The tuna fishery in the EPO in 2023, stock status and staff recommendations for management

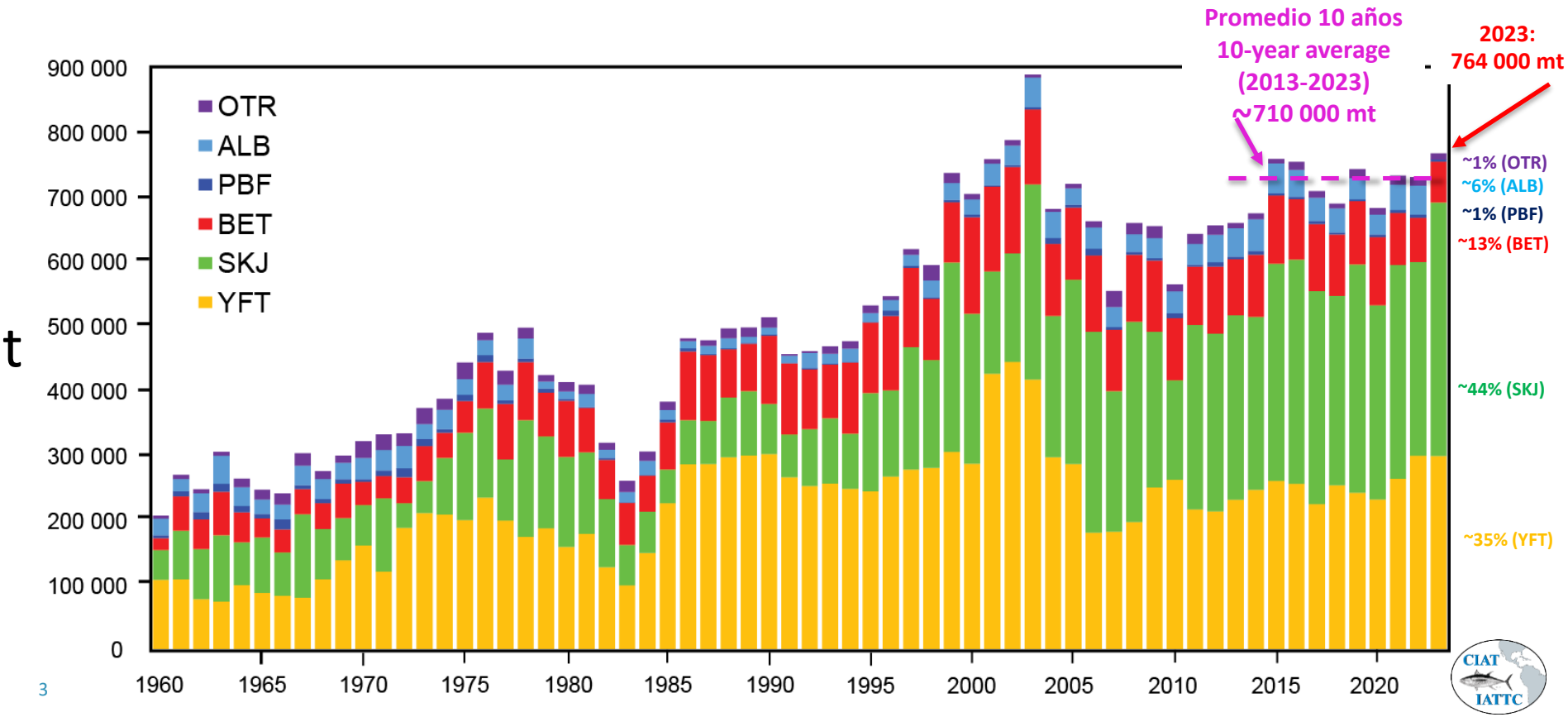
Alexandre Aires-da-Silva

WCPFC-SC20, 14-21 August 2024
Manila, Philippines

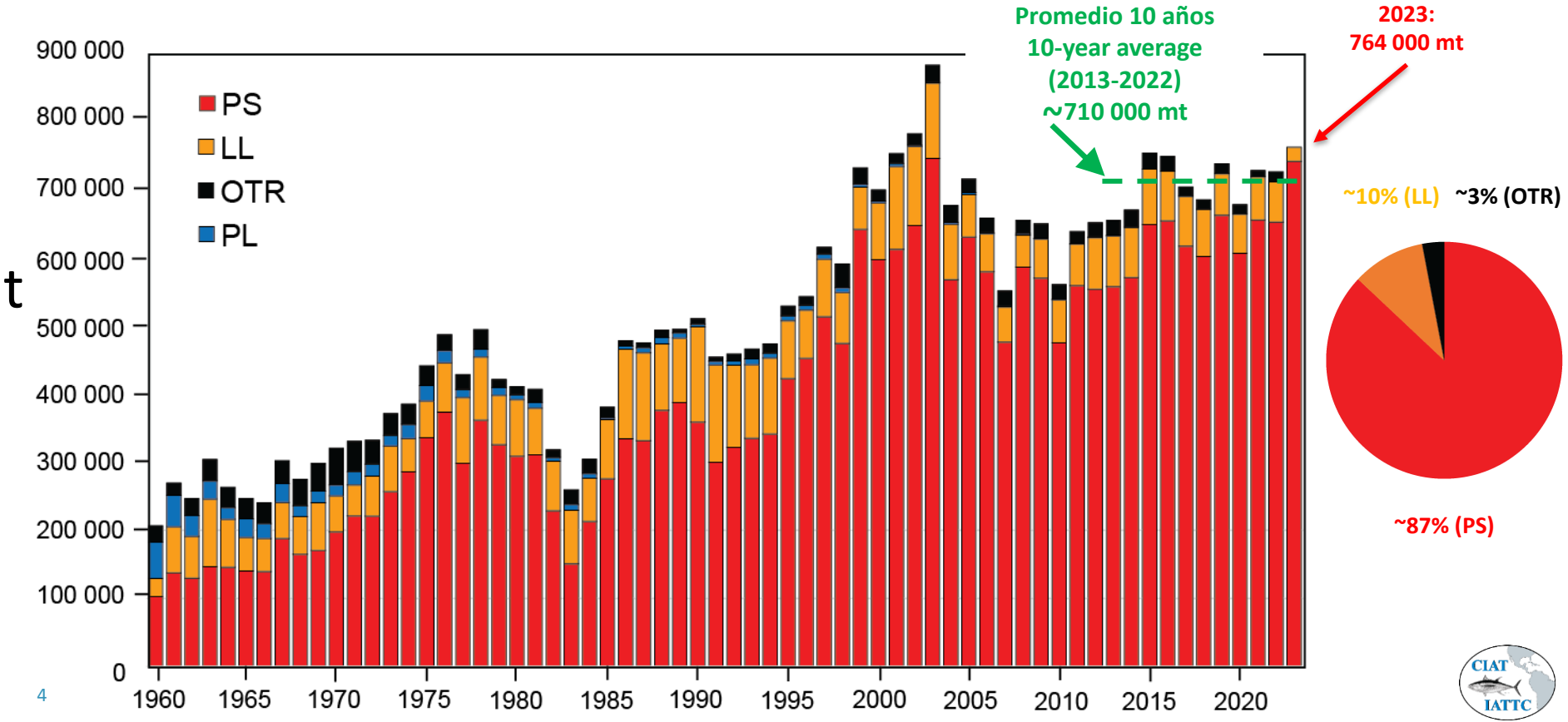
Topics

- The tuna fishery in the EPO in 2023
- Stock status and staff recommendations for management
  - Tropical tuna species (YFT, BET, SKJ)
  - Temperate tuna species (PBF, N-ALB and S-ALB)

