8.4 ALB – ALBACORE

The status of the North and South Atlantic albacore stocks is based on the most recent analyses conducted in June 2013 by means of applying statistical modelling to the available data up to 2011. Complete information on the assessment can be found in the Report of the 2013 ICCAT Albacore Stock Assessment Session (SCRS/2013/016).

The status of the Mediterranean albacore stock is based on the 2011 assessment using available data up to 2010. Complete information is found in the Report of the 2011 ICCAT South Atlantic and Mediterranean Albacore Stock Assessment Session (Anon. 2012b).

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: northern and southern Atlantic stocks (separated at 5ºN) 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. Likewise, there is likely intermingling of Indian Ocean and South Atlantic immature albacore which needs further research.

Scientific studies on albacore stocks, in the North Atlantic, North Pacific and the Mediterranean, suggest that environmental variability may have a serious potential impact on albacore stocks, affecting fisheries by changing the fishing grounds, as well as productivity levels and potential MSY of the stocks. Those yet sufficiently unexplored aspects might explain recently observed changes in fisheries, such as the lack of availability of the resource in the Bay of Biscay in some years, or the apparent decline in the estimated recruitment which are demanding focussed research.

The expected life-span for albacore is around 15 years. While albacore is a temperate species, spawning in the Atlantic occurs in tropical waters. Present available knowledge on habitat, distribution, spawning areas and maturity of Atlantic albacore is based on limited studies, mostly from past decades. 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.

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

ALB-2. Description of fisheries or fishery indicators

North Atlantic

The northern stock is exploited by surface fisheries targeting mainly immature and sub-adult fish (50 cm to 90 cm FL) and longline fisheries targeting immature and adult albacore (60 cm to 130 cm FL). The main surface fisheries are carried out by EU fleets (Ireland, France, Portugal and Spain) in the Bay of Biscay, in the adjacent waters of the northeast Atlantic and in the vicinity of the Canary and Azores Islands in summer and autumn. The main longline fleet is the Chinese Taipei fleet which operates in the central and western North Atlantic year round. However, Chinese Taipei fishing effort decreased in late 1980s due to a shift towards targeting on tropical tuna, and then continued at this lower level to the present. Over time, the relative contribution of different fleets to the total catch of North Atlantic albacore has changed, which resulted in differential effects on the age structure of the stock. Since the 1980s, a significant reduction of the effective albacore area fished was observed for both longline and surface fisheries.

Total reported landings, steadily increased since 1930 to peak above 60,000t in the early 1960s, declining afterwards, largely due to a reduction of fishing effort by the traditional surface (troll and baitboat) and longline fisheries (**ALB-Table 1**; **ALB-Figure 2a**). Some stabilization was observed in the 1990s, mainly due to increased effort and catch by new surface fisheries (driftnet and mid-water pair pelagic trawl), with a maximum catch in 2006 at 36,989 t and, since then, a decreasing trend of catch is observed in the North Atlantic.

The total catch in 2013 was 20,948 t, and the average catch in the last five years has remained about 20,000 t, the lowest recorded in the time series since 1950. During these years, the surface fisheries contributed to approximately 80% of the total catch (**ALB-Table 1)**. The reported catch in 2013 for EU-France, EU-Ireland and EU-Spain was below the average of the last five years.

Longline catch contributed to approximately 20% of the total catch during the last five years. During the last decades, both Chinese Taipei and Japan have reduced their fishing effort directed to albacore. In the case of Japan, albacore was taken mainly as by-catch. Still, the catch reported in 2013 for Japan and Chinese Taipei was above the last 5 year average.

The trend in mean weight for northern albacore remained stable between 1975 and 2011, ranging between 7 and 11 kg. The mean weight for surface fleets (baitboat and troll) showed a stable trend with an average of 7 kg (range: 4-10), and for longline fleets it showed no clear trend with an average of 19 kg, but some important fluctuations between 15 and 26 kg since the 1990 (**ALB-Figure 3a)**.

South Atlantic

The recent total annual South Atlantic albacore landings were largely attributed to four fisheries, namely the surface baitboat fleets of South Africa and Namibia, and the longline fleets of Brazil and Chinese Taipei (**ALB-Table 1**; **ALB-Figure 2b**). The surface fleets are entirely albacore directed and mainly catch sub-adult fish (70 cm to 90 cm FL). These surface fisheries operate seasonally, from October to May, when albacore are available in coastal waters. Brazilian longliners target albacore during the first and fourth quarters of the year, when an important concentration of adult fish (>90 cm) is observed off the northeast coast off Brazil, between 5ºS and 20ºS, being likely related to favorable environmental conditions for spawning, particularly of sea surface temperature. The longline Chinese Taipei fleet operates over a larger area and throughout the year, and consists of vessels that target albacore and vessels that take albacore as by-catch, in bigeye directed fishing operations. On average, the longline vessels catch larger albacore (60 cm to 120 cm FL) than the surface fleets.

Albacore landings increased sharply since the mid-1950s to reach values oscillating around 25,000 t between mid-1960s and the 1980s, 35,000 t until the last decade were they oscillated around 20,000 t. Total reported albacore landings for 2013 were 19,148 t, lower than the last five year average. The Chinese Taipei catch in 2013 was significantly below the last five year average. In fact, the Chinese Taipei catch in the last years has decreased compared to historical catches, mainly due to a decrease in fishing effort targeting albacore. Chinese Taipei longliners (including boats flagged in Belize and St. Vincent and the Grenadines) stopped fishing for Brazil in 2003, which resulted in albacore only being caught as by-catch in tropical tuna-directed longline fisheries. The 2013 catch for Brazil is higher than catches in the recent past. However, albacore is only caught as by-catch in Brazilian tropical tuna-directed longline and baitboat fisheries. The significantly higher average catch of about 4,287 t during the period 2000-2003 was obtained by the Brazilian longline fleet when albacore was a target species.

In 2013, the estimated South African and Namibian catch (mainly baitboat), was below the average of the last five years. During the last decades, Japan took albacore as by-catch using longline gear, but recently Japan is again targeting albacore and increased the fishing effort in waters off South Africa and Namibia (20-40˚S). Thus, catches during the last five years double those in the last few decades.

The trend in mean weight from 1975 to 2011 is shown in **ALB-Figure 3b** Surface fleets showed a stable trend from 1981 onwards with an average of 13 kg and a maximum and minimum average weight of 17 kg and 10 kg, respectively. Longline fleets showed a relatively stable trend for the mean weight around 17 kg until 1996 where the average weight increased to about 20 kg, oscillating between 16 and 26 kg.

Mediterranean

The catch series was revisited and compared to additional sources of information. This allowed identifying some catches that were not included in the ICCAT database, which requires further revisions. In 2013, the reported landings were 1,675 t, substantially below those in the last decade (**ALB-Table 1** and **ALB-Figure 2c**). The majority of the catch came from longline fisheries. EU-Italy is the main producer of Mediterranean albacore, with around 65% of the catch during the last 10 years. In 2013 the Italian catch was substantially lower than the last five year average.

ALB-3. State of stocks

North Atlantic

A thorough revision of North Atlantic Task I and Task II data was conducted and catch rate analyses were improved and updated with new information for the northern albacore fisheries. The base case assessment during the 2013 assessment session was based on similar methods and assumptions as in the previous assessment conducted in 2009 (Anon. 2010c). However, this time, a wider range of assessment methods were considered in sensitivity runs, including some that do not assume that catch-at-age is perfectly known. The approach provided the opportunity to evaluate a range of biological assumptions and hypothesis about how the fisheries operated over time and their impact on the population. The results of these efforts are reflected in the following summaries of stock status that analyzed data through 2011.

The CPUE trends for the various surface fleets, based upon the most recent available data showed somewhat different patterns from each other. This was also the case for the different longline fleets (**ALB-Figure 4**). The Spanish troll CPUE series showed a rather flat trend compared to the Spanish baitboat CPUE series that showed a more upward trend in the last three decades. For the longline fleets, the general trend in CPUE indices is a decline over time up until the mid 80ies, with varying rates, with some stability afterwards and a slight increase in the last few years. Comparatively, the Japanese CPUE showed steeper declines at the beginning of the series and the Chinese Taipei CPUE showed steeper increasing trends during the last years. Given the variability associated with these catch rate estimates, definitive conclusions about recent trends could not be reached just by examining the CPUE trends alone.

The data sets used for the analyses from 1930 to 2011 were compiled and screened during the April 2013 data preparatory meeting. The basic input data, catch, effort and catch-at-size were revised due to updates in the ICCAT Task I (**ALB-Table 1**) and Task II database, and the indices to be used in assessments were specified. The definition of the fisheries was also revised and 12 fishery units were agreed for the base case Multifan-CL assessment (compared to 10 fishery units used in the previous assessment). In general, the base case included similar but not exactly the same model specifications and datasets used in 2009. Decisions on the final specifications of the base case model were guided by first principles (e.g. knowledge of the fisheries) and diagnostics (e.g. goodness of fit of the model to the data).

There is substantial uncertainty on current stock status, since different models and assumptions provide a wide range of B/B_{MSY} and F/F_{MSY} estimates (**ALB-Figure 5**). However, most of them agreed on the view that spawning stock biomass decreased since the 1930s and started to recover since the mid-1990s (**ALB-Figure 6**). Most of the model formulations, as well as the base case, concluded that currently the stock is not undergoing overfishing but the spawning stock biomass is overfished. According to the base case assessment which considers catch and effort since the 1930s and size frequency since 1959, the spawning stock size has declined and in 2011 was about one third of the peak levels estimated for the late-1940s. Estimates of recruitment to the fishery, although variable, have shown generally higher levels in the 1960s and earlier periods with a declining trend thereafter (**ALB-Figure 7**).

The assessment indicated that the stock has remained overfished with SSB below SSB_{MSY} since the mid-1980s but has improved since the lowest levels around 30% in the late 1990s, and current SSB_{2011} is approximately 94% of SSB at MSY (**ALB-Figure 8**). Corresponding fishing mortality rates have been above F_{MSY} between the mid-1960s and the mid 2000's. Peak relative fishing mortality levels in the order of 2.5 were observed in the mid 90ies and remained below 1 afterwards, current F_{2011}/F_{MSY} ratio being 0.72 (**ALB-Figure 8**). According to the base case assessment, the probability of the stock being overfished and overfishing (red) is 0,2%, of being neither overfished nor overfishing (green) is 27.4%, and of being overfished or overfishing but not both (yellow) is 72.4% (**ALB-Figure 9**).

South Atlantic

In 2013, a stock assessment of South Atlantic albacore was conducted including catch, effort and size data up until 2011, and considering similar methods as in the previous assessment.

The southern standardized CPUE trends are mainly for longline fisheries, which harvest mostly adult albacore. The longest time series (those of Japan and Chinese Taipei), showed a strong declining trend in the early part of the time series, and less steep decline over the past decade. However, the Uruguayan longline CPUE series showed significant decreases since the 1980s (**ALB-Figure 10**).

In the 2013 assessment, the same eight scenarios as in 2011 were considered, but after screening during the data preparatory meeting, less CPUE series were input in the models. Stock status results varied significantly among scenarios (**ALB-Figure 11a, b**). Two different production model forms were considered, each with four scenarios. One showed more optimistic results than the other. However, the Committee lacked enough objective information to identify the most plausible scenarios. Considering the whole range of scenarios, the median MSY value was 25,228 t (ranging between 19,109 t and 28,360 t), the median estimate of current B/B_{MSY} was 0.92 (ranging between 0.71 and 1.26) and the median estimate of current F/F_{MSY} was 1.04 (ranging between 0.38 and 1.32). The wide confidence intervals reflect the large uncertainty around the estimates of stock status. Considering all scenarios, there is 57% probability for the stock to be both overfished and experiencing overfishing, 13% probability for the stock to be either overfished or experiencing overfishing but not both, and 30% probability that biomass is above and fishing mortality is below the Convention objectives (**ALB-Figure 11c**).

Mediterranean

In 2011, the first stock assessment for Mediterranean albacore was conducted, using data up until 2010. The methods used were adapted to the "data poor" category of this stock. The more data-demanding methods applied, such as a production model, gave unrealistic results.

