



Universidad Católica del Norte  
ver más allá

**The porbeagle shark (*Lamna nasus*)  
in the Southern Hemisphere:  
searching for biological patterns  
among oceans and regions.**

14th IOTC WPEB – Cape Town 10-14 september 2018



**Enzo Acuña<sup>1,2</sup>, Rubén Alarcón<sup>3</sup>, Alexander Arkhipkin<sup>4</sup>, Rui Coelho<sup>5</sup>, Andrés Domingo<sup>6</sup>, Malcolm Francis<sup>7</sup>, María Teresa González<sup>8</sup>, Pilar Haye<sup>1</sup>, Ana Massa<sup>9</sup>, Santiago Montealegre<sup>10</sup>, Robert Olson<sup>11</sup> and Patricia Zárate<sup>12</sup>.**

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- 7** NIWA, Wellington, New Zealand
- 8** Instituto de Ciencias Naturales “Alexander von Humboldt”, Facultad Ciencias Naturales y Recursos Biológicos. U. de Antofagasta, Chile
- 9** Grupo Condrictios, INIDEP, Argentina
- 10** Universidade Estadual Paulista Júlio de Mesquita Filho (UNESP), Brasil
- 11** Inter-American Tropical Tuna Commission (IATTC), La Jolla, California, USA
- 12** Instituto de Fomento Pesquero (IFOP), Chile



# OUTLINE

- BACKGROUND

- THE PROJECT ...

- FISHERIES

- SPATIAL DISTRIBUTION

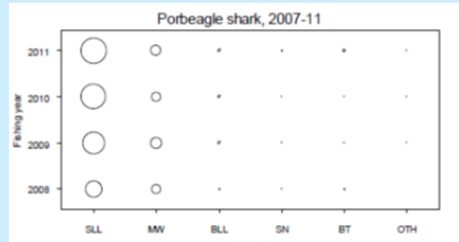
- REPRODUCTION

- GENETICS

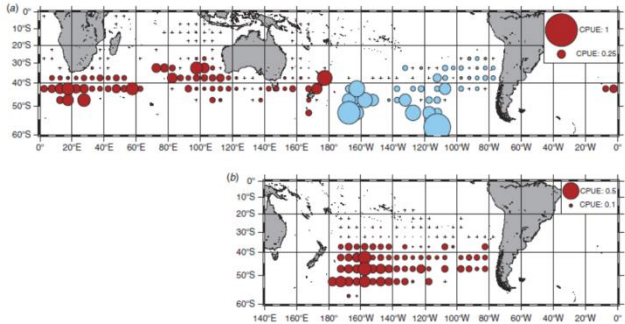
- PARASITES



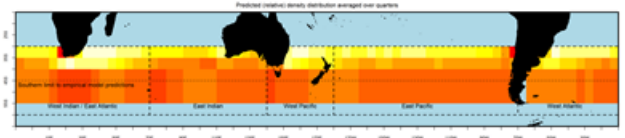




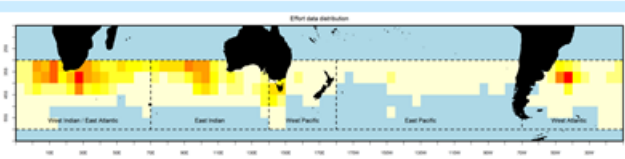
74-84% caught by surface longline (SLL) (main targets southern bluefin tuna, bigeye tuna, swordfish)  
13-22% caught by midwater trawl (MW)  
Francis (2013)



Porbeagle relative density



Fishing effort 1960-2015



At the 16th meeting of the Conference of the Parties to CITES (CoP16) in March 2013, **five shark species and all manta rays** were included in CITES Appendix II. The entry into effect of these listings was delayed until 14 September 2014 to resolve technical and administrative issues related to their implementation. These listings set challenges and opportunities for Parties in implementing CITES regulations for highly-traded fishery commodities.

## What should CITES Parties do by 14 September 2014?

Countries wishing to (re-)export or import specimens of the recently CITES-listed sharks and rays after 14 September 2014 must meet certain requirements, for which collaboration between CITES authorities and fishery agencies is essential:

**Legality:** Ensure that specimens in trade have been legally acquired, through monitoring and compliance with applicable laws, (sub)regional fishery management measures, etc.

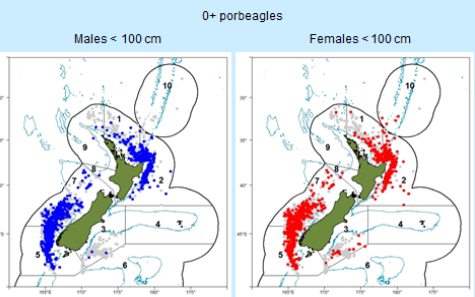
**Sustainability:** Determine that proposed trade will not be detrimental to the survival of the species, through scientific assessments of the status of the species in the national/regional territory (called 'non-detriment findings' or 'NDFs' in CITES).

**Traceability:** Record and trace trade from the country of origin to the country of destination, through the issuance of appropriate CITES permits or certificates, inclusion of all relevant trade in national annual reports and the CITES Trade Database, training of enforcement authorities on CITES regulations, identification/verification of specimens, etc.

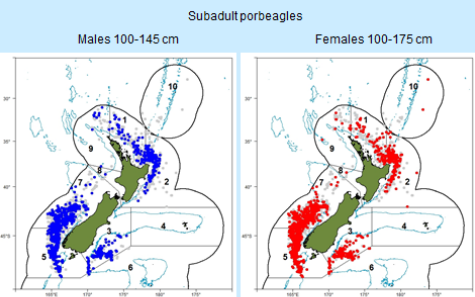


**RED LIST** Guiding Conservation for 50 Years

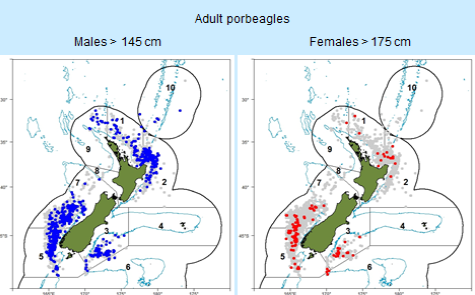
HOME SPECIES RANGE



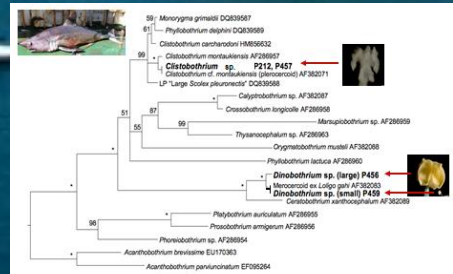
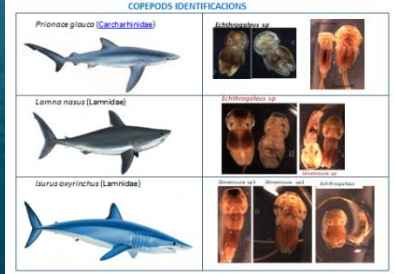
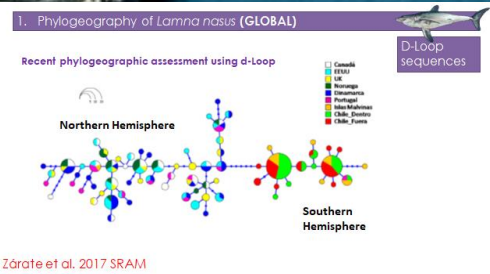
Grey dots = sets in which porbeagles were measured