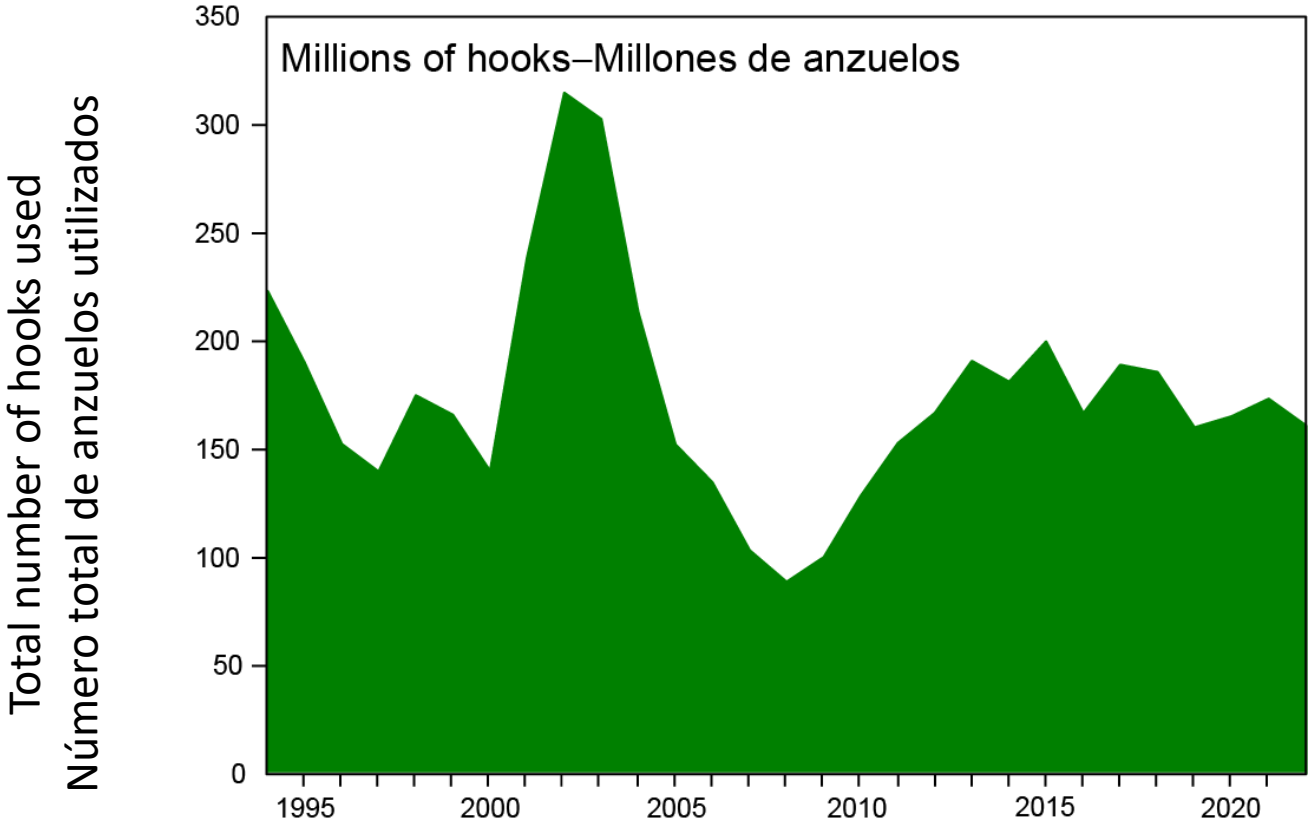
EPO retained catch – all gears



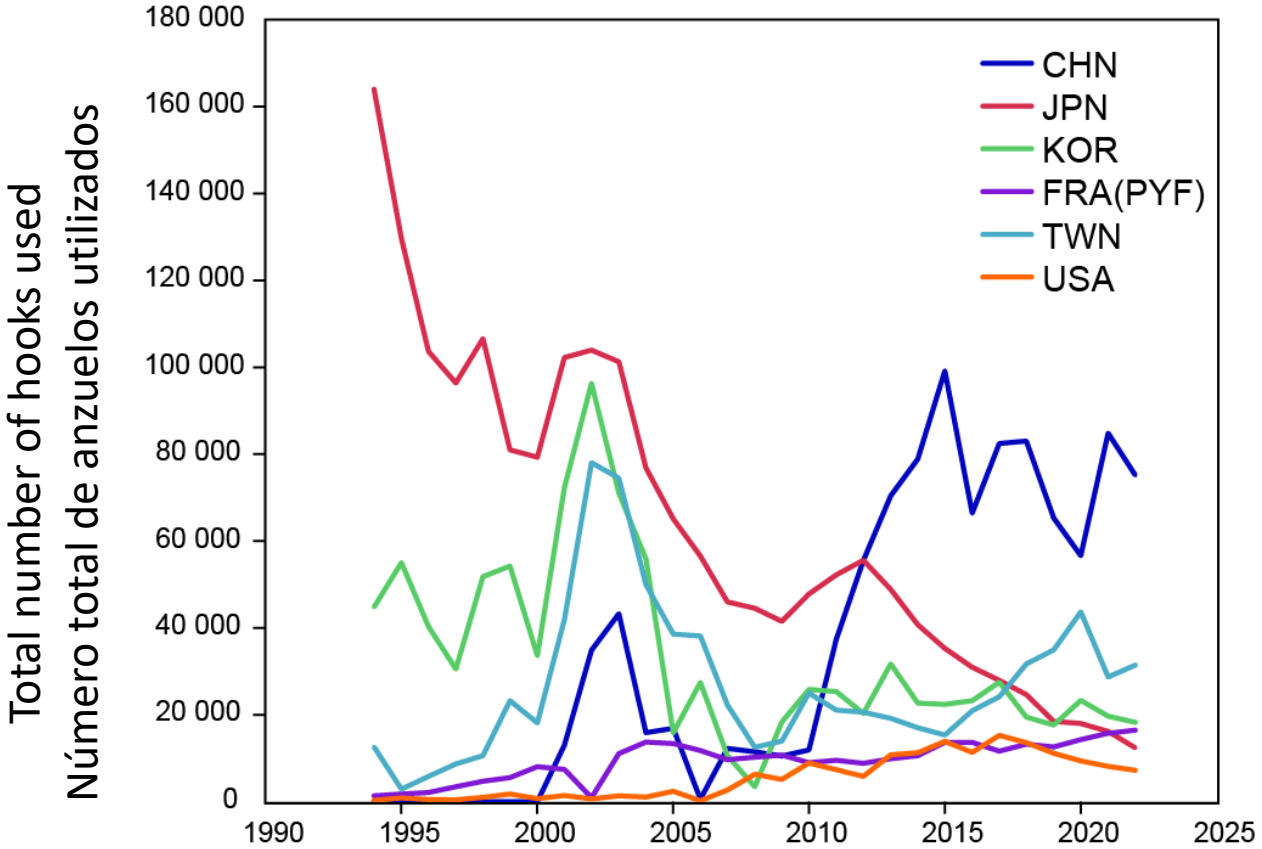
EPO retained catch – all gears



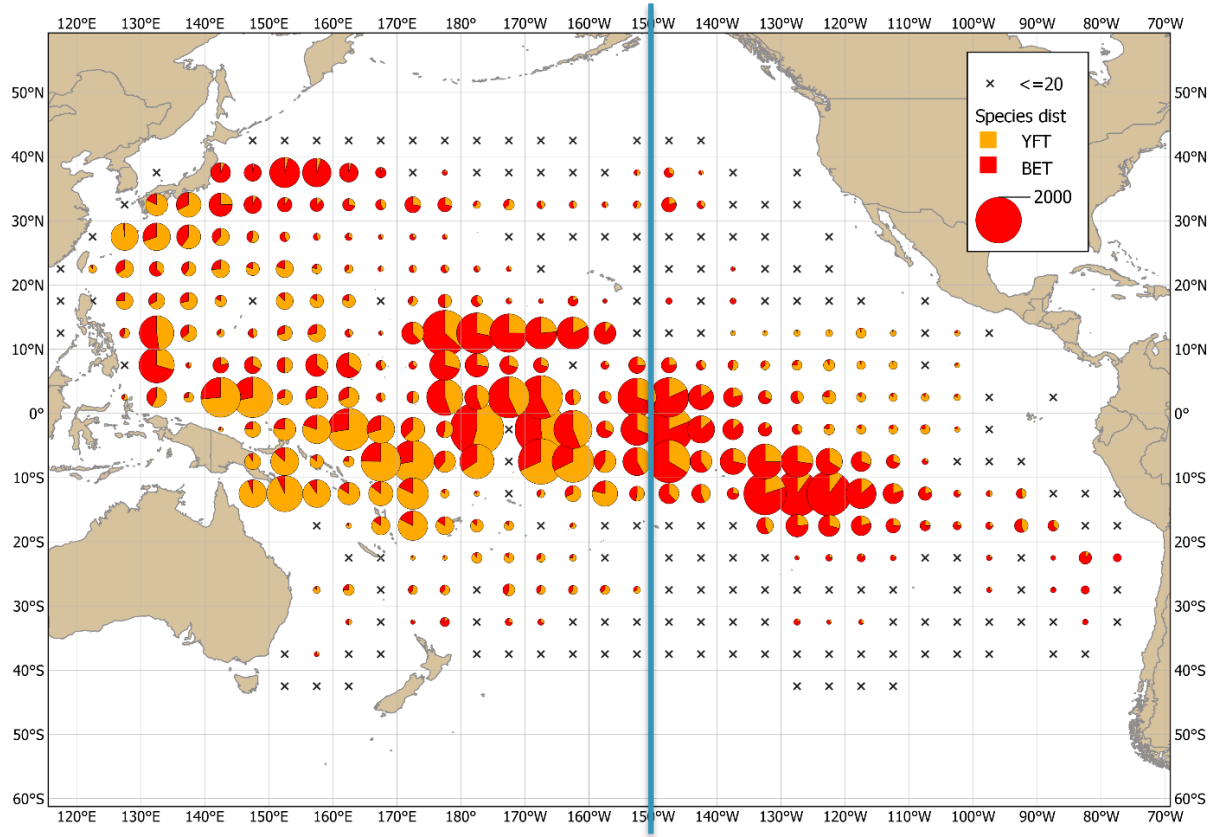
Esfuerzo de pesca: pesquería de palangre
Fishing effort: longline fishery



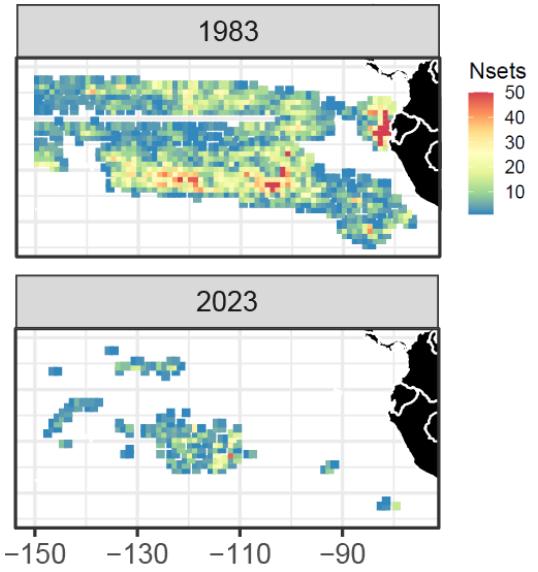
Esfuerzo de pesca: pesquería de palangre
Fishing effort: longline fishery



