# REPORT OF THE 2014 ICCAT BLUEFIN DATA PREPARATORY MEETING

*(Madrid, Spain – May 5 to 10, 2014)*

## 1. Opening, adoption of agenda and meeting arrangements

The meeting was held at the ICCAT Secretariat in Madrid from May 5 to 10, 2014. Mr. Driss Meski, ICCAT Executive Secretary, opened the meeting and welcomed participants ("the Group").

Drs. C. Porch (USA) and Sylvain Bohommeau (EC-France), Rapporteurs for the western Atlantic and eastern Atlantic and Mediterranean stocks, respectively, served as co-Chairmen. The Chairmen welcomed meeting participants and proceeded to review the Agenda which was adopted with minor changes (**Appendix 1**).

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

| *Sections* | *Rapporteur* |
|---|---|
| Items 1and 14 | P. Pallarés |
| Item 2 | E. Rodríguez-Marín and J. Walter |
| Item 3 | C. Palma and P. de Bruyn |
| Item 4 and 5 | C. Palma, A. Kimoto and P. de Bruyn |
| Item 6 | M. Ortiz |
| Item 7 | G. Díaz, W. Ingram, and M. Neves Santos |
| Item 8 | H. Arrizabalaga and M. Lauretta |
| Item 9, 11 and 12 | C. Porch and S. Bonhommeau |
| Item 10 | C. Porch and L. Kell |
| Item 13 | L. Kell |

## 2. Review of historical and new information on biology

The Group reviewed the working papers presented to the 2014 Atlantic bluefin tuna Data Preparatory Meeting describing BFT biology.

### *2.1 Tagging*

Two presentations on tagging were given to the Group: a review of the ICCAT-GBYP tagging activities 2011-2014 and the multi-year electronic tagging program conducted by the WWF Mediterranean Programme Office in collaboration with GBYP.

The first presentation was a review of the ICCAT-GBYP tagging activities 2011-2014. The presentation provided total number of fish tagged (24086) during the course of GBYP. Most of the tagging occurred in the Bay of Biscay, Strait of Gibraltar, western and central Mediterranean with smaller numbers deployed in Morocco and Portugal. A number of tags have already be returned (171) and the reporting rates are much higher than pre-GBYP periods, but recovery rates are still very low. In addition there has been no tagging in the Eastern Mediterranean. The Group expressed concerns that tagging activities were suspended in 2014 due to budget issues.

The second presentation described the results of an electronic (internal archival and PSAT) tagging program in the Atlantic and Mediterranean. Duration of time at liberty for fish spanned from 22-391 days. The results showed that there are two different behavior patterns coexisting. Some of the fish tagged in the Atlantic (13) moved into the western and central Mediterranean to spawn during the spawning season and then engaged in the trophic migration into the Atlantic, while fish tagged in the western Mediterranean (35) stayed within the Western Mediterranean for the entire time period. These results might be evidence of migratory contingents (Secor, 1999) and the presence of at least two different migratory strategies. It is worth noting that fish that appeared to exhibit the two different migratory behaviors spawned in similar locations at almost the same time indicating that these contingents would not be considered separate stocks, based solely on this evidence. Potential spawning of tagged fish was only observed south of 40$^{o}$N where adequate environmental and oceanographic conditions occurred.

Two other findings are also worth noting. First, there could be a segregation between the fish tagged in this study and the Eastern Mediterranean as no fish moved into the Eastern Mediterranean, where spawning is known to occur. Second, a fish tagged off the Atlantic coast of Morocco entered the Mediterranean during the spawning season and then moved across the 45$^{o}$W boundary, indicating connectivity between the spawning grounds in the Mediterranean Sea and feeding grounds off Newfoundland. Some questions were also raised about the scarce movement of tagged fish to the Tyrrhenian Sea, since it has been generally accepted that this area is an important spawning one.

It was highlighted that the increasing electronic tagging deployments in the Mediterranean and eastern Atlantic in recent years, represent effort levels approaching the electronic tagging activity in the western Atlantic. In addition to providing unique behavioral inference, these data also allow for the estimation of movement rates and potential stock structure. Estimated movement rates need to account for variables such as age/size, annual variability and location and time of tagging. Considering all these variables, a large number of tags are needed for a consistent analysis.

Also, it was pointed out that a great deal of electronic tagging information has not been made available to the ICCAT database. There is substantial interest in using these data as it provides a basis for parameterizing movement for future assessment models and there is a need to collate the tagging data to quantify movement probabilities. ICCAT has developed a common survey form to report both electronic and conventional tagging. There is also a potential to use a published online database for management and visualization of tagging data (Tagbase, Lam & Tsontos (2011)) that should be explored as a tool for analyzing the tagging data.

The Group discussed some concepts for the future, such as the development of cheaper electronic tags, internal archival tags and the potential for using genetic tags to augment the current conventional tagging efforts. Cheaper electronic tags and internal archival tags could allow for more tag deployment. Advanced genetic techniques that can identify individuals can be used in the same manner as conventional tags, but avoiding the confounding effect due to differential or unknown reporting rates or tag shedding. These concepts should be explored through cost-benefit simulations similar to those being conducted for the ICCAT tropical tunas tagging program.

### *2.2 Ageing and conversion factors*

A study evaluating age estimates from an otolith collection for bias, precision, and comparing age estimates to the most recent growth curve (Restrepo *et al*., 2010) was presented (SCRS/2014/038). An acceptable precision between readers was found, however, all readers exhibited a consistent difference in ageing larger fish (CFL>180 cm) compared to the growth curve. Authors conclude that this set of images can serve as a reference collection and described a detailed protocol for age interpretation from this calcified structures. There was consensus for use of this protocol for production aging. Questions were raised about the influence of the type of light influence and quality selection of pictures. Authors responded that type of light did not result in significant differences in age interpretation and that type of band counting; translucent or opaque may be more important. Good quality images were selected to create this collection, which is available for interested laboratories.

This document also discussed the observed difference with the western stock growth curve which may be explained by the fitting of the growth model to age data, temporal variability in growth rate, or ageing interpretation criteria. For instance when the same images used for the Restrepo *et al*. (2010) growth curve were re-aged by the primary reader in this new study, they estimated age to be ~3 years younger. It was suggested to re-fit the Restrepo *et al*. (2010) growth curve given the 24 re-aged samples which were originally used in fitting the Restrepo *et al*. (2010) growth curve to see if it accounts for the difference in the two growth curve estimates.

The GBYP coordinator announced the Call for expressions of interest to participate in the age calibration exercise within the GBYP framework, with the aim of assessing the use of calcified structures for obtaining catch at age composition in order to improve the current length/weight-age estimations for bluefin tuna catches.

SCRS/2014/041 presented length weight relationships from 273 bluefin captured in different fishing years by Morocco. The results showed that monthly relationships were statistically significant although they were based on a limited temporal sampling and mainly on pre-spawning individuals. It was highlighted the need to explore seasonal changes in these relationships based on a wider temporal and size range coverage. Compared to the length weight relationship currently used by ICCAT, this one estimated heavier weights at length likely because it was based on pre-spawning individuals.

Length and weight relationships obtained from an extensive sampling conducted in the last 15 years and covering most of the distribution area of Atlantic bluefin tuna in the North Atlantic and Mediterranean Sea were presented in SCRS/2014/053. GLM models applied to the relationships, for which spatiotemporal effects could be analyzed, showed that length explained almost all the observed variability in weight. Taking into account these results and the fact that having too many different relationships, which presented minimal differences, for different geographical zones or months may not be practical, the authors suggested applying only one function for each relationship using plain linear models. The proposed relationships were based on extensive efforts to collect all available length and weight data by year, month, geographical area and fishing gear variables, therefore, fully representing the range of variability for these factors.

Methodological concerns about outlier filtering were raised, but there was a general consensus that the procedure presented in the paper was appropriate as it does not assume any *a priori* isometric relationship in the weight-length function and fish condition factor varies with the physiological state of the fish during its life history.

The proposed straight fork length-round weight relationship and some other conversion factors differed from the ones used in the most recent 2012 assessments of both stocks. In particular, the new WL relationship indicates a smaller weight at length than the Arena (1980) and Parrack and Phares (1979) September relationships used in the previous stock assessments for EBFT and WBFT, respectively (**Figure 1**). Attempts were made to extract the raw data from tables in the Arena (1980) manuscript. After doing so, there was some concern that the Arena (1980) samples exhibited unexpectedly low variability in the mean weights at each of the 1 cm size bins, which suggests some data filtering was done for using these data for the growth model presented in the Arena paper (**Figure 2**). It was also observed that Arena's WL function was above the WL relationship estimated from farmed tuna after an average of one year ranching (**Figure 3**).

Exploration of the representativeness of the samples across the full size range of BFT was conducted for the new dataset. There was a scarcity of large fish for the SFL~RWT relationship and, conversely an absence of small fish for the CFL~DWT relationships (**Figure 4**). This is primarily due to the different types of measurements for different datasets. Additionally the Arena (1980) data showed a greater representation of larger fish. Two potential solutions to the differential representation of fish across all size classes would be to: 1) *a priori* convert CFL to SFL and DWT to RWT which would allow estimation of the W parameters across the full range of sizes or 2) to attempt to estimate the conversion parameters and the WL parameters in one integrated model, as there are records for which both sets of measurements are taken.

The discussion about how the values of these parameters may affect the stock assessment of this species, as they are used mainly for constructing CAS from weight size sampling and for projections, focused on the need that the functions represent where and when the majority of the catch is obtained. It was also recognized that simplicity, having just one function, was most advisable for projections. Having different relationships by spatiotemporal factors may still be useful for reconstructing CAS for the past.

Fish size-weight relationships usually follow a power function type, such that, for larger sizes the variance on weight can be extremely large, limiting the utility of this function particularly if the true variance is ignored. Quantile regression is a non-parametric statistical procedure that relaxes the assumptions of the variance function on non-linear relationships, allowing modeling and estimation of the variance based on fewer assumptions commonly used in other fitting methods. It is proposed to explore this procedure or other techniques to estimate more robust values and may better reflect increasing variance with size. Also it is proposed to fit the new data with equally represented sizes for the whole size range and using other fitting approaches more flexible than the power function.

Given the concerns over the representativeness of the samples across all size ranges, the Group agreed to retain the Arena (1980) and Parrack and Phares (1979) WL relationships for the update assessment and continue exploration of the revised curves to be presented at the July webinar. The Group recommended evaluating the options proposed in the above paragraph to obtain a revised WL relationship that could be used for the pilot stock assessment to be conducted in 2014.

### *2.3 Biological sampling and analysis*

A brief presentation followed on the Biological Sampling and Analysis project being conducted by a large consortium led by AZTI-Tecnalia. The presentation summarized the progress so far under GBYP Phase 4. The main objectives of this project is to enhance knowledge about Atlantic bluefin tuna population structure and mixing, using a range of methodologies (microchemistry, genetics and otolith shape), as well as to conduct an age calibration exercise. During Phase 4, a total of 3723 biological samples (otoliths, spines and genetic samples) were collected from 1733 individuals of different age classes, throughout the Atlantic and Mediterranean. Microchemical analyses suggest that natal homing is well developed with fish close to the Strait of Gibraltar and inside the Mediterranean being mostly of eastern origin (Rooker *et al*. 2014). However, mixing occurs in both directions in areas closer to the line separating the two stocks boundary. This mixing pattern shows some interannual variability that is important to further characterize in future analyses. On genetics, the consortium reported that during Phase 4, a new approach (Rad-Seq) is being tried in parallel to continuing efforts on the Reduced Representation Sequencing by Genotyping (RRSG) approach. Rad-Seq has proved successful in showing genetic structure in other scombrids at the Atlantic scale and there is hope that it can serve to address bluefin population structure as well as individual origin assignment. Preliminary otolith shape analyses suggest the existence of two Groups that mix to varying degrees in the different regions during feeding. The consortium has also prepared a set of spine and otolith images to be exchanged within an aging calibration exercise where any interested party can participate.

The Group noted that recent advances in resolution and decreases in cost of genetic methods makes it increasingly possible that these methods could be used in conjunction with conventional tagging and for analyses such as close-kin methods that can estimate spawning population size in absolute terms.

### *2.4 Other matters on bluefin biology*

An anticipated draft on a Review of the historical and biological evidences about a population of bluefin tuna (*Thunnus thynnus* L.) in the eastern Mediterranean and the Black Sea (SCRS/2014/047) was presented. Historical accounts indicate that BFT were present in enough abundance in the Black Sea to support garum factories during Roman times and existed in the Black Sea until the 1970s. Since then BFT have apparently not returned to the Black Sea. It is unlikely based on salinity and temperature tolerances of larvae that BFT successfully spawned in the Black Sea. However the high productivity likely made it a desirable foraging area.

SCRS/2014/037 used the SSB and R time series resulting from the case base scenarios "Inflated" and "Reported" explored during the 2012 EBFT assessment, to fit stock recruitment relationships (Beverton & Holt, Ricker and smooth Hockey-stick). The author suggests that the stock has maintained its full reproductive capacity throughout the time series since the 50s. The author indicated the possible decline in recruitment at high SSB and argued that a Ricker stock-recruitment relationship cannot be rejected for this stock regarding the output from the VPA. This adds more uncertainty to $B_{MSY}$ reference point estimate, making it useless as a biomass reference point for this stock. As an alternative the author proposed the use of $B_{loss}$, as $B_{lim}$ (defined as the stock size below which there may be reduced reproduction resulting in reduced recruitment) and then, to estimate $B_{pa}$ (defined as the precautionary approach biomass at which level fishing mortality begins should be reduced to prevent biomass from decreasing to $B_{lim}$) from this value. It is also proposed to test two HCR and select the most suitable for this stock.

The Group emphasizes the need to work on alternative reference points and their estimation. Given the uncertainty on EBFT recruitment estimates from the VPA the fit of a stock recruitment relationship is difficult. Moreover, there is currently no biological evidence of mechanisms that could lead to a Ricker stock recruitment shape for Atlantic bluefin tuna (e.g. cannibalism of juveniles), although the author pointed out that a high level of SSB may lead to a high density of individuals which produces food shortages affecting their condition and in consequence the quality of the eggs and their survival. The paper was also presented at the 2014 meeting of the WGSAM (see that report for more discussion).

The Group noted that there were at least three parallel efforts to develop statistical catch-at-size models. The Secretariat will collaborate with these efforts.

The following information was presented to the group: According to Cort *et al*. (accepted by *Reviews in Fisheries Science and Aquaculture*), the growth equation for ABFT eastern stock (Cort, 1991) is validated using several approaches. One involved a comparison of studies with von Bertalanffy parameter estimates in which, different methods for the age estimation are utilized, taking as references the maximum size of this species ($L_{max}$= 319.93 ± 11.3 cm; Cort *et al*., 2013) and the growth equation of the western Atlantic stock (Restrepo *et al*., 2010). The validation is also made by superimposing tag-recovery data from tagging surveys in the Bay of Biscay, western Mediterranean and western Atlantic and fin spines readings to the eastern stock ABFT growth equation and obtaining residuals.

## 3. Review of Task I nominal catch

This section describes the current status of Task I nominal catch (T1NC) statistics that will be used for the update 2014 assessment, and also, the progress made on the incorporation of new information obtained from the GBYP Program and other sources into a fully revised Task I dataset. This ongoing work aims to produce a highly improved Task I catch series (the SCRS best scientific estimates) for bluefin tuna.

***Current T1NC***

The Secretariat presented to the Group, the most up-to-date bluefin tuna information on T1NC statistics for both stocks. This information was summarised in **Table 1** (and **Figures 5** and **6**). Overall, no changes were made in T1NC for either stock until 2012. The gap found for Italy PS in 2010 is explained by the moratorium in Italy in 2010 which stopped the PS Italian fishery in the Mediterranean Sea during this year. The Secretariat presented to the Group a preliminary estimation of the 2013 bluefin tuna catches by stock, flag, and gear (**Table 2**), reported under the Bluefin tuna Catch Documentation program (BCD). The Secretariat noted that, those catches are still incomplete for the eastern stock and do not cover all fisheries in the western stock. The most important deep long line fisheries are also missing in both stocks.

The Group reiterated the need for CPCs to report the 2013 T1NC statistics (or any required correction for 2010, 2011 and 2012) by the deadline of May 31, 2014. Any information submitted afterwards shall not be considered for the assessment. The resulting T1NC (1950-2013) will be used in the estimations of the updated CAS/CAA matrices used in the VPA.

***Future T1NC revisions***

In addition, the Secretariat also presented to the Group the progress made with the ongoing work behind the integral revision of T1NC statistics. This work includes the incorporation of the new (and/or updated) information obtained from various sources (GBYP data, market data/BCD data, national revisions, etc.). This revised T1NC will be the basis for estimating future CAS/CAA matrices.

The GBYP project is the major contributor to this revision. Appendix 10 of the 2013 SCRS report describes which datasets will be updated, and how they will replace the official T1NC statistics. For additional details, the document SCRS/2013/169 describes the differences between the Task-I and equivalent GBYP catch series, by fleet and gear. Newly submitted data sets from historical trap total or/and partial yearly catches from various ICCAT CPCs traps (which may have duplications with the data in the newly created GBYP database) require further work and a proper incorporation into the GBYP database. Once the required checks have been completed, a proposal for its utilisation should be presented by the GBYP for the 2015 assessment. Additionally, Spain (Doc. SCRS/2014/052) presented, under the GBYP data recovery plan, 2 revised series (1950-2000) for the Spanish BB fleet fishing in the Bay of Biscay (one for the fleet targeting BFT and another for the fleet catching BFT as by-catch – targeting ALB). These 2 series were adopted by the Group for inclusion in the revised T1NC (replacing the version approved in Appendix 10 of the 2013 SCRS report).

Algeria and Turkey indicated that they are doing some revisions to their bluefin tuna T1NC. Algeria is revising a gap found (all gears) in their catches for 2009. Turkey is working on a revision (1985 to 2009) to their catch series. The Turkish national scientist clarified that, the early period requires a gear reclassification (UNCL to TRAP), the 90s a large revision of the PS fishery (already integrated in FAO fishery statistics), and some minor corrections (gear breakdown) thereafter. Both revisions should arrive to ICCAT before the deadline.

Another important source of information that could contribute to the improvement of T1NC is the use of market information. Document SCRS/2014/042 explained that for a number of years, both the ICCAT-SCRS and ICCAT-GBYP have examined the possible use of auction, trade, and marked data for scientific purposes. These data are currently not used by scientists and not included in the ICCAT database because of the need to closely check them to avoid uncertainties such as double-counting, use of various types of conversion factors, representativeness of various age classes on the Japanese markets, data coverage, sample representation, and many others. The Informal Group on Trade-Market Data (which was set during the 2012 Bluefin Tuna Assessment Meeting), the SCRS, and the GBYP Steering Committee, agreed that these important data should be examined by a group of experts, to select the reliable and documented data, using all sources for validation, including BCDs, and to make them available to the SCRS scientists. In this document, comprehensive trade, market and tuna ranching corporate information, including a vast record of Atlantic bluefin tuna specimens (with individual and grouped disclosed information on weight/size) that were fished and/or ranched in the northeast

Atlantic and Mediterranean Sea, from 1995 to 2014, has been recovered and therein presented to the SCRS. Three distinct sets of data (form 1, forms 2 (a & b) and forms 3 (a & b)) are herein presented for ICCAT-SCRS evaluation and analysis. All three such sets have been standardized in order to comply with SCRS data and statistics format requirements and are delivered in MS EXCEL format.

