

### 9.3 *ALB-MED-Mediterranean Albacore*

The status of the Mediterranean albacore stock is based on the 2021 assessment using 2019 as the terminal year for catch data. Complete information is found in the *Report of the 2021 ICCAT Albacore Species Group Intersessional Meeting (including assessment of Mediterranean albacore)* (Anon. in press).

#### **ALB-1. Biology**

Albacore is a temperate tuna widely distributed throughout the Atlantic Ocean and Mediterranean Sea. On the basis of the biological information available for assessment purposes, the existence of three stocks is assumed: North and South Atlantic stocks (separated at 5°N) and a Mediterranean stock (**ALB-Figure 1**). However, some studies support the hypothesis that various sub populations of albacore exist in the North Atlantic and Mediterranean.

Scientific studies on albacore stocks, in the North Atlantic, North Pacific and the Mediterranean, suggest that environmental variability may have a substantial impact on albacore stocks, affecting fisheries due to a shift in species distribution, as well as productivity and potential MSY of the stocks.

The expected lifespan for Mediterranean albacore is around 15 years. In the Mediterranean, there is a need to integrate different available studies so as to better characterize growth of Mediterranean albacore. Besides some additional recent studies on maturity, in general, there is poor knowledge about Mediterranean albacore biology and ecology in some areas.

More information on Mediterranean albacore biology and ecology is published in the *ICCAT Manual*.

#### **ALB-2. Description of fisheries or fishery indicators**

During the assessment, the catch series were revised and approved by the Group. It is known that the catch series of some ICCAT CPCs are still incomplete, and efforts are being made to recover those catches to complete Task 1 estimations. In 2019 and 2020, the reported landings were 2,484 t and 2,675 t, respectively, below those in the last decade (**ALB-Table 1** and **ALB-Figure 2**). The majority of the catch came from longline fisheries. EU-Italy is the main harvester of Mediterranean albacore, with around 50% of the catch during the last 10 years. In 2019 the Italian catch remained similar to the average over the last five years.

#### **ALB-3. State of stocks**

In 2021, the stock assessment for Mediterranean albacore was conducted using catch and CPUE data up to 2019. A Bayesian state space surplus production model (JABBA) was used for assessment purposes.

Eight indices were used: Spanish, Italian, Ionian, Ligurian, Med-South, and historical Italian longline indices, western Mediterranean larval index (providing information on the trends of the spawning biomass), and the Spanish Tournament index (new). These indices (expressed in fish number or weight) showed a general decreasing trend over time. Comparatively, the larval survey suggests the largest decrease in biomass during the 2000s and early 2010s, and the Italian longline index suggests the greatest increase during the most recent years (**ALB-Figure 3**).

Overall, the data inputs to the model remain uncertain, including: possible under-reporting of the catch; limitations both in spatial and temporal coverage of available indices of abundance; the fact that most indices are limited to the most recent years of the fisheries; and, conflicting trends among these indices. In fact, the conflict between the trends of the Italian longline and western Mediterranean larval index proved crucial when characterizing the current state of the stock.

The Committee reiterates that the ability of the available CPUE series to monitor stock trends is limited.

The results indicate that current fishing mortality levels (2019) are above  $F_{MSY}$  (1.2; 0.62-2.18, Median and 95% CI), and the current biomass is below the  $B_{MSY}$  level (0.57; 0.32-1.00, Median and 95% CI) (**ALB-Figure 4**). The probability of being in the red, yellow, orange and green quadrants of the Kobe plot is 73.8%, 23.6%, 0.1% and 2.5%, respectively (**ALB-Figure 4**).

***ALB-4. Outlook***

The best available model was projected into the future under alternative catch scenarios. The Kobe matrix indicates that catches of the order of 2,700 t, close to the average of the last three years (2017-2019) of the assessment would allow the stock to recover to the green quadrant of the Kobe plot with a greater than 50% probability within a time frame of eleven years, which is approximately twice the estimated generation time for this stock. Reducing the catch level to around 2,000 t would allow the stock to recover to the green quadrant of the Kobe plot with a greater than 60% probability within a time frame of eight years (2029). Larger decreases would allow for faster recoveries and/or higher probabilities to be in the green quadrant (**ALB-Table 2**).