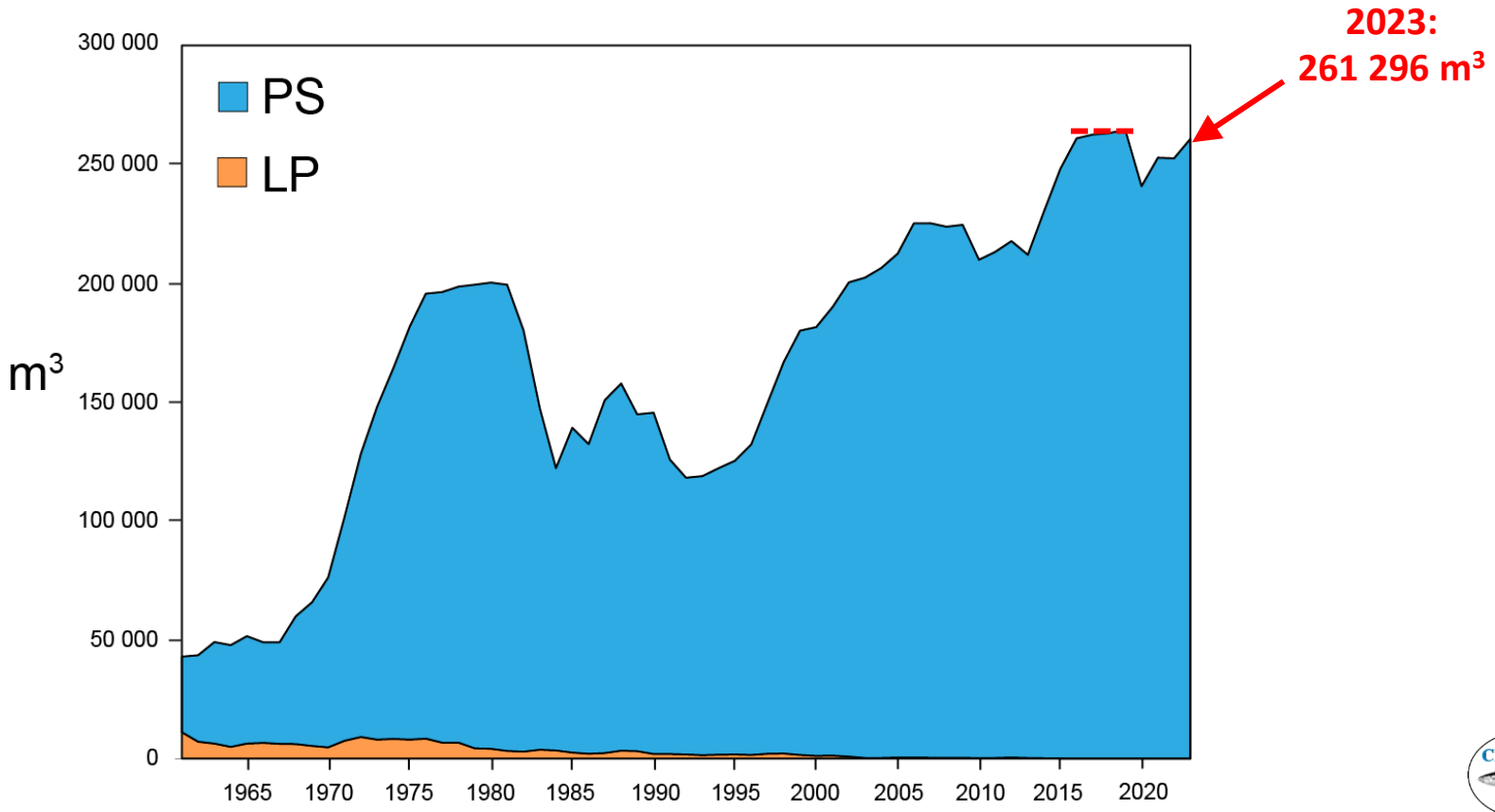
LL distribution 2018-2022



SAC-15-02

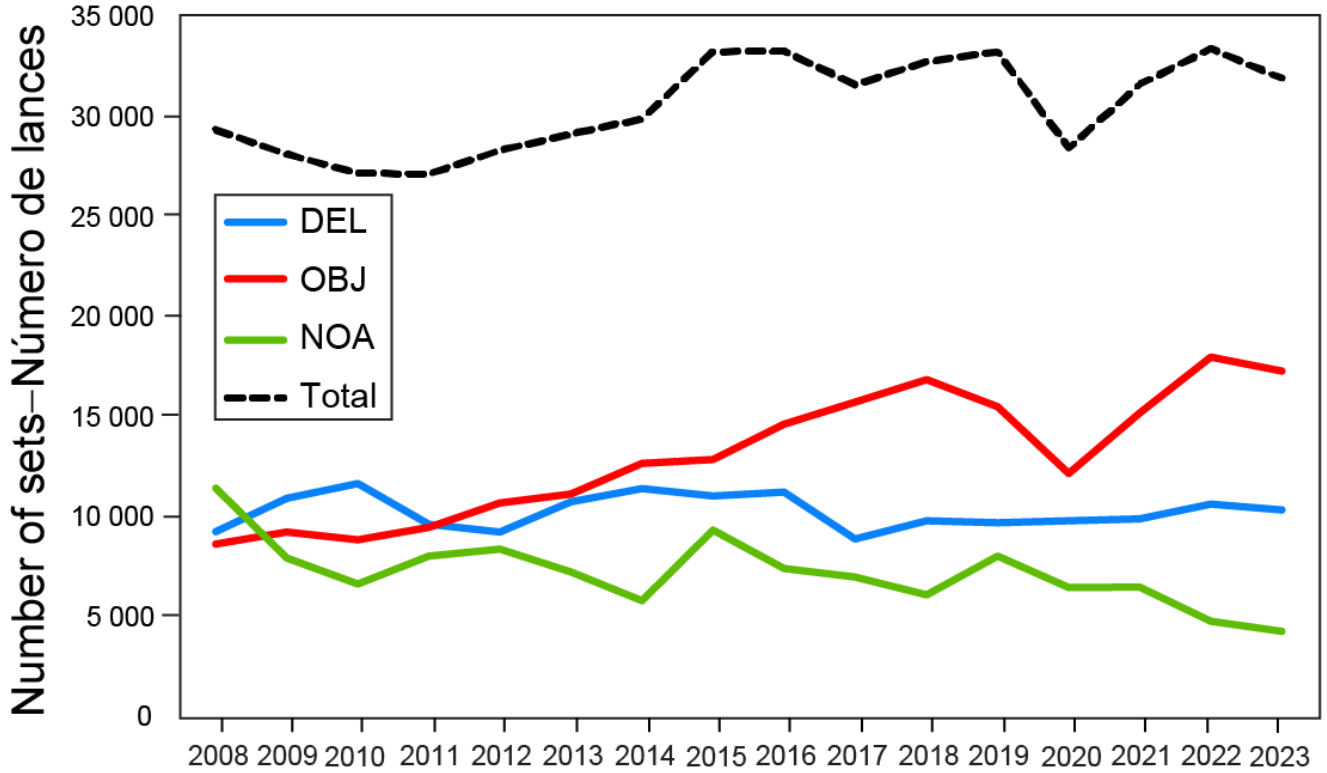


Fleet capacity

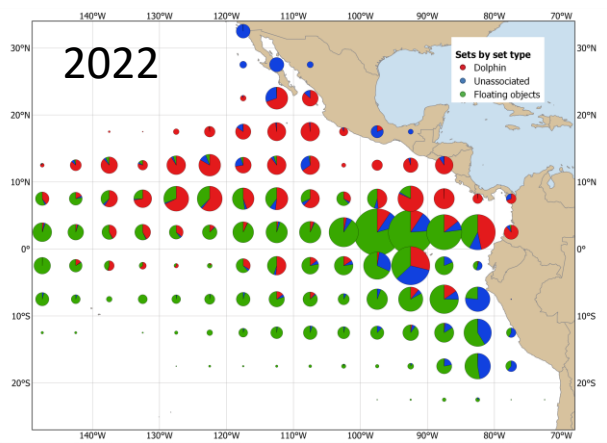


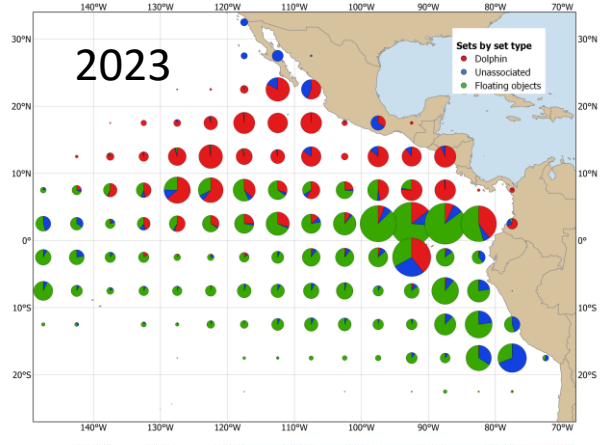
Fishing effort: purse-seine fishery

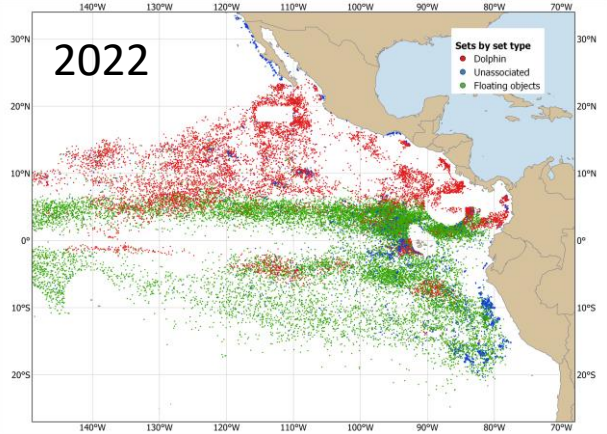
Numero de lances de cerco, por tipo – Number of purse seine sets, by set type