Some CPUE series for Mediterranean fisheries became available (**ALB-Figure 12**). However, these series were discontinuous and highly variable, with no clear trend over the last couple of decades. Since they are mostly very short, and there is little overlap between time series, they may or may not accurately characterize biomass dynamics in Mediterranean albacore.

The results of the 2011 assessment, based on the limited information available and in simple analyses, point to a relatively stable pattern for albacore biomass in the recent past. Recent fishing mortality levels appear to have been reduced from those of the early 2000s, which were likely in excess of F_{MSY}, and might now be at about or lower that level (**ALB-Figure 13**).

ALB-4. Outlook

North Atlantic

The stock projected under different scenarios indicates that if catch in the future were on average similar to those observed over the recent five years (about 20,000 t) or around the current TAC (28,000 t), the biomass would continue to increase from its level of 2012 (**ALB-Table 2**). Considering the Commission's decision framework in Rec. [11-13] (**ALB-Figure 14**), and noting that the Commission requested SCRS to identify a limit reference point for northern Albacore (Rec [11-04]), the outlook for stock status under the Commission's decision guidelines was projected making use of Harvest Control Rule (HCR, **ALB-Figure 15**) options (**ALB-Table 3**) consistent with the policies identified in Rec [11-13], using an interim biomass limit of $0.4B_{MSY}$ that should be further tested, together with other candidate reference points, using the MSE framework. Projections were constructed in this way to inform the Commission's choice of 'high probability' and 'short period' (**ALB-Figure 14**), considering the uncertainty in stock status evaluations that could be quantified and assuming that the indicated strategy could be perfectly implemented.

ALB-Table 4 provides the results of the HCR evaluations and indicate the projected probability of being 'Green' within the time-frame indicated. Expected catch along different timeframes are also shown, allowing the Commission to choose appropriate probability and time frames and weigh tradeoffs with expected catch.

South Atlantic

The projection results differ between the base case scenarios. Since there is not objective information with which to select which scenario is most plausible, the group considered the entire range of scenarios, thus characterizing the range of possible responses to the distinct catch levels projected, as done in 2011. Projections at a level consistent with the 2013 TAC (24,000 t) showed that probabilities of being in the green area of the Kobe plot would be higher than 50% only after 2020. Similar probabilities could be achieved earlier with lower TAC values. Likewise, lower TAC values would provide higher probabilities of being in the green area by 2020 (**ALB-Table 5**). However, larger TACs would not provide larger than 50% probability in the timeframe analyzed.

Projections at $F_{MSY,}$ without considering implementation errors, suggested that the stock biomass would not rebuild with a probability higher than 50% before 2026. Similar probabilities (higher than 50%) of rebuilding could be obtained from 2017 when projected at 0.95*F_{RMS}.

Mediterranean

Due to the fact that the management advice for the Mediterranean stock was based on catch curve analysis and due to the limited quantitative information available to the SCRS, projections for this stock were not conducted. As a result, future stock status in response to management actions could not be simulated. The outlook for this stock is thus unknown.

ALB-5. Effect of current regulations

North Atlantic

In 2013, the Commission established a TAC for 2014-2016 of 28,000 t [Rec. 13-05], but included several provisions that allow the catch to exceed this level.

Furthermore, a 1998 recommendation that limits fishing capacity to the average of 1993-1995, remains in force.

The Committee noted that, since the establishment of the TAC in the year 2001, catch remained substantially below the TAC in all but two years (**ALB-Figure 2**). This might have accelerated rebuilding over the last decade.

South Atlantic

In 2013 the Commission established a new TAC of 24,000 t for 2014-2016 [Rec. 13-06]. The Committee noted that, since 2004, reported catches remained below 24,000 t, except in 2006, 2011 and 2012, where reported catches were slightly above this value (**ALB-Table 1**).

Mediterranean

There are no ICCAT regulations directly aimed at managing the Mediterranean albacore stock.

ALB-6. Management recommendations

North Atlantic

Projections at the current TAC level (28,000 t) indicate that the stock would rebuild by 2019 with 53% probability, which would meet the objective of the albacore recovery plan (Rec. 13-05). The recovery of the stock with similar probabilities would be faster (by 2016) if the catches remain at the level of recent catches (around 20,000 t). Higher probabilities of rebuilding would require longer timeframes. For instance, 75% probability of rebuilding would be achieved by 2019 with a constant catch of 20,000 t, and by 2027 with a constant catch of 28,000t. Catches above 34,000 t would not rebuild the stock with at least 50% probability in the projected timeframes (**ALB-Table 2**).

These projections were complemented by a set of projections under alternative provisional HCRs that could serve the Commission to decide on desired timeframes and probabilities for recovering the north Atlantic stock and which are consistent with the decision framework of Rec [11-13] in that there is a high probability of F<FMSY in as short a time as possible. A range of time-frames and probability levels for achieving the Commission's goals established in Rec [11-13] are provided in **ALB-Table 4**. Longer time frames provide more options for HCR parameters that project higher probabilities of being 'Green'. The HCR projections indicate, for example, should the Commission wish to have a 'high probability' of 75% within a 10 year time-frame, then the HCR with a Biomass Threshold at BMSY paired with a Target F of .9FMSY would provide the highest expected 10 year cumulative catch amongst options and the average catch expected from 2014-2016 would be approximately 26,260 t. Should the Commission consider a 'high probability' of 60% sufficient within a five year time-frame, then the HCR with a Biomass Threshold at BMSY paired with a Target F of .9FMSY would also meet that objective and provide the highest expected cumulative catch amongst options that would provide at least 60% probability within five years and the average catch from 2014-2016 would remain approximately 26,260 t. Unlike the constant catch projections, the HCR projections imply increasing catch as the population biomass increases resulting in higher cumulative catch over time to achieve equivalent conservation objectives of a constant catch policy. This can be evaluated by comparing **ALB-Tables 2** and **4**. Consideration of implementation and other uncertainties in these projections would likely change the probability level estimates.

South Atlantic

Results indicate that, most probably, the South Atlantic albacore stock is around the spawning biomass and the fishing mortality that can sustain the maximum sustainable levels. However, there is considerable uncertainty about the current stock status, as well as on the effect of alternative catch limits on the rebuilding probabilities of the southern stock.

Projections at a level consistent with the 2013 TAC (24,000 t) showed that probabilities of being in the green area would exceed 50% only after 2020. Similar probabilities could be achieved earlier with lower TAC values.

With catches around 20,000 t, probabilities of 50% would be exceeded by 2015, and probabilities of 60% would be exceeded by 2018. Lower catches (as in 2013) would increase the probability of recovery in those timeframes. And likewise, increases would reduce rebuilding probabilities and extend the timeframes. Catches over the current TAC (24,000 t) will not permit the rebuilding of the stock with at least 50% probability over the projection timeframe (**ALB-Table 5**).

Mediterranean

The available information on Mediterranean albacore stock status indicates a relatively stable pattern for albacore biomass over the recent past. Unfortunately, very little quantitative information is available to SCRS for use in conducting a robust quantitative characterization on biomass status relative to Convention objectives. While additional data to address this issue might exist at CPC levels, our ability to provide quantitative management advice will be seriously impeded until such data become available either through recovery of historical data or institution of adequate fishery monitoring data collection programs. Recent fishing mortality levels appear to have been reduced from those of the early 2000s, which were likely in excess of F_{MSY}, and might now be at about or lower than that level. However, there is considerable uncertainty about this and for this reason, the Commission should institute management measures designed to limit increases in catch and effort directed at Mediterranean albacore.

ATLANTIC AND MEDITERRANEAN ALBACORE SUMMARY			
	North Atlantic	**South Atlantic**	**Mediterranean**
Maximum Sustainable Yield	31,680 t	25,228 t (19,109-28,360)[1]	Unknown
Current (2014) TAC	28,000 t	24,000 t	None
Current (2013) Yield	20,948 t	19,148 t	1,675 t
Yield in last year of assessment (2011)	20,044 t	24,117 t	
Yield in last year of assessment (2010)			2,124 t
SSB_{MSY}	81,110 t		
B_{MSY}		216,807 t (88,380-595,953) [1]	
F_{MSY}	0.1486	0.176 (0.063-0,481) [1]	
SSB_{cur}/SSB_{MSY} [2]	0.94 (0.74-1.14) [2]		Not estimated
SSB_{cur}/Blim	2.4[3]		
B_{2012}/B_{MSY} [1]		0.92 (0.71-1.26)[1]	
F_{cur}/F_{MSY} [2]	0.72 (0.55-0.89) [2]		<=1 [4]
F_{2011}/F_{MSY} [1]		1.04 (0.38-1.32)[1]	
Stock Status	Overfished: YES	Overfished: YES	?
	Overfishing: NO	Overfishing: YES	NO
Management measures in effect:	[Rec. 98-08]: Limit number of vessels to 1993-1995 average. [Rec. 13-05] TAC of 28,000 t for 2014-2016.	[Rec. 13-06]: TAC of 24,000 t for 2014-2016	None

[1] Median range and 80% CI calculated for the whole range of the 8 base cases.
[2] Average for the last three years, with base case 95% confidence interval.
[3] The proposed interim Blim is 0.4.
[4] Estimated with length converted catch curve analysis, taking M as a proxy for F_{MSY}.

