Longline data

1st External review of data used in stock assessments of tropical tuna in the eastern Pacific Ocean
Oct 2-6 2023

Outline

- Type of longline data

- Catch and effort data

- Computation of total catch for the assessments

- Improvement of longline data

Types of longline data

Five types of data from the longline fleets are submitted routinely by the CPCs to the IATTC in fulfillment of the obligations from several resolutions:

1) the list of the vessels predicted to operate in the EPO,

2) catches without spatial information (aggregated by year)

3) catch and effort data with spatial information aggregated at the 5° latitude by 5° longitude –month by species,

4) size (length and/or weight) data with spatial and temporal information aggregated at different scales,

5) observer data with spatial and information at fine scale resolution ('operational level data').

Other data sets are available for special projects with national scientists using other instruments such as Memorandums of Understanding.

IATTC stock assessments: data sources (industrial fisheries)

Fishery	Catches	Indices of abundance	Size composition
Purse-seine	***Staff collection** and member submission* Best scientific estimate: Unloading, port-sampling, observers, logbooks	***Staff collection** and member submission* **Observer data (100% coverage large vessels)** **Echosounder buoy data (all PS) – index**	***Staff collection*** Port sampling Observer data (small, medium, large)
Longline	*Member submission* **Resolution C-03-05:** Task I (total catches) and Task II data (with spatial information)	*Member submission* **Resolution C-03-05:** Task II data, **MoUs:** aggregated, with hooks-between-floats information Observer data (**5% coverage**) (not enough to estimate the fleet catches) **Opportunity: logbook data already available**	*Member submission* **Resolution C-03-05:** Observer data **(5% coverage)**

CIAT IATTC

Annual submission

IATTC Resolution C-03-05

IATTC resolution C-03-05 on Data Provision established that "the data be provided, by species and fishing gear, where practical, via vessel logbooks and unloading records, and otherwise in aggregated form as in the following table, with Level 3 catch and effort data as a minimum requirement, and, whenever possible, Levels 2 and 1 catch and effort data and length-frequency data."

Category	Level	Resolution	Data
Catch and effort	1	Set-by-set, logbook data with information on **gear configuration and target species**	**Total catch in numbers, and weight if available; fishing effort**
	2	1°x1°–month, with information on **gear configuration and target species**	
	3	5°x5°–month, with information on **gear configuration and target species**	
Length frequency	1	Set position, start or end of set	**Length or weight of individual fish**
	2	Grid position, best possible spatial-temporal resolution of area of capture	

The following exceptions shall apply to the immediate entry into force of this resolution:

a. For vessels of less than 24 meters in length overall, the requirements of this resolution shall not enter into force until 1 January 2007. However, each member shall make its best efforts to provide as much data as possible for these vessels.

b. Catch data from artisanal vessels may be reported as total annual catches, without data on fishing effort.

c. Catch data from recreational fishing vessels may be reported as total annual catches, without data on fishing effort.

Monthly submission

MEASURES FOR THE LONGLINE FISHERY

15. China, Japan, Korea, United States, and Chinese Taipei undertake to ensure that the total annual catches of bigeye tuna by their longline vessels in the Convention Area during 2021 do not exceed 55,131 metric tons, distributed at the following levels:

| Country	Metric tons
China	2,507
Japan	32,372
Korea	11,947
Chinese Taipei	7,555
United States	750

16. All other CPCs undertake to ensure that the total annual catches of bigeye tuna by their longline vessels in the Convention Area do not exceed the greater of 500 metric tons or their respective catches of bigeye tuna in 2001[2,3]. CPCs whose annual catches have exceeded 500 metric tons shall provide monthly catch reports to the Director.