The Group agreed that this work may provide important information for scientific use and should be validated for use in the 2015 assessment by a coordinated team of CPC scientists, potential external experts and the Secretariat. This group will be established by the rapporteurs, the Secretariat and the GBYP coordinator by September 2014:

The Group agreed that incorporating all the above mentioned information into a final and fully revised T1NC has to be accomplished in two phases:

- Phase 1: a first version of the revised T1NC should be ready by 2014-06-30. This version should include all the catch series already approved by SCRS and this Group, excluding however any detailed results from document SCRS/2014/042 (this requires complex and time consuming validation work).
- Phase 2: a final version of the revised T1NC ready by April 2015. It will include the intersessional validation work of the coordinated team, which will provide clearly defined NEI flag related catch series estimations per gear and area. These series should replace the "old" NEI-COMB catches series estimated by the SCRS (Report of the 2010 & 2008 data preparatory meeting) using biannual reports from the BFT SDC/RC (Statistical Documentation Scheme/ Re-export certificates) of ICCAT.

Under these T1NC revision process, the Secretariat will prepare a table that maps in detail the association between the current and the new T1NC values. This table must be updated in accordance with the specifications of Phases 1 and 2.

In relation to the integration of all the T1NC information collected for the historical period (before 1950), the Appendix 10 of the SCRS report states that this information should be available to the SCRS in a format compatible with Task-I. However, it does not specify how this will be accomplished. The Secretariat proposed to the Group the integration of those BFT historical series into the ICCAT-DB system and request further guidance from the SCRS on its use. These data will not be published along with the regular ICCAT statistics, but may be made available upon request.

## 4. Review of old and new Task II information

### *4.1 Current status*

Task II information is made of two distinct dataset types. One contains catch and effort information (T2CE). The other one contains size frequencies information (T2SZ). Both types can contain observed data (a large portion properly identified) and inference data (partial or total extrapolations).

With the new SCRS standard catalogues recently adopted, the availability of both Task II dataset types can be compared with the respective T1NC series on a "fishery" (flag/gear/region combinations) basis, ranked by catch over the period analysed. For that purpose, the Secretariat presented an updated version of the bluefin tuna catalogues for both stocks for the period 1980 to 2012. The catalogue for the BFT E stock is presented in **Tables 3** and **4** (ATE and MED regions, respectively). The BFT-W stock is shown in **Table 5**.

*BFT-E stock*

The eastern Atlantic region (ATE) represents on average about ¼ of the BFT-E stock removals. The most important fisheries are: Japan LL, Spain BB, Spain TP and Morocco TP. Those four fisheries represent nearly 80% of the entire removals (with 98% of the catch concentrated in 20 fisheries). The 4 major fisheries are relatively well covered in terms of Task II data availability in the last two decades. However, some minor gaps were identified (in either T2CE and/or T2SZ) in recent years for some important fisheries.

The Mediterranean region (MED) represents on average about ¾ of the BFT-E stock removals. The six major fisheries are all purse seines (EU-France, EU-Italy, Turkey, Tunisia, EU-Spain, EU-Croatia). Those 6 fisheries represent about 65% of all the MED removals (with 98% of the catch concentrated in a large set of 43 fisheries). Unfortunately, Task-II information (T2CE and/or T2SZ) is missing for most of the PS fisheries. Task-II data from French purse seines are thus extrapolated to other purse seine fisheries. With the exception of some LL (Japan, Spain and Italy) and HL fisheries (Spain and Croatia) the lack of Task-II for the MED is similar to the major PS related fisheries. This situation, well known by the SCRS, is a drawback in the estimation of the CAS/CAA matrices which are the basis for any stock assessment based on VPA or any other size/age structured based model.

*BFT-W stock*

The five major fisheries of BFT-W are: Japan LL, USA RR, USA-PS (mostly active during the 90s), Canada RR, USA LL. They represent about 80% of the entire removals (with 99% of the catch only associated with 13 fisheries). In general, except some minor gaps, all the major fisheries are relatively well covered in terms of Task II data in the last two decades.

With the collaboration of scientists from Spain, Portugal, USA, Japan, Morocco, Tunisia, Turkey and Algeria, several datasets were recovered to fill up some of the data gaps found, in particular T2CE, T2SZ, and CAS information for 2011 and 2012. The Group acknowledged the effort and accepted this additional information and it proposed that these data be included in the estimations of the updated CAS/CAA matrices. The Secretariat confirmed that this information will be added to the updated catalogues of the BFT assessment detailed report.

Document SCRS/2014/046 updates information previously presented on the bluefin tuna catch-at-size from a tuna trap fishery operating off the southern coast of Portugal (Algarve) since 1998. Trends on intra- and inter-annual catches-at-size were presented, showing an annual decrease trend decreasing trend on the mean size until 2007, followed by an increase in mean size and a more stable situation in recent years. A monthly trend on the catch at size was observed during the fishing period, with the largest specimens caught mostly between April and August, while specimens caught in the extreme months of the season (in late October) tended to be smaller. The sex ratios showed that females dominated the catches in the Algarve tuna traps in the period 2012-2013, with an overall sex-ratio of 60.0% females and 40.0% of males. Size distributions by sex were also presented for the same period, showing a slight increase for both the captured males and females.

### *4.2 Integration of new Task II data into the ICCAT-DB system*

Appendix 10 of the 2013 SCRS report clearly states that all the Task II data compiled and recovered under the framework of the GBYP should be incorporated into the ICCAT-DB system (following the guidance and conclusions of doc. SCRS/2012/116). Thus:

- T2SZ/CAS should be integrated, maintaining the identification of fleet, year, area and data source.
- T2CE should be integrated, maintaining fleet, gear, area, and time strata definition (1x1 lat. - long., month).

Datasets prior to 1950 (historical catches) should be available for the Species Group in a format compatible with Task II. The Group proposed that all the information be stored in the ICCAT-DB system, without any requirement for being published elsewhere.

The Secretariat reported to the Group the current status of this work. A proper MS-SQL database was already created by the Secretariat to store all the information collected under the 4 data recovery projects on its original format. Currently, the database already contains the majority (except one particular case) of the data compiled. Still pending, the development of the code (around 5000 lines of SQL scripting) that will reshape, transform, and integrate the information in the ICCAT-DB system. Only then, this data can be used on the CAS/CAA estimations.

In general terms, the Secretariat considers that the work is evolving as planned and that these new information should be ready to be used on the new CAS/CAA estimations.

## 5. Updated CAS/CAA and fully revised CAS/CAA

Two CAS/CAA estimations will have to be prepared by the Secretariat.

***Updated CAS/CAA***

The updated CAS will take into account only the new/revised series submitted before the deadline of May 31st (as for Task-I). Because it is an update, only years 2011to 2013 can be changed. The same substitution rules used for the 2012 assessment will be applied (**Table 6**). As in previous assessments, the relative differences between Task-I and the CAS weight equivalent catches, mostly found in two Flags (Japan and USA) will not be addressed in this updated version.
The French PS pseudo samples (extrapolated to Task I) were discussed. The Group considered that pseudo size samples should not be included in the ICCAT-DB system as being observed samples, and recommended its deletion from the database according to the scheme of **Table 7**. In addition, the Group recommended that the remaining French BFT CAS series reported be bookmarked (internally in ICCAT-DB) with a special field indicating that those estimations were obtained from re-sampling techniques.

The following schedule was planned to finalise this work:

- Deadline for data submission: May 31, 2014
- Updated CAS (overall & partial matrices) ready on: 2nd week of June.
- Updated CAA (overall & partial matrices) ready on: 3rd week of June.

***Fully revised CAS/CAA***

As for the fully revised T1NC (section 4), it will include all the new size information collected under GBYP and other sources (farmed samples corrected from growth on cages presented in Doc. SCRS/2014/040, etc.) and it will also be implemented in two phases:

- *Phase 1*: planned to be ready in the end of July, it will:
  - Include all the new samples available.
  - Use the new W/L relationship as defined during the July webinar.
  - Adopt one growth function for farm back-calculated size-at-catch and use those samples in the CAS (noting however that, outside of the deadline, alternative growth functions should be explored for the 2015 assessment, having one possible case study around middle September/2014).
- *Phase 2*: planned to be ready around May/2015:
  - Fine tune the matrices obtained in Phase 1.
  - Address alternative growth functions for farm back-calculated size-at-catch input of CAS.
  - Use the trade data discussed in the doc. SCRS/2014/042 as validated by the Expert Team (see section 3)
  - Recalibrate USA and Japan CAS considering Task I as the best estimation.

## 6. Definition of a new procedure to estimate CAS, CAA and WAA using new information validated by the Group

Document SCRS/2014/040 presented a review and estimation of size frequency distribution at time of catch from the size data of farm harvested bluefin tuna. Tuna farms had collected size and weight information from their harvesting operations, and submitted to the Secretariat since 2008. Size, weight, and sex identification data was revised and standardized. There are substantial size samples from harvest operations since 2005 with few reports from prior years. Assuming a similar growth in length of wild and farmed bluefin tunas, expected size at catch was estimated by inversion of the von Bertalanffy growth equation discounting for days-at-farm. Preliminary results indicated, in general, a bimodal size distribution for bluefin that goes into farms with a first larger mode at about 90-160 cm FL with a peak at 125 cm FL, and a second mode from about 170 to 250 cm FL, with a peak at 210 cm FL. However, there are variations in size frequency distribution of farmed fish by year and by flag-farm, as well as by month of capture. Results show some identifiable cohort trends particularly of smaller fish, likely representing population size trends. The time spent in farms is quite variable. From the available data fish can be in farms from a few days up to over 3 years, with a median of 322 days. However, the 'days in farm' shows a left skewed type distribution with 80% of the fish being in cages for less than 1 year, and a second mode at about 500 days. In addition, the document reported that by comparing the observed weight at harvest versus the expected weight of equivalent wild-size fish of same size it estimated the potential weight gain in farming operations. The results indicated a gaining of on average 13% of additional weight compared with similar size wild fish, with an 80% probability of positive weight gain for farmed bluefin tuna.

The Group discussed the results indicating that overall the size frequency at catch derived from farmed bluefin tuna is more reliable that the substitutions used in the past for the purse seine fleets in the Mediterranean and should be used to create the CAS and CAA matrices. The Group discussed the assumption of similar growth in length between wild and farmed fish, recommending reviewing reports from farms growth experiments. The authors presented a summary of three research reports, two in the Adriatic Sea farm (SCRS/2001/92, SCRS/2009/190) and one off Malta (SCRS/2010/108) where size measures were reported at start and end of the farming operation. Albeit the low sample size (36 fish), the SCRS/2001/92 experiment with 512 days at farm indicated a positive growth in length (small fish 65 FL cm) 16% more than the predicted size for wild fish, and 11% of larger fish (95 FL cm). By contrast, the study off Malta farm with over 2400 fish showed no gain in length of farmed bluefin tunas over a 4 month period, but in this case it was for fish with an average size of 224 FL cm. The Group concluded that the assumption of similar growth in length of farmed/wild bluefin tunas is valid for larger fish, and for smaller fish the percent difference is likely within the margin of measuring error, particularly for fish harvested within a year. In conclusion, the Group recommended to incorporate the size frequency at catch for the purse seine fleet estimated from the size farm harvest reports. It was further recommended:

- Restrict the analysis to size data of fish non-EU-Croatia farms for less than 365 days at farm, and for EU-Croatia for less than 1095 days.
- Assign the CAS to the fleet nation of the farm flag for substitution in the CAS substitution tables for 2005 through 2013.
- Compare the means size frequency from the French and Spanish size sampling program with the estimates from the current size estimates.
- Apply a faster growth in length for small fish (e.g. SCRS/2001/092) to generate an alternative CAS for sensitivity analysis.
- Compare the estimated size frequency at catch with data collected with the stereoscopic camera used in the farms (as calibration/verification test). If differences are detected, it will be possible to estimate calibration factors for the growth in length during farming.

The Secretariat presented a summary of a research work on procedures for estimating CAS and CAA, including statistics methods for data substitution when needed. A presentation was made on quantifying uncertainty due to data processing in age-structured stock assessments. This was a proof of concept and results are only preliminary and not intended to be for advice. The example demonstrated how the approach could be used to determine what stock assessment inputs and assumptions (e.g. natural mortality rate, relative abundance indices, construction of the total size dataset and aging of the total size CAS dataset) affected estimates of reference points and stock status. A particular aim is to develop a transparent, reproducible way of imputing size data (i.e. estimating values that have not been observed) that can allow assessments to account for this source of uncertainty. The method was thought to be a useful step forward in generating CAS and CAA. Its application by species groups will vary on a case specific basis and it will require input from the different Working Group experts.

The Group discussed the pros and cons of the protocol. It was noted that for statistical catch models, it is preferable to use actual data and avoid creating pseudo data. For cases where it is necessary to have complete data input (such catch-at-age for VPA models), the scheme of substitution should give preference to the expertise knowledge of scientists familiar with the data, and/or that a panel of experts defined a frame-work of hierarchical substitutions base on similarity of temporal, spatial, gear, fishery or operation data. This so-called "hybrid" approach will ensure that the statistical protocols for missing data generation be applied within logic boundaries. It was further noted that under MSE simulations, it would be feasible to determine the robustness of the statistical protocols to generate missing information.

Document SCRS/2014/044 presented an alternative size composition of Atlantic bluefin tuna derived from the Bluefin Catch Document (BCD) information of imports from farmed fish into Japan markets. Over 210 thousand fish size-weight categories were compiled from the BCD data from 2011 to 2013. Round weight distributions of fish were grouped into three main categories; < 100 RW kg (small), 100-200 RW kg (medium) and > 200 RW kg (large). Analyses by harvest CPC showed differences in weight distribution among CPCs but were more consistent by year within a harvesting CPC. In a BCD, when multiple fish per record were reported the average weight was assumed for all in the BCD. Proportions by weight categories would be useful for cross-check the catch-at-size estimated from the Secretariat.

## 7. Review of available indices of relative abundance by fleet

Document SCRS/2014/054 reported two indices of the Bay of Biscay baitboat fishery (BB), a long term age-aggregated index, from 1952 to 2007, based on trip information, and a new age-aggregated index for the most recent period, 2000-2013, based on a fine scale database that incorporates daily logbooks, trip and VMS information. The effects of regulations on the CPUE are described and considered in the analysis, as well as technological and environmental variables. Both indices show similar trends in the overlapped timeframe. These indices were used in the 2012 stock assessment, and the most recent series has been updated until 2013 for its consideration in the 2014 stock assessment.

The authors described the difficulties for updating the series due to the fact that the Spanish BB fleet sold part of its 2012 quota and its entire 2013 quota. In order to overcome this situation and to assure the continuity of this important index representing young ages, daily records from the Basque-French baitboats that operate in the same area and season as the Basque-Spanish fleet and had continued fishing up to 2013 was incorporated into the analysis.

The Group raised some concerns due to the fact that the number of observations of the Basque-French fleet is much lower than that of the Basque-Spanish fleet, and the last two years are solely based on the Basque-French fleet. The authors provided an additional analysis comparing the French fleet component of the index to the overall index (**Figure 7**), which showed good correlation between the two indices, indicating that the approach of incorporating this new fleet component into the standardization of the BB series is adequate.

The Group also discussed recent (2012 and 2013) changes in the selectivity of the fleet. **Figure 8** shows the evolution of the proportion of BFT catches of the overall BB fleet by commercial category (<8kg, 8-30kg, >30kg) in the last decade. The 8 kg minimum weight regulation entered into force in 2007 clearly affecting the selectivity pattern of the fleet. This justified further splitting the index into three periods (1952-1963, 1964-2006, and 2007 onwards) to use in the VPA. Additional changes in selectivity towards bigger fish occurred within this period, mainly driven by market requirements in a context of reduced allowable catches and a partial sale of the quota as in 2012. In 2013, the selectivity shifted towards relatively smaller fish because only the Basque-French fleet operated, which is partially less influenced by management regulations.

The Group agreed on the importance of this series since it is the only index for young bluefin tuna in the East Atlantic. The Group recommended the series to be used in the base case of the 2014 assessment and to explore ways to down weight the two most recent years for a sensitivity run. The Group emphasized the need to either continue or to develop new indices of abundance for young bluefin tuna.

Document SCRS/2014/059 reported fishery independent indices of bluefin tuna larvae in the western Mediterranean Sea, based on ichthyoplankton survey data collected from 2001 through 2005 and 2012 by the Spanish Institute of Oceanography. Indices were developed using larval catch rates collected using two different types of bongo nets, fished three ways, by first standardizing catch rates by gear/fishing-style and then employing a delta-lognormal modeling approach, including following covariates: average water temperature between the surface and the mixed layer depth, average salinity between the surface and the mixed layer depth, time of day, a systematic geographic area variable, month and year. Also, a separate model (HLI) was developed using a spawning habitat quality variable (HQ) to determine if the inclusion of such information reduces the variance in the index values. The delta-lognormal model that included the HQ showed lower coefficients of variation (CVs) along the six years of data, as compared to the standard model (SLI) with no HQ. The fact that the highest improvement of HLI against SLI was associated to one of the years where the effect of temperature was the strongest (2003) may suggest that the HQ improves the capability of the larval index model to account for interannual effects on the sampling distribution due to differences is the spawning habitat locations; and new advances towards the capability of modeling the spawning habitats will be relevant for future improvements of the ABT stock assessments when including fishery independent larval indices. The author recommends the use of the HLI in the stock assessment.

The Group expressed concern in standardizing the LI with the HQ. The author explained how the LI is an index of the spawning stock biomass (SSB), and how the environment/habitat quality can affect larval numbers even after standardizing for gear-type and fishing style, inhibiting correct indexing of the SSB from larval abundance. Therefore, the author explained that the inclusion of the HQ allows for standardization of larval numbers in the face of interannual differences in spawning locations and larval habitat. The Group also mentioned the existence of bluefin tuna spawning in areas adjacent to that of the sampling area and questioned if there may be an issue with estimating SSB. The author explained how the LI was indexing the SSB – not directly estimating SSB; and that as long as sampling is standardized similarly between years, the index would still be appropriate. The Group recommended running a sensitivity incorporating this index as an index of SSB in the 2015 assessment.

Document SCRS/2014/060 presented relative abundance indices of bluefin tuna (*Thunnus thynnus*) caught by the Moroccan and Spanish traps in the area close to the Strait of Gibraltar estimated for the period 1981- 2013. Standardized CPUEs were estimated through a General Linear Modeling (GLM) approach under a negative binomial error distribution assumption. The Group discussed that the high CPUE value estimated for 2013 might be due to large catches of the 2003 strong year class. It was pointed out that the information on the number of bluefin tuna released from the traps is self-reported information by trap operators.

The Group also acknowledges the potential use of four other abundance indices for EBFT in the future assessments. A standardized CPUE based on Italian traps has been developed from 1993 to 2010 and represents individuals from age 4 to 10+ (Addis *et al*. 2012). Portuguese catch rates from traps for the period 1998 to 2013 was presented to the group (SCRS/14/046) and these could be used in the future.

A fisheries independent abundance index is derived from aerial surveys in the Gulf of Lions from 2000-2003 and 2009-2013 and represents juvenile bluefin tuna. This aerial survey index will be presented during the next BFT Working Group meeting in September 2014. Catch rates from the Spanish purse seiner fishery in the Balearic grounds are also available from 2000 (SCRS/2013/187) and can be investigated for future consideration.

