

*Science, Service, Stewardship*

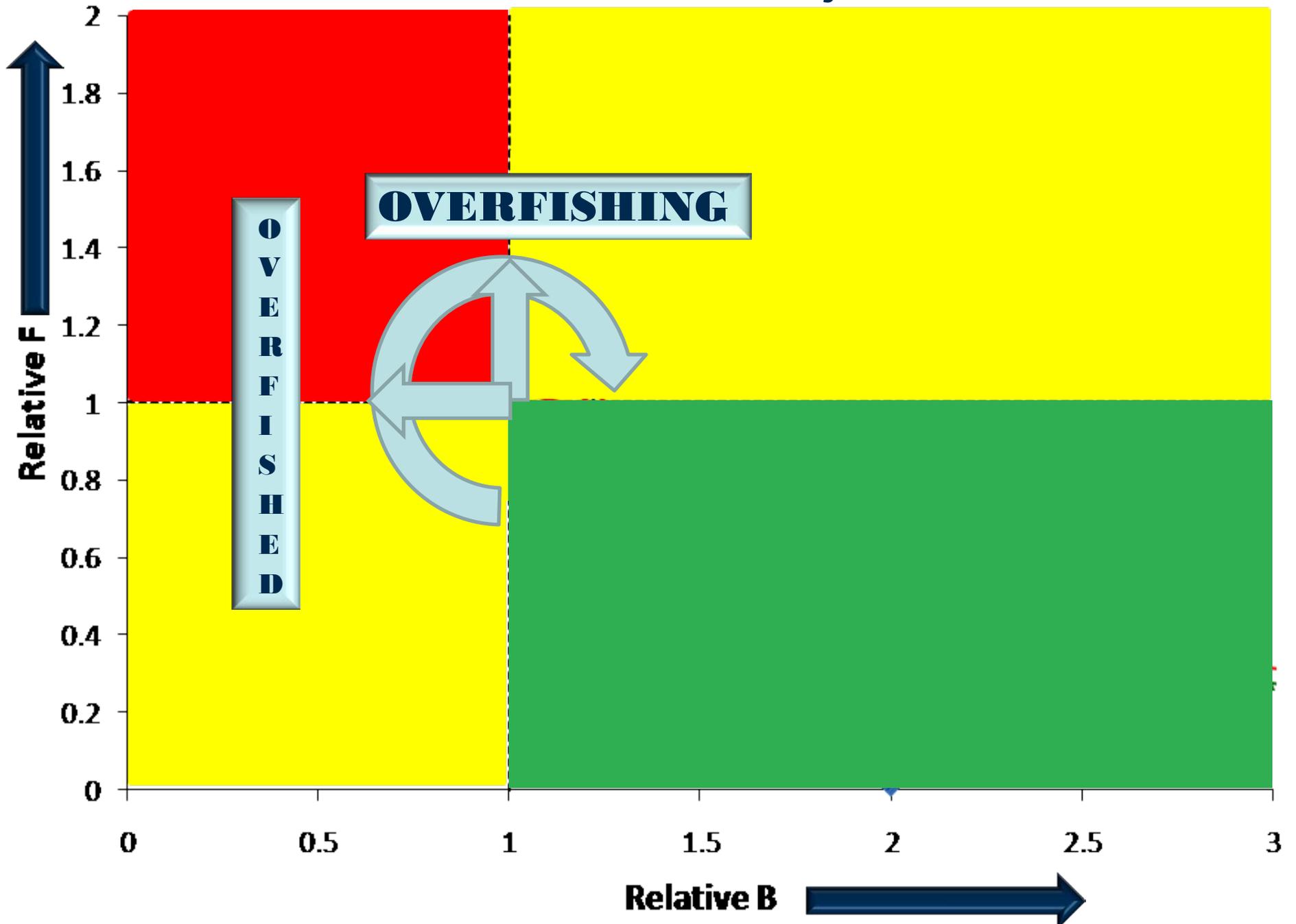


# Presentation of SCRS Meeting Results and Advice

**2014 Fall Meeting of the  
Advisory Committee to the U.S. Section to the  
International Commission for the Conservation of Atlantic Tunas  
October 9<sup>th</sup>–10<sup>th</sup>, 2014 Silver Spring, MD**

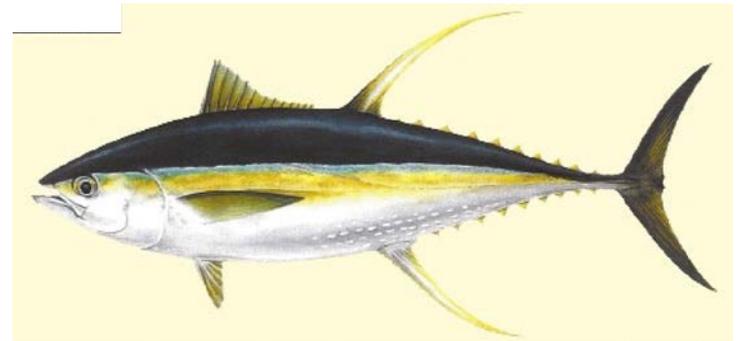
**NOAA  
FISHERIES  
SERVICE**

# Stock Status Trajectories





# Bigeye, Albacore, Yellowfin and Skipjack (BAYS) Tunas





**LAST ASSESSED IN 2010:**  
**In 2009, the stock and fishery were**  
**close to the Convention's objectives**

---

**ATLANTIC BIGEYE TUNA SUMMARY**

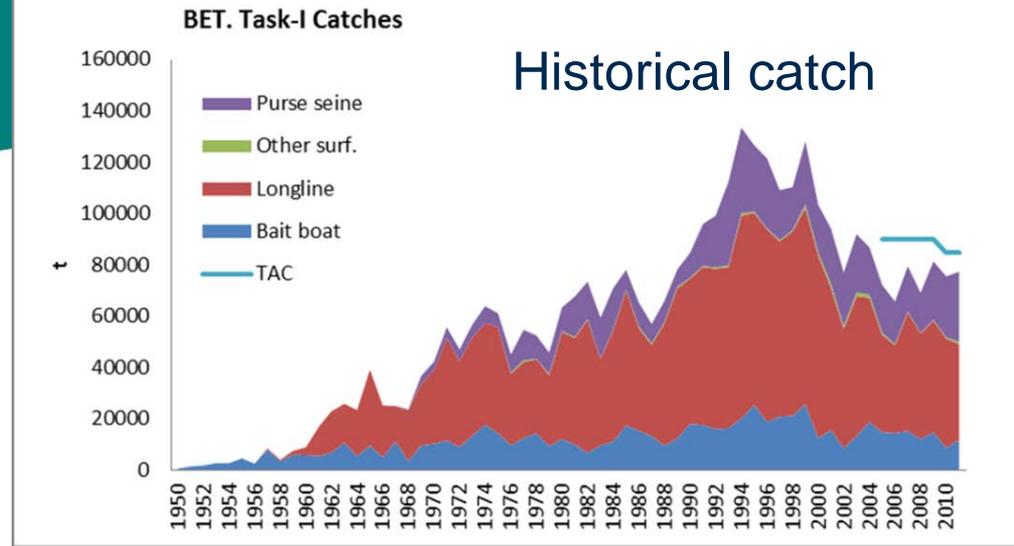
---

Maximum Sustainable Yield	<b>78,700- 101,600 t (92,000 t)</b>
Current (2013) Yield <sup>3</sup>	<b>63,066 t</b>
Replacement Yield (2011)	<b>64,900 -94,000 (86,000 t)</b>
Relative Biomass ( $B_{2009}/B_{MSY}$ )	<b>0.72-1.34 (1.01)</b>
Relative Fishing Mortality $F_{2009}/F_{MSY}$	<b>0.65-1.55 (0.95 )</b>

<sup>3</sup> *current yield is preliminary*



**Relative abundance indices**

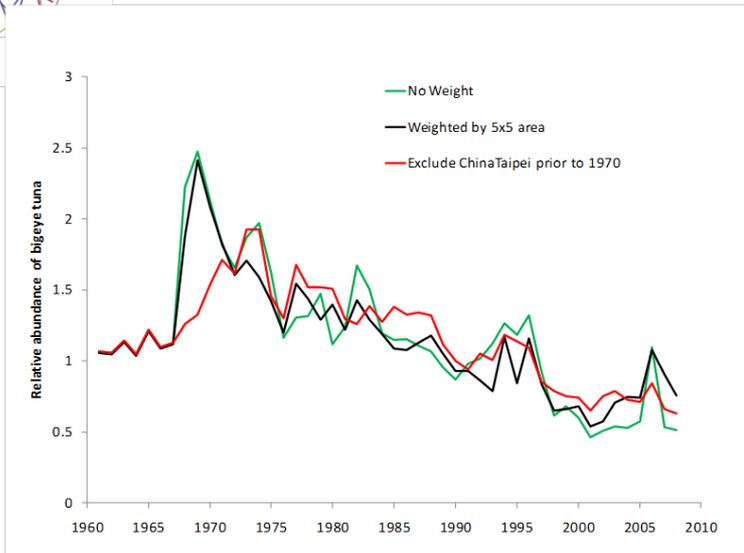
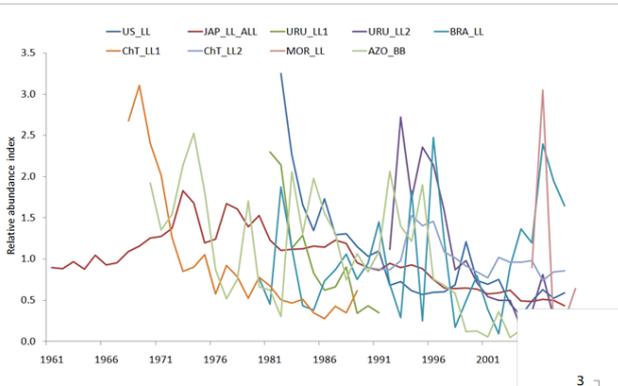


**Historical catch**

2011 (preliminary) catch 77,513 t

6 from longline fleets  
and 1 from Baitboat fleet

**MAIN sources  
of data  
for assessment**



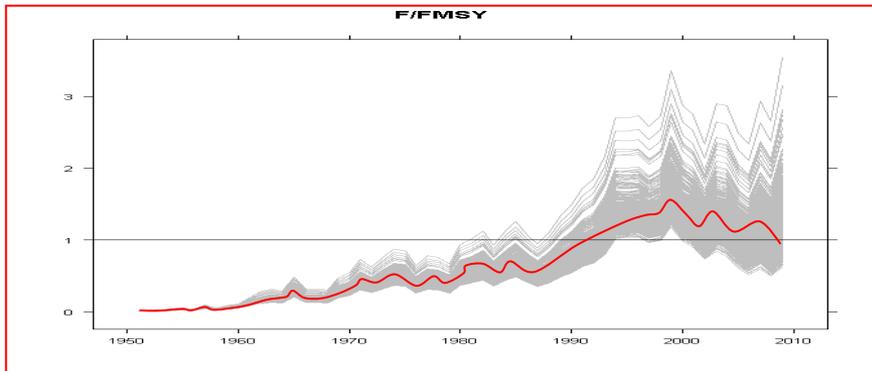
3 different  
combined indices



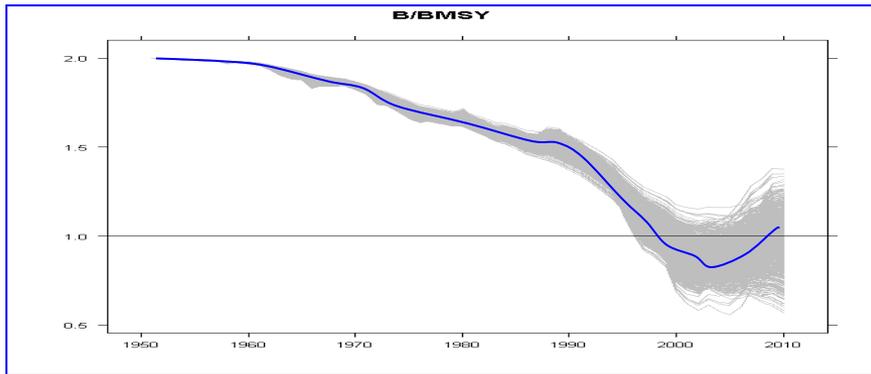


# Characterization of uncertainty in the assessment of stock status for bigeye tuna

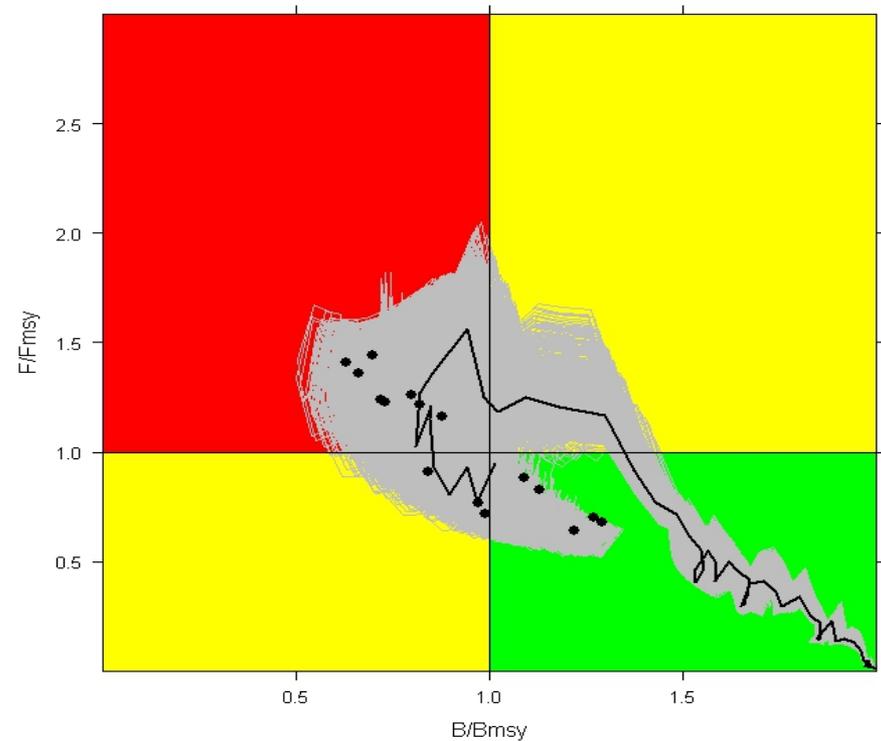
## Observation uncertainty



*$F/F_{MSY}$  and  $B/B_{MSY}$  estimated from the logistic production model*



## Model uncertainty



*Terminal year status (black dots) from all other models considered in the assessment*



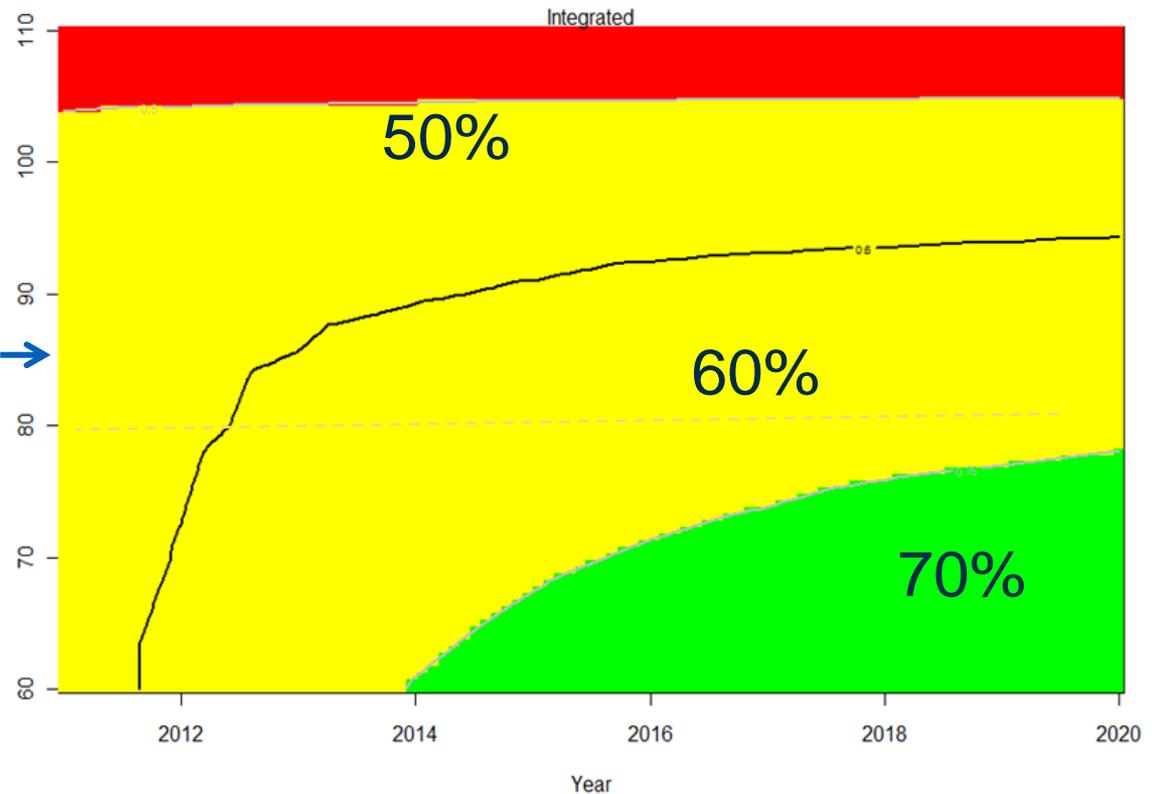
# KOBE plot matrix

Current TAC 85,000 t

Reported catch 2011  
77,513 t

TAC

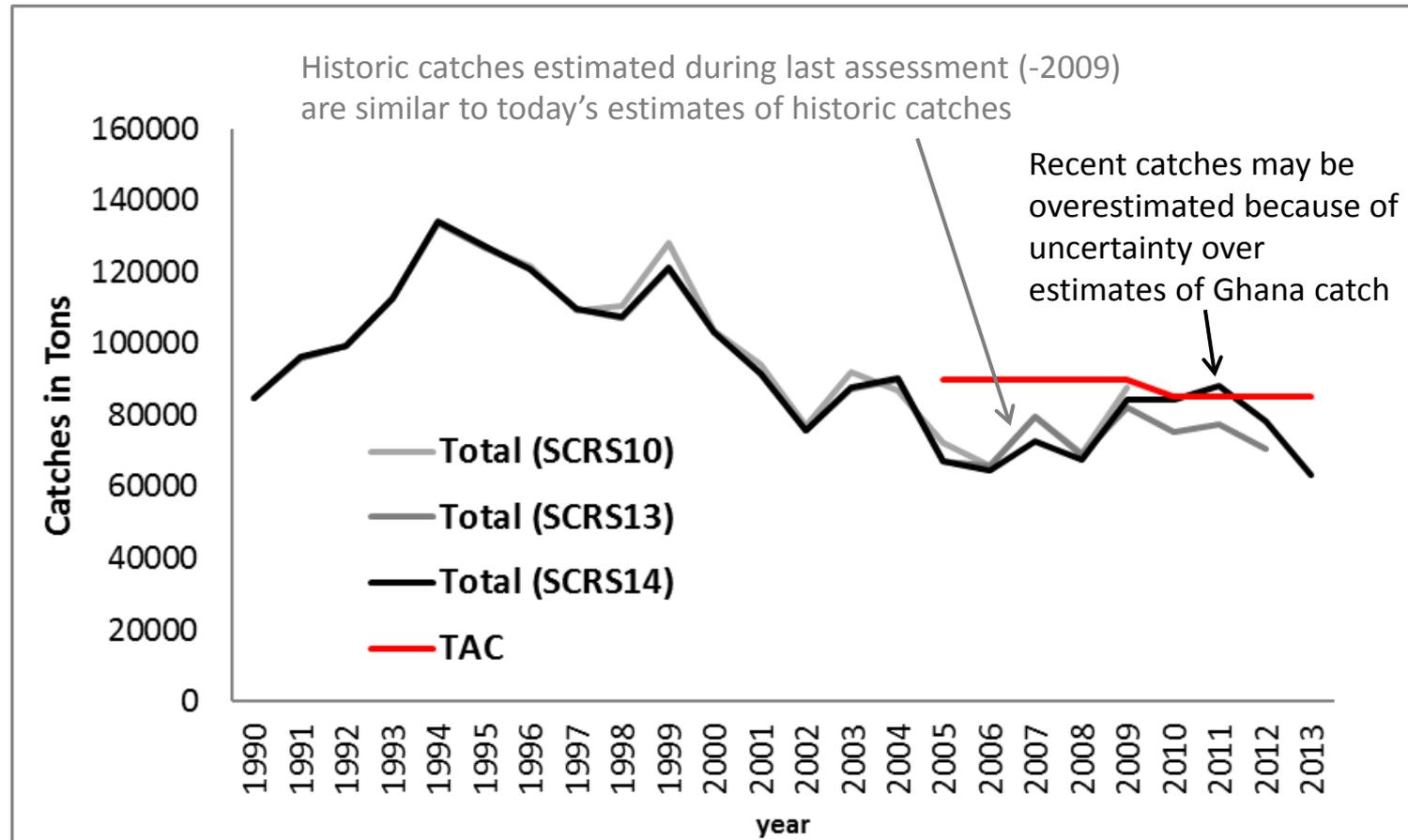
Probabilities of the stock being above  $B_{MSY}$  and fishing mortality below  $F_{MSY}$  in a given year for a future constant catch (TAC)



*Projections were calculated from results of the combination of the three logistic production model runs used as the basis of the assessment*

