The tuna fishery in the EPO in 2024

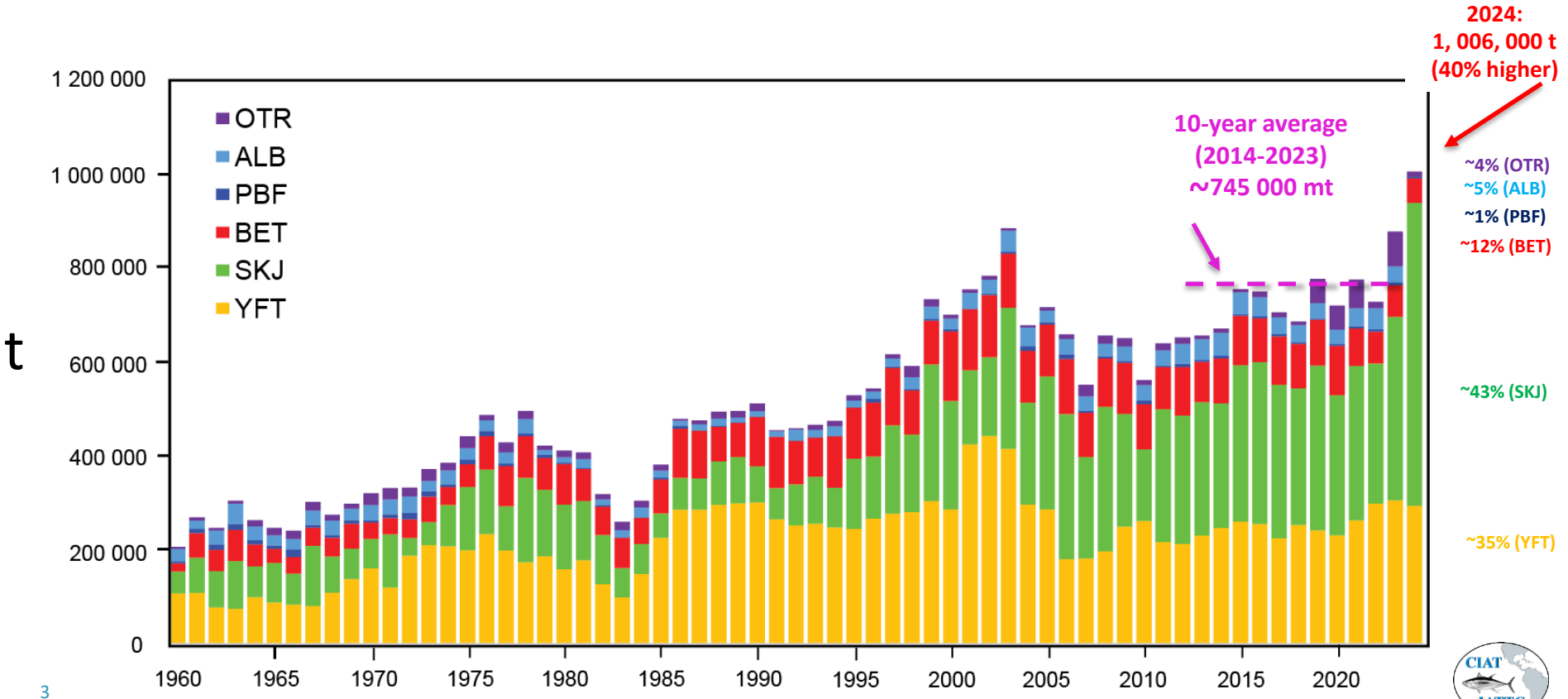
(SAC-16-01 and SAC-16-11)

WCPFC-SC21, August 13-21, 2025
Tonga

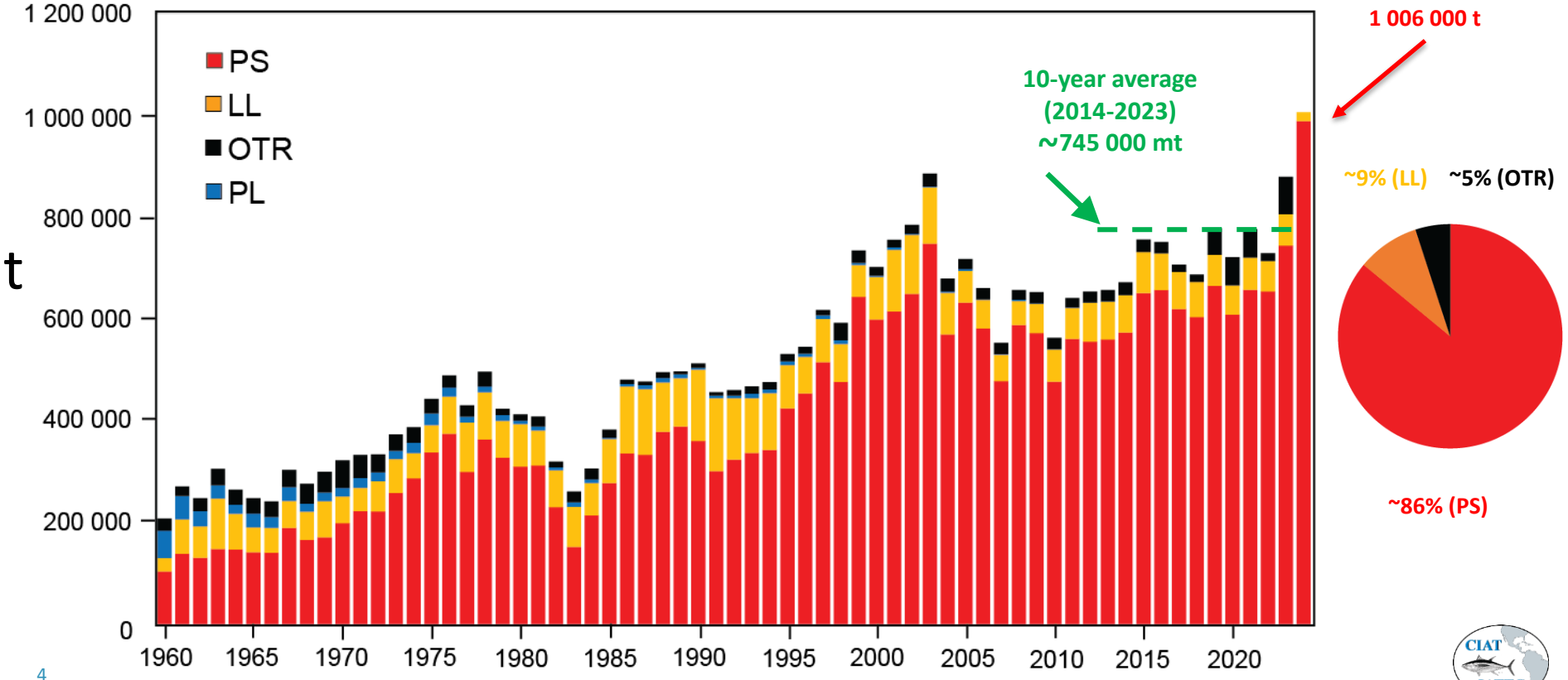
Topics

- The tuna fishery in the EPO in 2024
- Stock status and staff recommendations for management
  - Tropical tuna species (YFT, BET, SKJ)

Species composition of EPO retained catch (all gears)

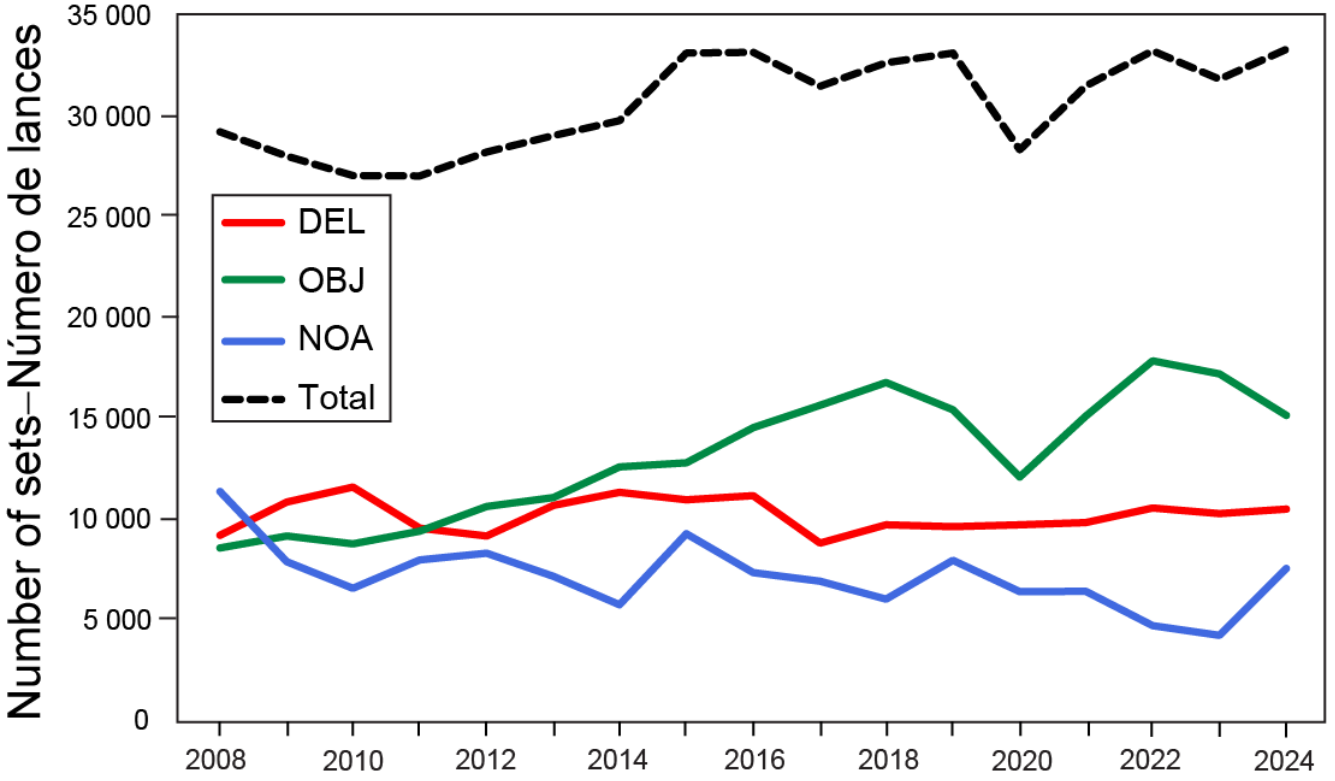


EPO retained catch – all gears



Fishing effort: purse-seine fishery

Number of purse seine sets, by set type



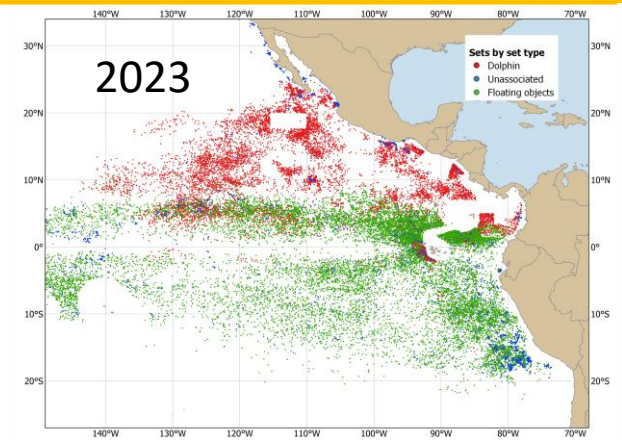
+5% (1,489)

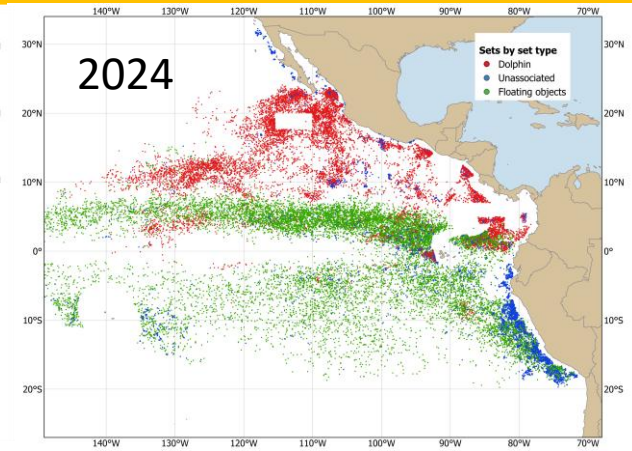
-12% (-2,055)

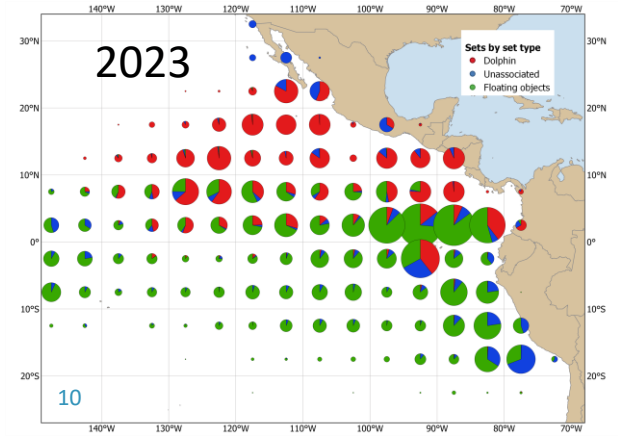
+2% (226)

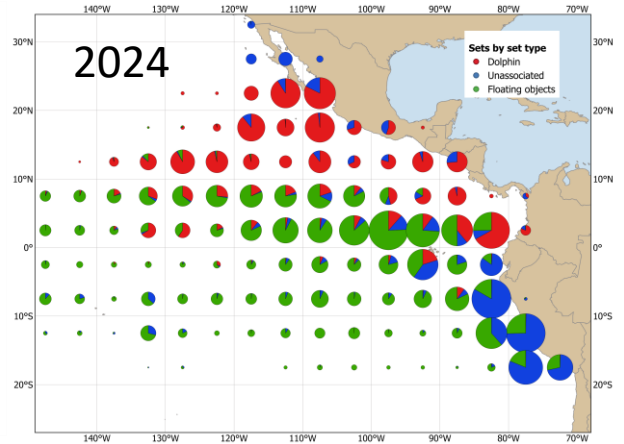
+77% (3,318)

Distribution of purse seine sets (all vessel classes)