Grey dots = sets in which porbeagles were measured



Grey dots = sets in which porbeagles were measured







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Proyecto FIPA N° 2017-65

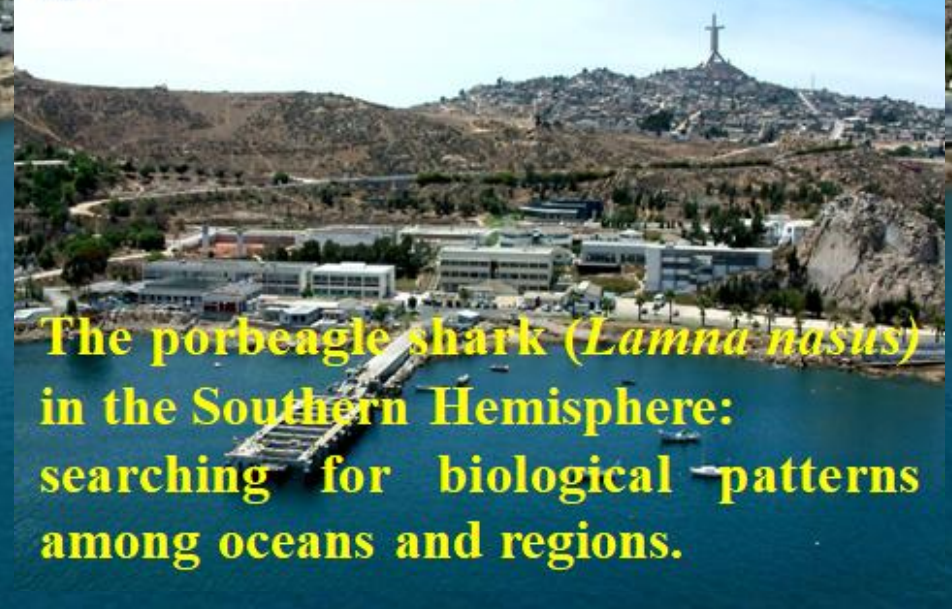
# "BIOLOGÍA REPRODUCTIVA DEL TIBURÓN SARDINERO *Lamna nasus* EN CHILE"

Enzo Acuña

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eacuna@ucn.cl



Universidad Católica del Norte  
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The porbeagle shark (*Lamna nasus*)  
in the Southern Hemisphere:  
searching for biological patterns  
among oceans and regions.

The multiplication of fishes (Sharks)



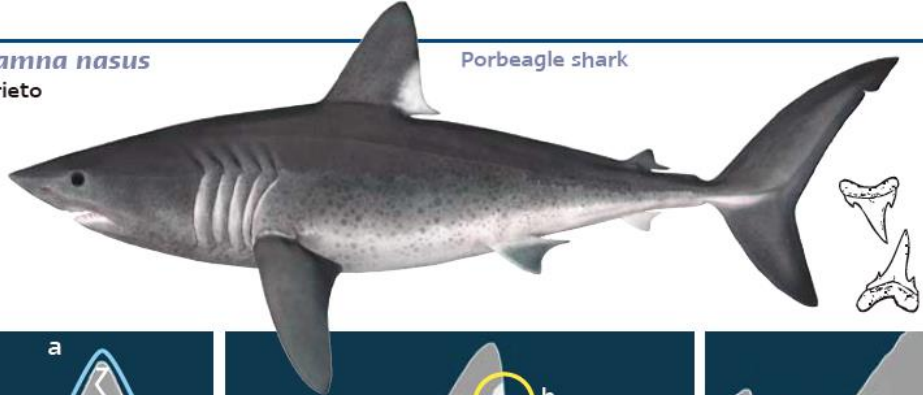


Porbeagle shark *Lamna nasus*

**Lamna nasus**

Porbeagle shark

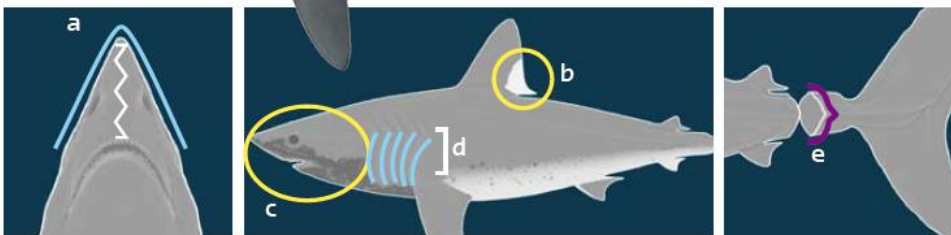
Prieto



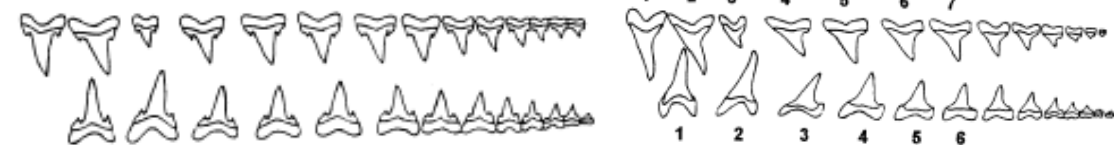
IDENTIFICACION MORFOLOGICA DE LAS ALETAS DE LOS PRINCIPALES TIBURONES PELAGICOS COMERCIALIZADOS EN CHILE: AZULEJO (*Prionace glauca* Linnaeus), MARRAJO (*Isurus oxyrinchus* Rafinesque), Y TINTORERA (*Lamna nasus* Bonnaterre)

MORPHOLOGICAL IDENTIFICATION OF FINS OF THE MAIN TRADED PELAGIC SHARK SPECIES IN CHILE: BLUE SHARK (*Prionace glauca* Linnaeus), SHORTFIN MAKO (*Isurus oxyrinchus* Rafinesque), AND PORBEAGLE (*Lamna nasus* Bonnaterre).

Sebastián Hernández<sup>1,3</sup>, Pilar A. Haye<sup>1,2</sup>, Enzo Acuña<sup>1</sup>



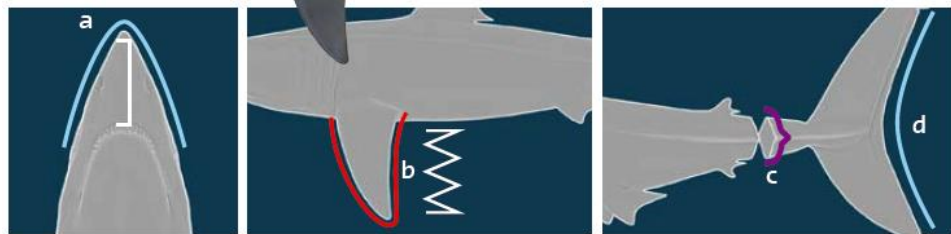
a. Cabeza triangular, hocico mediano.  
 b. Mancha blanca en punta libre de aleta dorsal.  
 c. Cabeza y partes inferiores oscuras.  
 d. Branquias grandes.  
 e. Quilla caudal.