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

			1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
TOTAL			63342	67491	56326	69615	73086	71812	67517	60379	59585	59039	67063	70088	69919	60095	61466	53378	57728	67407	48841	42320	41661	40857	48828	52825	41772
	ATN		32071	36881	27931	30851	38135	35163	38377	28803	29023	25746	34551	33124	26253	22741	25567	25960	35318	36989	21991	20483	15380	19509	20044	25680	20948
	ATS		27212	28714	26016	36562	32813	35300	27552	28426	28022	30595	27656	31387	38796	31746	28002	22543	18882	24453	20283	18867	22260	19225	24124	25060	19148
	MED		4060	1896	2379	2202	2138	1349	1587	3150	2541	2698	4856	5577	4870	5608	7897	4874	3529	5965	6567	2970	4021	2124	4660	2086	1675
Landings	ATN	Bait boat	15374	18624	8968	12436	15646	11967	16411	11338	9821	7562	8780	11072	6103	6638	7840	8128	10458	14273	8496	7931	4994	6026	5530	8816	4830
		Longline	2239	2683	5315	3152	7093	7309	4859	4641	4051	4035	6710	7321	7372	6180	7699	6917	6911	5223	3237	2647	2619	3913	3666	3759	6325
		Other surf.	1652	3865	3999	5173	7279	7506	3555	3337	4378	6846	6817	5971	2828	422	551	697	624	625	525	274	427	324	412	352	358
		Purse seine	12	1	222	139	229	292	278	263	26	91	56	191	264	118	211	348	99	188	198	70	89	74	5	167	7
		Trawl	2240	1033	469	2603	1779	2131	3049	2571	2877	1318	5343	3547	5374	5376	3846	2369	7001	6385	3429	4321	2811	2026	6852	6678	3468
		Troll	10554	10675	8959	7348	6109	5959	10226	6652	7870	5894	6845	5023	4312	4007	5419	7501	10224	10296	6105	5239	4440	7146	3578	5909	5867
	ATS	Bait boat	7393	5981	3454	6490	7379	8947	7091	6960	8110	10353	6709	6873	10355	9712	6973	7475	5084	5876	3375	4350	7926	3748	5938	6710	5223
		Longline	19407	21590	22008	27162	23947	24806	20040	21000	19547	19799	20640	24398	28039	21671	20626	14735	12977	17740	15087	13218	12113	13471	16445	17846	13832
		Other surf.	411	1139	137	393	39	483	10	209	127	0	73	58	377	323	82	299	288	395	1762	1219	2066	1651	1538	66	2
		Purse seine	0	4	416	2517	1448	1064	412	257	117	434	183	58	25	39	309	16	534	442	58	81	155	355	203	437	91
		Trawl	0	0	0	0	0	0	0	0	120	9	52	0	0	0	12	18	0	0	0	0	0	0	0	0	
	MED	Bait boat	0	83	499	171	231	81	163	205	0	33	96	88	77	29	0	0	0	0	0	0	0	0	0	0	
		Longline	165	624	524	442	410	350	87	391	348	194	416	2796	2597	3704	4248	2335	1997	3026	4119	2694	1582	1719	2356	1998	1558
		Other surf.	3879	1098	1198	1533	879	766	1031	2435	1991	2426	4271	2693	2196	1757	3171	2187	1215	2723	1401	250	2414	404	2245	8	25
		Purse seine	16	91	110	6	559	23	0	0	0	0	0	0	0	1	478	353	317	214	1046	24	26	0	34	68	86
		Trawl	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
		Troll	0	0	48	50	59	129	306	119	202	45	73	0	0	117	0	0	0	1	0	1	0	1	0	6	
Discards	ATN	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93
	ATS	Longline	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
	MED	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	6	7
Landings	ATN	Barbados	0	0	0	0	0	0	0	0	1	1	1	0	2	5	8	10	13	9	7	7	4	6	4	20	22
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	26	39	416	351	155	230
		Brazil	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	
		Canada	22	6	5	1	9	32	12	24	31	23	38	122	51	113	56	27	52	27	25	33	11	14	28	34	32
		Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	
		China PR	0	0	0	0	0	14	8	20	0	0	21	16	57	196	155	32	112	202	59	24	27	142	101	21	81
		Chinese Taipei	1294	3005	4318	2209	6300	6409	3977	3905	3330	3098	5785	5299	4399	4330	4557	4278	2540	2357	1297	1107	863	1587	1367	1180	2394
		Cuba	1	2	0	0	0	0	0	0	0	0	0	0	0	1	322	435	424	527	0	0	0	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	53	39	146	
		Dominican Republic	0	0	0	0	0	0	0	0	323	121	73	95	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	25424	25792	17233	18175	18380	16998	20197	16324	17295	13285	15363	16000	9177	8952	12530	15379	20447	24538	14582	12725	9617	12961	8357	13719	10502
		EU.France	4050	3625	4123	6924	6293	5934	5304	4694	4618	3711	6888	5718	6006	4345	3456	2448	7266	6585	3179	3009	1122	1298	3348	3361	1241
		EU.Ireland	0	40	60	451	1946	2534	918	874	1913	3750	4858	3464	2093	1100	755	175	306	521	596	1517	1997	788	3597	3575	2231
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	
		EU.Portugal	169	3185	709	1638	3385	974	6470	1634	395	91	324	278	1175	1953	553	513	556	119	184	614	108	202	1046	1231	421
		EU.United Kingdom	0	0	0	59	499	613	196	49	33	117	343	15	0	0	0	0	6	19	30	50	67	118	57	50	133
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	7	2	0	3	0	0	0	0	0	0
		Grenada	0	0	0	0	0	0	2	1	6	7	6	12	21	23	46	25	29	19	20	15	18	18	18	0	
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	764	737	691	466	485	505	386	466	414	446	425	688	1126	711	680	893	1336	781	288	402	288	525	336	400	1804
		Korea Rep.	53	34	1	0	8	0	2	2	1	0	0	0	0	0	0	0	59	45	12	59	82	110	60	200	184
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	55	81	120	178	98	96	99	130	0	0	0	**0**
		Mexico	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**
		NEI (Flag related)	0	0	11	19	13	10	8	11	3	8	12	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	29	60	117	73	11	5	0	0	0	0	0	0	0	0	96	298	113	45	154	103	0	227
		Philippines	0	0	0	0	0	0	0	0	0	151	4	0	0	0	0	0	9	0	8	19	54	0	0	83	**0**
		Sierra Leone	10	0	0	0	0	0	0	0	0	0	0	0	91	0	0	0	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	2	0	0	0	0	0	1	704	1370	300	1555	89	802	76	263	130	135	177	329	305	286
		Sta. Lucia	0	0	0	1	1	0	1	1	0	0	0	1	3	2	10	0	2	2	2	2	0	130	2	3	2
		Suriname	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	249	216
		Trinidad and Tobago	0	4	0	247	0	0	0	0	2	1	1	2	11	9	12	12	9	12	18	32	17	17	23	47	67
		U.S.A.	243	357	479	438	509	741	545	472	577	829	315	406	322	480	444	646	488	400	532	257	189	315	422	418	599
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	0	0	0	0	0	0	0	0	1	0	2	2	2	0	0	1	1	0	0	0	0	0	1	0	0
		UK.Turks and Caicos	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
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	414	507	235	95	20	140	187	196	172	
		Venezuela	41	94	302	193	246	282	279	315	75	107	91	299	348	162	346	457	175	321	375	222	398	288	247	312	181
	ATS	Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168	
		Argentina	354	151	60	306	0	2	0	0	120	9	52	0	0	0	12	18	0	0	0	0	0	130	43	0	
		Belize	0	0	0	0	0	0	2	0	0	0	8	2	0	0	0	0	0	54	32	31	213	303	365	171	87

		Brazil	435	514	1113	2710	3613	1227	923	819	652	3418	1872	4411	6862	3228	2647	522	556	361	535	487	202	271	1269	1857	1743
		Cambodia	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	46	24	0	0	0	0	0	
		China PR	0	0	0	0	0	0	0	0	0	0	39	89	26	30	26	112	95	100	35	25	89	97	80	61	65
		Chinese Taipei	18386	21369	19883	23063	19400	22573	18351	18956	18165	16106	17377	17221	15833	17321	17351	13288	10730	12293	13146	9966	8678	10975	13032	12812	8519
		Cuba	1	2	17	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Curaçao	0	0	0	0	0	0	0	0	9	192	0	2	0	0	0	0	0	0	0	0	21	4	4	24	**0**
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	43	45	50	
		EU.España	0	0	280	1943	783	831	457	184	256	193	1027	288	573	836	376	81	285	367	758	933	1061	294	314	351	381
		EU.France	0	0	50	449	564	129	82	190	38	40	13	23	11	18	63	16	478	347	12	50	60	109	53	161	73
		EU.Portugal	557	732	81	184	483	1185	655	494	256	124	232	486	41	433	415	9	43	8	13	49	254	84	44	11	1
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
		Ghana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	10	14	25	0	0	
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	56	0	0	15
		Guinée Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	74	**0**
		Honduras	0	0	0	29	0	0	2	0	7	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	450	587	654	583	467	651	389	435	424	418	601	554	341	231	322	509	312	316	238	1370	921	973	1194	2903	3145
		Korea Rep.	54	19	31	5	20	3	3	18	4	7	14	18	1	0	5	37	42	66	56	88	374	130	70	89	33
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (ETRO)	0	4	8	122	68	55	63	41	5	27	0	0	10	14	53	0	7	0	0	0	0	0	0	0	
		NEI (Flag related)	0	0	149	262	146	123	102	169	47	42	38	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Namibia	0	0	0	0	0	1111	950	982	1199	1429	1162	2418	3419	2962	3152	3328	2344	5100	1196	1958	4936	1320	3791	2420	848
		Panama	0	0	240	482	318	458	228	380	53	60	14	0	0	0	0	0	17	0	87	5	6	1	0	12	3
		Philippines	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	52	0	13	79	45	95	96	203	415
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		South Africa	6890	5280	3410	6360	6881	6931	5214	5634	6708	8412	5101	3610	7236	6507	3469	4502	3198	3735	3797	3468	5043	4147	3380	3553	3510
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	2116	4292	44	0	0	0	65	160	71	51	31	94	92	97
		U.S.A.	0	0	0	0	0	0	0	1	5	1	1	1	2	8	2	1	0	0	0	0	0	0	0	0	0
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	1	1	5	28	38	5	82	47	18	1	1	58	12	2	0	0	0	62	46	94	81	3	120	2	2
		Uruguay	83	55	34	31	28	16	49	75	56	110	90	90	135	111	108	120	32	93	34	53	97	24	37	12	209
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	684	1400	96	131	64	104	85	35	
	MED	EU.Croatia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7	12	20
		EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	6	0	12	30	255	425	507	712	209	223	206	222	315	350
		EU.España	0	84	548	227	298	218	475	429	380	126	284	152	200	209	1	138	189	382	516	238	204	277	343	389	489
		EU.France	31	121	140	11	64	23	3	0	5	5	0	0	0	1	0	0	0	0	2	1	0	1	2	0	0
		EU.Greece	500	500	500	500	1	1	0	952	741	1152	2005	1786	1840	1352	950	773	623	402	448	191	116	125	165	165	93
		EU.Italy	3529	1191	1191	1464	1275	1107	1109	1769	1414	1414	2561	3630	2826	4032	6912	3671	2248	4584	4017	2104	2724	1109	2494	1117	615
		EU.Malta	0	0	0	0	0	0	0	0	1	1	6	4	4	2	5	10	15	18	1	5	1	2	5	19	29
		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	
		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	
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	120	0	0	0	**0**
		NEI (MED)	0	0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Syria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	14	0	0	0	1	1
		Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	30	73	852	208	631	402	1396	62	71
		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	
Discards	ATN	Chinese Taipei	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
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93
	ATS	Chinese Taipei	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	0	0	0	0	0	0	0	0	**0**
		South Africa	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
	MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	6	7

Updates/corrections to Task 1 (2013 only) provided after 2014-09-29 (Ghana, China PR and EU-France) were not included in the table.

ALB-Table 2. North Atlantic albacore estimated probabilities (in %) that the fishing mortality is below F_{MSY} (a), spawning stock biomass is above SSB_{MSY} (b) and both (c). Projections for constant catch levels are shown.

(a) Probability F<Fmsy

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
20000	96	97	98	98	98	98	98	98	98	98	99	99	99	99	99	99	99	99
22000	93	94	95	96	96	97	97	97	97	97	97	98	98	98	98	98	98	98
24000	87	89	91	92	93	94	94	95	95	95	96	96	96	96	96	96	96	97
26000	79	82	84	86	87	89	90	90	91	91	92	92	93	93	93	93	94	94
28000	68	72	74	77	78	80	81	83	84	85	85	86	87	87	88	88	89	89
30000	57	61	63	66	68	70	72	73	75	76	77	78	78	79	80	81	81	82
32000	48	49	52	54	56	58	60	61	63	65	66	67	68	69	70	71	71	72
34000	39	40	42	44	45	47	49	51	52	53	54	55	56	57	57	58	59	59
36000	32	33	34	35	36	37	38	40	41	42	43	44	45	46	47	47	48	48
38000	24	25	26	27	28	29	30	31	32	33	33	34	35	35	36	36	37	38
40000	17	17	18	18	19	20	20	21	22	22	23	23	23	24	24	25	26	27

(b) Probability SSB>SSBmsy

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
0	38	56	74	86	91	94	96	97	98	98	99	99	99	99	100	100	100	100
20000	29	38	45	54	63	69	75	79	83	85	87	89	90	92	93	93	94	95
22000	28	36	43	50	58	64	70	75	78	81	84	85	87	89	89	91	92	92
24000	27	35	40	46	53	59	64	69	73	76	79	81	83	84	86	87	88	89
26000	26	33	38	43	49	54	59	63	67	70	73	76	78	79	81	83	84	84
28000	25	31	36	39	44	49	53	57	61	63	66	69	71	73	75	76	77	79
30000	24	29	34	37	39	43	47	50	54	56	59	61	63	65	66	68	69	71
32000	23	27	31	34	36	39	41	43	47	49	51	53	55	57	58	59	61	62
34000	22	25	27	30	33	35	36	38	40	42	43	45	47	48	50	51	52	53
36000	22	23	24	26	28	30	32	33	34	35	36	37	38	39	40	41	41	42
38000	21	21	22	22	23	24	25	26	27	28	29	29	30	31	31	32	32	32
40000	21	20	19	19	19	19	19	19	19	20	20	20	20	20	21	21	21	21

(c) Probability of green status (SSB>SSBmsy and F<Fmsy)

