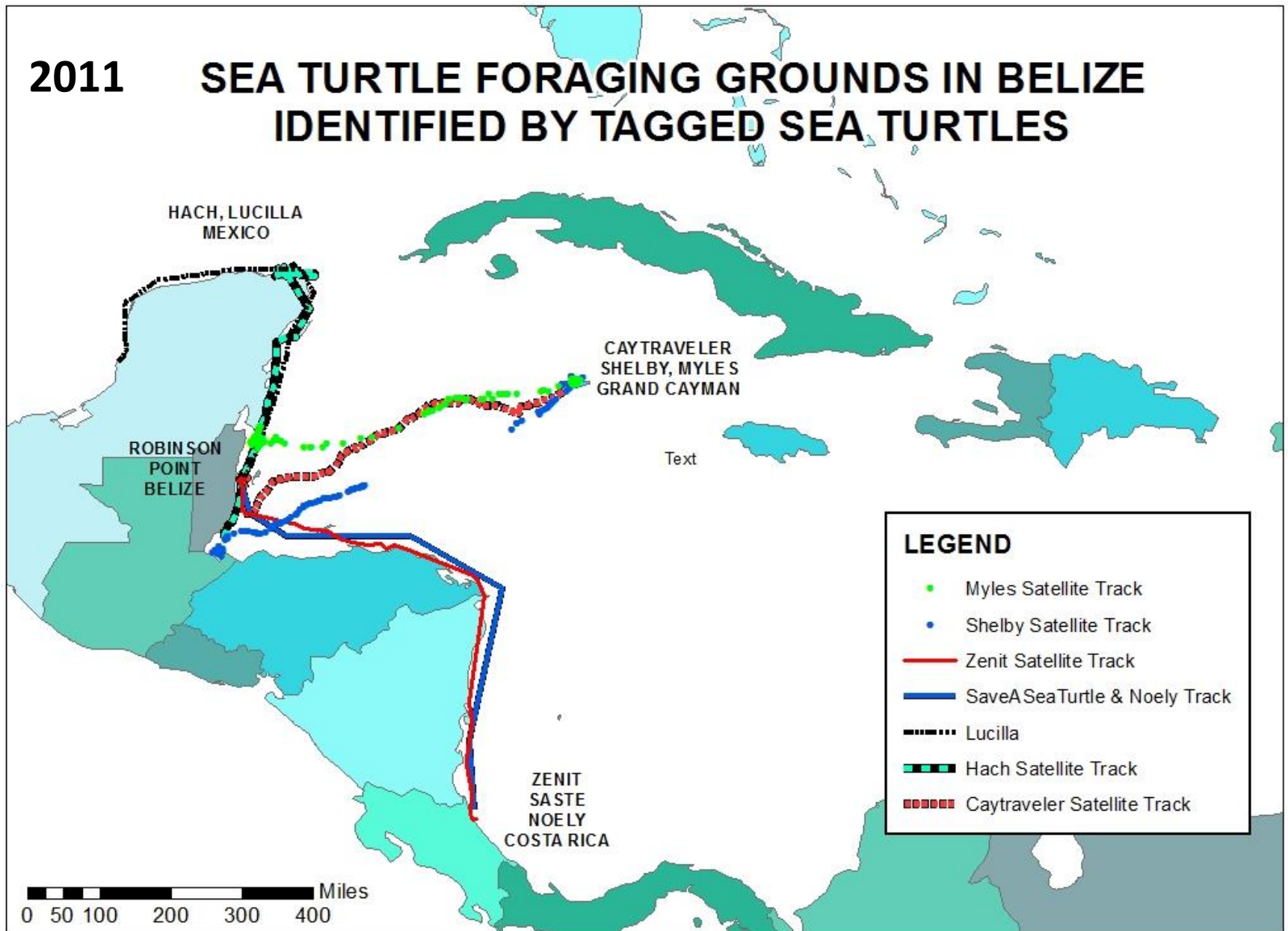
©2009 Google

Eye alt 1774



2011

# SEA TURTLE FORAGING GROUNDS IN BELIZE IDENTIFIED BY TAGGED SEA TURTLES



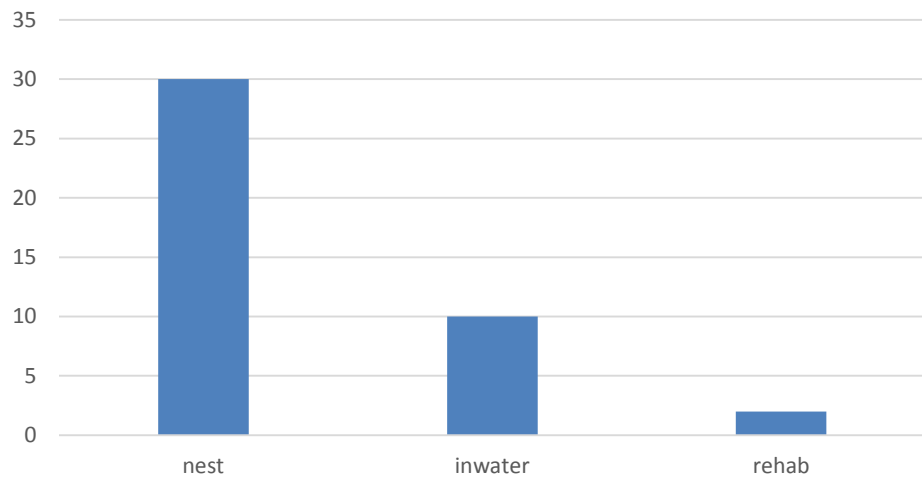


# Quick Summary

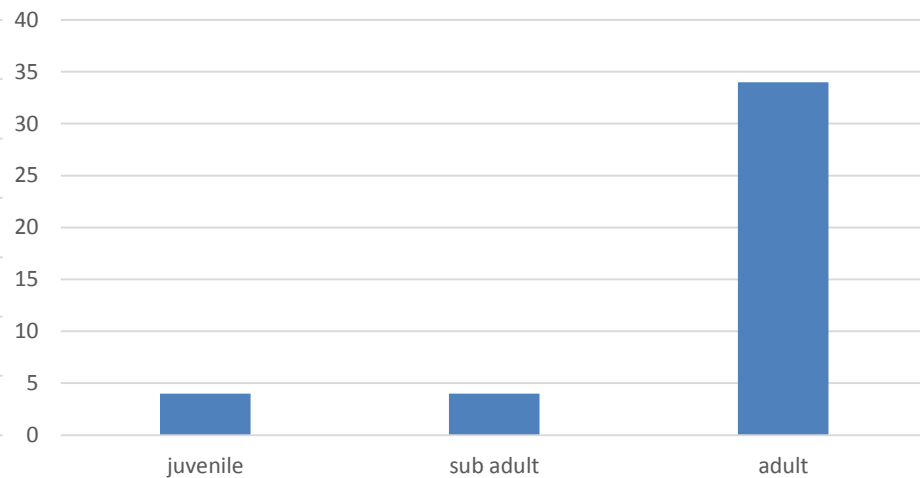
- 2009 – 3 turtles tracked to Robinson Point
- 2011 – 7 turtle tracked to Belize
- 2017 - 42 turtles tracked to/from Belize by 14 different organizations, from 7 different countries
  - Honduras
  - Mexico
  - Cayman
  - Jamaica
  - Costa Rica
  - Nicaragua
  - Barbados



