2024 Report of the Standing Committee of Research and Statistics (SCRS) to the ICCAT Panel 2 – Temperate Tunas

Limassol, Cyprus
12 November 2024

Complete 2024 SCRS Report available online AS PLE-104/2024

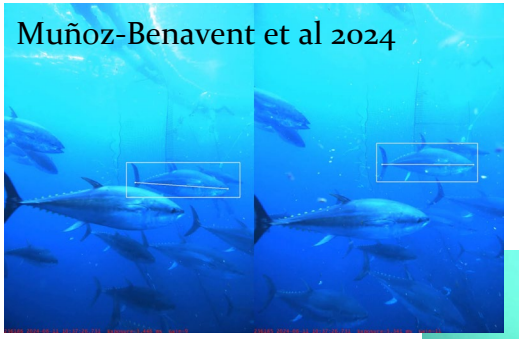
2024 Work conducted for BFT

Intersessional on EBFT close-kin mark recapture (CKMR).

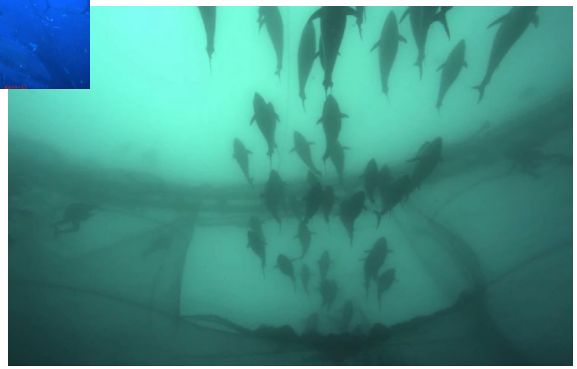
- Focused on elaboration of a proposal for implementation of (CKMR methodology for E-BFT, in coordination with ongoing W-BFT CKMR study
- Reviewed the progress on CKMR components
- External advisor for GBYP Steering Committee for CKMR matters.

BFT Species group

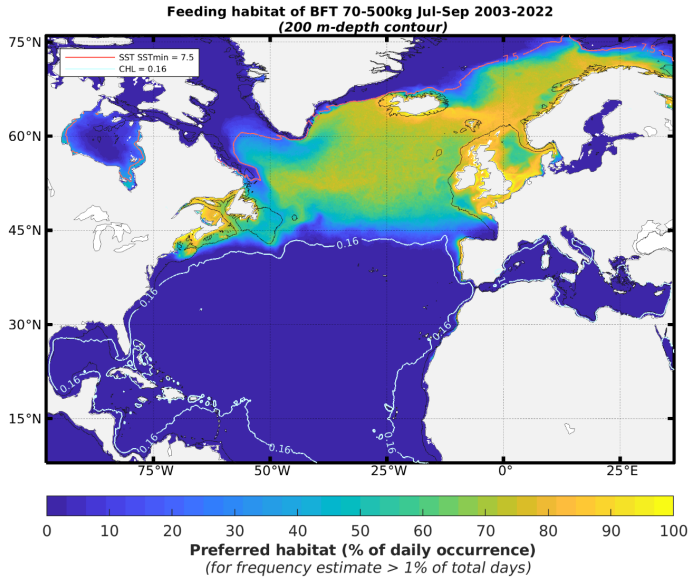
- **Indices:** Strict updates MP indices and improvements to others (6 docs & present.)
- **Farming related** (6 docs) Stereoscopic camera using **AI** in fish transfers. 2 projects ICCAT funded.
- **Tagging related** (4 docs). Electronic and conventional tagging. BFT potential feeding & spawning habitats.
- **Biology, MSE and others** (7 docs)



AI counting & measuring



Muñoz-Benavent et al 2024



BFT Species group

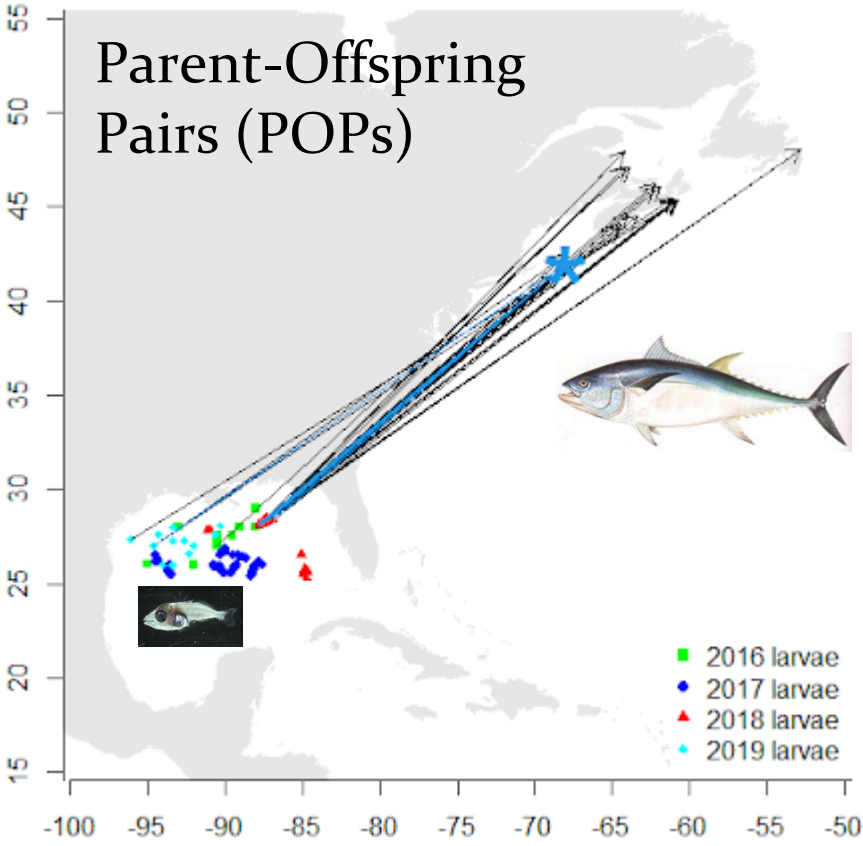
- **CKMR-related matters** (6 docs)
- **Initial W-BFT CKMR estimates of abundance**
- **2025 plans for Slope Sea longline and larval surveys, integrate into CKMR to evaluate its importance**

OPEN

Low levels of sibship encourage use of larvae in western Atlantic bluefin tuna abundance estimation by close-kin mark-recapture

