

REPORT OF THE 2010 ICCAT MEDITERRANEAN ALBACORE DATA PREPARATORY MEETING

(Madrid, Spain – June 28 to July 2, 2010)

1. Opening, adoption of agenda and meeting arrangements

The Meeting was held at the ICCAT Secretariat in Madrid from June 28 to July 2, 2010. Dr. Pilar Pallarés on behalf the ICCAT Executive Secretary opened the meeting and welcomed participants (“the Working Group”).

Ms. Victoria Ortíz de Zárate (UE-Spain), meeting Chairperson, welcomed meeting participants and proceeded to review the Agenda which was adopted with some adjustments (**Appendix 1**). In the revision of the agenda, the Working Group decided to generate two independent reports for Mediterranean albacore and swordfish, although both meetings held together and the agenda was shared.

The List of Participants is included in **Appendix 2**. The List of Documents presented at the meeting is attached as **Appendix 3**. The following participants served as rapporteurs:

Item1 and 10	P. Pallarés
Item 2	T. Ceyhan and P. Peristeraki
Item 3	C. Palma
Item 4	N. Abid
Items 5, 6, 7 and 9	V. Ortiz de Zárate
Item 8	L. Kell

2. Description and evolution of the Mediterranean albacore fisheries

In general, the Mediterranean albacore fisheries are characterised by high spatio-temporal variability in landings and fishing patterns. The gears used for the fishery are surface longlines for albacore, troll lines and gillnets and, mainly in the western Mediterranean, baitboats and rod and reel are used also for the albacore. Reported catches for the last decade (1998-2008) show that 51% of the catches are caught by surface longlines, 40% by other surface gears and 9% from purse seines. The Group expressed concern about the species composition of the purse seine catches. **Figure 1** presents the evolution of the catches by fishing gear group and year.

The albacore catches in the Mediterranean are highly uncertain. In the last 20 years the average reported catches were 3,837 t. In the last decade, 69% of the catches is produced by Italy, while Greece produces about 20% followed by Spain (5%), Cyprus (4%) and Turkey (2%).

The trend of fishing effort of the various fishing gears targeting albacore is still not possible to estimate, due to short time series and inadequate coverage of artisanal gears. Only partial information exists on size composition of the partial catch.

Figure 2 shows the Mediterranean areas considered in the fisheries descriptions given below.

EU-Greece

The Greek albacore fishery is seasonal, carried out mainly in the North Aegean Sea during autumn, from the end of August to the end of November, depending on the species availability. The fleet consists of 100-150 boats, the majority under 12 m, which use troll lines or surface longlines for albacore. Most of the boats are opportunistically involved in the fishery. In 2009, data from the fishery were not available since the National Data Collection Project was not realized due to administrative problems.

EU-Italy

Albacore fishing is a traditional activity in several Italian regions, mostly in the southern part of the country. The bulk of the catches is taken by longliners, even though the fleet is not well defined because some vessels usually switch between targeting albacore to swordfish or bluefin, according to the fishing possibilities. There are also catches from other surface gears. Catches from the sport fishery exist but they are minimal. The fishery showed

significant changes in the past 10 years. The most relevant, in terms of production, occurred as a consequence of the driftnet ban because Italy had the most numerous driftnet fleet in the Mediterranean and it was not easy to apply and enforce the new regulation, due to a strong tradition. There were driftnets targeting albacore and catching good quantities, while these vessels now have been mostly substituted by longliners. The other relevant change was noticed at the end of the 1990s, when large groups of albacore showed up in the southern central Mediterranean. In previous years, albacore was almost absent in the Strait of Sicily and in the southern central Mediterranean and this change induced several longliners to use the new fishing grounds, obtaining high catches. Anyway, albacore is also an important by-catch component of the swordfish fishery.

The two-month fishing closure for swordfish (Rec.09-04) was strictly enforced in 2009 and also affected the albacore fishery. The fishing grounds show moderate yearly variability, depending mostly on oceanographic factors. The presence of albacore in the Ligurian Sea is sporadic and concentrations can be found only periodically over decades. Juvenile albacore less than 50 cm are not present in the Italian catches, possibly indicating that very young size-classes concentrate in other parts of the Mediterranean. The most recent 2010 fishery was heavily affected by very adverse weather, which caused the lack of fishing activity until April. Data have been collected according to the ICCAT rules and within the framework of the EC Data Collection Programme.

EU-Spain

The Spanish fishery for albacore in the Mediterranean was traditionally carried out by rod and reel/baitboat, troll lines and surface longlines. The fleet is composed of a small number of boats with heterogeneous characteristics. The mean annual catches of the last 10 years (1998-2008) were 310 t. Seventy percent of the catches come from the surface longlines. Albacore catches for 2009 amounted to 199 t, very similar to the 2008 catches (205 t). The fork length of the captured fish ranged from 55 to 90 cm. The estimated nominal longline CPUE was 165 kg/1000 hooks in 2009, while it was 171kg/1000 hooks in 2008.

Turkey

The Turkish albacore fishery has been developed since 2004. There are about 40 vessels currently involved in the fishery using gillnets (SCRS/2010/073). After the driftnet ban in 2006, the fishermen made some modifications to their nets in order to get out of scope of driftnet definition in Notification 2/1 Regulating Commercial Fishing. It is possible to provide grants and loans to fishermen in order to encourage them to change fishing methods. Furthermore, the Ministry of Agriculture and Rural Affairs (MARA) will prohibit the use of modified gillnets in July, 2011.

The average characteristics of the boats are: length 19 m, GRT 50, HP 382, daily fuel consumption 203 l, crew number 5.

The fishing season lasts from 15 May to 15 July in the Gulf of Antalya. The fishery takes place in the open sea, 20-40 nm off Alanya (1000-3000 m depths). The target species of this fishery are both albacore and swordfish. Other species are also caught as by-catch, like dolphinfish, bluefin tuna, ocean sunfish, bullet tuna, little tunny and Mediterranean spearfish.

The albacore catches in Turkey show considerable fluctuation. The reported catch for 2007 was 852 t while for 2008 the catch was 208 t.

In recent years the mean size of the albacore has been 72 cm; 33% of the catches were between 75 to 80 cm.

Sport fisheries

The Confédération Internationale de la Pêche Sportive, which was founded in 1952, and includes in its association, representatives of the Fédération Française de Pêche en Mer (FFPM), supported by the Federazione Italiana de Pesca Sportiva (FIPS-AS) and the Federacion Española de Pesca Desportiva y Casting (FEPYC), conducted a survey of its membership regarding the change in availability of albacore to the sport fishery. The responses indicated that albacore, which were abundant and available to sport fishers during the months of August and September in the northern Mediterranean, have largely disappeared from these grounds over the past decade and now only a few specimens are caught, often mixed with bluefin tuna. While the reasons for this disappearance remain unknown, it will be of high importance to incorporate this information into any future assessments of stock status for Mediterranean albacore.

