

**Recent findings on stock status:  
Eastern Atlantic and Mediterranean  
Bluefin tuna, Mediterranean  
Swordfish and Albacore**

*Working Group (WG2) on pelagic fishes -ICCAT*

*ICCAT Secretariat*

(10 October 2017)

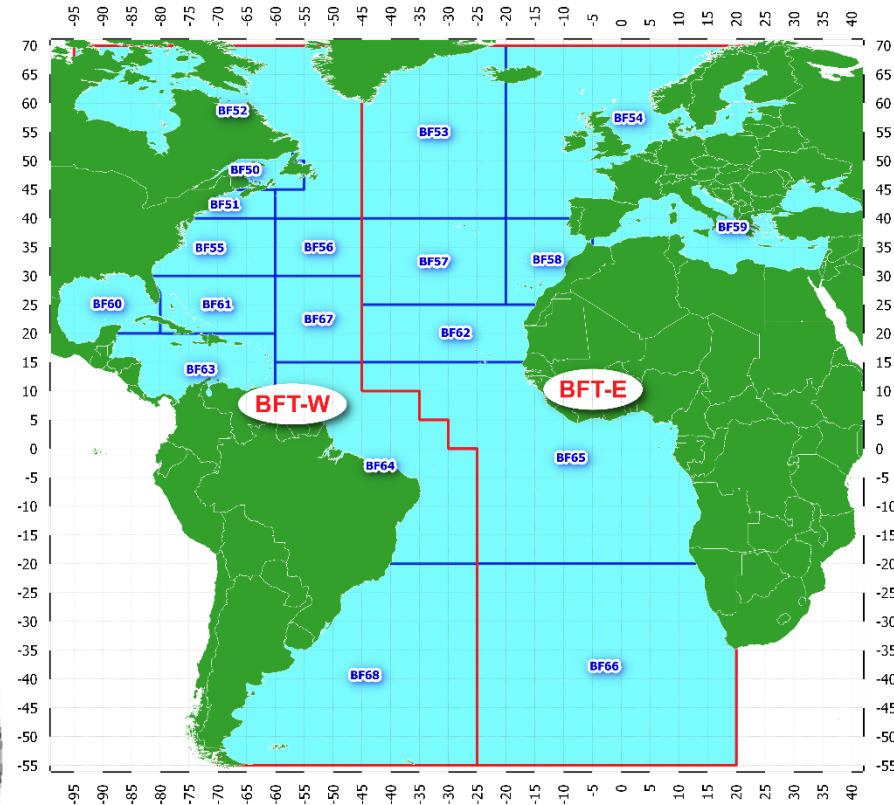
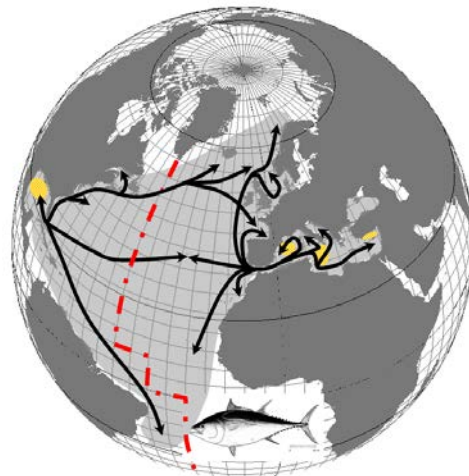
**ICCAT CICTA CICAA**



# Bluefin tuna: Background information

Managed by International Commission for the Conservation of Atlantic Tunas (ICCAT):

- Two stocks (mixing occurring, but extent not know)
- Last assessment in September 2014 (projections provided in 2016)
- Management through input control measures (e.g. vessel list, minimum size/weight, fisheries closures, etc.)



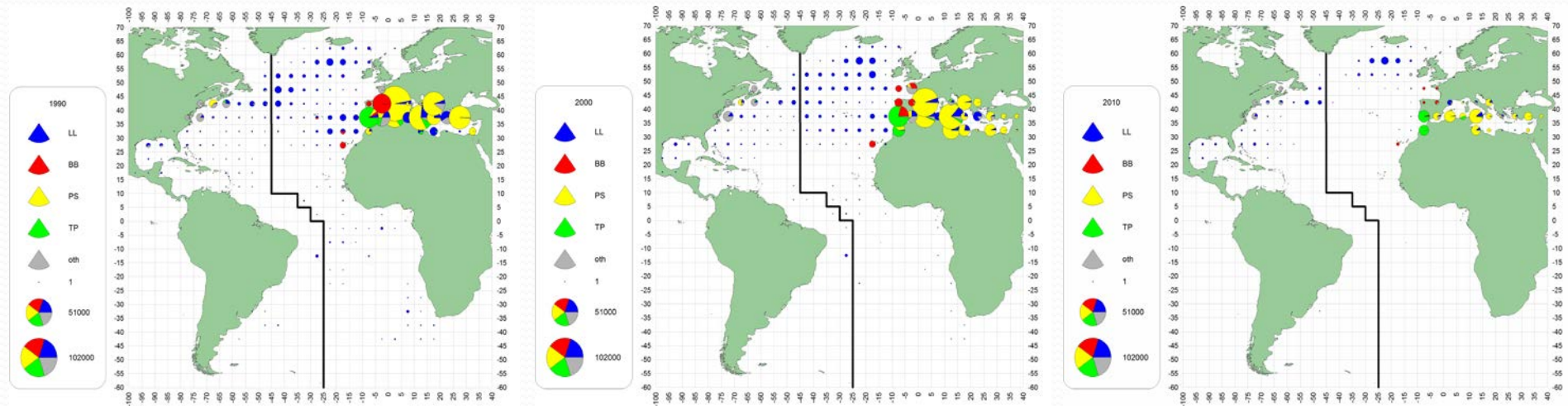
## Objective:

- Maintain the stocks at level which will permit maximum sustainable catch for food and other purposes



# Fisheries

- Main gears:
  - East-Atlantic -Traps, longlines (surface, mesopelagic) and baitboats
  - Mediterranean – Purse-seine, longlines and sport (HL+RR)



