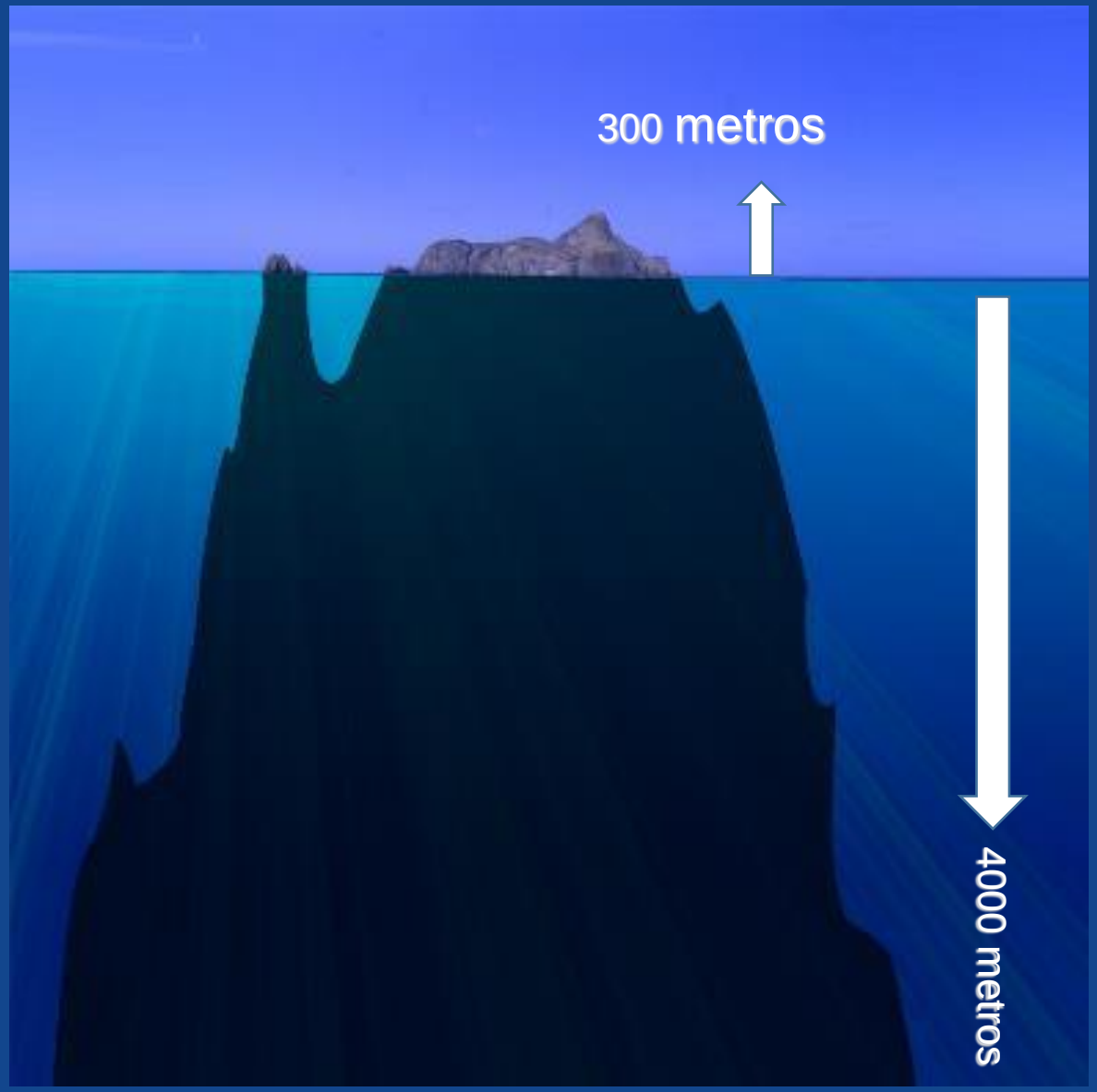
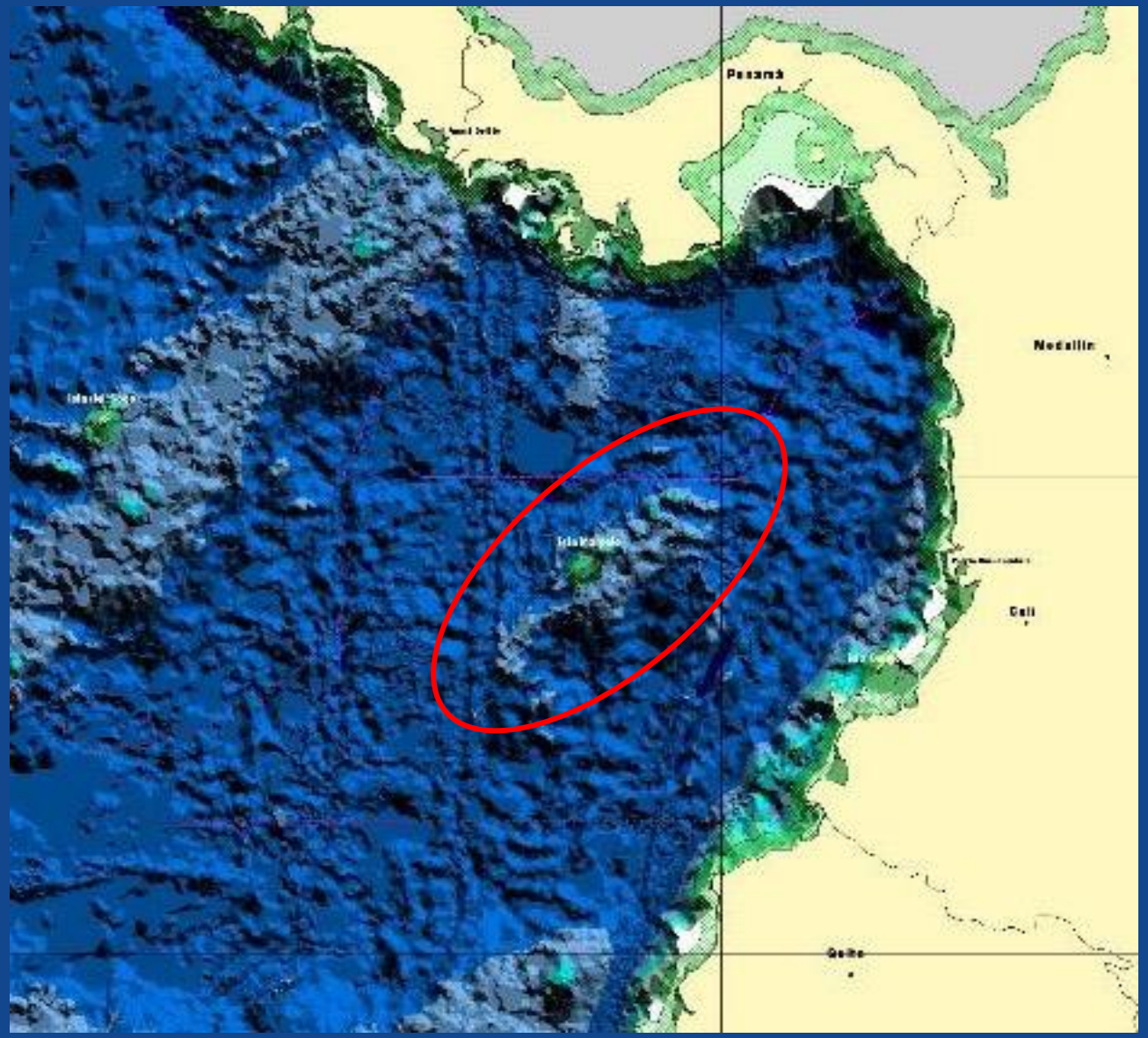
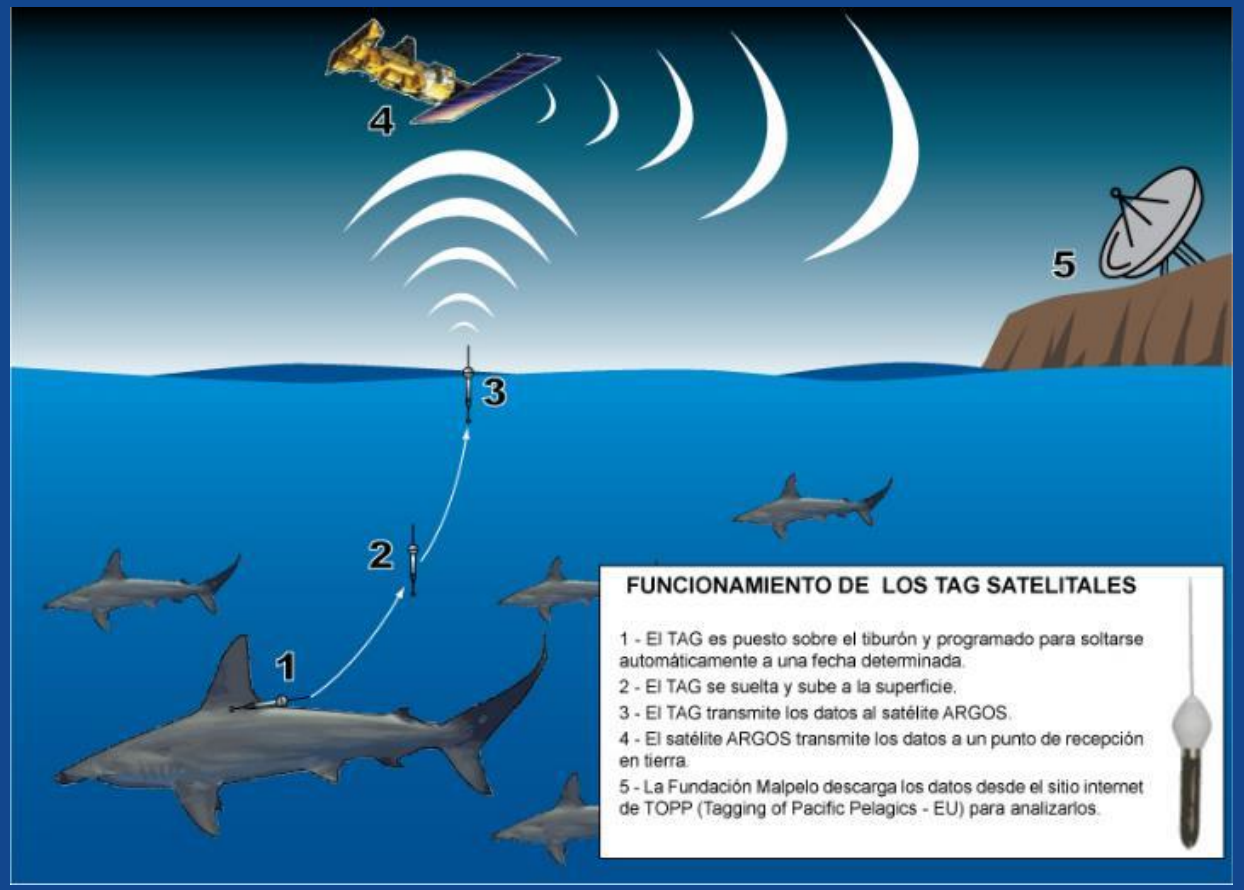
SANDRA BESSUDO
Fundadora y Directora
Fundación Malpelo y Otros Ecosistemas Marinos