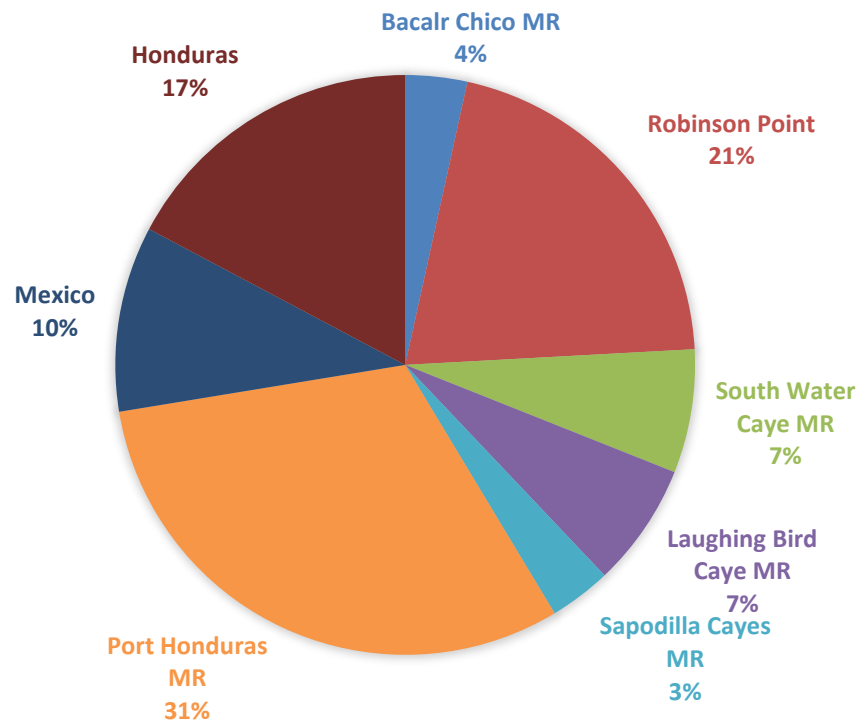
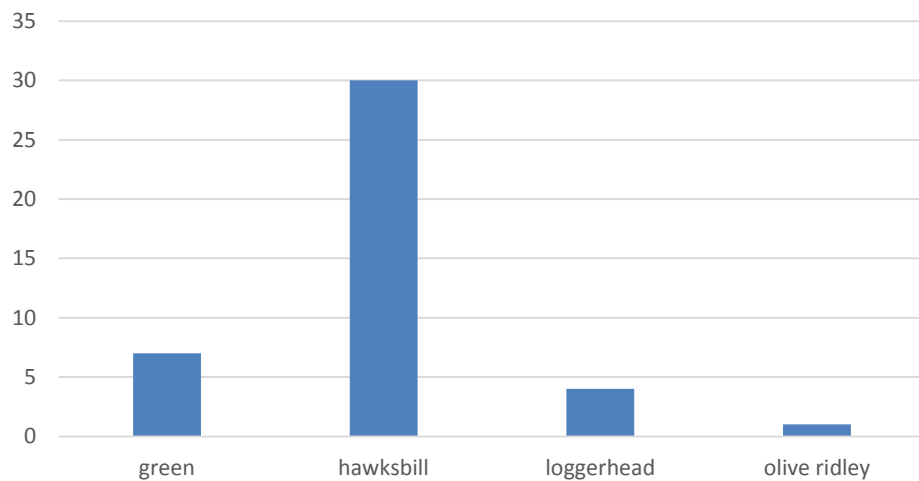
### Source of Turtles Tagged