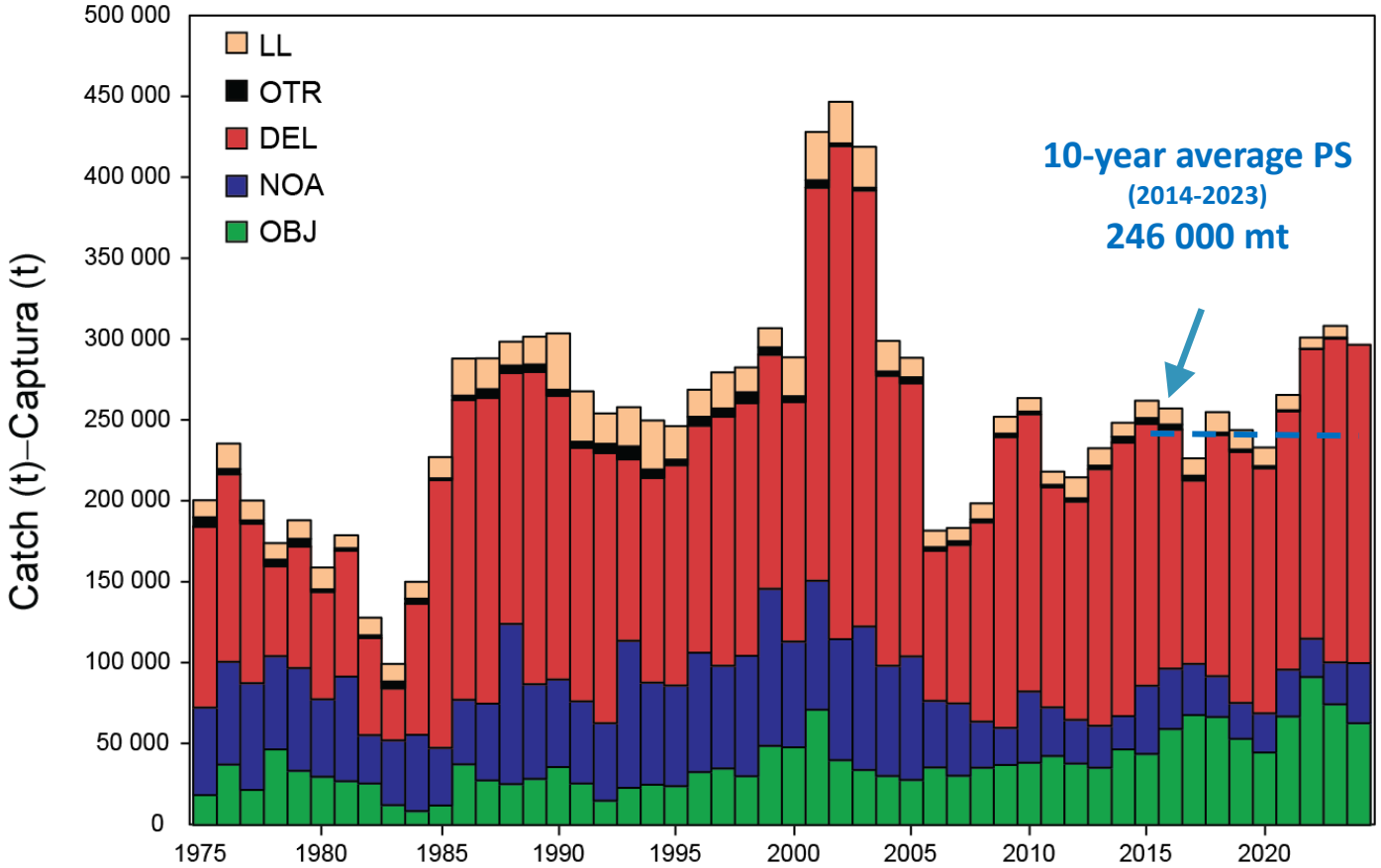




No. Sets	2023	2024
DEL	10,328	10,554
NOA	4,285	7,603
OBJ	17,264	15,209
	31,877	33,366

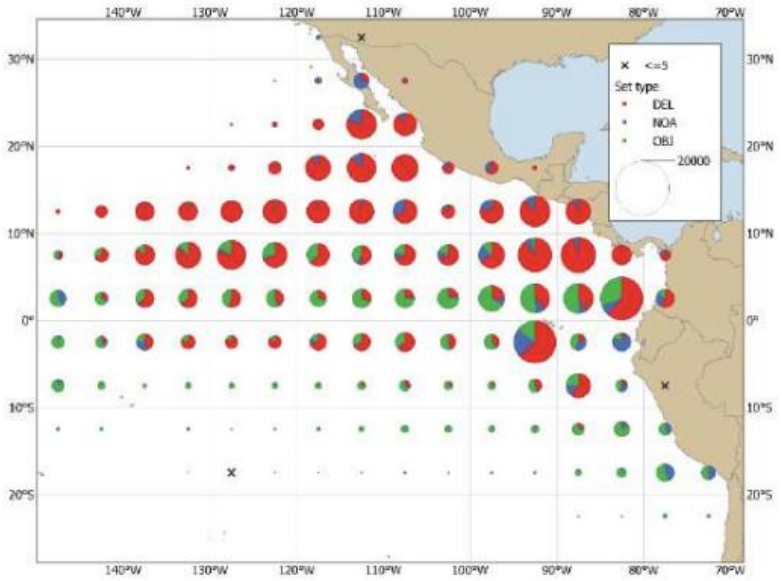
% by set type	DEL	NOA	OBJ
2021	31.4	20.6	48.1
2022	31.9	14.3	53.8
2023	32.4	13.4	54.2
2024	31.6	22.8	45.6

YFT - Catch by gear type



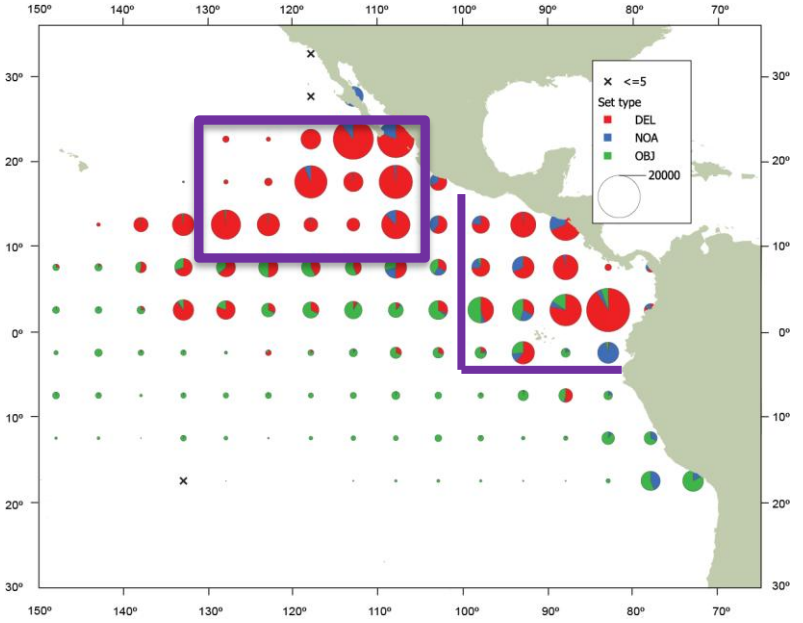
YFT - Distribution of purse-seine catches

Average 2014-2023



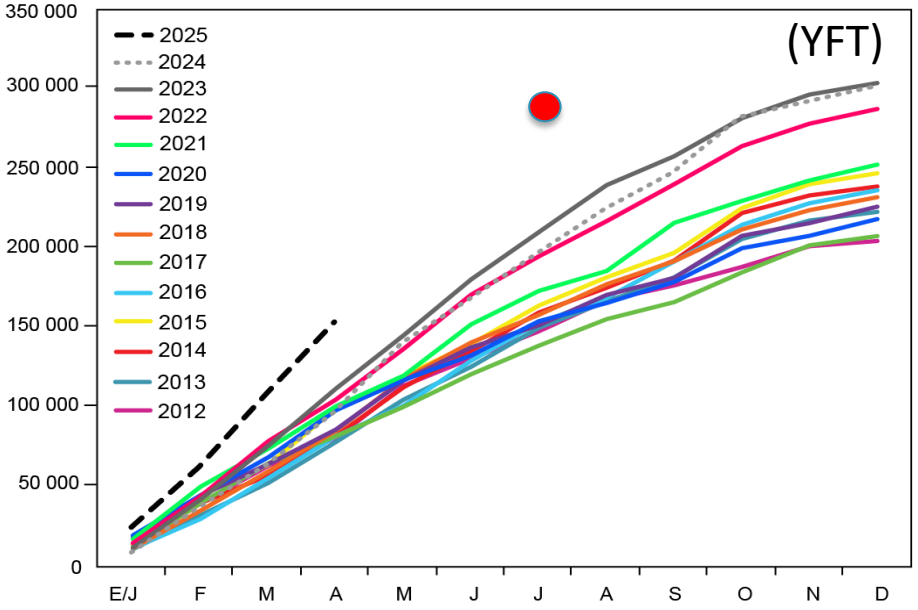
246 000 mt (211 000 - 298 000)

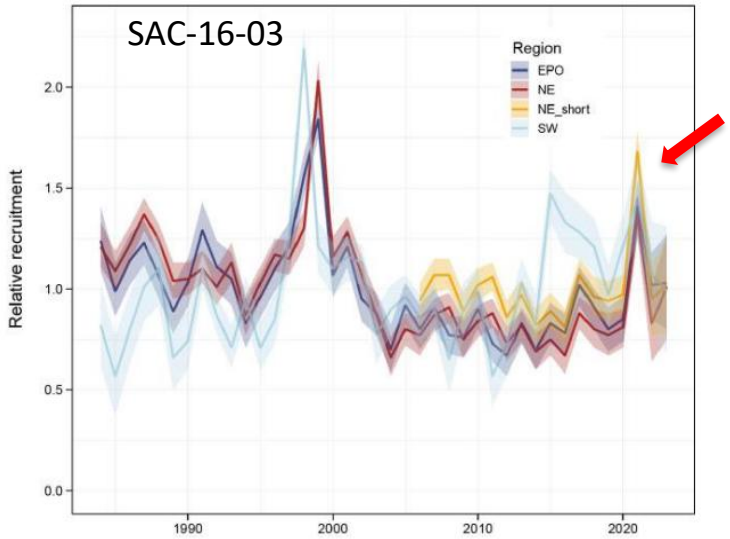
2024



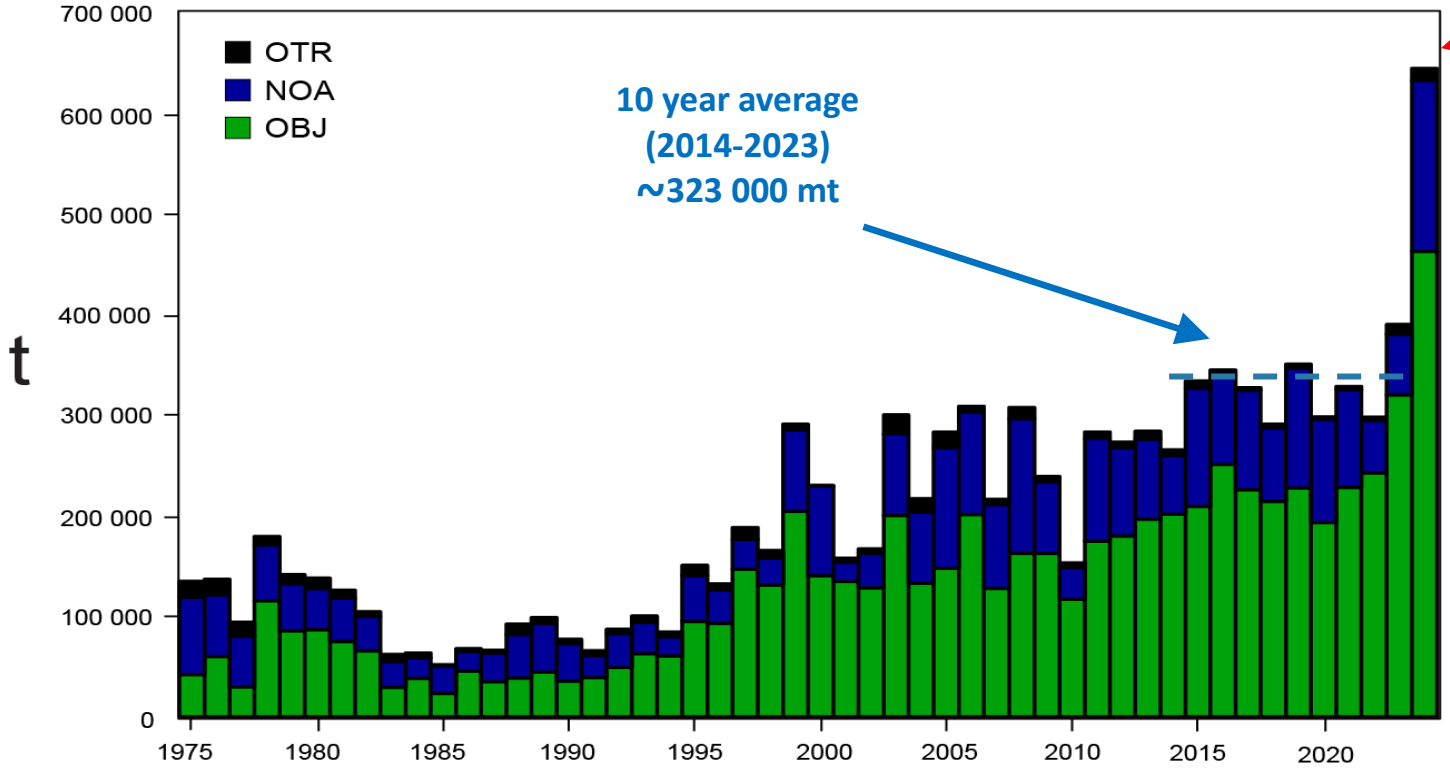
294 000 mt (20% Higher)

YFT - Cumulative catch





SKJ - Catch by gear type



2024:
645 000 mt
(100% higher)