IATTC Resolution C-20-06

Longline catches aggregated by year

Fleets that **also report data on 5 by 5 by month resolution** for tropical tunas
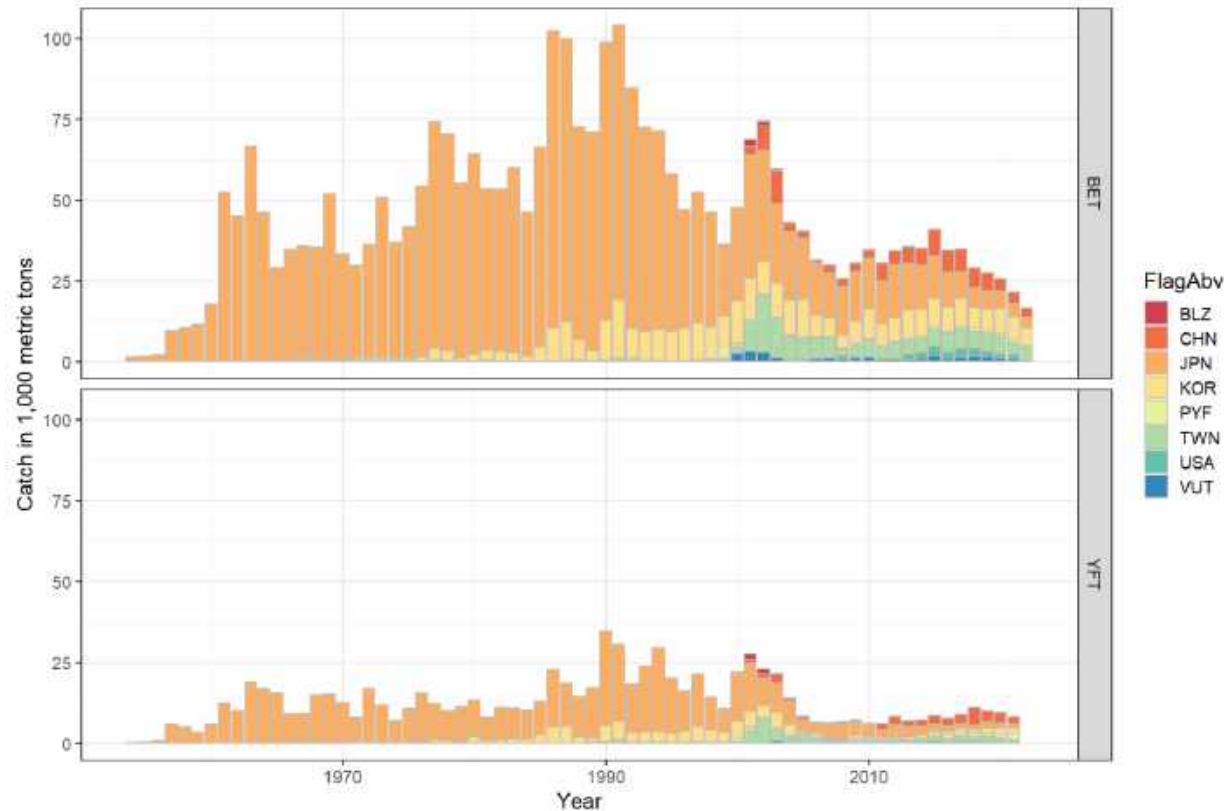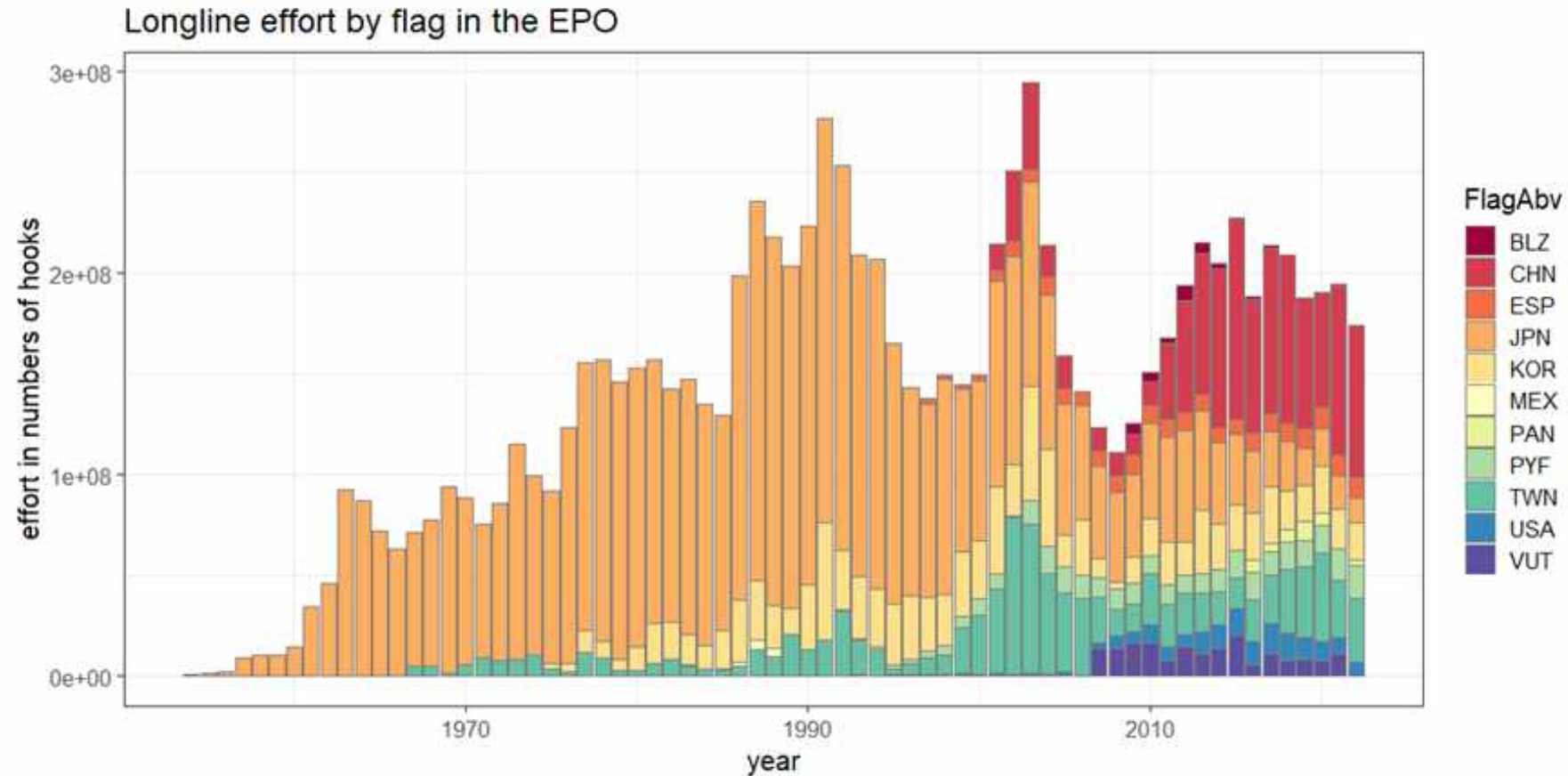