Document SCRS/2014/045 provided abundance indices of bluefin tuna from the Japanese longline fishery in the West and Northeast Atlantic through 2014 fishing year. A Fishing Year (FY) starts on August 1st and ends on July 31st of the following calendar year. The indices were standardized using delta-lognormal models with random effect. West Atlantic index fluctuated significantly since 2007FY, showing considerably high values since 2012FY. These high indices might be related to the 2003 and the following year classes and they also may be influenced by a recent tendency of the fleet to target more bigeye tuna. Abundance index in the Northeast Atlantic showed a steep increasing trend since 2009FY, and the size of bluefin tuna caught showed a continued contribution of the 2003 strong year class. The document also provided the indices in the West and Northeast Atlantic split into two periods at the 2010FY due to very rapid changes observed in the fishing patterns of the fleet. The indices in the recent years showed an increasing trend. It is believed that the 2003 strong year class started to migrate into the spawning grounds, and it would be beneficial to monitor other fisheries targeting large spawners both in the Western and Eastern stocks.

The Group recalled that the previous recommendation to explore estimating a split CPUE series was because the number of areas and months fished has fluctuated in the West Atlantic and has concentrated in the Northeast Atlantic since 2009 due to the implementation of vessel IQs and strong/good year classes. However, the Group discussed that there is an overlap of the areas and months fished throughout the time period covered by the series and, therefore, the standardization model should be able to handle a reduction in the number of observations.

It was explained that after the adoption of vessel IQ, in conjunction with increased CPUE due to strong 2003 year class, the fishing season became more widespread temporally which resulted in a substantial reduction in the number of sets deployed in the traditional fishing area and season in the West Atlantic. It was also explained that the combination of the substantially high CPUE due to interactions with the strong 2003 year class, reductions in TAC, and the adoption of vessel IQ resulted in a reductions in the number of sets in the Northeast Atlantic.

The Group discussed that estimating a split series would result in a loss of data in both areas. It was suggested that if the time*area interactions are not large, then there is no need to split the CPUE series. The Group found that the estimated variances of the random effects were small in comparison to the total residual variance in both the Western and the northeast Atlantic indices. Therefore, the Group agreed that the changes in operation experience by the fleet can be captured by the month and area effects. Furthermore, an examination of the CPUE data in the northeast Atlantic suggested that the trends were very similar across the subareas and therefore the trends for the standardized index would not be sensitive to the contraction of the fishery (reduction in fishing areas). The Group concluded that splitting the CPUE series was not warranted and it recommended using the continuous series for the base case (as it was done in the 2012 assessment).

Document SCRS/2014/039 presented the catch-pre-unit effort of Atlantic bluefin tuna from the Canadian rod and reel, tended line, and harpoon fisheries standardized for two geographically distinct areas: south west Nova Scotia (SWNS) and the southern Gulf of St. Lawrence (GSL). Nominal and standardized series from the two areas suggest an increasing trend in abundance in the southern Gulf of St. Lawrence while the trend for southwest Nova Scotia is a decline that appears to be linked to the fact that the scope of the data has not changed in accordance with the redistribution of the fishing effort. Another consideration is that the size composition of the catch has shifted towards larger individuals over the past 5 years.

The Group discussed the implications of the hypothesis that the decline in the SWNS index was due to fish movement and not to decreases in fish abundance. There was concern that the SWNS and the GSL indexes showed divergent trends and the potential effect that this might have in the VPA. The Group also discussed the use of different index weighting which is one approach that could be used to deal with conflicting signals in these indexes; however, there was a general agreement on the difficulties of choosing the proper weighting scheme.

The Group pointed out that historically the GSL index has been used as a 13+ age index and it discussed if the presence of fish < 272 kg will require to either change the age class represented by the index or if the index will have to be re-estimated excluding these smaller fish. After further examination of the SWNS data, the Group agreed to include the newly available age composition from this fishery in the partial catches in the VPA to estimate selectivities, and that the SWNS index will be considered an index for ages 5-16+. A similar decision was made for the GSL with respect to the available age composition and the index will apply to ages 8 and older. The Group discussed how these changes in the size composition of the catch can affect the selectivity of the fishery and the difficulties that this can create for the VPA. It was pointed out that in the 2012 assessment the estimate for year 2010 for the GSL index was not included in the base model, but it was included in one of the sensitivity runs. Despite the fact that the inclusion of the 2010 estimate did not have a significant effect on the results of the stock assessment, the Group agreed to maintain the decision made for the 2012 assessment and not to include the 2010 estimate in the base model of the upcoming assessment.

In document SCRS/2014/055, individual trip rod and reel/handline bluefin tuna catch and effort data, collected through interviews with fishermen, were used to estimate standardized catch indices considering factors such as year, month, area fished, boat type, fishing method, fishery open/closed status, bag limits. Data were filtered to exclude samples during fishery closures; filter criteria remained unchanged from the previous update, conducted in 2012. Generalized linear mixed models (GLMM) were developed for three size categories of bluefin tuna (small school = 66 to 114 cm, large school = 115 to 144 cm, and large> 177 cm), applying a negative binomial regression of the number of bluefin caught using a log link function and fishing effort modeled as an intercept offset. The document presented three indices of abundance, updated for the period 1993 to 2013. The updated GLMM produced similar least square means as the previous delta-Poisson, assuming the same set of covariates as the binomial component of the previous analysis. The updated GLMM demonstrated better goodness-of-fit to the catch data by modeling overdispersion (small school and large school bluefin) resulting from infrequent high catches, as well as underdispersion of large bluefin resulting from data comprised primarily of zeros and ones.

The Group pointed out that the estimated standardized CPUE values in the last part of the time series for BFT in the 115-144 cm FL were all higher than the observed nominal values and it inquired of the reason for this particular trend. The author indicated that this was due to the area effect in the standardization procedure. In other words, it was the result of changes in the area from where most of the samples were taken. The document indicated that the standardization was conducted using a different error assumption from the delta-Poisson assumption used in previous development of these indexes. The Group agreed that using a negative binomial error distribution assumption was an improvement over the error distributions previously used.

Document SCRS/2014/057 presented fishery independent indices of spawning stock biomass of western bluefin tuna estimated from ichthyoplankton survey data collected from 1977 through 2013 in the Gulf of Mexico. Indices were developed using standardized data from which previous indices were developed (i.e. abundance of larvae with a first daily otolith increment formed under 100 $m^2$ sea surface sampled with bongo gear). Due to the large frequency of zero catches during ichthyoplankton surveys, indices of larval abundance were developed using zero-inflated delta-lognormal models, including following covariates: time of day, time of month, area sampled and year.

The Group inquired if during the development of these indices, special consideration was given to the Deep Water Horizon (DWH) oil spill event that occurred on the Gulf of Mexico in 2010. The author explained that the model was able to standardize for the missing data (i.e., areas and months that were not sampled due to DWH) and, therefore, it was not necessary to give any special consideration to this event. The author was also asked if there has been any attempt to link the larval abundance estimated in different years with either observed annual recruitments or the age structure of the population. The Group indicated that this index has only been used as an index of spawning stock biomass and no attempts to link the larval abundance with the age structure of the population have been made.

The author indicated that the standardization was conducted assuming a zero inflated binomial error distribution. The Group indicated that it could be useful to explore using alternative error distributions in the future.
In document SCRS/2014/056, fishery independent indices based upon larval surveys have been used to estimate spawning biomass of bluefin tuna in the western North Atlantic since the late 1970s. Using recent advances in habitat modeling and sampling gears the document proposes to improve the existing indices by:

1) Modifying the existing sampling grid used in the Gulf of Mexico to incorporate a model-assisted sampling scheme based upon habitat models.
2) Expanding depth-stratified sampling to define the vertical distribution of bluefin tuna larvae. The efficiency of current sampling gears can then be estimated.
3) Incorporating annual age and mortality estimates for larvae collected in different regions within the Gulf of Mexico.

In addition the document proposes the development of several new indices:

1) An index of larval prey, feeding success and growth to be used in next-generation stock assessments as an environmental driver of recruitment.
2) Development of a bluefin tuna egg sampling effort as part of the standard spring plankton survey, which will lead to a more direct index of SSB.
3) Exploratory sampling efforts in the Caribbean and western North Atlantic to determine the significance and geographic extent of alternative spawning grounds. The inclusion of alternative spawning grounds in the development of indices may better reflect abundance trends.

Document SCRS/2014/058 presented an updated index of abundance of bluefin tuna constructed from logbook reports from the U.S. pelagic longline fishery in the U.S. Gulf of Mexico for the period 1987-2013. The index is an update of the index used in the 2012 assessment which was subsequently updated in 2013. The index was constructed using vessel as a repeated measure to account for the variance in catch rates within vessels, and was standardized using two stage Generalized Linear Mixed Models with separate binomial and a lognormal models. In 2011, U.S. longline vessels operating in the Gulf of Mexico were required to only use a ‘weak hook’ that bends under the pressure that can be exerted by large bluefin tuna as a means of reducing bluefin tuna bycatch. Extensive fishing experiments determined that these hooks result in a 46% (23-62%CI) average reduction in the catch rates of bluefin tuna. Consequently, indices for 2011, 2012, and 2013 were adjusted upwards by a factor of 1.108, 1.54, and 1.54, respectively, to account for the expected reduction in CPUE. Adjusted index values for 2012 were among the highest three in the time series and appear to indicate an increasing CPUE trend in recent years. However, the index showed a decline in the 2013. Due to management regulations adopted in 1991, which the model cannot account for, an alternative index that splits the series in 1992 was presented.

The Group discussed if for the base case run the ‘continuous’ index should be used instead of the newly developed ‘split’ series that takes into consideration important management regulations that occurred in 1991. There was a general agreement that although the 2012 assessment used a continuous time series, the split series presented in the document takes management regulations into consideration better, and, therefore, the Group recommended that this split series be used in the base case.

The Group inquired if the mandatory adoption of the ‘weak hooks’ had resulted in changes in selectivity. The Group agreed that if such changes have occurred, then it might be necessary to further split this CPUE series at the time when the use of the weak hook was adopted in 2011. It was indicated to the Group that during the experiments conducted to assess the effectiveness of the weak hooks, a significant difference in the size of fish being caught by the weak hook and the control hook was detected (Wilcoxon rank test, W=2407.5, p=0.041, one sided test). The Group acknowledged the possibility that the index might underestimate the abundance of larger fish after the adoption of the weak hooks. However, given that the difference was marginal and that splitting the series would result in loss of information and a very short time series (2011, 2012, and 2013), the Group agreed not to split the series at the point where the use of weak hooks was adopted.

It was also discussed that in the 2012 assessment, the year 2011 estimate was excluded because during that year the fleet operated in a very abnormal pattern as a result of the DWH event. However, the Group recommended including the 2011 year in the upcoming assessment since the variance of the year and zone effect was small compared to the residual variance.

The updated indices to be used in the 2014 assessment are included in **Table 8** and **Figure 9**. The Group noted the recommendation of the Working Group on Stock Assessment Methods (WGSAM) of a table to evaluate the sufficiency of bluefin tuna CPUE series with regard to its use in the assessment. However, considering that the 2014 assessment will be an update of the assessment conducted in 2012 and that the indices used were those defined in 2012, the Group decided not to establish any score of the elements of the table. Therefore, **Table 9** only describes the information provided with each of the different indices regarding the elements defined by the WGSAM as reference for future bench mark assessment.

## 8. Definition of data inputs and specifications for the 2014 update assessment and advice framework

### *8.1 Eastern Atlantic and Mediterranean stock*

*VPA specifications*

For the update assessment, the Group plans to run the same model, i.e. ADAPT VPA (as implemented in VPA-2box), with similar technical specifications as in 2012. Run 2 from the 2012 assessment, which was used as the basis for the 2012 scientific advice, will be updated and used to consider different sensitivity scenarios. This run includes the following CPUE indices: Spanish-Moroccan trap, Japanese longline in the East Atlantic and Mediterranean, Norwegian purse seine, Japanese longline in the North East Atlantic and Spanish baitboat (split in 3 periods as in the 2012 assessment).

The agreed set of runs is specified in **Table 10**. All runs consider catch-at-age data for the 1950-2013 years. A 3-year constraint on vulnerability (sd=0.5, see SCRS/2008/089 for details) and a 2 year constraint on recruitment (sd=0.5) will be applied (for details see the VPA2-box manual available at the ICCAT software catalog). All CPUE indices will be equally weighted and terminal year Fs will be estimated for ages 1 to 9. The F-ratios will be fixed as in 2012, i.e. equal to 0.7 over 1950-1969, equal to 1 over 1970-1984, equal to 0.6 over 1985-1994 and equal to 1.2 from 1995 onwards. The natural mortality vector remains the same as the one used for the East stock since 1998, i.e., an age specific but time invariant vector (0.490, 0.240, 0.240, 0.240, 0.240, 0.200, 0.175, 0.150, 0.120, 0.100 for ages 1 to 10, respectively).

A suite of different specifications will be investigated to test the sensitivity of the VPA to different technical assumptions and the choice of the CPUE series. Run 1 will be used to assess the impact in historical changes to the data, while Run 2 will assess the effect of the information contained in the last two years of data. Following discussions on the standardized CPUE series (see section 7), Runs 3, 4 and 5 will inspect the effects of splitting the Japanese longline in the East Atlantic and Mediterranean index, leaving out the last 2 years of the Spanish baitboat index, and leaving out the last year of the Spanish-Moroccan trap index, respectively. Additional sensitivity runs (e.g. on F-ratios or on the constraints on vulnerability of recent years, as well as retrospective analyses and jackknife analysis on CPUEs (drop one index at a time)) can be considered at a future stage of the analysis.

For continuity purposes, all the scenarios of the “update” assessment will use both the reported and inflated catch scenario. The inflated catch scenario uses an inflated CAA in the same way as done in the 2008, 2010, and 2012 assessments (i.e., catch raised to 50,000 tons from 1998 to 2006 and to 61,000 t in 2007; no inflated catch from 2008 to 2013).

Run 6 represents the preliminary benchmark assessment. In this run, the group decided to include the new bits of information that become available and were subject to scrutiny and acceptance by the group. Other pieces of information (e.g. SCRS/2014/042) require additional verification and, additionally, a new catch at age from the statistics cannot be created in the available time for the 2014 assessment (see sections 3 and 4). Additional ideas for the 2015 and/or later assessments include expansion of the plus group to 16+ and examining the F-ratio=1 assumption.

*Projection specifications*

The Group felt important to base the specifications of the projections on the output of the VPA. For this reason, the group ended up agreeing some preliminary specifications, but opened the possibility to further refine these (e.g. through webinar meetings) at a later stage of the analysis once the VPA outputs are circulated.

When projecting, it is necessary to specify biological parameters, selectivity pattern (including any modifications due to management measures that may be implemented), recruitment, and any modifications that may be made to circumvent the poorly estimated numbers-at-age for recent year classes from the VPA. Since for the most recent year-classes in VPA numbers-at-age are poorly estimated, especially for the younger ages, the first three ages in the initial population vector (i.e. for 2011, 2012, and 2013) will be replaced with a random value from the stochastic recruitment specifications. These values will then be projected forward in time accounting for the observed catches and the assumed natural mortality at age. This results in changes to both the number at age in 2014 (i.e. the first projection year) and the fishing mortality-at age for the replaced three year-classes.

Projections will be carried out on the base case with reported and inflated catches. In principle, 3 constant recruitment scenarios (as in 2012) will be considered (low, medium and high geometric mean levels, corresponding to the periods 1970-1980, 1955-2006 and 1990-2000 years, respectively), but this will depend on the new VPA recruitment estimates. Similarly, the group agreed to project the recent selectivity as estimated by the VPA. The "recent" selectivity will be estimated as the geometric mean of the 2011-2013 fishing mortality and will be calculated independently for each bootstrap within Pro2Box. However, given the recent changes (market driven changes in selectivity or quota transfers between fleets with different selectivity), this decision might be revisited after the VPA is fitted.

Biological parameters will be based upon the historical VPA values, i.e. natural mortality and proportion mature at-age vary by age but are time invariant, while weights-at-age in the projections are derived from the average weights-at-age for ages 1 to 9 and the growth curve for the plus group (which allows changes in the mean of weight of the plus-group according to changes in the age composition due to the rebuilding/decline of the SSB).

The 6 projection scenarios therefore comprise: (i) the VPA Run 2 using two assumed historical catch levels (reported and inflated scenarios); and (ii) three recruitment levels. These will be projected with quotas ranging from 0-30000 t to create the Kobe matrix.

### *8.2 Western Atlantic stock*

The Group agreed to use the same data series and parameter specifications as used for the 2012 VPA assessment of western Atlantic bluefin tuna except for minor changes relating to the indices of abundance and corresponding partial catch-at-age as described in section 7. The specifications for the projections were also retained with the following exceptions:

- Use the 2012 Parrack and Phares, Sept weight-length relationship.
- Use geometric mean selectivity from 2010-2012.
- Compute 'low' recruitment scenario with the two line relationship where the spawning biomass at the hinge point is set equal to the lowest average of any 6 consecutive years in the series (probably during 1990-1995) and the asymptotic recruitment is the geometric mean from 1976-2010.
- Compute the 'high' recruitment scenario with the Beverton and Holt curve fitted to recruitment estimates from 1971-2010 and corresponding spawning biomass estimates from 1970-2009.
- Recruitment parameters, autocorrelations and standard deviations for the projections will be re-estimated using the methods employed in the last assessment.

The Group discussed the model sensitivities that will be run for the VPA assessment of western bluefin. The following model sensitivities were agreed upon: (1) a sensitivity of the estimated selectivity of the plus group based on results from an integrated catch-at-size model to be evaluated by changing the F-ratio parameter of the plus group to age 15, (2) alternative maturity schedules to match the estimated early maturity-at-age of the eastern stock as well as a sensitivity of late maturity-at-age of 15 and 16+ aged fish under the assumption that only the largest fish spawn in the Gulf of Mexico, (3) an index jackknife sensitivity where each CPUE index is iteratively removed from the VPA to assess the effect on model estimates, (4) alternative natural mortality vector, using the estimated mortality-at-age of the eastern stock opposed to constant natural mortality of 0.14, (5) alternative partial catch-at-age of the U.S. Gulf of Mexico larval index fixed at the maturity schedule, and (6) a retrospective analysis to evaluate the effects of removing recent years data.

## 9. Identification of the evaluation team and definition of the revision procedure

The Group agreed with the work plan and priorities presented at the beginning of the meeting. Two evaluation teams were established to implement the stock assessments; one for the western stock and another for the eastern stock. The western team will conduct a preliminary update of the 2012 assessment for the western Atlantic stock (using data through 2013). The eastern team will conduct a preliminary update of the 2012 assessment of the east Atlantic and Mediterranean stock (using data through 2013) as well as a 'pilot' assessment using the new information identified in sections 2-7 above. Each team was charged with producing an SCRS document detailing the methods and results with the same format as the detailed reports from previous assessments. Draft documents will be circulated to all members of the working group by late August and revised drafts will be presented to the special session of the bluefin tuna species group in September.

The Group recommended that the two teams provide progress reports via two webinars (one to be held at the end of July and one sometime in August). The July webinar will focus on the progress of the update assessments and will be held only if one of the assessment teams identifies a matter that requires the attention of the entire Group (e.g., an unexpected change in the pattern of selection pattern or recruitment). The August webinar will focus on the pilot assessment of the eastern stock, where it is expected that a number of issues will arise in connection with structural changes to the VPA to accommodate the new data and possible revisions to the specifications of the projections. The suggestions of the Group will then be incorporated to the extent possible and documented in the revised detailed reports that will be submitted to the Bluefin Tuna Species Group meeting in September.

The western evaluation team will consist of the western bluefin rapporteur (C. Porch) and three volunteers (A. Kimoto, Japan; A. Hanke, Canada; and M. Lauretta, U.S.A). The eastern evaluation team will consist of the eastern bluefin rapporteur (S. Bonhommeau) and six volunteers (L. Kell, ICCAT Secretariat, H. Arrizabalaga, Spain; A. Kimoto, Japan; J. Walter, U.S.A., J. Ortiz de Urbina, Spain, R. Zarrad, Tunisia, N. Abid, Morocco).