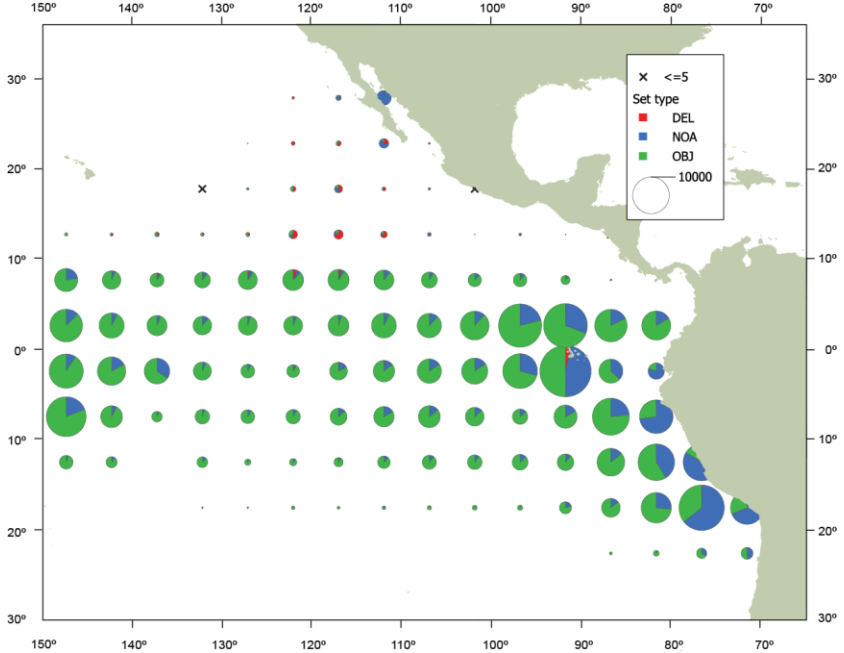
~1% (OTH)

~27% (NOA)

~72% (OBJ)

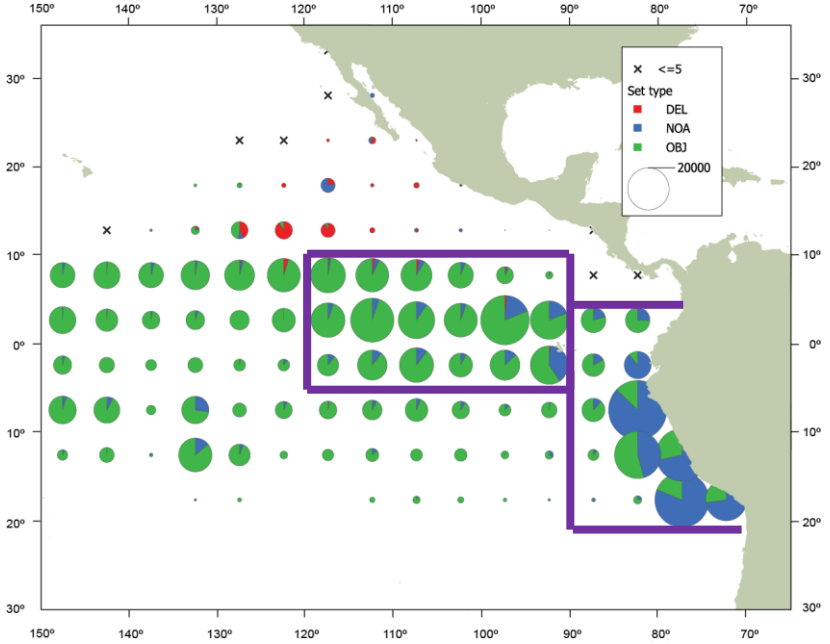
SKJ - Distribution of purse-seine catches

Average 2014-2023



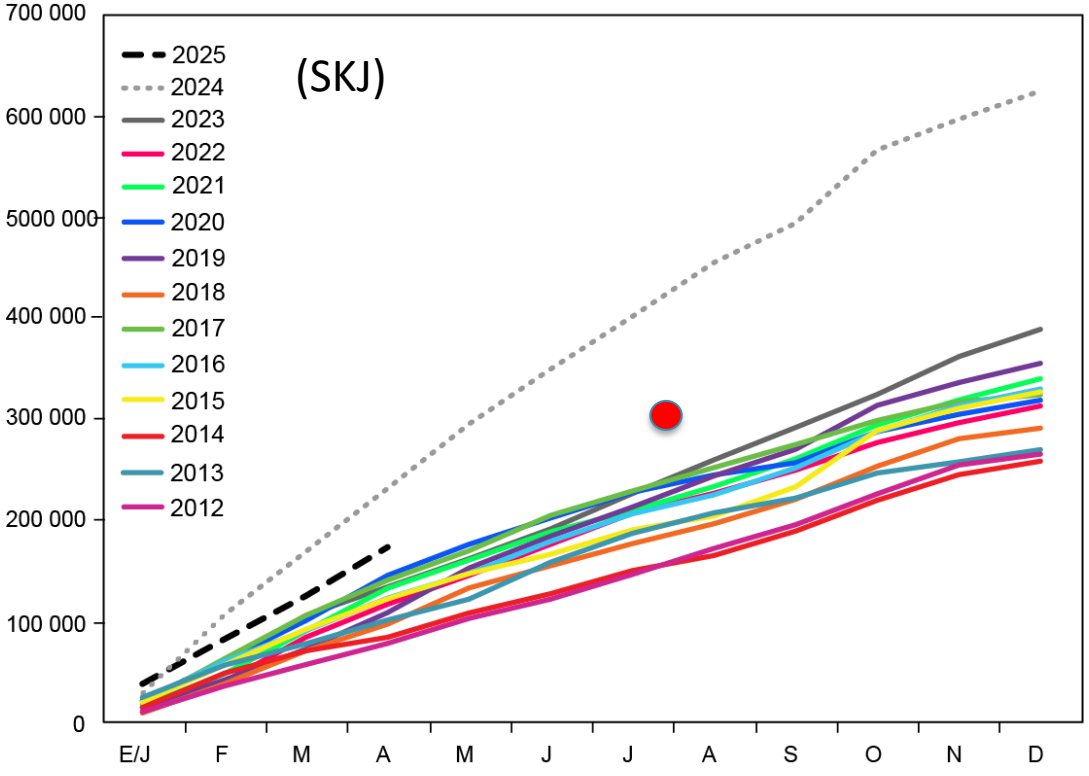
323 000 mt (265 000 - 391 000)

2024

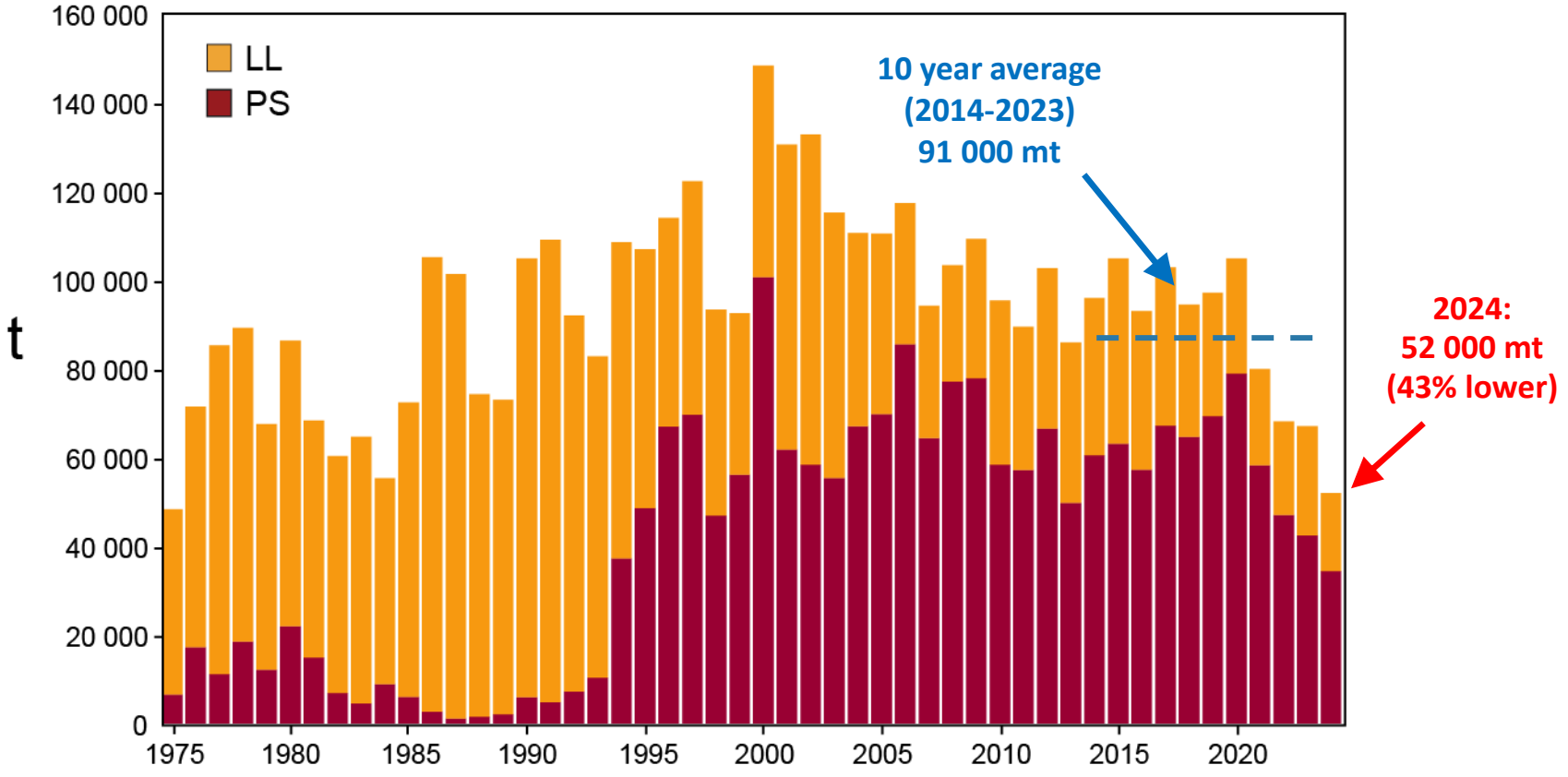


645 000 mt (100% Higher)

SKJ - Cumulative catch

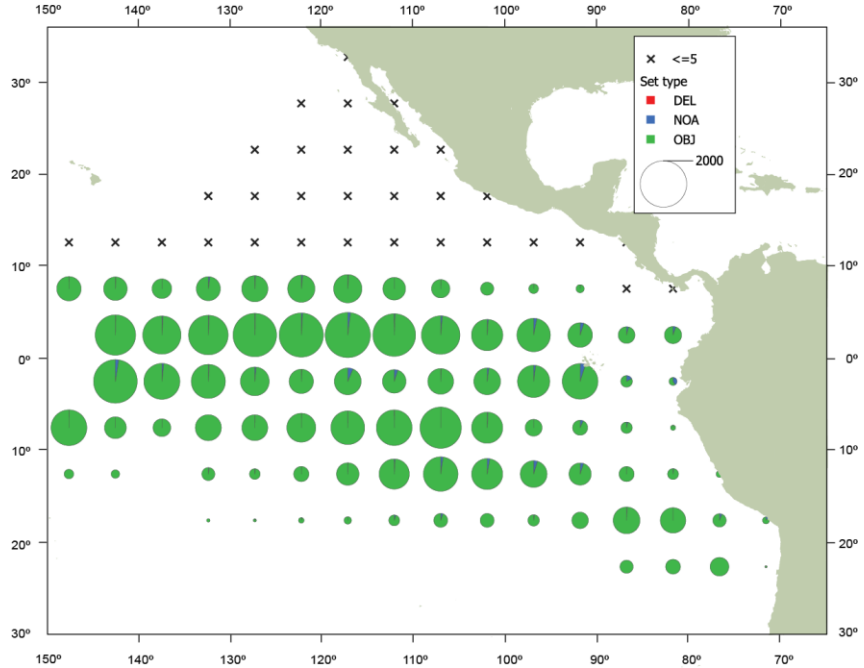


BET - Catch by gear type



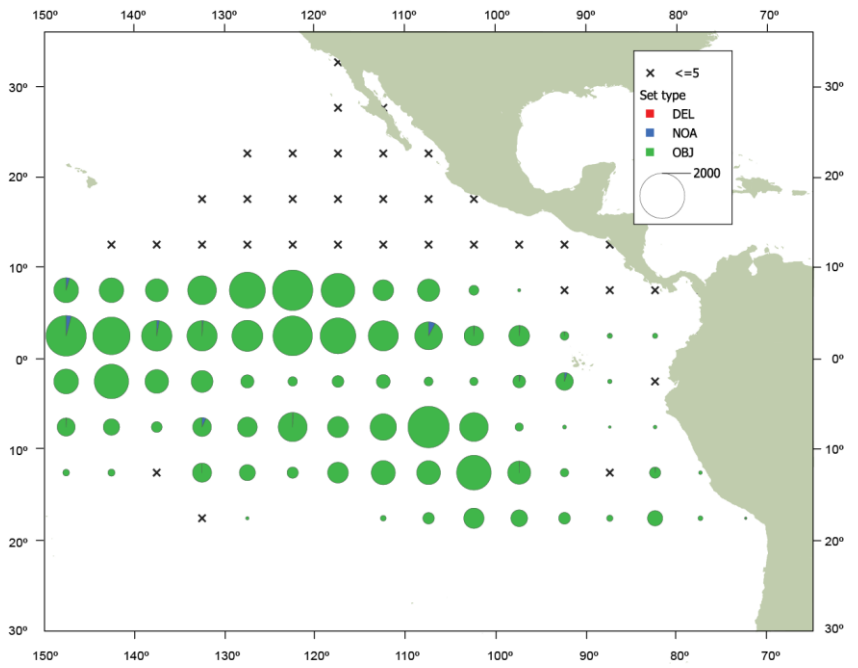
BET - Distribution of purse-seine catches

Average 2014-2023



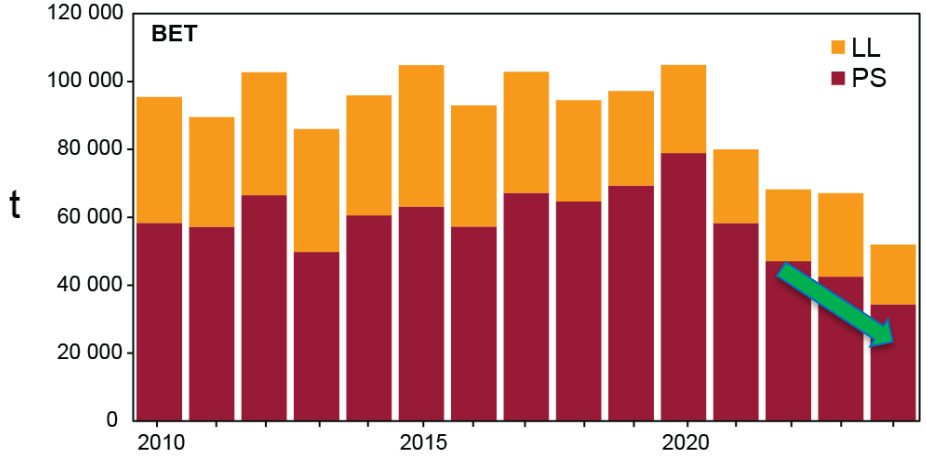
61 000 mt (42 000 - 79 000)

