

9.5 ALB-MD - 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 Intersessional Meeting of the Albacore Species Group including the Mediterranean Albacore Stock Assessment ([Anon., 2021c](#)).

ALB-MD-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-MD 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-MD-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 2021 and 2022, the reported landings were 2,895 t and 2,295 t, respectively, below those in the last decade (**ALB-MD-Table 1** and **ALB-MD-Figure 2**). The majority of the catch came from longline fisheries. EU-Italy is the main harvester of Mediterranean albacore, with around 43% of the catch during the last 10 years. In 2022 the Italian catch remained similar to the average over the last five years.

ALB-MD-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-MD-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 catch per unit effort (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% Confidence Interval (CI)), and the current biomass is below the B_{MSY} level (0.57; 0.32-1.00, median and 95% CI) (**ALB-MD-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-MD-Figure 4**).

ALB-MD-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-MD-Table 2**).

ALB-MD-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-MD-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-MD-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-MD-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-MD-Table 3**). Decreasing catches below 2,700 t would allow for faster recoveries and/or higher probabilities of being in the green quadrant.

MEDITERRANEAN ALBACORE SUMMARY	
Maximum Sustainable Yield	3,653.9 t (2,446 - 5,090 t) ¹
Current (2022) Yield	2,295 t
Yield in last year of assessment (2019)	2,484 t
B _{MSY}	19,703.1 t (11,676 - 36,833 t) ¹
F _{MSY}	0.184 (0.091 - 0.335) ¹
B ₂₀₁₉ /B _{MSY}	0.570 (0.322 - 1.004) ¹
F ₂₀₁₉ /F _{MSY}	1.213 (0.618 - 2.175 t) ¹
Stock Status	Overfished: YES Overfishing: YES
Management measures in effect:	Rec. 22-05 : 15-year Rebuilding plan (2022-2036); TAC for years 2022, 2023 and 2024: 2,500 t Limited number of vessels (reference year 2017 or 2018); Census of authorized sport & recreational vessels (maximum three albacore specimens/vessel/day); Time closure: 01/10-30/11 + 1 month between 15/02-31/03; alternatively, 01/01-31/03.

¹ Median and 95% credibility intervals for the Bayesian surplus production model.

ALB-MD-Table 1. Estimated catches (t) of albacore (*Thunnus alalunga*) by area, gear and flag.

		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022		
TOTAL	MED	2138	1349	1587	3150	2541	2698	4856	5577	4870	5608	7898	4874	3529	5965	6520	2970	4024	2124	4628	2047	1503	2400	3800	4396	3176	2863	2762	2675	2895	2295		
Landings	Bait boat	231	81	163	205	0	33	96	88	77	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Longline	410	350	87	391	348	194	416	2796	2597	3704	4248	2335	1997	3026	4101	2694	2160	1719	2327	1959	1392	2343	3235	4333	3087	2378	2656	2497	2798	2112		
	Other surf.	879	766	1031	2435	1991	2426	4271	2693	2196	1757	46	87	169	134	182	246	634	404	1408	8	18	27	5	4	2	2	8	29	1	34		
	Purse seine	559	23	0	0	0	0	0	0	0	1	3557	2452	1362	2803	2237	24	1230	0	869	68	86	15	543	34	82	481	30	66	72	110		
	Trawl	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	5	0	0	0	0	0	5	7	9	3	2	2	5	13	1		
	Troll	59	129	306	119	202	45	73	0	0	117	0	0	0	1	0	1	0	1	0	6	0	3	0	0	2	1	67	62	5	0		
Discards	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	6	7	8	10	16	0	0	0	16	5	39	
Landings	CP	EU-Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7	12	20	30	11	7	2	2	1	1	0	0		
		EU-Cyprus	0	0	0	0	0	0	6	0	12	30	255	425	507	712	209	223	206	222	315	350	377	495	542	568	624	714	632	513	448		
		EU-España	298	218	475	429	380	126	284	152	200	209	1	138	189	382	516	238	204	277	343	389	244	283	53	51	206	71	68	67	133	98	
		EU-France	64	23	3	0	5	5	0	0	1	0	0	0	0	2	1	0	1	2	0	0	1	1	0	0	0	0	15	15	24	36	
		EU-Greece	1	1	0	952	741	1152	2005	1786	1840	1352	950	773	623	402	448	191	116	125	126	126	165	287	541	1332	608	522	297	158	182	145	
		EU-Italy	1275	1107	1109	1769	1414	1414	2561	3630	2826	4032	6913	3671	2248	4584	3970	2104	2727	1109	2501	1117	615	1353	1602	1490	1348	1044	1287	1423	1192	1154	
		EU-Malta	0	0	0	0	1	1	6	4	4	2	5	10	15	18	1	5	1	2	5	19	29	62	37	56	4	104	77	13	137	50	
		EU-Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Egypt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	246	77	396	429	278	316	622	177	
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Korea Rep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	750	800	0	30	21	19	17	20	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	0	0	0	0	0	0	0	0	0	0	0	0	10	10
		Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	14	0	0	0	1	1	0	0	0	0	0	0	0	0	0	
		Türkiye	0	0	0	0	0	0	0	0	0	0	27	30	73	852	208	631	402	1396	62	71	0	53	25	44	38	4	16	58	118		
	NCO	NEI (MED)	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Yugoslavia Fed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Discards	CP	EU-Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	6	7	8	10	16	0	0	0	16	5	37	
		EU-España	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