### Life Stage



### Species Tagged

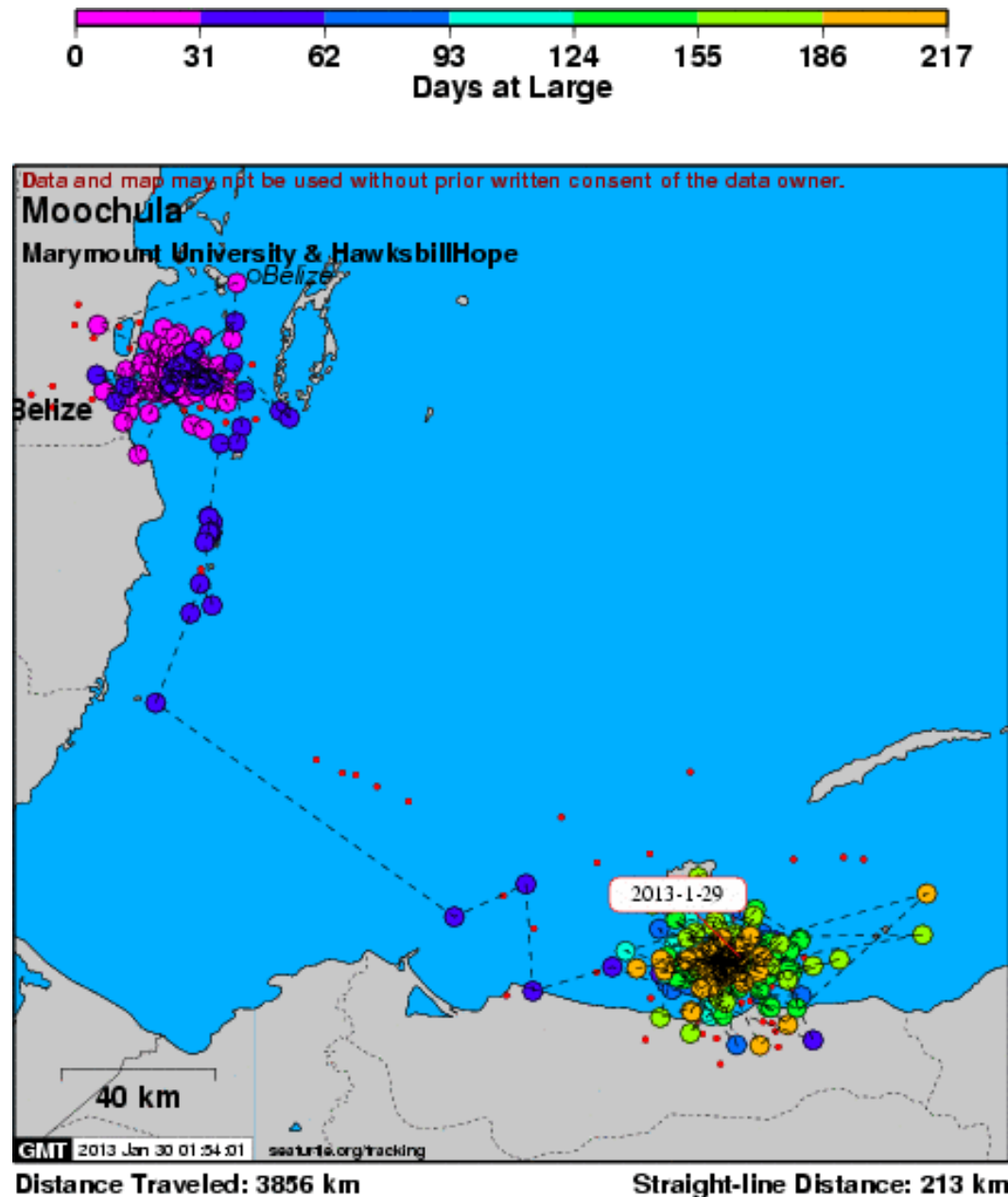




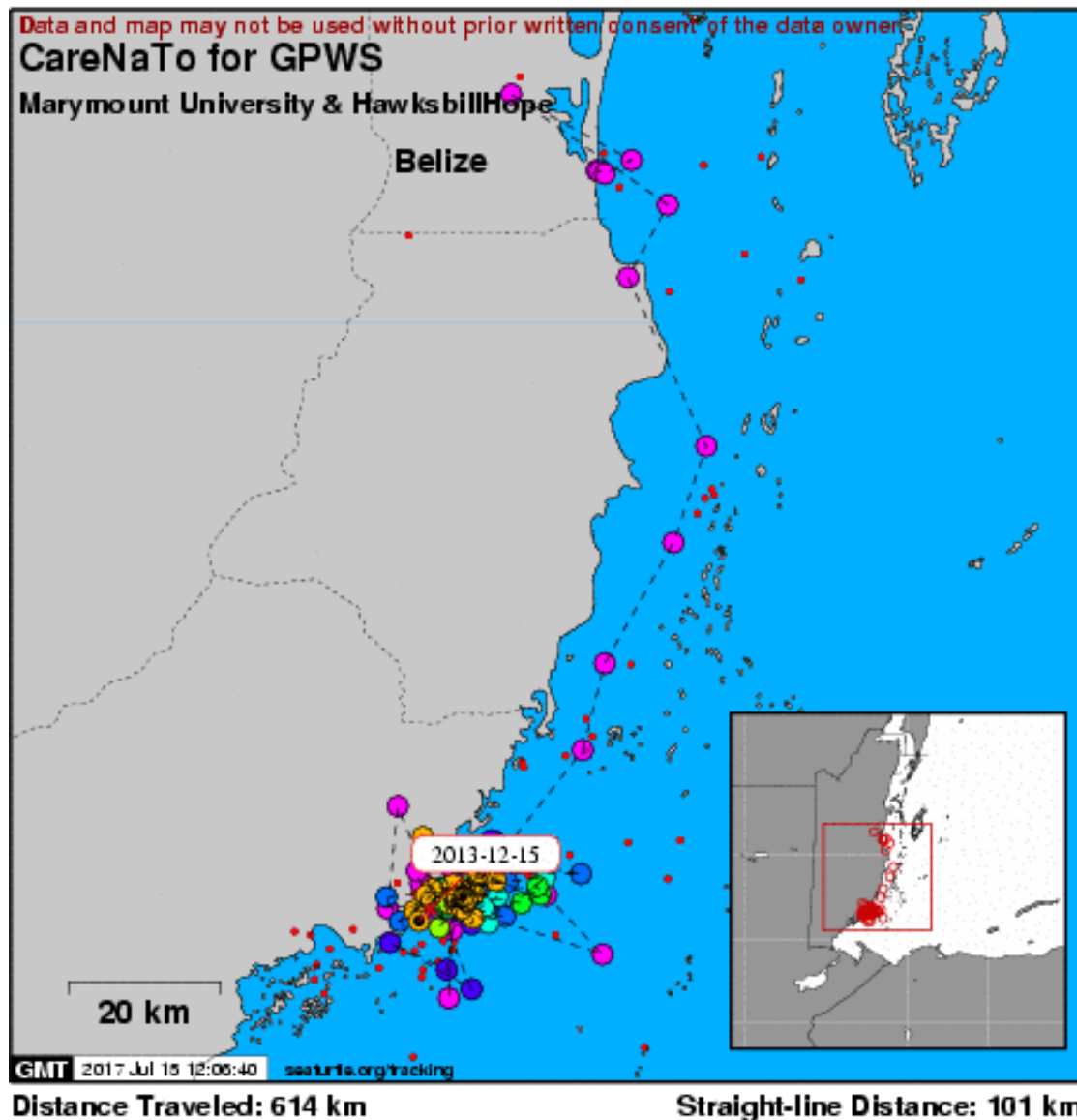
# Hawksbill

## Moochula 2013

- Nests at Gales Point
- Forage in Honduras







## Hawksbill

### Carenato 2015

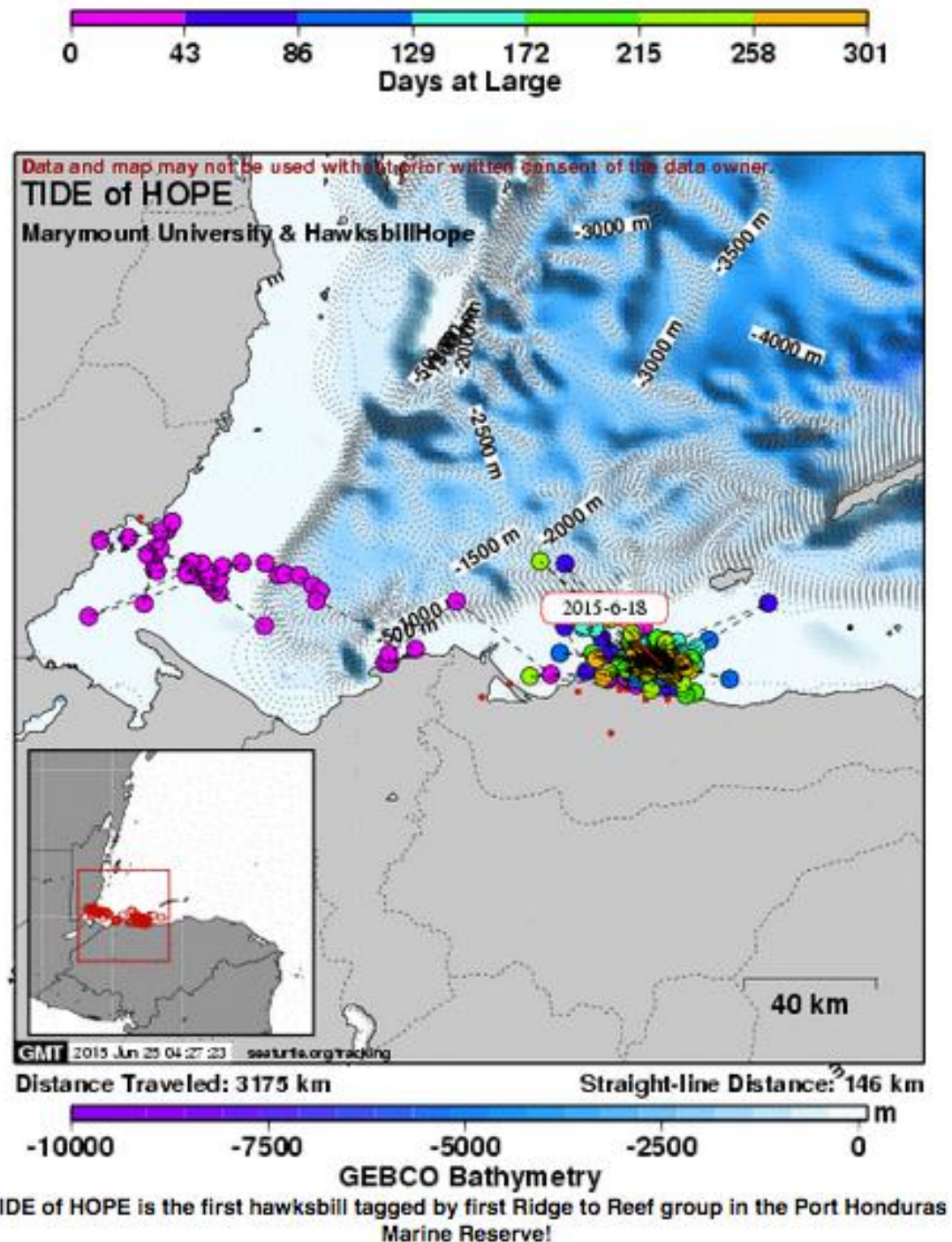
- Nests at Gales Point
- Forages near Port Honduras