3. Update of basic information: albacore

At the start of the meeting, the Secretariat presented the most up-to-date information available for the Mediterranean albacore stock. This covers the Task I nominal catch (T1NC), Task II catch and effort (T2CE), Task II size frequencies (T2SZ) and conventional tagging (TAGG) information related (released and/or recovered) to the Mediterranean.

3.1 Task I (catches)

The T1NC data for 2009 are preliminary and still very incomplete. In general, the majority of the ICCAT CPCs that reported 2009 data have done so before the deadline. However, according to the historical Mediterranean albacore T1NC catch series, important 2009 catches are missing for the following CPCs: Syria and Turkey. No additional T1NC information was obtained during the meeting. The ALB-MED summary table, presented in **Table 1** and **Figure 2**, show the yearly cumulative catch trends by year and major gear.

In the analyses of the historical catch trends, the Group noted that some series could be incomplete or have partial gaps. This evidence was identified in EU-Spain (2003), EU-Greece (1993-1995) and doubts were identified in relation to the incompleteness of Syria and Turkey. Moreover, the catch reported by EU-Italy peaked in 2003, representing the highest record in the time series (198% increase compared to the average Task I catch of the period 2000-2002). Concern was expressed by the Group about the reliability of this high catch.

Additionally, the Working Group discussed the weight of unclassified gear in the global catches (nearly 100% in the 1980s, about 40% in the 1990s and 30% in 2000 decade). This mixing of gears (mainly related to EU-Italy and EU-Greece) is very problematic for fisheries-based characterization and subsequent modeling approaches (catchability of the various fleet components, biomass abundance indices estimations, exploitation rates and selectivity patterns, etc.). The Working Group considers the discrimination of the T1NC catches by gear (including gillnet) a crucial step that has to be done before any attempt to assess the stock. The Group also considered the possibility that some albacore may have been caught as by-catch and not reported in other longline fisheries in the Mediterranean.

3.2 Task II (catch-effort and size samples)

The T2CE information for 2009 has been reported in time by the majority of the CPCs. Among the CPCs with important ALB-MED catches, only Syria and Turkey are missing (not only 2009 data but for entire series of years). The T2CE data available (see detailed catalogue in **Table 2**) evidences the poor coverage of the available T1NC catch statistics, when considering only the datasets having the two fundamental components: catch and the corresponding effort. At the same time, the Working Group considers that there is large heterogeneity in the level of stratification (in particular, time strata, geographical strata, various efforts units for the same gear). The various CPCs should make an effort to harmonize their own T2CE data series, following the SCRS basic requirements. This revision should facilitate the CPUE standardization studies in the future.

The spatial distributions of the Task I catches (also known as CATDIS, in 5x5 and trimester), presented in **Figures 3** (1965-2008) and **Figure 4** (2000-2008) by major gear, is an estimate that uses the T2CE time-space stratification. These maps show the two problematic issues of T2CE statistics identified: weakness in spatial stratification and weight of unclassified gear in the global catch.

The Working Group also noted the difficulty arising when trying to establish relationships between T1NC and T2CE at the fishery level (fleet/gear combinations). There is no direct match between the gears reported in T1NC and T2CE.

The T2SZ information for 2009 was only reported by EU-Cyprus and EU-Italy. The Working Group noted that T2SZ data have the same poor coverage (and in some cases even worse) of T1NC and heterogeneity problems. Details are presented in the T2SZ data catalogue (**Table 3**). The situation here is even more problematic in terms of coverage (size data only for EU.Cyprus, EU.Spain, EU.Greece and EU.Italy). A T2SZ data recovery plan should be requested from various CPCs with important catches of Mediterranean albacore. Otherwise it will be extremely difficult to develop a catch-at-size (CAS) matrix in the near future to be used in structured models (VPA, LCA, etc).

The consolidated view of Task I catches and Task II availability (T2CE and T2SZ) is presented in **Table 4**. It shows in a summarized way (by flag and gear) which CPCs have missing data or any other inconsistencies (gear

classifications, etc.). This table is very useful to revise the consistency between T1NC, T2CE and T2SZ information before any stock assessment of Mediterranean albacore.

4. Review of the albacore catch per unit effort series

No new CPUEs analyses were presented at the Working Group. The Group revised a document submitted in 2009 (Schirripa, 2010) which presented information on albacore catch rates from the Spanish recreational fishery around the Balearic Sea (Mediterranean Sea) from 2004 to 2009. Annual fluctuation was observed based on the observations made in July in the spawning season in this area. Further evaluations of sport fishery CPUE patterns over longer periods of time could be quite informative, if data become available from sportsmen's log records.

5. Albacore stock structure

Albacore is a temperate tuna widely distributed throughout the Atlantic Ocean and Mediterranean Sea. The existing stock boundaries were established based on fisheries distribution, identification of separate spawning areas, different estimated growth rate, morphological differences and some tagging information providing evidence of horizontal movements and migration pathways in the northern and southern Atlantic and Mediterranean Sea (Anon., 1990). Since then new information provided supports the hypothesis of three stocks for albacore: northern and southern Atlantic stocks (separated at 5°N) and the Mediterranean stock. Precisely, in the western Mediterranean Sea a spawning area around the Balearic Islands was described based on the larvae distribution obtained by means of an ichthyoplankton survey carried out in June (García *et al.*, 2002) complemented with other spawning areas extending from west to the eastern Mediterranean (Levantine Sea and the Strait of Sicily) described also to take place in summer, from June to September (García *et al.*, 2005; Oray *et al.*, 2005).

5.1 Review of tagging information

The Secretariat presented the available tagging information recorded in the ICCAT database. Some recoveries presented an incorrect geographic location and should be revised by the Secretariat (**Figure 5**). A document presented to the Group (SCRS/2010/081) included a screening of the ICCAT conventional tag Mediterranean albacore database (<http://www.iccat.int/en/accesingdb.htm>) current to July, 2009, which included a total of 717 albacore tagged releases in the Mediterranean for the period 1983-2004 (**Table 5**). Accordingly, with the revised information, tagging experiments were carried out by EU-España (n= 96), EU-France (n= 35), EU-Greece (n=1) and EU-Italy (n=585) mostly in the western (131 tags) and central (585 tags) areas of the Mediterranean (**Figure 6**).

A total of 44 recaptures out of the 717 releases was registered. The observed rate of recapture is low, less than 3% (**Table 6**). Examination of the information on the recoveries such as length at recapture and location was done. The estimated mean fork length of the overall releases was 68.9 cm (\pm 5.6 cm) with a range of 33 to 89 cm. Five released albacore recorded as having a fork length between 212 cm and 228 cm were considered to be errors in the database (**Figure 7**). Albacore make latitudinal migration in the Aegean and Ionian Seas and is one of the most important commercial tuna species exploited in the Mediterranean (Megalofonou, 2000; Di Natale, 1991).