Fleets that **only report aggregated** data for tropical tunas (note the difference in scale)
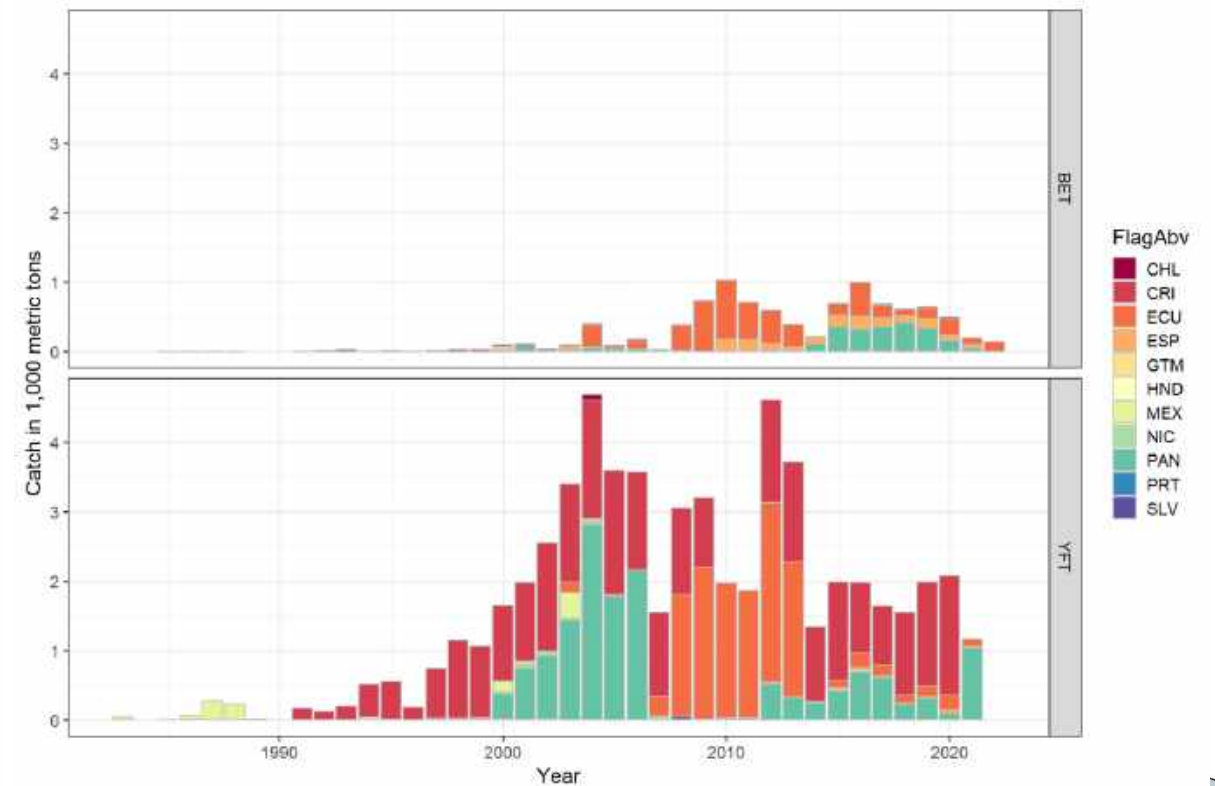
Effort: fleets that report data with spatial information
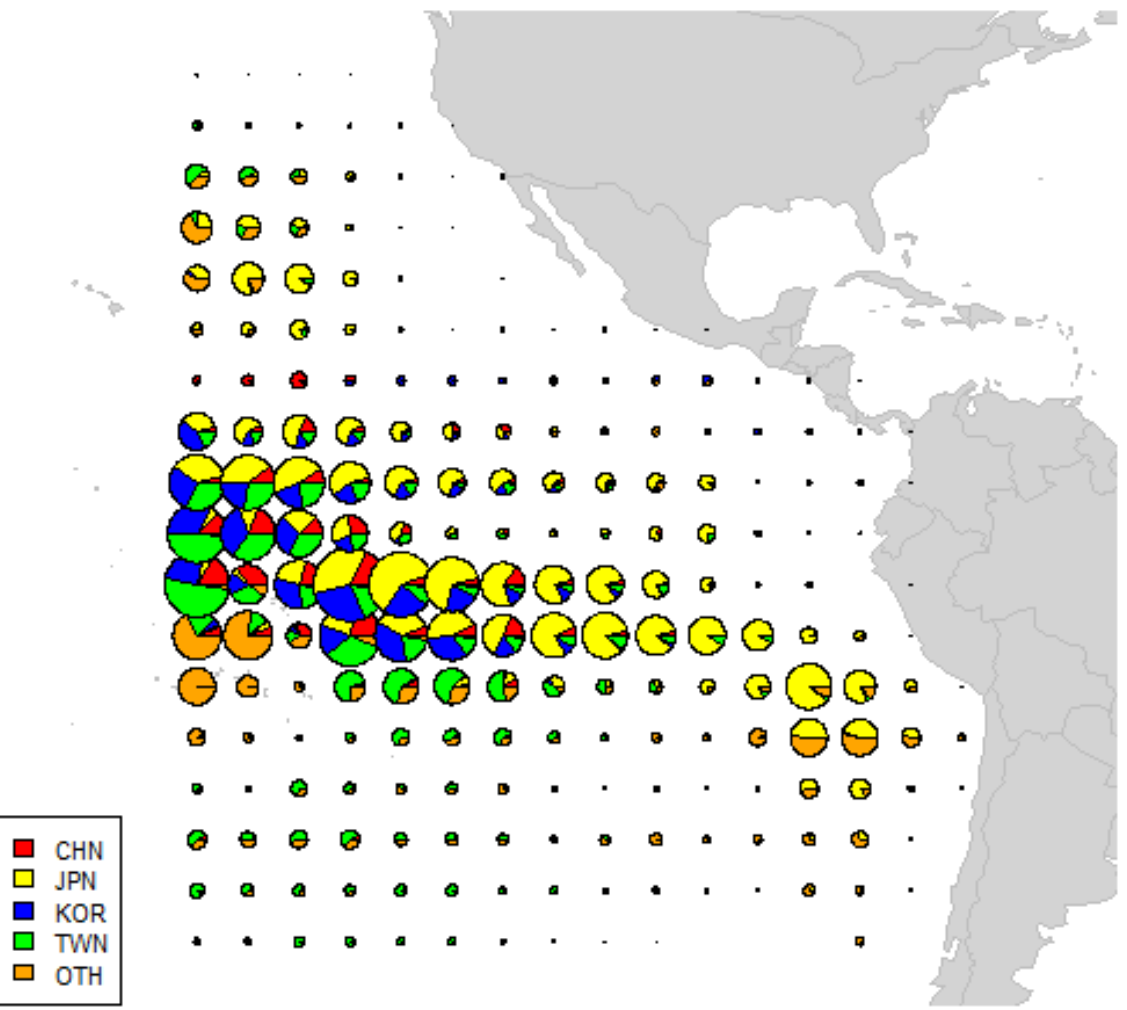
Data on 5 by 5 by month resolution