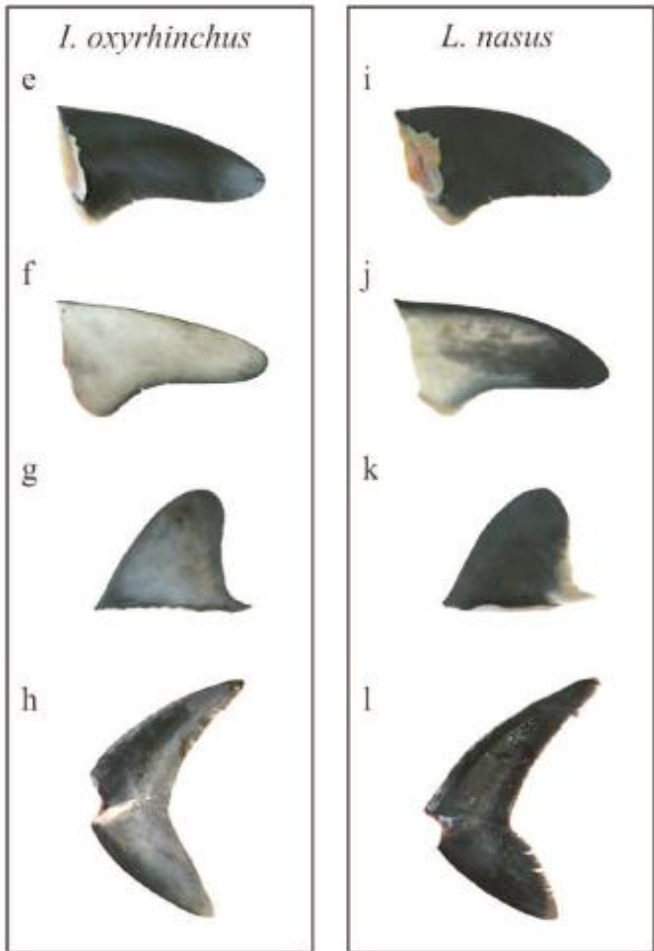
**Isurus oxyrinchus**

Shortfin Mako

Mako, tinto, marrajo

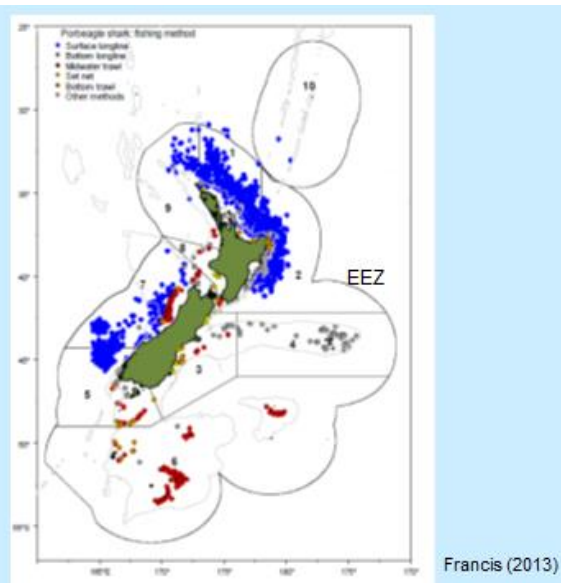


a. Cabeza triangular y hocico largo.  
 b. Aleta pectoral corta y picuda.  
 c. Quilla alta.  
 d. Aleta caudal en forma de semiluna.





Distribution of catch by fishing method



# Porbeagles are caught by highly migratory resources fleets

1. Industrial longline



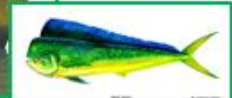
2. Artisanal longline



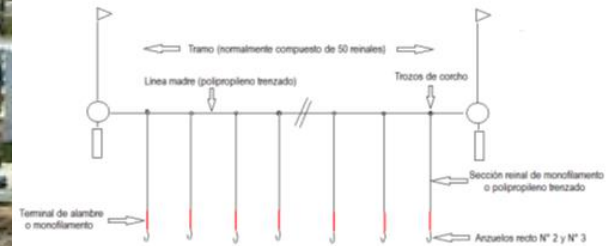
3. Artisanal gillnets



4. Artisanal espinel



Espinel



Patagonian toothfish Fishery: Deepwater longliner

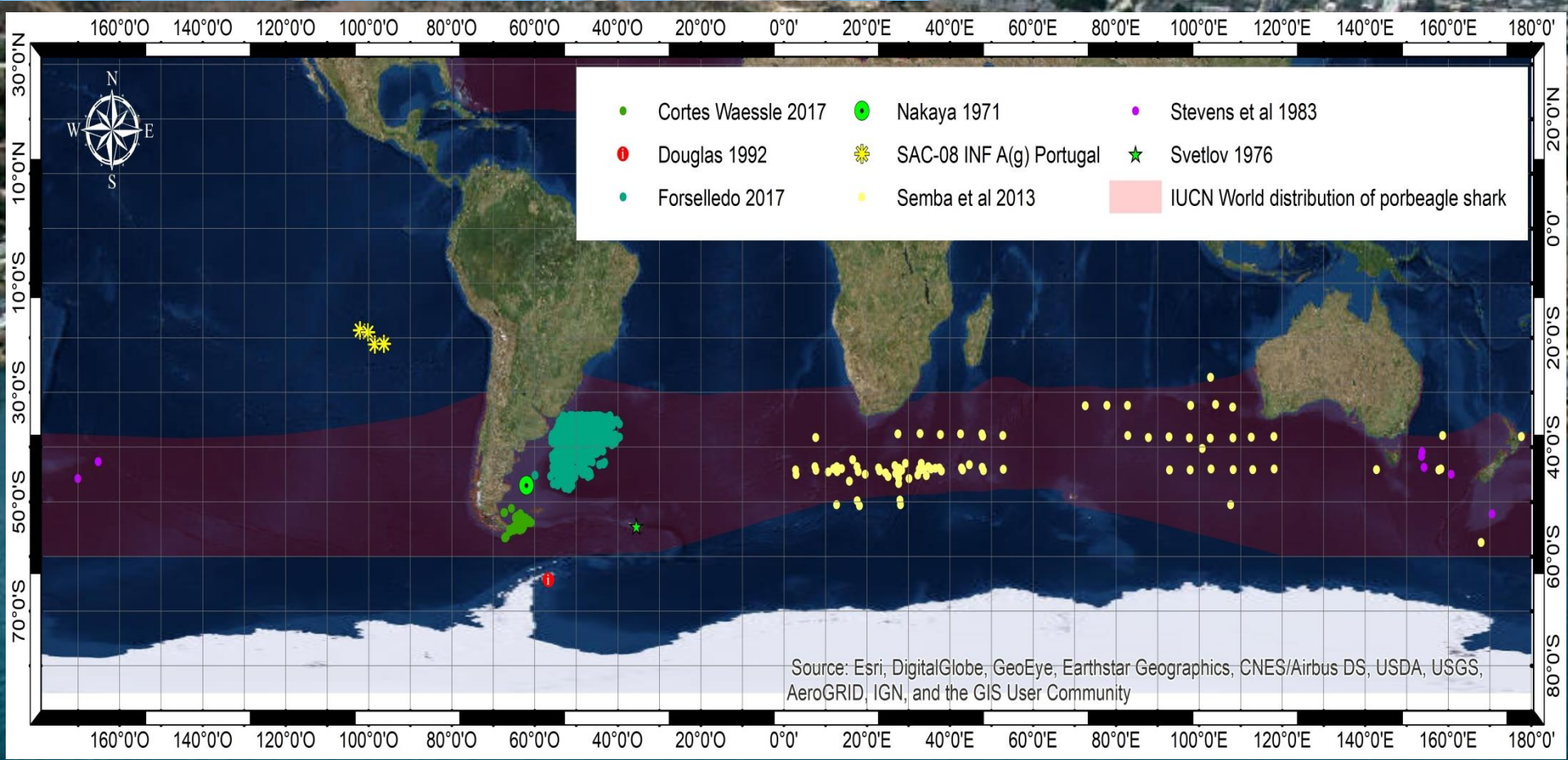
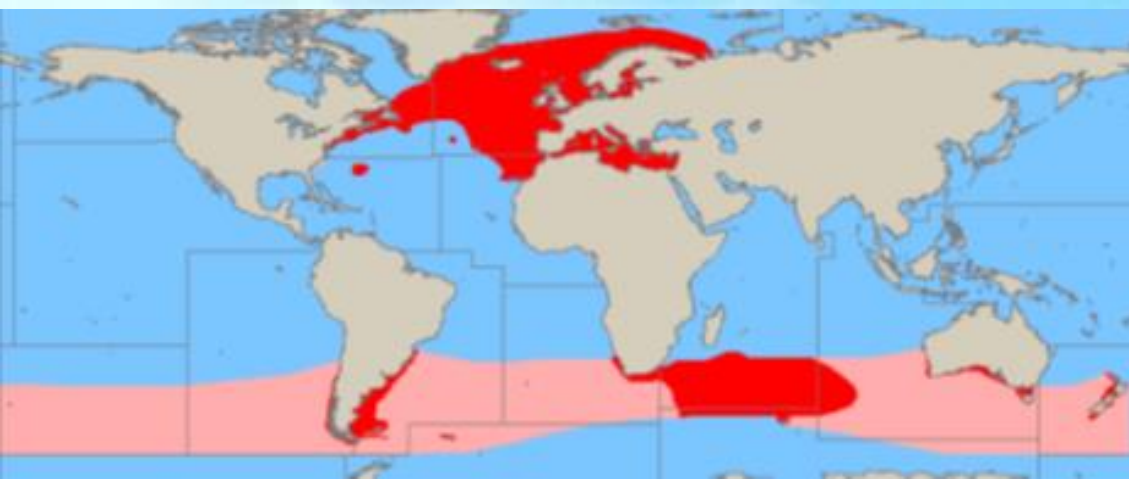