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Average catch over: 3 years	Cumulative Catch over: 5 years	10 years	15 years	20 years
0	38	56	74	86	91	94	96	97	98	98	99	99	99	99	100	100	100	100	0	0	0	0	0
20000	29	38	45	54	63	69	75	79	83	85	87	89	90	92	93	93	94	95	20,000	100,000	200,000	300,000	400,000
22000	28	36	43	50	58	64	70	75	78	81	84	85	87	89	89	91	92	92	22,000	110,000	220,000	330,000	440,000
24000	27	35	40	46	53	59	64	69	73	76	79	81	83	84	86	87	88	89	24,000	120,000	240,000	360,000	480,000
26000	26	33	38	43	49	54	59	63	67	70	73	76	78	79	81	83	84	84	26,000	130,000	260,000	390,000	520,000
28000	25	31	36	39	44	49	53	57	61	63	66	69	71	73	75	76	77	79	28,000	140,000	280,000	420,000	560,000
30000	24	29	34	37	39	43	47	50	54	57	59	61	63	65	66	68	69	71	30,000	150,000	300,000	450,000	600,000
32000	23	27	31	34	36	39	41	44	47	49	51	53	55	57	58	59	61	62	32,000	160,000	320,000	480,000	640,000
34000	22	24	27	30	32	34	36	38	40	41	43	45	47	48	49	50	52	52	34,000	170,000	340,000	510,000	680,000
36000	21	22	23	25	27	29	31	32	33	34	35	36	38	39	40	40	41	42	36,000	180,000	360,000	540,000	720,000
38000	18	19	19	20	21	22	23	24	25	26	27	28	29	30	30	31	31	32	38,000	190,000	380,000	570,000	760,000
40000	16	16	16	16	16	16	17	17	17	18	18	18	18	19	19	19	19	20	40,000	200,000	400,000	600,000	800,000

ALB-Table 3. Levels of Target F, and Biomass threshold levels in combination with an interim Biomass limit of $0.4B_{MSY}$ in HCR parameterization consistent with Rec [11-13] to inform the Commission in support of identifying 'high probability' and 'short period'.

FTarget: $.75F_{MSY}$, $.8F_{MSY}$, $.85F_{MSY}$, $.9F_{MSY}$, $.95F_{MSY}$, F_{MSY}

BThreshold: $.6B_{MSY}$, $.8B_{MSY}$, B_{MSY}

ALB-Table 4. North Atlantic albacore estimated probabilities (in %) that the fishing mortality is below F_{MSY} and spawning stock biomass is above SSB_{MSY} (green status). Projections conducted with different Harvent Control Rules (as combinations of Bthresh and Ftarget values, all assuming Blim=0.4SSB_{MSY}) are shown (see also **ALB-Figure 14 and ALB-Figure 15**).

	Kobe II Strategy matrix. Future probability of SSB>SSBMSY and F<FMSY for different combinations of Bthreshold and Ftarget values																			Average catch over		Cumulative catch over:		
Bthreshold	Ftarget	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	3 years	5 years	10 years	15 years	20 years
.6Bmsy	0.75Fmsy	29	32	36	49	54	57	61	65	68	70	73	75	77	78	80	81	82	84	26.969	139.100	293.575	454.716	620.434
.6Bmsy	0.8Fmsy	29	31	35	45	52	55	58	61	64	67	69	71	74	75	77	78	79	80	28.458	146.274	306.335	472.388	642.668
.6Bmsy	0.85Fmsy	29	31	33	42	47	52	55	57	59	62	64	67	69	71	72	74	76	77	29.911	153.211	318.349	488.666	662.774
.6Bmsy	0.9Fmsy	29	30	30	39	42	46	50	52	54	56	58	60	62	64	66	68	70	71	31.330	159.918	329.637	503.591	680.809
.6Bmsy	0.95Fmsy	29	29	20	36	37	39	42	44	48	50	51	52	54	55	56	58	60	61	32.715	166.398	340.221	517.205	696.835
.8Bmsy	0.75Fmsy	29	32	42	51	55	59	63	67	70	72	75	76	78	80	81	83	86	88	25.260	133.581	289.167	451.760	618.642
.8Bmsy	0.8Fmsy	29	32	41	50	53	56	59	62	66	69	71	73	75	77	78	80	81	83	26.655	140.496	301.820	469.532	641.152
.8Bmsy	0.85Fmsy	29	31	39	48	50	53	56	58	61	63	67	69	71	73	75	76	77	79	28.016	147.185	313.734	485.931	661.571
.8Bmsy	0.9Fmsy	29	30	35	46	48	50	51	54	56	58	60	62	64	67	69	70	72	73	29.346	153.654	324.930	500.996	679.954
.8Bmsy	0.95Fmsy	29	29	23	45	45	46	47	48	49	51	52	54	55	56	58	59	61	63	30.643	159.905	335.420	514.759	696.359
Bmsy	0.75Fmsy	29	35	47	58	62	68	72	75	78	80	82	84	87	90	92	94	95	96	22.639	123.151	277.783	441.651	610.569
Bmsy	0.8Fmsy	29	34	46	56	61	66	71	73	76	78	80	82	85	87	90	92	94	95	23.877	129.456	289.836	458.946	632.882
Bmsy	0.85Fmsy	29	33	45	55	59	63	69	71	74	77	78	80	82	84	87	89	91	93	25.083	135.543	301.142	474.839	653.068
Bmsy	0.9Fmsy	29	33	42	54	56	60	66	68	71	74	76	77	79	81	83	85	87	89	26.260	141.416	311.703	489.342	671.130
Bmsy	0.95Fmsy	29	32	32	52	54	57	62	64	67	70	72	73	76	77	78	80	81	83	27.407	147.079	321.520	502.449	687.030

ALB-Table 5. South Atlantic albacore estimated probabilities (in %) that the South Atlantic albacore stock fishing mortality is below F_{MSY} (a), biomass is above B_{MSY} (b) and both (c). Projections for constant F and constant catch levels are shown.

(a) Probability F<Frms

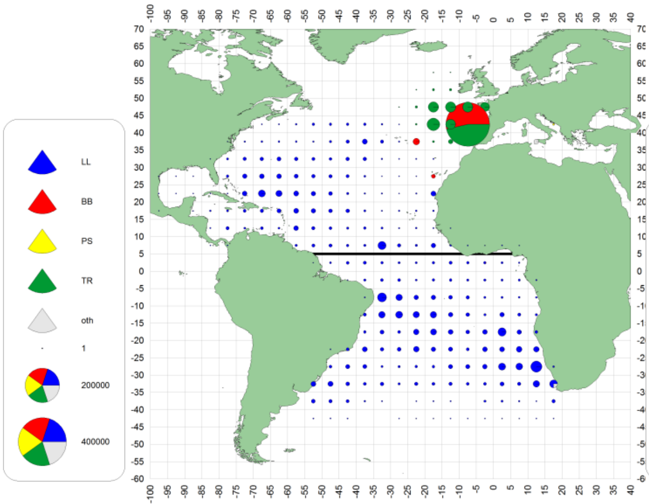
Harvest	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
14000	0.909	0.914	0.919	0.922	0.923	0.924	0.926	0.928	0.929	0.929	0.930	0.932	0.931
16000	0.857	0.863	0.871	0.874	0.878	0.882	0.887	0.892	0.895	0.897	0.899	0.901	0.902
18000	0.799	0.808	0.819	0.825	0.830	0.834	0.838	0.841	0.843	0.846	0.848	0.851	0.852
20000	0.680	0.698	0.708	0.719	0.728	0.740	0.746	0.753	0.759	0.765	0.772	0.776	0.781
22000	0.590	0.603	0.610	0.618	0.626	0.634	0.637	0.644	0.648	0.654	0.656	0.659	0.662
24000	0.506	0.511	0.519	0.526	0.530	0.534	0.537	0.540	0.541	0.542	0.545	0.547	0.550
26000	0.414	0.413	0.414	0.414	0.415	0.415	0.417	0.418	0.419	0.419	0.420	0.419	0.418
28000	0.339	0.332	0.325	0.322	0.316	0.311	0.306	0.304	0.301	0.299	0.292	0.287	0.284
30000	0.286	0.272	0.261	0.247	0.236	0.227	0.221	0.213	0.207	0.200	0.193	0.188	0.185
32000	0.240	0.220	0.206	0.192	0.182	0.175	0.170	0.166	0.161	0.157	0.154	0.149	0.148
34000	0.201	0.182	0.171	0.165	0.157	0.151	0.144	0.140	0.133	0.129	0.126	0.124	0.123

(b) Probability B>Brms

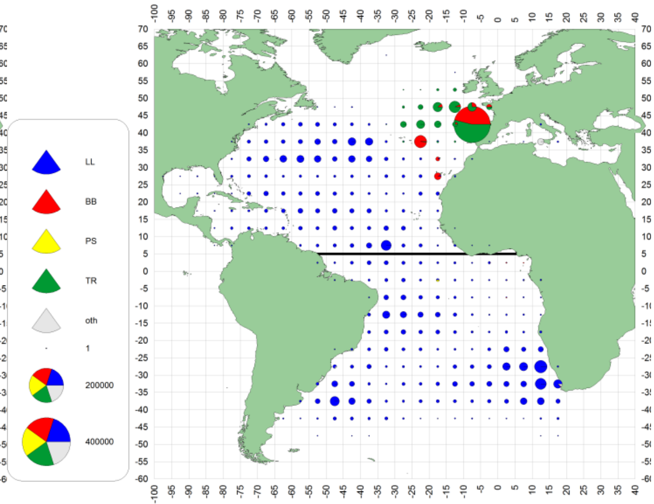
Harvest	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
0.75 Fmsy	0.470	0.539	0.598	0.637	0.678	0.700	0.728	0.753	0.778	0.809	0.824	0.841	0.851
0.8 Fmsy	0.465	0.526	0.576	0.610	0.641	0.675	0.693	0.717	0.735	0.755	0.782	0.796	0.810
0.85 Fmsy	0.464	0.510	0.547	0.584	0.609	0.634	0.658	0.676	0.696	0.712	0.723	0.738	0.757
0.9 Fmsy	0.459	0.490	0.522	0.548	0.570	0.592	0.610	0.625	0.642	0.658	0.671	0.681	0.694
0.95 Fmsy	0.457	0.475	0.493	0.513	0.526	0.542	0.557	0.568	0.581	0.591	0.600	0.609	0.618
1.0 Fmsy	0.451	0.459	0.464	0.471	0.475	0.480	0.482	0.487	0.490	0.493	0.496	0.499	0.500
14000	0.477	0.581	0.643	0.696	0.734	0.762	0.790	0.815	0.836	0.848	0.855	0.864	0.872
16000	0.472	0.562	0.615	0.660	0.700	0.724	0.750	0.767	0.788	0.802	0.822	0.833	0.840
18000	0.471	0.541	0.590	0.623	0.650	0.678	0.703	0.719	0.737	0.750	0.763	0.775	0.787
20000	0.465	0.519	0.564	0.592	0.610	0.627	0.644	0.658	0.671	0.680	0.688	0.696	0.709
22000	0.463	0.495	0.529	0.549	0.570	0.583	0.591	0.599	0.606	0.615	0.623	0.628	0.635
24000	0.460	0.475	0.488	0.501	0.511	0.522	0.524	0.534	0.538	0.542	0.544	0.548	0.551
26000	0.455	0.453	0.451	0.449	0.449	0.444	0.443	0.443	0.439	0.436	0.437	0.437	0.438
28000	0.454	0.432	0.412	0.398	0.384	0.372	0.361	0.352	0.347	0.337	0.327	0.321	0.316
30000	0.447	0.409	0.373	0.350	0.326	0.308	0.285	0.269	0.253	0.242	0.231	0.226	0.218
32000	0.445	0.386	0.342	0.307	0.265	0.239	0.221	0.209	0.201	0.193	0.187	0.182	0.176
34000	0.442	0.368	0.308	0.257	0.224	0.205	0.191	0.182	0.175	0.169	0.160	0.155	0.151

(c) Probability of green status (B>Brms y F<Frms).