ALB-MD-Table 2. Mediterranean albacore estimated probabilities (in %) based on Bayesian surplus production model that the stock fishing mortality is below F_{MSY} (a), biomass is above B_{MSY} (b) and both (c). 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).

(a) Probability $F < F_{MSY}$.

TAC Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100
500	99	100	100	100	100	100	100	100	100	100	100	100	100	100
1000	94	96	97	98	98	98	99	99	99	99	99	99	99	99
1500	81	85	88	89	91	92	93	94	95	95	95	96	96	96
2000	64	69	73	76	78	80	81	82	84	84	85	86	87	87
2500	47	52	55	58	61	63	65	66	68	69	70	70	71	72
2600	44	48	52	55	57	59	61	63	64	65	66	67	68	68
2700	41	46	49	52	54	56	58	60	61	62	63	64	64	64
2800	39	43	46	48	50	52	54	55	57	58	58	59	60	60
2900	36	40	43	45	47	49	51	52	53	54	55	55	56	57
3000	34	37	40	42	45	46	47	48	50	51	51	52	52	53
3600	22	24	25	26	27	28	28	28	29	29	29	29	29	30
4000	16	17	18	19	19	19	19	19	19	19	19	19	19	19

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

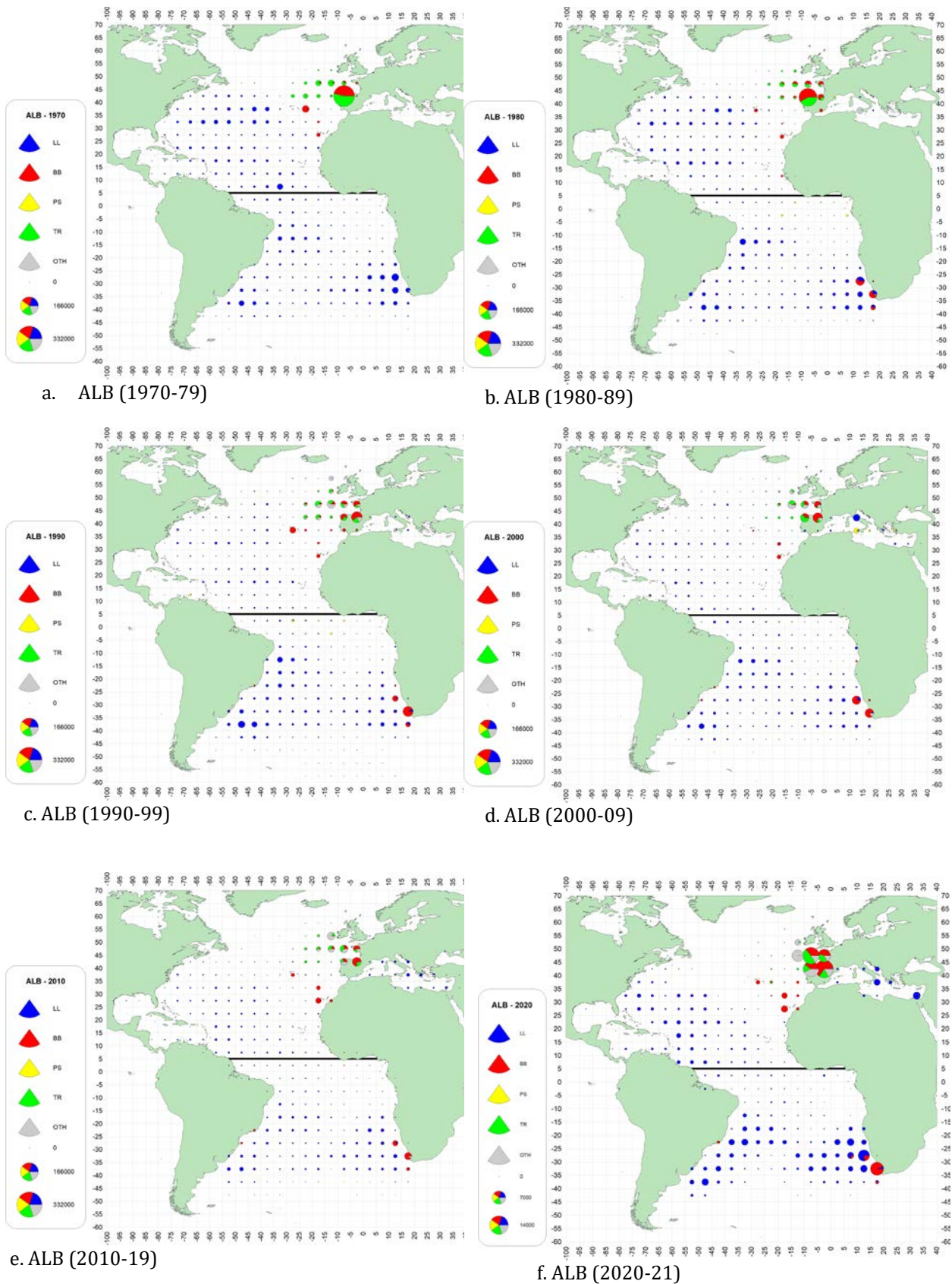
TAC Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
0	18	35	52	66	76	83	88	91	94	95	97	97	98	98
500	18	32	47	60	71	78	83	87	90	92	94	95	96	97
1000	18	30	42	54	63	70	76	80	84	87	89	90	92	93
1500	18	28	38	48	55	61	67	71	75	78	81	83	84	86
2000	18	27	35	41	48	53	57	61	65	67	70	72	73	75
2500	18	24	30	35	39	43	47	50	52	55	57	58	60	61
2600	18	24	29	34	38	41	44	47	50	52	54	56	57	58
2700	18	23	28	32	36	40	42	45	48	49	51	53	54	55
2800	18	23	28	31	35	38	41	43	45	46	48	49	50	52
2900	18	23	26	30	33	36	39	41	42	44	45	47	48	49
3000	18	22	26	30	32	34	37	39	40	41	43	44	45	45
3600	18	20	21	23	24	25	25	25	26	26	27	27	27	27
4000	18	18	19	20	20	20	20	19	19	19	19	19	19	19

(c) Probability of green status ($B > B_{MSY}$ and $F < F_{MSY}$).