Loligo Fishery: Trawler

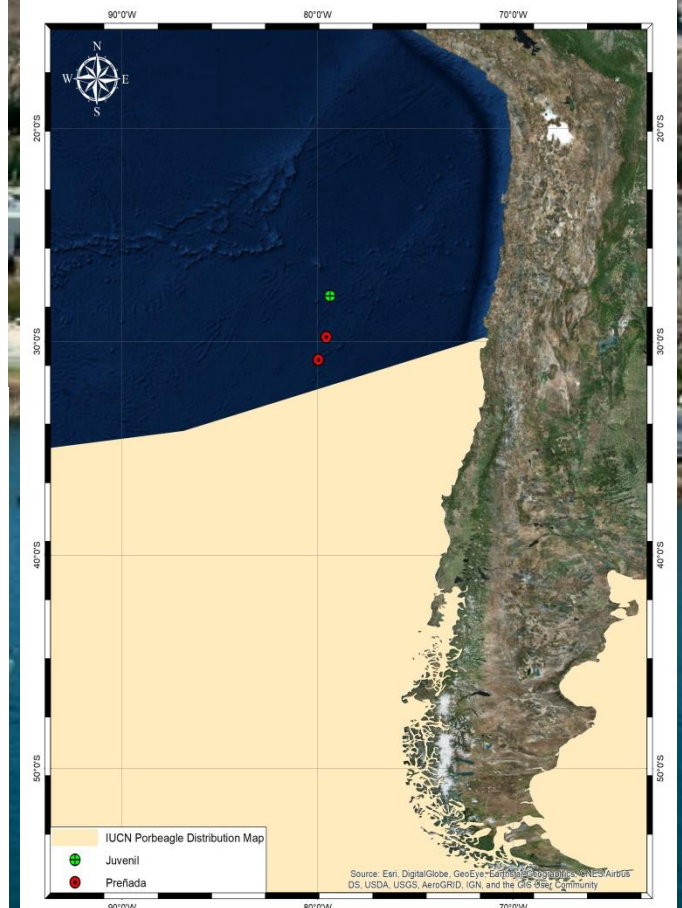
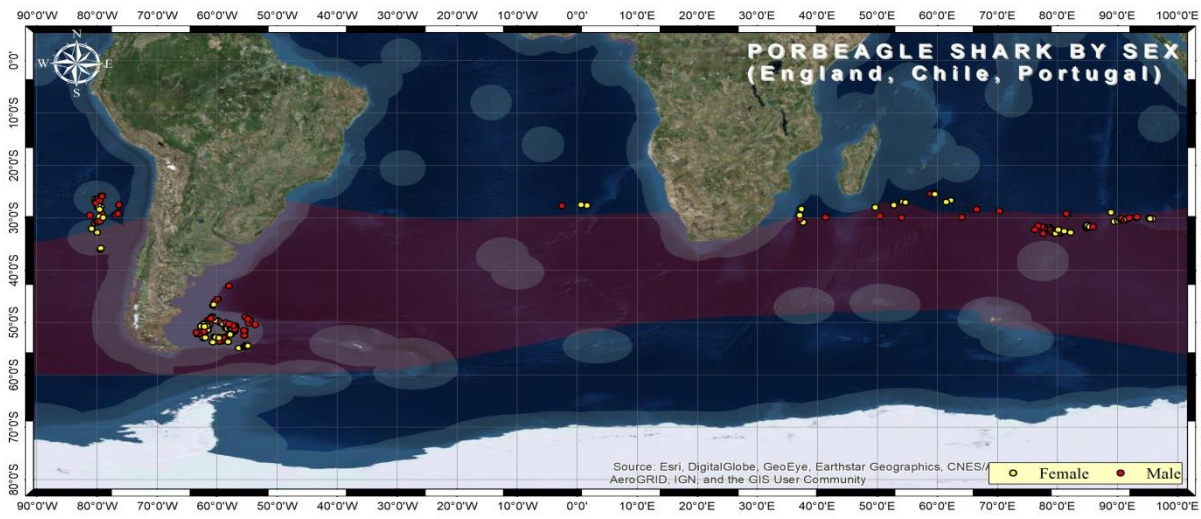
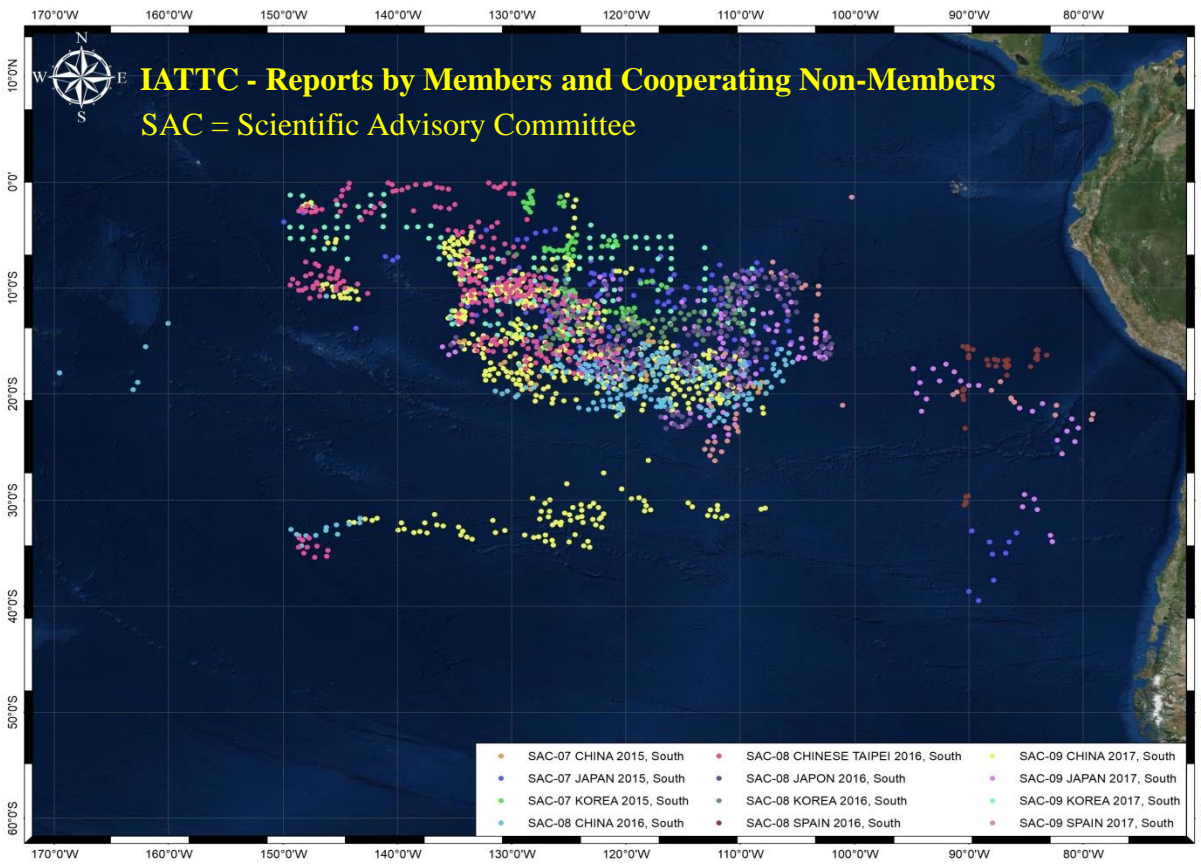