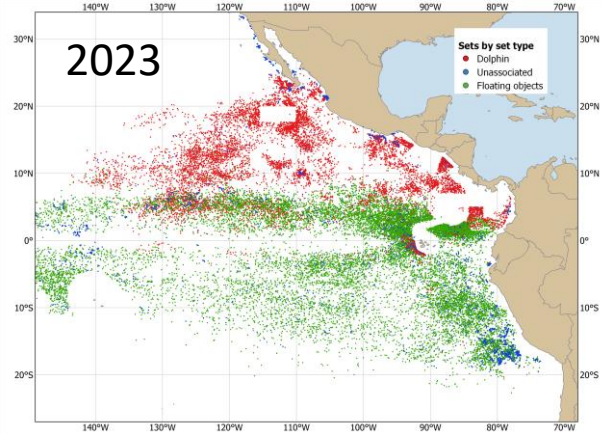


Distribution of purse seine sets, by type









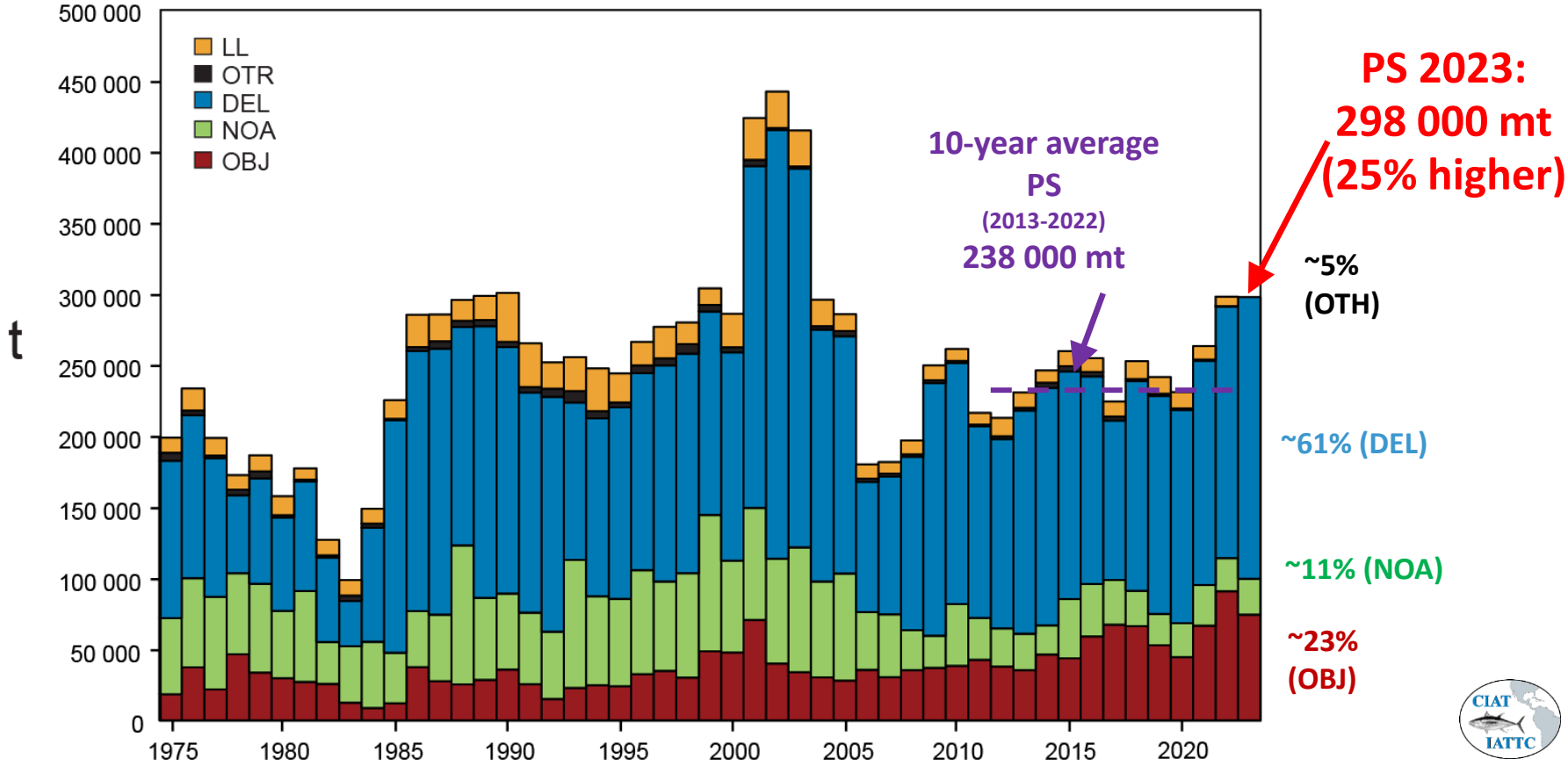
No. Lances – Sets

	2022	2023
DEL	10,614	10,328
NOA	4,764	4,273
OBJ	17,938	17,255
	33,316	31,856

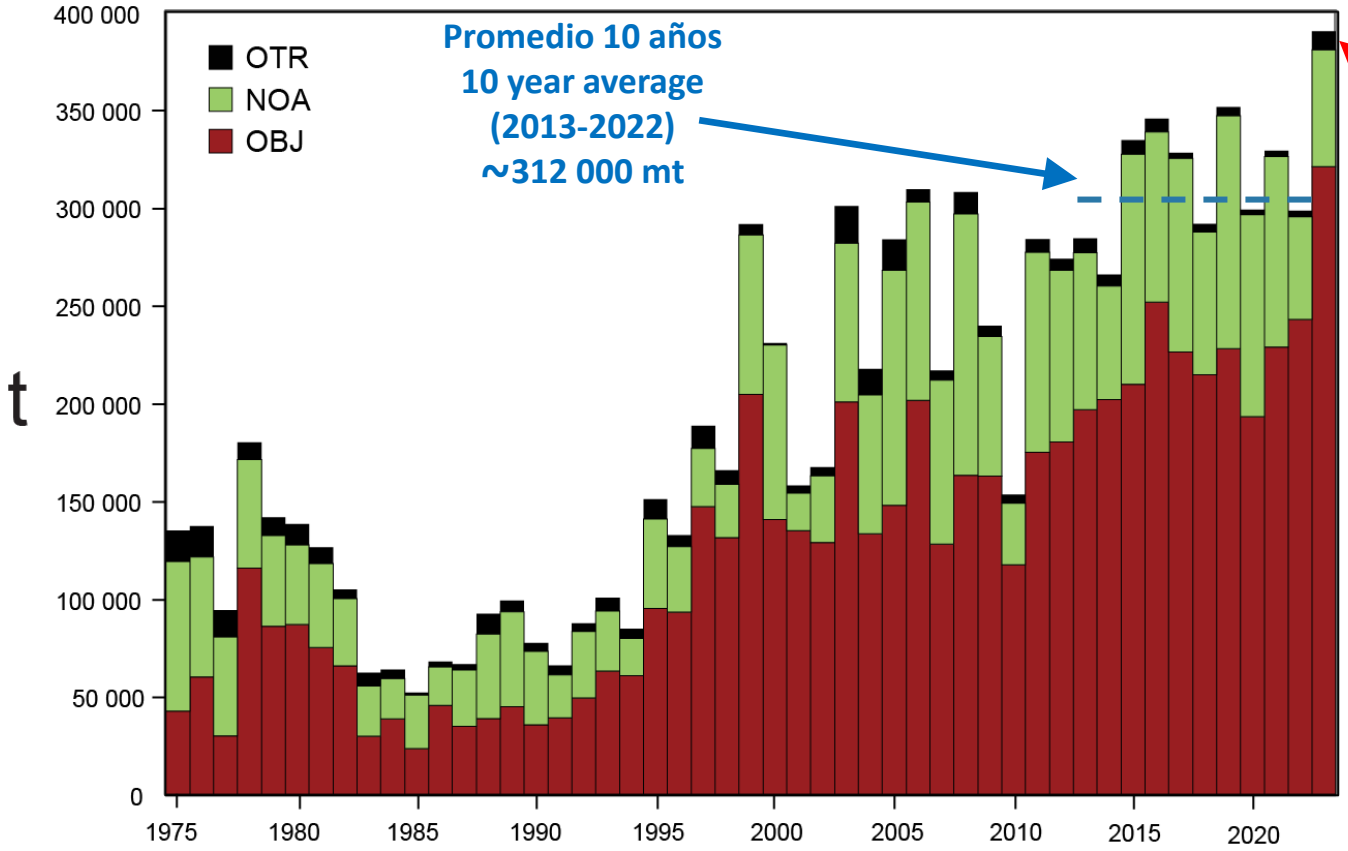
% por tipo – by set type

	DEL	NOA	OBJ
2020	34.4	22.8	42.8
2021	31.4	20.6	48.1
2022	31.9	14.3	53.8
2023	32.4	13.4	54.2

YFT - Catch by gear type



SKJ - Catch by gear type



2023:
390 000 mt
(25% higher)