***ALB-5. Effect of current regulations***

In 2017 the Commission adopted Rec. 17-05, according to which no increase in catch and fishing effort is allowed until more accurate scientific advice was available from the SCRS. Albacore catches in the Mediterranean have been relatively constant between 2016 and 2019 with only a slight decrease from 2018 to 2019. Moreover, a time closure of two months (1 October - 30 November), originally aimed at protecting juvenile Mediterranean swordfish, applies to the longline fleet targeting albacore in the Mediterranean from 2018 onwards. Furthermore, according to the same Recommendation, the number of vessels for each CPC is limited to the number of vessels that were authorized to target Mediterranean albacore in 2017 under paragraph 28 of Rec. 16-05.

From 2012 onwards, the seasonal closure aimed at the protection of swordfish in the Mediterranean (Rec. 16-05, Rec. 13-04, and Rec. 11-03) contemplates an additional 45 day closure of the swordfish fishery (between 15 February and 31 March), that also affects the albacore fisheries in the Mediterranean.

***ALB-6. Management recommendations***

As noted previously under the State of the Stocks section, the limitations and uncertainty in data inputs contribute to uncertainties in the characterization of stock status, in particular for fishing mortality, as noted by the wide confidence intervals on  $F/F_{MSY}$ .

Based on the best available data and models, the projections of current (2019) stock status show that catches on the order of those observed in the first decade of the 2000s (5,000 t) are not sustainable and catches exceeding 4,000 t would lead to a high probability of driving the stock to extremely low levels, risking stock collapse (**ALB Figure 5**). By comparison, catches on the order of 2,700 t, close to the average of the last three years (2017-2019) would allow the stock to recover to the green quadrant of the Kobe plot with a greater than 50% probability by 2032 (**ALB-Table 2**; 11 years is approximately twice the estimated generation time for this stock), however this level of fishing also has a 17% probability of reducing  $B/B_{MSY}$  below 0.2 in 2032, a level below which there is an increased risk of stock collapse. Catches higher than 2,700 t will delay the recovery of the stock and have a greater than 17% probability for  $B$  below  $0.2 \cdot B_{MSY}$  (**ALB-Table 3**). Decreasing catches below 2,700 t would allow for faster recoveries and/or higher probabilities of being in the green quadrant.

<b>MEDITERRANEAN ALBACORE SUMMARY</b>	
	<b>Mediterranean</b>
Maximum Sustainable Yield	3,653.9 t (2,446-5,090 t) <sup>1</sup>
Current (2020) Yield	2,675 t
Yield in last year of assessment (2019)	2,484 t
B <sub>MSY</sub>	19,703.1 t (11,676 - 36,833 t) <sup>1</sup>
F <sub>MSY</sub>	0.184 (0.091 - 0.335) <sup>1</sup>
B <sub>2019</sub> /B <sub>MSY</sub>	0.570 (0.322 - 1.004) <sup>1</sup>
F <sub>2019</sub> /F <sub>MSY</sub>	1.213 ( 0.618 - 2.175 t) <sup>1</sup>
Stock Status	Overfished: YES Overfishing: YES
Management measures in effect:	Rec. 17-05: Time closure of two months (1 October-30 November) for longlines, aimed at protecting the Mediterranean swordfish juveniles. A list of vessels authorized to target Mediterranean albacore implemented in 2017. No increase of catch and effort until more accurate advice is delivered.

