



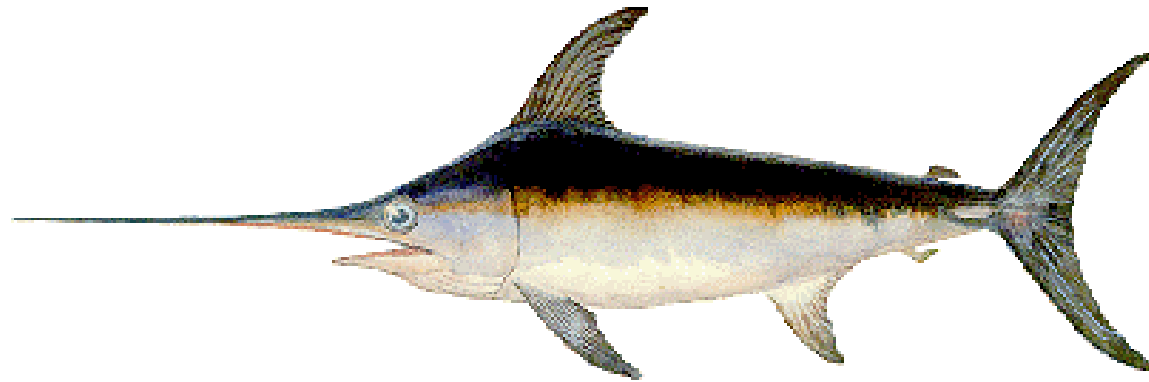
2024 Report of the
Standing Committee of Research and Statistics (SCRS) to
the ICCAT Panel 4

*Limassol, Cyprus
12 November 2024*

Complete 2024 SCRS Report available online AS [PLE-104/2024](#)



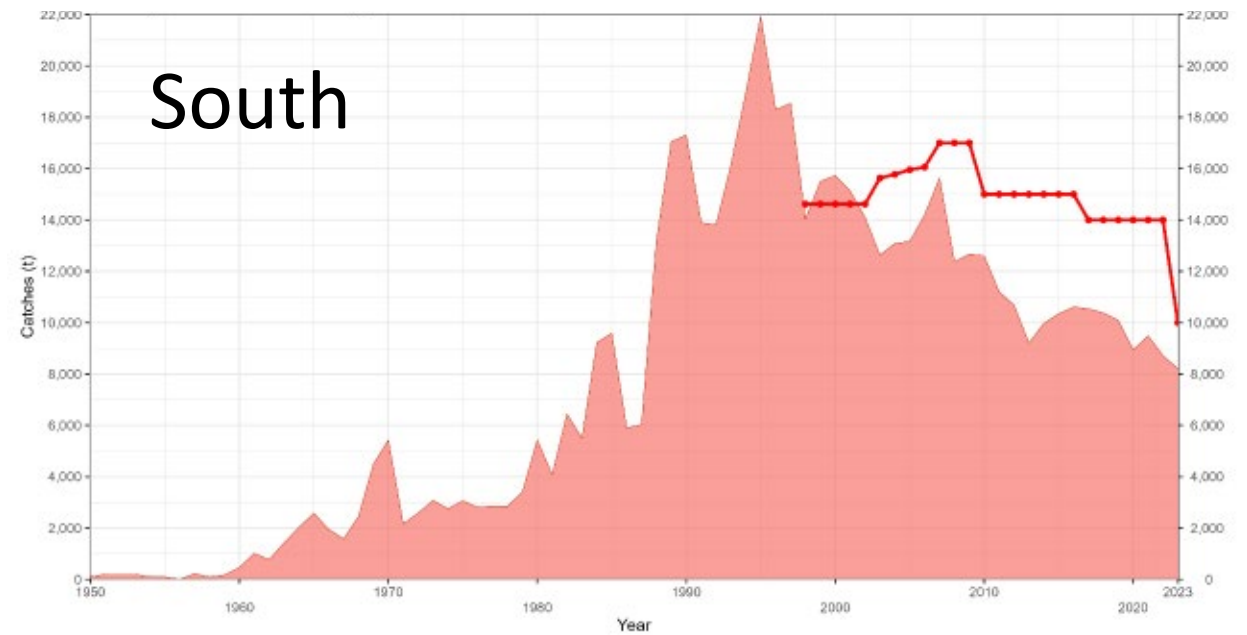
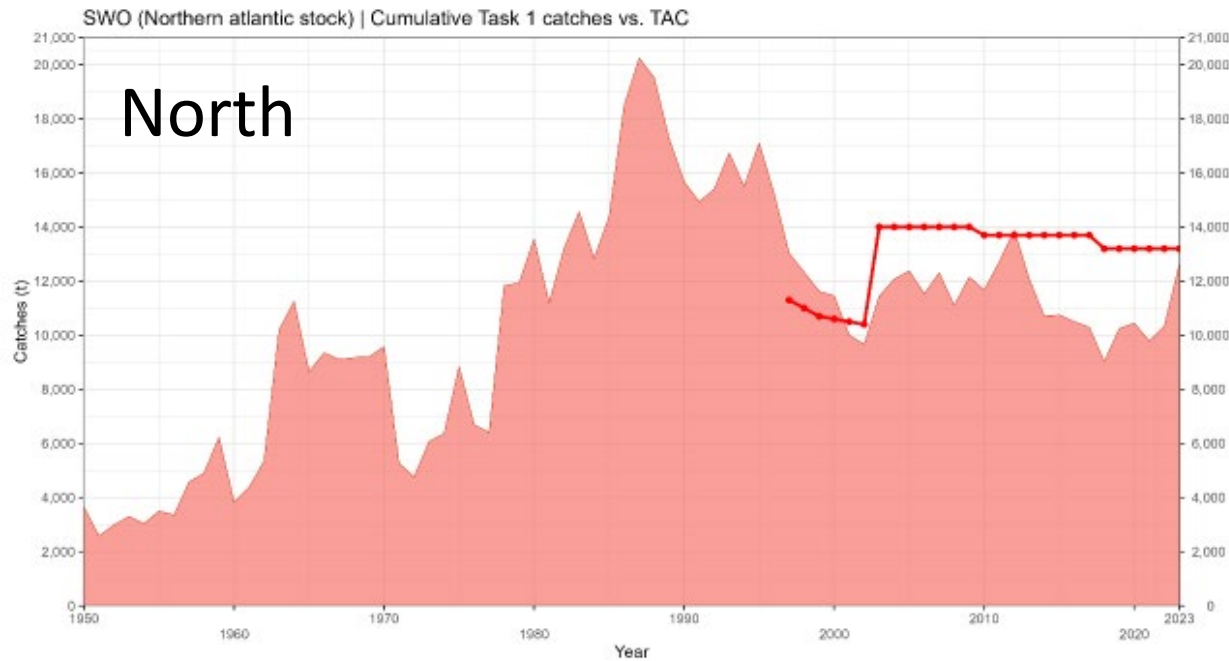
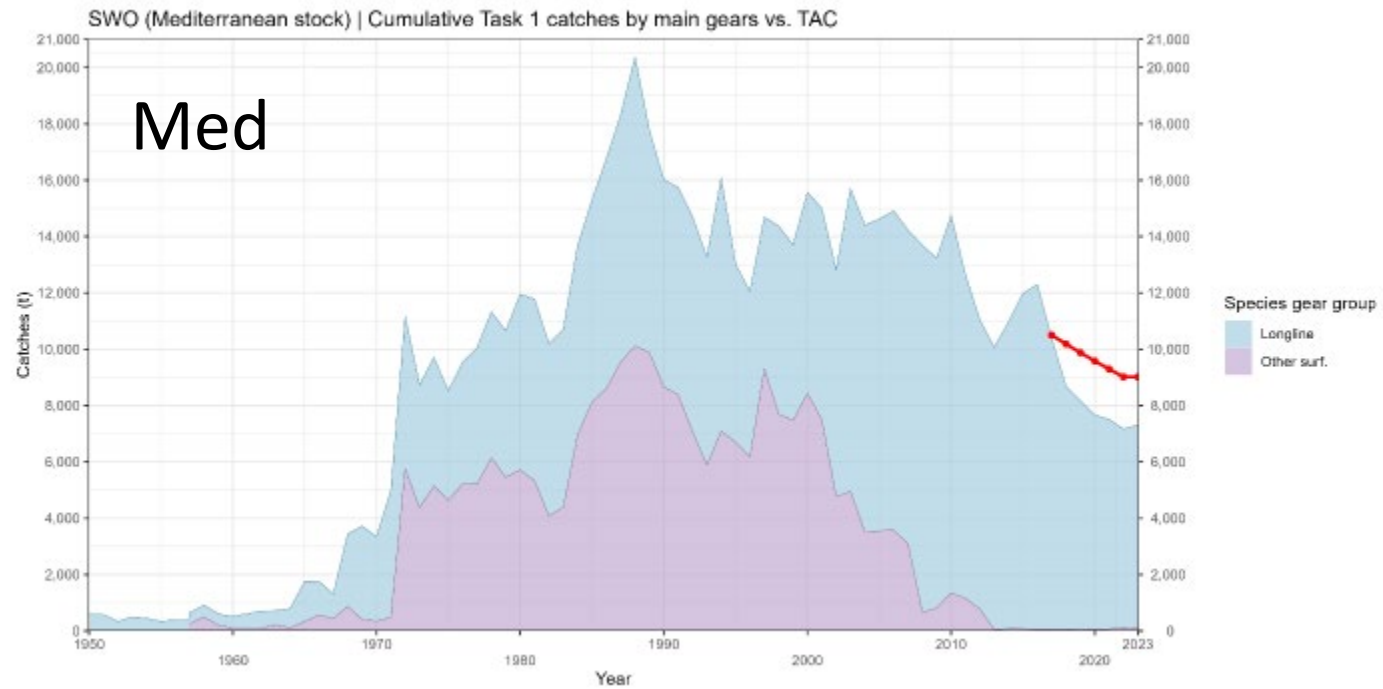
SWO - SWORDFISH



3 stocks
(North Atlantic, South Atlantic, Mediterranean)



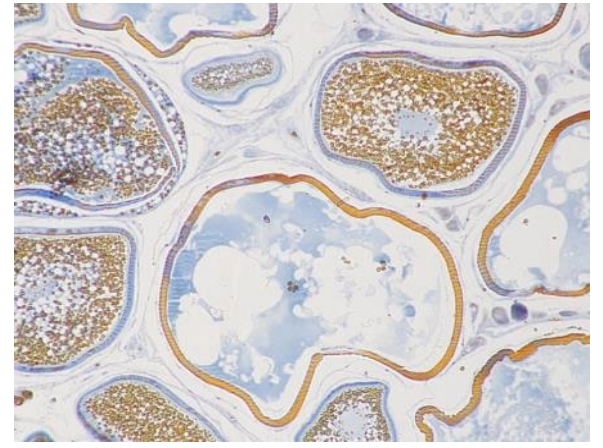
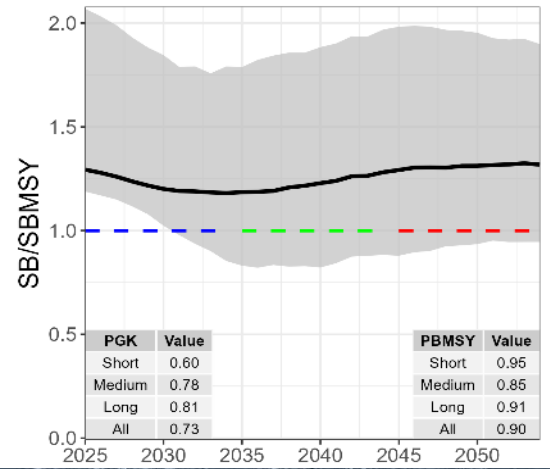
Swordfish Catches