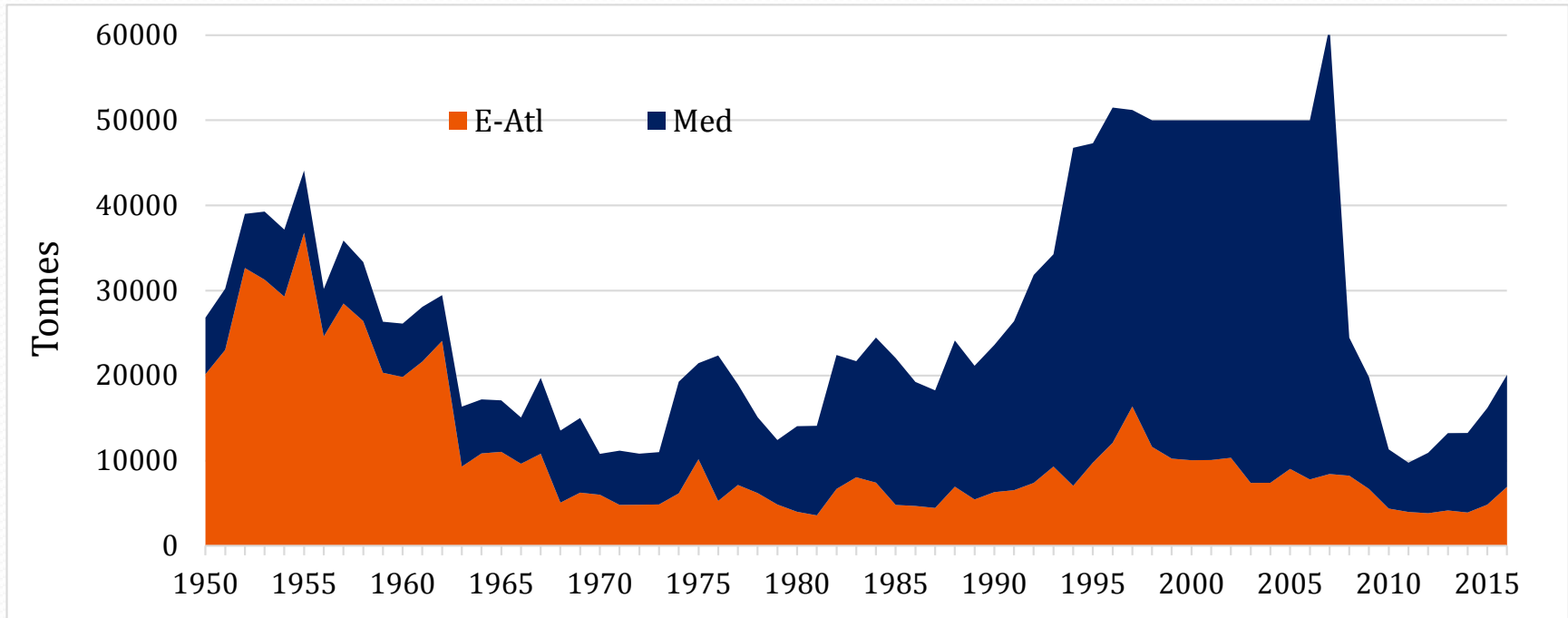
Geographic distribution of bluefin tuna catches per 5x5 degrees and per main gears from 1990 to 2016 (last decade only covers 6 years).



# Fisheries

- Production:

- a peak of 61,000t in 2007, average of 50,000t period 1996-2006
- 20,098t in 16 in 2016, of which 13,162t in the Mediterranean

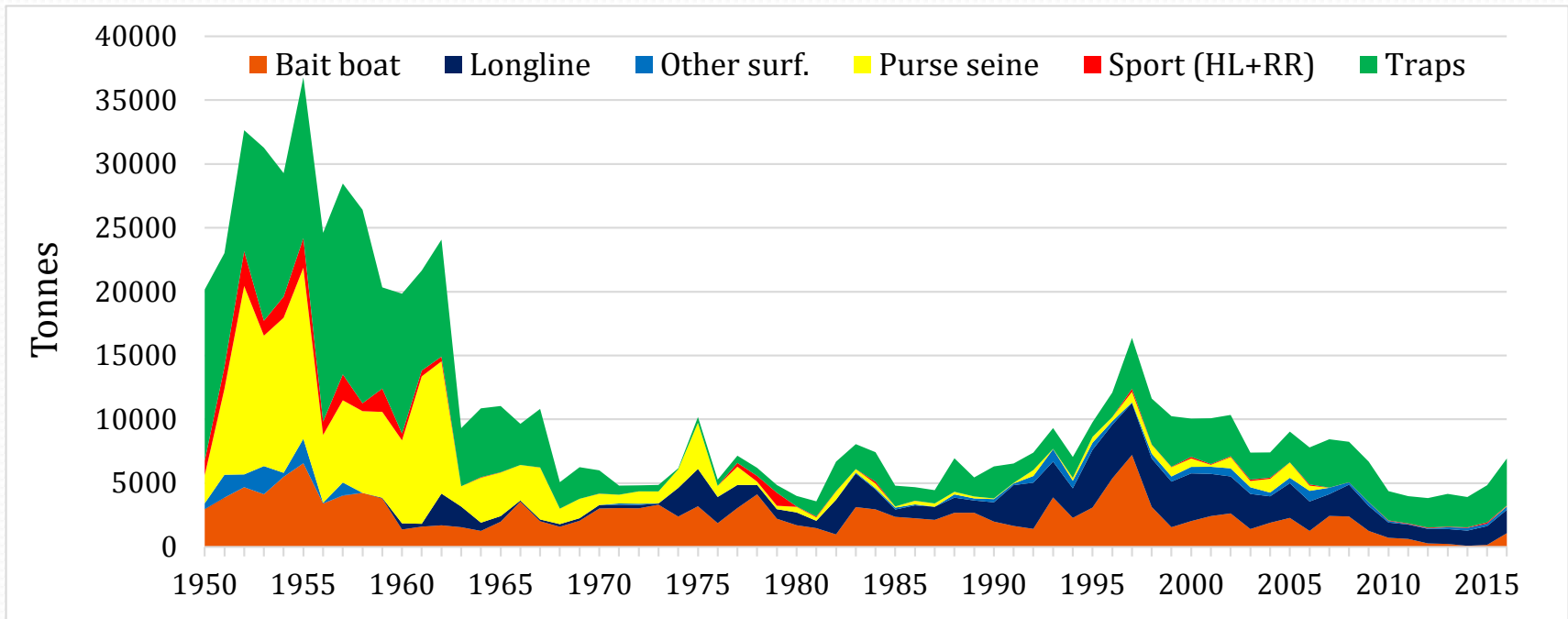




# Fisheries

Major fisheries:

- **East & Med 2016:** Spain (22.9%), France (16.9%) Italy (12.4%), Morocco (8.9%), Tunisia (7.3%)
- **Mediterranean 2016:** France (23.2%), Italy (18.9%), Spain and Tunisia (11.1%), Libya (10.4%) and Turkey (10.1%)





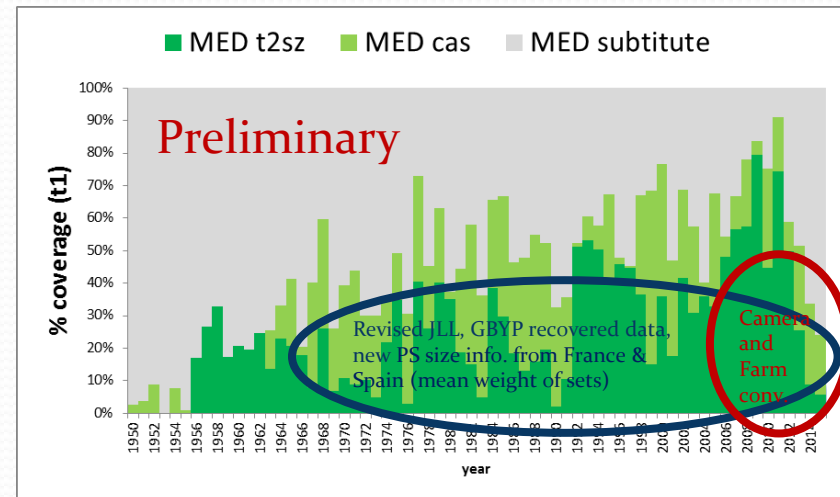
# Work conducted prior to the stock assessment