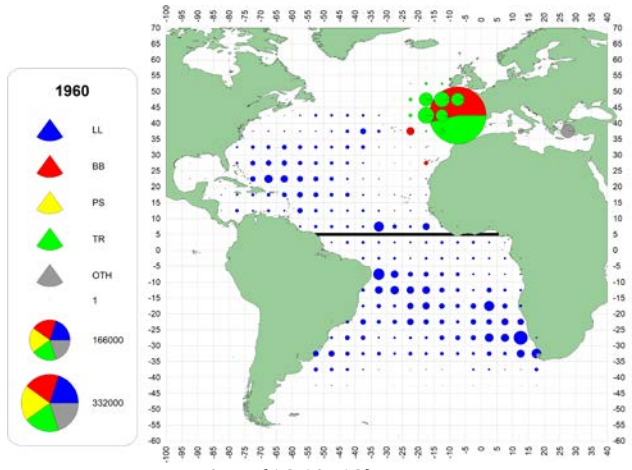
<sup>1</sup> Median and 95% credibility intervals for the Bayesian surplus production model.



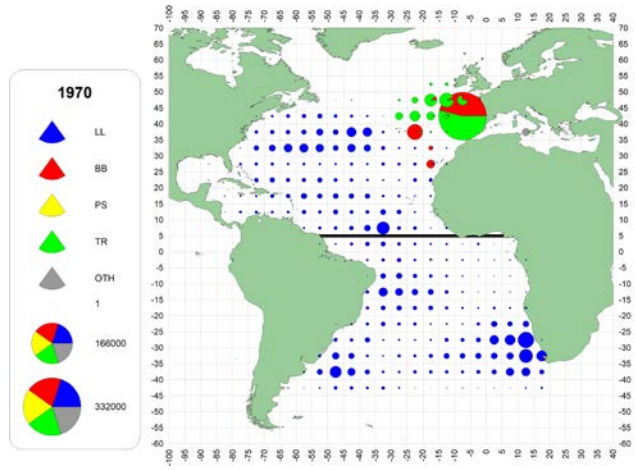


**ALB-Table 3.** Mediterranean albacore estimated probabilities (in %) based on Bayesian surplus production model that the stock biomass is below 20% BMSY. Projections for constant catch levels (0 t to 4,000 t, MSY 3,600 t, average catch 2017-19, 2,700 t) are shown. Assumed catches for 2020 and 2021 were 2,700 t (average of the 2017-2019 period).

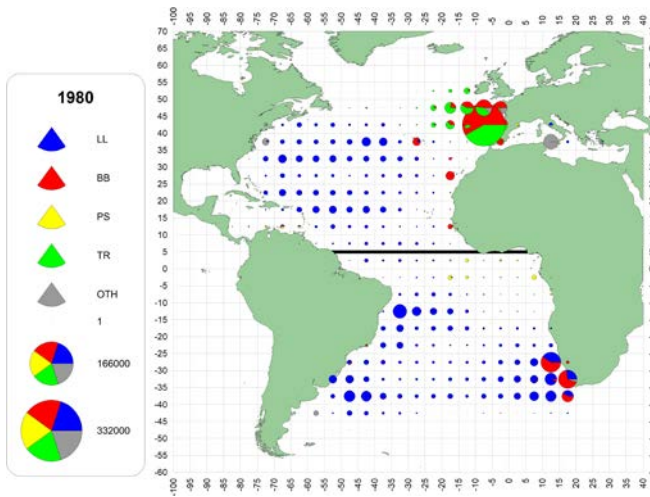
TAC	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
500	1	1	0	0	0	0	0	0	0	0	0	0	0	0
1000	1	1	1	1	1	0	0	0	0	0	0	0	0	0
1500	1	1	1	1	1	1	1	1	1	1	2	2	2	2
2000	1	2	2	3	3	4	4	4	5	5	5	6	6	6
2500	1	2	3	5	6	8	9	10	11	12	13	13	14	15
2600	1	2	4	6	7	9	10	11	13	14	15	15	16	17
2700	1	3	4	6	8	10	12	13	14	16	17	18	19	19
2800	1	3	5	7	9	11	13	15	16	18	19	21	22	23
2900	1	3	5	8	10	13	15	17	19	20	22	23	25	26
3000	1	3	6	8	11	14	17	19	21	23	24	26	27	28
3600	1	4	9	14	19	24	29	33	37	39	42	45	47	49
4000	1	5	11	19	26	33	38	43	48	51	54	57	59	61