## 10. Develop a web app from the R-VPA2-BOX interface

A presentation was given on tools for intersessional collaboration, including a variety of cloud computing tools for data analysis. The Secretariat has made available all the stock assessment files used to provide stock assessment as part of the Kobe advice framework (http://rscloud.iccat.int/kobe) which can be used with various R packages (e.g. http://cran.r-project.org/web/packages/kobe/index.html ) to fully document the assessments and K2SMs used in the Executive Summaries (e.g. SCRS/2013/180, SCRS/2013/56). The cloud computing system (http://rscloud.iccat.int/rstudio) can also be used to run assessment software in a fast and efficient way, using parallel computing and for interactive analysis (http://rscloud.iccat.int:3838/mse-datapoor).

The benefits of using the cloud for intersessional work include reducing the number and length of meetings, thereby saving money and increasing productivity. The group agreed that it was essential that the cloud infrastructure is adequately funded and that the update and benchmark assessments would be conducted using the cloud.

## 11. Responses to the Commission

The response to the Commission on the development of updated growth tables will be prepared intersessionaly and will be submitted in September to the Bluefin Species Group for approval.

## 12. Recommendations

- The Group recommended the creation of a group of experts (to be established by the Group rapporteurs, the Secretariat and the GBYP coordinator during the September species group meeting) to review and fully validate the trade data compiled and presented in document SCRS-14-042 for use in the 2015 stock assessment. The Group acknowledged the important work of preliminary validation carried out by the external expert contracted by GBYP.
- The Group recognized that there was still some uncertainty related to the most appropriate weight-length relationship to employ for the eastern and western stocks of Atlantic bluefin tuna. Accordingly, the Group recommended the following modification to the 2014 workplan:

  - The update assessments for the eastern and western stocks will employ the weight length relationships used in 2012.
  - Work will continue to refine the length-weight relationships until the proposed webinar in July
  - The Group will determine the most appropriate weight length relationships for the preliminary benchmark at the July webinar.
  - A final determination of the most appropriate weight-length relationships will be made during the September species group meeting in order to meet SCRS obligations to respond to the Commission request.

- Given the substantial number of tags that have been deployed on Atlantic bluefin tuna, much of which has not been made available through ICCAT, the Group recommended that all electronic tagging data be submitted to ICCAT in the format approved by the Ad Hoc SCRS working group on tagging to be made available for analyses by April, 2015. In this regard, the Group supports the previous recommendation from the 2013 Bluefin Meeting on Biological Parameters Review (Tenerife).

- To help inform the process, the Group recommended that once the modeling requirements for the 2015 assessment are established, that a call for electronic and conventional tagging data be issued to all parties conducting such research on Atlantic bluefin tuna. In the case of electronic tagging, and to avoid concerns that sharing such data might compromise publication possibilities, the Call should identify that the data requested include:
  - the date, location, and size of all tagged fish released during the study.
  - the date, location, and size (or age) of all recovered fish during the study.
  - where applicable, the duration of time spent within a X by X degree square.
  - where applicable, the stock of origin as deduced by genetics or otolith microchemistry.

- Given the problems identified in the availability and quality of fishery dependent indicators, the Group recommended to continue efforts to improve current fishery dependent abundance indices (including data collection and analyses) and also to continue developing fishery independent indices of abundance for both juveniles and adults, including aerial surveys, acoustic methods, genetic methods, larval surveys, electronic tagging, etc. The Group emphasized that both fishery dependent and fishery independent indices would benefit greatly from increased multinational collaborations.

- Considering the amount of work on BFT planned for the immediate future, the Group recommended that the Commission provides the Secretariat with sufficient resources both in personnel and time to continue the support for the scientific activities of the SCRS Bluefin Tuna Working Group and the GBYP research program.

- The Group recommends securing funding for the Atlantic-wide research programme (ICCAT/GBYP), which is currently suffering a serious funding problem preventing almost all field activities and is therefore unable to fulfill the objectives set by the SCRS and the Commission.

## 13. Other matters

An example of an MSE for BFT-E using the SBT HCRs was presented (SCRS2013/36) using the last assessment (based on VPA2Box) as the Operating Model (OM). This is part of the ongoing efforts being conducted under the GBYP modeling programme (see the Report of the 2013 Bluefin Meeting on Biological Parameters Review, held in Tenerife, Spain and the Report of the 2013 Meeting on Bluefin Stock Assessment Methods, held in Gloucester, U.S.). MSE has a number of benefits i.e. it i) allows a fuller consideration of uncertainty as required by the Precautionary Approach; ii) helps provide stability if management objectives and how to evaluate how well alternative management strategies meet them are agreed through a dialogue between scientists and stakeholders; and iii) can be used to guide the scientific process by identifying where the reduction of scientific uncertainties improve management and so can help to ensure that expenditure is prioritised to provide the best research, monitoring and enforcement.

To conduct an MSE requires a number of steps, ideally conducted within an iterative and participatory framework i.e.

- Identification of management objectives and mapping these to performance measures in order to quantify how well they have been achieved.
- Selection of hypotheses about system dynamics.
- Conditioning of OMs on data and knowledge and possible rejecting and weighting the different hypotheses.
- Identifying candidate management strategies and coding these up as MPs, i.e. the combination of pre-defined data, together with an algorithm to which such data are input to set control measures).
- Projecting the OMs forward using the MPs as feedback control procedures; and
- Agreeing the MPs that best meet management objectives.

Work on MSE will be conducted under the GBYP.

The Group noted that there were at least three parallel efforts to develop statistical catch-at-size models. The Secretariat will collaborate with these efforts.

## 14. Adoption of the report and closure

The report was adopted during the meeting.

The Chairman thanked the Secretariat and participants for their hard work.

The meeting was adjourned.

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**Table 1.** Task-I nominal catches estimates (t) for BFT by stock, region, flag and year (1980-2012).

| Stock | Region | Status | Flag | 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 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ATE | ATE | CP | Cape Verde | | | | 10 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | China PR | | | | | | | | | | | | | | | | | | | 85 | 103 | 80 | 68 | 39 | 19 | 41 | 24 | 42 | 72 | 119 | 42 | 38 | 36 | 36 |
| | | | EU.Denmark | 2 | 1 | 0 | 0 | 0 | 37 | 0 | 0 | 1 | | 0 | 0 | | 37 | | 0 | 0 | | 1 | | | | | | | | | | | | | | |
| | | | EU.España | 2480 | 2177 | 2857 | 4587 | 4804 | 3628 | 2876 | 2479 | 4567 | 3565 | 3557 | 2272 | 2319 | 5078 | 3137 | 3819 | 6174 | 6201 | 3800 | 3360 | 3474 | 3633 | 4089 | 2138 | 2801 | 3102 | 2033 | 3276 | 2938 | 2409 | 1550 | 1483 | 1329 |
| | | | EU.France | 260 | 153 | 150 | 400 | 602 | 490 | 348 | 533 | 724 | 460 | 510 | 565 | 894 | 1099 | 336 | 725 | 563 | 269 | 613 | 588 | 542 | 629 | 755 | 648 | 561 | 818 | 1218 | 629 | 253 | 366 | 228 | 135 | 148 |
| | | | EU.Germany | | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | EU.Greece | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | EU.Ireland | | | | | | | | | | | | | | | | | | 14 | 21 | 52 | 22 | 8 | 15 | 3 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 4 | 10 |
| | | | EU.Portugal | 24 | 17 | 41 | 174 | 34 | 29 | 193 | 163 | 48 | 3 | 27 | 117 | 38 | 25 | 240 | 35 | 199 | 712 | 323 | 411 | 441 | 404 | 186 | 61 | 27 | 79 | 97 | 29 | 36 | 53 | 58 | 180 | 223 |
| | | | EU.Sweden | | 1 | | 1 | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | |
| | | | EU.United Kingdom | | | | | | | | | | | | | | | | 1 | 0 | 1 | 1 | 12 | 0 | | | 0 | | | 0 | | 0 | 1 | | | |
| | | | Guinée Rep. | | | | | | | | | | | | | | | 330 | | | | | | | | | | | | | | | | | | |
| | | | Iceland | | | | | | | | | | | | | | | | | | | 2 | 27 | | | 1 | | | | | | | | | 2 | 5 |
| | | | Japan | 880 | 515 | 2573 | 2609 | 1514 | 420 | 739 | 900 | 1169 | 838 | 1464 | 2981 | 3350 | 2484 | 2075 | 3971 | 3341 | 2905 | 3195 | 2690 | 2895 | 2425 | 2536 | 2695 | 2015 | 2598 | 1896 | 1612 | 2351 | 1904 | 1155 | 1089 | 1093 |
| | | | Korea Rep. | | | | 3 | | 77 | | | | | | | | | 4 | 205 | 92 | 203 | | | 6 | 1 | | 0 | 3 | | 1 | | | | | | |
| | | | Libya | | | | | | | | | | | | | 312 | | | | 576 | 477 | 511 | 450 | 487 | | | | | | 47 | | | | | | |
| | | | Maroc | 161 | 177 | 993 | 365 | 171 | 86 | 288 | 356 | 437 | 451 | 408 | 531 | 562 | 415 | 720 | 678 | 1035 | 2068 | 2341 | 1591 | 2228 | 2497 | 2565 | 1797 | 1961 | 2405 | 2196 | 2418 | 1947 | 1909 | 1348 | 1055 | 990 |
| | | | Norway | 282 | 161 | 50 | 1 | 243 | | 31 | | | | | | | | | | | | | 5 | | | | | | | | | 0 | | | | |
| | | | Panama | 117 | 48 | 12 | | 17 | 22 | 11 | 4 | | | | | | | 1 | 19 | 550 | 255 | | 13 | | | | | | | | | | | | | |
| | | | Sierra Leone | | | | | | | | | | | | | | | | | | | | | 93 | 118 | | | | | | | | | | | |
| | | | U.S.A. | | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | NCC | Chinese Taipei | 5 | 6 | 16 | 2 | 3 | 16 | 197 | 20 | | 109 | | | | 6 | 20 | 4 | 61 | 226 | 350 | 222 | 144 | 304 | 158 | | | 10 | 4 | | | | | | |
| | | NCO | Faroe Islands | | | | | | | | | | | | | | | | | | | 67 | 104 | 118 | | | | | | | | | | | | |
| | | | NEI (ETRO) | | | | | 6 | 3 | 4 | | 5 | 6 | 74 | 4 | | | | | | | | | | | | | | | | | | | | | |
| | | | NEI (Flag related) | | | | | | | | | | | | 85 | 144 | 223 | 68 | 189 | 71 | 208 | 66 | | | | | | | | | | | | | | |
| | | | Seychelles | | | | | | | | | | | | | | | | | | | | | | | 2 | | | | | | | | | | |
| | MED | CP | Albania | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 50 | | 0 | |
| | | | Algerie | 190 | 220 | 250 | 252 | 254 | 260 | 566 | 420 | 677 | 820 | 782 | 800 | 1104 | 1097 | 1560 | 156 | 156 | 157 | 1947 | 2142 | 2330 | 2012 | 1710 | 1586 | 1208 | 1530 | 1038 | 1511 | 1311 | | | | 69 |
| | | | China PR | | | | | | | | | | | | | | | 97 | 137 | 93 | 49 | | | | | | | | | | | | | | | |
| | | | Egypt | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 64 |
| | | | EU.Croatia | | | | | | | | | | | | 1418 | 1076 | 1058 | 1410 | 1220 | 1360 | 1105 | 906 | 970 | 930 | 903 | 977 | 1139 | 828 | 1017 | 1022 | 825 | 834 | 619 | 389 | 375 | 374 |
| | | | EU.Cyprus | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 14 | 10 | 10 | 10 | 10 | 21 | 31 | 61 | 85 | 91 | 79 | 105 | 149 | 110 | 1 | 132 | 2 | 3 | 10 | 18 |
| | | | EU.España | 133 | 354 | 989 | 812 | 2743 | 1460 | 701 | 1178 | 1428 | 1645 | 1822 | 1392 | 2165 | 2018 | 2741 | 4607 | 2588 | 2209 | 2000 | 2003 | 2772 | 2234 | 2215 | 2512 | 2353 | 2758 | 2689 | 2414 | 2465 | 1769 | 1056 | 942 | 1064 |
| | | | EU.France | 1701 | 2350 | 4878 | 3660 | 3600 | 5430 | 3490 | 4330 | 5780 | 4434 | 4713 | 4620 | 7376 | 6995 | 11843 | 9604 | 9171 | 8235 | 7122 | 6156 | 6794 | 6167 | 5832 | 5859 | 6471 | 8638 | 7663 | 10157 | 2670 | 3087 | 1754 | 805 | 791 |
| | | | EU.Greece | | | | | | 11 | 131 | 156 | 159 | 182 | 201 | 175 | 447 | 439 | 886 | 1004 | 874 | 1217 | 286 | 248 | 622 | 361 | 438 | 422 | 389 | 318 | 255 | 285 | 350 | 373 | 224 | 172 | 176 |
| | | | EU.Italy | 6272 | 6017 | 6658 | 5865 | 7140 | 7199 | 7576 | 4607 | 4201 | 4317 | 4110 | 3783 | 5005 | 5328 | 6882 | 7062 | 10006 | 9548 | 4059 | 3279 | 3845 | 4377 | 4628 | 4973 | 4686 | 4841 | 4695 | 4621 | 2234 | 2735 | 1053 | 1783 | 1788 |
| | | | EU.Malta | 24 | 32 | 40 | 31 | 21 | 21 | 41 | 36 | 24 | 29 | 81 | 105 | 80 | 251 | 572 | 587 | 399 | 393 | 407 | 447 | 376 | 219 | 240 | 255 | 264 | 346 | 263 | 334 | 296 | 263 | 136 | 142 | 137 |
| | | | EU.Portugal | | | | | | | | | | | | 278 | 320 | 183 | 428 | 446 | 274 | 37 | 54 | 76 | 61 | 64 | | 2 | | 0 | 11 | | | | | | |
| | | | Iceland | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 50 | | | | |
| | | | Japan | 119 | 100 | 961 | 677 | 1036 | 1006 | 341 | 280 | 258 | 127 | 172 | 85 | 123 | 793 | 536 | 813 | 765 | 185 | 361 | 381 | 136 | 152 | 390 | 316 | 638 | 378 | 556 | 466 | 80 | 18 | | | |
| | | | Korea Rep. | | | | | | | | | | | | | | | 684 | 458 | 591 | 410 | 66 | | | | | | 700 | 1145 | 26 | 276 | 335 | 102 | | | |
| | | | Libya | 398 | 271 | 310 | 270 | 274 | 300 | 300 | 300 | 300 | 84 | 328 | 370 | 425 | 635 | 1422 | 1540 | 812 | 552 | 820 | 745 | 1063 | 1941 | 638 | 752 | 1300 | 1091 | 1280 | 1358 | 1318 | 1082 | 645 | | 763 |
| | | | Maroc | | 2 | | 1 | 4 | 12 | 56 | 116 | 140 | 295 | 1149 | 925 | 205 | 79 | 1092 | 1035 | 586 | 535 | 687 | 636 | 695 | 511 | 421 | 760 | 819 | 92 | 190 | 641 | 531 | 369 | 205 | 182 | 223 |
| | | | Panama | | | | | | | | 72 | 67 | | 74 | 287 | 484 | 467 | 1499 | 1498 | 2850 | 236 | | | | | | | | | | | | | | | |
| | | | Syria | | | | | | | | | | | | | | | | | | | | | | | | | | | | 50 | 41 | | 34 | | |
| | | | Tunisie | 228 | 218 | 298 | 293 | 307 | 369 | 315 | 456 | 624 | 661 | 406 | 1366 | 1195 | 2132 | 2773 | 1897 | 2393 | 2200 | 1745 | 2352 | 2184 | 2493 | 2528 | 791 | 2376 | 3249 | 2545 | 2622 | 2679 | 1932 | 1042 | 852 | 1017 |
| | | | Turkey | 391 | 565 | 825 | 557 | 869 | 41 | 69 | 972 | 1343 | 1707 | 2059 | 2459 | 2817 | 3084 | 3466 | 4220 | 4616 | 5093 | 5899 | 1200 | 1070 | 2100 | 2300 | 3300 | 1075 | 990 | 806 | 918 | 879 | 665 | 409 | 528 | 536 |
| | | NCC | Chinese Taipei | | | | | | | | | | | | | | 328 | 709 | 494 | 411 | 278 | 106 | 27 | 169 | 329 | 508 | 445 | 51 | 267 | 5 | | | | | | |
| | | NCO | Israel | | | | | | | | | | | | | | | | | 14 | | | | | | | | | | | | | | | | |
| | | | NEI (combined) | | | | | | | | | | | | | | | 773 | 211 | | 101 | 1030 | 1995 | 109 | 571 | 508 | 610 | 709 | | | | | | | | |
| | | | NEI (Flag related) | | | | | | | | | | | | | | | 427 | 639 | 171 | 1066 | 825 | 140 | 17 | | | | | | | | | | | | |
| | | | NEI (MED) | | | 1 | | 19 | | 168 | 183 | 633 | 757 | 360 | 1799 | 1398 | | | | | | | | | | | | | | | | | | | | |
| | | | Serbia & Montenegro | | | | | | | | | | | | | | | | 2 | 4 | | | | 4 | | | | | | | | | | | | |
| | | | Yugoslavia Fed. | 573 | 376 | 486 | 1222 | 755 | 1084 | 796 | 648 | 1523 | 560 | 940 | | | | | | | | | | | | | | | | | | | | | | |
| **ATE Total** | | | | **14250** | **13774** | **22408** | **21802** | **24427** | **22010** | **19247** | **18220** | **24118** | **21061** | **23247** | **26429** | **31849** | **34268** | **46740** | **47286** | **50807** | **47155** | **39718** | **32456** | **33766** | **34605** | **33770** | **31163** | **31381** | **35845** | **30689** | **34516** | **23849** | **19751** | **11328** | **9774** | **10852** |
| ATW | ATW | CP | Brazil | 2 | 3 | 1 | 1 | | 1 | | 2 | | 2 | 1 | | | | 0 | 0 | | | | 13 | | | | | | | | | | | | | 1 |
| | | | Canada | 324 | 425 | 291 | 433 | 264 | 142 | 73 | 83 | 393 | 633 | 438 | 485 | 443 | 459 | 392 | 576 | 597 | 509 | 611 | 587 | 595 | 537 | 641 | 571 | 552 | 600 | 735 | 491 | 576 | 533 | 530 | 510 | 493 |
| | | | EU.Portugal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 0 | | | | |
| | | | EU.United Kingdom | | | | | | | | | | | | | | | | | | | | | | | 0 | | | | | | | | | | |
| | | | FR.St Pierre et Miquelon | | | | | | | | | | | | | | | | | | | | 1 | | | 3 | 1 | 10 | 5 | | 4 | 3 | 2 | 8 | 0 | |
| | | | Japan | 3936 | 3771 | 292 | 711 | 696 | 1092 | 584 | 960 | 1109 | 468 | 550 | 688 | 512 | 581 | 427 | 387 | 436 | 330 | 691 | 365 | 492 | 506 | 575 | 57 | 470 | 265 | 376 | 277 | 492 | 162 | 353 | 578 | 289 |
| | | | Korea Rep. | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 52 | | | | | | |
| | | | Mexico | 10 | 20 | 14 | | | | | | | | | | | | 4 | | 19 | 2 | 8 | 14 | 29 | 10 | 12 | 22 | 9 | 10 | 14 | 7 | 7 | 10 | 14 | 14 | 52 |
| | | | Panama | 9 | 14 | 12 | | | | | | | | | | | | | | | | | | | | | | | | 0 | | | | | | |
| | | | Trinidad and Tobago | | | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | U.S.A. | 1505 | 1530 | 807 | 1394 | 1320 | 1424 | 1656 | 1452 | 1391 | 1602 | 1751 | 1710 | 1296 | 1325 | 1246 | 1449 | 1456 | 1489 | 1345 | 1362 | 1388 | 1681 | 2014 | 1644 | 1066 | 848 | 615 | 858 | 922 | 1273 | 953 | 905 | 915 |
| | | | UK.Bermuda | | | | | | | | | | | | | | | | | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 0 | | | | | | 0 | | 0 | 0 |
| | | NCC | Chinese Taipei | 15 | 7 | 11 | 2 | | 3 | 3 | 4 | | 20 | | | | | | 4 | | 2 | | | | | | | | | | | | | | | |
| | | NCO | Argentina | | | | | | 6 | | 2 | | 1 | 2 | | | | | | | | | 0 | | | | | | | | | | | 19 | | |
| | | | Cuba | 1 | | | | | | | | | | | | | | | | | | | | | | 74 | 11 | 19 | 27 | 19 | | | | | | |
| | | | NEI (ETRO) | | | 14 | 1 | | | | | | 30 | 24 | 23 | 17 | | | | | | | | | | | | | | | | | | | | |
| | | | NEI (Flag related) | | | | | | | | | | | | | | | | | 2 | | | 429 | 270 | 49 | | | | | | | | | | | |
| | | | Sta. Lucia | | | | | | | | 1 | 3 | 2 | 14 | 14 | 14 | 2 | 43 | 9 | 3 | | | | | | | | | | | | | | | | |
| **ATW Total** | | | | **5802** | **5770** | **1442** | **2542** | **2280** | **2669** | **2316** | **2503** | **2896** | **2759** | **2780** | **2920** | **2282** | **2367** | **2113** | **2425** | **2514** | **2334** | **2657** | **2772** | **2775** | **2784** | **3319** | **2305** | **2125** | **1756** | **1811** | **1638** | **2000** | **1980** | **1876** | **2007** | **1750** |