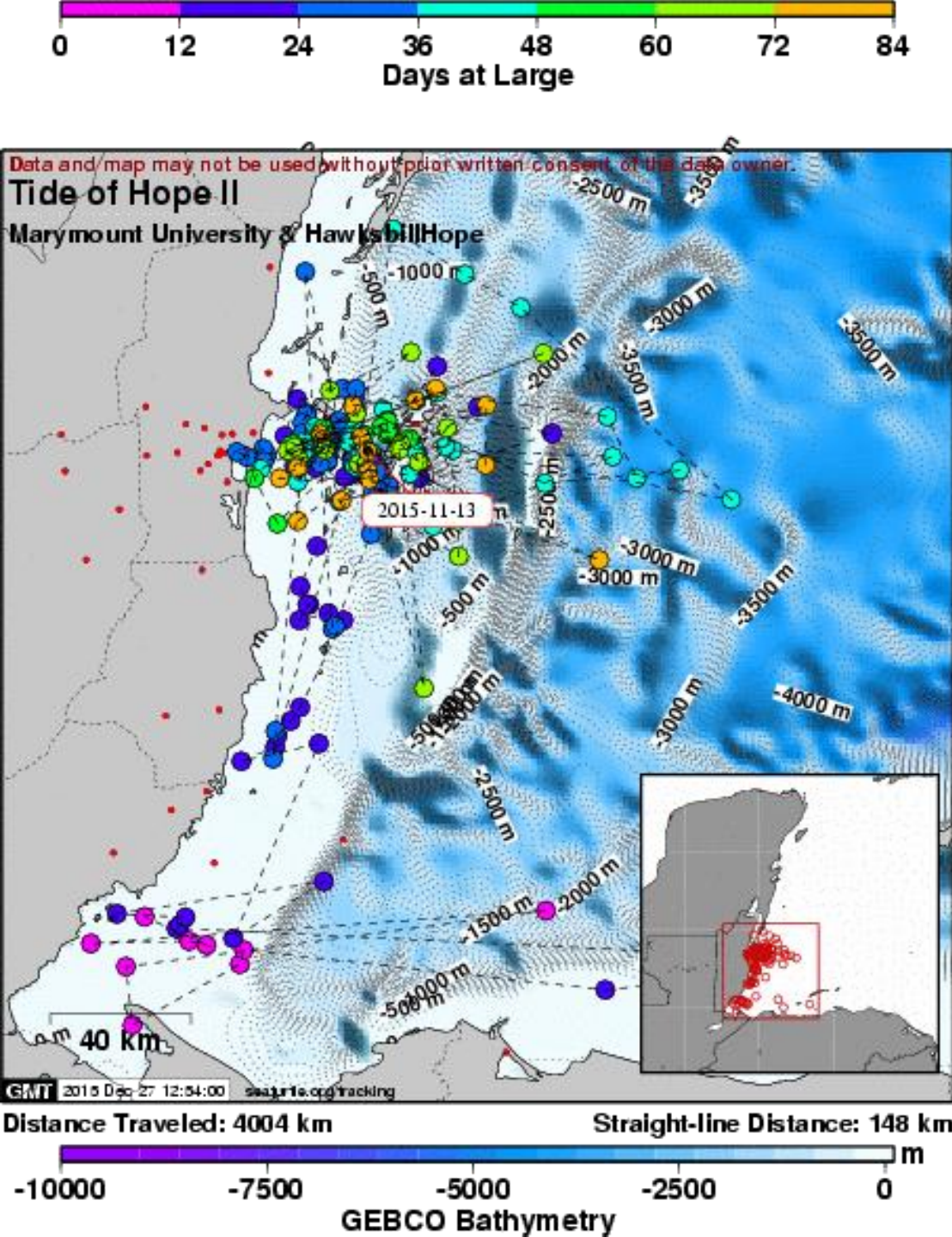


# Hawksbill

## Tide of Hope 2014

- Hawksbill turtle nests on the Port Honduras Marine Reserve
- Forages in Honduras





## Hawksbill Tide of Hope II 2015

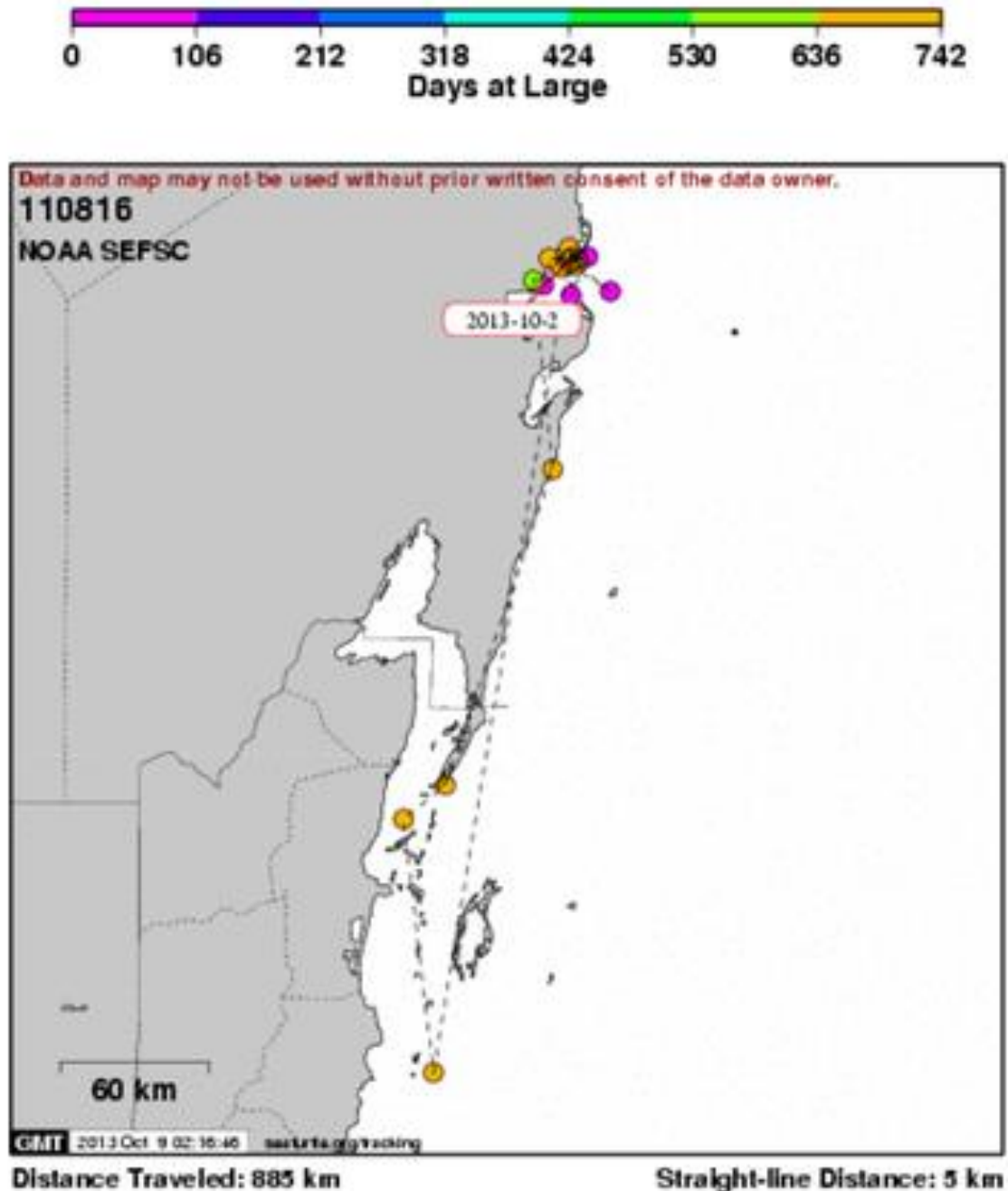
- Nests in Port Honduras Marine Reserve
- Forages in Robinson Point

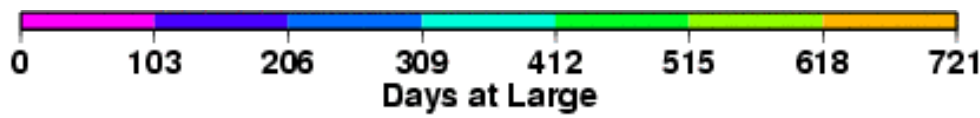


# LOGGERHEAD

**110815 2011**

- Juvenile loggerhead
- Inwater capture at Punta Allen, Mexico
- Migrated to Belize
- 2 years 12 days