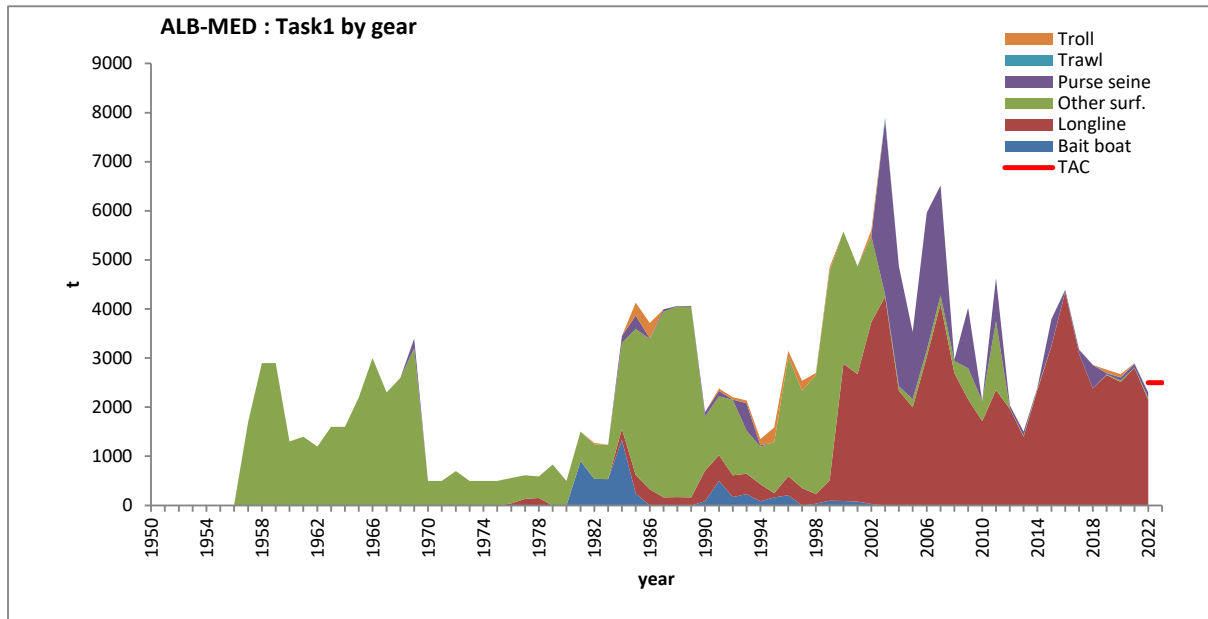
TAC Year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
0	18	35	52	66	76	83	88	91	94	95	97	97	98	98
500	18	32	47	60	71	78	83	87	90	92	94	95	96	97
1000	18	30	42	54	63	70	76	80	84	87	89	90	92	93
1500	18	28	38	48	55	61	67	71	75	78	81	83	84	86
2000	18	27	34	41	48	53	57	61	65	67	70	72	73	75
2500	18	24	30	35	39	43	47	50	52	54	57	58	60	61
2600	18	24	29	34	37	41	44	47	50	52	54	56	57	58
2700	18	23	28	32	36	40	42	45	48	49	51	53	54	55
2800	18	23	28	31	34	38	41	42	44	46	48	49	50	51
2900	17	22	26	30	33	36	38	41	42	44	45	46	47	48
3000	18	22	26	29	32	34	36	39	40	41	43	44	44	45
3600	16	18	20	21	22	23	24	24	25	25	26	26	26	27
4000	13	14	16	16	17	17	18	18	18	18	18	18	18	17

ALB-MD-Table 3. Mediterranean albacore estimated probabilities (in %) based on Bayesian surplus production model that the stock biomass is below 20% B_{MSY} . 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).