**Table 2.** Bluefin tuna 2013 total catch (t) by stock, flag and gear, registered (as of 2014-05-08) on the BCD program. BFT-W is incomplete in its majority. CPCs with LL fleets are missing [Japan, USA, China (Rep.) etc.]).

| | | **2013** | | | | | | | | | | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Stock** | **FishFlag** | **HL** | **HP** | **LL** | **PS** | **RR** | **TL** | **TP** | **TR** | **TW** | **UN** | |
| **BFT-E** | Algerie | | | | 244 | | | | | | | 244 |
| | Egypt | | | | 77 | | | | | | | 77 |
| | EU.Croatia | 6 | | 2 | 342 | | | | | | | 350 |
| | EU.Cyprus | | | 16 | | | | | | | | 16 |
| | EU.España | | | | 1098 | | | 1320 | | | | 2418 |
| | EU.France | | | | 2036 | | | | | | | 2036 |
| | EU.Greece | 3 | | 13 | 91 | | | | | | | 107 |
| | EU.Italy | | | 195 | 1476 | | | 222 | | 0 | 1 | 1895 |
| | EU.Malta | | | 66 | 66 | | | | | | | 132 |
| | EU.Portugal | | | | 2 | | | 232 | | | | 234 |
| | Iceland | | | | | | | | | 4 | | 4 |
| | Korea Rep. | | | | 80 | | | | | | | 80 |
| | Libya | | | | 933 | | | | | | | 933 |
| | Maroc | | | 135 | 170 | | | 960 | | | | 1265 |
| | Tunisie | | | | 1057 | | | | | | | 1057 |
| | Turkey | | | | 545 | | | | | | 0 | 545 |
| **BFT-E Total** | | **9** | | **427** | **8218** | | | **2735** | | **4** | **1** | **11394** |
| **BFT-W** | Canada | 1 | 7 | 24 | | 29 | 0 | 0 | | | 3 | 65 |
| | Mexico | | | 18 | | | | | | | | 18 |
| | UK.Bermuda | | | | | 0 | | | 0 | | | 1 |
| **BFT-W Total** | | **1** | **7** | **42** | | **29** | **0** | **0** | **0** | | **3** | **84** |

**Table 3. BFT-E (Atlantic region)**: Catalogue on Task-I vs Task-II major fishery (flag/gear combinations ranked by order of its T1 importance) and year (1980 to 2012). [Task-II colour scheme has a concatenation of characters ("a"= T2CE exists; "b"= T2SZ exists; "c"= CAS exists) that represents the Task-II data availability in the ICCAT-DB].

| Stock | Status | FlagName | GearGrp | DSet | 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 | 2010 | 2011 | 2012 | Rank | % | %cum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ATE | CP | Japan | LL | t1 | 880 | 515 | 2573 | 2609 | 1514 | 420 | 739 | 900 | 1169 | 838 | 1464 | 2981 | 3350 | 2484 | 2075 | 3971 | 3341 | 2905 | 3195 | 2690 | 2895 | 2425 | 2536 | 2695 | 2015 | 2598 | 1896 | 1612 | 2351 | 1904 | 1155 | 1089 | 1093 | 1 | 27.2% | 27% |
| | | | | t2 | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | ac | 1 | | |
| ATE | CP | EU.España | BB | t1 | 1215 | 952 | 651 | 1419 | 1680 | 1621 | 1114 | 1230 | 1428 | 1664 | 1314 | 997 | 769 | 3281 | 1694 | 2386 | 4595 | 2940 | 2017 | 1217 | 1729 | 2168 | 2410 | 1239 | 1735 | 2012 | 1065 | 1903 | 1727 | 1197 | 641 | 562 | 197 | 2 | 21.4% | 49% |
| | | | | t2 | abc | abc | abc | abc | ac | abc | abc | abc | ac | ac | abc | abc | ac | ac | ac | ac | ac | ac | ac | ac | abc | ac | ac | ac | ac | abc | abc | abc | abc | abc | abc | abc | abc | 2 | | |
| ATE | CP | EU.España | TP | t1 | 700 | 787 | 1916 | 1862 | 2271 | 1630 | 891 | 939 | 2389 | 1174 | 1911 | 1040 | 1271 | 1244 | 1136 | 941 | 1207 | 2723 | 1525 | 2005 | 1416 | 1240 | 1548 | 750 | 862 | 880 | 820 | 1348 | 1194 | 1209 | 887 | 902 | 1106 | 3 | 17.8% | 66% |
| | | | | t2 | -1 | -1 | -1 | b | b | b | ac | -1 | c | c | ac | ac | ab | ab | ac | ab | ab | ab | ac | ac | ab | ac | ac | c | c | abc | b | a | abc | abc | abc | b | abc | 3 | | |
| ATE | CP | Maroc | TP | t1 | 6 | 72 | 393 | 94 | | | 166 | 101 | 235 | 304 | 323 | 482 | 94 | 387 | 494 | 210 | 699 | 1240 | 1615 | 852 | 1540 | 2330 | 1670 | 1305 | 1098 | 1518 | 1744 | 2417 | 1947 | 1909 | 1348 | 1055 | 990 | 4 | 11.6% | 78% |
| | | | | t2 | -1 | -1 | -1 | -1 | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | a | a | a | -1 | -1 | -1 | -1 | bc | abc | ab | abc | abc | abc | abc | 4 | | |
| ATE | CP | EU.España | TR | t1 | 526 | 362 | 159 | 1291 | 686 | 361 | 839 | 311 | 746 | 713 | 300 | 204 | 277 | 553 | 305 | 492 | 373 | 376 | 226 | 94 | 192 | 151 | 68 | 39 | 112 | 195 | 125 | 0 | 1 | | | | | 5 | 4.1% | 82% |
| | | | | t2 | -1 | -1 | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | c | bc | abc | abc | abc | | | | | 5 | | |
| ATE | CP | Maroc | PS | t1 | 155 | 105 | 600 | 187 | 127 | 86 | 122 | | | | 54 | 46 | 462 | 24 | 213 | 458 | 323 | 828 | 692 | 709 | 660 | 150 | 884 | 490 | 855 | 871 | 179 | | | | | | | 6 | 3.8% | 86% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | 6 | | |
| ATE | CP | EU.France | BB | t1 | 260 | 153 | 150 | 400 | 566 | 380 | 272 | 533 | 479 | 306 | 367 | 448 | 372 | 164 | 66 | 181 | 310 | 134 | 282 | 270 | 91 | 105 | 150 | 130 | 47 | | 50 | 128 | 67 | 62 | 83 | 74 | 85 | 7 | 2.9% | 89% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | -1 | a | a | a | a | a | a | 7 | | |
| ATE | CP | EU.France | TW | t1 | | | | | | | | | 100 | 22 | 101 | 70 | 441 | 436 | 224 | 400 | | 57 | 259 | 247 | 394 | 456 | 599 | 518 | 26 | | 731 | 501 | 180 | 295 | 122 | 28 | 36 | 8 | 2.5% | 91% |
| | | | | t2 | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | -1 | abc | abc | ab | ab | abc | abc | 8 | | |
| ATE | CP | Libya | LL | t1 | | | | | | | | | | | | | 312 | | | | 576 | 477 | 511 | 450 | | | | | | | 47 | | | | | | | 9 | 1.0% | 92% |
| | | | | t2 | | | | | | | | | | | | | -1 | | | | -1 | -1 | -1 | -1 | | | | | | | -1 | | | | | | | 9 | | |
| ATE | CP | EU.Portugal | LL | t1 | | | | | | | | | | | | 99 | 4 | 4 | 8 | | 97 | 246 | 18 | 404 | 398 | 383 | 160 | 33 | 1 | 63 | 71 | 6 | 12 | 5 | | | 8 | 10 | 0.8% | 93% |
| | | | | t2 | | | | | | | | | | | | a | a | -1 | a | | -1 | a | a | -1 | -1 | a | a | a | a | ab | a | a | a | a | a | | a | 10 | | |
| ATE | NCC | Chinese Taipei | LL | t1 | 5 | 6 | 16 | 2 | 3 | 16 | 197 | 20 | | 109 | | | | 6 | 20 | 4 | 61 | 226 | 350 | 222 | 144 | 304 | 158 | | | 10 | 4 | | | | | | | 11 | 0.8% | 94% |
| | | | | t2 | -1 | -1 | -1 | b | b | -1 | -1 | -1 | | -1 | | | | -1 | -1 | ab | ab | ab | ab | ab | ab | ab | ab | | | ab | ab | | | | | | | 11 | | |
| ATE | CP | EU.France | GN | t1 | | | | | | | | | 145 | 31 | 42 | 47 | 74 | 497 | 21 | 144 | 253 | 3 | 72 | 71 | 57 | 68 | 6 | | | | | | | | | | | 12 | 0.6% | 94% |
| | | | | t2 | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | | | 12 | | |
| ATE | CP | EU.France | UN | t1 | | | | | | | | | | 101 | | | | | 25 | | | 75 | | | | | | | 263 | 818 | 189 | | 5 | | 19 | | | 13 | 0.6% | 95% |
| | | | | t2 | | | | | | | | | | -1 | | | | | -1 | | | -1 | | | | | | | -1 | -1 | -1 | | -1 | | -1 | a | | 13 | | |
| ATE | CP | EU.Portugal | BB | t1 | 24 | 17 | 31 | 53 | 15 | 3 | 28 | 58 | 29 | 1 | 12 | | 0 | 2 | 219 | 34 | 80 | 447 | 252 | 5 | 2 | 2 | 7 | 1 | 8 | 6 | 0 | 1 | | | | | | 14 | 0.5% | 96% |
| | | | | t2 | ab | ab | ab | ab | ac | ab | ab | b | ab | ab | a | | a | ab | ab | ab | abc | abc | ab | ab | a | a | a | ab | abc | ab | a | a | | | a | | | 14 | | |
| ATE | CP | Panama | LL | t1 | 117 | 48 | 12 | | 17 | 22 | 11 | 4 | | | | | | | 1 | 19 | 550 | 255 | | 1 | | | | | | | | | | | | | | 15 | 0.4% | 96% |
| | | | | t2 | -1 | -1 | -1 | | -1 | -1 | -1 | -1 | | | | | | | -1 | -1 | -1 | -1 | a | a | | | | | | | | | | | | | | 15 | | |
| ATE | NCO | NEI (Flag related) | LL | t1 | | | | | | | | | | | | 85 | 144 | 223 | 68 | 189 | 71 | 208 | 66 | | | | | | | | | | | | | | | 16 | 0.4% | 96% |
| | | | | t2 | | | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | | | | | | | 16 | | |
| ATE | CP | EU.España | HL | t1 | 38 | 70 | 12 | | | | | | | | | | | | | | | 162 | 28 | 33 | 126 | 61 | 63 | 109 | 87 | 11 | 4 | 10 | 6 | 2 | 21 | 19 | 25 | 17 | 0.4% | 97% |
| | | | | t2 | -1 | -1 | -1 | | | | | | | | | | | | | | | ab | ac | ac | ab | ac | ac | c | c | abc | ab | abc | abc | abc | abc | b | abc | 17 | | |
| ATE | CP | China PR | LL | t1 | | | | | | | | | | | | | | | | | | | 85 | 103 | 80 | 68 | 39 | 19 | 41 | 24 | 42 | 72 | 119 | 42 | 38 | 36 | 36 | 18 | 0.3% | 97% |
| | | | | t2 | | | | | | | | | | | | | | | | | | | -1 | a | a | a | a | a | a | a | a | ab | a | a | a | ab | a | 18 | | |
| ATE | CP | EU.Portugal | TP | t1 | | | | | | | | | | | | | | | | 1 | 15 | 19 | 45 | 2 | 40 | 15 | 17 | 27 | 18 | 9 | 25 | 23 | 24 | 46 | 57 | 180 | 215 | 19 | 0.3% | 97% |
| | | | | t2 | | | | | | | | | | | | | | | | -1 | a | a | a | ab | ab | ab | ab | ab | b | b | b | b | b | b | ab | ab | b | 19 | | |
| ATE | CP | Norway | PS | t1 | 282 | 161 | 50 | 1 | 243 | | 31 | | | | | | | | | | | | | 5 | | | | | | | | | | | | | | 20 | 0.3% | 98% |
| | | | | t2 | ab | ab | -1 | ab | ab | | abc | | | | | | | | | | | | | -1 | | | | | | | | | | | | | | 20 | | |
| ATE | CP | Maroc | SU | t1 | | | | 84 | 44 | | | 255 | 202 | 147 | | | | | | | | | | | | | | | | | | | | | | | | 21 | 0.3% | 98% |
| | | | | t2 | a | | | -1 | -1 | | | -1 | -1 | -1 | | | | | | | | | | | | | | | | | | | | | | | | 21 | | |
| ATE | CP | Korea Rep. | LL | t1 | | | | 3 | | 77 | | | | | | | | | 4 | 205 | 92 | 203 | | | 6 | 1 | | 0 | 3 | | 1 | | | | | | | 22 | 0.2% | 98% |
| | | | | t2 | | | | ab | | -1 | | | | | | | | | -1 | -1 | a | a | | | a | a | | a | a | | -1 | | | | | | | 22 | | |
| ATE | CP | Libya | PS | t1 | | | | | | | | | | | | | | | | | | | | | 487 | | | | | | | | | | | | | 23 | 0.2% | 99% |
| | | | | t2 | | | | | | | | | | | | | | | | | | | | | -1 | | | | | | | | | | | | | 23 | | |
| ATE | CP | EU.France | PS | t1 | | | | | | | | | | | | | | | | | | | | | | | | | 223 | | 153 | | | | | | | 24 | 0.2% | 99% |
| | | | | t2 | | | | | | | | | | | | | | | | | | | | | | | | | -1 | | -1 | | | | | | | 24 | | |
| ATE | CP | EU.Portugal | SU | t1 | | | 10 | 47 | 16 | 25 | 41 | 102 | 18 | 0 | 14 | 18 | 34 | 19 | 12 | 0 | | | 8 | 0 | 1 | 3 | 3 | | | | | | 0 | 1 | 0 | 0 | | 25 | 0.2% | 99% |
| | | | | t2 | | | -1 | -1 | -1 | -1 | -1 | a | a | a | a | a | a | a | a | a | | | a | a | a | a | a | a | | a | | | a | a | a | a | | 25 | | |

**Table 4. BFT-E (MEDI region):** Catalogue on Task-I vs Task-II major fishery (flag/gear combinations ranked by order of its T1 importance) and year (1980 to 2012). [Task-II colour scheme has a concatenation of characters (“a”= T2CE exists; “b”= T2SZ exists; “c”= CAS exists) that represents the Task-II data availability in the ICCAT-DB].