## More complete and detailed size series

- Stereoscopic cameras
- Back-calculations of farmed tuna
- Revision of the French and Spanish purse-seine catch length composition
- Revision of Japanese catch-at-size
- Historical data for the Bay of Biscay
- Italian Traps (Sardinia)
- Canada since 1999 (all gears)
- Algeria longlines
- Other minor gears (e.g. Portuguese traps)

## Fully revised Task I

- Elimination of UNCL (unclassified) gears
- Many gaps filled in
- Dozens of errors eliminated



**Considerable improvements** in the data quality and quantity, but **important gaps remain** (temporal and spatial coverage for detailed size and catch-effort statistics) for several fisheries, **especially in the Mediterranean**



## Selected indices:

### **Fisheries dependent (standardized CPUE):**

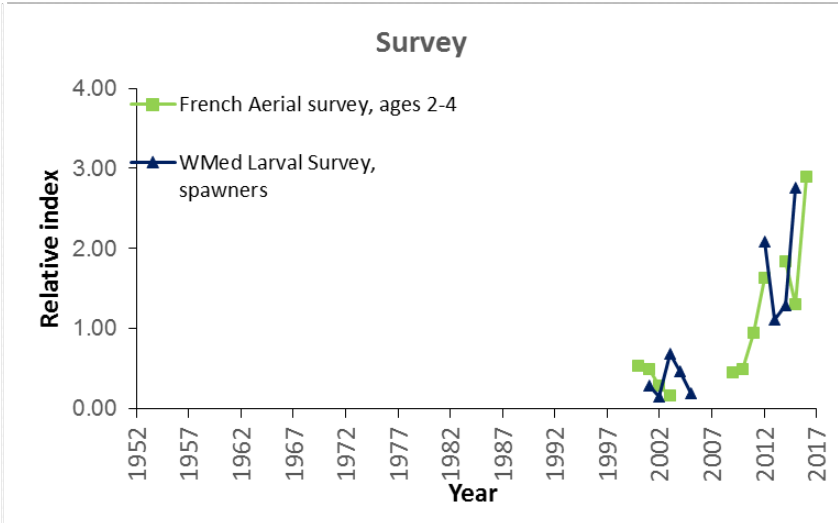
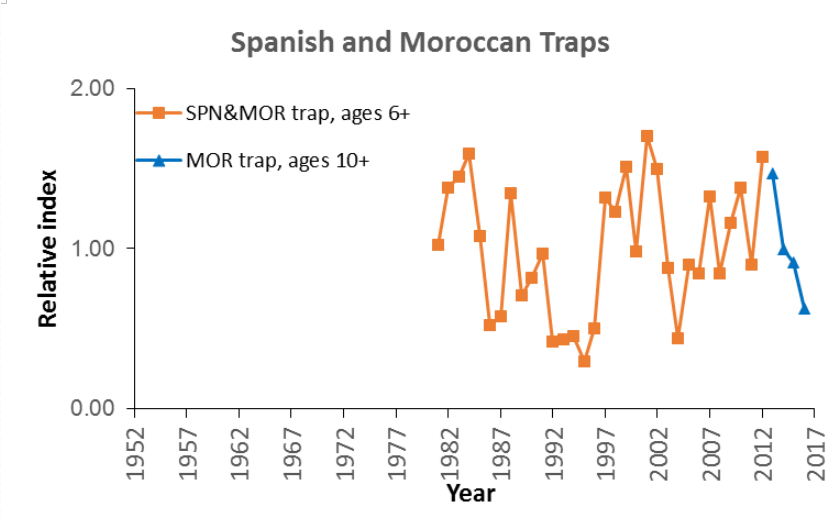
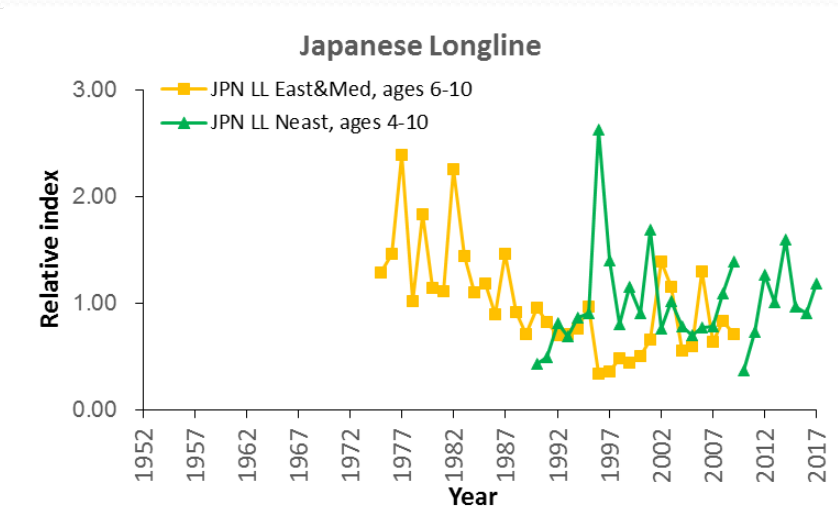
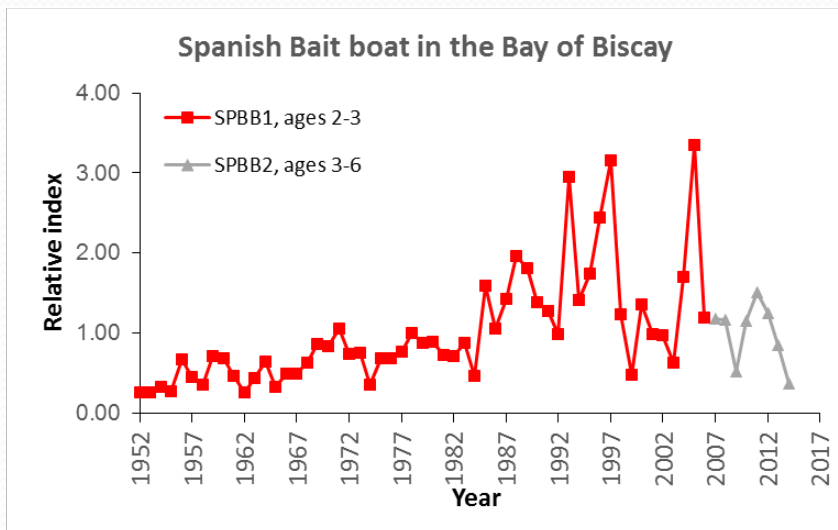
- Combined Morocco Spanish traps (1981- 2011)
- Combined Morocco Portuguese traps (2012-2015)
- Jap. LL in the NE. Atl 1 (1990-2009)
- Jap. LL in the NE. Atl 2 (2010-2015)
- Jap. LL in the Med+NE.40°-60°N (1975-2009)
- Spanish BB1 (1952-2006)
- Spanish BB2, Spanish and French combined (2007-2014)

### **Fisheries independent (surveys):**

- French aerial survey (2000 to 2003 / 2009 to 2012 and 2014-2015)
- Western MED Larval survey (2001-2005 and 2012 to 2015)
- **GBYP aerial survey (excluded due to limited period covered by the time series)**



# Fisheries dependent and independent indicators







## Other major changes on input data:

- New age specific natural mortality
- Length of the time series (starting 1968)
- Task I was updated with “inflated catch” and considered the best estimate of total removals (SCRS considered catches seriously under-reported between mid-1990’s through 2007).