2024



42 000 mt (43% Lower)

BET – Impact of Individual Vessel Threshold (IVT) measure



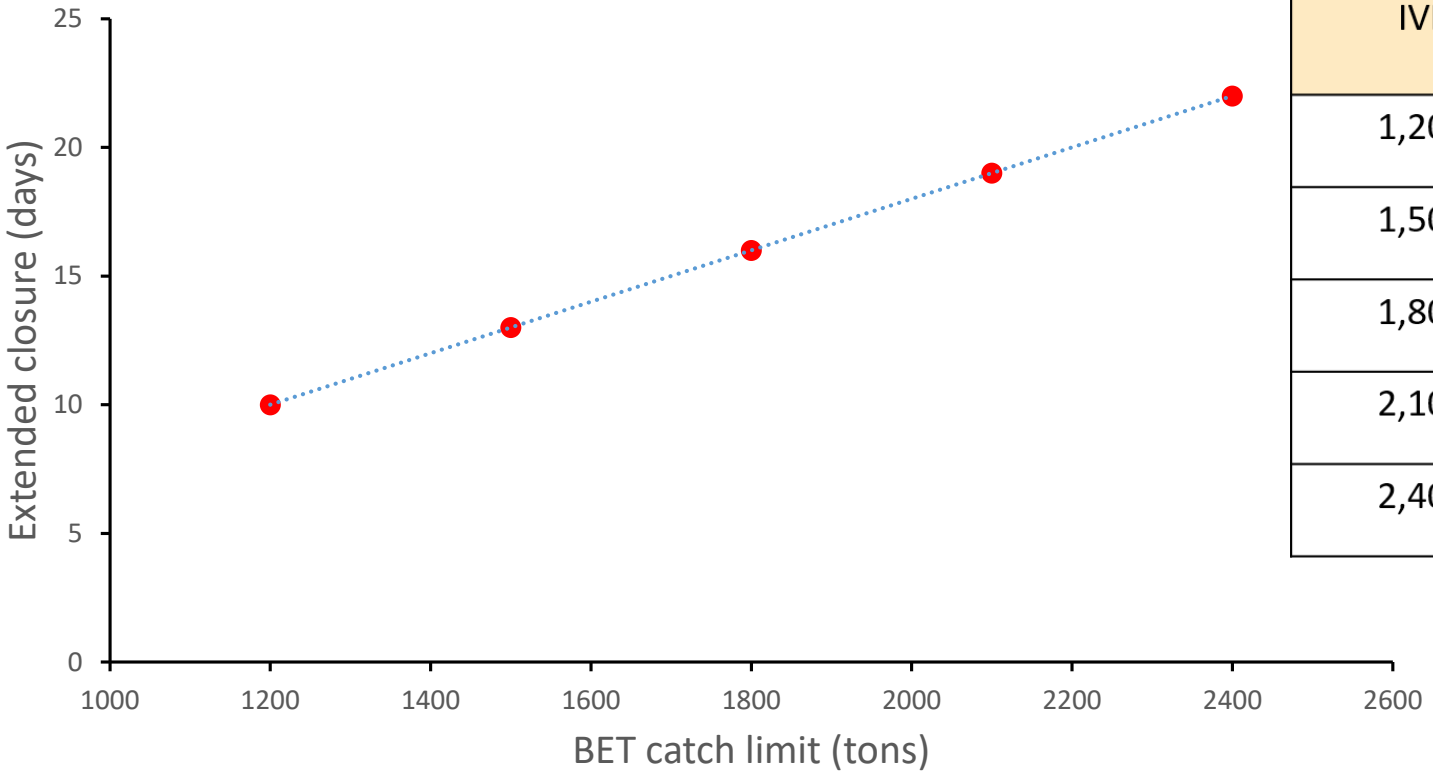
	Cavg (t)
PS pre IVT (2012-2021)	64,000
OBJ post IVT (2022-2024)	41,000

-36%

DOCUMENT SAC-16 INF-S

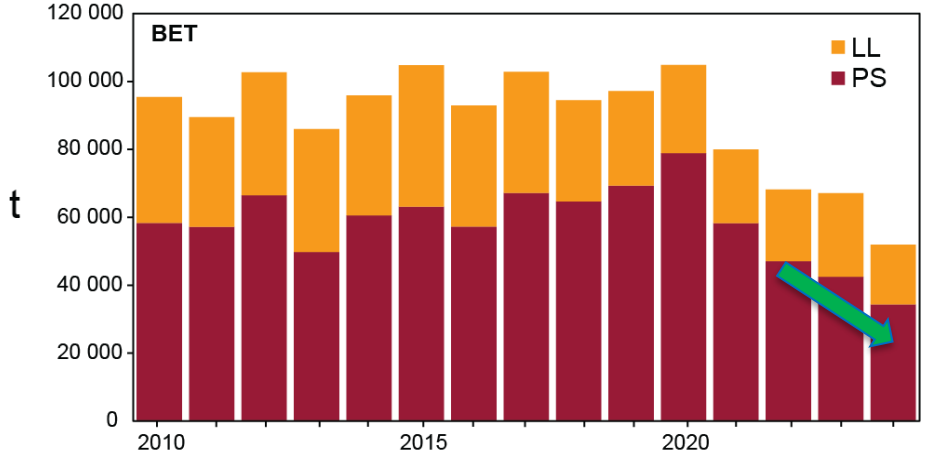
THE EFFECTS OF THE INDIVIDUAL VESSEL THRESHOLD PROGRAM ON TROPICAL TUNA CATCHES AND FLEET BEHAVIOR: A 2024 UPDATE

Individual Vessel Threshold (IVT) measure (Resolution C-21-04)



IVL	Additional days
1,200	10
1,500	13
1,800	16
2,100	19
2,400	22

BET – Impact of Individual Vessel Threshold (IVT) measure



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-36%

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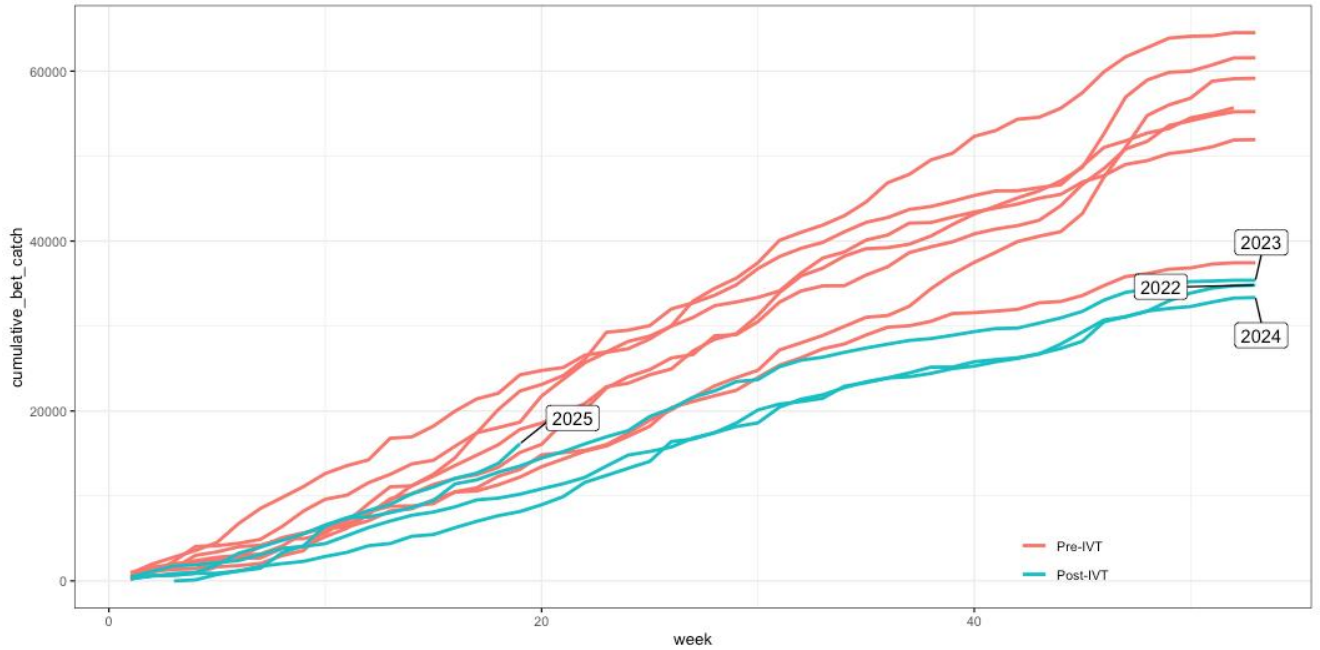
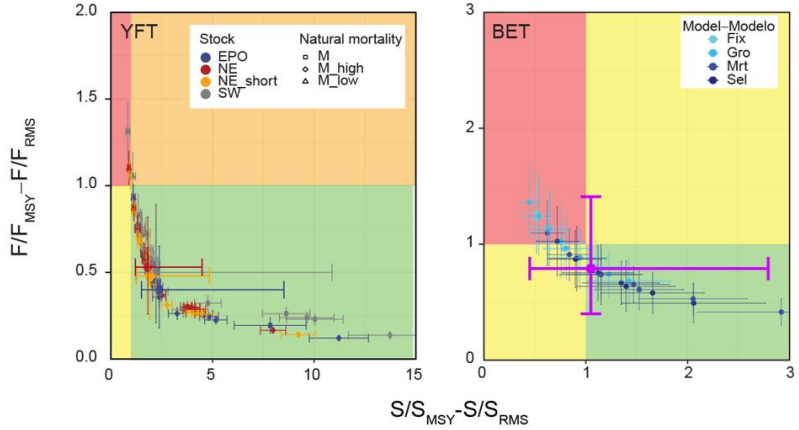
BET - Cumulative catch



(BET)

Weekly cumulative catch curves by year through week 19 for 2025.
Green curves are post-IVT years

Staff response to paragraph 14 of Resolution C-24-01



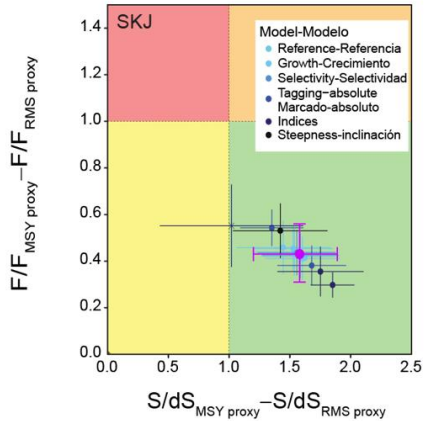


TABLE 1. Stock status[5] of yellowfin, bigeye and skipjack tunas, expressed in terms of the probabilities of exceeding the reference points specified in the HCR.

	Probability (%) of exceeding RP		
Target RP	**Yellowfin**	**Bigeye**	**Skipjack**
$F_{cur}>F_{MSY}$	<7	25	0
$S_{cur}<S_{MSY}$	<3	47	4
Limit RP			
$F_{cur}>F_{LIMIT}$	0	<1	0
$S_{cur}<S_{LIMIT}$	0	<1	<1

Questions?

RESOLUTION C-24-01

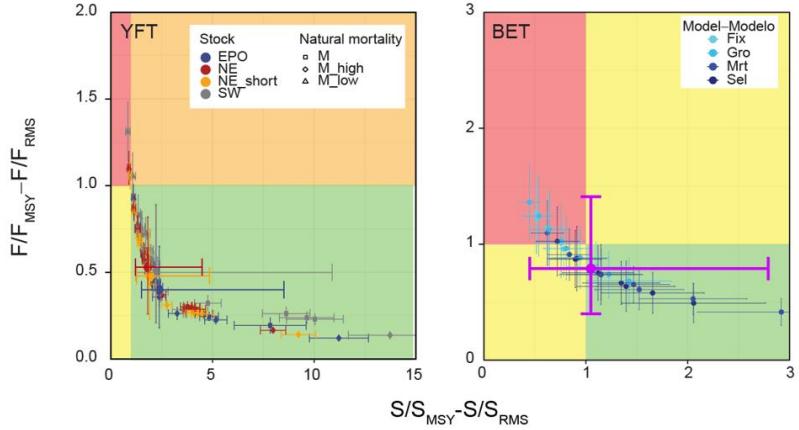
CONSERVATION MEASURES FOR TROPICAL TUNAS IN THE EASTERN PACIFIC OCEAN DURING 2025-2026

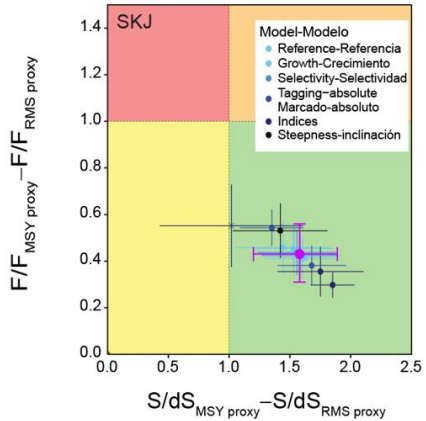
- Resolution C-24-01 establishes conservation measures for tropical tunas in the EPO for the 2025–2026 biennial period. Therefore, **the adoption of a new resolution is not necessary in 2025 to establish conservation measures for 2026**, unless the Commission decides otherwise.

- However, according to **paragraph 14 of the resolution**:

  If the implementation of this measure has positive effects that demonstrate an improvement of the status of the bigeye tuna stock, the scientific staff shall analyze the conservation measures in force in order to submit to the Commission for consideration new measures that consider, among others, reducing the number of closure days or eliminating the "corralito".

Staff response to paragraph 14 of Resolution C-24-01





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	Probability (%) of exceeding RP		
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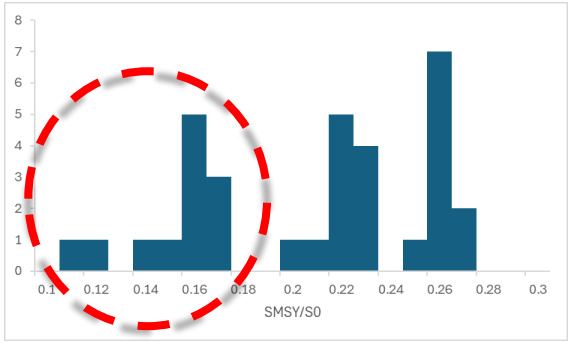
$F_{cur}>F_{MSY}$	<7	25	0
$S_{cur}<S_{MSY}$	<3	47	4
Limit RP			
$F_{cur}>F_{LIMIT}$	0	<1	0
$S_{cur}<S_{LIMIT}$	0	<1	<1

Staff response to paragraph 14 of Resolution C-24-01 (cont.)