| Stock | Status | FlagName | GearGrp | DSet | 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 | 2010 | 2011 | 2012 | Rank | % | %cum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MED | CP | EU.France | PS | t1 | 1701 | 2300 | 4818 | 3600 | 3570 | 5400 | 3460 | 4300 | 5750 | 4404 | 4663 | 4570 | 7346 | 6965 | 11803 | 9494 | 8547 | 7701 | 6800 | 5907 | 6780 | 6119 | 5810 | 5549 | 6339 | 8328 | 7438 | 9543 | 2536 | 2918 | 1546 | 678 | 678 | 1 | 26.2% | 26% |
| | | | | t2 | ac | abc | bc | c | bc | bc | c | c | c | abc | bc | bc | b | b | b | b | b | b | bc | c | c | c | c | b | b | c | bc | abc | ab | ab | ab | abc | abc | 1 | | |
| MED | CP | EU.Italy | PS | t1 | 6120 | 5704 | 6442 | 5552 | 5382 | 4522 | 4789 | 2579 | 2229 | 2345 | 2651 | 2652 | 3846 | 4162 | 4654 | 3613 | 7060 | 7068 | 3334 | 1859 | 2801 | 3256 | 3246 | 3849 | 3752 | 3961 | 4006 | 4311 | 1854 | 2339 | | 752 | 1374 | 2 | 18.1% | 44% |
| | | | | t2 | -1 | -1 | -1 | -1 | b | b | -1 | -1 | -1 | b | -1 | -1 | -1 | -1 | -1 | ac | -1 | -1 | -1 | -1 | b | -1 | -1 | b | b | b | b | a | ab | abc | | abc | -1 | 2 | | |
| MED | CP | Turkey | PS | t1 | | | | | | 41 | 69 | 972 | 1343 | 1707 | 2059 | 2459 | 2817 | 3084 | 3466 | 4219 | 4616 | 5093 | 5899 | 1200 | 1070 | 2100 | 2300 | 3300 | 1075 | 990 | 806 | 918 | 879 | 665 | 409 | 528 | 536 | 3 | 8.1% | 52% |
| | | | | t2 | | | | | | -1 | -1 | -1 | b | b | -1 | -1 | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | ab | a | a | a | ab | ab | 3 | | |
| MED | CP | Tunisie | PS | t1 | 147 | 97 | 108 | 110 | 102 | 127 | 109 | 148 | 153 | 94 | 114 | 1073 | 975 | 1997 | 2523 | 1617 | 2147 | 1992 | 1662 | 2263 | 2134 | 2432 | 2510 | 740 | 2266 | 3245 | 2542 | 2618 | 2679 | 1932 | 1042 | 852 | 1017 | 4 | 6.4% | 59% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | a | a | a | -1 | -1 | -1 | a | -1 | abc | abc | a | a | ab | abc | 4 | | |
| MED | CP | EU.España | PS | t1 | | 50 | 277 | | 79 | 45 | 110 | 170 | 160 | 300 | 635 | 807 | 1366 | 1431 | 1725 | 2896 | 1657 | 1172 | 1573 | 1504 | 1676 | 1453 | 1686 | 1886 | 1778 | 2242 | 2013 | 1649 | 1645 | 1167 | 804 | 877 | 1034 | 5 | 5.3% | 64% |
| | | | | t2 | | -1 | -1 | | -1 | -1 | a | -1 | -1 | -1 | a | a | a | a | ab | ab | a | a | ac | ac | a | a | a | -1 | -1 | a | a | bc | ab | a | a | -1 | -1 | 5 | | |
| MED | CP | EU.Croatia | PS | t1 | | | | | | | | | | | | 1418 | 1076 | 1058 | 1410 | 1220 | 1360 | 1088 | 889 | 921 | 930 | 890 | 975 | 1137 | 827 | 1017 | 1022 | 817 | 821 | 609 | 370 | 366 | 367 | 6 | 3.0% | 67% |
| | | | | t2 | | | | | | | | | | | | a | a | a | a | -1 | -1 | -1 | -1 | -1 | -1 | a | a | a | a | a | a | a | a | a | a | a | a | 6 | | |
| MED | CP | EU.Italy | LL | t1 | | | | 29 | 41 | 62 | 1 | 65 | 63 | 63 | 79 | 102 | 78 | 135 | 1018 | 2103 | 2100 | 1620 | 292 | 515 | 287 | 260 | 395 | 475 | 302 | 310 | 286 | 217 | 216 | 193 | 521 | 670 | 256 | 7 | 1.9% | 69% |
| | | | | t2 | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | a | a | b | a | -1 | -1 | -1 | a | -1 | ab | -1 | -1 | -1 | b | b | b | ab | abc | abc | abc | abc | abc | 7 | | |
| MED | CP | Japan | LL | t1 | 119 | 100 | 961 | 677 | 1036 | 1006 | 341 | 280 | 258 | 127 | 172 | 85 | 123 | 793 | 536 | 813 | 765 | 185 | 361 | 381 | 136 | 152 | 390 | 316 | 638 | 378 | 556 | 466 | 80 | 18 | | | | 8 | 1.8% | 71% |
| | | | | t2 | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | a | ab | a | a | a | ac | ac | ac | abc | ac | abc | ab | ac | | | | 8 | | |
| MED | CP | Algerie | UN | t1 | 190 | 220 | 250 | 252 | 254 | 260 | 566 | 420 | 677 | 820 | 782 | 800 | 1104 | 1097 | 1560 | 156 | 156 | 157 | 175 | 179 | 101 | 145 | 145 | 1586 | 58 | | | | | | | | | 9 | 1.8% | 73% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | 9 | | |
| MED | CP | Libya | PS | t1 | | | | | | | | | | | 129 | 177 | 300 | 568 | 470 | 495 | 598 | 32 | 230 | 195 | 16 | | 200 | 512 | 872 | 730 | 1140 | 1200 | 1267 | 1047 | 645 | | 763 | 10 | 1.7% | 74% |
| | | | | t2 | | | | | | | | | | | -1 | -1 | b | -1 | -1 | -1 | -1 | -1 | -1 | a | a | | -1 | -1 | -1 | -1 | -1 | a | -1 | -1 | -1 | | ab | 10 | | |
| MED | CP | EU.Italy | UN | t1 | | 48 | 37 | | 1250 | 2100 | 2338 | 1495 | 1452 | 1452 | | 27 | | | 50 | | | | | 156 | 0 | 4 | 2 | 3 | 13 | | 0 | | | | 90 | 130 | 25 | 11 | 1.6% | 76% |
| | | | | t2 | | -1 | -1 | | -1 | -1 | -1 | -1 | -1 | -1 | | -1 | | | -1 | b | b | | | -1 | -1 | b | -1 | b | -1 | b | -1 | | | | a | -1 | bc | 11 | | |
| MED | CP | EU.España | LL | t1 | 100 | 200 | 538 | 233 | 69 | 129 | 117 | 116 | 135 | 98 | 59 | 51 | 28 | 40 | 178 | 368 | 369 | 871 | 253 | 418 | 493 | 644 | 436 | 583 | 529 | 484 | 668 | 745 | 804 | 590 | 240 | 58 | 26 | 12 | 1.6% | 78% |
| | | | | t2 | -1 | -1 | -1 | b | b | -1 | ac | ab | ab | ac | abc | ab | ab | ab | ab | abc | ab | ab | ab | ac | ab | ac | ac | c | c | abc | abc | abc | abc | abc | abc | b | abc | 12 | | |
| MED | NCO | Yugoslavia Fed. | PS | t1 | 573 | 376 | 486 | 1222 | 755 | 1084 | 796 | 648 | 1523 | 560 | 940 | | | | | | | | | | | | | | | | | | | | | | | 13 | 1.3% | 79% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | | | | | | | | | | | | | | | 13 | | |
| MED | CP | Libya | LL | t1 | | | | | | | | | | | 173 | 164 | 60 | 67 | 802 | 865 | 80 | 448 | 409 | 450 | 1002 | 1867 | 331 | 170 | 393 | 318 | 140 | 158 | 51 | 34 | | | | 14 | 1.2% | 80% |
| | | | | t2 | | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | ac | a | a | -1 | -1 | -1 | -1 | -1 | a | b | b | | | | 14 | | |
| MED | CP | EU.Italy | TP | t1 | 152 | 209 | 155 | 284 | 327 | 295 | 293 | 310 | 301 | 301 | 279 | 263 | 364 | 199 | 182 | 241 | 297 | 154 | 419 | 308 | 353 | 427 | 364 | 145 | 119 | 69 | 125 | 93 | 149 | 144 | 281 | 165 | 125 | 15 | 1.2% | 81% |
| | | | | t2 | b | b | b | b | b | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | b | b | -1 | -1 | b | -1 | -1 | b | b | -1 | b | abc | a | a | a | abc | a | 15 | | |
| MED | CP | Algerie | PS | t1 | | | | | | | | | | | | | | | | | | | 900 | 1056 | 778 | 917 | 922 | | 753 | 623 | 850 | 650 | 84 | | | | 69 | 16 | 1.1% | 82% |
| | | | | t2 | | | | | | | | | | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | | -1 | -1 | -1 | -1 | -1 | | | | ab | 16 | | |
| MED | CP | Panama | LL | t1 | | | | | | | | 72 | 67 | | 74 | 287 | 484 | 467 | 1499 | 1498 | 2850 | 236 | | | | | | | | | | | | | | | | 17 | 1.1% | 83% |
| | | | | t2 | | | | | | | | -1 | -1 | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | | | | | | | | 17 | | |
| MED | CP | EU.Greece | HL | t1 | | | | | | 11 | 131 | 79 | 82 | 105 | 124 | 98 | 348 | 339 | 766 | 915 | 784 | 1127 | 279 | 233 | 597 | 341 | 394 | 245 | 73 | | 6 | 7 | 93 | 66 | 135 | 52 | 39 | 18 | 1.1% | 85% |
| | | | | t2 | | | | | | -1 | a | a | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | a | a | -1 | -1 | a | -1 | | -1 | -1 | a | a | a | a | a | 18 | | |
| MED | CP | EU.Italy | SP | t1 | | | | | 10 | 50 | 50 | 53 | 51 | 51 | 442 | 352 | 368 | 410 | 480 | 491 | 360 | 350 | 5 | 415 | 383 | 401 | 600 | 500 | 500 | 500 | 277 | | 17 | 58 | 161 | 66 | 8 | 19 | 1.1% | 86% |
| | | | | t2 | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | -1 | a | b | -1 | -1 | 19 | | |
| MED | NCO | NEI (combined) | UN | t1 | | | | | | | | | | | | | | | 773 | 211 | | 101 | 1030 | 1995 | 109 | 571 | 508 | 610 | 709 | | | | | | | | | 20 | 1.0% | 87% |
| | | | | t2 | | | | | | | | | | | | | | | -1 | -1 | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | 20 | | |
| MED | CP | EU.Malta | LL | t1 | 24 | 32 | 40 | 31 | 21 | 21 | 41 | 36 | 24 | 29 | 81 | 105 | 80 | 251 | 572 | 587 | 399 | 393 | 407 | 447 | 376 | 219 | 240 | 255 | 264 | 321 | 263 | 144 | 165 | 263 | 136 | 92 | 137 | 21 | 1.0% | 88% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | ac | ac | ac | -1 | -1 | -1 | abc | bc | ab | ab | ab | ab | ab | abc | 21 | | |
| MED | CP | Maroc | HL | t1 | | | | | | | | | | | | | | | 373 | 816 | 541 | 455 | 634 | 600 | 650 | 195 | 407 | 570 | 597 | 80 | 187 | 19 | | 2 | | 78 | 120 | 22 | 0.9% | 88% |
| | | | | t2 | | | | | | | | | | | | | | | -1 | c | -1 | -1 | -1 | a | a | a | -1 | -1 | -1 | -1 | -1 | -1 | | -1 | | a | -1 | 22 | | |
| MED | NCO | NEI (MED) | LL | t1 | | | 1 | | 19 | | 168 | 183 | 633 | 757 | 341 | 1750 | 1349 | | | | | | | | | | | | | | | | | | | | | 23 | 0.8% | 89% |
| | | | | t2 | | | -1 | | -1 | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | | | | | | | | | | | | | 23 | | |
| MED | CP | Maroc | TP | t1 | | | | | | | 38 | 110 | 96 | 286 | 1118 | 912 | 201 | 73 | 703 | 127 | 15 | 63 | 35 | 30 | 39 | 307 | | | | | | | 3 | | | | | 24 | 0.6% | 90% |
| | | | | t2 | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | -1 | | | | | 24 | | |
| MED | NCC | Chinese Taipei | LL | t1 | | | | | | | | | | | | | | 328 | 709 | 494 | 411 | 278 | 106 | 27 | 169 | 329 | 508 | 445 | 51 | 267 | 5 | | | | | | | 25 | 0.6% | 90% |
| | | | | t2 | | | | | | | | | | | | | | -1 | -1 | b | b | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | | | | | | | 25 | | |
| MED | CP | EU.España | SU | t1 | | | | 391 | 26 | 415 | 220 | 404 | 225 | 717 | 247 | 126 | 250 | 146 | 336 | | 76 | 30 | 55 | 35 | 38 | 28 | 11 | 9 | 9 | | | | | | | | | 26 | 0.6% | 91% |
| | | | | t2 | | | | b | b | -1 | -1 | -1 | a | -1 | a | ac | ab | ab | a | | a | a | a | -1 | a | a | a | -1 | -1 | | | | | | | | | 26 | | |
| MED | CP | EU.France | UN | t1 | | 30 | 30 | 30 | | | | | | | | | | | | 60 | 580 | 500 | 300 | 246 | | | | 300 | 130 | 309 | 226 | 614 | 134 | | 184 | 93 | | 27 | 0.6% | 92% |
| | | | | t2 | | -1 | -1 | -1 | | | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | | | | -1 | -1 | -1 | -1 | a | -1 | | -1 | a | | 27 | | |
| MED | CP | Tunisie | TP | t1 | 54 | 120 | 188 | 170 | 145 | 163 | 184 | 274 | 409 | 493 | 249 | 243 | 175 | 92 | 169 | 223 | 154 | 95 | 35 | 46 | 13 | 3 | 3 | 5 | 1 | | | | | | | | | 28 | 0.5% | 92% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | b | b | b | b | b | -1 | -1 | -1 | -1 | -1 | -1 | a | a | a | -1 | -1 | -1 | | | | | | | | | 28 | | |
| MED | CP | EU.España | HL | t1 | | | | 151 | 145 | 267 | 29 | 177 | 553 | 137 | 296 | 10 | 4 | 200 | 93 | 726 | 206 | 69 | 76 | 21 | 67 | 98 | 48 | 9 | 9 | 2 | | 6 | 4 | | | | 0 | 29 | 0.5% | 93% |
| | | | | t2 | | | | b | b | -1 | ab | ab | abc | ac | ac | a | ab | ab | ab | ab | ab | ab | ac | abc | ab | ac | ac | c | -1 | abc | | a | a | | | | a | 29 | | |
| MED | NCO | NEI (Flag related) | LL | t1 | | | | | | | | | | | | | | | 427 | 639 | 171 | 1066 | 761 | 98 | 17 | | | | | | | | | | | | | 30 | 0.5% | 93% |
| | | | | t2 | | | | | | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | | | | | 30 | | |
| MED | CP | Algerie | LL | t1 | | | | | | | | | | | | | | | | | | | | | 700 | 109 | 186 | | 167 | 712 | 88 | 754 | 339 | | | | | 31 | 0.5% | 94% |
| | | | | t2 | | | | | | | | | | | | | | | | | | | | | -1 | -1 | -1 | | -1 | -1 | -1 | ab | ab | | | | | 31 | | |
| MED | CP | EU.España | UN | t1 | | | | | 101 | 22 | 57 | 92 | 127 | 162 | 90 | 226 | 343 | 147 | 396 | 395 | 274 | 58 | | 4 | 488 | | 11 | 7 | 1 | 5 | | | | | | | | 32 | 0.4% | 94% |
| | | | | t2 | | | | | b | -1 | ac | -1 | -1 | ac | ac | ac | ab | ab | -1 | a | -1 | a | | a | a | | a | -1 | -1 | -1 | | | | | | | | 32 | | |
| MED | CP | EU.España | BB | t1 | | 100 | 53 | | 1699 | 278 | | | | | 25 | 148 | 158 | 48 | | 206 | 5 | 4 | 11 | 4 | | | 1 | 9 | 17 | 5 | | | | | | | | 33 | 0.4% | 94% |
| | | | | t2 | | -1 | -1 | | b | -1 | | | | | -1 | -1 | c | c | | ac | a | -1 | -1 | ac | | | a | -1 | -1 | -1 | | | | | | | a | 33 | | |
| MED | CP | Libya | TP | t1 | 339 | 255 | 130 | 270 | 274 | | | | | | 26 | 29 | 65 | | 150 | 180 | 134 | 72 | 181 | 100 | 44 | 74 | 107 | 71 | 34 | 42 | | | | | | | | 34 | 0.4% | 95% |
| | | | | t2 | -1 | -1 | -1 | -1 | -1 | | | | | | -1 | -1 | -1 | | -1 | -1 | -1 | -1 | -1 | ac | ac | ab | -1 | -1 | -1 | -1 | | | | | | | | 34 | | |
| MED | CP | Algerie | GN | t1 | | | | | | | | | | | | | | | | | | | 200 | 158 | 214 | 312 | 287 | | 186 | 165 | 75 | 85 | 888 | | | | | 35 | 0.4% | 95% |
| | | | | t2 | | | | | | | | | | | | | | | | | | | -1 | -1 | -1 | -1 | -1 | | -1 | -1 | -1 | -1 | -1 | | | | | 35 | | |
| MED | CP | Korea Rep. | PS | t1 | | | | | | | | | | | | | | | | | | | | | | | | | 700 | 1145 | | 276 | 335 | 102 | | | | 36 | 0.4% | 96% |
| | | | | t2 | | | | | | | | | | | | | | | | | | | | | | | | | -1 | -1 | | ab | a | a | | | | 36 | | |
| MED | CP | EU.España | TP | t1 | | 3 | 66 | 37 | 621 | 302 | 168 | 219 | 228 | 231 | 470 | 24 | 16 | 6 | | 1 | 1 | 1 | 5 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | | | | | | | | 37 | 0.4% | 96% |
| | | | | t2 | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | c | -1 | -1 | a | a | | a | a | a | a | a | -1 | a | a | -1 | -1 | a | | | | | | | | 37 | | |
| MED | CP | Turkey | TP | t1 | | | 825 | 557 | 869 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 38 | 0.3% | 96% |
| | | | | t2 | | | -1 | -1 | -1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 38 | | |

**Table 5. BFT-W:** Catalogue on Task-I vs Task-II major fishery (flag/gear combinations ranked by order of its T1 importance) and year (1980 to 2012). [Task-II colour scheme has a concatenation of characters ("a"= T2CE exists; "b"= T2SZ exists; "c"= CAS exists) that represents the Task-II data availability in the ICCAT-DB].