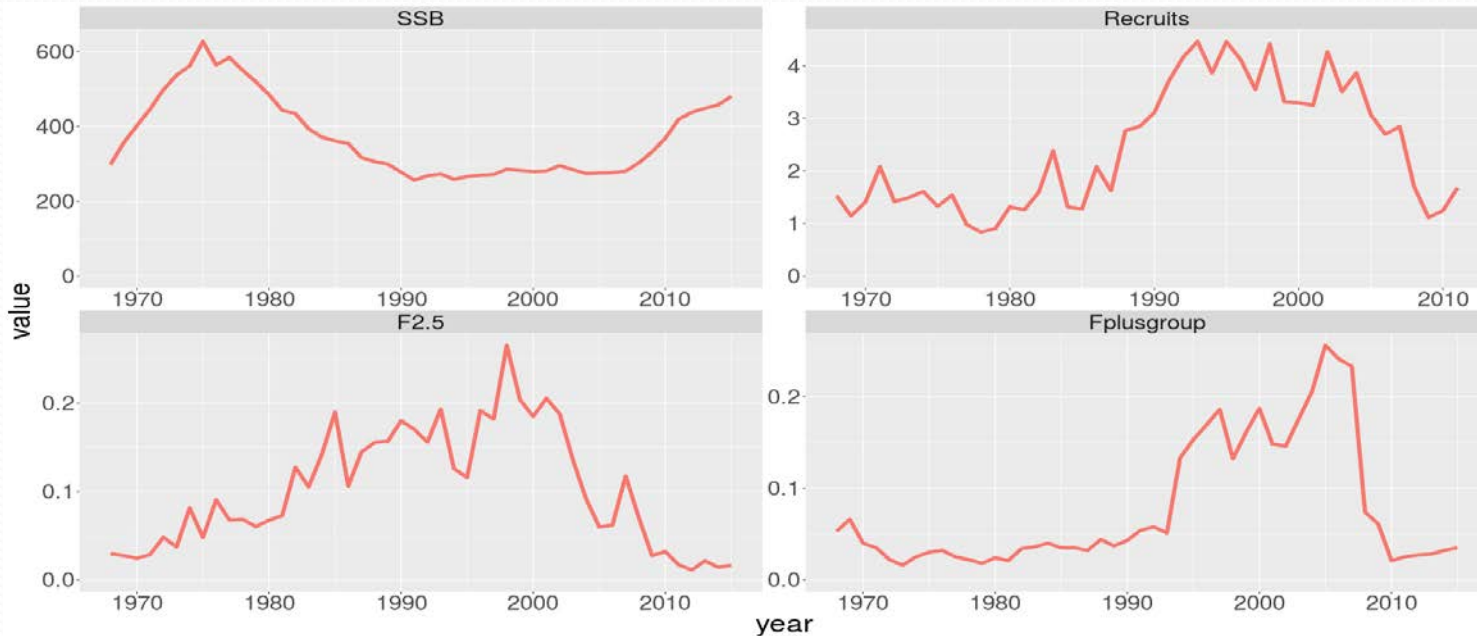
## Stock assessment models

**5 stock assessment platforms (models) were used and explored:**

- Stock Synthesis 3 (SS3)
- Age Structured Assessment Program (ASAP 3)
- State Space assessment model (SAM)
- Statistical-Catch-at-Length (SCAL)
- ... but only **Virtual Population Analysis** (VPA-2box) results were considered as primary basis for management advice



# SA in 2017: Biomass, Recruitment and Fishing mortality

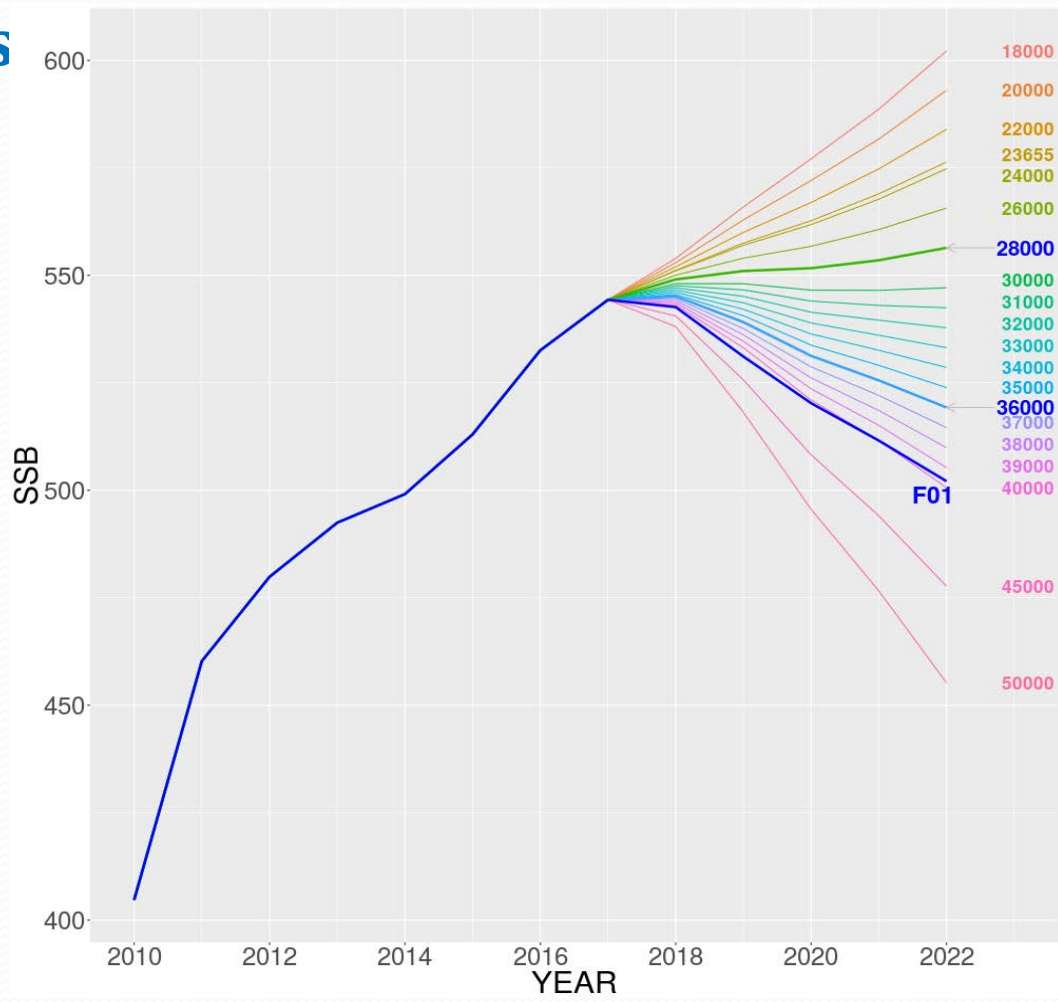


- Spawning Stock Biomass (SSB) peaked in mid-1970's, declined thereafter until 1991 and exhibited significant increase since late 2000's
- Recruitment (Recruits) were high 1993-2002, declines until 2009 followed by an increase in 2011 (poorly estimated thereafter)
- Fishing mortality over juveniles ( $F_{2.5}$ ) increased until late 1990's and then a sharp decline
- Fishing mortality over older fishes ( $F_{plusGroup}$ ) increased continuously until 2007, showing a rapid decrease thereafter



# SA in 2017: projections

- $F_{0.1}$  was considered a reasonable proxy for  $F_{MSY}$
- $F_{0.1}$  can be higher or lower than  $F_{MSY}$  depending on the stock recruitment relationship, which in this case is poorly determined



If an  $F_{0.1}$  strategy were to continue to be applied, over the longer term (2022) the resource would fluctuate around (the true, but unknown) value of  $B_{0.1}$  whatever the future recruitment level



# Projections: Kobe matrix

**Kobe II Strategy matrix** showing probabilities (%) of  $F < F_{0.1}$  for TACs from 18,000 to 50,000 t from 2018 through 2022 under the recent 6 years (2006-2011) recruitment scenario.