SWO Species Group – primary work in 2024

- N-SWO management strategy evaluation
- S-SWO closed loop simulation modeling
- SWOYP research program
 - Ageing and growth
 - Reproduction
 - Genetics
 - Tagging





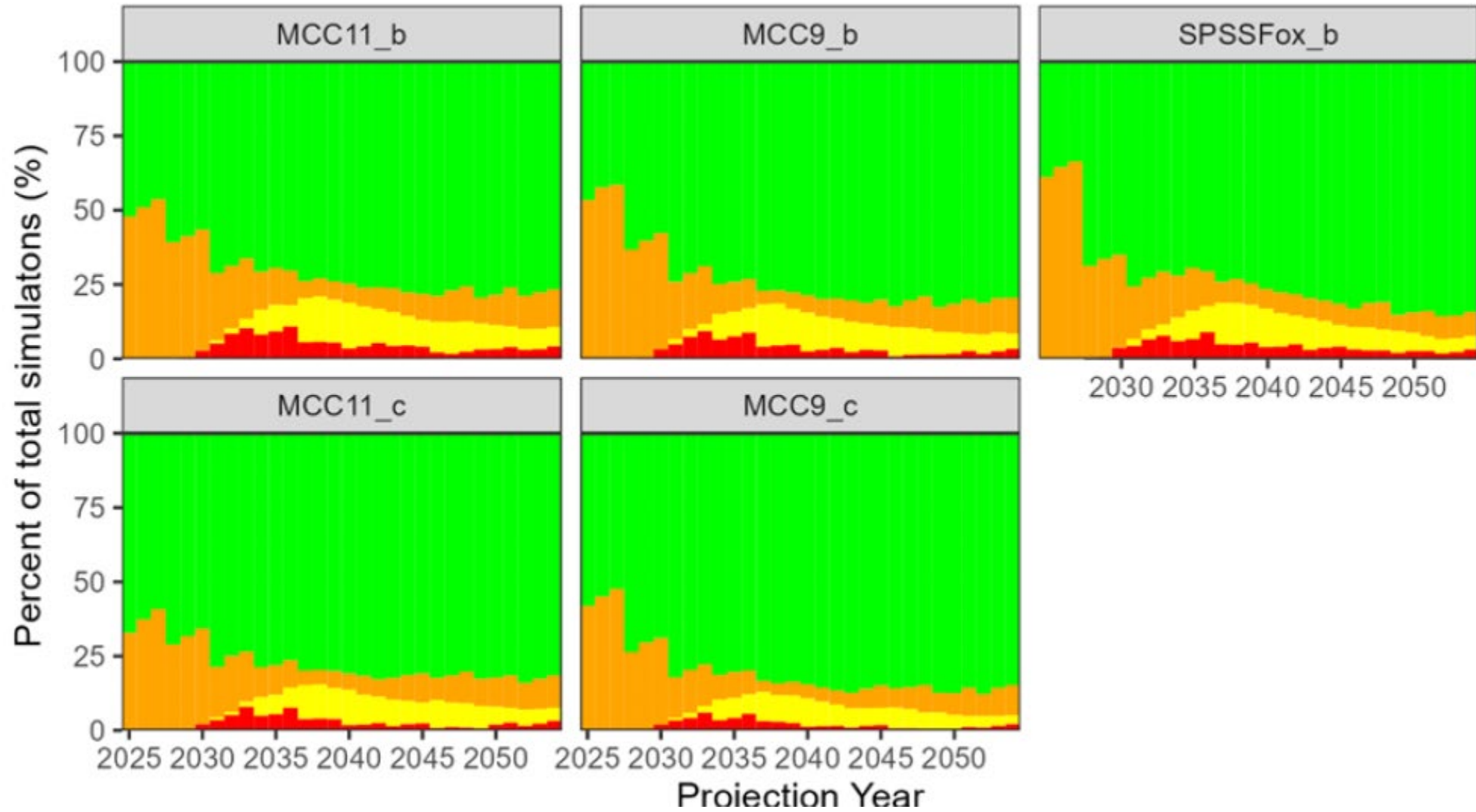
SWO-N MSE

- Reference [PA4-812 Rev](#)

North Atlantic Swordfish MSE: Final Results & Decision Guide

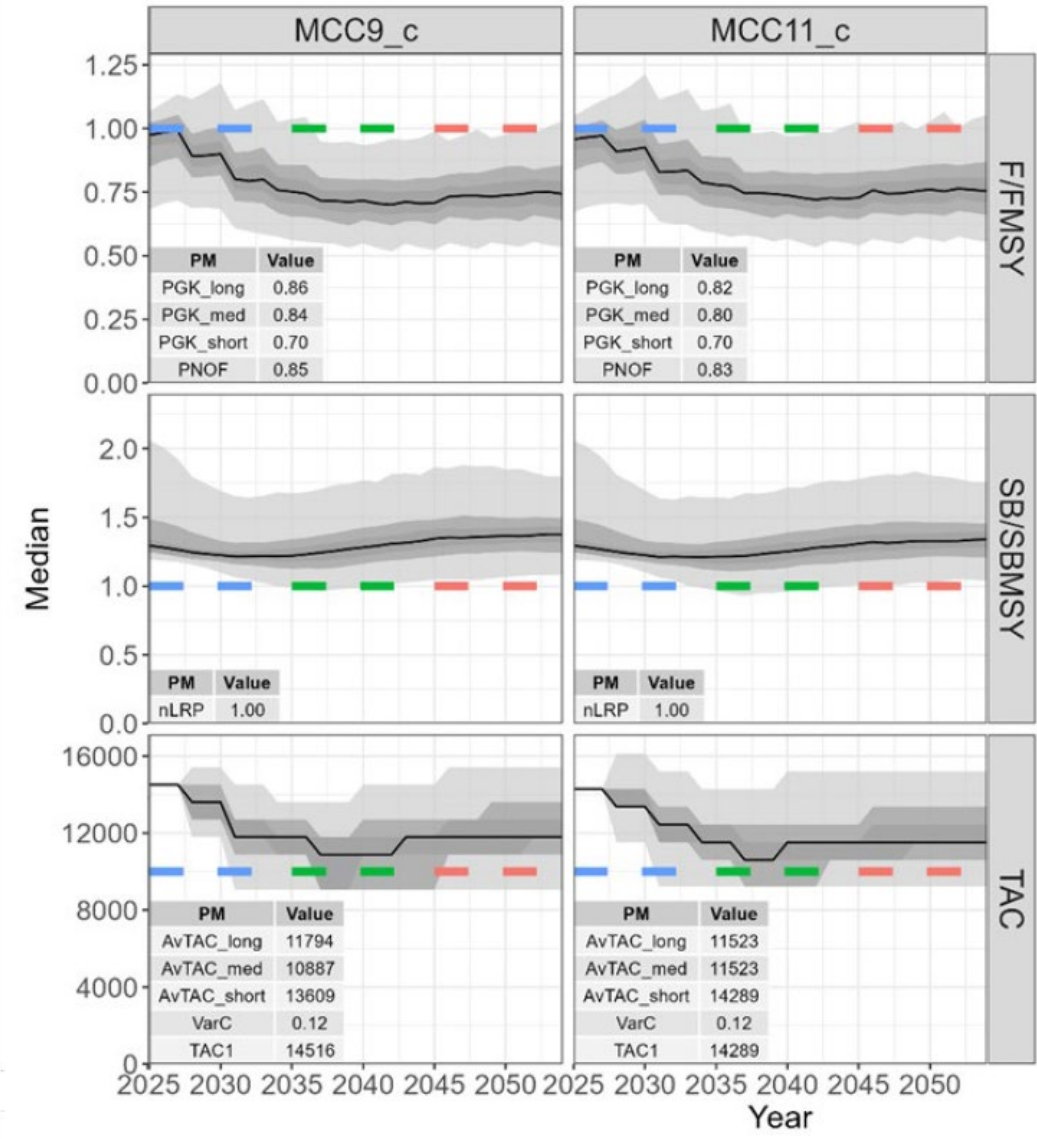
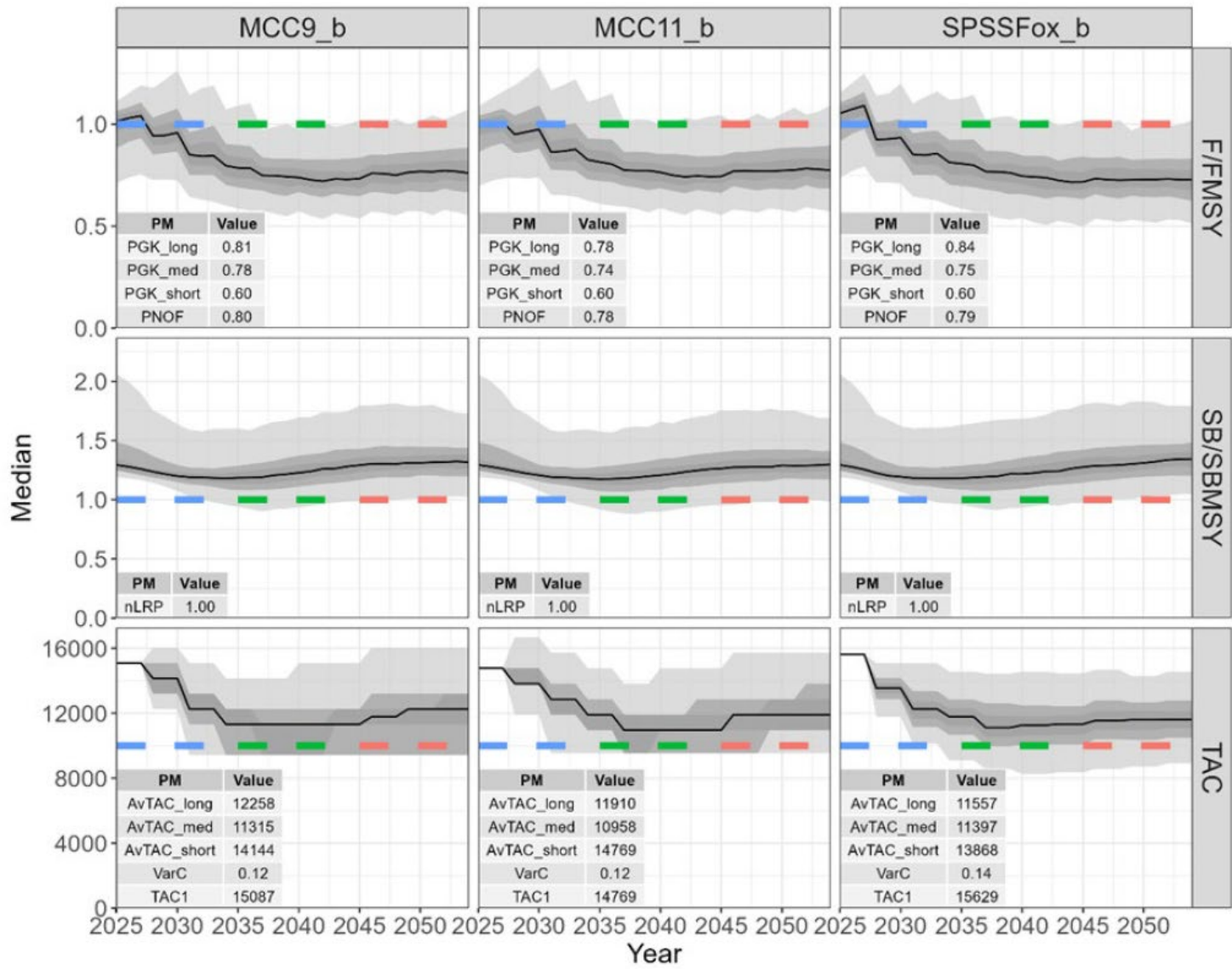