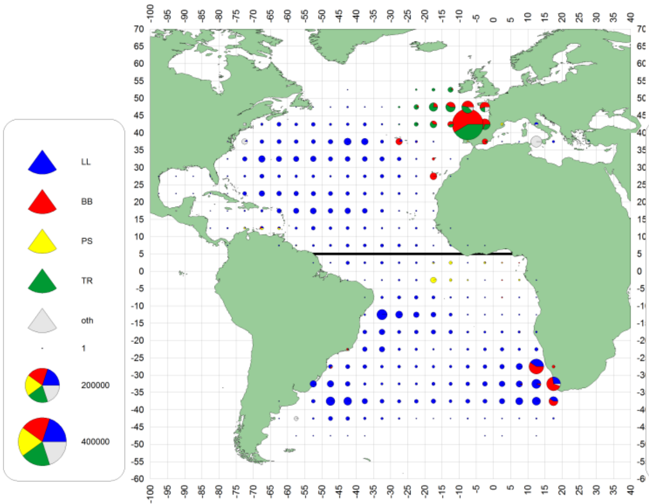
Harvest	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
0.75 Fmsy	0.469	0.538	0.597	0.637	0.677	0.699	0.728	0.753	0.778	0.809	0.824	0.841	0.851
0.8 Fmsy	0.465	0.525	0.575	0.610	0.641	0.675	0.693	0.717	0.735	0.755	0.782	0.796	0.810
0.85 Fmsy	0.464	0.509	0.547	0.583	0.609	0.634	0.658	0.676	0.696	0.712	0.723	0.738	0.757
0.9 Fmsy	0.458	0.489	0.522	0.547	0.570	0.592	0.610	0.625	0.642	0.658	0.671	0.681	0.694
0.95 Fmsy	0.456	0.474	0.492	0.513	0.526	0.541	0.557	0.568	0.581	0.591	0.600	0.609	0.618
1.0 Fmsy	0.160	0.169	0.174	0.181	0.186	0.190	0.193	0.197	0.201	0.203	0.207	0.209	0.211
14000	0.474	0.578	0.641	0.693	0.731	0.760	0.788	0.812	0.833	0.846	0.853	0.861	0.868
16000	0.468	0.557	0.610	0.656	0.695	0.720	0.746	0.763	0.785	0.798	0.819	0.829	0.837
18000	0.463	0.533	0.583	0.615	0.642	0.672	0.697	0.713	0.730	0.744	0.757	0.770	0.783
20000	0.454	0.508	0.553	0.581	0.601	0.618	0.635	0.650	0.663	0.673	0.682	0.692	0.704
22000	0.446	0.480	0.514	0.536	0.558	0.572	0.580	0.590	0.598	0.608	0.615	0.620	0.627
24000	0.428	0.445	0.459	0.475	0.484	0.496	0.503	0.513	0.517	0.521	0.526	0.529	0.532
26000	0.394	0.395	0.399	0.400	0.402	0.403	0.405	0.406	0.407	0.409	0.411	0.412	0.413
28000	0.336	0.329	0.324	0.321	0.315	0.309	0.305	0.302	0.300	0.298	0.291	0.285	0.283
30000	0.286	0.272	0.261	0.247	0.236	0.227	0.221	0.213	0.207	0.200	0.193	0.188	0.185
32000	0.240	0.220	0.206	0.192	0.182	0.175	0.170	0.166	0.161	0.157	0.154	0.149	0.148
34000	0.201	0.182	0.171	0.165	0.157	0.151	0.144	0.140	0.133	0.129	0.126	0.124	0.123



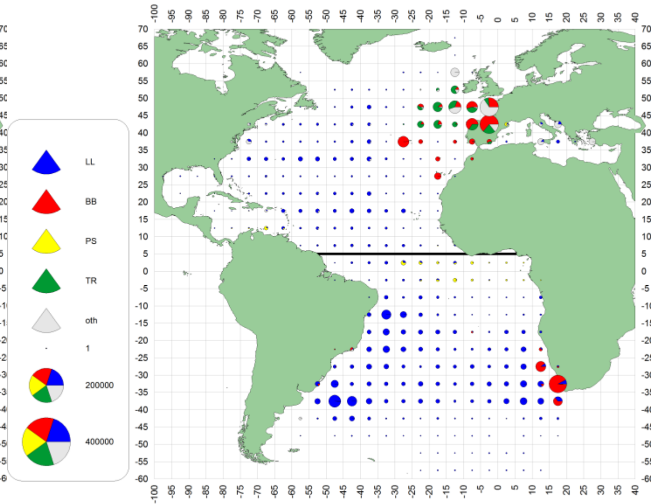
a. ALB(1960-69)



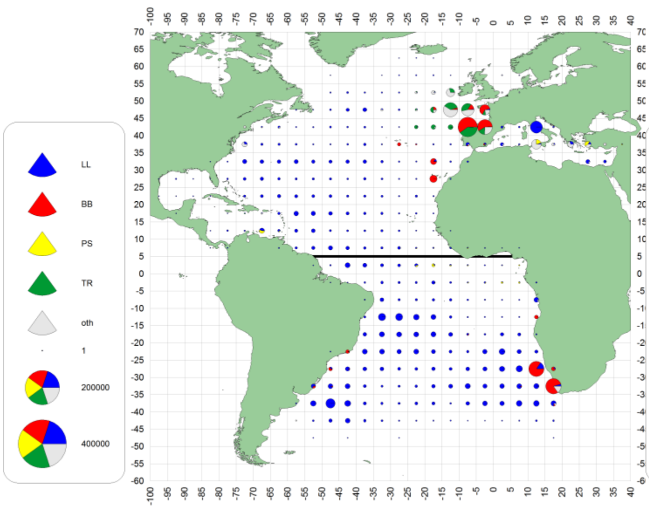
b. ALB(1970-79)



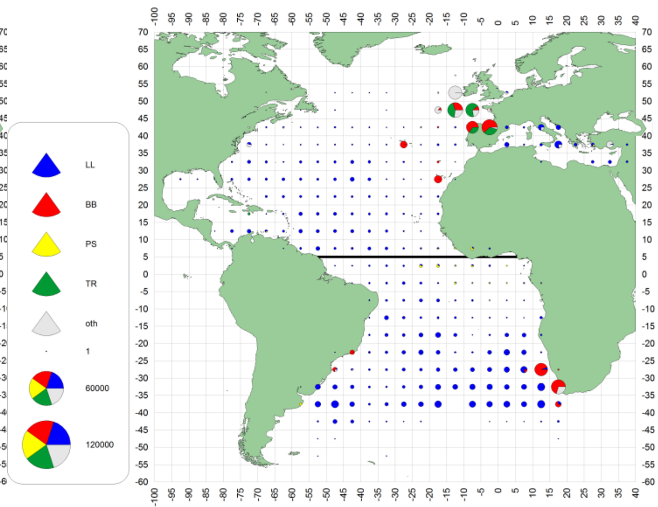
c. ALB(1980-89)



d. ALB(1990-99)



e. ALB (2000-09)



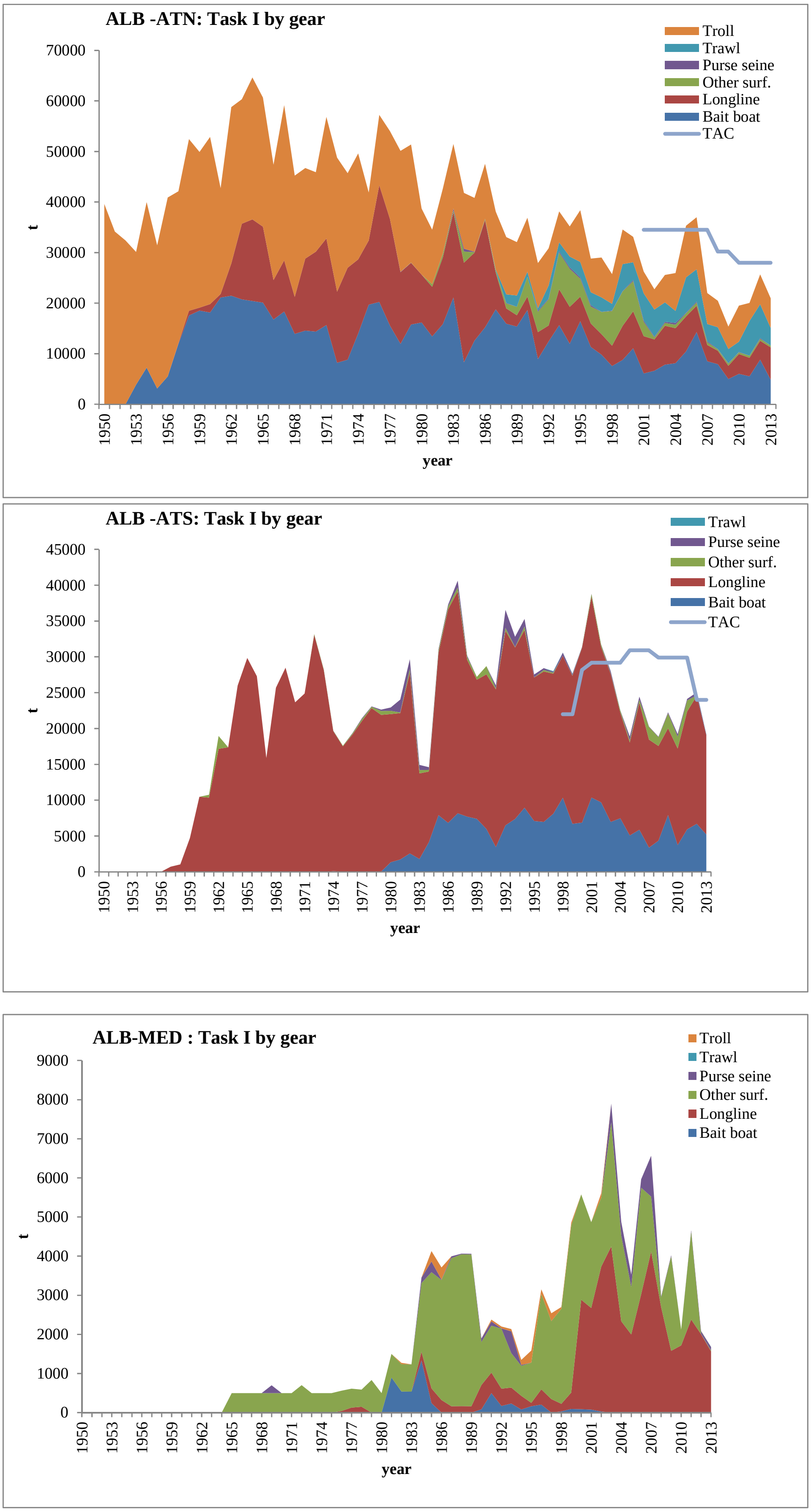
f. ALB(2010-12)

ALB-Figure 1. Geographic distribution of albacore accumulated catch by major gears and decade (1960-2012). Baitboat and troll catches prior to the 1990s, these catches were assigned to only one 5ºx5º stratum in the Bay of Biscay. The symbols for the 2010-2012 information (f) are scaled to the maximum catch observed during 2010-2012, whereas the remaining plots are scaled to the maximum catch observed from 1960 to 2009.

a)