# Recent Trends: Catch (mt)

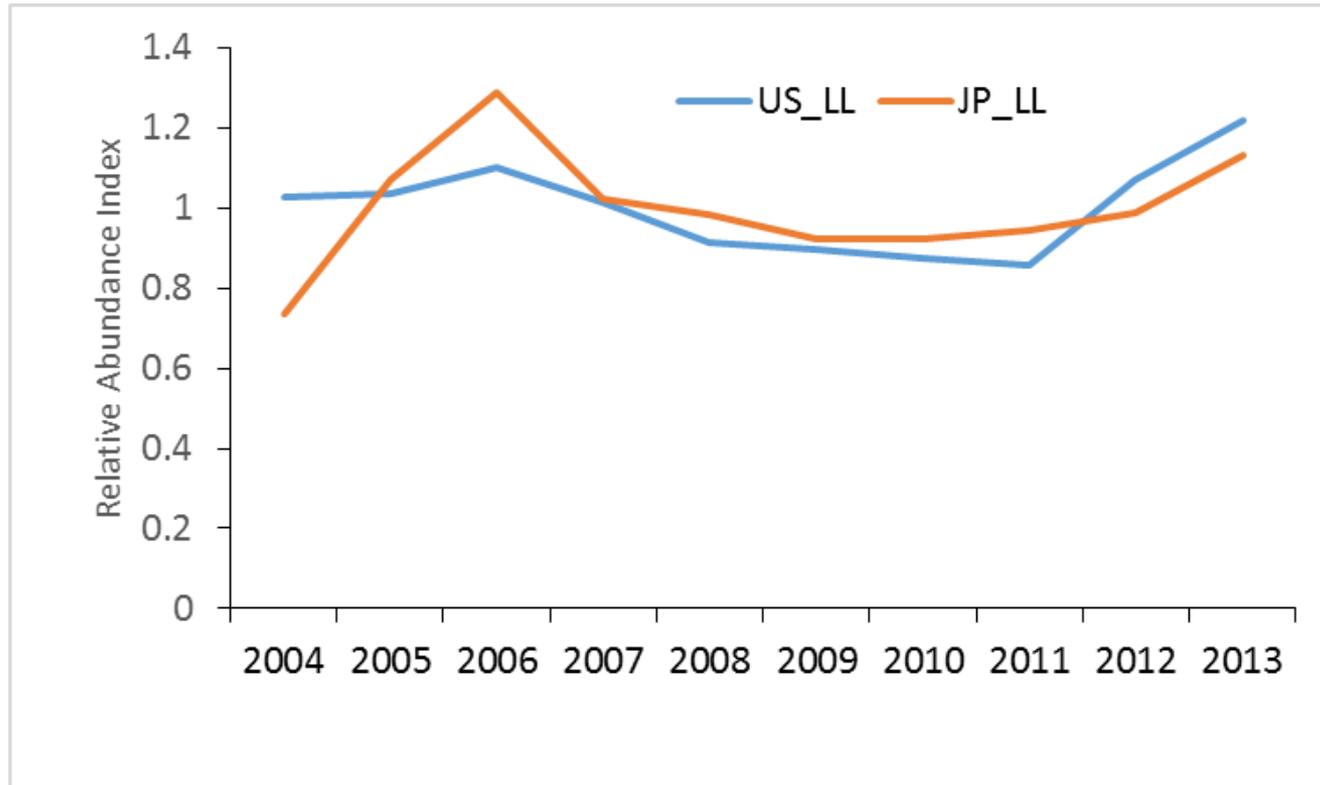
## No large changes since last assessment



2013 (preliminary) catch 63,066 mt

## Recent trends: updated longline indices

No conclusions drawn,  
especially as no other indices were updated

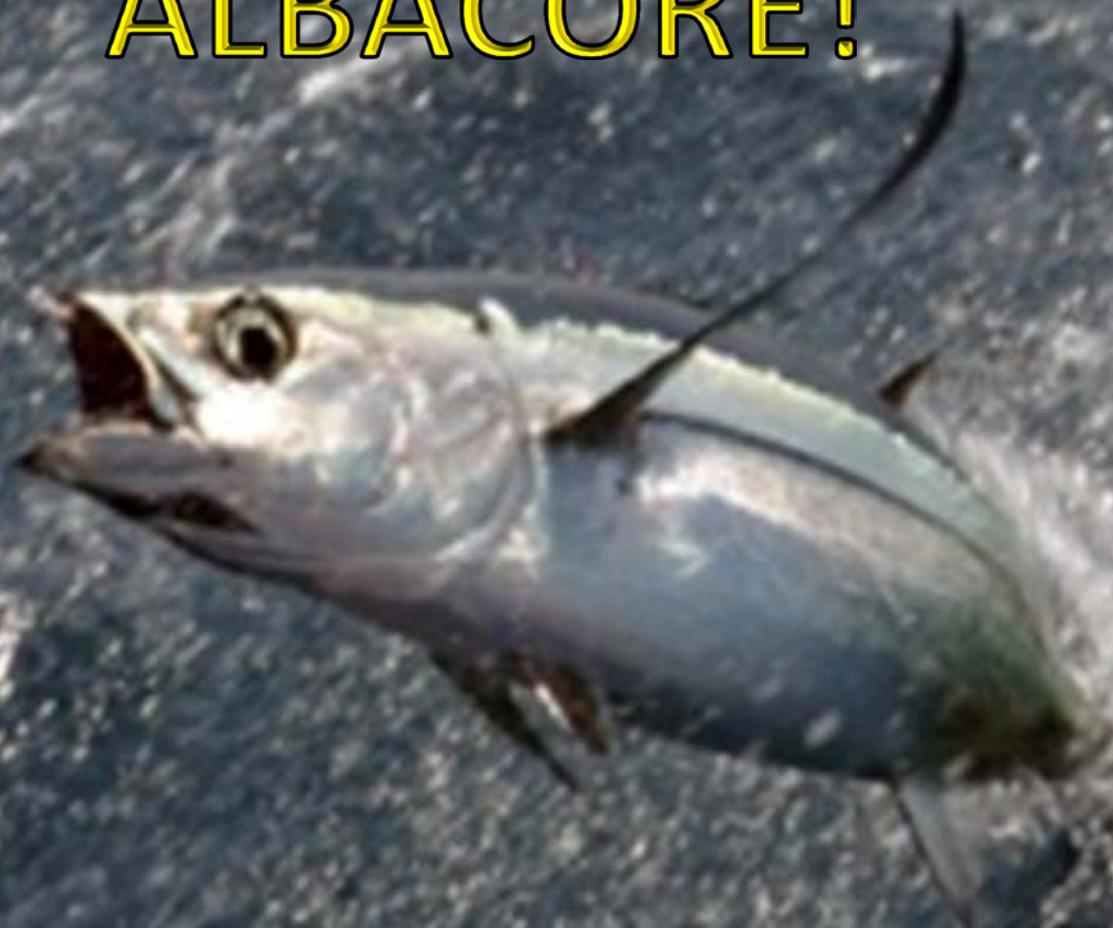


# Summary

- The last Bigeye Tuna assessment had substantial uncertainties
- Recent catches below TAC (Except 2011)\*
- Biomass at end of 2009 was close to  $B_{MSY}$
- Fishing mort. in 2009 was close to  $F_{MSY}$
- Replacement yield close to current catches
- Outlook “*cautiously optimistic*” because of the amount of uncertainty in the assessment and if catches are maintained about current levels
- The SCRS recommends conducting a new assessment as soon as possible (2015)
- Recent catches are uncertain because estimated Ghanaian catches for 2006-2013 are under review



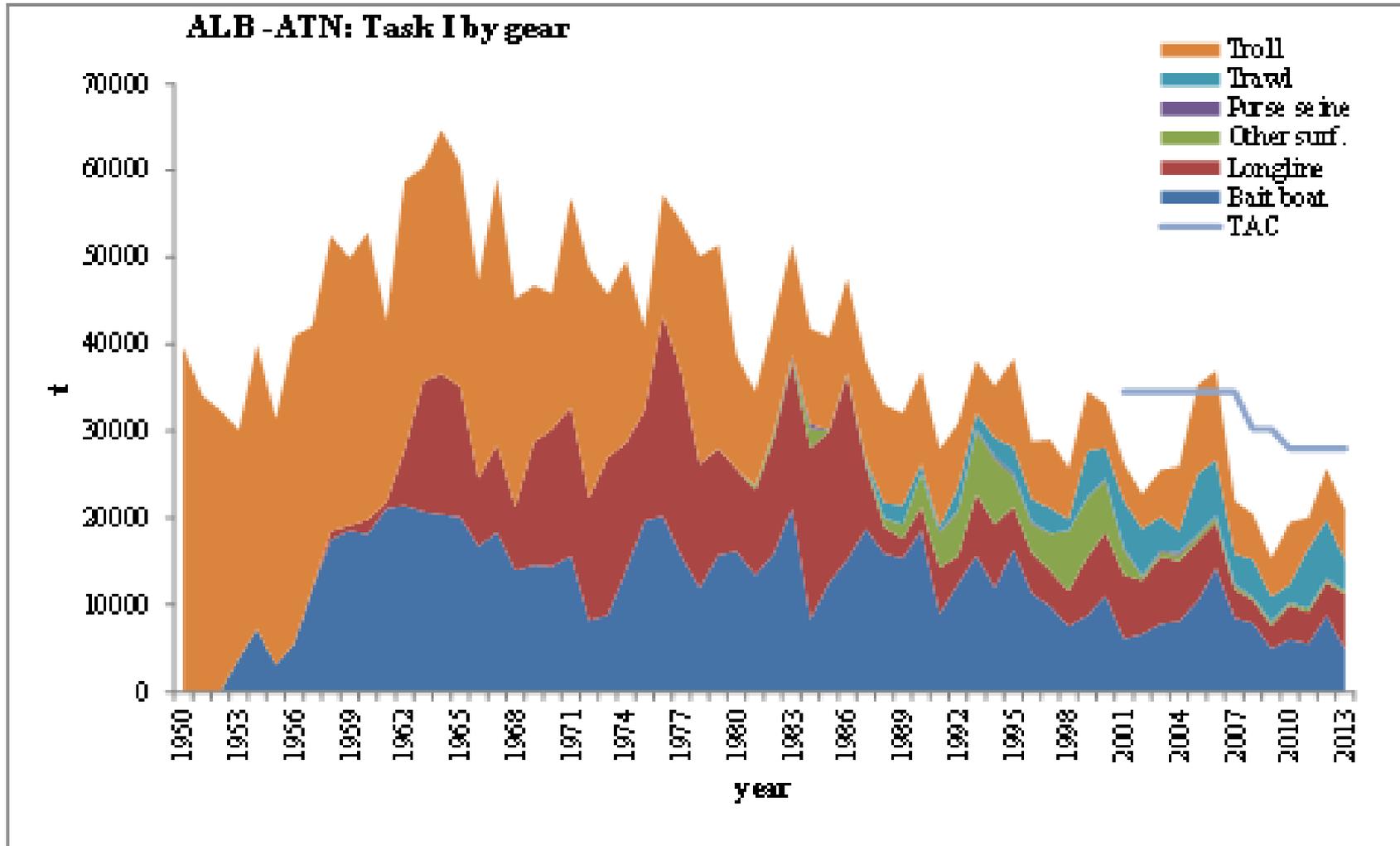
**ALBACORE!**



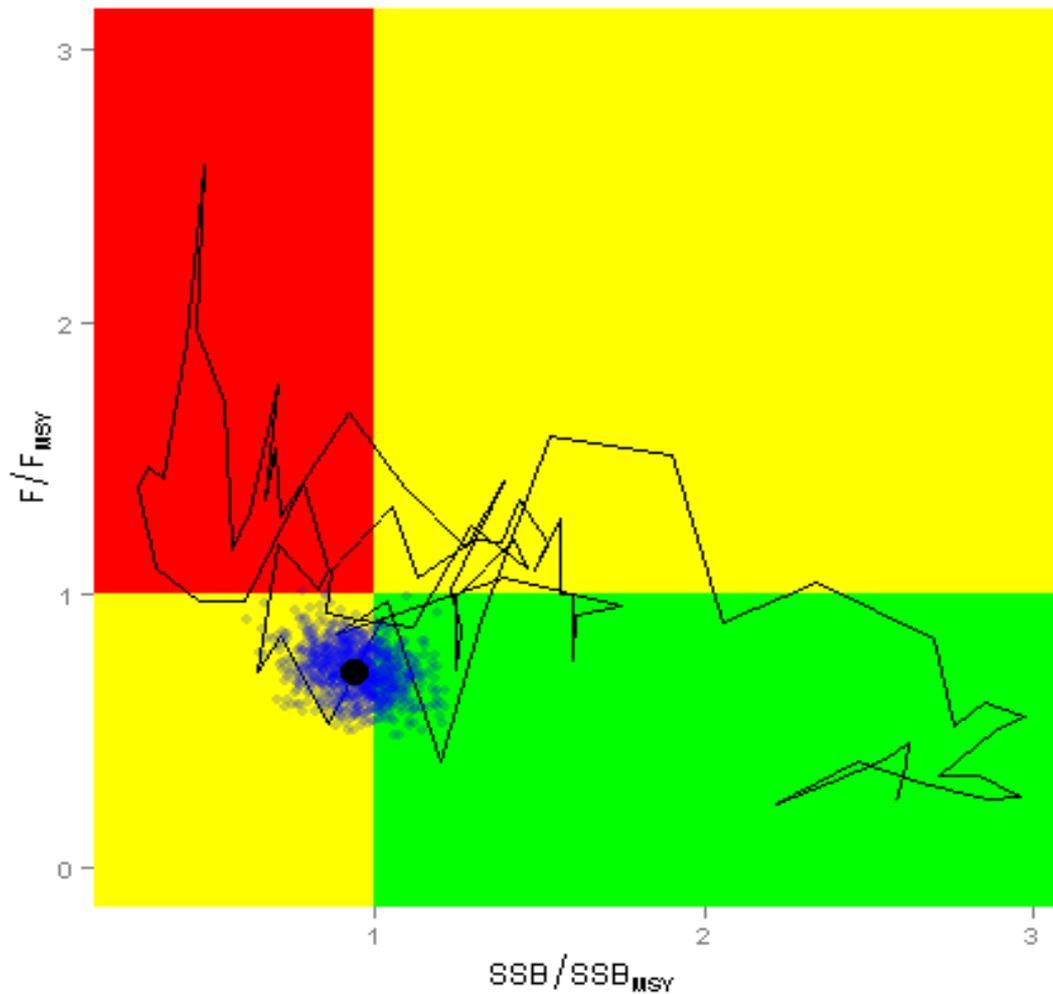
# North Atlantic Albacore

## Catch (mt) by Gear Type:

2006-2013 Catches below TAC



# North Atlantic Albacore 2013 Assessment Stock Status (and historical trend)



Slightly overfished:  $SSB/SSB_{MSY}=0.94$

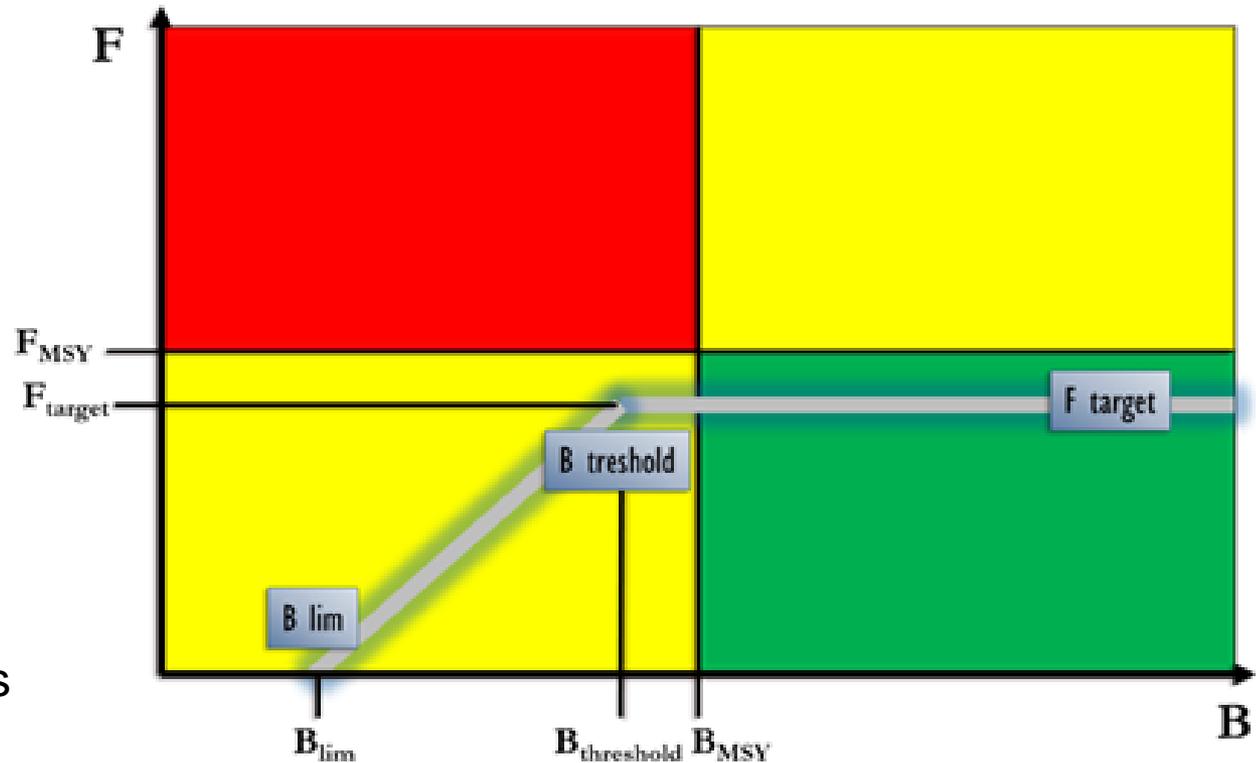
No longer overfishing:  $F/F_{MSY}=0.72$

# Harvest Control Rules:

North Atlantic Albacore – Interim  $B_{lim}$  set at  $0.4B_{MSY}$

$B_{lim}$  = fishing must stop if biomass falls below this point

$B_{Threshold}$  = biomass point below which increasingly strict management actions should be taken as biomass decreases



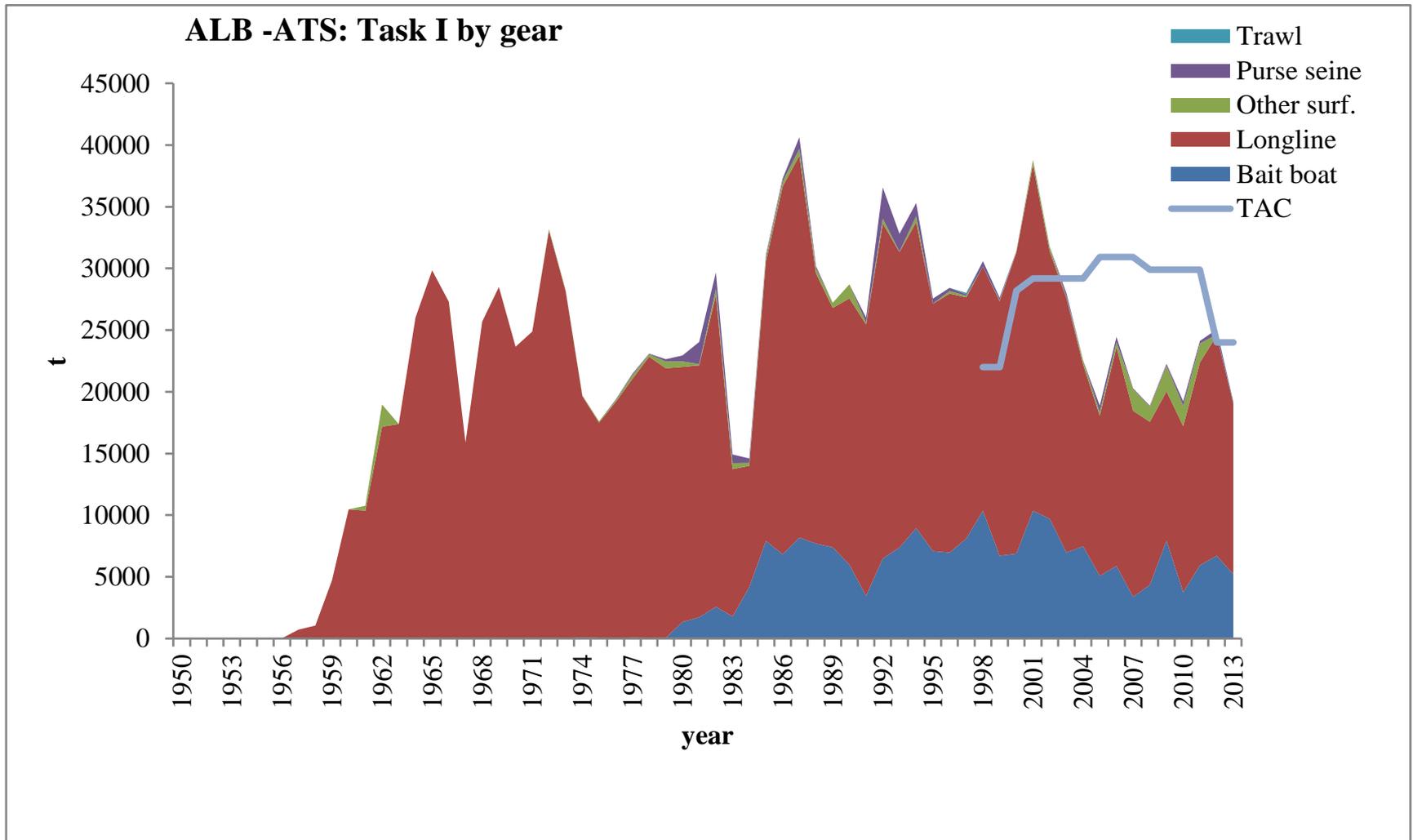
$F_{target}$ , the target fishing mortality rate to be applied such that it is lower than  $F_{MSY}$  with 'high probability'