Jan R. McDowell[1✉], Mark Bravington[2✉], Peter M. Grewe[2✉], Matthew Lauretta[3✉], John F. Walter III[3], Shane M. Baylis[2], Thierry Gosselin[4], Estrella Malca[3,5], Trika Gerard[3], Akihiro Shiroza[3,5], John T. Lamkin[3], Ellen E. Biesack[1], Glenn Zapfe[3], Walter Ingram[3], Campbell Davies[2] & Clay Porch[3]

Parent offspring pairs (POPs)	
2017	4
2018	15
2019	15
2020	5
2021	18
Total	57



Next steps: Operational phase (2025-2027) of WBFT CKMR

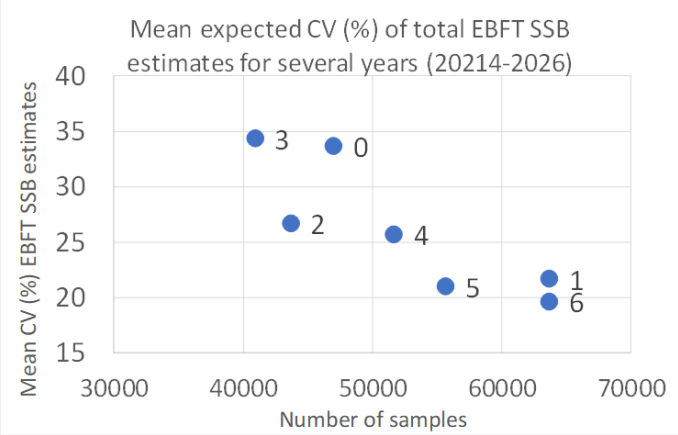
year	Gulf larvae	adults	Index
2016	351	1667	Y
2017	500	2262	Y
2018	3270	2043	Y
2019	167	2460	Y
2020	covid	1590	
2021	350	3467	Y
2022	*vessel breakdown*	*2879*	
2023	*~500*	*~2500*	*Y*
2024	*~150-500*	*~2500*	*Y*
2025	*~150-500*	*~2500*	*?*

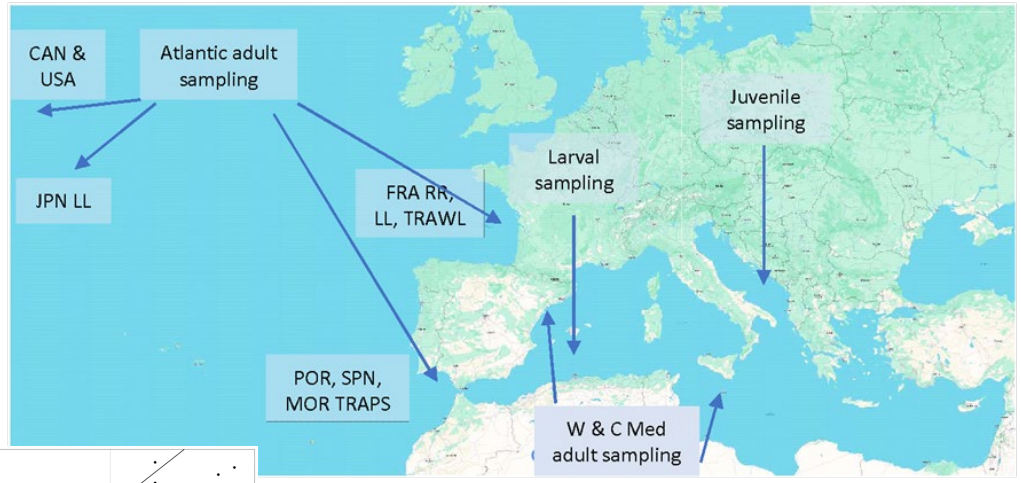
Products

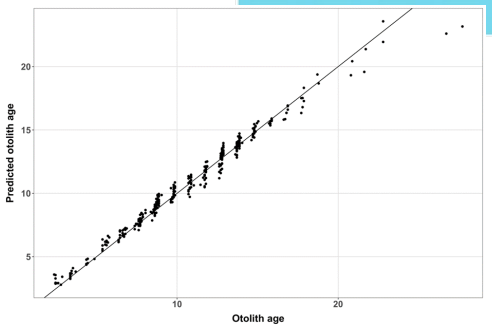
1. POPs and Halfsibling data to input to OMs for conditioning (once OMs are restructured to incorporate CKMR data)
2. Half siblings provide estimates of M for OM conditioning
3. 7 or 8 year time series of WBFT Gulf of Mexico spawner stock biomass by 2027 MSE guillotine
4. *Possibly* CKMR-informed management procedure for 2027 based on POP return rate or SSB index

BFT Species group. E-BFT CKMR feasibility

- **A breakthrough in the modelling of CKMR has been made, allowing different sampling scenarios to be evaluated.**
- **Genotyping platforms identify stock ID, sex & kinships.**
- **Pilot study confirms epigenetic ageing is feasible for BFT.**







- **Genetic procedures and CKMR calculations must be completed.**

BFT Species group. **CKMR-related matters**

- **-Feasibility of applying CKMR to E-BFT.**

- CKMR has the potential to provide absolute abundance estimates, as well as stock structure, genetic sex & age

Bravington and Fernandez simulation study (2024) indicates EBFT CKMR is feasible, ICCAT has 34000 existing historical samples.

- E-BFT CKMR Implementation Plan Proposal (SCI-104).