Longline effort by flag in the EPO

Coverage: fleets that report data with spatial information

The spatial coverage of each fleet by year can be assessed by the number of 5 by 5 cells where the fleet operate. Japan, Korea and Chinese Taipei have all been contracting their spatial distribution in t recent years, while China has expanded.
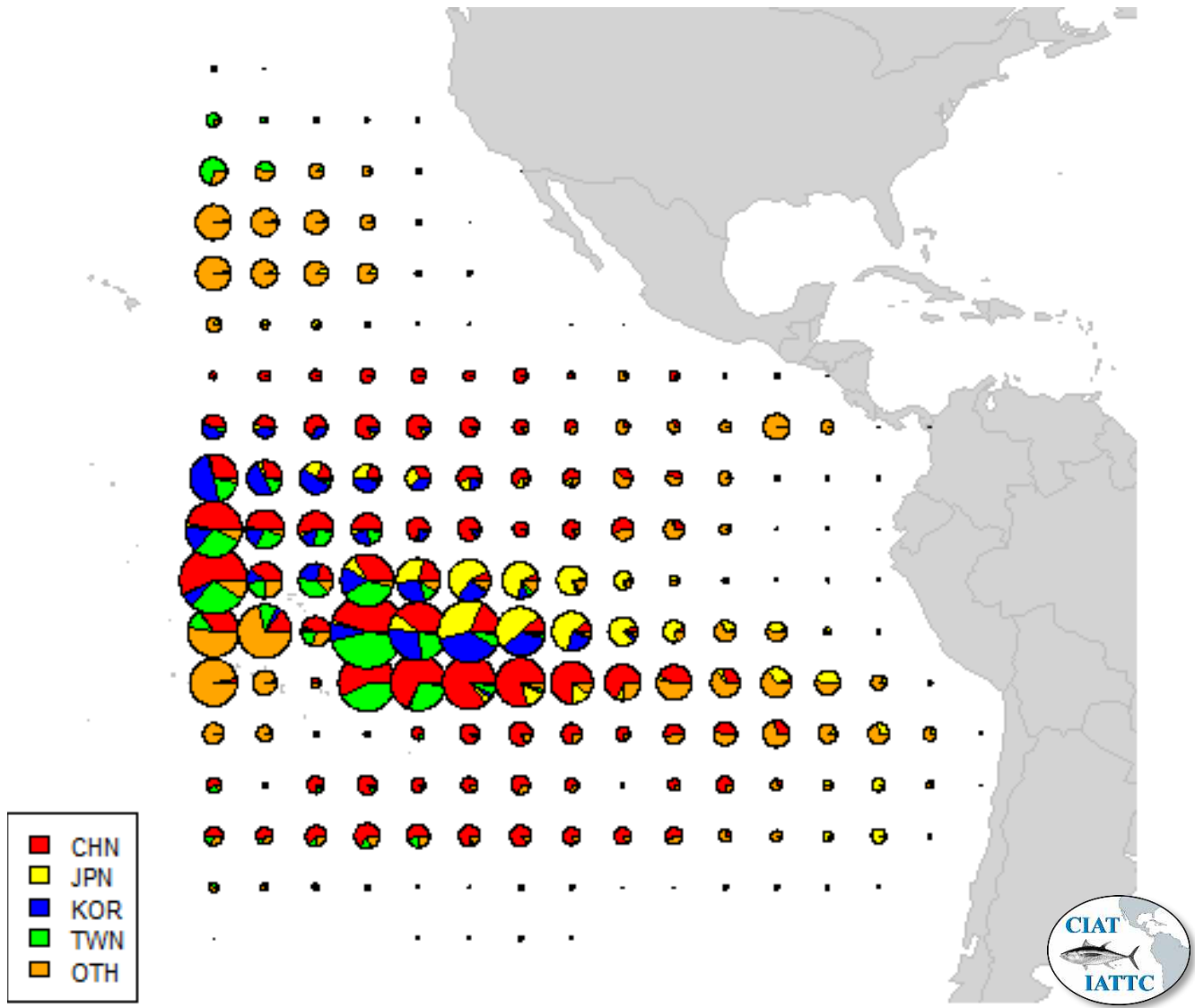
As ratio to the maximum number of cells ever occupied by a fleet in the EPO
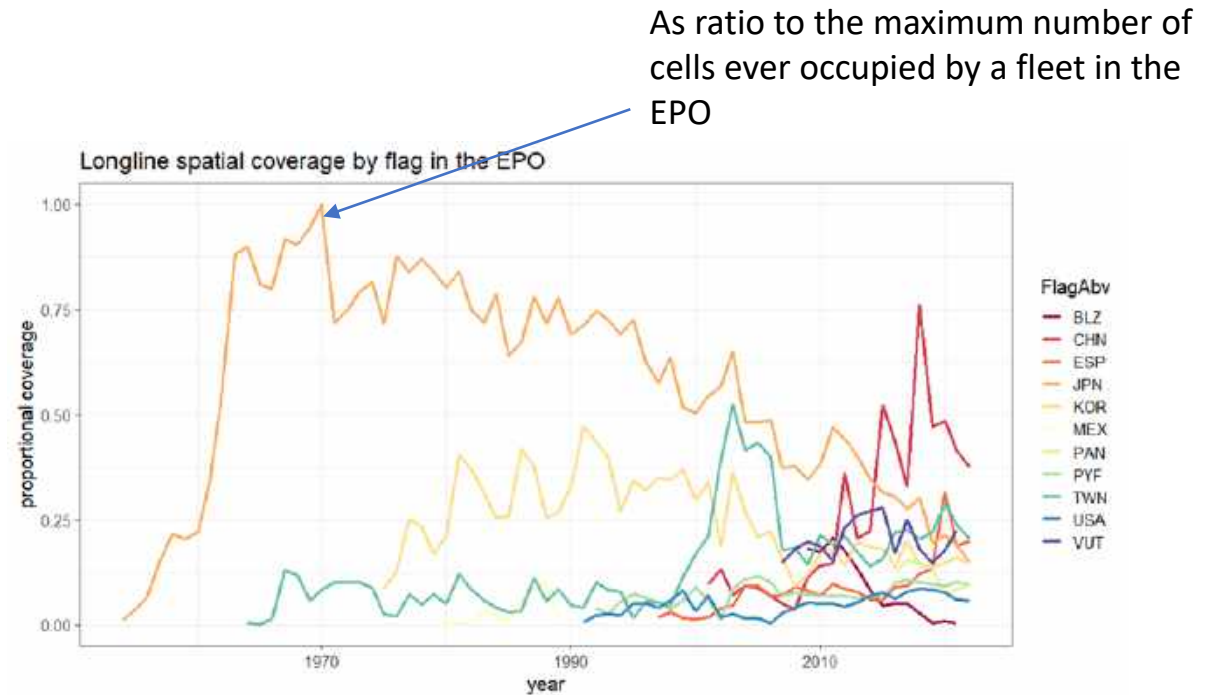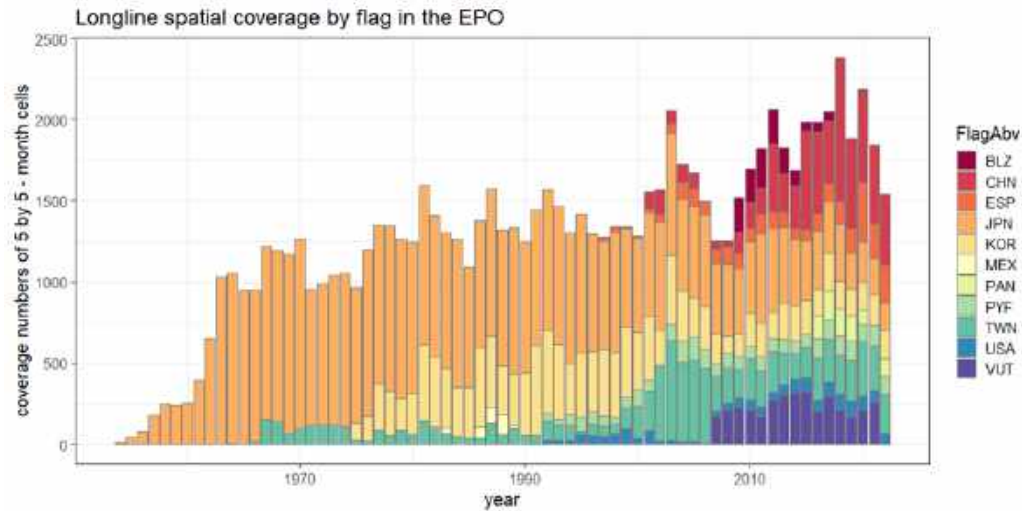
Distribution of longline effort