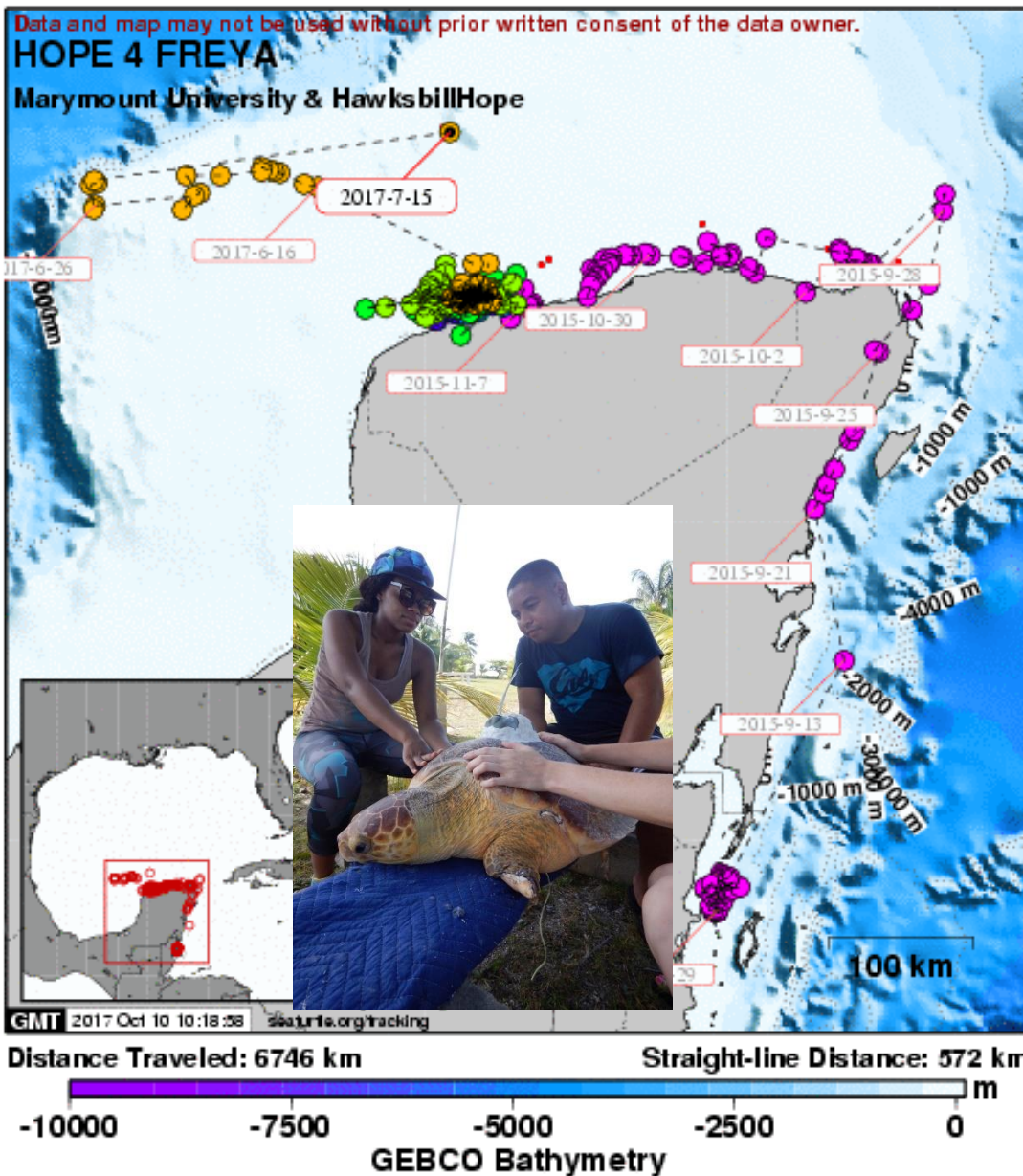




# LOGGERHEAD

## Hope 4 Freya 2015

- Loggerhead attacked by shark
- Immediate veterinary care
- Released w/in one week
- Tracked for almost 2 years and showed returning
- Longest of the HHMU tags