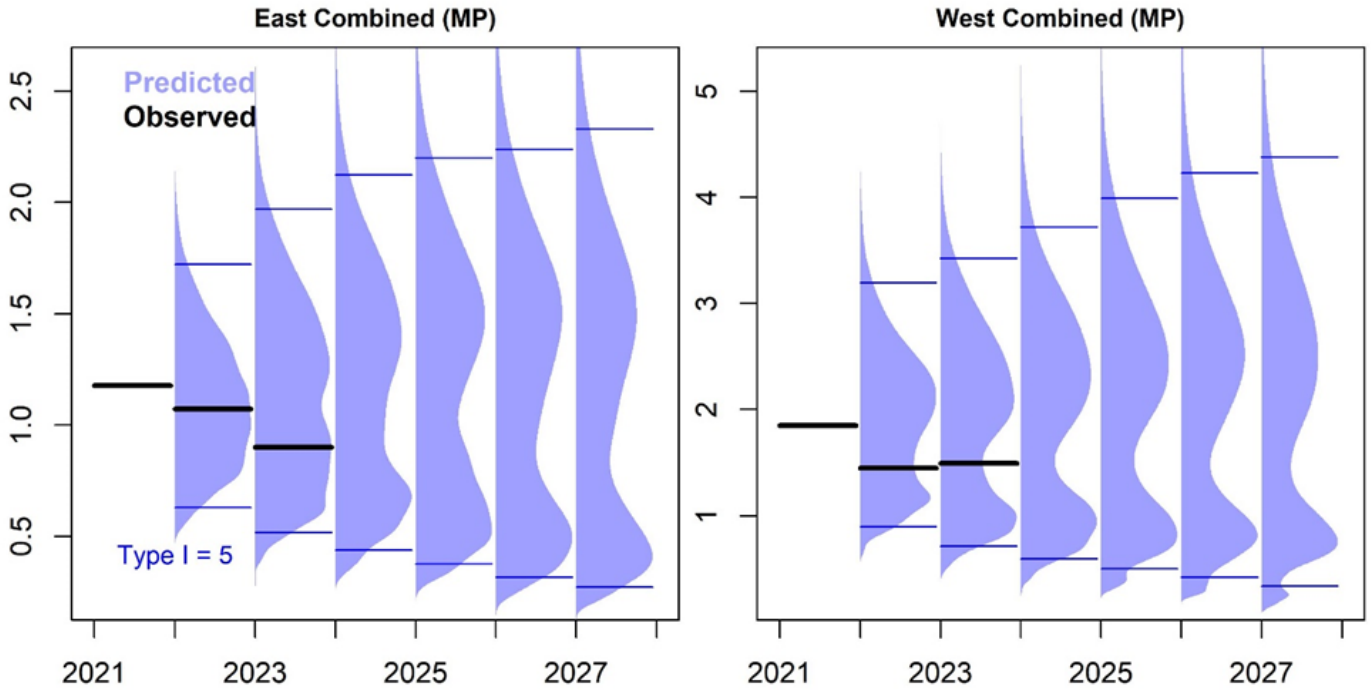
- 3 years "pilot phase (2025-2027)" would collect additional 30,000 samples, conduct key pilot studies & create tissue bank archive. It would require additional funding in 2026 for genotyping historical samples.
- starting in 2025 is essential to inform 2027 MSE reconditioning
- provide an initial basis for embarking on a multi-year operational phase (2028-2030) if this project is approved and successful.

Funding Options for E-BFT CKMR

1. The Committee recommends that the current funding for the Atlantic-wide Bluefin Tuna Research Program (GBYP) be maintained for the 2025 to 2030 period (€ 815.000).

2. Although not ideal, and if additional funding is unavailable, the Committee has proposed **to conduct the GBYP aerial survey every two years and only for the Balearic region, starting in 2025,** which will provide sufficient funds for all years project with no other changes to the GBYP 2025 budget, except in 2026. where additional funding is required to complete genetic analysis and CKMR calculations (€ 815.000 + € 926.000).

Exceptional Circumstances a. Stock dynamics: Combined index values (SCI_92)



Proposed EC: If one or more of the combined index values fall outside the 95% percentile range in any year.

No EC: No indices outside of 95% PI

Figure 19.12.1. Standard marginal plots of observed composite indices (black bars) and distribution of posterior predicted data (blue density distribution) for the reference grid of operating models (n =2304, 48 operating models, 48 simulations each). Blue bars represent the 95% intervals. The West Mediterranean Larval survey and the Moroccan-Portugal trap data point for 2023 were not available.

Key workplan items

1. Intersessional to consider index revisions and WBFT CKMR abundance in the context of the MSE to include a 'lite-reconditioning'
2. EBFT CKMR implementation plan (pending reallocation of funds) biological sampling, epigenetic pilot study and mitochondrial DNA evaluation
3. GBYP work on tagging focusing on a mix of archival, acoustic and electronic tags, participating in the resolution of pending CKMR issues and conducting aerial survey.
4. Tissue bank for archiving and curating samples (possible to extend to all ICCAT species)

Responses to the Commission

19.9 SCRS should evaluate procedures and results related to the stereoscopic camera programme (or alternative methods) provided by CPCs and report to the Commission at the next Annual meeting, Rec. 22-08, para 25 and 173

The Committee has two substantive recommendations to the Commission regarding the stereoscopic camera program:

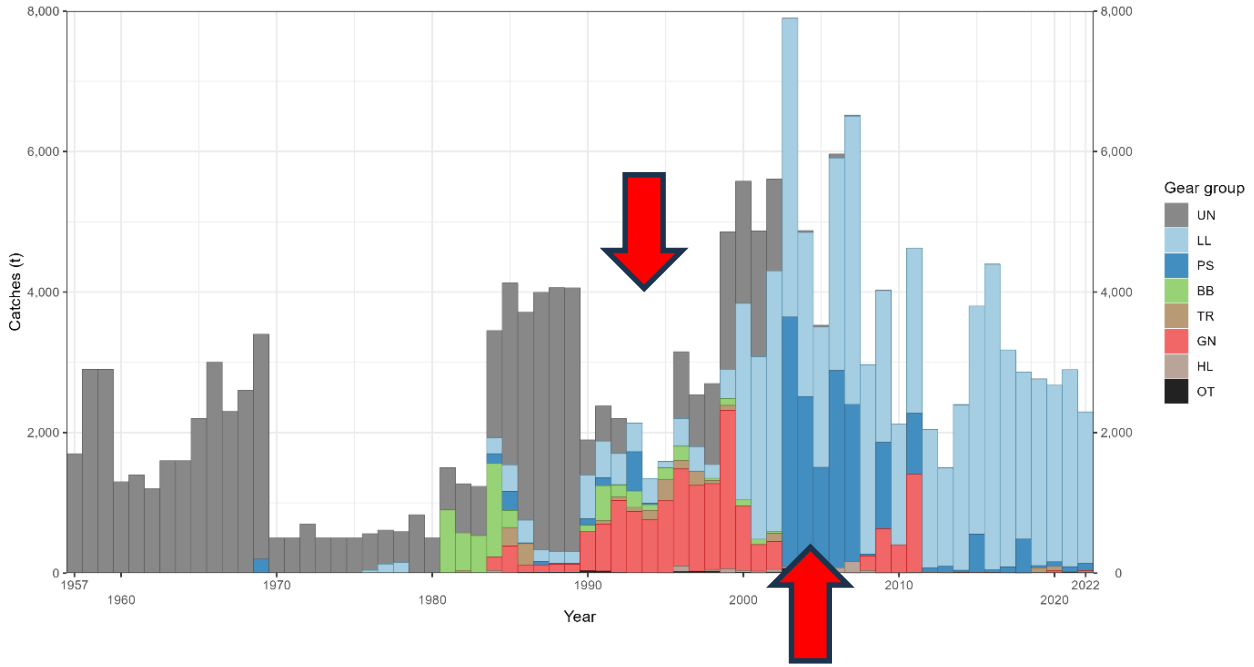
1. Priority be given to continue developing and validating a system for use of software and AI in conjunction with stereoscopic cameras and conventional cameras for estimating biomass at The first transfer from the purse seine and traps to the towing cage and other subsequent transfers.
2. The Committee reiterates that with the application of the technology, it requires that 100% of footage should be provided to SCRS rather than a 20% sample as so far required. The recent advances of AI allow for rapid and objective reading of the video footages and so would facilitate an objective review of the video footages and determination of minimum sample size. As a major objective for all of this work is to determine the biomass of fish removed from the water at the time of removal, estimating this biomass at the time of first transfer has many benefits of eliminating all of the confounding factors of fish weight gain or loss, mortality. Furthermore, the purse seiners and traps have a strong interest in accurate knowledge of what has been removed as this is where and how the quota would be most effectively monitored. If they are under the quota then they could make additional sets and if over, release remaining fish. Given that the technology is advancing to the point that stereo videos can be used in that first transfer this should be the top priority.