REGION ETPS
COSTA RICA
PANAMÁ
Las Baulas
Coiba
Cocos
Malpelo
COLOMBIA
Gorgona
ECUADOR
ECUADOR
Galápagos
Los Tres Mosqueteros
El Acuario
D'Artagnan
La Catedral
Bajo del Cholo
Bajo del Ancla
La Pared del Naufrago
Bajo del Monstruo
La Cara del Fantasma
El Freezer
El Arrecife
Aquamarina
El Mirador
La Nevera
La Pared del Tangón
El Arco del Tropic
Vagamares
La Tarta
La Pared del Aguila
La Puerta del Cielo / El tunel de la Chupadera
El Sahara
Los Gemelos
Salomón
Bajo de Junior
Saul
David
La Gringa
La Ferreteria
Escuba
Metros


300 metros
4000 metros


Panamá
Medellín
Cali

- Telemetría acústica
- Telemetría satelital
- Foto identificación
- Genética
- Censos visuales
- Bruvvs
- Censos 360



FUNCIONAMIENTO DE LOS TAG SATELITALES

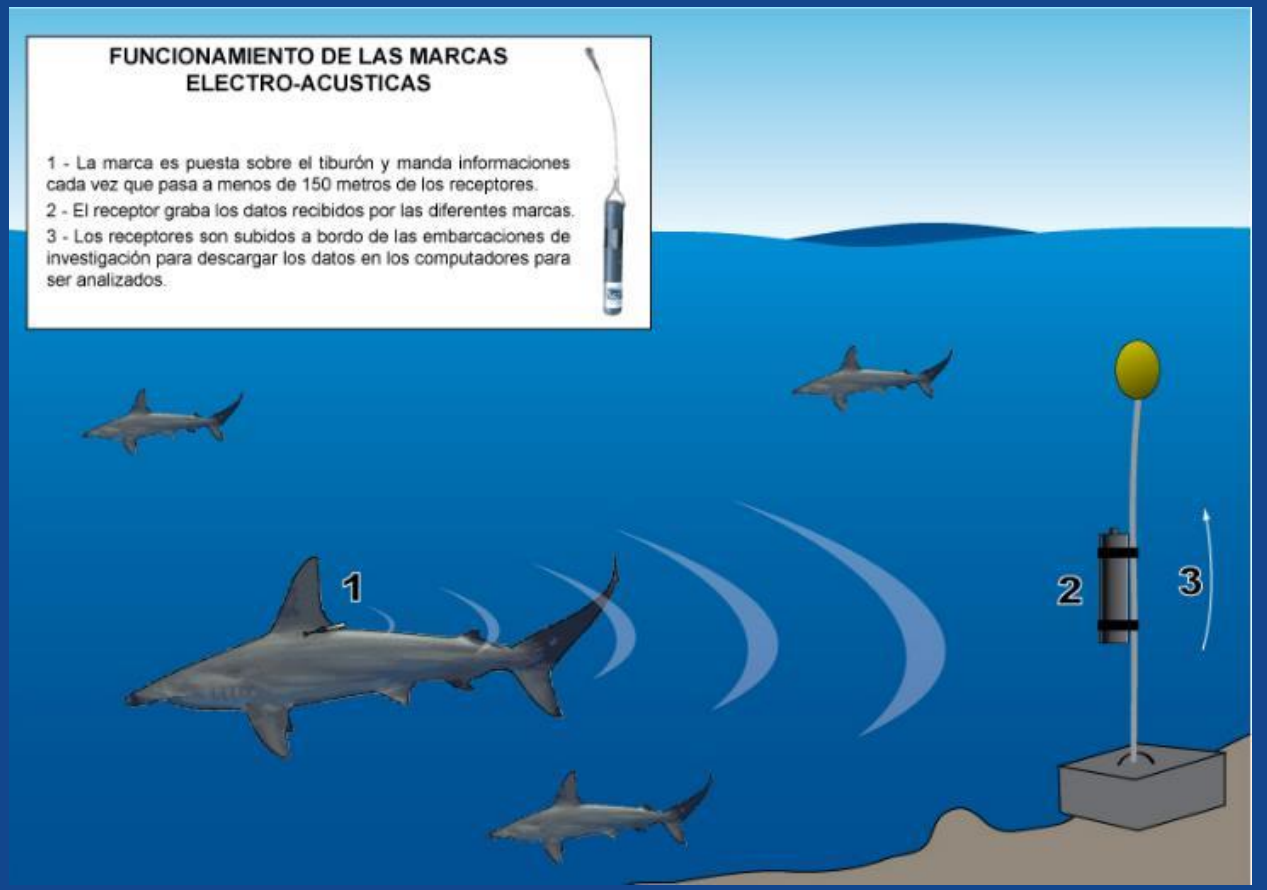
1 - El TAG es puesto sobre el tiburón y programado para soltarse automáticamente a una fecha determinada.

2 - El TAG se suelta y sube a la superficie.

3 - El TAG transmite los datos al satélite ARGOS.

4 - El satélite ARGOS transmite los datos a un punto de recepción en tierra.

5 - La Fundación Malpelo descarga los datos desde el sitio internet de TOPP (Tagging of Pacific Pelagics - EU) para analizarlos.



FUNCIONAMIENTO DE LAS MARCAS ELECTRO-ACUSTICAS

1 - La marca es puesta sobre el tiburón y manda informaciones cada vez que pasa a menos de 150 metros de los receptores.

2 - El receptor graba los datos recibidos por las diferentes marcas.

3 - Los receptores son subidos a bordo de las embarcaciones de investigación para descargar los datos en los computadores para ser analizados.