# Published data

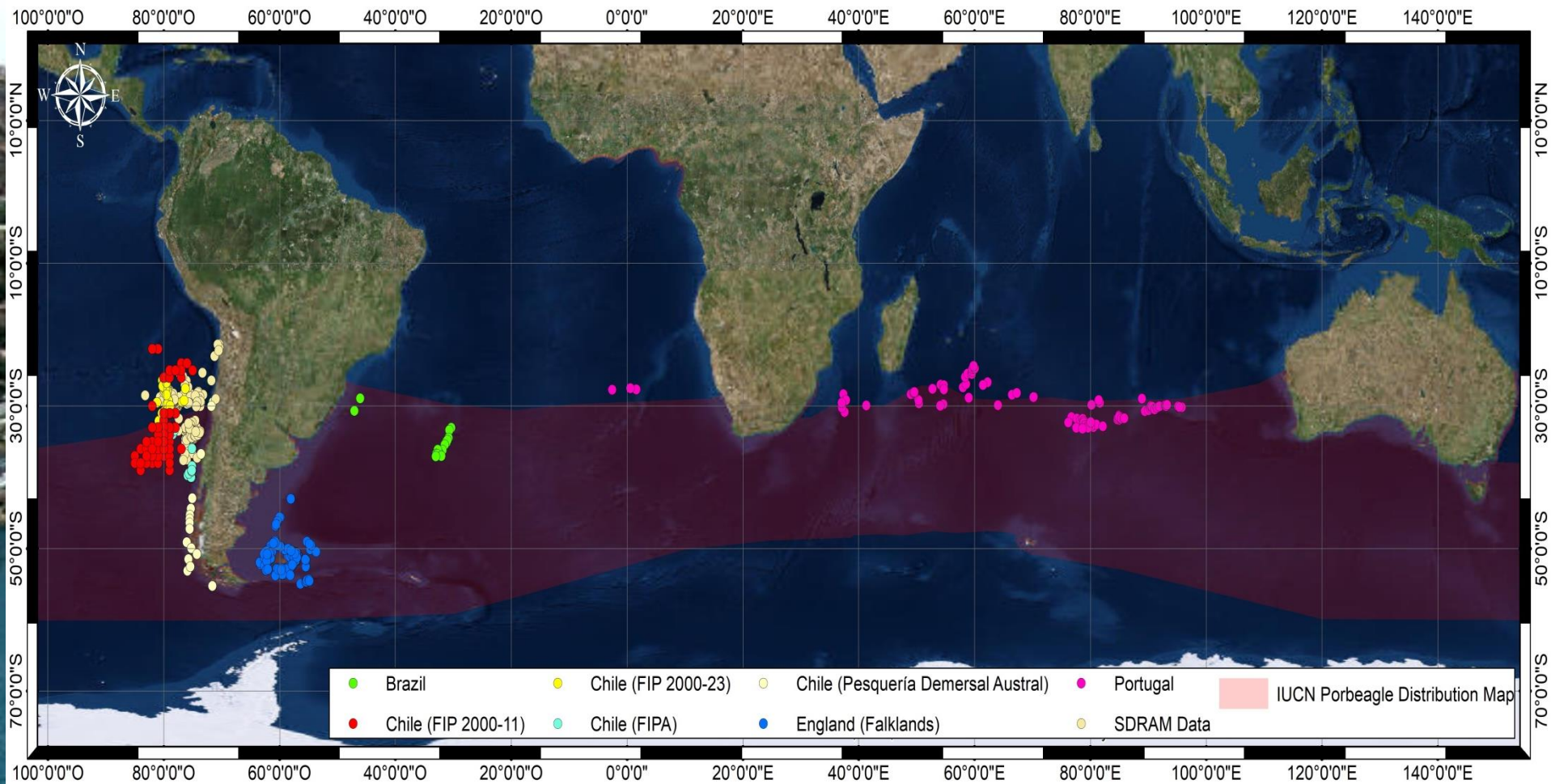




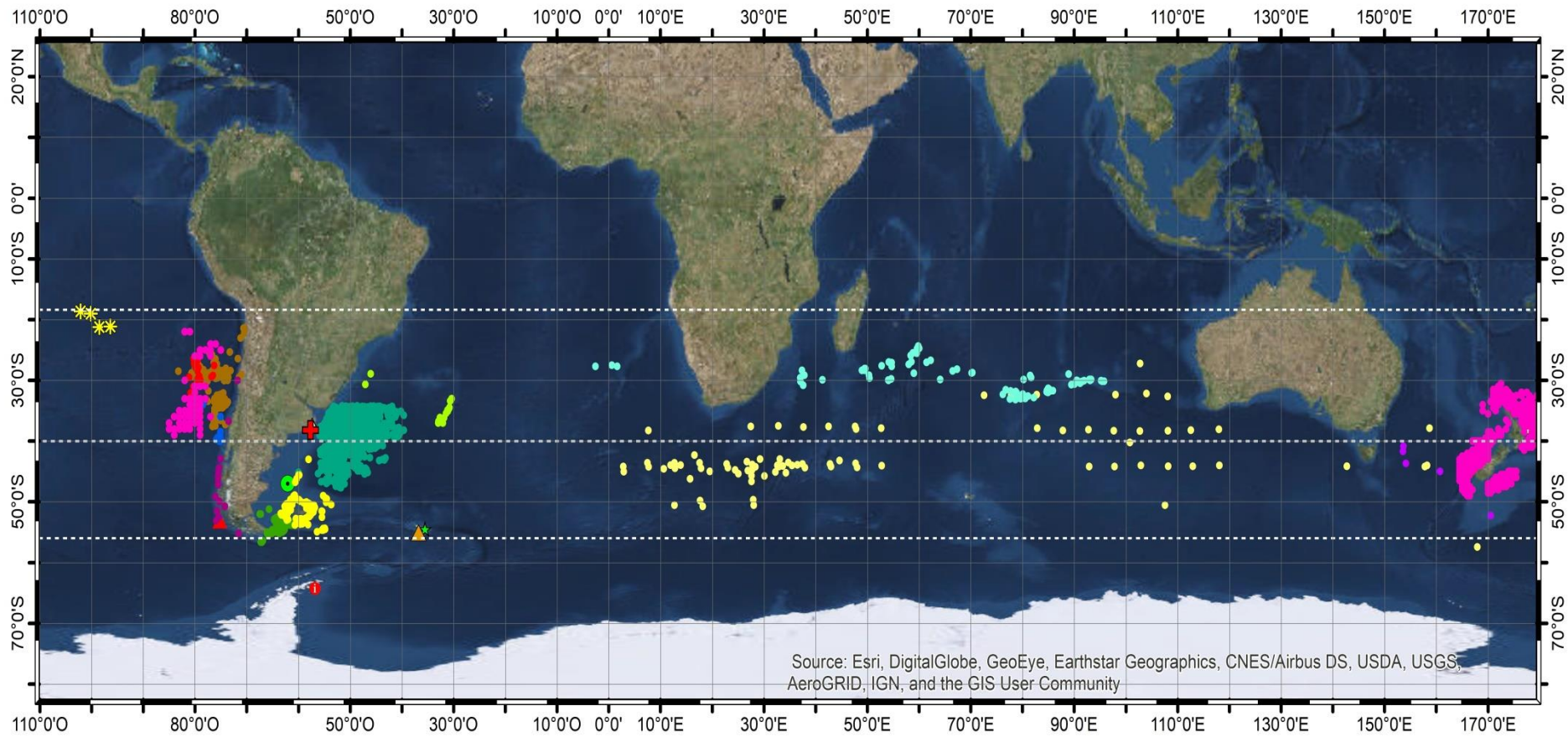




# New data







**BASE DE DATOS**

- Brazil
- Chile (FIP 2000-11)
- Chile (FIP 2000-23)

- Chile (FIPA)

- Chile (Pesquería Demersal Austral)
- England (Falklands)

- New Zealand

- SDRAM Data

**DATOS PUBLICADOS**

- Cortes Waessle 2017