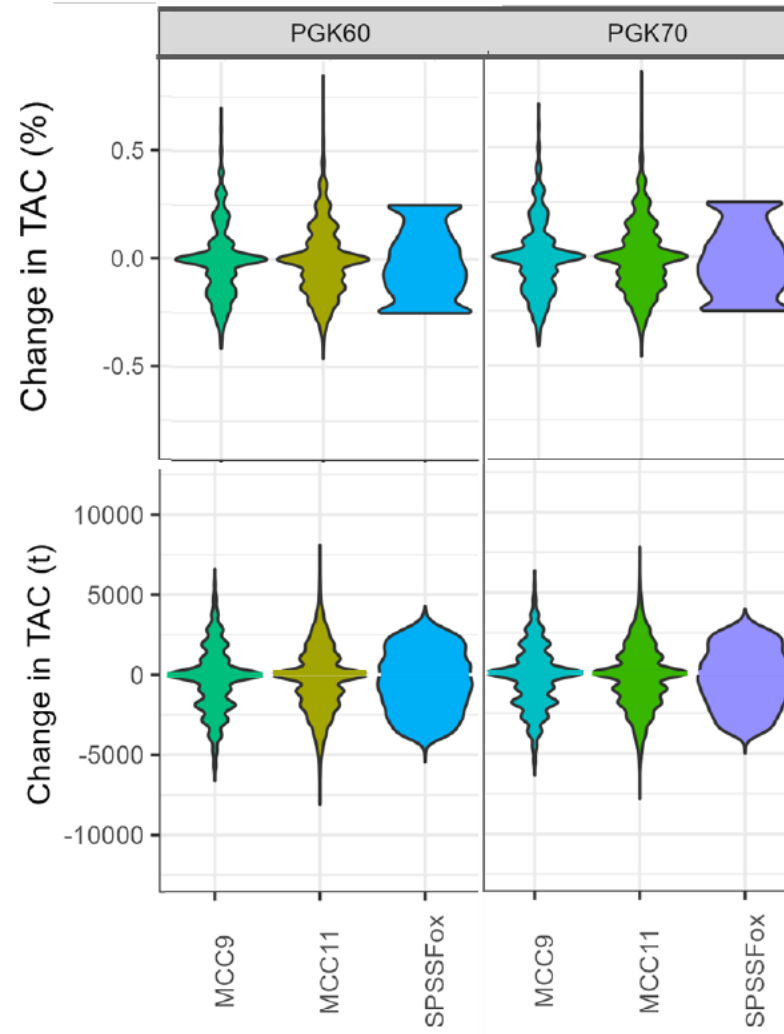
	MP	AvTAC_long	AvTAC_med	AvTAC_short	nLRP	PGK	PGK_med	PGK_short	PNOF	VarC	TAC1
1	MCC9_b	12,258	11,315	14,144	1.00	0.73	0.78	0.60	0.80	0.12	15,087
2	MCC9_c	11,794	10,887	13,609	1.00	0.80	0.84	0.70	0.85	0.12	14,516
3	MCC11_b	11,911	10,958	14,769	1.00	0.71	0.74	0.60	0.78	0.12	14,769
4	MCC11_c	11,523	11,523	14,289	1.00	0.77	0.80	0.70	0.83	0.12	14,289
5	SPSSFox_b	11,557	11,397	13,869	1.00	0.73	0.75	0.60	0.79	0.14	15,629





ICCAT CICTA CICAA







MSE work planned for 2025

- SCRS supports PA4's development of an exceptional circumstances protocol
 - PA4 leads development with support from SCRS
 - Examples from N-ALB and BFT
- SCRS development of additional robustness tests, as requested by COMM
 - Climate change
 - Minimum size limits



Climate change project with Sub-Comm Eco

- Identify key driving variables affecting the stock's productivity and plausible future climate scenarios for that variable for driving future productivity conditions.
- Produce a post hoc conditioning of the advice coming from the assessment based on the ecological or environmental variables.



Roadmap for the ICCAT MSE (concerning SWO) (SCI-53)



MSE roadmap

- 2025
 - SCRS and PA4 to develop an exceptional circumstances document
 - SCRS to continue development of robustness tests
 - Climate change scenarios
 - Minimum size limits
- 2026 and beyond
 - SCRS to review MSE on predetermined schedule



SWOYP Brief Overview



Challenges for swordfish assessment

Strong history of swordfish biological research yet sources of uncertainty impact SCRS's ability to assess status and trend of stock

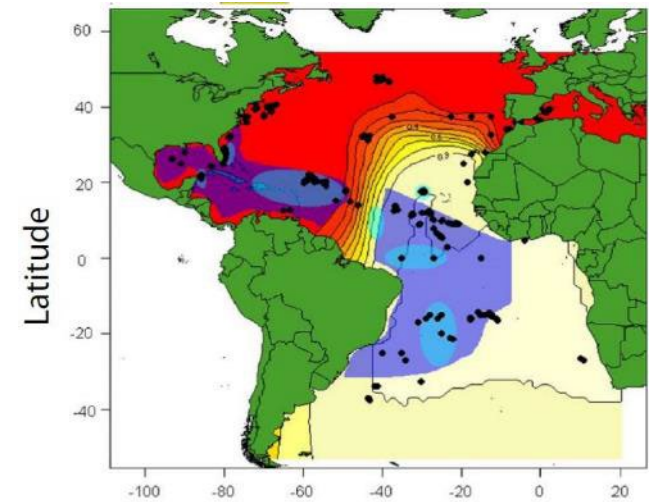
- Stock structure is highly uncertain
 - Conflict in CPUE indices—multiple stocks vs calculation of indices vs spatial-temporal patterns
 - Where are the stock boundaries and mixing zones?
- Ageing is very challenging
 - Small otoliths
 - Vascularization of fin spines
- Productivity of the stock has been unpredictable
- High mortality among discards
 - Impacts to stock dynamics?
- Age/size at maturity
 - Reproductive output with a given age/size structure
- Differing traits by stock



Objectives

Data collection will **support** the following objectives:

1. Resolve the **spatial-temporal distribution of the three known swordfish stocks** found within the Atlantic Ocean and Mediterranean Sea using a genetic analysis of tissue sampled from the catch of participating CPCs.
2. Resolve the **age and size at maturity** of the three known swordfish stocks found within the Atlantic Ocean and Mediterranean Sea using samples/measurements provided by participating CPCs.
3. Characterize the **age composition** of the catch and validate the **growth curves** for each swordfish stock.
4. Determine the **spawning period** and areas of each stock.
5. Develop a protocol/template based on **genetic analysis** that will allow for the assignment of tissue samples to a particular stock.
6. Develop a **biological database** that links the sample information to the age, stock origin, gender, size, diet and maturity data of each fish.
7. **Update the ICCAT Manual** with new pertinent information.



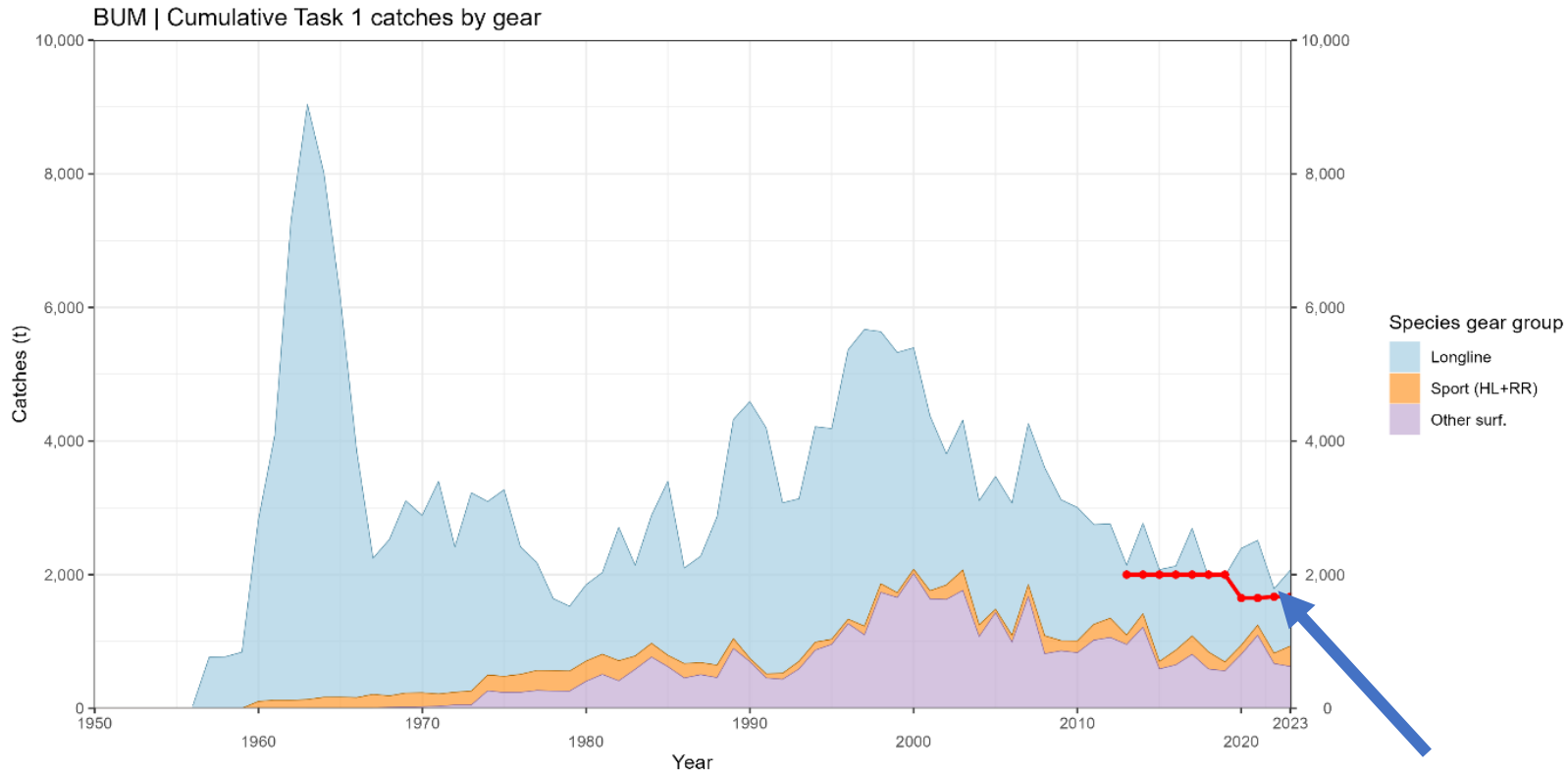
(adapted from Smith et al., 2015)



Intersessional meetings in 2024

- SWOYP
 - Strategic research plan – ~5 days
 - Technical workshop (ageing, reproduction, genetics) – 5 days (Sec not needed)
- SWO intersessional – 5 days
 - Med CPUE improvements; SWO biology program; size/sex distribution study; MSE (EC protocol; robustness tests); dead discard estimation; environmental effects/climate change study; S-SWO closed loop simulation study; update to the SWO species distribution model; updates to the ICCAT manual
- SWO MSE
 - One day technical meeting
 - One day PA4