Constant catches up to 36,000 t have higher than 60% probability of maintaining  $F$  below  $F_{0.1}$  throughout 2022

	2018	2019	year 2020	2021	2022
18000	100	100	100	100	100
20000	99	99	99	99	99
22000	99	99	98	98	98
23655	98	98	98	98	98
24000	98	98	97	98	97
26000	97	96	96	96	96
28000	95	94	94	94	94
30000	93	92	92	90	89
31000	90	90	89	89	88
32000	89	88	87	86	83
33000	86	85	83	81	80
34000	82	81	79	78	75
35000	79	77	76	72	70
36000	75	73	70	68	64
37000	70	68	65	62	59
38000	65	63	60	57	54
39000	59	57	54	52	49
40000	56	52	49	46	44
45000	36	35	34	30	28
50000	24	22	20	18	18



# Synthesis

- Catches up to 38,000 t or 36,000 t have a greater than a 60% probability of maintaining  $F$  below  $F_{0.1}$  in 2020 or 2022, respectively
- Catches of 28,000 t or less have a higher than 50% the probability of allowing a continue increase in the stock
- Kobe strategy matrix cannot integrate some important sources of uncertainties that currently remain unquantified
- Several sensitivity runs of the VPA and preliminary results of other assessment models suggest catches at  $F_{0.1}$  that are notably lower than given by the base VPA



# East Atlantic and Mediterranean Bluefin tuna summary in 2017

Current reported yield (2016)	20,098 t*
$F_{0.1}$	0.107(0.103-0.120) <sup>1</sup>
$F_{2012-2014}/F_{0.1}$ <sup>2</sup>	0.339 (0.254-0.438) <sup>1</sup>
Stock Status	Overfishing: No Overfished: undetermined
Projected Yield <sup>3</sup> at $F_{0.1}$ in 2018	41,205 (31190 - 57770) t
Projected Yield <sup>3</sup> at $F_{0.1}$ in 2019	40,455 (31330 - 56600) t
Projected Yield <sup>3</sup> at $F_{0.1}$ in 2020	39,655 (30420 - 55280) t
[Rec. 12-03] TAC in 2013-2014	13,400 t – 13,400 t
[Rec. 14-04][Rec. 16-09] TAC in 2015-2017	16,142 t – 19,296 t – 23,655 t

1) Median and approximate 80% confidence interval from bootstrapping from the assessment.

2)  $F_{2012-2014}$  refers to the geometric mean of the estimates for 2012-2014 (a proxy for recent F levels).

3) Projected yield at  $F_{0.1}$  was calculated with the recent 6 years (2006-2011) recruitment level.

\* As of 29 September 2017.



# SCRS management recommendation

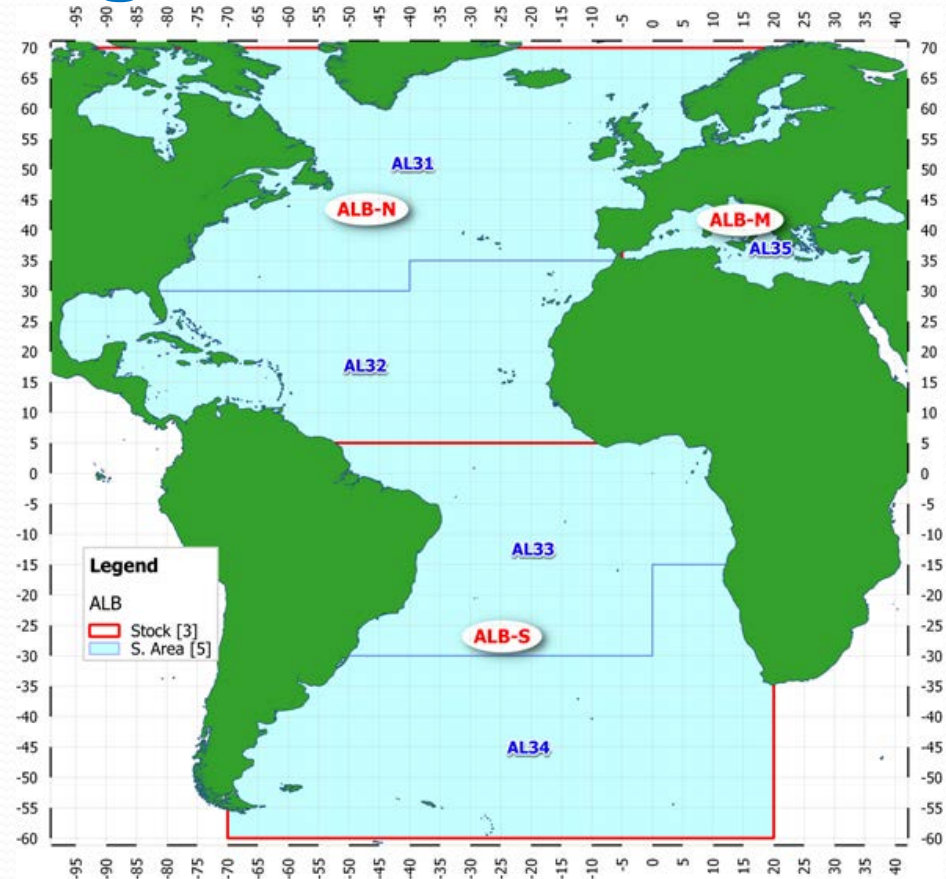
- **TAC advice** could be **based** on the Kobe matrix **results for either 2020 or 2022**
- TAC set at **38,000 t through 2020**, then it **may** have to **be reduced below 36,000 t in 2021 and 2022** to maintain above 60% probability of not overfishing
- **TAC of 36 000 t** is advised due to the **rebuilding** time frame set to 2022
- Committee advises that the **catches be increased using a gradual stepwise** approach to **36,000 t in 2020** (e.g. starting at 28,000 t, increasing by 4,000 t/year)
- The **stepped increases** should be **reviewed annually**
- Commission should consider **moving from** to the current **rebuilding plan** to a **management plan**



# MED Albacore tuna: Background information

Managed by International Commission for the Conservation of Atlantic Tunas (ICCAT):

- Three stocks (mixing occurring and sub-population within in stock, but extent not know)
- Last assessment in June 2017 (previously in 2011)
- Management through input control measures (e.g. vessel list, temporal fisheries closures)