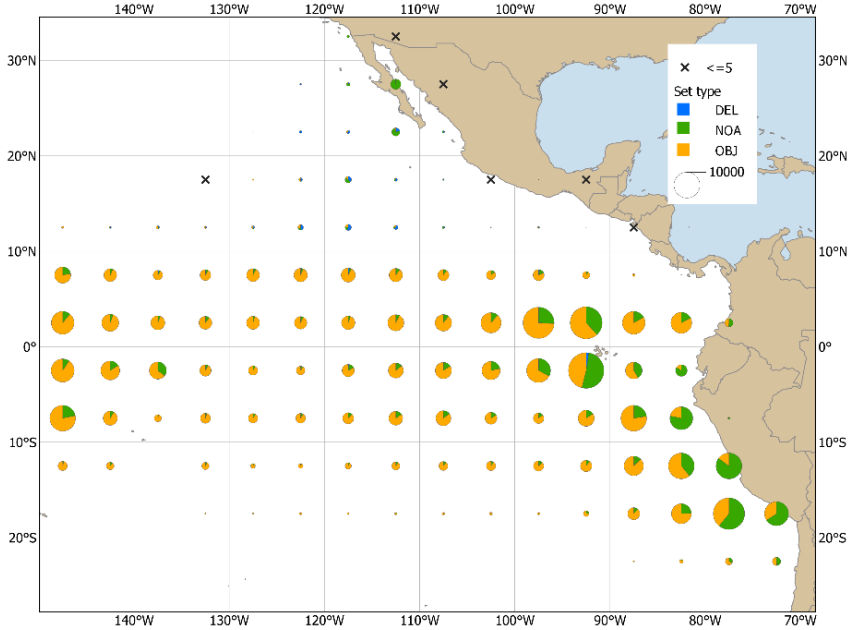
~2% (OTH)

~28% (NOA)

~70% (OBJ)

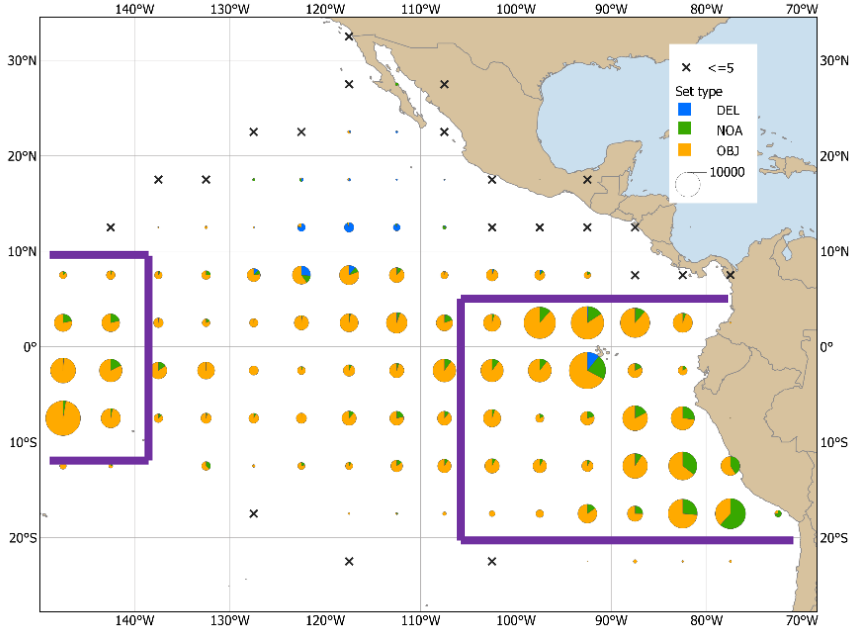
SKJ - Distribution of purse-seine catches

Promedio - Average 2013-2022



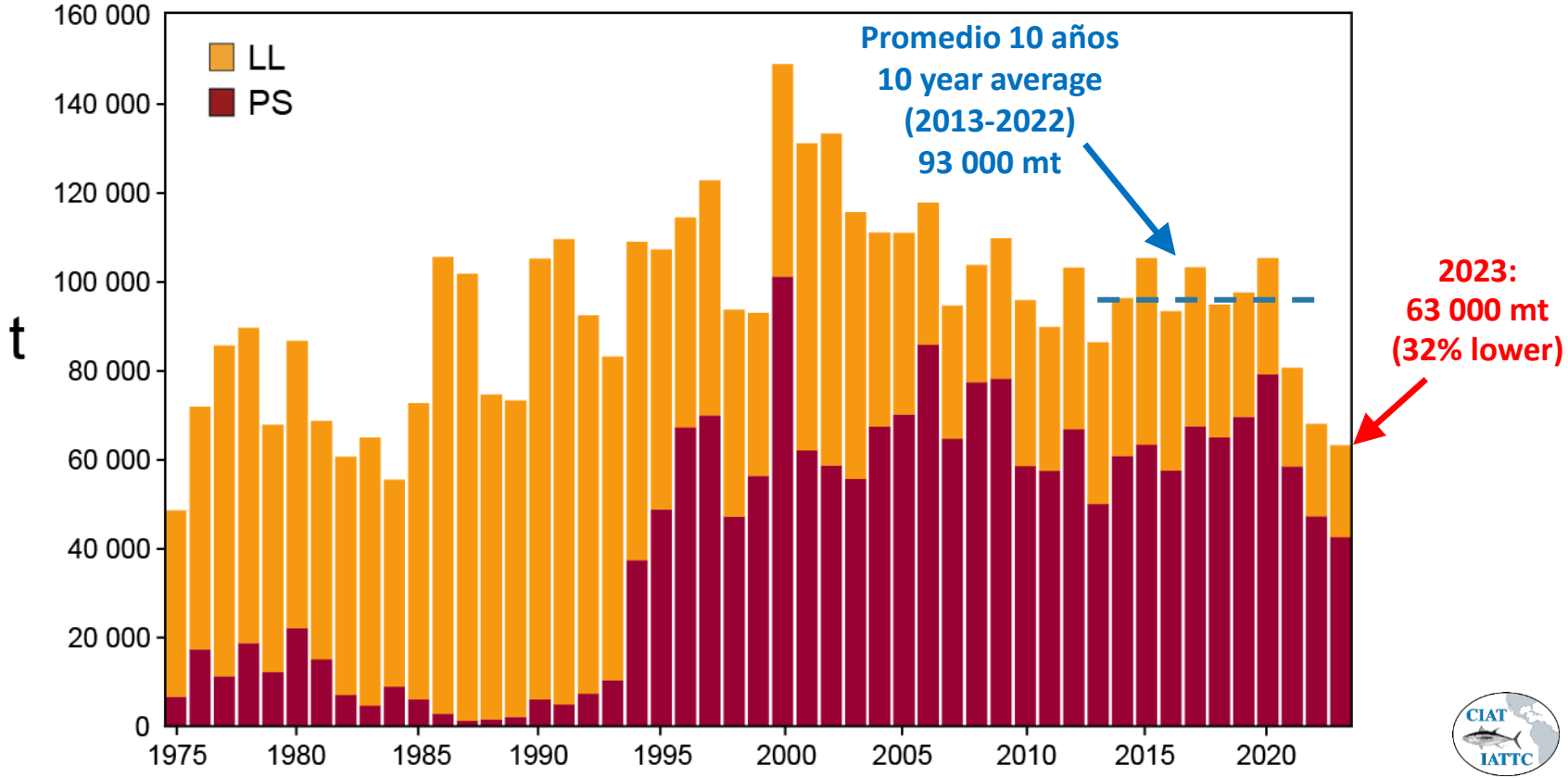
309 000 mt (261 000 - 347 000)