Programa Regional de Marcaje de Tiburones

Especies de tiburones marcados por isla

Cocos:
40 Tiburones martillo

Coiba:
1 Tiburón martillo

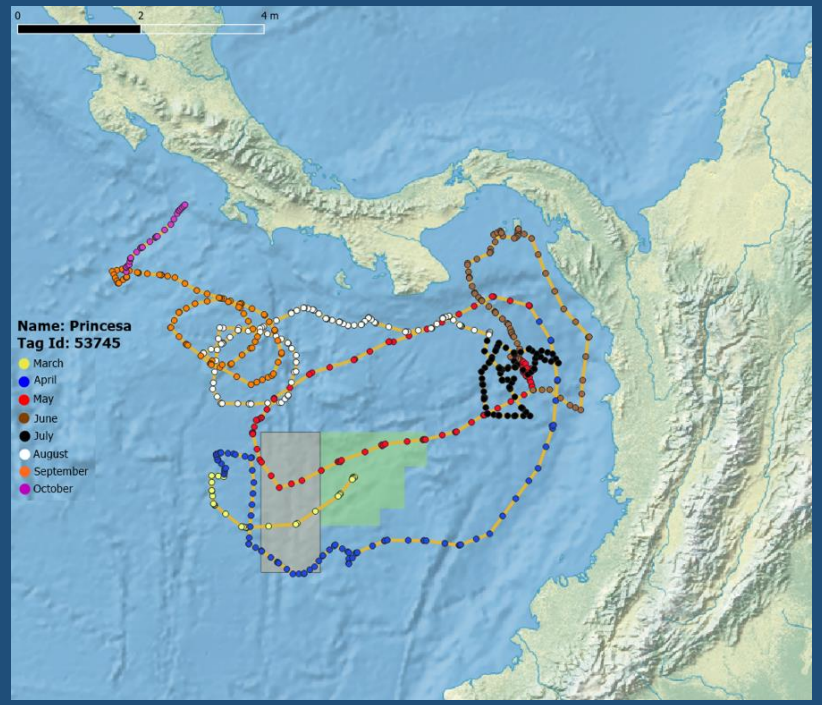
Las Perlas:
10 Tiburones Ballena

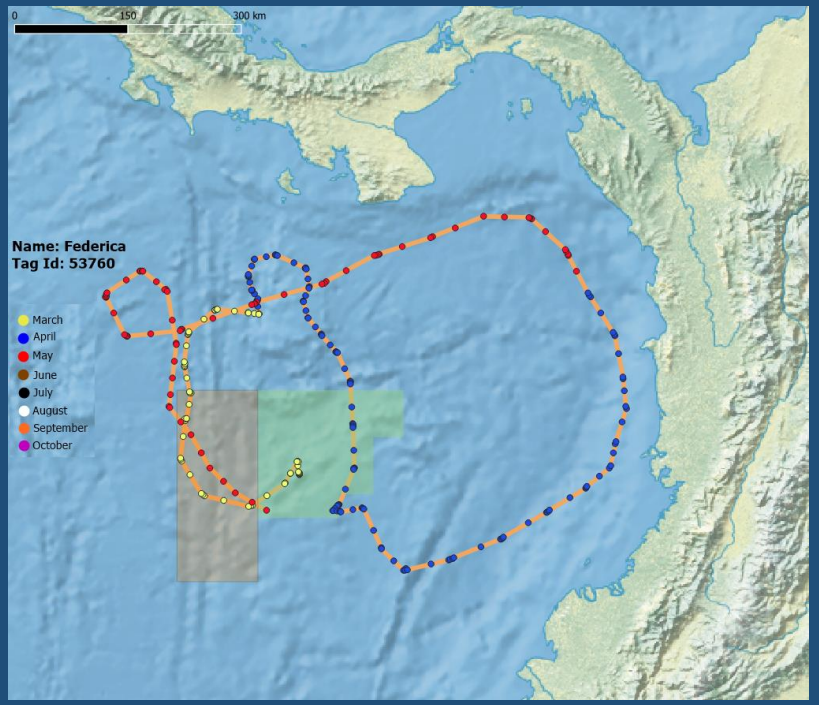
Galápagos:
91 Tiburones martillo
4 Tiburones Galápagos
4 Tiburones Ballena
4 Tiburones punta blanca

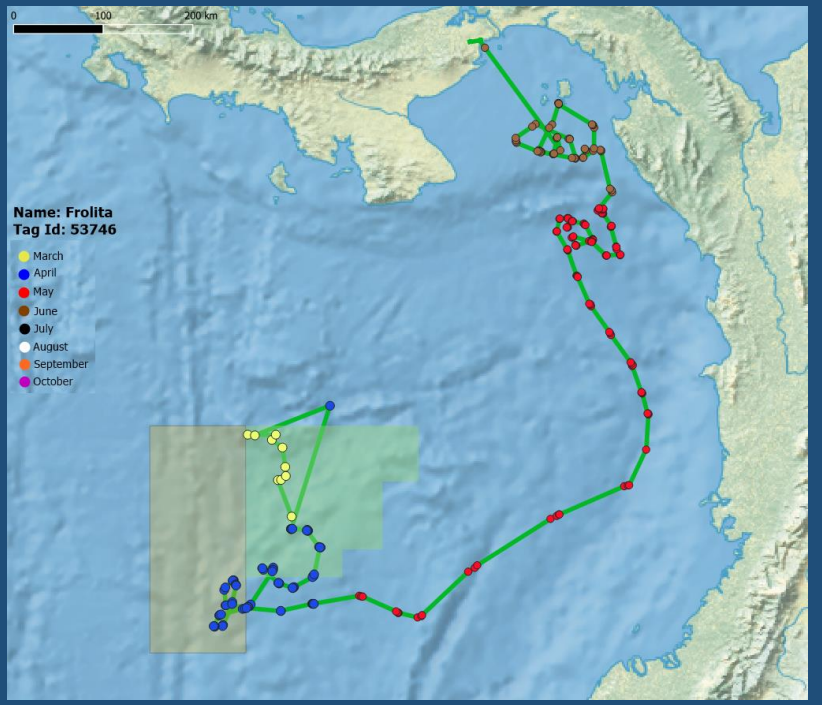
Malpelo:
69 Tiburones martillo
4 Tiburones Galápagos
2 Tiburones solrayo