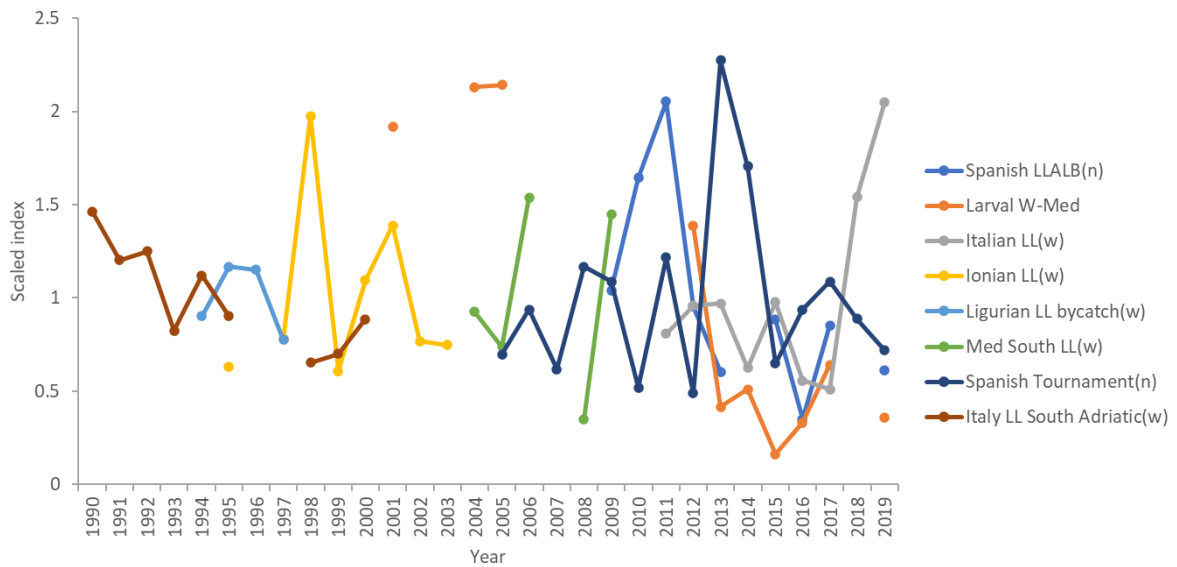
<i>TAC</i>	<i>2022</i>	<i>2023</i>	<i>2024</i>	<i>2025</i>	<i>2026</i>	<i>2027</i>	<i>2028</i>	<i>2029</i>	<i>2030</i>	<i>2031</i>	<i>2032</i>	<i>2033</i>	<i>2034</i>	<i>2035</i>
0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
500	1	1	0	0	0	0	0	0	0	0	0	0	0	0
1000	1	1	1	1	1	0	0	0	0	0	0	0	0	0
1500	1	1	1	1	1	1	1	1	1	1	2	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