Estimated catches of Atlantic Blue marlin (*Makaira nigricans*) by gear (1956-2023)



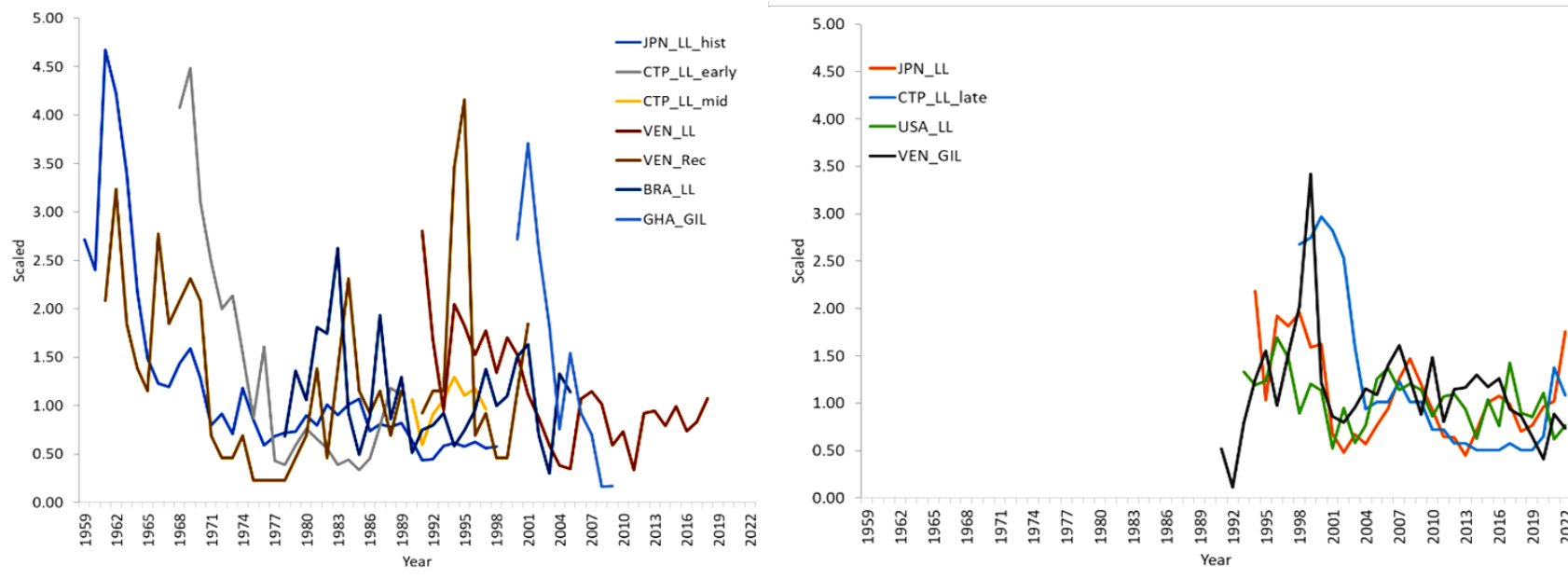
Atlantic blue marlin has been exploited by surface fisheries (mainly gillnets), as bycatch of the high seas' longline fleets and by sport-recreational fisheries

Catches of Atlantic BUM in 2023 were **2,068 t**, compared to **1,789 t** reported for 2022

[Rec. 18-05](#) and [Rec. 19-05](#)

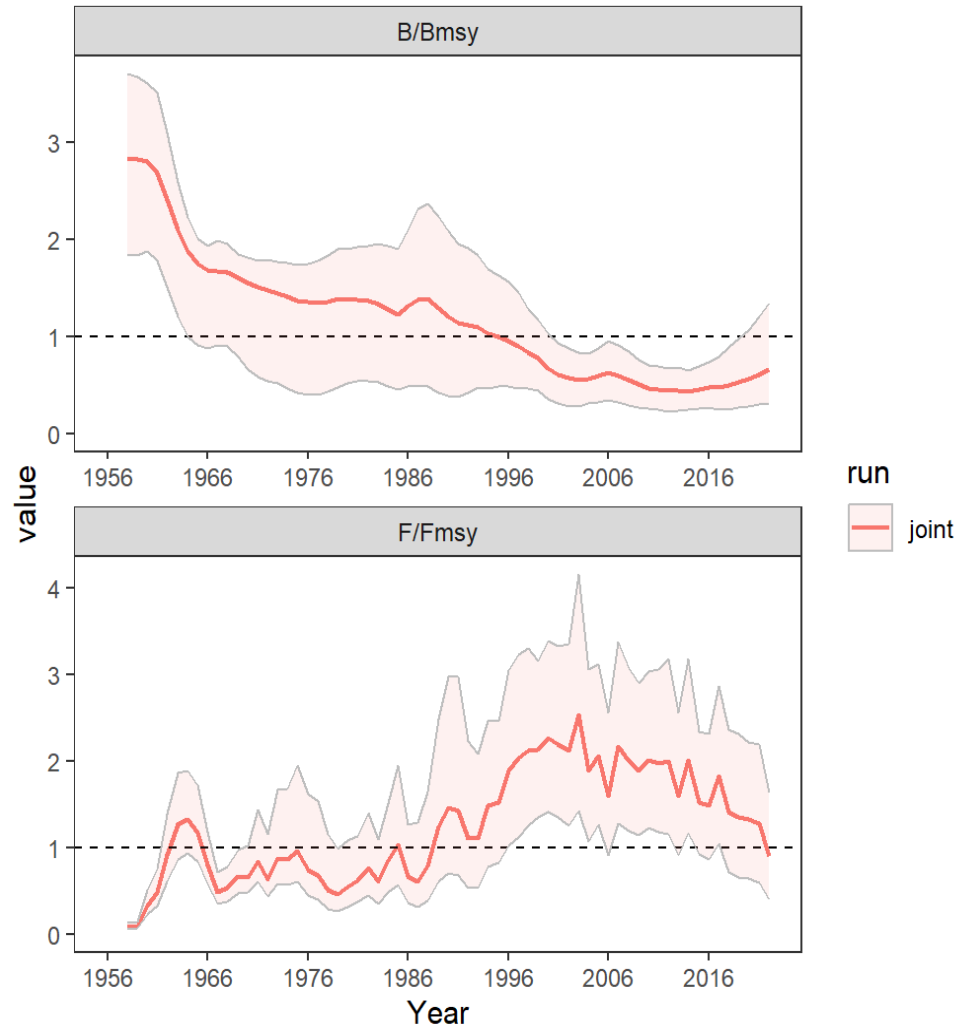
Catch limit **1670 t**
beginning in 2020

Relative abundance indices used in the 2024 BUM assessment



11 Estandardized CPUE series : Japan (historical and current longline), Chinese Taipei (long line with three time series), USA (longline), Venezuela (longline, gillnet and rod & reel), Brazil (longline) and Ghana (gillnet) CPUE series were used in the assessment.

The final combined grid model scenarios for Atlantic blue marlin

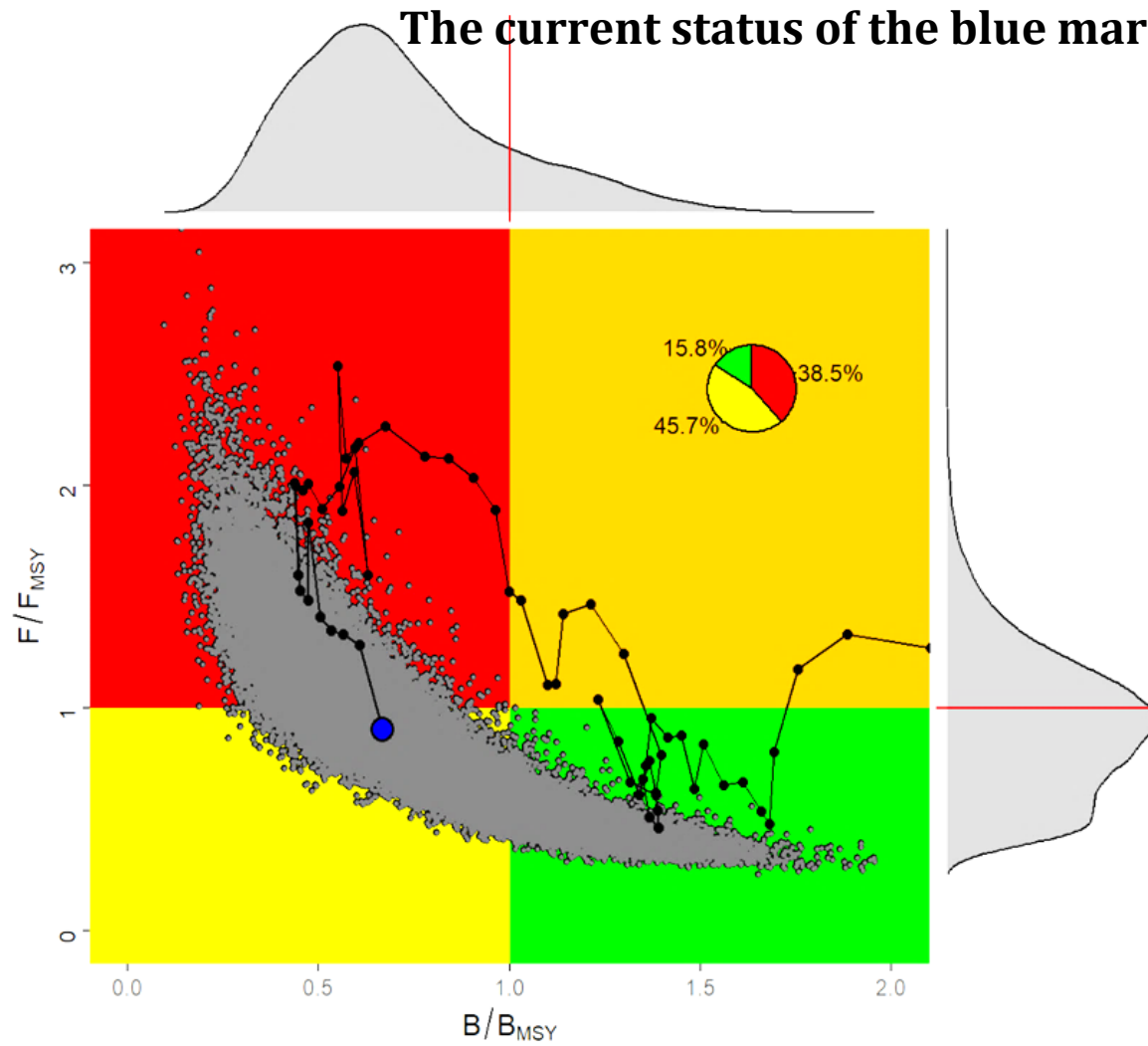


The results of the final combined models of 2024 assessment indicated that the estimated B/B_{MSY} and F/F_{MSY} were such that **the current stock status is overfished but not subject to overfishing**

The estimated MSY was determined to be **3,331 t** with approximate 95% confidence limits of **2,323 to 4,659 t**

Annual trends of relative biomass (B/B_{MSY}) and fishing mortality (F/F_{MSY}) from the final combined grid model scenarios for Atlantic blue marlin. The red line indicates the mean of all scenarios, and the shaded area the overall 95% confidence bounds of the results

The current status of the blue marlin stock



High uncertainty with regard to catch (landings and dead discards) data and the productivity of the stock

Probability that $F < F_{MSY}$ and $B > B_{MSY}$.