Two individuals tagged and released during the French campaigns in the Gulf of Lion that took place in 1989 and 1991 crossed the Strait of Gibraltar boundary to be recaptured in the Atlantic Ocean. One of these was released in 1989 and recaptured in 1994, after 1794 days at liberty in the Bay of Biscay in the northeastern Atlantic. The other albacore released in 1991 was recaptured in 1994, after 1134 days at liberty in the Atlantic Ocean between the Azores and Madeira Islands. On the other hand, only one recovery was reported in the Mediterranean Sea of a tagged albacore released in the Atlantic (Aloncle et Delaporte, 1976) (**Figure 8**).

However, in the study presented by Arrizabalaga (2003), there was a higher number of releases and recoveries used during the period 1986-1995 that seemed not to be registered in the ICCAT database (**Table 7**). Nevertheless, the number of releases recovered in the Atlantic was the same in Arrizabalaga's study. Therefore, according to the most updated conventional tagging information recorded in the ICCAT database, the exchange between the Atlantic and Mediterranean is minor and the hypothesis of a separate stock in the Mediterranean remains for assessment purposes.

5.2 Other related studies

Document (SCRS/2010/081) presented a summary of results obtained in the different genetic studies conducted to investigate the population structure of Atlantic and Mediterranean albacore which is shown in **Table 8**. All analyses gave similar results. From the genetic analyses done on a total number of 195 albacore sampled in the Mediterranean and 140 albacore sampled in the North Atlantic, it was inferred that the Atlantic and Mediterranean population can be treated as separated stocks for management purposes. The authors considered that according to the results, the Mediterranean albacore populations constitute a genetically differentiated stock (Arrizabalaga *et al.*, 2004; Nakadate *et al.*, 2005; Viñas *et al.*, 2004). Nevertheless, the number of samples is still scarce concerning the whole distribution of Mediterranean albacore.

Moreover, a set of about 290 tagged albacore releases (1984 to 2009) in the western Mediterranean by IEO (Spain) was received during the meeting and will be integrated in the ICCAT tagging database for future albacore analyses.

6. Review of growth and other biological parameters

6.1 Growth models

The growth rate of fish is an essential input parameter into stock assessment models of fish populations with a significant impact on the outcome of the analysis. Likewise, the weight-at-length relationship is also an important component of the description of the life cycle and the population dynamic analyses. The present growth model and length-weight relationship adopted by the SCRS for Mediterranean albacore are those published in the *ICCAT Manual* (ICCAT, 2006-2009) estimated by Megalofonou (1990; 2000).

Document (SCRS/2010/082) presented new data on growth and length-weight information for albacore by sex in the western Mediterranean fishing area from the period 2004 to 2006. In addition, it included summarized information about other estimates of these biological parameters taken from literature. The age determination was done by direct reading of sections from the first ray of first dorsal fin. The assumed aging pattern of annual time marks was based on the method described by Megalofonou (2000), who indicated that albacore spines develop only one hyaline band (annulus) probably in late winter or early spring by year in the eastern Mediterranean. Consequently, a single translucent band, or tight double bands and the associated opaque band were assumed to represent one year of growth in this study. The results found that the 111 male albacore ranging from 53 cm to 96 cm fork length (FL) were aged from 1 to 11 years old, while the 138 females albacore ranging from 52 cm to 94 cm FL following age determination ages varied from 1 to 10 years old. When observations were treated by sexes combined, the most abundant age groups were age 2 (n= 49, 19.68%) and age 5 (n=39, 15.66%) and albacore grouped in the age interval from 2 to 5 years old accounted for the 56.6% of the total aged albacore. Due to the absence of estimates of precision and bias within and among readers, albacore ages derived from counting the hyaline bands were considered preliminary. Nevertheless, results indicated a differential growth rate between males and females albacore.

Present results suggest a maximum life span of at least 10 and 11 years for male and female albacore respectively. However, results on aging albacore reached by Megalofonou (2000) were different. The Aegean albacore samples (57– 92 cm LF) were dominated by the age groups 3 and 4, while the age groups 2 and 3 were dominant in the Ionian Sea and age group 3 was the most abundant year class in both areas. The life span ranged from 1+ to 9 years. Males grew faster and reached a greater size and age than females. The estimated ages for males ranged between 2+ to 7+ years while the range for females was from 1+ to 6+ years. However, a precision and bias analysis between readers has not been accomplished. Similarly, a validation study (Beamish and McFarlane, 1983) on the formation of the number of hyaline band (annuli) per year has not been accomplished yet. Moreover, most of the growth studies in the Mediterranean Sea were based on scales reading (Arena *et al.*, 1980, Cefali, *et al.*, 1986, Megalofonou, 1990; Megalofonou *et al.*, 2003). Those authors found that the scales methodology underestimated the age in larger fish. A comparison of mean length at age obtained from various studies addressing the growth studies and age determination of albacore using hard parts were presented **Table 9**. It is worthwhile to point out the different sex ratio observed between albacore sampled in the western and eastern Mediterranean sea areas of study.

In addition, document (SCRS/2010/089) presented information on age structure of albacore catches from the Tyrrhenian Sea and the south-central Mediterranean Sea for years 2003, 2004 2005 and 2007. Reading of the spine section of 722 albacore provided the proportion of albacore by age from a sub-sample of these catches by 5 cm FL interval. Compared with previous studies the obtained age length proportions were different and represented a faster growth rate for albacore in these areas of central Mediterranean.

6.2 Length-weight relationship

Document (SCRS/2010/082) also presented analyses of length and weight observations collected from June to September, although mainly in June and July, during the 2005 and 2006 fishing seasons in the western Mediterranean, around the Balearic Islands. A total of 300 sexed individuals ranging from 52 to 92 cm fork length and from 1.37 to 16.4 kg round weight were analysed. A significant relationship was estimated for female albacore ($r^2 = 0.912$, $a = 7 \times 10^{-6}$; $b = 3.24$) as well as for male albacore ($r^2 = 0.973$, $a = 1 \times 10^{-5}$; $b = 3.107$), when sexes were combined the model fit was also significant ($r^2 = 0.94$, $a = 1 \times 10^{-5}$; $b = 3.165$). On the other hand from a sample of length and weight data collected during autumn in 1986, 1987 and 1989 in the eastern Mediterranean sea (Aegean Sea) Megalofonou (1990) estimated the length-weight relationship ($r^2 = 0.96$, $a = 3 \times 10^{-5}$; $b = 2.88$) used by ICCAT actually. Model estimates for albacore length-weight relationship (sex combined) are shown in **Figure 9**. It was observed that for albacore larger than 70 cm the estimated weight using the new relationship is greater than the estimate obtained from the relationship adopted by the SCRS.

7. Review of potential methods to be used in the albacore assessment (potential 2011 assessment)

Considering the incomplete fishing statistics for Mediterranean albacore and the lack of knowledge on the life-cycle and the biological population parameter, the stock can be classified as data poor.

Abella (2010) described a set of simple indicators and methods for the assessment of the status of exploitation of stocks in conditions of data shortage.