ALBACORE

- Mediterranean ALB Assessment
- North ALB MSE
- Responses to the Commission
- ALBYP
- Workplan
- Recommendations

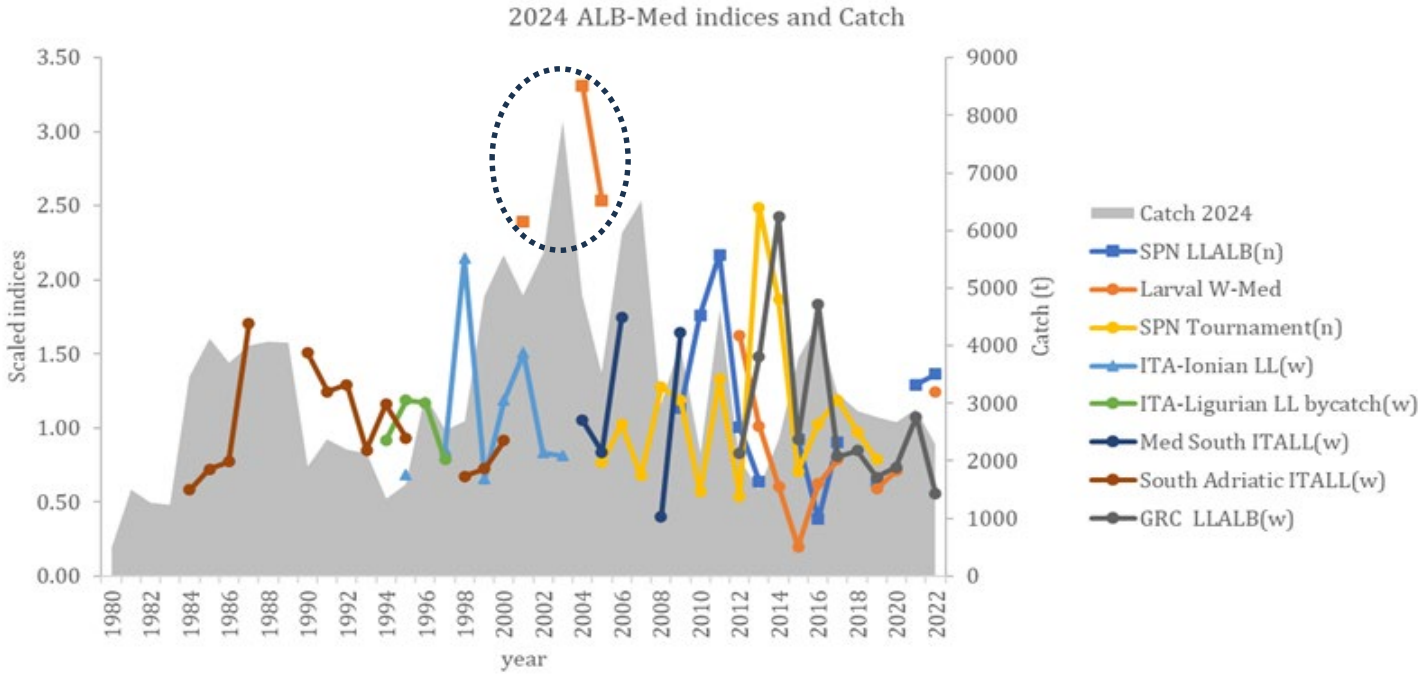
Med ALB assessment

- Jabba (1980-2022)
- Catch history incomplete (under/miss reporting)



Med ALB assessment

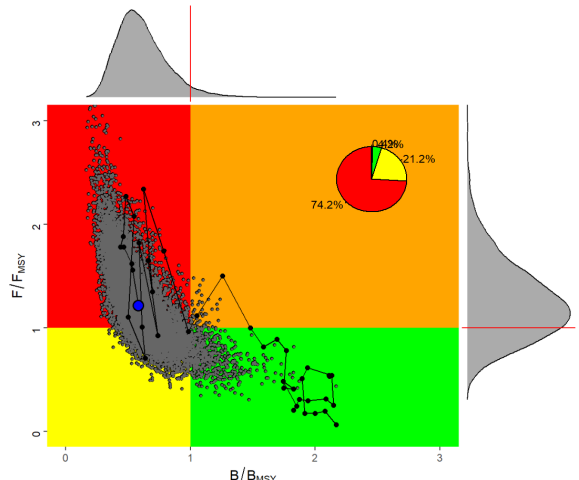
- Some new indices considered (Greek LL, Cyprus LL), but Italian LL not updated.
- Finally 8 cpues used (short, noisy).
- Only the **larval index** connects peak catch and recent periods. But concerns about **reliability of historical period** suggesting large drop in biomass, because different gear/method were used.