- The probability that the BET fishing mortality (*F*) is above F_{MSY} *is* low (25%). Reduced from 59% during 2017-2019, the *status quo* period
- The probability that the spawning biomass (*S*) at the beginning of 2024 is below S_{MSY} is 47% and will keep reducing in future years under current *F*
- S_{MSY}/S_0 is < 0.2 for some scenarios (e.g. 0.17 for h=1)
- Based on the strict objective to maximize yield given the current mix of effort among gears, $S_{MSY}/S_0 < 0.2$ is technically possible
- To achieve the *F* corresponding to the MSY for BET, a reduction in the closure of the purse seine fishery from 72 to 8 days would be necessary!



[1] Calculation of the new closure ignoring any changes in fishing capacity:

$$Closure = 365 - (365 - Closure_{old})\left(\frac{F_{MSY}}{F_{cur}}\right) = 365 - (365 - 72)\left(\frac{1}{0.82}\right) = 8$$

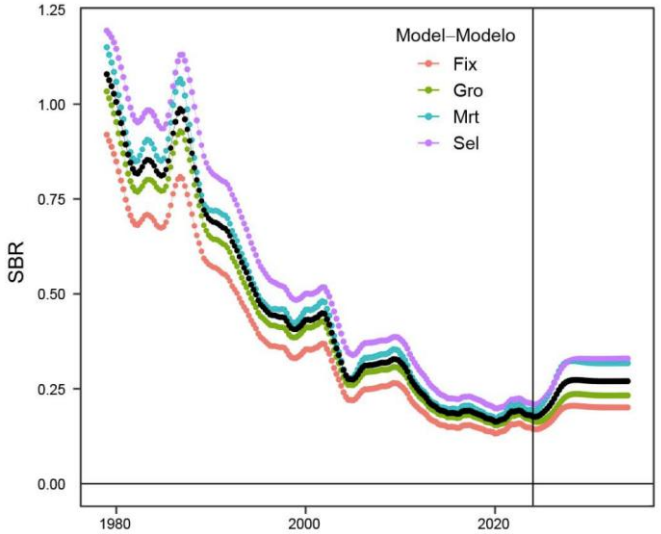
Points to consider if reducing measures

- Other organizations and stakeholders have considered such low levels of S_{MSY}/S_0 undesirable (e.g. WCPFC uses a 20% as limit)

- The 10-year projection under the current *F* indicates a 50% probability that the BET stock depletion at the beginning of 2034 will be above 0.27

- A more global approach to defining MSY supports a less depleted biomass (S_{MSY}/S_0 = 0.3; SAC-15-05)

- Consistent with the 0.3 proxy proposed by the staff as interim TRP (SAC-14-09 and SAC-14 INF-O)



Points to consider if reducing measures (cont.)

- **Significant reductions in measures should be implemented incrementally** to allow for careful evaluation of their effects on the stocks and the ecosystem, and also to help minimize variability in catch and effort

- Such adjustments should be made within the framework of an **adopted harvest strategy**

- The staff recommends that any reduction in the number of closure days be limited to a maximum of 10 days (corresponding to approximately 15% reduction of the duration of the current closure)

Two options if the Commission decides to reduce measures

- **Option 1:** If the Commission wishes to adopt revised management measures for **2026 only,** a maximum reduction of 10 days in the purse seine fishery closure is recommended (or alternatively a maximum reduction of 7 days if the *corralito* is eliminated).

- **Option 2:** If the Commission wishes to initiate a new triennial cycle (2026-2028) with revised management measures, the staff recommends the adoption of the **proposed candidate harvest strategy** (developed in response to paragraph 8 of Resolution C-24-01; see SAC-16-06).

Corralito

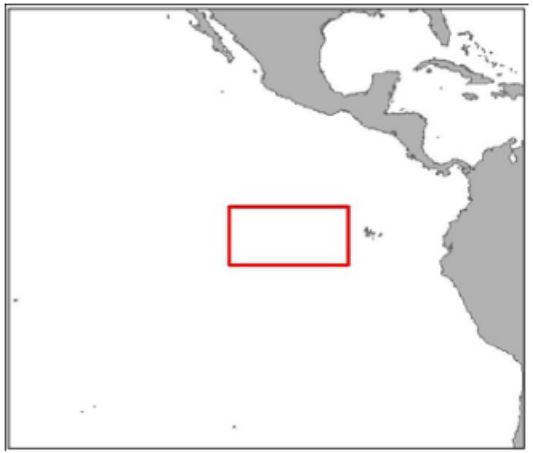


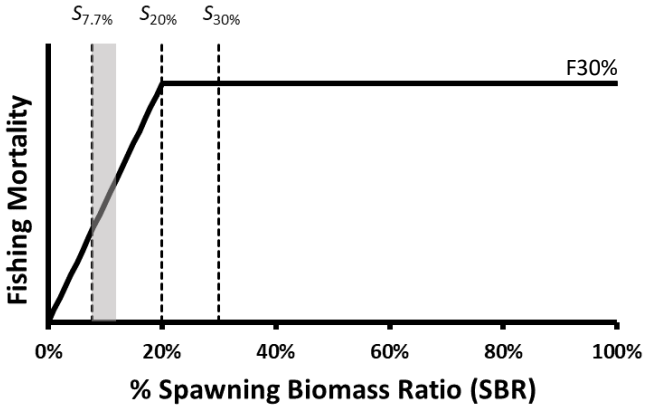
Figure 1. Closure area

Closed 9-Oct thru 8-Nov
Equates to 3 days of full EPO closure

Proposed Harvest Strategy: Summary

"Reference" points for use in the HS:
HS Objective: $S_{30\%}$
HCR Fmax: $F_{30\%}$
HCR control point: $S_{20\%}$
Exceptional circumstances limit: $P(S < S_{7.7\%}) \geq 10\%$

Objectives:
Maintain stock at or above $S_{30\%}$: $S \geq S_{30\%} \geq S_{MSY}$
Maintain stock above limit RP with very high probability: $S >> S_{7.7\%}$
Maintain F below reference level: $F \leq F_{2019\text{-}2021}$
Long term stability of catch and effort
Reduction in the closure of the purse-seine fishery
Elimination of the *corralito*



Harvest Control Rule: F_{30}-S_{20}
F_{MAX}: $F_{30\%}$
$S_{control}$: dynamic $S_{20\%}$
$S_{F=0}$: 0
Maximum allowed change (closure days): 10 days

Estimation model (ASPM-Rdev+):

Age structured production model
Estimated recruitment
Fit to a subset of the length composition data
Base reference model assumptions

Data used:
Catch by fishery
Longline CPUE: Spatiotemporal standardized index of abundance
Length composition: Longline index and fishery

Management actions (calculation of PS closure days):

$$Closure_{new} = 365 - (365\text{-}Closure_{old})(F_{HCR}/Fcur)(C_{old}/C_{new})$$

Exceptional circumstances:

- The IATTC limit reference point is exceeded with a probability greater than 10%
- F_{HCR} is greater than the 2019-2021
- When a benchmark assessment, MSE, or indicators suggests the HCR is inappropriate
- Data becomes unreliable
- The EMP program (or its proposed alternative, the IPSP) is not continued or the IVT is evaluated to be ineffective
- The purse seine closure resulting from application of the HCR is more than 72 days
- Either yellowfin or skipjack requires stricter management
- Longline catch exceeds its TAC
- A reliable skipjack tun assessment is not available

SAC-16-06

Staff recommendations – tropical tunas

RECOMMENDATIONS:

Resolution C-24-01 establishes conservation measures for tropical tunas in the EPO for the 2025–2026 biennial period. Therefore, the adoption of a new resolution is not necessary in 2025 to establish conservation measures for 2026, unless the Commission decides otherwise.

If the Commission chooses to update the conservation measures in 2025, substantial reductions are possible under the harvest control rule specified in Resolution C-23-06. However, the staff recommends that any reductions in management measures be planned incrementally to allow for a careful evaluation of their effects on the stocks and the ecosystem, and also to help minimize variability in catch and effort.

Accordingly, the staff presents the following two options for consideration should the Commission decide to revise the conservation measures in 2025, and adopt new measures for 2026 and beyond:

- **Option 1:** If the Commission wishes to adopt revised management measures for **2026 only,** a maximum reduction of 10 days in the purse seine fishery closure is recommended (or alternatively a maximum reduction of 7 days if the *corralito* is eliminated).
- **Option 2:** If the Commission wishes to initiate a **new triennial cycle (2026-2028)** with revised management measures, the staff recommends the adoption of the proposed **candidate harvest strategy** (developed in response to paragraph 43 of Resolution C-24-01; see SAC-16-06).

Additional actions

Additional actions that the staff believes should accompany any significant reductions in management measures:

- **Maintain the incentive provided by the Individual Vessel Threshold (IVT) program for fisheries to continue reducing fishing mortality for bigeye** (see Section 1.1.1.b). This includes the continuation of the EMP program or, preferably, the staff's proposed Integrated Port Sampling Program (IPSP) to merge the EMP with the traditional sampling program (see proposed IPSP in SAC-16-05 developed in response to Commission request on paragraph 8 of Resolution C-24-01).
- **Secure the staff's ability to conduct a benchmark assessment for skipjack in 2028-2029**. This requires securing funding in 2025 to carry out a tropical tuna tagging program in the EPO during 2026-2027 (see unfunded project in SAC-16 INF-E.b).

Development of harvest strategies

RECOMENDATIONS

1. The Commission adopt management objectives (WSMSE-05-01 , SAC-16-06) and revised reference points for tropical tunas (SAC-15-05).

2. If the Commission wishes to initiate a new triennial cycle (2026-2028) with revised management measures, the staff recommends the adoption of the **proposed candidate harvest strategy** (developed in response to paragraph 8 of Resolution C-24-01, SAC-16-06).

3. Continue development and testing of harvest strategies for tropical tuna in the EPO with support from the IATTC WG on MSE.

Integrated Port-Sampling Program for data collection for scientific research in support of fisheries management

RECOMMENDATION:

Establish the Integrated Port Sampling Program (SAC-16-05) as a regular program at the IATTC, to merge the scope of the Enhance Monitoring Program (EMP) and the traditional Port Sampling Program.

Questions?

Stock status

Scientific work for consideration in 2025

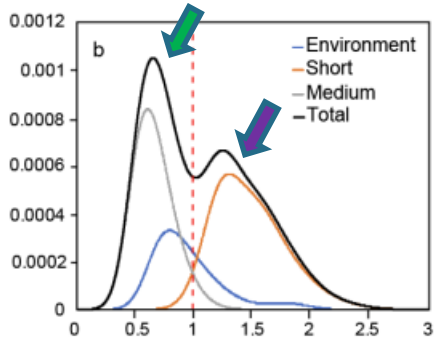
- **2024 benchmark assessment reports, including a risk analysis, for all three tropical tuna species**: bigeye (SAC-15-02), skipjack (SAC-15-04; SAC-16-04), and yellowfin (SAC-16-03)

- **Stock status indicators** (SAC-16-02) for all three species

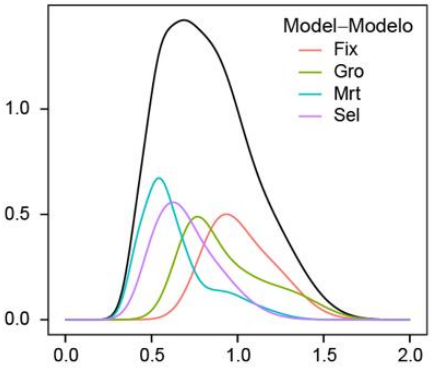
- **Evaluation of conservation measures:** 1) impact of the Individual Vessel Threshold (IVT) measure on BET catches (SAC-15 INF-K; SAC-16 INF-S); 2) and the corralito (SAC-15 INF-M).

2024 BET benchmark assessment: improvements

- The bimodal distribution of management quantities has been resolved (shifted to unimodal pattern)
- The “regime shift” in recruitment has been greatly improved



F_{cur}/F_{MSY}–F_{act}/F_{RMS}

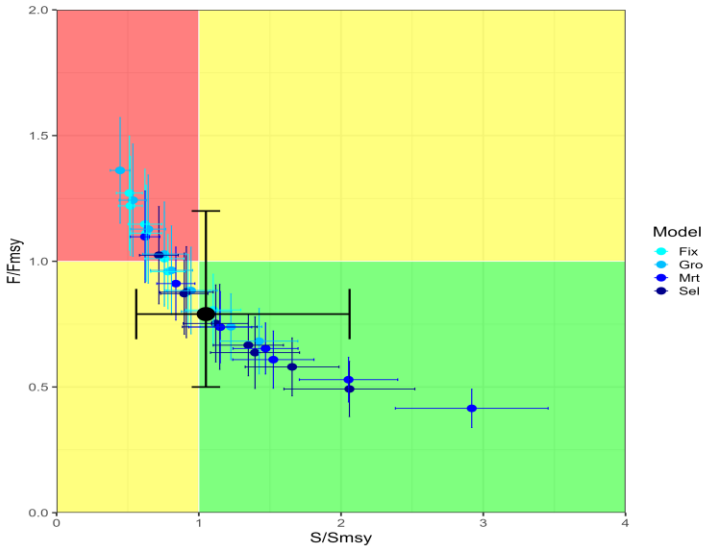


F_{cur}/F_{MSY}–F_{act}/F_{RMS}

2024 BET benchmark assessment: risk analysis

- **Target reference points:**
  - 25% probability that F_{MSY} has been exceeded:
    $P(F_{cur}>F_{MSY}) = 25\%$
  - 47% probability that S_{cur} is below S_{MSY}:
    $P(S_{cur}<S_{MSY}) = 47\%$

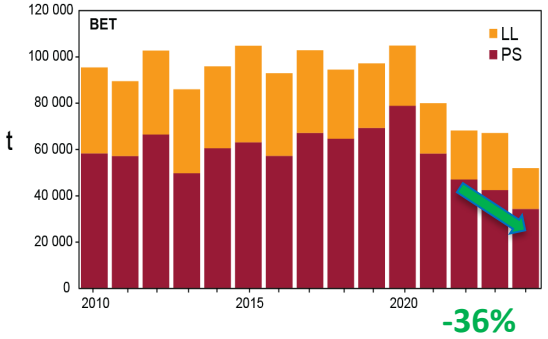
- **Limit reference points:**
  - There is a very low probability that the *S* and *F* LRPs have been exceeded:
    $P(S_{cur}<S_{LIMIT}) = 0.2\%$; $P(F_{cur}>F_{LIMIT}) = 0.1\%$