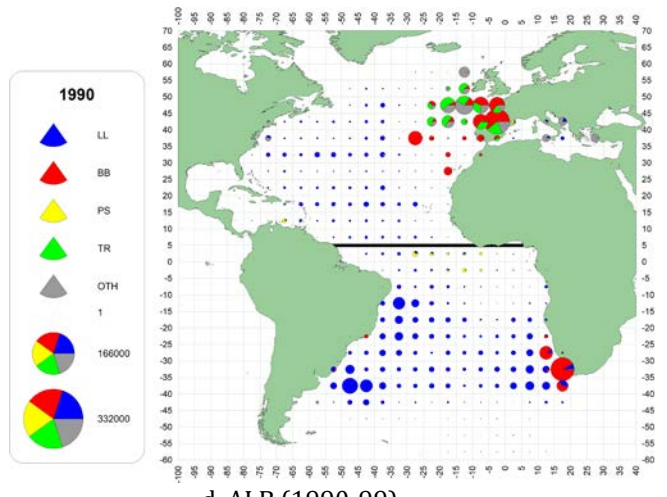
a. ALB (1960-69)



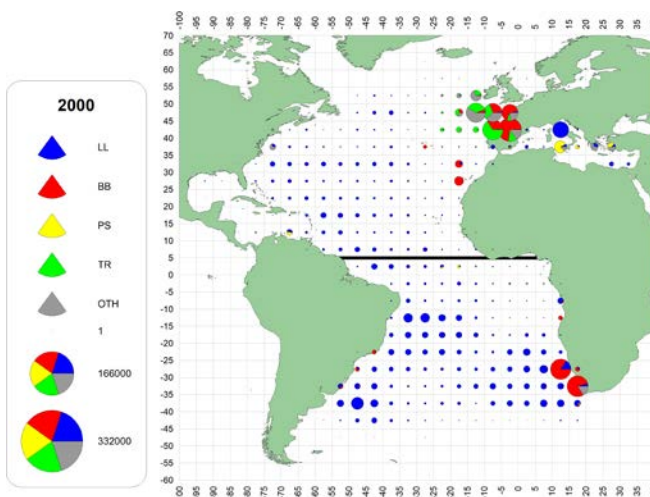
b. ALB (1970-79)



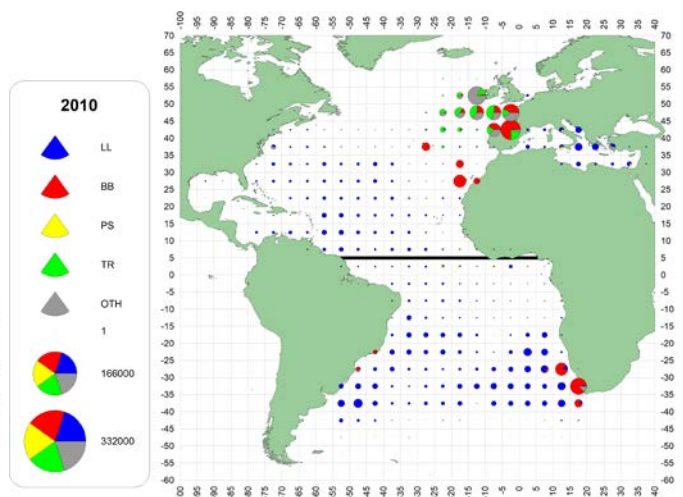
c. ALB (1980-89)



d. ALB (1990-99)