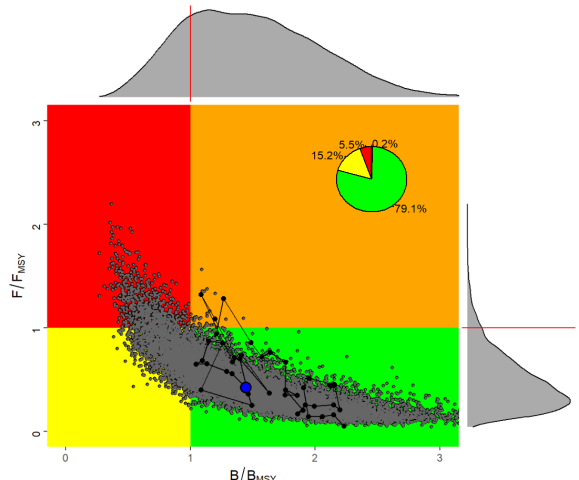
Med ALB assessment

- Two treatments/scenarios:
  - Continuous larval index (as in last assessment) -> S12
  - Split index (early and late series) -> S19
- Models strongly sensitive to treatment of Larval Index
- Decision to project them separately AND investigate further the larval index calibration for future assessments -> ALBYP

SC12

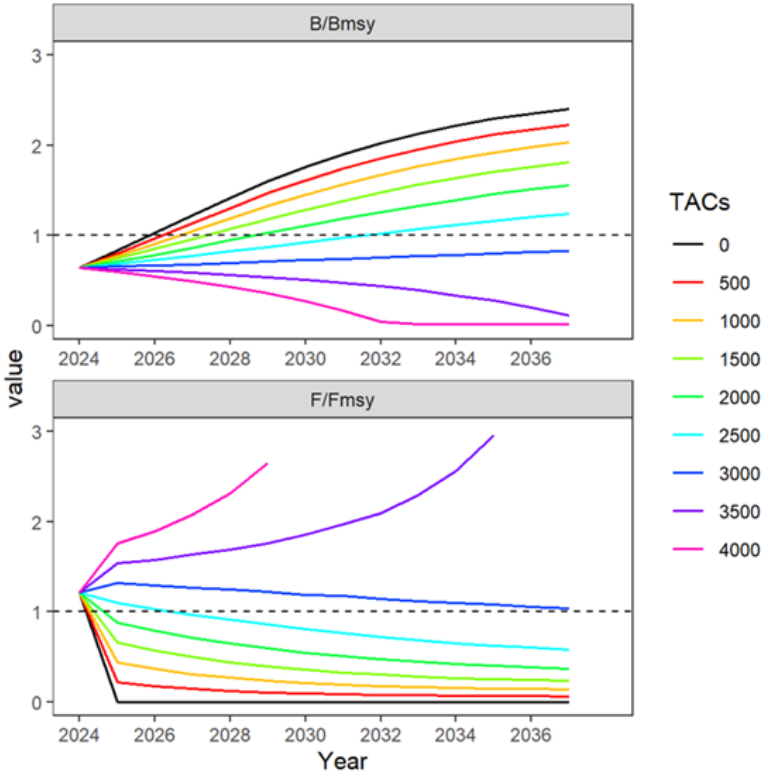


SC19

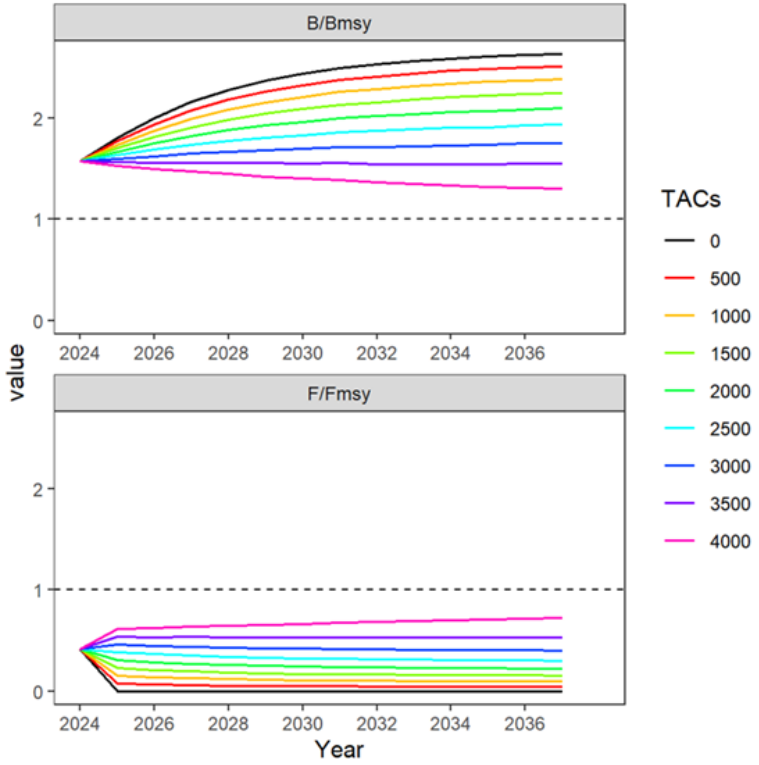


Projections

Scenario 1 (SC12)



Scenario 2 (SC19)



Projections

Scenario 1
MSY=3564 t (2584-4663)

(b) Probability $B>=B_{MSY}$

Catch (t)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
0	33%	53%	69%	81%	88%	92%	95%	97%	98%	98%	99%	99%	99%
500	30%	47%	62%	74%	82%	87%	91%	94%	95%	96%	97%	98%	98%
1000	28%	41%	54%	65%	74%	80%	85%	88%	91%	92%	94%	95%	96%
1500	25%	36%	46%	56%	64%	70%	75%	79%	83%	85%	87%	89%	90%
2000	22%	30%	39%	46%	53%	58%	63%	66%	70%	73%	76%	77%	79%
2500	20%	26%	31%	36%	41%	45%	48%	51%	54%	57%	59%	60%	62%
3000	18%	22%	25%	28%	30%	32%	34%	36%	38%	39%	41%	42%	43%
3500	16%	18%	20%	21%	22%	22%	23%	24%	24%	24%	24%	25%	25%
4000	15%	15%	15%	14%	14%	14%	14%	14%	14%	13%	13%	13%	13%

Scenario 2
MSY=4174 t (2831-7936)

