Update of the Eastern and Mediterranean Atlantic bluefin tuna stock (test)

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Abstract

The update of the East and Mediterranean stock of Atlantic bluefin Tuna (ABFT) has been performed during an intersessional meeting of the species group. The objective was to update the catch and abundance index data up to 2013 and to use the same model specifications as in the 2012 stock assessment. The VPA2-Box was used to estimate the stock status. Due to major changes in fisheries harvest since the management plan has been set in 2007, sensitivity runs have been tested, including splitting the Northeast Atlantic Japanese longline index (NEATL JPLL), removing the last year of the Moroccan and Spanish trap index (2013; MorSpa Trap), and removing the last two years of the Spanish and French bait boat index. The run using split the NEATL JPLL index and removing the last year of the MorSpa Trap index is chosen as the best case scenario for this E-MED ABFT updated stock assessment. This document will serve as a basis for 2014 update of ABFT stock assessment.

1 Introduction

The update of the East and Mediterranean stock of Atlantic bluefin Tuna (ABFT) stock assessment has been performed during an intersessional meeting in July-September 2014. This update includes updated catch data and abundance index values for 2012 and 2013. As proposed during the data preparatory group held in May 5-10 2014, a suite of different specifications have been investigated to test the sensitivity of the VPA to different technical assumptions and the choice of the CPUE series. Run 1 was used to assess the impact in historical changes to the data. The impact of each change in data (catch-at-age, weight-at-age, partial catch-at-age, and CPUEs) has been investigated and is reported in the Appendix. Run 2 assessed 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 investigated the effects of splitting the Japanese longline in the North East Atlantic 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. Several additional runs were performed: Run 6 which included the abundance index for juvenile ABFT derived from aerial surveys in the Gulf of Lions. Run 7 which combined the splitting of the Japanese longline in the North East Atlantic index and the removal of the last year of the Spanish-Moroccan trap index. For Run 11, F-ratios were estimated instead of being fixed for the same period as defined for the 2012 stock assessment using specifications of Run 7. For Run 12, F-ratios were estimated over different periods estimated using a catch curve analysis (see Laurie's paper). In Run 13, the age plus group was fixed at 16 years to enable us to assume fixed F-ratios over the whole period and equal to 1. The trajectories of Run 7, 11, 12, and 13 were selected to provide the potential trajectories of the bluefin stock and fishing mortalities and their uncertainties. As major changes in the Japanese longline fishery have occurred since the management plan has been set in 2007 and due to substantial changes in the effort and data (no information from Spanish traps since 2012, released individuals accounted for in the trap index and individuals caught outside the fishing season are

also included as released individuals now on), these runs were selected for this update assessement. A retrospective and bootstrap analysis was performed on these best-case runs. THIS PARAGRAPH WILL BE CHANGED SINCE RUN 5 IS NOW THE CONTINUITY RUN.

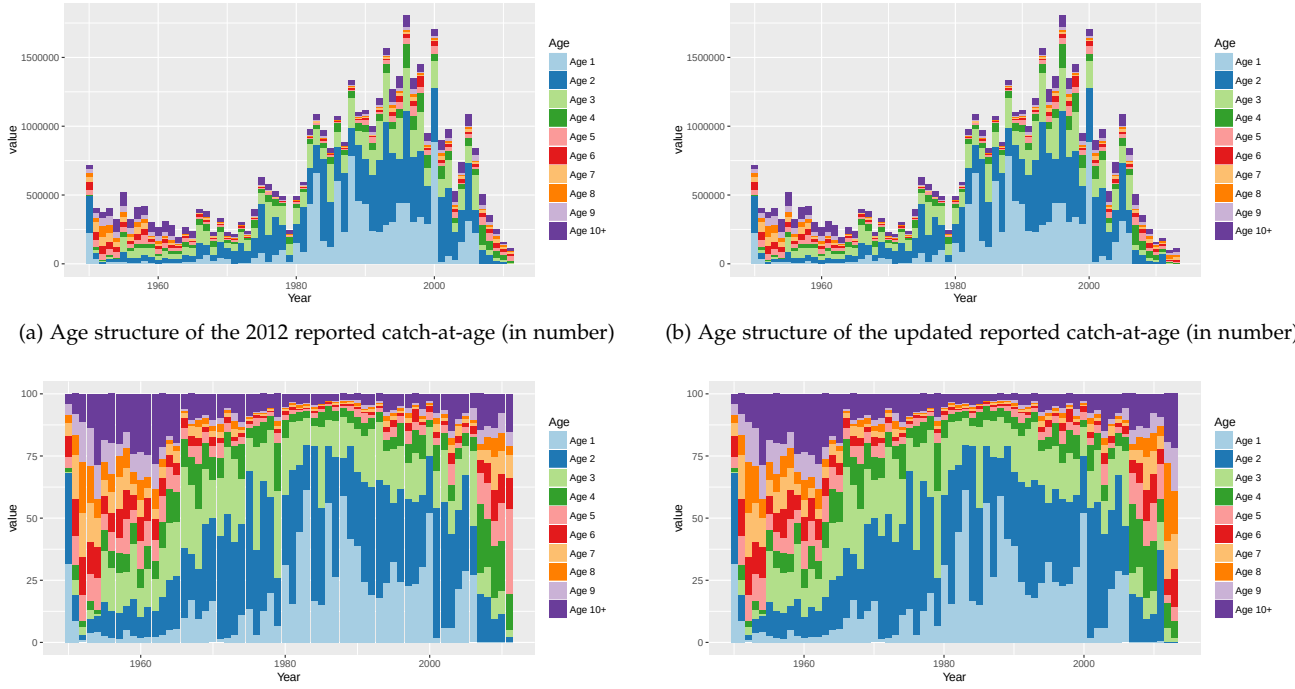
2 Materials and methods

2.1 Data inputs

Catch at age

The updated catch-at-size takes into account only the new/revised series submitted before the deadline of May 31^{st} 2014 (as for Task-I). Because this stock assessment is an update, only years 2011 to 2013 can be changed. The same substitution rules used for the 2012 assessment has been applied (see data preparatory group report). As in previous assessments, the relative differences between Task-I and the catch-at-size weight equivalent catches, mostly found in two Flags (Japan and USA) will not be addressed in this updated version.