- Douglas 1992
- ▲ Figueroa 1997

- Forselledo 2017
- ◆ Lucifora y Menni 1998

- Mabragaña et al 2015
- Nakaya 1971

- ▲ Reyes y Torres 2009

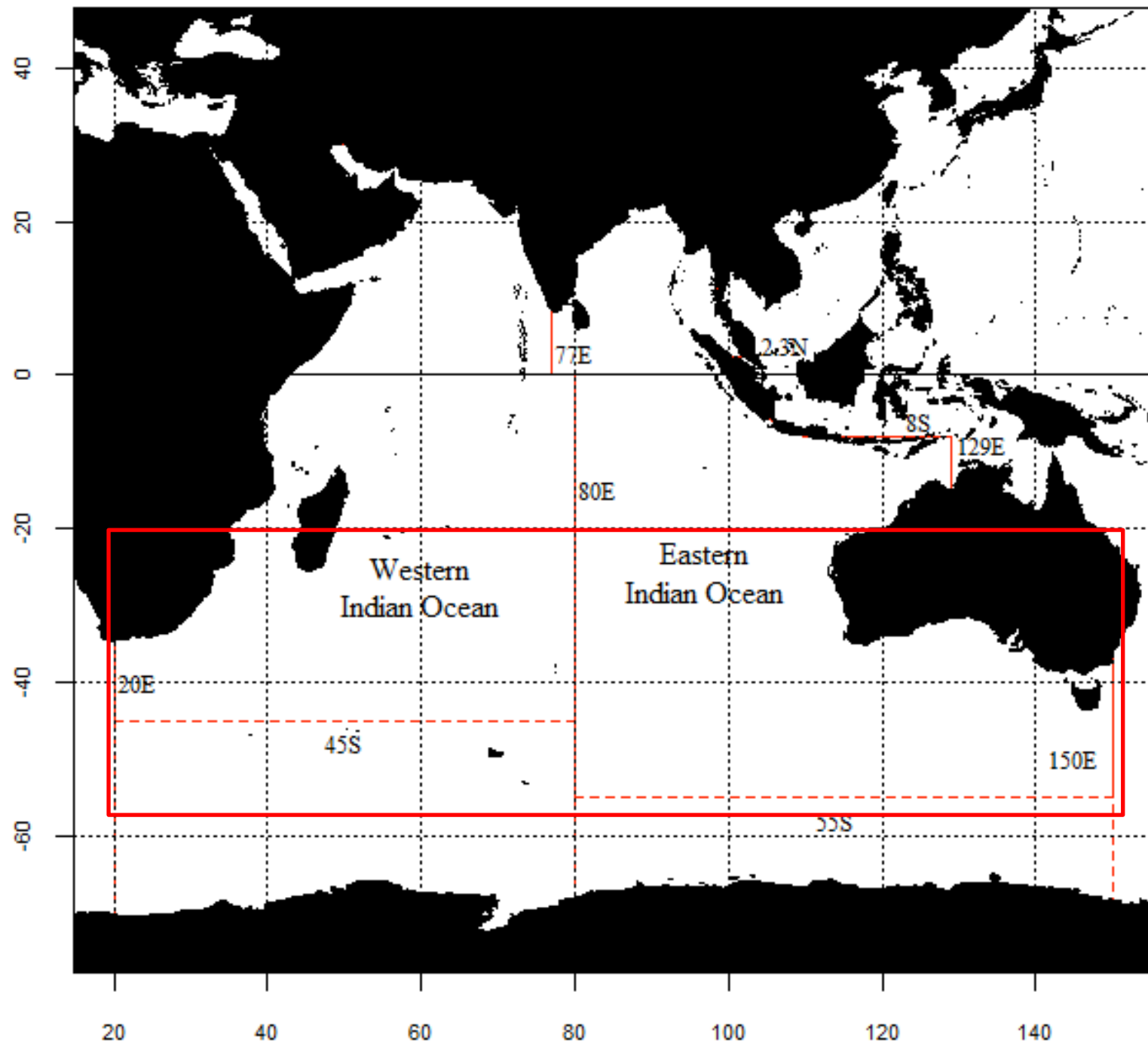
- Semba et al 2013
- Stevens et al 1983

- ★ Svetlov 1976

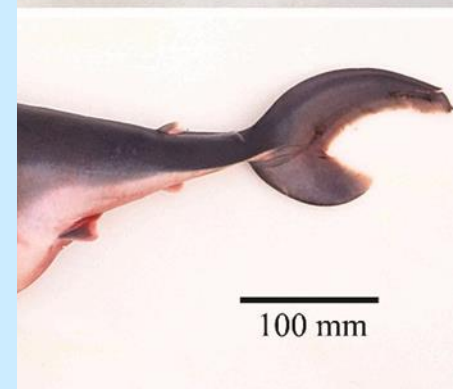
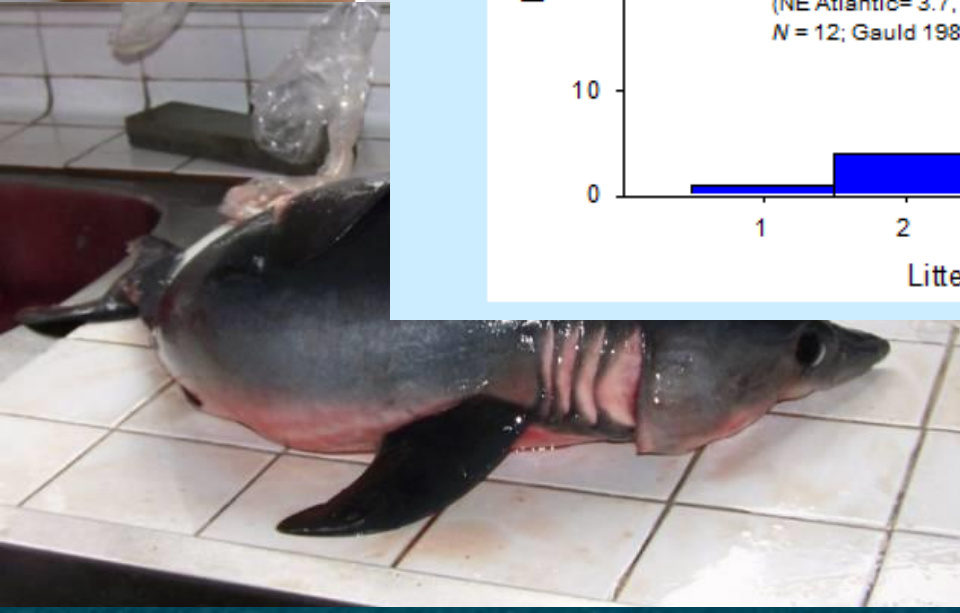
- Svetlov 1978