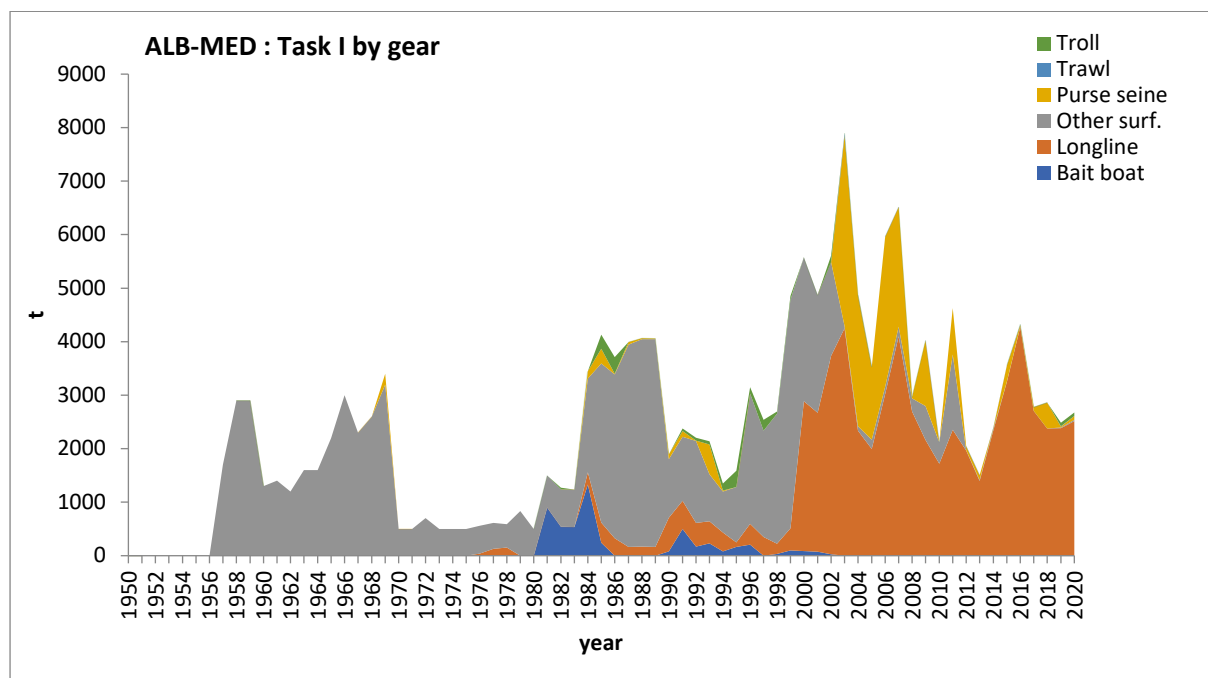


e. ALB (2000-09)

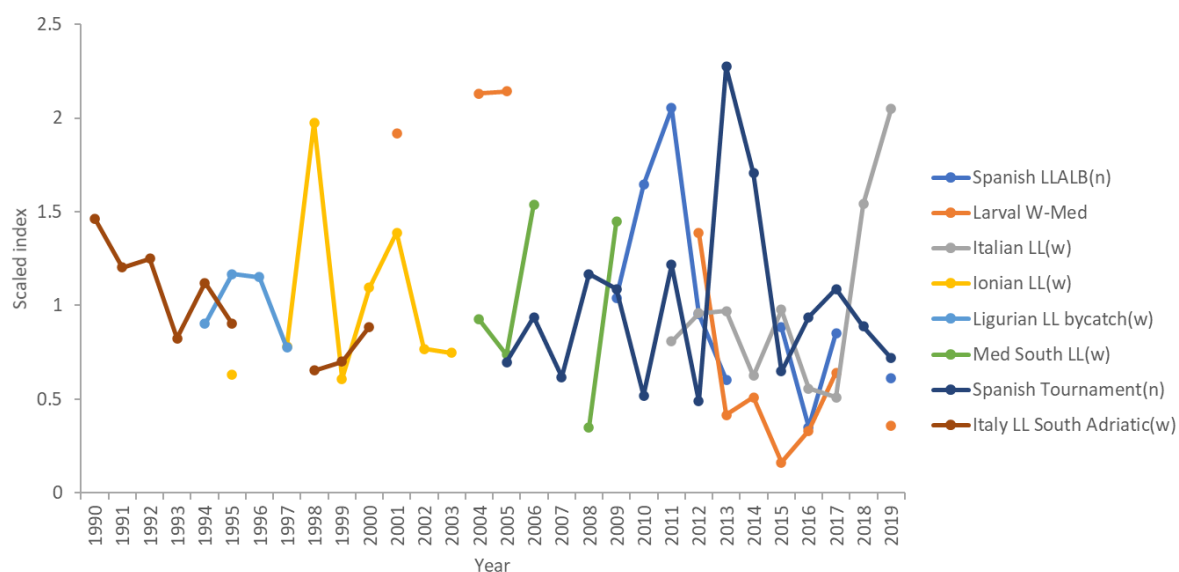


f. ALB (2010-18)