(b) Probability $B>=B_{MSY}$

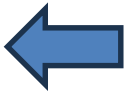
Catch (t)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
0	91%	95%	97%	98%	99%	99%	100%	100%	100%	100%	100%	100%	100%
500	90%	94%	96%	97%	98%	99%	99%	99%	100%	100%	100%	100%	100%
1000	89%	92%	95%	96%	97%	98%	99%	99%	99%	99%	99%	99%	100%
1500	88%	91%	93%	95%	96%	97%	97%	98%	98%	98%	99%	99%	99%
2000	87%	89%	91%	92%	94%	94%	95%	95%	96%	96%	97%	97%	97%
2500	85%	87%	88%	89%	90%	91%	91%	92%	92%	93%	93%	93%	93%
3000	84%	84%	85%	85%	86%	86%	86%	86%	86%	86%	86%	87%	87%
3500	83%	82%	81%	81%	80%	80%	79%	79%	78%	78%	77%	77%	76%
4000	81%	79%	77%	75%	73%	72%	70%	69%	68%	67%	66%	65%	64%

Projections

Scenario 1

Probability of B < 20% of B_{MSY}

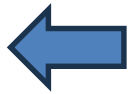
Catch (t)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1000	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1500	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2000	1%	2%	2%	2%	3%	3%	3%	4%	4%	4%	4%	4%	4%
2500	2%	3%	4%	5%	7%	8%	9%	10%	11%	12%	12%	13%	14%
3000	2%	5%	8%	11%	14%	17%	20%	22%	24%	26%	27%	29%	30%
3500	3%	8%	13%	19%	25%	30%	34%	38%	42%	45%	48%	50%	52%
4000	5%	12%	21%	30%	38%	45%	51%	56%	60%	63%	66%	68%	70%



Scenario 2

Probability of B < 20% of B_{MSY}

Catch (t)	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1500	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2000	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2500	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%
3000	0%	0%	0%	0%	1%	1%	1%	1%	2%	2%	2%	3%	3%
3500	0%	0%	1%	1%	2%	2%	3%	4%	5%	6%	6%	7%	8%
4000	0%	0%	1%	2%	3%	5%	6%	8%	9%	11%	13%	14%	16%



Management Recommendations

- Two alternative scenarios, but the current TAC (2500t) meets the management objective (60% B>Bmsy) in both.
- Re-evaluate the stock only after main concerns (task 1, larval index) are addressed (previous assessments likely affected by same issues)

Response to Commission

- ***19.8 Mediterranean albacore stock assessment, state of stock, effectiveness of the rebuilding plan, and minimum size for 2024, Rec. 22-05 para 10***

  - a **minimum size aiming to protect juveniles, would be of limited benefit**, because a high percentage (above 80% in numbers of fish caught) of current catches are well above the size at first maturity.
  - given the recent implementation of the recovery plan in 2022, it was not possible to assess the effectiveness of the rebuilding plan, as the 2024 Mediterranean albacore stock assessment used data up until 2022.

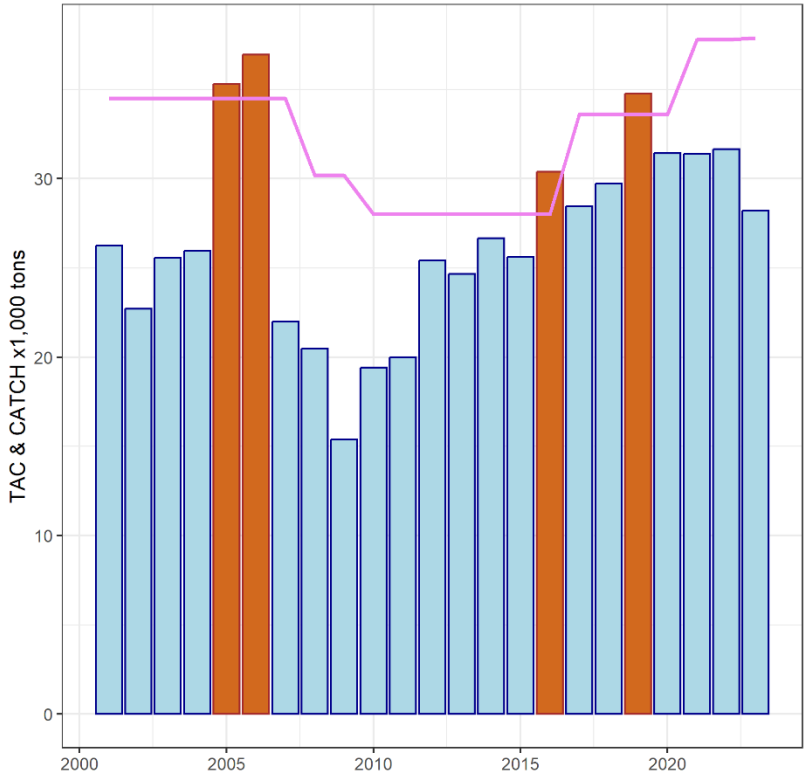
North ALB MSE

- New MSE framework started:
- Conditioning reference grid of OMs
- Test of current MP
- New observation error model with historical uncertainty
- Review of climate change effects on albacore, but little info on productivity effects to inform Robustness tests.
- Ex. Circ. Protocol applied

Exceptional Circumstances
Response to Rec 21-04 Par. 4 (SCI 87)