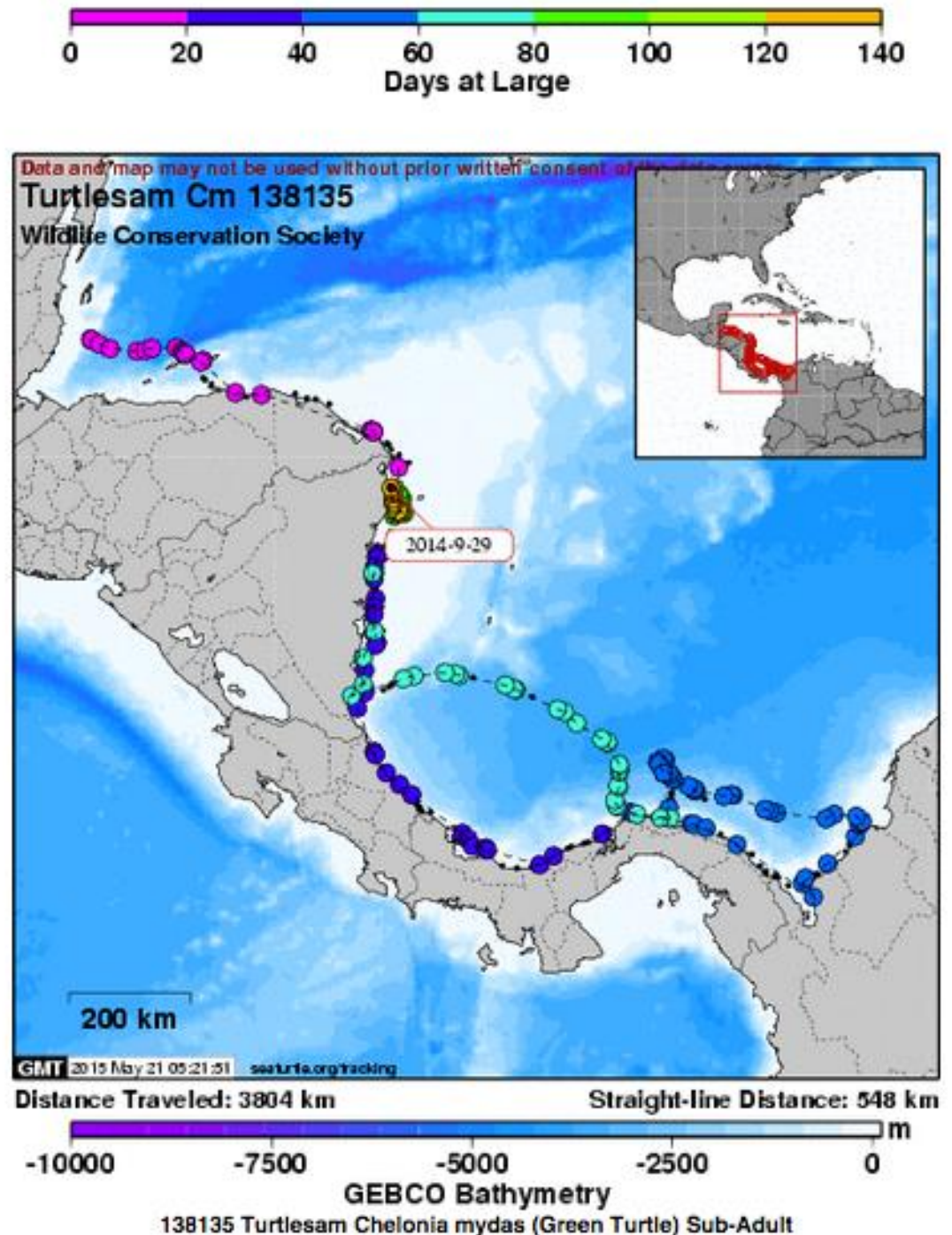


# LONGEST MIGRATION

**GREEN**

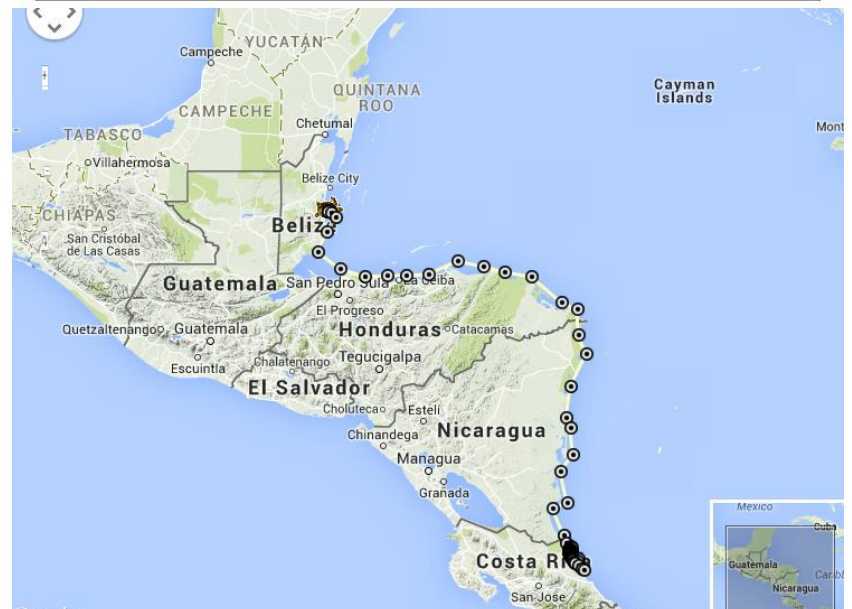
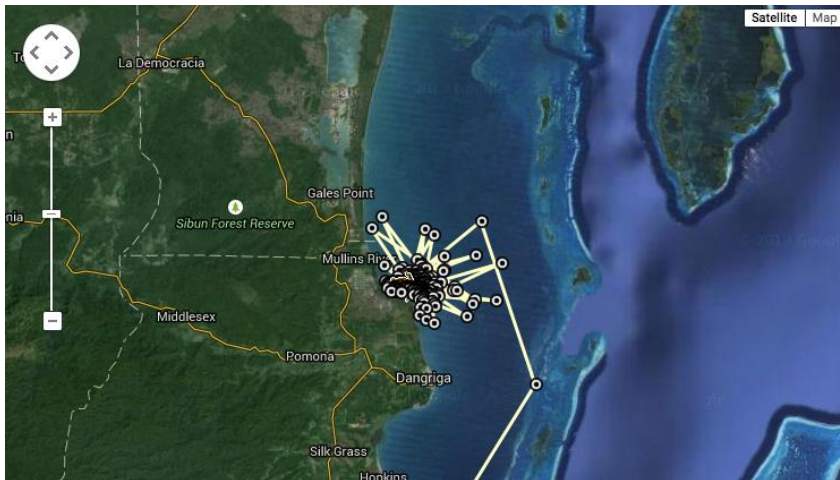
## Turtle Sam 2014

- Subadult green forage in Glovers
- Travelled to Columbia
- Last transmission Nicaragua



# Green- Esperanza 2014

- Tour de Turtles
- Nests in Costa Rica
- Forages in Belize near Colson Point (Gales Point area) in the Victoria Channel





# Green– Reefie 2017

## Sea Turtle Satellite Tracking | Reefie



- Tour de Turtles
- Green turtle nests in Costa Rica
- Forages at Robinson Point

# Potential Issues?

## **PROS**

- Foraging grounds identified
- If outside MPA maybe protection can be afforded
- Further studies on habitat

## **CONS**

- Fishermen learn of the foraging grounds
- Tourist visit and start feeding



# BELIZE

## Sea Turtle Migration Paths

### Legend

- Protected Areas
- Jamaica 2000
- Ginger 2012
- Zenit 2000
- Shelby 2003
- Myles 2003
- Caytraveler 2005
- Gale 2000
- Hope 2010
- Peace 2010
- Moochula 2012
- Greater Hope 2013
- Carenato 2013
- Hach 2009

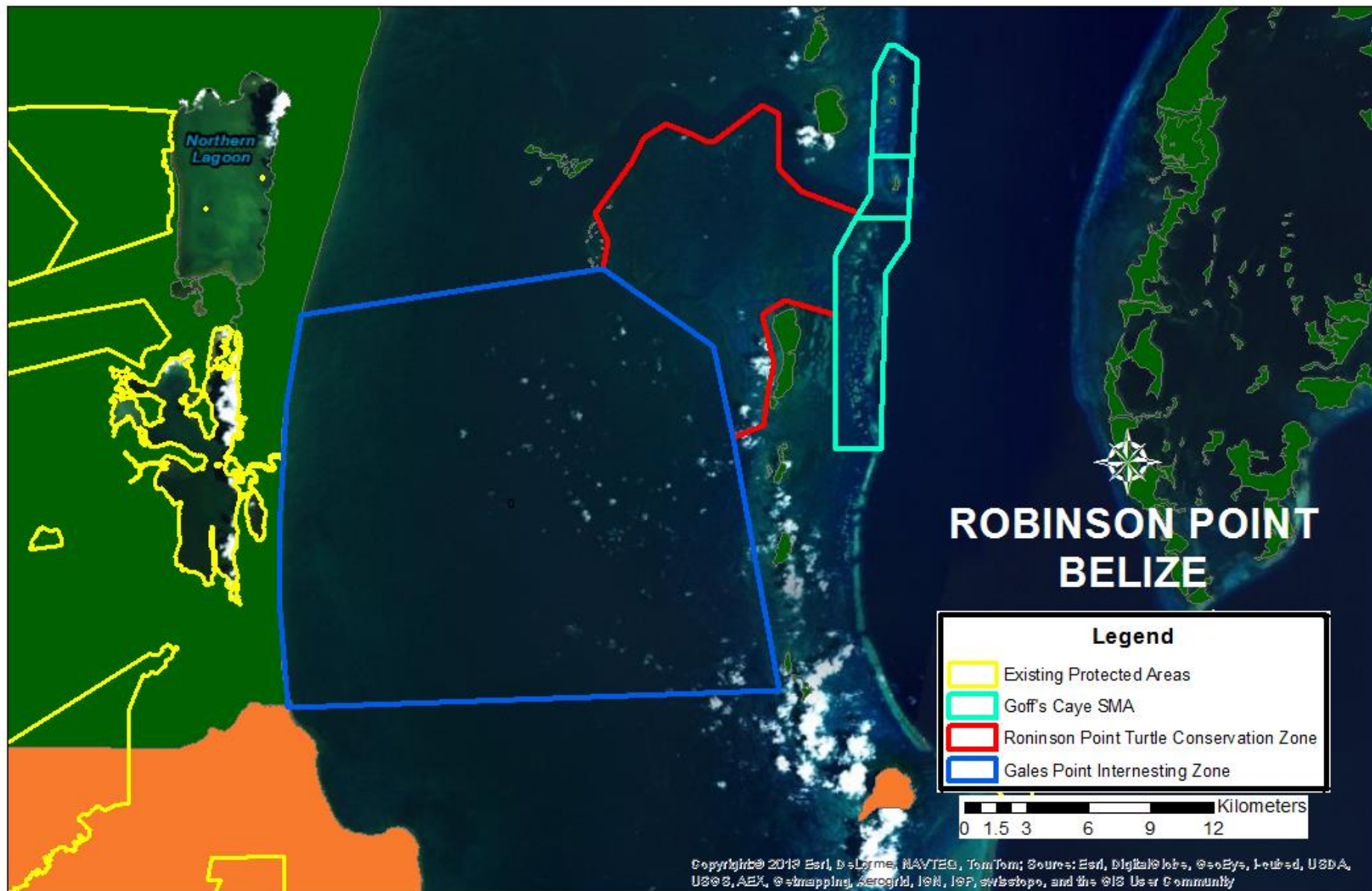
Orange = Hawkbills tagged in Belize  
Red = Hawkbills tagged in other countries  
Green = Greens tagged in other countries

0 5 10 20 30 40 Kilometers

# 2000-2013

## Foraging Areas Inside Main Barrier Reef Outside MPA boundaries

- Bacalar Chico
- Robinson Point
- Near Port Honduras Marine Reserve
- Near Laughing Bird Caye





# Mapping Methods

- Arc GIS/ESRI
- Seaturtle.org Data Explorer
- Movebank (Max Planck Institute for Ornithology)
- Google Maps - Leaflet
- Google Earth Engine
- Others...?