Catch (t)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
0	35%	45%	56%	65%	72%	78%	83%	86%	89%	92%
1000	32%	39%	46%	53%	59%	64%	69%	73%	76%	79%
1250	31%	37%	44%	50%	55%	60%	65%	69%	72%	75%
1500	30%	36%	41%	47%	52%	56%	60%	64%	67%	70%
1750	29%	34%	39%	44%	48%	52%	56%	59%	62%	65%
2000	29%	33%	37%	40%	44%	47%	51%	54%	56%	59%
2250	28%	31%	35%	38%	40%	43%	46%	48%	51%	53%
2500	27%	30%	32%	35%	37%	39%	41%	43%	44%	46%
2750	26%	28%	30%	31%	33%	34%	36%	37%	38%	39%
3000	24%	25%	26%	28%	29%	30%	30%	31%	32%	32%
3250	21%	22%	22%	23%	23%	24%	24%	25%	25%	25%
3500	17%	18%	18%	18%	18%	19%	18%	19%	19%	19%

Estimated probabilities of biomass the Atlantic BUM stock levels < 10% of B_{MSY} . Catch (t) scenarios include landing and dead discards.

Catch (t)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1250	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1750	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
2000	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%
2250	0%	0%	0%	0%	1%	1%	1%	2%	2%	2%
2500	0%	0%	0%	1%	1%	1%	2%	3%	3%	4%
2750	0%	0%	0%	1%	2%	2%	3%	4%	5%	6%
3000	0%	0%	1%	1%	2%	4%	5%	6%	8%	9%
3250	0%	0%	1%	2%	4%	5%	7%	9%	11%	13%
3500	0%	0%	1%	3%	5%	8%	10%	13%	16%	18%

Estimated probabilities of biomass the Atlantic BUM stock levels < 20% of B_{MSY} . Catch (t) scenarios include landing and dead discards

Catch (t)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1250	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1500	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%
1750	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2000	1%	1%	1%	1%	1%	2%	2%	2%	2%	2%
2250	1%	1%	1%	2%	2%	2%	3%	3%	3%	4%
2500	1%	1%	2%	2%	3%	3%	4%	5%	5%	6%
2750	1%	1%	2%	3%	4%	5%	6%	7%	8%	9%
3000	1%	2%	3%	4%	5%	7%	8%	10%	11%	13%
3250	1%	2%	3%	5%	7%	9%	11%	13%	15%	17%
3500	1%	2%	4%	7%	9%	12%	15%	18%	20%	23%

Effect of current regulations

The Commission further strengthened the plan to rebuild blue marlin stock by extending for 2016, 2017, 2018, and 2019 the annual limit of 2,000 t for blue marlin ([Rec. 15-05](#), [Rec. 18-04](#)).

The Commission established a landings limit of 1,670 t beginning in 2020 ([Rec. 19-05](#)). Landings in 2020, 2021, 2022, and 2023 exceeded the limit in the [Rec. 19-05](#).

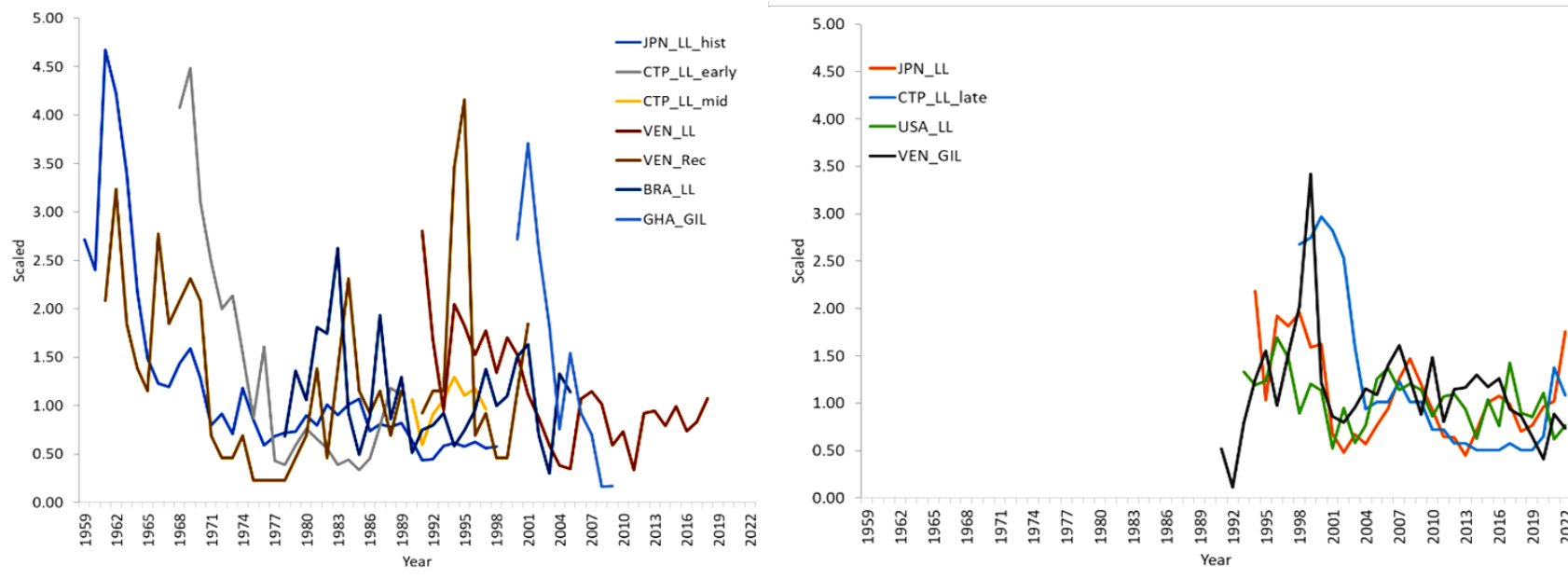
Management recommendations

The Committee emphasizes that unaccounted uncertainties, mostly associated with the levels of **landings and dead discards**, continue to hamper the ability of the Committee to provide sound management advice.

Therefore, the Committee recommends that the Commission **maintain or lower the current 1,670 t landings limit until the increasing biomass trend observed in the 2024 stock assessment** is confirmed at the next BUM assessment.

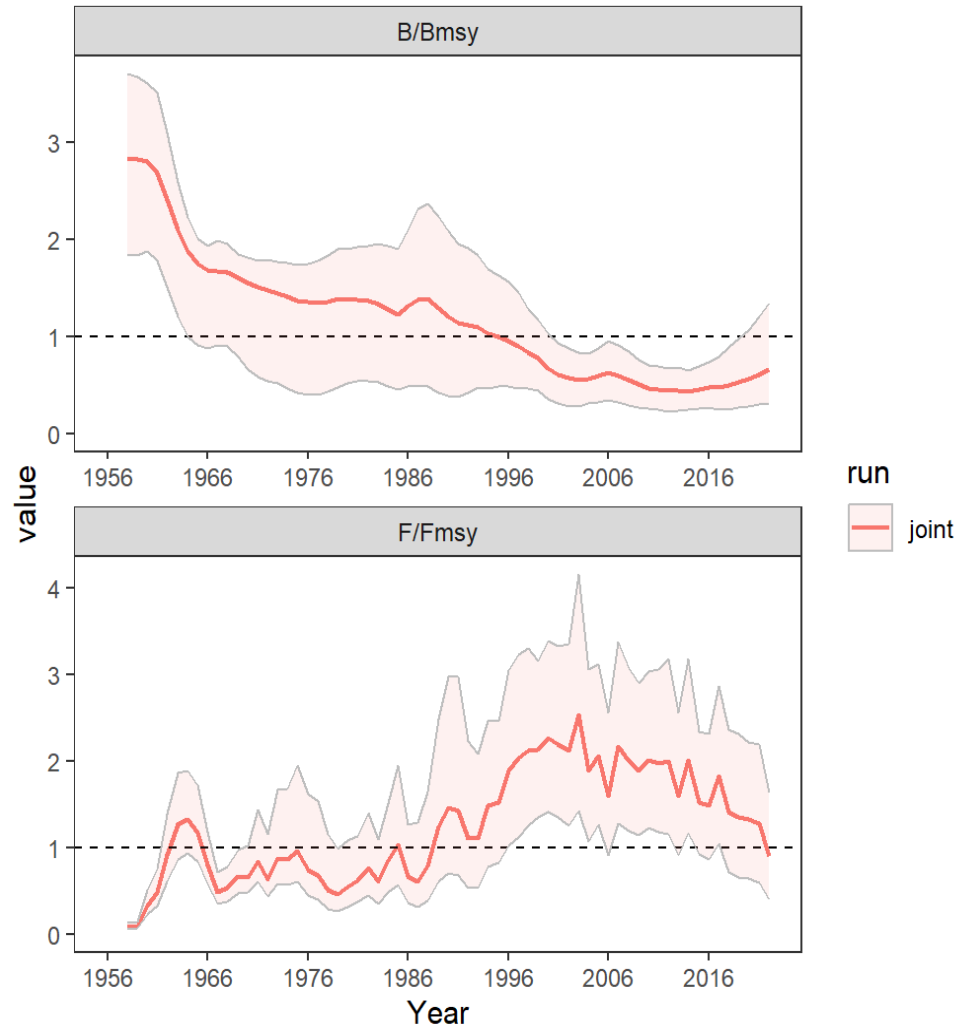
The Committee once again recommends that any landings limit adopted ([Rec. 19-05](#)) by the Commission shall correspond to true catch limits (i.e., landings + dead discards).

Relative abundance indices used in the 2024 BUM assessment



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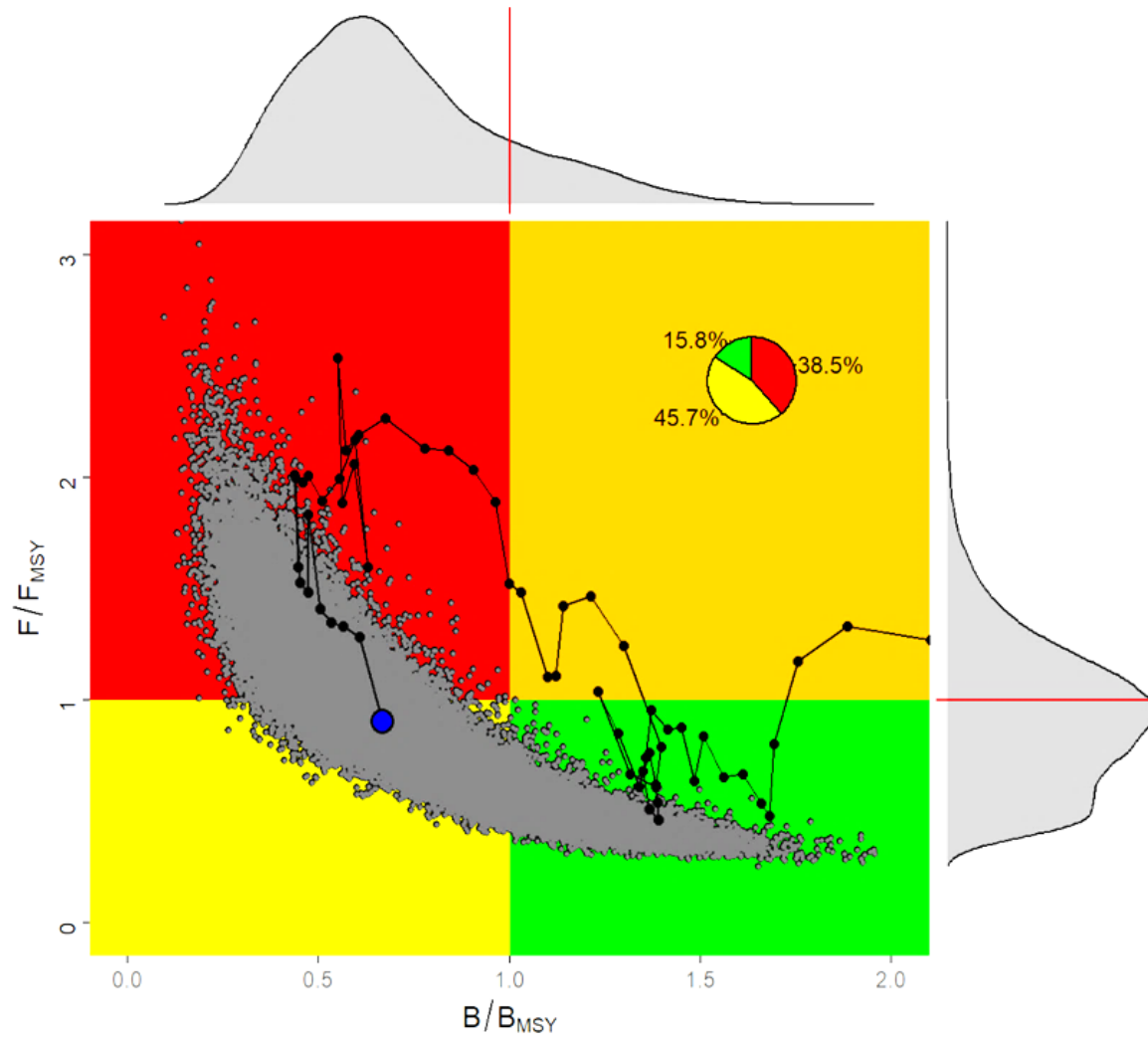