2000- 2010

2015- 2020

CHN
JPN
KOR
TWN
OTH

CHN
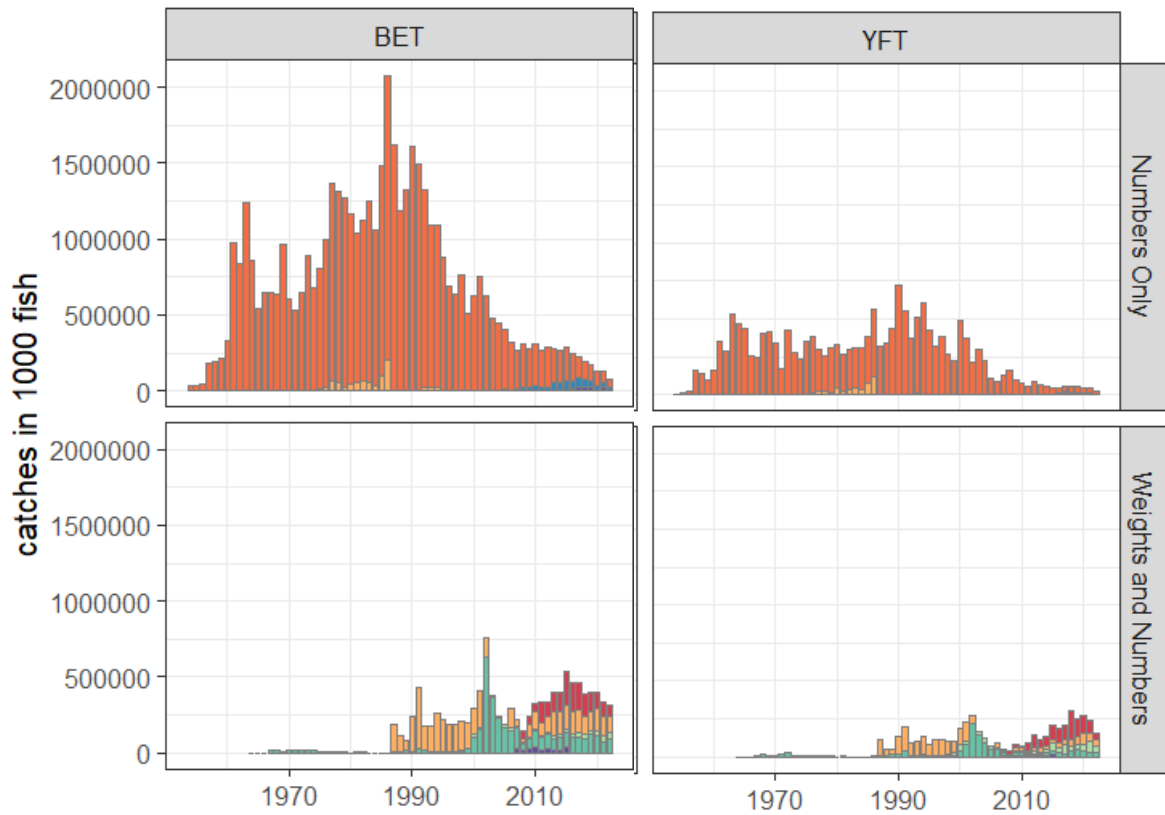JPN
KOR
TWN
OTH

CIAT
IATTC

Unit of catches

- The catches are **reported in numbers, in weight or both.**
- JPN and USA only report the catches in numbers, PYF and TWN always report both weight and numbers
- Other flags report either both quantities or only weight in some years.
- When the catches are reported in weight it is **not clear if the reported weight is** whole weight or processed weight and what type of processing was done.
- The comparisons of the catches among the flags in complicated by the mixture of units, as assumptions are needed.
- For the stock assessments whole weight is assumed.
- In the assessment longline fisheries are defined for the two types of units
- When a flag report both, numbers are used in the assessment

Proportion of catch records of tropical tunas (BET, YFT, SKJ) for the EPO in the IATTC longline data base by type of unit
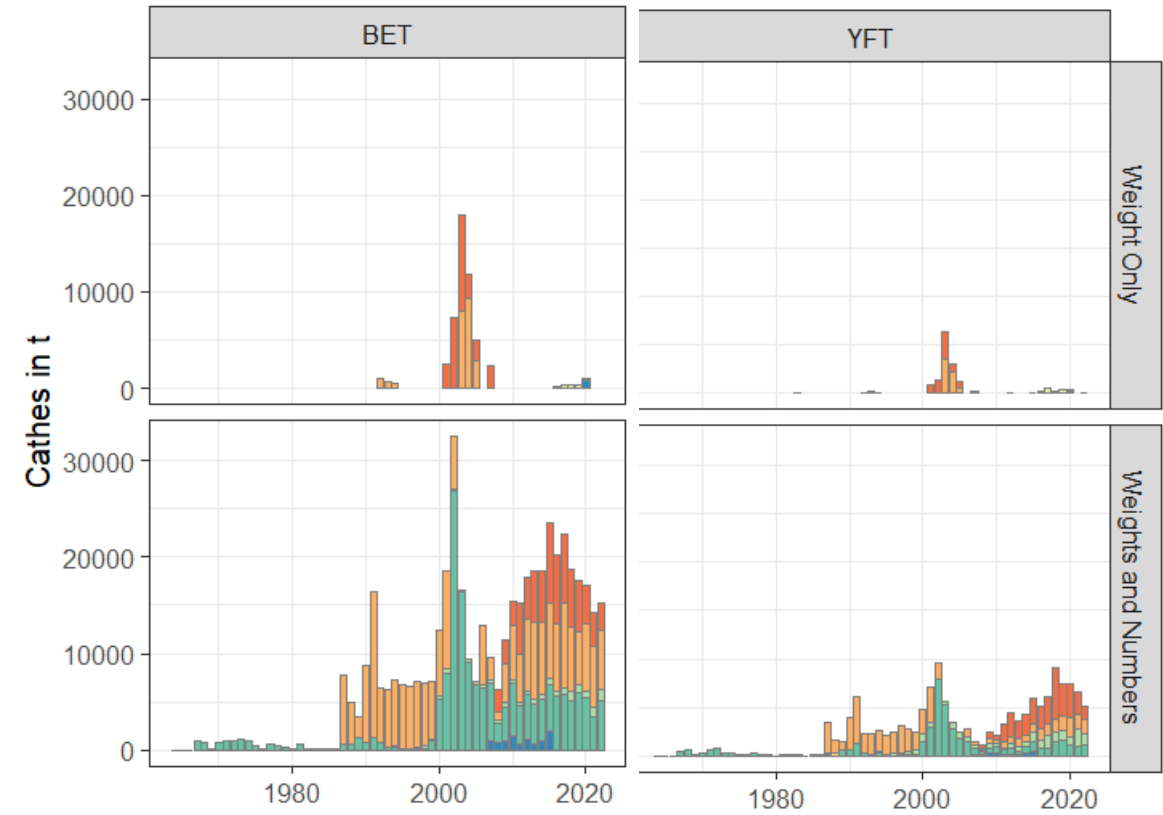(each record is a combination of a 5o latitude by 5o longitude, by month and year for each flag)