# Ideal Attributes

- Vectors vs points
- Select paths to display
  - country, species, year, age class, nesting, inwater, rehab, etc...
- Easy to upload
- Easy to share
  - With communities
  - Embed on websites

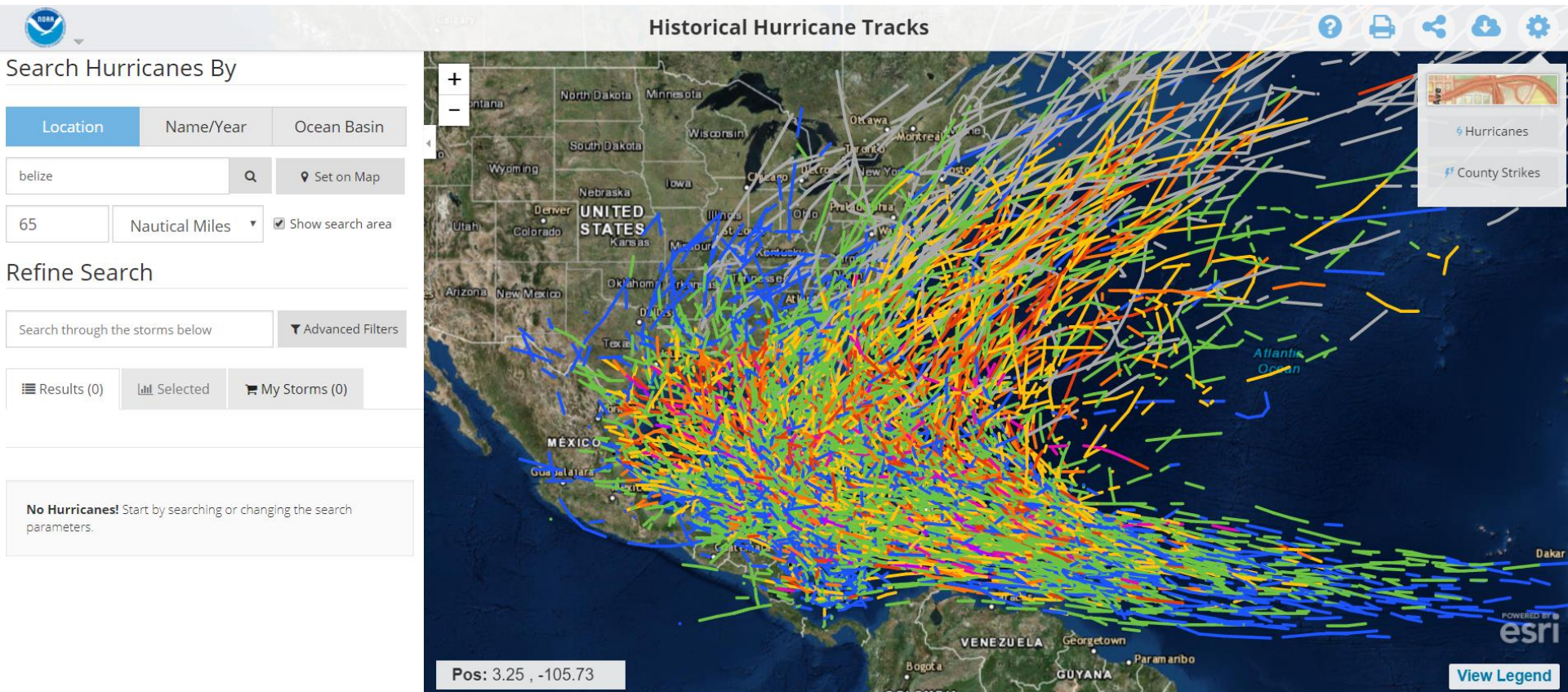


# MARINETRAFFIC.COM



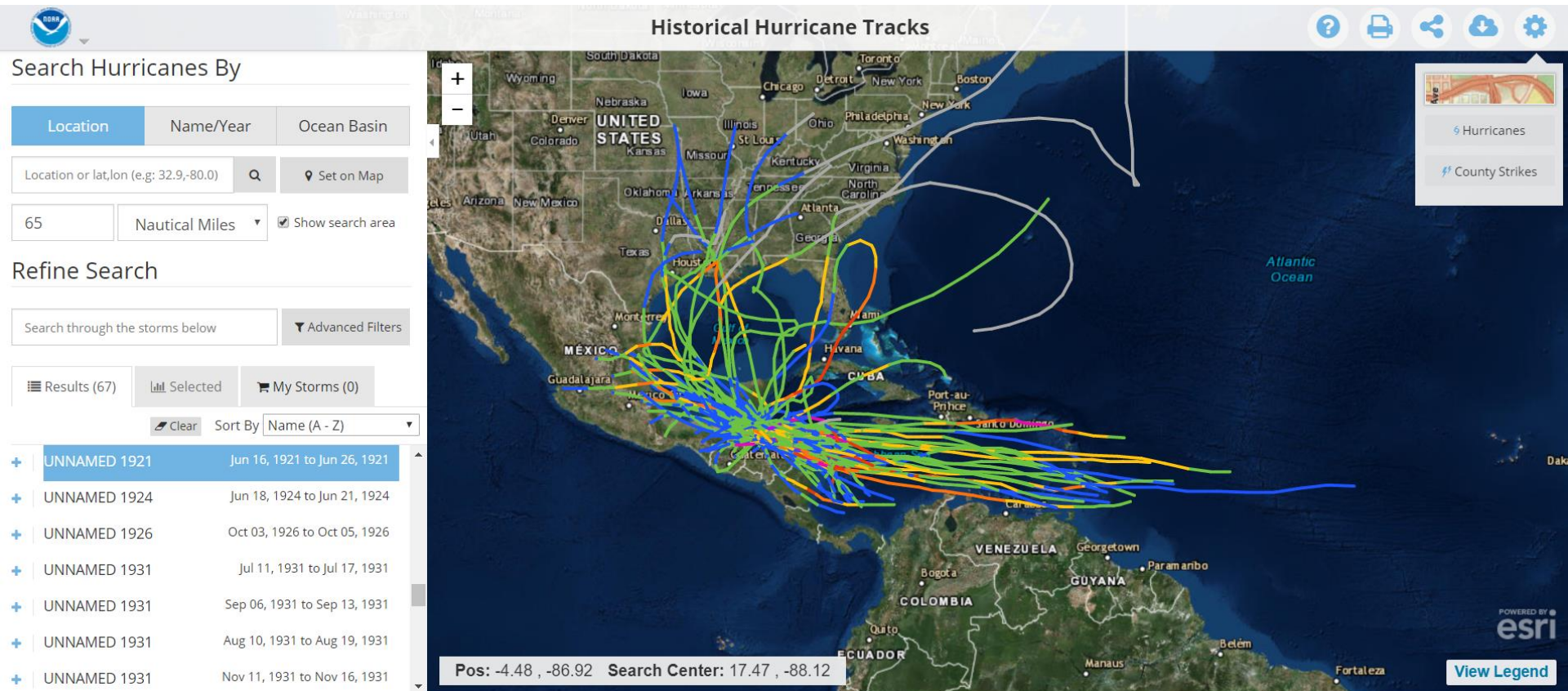


# ESRI COAST.NOAA.GOV

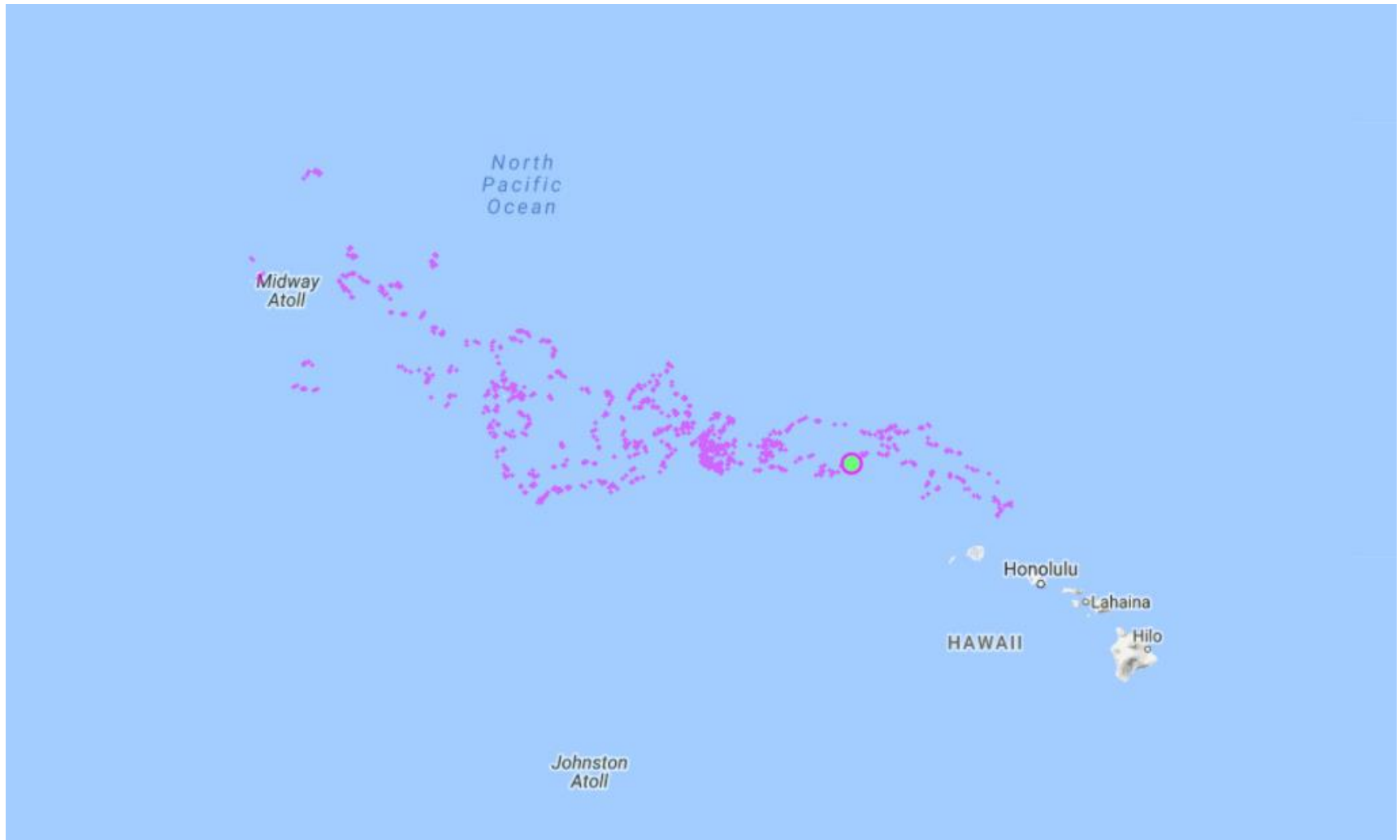




# ESRI COAST.NOAA.GOV

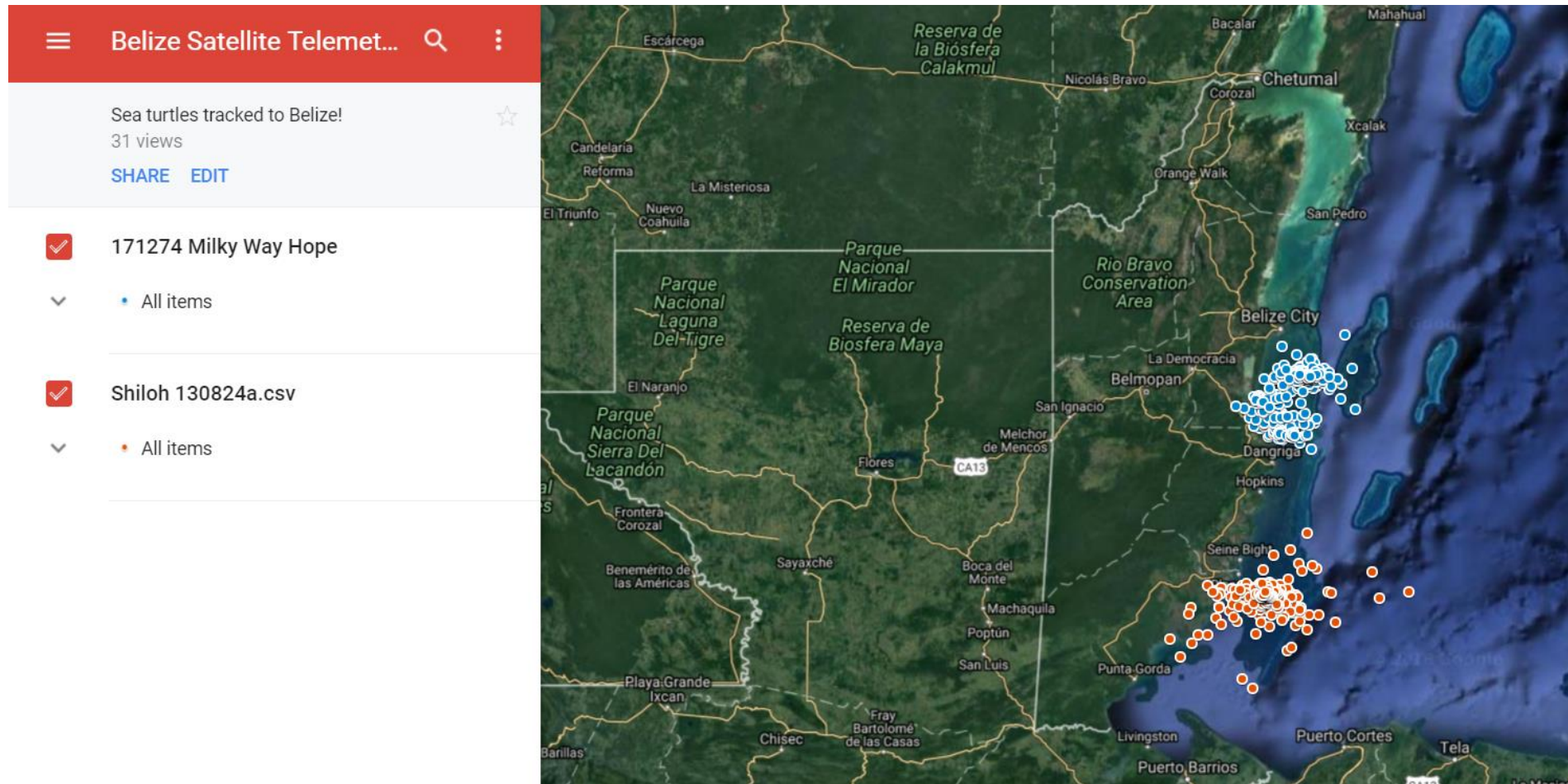


# Movebank.org





# Google Maps



# BENEFITS

- Identify foraging grounds
- Identify migration paths
- Comprehensive database compiling all WIDECAST member tracks
- Alert when turtles approach your country
- Better management



# NEXT STEPS

## ACTIVITY

## TIMELINE ?

- |   |                      |
|---|----------------------|
| 1. Identify interested members  | APR 2018             |
| 2. Identify best map method   | SEP 2018             |
| – GIS/ESRI  |                      |
| – Google product  |                      |
| – Other ?   |                      |
| 3. Prepare & Adopt Data Sharing Agreement   | FEB 2019             |
| – Belize Coral Reef & Sea Turtle Conservation Networks                              |                      |
| 4. Identify Data Manager  |                      |
| 5. Compile data - CSV files   | FEB 2019             |
| 6. Provide embed codes for partners to share on their websites and WIDECAST website | MAY 2019<br>SEP 2019 |

A close-up photograph of a sea turtle swimming underwater. The turtle's head is in the center, looking upwards. Its skin is yellowish with dark spots. A speech bubble with a black outline and three small circles leading to the turtle's head contains the text "Thank you!". The background is a clear blue water.

**Thank  
you!**

**Thanks to**

**Michael Coyne  
(seaturtle.org) Daniel  
Evans**

**(Sea Turtle  
Conservancy) Eduardo  
Cuevas (Mexico)**

**Barbara Schroeder  
(NOAA)**

**Julia Horrocks (UWI)**

**Stephen Dunbar  
(Protector)**

**Janice Blumenthal  
(Cayman Islands)**

**for sharing the tracks of  
turtles to Belize!**