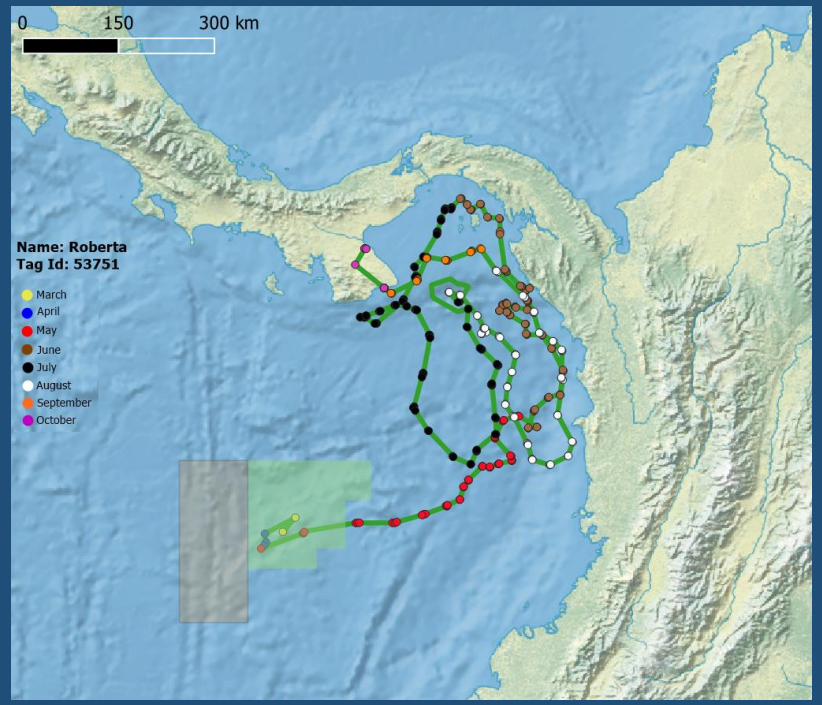
MigraMar

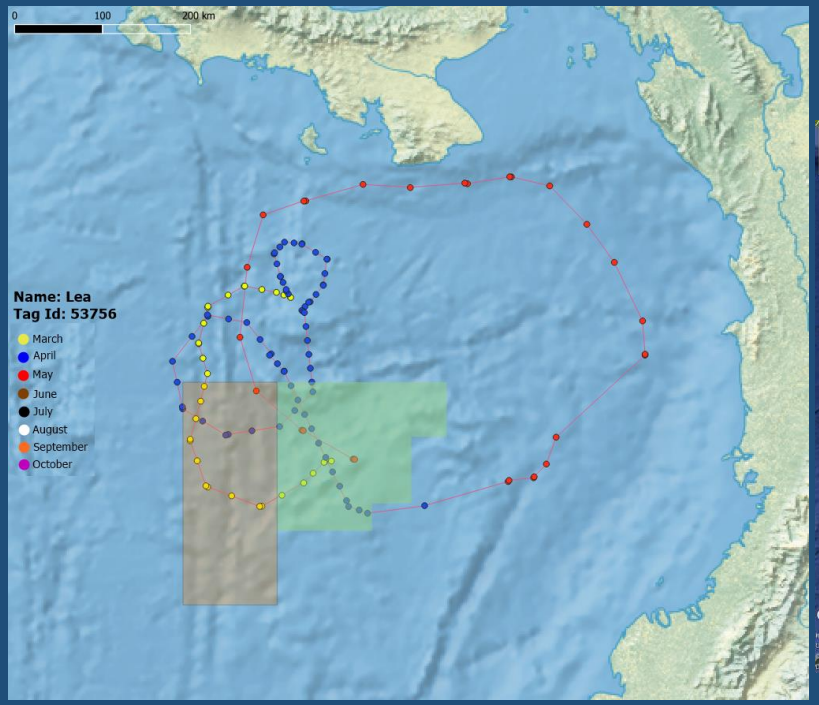
TIBURÓN MARTILLO /REQUIN MARTEAU /HAMMERHEAD SHARK
(*Sphyrna lewini*)


0
2
4 m
Name: Princesa
Tag Id: 53745
March
April
May
June
July
August
September
October


0
150
300 km
Name: Federica
Tag Id: 53760
March
April
May
June
July
August
September
October


0
100
200 km
Name: Frolita
Tag Id: 53746
March
April
May
June
July
August
September
October


0
150
300 km
Name: Roberta
Tag Id: 53751
March
April
May
June
July
August
September
October


0
100
200 km
Name: Lea
Tag Id: 53756
March
April
May
June
July
August
September
October

S. lewini 2018
FEMALES OF SPHYRNA LEWINI 2018
Leyenda
Trajectory
Nicaragua
Costa Rica
Panamá
Colombia
Google Earth

Estudios genéticos

American Genetic Association

Journal of Heredity, 2015, 448–458
doi:10.1093/jhered/esv050
Symposium Article

OXFORD

Symposium Article

Conservation Genetics of the Scalloped Hammerhead Shark in the Pacific Coast of Colombia

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Data deposited at Dryad: http://dx.doi.org/doi:10.5061/dryad.kq685