**ALB-Figure 1.** Geographic distribution of accumulated albacore catch by major gears and decade (1960-2018). Prior to the 1990s, baitboat and troll catches were assigned to only one 5°x5° stratum in the Bay of Biscay. Plots are scaled to the maximum catch observed from 1960 to 2018 (last decade only covers 9 years).

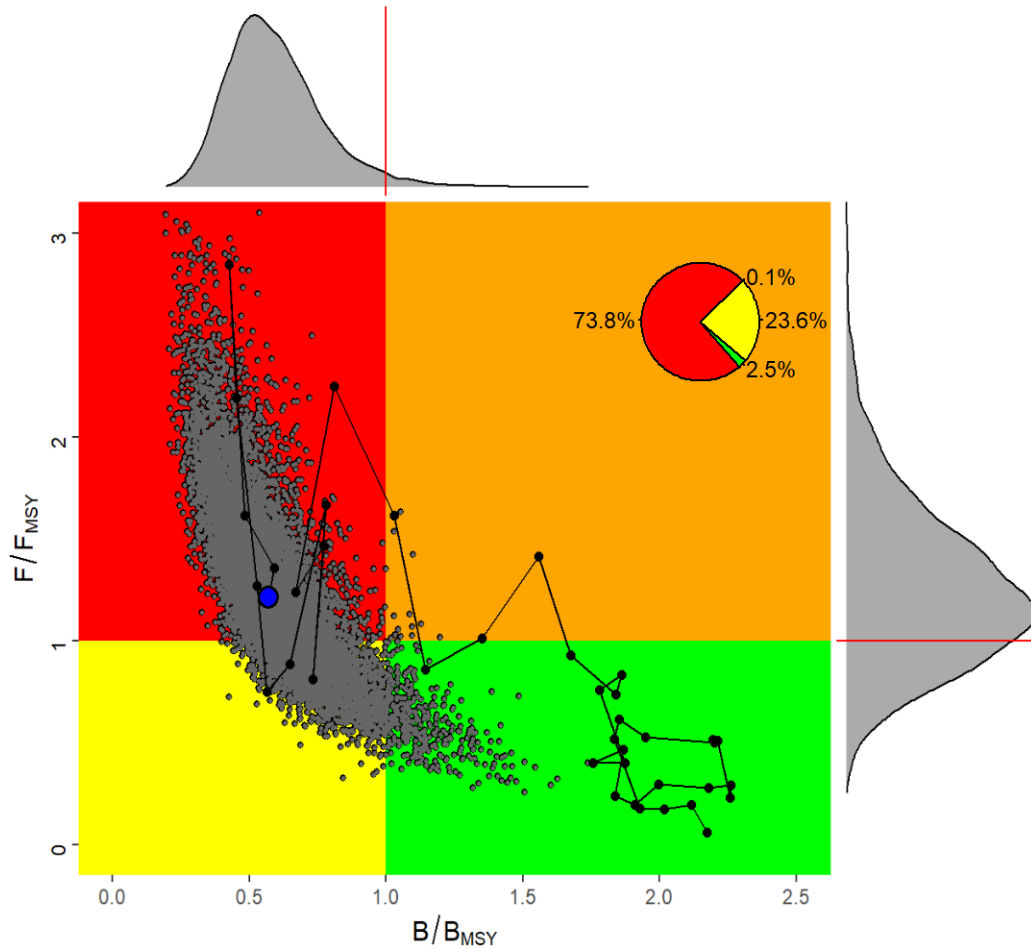


**ALB-Figure 2.** Total albacore catches reported to ICCAT (Task 1) by gear for the Mediterranean stock.

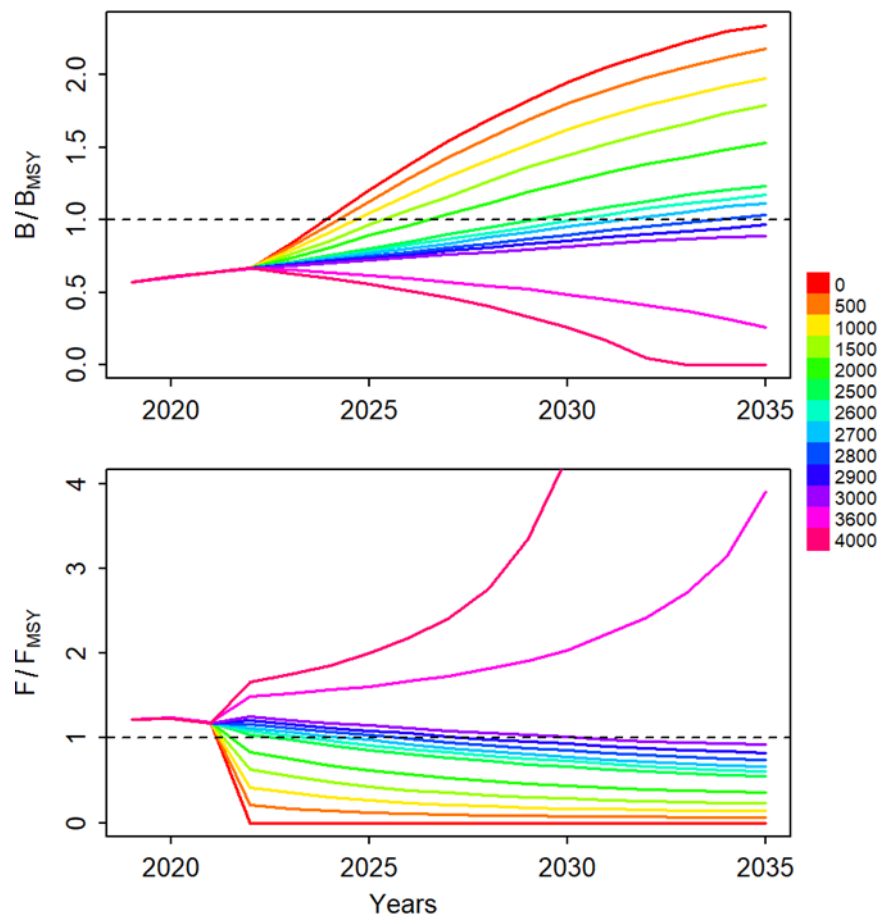


**ALB-Figure 3.** Mediterranean albacore. Abundance indices used in the 2021 Assessment of the Mediterranean albacore stock (Anon., in press). *n* and *w* refer to abundance indices in number and weight, respectively.





**ALB-Figure 4.** Mediterranean albacore. Stock status trajectories of  $B/B_{MSY}$  and  $F/F_{MSY}$  over time (1980-2019) with uncertainty around the current estimate (Kobe plots) for Bayesian surplus production model, as well as probability of being overfished and overfishing (red, 73.8%), of being neither overfished nor overfishing (green (2.5%), of being overfished but not overfishing (yellow, 23.6%) and of overfishing but not overfished (orange, 0.1%). The probability distributions shown in each axis represent uncertainty around current  $B/B_{MSY}$  and  $F/F_{MSY}$ .



**ALB-Figure 5.** Trends of projected relative stock biomass (upper panel,  $B/B_{MSY}$ ) and fishing mortality (bottom panel,  $F/F_{MSY}$ ) for Mediterranean albacore under different fixed catch scenarios of 0–4,000 t (Note:  $MSY \sim 3,600$  t; average catch between 2017 and 2019  $\sim 2,700$  t), based upon the projections of the Bayesian surplus production model. Each line represents the median of 15,000 MCMC iterations by projected year.