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Annual trends of relative biomass (B/B_{MSY}) and fishing mortality (F/F_{MSY}) from the final combined grid model scenarios for Atlantic blue marlin. The red line indicates the mean of all scenarios, and the shaded area the overall 95% confidence bounds of the results

The current status (2022) of the BUM



High uncertainty with regard to catch (landings and dead discards) data and the productivity of the stock

ATLANTIC BLUE MARLIN SUMMARY

Maximum Sustainable Yield	3,331 t (2,323 – 4,659 t) ¹
Yield at last assessment year (2022) ²	1,789 t
Yield (2023)	2,068 t
Relative Biomass (B_{2022}/B_{MSY}) ⁴	0.67 (0.30 – 1.35) ¹
Relative Fishing Mortality (F_{2022}/F_{MSY})	0.91 (0.40 -1.64) ¹
Stock Status (2022)	Overfished: Yes [61% probability of being overfished] ³
	Overfishing: No [39% probability of be subject to overfishing] ³
Conservation and management Measures in effect:	Rec. 18-05 and Rec. 19-05 Landing limit of 1,670 t beginning in 2020.

¹ Combined Bayesian surplus production model and age structured assessment model results. Values correspond to median estimates, 95% confidence interval values are provided in parenthesis.

² The term yield refers to the total catch (i.e. landings + dead discards).

³ Based on the Kobe plot proportions by quadrant.

Probability that $F < F_{MSY}$ and $B > B_{MSY}$.

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3000	24%	25%	26%	28%	29%	30%	30%	31%	32%	32%
3250	21%	22%	22%	23%	23%	24%	24%	25%	25%	25%
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1250	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1750	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
2000	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%
2250	0%	0%	0%	0%	1%	1%	1%	2%	2%	2%
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Management recommendations

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The Committee once again recommends that any landings limit adopted ([Rec. 19-05](#)) by the Commission shall correspond to true catch limits (i.e., landings + dead discards).

Billfish Workplan for 2025

- The last assessment for the white marlin (WHM) stock was conducted in 2019. [The next white marlin stock assessment is proposed for 2025.](#)

Several high priority tasks have been identified that require increased effort, including, but not limited to:

- An [intersessional hybrid data preparatory meeting](#) (5 days) to collect and analyze all the existing information required for stock assessment, using data through 2023.
- A [stock assessment hybrid meeting](#) (5 days), using data through 2023.
- ***Catch (Task 1), catch and effort, and size data (Task 2)***

- ***Discards***

CPCs should make every effort to take advantage of The Bycatch Estimator (BYET) and participate in any future workshop(s) in an effort to improve the estimation and reporting of billfish discards.

Life history parameters

Continue the Enhanced Programme for Billfish Research (EPBR) activities

Tagging

Continue the satellite tagging of blue and white marlin on the South Portugal coast in the recreational fishery.

Recommendations from the Billfish SG :

General recommendations to the Commission that have financial implications

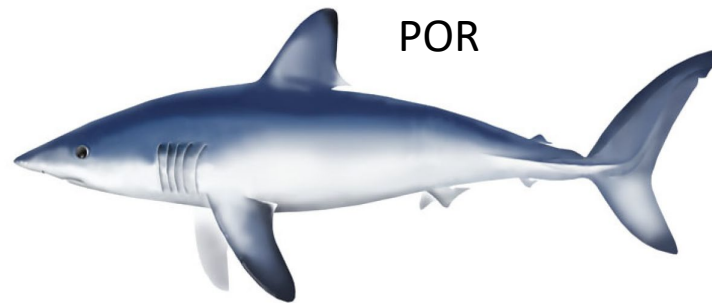
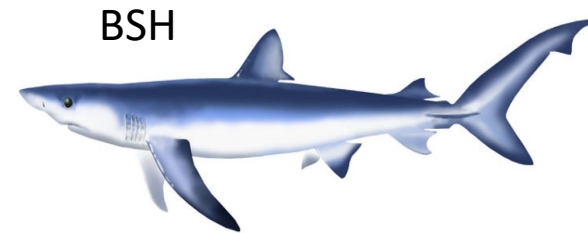
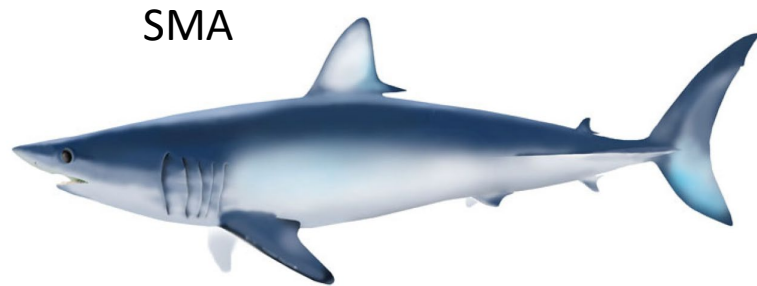
The Committee recommends continued funding of the Enhanced Programme for Billfish Research (EPBR). In 2025 research will be focused on the following areas by order of priority:

- Continue the **growth study** of the three priority billfish species in the **eastern Atlantic** including sampling collection and shipping;
- Advance in direct validation of **aging protocols** through bomb radiocarbon, genetics, and other latest scientific techniques.
- **Age validation** (bomb-radiocarbon) for blue marlin started in 2024 with a limited sample and with good results. Given the success of this new validation work, the Committee requests an increase in this budget line so that the full work can be developed. For 2025 this will use otoliths from the **eastern Atlantic** collected within the EPBR that are available;
- Continue the **electronic tagging** of marlins (BUM/WHM) in the **North East Atlantic**;
- Continue **reproduction study** of blue marlin (BUM) in the **Gulf of Mexico**

<i>Billfish</i>	<i>2025</i>
Tagging	
Electronic tagging, rewarding, and awareness (NE Atlantic)	€27,500
Biological studies:	
Reproduction	€10,000
Age and growth	€35,000
Genetic	
Other (if any, identify)	
Sample collection and shipping	€7,000
Stock assessment	
WHM assessment external review	€10,000
Workshops/meetings	
TOTAL	€89,500



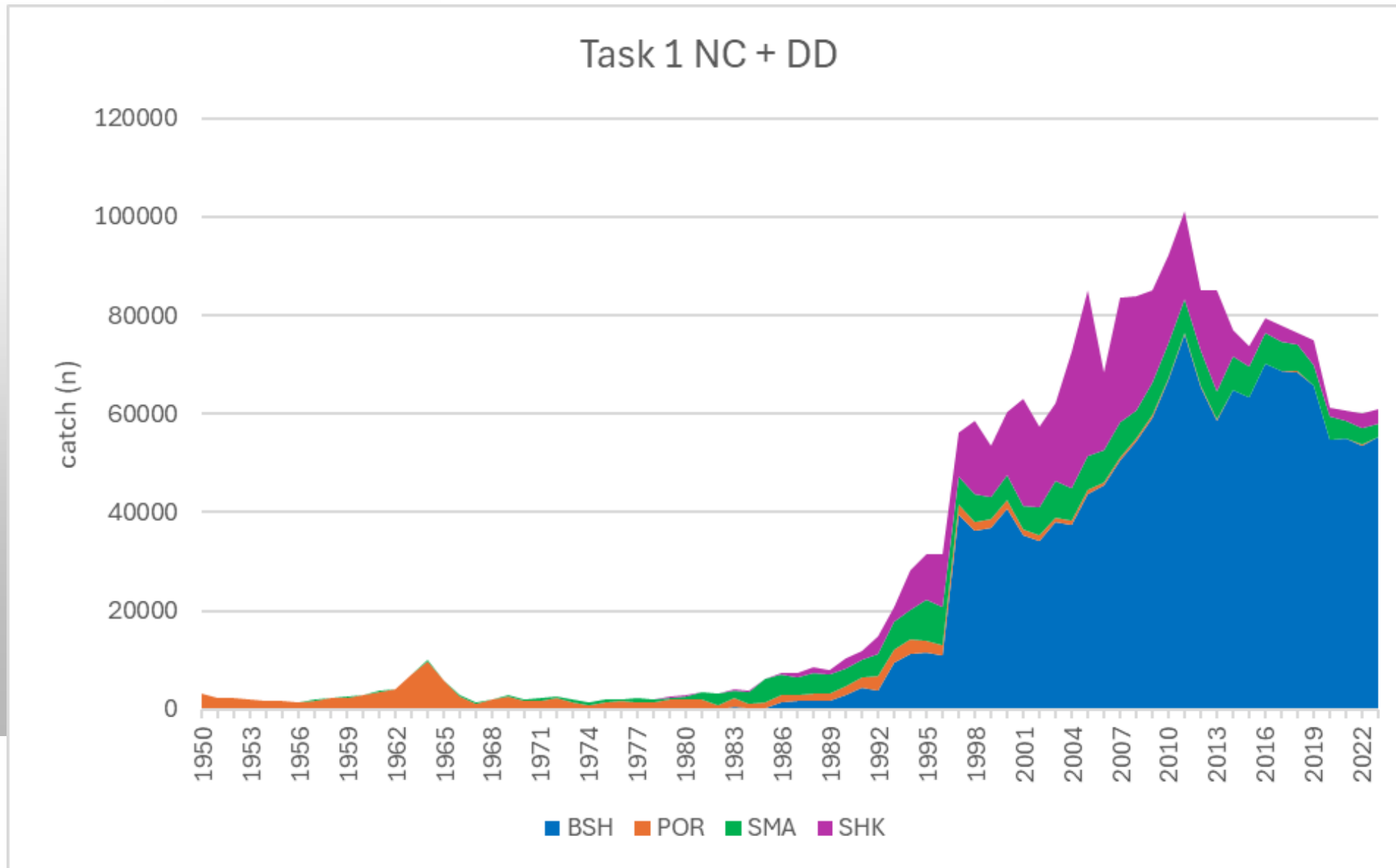
SHK - SHARKS



...and 21 more species (sharks and rays)

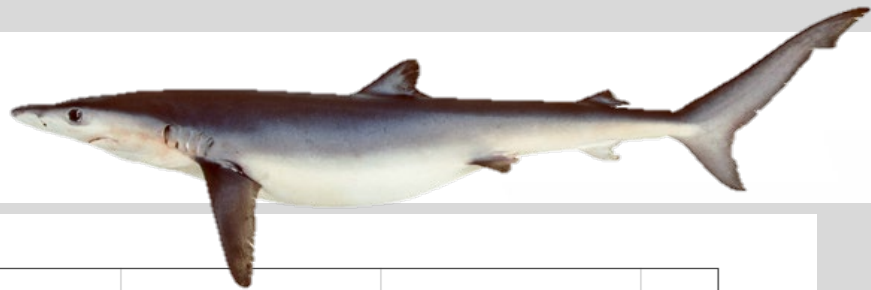
➤ 2024 Review of Major SHK catches

- Total accumulated catches (landings and dead discards, t) by groups of sharks (major, others) and year.