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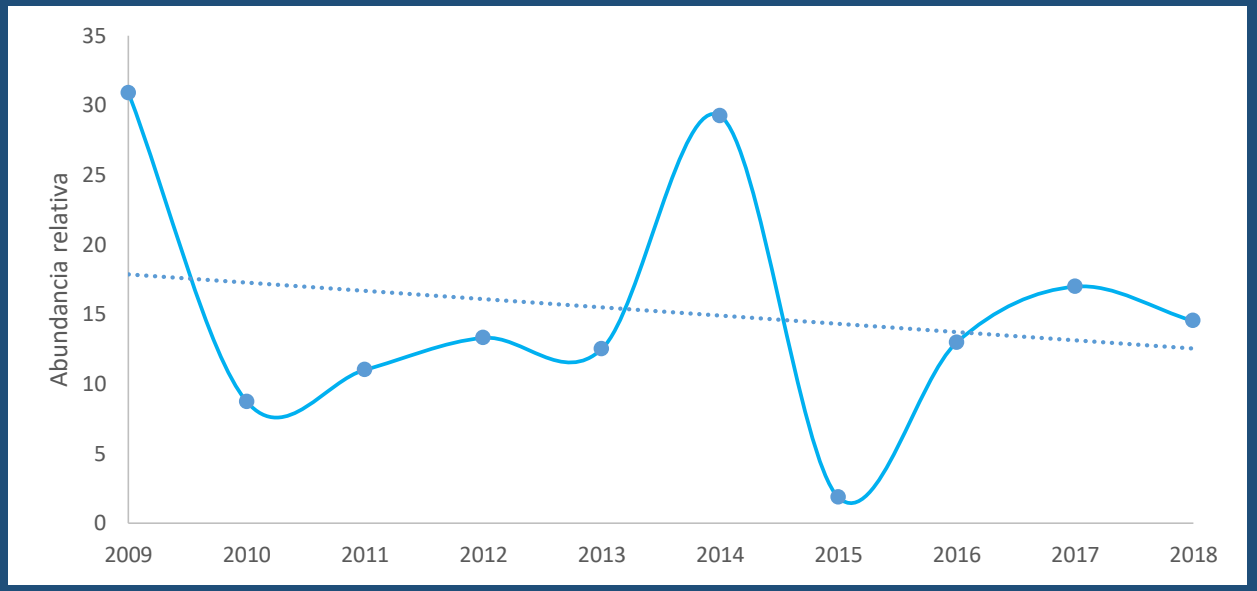
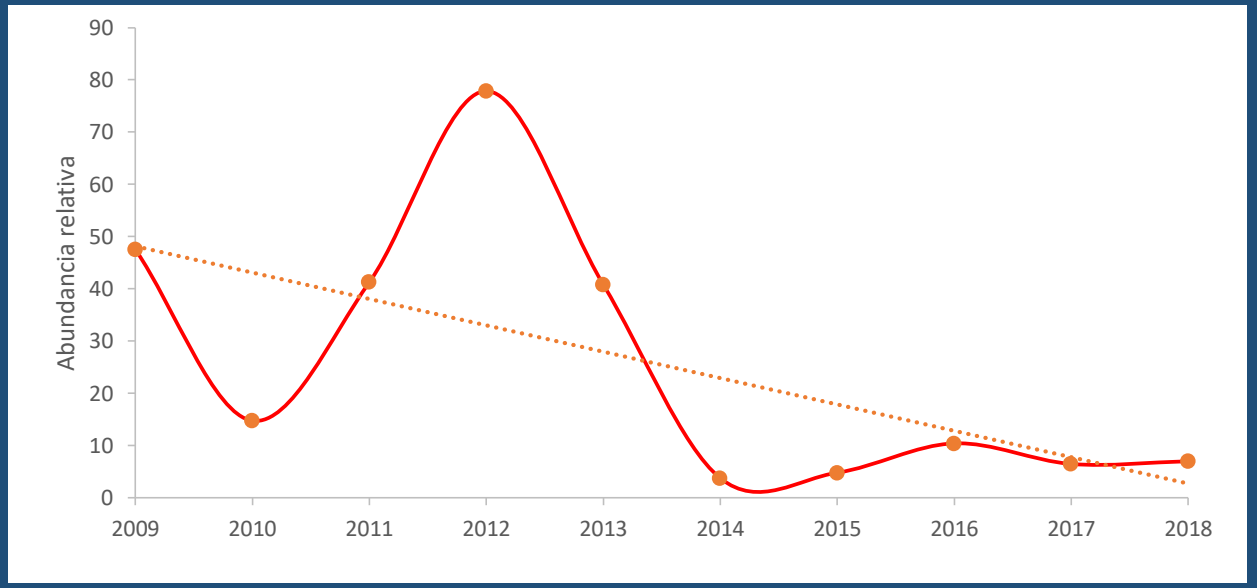
Abstract

Previous investigations of the population genetics of the scalloped hammerhead sharks (*Sphyrna lewini*) in the Eastern Tropical Pacific have lacked information about nursery areas. Such areas are key to promoting conservation initiatives that can protect young sharks from threats such as overfishing. Here, we investigated the genetic diversity, phylogeography, and connectivity of *S. lewini* found in 3 areas of Colombia's Pacific coast: around Malpelo Island and in 2 National Natural Parks on the Colombian Pacific mainland (Sanquianga and Ensenada de Utría). We analyzed mtDNA control region (CR) sequences and genotyped 15 microsatellite loci in 137 samples of adults and juveniles. The mtDNA analyses showed haplotypes shared between the Colombian Pacific individuals sampled in this investigation and other areas in the Eastern Tropical Pacific, the Indo-Pacific, and with sequences previously reported in Colombia (Buenaventura Port), as well as 4 unique haplotypes. Population assignment and paternity analyses detected 3 parent–offspring pairs between Malpelo and Sanquianga and 1 between Malpelo and Utría. These results indicate high genetic connectivity between Malpelo Island and the Colombian Pacific coast, suggesting that these 2 areas are nurseries for *S. lewini*. This is, to our knowledge, the first evidence of nursery areas identified for the scalloped hammerhead shark anywhere in the world. Additional conservation planning may be required to protect these nursery habitats of this endangered shark species.

Resumen

LOS TIBURONES MARTILLO:
UNA ESPECIE ALTAMENTE AMENAZADA





SCUBAPRO

MERCURY LEVELS AND TROPHIC INTERACTIONS AMONG SHARKS OF THE COLOMBIAN PACIFIC AND RISKS TO HUMAN HEALTH

Sandra Bessudo[1], **Natalia Vélez**[1,2], Dalia C. Barragán-Barrera[3], Felipe Ladino[1], Andrea Luna-Acosta[2]

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[3]Laboratory of Molecular Ecology of Acuatic Vertebrates (LEMVA), Department of Biological Science, Universidad de los Andes, Cra 1 No 18A – 12, Bogotá, Colombia.

INTRODUCTION

- Sharks are the top predators of marine ecosystems and are responsible for regulating the TOP-DOWN processes (Baum and Worm, 2009).

- Main threats of sharks populations (Dulvy et al., 2014):

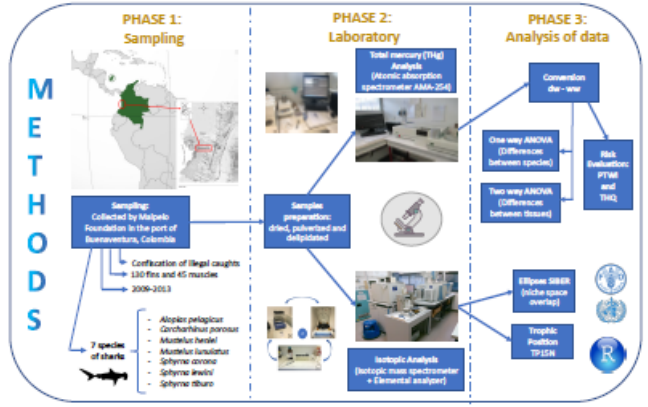
- Fins have a high cost and strong demand in the Asian markets, specially in Hong Kong, whose traditional dish is the shark fin soup (Clarke, 2004).