2023

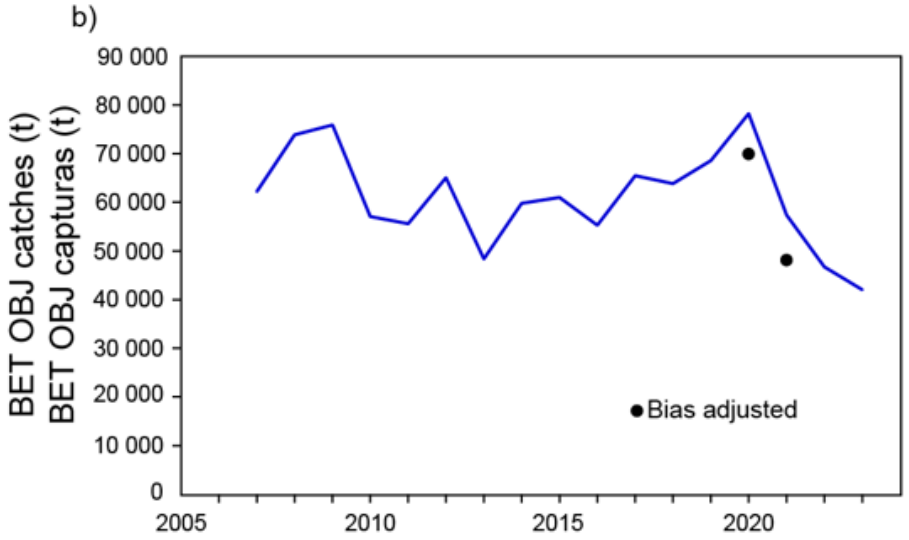


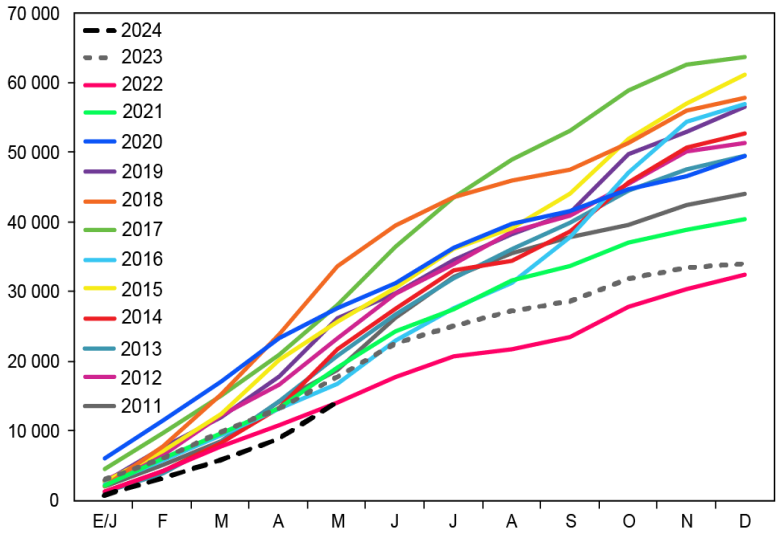
388 000 mt 26% Mayor-Higher

BET - Captura por arte de pesca–Catch by gear type



BET – impact of IVT program





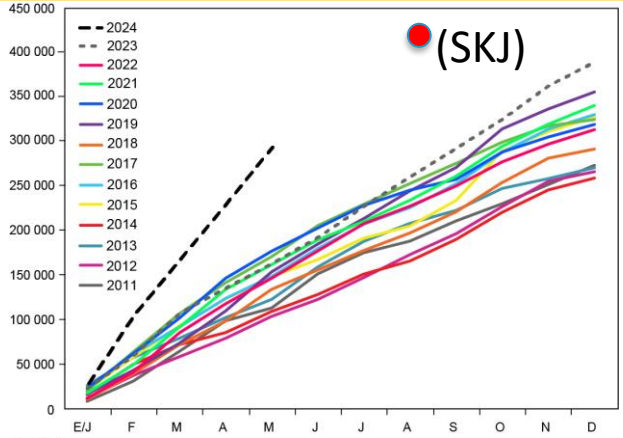
DOCUMENT SAC-15 INF-K

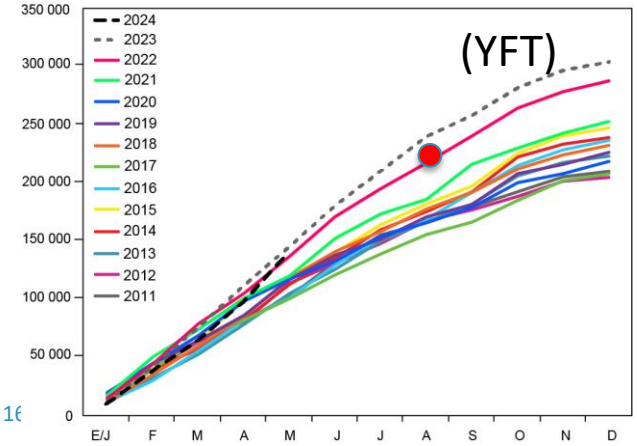
EFFECTS OF THE INDIVIDUAL VESSEL THRESHOLD PROGRAM ON TROPICAL TUNA CATCHES AND FLEET BEHAVIOR IN THE EASTERN PACIFIC OCEAN

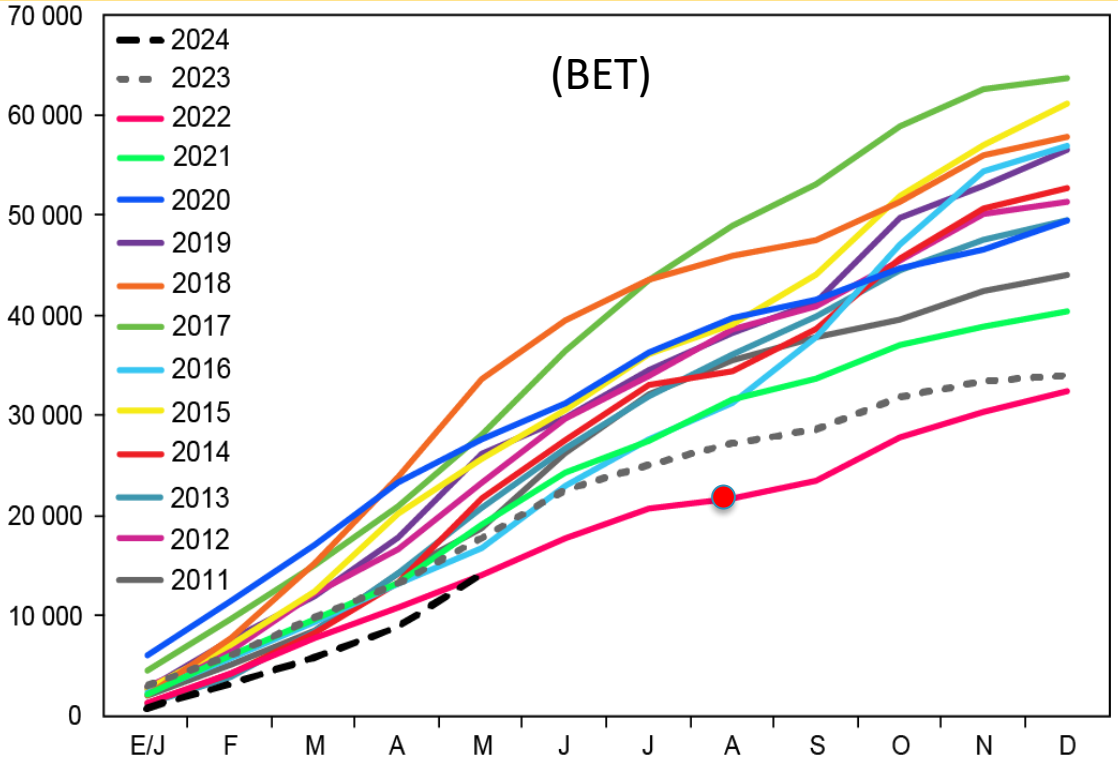
SAC-15 INF-H

ENHANCED MONITORING PROGRAM: 2023 REPORT AND OTHER DEVELOPMENTS

Captura acumulativa–Cumulative catch







Main scientific work for consideration in 2024

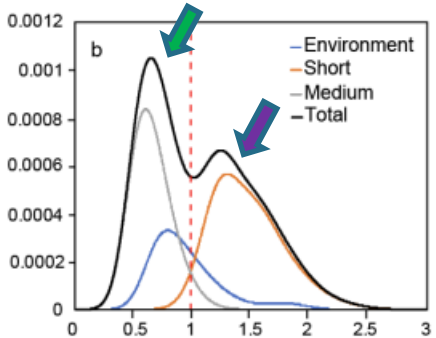
- Two **benchmark stock assessment** reports, for bigeye (SAC-15-02) and skipjack (SAC-15-04), and an **exploratory assessment** report for yellowfin (SAC-15-03)

- **Stock status indicators** (SAC-15 INF-F) for all three tropical tuna species (yellowfin, bigeye, and skipjack)

- **Evaluation of conservation measures:** 1) impact of the Individual Vessel Threshold (IVT) program on bigeye catches (SAC-15 INF-K); 2) and the corralito (SAC-15 INF-M)

BET benchmark assessment: why is the bimodal pattern resolved?

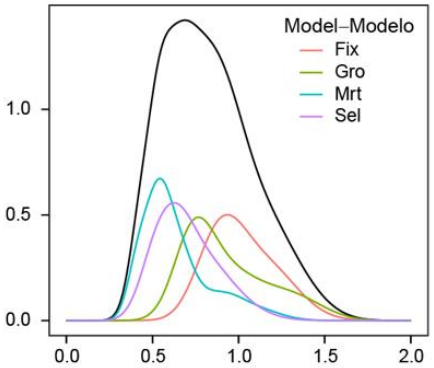
- The bimodal distribution of management quantities has been resolved (shifted to unimodal pattern)



F_{cur}/F_{MSY}–F_{act}/F_{RMS}

SAC-11-08

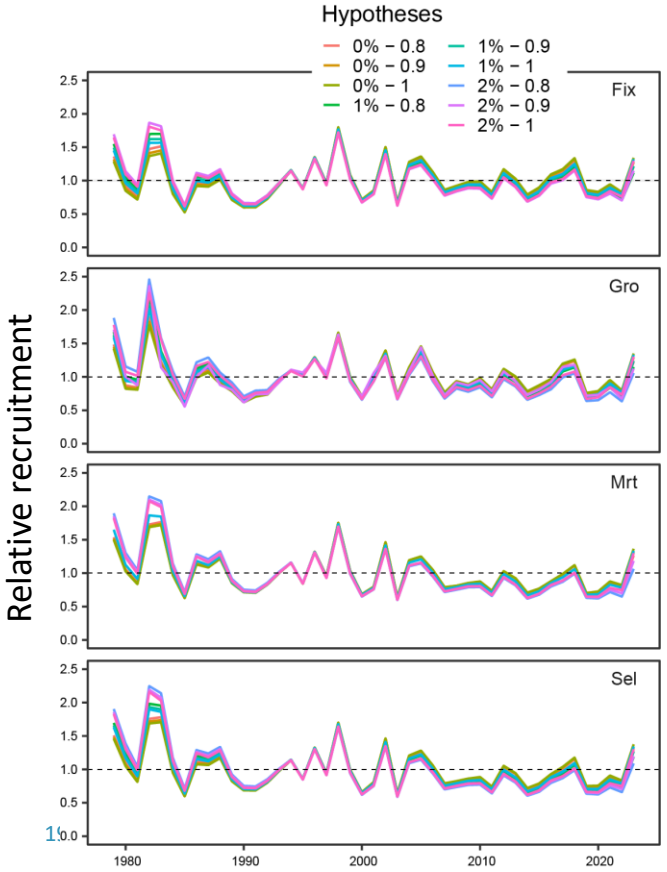
- The shift from a bimodal to unimodal pattern in the distributions likely results from resolving the regime shift in recruitment in this benchmark assessment



F_{cur}/F_{MSY}–F_{act}/F_{RMS}

SAC-15-02

BET benchmark assessment: why is the recruitment regime shift resolved?