Potential methods that could be used are:

- The SEINE Model allows estimating levels of total mortality based on observed length frequency data and input von Bertalanffy growth parameters. Either single or multiple changes in mortality levels can be estimated. It allows a series of mortality rates to be estimated from mean length data representing non-equilibrium conditions in multiple years. The Beverton–Holt mortality estimator has been frequently used, especially in data-limited situations, because it only requires information on the von Bertalanffy growth parameters (K and L_∞), on the smallest size (L') at which animals are fully vulnerable to the fishery and to the sampling gear and the mean length of the animals larger than L' .
- The Depletion-Adjusted Average Catch (DCAC) model is a simple method for estimating sustainable catch levels when the available data are little more than a time series of catches.

A Robin Hood approach could also be used where information rich case are used to provide priors for stock parameters (e.g. r & K or steepness) and for conducting joint hierarchical assessments for data poor cases; allowing stocks such as Mediterranean albacore to “learn” from information rich stocks.

In information poor cases, a variety of indicators have been proposed. However, evaluation of the robustness of any indicators used for management is essential, because an indicator such as mean size landed may not actually measure a property of the population, as it can be a function of changes in targeting by fleets and management regulations. Also, credibility with stakeholders is important, especially where results are based on incomplete data. Management strategy evaluation can also provide an important tool for evaluating the potential performance of management based on indicators.

8. Recommendations

The recommendation of having an assessment session devoted to the Mediterranean albacore stock is contemplated for 2011. Having done a revision on Task I and Task II statistics between 1965 and 2009 and a revision on biological parameters knowledge of this species, the following recommendations should be accomplished to have a robust assessment of this stock:

8.1 Statistics

- A complete revision of Task I data by fleet and gear is required according to the deficiencies found by the Working Group. Some referred to extremely low catch being reported for a given period by EU-Greece. Likewise, some peaked catch reported by EU-Italy needs further insight. Moreover, a cause of great concern is the high percentage of gear unclassified (UN) catches reported by EU-Greece and EU-Italy in

the last 20 years. These catches need to be revised and discriminated by fleet and gear, documented and submitted to the Secretariat in order to be considered in a future assessment.

- There is a general lack of Task II catch and effort data by fleet and gear reported to ICCAT. The need to work out this information and document it for completion of ICCAT statistics on this stock is emphasized.
- It is important to work toward data recovery from the full range of fleets, including the sport fisheries, to support catch rate analysis.
- Task II size frequencies in the ICCAT database are very incomplete, and the Working Group considers that this size information has been collected over time for some important fleets. This size information should be recovered and communicated to ICCAT before any attempt to assess the stock.
- The ICCAT CPCs should increase the sampling coverage and the number of fish sampled of all the fisheries, in particular the longline fishery.
- Detailed catch per unit effort (CPUE) data on albacore should be provided from all areas in the Mediterranean where different seasonal fisheries developed year round and were operated by different fleets. The minimum required to develop standardized CPUE series, for the longline fleets exploiting the Mediterranean albacore as targeted species and as by-catch from longliners targeting swordfish, in order to have an indicator of relative abundance trend of the stock.
- According to the revision of available conventional tagged released and recaptured albacore in the Mediterranean, there is a large amount of data obtained in diverse research programs that have not been reported to ICCAT. Communication of this information (using the official standard forms) needs to be done in order to have a more comprehensive set of mark and recapture information for Mediterranean albacore.

8.2 Research

- More extensive conventional tagging and also the use of electronic tags (e.g. mini PATs) would assist to investigate the stock structure and seasonal migrations of Mediterranean albacore as well as habitat distribution.
- Genetic studies should be continued based on mtDNA by increasing the sample size along the Mediterranean albacore distribution to achieve a clear distinction between stocks.
- Studies on age validation based on sections of the first ray of the first dorsal fin spine should be encouraged in order to contrast the assumed hypothesis of the formation of one *annuli* per year considered as the annual temporal mark for aging Mediterranean albacore.

There are several von Bertalanffy growth model fits to spine reading analyses in the literature whose estimates diverge depending on the spatial and temporal strata covered by the sampling scheme and by considering sexes combined or separated. It is important to obtain a von Bertalanffy growth model that includes the Mediterranean as a whole.

- There are several length and weight relationship estimates for Mediterranean albacore concerning different temporal and spatial strata according to the different fishing grounds located in the Mediterranean basin. Thus, each relationship represents a given available population on certain time and area upon specific fishery activity. It is recommended that a length-weight relationship be obtained which will integrate albacore data from the geographic extent and seasonal distribution in the Mediterranean Sea.
- Knowledge on maturity for the Mediterranean stock is described in one study carried out with samples obtain from 1978 to 1980 in the Tyrrhenian Sea. Findings were that 50% albacore of 2 years old with a mean fork length of 66.3 cm were sexually mature (Arena *et al.* 1980). Since then, few observations have been recorded addressing the reproductive biology of albacore. It is recommended that studies on maturity and fecundity for this stock be carried out.

- Considering that biological data have been likely collected in different data collection programs (e.g. EU/DCR), it is recommended that a concerted effort be made to consolidate these data in an appropriate form for analyses.
- Evaluation on how improvements in data can reduce uncertainties in stock status and improve scientific management advice should be conducted.

9. Other matters

No other matters were discussed by the Group.

10. Adoption of the report and closure

The report was adopted during the meeting. The Chairman thanked the participants for their hard work.

The meeting was adjourned.

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

		1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
MED total		500	500	500	500	700	500	500	701	500	500	500	561	613	590	833	500	1500	1272	1235	3451	4129	3712	3996	4063	4060
Landings	Bait boat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	900	539	535	1331	243	0	0	0	0
	Longline	0	0	0	0	0	0	0	1	0	0	0	41	130	150	0	0	0	0	226	375	324	164	168	165	165
	Other surf.	500	500	500	500	500	500	500	700	500	500	500	520	483	440	833	500	600	700	700	1753	2973	3068	3782	3879	3879
	Purse seine	0	0	0	0	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	141	274	10	50	16	16
	Tawl	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	264	310	0	0	0
EU.Cyprus		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
EU.España		0	0	0	0	0	0	0	200	0	0	0	0	0	0	0	0	900	572	535	1368	531	0	3	3	0
EU.France		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	141	250	20	60	31	31	
EU.Greece		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	484	500	500	500
EU.Italy		500	500	500	500	500	500	500	500	500	500	560	613	590	833	500	600	700	700	1942	3348	3208	3433	3529	3529	
EU.Malta		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
NEI (MED)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Syria 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	
Turkey		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	200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
MED total		1896	2379	2202	2138	1349	1587	3150	2541	2698	4851	5577	4866	5608	7893	4874	3529	5947	6566	2970	3246
Landings	Bait boat	83	499	171	231	81	163	205	0	33	96	88	77	29	0	0	0	0	0	0	0
	Longline	624	524	442	410	350	87	391	348	194	417	2800	2597	3706	4248	2345	2012	3010	4119	2695	2979
	Other surf.	1098	1198	1533	879	766	1031	2435	1991	2426	4265	2689	2193	1755	3166	2176	1200	134	1401	250	239
	Purse seine	91	110	6	559	23	0	0	0	0	0	0	0	1	478	353	317	2803	1046	24	25
	Tawl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Troll	0	48	50	59	129	306	119	202	45	73	0	0	117	0	0	0	0	0	0	1
EU.Cyprus		0	0	0	0	0	0	0	0	0	0	6	0	12	30	255	425	507	712	209	223
EU.España		84	548	227	298	218	475	429	380	126	284	152	200	209	1	138	189	382	516	238	293
EU.France		121	140	11	64	23	3	0	5	5	0	0	0	1	0	0	0	0	2	1	0
EU.Greece		500	500	500	1	1	0	952	741	1152	2005	1786	1840	1352	950	773	623	402	448	191	5
EU.Italy		1191	1191	1464	1275	1107	1109	1769	1414	1414	2561	3630	2826	4032	6912	3671	2248	4584	4017	2104	2724
EU.Malta		0	0	0	0	0	0	0	1	1	1	4	0	2	0	10	15	0	1	5	1
EU.Portugal		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
NEI (MED)		0	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syria Rep.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	14	0
Turkey		0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	30	73	852	208	0
Yugoslavia Fed.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4. ALB-MED consolidated catalogue of Tas -I (T1, tones) and Task II (T2, presence of catch & effort [a], size/CAS data [b], both datasets a&b [ab], or, none[-1]) by stock/flag/gear and year (1990-09). Task-II catch and effort datasets [a] without effort were removed. (A “zero” value in Task I catch table indicates that there is information on Task II, but catches are not significant (<=0.5t).