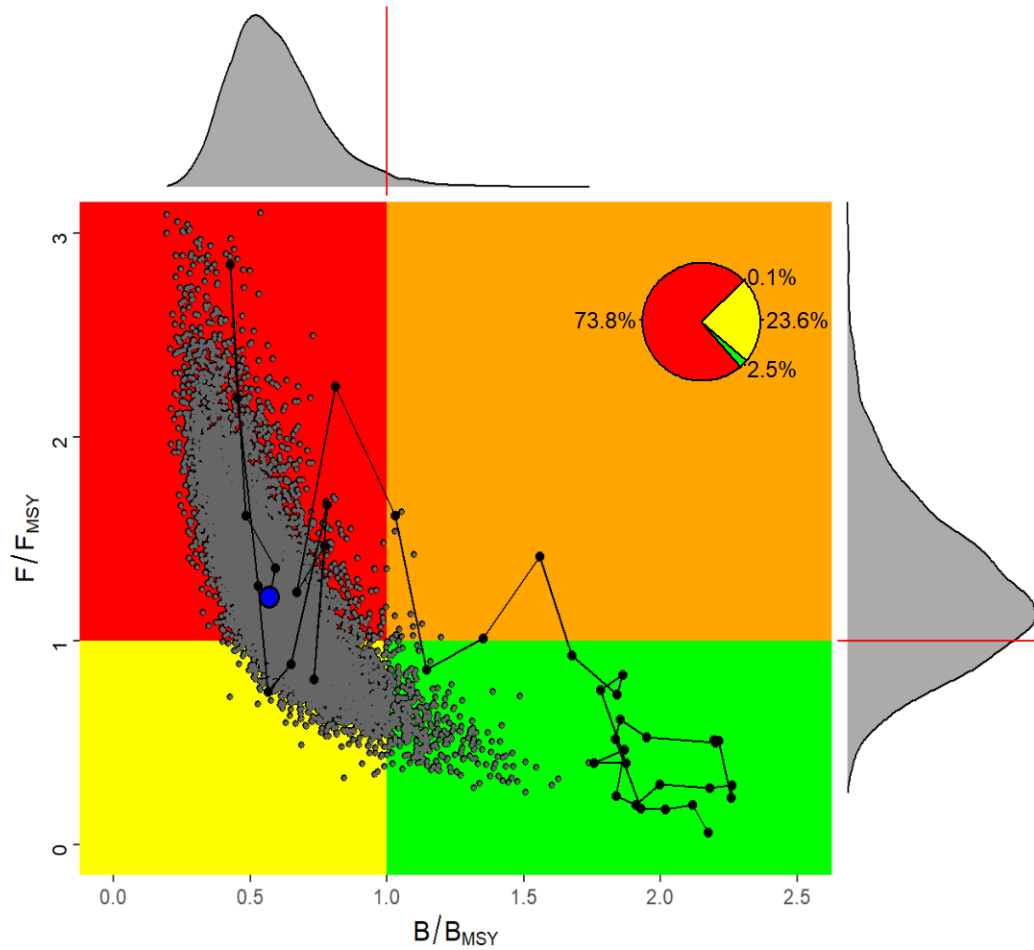
ALB-Figure 1. Geographic distribution of accumulated albacore catch by major gears and decade (1970-2021). Prior to the 1990s, baitboat and troll catches were assigned to only one 5°x5° stratum in the Bay of Biscay. Plots are scaled to the maximum catch observed from 1970 to 2021 (last decade only covers 2 years).