To examine the differences between the updated and previous catch-at-age, we show the age structure of the updated reported catch-at-age (Fig. 1).



(a) Age structure of the 2012 reported catch-at-age (in number)

(b) Age structure of the updated reported catch-at-age (in number)

(c) Age structure of the 2012 reported catch-at-age (in %)

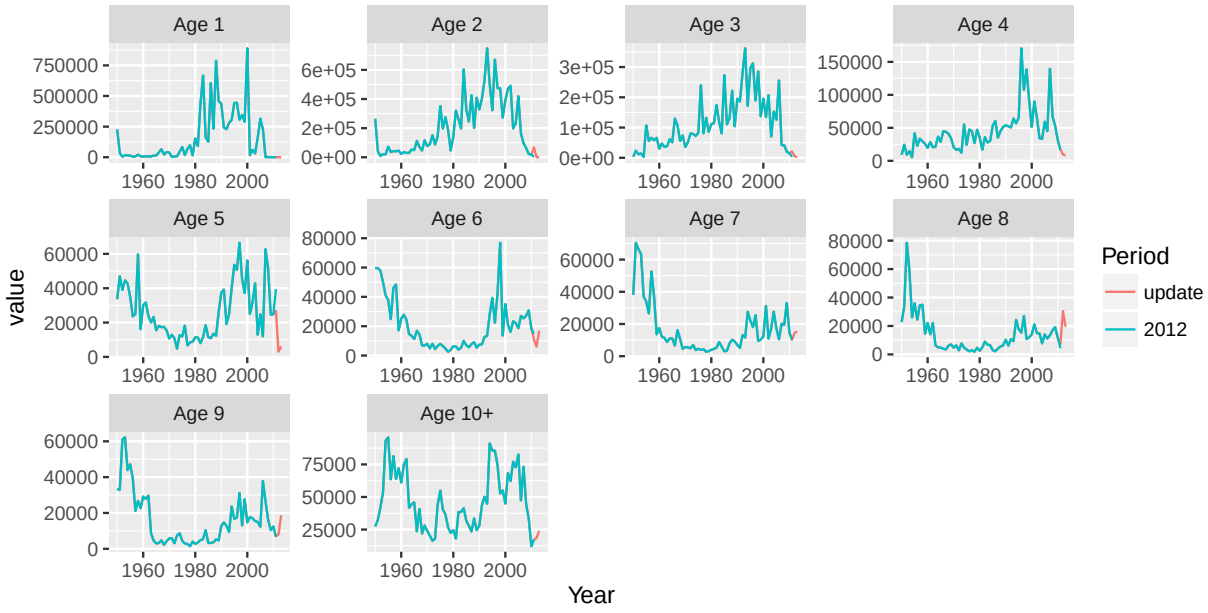
(d) Age structure of the updated reported catch-at-age (in %)

Figure 1: Main characteristics of the updated catch-at-age

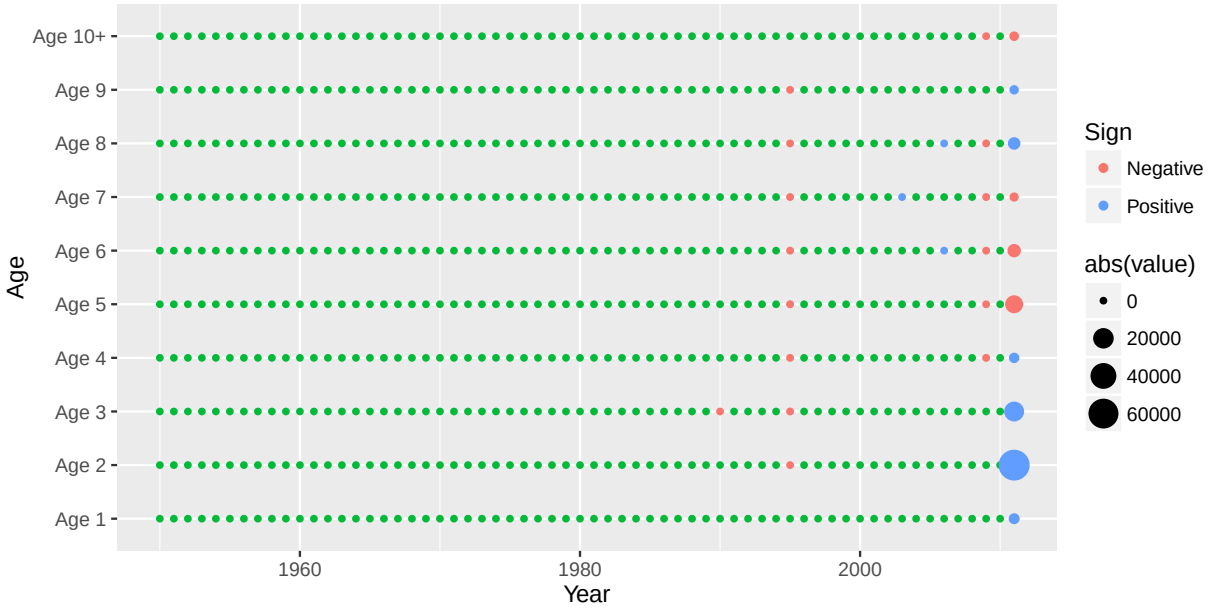
Here we show the comparison between the catch at age used in the 2012 ABFT stock assessement and the updated catch at age (Fig. 2).