# South Atlantic Albacore

## Catch (mt) by Gear:

### Near TAC in recent years

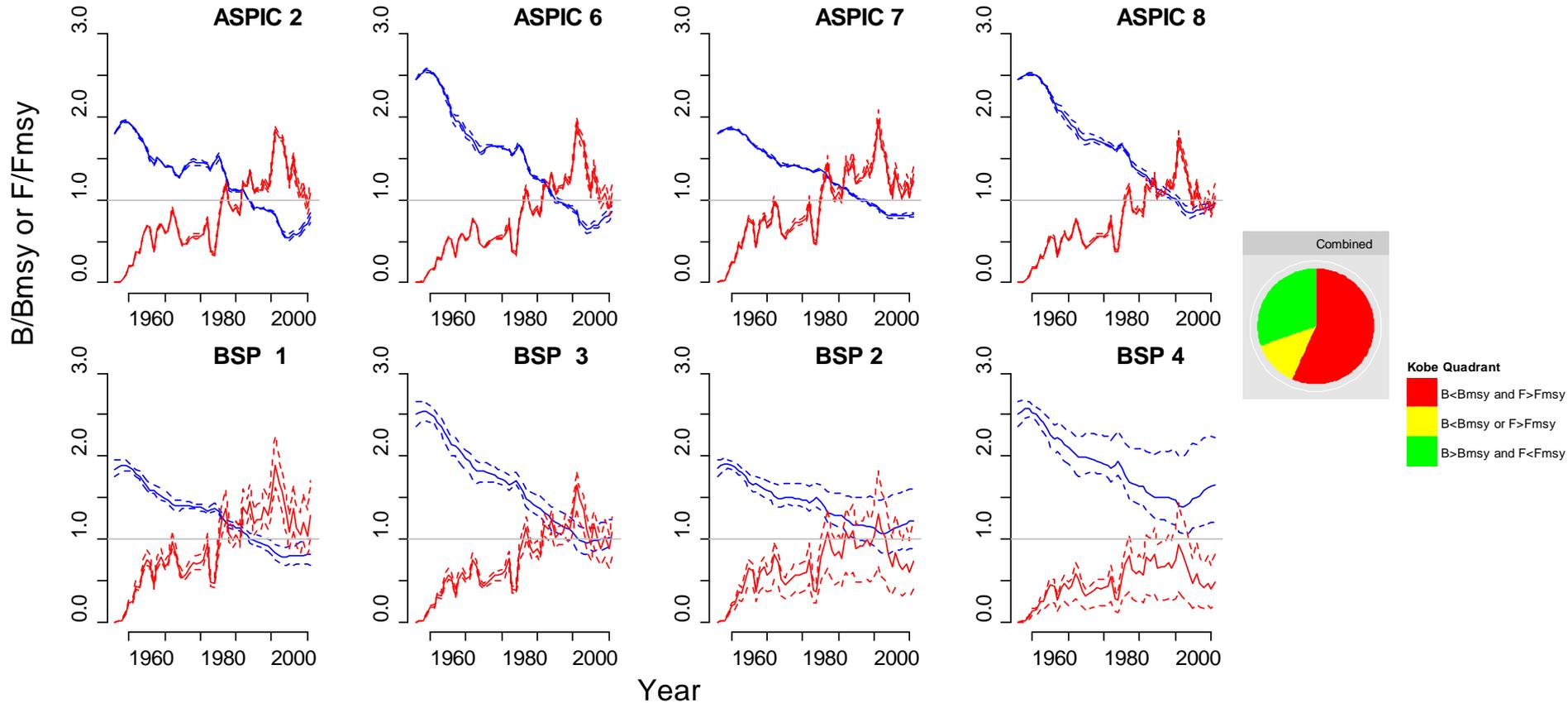




# South Atlantic Albacore

## Stock Status (2013 Assessment):

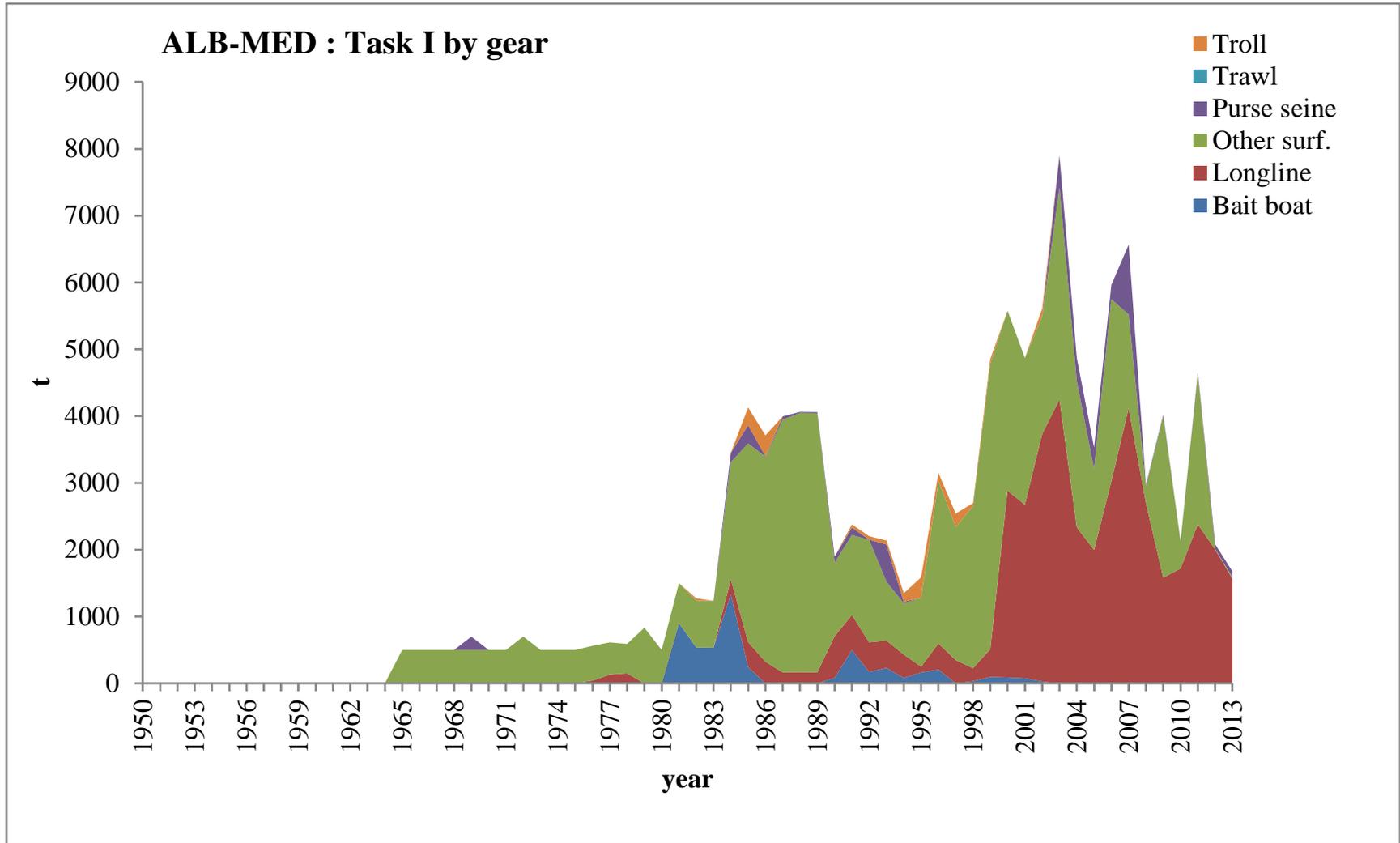
### Overfished and Undergoing Overfishing



$$\frac{SSB_{2012}}{SSB_{MSY}} \quad F_{current}/F_{MSY}$$



# Mediterranean Albacore Catches (mt) by Gear





## Mediterranean Albacore Assessment Summary

- very little quantitative information was available to SCRS for use in conducting a robust quantitative characterization on biomass status relative to Convention Objectives
- *recent fishing mortality appears to have been reduced compared to the early 2000's , a period where the stock was likely overfished*



# Albacore Assessment Summary

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

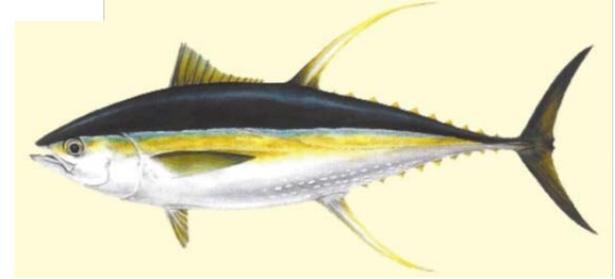
## *SCRS Albacore Recommendations*

- Northern Albacore projected to rebuild by 2019 under current harvest levels, 75% probability of achieving biomass objective by 2019 with catches less than 20,000 t
- Southern Albacore is estimated to be near Convention objectives, but with high uncertainty around assessment results.
- The SCRS recommended continuing the work towards integrating the various studies relating life history parameters and ecology for Mediterranean albacore.

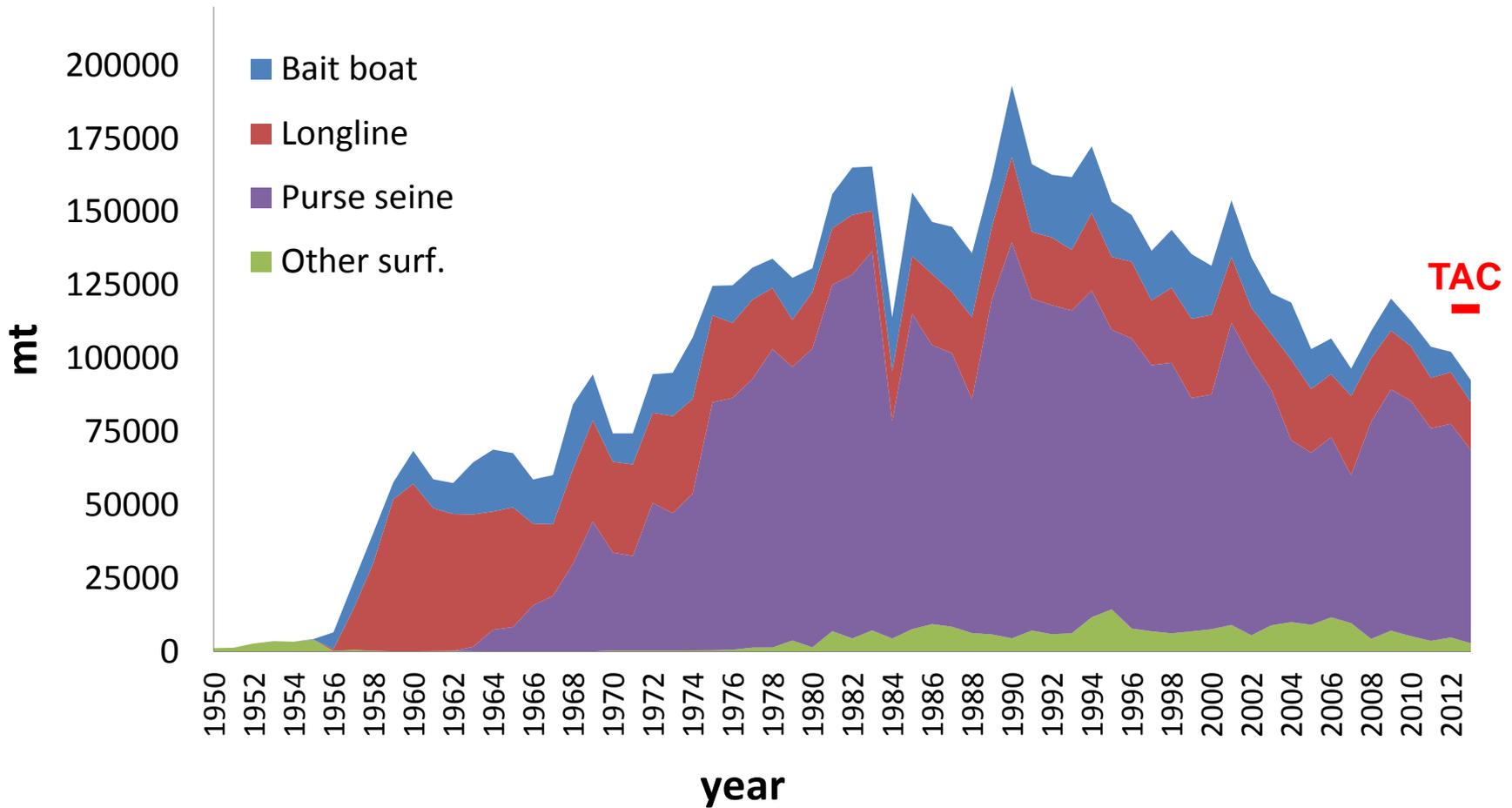
# Yellowfin Tuna



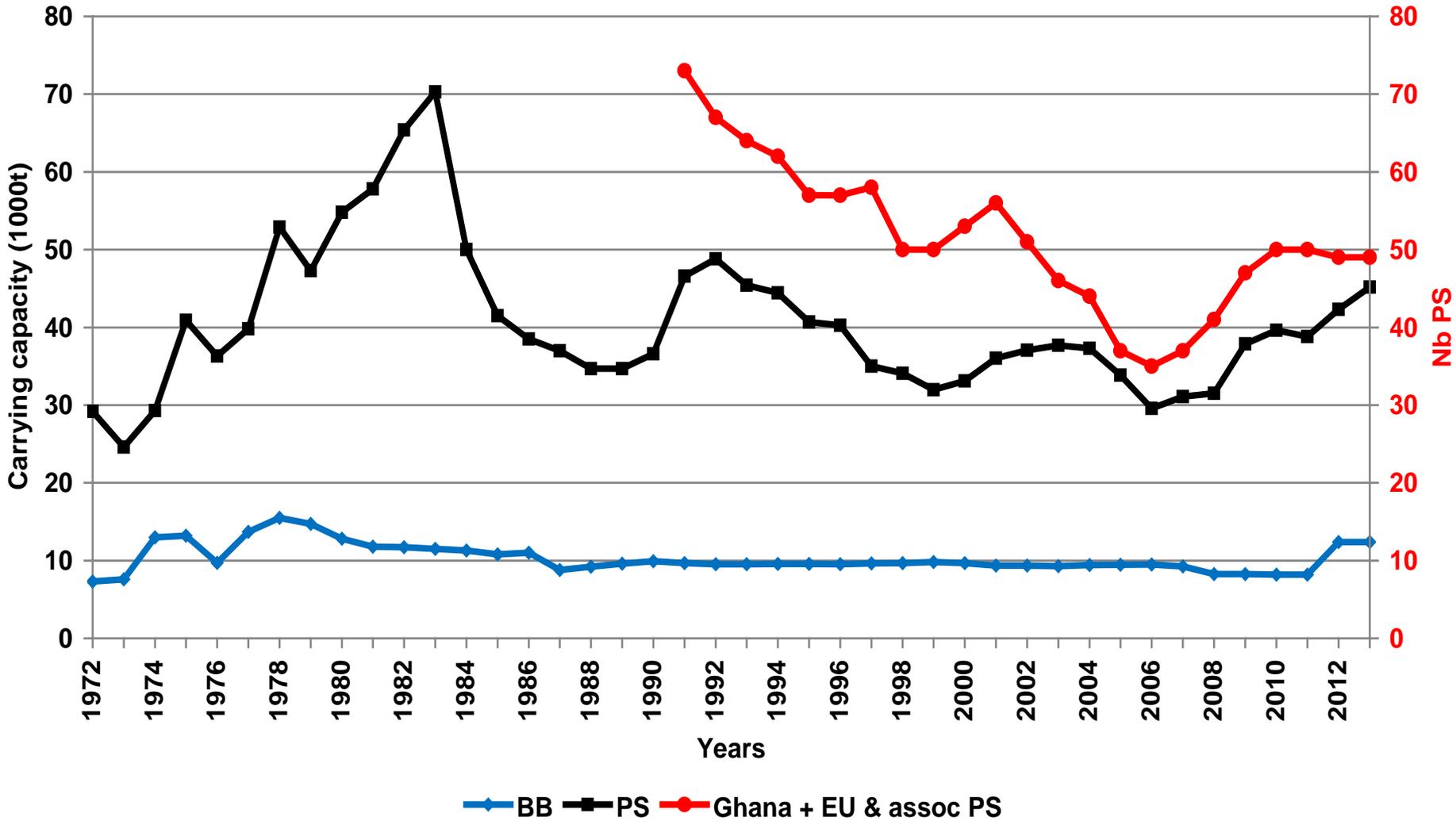
# Yellowfin Tuna



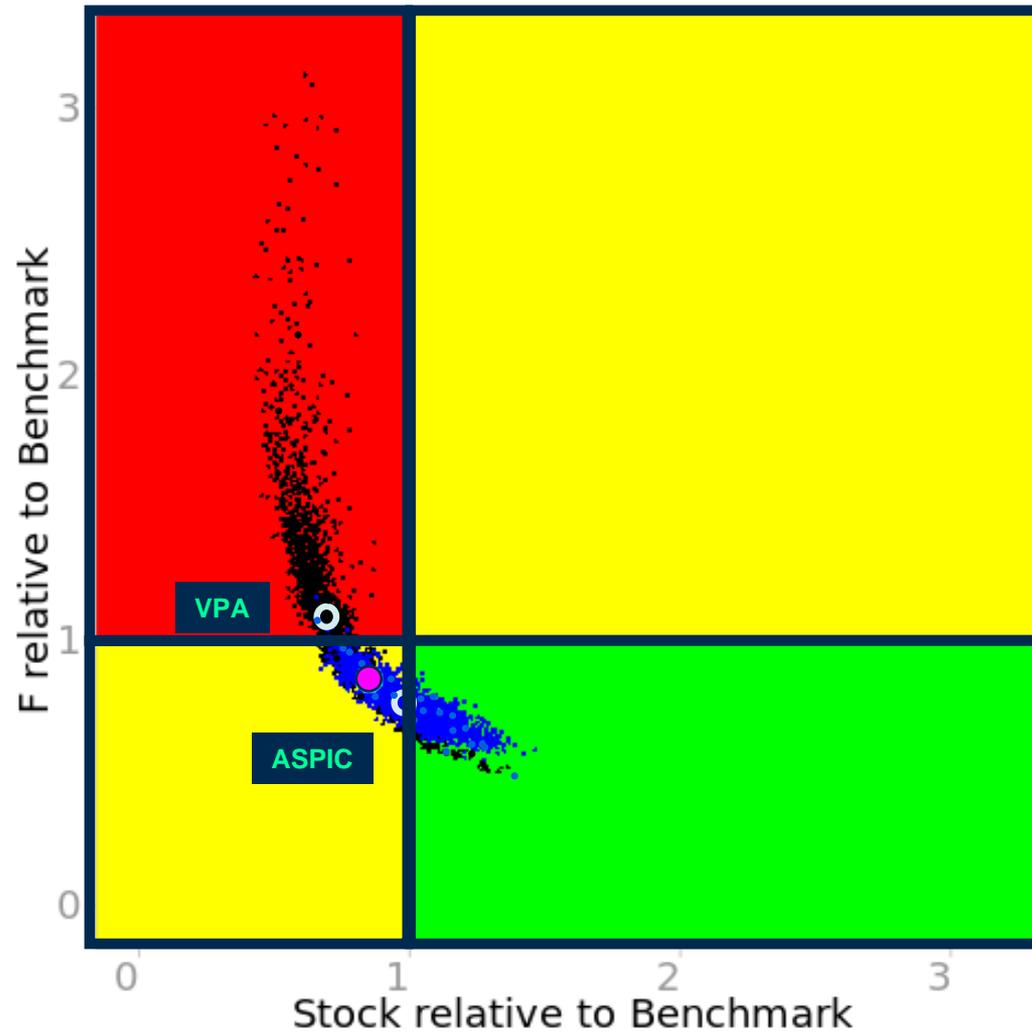
## YFT Task I: Catches by Gear

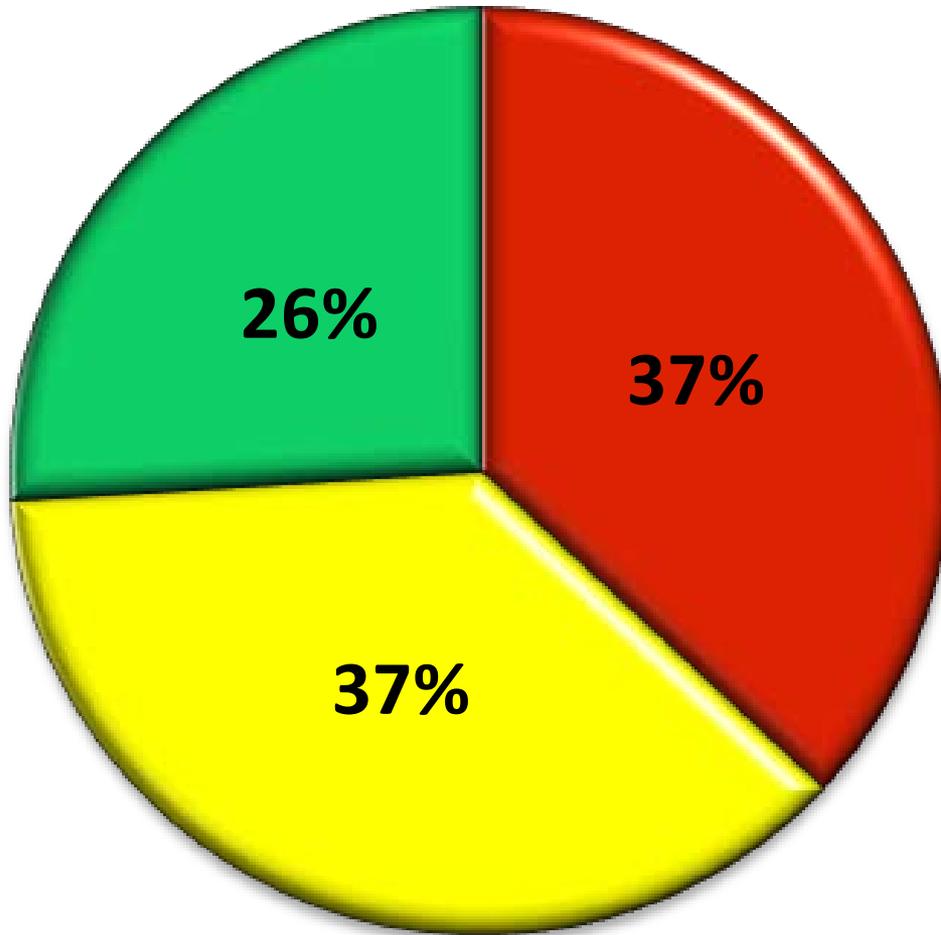


# Impacts of Increased PS effort



# Stock Status estimated for 2010 (2011 Assessment)



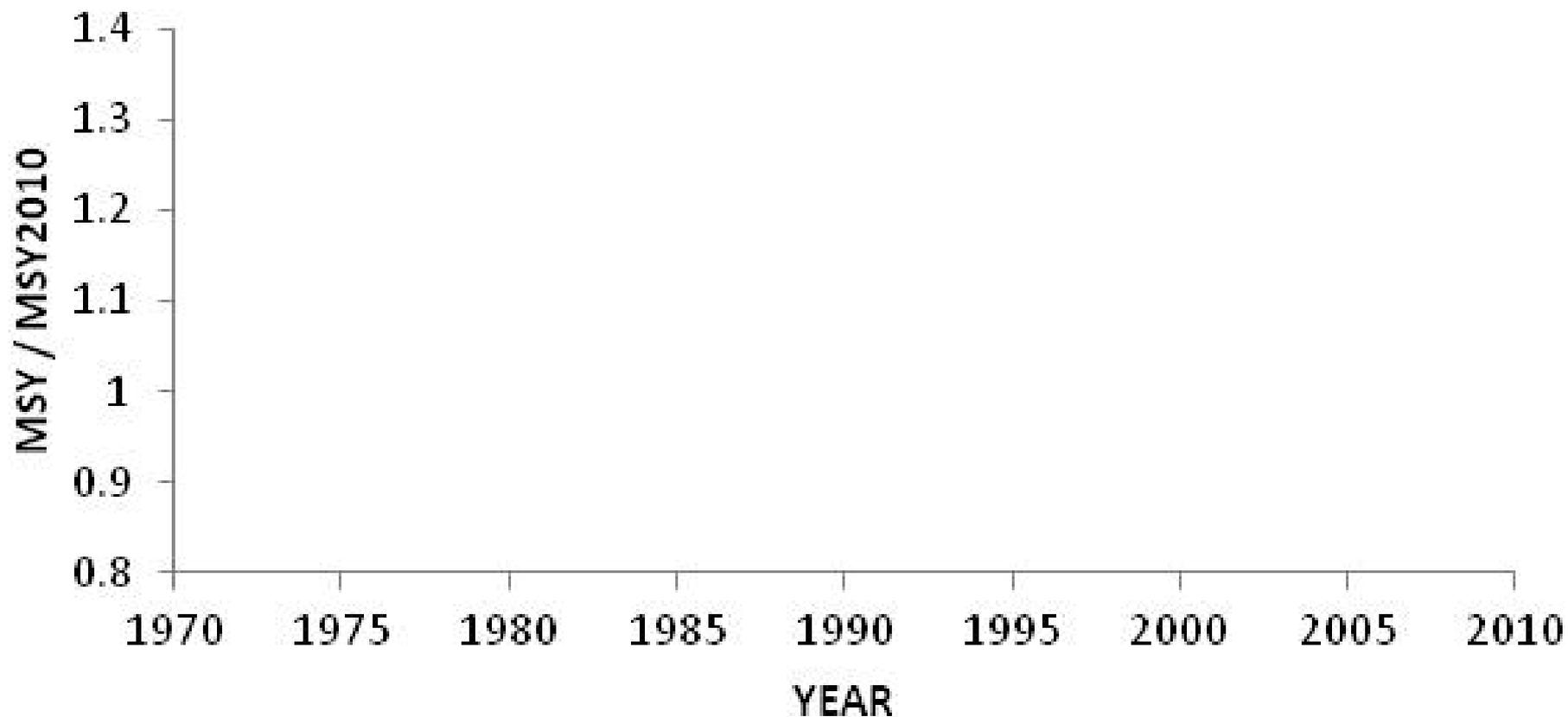


- overfished and overfishing
- overfished
- neither overfished nor overfishing

## Estimates of MSY are calculated assuming recent selectivity

(i.e. the current mix of gears and fishing strategies,  
and the probability of catching particular sizes/ages)

### YFT MSY Relative to MSY 2010



---

## ATLANTIC YELLOWFIN TUNA SUMMARY

---

Maximum Sustainable Yield (MSY)	144,600 <sup>1</sup> (114,200 - 155,100)
2013 Yield	92,615 t
Relative Biomass $B_{2010}/B_{MSY}$	0.85 (0.61-1.12) <sup>2</sup>
Relative Fishing Mortality: $F_{current(2010)}/F_{MSY}$	0.87 (0.68-1.40) <sup>2</sup>

Management measures in effect:

[Rec. 93-04]:

- Effective fishing effort not to exceed 1992 level

[Rec. 11-01] (in effect beginning in 2013):

- Time-area closure for FAD associated surface fishing; TAC of 110,000 t beginning in 2013
- Specific limits of number of longline and/or purse seine boats for a number of fleets

*Other measures also impacting yellowfin tuna*

[Rec. 09-01], para. 1 of [Rec. 06-01], [Rec. 04-01]:

- Limits on numbers of fishing vessels less than the average of 1991 and 1992.
- Specific limits of number of longline boats; China (45), Chinese Taipei (75), Philippines (10), Korea (16).
- Specific limits of number of purse seine boats; Panama (3).