	Numbers	Weight	Both
BLZ	0%	0%	100%
CHN	0%	11%	89%
JPN	100%	0%	0%
KOR	25%	7%	67%
MEX	19%	4%	76%
PAN	0%	93%	7%
PYF	0%	0%	100%
TWN	0%	0%	100%
USA	100%	0%	0%
VUT	33%	6%	61%

Longline catches of tropical tunas with spatial information by reporting unit

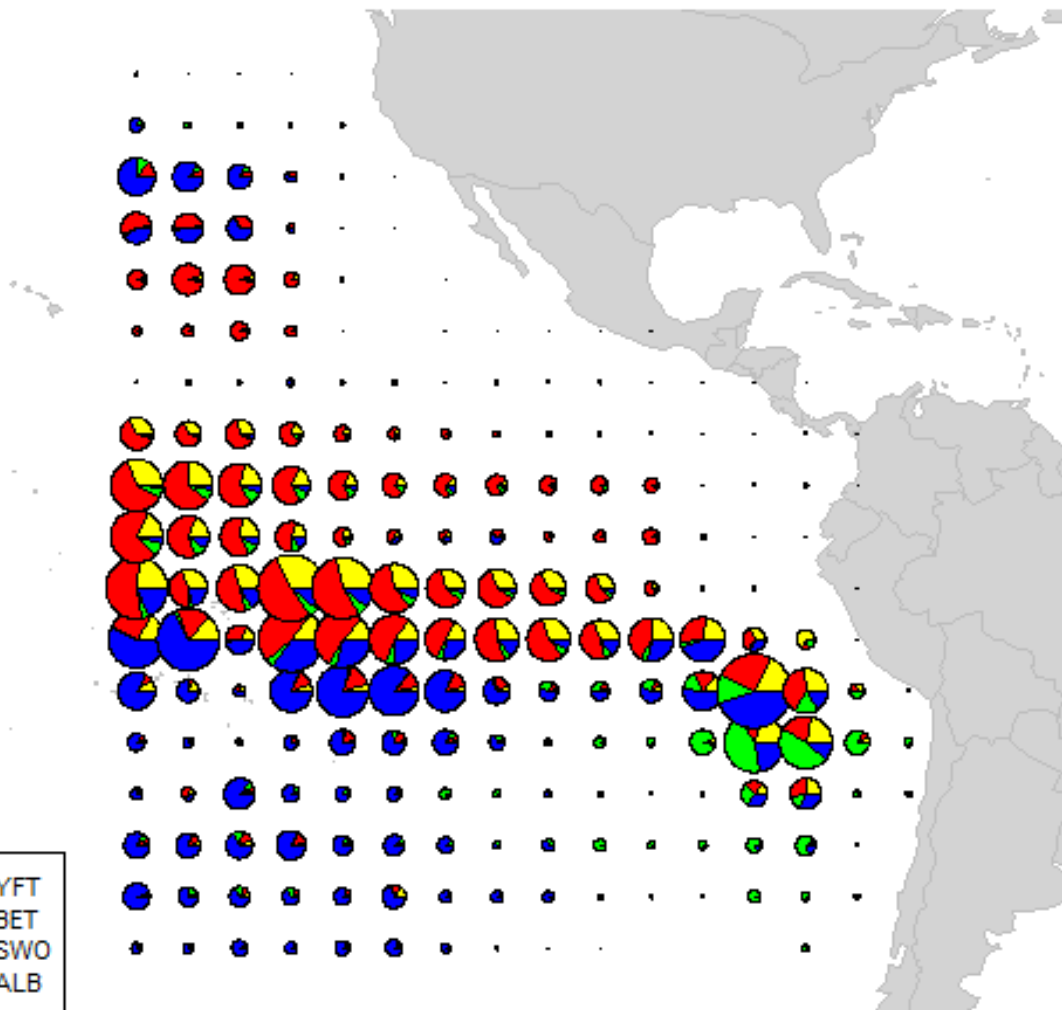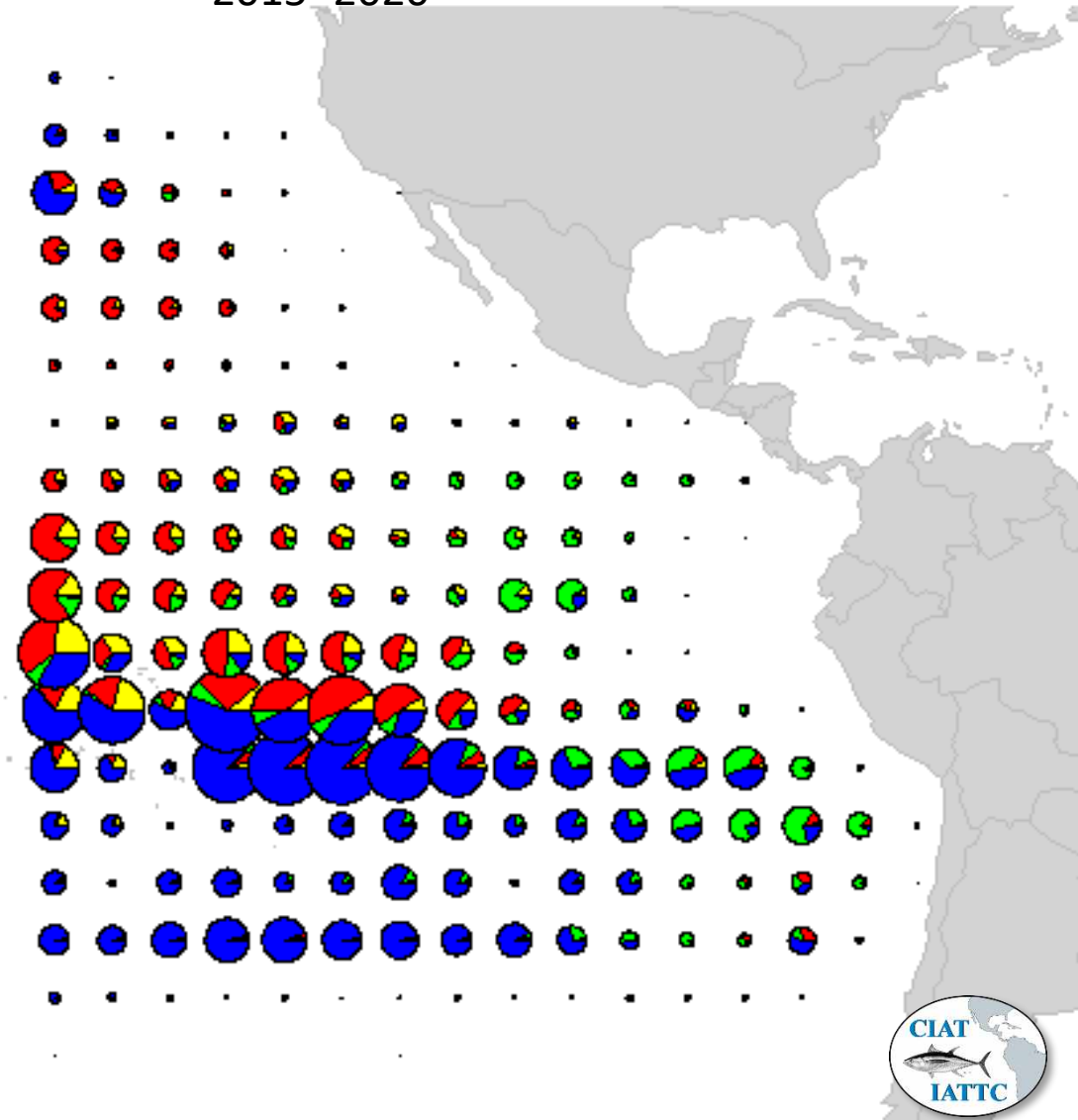# Distribution of longline catches