Stock	Status	Flag name	Gear group	Data type	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009				
MED	CP	EU.Cyprus	GN	T1																																		
				T2																									0									
			LL	T1																									17	243	337	451	695	204	220			
				T2																									a	a	a	ab	ab	ab	ab			
			SP	T1																							6		12	13	6	30						
				T2																							-1		-1	-1	-1	-1						
			TL	T1																																	1	
				T2																																a		
			TN	T1																											7	58						
				T2																										a	a							
TR	T1																																	0				
	T2																																	b				
UN	T1																																	56	17	4	3	
	T2																																a	a	a	-1		
EU.España	BB	T1			900	539	535	1331	243						83	499	171	231	81	163	205			33	96	88	77	29		0		0		0				
		T2			-1	a	ab	ab	b							ab	ab	ab	b	ab	ab	ab			ab	ab	-1	-1	ab		-1		a		-1			
	LL	T1														1	6	8	ab	6	25	176	22	74	51	112	37	1	109	148	322	421	208	242				
		T2														b	ab	ab	ab	b	ab	ab	ab	ab	ab	ab	ab	ab	ab	-1	-1	a	a	a	ab	ab		
	PS	T1																																				
		T2																																				
	SP	T1																																		0	0	
		T2																																	b	b		
	SU	T1																																				
		T2																																				
TP	T1																																					
	T2																																					
TR	T1																																					
	T2																																					
UN	T1																																					
	T2																																					
EU.France	LL	T1																																		0		
		T2																																				
	PS	T1																																				
		T2																																				
	SP	T1																																				
		T2																																				
TW	T1																																					
	T2																																					
UN	T1																																					
	T2																																					
EU.Greece	HL	T1																																				
		T2																																				
	LL	T1																																				
		T2																																				
	PS	T1																																				
		T2																																				
TR	T1																																					
	T2																																					
UN	T1																																					
	T2																																					
EU.Italy	GN	T1																																				
		T2																																				

Table 5. Number of albacore tagged and released from 1983 to 2004 in the Mediterranean Sea.

<i>Month</i>	<i>Year</i>									
	<i>1983</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>2004</i>	<i>Total</i>
June					2					2
July	1									1
August				4						4
September		2	12	4	32			14		64
October			9		162		87		1	259
November					141	5		166		312
December								75		75
Total	1	2	21	8	337	5	87	255	1	717

Table 6. Percentage of albacore recaptures from 1983 to 2007 in the Mediterranean Sea.

<i>Year</i>	<i>Tagged and released</i>	<i>Recaptured</i>	<i>% Recaptured</i>
1983	1		
1988	2	2	100*
1989	21	21	100*
1990	8	8	100*
1991	337	8	2.37
1992	5		
1993	87	1	1.15
1994	255	4	1.57
2004	1		
Total	717	44	6.14

Table 7. Mediterranean albacore number of releases compiled by Arrizabalaga (2003).

<i>Year</i>	<i>FAO (1994)</i>	<i>Univ. Bari (De Metrio, G. 1997)</i>	<i>Total</i>
1986	6		6
1987	95		95
1988	239		239
1989	1,392		1,392
1990	526	54	580
1991	1,340	252	1,592
1992		4	4
1993		86	86
1994		246	246
1995		265	265
Total	3,598	907	4,505

Table 8. Recent genetic analyses carried out to investigate stock structure of the North Atlantic and Mediterranean Sea albacore.

<i>Author</i>	<i>N. samples</i>		<i>Study area</i>	<i>Method applied</i>	<i>Conclusions on stock structure</i>
	<i>N. Atl.</i>	<i>Med</i>			
Nakadate <i>et al.</i> (2005)	66	104	North Atlantic, South Atlantic, Mediterranean Sea	Nucleotide sequence variations of the glucose-6-phosphatce dehydrogenase gene (G6PD9 and D-loop region in the mitochondrial DNA	The gene flow between Mediterranean and Atlantic albacore has been considerably restricted. Populations must be treated as two distinct management units.
Viñas <i>et al.</i> (2004)	54	50	Pacific, Atlantic, Mediterranean Sea	Mitochondrial DNA and Nuclear DNA markers	Genetic differentiation between NE Atlantic and Mediterranean albacore
Arrizabalaga <i>et al.</i> (2004)	20 *	41	Worldwide	Lectins in blood groups	Mediterranean and North Atlantic populations are distant

Table 9. Summary of albacore growth studies using hard parts in the Mediterranean Sea. In brackets number of aged samples.