---

**NOTE:**  $F_{current(2010)}$  refers to  $F_{2010}$  in the case of ASPIC, and the geometric mean of  $F$  across 2007-2010 in the case of VPA. As a result of the constant trend in recruitment estimated by the VPA model,  $F_{MAX}$  is used as a proxy for  $F_{MSY}$  for VPA results. Relative biomass is calculated in terms of spawning stock biomass in the case of VPA and in fishable biomass in the case of ASPIC.

<sup>1</sup> Estimates (with 80% confidence limits) based upon results of both the non-equilibrium production model (ASPIC) and the age-structured model (VPA).

<sup>2</sup> Median (10<sup>th</sup>-90<sup>th</sup> percentiles) from joint distribution of age-structured and production model bootstrap outcomes considered.

# REPORT OF THE 2014 ICCAT EAST AND WEST ATLANTIC SKIPJACK STOCK ASSESSMENT MEETING

*(Dakar, Senegal - June 23 to July 1, 2014)*



## SKJ Key issues:

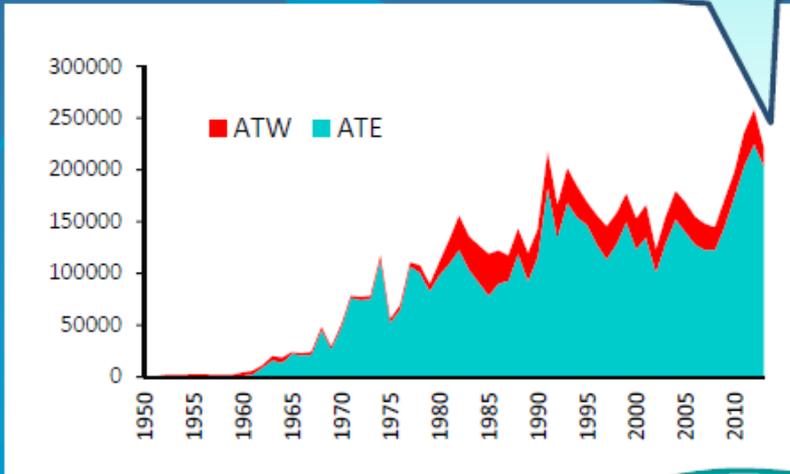
- West, no indication that stock is overfished or undergoing, really only one major fishery (Brasil)
- First ever use of the larval index
- East: Substantial increases in catch in East, coupled with lack of reliable CPUE indicators make estimation of MSY not possible
- MSY could be as high as recent catches (~220,000t)
- Major concern is BET and YFT bycatch
- Expansion of SKJ targeted catch off of Mauritania substantial.
  
- Tropical tuna tagging program has almost reached funding goals.
  - EU has proposed 15 mil, now needs match of ?



# Catch

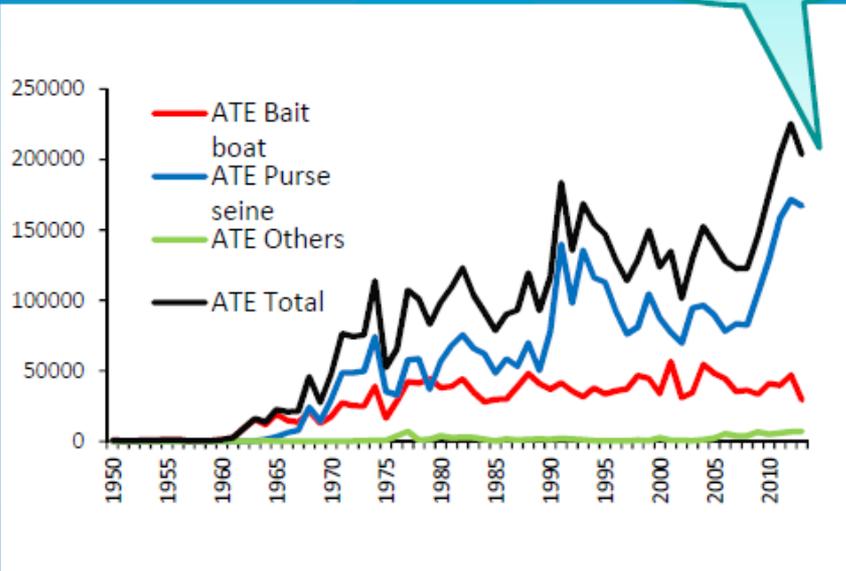
221,600 t

- Decline in catch since the early 1990s (due to a decrease in nominal fishing effort and/or to a moratorium effect), followed by a new strong increase in the recent years (2012 historic record)
- Catchability of SKJ increased in the early 1990s and recently due to FADs fishing



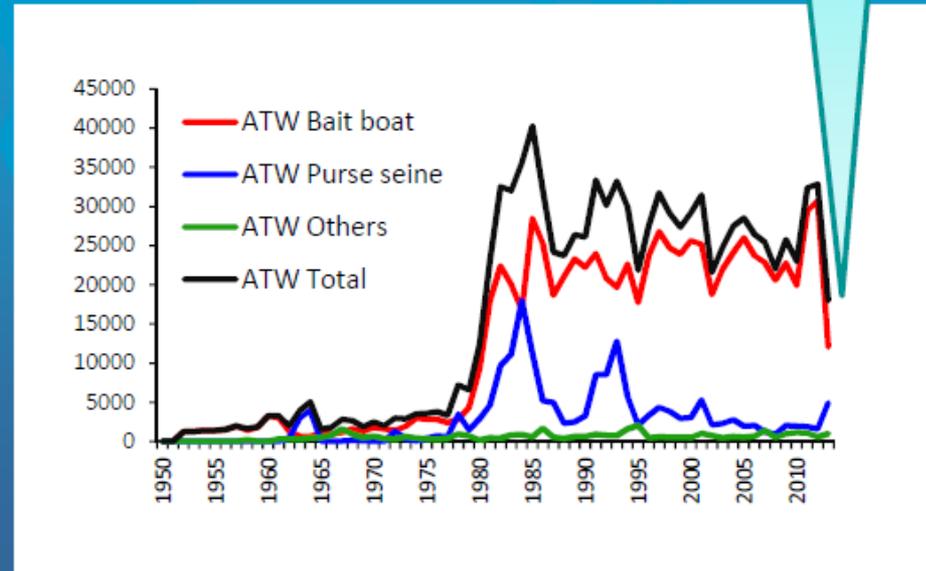
## East

203,500 t



## West

18,000 t



Model type	MSY
Catch only model	29,000 t – 31,000 t
ASPIC (Schaefer form)	29,960 t – 32,630 t
BSP (Schaefer form)	?



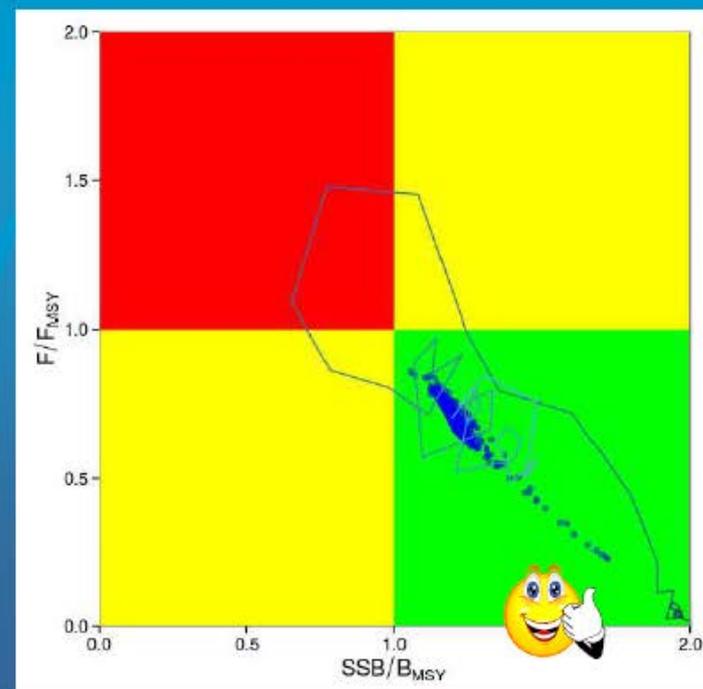
<b>Current Catch (2013)</b>	<b>18,000 t</b>
Average recent catches (5 years)	27,200 t

## State of the Western Atlantic SKJ

From ASPIC

$$B_{2013} / B_{MSY} = 1.28 \text{ (1.21-1.33)}$$

$$F_{2013} / F_{MSY} = 0.69 \text{ (0.64-0.76)}$$



---

## ATLANTIC SKIPJACK SUMMARY TABLE

---

	<b>East Atlantic</b>	<b>West Atlantic</b>
Maximum Sustainable Yield (MSY)	Probably higher than previous estimates (143,000-170,000)	Around 30,000-32,000 t
Current yield (2013 <sup>1</sup> )	<u>203,500 t</u>	<u>18,000 t*</u>
Current Replacement Yield	Unknown	Somewhat below 32,000 t
Relative Biomass ( $B_{2013}/B_{MSY}$ )	Likely >1	Probably close to <u>1.3</u>
Mortality due to fishing ( $F_{2013}/F_{MSY}$ )	Likely <1	Probably close to <u>0.7</u>
Management measures in force	Rec. 11-01 <sup>(2)</sup>	None

---

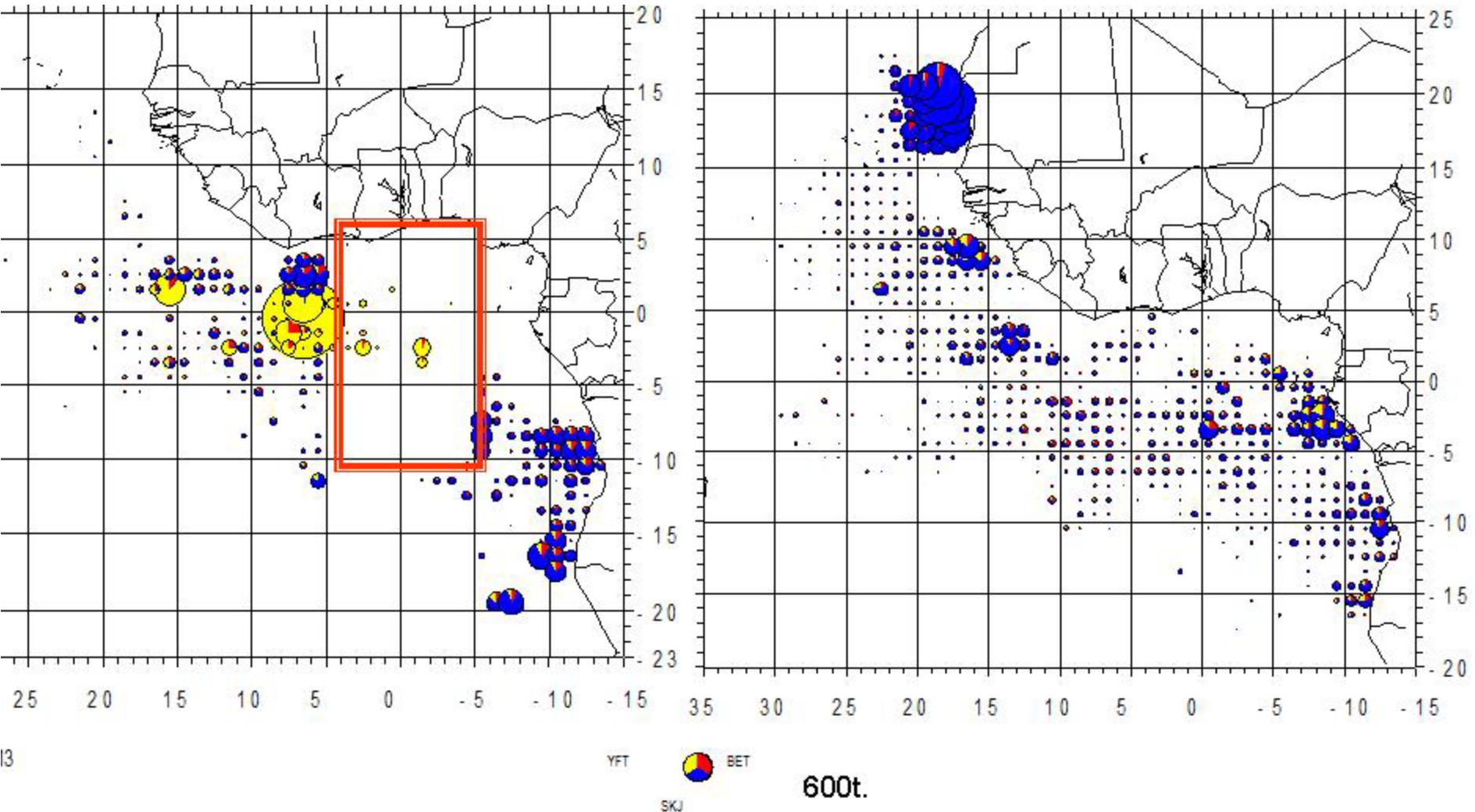
<sup>1</sup> Reports of catches for 2013 should be considered provisional, particularly for the West Atlantic.

<sup>2</sup> This new moratorium on FADs entered into force in January 2013 and replaces Rec. 04-01.

\* Preliminary estimate due to incomplete reporting by Brazil.

# Evaluate efficacy of Jan&Feb FAD closure, 2013

- EUPS fleet maintained catches by fishing outside closure area
- FAD catches from the Ghanaian fleet during closure season lower



2. Catches of tropical tunas by EU purse seiners in 2013, during January & February in free school and FAD sets (left panel) and March to December only on FAD sets

# Atlantic tropical Tuna tagging program



- The SCRS has repeatedly stressed the importance of the implementation of a large-scale tagging program for tropical tuna species (AOTTP). EU has expressed interest in funding 80% of the budget if others co-fund the remaining 20% and with the condition that no more than half of the co-funding is “in-kind”.

ETUDE DE FAISABILITE DU PROGRAMME DE  
MARQUAGE DE THONS TROPICAUX  
DE L'OCEAN ATLANTIQUE



Rapport provisoire

Mai 2014

**SOLEAF**  
INGENIERIE - CONSEIL - ASSISTANCE TECHNIQUE  
PROFESORAT UNIVERSITARIO - FORMACION - TECNICO ASISTENTE  
ZONE INDUSTRIELLE DU MOINE / 34000 GENNEVILLE / FRANCE  
TEL: 33 (0) 5 34 36 30 31 / FAX: 33 (0) 5 34 36 30 32  
WWW.SOLEAF.COM / WWW.FANAFRANCE.COM

## REQUIRED BUDGET

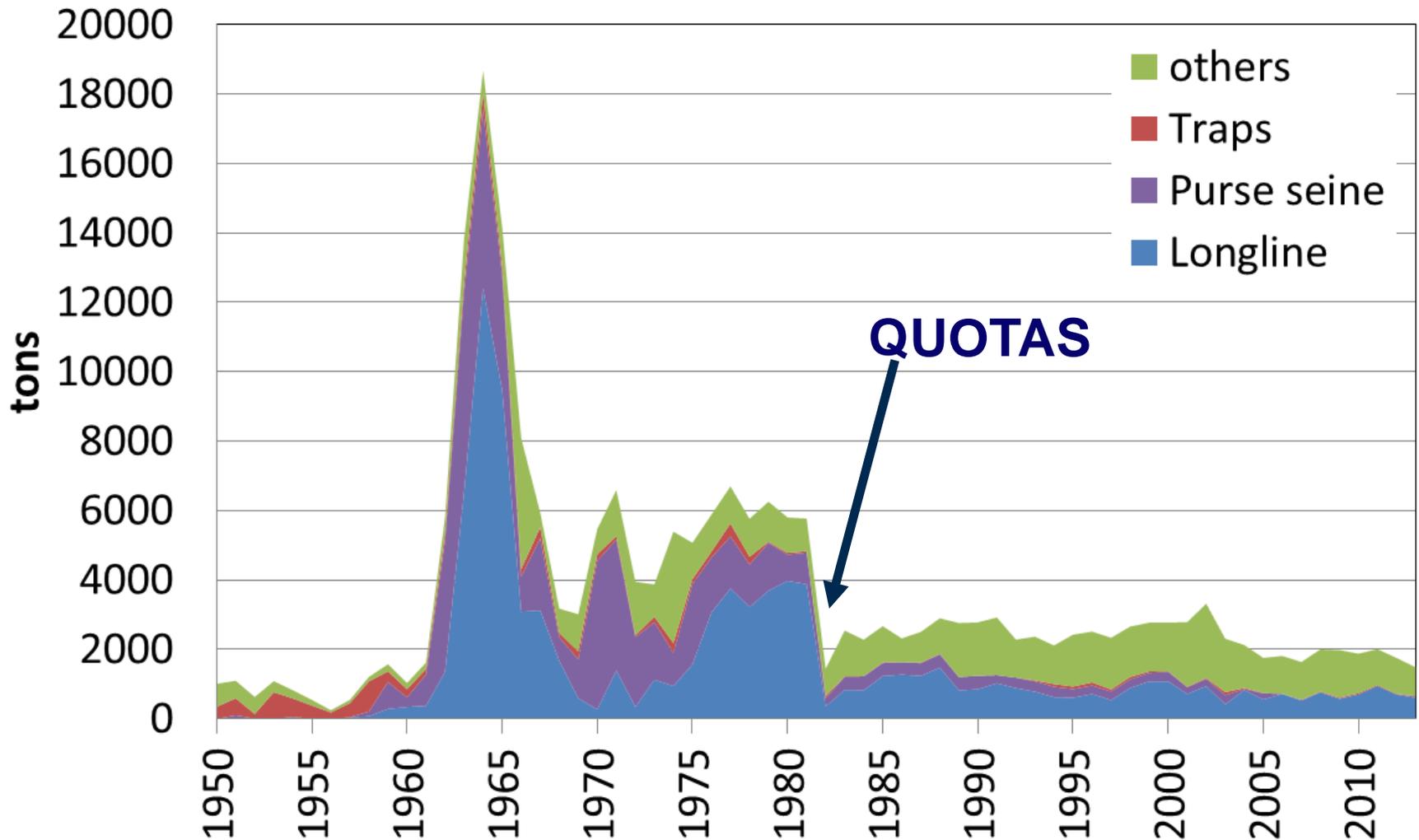
Thousands of Euros	1	2	3	4	5	Total
<b>Total</b>	€ 7,041	€ 5,968	€ 3,281	€ 985	€ 1,288	€ 18,563
<b>EU Funding</b>	€ 5,633	€ 4,775	€ 2,625	€ 788	€ 1,030	€ 14,851
<b>Co-Funding total</b>	€ 1,408	€ 1,194	€ 656	€ 197	€ 258	€ 3,713
<b>cash</b>	€ 704	€ 597	€ 328	€ 99	€ 129	€ 1,856
<b>in kind</b>	€ 704	€ 597	€ 328	€ 99	€ 129	€ 1,856