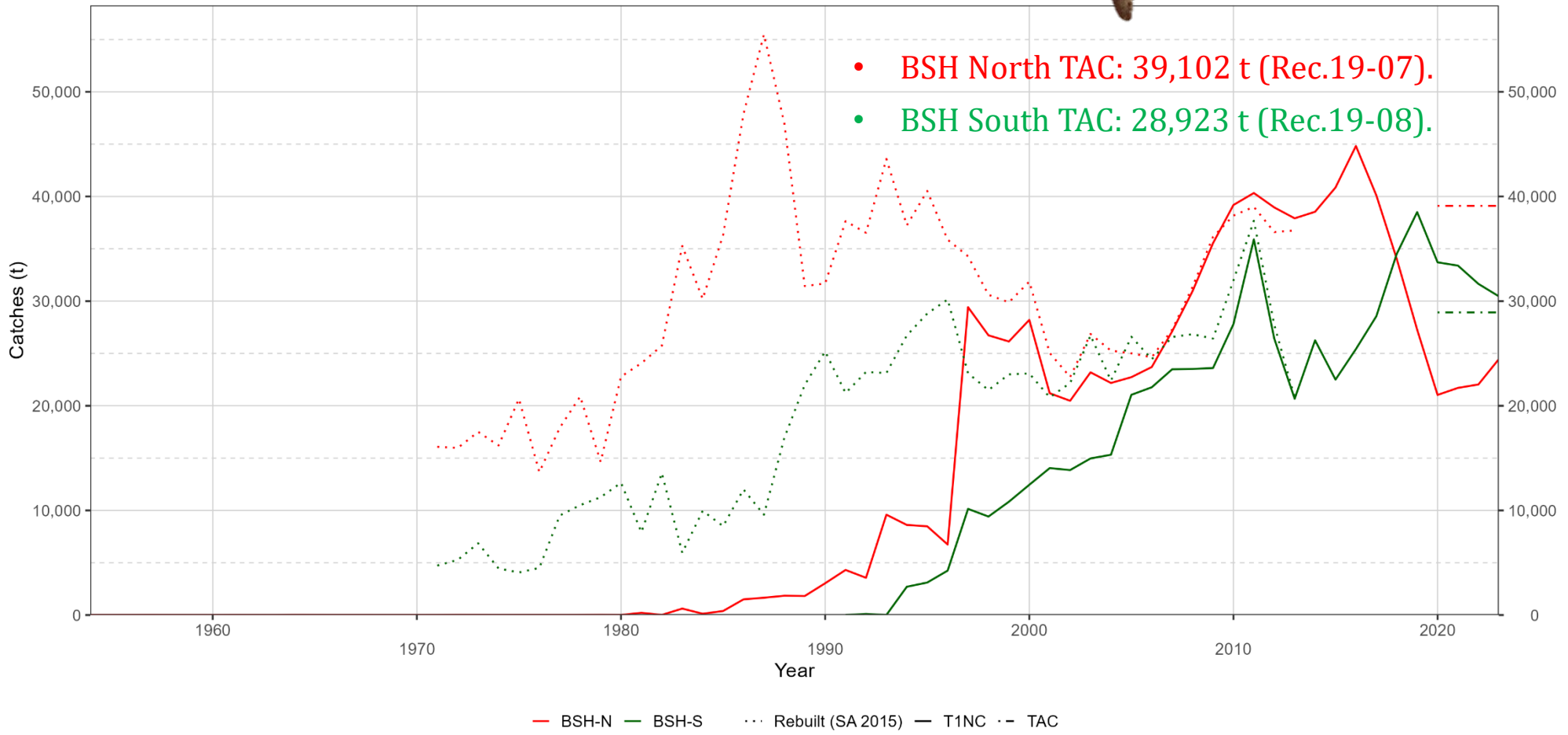


➤ 2024 Review of Major SHK catches

- Blue shark catches



BSH | Task 1 and rebuilt catches by stock vs. TAC



North: Captures below the TAC since 2018.

↑ 2023: 24,773 t
+2,774 t

Rec.23-10 North TAC 30,000 t.

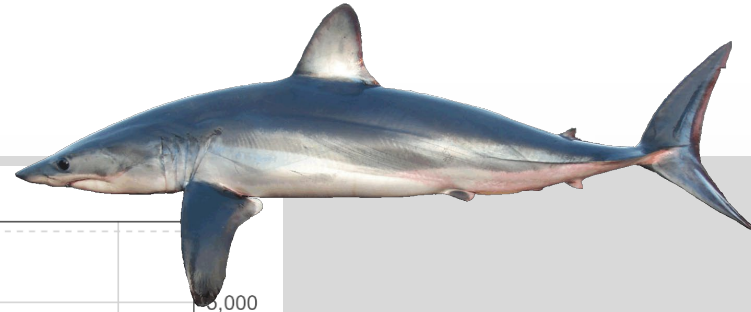
South: Captures 10 – 20% over the TAC since 2018.

↓ 2023: 30,602 t
-1,048 t

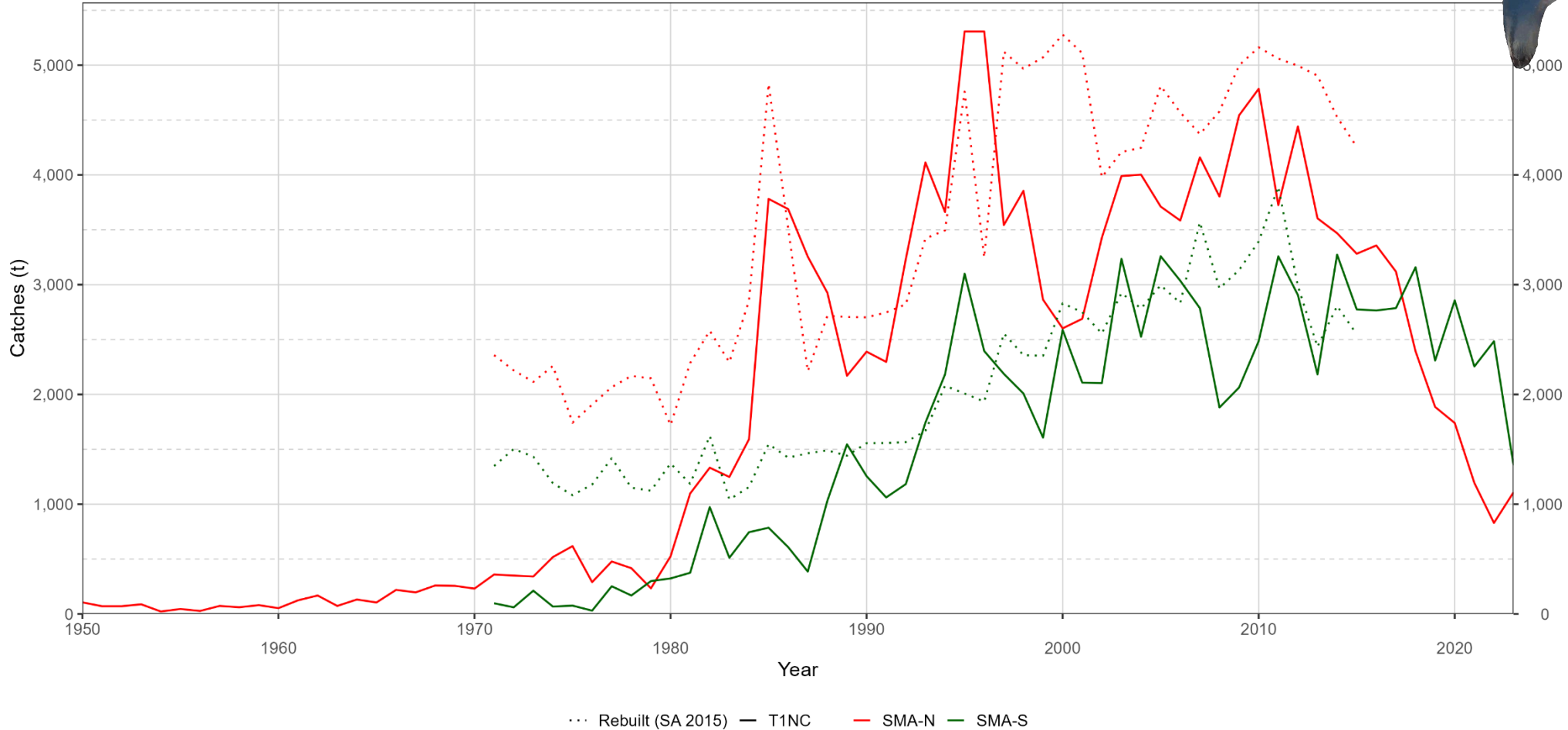
Rec.23-11 South TAC 27,711 t.