- ★ SAC-08 INF A(g) Portugal









100 mm

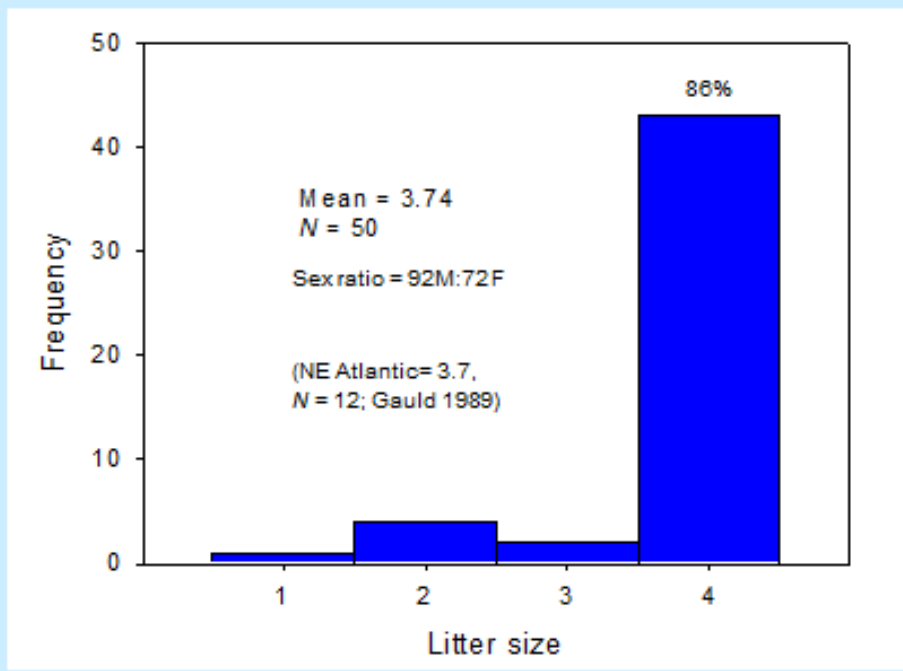
Male is oophagous



Ovary

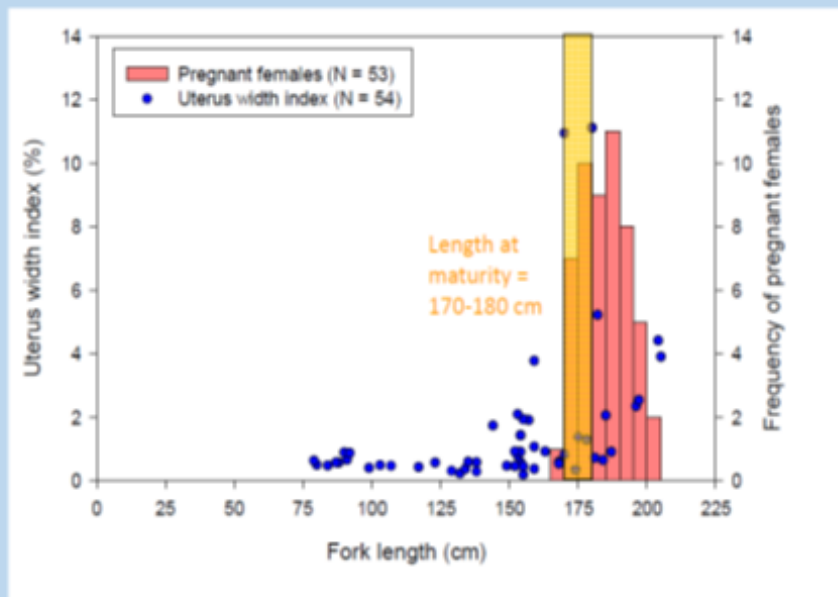
Uterus

Litter size and embryo sex ratio, SW Pacific  
(Francis & Stevens 2000, unpubl. data)



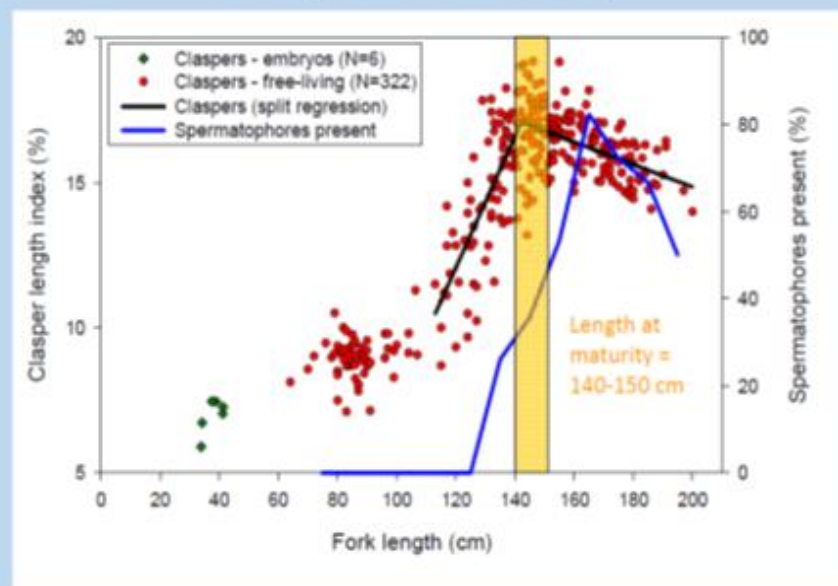


### Porbeagle shark – female maturity

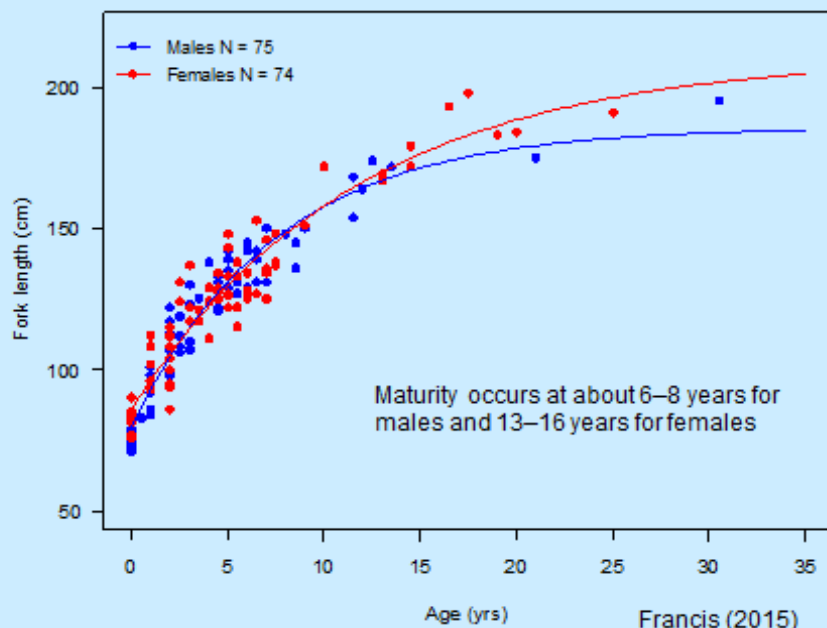


Francis & Duffy (2005)