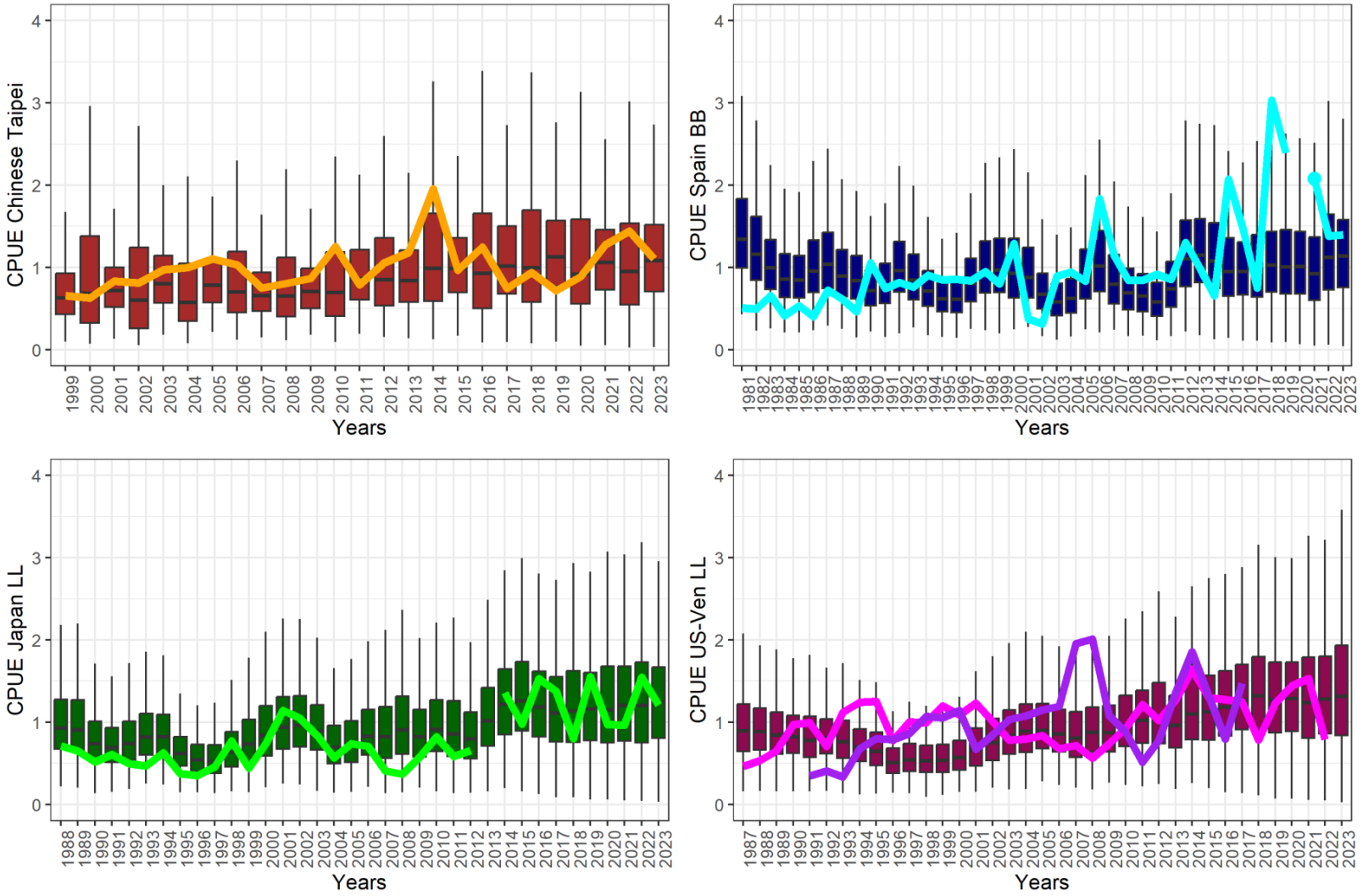
Principle	*Indicator*	*Criterion*	*Frequency of evaluation of Exceptional Circumstances*
a. Stock dynamics	Relative stock biomass (B/B_{MSY})[1]	Falls outside the 2.5% and 97.5% percentile range of values in any year from the OMs used in the MSE when the accepted MP was tested	Each benchmark stock assessment (every 6-7 years)
	Relative fishing mortality (F/F_{MSY})[1]		
	Growth[2]	Are substantially different from the values from the OMs used in the MSE when the accepted MP was tested	After completion, presentation, and acceptance by the SCRS of a study as the new reference
	Maturity[2]		
	Natural mortality[2]		
	CPUE[3]	Falls outside the 2.5% and 97.5% percentile range of values in any year from the OMs used in the MSE when the accepted MP was tested	Annually
b. Application of the MP	CPUE	If two or more series have not been updated for two or more years. If two or more series are determined to no longer reflect abundance	Each MP iteration (every 3 years)
	Catch	Catch data are unavailable or substantially unreported	Each MP iteration (every 3 years)
	Relative stock biomass (B/B_{MSY})[4]	Values from the production model in an iteration of the MP fall outside the 2.5% and 97.5% percentile range of values in any year produced by the accepted MP's production model during MSE testing	Each MP iteration (every 3 years)
	Relative fishing mortality (F/F_{MSY})[4]		
c. Implementation of the TAC	Catch	Total catch is above by more than 20% the TAC set using the MP	Annually

MSE: Exceptional Circumstances



- 2023 catch below TAC

MSE: Exceptional Circumstances



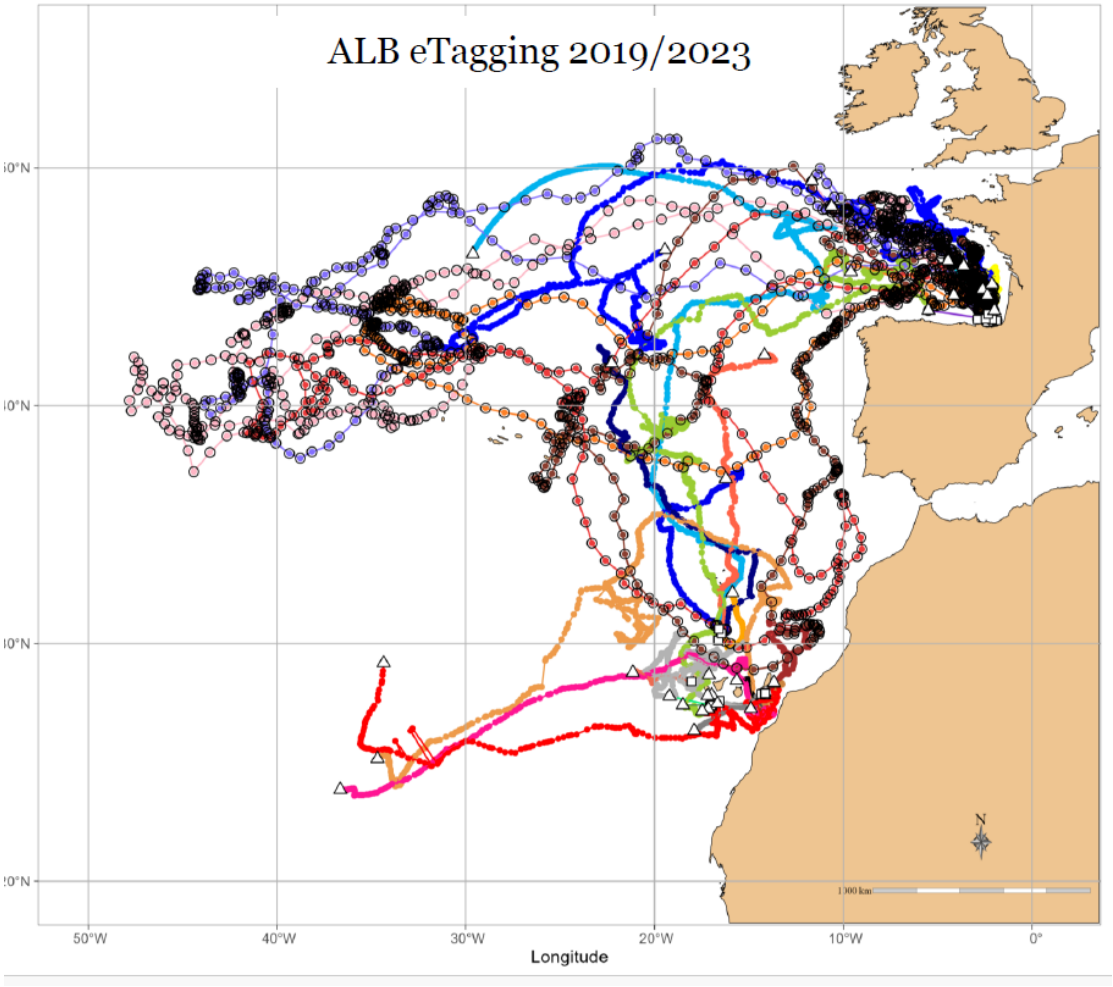
- **CPUEs within 2.5%-97.5% percentile range**