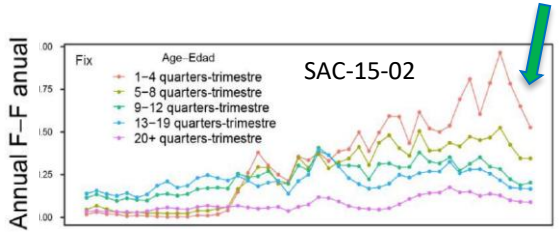
SAC-15-02

BET – Impact of IVT measure(2022-2024)

- The IVT meaningfully decreased catches of bigeye in OBJ sets by class 6 purse seine vessels
- Reduction in BET juvenile fishing mortality (*F*) in 2022-2023
- This change appears to have been driven largely by a decrease in OBJ CPUE
- Research supports that “highliner” vessels appeared to have decreased their probability of catching ≥ 10 t of BET in OBJ sets

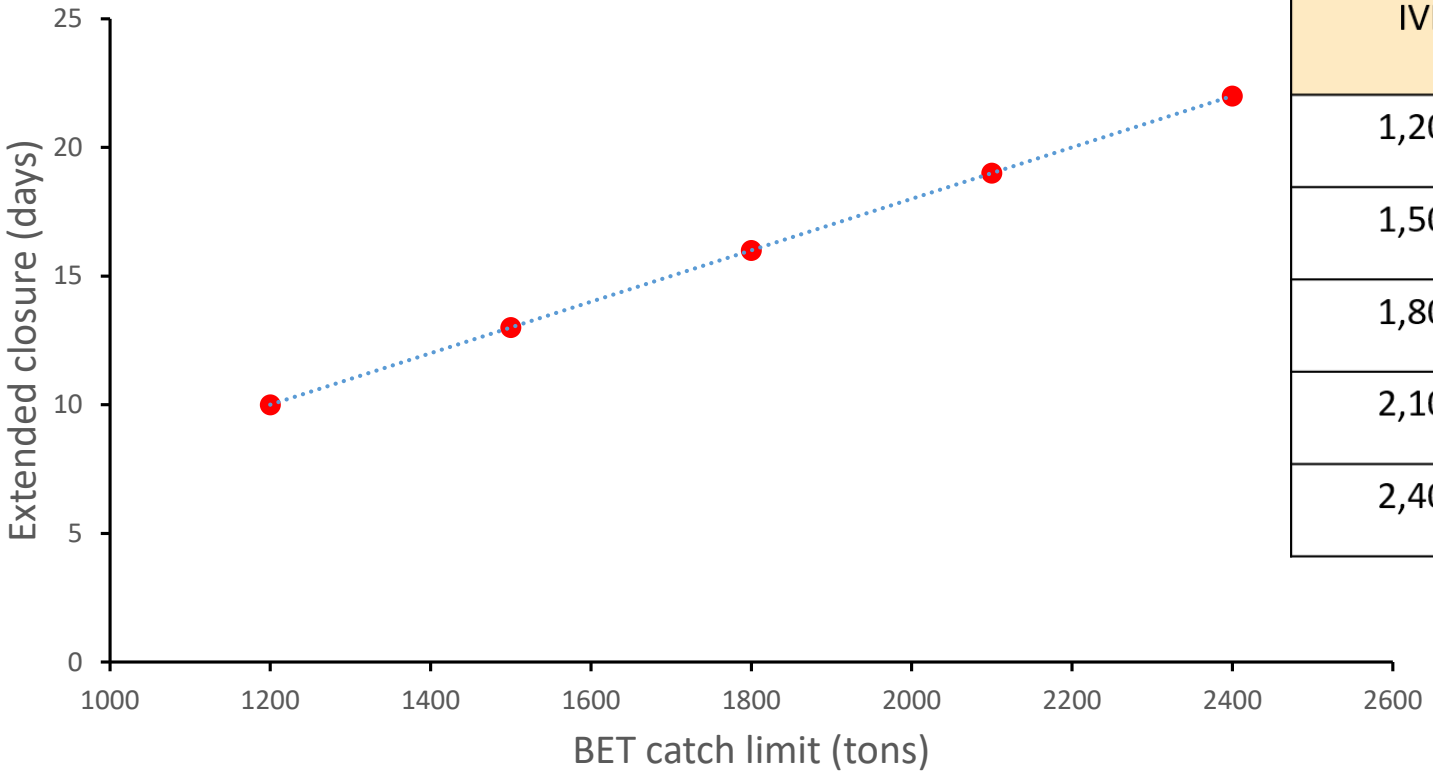


	Cavg (t)
PS pre IVT (2012-2021)	64,000
OBJ post IVT (2022-2024)	41,000



SAC-15 INF-K
SAC-16 INF-S

Individual Vessel Threshold (IVT) measure - Extended closure days

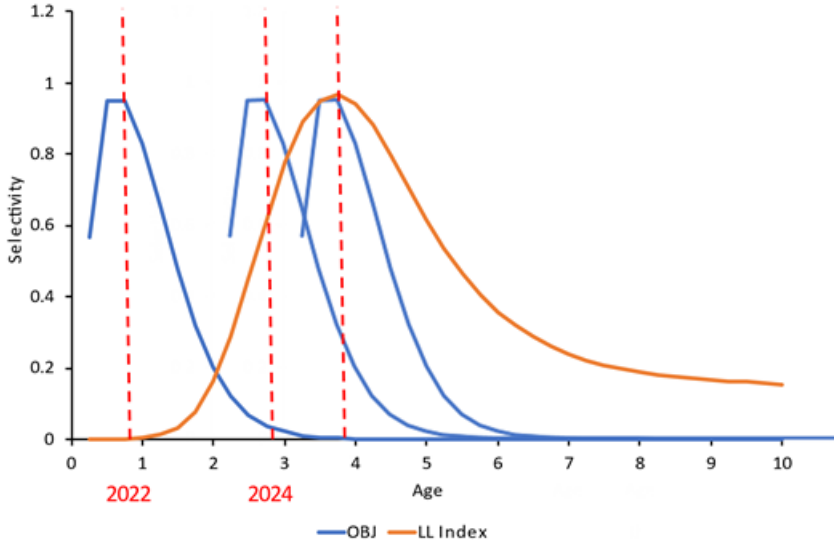


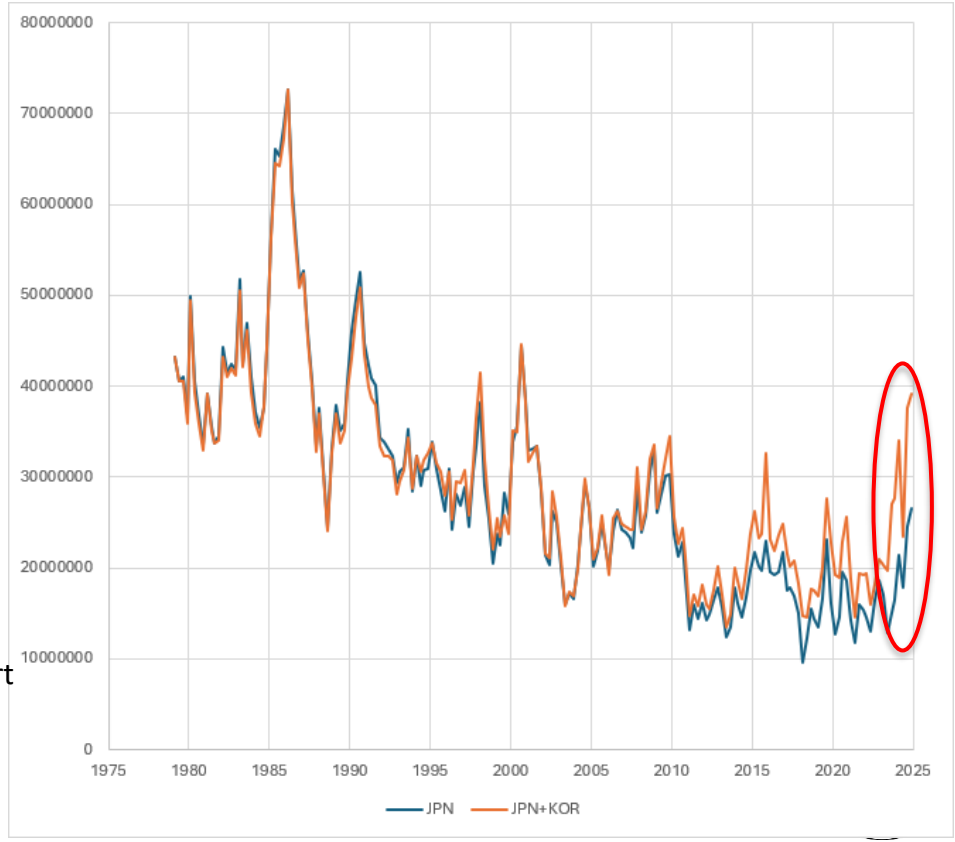
IVL	Additional days
1,200	10
1,500	13
1,800	16
2,100	19
2,400	22

Data improvements: enhanced species composition port-sampling (EMP)

- As a component of the IVT, Resolution C-21-04 established the Enhanced Monitoring Program (EMP) as a science-based support tool through:
  - Specialized port-sampling protocol for purse-seine catches.
  - Trip-level estimates of BET catch, and a measure of precision for those estimates.
- Could be used as a platform to improve science for management of tropical tuna in the EPO (SAC-16-05)

BET – Impact of IVT program (2022-2024)

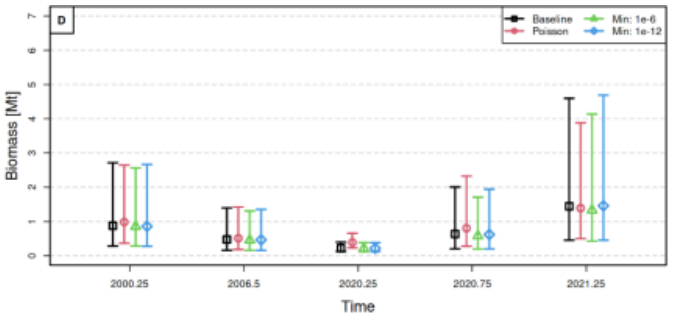




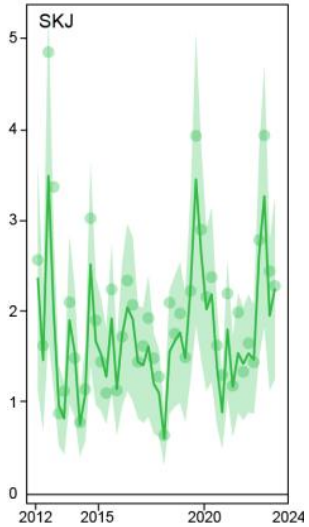
- Fish caught by the OBJ fishery at the start of 2022 would be fully selected by the start of 2025 and moderately selected by the start of 2024
- We should expect to see an impact of the IVT in the longline index during 2024 and particularly towards the end of 2024.

SKJ benchmark assessment 2024: improvements

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



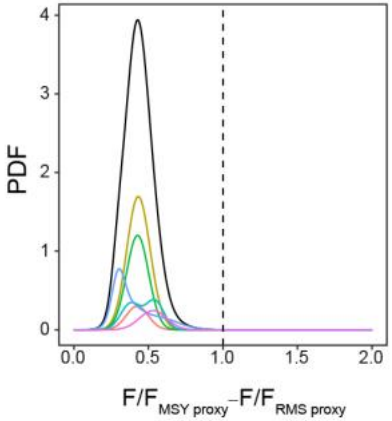
  - An index based on the echosounder buoy data (BAI index, FAD-08-02)

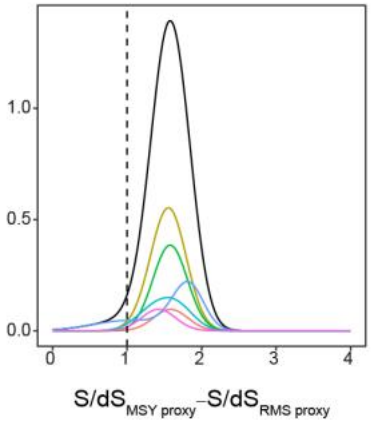


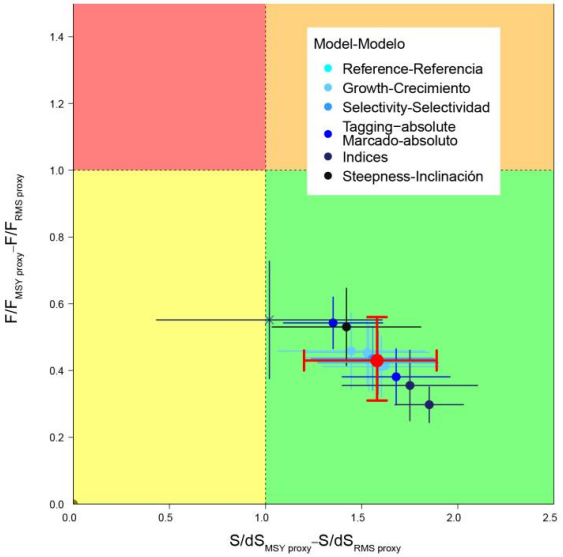
2024 SKJ benchmark assessment: risk analysis

- **MSY-*proxy* target reference points:**
  - zero probability that $F_{MSY\text{-}proxy}$ has been exceeded:
    $P(F_{cur}>F_{MSY\text{-}proxy}) = 0\%$
  - 4% probability that S_{cur} is below $S_{MSY\text{-}proxy}$:
    $P(S_{cur}< S_{MSY\text{-}proxy}) = 4\%)$

- **Limit reference points:**
  - Very low probability that the *F* and *S* limit reference points have been exceeded:
    $P(F_{cur}>F_{LIMIT}) = 0\%$; $P(S_{cur}<S_{LIMIT}) < 1\%$