2000- 2010

2015- 2020



YFT
BET
SWO
ALB

Longline catch estimation

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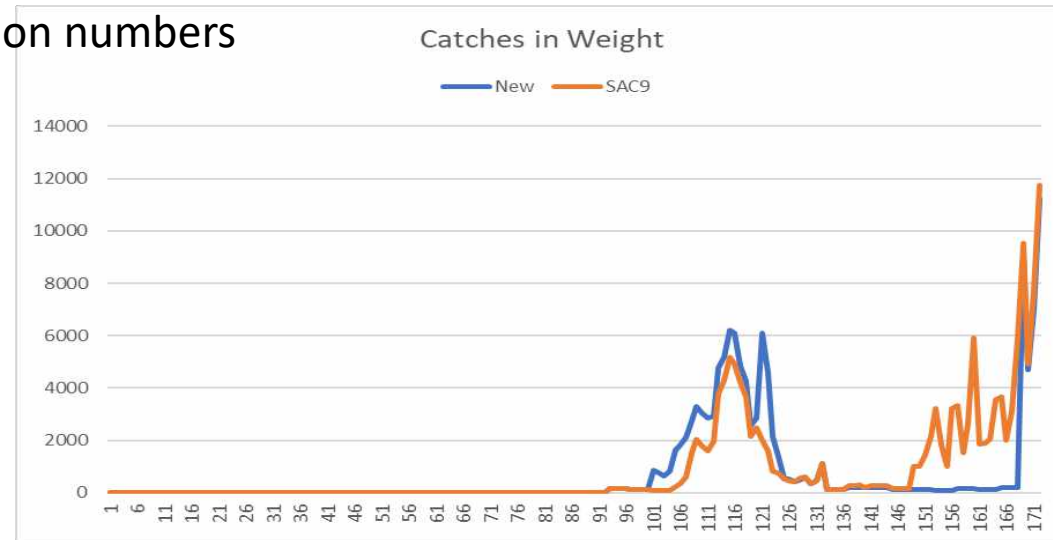**Oct 2-6 2023**

Longline catch calculation

- Algorithm in R
- Rules for:
  - Substitution
  - Allocation in space
- Catch in numbers and catch in weight (as separate fisheries)

Example for BET: catches switch fisheries as they become reported on numbers
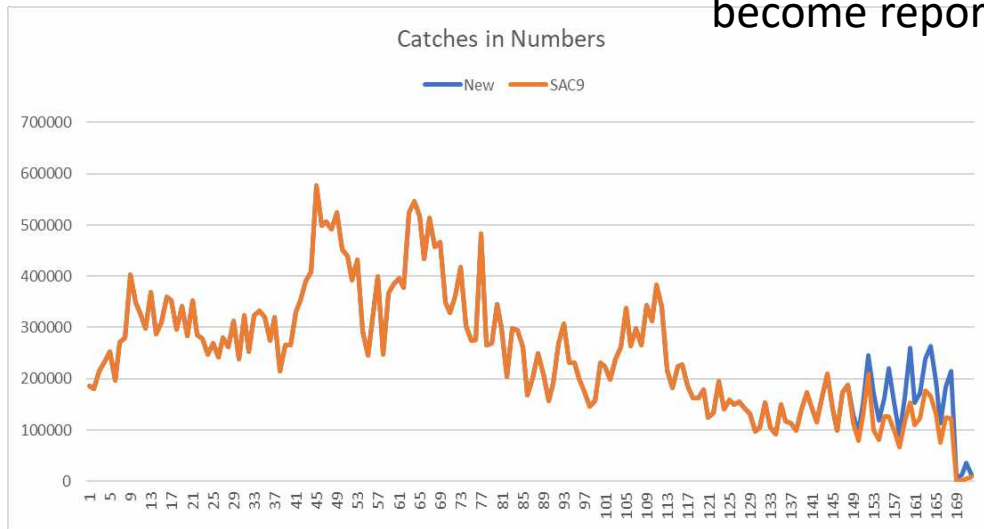

Model time step: year_quarter

Model time step: year_quarter

Indicators: total longline catches by species

Total longline catches for tropical tunas in the EPO is reported every year in the Stock status indicators for tropical tunas in the EPO (SAC-14-04).