	<i>Arena (1980)</i>	<i>Megalofonou (1990)</i>	<i>Megalofonou (2000)</i>			<i>Megalofonou (2003)</i>	<i>Present study (2010)</i>		
Zone	Thyrranean Sea	Aegean Sea	Aegean Sea and Gulf of Taranto			Aegean Sea	Western Mediterranean		
Method	Scales	Scales	First dorsal fin ray			Scales	First dorsal fin ray		
Sample size	122	219	1087			446	249		
Length range (cm)	32 – 88	54.8 – 82	57 – 92			55.5 – 89	52 - 96		
Sex ratio (M:F)		2. 1 :1				2: 1	1 : 1.14		
Age	Undetermined	Undetermined	Males	Females	Combined	Undetermined	Males	Females	Sex combined
0	38.3 (19)								
1	45 (1)	56.5 (4)		59.5 (2)	59.5 (2)	56.6 (4)	54.8 (8)	57.8 (14)	56.7 (22)
2	66.3 (7)	64.5 (83)	65.9 (91)	65.1 (117)	65.8 (280)	65.4 (139)	62.2 (25)	63.9 (24)	63.0 (49)
3	75.4 (75)	68.8 (78)	70 (219)	68.1 (123)	69.8 (520)	69.4 (201)	63.0 (8)	64.6 (14)	64.1 (22)
4	78.1 (20)	73 (39)	74.9 (109)	72.1 (25)	74.4 (195)	74.3 (81)	75.0 (2)	70.2 (29)	70.5 (31)
5		77 (5)	79.1(38)	76.3 (5)	79.3 (72)	78.2 (16)	76.0 (16)	73.1 (23)	74.3 (39)
6		79 (1)	81.1 (7)	79.4 (2)	81.2 (13)	82.8 (5)	79.4 (13)	77.6 (19)	78.3 (32)
7			89 (1)		85.5 (4)		81.5 (11)	81.6 (7)	81.6 (18)
8					92 (1)		84.7 (11)	84.0 (4)	84.5 (15)
9							87.0 (10)	87.0 (3)	87.0 (13)
10							89.7 (6)	83.0 (1)	88.7 (7)
11							92.0 (1)		92 (1)



Figure 1. Map of the Mediterranean Sea with the main locations referred to in the Report.

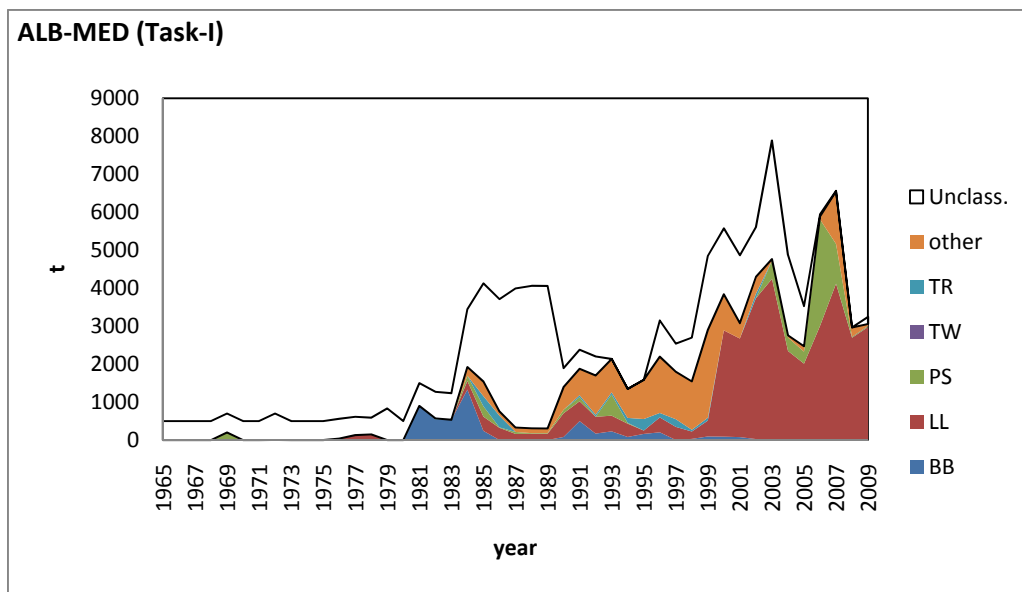


Figure 2. Mediterranean albacore Task I cumulative catches (t) by gear and year

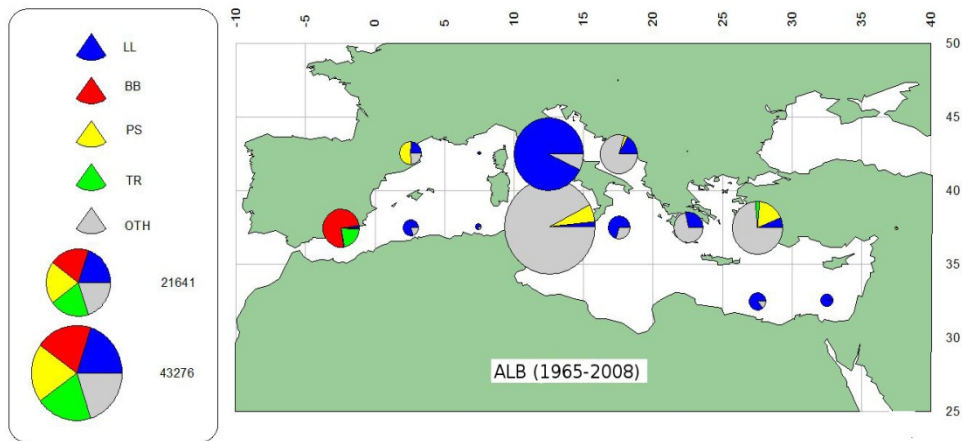


Figure 3. Mediterranean albacore spatial (5x5 degree squares) distribution Task I for the entire series (1965-2008). Data obtained from CATDIS estimations.

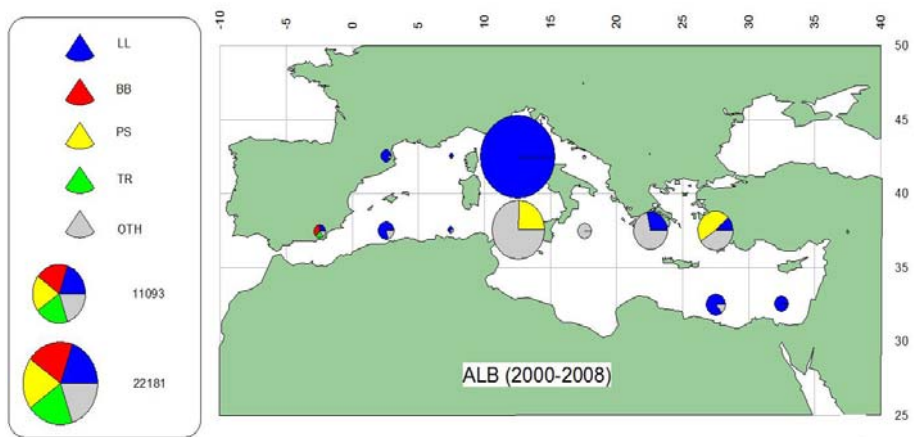


Figure 4. Mediterranean albacore spatial (5x5 degree squares) distribution of Task I catches (t) of last decade (2000-2008). Data obtained from CATDIS estimations.