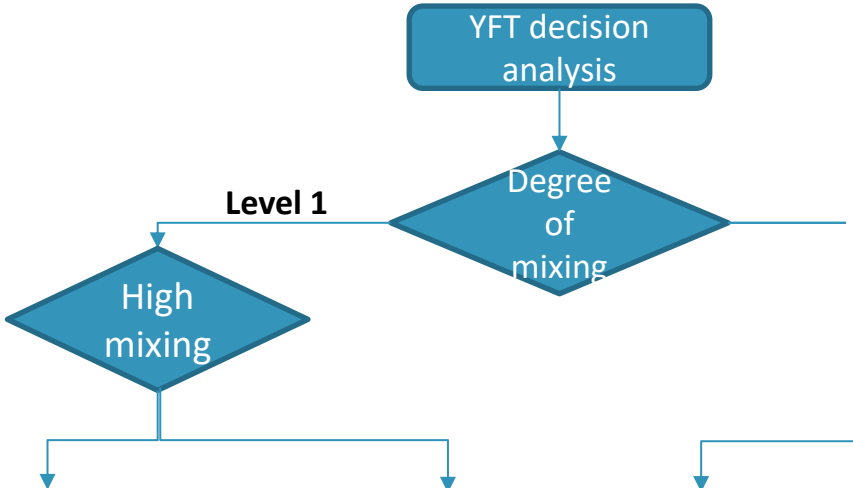


SAC-16-04

Background: YFT Benchmark Assessment SAC-11-07 2020

Issues that remained:

- Stock structure/spatial structure (explorations on how to “split” stocks inconclusive)
- Bimodal/multimodal patterns in length composition of fisheries and index
- Uncertainty in growth and natural mortalit



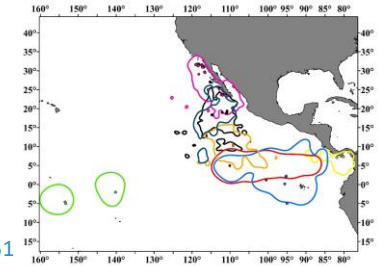
Pragmatic solutions adopted:

- Focus of the model on the core area of the catches (e.g. **main index is purse-seine index north of 5°N)**
- Model selectivities using flexible curves (splines)
- Time-blocks in selectivity

Background: YFT Exploratory analyses SAC-14-06 2023

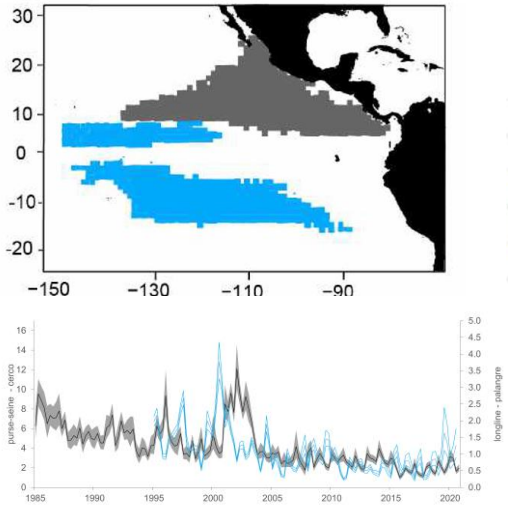
I.Genetic and genomic data is sparse but points towards spatial structure (NE vs SW)

II.Archival tagging data shows limited movement

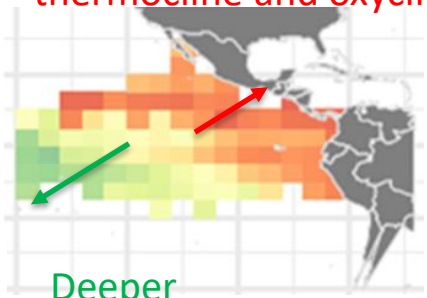


III.**PS-DEL index** and **LL index**:

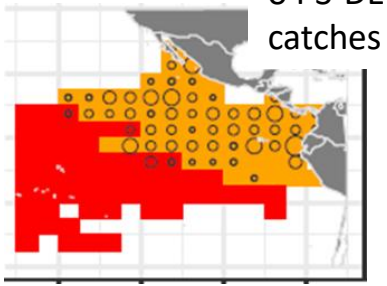
do not overlap in space and are dominated by different cohorts



IV. “Stock” structure may be related to broad oceanographic patterns, and may vary temporally



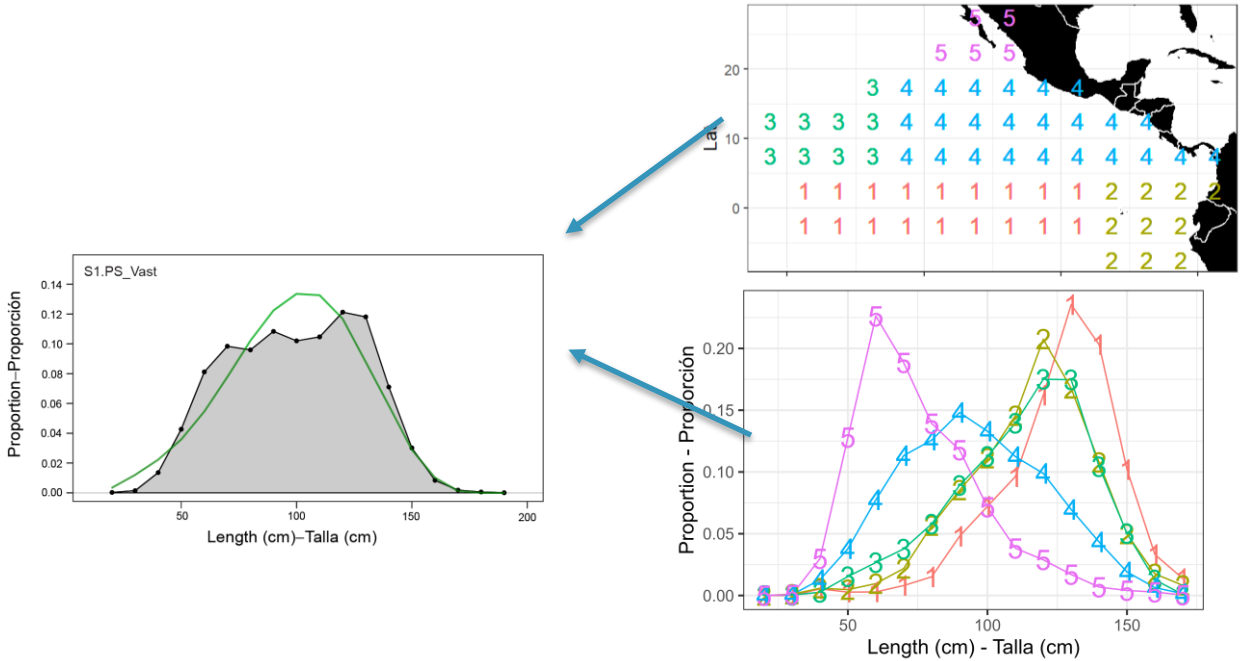
V. “Stocks” may occupy irregular areas, not able to split using latitude and longitude.



Areas based on habitat and tree analysis of PS-OBJ length frequencies

Background: YFT Exploratory models SAC-15-03 2024

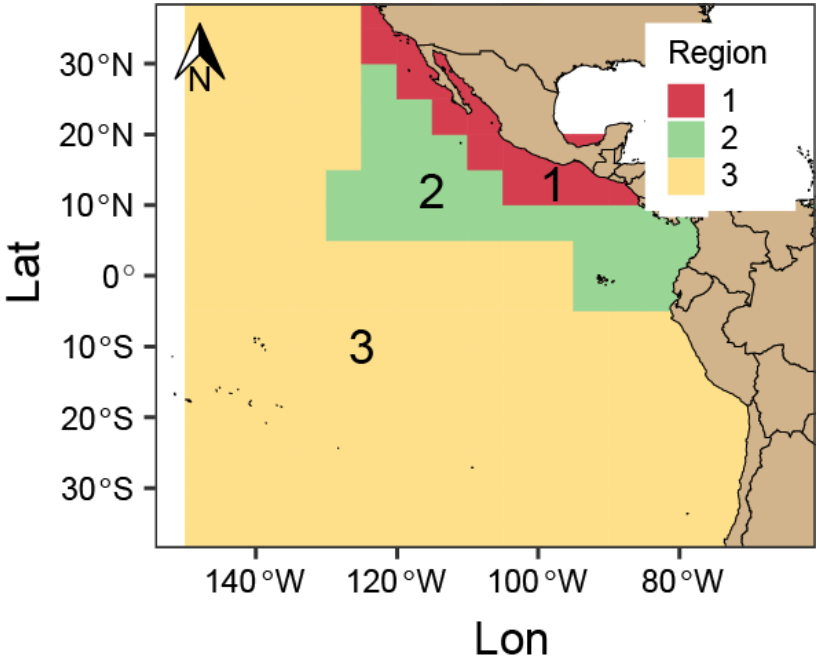
- There is spatial structure even within PS-DEL area
- May be related to spatial structure
- Limitations of the methods to discriminate areas: only along latitude and longitude
- Index associated with multimodal length compositions



2025 benchmark assessment: achievements

- Cluster analysis for irregular areas ✓
- Flexible well-behaved asymptotic selectivity curves ✓
- Spatio-temporal analysis of tagging data
- Longline CPUE index based on all distant water fleets ✓
- Investigate dolphin associated fishery CPUE index ✓
- Investigate within-year depletion in the DEL index
- Investigate changes in the ecosystem after the 1997-1998 el Niño ✓
- Further develop models of stock structure ✓

Level 1: Spatial structure



EPO:

- spatial model: movement estimated to be near zero
- areas-as-fleet model

NE: Region 1 and 2

SW: Region 3

Indices of abundance and corresponding length composition

Longline:
Collaborative work with Japan, Korea, China and Chinese Taipei

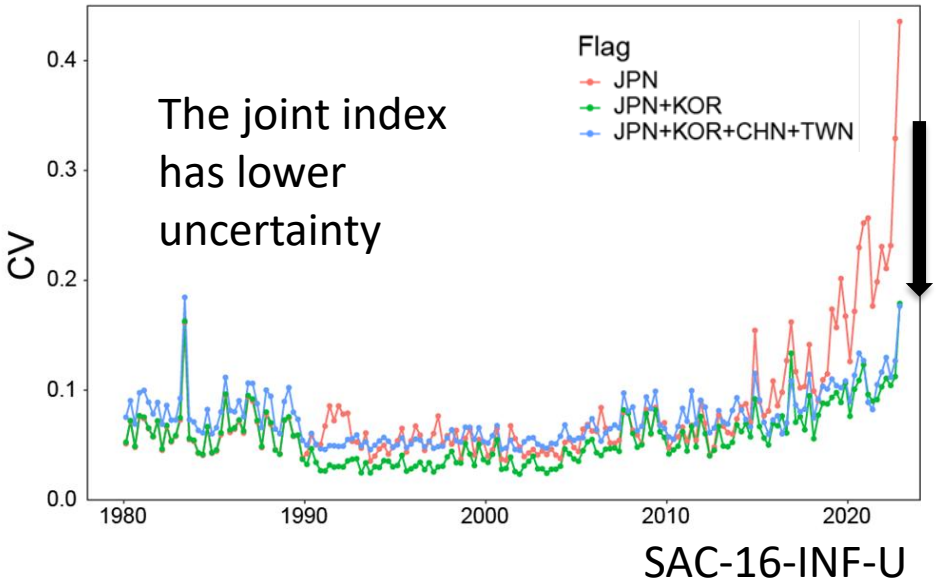
VAST: **Multi-fleet index from standandardization of operational level data for Japan and Korea** using spatiotemporal model

Length composition:

Data from fishers (Japan) and observers (Japan and Korea)

Standardized with spatiotemporal model with correlation parameters fixed at the Index values.

Data raised to the density.



SAC-16-INF-U

Models: axes of uncertainty

Period: 1984 to 2023
2006 to 2023 (NE_short)
Start from fished conditions
All models converged