# 2014 Update Assessment of Western Atlantic Bluefin Tuna

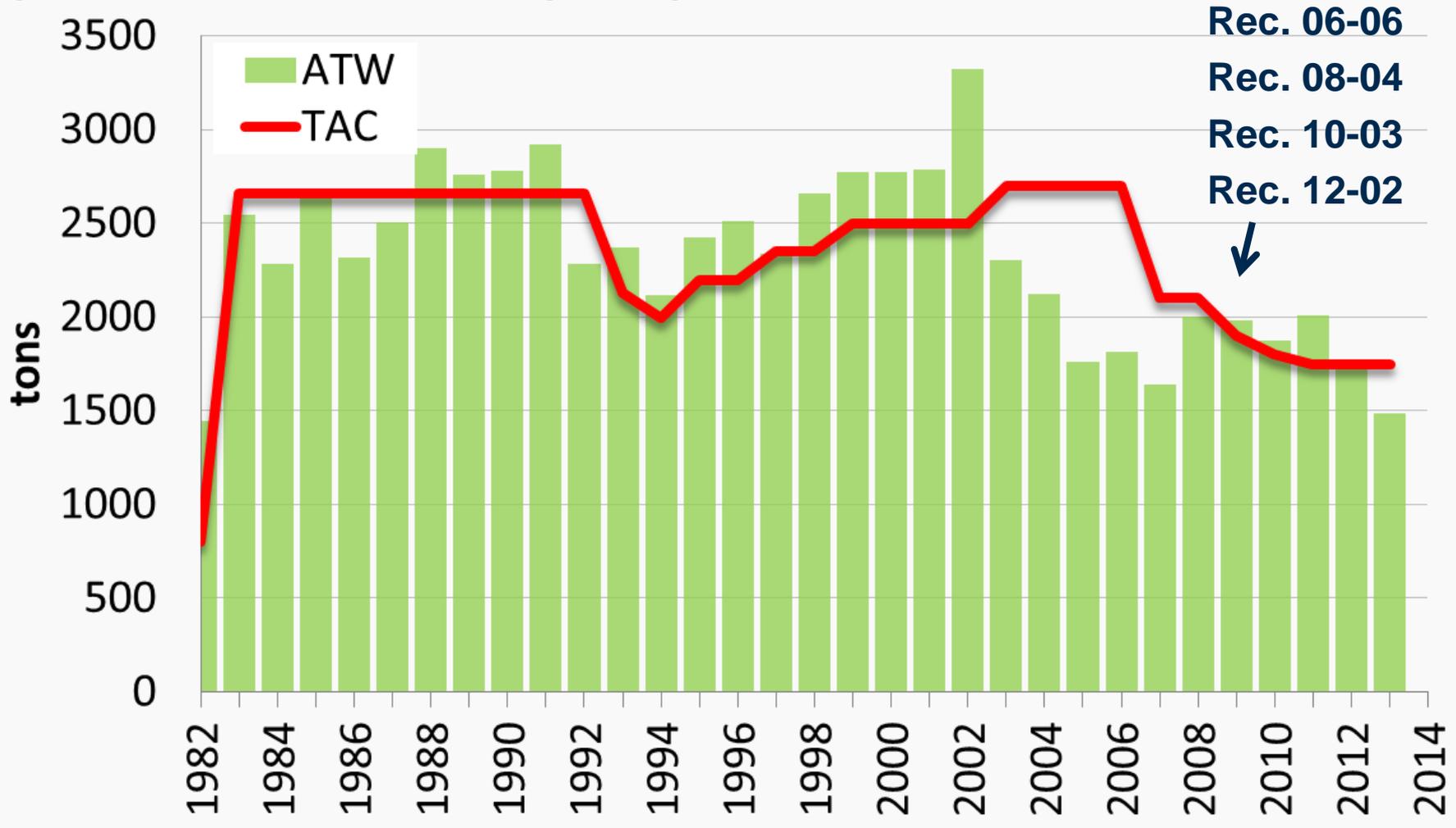
# CATCH

a) BFT-WEST Atlantic stock (Task-I) by major gear

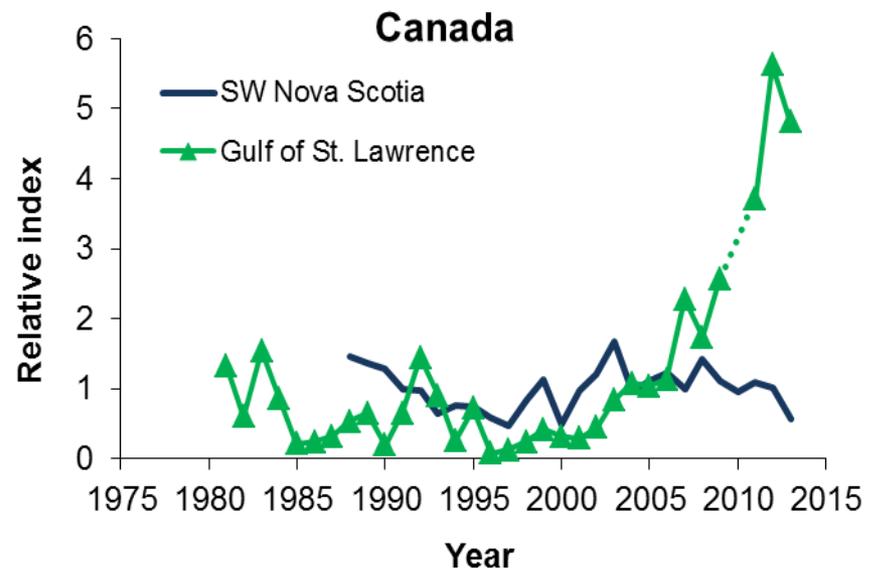
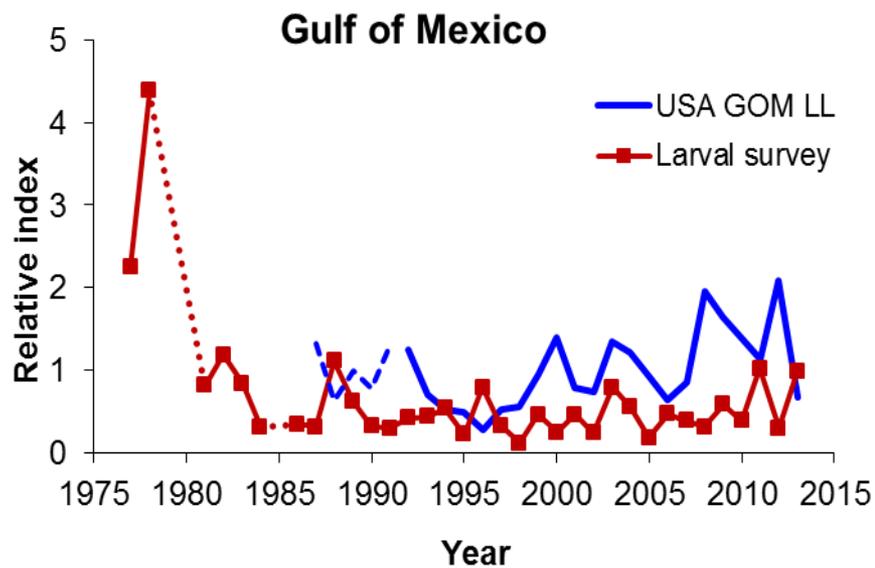
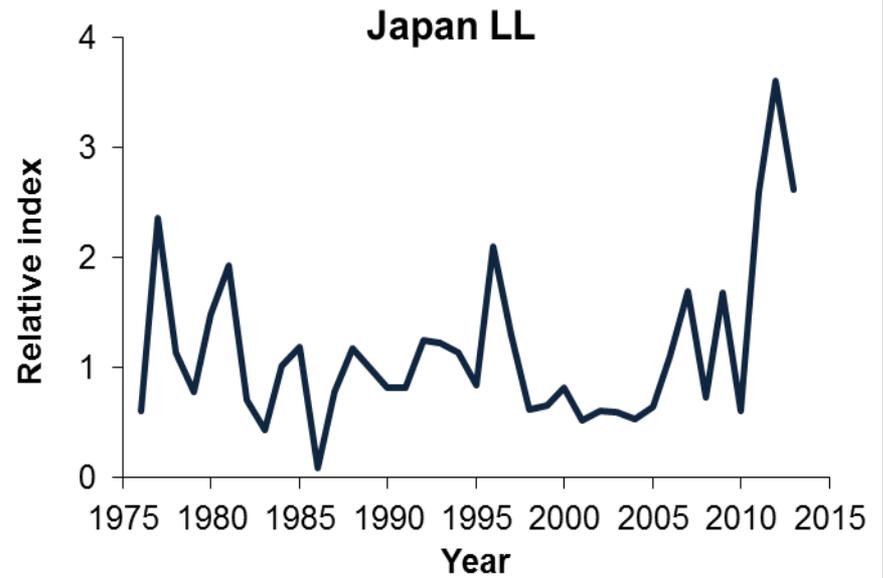
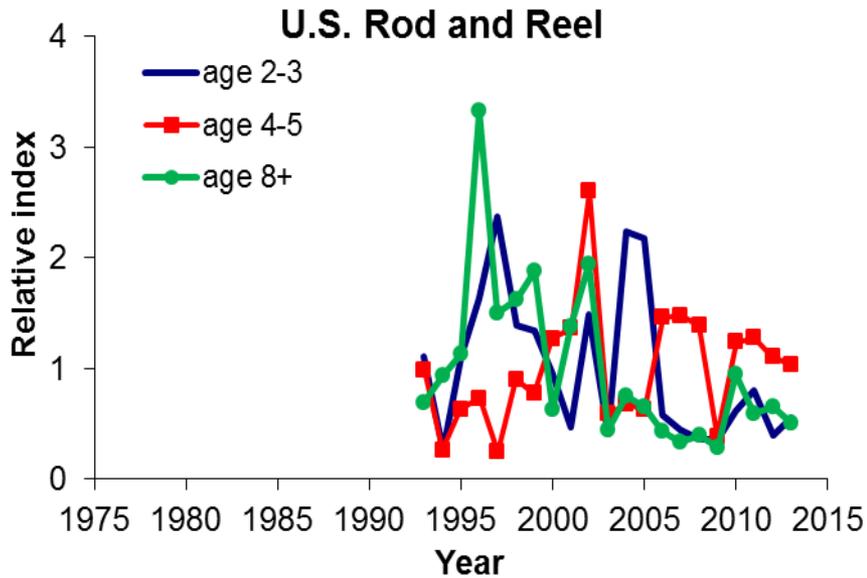


# TOTAL ALLOWABLE CATCH

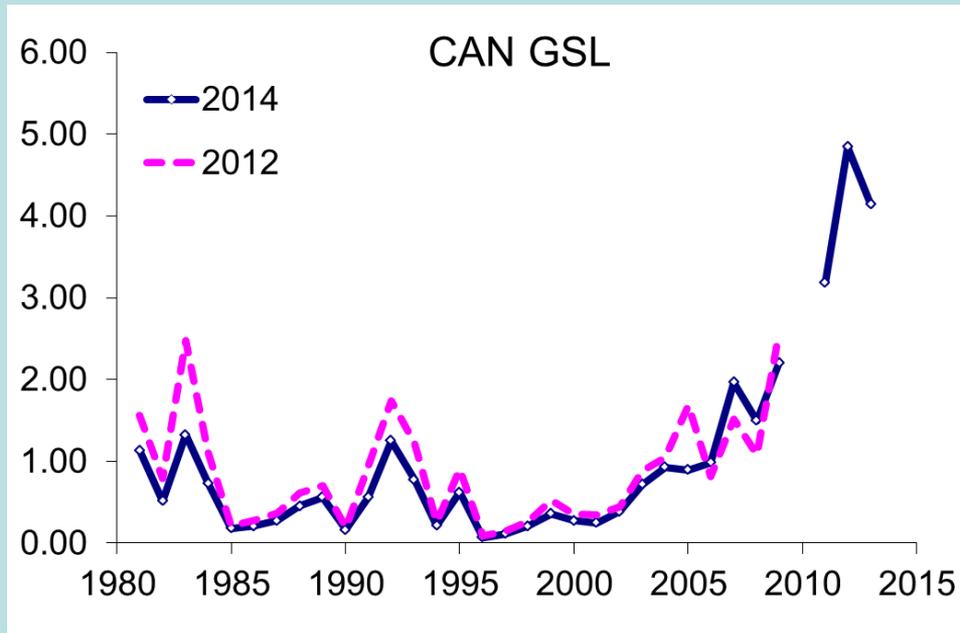
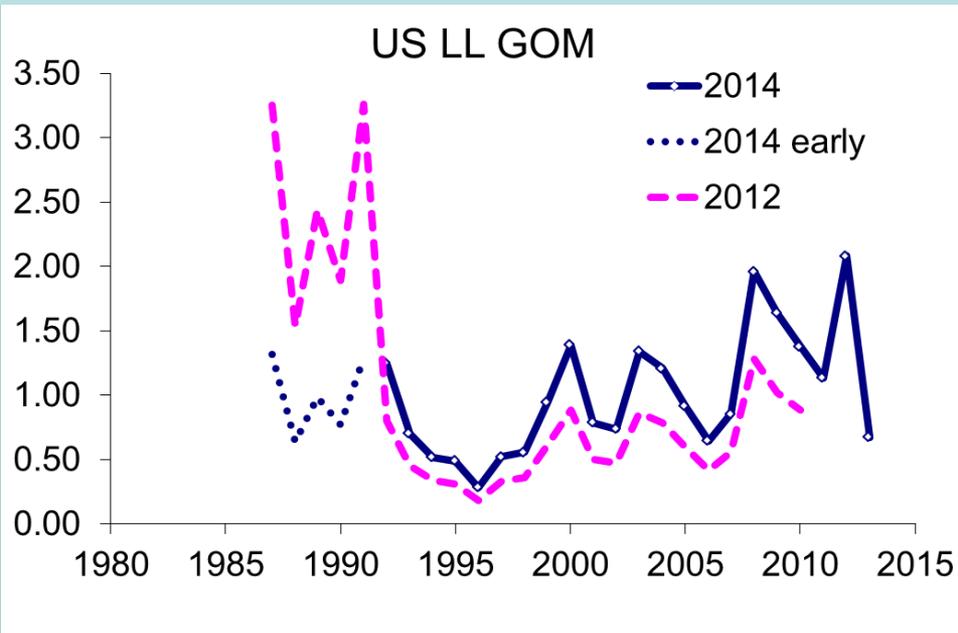
b) BFT-WEST Atlantic stock (Task-I) total catch & TAC's