1. Adding one more time block to the selectivity of longline fisheries in 2011: leads to less depleted spawning biomass

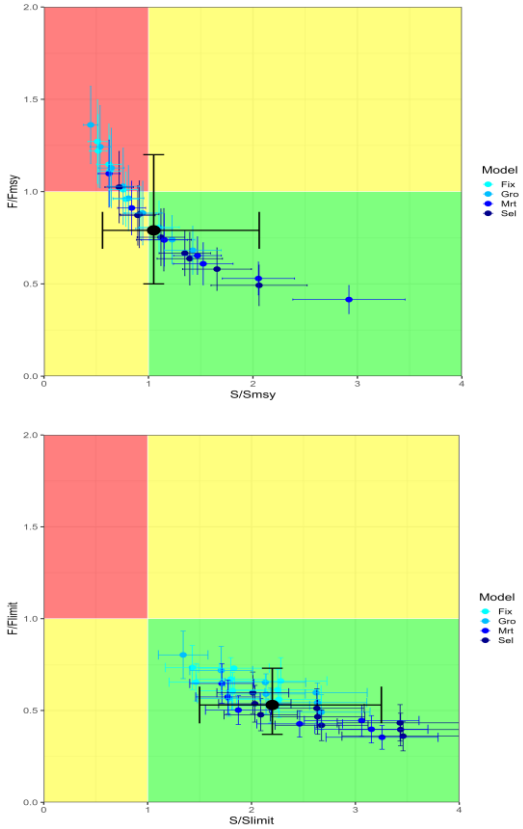
2. Improving the CPUE standardization model: leads to a steeper decline in the longline index of abundance

3. Updating the natural mortality curve for bigeye: leads to higher natural mortality for juveniles

All three changes reduce the discrepancy between the observed and expected impact of the OBJ fishery on population depletion

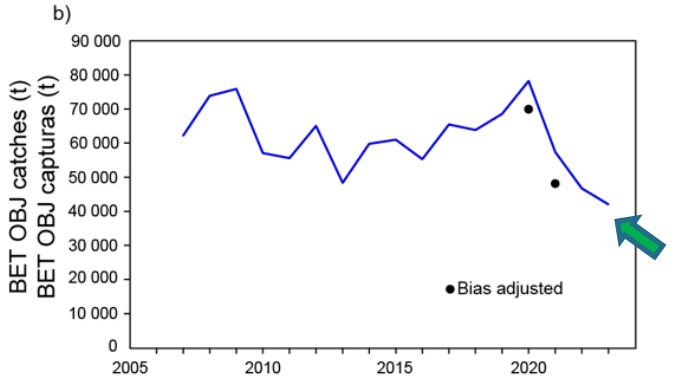
BET benchmark assessment: stock status

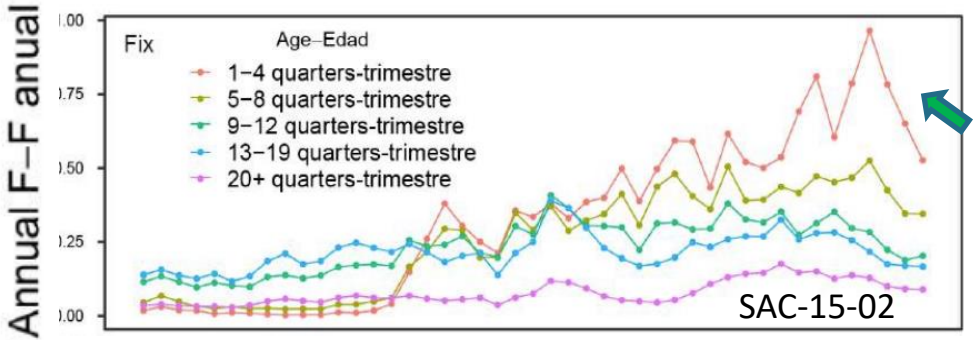
- TARGETS
  - 25% probability that F_{MSY} has been exceeded: $P(F_{cur}>F_{MSY})$ = 25%
  - 47% probability that S_{cur} has breached S_{MSY}: $P(S_{cur}<S_{MSY})$ = 47%
- LIMITS
  - There is zero probability that the *S* and *F* limit reference points have been exceeded: $P(S_{cur}<S_{LIMIT})$ = 0.2%; $P(F_{cur}>F_{LIMIT})$ = 0.1%



Impact of Individual IVT program on BET catches (SAC-15 INF-K)

- The IVT meaningfully decreased catches of bigeye in OBJ sets by class 6 purse seine vessels
- This change appears to have been driven largely by a decrease in OBJ CPUE, as opposed to a decrease in the number of total sets or a shift from OBJ to NOA
- These results are further supported by highliner vessels appearing to have decreased their probability of catching ≥ 10 t of BET in OBJ sets





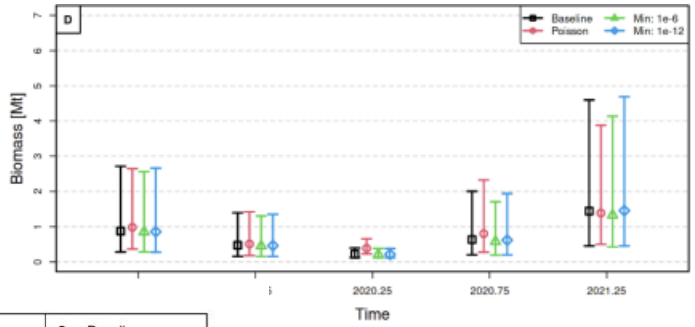
SKJ benchmark assessment: improvements

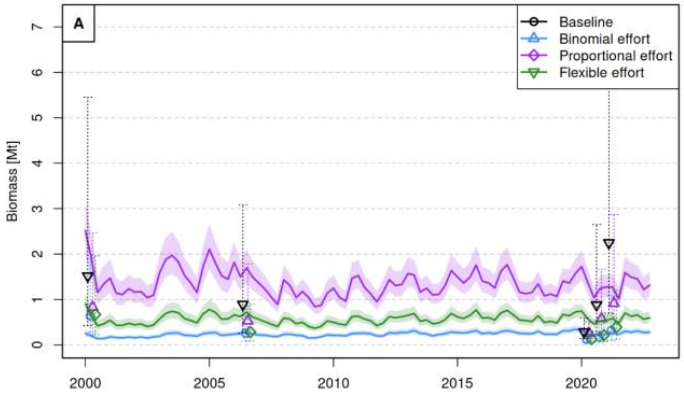
- New data:
  - Absolute and relative biomass indices derived from tagging data (SAC-15 INF-G)