72 models

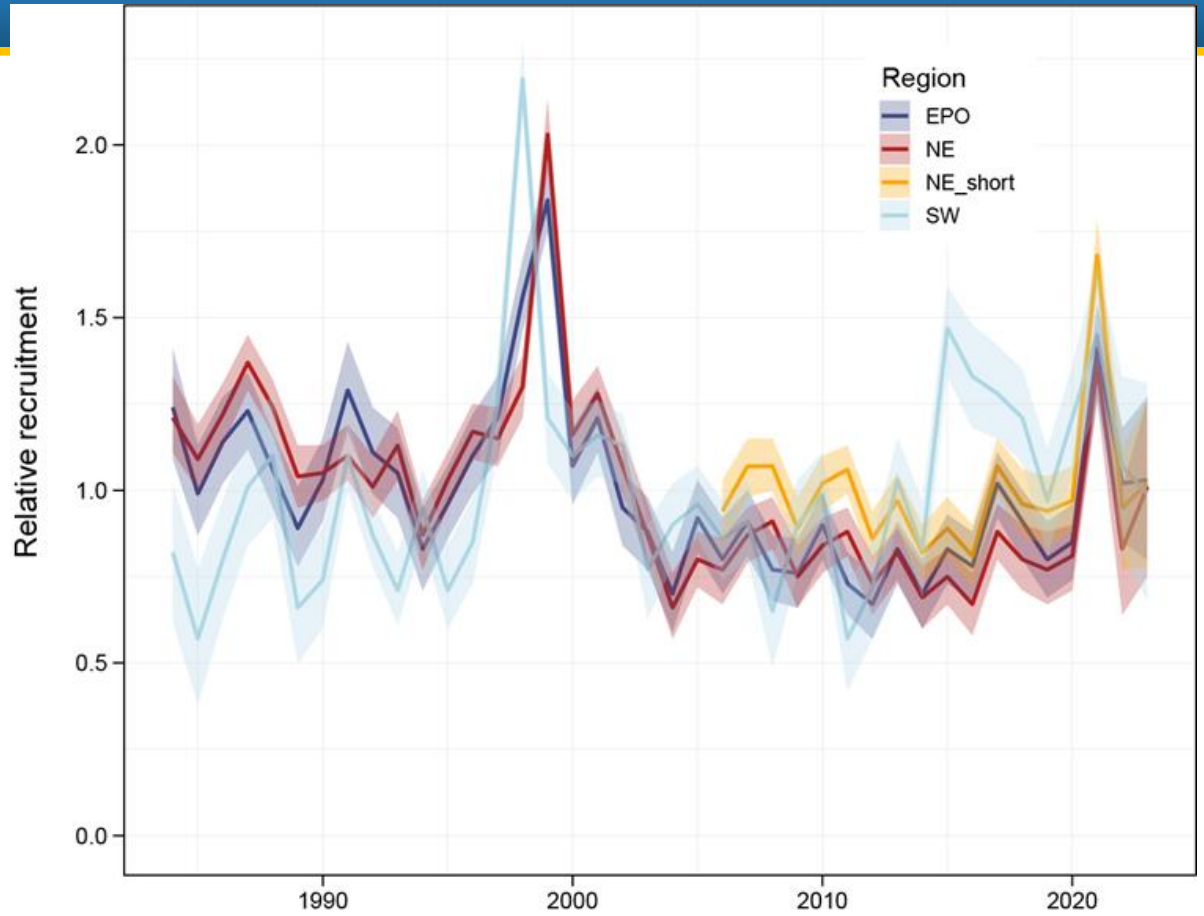
Level 1

Level 2

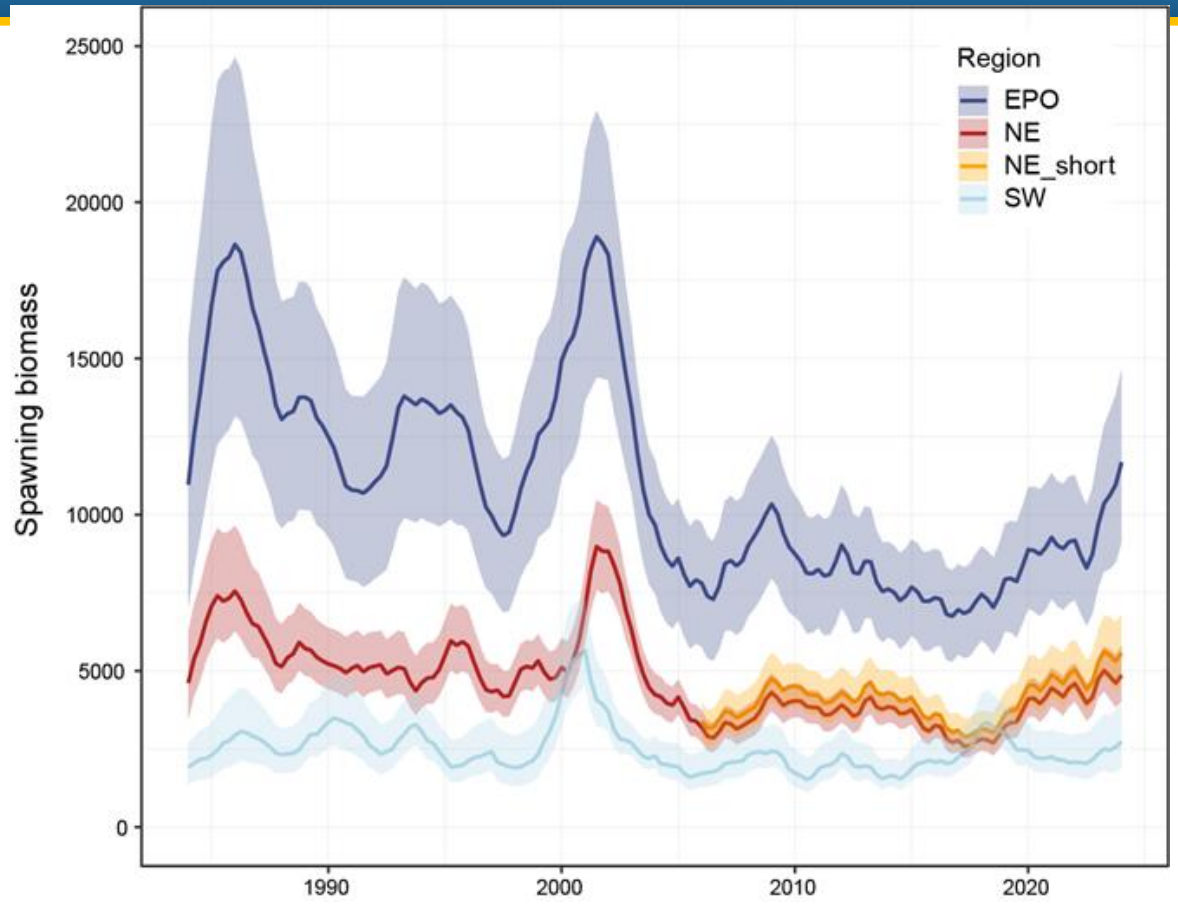
	EPO	NE	NE_short	SW
base	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8
G_high	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8
G_low	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8
M_high	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8
M_low	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8
q1	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8	h=1,0.9, 0.8

Level 3

YFT Recruitment: multimodel estimates

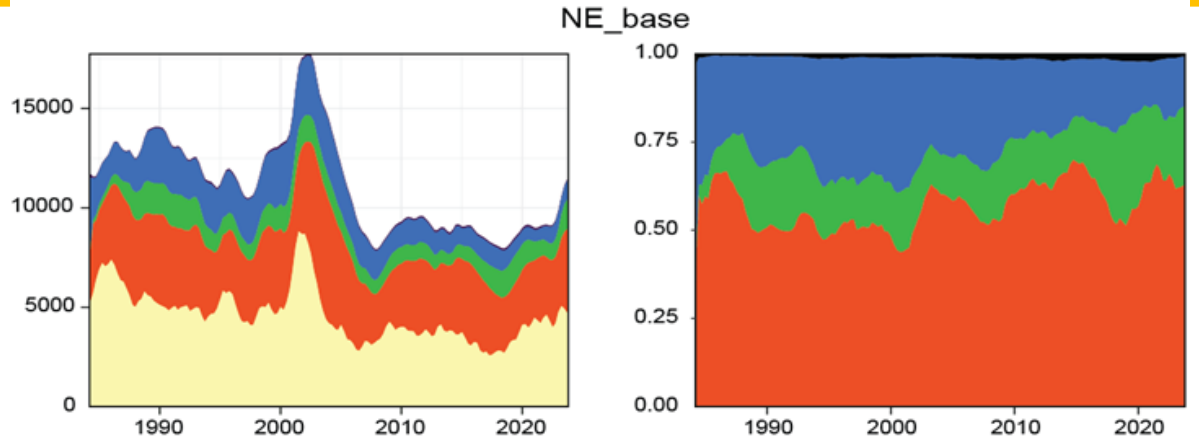


YFT Spawning biomass: multimodel estimates

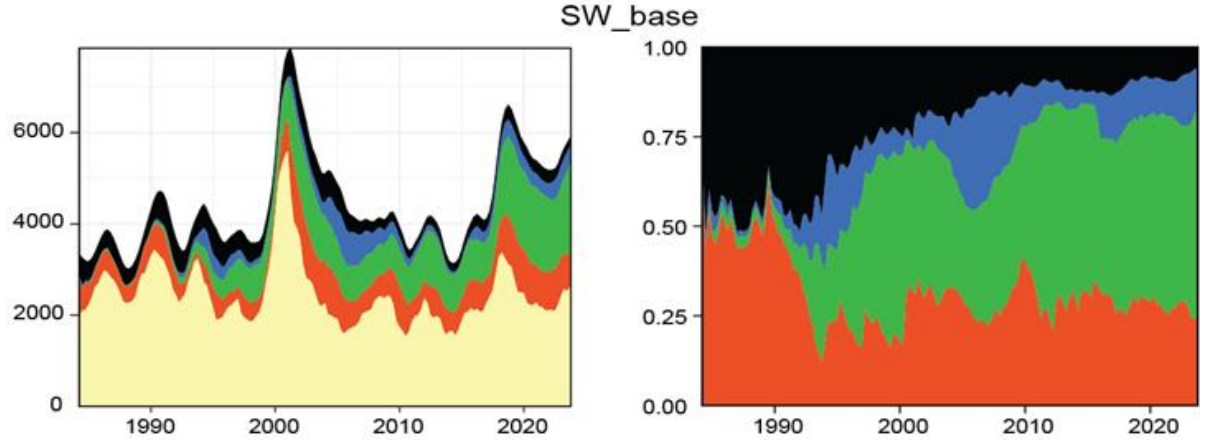


YFT assessment results: fisheries impact

NE

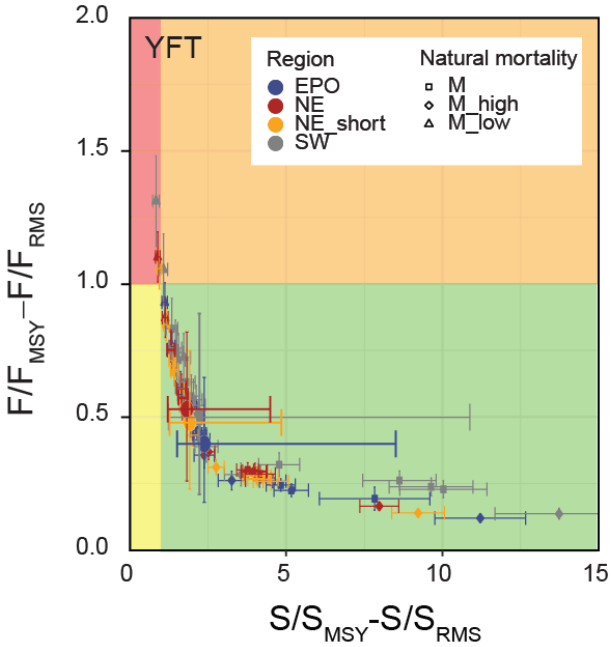


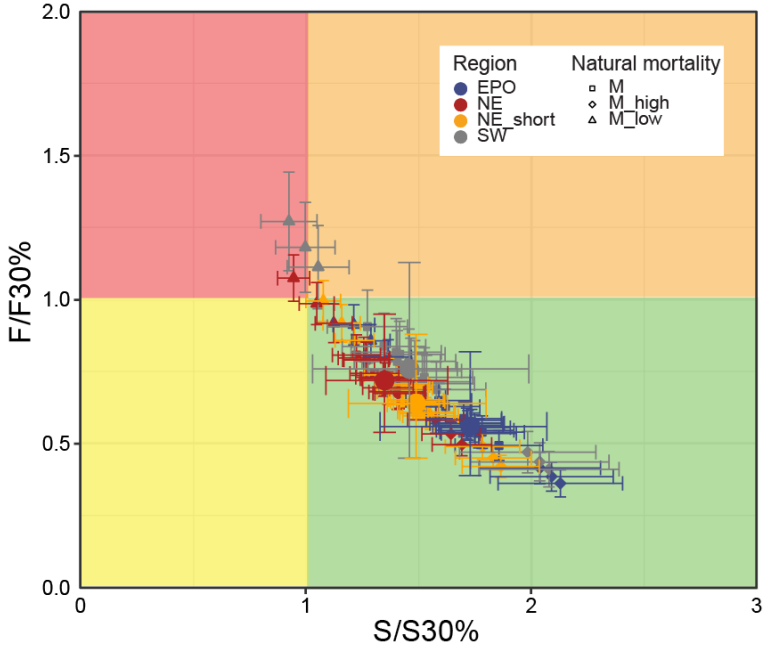
SW



LL
NOA
OBJ
DEL

YFT: Stock status





Risk analysis

Median or *Mean

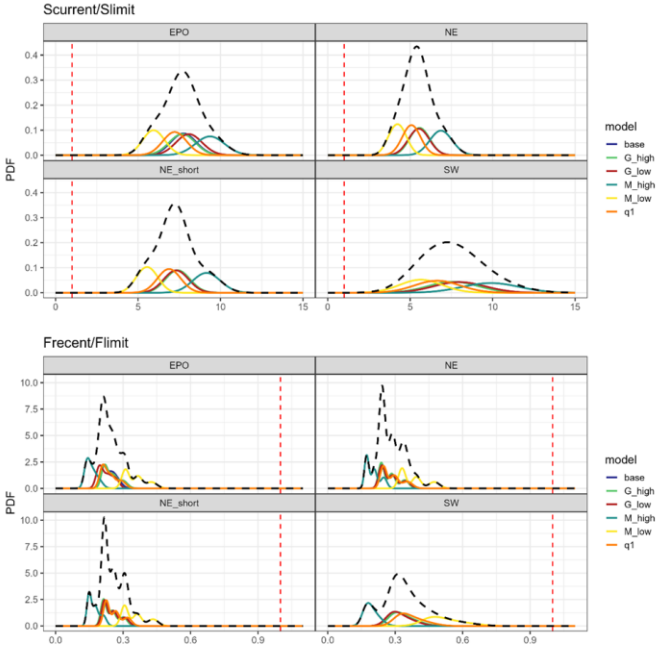
	EPO	NE	NE_short	SW
*SMSY/S0 **	0.180	0.189	0.194	0.162
*SMSY_d/S0_d **	0.190	0.192	0.201	0.170
$F_{current}$/ $F_{30\%S0\_d}$	0.559	0.718	0.643	0.757
p($F_{current}$> $F_{30\%S0\_d}$)	0.002	0.059	0.020	0.161
$F_{current}/F_{MSY}$	0.397	0.532	0.484	0.502
p($F_{current}$>F_{MSY})	0.004	0.034	0.031	0.075
$F_{current}/F_{LIMIT}$	0.232	0.272	0.243	0.330
p($F_{current}$>F_{LIMIT})	0.000	0.000	0.000	0.000
$S_{current}$/ *30%S0* $_d$	1.73	1.35	1.49	1.46
p($S_{current}$< *30%S0*$_d$)	0.0000588	0.044	0.004	0.081
$S_{current}/S_{MSY\_d}$	2.38	1.82	1.91	2.22
p($S_{current}$<S_{MSY_d})	0.000	0.000	0.000	0.000
$S_{current}/S_{LIMIT}$	7.67	5.43	7.23	7.48
p($S_{current}$<S_{LIMIT})	0.000	0.000	0.000	0.000

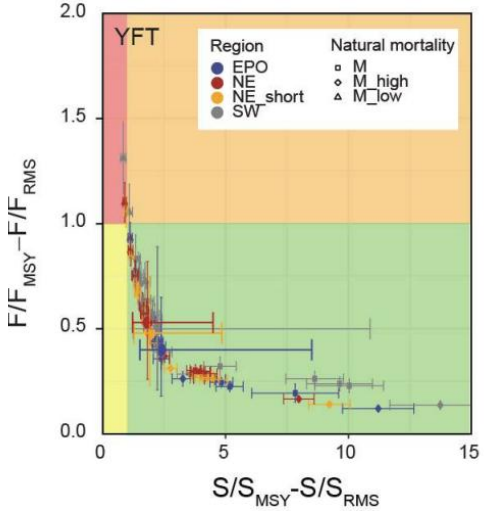
- Low probability of breaching TARGET RP

YFT: Risk analysis

- **Target reference points:**
  - Less than 7% probability that F_{MSY} has been exceeded: $P(F_{cur}>F_{MSY}) < 7\%$
  - Less than a 3% probability that S_{cur} is below S_{MSY}: $P(S_{cur}<S_{MSY}) < 3\%$).

- **Limit reference points:**
  - no probability that the *F* and *S* limit reference points have been exceeded
    $P(F_{cur}>F_{LIMIT}) = 0\%$;
    $P(S_{cur}<S_{LIMIT}) = 0\%$)





SAC-16-03

Extras