# FISHERY INDICATORS

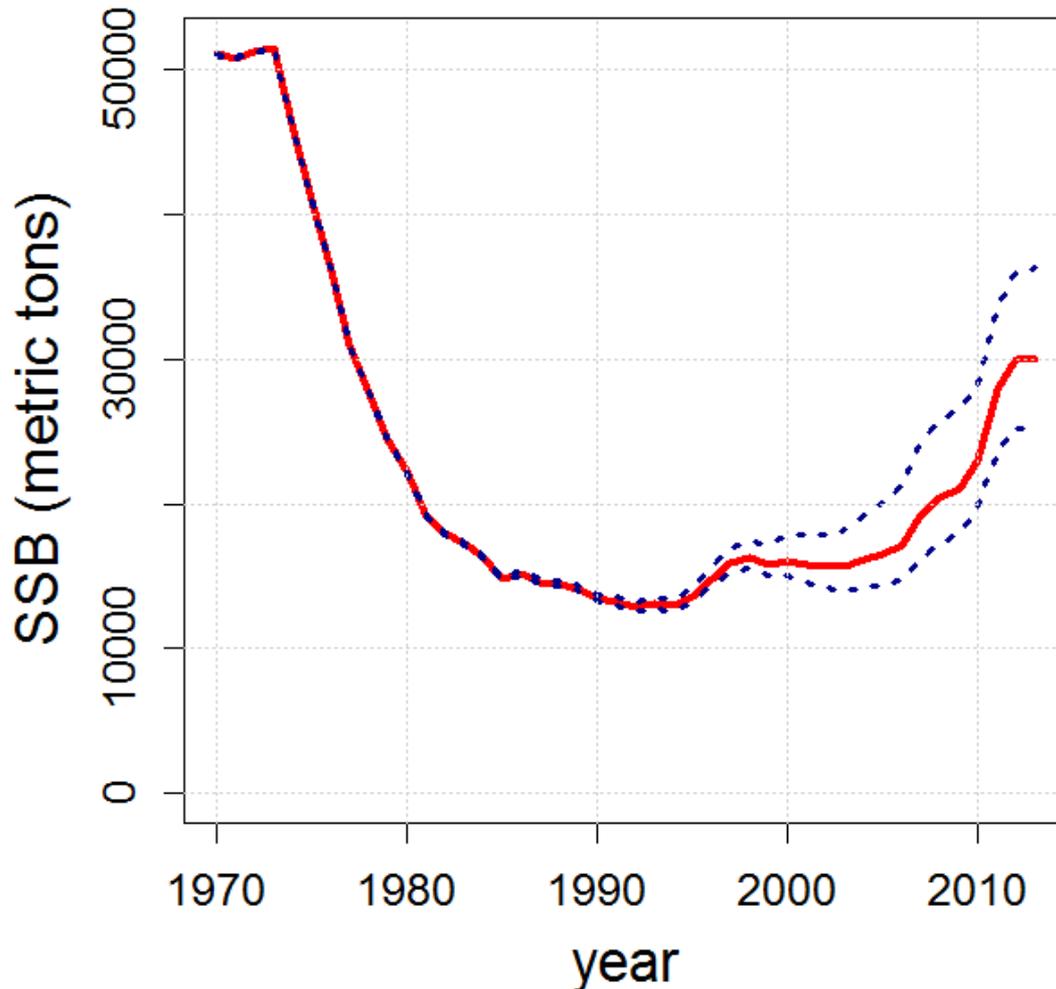


# KEY CHANGES IN FISHERY INDICATORS



# STATUS OF STOCK

## Spawning Stock Biomass

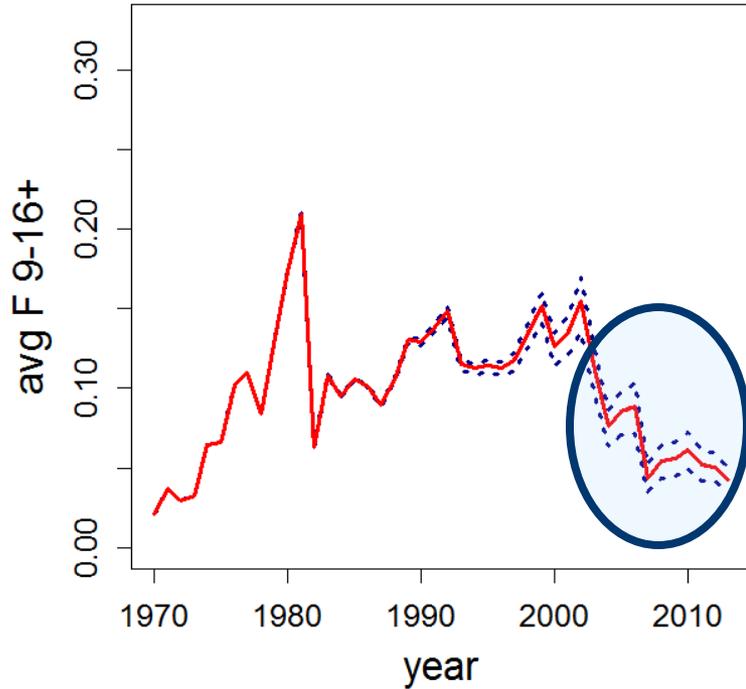


**Estimates of spawning stock biomass show continued progress towards rebuilding**

**SSB in 2013 is 70% greater than in 1998)**

# STATUS OF STOCK

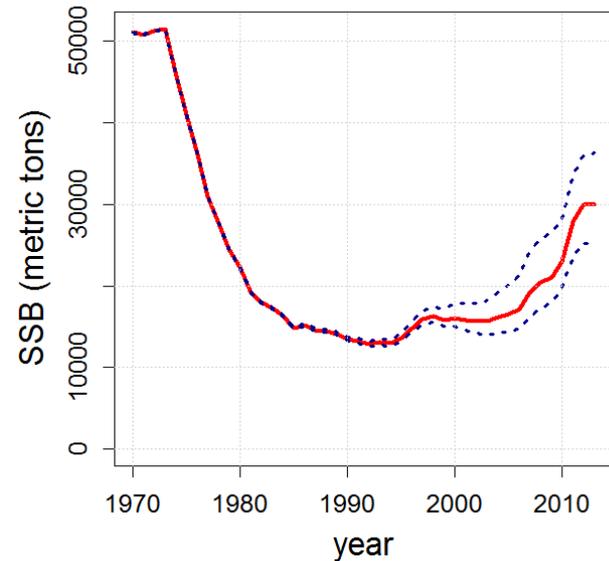
F on Spawners age 9+



**Estimates of fishing mortality on spawners show decrease in recent years**

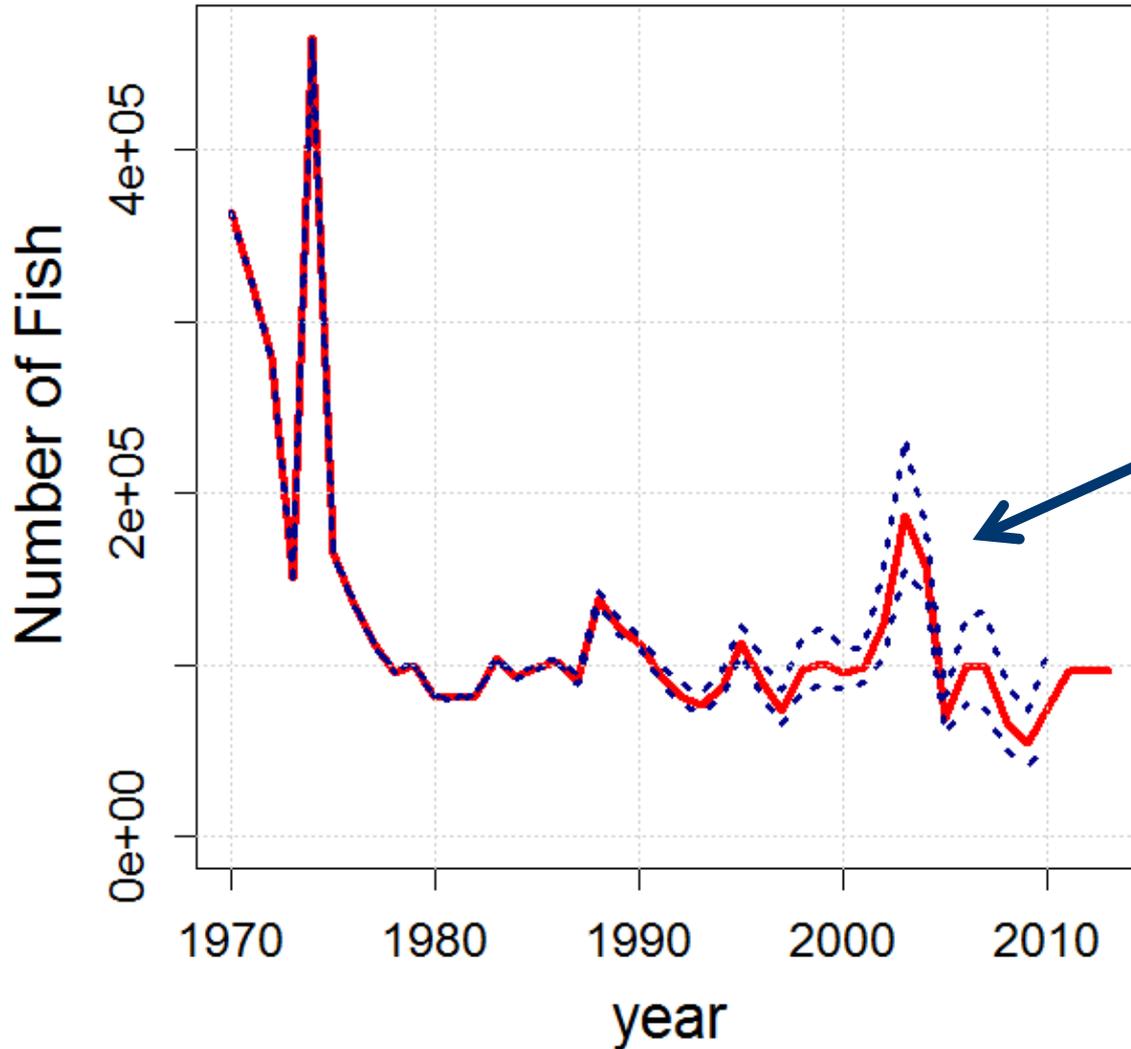


Spawning Stock Biomass



# STATUS OF STOCK

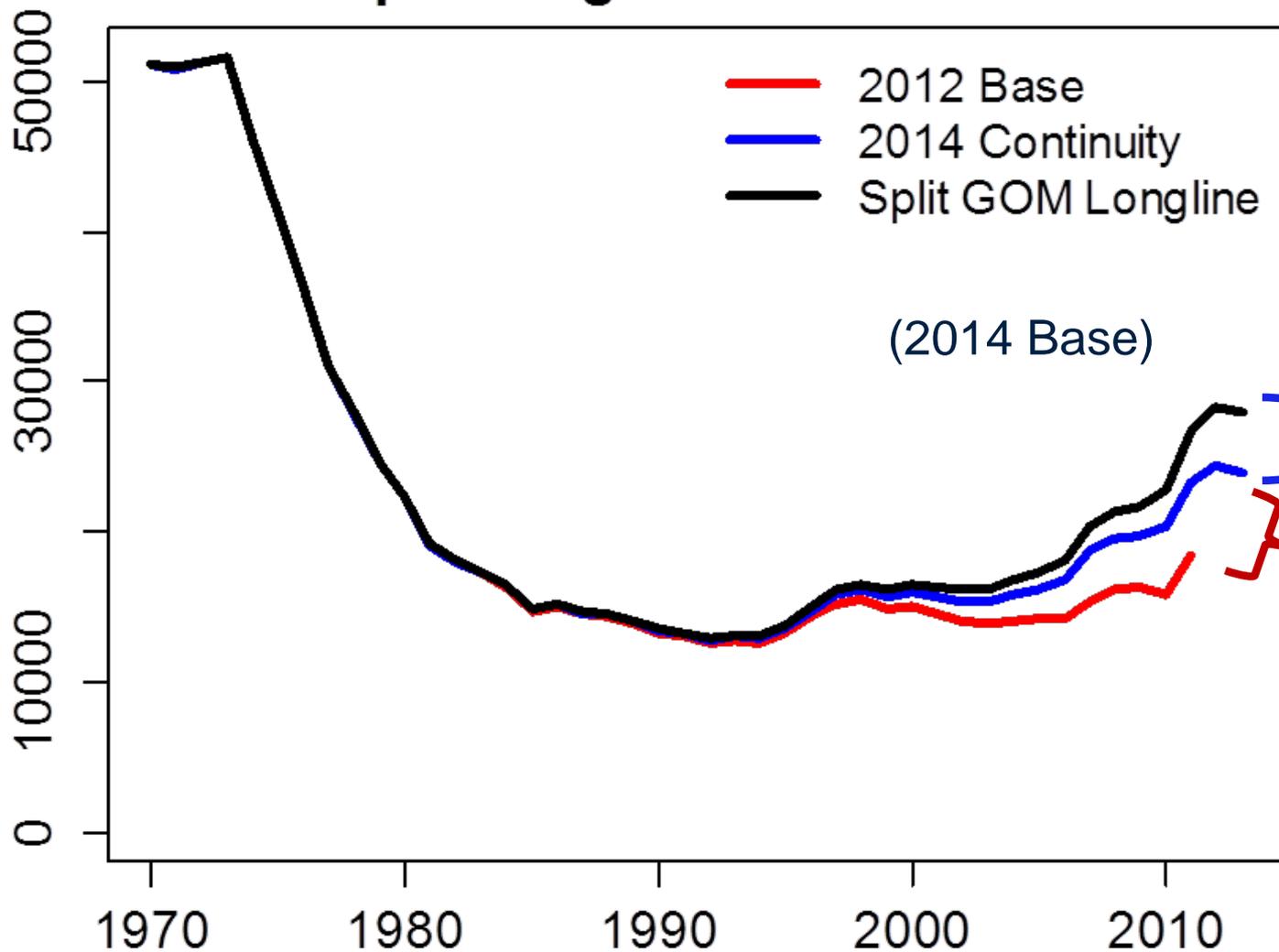
## Recruits (Age 1)



**Model estimates strong year-classes in 2003 and 2002**

# WHY IS 2014 SO DIFFERENT FROM 2012?

## Spawning Stock Biomass

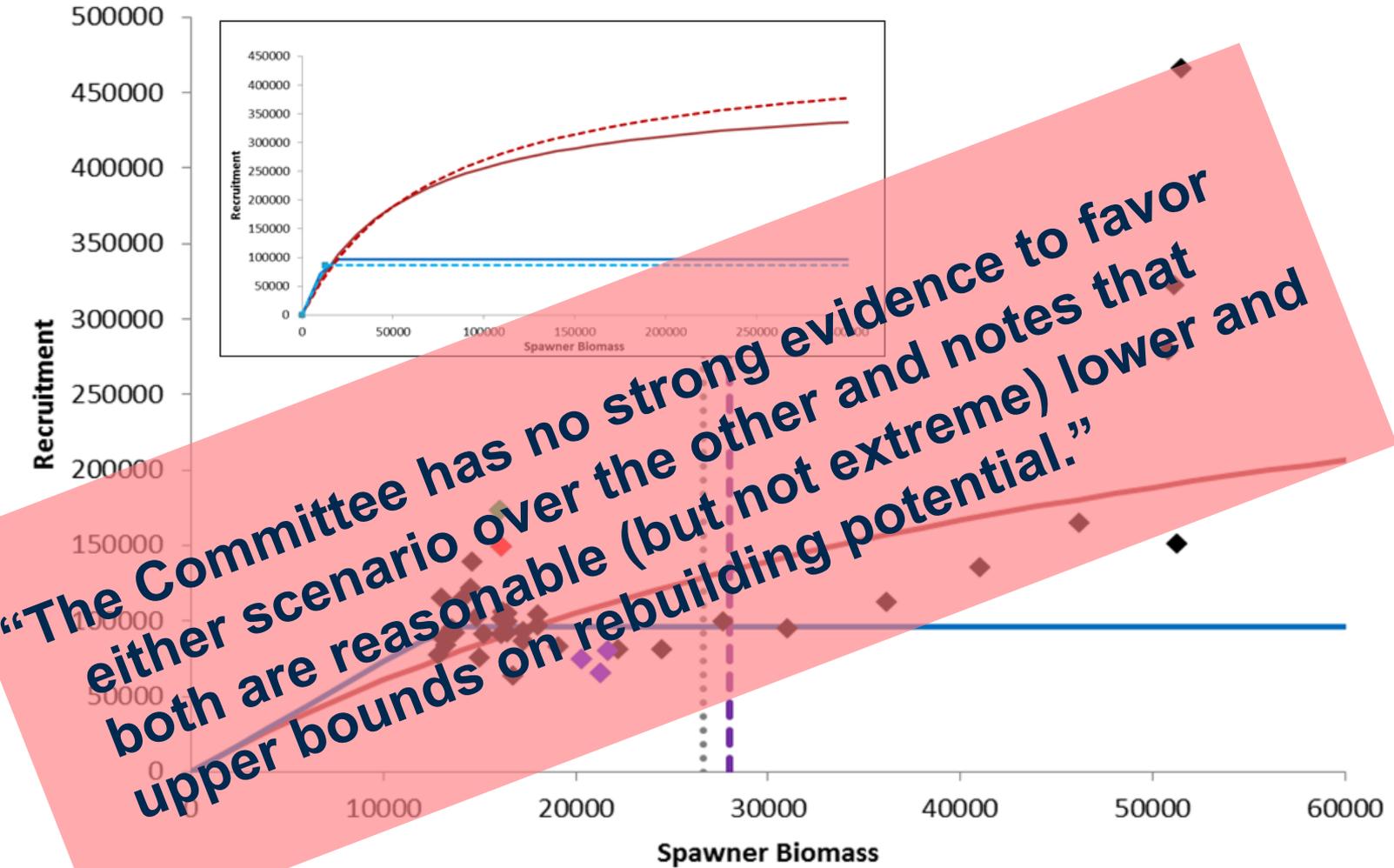


Effect of  
split USLL

Effect of  
GSL & JLL

# STATUS OF STOCK

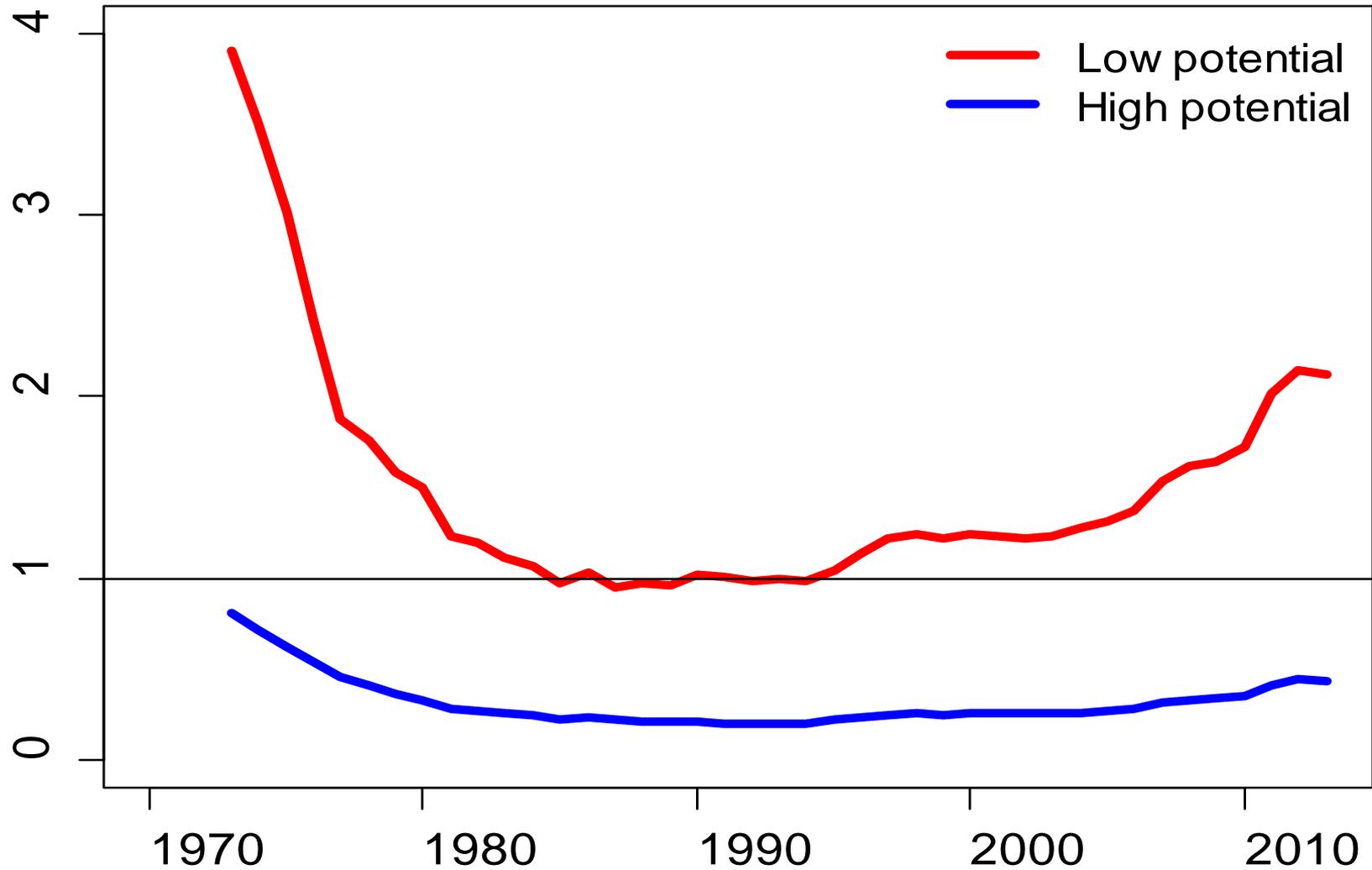
## Stock-Recruitment of Western Bluefin Tuna



- ◆ VPA Estimated Recruitment
- 2014 Beverton-Holt
- ◆ 2007-2009 yearclass
- 2014 2-Line
- ◆ 2002 yearclass
- ◆ 2003 yearclass
- ..... 2014 VPA 2011 SSB
- - - 2014 VPA 2013 SSB

# STATUS OF STOCK

$SSB/SSB_{MSY}$



# STATUS OF STOCK

**HIGH RECRUITMENT  
POTENTIAL:**

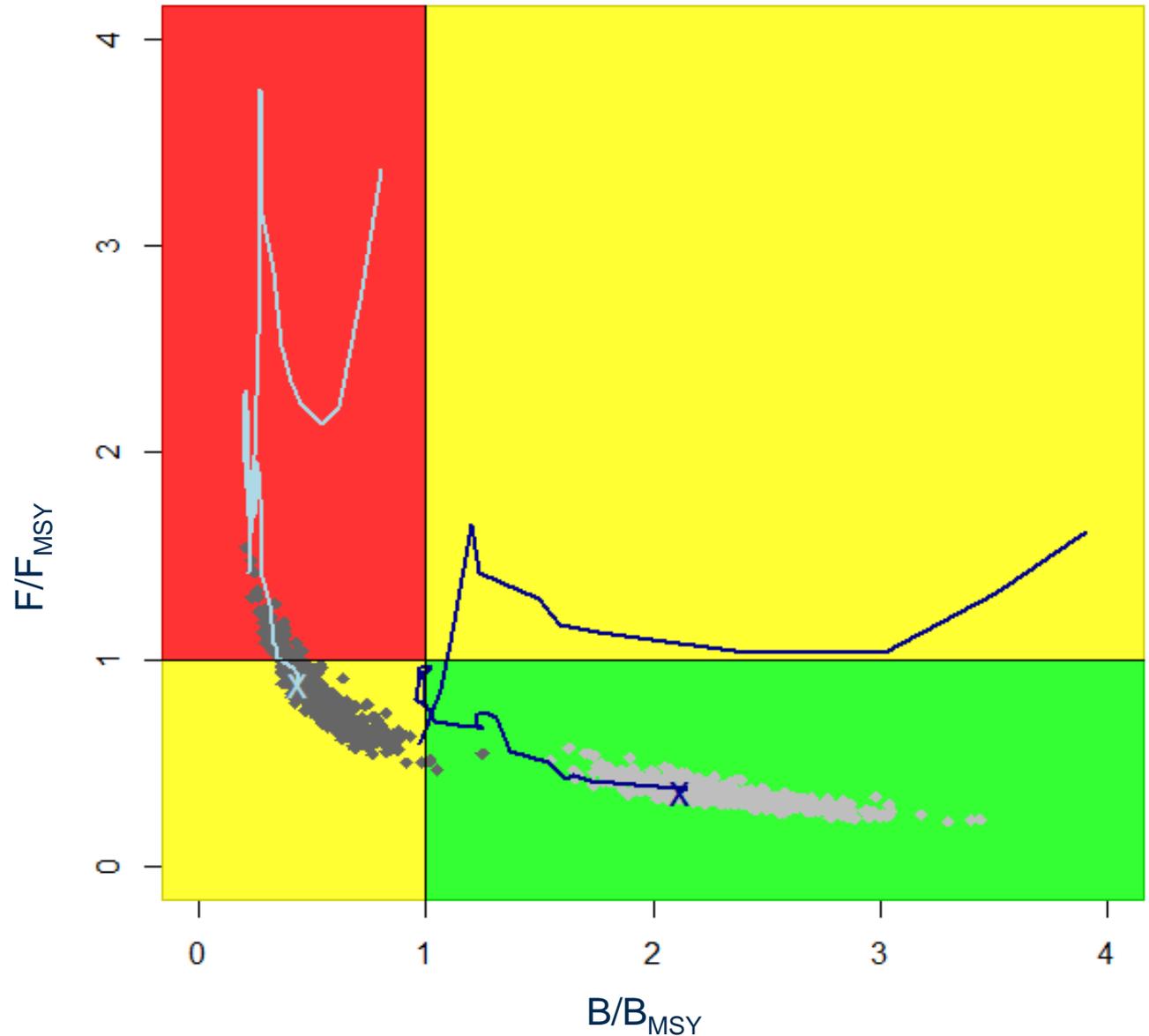
$$F/F_{MSY}=0.88$$

$$B/B_{MSY}=0.48$$

**LOW RECRUITMENT  
POTENTIAL:**

$$F/F_{MSY}=0.36$$

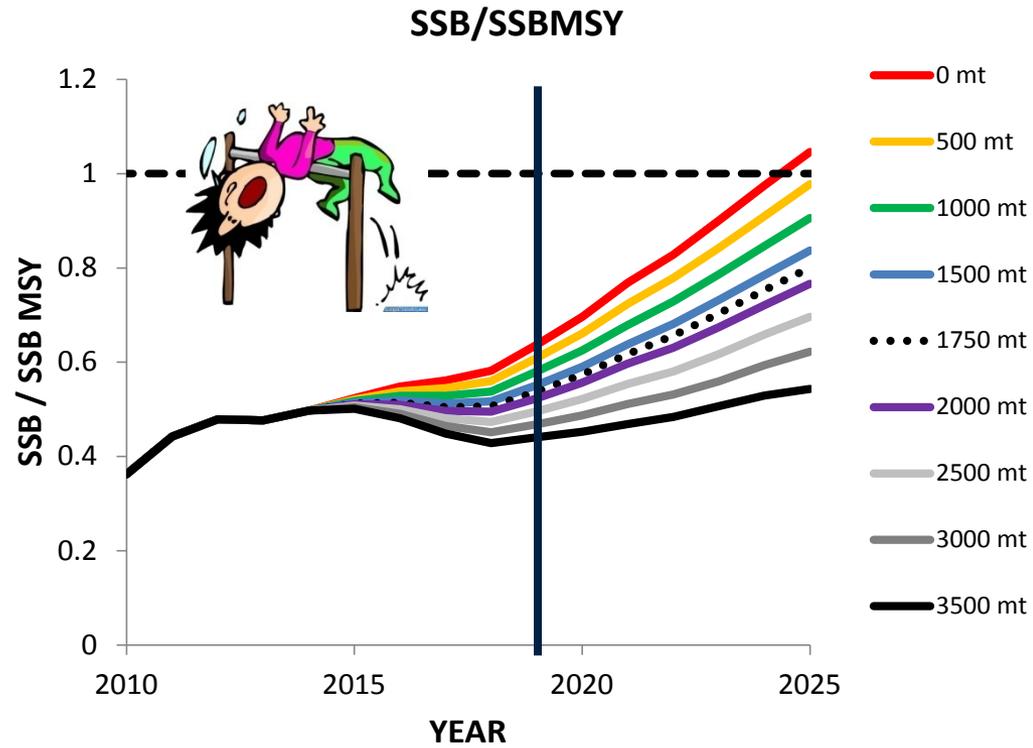
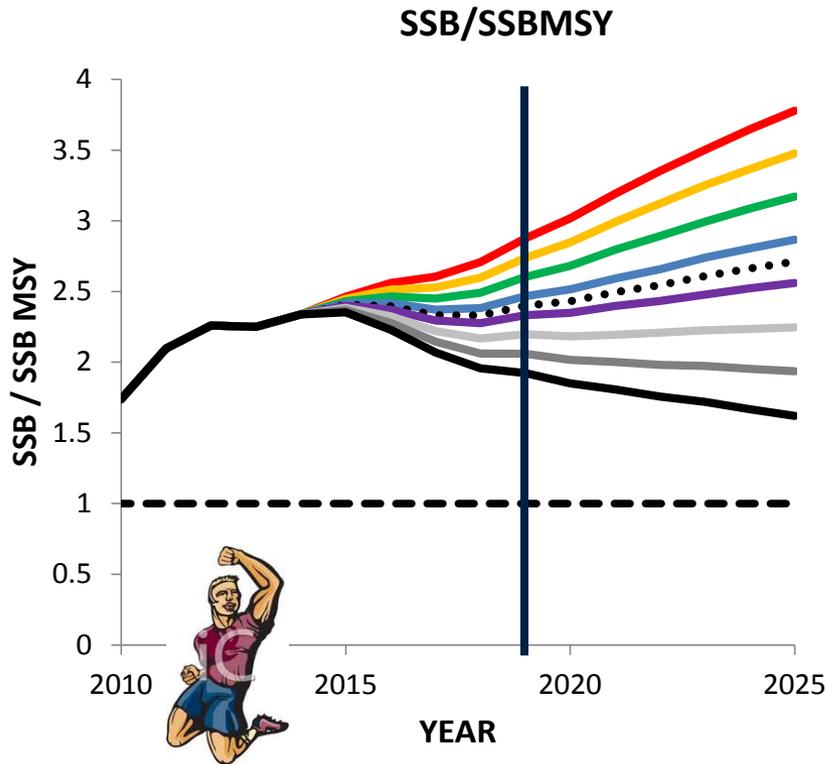
$$B/B_{MSY}=2.25$$