- Colombia is the 3rd country that emits more Hg to the ocean mainly by gold mining activities in the Colombian Pacific coast (1), which can contribute to the bioaccumulation and biomagnification (2) of this metal in the tissues of sharks (Trystam, 2017).

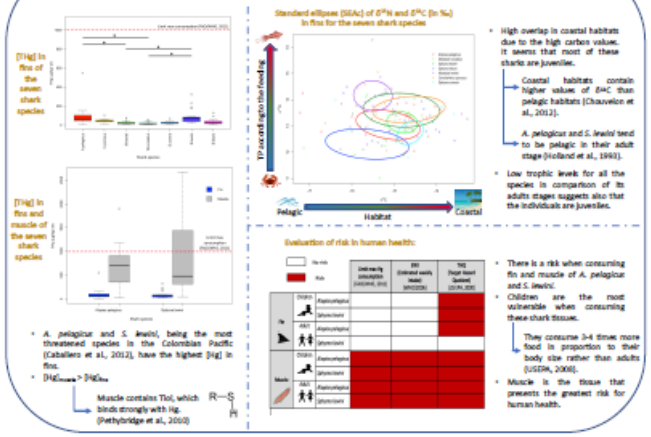
OBJECTIVES:

1) Identify the concentrations of mercury in fins and muscle, and the differences between tissues.
2) Identify if there is any risk to human health by consuming the fins of these species.
3) Analyze the trophic ecology using stable isotopes $\delta^{13}C$, $\delta^{15}N$ and Hg.

METHODS



RESULTS AND DISCUSION



- A. pelagicus and S. lewini, being the most threatened species in the Colombian Pacific (Caballero et al., 2012), have the highest [Hg] in fins.
- $[Hg]_{muscle} > [Hg]_{fins}$
- High overlap in coastal habitats due to the high carbon values. It seems that most of these sharks are juveniles.
  - Coastal habitats contain higher values of $\delta^{13}C$ than pelagic habitats (Chouvelon et al., 2012).
  - A. pelagicus and S. lewini tend to be pelagic in their adult stage (Holland et al., 1993).
- Low trophic levels for all the species in comparison of its adults stages suggests also that the individuals are juveniles.
- There is a risk when consuming fin and muscle of A. pelagicus and S. lewini.
- Children are the most vulnerable when consuming these shark tissues.
  - They consume 3-4 times more food in proportion to their body size rather than adults (USEPA, 2000).
- Muscle is the tissue that presents the greatest risk for human health.

CONCLUSIONS

- ✓ Concentrations of Hg vary according to species and tissue.
- ✓ The consumption of any of the tissues of *A. pelagicus* and *S. lewini* can be harmful to human health.
- ✓ These results suggest that species were captured in coastal areas and fed of low trophic level preys.

RECOMMENDATIONS:

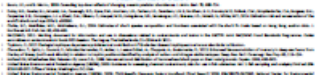
- ➢ Avoid the consumption of these predators since the consumption of both muscle and fins can generate risks for human health.
- ➢ Have extra variables such as sex or the size of the individual.
- ➢ Identify the exact location of each individual's extraction.

FOR MORE INFORMATION PLEASE CONTACT:
- Natalia Vélez Jiménez: n.velez858@gmail.com
- Andrea Luna-Acosta: andrea-luna@javeriana.edu.co

ACKNOWLEDGEMENTS:

Special thanks to Paco Bustamante, Maud Brault-Favrou, Carine Churlaud, Gaël Guillou and staff from LIENSs University of la Rochelle for their support in the laboratory.

REFERENCES:

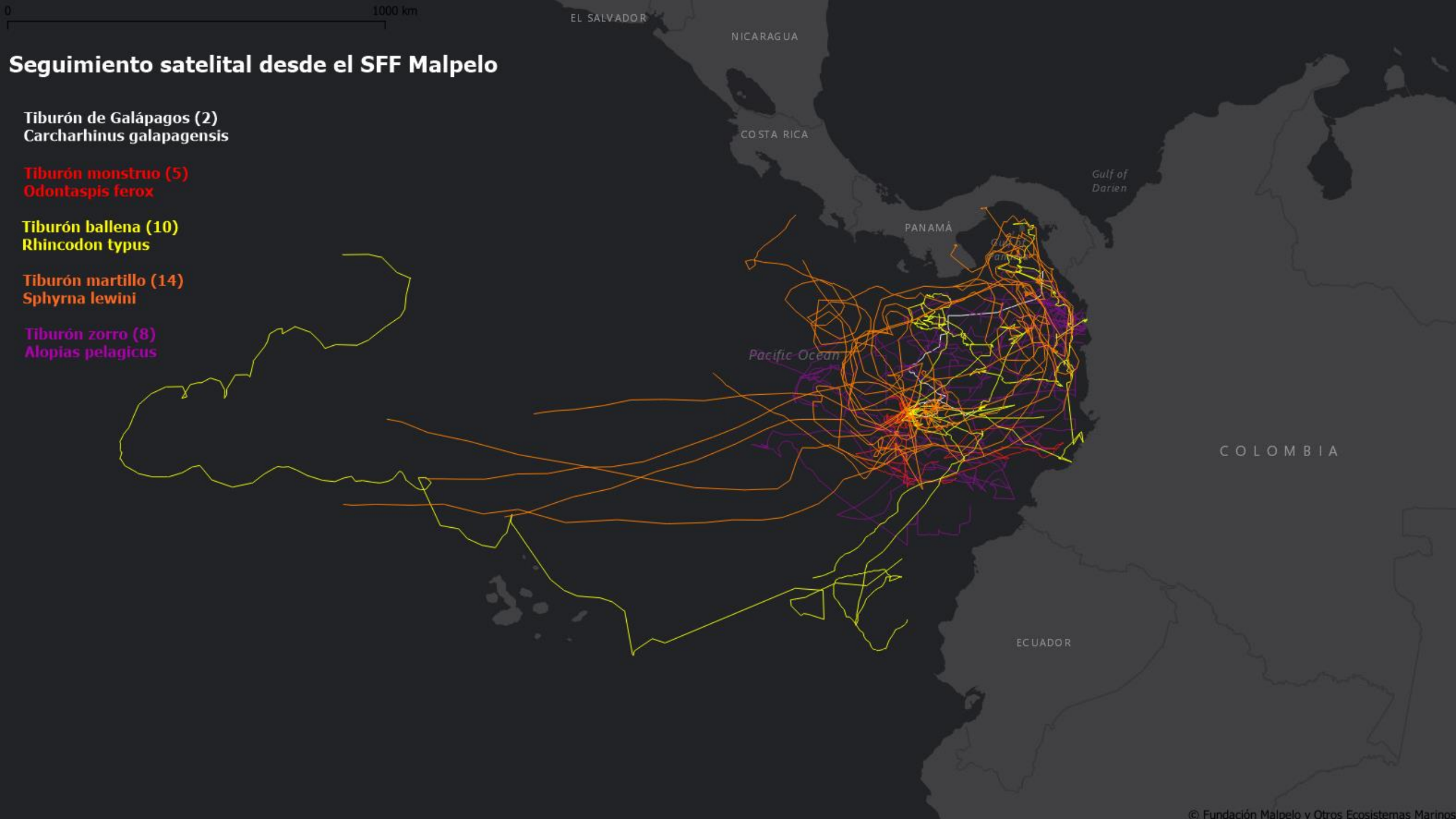


TIBURÓN ZORRO / REQUIN RENARD / TREASHURE SHARK
(Alopias pelagicus)

TIBURÓN GALAPAGOS / REQUIN DES GALAPAGOS / GALAPAGOS SHARK
(*Carcharhinus galapagensis*)

TIBURÓN BALLENA / REQUIN BALEINE / WHALE SHARK
(*Ryncodon typus*)

TIBURÓN SOLRAYO / REQUIN FÉROCE /RAGGED-TOOTH SAND
(*Odontaspis ferox*)



Seguimiento satelital desde el SFF Malpelo

Tiburón de Galápagos (2)
Carcharhinus galapagensis

Tiburón monstruo (5)
Odontaspis ferox

Tiburón ballena (10)
Rhincodon typus

Tiburón martillo (14)
Sphyrna lewini

Tiburón zorro (8)
Alopias pelagicus

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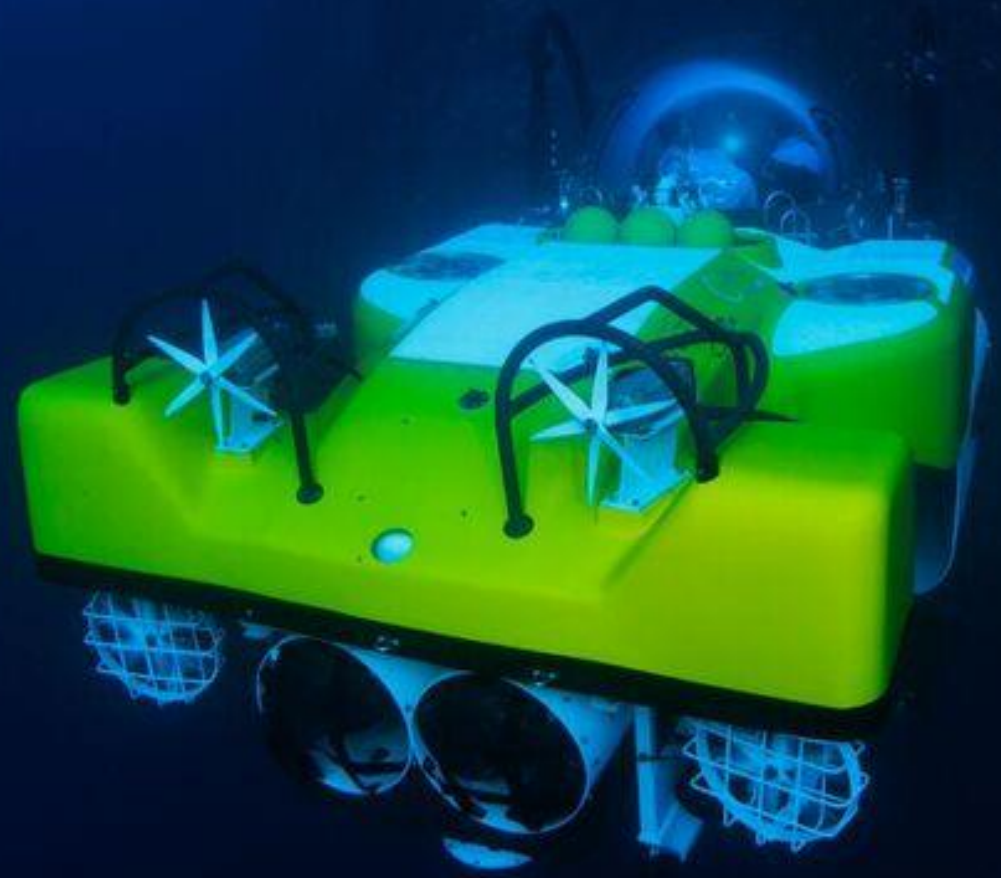
0
300
km
Distrito de Manejo Integrado
Yuruparí - Malpelo
Área Marina Protegida
SFF Isla Malpelo

Islas del Canal
Isla de Guadalupe
Los Alijos
Cabo Pulmo
Bahía Banderas
Revillagigedo
Clipperton
Peninsula of Osa
Coiba
Coco
Malpelo
Gorgona
Galápagos
Zorritos
Isla Pitcairn
Rapa Nui
Isla de la Pascua
Archipiélago Juan Fernandez
Islas
Rutas Migratorias
Receptores acústicos instalados
Migravía Coco-Galápagos
Migravía Coiba-Malpelo
Green sea turtle
Leatherback turtle
Gianta manta ray
Scalloped hammerhead shark
Galapagos shark
Silky shark
Smalltooth sand tiger
Big-eye shark
Tiger shark
Whale shark
Humpback whale
Blue whale
MIGRAMAR



GRACIAS