As it can be seen, there is a substantial problem for 2000 with a very large number of young fish compared to other years. However, we have a potential soultion for next assessements, i.e., using log-book for French purse seiners in the problematic years.

Here we show the age structure of the updated inflated catch-at-age (Fig. 3). Since the catch are inflated over a period previous this update, the anomalies showed before are the same.



(a) Comparison of catch for each age between the 2012 catch-at-age and the updated catch-at-age

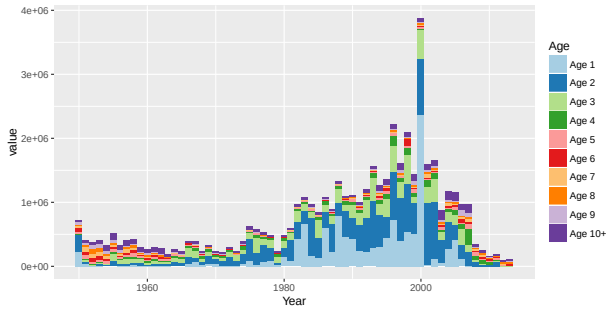


(b) Anomalies between the 2012 catch-at-age and the updated catch-at-age (in numbers)

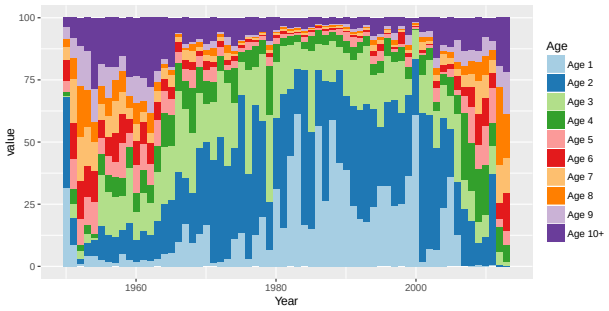
Figure 2: Comparison of the updated catch-at-age and the 2012 catch-at-age

Catch per unit of efforts

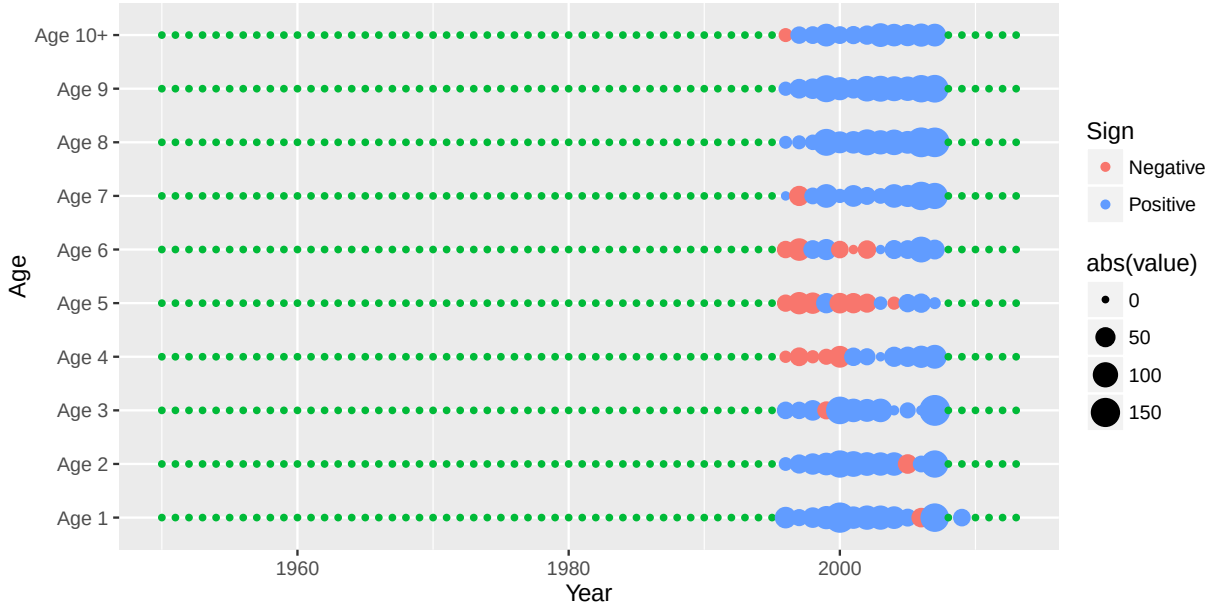
There is no substantial changes in the catch per unit of efforts (CPUE). Here we show the comparison between the CPUEs in the 2012 ABFT stock assessement and the updated CPUEs (Fig. 4).



(a) Age structure of the updated inflated catch-at-age (in number)



(b) Age structure of the 2012 inflated catch-at-age (in %)



(c) Anomalies between the updated inflated and reported catch-at-age (in numbers)

Figure 3: Main characteristics of the inflated updated catch-at-age and comparison with the reported one (values are percentage)