# PROJECTED OUTLOOK

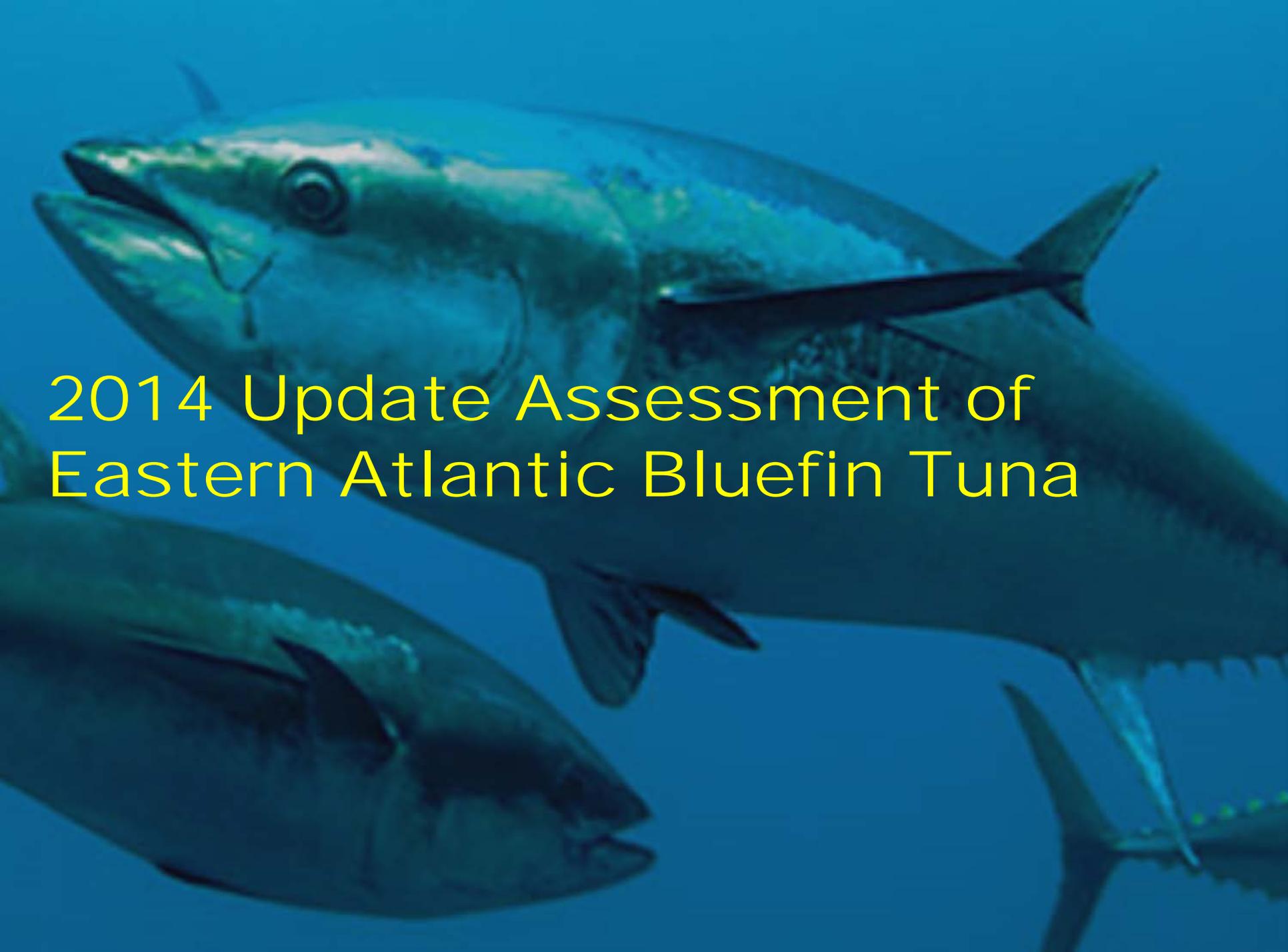
## LOW RECRUITMENT POTENTIAL

## HIGH RECRUITMENT POTENTIAL



# MANAGEMENT ADVICE

- *Low recruitment potential scenario* suggests that biomass is currently above the level needed to produce MSY, whereas the *high recruitment potential scenario* suggests that  $B_{MSY}$  has a very low probability of being achieved within the rebuilding period
- Under either scenario catches of less than 2,250 should prevent the spawning biomass in 2019 from falling below current levels (with 50% probability) and this level of catch should not be exceeded.
- Maintaining catch at current levels (1,750 t) is expected to allow the spawning biomass to increase more quickly, which may help resolve the issue of low and high recruitment potential.

The image shows two Eastern Atlantic Bluefin Tuna swimming in clear blue water. The fish in the foreground is larger and more prominent, showing its characteristic features like the dorsal fin, pectoral fins, and the pointed snout. The second fish is partially visible below and to the left. The overall scene is a naturalistic depiction of these large marine predators.

# 2014 Update Assessment of Eastern Atlantic Bluefin Tuna

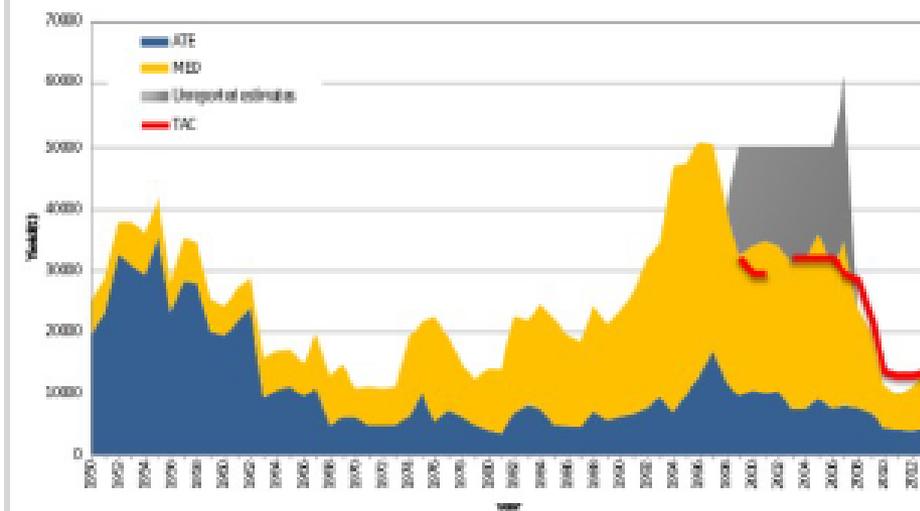


## Fishery Trends and Indicators

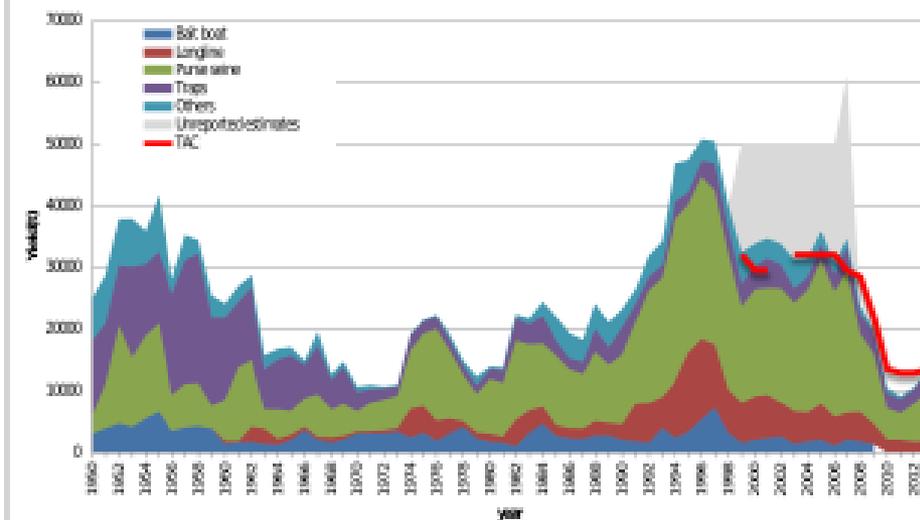
### How much is caught and by who?

- Decrease in catch mostly in the Mediterranean, probably in response to the rebuilding plan and control enforcement
- No detection of under-reporting since 2008 when confronting reported catch with fishing capacity information, but the approach has some limits (not assessed since 2010)
- **2011: 9,774 t (lowest since 1950)**
- **2012: 11,473 t**
- **2013: 13,333 t**

IPT-East Atlantic stock (Tack-I) by region



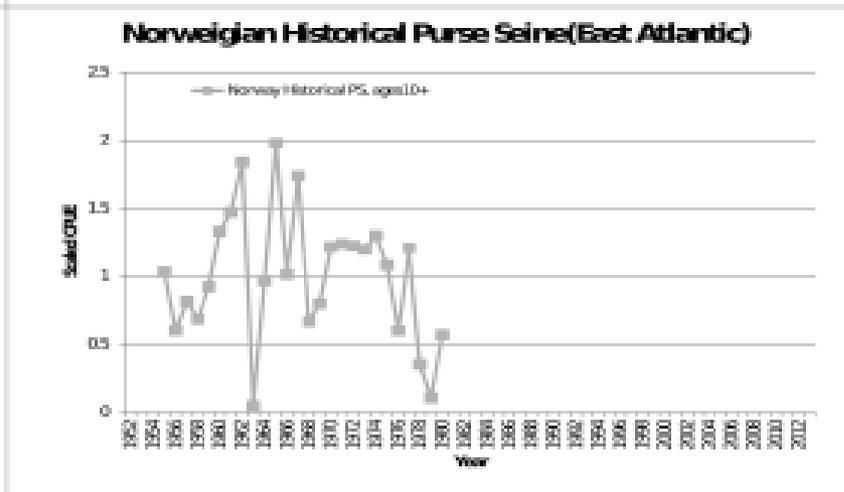
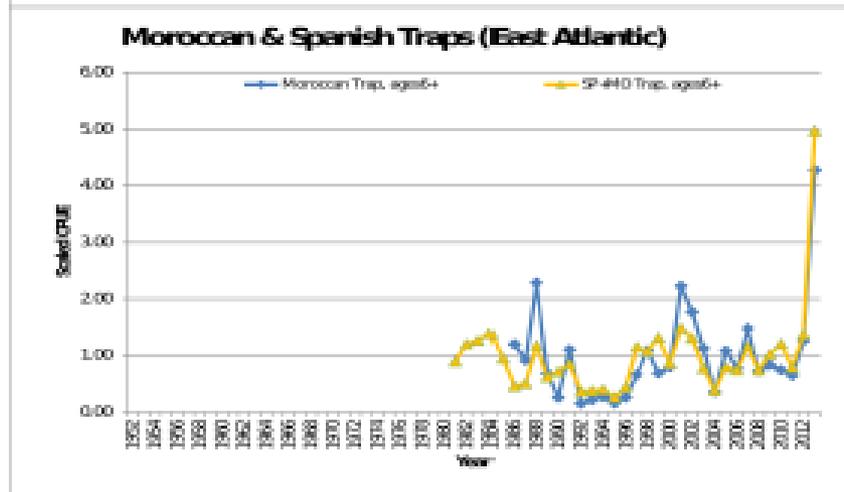
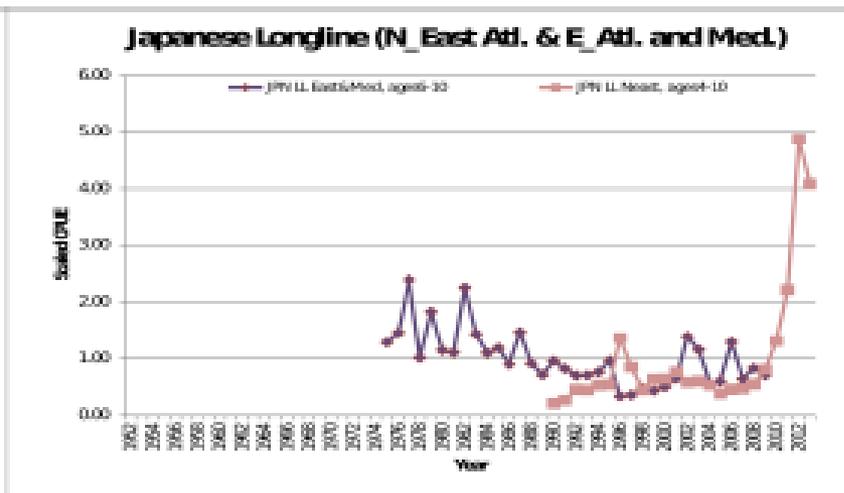
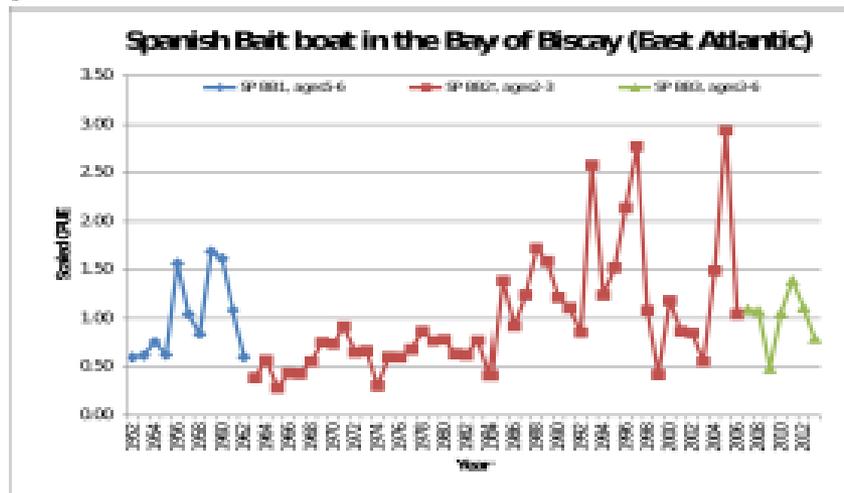
IPT-East Atlantic stock (Tack-I) by major gear





# Fishery Trends and Indicators

## Updated Catch Per Unit of Effort





## State of the stock

The stock status has significantly improved since 2012, as  $F_{2013} < F_{0.1}$

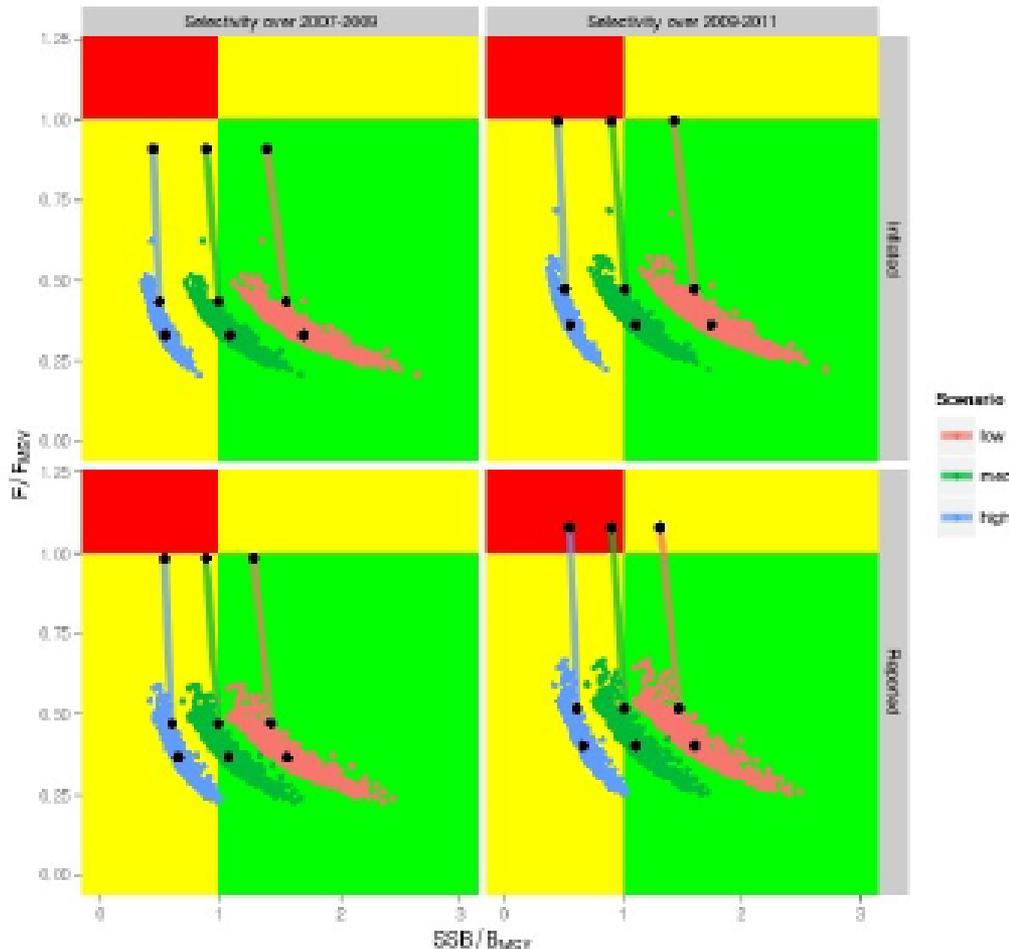
- $F_{2013}/F_{0.1} = 0.40$  (reported)
- $F_{2013}/F_{0.1} = 0.36$  (inflated)

and **SSB is most likely above the level expected at  $F_{0.1}$**

- $SSB_{2013}/SSB_{F_{0.1}} = 1.10$  (reported)
- $SSB_{2013}/SSB_{F_{0.1}} = 1.11$  (inflated)

Those ratios depend on:

- the selectivity patterns,
- total catch,
- mean recruitment levels (more pessimistic for high recruitment (0.55) than low recruitment (1.74))





## Outlook

The Group has, however, **little confidence in the projection outputs and thus in the Kobe matrices** because of various and significant sources of **unquantified uncertainties**:

- VPA outputs are impaired by the **poor quality of the catch statistics**
- VPA outputs are highly sensitive to technical specifications (F-ratios, Plus Group, selectivity, recruitment and catch levels...)
- Increasing **difficulties to track changes in abundance** through fisheries dependent information (need for fisheries-independent information)
- Lack of scientific information about main Mediterranean fisheries
- Projections calculated only with Continuity run

# EBFT Management recommendations

“...maintaining current TAC or moderately and gradually increasing over recent TACs ...should not undermine the success of the rebuilding plan ...

“Committee was not able to provide ...robust advice on an upper bound for the TAC because of differing views about the implications of the uncertainties associated with the assessment...no agreement ...[on] ...the upper limit ... that would not jeopardize recovery of the stock.”

“In equivalent situations, other scientific fora have similarly recommended moderate increases of the TAC.... To this end...a gradual increase (in steps over e.g. 2 or 3 years) in catch to the level of the most precautionary MSY estimate would allow the population to increase even in the most conservative scenario (low recruitment scenario)....

No consensus on the rate of increase or number of years.

One option discussed is increasing TAC from 13,500 to 23,000 mt over 2 or 3 years.

---

## EAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA SUMMARY

---

Current reported yield (2013)	14,286 t	
	Reported catch	Inflated catch
Maximum Sustainable Yield <sup>1</sup>		
Low recruitment scenario (1970s)	23,256 t	23,473 t
Medium recruitment scenario (1950-2006)	33,662 t	36,835 t
High recruitment scenario (1990s)	55,860 t	74,248 t
$F_{0.1}$ <sup>2,3</sup>	$0.07 \text{ yr}^{-1}$	$0.07 \text{ yr}^{-1}$
$F_{2013}/F_{0.1}$	0.40	0.36
$SSB_{F_{0.1}}$		
Low recruitment scenario (1970s)	351,500 t	354,600 t
Medium recruitment scenario (1950-2006)	508,700 t	556,600 t
High recruitment scenario (1990s)	843,800 t	1,121,000 t
$SSB_{2013}/SSB_{F_{0.1}}$		
Low recruitment scenario (1970s)	1.60	1.74
Medium recruitment scenario (1950-2006)	1.10	1.11
High recruitment scenario (1990s)	0.67	0.55
TAC (2010 - 2014)	13,500 t - 12,900 t - 12,900 t - 13,500 t – 13,500 t	

---

<sup>1</sup> Approximated as the average of the potential long-term yield that is expected at a  $F_{0.1}$  strategy. The levels of these yields have been computed using the selectivity pattern over 2009-2011 and can substantially change according to different selectivity patterns.

<sup>2</sup> The Committee decided, on the basis of current published literature, to adopt  $F_{0.1}$  as the proxy for  $F_{MSY}$ .  $F_{0.1}$  has been indeed shown to be more robust to uncertainty about the true dynamics of the stock and observation errors than  $F_{MAX}$ . Values are given for both reported and inflated catch scenarios, respectively.  $F_{0.1}$  have been also computed using the 2012 selectivity pattern and can thus substantially change according to different selectivity patterns

<sup>3</sup> The recruitment levels do not impact  $F_{0.1}$ .