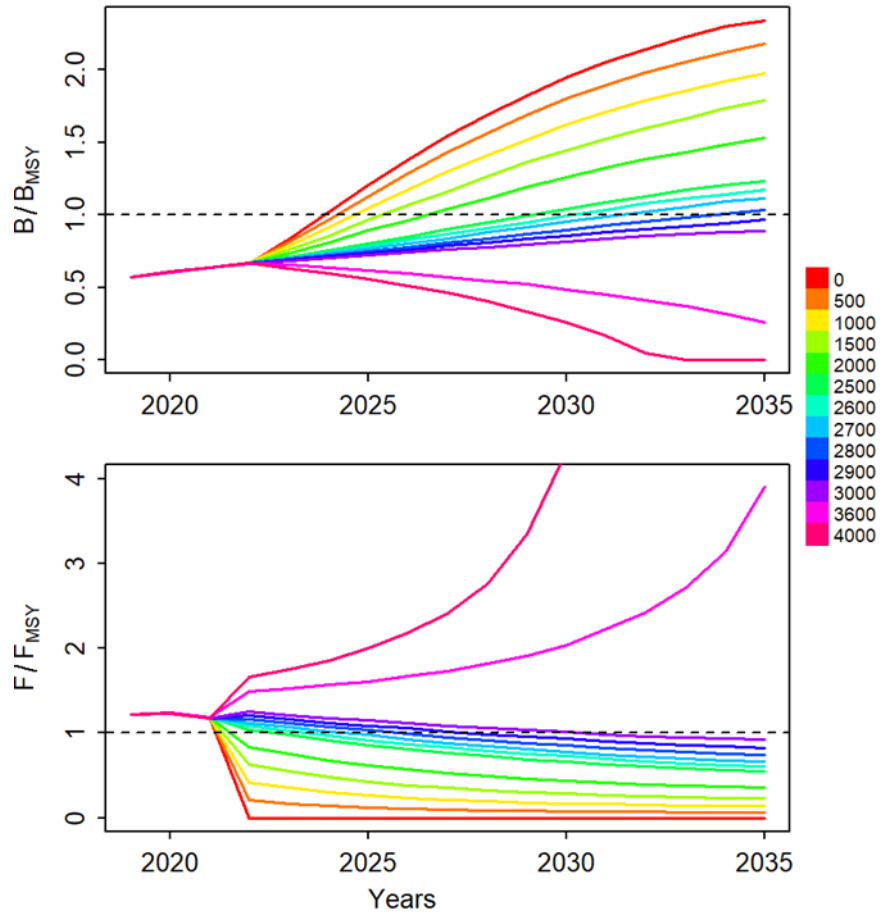
ALB-MD-Figure 2. Total albacore catches reported to ICCAT (Task 1) by gear for the Mediterranean stock.



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



ALB-MD-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-MD-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.