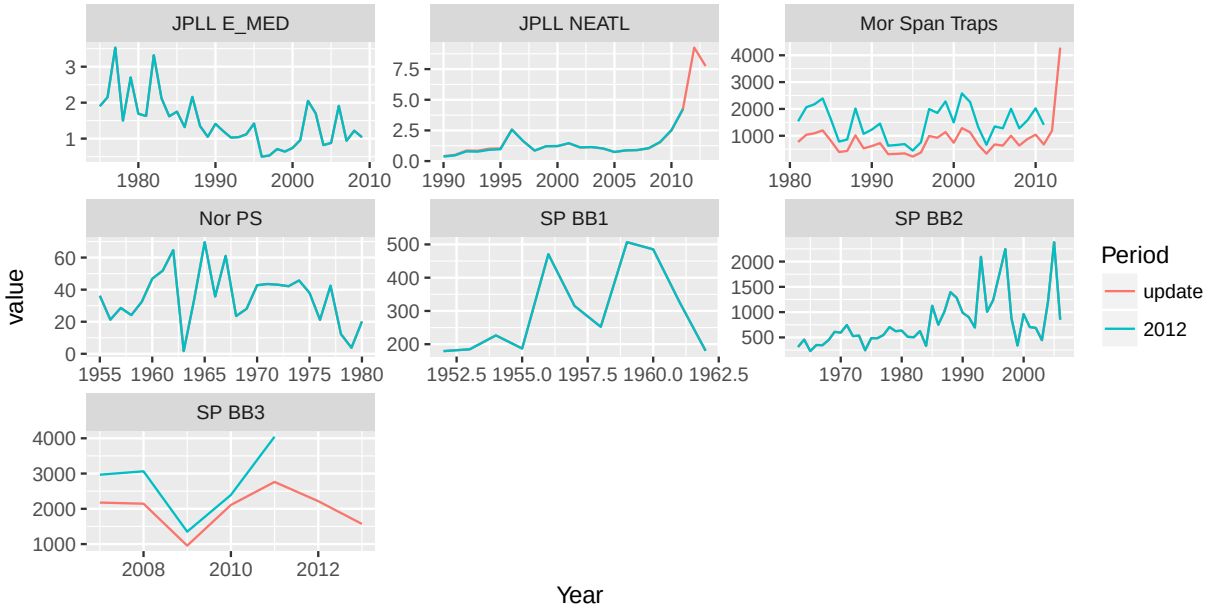


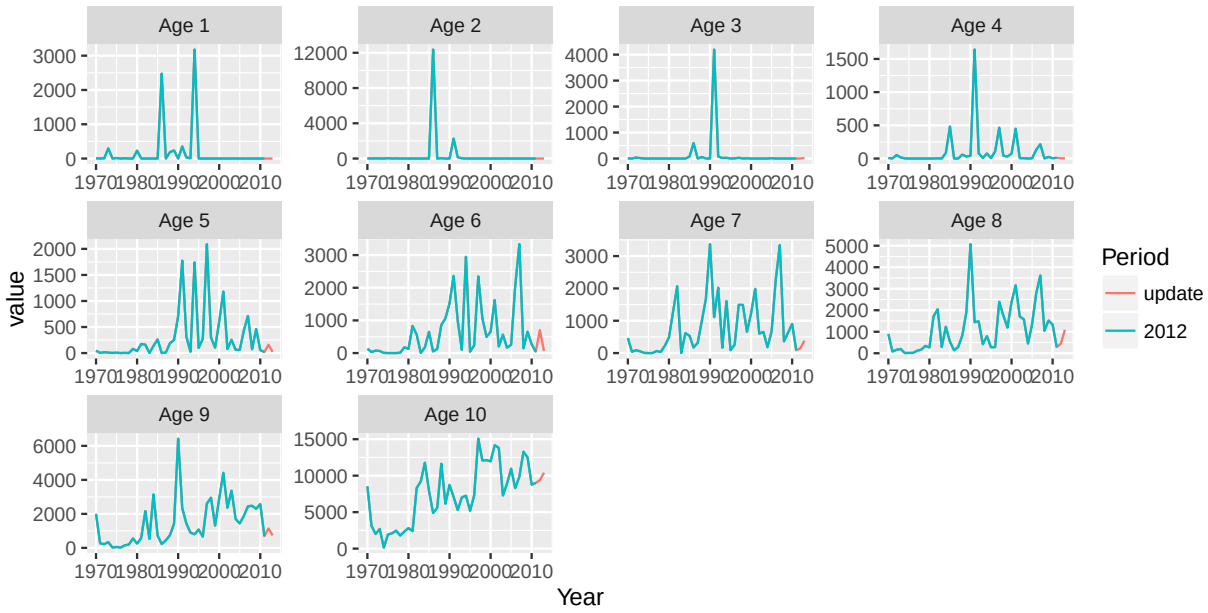
Figure 4: Comparison of the catch per unit of efforts (CPUEs) in the 2012 ABFT stock assessement and the updated CPUEs.

Weight at age

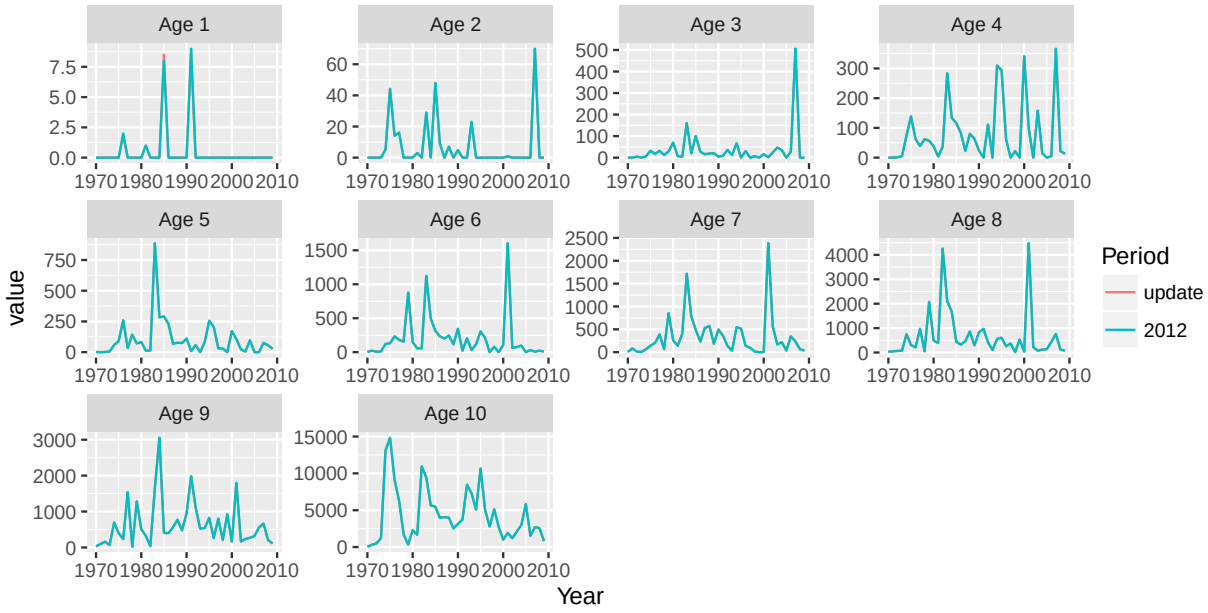
The weight-at-age calculation have been performed as previous years by divinding the landings-at-age data by the catch-at-age data.