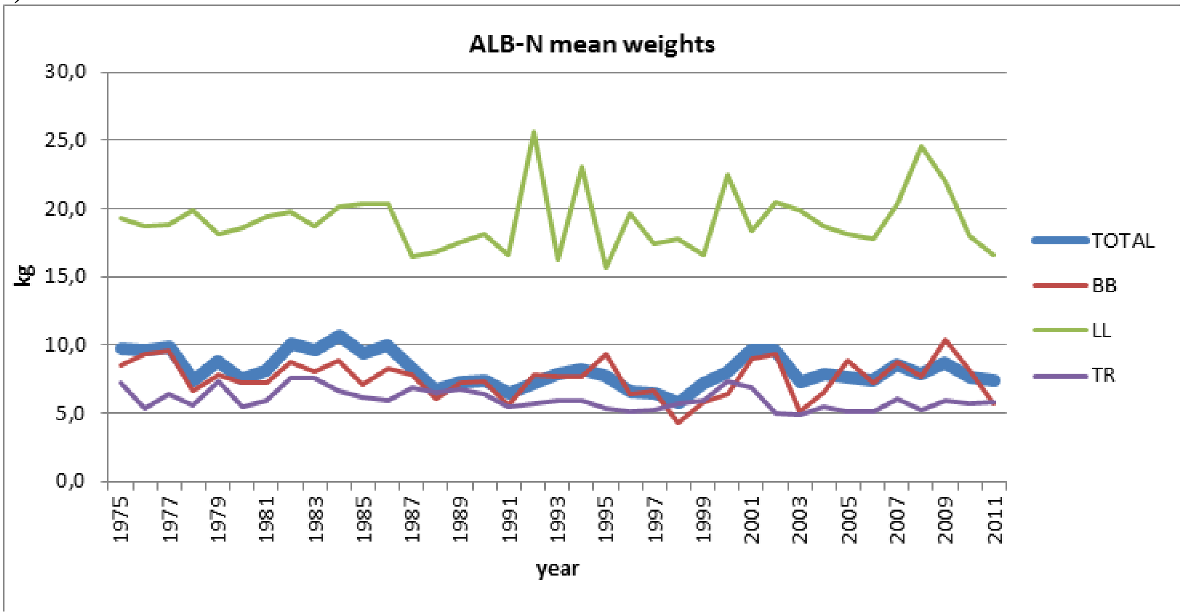
b)

c)

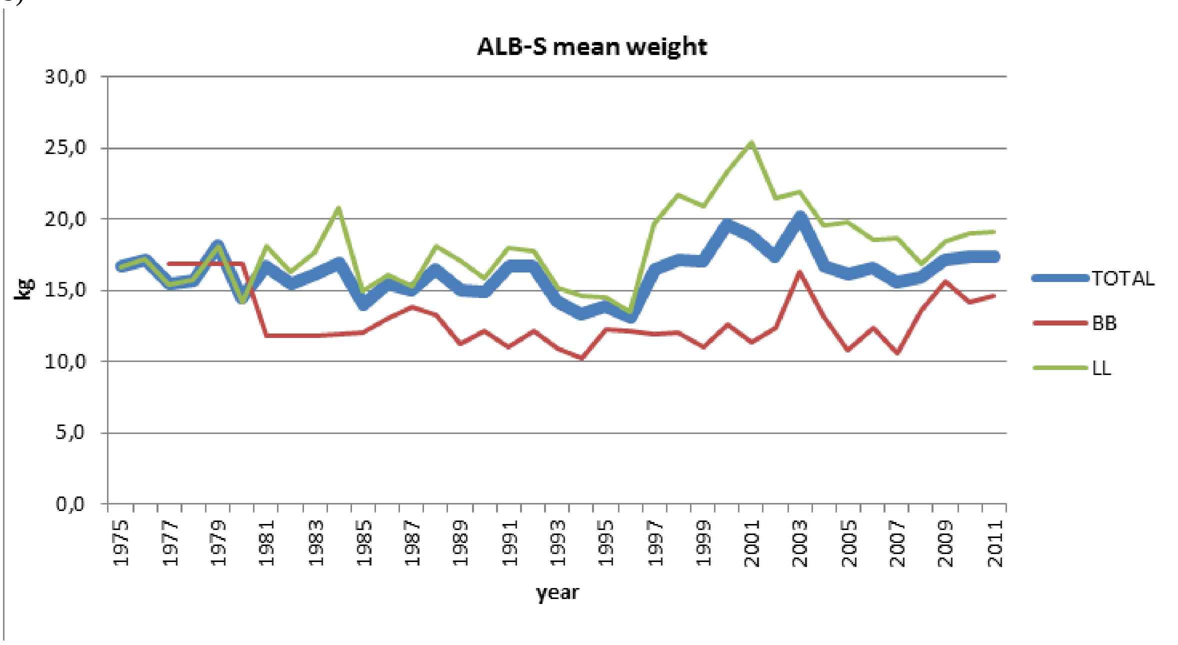


ALB-Figure 2a, b, c. Total albacore catches reported to ICCAT (Task I) by gear for the northern, southern Atlantic stocks including TAC, and the Mediterranean stock.

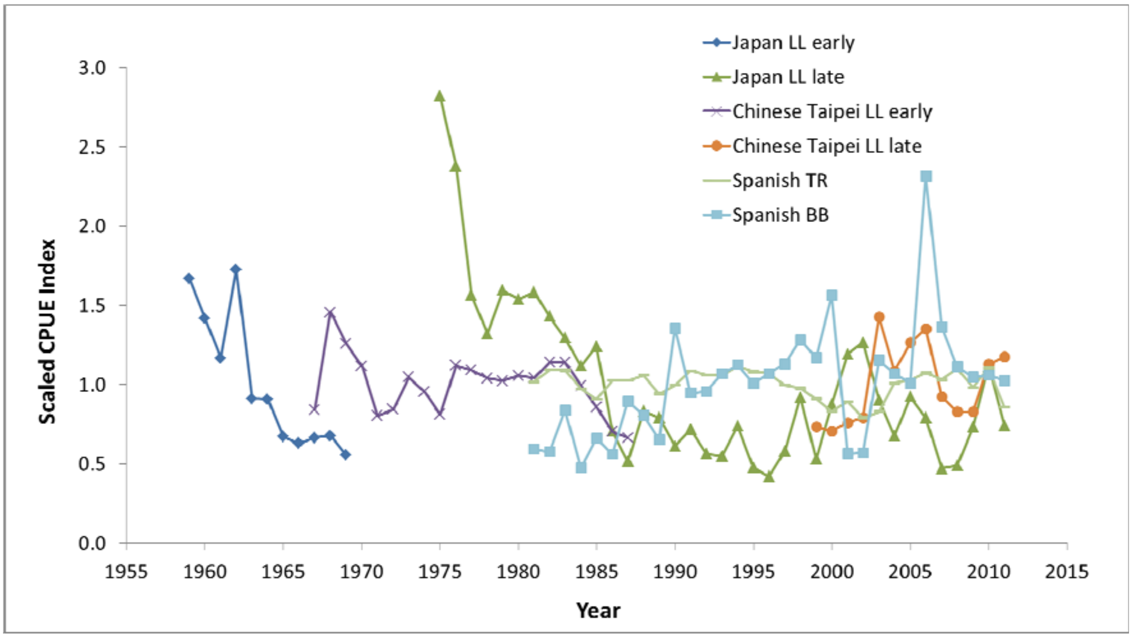
a)



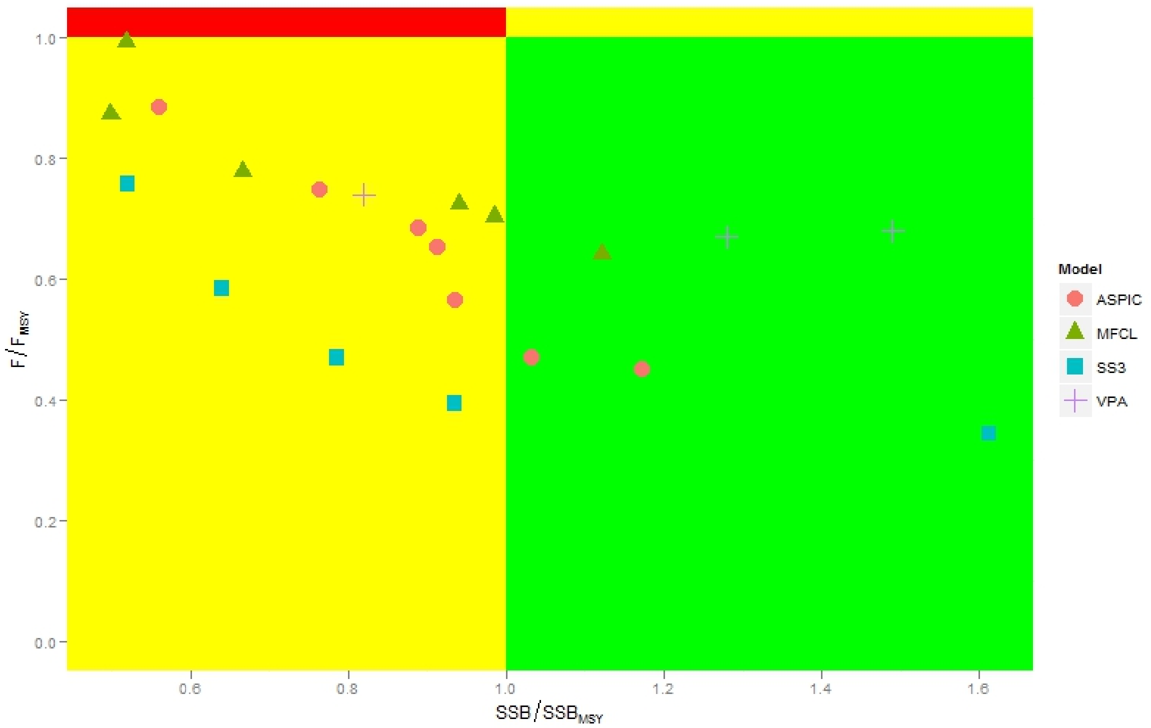
b)



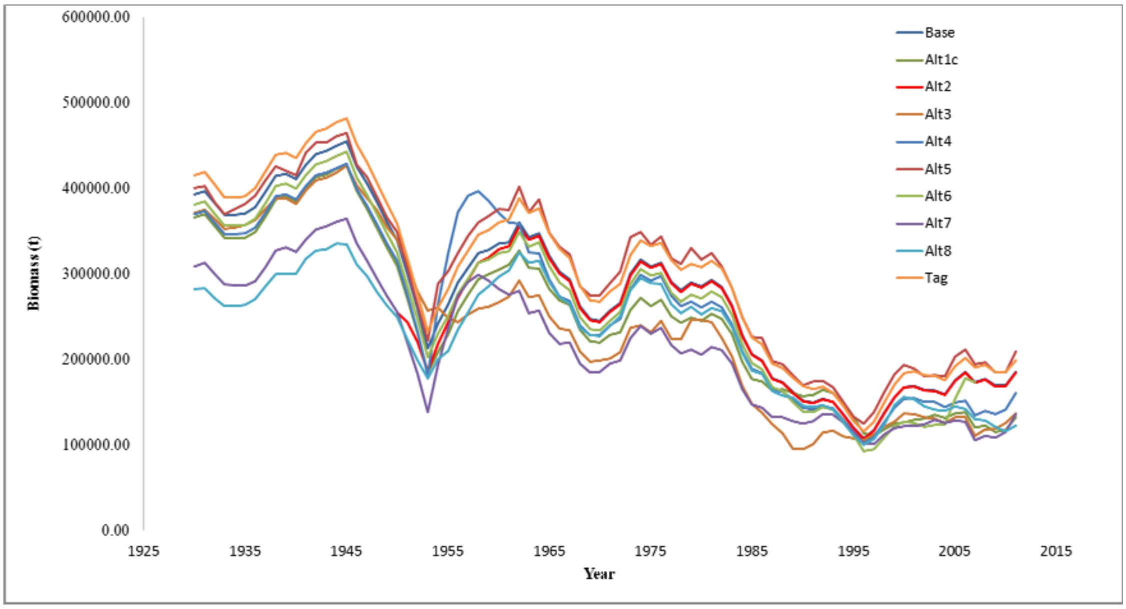
ALB-Figure 3a, b. North Atlantic and South Atlantic albacore. Mean weight trend by surface and longline fisheries in North Atlantic (a) and South Atlantic (b) stocks.