| Species | Stock | Status | FlagName | GearGrp | DSet | 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 | 2010 | 2011 | 2012 | Rank | % | %cum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BFT | ATW | CP | Japan | LL | t1 | 3936 | 3771 | 292 | 711 | 696 | 1092 | 584 | 960 | 1109 | 468 | 550 | 688 | 512 | 581 | 427 | 387 | 436 | 330 | 691 | 365 | 492 | 506 | 575 | 57 | 470 | 265 | 376 | 277 | 492 | 162 | 353 | 578 | 289 | 1 | 27.9% | 28% |
| | | | | | t2 | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | a | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | ac | 1 | | |
| BFT | ATW | CP | U.S.A. | RR | t1 | 276 | 244 | 308 | 405 | 400 | 465 | 326 | 538 | 432 | 557 | 752 | 696 | 324 | 540 | 462 | 844 | 840 | 931 | 777 | 760 | 683 | 1244 | 1523 | 991 | 716 | 425 | 376 | 634 | 658 | 860 | 682 | 592 | 568 | 2 | 24.7% | 53% |
| | | | | | t2 | ac | ac | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | abc | ab | ab | ab | b | ab | ab | ab | ab | abc | ab | ab | ab | ab | abc | abc | abc | abc | abc | c | c | 2 | | |
| BFT | ATW | CP | U.S.A. | PS | t1 | 758 | 805 | 232 | 384 | 401 | 377 | 360 | 367 | 383 | 385 | 384 | 237 | 300 | 295 | 301 | 249 | 245 | 250 | 249 | 248 | 275 | 196 | 208 | 265 | 32 | 178 | 4 | 28 | | 11 | | | 2 | 3 | 10.0% | 63% |
| | | | | | t2 | c | c | b | b | b | b | b | b | b | b | b | b | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | b | b | c | bc | | bc | | | c | 3 | | |
| BFT | ATW | CP | Canada | RR | t1 | 259 | 279 | | 71 | 1 | 1 | 2 | 1 | 7 | | 28 | 32 | 30 | 88 | 71 | 195 | 155 | 245 | 303 | 348 | 433 | 402 | 508 | 407 | 421 | 497 | 629 | 389 | 471 | 390 | 324 | 294 | 347 | 4 | 9.1% | 72% |
| | | | | | t2 | ab | ab | b | -1 | -1 | -1 | -1 | b | b | | a | ab | ab | ab | ab | ab | ab | ab | ab | b | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | 4 | | |
| BFT | ATW | CP | U.S.A. | LL | t1 | 10 | 83 | 30 | 114 | 127 | 132 | 653 | 238 | 260 | 244 | 275 | 305 | 347 | 177 | 185 | 211 | 235 | 191 | 156 | 222 | 242 | 130 | 224 | 299 | 275 | 211 | 205 | 173 | 233 | 335 | 239 | 241 | 292 | 5 | 8.7% | 80% |
| | | | | | t2 | c | c | b | b | b | b | bc | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | b | ab | abc | ab | ac | abc | abc | abc | abc | ac | ac | 5 | | |
| BFT | ATW | CP | Canada | TL | t1 | | | 213 | 355 | 260 | 121 | 39 | 32 | 268 | 579 | 404 | 447 | 403 | 284 | 203 | 262 | 298 | 138 | 172 | 125 | 81 | 79 | 39 | 42 | 49 | 44 | 35 | 23 | 24 | 37 | 40 | 30 | 34 | 6 | 6.1% | 86% |
| | | | | | t2 | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | ab | ab | ab | ab | ab | ab | ab | ab | ab | ab | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | 6 | | |
| BFT | ATW | CP | U.S.A. | HL | t1 | 358 | 285 | 151 | 332 | 275 | 284 | 190 | 186 | 159 | 227 | 210 | 341 | 218 | 224 | 228 | 66 | 33 | 17 | 29 | 15 | 3 | 9 | 4 | | 1 | 2 | 0 | | 1 | 0 | 3 | 1 | 1 | 7 | 4.6% | 91% |
| | | | | | t2 | c | c | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | c | | c | bc | bc | c | c | 7 | | |
| BFT | ATW | CP | U.S.A. | HP | t1 | 102 | 109 | 86 | 159 | 115 | 166 | 127 | 122 | 151 | 187 | 129 | 129 | 105 | 88 | 68 | 77 | 96 | 98 | 133 | 116 | 184 | 102 | 55 | 88 | 41 | 32 | 30 | 23 | 30 | 66 | 29 | 70 | 52 | 8 | 3.8% | 95% |
| | | | | | t2 | c | c | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | b | bc | bc | bc | bc | bc | c | c | 8 | | |
| BFT | ATW | CP | Canada | LL | t1 | | | | | | | 32 | 33 | 104 | 53 | 4 | 6 | 9 | 25 | 5 | 4 | 22 | 12 | 32 | 31 | 47 | 20 | 53 | 28 | 43 | 36 | 48 | 58 | 30 | 64 | 89 | 112 | 65 | 9 | 1.3% | 96% |
| | | | | | t2 | | | | | | | b | b | b | b | ab | a | a | a | ab | ab | ab | ab | ab | ab | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | 9 | | |
| BFT | ATW | CP | Canada | TP | t1 | 47 | 41 | 68 | 7 | 3 | 20 | | 17 | 14 | 1 | 2 | | 1 | 29 | 79 | 72 | 90 | 59 | 68 | 44 | 16 | 16 | 28 | 84 | 32 | 8 | 3 | 4 | 23 | 23 | 39 | 26 | 17 | 10 | 1.2% | 97% |
| | | | | | t2 | ab | b | b | -1 | -1 | -1 | | -1 | b | b | ab | | ab | ab | ab | ab | ab | ab | ab | ab | abc | abc | ac | ac | abc | abc | abc | abc | abc | abc | abc | abc | abc | 10 | | |
| BFT | ATW | NCO | NEI (Flag related) | LL | t1 | | | | | | | | | | | | | | | | | 2 | | | 429 | 270 | 49 | | | | | | | | | | | | 11 | 0.9% | 98% |
| | | | | | t2 | | | | | | | | | | | | | | | | | -1 | | | -1 | -1 | -1 | | | | | | | | | | | | 11 | | |
| BFT | ATW | CP | Canada | HP | t1 | | | | | | | | | | | | | | 33 | 34 | 43 | 32 | 55 | 36 | 38 | 18 | 20 | 13 | 10 | 7 | 14 | 20 | 17 | 24 | 18 | 37 | 30 | 31 | 12 | 0.6% | 99% |
| | | | | | t2 | | | | | | | | | | | | | | ab | ab | ab | ab | ab | ab | ab | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | abc | a | 12 | | |
| BFT | ATW | CP | Mexico | LL | t1 | | | | | | | | | | | | | | | 4 | | 19 | 2 | 8 | 14 | 29 | 10 | 12 | 22 | 9 | 10 | 14 | 7 | 7 | 10 | 14 | 14 | 52 | 13 | 0.3% | 99% |
| | | | | | t2 | | | | | | | | | | | | | | | ab | b | ab | ab | ab | ab | ab | bc | b | ab | ab | ab | ab | abc | ab | ab | ab | ab | ab | 13 | | |
| BFT | ATW | NCO | Cuba | LL | t1 | 1 | | | | | | | | | | | | | | | | | | | | | | 74 | 11 | 19 | 27 | 19 | | | | | | | 14 | 0.2% | 99% |
| | | | | | t2 | a | | | | | | | | | | | | | | | | | | | | | | ab | -1 | -1 | -1 | -1 | | | | | | | 14 | | |
| BFT | ATW | NCO | NEI (ETRO) | LL | t1 | | | 14 | 1 | | | | | | 30 | 24 | 23 | 17 | | | | | | | | | | | | | | | | | | | | | 15 | 0.1% | 99% |
| | | | | | t2 | | | -1 | -1 | | | | | | -1 | -1 | -1 | -1 | | | | | | | | | | | | | | | | | | | | | 15 | | |
| BFT | ATW | CP | Canada | PS | t1 | | 105 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 16 | 0.1% | 99% |
| | | | | | t2 | | b | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 16 | | |
| BFT | ATW | NCO | Sta. Lucia | HL | t1 | | | | | | | | 1 | 3 | 2 | 14 | 14 | 14 | 2 | 43 | 9 | | | | | | | | | | | | | | | | | | 17 | 0.1% | 100% |
| | | | | | t2 | | | | | | | | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | | | | | | | | | | | | | | | | | | 17 | | |
| BFT | ATW | NCC | Chinese Taipei | LL | t1 | 15 | 7 | 11 | 2 | | 3 | 3 | 4 | | 20 | | | | | | 4 | | 2 | | | | | | | | | | | | | | | | 18 | 0.1% | 100% |
| | | | | | t2 | -1 | -1 | -1 | b | b | b | b | -1 | | -1 | | | | | | ab | ab | ab | | a | | | | | | | | | | | | | | 18 | | |
| BFT | ATW | CP | Korea Rep. | LL | t1 | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 52 | | | | | | | 19 | 0.1% | 100% |
| | | | | | t2 | | | | | | a | | | | | | | | | | | | | | | | | | | | -1 | -1 | | | | | | | 19 | | |
| BFT | ATW | CP | Mexico | UN | t1 | 10 | 20 | 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 20 | 0.1% | 100% |
| | | | | | t2 | -1 | -1 | -1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 20 | | |
| BFT | ATW | CP | FR.St Pierre et Miquelon | LL | t1 | | | | | | | | | | | | | | | | | | | | | | | 3 | 1 | 10 | 5 | | 4 | 3 | 2 | 8 | 0 | | 21 | 0.0% | 100% |
| | | | | | t2 | | | | | | | | | | | | | | | | | | | | | | | -1 | -1 | -1 | -1 | | a | a | a | ab | ab | | 21 | | |

**Table 6.** Substitution rules to be used in the BFT CAS/CAA estimations (not changed since 2012 assessment).

| | | | sz/cs series used | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | BB | HL | | LL | | | | | | | PS | | | SP | TP | TW |
| t1Stock | t1GearG | t1FlagN | EU.España | Croatia | EU.España | Canada | EU.Cyprus | EU.España | EU.Italy | EU.Malta | Japan | U.S.A. | EU.France | EU.Italy | Turkey | EU.Italy | EU.Portugal | EU.France |
| ATE | BB | EU.France | X | | | | | | | | | | | | | | | |
| | HL | EU.France | | | X | | | | | | | | | | | | | |
| | LL | China P.R. | | | | | | | | | X | | | | | | | |
| | | EU.France | | | X | | | | | | | | | | | | | |
| | PS | EU.Portugal | | | | | | | | | | | | | | | X | |
| | UN | EU.France | | | | | | | | | | | | | | | | X |
| MED | HL | Croatia | | X | | | | | | | | | | | | | | |
| | | EU.France | | | | | | X | | | | | | | | | | |
| | | EU.Greece | | X | | | | | | | | | | | | | | |
| | LL | EU.Cyprus | | | | | X | | | | | | | | | | | |
| | | EU.France | | | | | | X | | | | | | | | | | |
| | | EU.Greece | | | | | X | | | | | | | | | | | |
| | | EU.Malta | | | | | | | | X | | | | | | | | |
| | | Maroc | | | | | | X | | | | | | | | | | |
| | PS | Croatia | | | | | | | | | | | X | | | | | |
| | | EU.España | | | | | | | | | | | X | | | | | |
| | | EU.Greece | | | | | | | | | | | X | | | | | |
| | | EU.Malta | | | | | | | | | | | | X | | | | |
| | | Libya | | | | | | | | | | | X | | | | | |
| | | Maroc | | | | | | | | | | | X | | | | | |
| | | Syria Rep. | | | | | | | | | | | X | | | | | |
| | | Tunisie | | | | | | | | | | | X | | | | | |
| | | Turkey | | | | | | | | | | | X | | | | | |
| | SP | EU.España | | | | | | X | | | | | | | | | | |
| | | EU.Italy | | | | | | | | | | | | | | X | | |
| | TP | EU.Italy | | | | | | | X | | | | | | | | | |
| | TW | EU.France | | | | | | | | | | | X | | | | | |
| | UN | EU.France | | | | | | | | | | | X | | | | | |
| | | EU.Italy | | | | | | | | | | | | | | X | | |
| ATW | LL | Canada | | | | X | | | | | | | | | | | | |

**Table 7.** French PS BFT datasets "pseudo" samples (number of fish) to be dropped and/or reclassified from ICCAT-DB system.

| Gear G. | SizeInfo | Stock | TimeStrata | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PS | CS | MED | mm | 43450 | 202088 | 216378 | | | 51179 | 68504 | 39099 | | | | 4788 | 2241 | OK |
| | sz | MED | mm | | | | | | | 68504 | 39099 | | | | 4788 | 2241 | DELETE |
| | | MED | mm | | | | 79757 | 85376 | | | | 25801 | 8608 | 11663 | | | Reclass. as CAS |

**Table 8.** Summary table to evaluate the available Atlantic bluefin abundance indices.

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| | Paper | SCRS/2014/054 | SCRS/2014/060 | SCRS/2012/124 | SCRS/2014/045 | SCRS/2014/055 | SCRS/2012/160 | SCRS/2014/057 | SCRS/2014/039 | SCRS/2014/039 |
| | Index | Bay of Biscay baitboat | Morocco and Spanish traps | Juvenile western Mediterranean | Japanese LL | US rod and reel | US LL | Larval survey | Southern Gulf of St. Lawrence | Southwest Nova Scotia |
| 1 | Diagnostics | Most of the appropriate diagnostics are included | Most of the appropriate diagnostics appear to be included | No diagnostics presented | Most of the appropriate diagnostics appear to be included | observed catch distributions and probability model fits are shown | Most of the appropriate diagnostics appear to be included | Most of the appropriate diagnostics appear to be included | All the appropriate diagnostics were included | All the appropriate diagnostics were included |
| 2 | Appropriateness of data exclusions and classifications (e.g. to identify targeted trips). | Data exclusions/ classifications are listed and justified, specific targeting factors included in standardization | Data exclusions not discussed, targetting not an issue | Data described and method clearly explained with caveats and limitations | Data exclusions are clearly identified and justified, alternate CPUE runs are attempted using additional exclusions. GLM includes factors that could be considered proxies for targetting | Data exclusions and filter criteria are listed in report | Data exclusions explained, timing and area of data selection designed for BFT spawning season | Data collection method clearly explained, as is a survey, presumably few data exclusions | Data exclusions are indicated, classifications appropriate | Data exclusions are indicated, classifications appropriate |
| 3 | Geographical coverage | Geographical coverage is limited to bay of Biscay, maps are provided | Coverage limited to the Straits of Gibraltar | Western Med, around the Balearic Islands | Covers west and northeast Atlantic. Distribution maps are provided | Northeast U.S. coast only, distribution maps not provided, sample proportions shown by State regions | Coverage extends to about 1/2 of the Gulf of Mexico - the presumed main spawning area for WBFT | Coverage limited to Med. No maps of surveys provided | Coverage limited to NAFO area 4T | Coverage limited to NAFO area 4X5YZ |
| 4 | Catch fraction | Catch fraction is roughly 5% | ? Not clear | N/A | Significant | No information on catch fraction | 5% no directed fishery | No direct catch | 14% | 5% |
| 5 | Length of Time Series relative to the history of exploitation | Since 1952 | Time series starts at beginning of the 1980s | Short | Since 1976 in the west and 1990 in the northeast | Time series starts at beginning of the 1980s | Time series starts in 1987. One break in 1992 proposed | Since 2001 | Since 1981; exploitation began in 1972-73 | Since 1988 |
| 6 | Are other indices available for the same time period? | Yes, although not for juveniles | 3 | No | Yes | Yes | Yes | Yes | No | No |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Does the index standardization account for known factors that influence catchability/ selectivity? | The analysis includes many factors that could affect fishing efficiency/selectivity. Multiple interactions included | Factors included in the model, table 1, are not explained in the text and impossible to understand for those not immediately familiar with the fishery. It would appear only one factor was included that could influence catchability - trap | Yes, the larval catch is adjusted for gear selectivity | Gear type is included as is a selectivity proxy. No interactions included | Model includes multiple factors that could influence cathability and selectivity) | No | Methodology for standardization of the series appears to be appropriate for a survey | Factors are month, fleet, gear and hours fished | Factors are month, fleet, gear and hours fished |
| 8 | Are there conflicts between the catch history and the CPUE response? | | No conflict noted | No conflict noted | No conflict noted | No conflict noted | No conflict | No conflict noted | Response sensitive to management measures and shrinking quotas | Response sensitive to management measures and shrinking quotas |
| 9 | Is the interannual variability within plausible bounds? (e.g. SCRS/2012/039) | Variability increases over the latter years of the series | Yes | Variability decreases over time | Annual variability higher for west Atlantic base case CPUEs, but northeast CPUE has extreme increase in most recent years | Yes | With the split index the variability is within plausible bounds for most of the time series but shows high variability in last 3 years | Yes | Variability does not impair interpretation of the trend. Increased variability in recent times | Variability does not impair interpretation of the trend. Increased variability in recent times |
| 10 | Are biologically implausible interannual deviations severe? (e.g. SCRS/2012/039) | Moderate | 5 | No tests conducted | No tests conducted | No | The index in 2013 shows a 3-fold decline. Note that the doubling between 2011 and 2012 is possible with the maturation of the 2003 cohort | No | Deviations relate to known impacts | Deviations relate to known impacts |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | Assessment of data quality and adequacy of data for standardization purpose (e.g. sampling design, sample size, factors considered) | Multiple factors and interactions included. Model design takes into account effort distribution. Discussions of data quality touched on. Management regulations affected data quality but these effects are partially addressed | Document states LF data was recorded, but it is not presented. Document states series applied to spawners 10+, model is extremely low on factors | Moderate | Information includes length frequencies of catches. Multiple factors included. Sample design and sensitivity runs investigate effort distribution as well as data assumptions/ concerns and effort is presented | Size classes are modeled separately. Multiple factors included. Sample design and sensitivity runs investigate alternative data assumptions/ concerns<br><br>Multiple factors included. Sample designs and sensitivity runs investigate alternative data assumptions/ concerns.<br>Size classes are modeled separately. Multiple factors included. Sample designs and sensitivity runs investigate alternative data assumptions/ concerns | Data quality is high, sample sizes are relatively large | Data is presented and methodology for standardization explicitly presented. Factors appear to be appropriate for a survey | Includes trends in forage fish and recent changes in environmental variables. Shows weight frequencies, trends in condition and describes a potential shift in the distribution of size components of the population to other areas | Includes trends in forage fish and recent changes in environmental variables. Shows trends in weight and it describes a potential shift in the distribution of size components of the population to other areas |

**Table 9.** CPUE series used in the eastern and Mediterranean bluefin stock assessment.

| Series<br>Age<br>Indexing<br>Area<br>Method<br>Time of year<br>Source | JP LL<br>4-10<br>Number<br>East Atl and Med<br>delta log-normal<br>Begin-year<br>SCRS/2014/045 | | MO-SP TRAP<br>10+<br>Number<br>East Atl and Med<br>Neg. Binom. (log) no.<br>Mid-year<br>SCRS/2014/060 | | SP BB1<br>5-6<br>Weight<br>East Atl and Med<br>delta log-normal<br>Mid-year<br>SCRS/2014/054 | | SP BB2<br>2-3<br>Weight<br>East Atl and Med<br>delta log-normal<br>Mid-year<br>SCRS/2014/054 | | SP BB3<br>3-6<br>Weight<br>East Atl and Med<br>delta log-normal<br>Mid-year<br>SCRS/2014/054 | | Norway PS from Task II<br>10+<br>Weight<br>East Atl<br>Nominal<br>Unknown | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Std. CPUE | CV | Std. CPUE | CV | Std. CPUE | CV | Std. CPUE | CV | Std. CPUE | CV | Task I | Effort | CPUE |
| 1952 | | | | | 179,22 | 0,4250 | | | | | | | |
| 1953 | | | | | 184,74 | 0,5300 | | | | | | | |
| 1954 | | | | | 226,46 | 0,4140 | | | | | | | |
| 1955 | | | | | 187,01 | 0,4230 | | | | | 13394 | 370 | 36 |
| 1956 | | | | | 470,53 | 0,4310 | | | | | 5313 | 250 | 21 |
| 1957 | | | | | 315,05 | 0,4110 | | | | | 6437 | 225 | 29 |
| 1958 | | | | | 252,25 | 0,4090 | | | | | 3860 | 160 | 24 |
| 1959 | | | | | 506,79 | 0,4120 | | | | | 3241 | 100 | 32 |
| 1960 | | | | | 485,16 | 0,4250 | | | | | 4215 | 90 | 47 |
| 1961 | | | | | 327,29 | 0,4130 | | | | | 8553 | 165 | 52 |
| 1962 | | | | | 180,12 | 0,4620 | | | | | 8730 | 135 | 65 |
| 1963 | | | | | | | 312,09 | 0,493 | | | 167 | 100 | 2 |
| 1964 | | | | | | | 457,4 | 0,415 | | | 1461 | 43 | 34 |
| 1965 | | | | | | | 228,91 | 0,41 | | | 2506 | 36 | 70 |
| 1966 | | | | | | | 349,1 | 0,421 | | | 1000 | 28 | 36 |
| 1967 | | | | | | | 345,89 | 0,414 | | | 2015 | 33 | 61 |
| 1968 | | | | | | | 447 | 0,422 | | | 753 | 32 | 24 |
| 1969 | | | | | | | 610,62 | 0,401 | | | 842 | 30 | 28 |
| 1970 | | | | | | | 594,66 | 0,431 | | | 470 | 11 | 43 |
| 1971 | | | | | | | 744,71 | 0,403 | | | 653 | 15 | 44 |
| 1972 | | | | | | | 525,63 | 0,413 | | | 430 | 10 | 43 |
| 1973 | | | | | | | 535,63 | 0,396 | | | 421 | 10 | 42 |
| 1974 | | | | | | | 245,39 | 0,439 | | | 869 | 19 | 46 |
| 1975 | | | | | | | 484,22 | 0,41 | | | 988 | 26 | 38 |
| 1976 | | | | | | | 483,96 | 0,414 | | | 529 | 25 | 21 |
| 1977 | | | | | | | 547,56 | 0,407 | | | 764 | 18 | 42 |
| 1978 | | | | | | | 705,26 | 0,412 | | | 221 | 18 | 12 |
| 1979 | | | | | | | 623,01 | 0,409 | | | 60 | 16 | 4 |
| 1980 | | | | | | | 634,81 | 0,446 | | | 282 | 14 | 20 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1981 | | | 768,36 | 57,19 | | | 510,66 | 0,422 | | | | | |
| 1982 | | | 1038,12 | 34,63 | | | 503,78 | 0,418 | | | | | |
| 1983 | | | 1092,05 | 34,63 | | | 625,14 | 0,432 | | | | | |
| 1984 | | | 1200,27 | 34,63 | | | 331,71 | 0,449 | | | | | |
| 1985 | | | 814,46 | 34,64 | | | 1125,74 | 0,407 | | | | | |
| 1986 | | | 394,33 | 28,05 | | | 751,21 | 0,419 | | | | | |
| 1987 | | | 433,53 | 28,05 | | | 1008,43 | 0,415 | | | | | |
| 1988 | | | 1014,56 | 28,03 | | | 1394,68 | 0,419 | | | | | |
| 1989 | | | 531,45 | 26,09 | | | 1285,6 | 0,4 | | | | | |
| 1990 | 0,401 | 0,318 | 614,37 | 22,60 | | | 986,51 | 0,407 | | | | | |
| 1991 | 0,504 | 0,271 | 727,86 | 22,59 | | | 901,2 | 0,422 | | | | | |
| 1992 | 0,856 | 0,164 | 313,95 | 22,63 | | | 695,16 | 0,427 | | | | | |
| 1993 | 0,843 | 0,136 | 325,36 | 22,62 | | | 2093,55 | 0,403 | | | | | |
| 1994 | 1,008 | 0,159 | 341,90 | 22,62 | | | 1007,03 | 0,419 | | | | | |
| 1995 | 1,029 | 0,134 | 223,43 | 22,65 | | | 1235,91 | 0,405 | | | | | |
| 1996 | 2,581 | 0,130 | 375,22 | 24,62 | | | 1739,29 | 0,398 | | | | | |
| 1997 | 1,610 | 0,128 | 992,41 | 24,59 | | | 2246,41 | 0,404 | | | | | |
| 1998 | 0,848 | 0,160 | 925,14 | 24,59 | | | 879,51 | 0,409 | | | | | |
| 1999 | 1,202 | 0,147 | 1137,45 | 24,59 | | | 339,77 | 0,436 | | | | | |
| 2000 | 1,209 | 0,116 | 739,23 | 22,59 | | | 960,44 | 0,402 | | | | | |
| 2001 | 1,441 | 0,122 | 1284,62 | 22,58 | | | 704,49 | 0,447 | | | | | |
| 2002 | 1,104 | 0,126 | 1130,42 | 22,58 | | | 687,42 | 0,423 | | | | | |
| 2003 | 1,134 | 0,142 | 662,66 | 23,68 | | | 444,91 | 0,482 | | | | | |
| 2004 | 1,015 | 0,118 | 332,36 | 22,62 | | | 1210,46 | 0,417 | | | | | |
| 2005 | 0,733 | 0,115 | 677,39 | 22,59 | | | 2383,57 | 0,4 | | | | | |
| 2006 | 0,866 | 0,115 | 633,94 | 22,60 | | | 850,09 | 0,48 | | | | | |
| 2007 | 0,887 | 0,116 | 1000,60 | 22,59 | | | 1177,62 | 0,419 | | | | | |
| 2008 | 1,035 | 0,115 | 634,18 | 22,60 | | | | | 2144,54 | 0,304 | | | |
| 2009 | 1,529 | 0,114 | 876,71 | 22,59 | | | | | 955,29 | 0,305 | | | |
| 2010 | 2,486 | 0,129 | 1042,24 | 23,66 | | | | | 2109,08 | 0,309 | | | |
| 2011 | 4,203 | 0,168 | 674,97 | 22,59 | | | | | 2762,62 | 0,306 | | | |
| 2012 | 9,252 | 0,214 | 1187,75 | 23,66 | | | | | 2216,18 | 0,390 | | | |
| 2013 | 7,750 | 0,177 | 4285,56 | 33,12 | | | | | 1571,64 | 0,445 | | | |