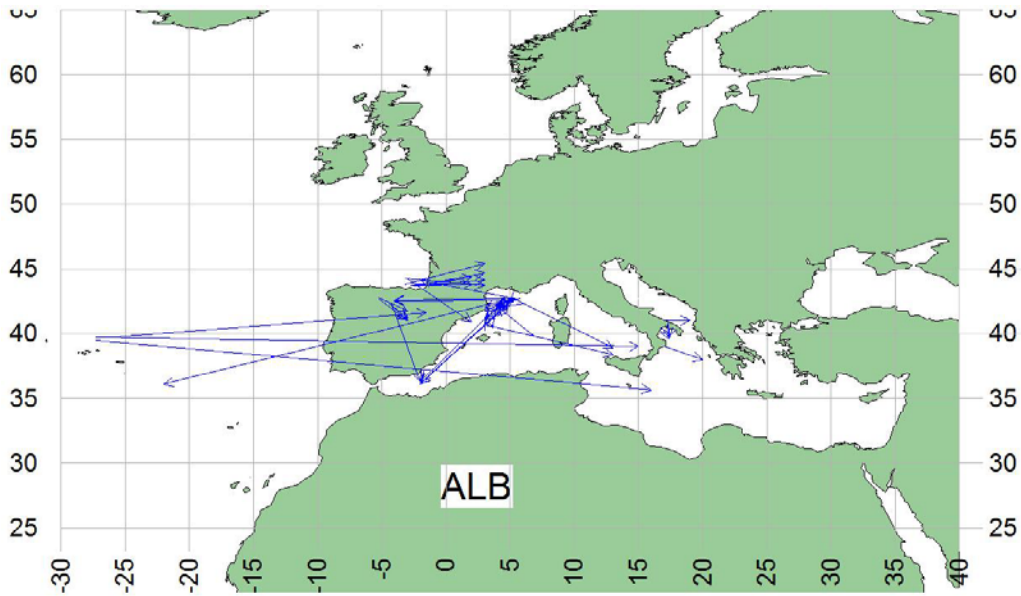


Figure 5. Albacore conventional tagging in the Mediterranean Sea from 1988 to 2004. Information recorded in ICCAT conventional tag database.

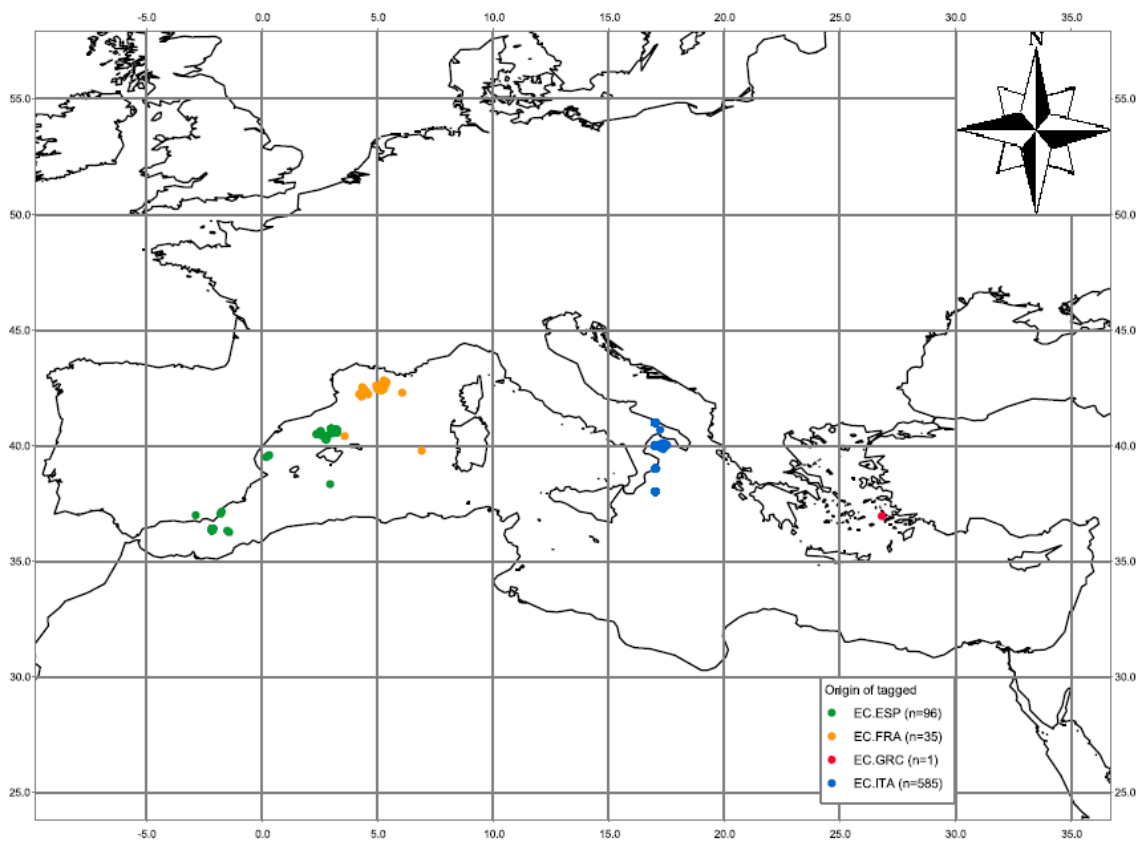


Figure 6. Location of albacore tagging activities from 1988 to 2004 in the Mediterranean Sea. *Source* ICCAT conventional tag database.

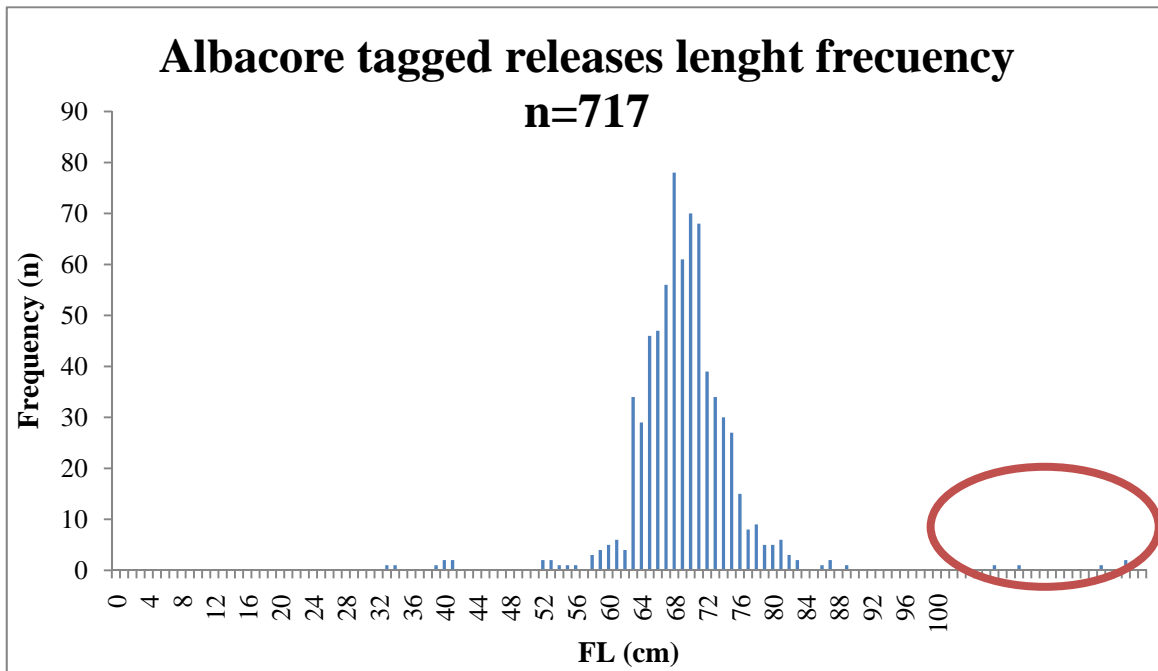


Figure 7. Length distribution (FL) of tagged albacore releases in the Mediterranean Sea. Inside the circle, are highlighted specimen whose fork length is outside the length range for this stock. The fork length (FL) was estimated based on lower jaw-first dorsal length (LD1) measurement.