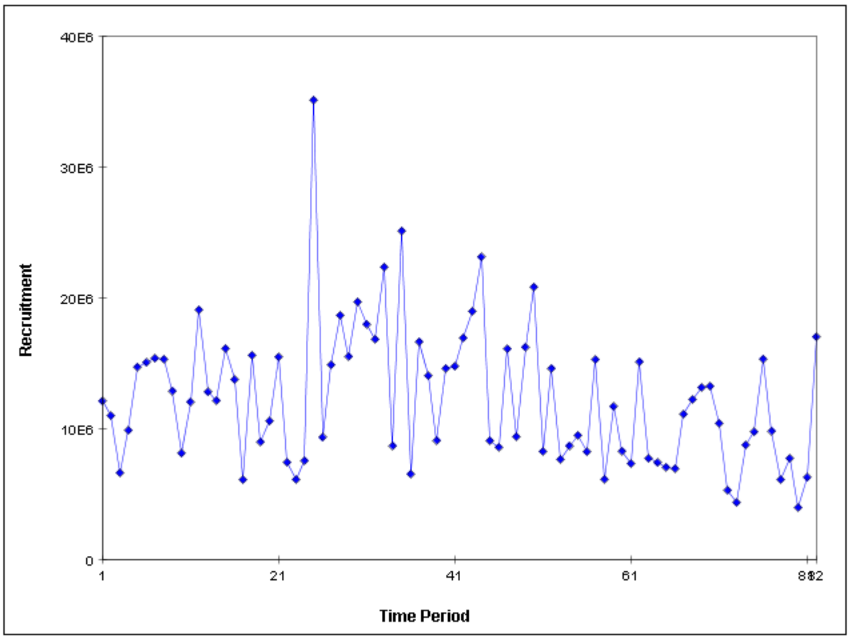
ALB-Figure 4. Standardized catch rate indices used in the 2013 northern albacore stock assessment from the surface fisheries, which take mostly juvenile fish, and from the longline fisheries, which take mostly adult fish.



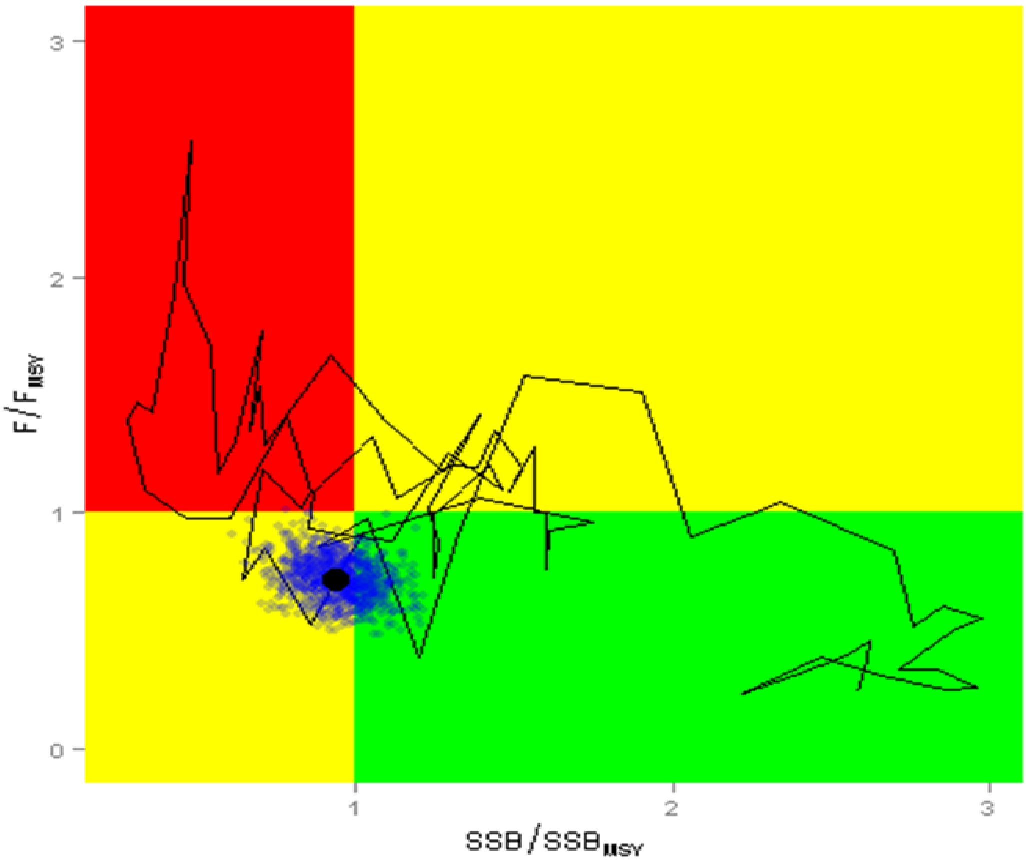
ALB-Figure 5. Stock status of Northern albacore tuna according to base case as well as different models and runs considered during the assessment.



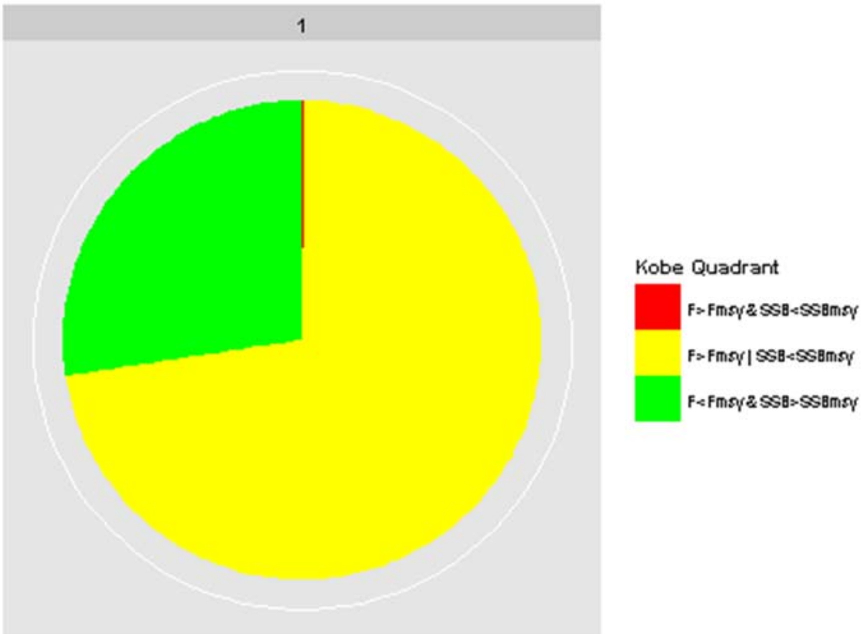
ALB-Figure 6. Estimates of northern Atlantic albacore spawning stock size between 1930-2011 according to the Multifan-CL Base Case and the different sensitivity runs considered in the assessment.



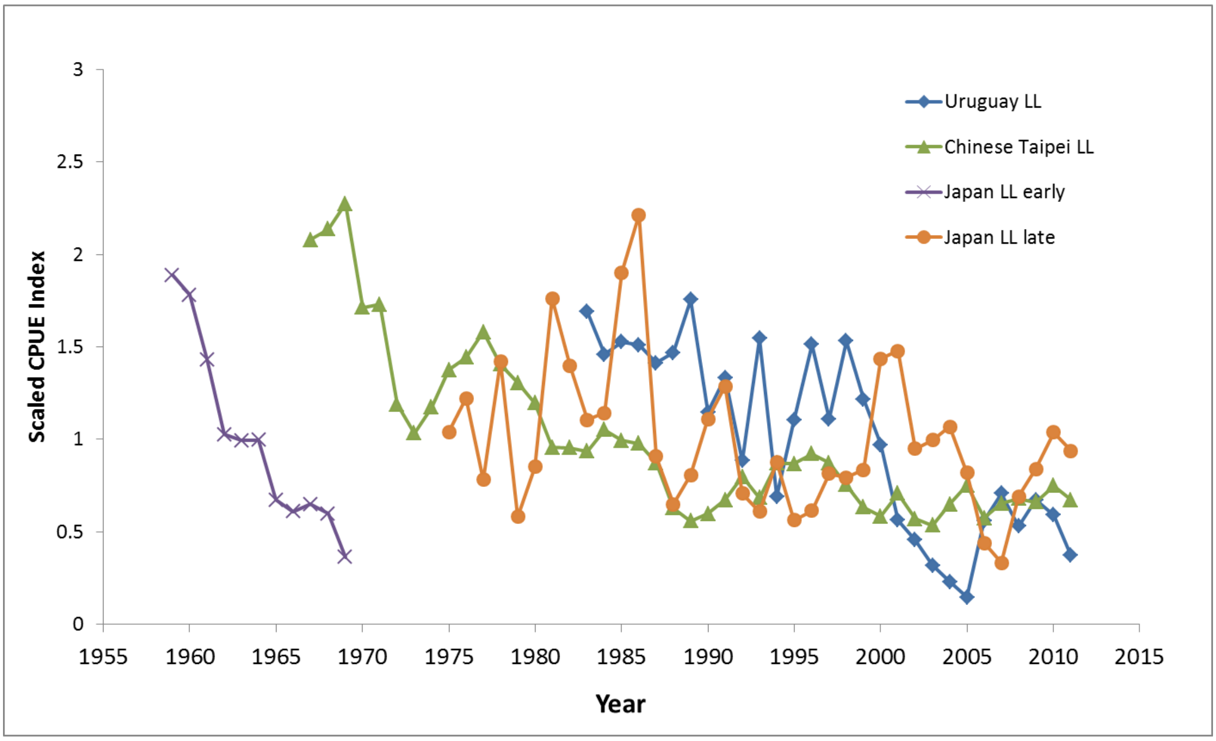
ALB-Figure 7. Estimates of northern Atlantic albacore recruitment (age 1) between 1930-2011 from Multifan-CL base case. Uncertainty in the estimates has not been characterized, but the uncertainty in recent recruitment levels is considered to be higher than in the past.



ALB-Figure 8. Joint trajectories of SSB/SSB_{MSY} and F/F_{MSY} over time and current stock status of northern albacore according to the estimated Multifan-CL Base Case. The black point represents the stock status in 2011, and the blue points represent the uncertainty on the current stock status.

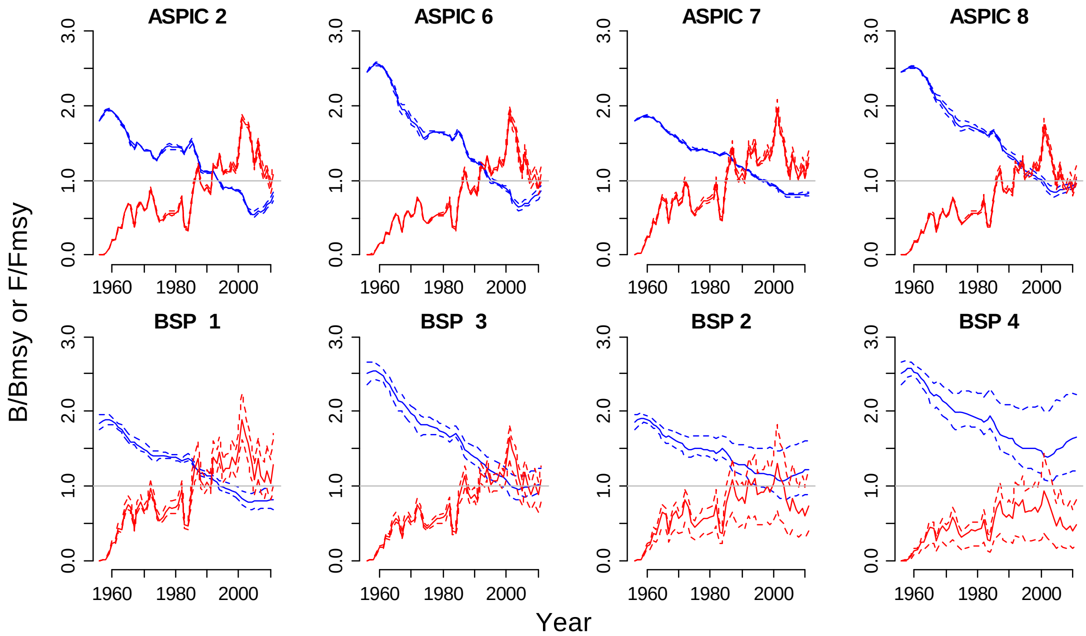


ALB-Figure 9. North Atlantic albacore probability of being overfished and overfishing (red, 0.2 %), of being neither overfished nor overfishing (green, 27.4%), and of being overfished or overfishing, but not both (yellow, 72.4%), according to the Multifan-CL Base Case.