## Objective:

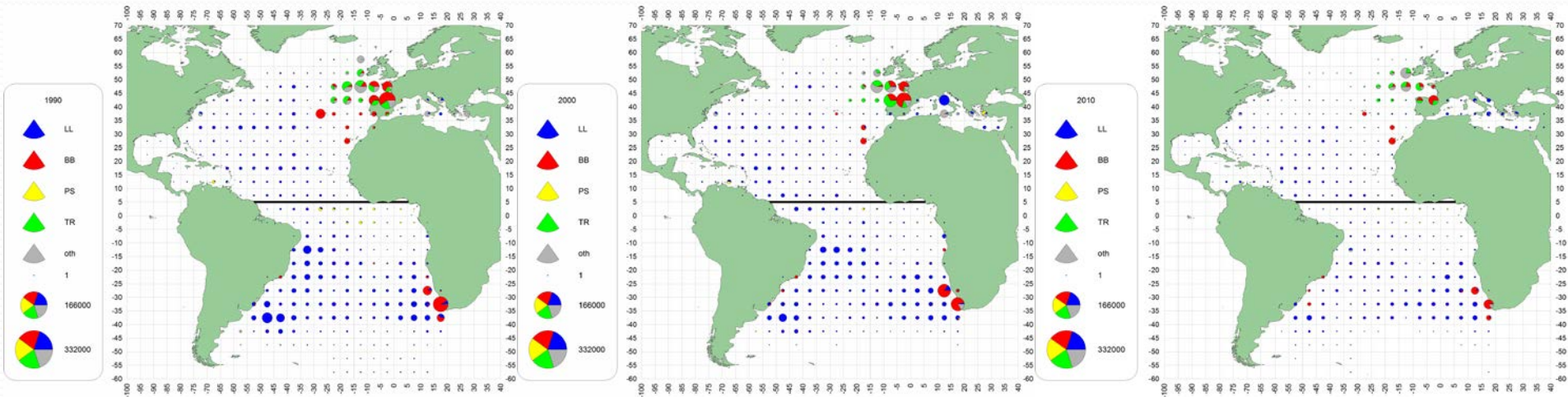
- Maintain the stocks at level which will permit maximum sustainable catch for food and other purposes





# Fisheries

- Main gears:
  - East-Atlantic - longlines (surface, mesopelagic) and baitboats
  - Mediterranean – Almost exclusively longlines



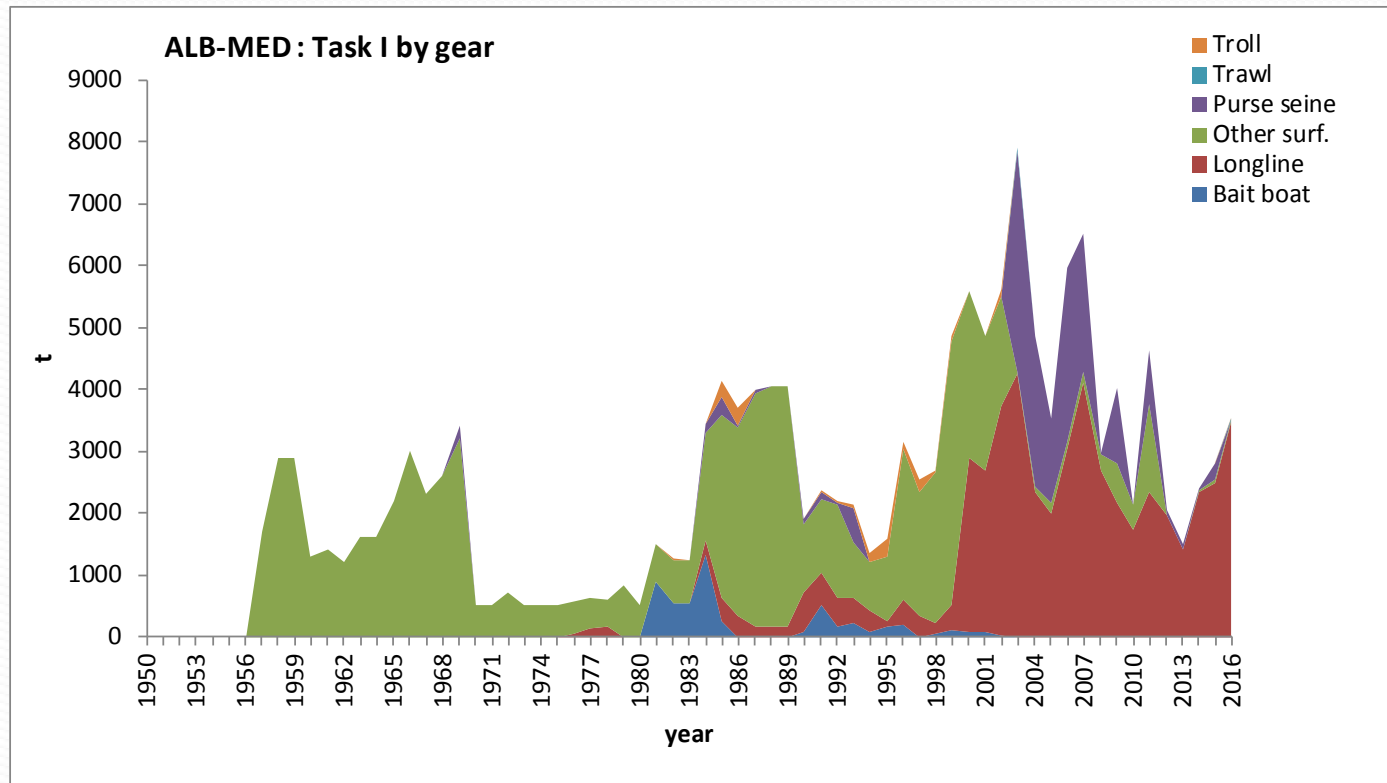
Geographic distribution of Albacore catches per 5x5 degrees and per main gears from 1990 to 2016 (last decade only covers 6 years).