Partial catch

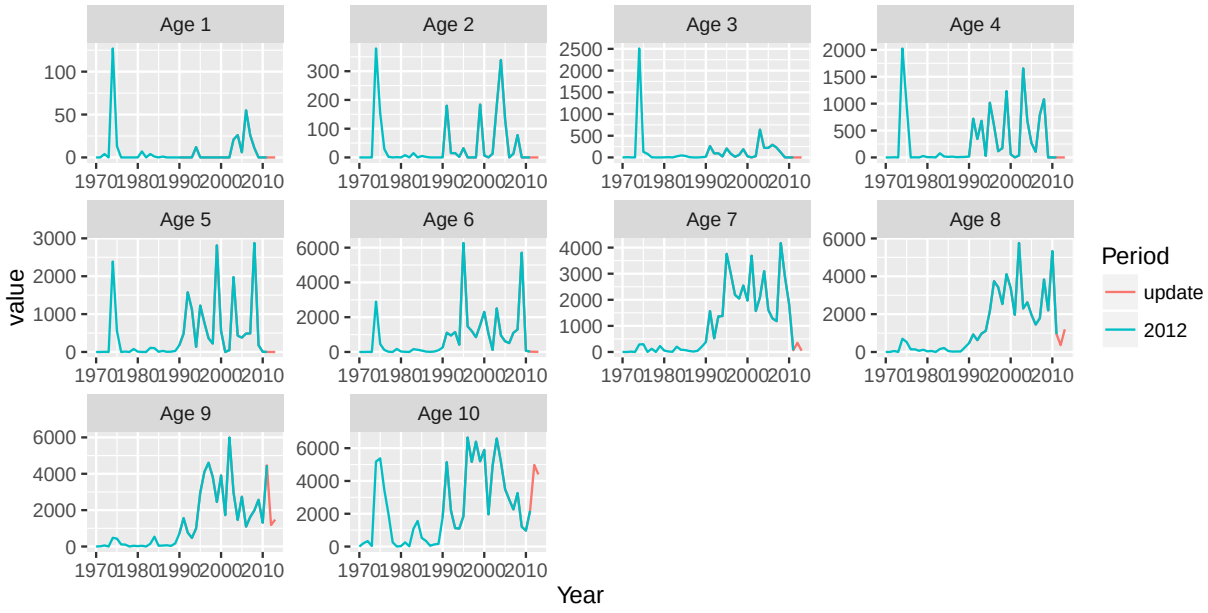
Partial catch are identical to last assessment. However, for 2011, small changes has occured as new catch data arrived in between. Here we show the comparison between the partial catch-at-age (PCAA) for each CPUE used in the 2012 ABFT stock assessement and the updated PCAAs (Fig. 6).



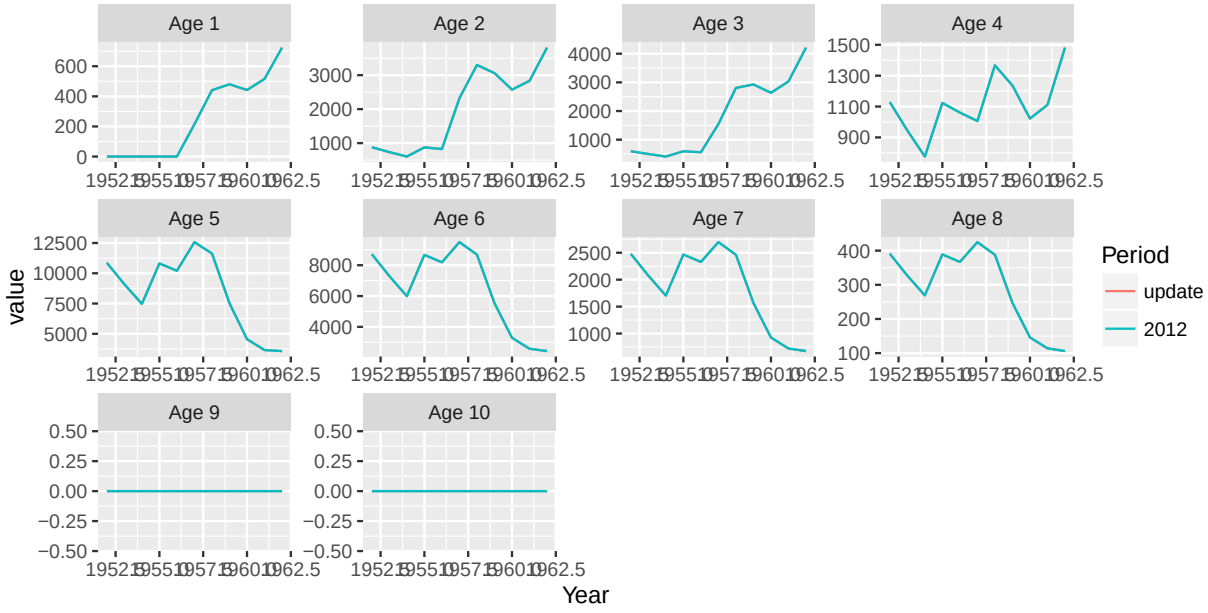
(a) Partial catch-at-age for Moroccan and Spanish traps