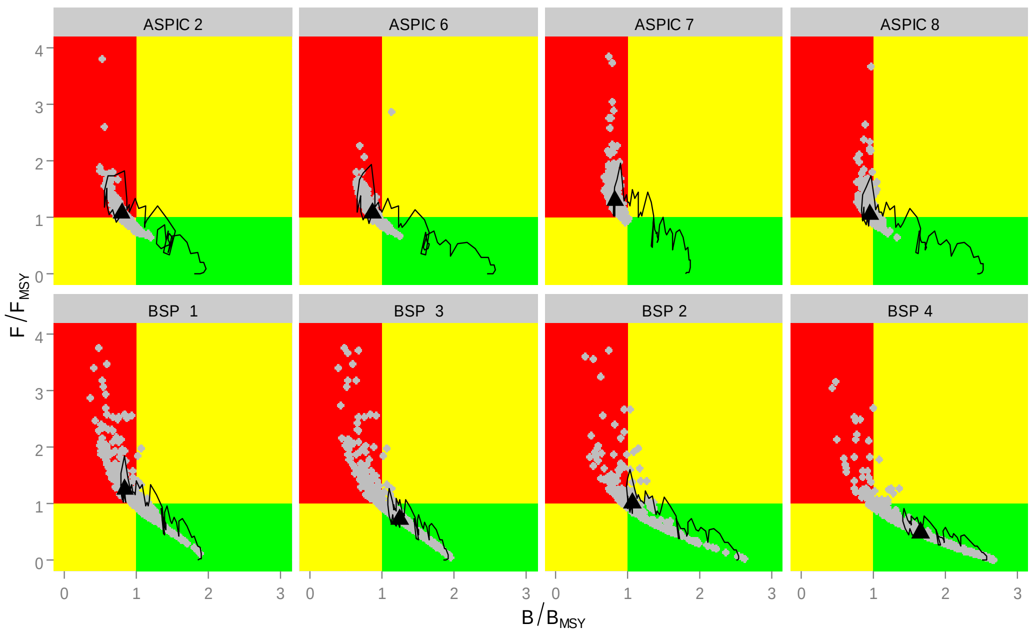


ALB-Figure 10. Standardized catch rates used in the 2013 southern albacore stock assessment.

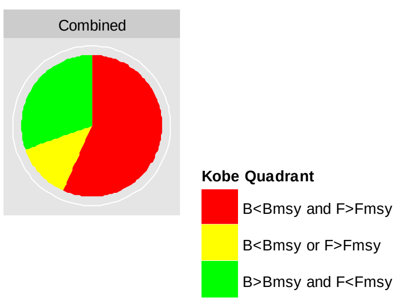
a)



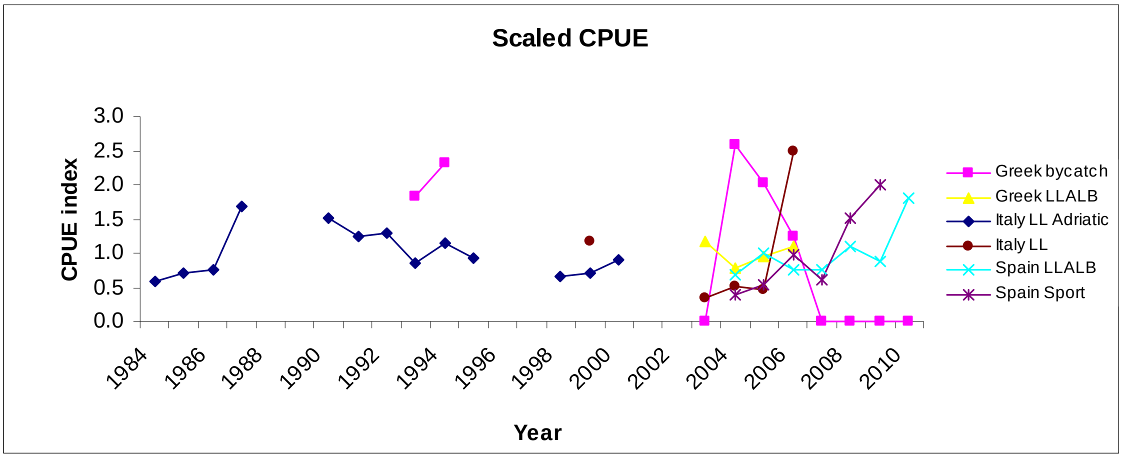
b)



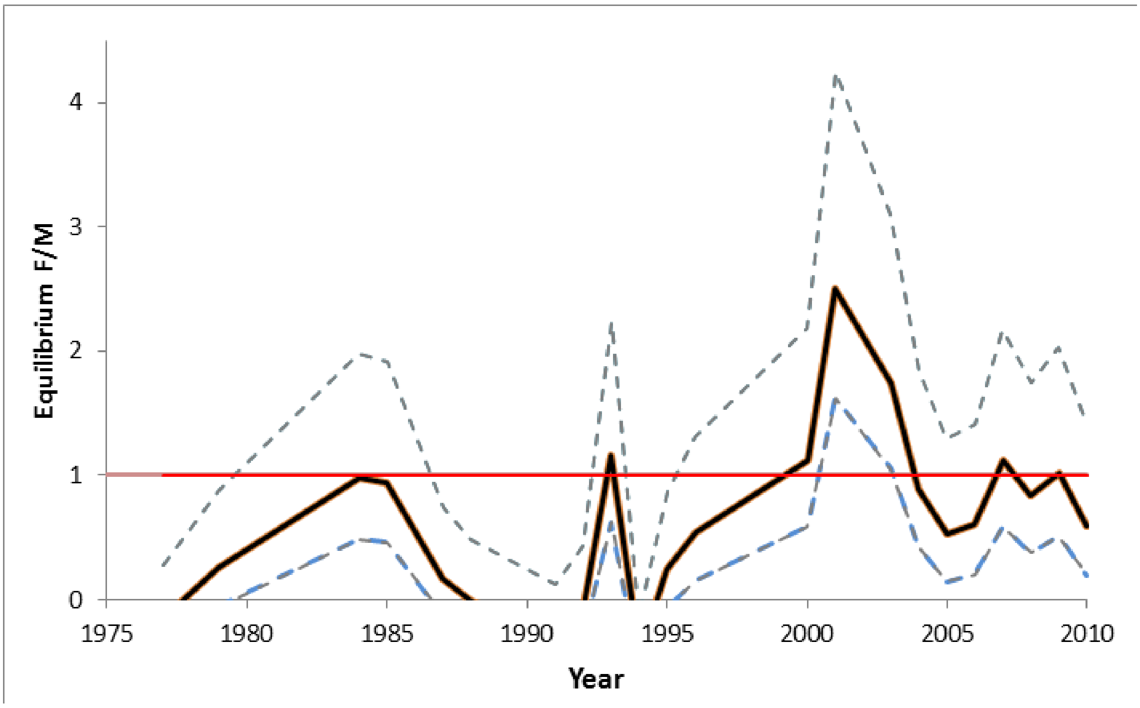
c)



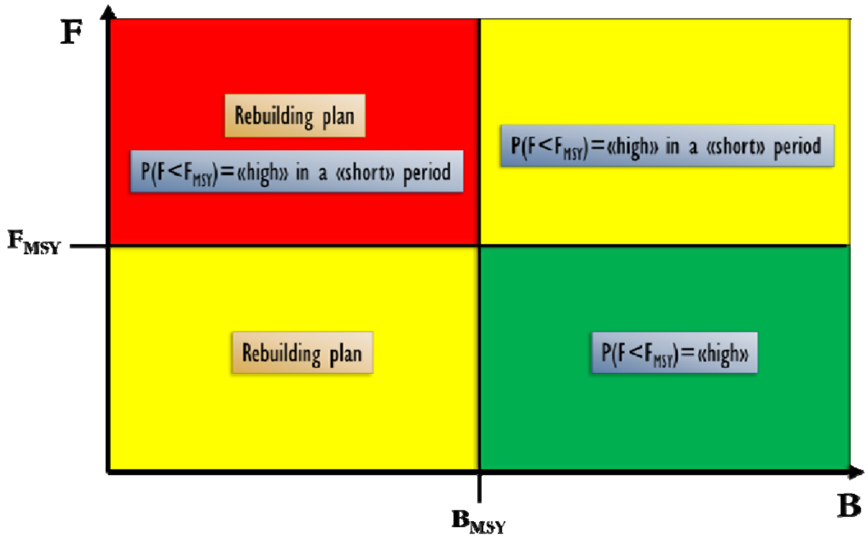
ALB-Figure 11. South Atlantic albacore. a) Median biomass (in blue) and fishing mortality rates (in red) relative to MSY levels, with 50% credibility intervals, for the 4 base case Bayesian Surplus Production (BSP) models and the point estimate biomass and 50% credibility intervals for the 4 base case ASPIC Production models. (b) Stock status trajectories of B/B_{MSY} and F/F_{MSY}, as well as uncertainty around the current estimate (Kobe plots) for the base case ASPIC models (Runs 2, 6, 7 and 8) alongside those from the base case BSP runs (1, 2, 3 and 4). (c) Combined probability of being overfished and overfishing (red, 57%), of being neither overfished nor overfishing (green (30%), and of being overfished or overfishing, but not both (yellow, 13%).



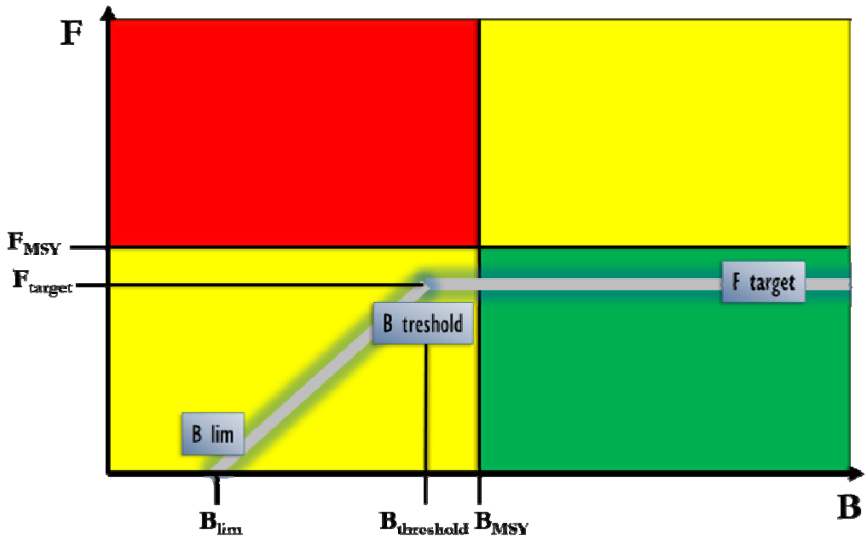
ALB-Figure 12. Set of standardized and nominal CPUEs used in the assessment of the Mediterranean albacore stock. The "Greek by-catch" indicates the probability of albacore by-catch in the swordfish fishery, practically null in some years. This series is the only one that is not included in the base case Bayesian production model.



ALB-Figure 13. Mediterranean albacore. Estimates of equilibrium fishing mortality rate relative to M (as a proxy for $F_{MSY)}$ based on length-converted catch curve analysis. The central solid line represents an M assumption of 0.3 with patterns resulting from an assumed M of 0.4 (lower dashed) and 0.2 (upper dashed) also depicted.



ALB-Figure 14. Schematic representation of the key elements of the *Recommendation by ICCAT on the principles of decision making for ICCAT conservation and management measures* [Rec. 11-13].



ALB-Figure 15. Generic form of the HCR recommended by SCRS (SCRS, 2011). Blim is the limit biomass reference point, BThreshold is the biomass point at which increasingly strict management actions should be taken as biomass decreases and Ftarget, the target fishing mortality rate to be applied such that it is lower than FMSY with 'high probability' [Rec. 11-13].