# Fisheries

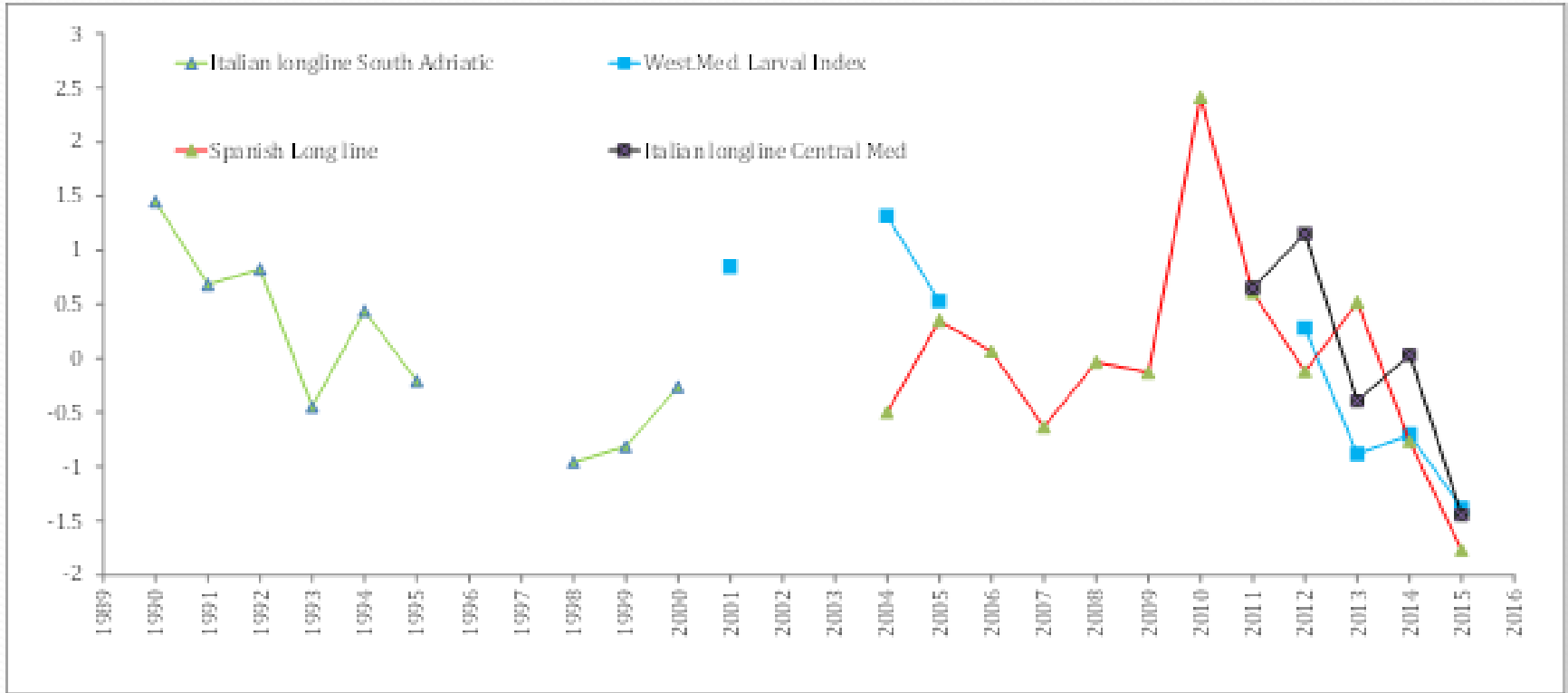
- Production in the Mediterranean:

- a peak of 7,898t in 2003, average of 2,717t period 2010-2016
- 3,098t in 2016





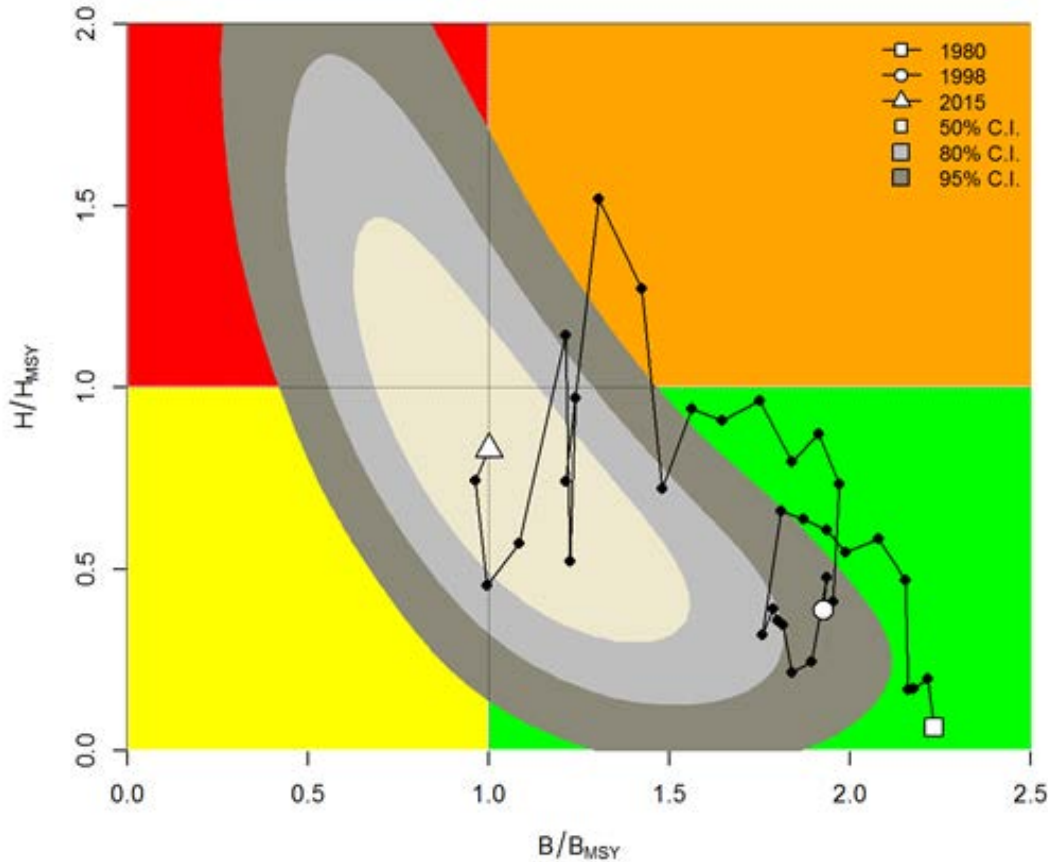
# Fisheries dependent and independent indicators



The three indices showed a decreasing trend for the period 2012-2015.



# Kobe plot – stock status



Stock status trajectories of  $B/B_{MSY}$  and  $F/F_{MSY}$  as well as uncertainty around the current estimate (Kobe plots) for the base case JABBA mode.

- Limited quantitative information is available to conduct a robust quantitative characterization on biomass status relative to  $MSY$  (Convention objectives).
- Despite the high uncertainty, the results seem to indicate that recent albacore median biomass levels are at about  $B_{MSY}$ , and median fishing mortality levels are below  $F_{MSY}$



Probability of being overfished and overfishing (red, 36%), of being neither overfished nor overfishing (green, 48%), and of being overfished or overfishing, but not both (yellow, 16%).



# Mediterranean Albacore summary in 2017

Maximum Sustainable Yield	3,419 t (2,187-7,842) <sup>1</sup>
Current (2017) TAC	Not established
Current (2016) Yield	3,519 t
Yield in last year of assessment (2014)	
Yield in last year of assessment (2015)	2,774 t
$B_{MSY}$	29,168 t (17,939-65,861) <sup>1</sup>
$F_{MSY}$	0.119 (0.072-0.192) <sup>1</sup>
$B_{2015}/B_{MSY}$	1.002 (0.456-1.760) <sup>1</sup>
$B_{2015}/B_{Lim}^3$	
$F_{2014}/F_{MSY}$	
$F_{2015}/F_{MSY}$	0.830 (0.223-2.194)
Stock Status	Overfished: NOT LIKELY
	Overfishing: NOT LIKELY
Management measures in effect:	[Rec. 16-05]: Time closure of two months (1 October- 30 November) for longlines, aimed at protecting the Mediterranean swordfish juveniles. A list of vessels authorized to target Mediterranean albacore implemented in 2017.

<sup>1</sup> Median and 95% CI for the base case.