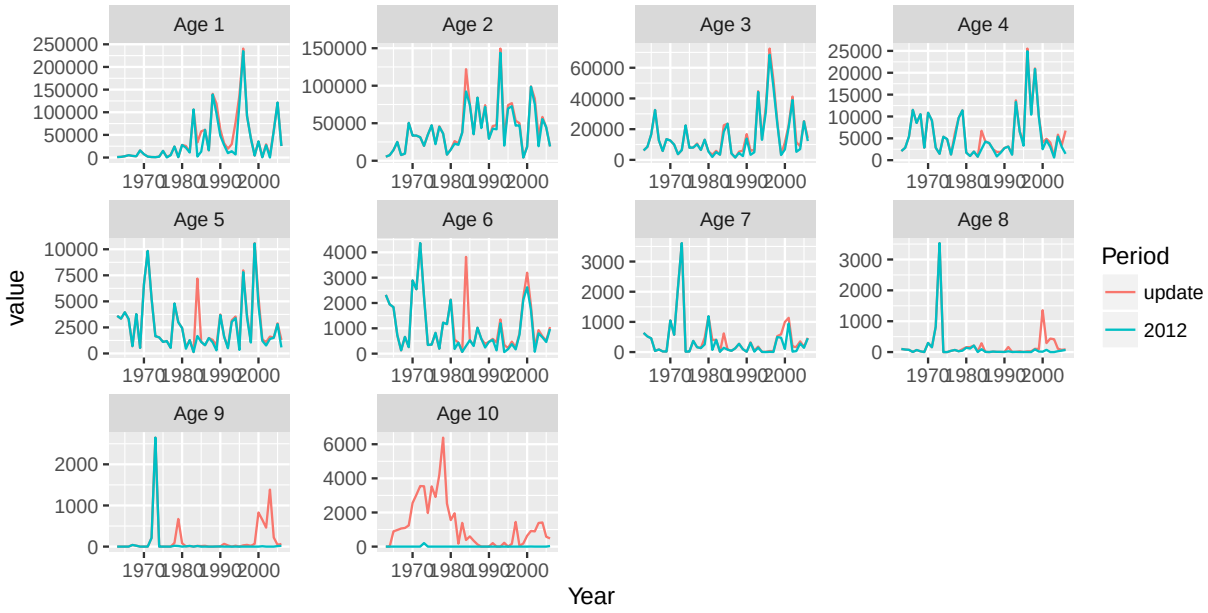
(b) Partial catch-at-age for Japanese Longline East and Mediterranean Sea



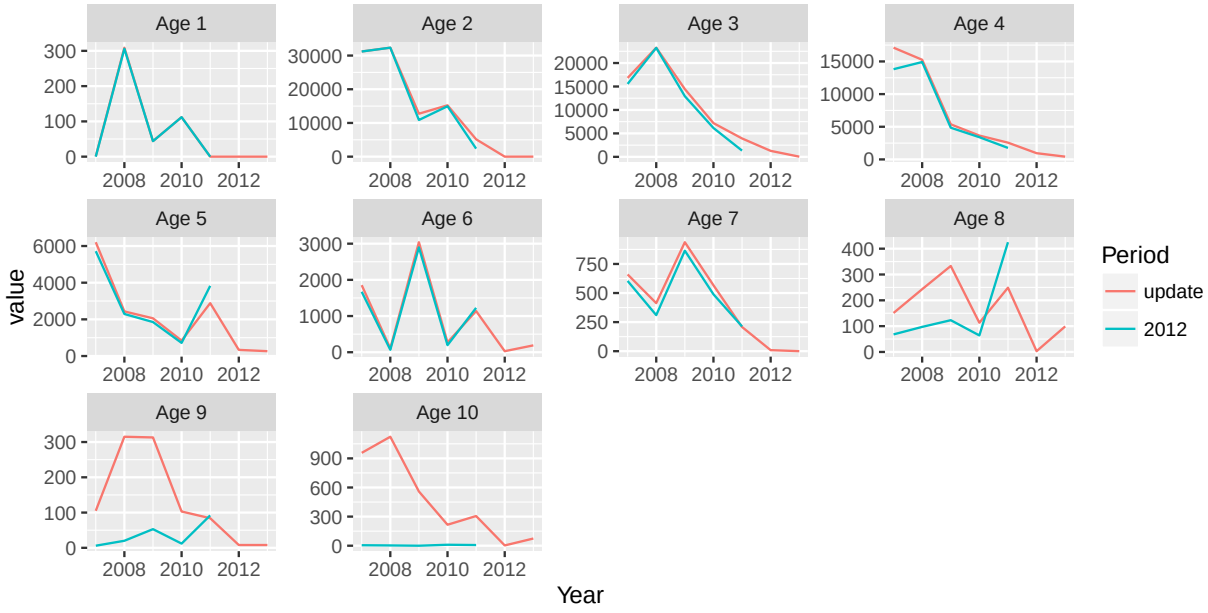
(c) Partial catch-at-age for Japanese longline NorthEast Atlantic



(d) Partial catch-at-age for Spanish baitboat 1



(e) Partial catch-at-age for Spanish baitboat 2



(f) Partial catch-at-age for Spanish baitboat 3

Figure 6: Comparison of the updated partial catch-at-age and the 2012 partial catch-at-age

2.2 Model used

VPA-2 Box and R

We will wrote a small paragraph about this.