DOCUMENT SAC-15 INF-G

A SPATIOTEMPORAL PETERSEN-TYPE MODEL FOR SKIPJACK IN THE EPO

Tobias K. Mildenberger, Anders Nielsen, and Mark Maunder



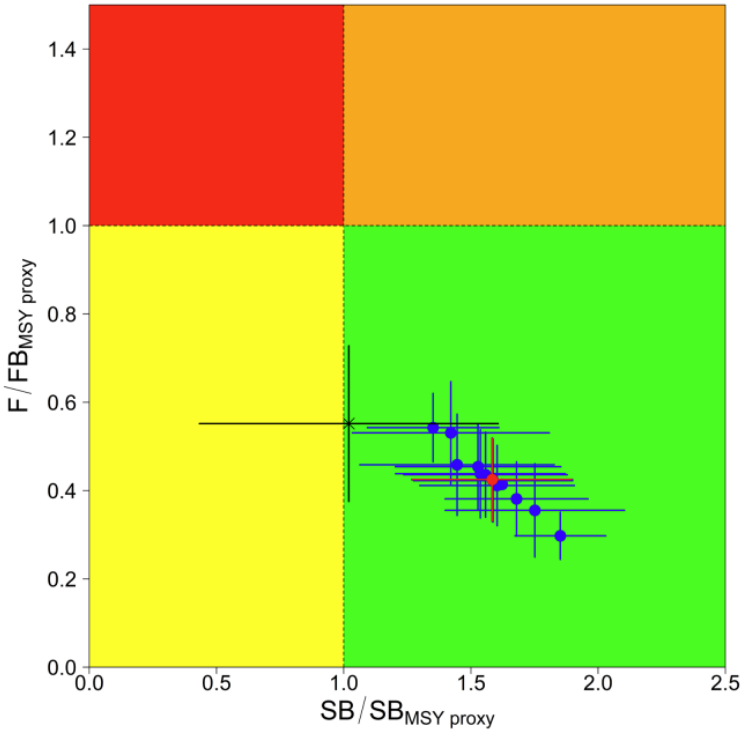


SKJ benchmark assessment: sensitivity analyses

Process	Model	Brief	Description
Growth	A1	Asymptotic length	Estimating asymptotic length.
	A2		Lower asymptotic length. The asymptotic length is set at 78 cm.
	A3		Higher asymptotic length. The asymptotic length is set at 88 cm.
	A4	Length-at-age CV	Estimating CV of the variation of length-at-age for the oldest individuals.
	A5		Lower CV of the variation of length-at-age for the oldest individuals. The CV is fixed at 0.03.
	A6		Higher CV of the variation of length-at-age for the oldest individuals. The CV is fixed at 0.09.
	A7	Growth shape	Estimating growth shape parameter.
Selectivity	B1	Longline	Longline fishery selectivity is constant after 78 cm.
	B2		Longline fishery selectivity is constant after 83 cm.
	B3		Longline fishery selectivity is constant after 88 cm.
	B4	F9	The selectivity of fleet F9 is asymptotic, defined through a double-normal function.
Tagging-absolute	C1	Upweight	The most precise tagging-based absolute biomass (2020 Q2, CV = 0.3) is used in the analysis and is upweighted by ten times (i.e., $\lambda = 10$).
	C2	More indices	Four tagging-based absolute biomass indices with low CVs (0.3-0.6) and low correlation coefficients (<0.13) during 2006-2023 are used in the analysis and are fully weighted (i.e., $\lambda = 1$).
Indices	D1	No tagging absolute	Excluding the tagging-based absolute index from the assessment model.
	D2	No ECHO	Excluding the echosounder buoy index from the assessment model.
	D3	Add longline	Inclusion of the longline survey index and size composition.
Steepness	E1	-	Steepness = 0.75.

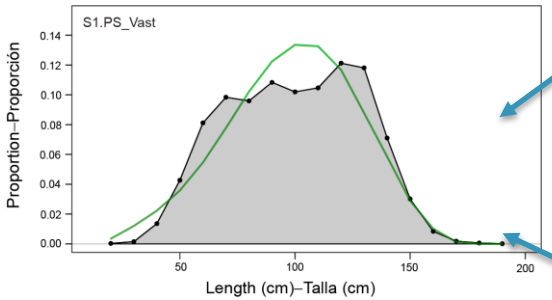
2024 SKJ benchmark assessment: stock status

- **Results from the reference model and most sensitivity models:**
  - The current *F* is below the level corresponding to the MSY *proxy*
  - The current spawning biomass (S_{cur}) is above the dynamic level corresponding to the MSY *proxy*
  - Only one sensitivity model, which excludes the ECHO index, estimates that the S_{cur} is not significantly above the MSY *proxy*, but does not have a 10% or more probability of exceeding the limit RP.

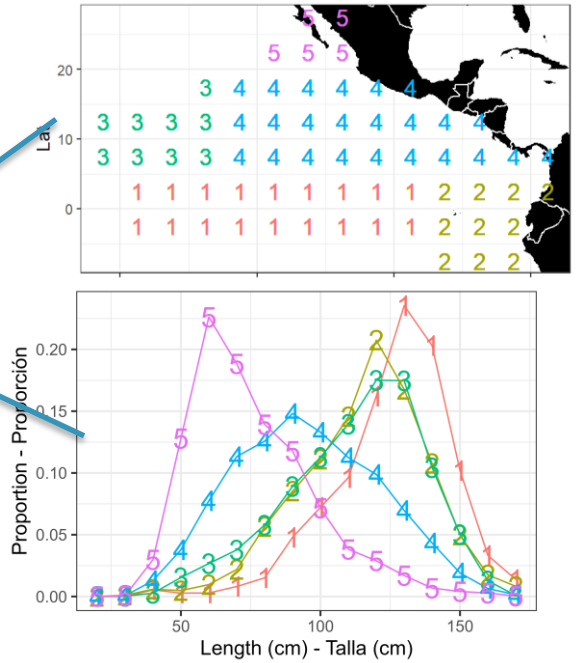


YFT issues: stock structure

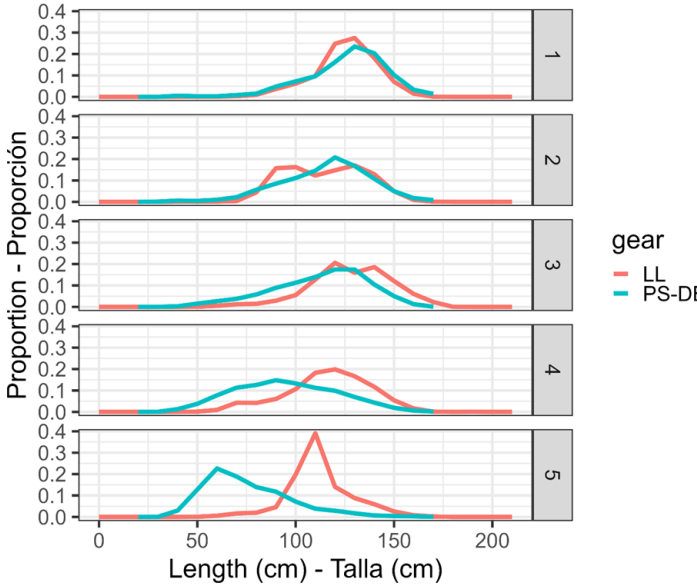
- Model cannot fit the length composition data associated with the index of abundance
- Data comes from different areas



- Lengths are different in different areas of the EPO



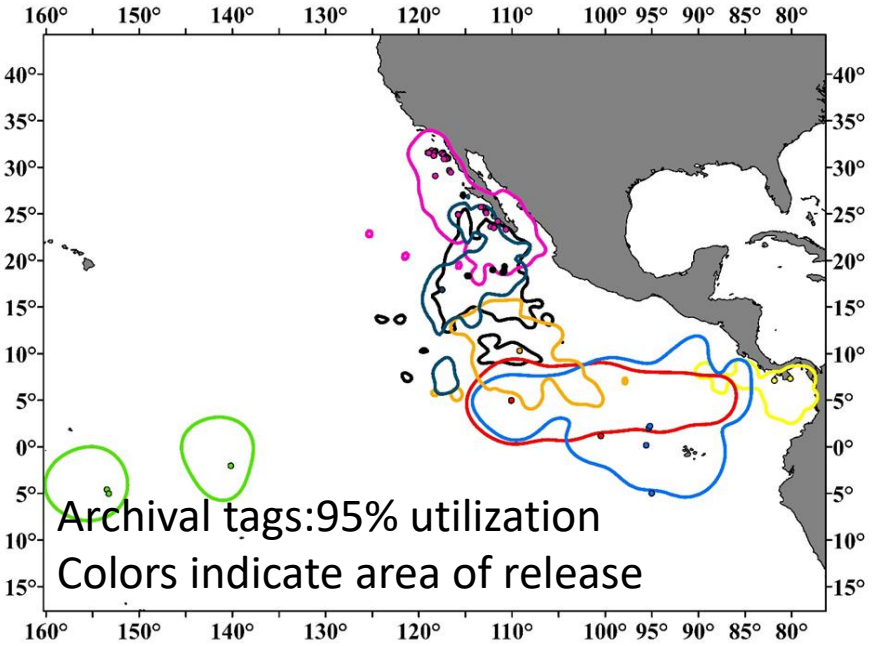
- Spatial differences are persistent over time and are evident for different gears



LL: longline 1960-1970
PS: purse-seine 2000-2023

YFT issues: stock structure

- Tagging data suggests limited movement
- Possible isolation by distance, stock-structure, and local depletion



2024 YFT exploratory assessment: summary

- A benchmark assessment is not available in 2024
- Although improvements were made in the YFT assessment, several uncertainties remain to be addressed, most importantly on spatial structure
- In 2024 an exploratory stock assessment was focused on the core area of the DEL fishery. Stock status indicators were developed for other areas (or "sub-stocks")
- The results of the exploratory analysis indicate that the yellowfin stock and the possible sub-stocks are likely to be near or above the level that corresponds to dynamic MSY and not likely to have exceeded the spawning biomass limit reference point
- These results are uncertain and further data collection and research is needed to ensure reliable assessments and management advice in the future

Recommendations – Management advice

1. Extend the provisions under Resolution C-21-04 for 3 additional years with the following two outcomes that would trigger re-opening of management package:
   a. Completion and acceptance of a stock assessment for YFT that finds the stock(s) to be in a condition that requires additional management measures;
   b. A stock assessment for YFT that is not reliable enough to use for management advice and stock status indicators showing reasons for concern.

2. Continue the Enhanced Monitoring Program (EMP) for bigeye catches for three additional years, expanded for scientific value in 2025 (see the proposal in SAC-15 INF-H for details).

3. Adopt provisions to make operational level longline data routinely available for scientific purposes: At a minimum data aggregated at a 1 by 1 by month by vessel and HBF level (SAC-14 INF-Q).

4. To ensure reliable stock assessments for management advice, continue and enhance the IATTC Regional Tuna Tagging Program (RTTP) and implement opportunistic tagging studies in collaboration with CPCs and relevant stakeholders (see section 3 on Tuna Tagging and unfunded project E.4.b).

5. Continue to support the development of harvest strategies for the tropical tuna in the EPO (see recommendations in section 1.3.a)

Preguntas - Questions