# Management recommendations

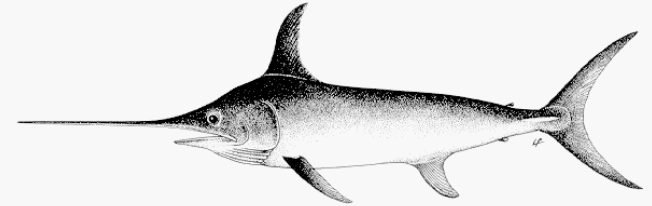
- Commission should institute management measures designed to avoid increases in catch and effort directed at Mediterranean albacore.
- The analyses suggest that catch levels as high as those in the years 2006-2007 (beyond 5,900 t) proved to be clearly unsustainable.
- Considering the high uncertainty regarding the most recent abundance trends, the Committee recommends to maintain catches below MSY at least until the abundance trends are updated. Level of catch depend on the level of risk the Commission is willing to take.



# Swordfish: Background information

Managed by International Commission for the Conservation of Atlantic Tunas (ICCAT):

- Unique stock (limited mixing with the N. Atlantic one)
- Last assessment in July 2016
- Management through input control measures (e.g. TAC, vessel list, min. size/weight, fisheries closures)



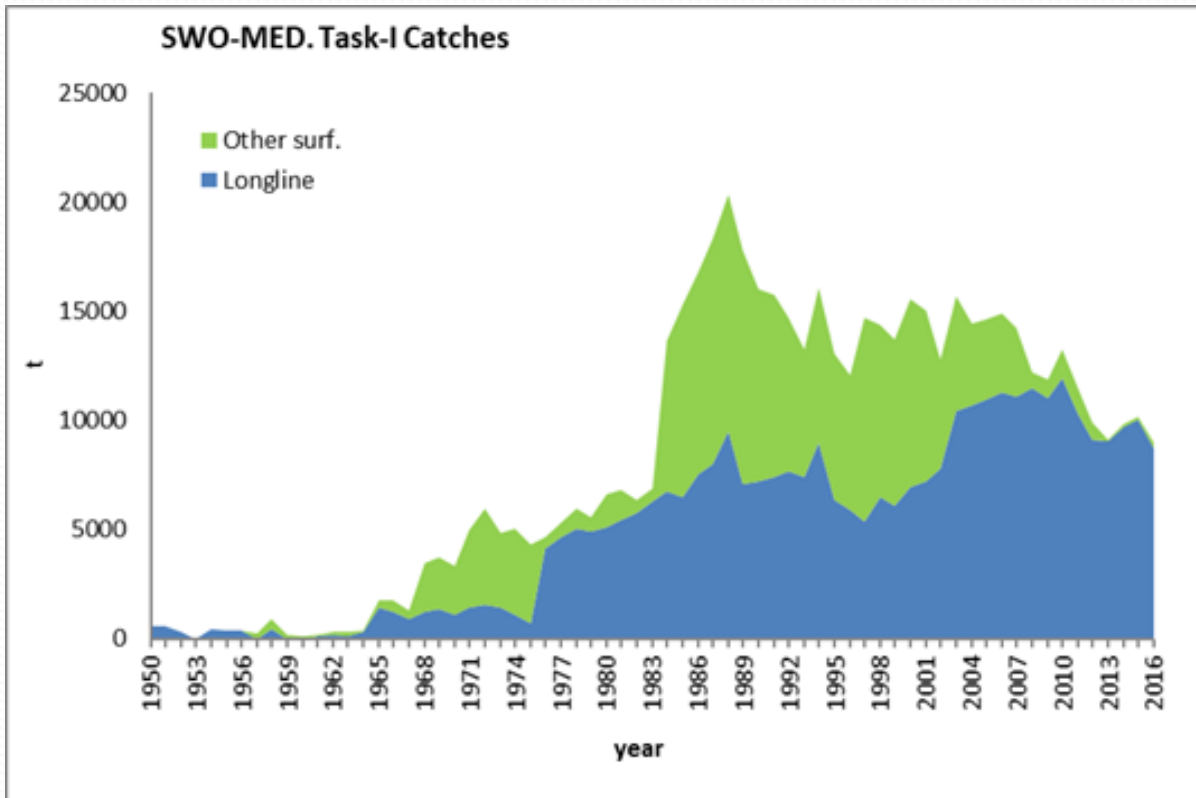
## Objective:

- Maintain the stocks at level which will permit maximum sustainable catch for food and other purposes



# Fisheries

- Main gears: Longlines (surface, mesopelagic) and Gillnets (prohibited since 2012)
- Production around 10,000 t in the recent years, with a peak of 20,365 t in 1988
- Major fisheries (2003-2016): Italy (38%), Spain (20%), Greece (11%), Morocco and Tunisia (8%)



Cumulative estimates of Task I swordfish catches (t) in the Mediterranean by major gear types, for the period 1950-2016. Misreporting may occur in the earlier period (up to the middle 1980s).





# Mediterranean Swordfish summary in 2017

Maximum Sustainable Yield	19,683 t <sup>1</sup>
Current reported yield (2016)	8,954 t <sup>2</sup>
SSB <sub>MSY</sub>	63,426 t <sup>1</sup>
F <sub>MSY</sub>	0.25 <sup>1</sup>
Relative Spawning Biomass (SSB <sub>2015</sub> /SSB <sub>MSY</sub> )	0.12 <sup>1</sup>
Relative Fishing Mortality	
F <sub>2015</sub> /F <sub>MSY</sub>	1.85 <sup>1</sup>
F <sub>2015</sub> /F <sub>0.1</sub>	2.64 <sup>1</sup>
Stock Status	Overfishing: Yes <sup>1</sup> Overfished: Yes <sup>1</sup>
Management Measures in Effect:	Driftnet ban [Rec. 03-04] Three month fishery closure, gear specifications (number and size of hooks and length of gear), minimum catching size, regulations, list of authorized vessels, fishing capacity restrictions, TACs (10,500t), 15 year Recovery plan starting in 2017 [Rec. 16-05].

<sup>1</sup> Estimates based on the XSA and equilibrium analyses (see text for details).

<sup>2</sup> Estimates for 2016 are considered preliminary.



# Allocation Key for Mediterranean Swordfish recently approved

	<i>CPC TAC allocation (%)</i>	<i>2017 Quota per CPC (t)</i>
Algeria	5.238	550.000
European Union	70.756	7410.480
Morocco	9.952	1045.000
Tunisia	9.597	1007.694
Turkey	4.200	441.000
Reserve Other CPCs	0.436	45.826
<b>Total</b>	<b>100</b>	<b>10,500</b>



## **Additional details on the Bluefin and Albacore tunas 2017 stock assessments available at:**

*[http://iccat.int/Documents/Meetings/Docs/2017\\_BFT\\_ASS\\_REP\\_ENG.pdf](http://iccat.int/Documents/Meetings/Docs/2017_BFT_ASS_REP_ENG.pdf)*  
*[http://iccat.int/Documents/Meetings/Docs/2017\\_ALB\\_REP\\_ENG.pdf](http://iccat.int/Documents/Meetings/Docs/2017_ALB_REP_ENG.pdf)*

**Visit also the ICCAT 2017 meeting webpage**  
(Report of the Meeting of the Standing Committee on Research and Statistics, SCRS)

*<http://iccat.int/en/meetingscurrent.htm>*

**Thanks for your attention**