The largest catches are from bigeye tuna, which is the main target of most of the industrial longline fleets. Skipjack tuna is rarely reported.
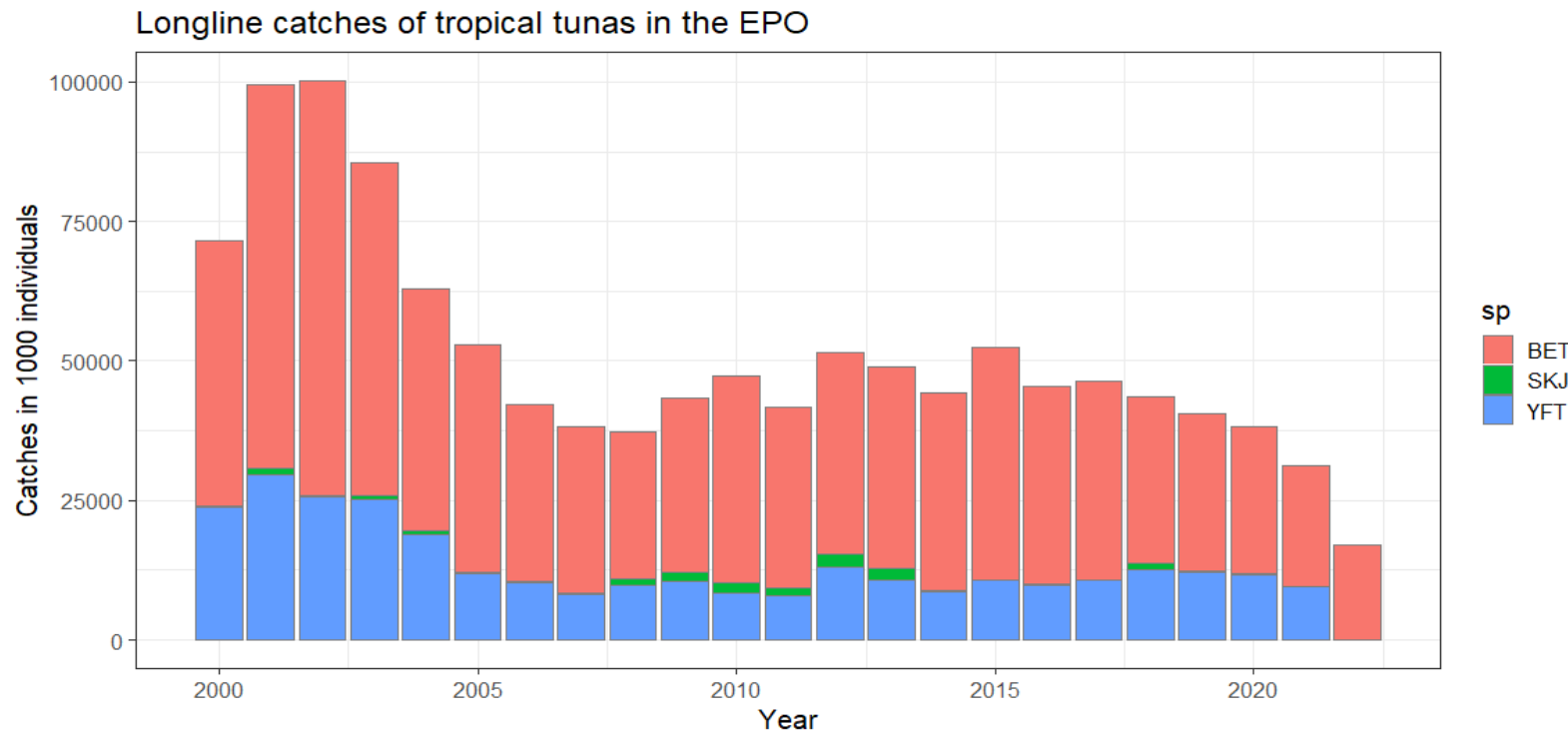
Indicators: total longline catches by species

The longline catches of tropical tunas in the EPO since the year 2000 are on avearge 73% bigeye tuna, 25% yellowfin tuna and 1.5% skipjack tuna
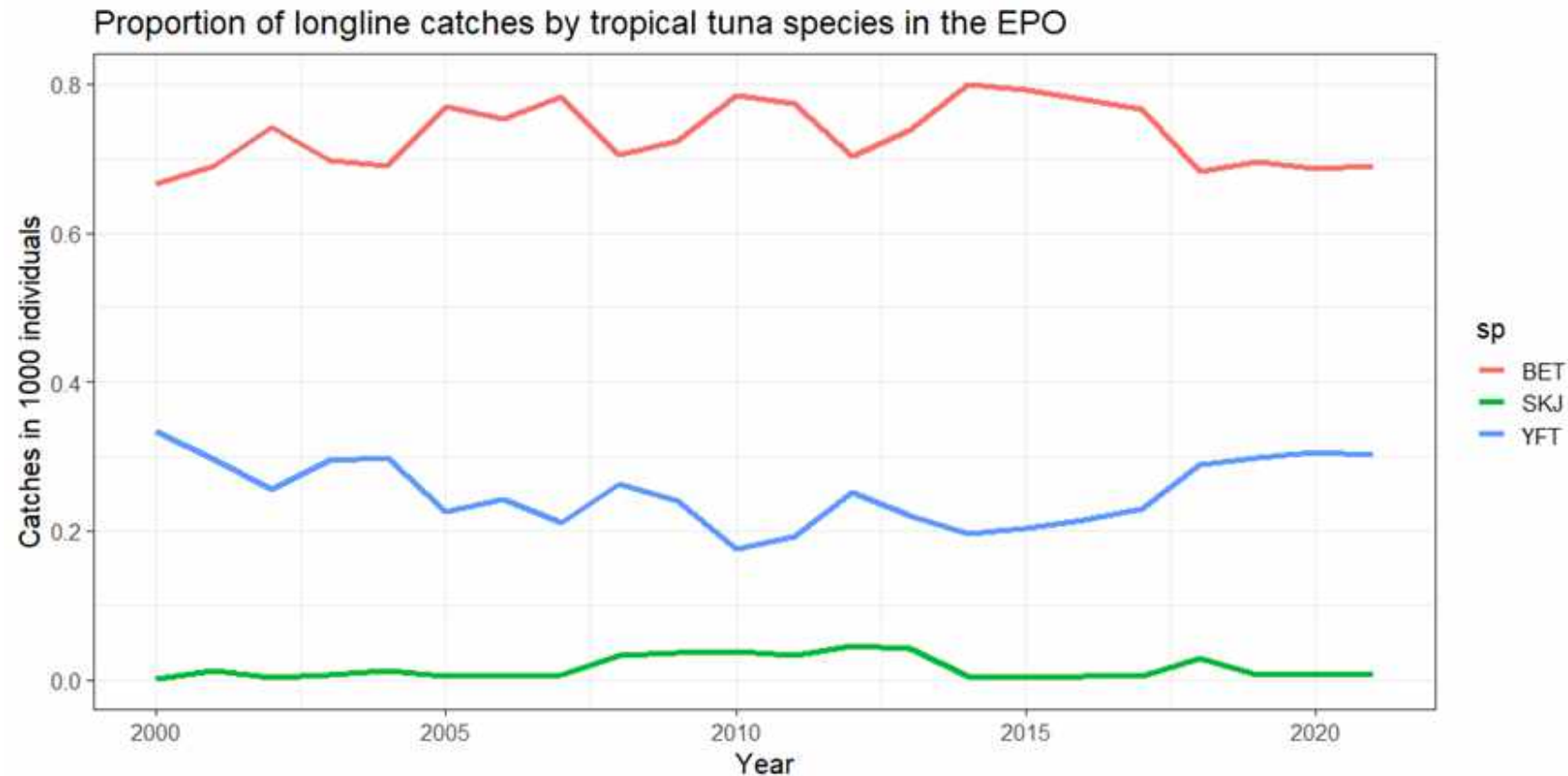
Proportion of longline catches by tropical tuna species in the EPO

How to treat the pandemic years

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Main problem

- No longline size composition from the Japanese fleet

- Japanese fleet data used to represent all the catches

Length ~ as.factor(yrqr) + as.factor(latlon) + as.factor(Flag)

Residual by year, Quarter and gender

Observer size composition