  -> no exceptional circumnstances detected

ALBYP (SCI 48, SCI 125) e-tagging

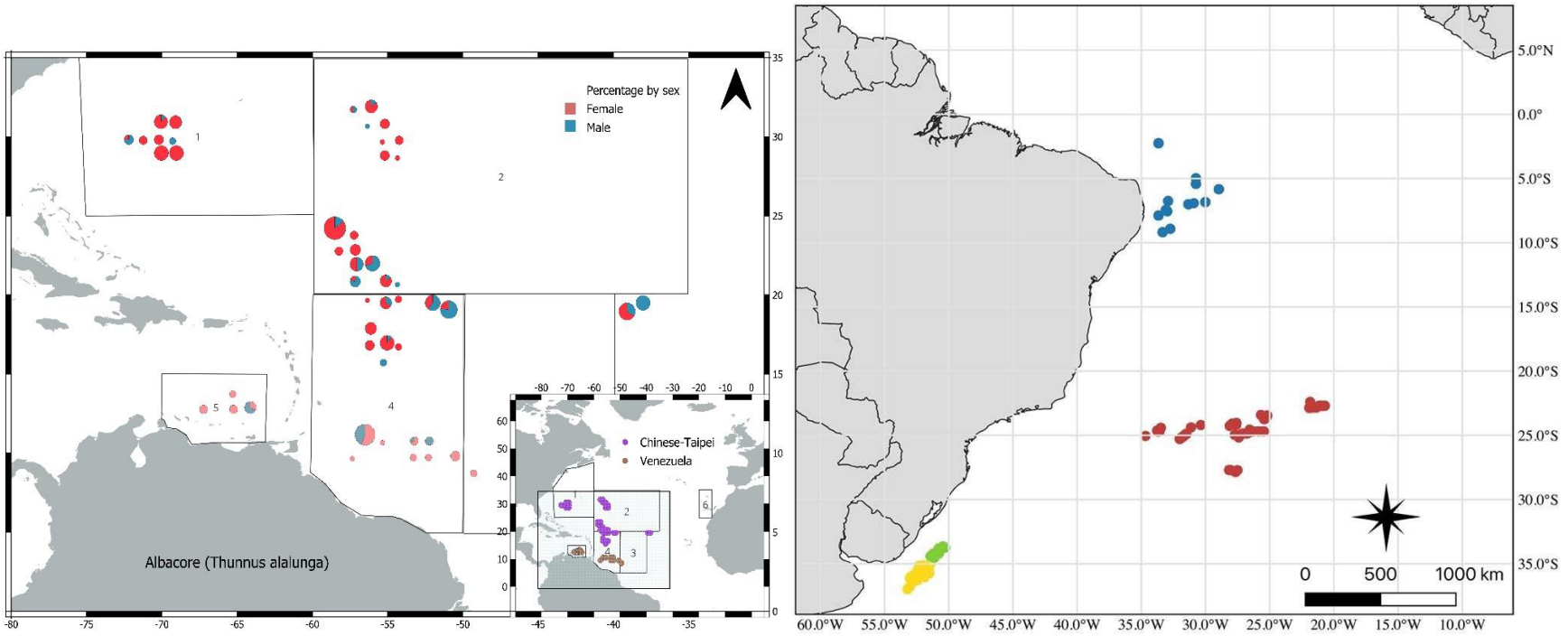
- 35 PSATS
- 155 IATs (12% recovery rate)
- 47 tracks, >5000 days
- 9 full year tracks

- -> <u>fidelity to Bay of Biscay</u>



Archival tagging
Reward posters

ALBYP: Reproductive biology



- Comparable L50 and batch fecundity (north-south)
- Finalize stock specific analyses and consider joint analysis

ALBYP: Mediterranean Research Strategic Plan

RESEARCH ITEM	PRIORITY	FEASIBILITY	WHEN
Fishery data			
Task1/2 data recovery	1	Low/Medium	2025
Alternative catch scenarios	1	High	2026
Larval survey calibration	1-2	High	2025
Joint longline CPUE	2	Low-Medium	By next assessment
Biology			
Integrated Growth	2	Medium	2025-2026
Improve r, K priors	2	Medium	2026-2027
Environmental issues	2-3	High	2025-2027
		Total	

ALB: Workplan 2025

NORTH:

- MSE
  - Finalize conditioning OMs
  - Finalize OEM
  - Test current and alternative MPs
  - Document
- Exceptional Circumstances
- ALBYP: etagging, reproduction + aging

SOUTH:

- Initiate SS3 development: inputs
- ALBYP: etagging, reproduction + aging

ALB: Workplan 2025

MEDITERRANEAN:

- Research:
  - Detailed plan
  - Reliability of the historical larval index: feasibility of albacore specific calibration
  - Growth model

ALB: Recommendations

Albacore
Tagging, rewards and awareness
Biological studies:
Reproduction
Age and growth
Genetic
Others
Sample collection and shipping
MSE
Progress of the ALB-N MSE

- Improve task 1 and work on potential catch scenarios
- Integrate Med into ALBYP

MSE Roadmap

The current version of the MSE Roadmap can be found in Appendix 7 of the 2024 SCRS Report

Thank You