➤ 2024 Review of Major SHK catches

- Shortfin mako catches



SMA | Task 1 and rebuilt catches by stock

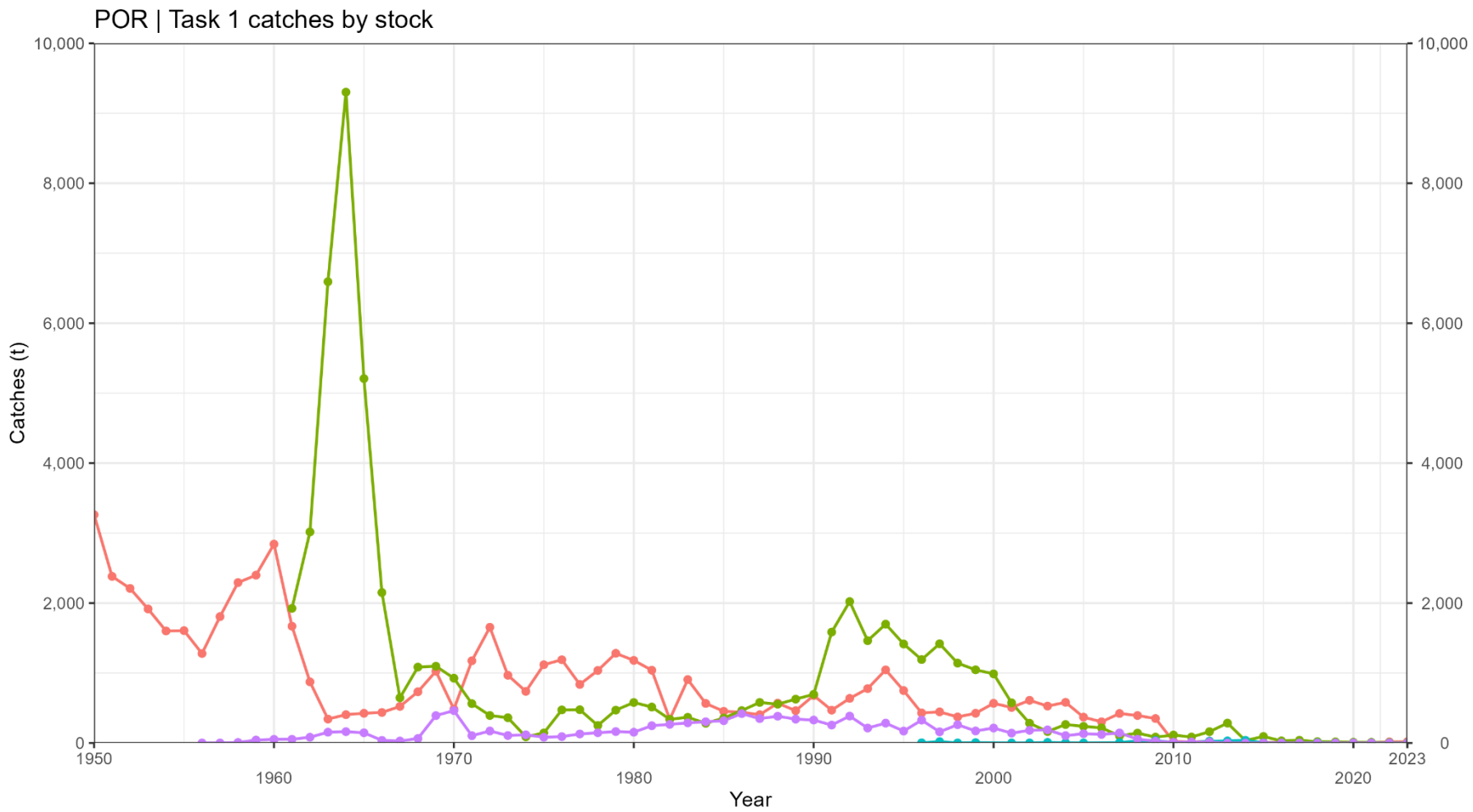


↑ 2023: 1,108 t
279 t

↓ 2023: 1,355 t
-1,129 t

➤ 2024 Review of Major SHK catches

- Porbeagle shark catches



NW captures decreasing, with less than 20 t since 2018, 6t.

NE captures low, with increment since 2019, 18 t.

SW captures are 0 t since 2013.

SE captures are 0 t since 2019.

➤ Shark Research and Data Collection Programme (SRDCP)

- Currently:

- Age and growth of South Atlantic shortfin mako.
- Age and growth other species (FAL, SPN, OCS, BTH, LMA).
- Genetic analysis of porbeagle in the Atlantic Ocean.
- Reproduction study on North Atlantic shortfin mako.
- Satellite tagging studies of several species.
- Tagging campaigns.
 - Electronic and conventional tagging.

➤ **Sharks Workplan and Research Plan for 2025**

- To conduct a stock assessment for shortfin mako in 2025 the Group will conduct the following activities:
 - Hold a 5-day Data Preparatory meeting (in March/April) to collate and analyze all the existing information required for stock assessment, using data through 2023.
 - Hold a 5-day Stock Assessment meeting (in June/July), using data through 2023.
- Continue and/or expand participation in:
 - The activities of the SRDCP.
 - SCRS Subgroup on Technical Gear Changes.
 - SCRS Subgroup on Electronic Monitoring System.

➤ Recommendations (SCI-74)

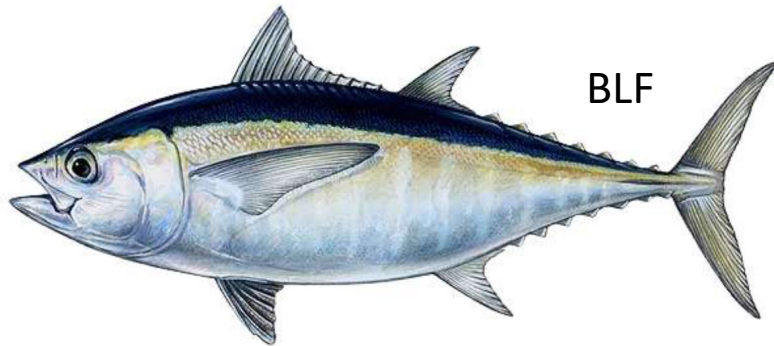
- Recommendations with financial implications:
 - Provide funding for Year 11 of the SRDCP to:
 - Requested funds for 2024 are meant to 1) continue with biology studies, 2) satellite and conventional tagging projects, and to 3) satellite tagging campaign.
 - TDRs and Hook-timers as requested in Recs. 21-09 and 22-11 SMA.
 - Hire one or more external expert for the 2025 shortfin mako stock assessment.

Requests with financial recommendations
for 2025

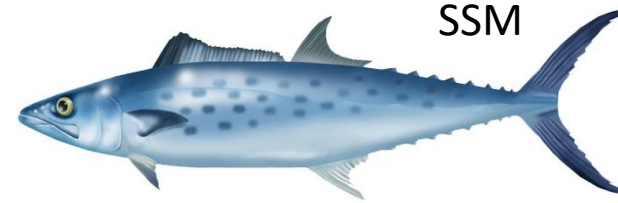
<i>Sharks</i>
Tagging
Electronic tagging, rewarding and awareness
Electronic tagging campaign
Biological studies:
Reproduction (SMA North)
Age and growth (other species)
Genetic (POR)
Other (if any, identify)
Sample collection and shipping
Workshops/meetings
SMA stock assessment expert
Equipment
TDRs and Hook-timers (long-term study, requested by Rec. 21-09)
TOTAL



SMT – SMALL TUNAS



BLF



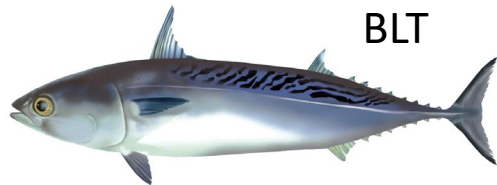
SSM



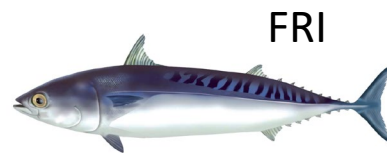
LTA



BON



BLT



FRI

...and 7 more species



Of the 13 species, the seven most important represent about 91% of Task 1 nominal catches between 1950 and 2023.

These are : **BON (31%),**
LTA (18%),
FRI (13%)
KGM (12%),
SSM (9%),
BLT (5%), and
WAH(4%).

Current estimate of total nominal landings of small tunas in **2023 is 129,931 t.**


Small tuna fisheries in the Mediterranean and the Black Sea, account for about 30% of the total small tuna catches (1950 to 2023) in the ICCAT area.

Small Tunas Year Program SMTYP

ICCAT **S**mall **T**unas **Y**ear **P**rogramme (**SMTYP**) was adopted by the Commission in its 2012 meeting in Agadir (Morocco).

Main objectives :

- To improve historical Task 1 and 2 data
- To collect biological data for small tunas (SMT) the growth, maturity and stock structure



These data are necessary for the assessing these stocks the near future, and thereby the SCRS can provide scientific advice to ICCAT for SMT management.

Conclusions

BON

- Confirming clear population structure
Mediterranean and North Atlantic vs tropical Atlantic
Morocco and Mauritania intermediate locations
- Malta differs from Tunisia?

WAH

- Lack of genetic structure

LTA

- Little tunny, two species?:
Tropical Atlantic (STP, GAB, CIV, SEN) - North Atlantic & Med (PRT, ESP, TUN, MLT)
- Genetic Differentiation among Atlantic tropical (GAB, CIV and SEN)
- MLT genetically differs from, PRT, ESP and TUN

FRI - BLT

- Species misidentification
About 2.5% of individuals were misidentified
- No genetic differentiation in any species

4. WORKPLAN _2025 (SCI_63)

Intersessional meeting of the Small Tunas Species Group in 2025

Background/objectives: Have an intersessional meeting of the Small Tunas Species Group in 2025 for three days to organize all the data and information that have been obtained to date during the SMTYP.

Progress on the biological studies of small tunas:

Background/objectives: In 2025 the age and growth and reproduction studies for BON, LTA and WAH shall be completed. In 2025 a comparison on morphometric and morphological parameters between of *Euthynnus* spp

Aiming to conclude the ongoing ageing studies, a workshop will be scheduled for 2025

Priority: High (first priority with financial implication);

Leader/Participation: the consortium led by Brazil (FADURPE)

Timeframe: Ongoing work with annual updates scheduled to be provided to the SMT Species Group.

Revision of small tunas length-weight (L/W) relationships at stock level:

The Group will undertake more work on this project in case more samples become available in 2025.

Updating the biological meta-database:

Background/objectives: The Committee recognized the importance of continuously updating this database as new biological information becomes available, **Priority:** High.

Leader/Participation: EU-Portugal, with collaboration of CPCs willing to participate.

Leaders: Dr. Pedro G. Lino and Mr. Rubén Muñoz-Lechuga (EU-Portugal).-

5. RECOMMENDATIONS

Financial implications

The Committee recommended continuing with the ICCAT SMTYP research programme activities in 2025 to further improve the biological information (improving geographical coverage for growth, maturity and stock identification) to fill the remaining gaps of the three species (WAH, LTA, BON) and continue the sampling for *Auxis thazard* (FRI) and *A. rochei* (BLT).

In addition, the Committee recommends doing a morphometric and morphological comparison between fresh/frozen specimens of *Euthynnus alleteratus* from the Northeast Temperate Atlantic, the Southwest, the Mediterranean Sea, and the eastern tropical Atlantic to assess if physical characters can be used to discriminate the two genetically different stocks. (for sample processing and analysis, and to buy samples).

RECOMMENDATIONS

Financial implications

Workshop (in person, 5 days) on ageing in 2025 for small tuna species:

This workshop would allow for calibration and adopting internationally agreed methodologies to conclude the ongoing ageing studies on (BON, LTA and WAH) and further develop the ageing studies on FRA and BLT. The estimated cost to cover the attendance of 1 expert and up to 6 national scientists

SMALL TUNAS SPECIES GROUP

Requests with financial
recommendations for
2025

<i>Small Tunas</i>
Biological studies:
Reproduction
Age and growth
Genetic
Sample collection and shipping
Workshops/meetings
Capacity building on small tuna ageing
TOTAL



Recommendations with financial implications

Note: Species working group recommendations with financial implications will be presented in the appropriate panel.

Sub-committee on Ecosystems and By-catch : 2025 Budget(€37,500)

Pertaining to bycatch

- The Committee recommends holding a Workshop to continue with the work to evaluate the impact of ICCAT fisheries on sea turtles in the MED in 2025. For this workshop, funds are requested to finance the participation of 6-7 scientists (€20,000).
- The Committee recommended that the Secretariat increase the supply of spaghetti tags aimed at tagging bycatch species, including *Mola mola*. Accordingly, different types of spaghetti tags should be purchased and made available (€3,000).

Pertaining to ecosystems

- Recognizing the need for climate and oceanographic indicators to expand the spatial extent of these indicators beyond the Mediterranean Sea to the Atlantic Ocean, it is recommended that the Commission provide funds to advance this work (€14,500).



Subcommittee on Ecosystems and Bycatch

Pertaining to bycatch

The Committee recognized the progress made by national scientists in characterizing the impact of ICCAT fisheries in the Mediterranean on sea turtles and recommended that such efforts continue.

Pertaining to ecosystems

The Subcommittee recommended that the SCRS discuss the potential need for additional resources to address climate change.