VPA specifications

Here is the table of the specifications of the different model runs according to the plan from data preparatory group (Table 1).

Run	Year	effect
Run_2	1950-2013	all new data

Table 1: Specifications of the different model runs according to the plan from data preparatory group

3 Results

4 Run 1 and Run 3: Last stock assessment and update

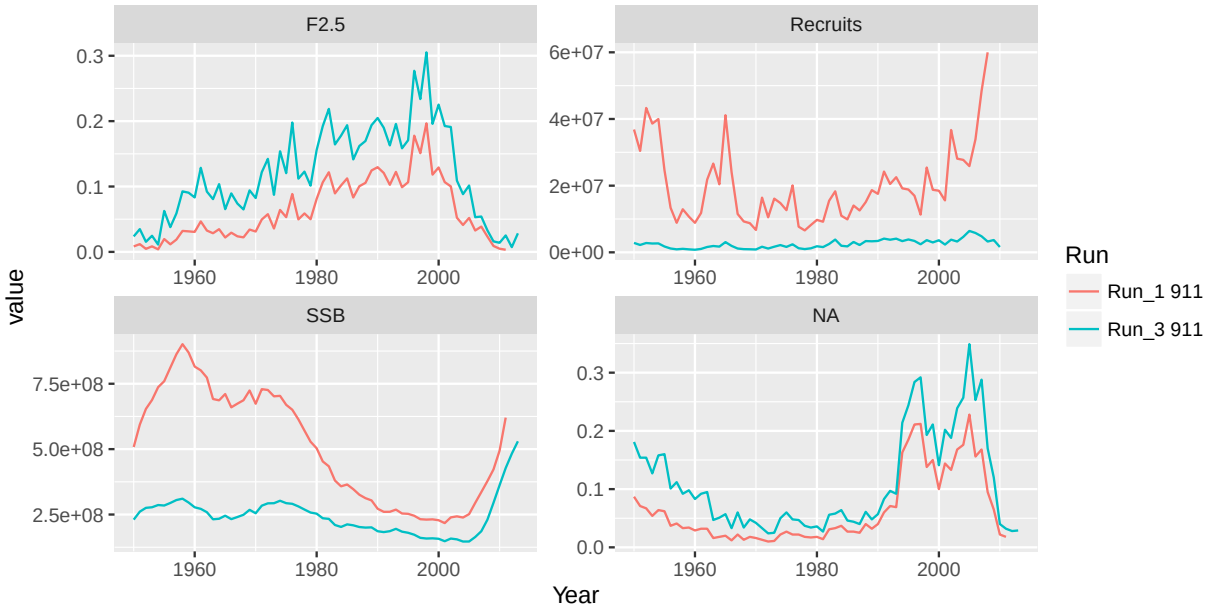


Figure 7: Run 1 and Run 3: Evolution of fishing mortality at age 2-5, fishing mortality for the 10+ group, recruitment (last three years are removed), and spawning stock biomass.

5 all Run: update of the stock assessment

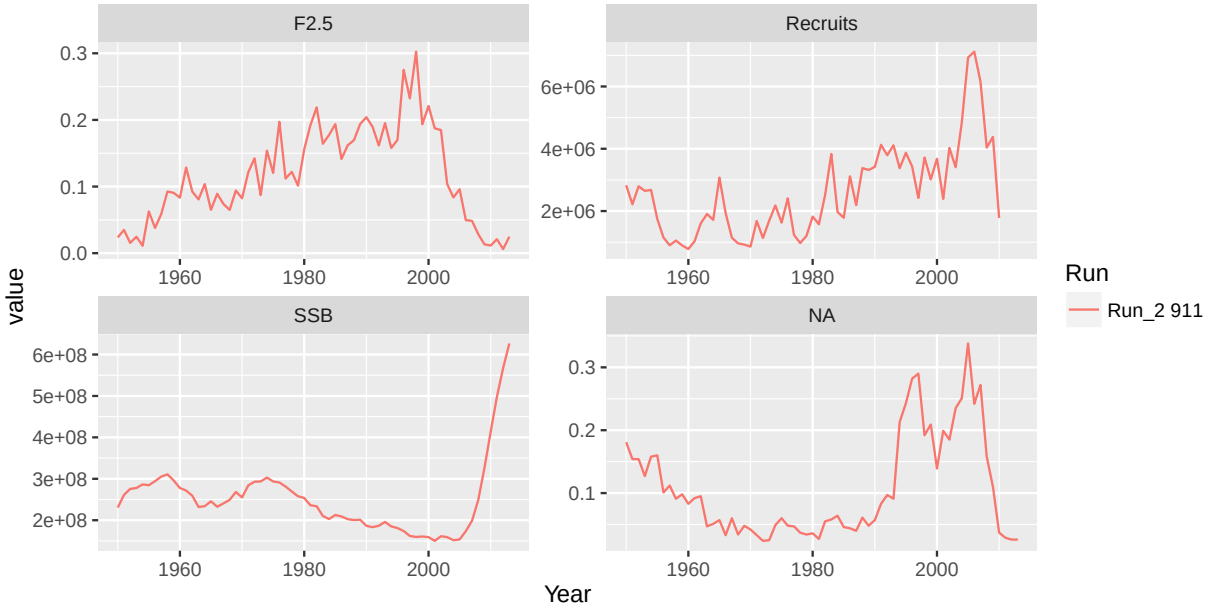


Figure 8: all Run: Evolution of fishing mortality at age 2-5, fishing mortality for the 10+ group, recruitment (last three years are removed), and spawning stock biomass.