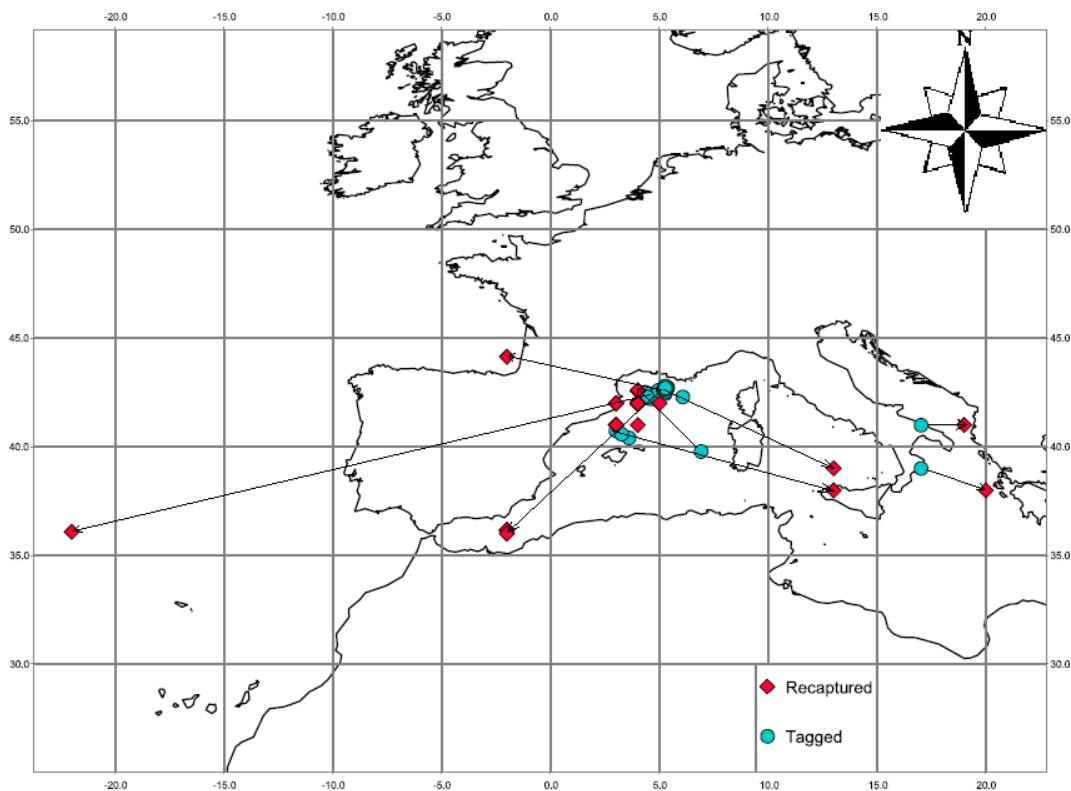


Figure 8. Locations of released albacore in the Mediterranean Sea and their respective recaptures (1988-2007). Arrows show distance between released and recaptured position connected by straight line. *Source* ICCAT conventional tag database.

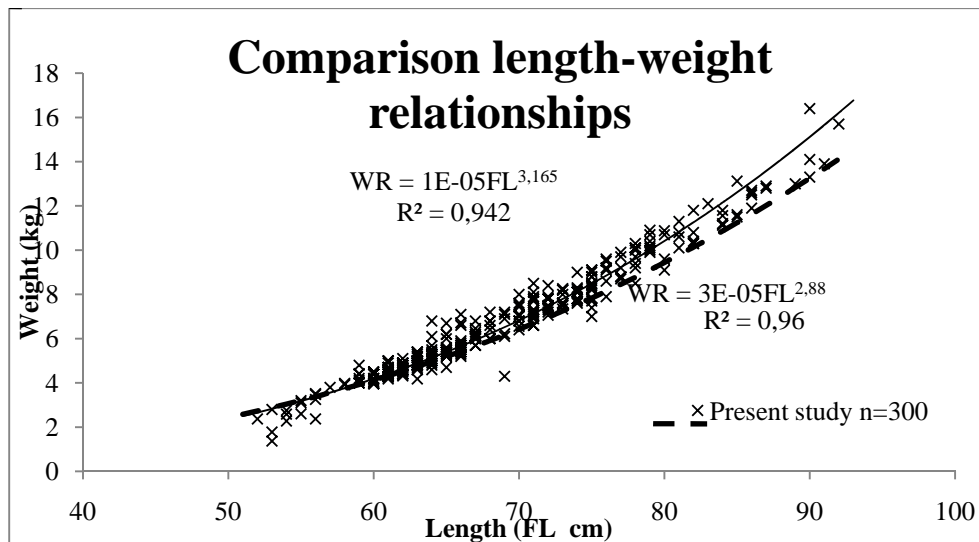


Figure 9. Comparison between the length-weight in SCRS/2010/082 and the length-weight relationship (Megalofonou, 1990) used for the Mediterranean albacore stock by ICCAT.

Appendix 1

AGENDA

1. Opening, adoption of the Agenda and meeting arrangements.
2. Description and evolution of the Mediterranean albacore fisheries
3. Update of basic information: albacore
4. Review of the albacore catch per unit effort series
5. Albacore stock structure
6. Review of growth and other biological parameters
7. Review of potential methods to be used in the albacore ALB assessment ALB (potential 2011 assessment)
8. Recommendations
 - 8.1 Statistics
 - 8.2 Research
9. Other matters
10. Adoption of the report and closure

Appendix 2

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LIST OF DOCUMENTS

- SCRS/2010/073 Albacore Fishery in Turkey. Ceyhan, T., Akyol, O. and Karakulak, F.S.
- SCRS/2010/081 Albacore (*Thunnus alalunga*) stock structure in the Medidetarrenan Sea. Ortiz de Zárate, V., Quelle, P. and Lastra, P.
- SCRS/2010/082 A review of Mediterranean albacore (*Thunnus alalunga*) biology and growth studies. Quelle, P., Ortiz de Zárate, V., Lastra, P. and Ruiz, M.
- SCRS/2010/089 Albacore (*Thunnus alalunga*) fisheries in the Tyrrhenian sea and in the South-central Mediterranean: fishery pattern, size frequencies, length-at-age, CPUEs. Di Natale, A., Mangano, A., Potoschi, A. and Valastro, M.