**Table 10.** Data included in the ADAPT-VPA runs investigated for the East Atlantic and Mediterranean bluefin tuna stock (for acronyms of CPUE series, see **Table 9**).

| Assessment | Run | Period | CPUE series | CAA |
|---|---|---|---|---|
| "Update" | 1 | 1950-2011 | MOSPTRAP, JPNLLEAM, NORPS, JPNLLNEA, SPBB1 (1952-1963), SPBB2 (1964-2006), SPBB3(2007-2011) | As in 2012 |
| "Update" | 2 | 1950-2013 | MOSPTRAP, JPNLLEAM, NORPS, JPNLLNEA, SPBB1 (1952-1963), SPBB2 (1964-2006), SPBB3(2007-2013) | As in 2012 |
| "Update" | 3 | 1950-2013 | As Run 2 but with the JPNLLNEA split in two periods | As in 2012 |
| "Update" | 4 | 1950-2013 | As Run 2 but leaving out the last 2 years of the SPBB3 series | As in 2012 |
| "Update" | 5 | 1950-2013 | As Run 2 but leaving out the last year of the MOSPTRAP series | As in 2012 |
| "Preliminary benchmark" | 6 | 1950-2013 | As Run 2 as a first test for guiding further sensitivity analyses | New CAA with:<br>- new T1 (including series in App. 10 of 2013 SCRS Report, as well as SCRS/2014/052).<br>- new LW relationship (SCRS/2014/053). |

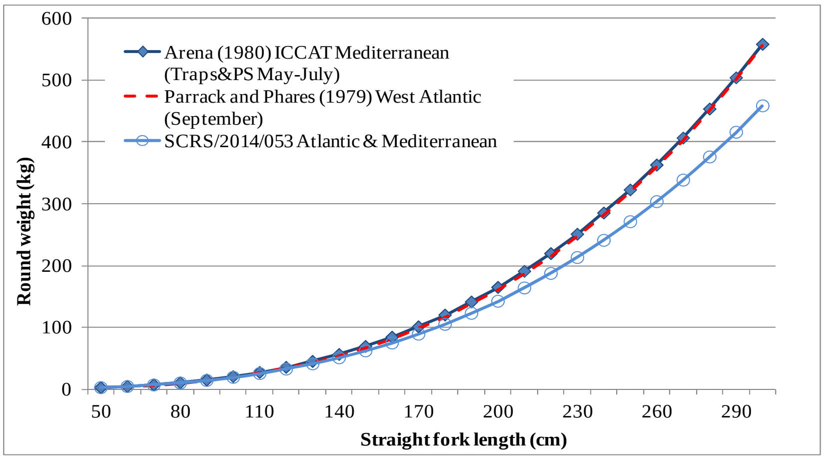


**Figure 1.** Weight-length relationship from current and new functions.

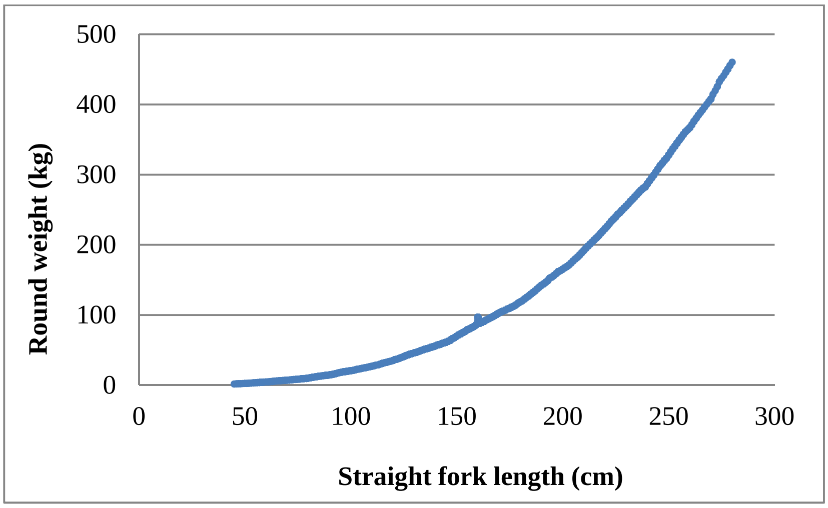


**Figure 2.** Weight-length relationship obtained from data detailed in Arena (1980).

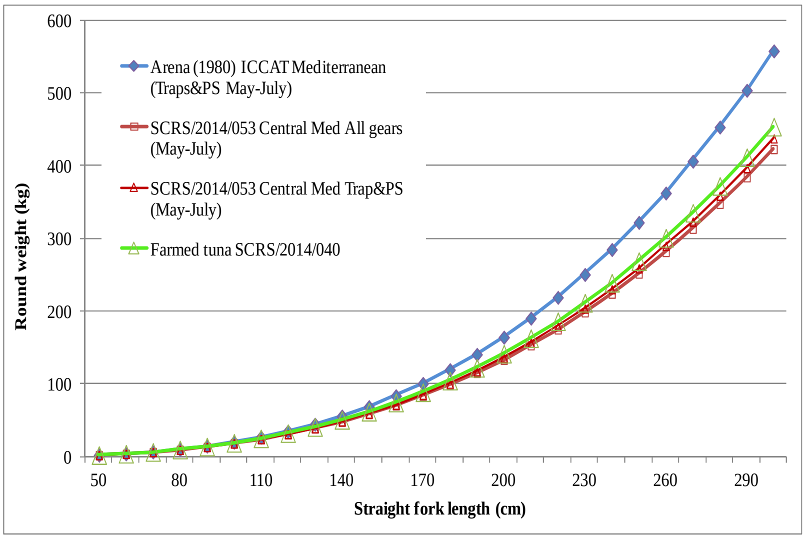


**Figure 3.** Weight-length relationships from Arena (1980), new ones from SCRS/2014/053 and from farmed tuna SCRS/2014/040.

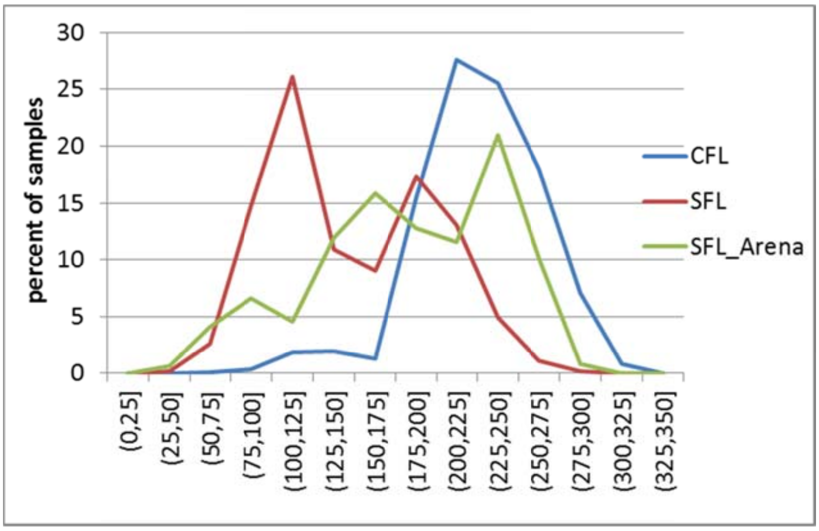


**Figure 4**. Proportional distribution of samples by length bin for the Arena (1980) and the current datasets. SFL corresponds to the observations recorded in straight fork length and CFL corresponds to observations recorded in curved fork length as the native measurement. The CFL observations consist of samples from Canadian and U.S. fisheries.

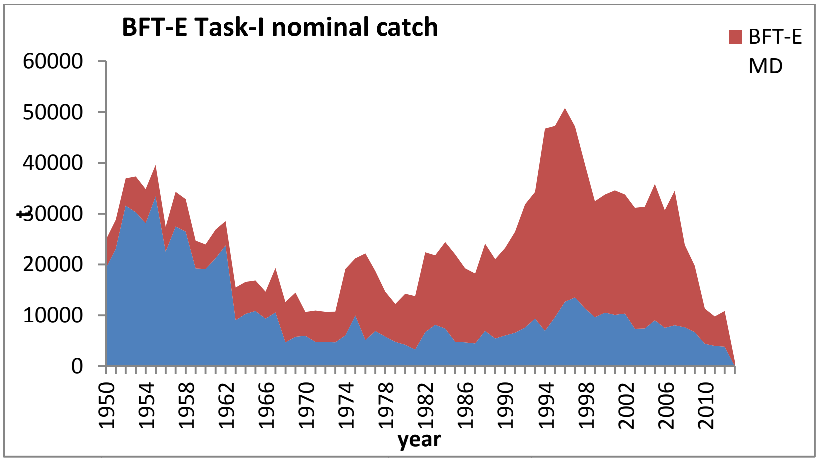


**Figure 5.** Eastern BFT (BFT-E) overall Task-I nominal catch (t) by region (AT-NE and MED) and year (1950-2012).

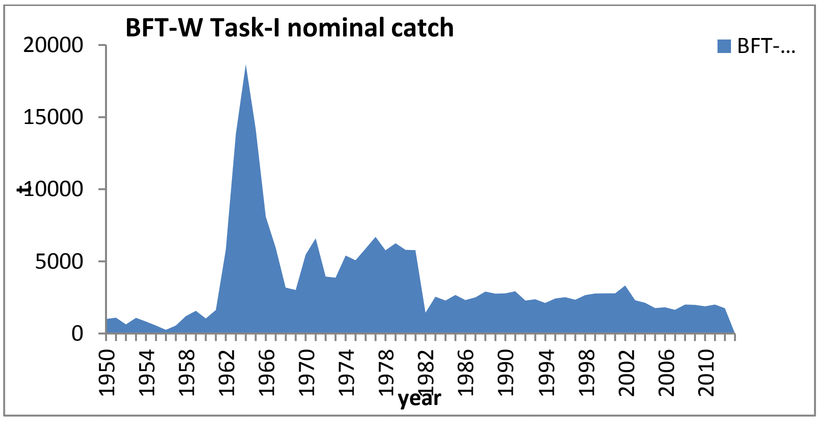


**Figure 6.** Western BFT (BFT-W) overall Task-I nominal catch (t) year (1950-2012).

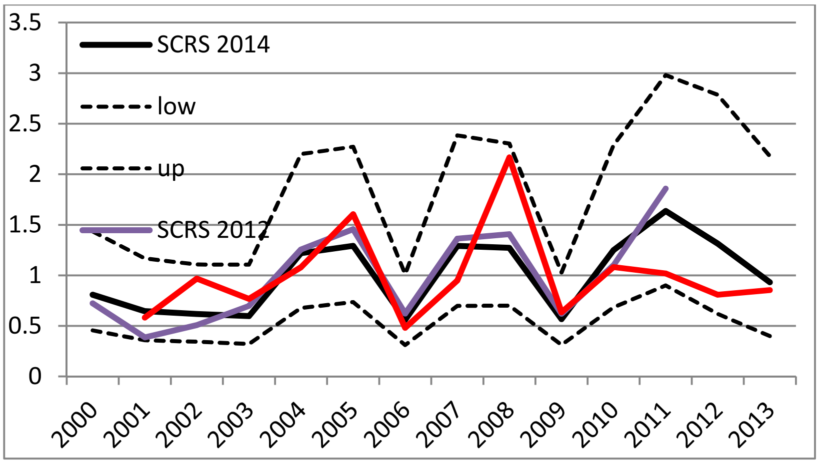


**Figure 7.** Comparison of the updated 2000-2013 Bay of Biscay BB standardized index with the previous series used in the 2012 assessment. The results of the analysis including only the BB French fleet is also shown.

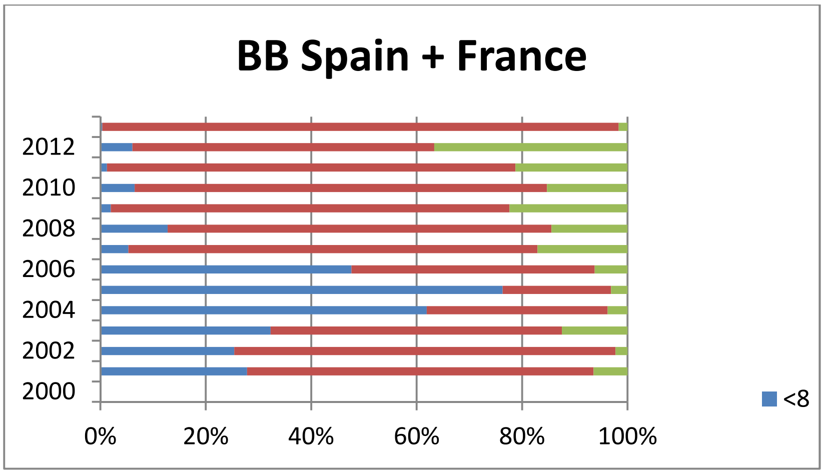


**Figure 8** Evolution of the proportion of BFT catches of the overall BB fleet in the Bay of Biscay by commercial category (<8kg, 8-30kg, >30kg) in the recent decade.

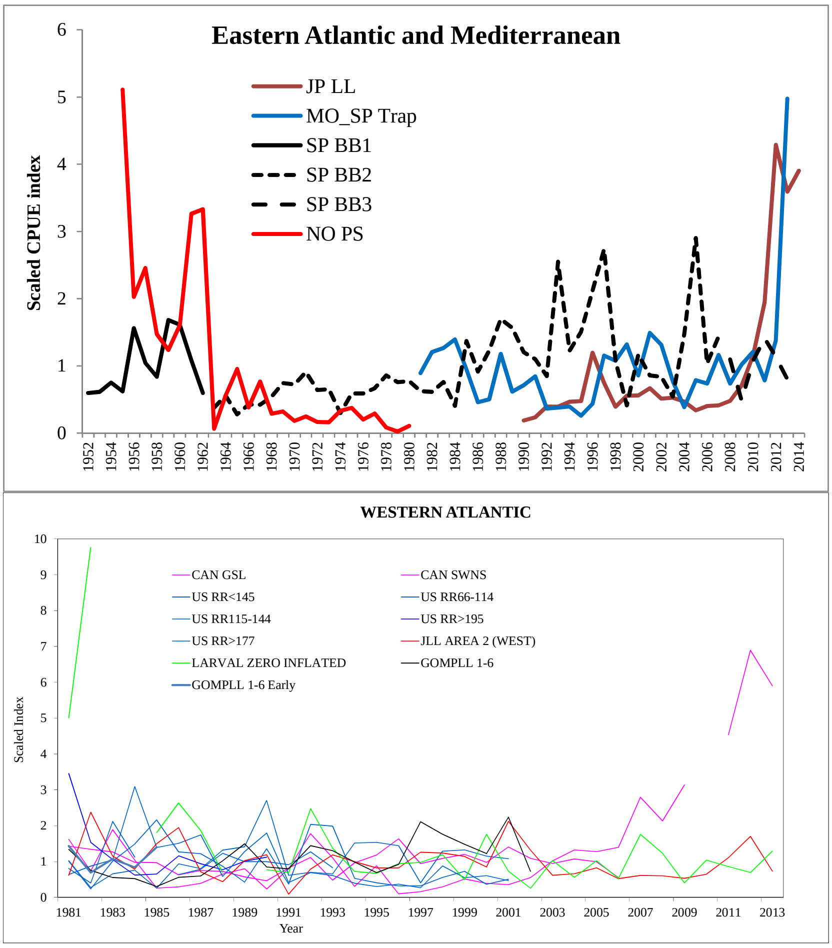


**Figure 9.** Scaled CPUE series available for the eastern Atlantic and Mediterranean (top) and western Atlantic (bottom).

**Appendix 1**

## AGENDA

1. Opening, adoption of the Agenda and meeting arrangements
2. Review of historical and new information on biology
   2.1 Tagging data
   2.2 Ageing and conversion factors
   2.3. Biological Sampling and Analysis
   2.4 Other matters on bluefin biology
3. Review of Task I nominal catch
4. Review of old and new Task II information
   4.1 Current status
   4.2 Integration of new Task II data into the ICCAT-DB system
5. Updated CAS/CAA and fully revised CAS/CAA
6. Definition of a new procedure to estimate CAS, CAA and WAA using new information validated by the Group
7. Review of available indices of relative abundance by fleet
8. Definition of data inputs and specifications for the 2014 update assessment and advice framework.
   8.1 Eastern Atlantic and Mediterranean stock
   8.2 Western Atlantic stock
9. Identification of the evaluation team and definition of the revision procedure
10. Develop a web app from the R-VPA2-BOX interface
11. Responses to the Commission
    11.1 Develop updated growth tables
12. Recommendations
13. Other matters
14. Adoption of the report and closure

**Appendix 2**

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**Appendix 3**

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