[SSB] [Recruits] [F2.5] [Fplusgroup]

5.1 Retrospective analysis for Run 1

The retrospective analysis show potential problems since high differences can be observed when some years are removed from the analysis. However, we would have to investigate whether this could be due to the random number issue in the VPA fortran code.

Figure 9: Retrospective analysis for Run 1: Evolution of fishing mortality at age 2-5, fishing mortality for the 10+ group, recruitment (last three years are removed), and spawning stock biomass when removing sequentially 5 years.

5.2 Fit to CPUEs for Run 1

For Run 1, the range of residuals is reasonable (between -2 and 2) and no major trends are observed.

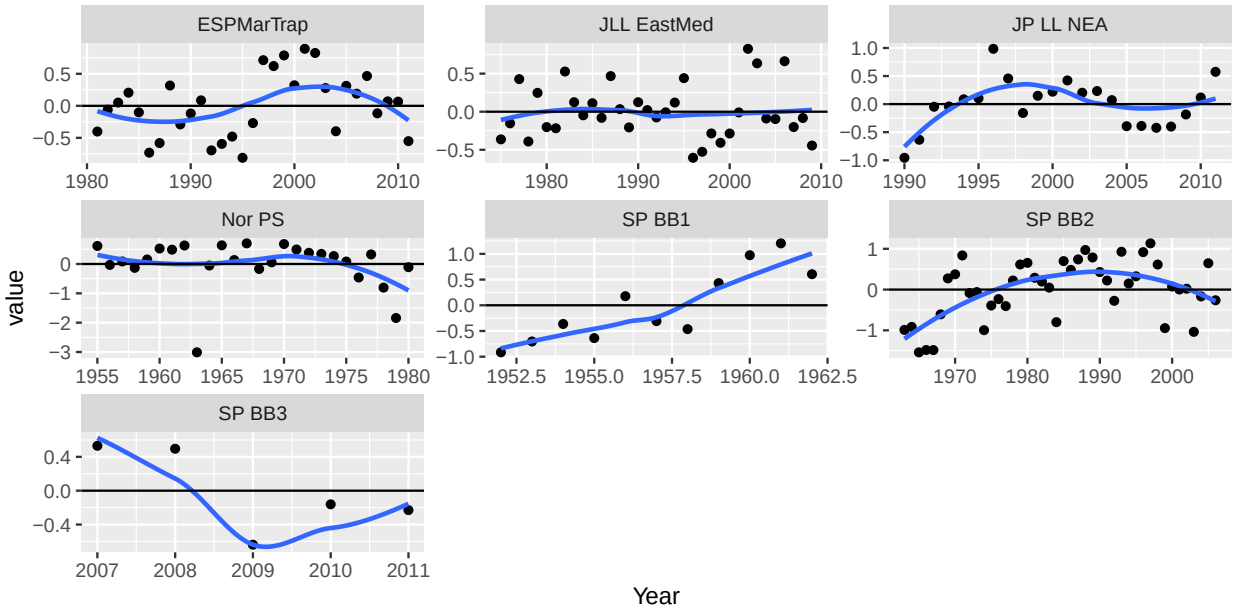


Figure 10: Time series of the fit to the different CPUEs for Run 1.

5.3 Fishing mortality at age for Run 1

The fishing mortalities for each ages are in agreement with historical knowledge of the fishery and show a sharp decline over the recent years.

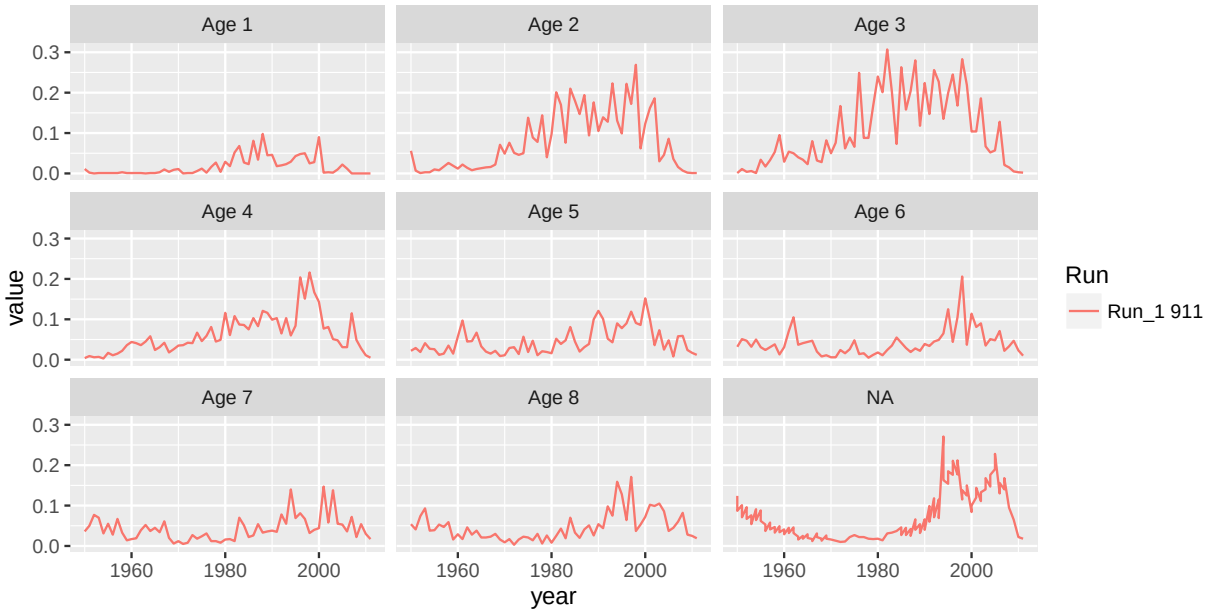


Figure 11: Fit to the different CPUEs for Run 5.