### Porbeagle shark – male maturity

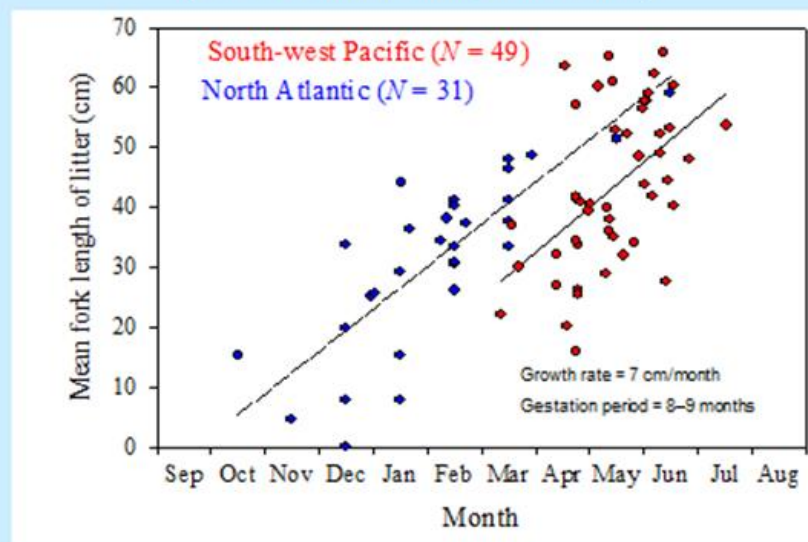


Francis & Duffy (2005)



Francis (2015)

### Embryo size, SW Pacific & N Atlantic (Francis & Stevens 2000, miscellaneous)











Western and  
Central Pacific  
Fisheries  
Commission  
SCIENTIFIC COMMITTEE  
THIRTEENTH REGULAR SESSION  
Rarotonga, Cook Islands  
9-17 August 2017

Development of Southern Hemisphere porbeagle shark stock abundance indicators using Japanese commercial and survey data

WCPFC-SC13-2017/SA-IP-15

S.D. Hoyle<sup>1</sup>, Y. Semba<sup>2</sup>, M. Kai<sup>2</sup> and H. Okamoto<sup>2</sup>



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Central Pacific  
Fisheries  
Commission  
SCIENTIFIC COMMITTEE  
THIRTEENTH REGULAR SESSION  
Rarotonga, Cook Islands  
9-17 August 2017

Standardized CPUE of porbeagle shark (*Lamna nasus*) caught by the Uruguayan pelagic longline fleet in the Southwestern Atlantic Ocean (1982-2012)

WCPFC-SC13-2017/SA-IP-18

R. Forselledo<sup>1</sup>, F. Mas<sup>1</sup>, A. Domingo<sup>1</sup> and S.D. Hoyle<sup>2</sup>



Western and  
Central Pacific  
Fisheries  
Commission  
SCIENTIFIC COMMITTEE  
THIRTEENTH REGULAR SESSION  
Rarotonga, Cook Islands  
9-17 August 2017

Aspects of porbeagle shark bycatch in the Argentinean surimi fleet operating in the Southwestern Atlantic Ocean (50-57°S) during 2006-2014

WCPFC-SC13-2017/SA-IP-14

F. Cortés<sup>1</sup>, J.A. Waessel<sup>1</sup>, A.M. Massa<sup>1</sup> and S.D. Hoyle<sup>2</sup>



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9-17 August 2017

Updated abundance indicators for New Zealand blue, porbeagle and shortfin mako sharks

WCPFC-SC13-2017/SA-IP-13

M.P. Francis and K. Large<sup>1</sup>

# Southern Hemisphere porbeagle shark stock status assessment

Prepared for Western and Central Pacific Fisheries Commission

S.D. Hoyle<sup>1</sup>, C.T.T. Edwards<sup>2</sup>, M.-J. Roux<sup>2</sup>, S.C. Clarke<sup>3</sup>, M.P. Francis<sup>2</sup>

<sup>1</sup> National Institute of Water and Atmospheric Research, P.O. Box 893, Nelson, New Zealand

<sup>2</sup> National Institute of Water and Atmospheric Research, Private Bag 14901, Wellington, New Zealand

<sup>3</sup> ABNJ (Common Oceans) Tuna Project, Western and Central Pacific Fisheries Commission, Pohnpei, Federated States of Micronesia, 96941

Final Report

November 2017

We limited our analyses to the region south of 30 °S which provided most of the available data, although the porbeagle shark's range extends slightly north of this latitude. Porbeagle sharks are taken in fisheries at least as far south as 56 °S. Southern Hemisphere population structure is not well understood, and we considered it unlikely that the population comprises a single well-mixed stock for management purposes. We subdivided the spatial domain of the assessment into five subpopulations or regions by longitude: 1) Western Atlantic Ocean; 2) Eastern Atlantic/Western Indian Ocean; 3) Eastern Indian Ocean; 4) Western Pacific Ocean; and 5) Eastern Pacific Ocean.



Western and  
Central Pacific  
Fisheries  
Commission  
SCIENTIFIC COMMITTEE  
THIRTEENTH REGULAR SESSION  
Rarotonga, Cook Islands  
9-17 August 2017

Population indicators for porbeagle sharks in the Chilean swordfish fishery

WCPFC-SC13-2017/SA-IP-17

S.D. Hoyle<sup>1</sup>, J.C. Quiroz<sup>2</sup>, P. Zarate<sup>2</sup>, D. Devia<sup>2</sup> and J. Azocar<sup>2</sup>



The Commission for the Conservation and Management of  
Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

Thirteenth Regular Session of the Scientific Committee

Rarotonga, Cook Islands  
9 - 17 August 2017

SUMMARY REPORT

4.3.7 Porbeagle shark (*Lamna nasus*)

a. Stock status and trends

1. SC13 noted that although the stock status of the species is currently unknown the results of the assessment show that fishing mortality on the Southern Hemisphere stock is very low, and that it decreases eastward from the waters off South Africa to the waters off New Zealand. In the assessment area (Eastern Atlantic to Western Pacific Ocean) in the last decade (2005 to 2014), median  $F$  values ranged from 0.0008 to 0.0015 (mean 0.0010). This fishing mortality was less than 9% of the MIST based on  $r$  in all years assessed (1992-2014) and fell to half that level in more recent years (Figure POR-1), with at most a 3% probability of exceeding the MIST based on  $r$  in 2010-2014 (Figure POR-2). For the same scenarios, fishing mortality is less than 12% of the MIST based on  $0.75r$  and less than 18% of the MIST based on  $0.5r$ .
2. These scenarios are based on 100% capture mortality, and assuming that some porbeagles survive their encounter with the fishery would reduce the estimated risk levels even further.

b. Management advice and implications

3. SC13 advises WCPFC14 that although the stock status of the species is currently unknown there is a very low risk that the Southern Hemisphere porbeagle shark is subject to overfishing anywhere within its range.
4. SC13 recommends that WCPFC14 request the Common Oceans (ABNJ) Tuna Project to explore options for data improvements through liaison with other regional fishery bodies managing fisheries catching Southern Hemisphere porbeagle shark.





**QUESTIONS and/or COMMENTS ?**