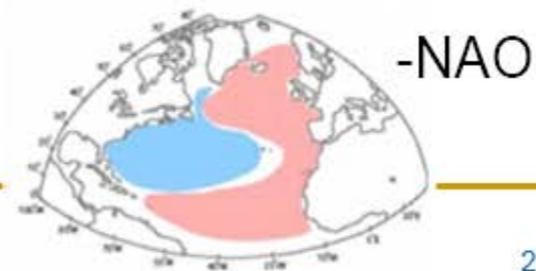
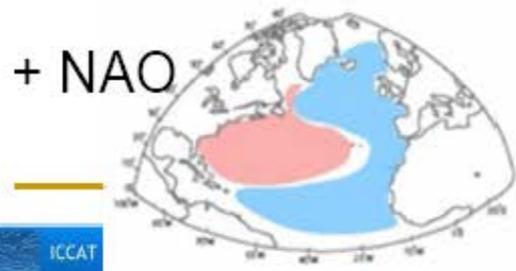
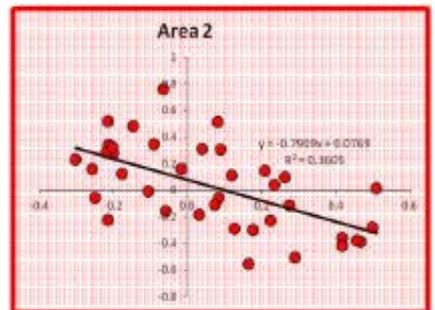
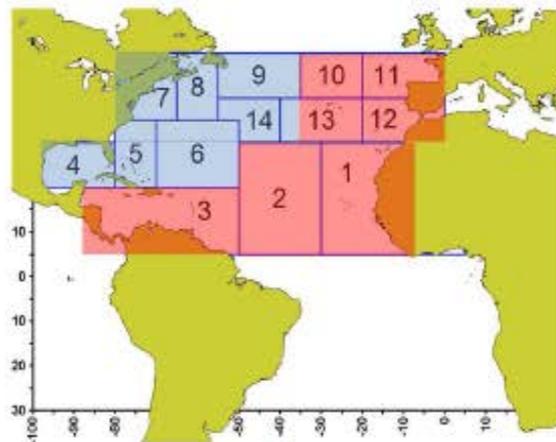
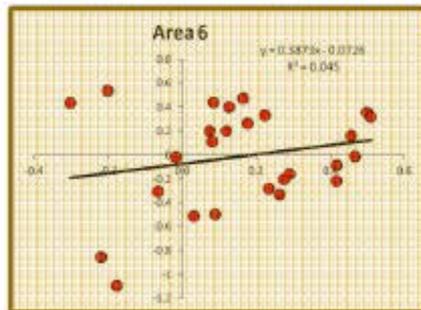
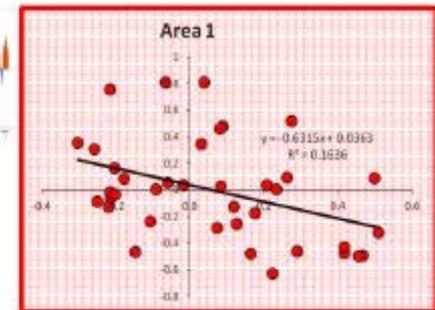
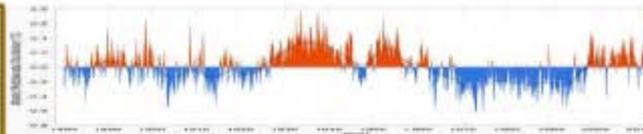
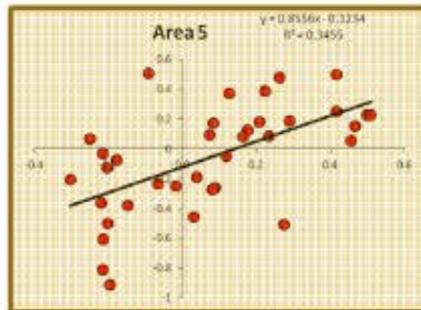
# Swordfish



# New information on SWO biology

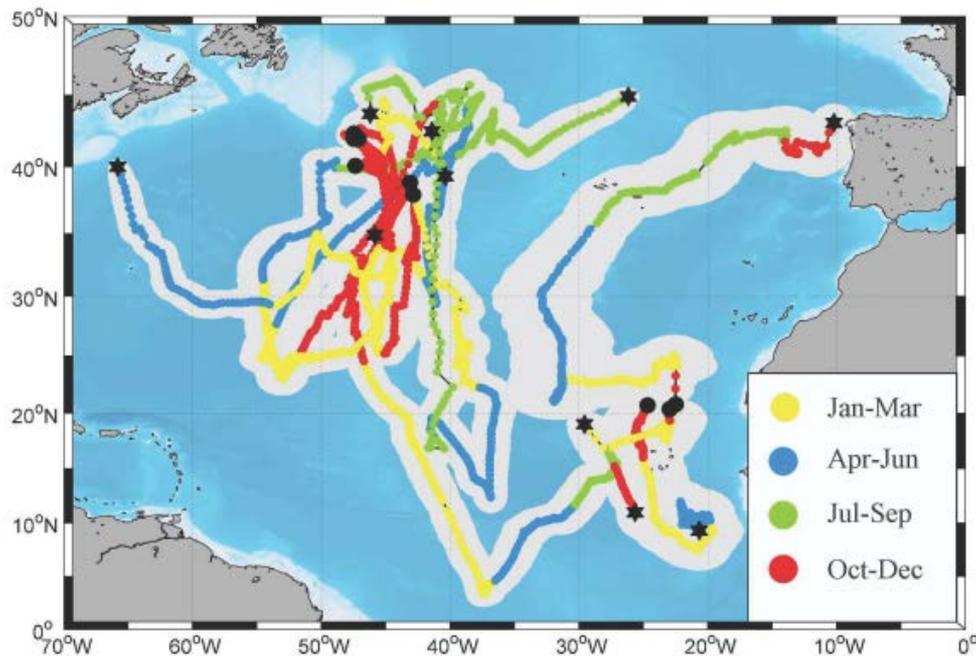
Several area specific residual patterns had significant relationships with the Atlantic Multidecadal Oscillation (AMO). These relationships of the eastern Atlantic were opposite to those in the western Atlantic.

This pattern mimicked very closely the spatial mapping of the AMO, as well as that of the North Atlantic Oscillation (NAO)



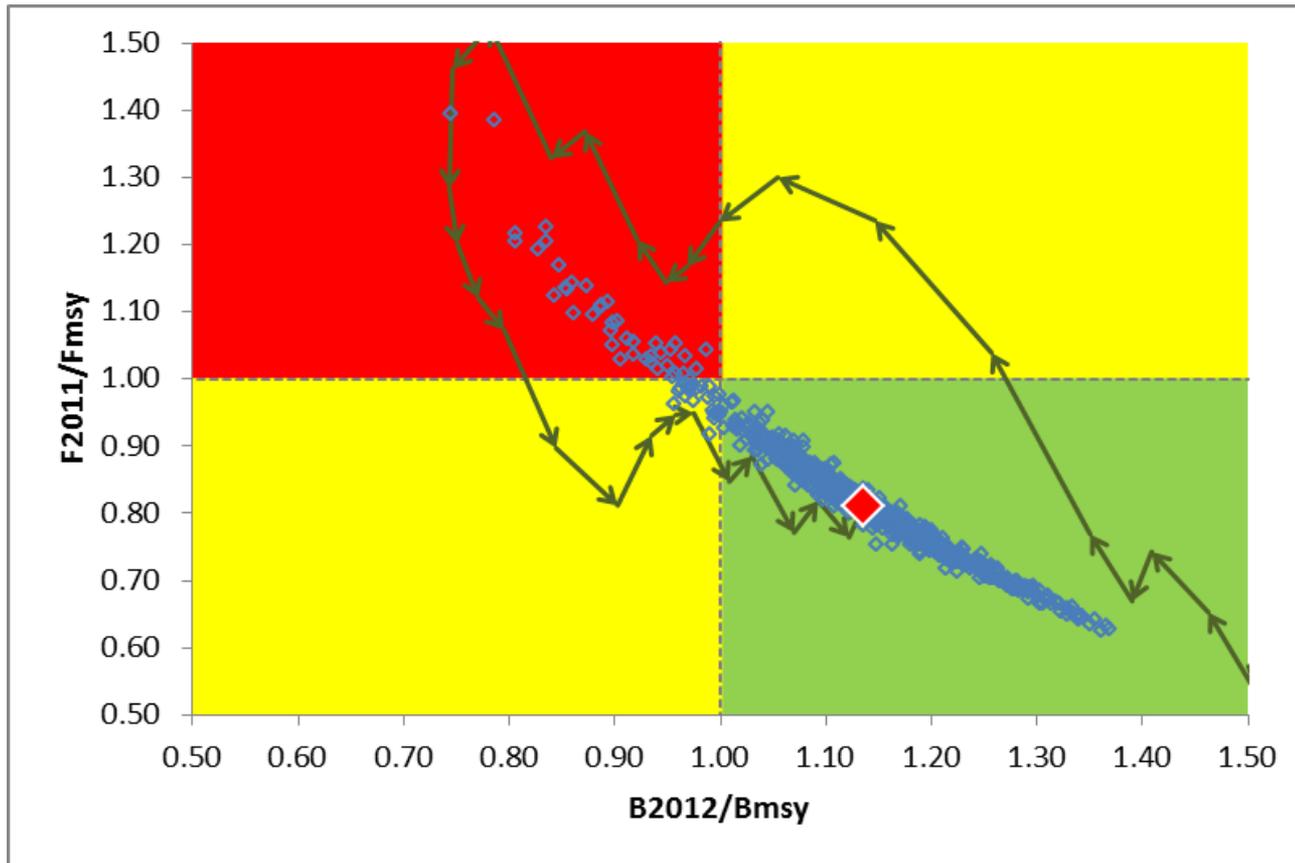
# New information on SWO biology

- ❑ SCRS/2013/151 presented the horizontal tracking of 21 swordfish tagged with pop-up satellite tags in the central and eastern North Atlantic
- ❑ Horizontal movements evidenced seasonal patterns with fish generally moving south in winter, returning to temperate foraging grounds in spring



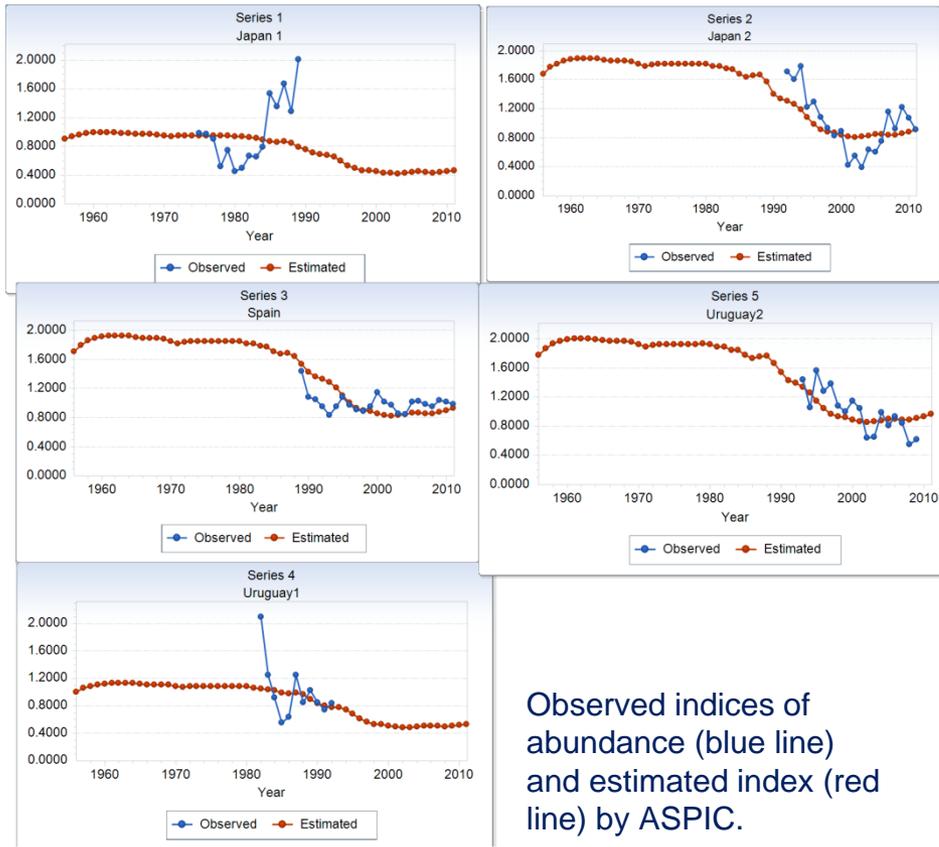
Synthetic map of the horizontal swordfish tracks color-coded by quarter. Fish tagging-release position (dots). Pop-up position (stars).

# Stock status (ASPIC), North

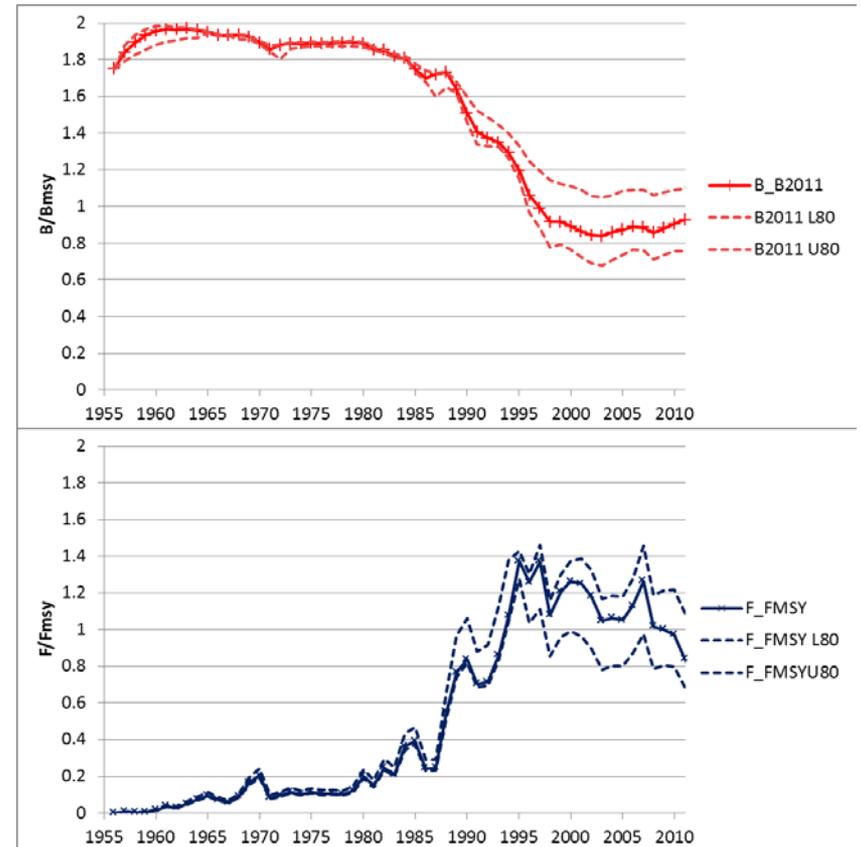


- Stock status in 2011 is relatively similar to the estimated status in 2009 assessment.
- There is greater than 90% probability that the stock is at or above  $B_{MSY}$ , and thus the Commission's rebuilding objective [99-2] has been achieved.

# ASPIC Production Model results, South



Observed indices of abundance (blue line) and estimated index (red line) by ASPIC.



- ❑ Conflicting signal for several indices and substantial conflict in the landings and the indices
- ❑ Currently fishing mortality is below  $F_{MSY}$  (not undergoing overfishing)
- ❑ The current results indicate that the stock is slightly overfished

---

## ATLANTIC SWORDFISH SUMMARY

---

	<i>North Atlantic</i>	<i>South Atlantic</i>
Maximum Sustainable Yield <sup>1</sup>	13,660 t (13,250-14,080) <sup>3</sup>	Unknown
Current (2013) TAC	13,700 t	15,000 t
Current (2013) Yield <sup>2</sup>	11,980 t	7,787 t
Yield in last year used in assessment (2011)	12,834 t <sup>4</sup>	11,055 t <sup>4</sup>
B <sub>MSY</sub>	65,060 (54,450-76,700)	Unknown
F <sub>MSY</sub>	0.21 (0.17-0.26)	Unknown
Relative Biomass (B <sub>2011</sub> /B <sub>MSY</sub> )	1.14 (1.05-1.24)	Unknown, but likely above 1 <sup>5</sup>
Relative Fishing Mortality (F <sub>2011</sub> /F <sub>MSY</sub> <sup>1</sup> )	0.82 (0.73-0.91)	Unknown, but likely below 1 <sup>5</sup>
Stock Status	Overfished: NO Overfishing: NO	Overfished: NO <sup>5</sup> Overfishing: NO
Management Measures in Effect	Country-specific TACs [Rec. <u>13-02</u> ];  125/119 cm LJFL minimum size	Country-specific TACs [Rec. <u>13-03</u> ];  125/119 cm LJFL minimum size

---

<sup>1</sup> Base Case production model (Logistic) results based on catch data 1950-2011.

<sup>2</sup> Provisional and subject to revision.

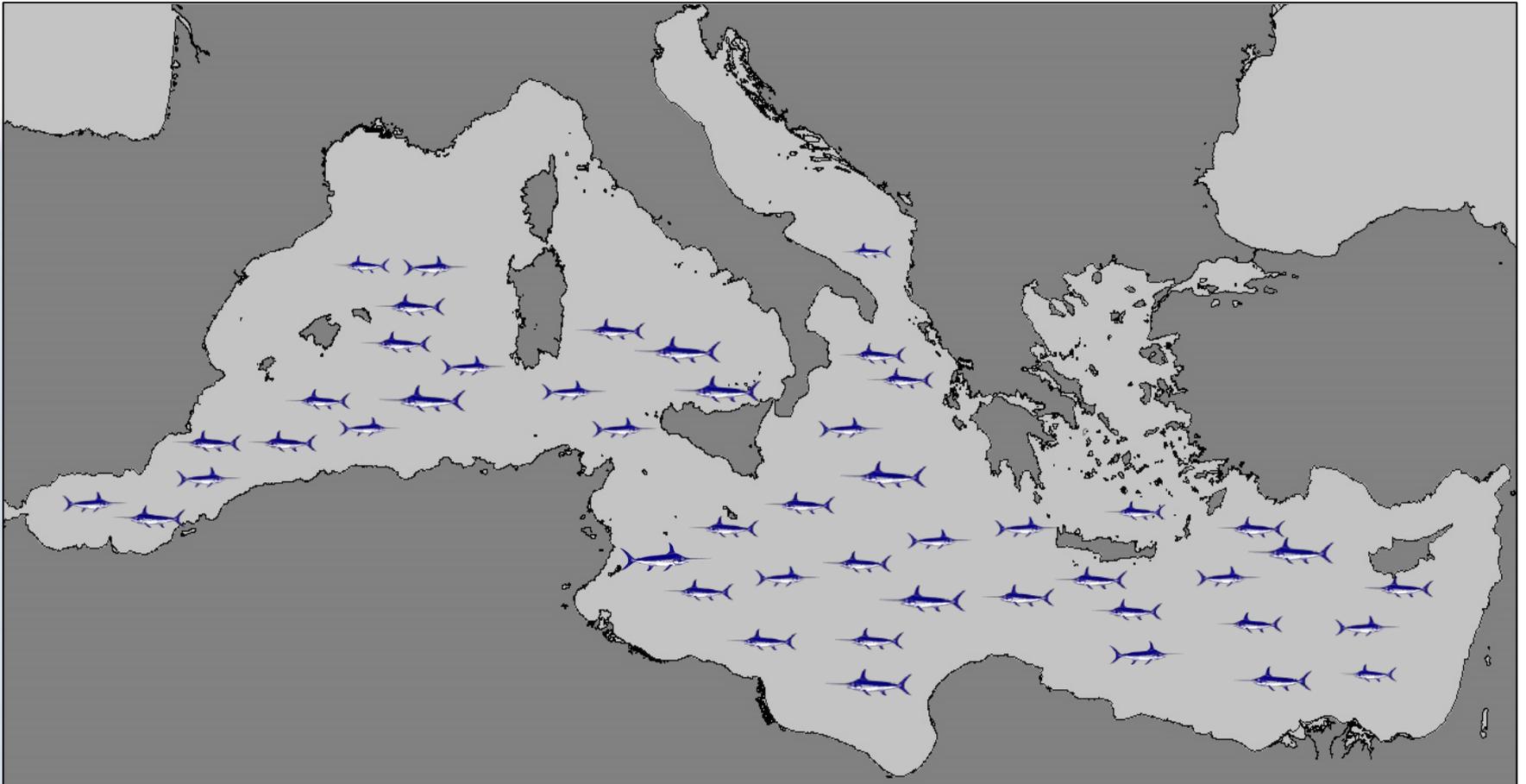
<sup>3</sup> Point estimate, 80% bias corrected confidence intervals are shown.

<sup>4</sup> As of 5 September 2013.

<sup>5</sup> This determination is based on the models and the ancillary information (e.g. catch trends, mean weight trends).

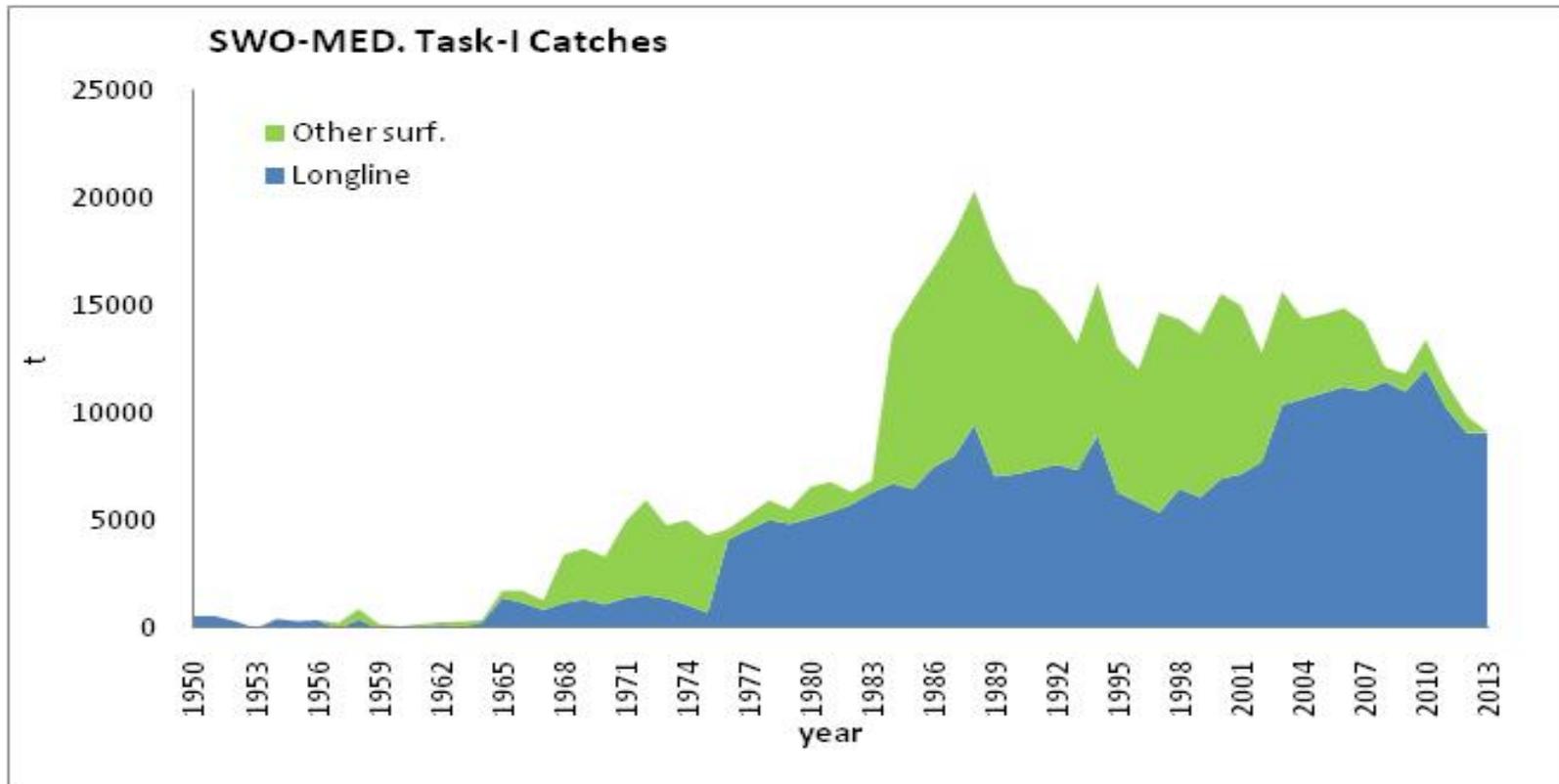
# MEDITERRANEAN SWORDFISH STOCK ASSESSMENT

*Heraklion, Greece, July 21 - 25, 2014*  
*(SCI- 033)*



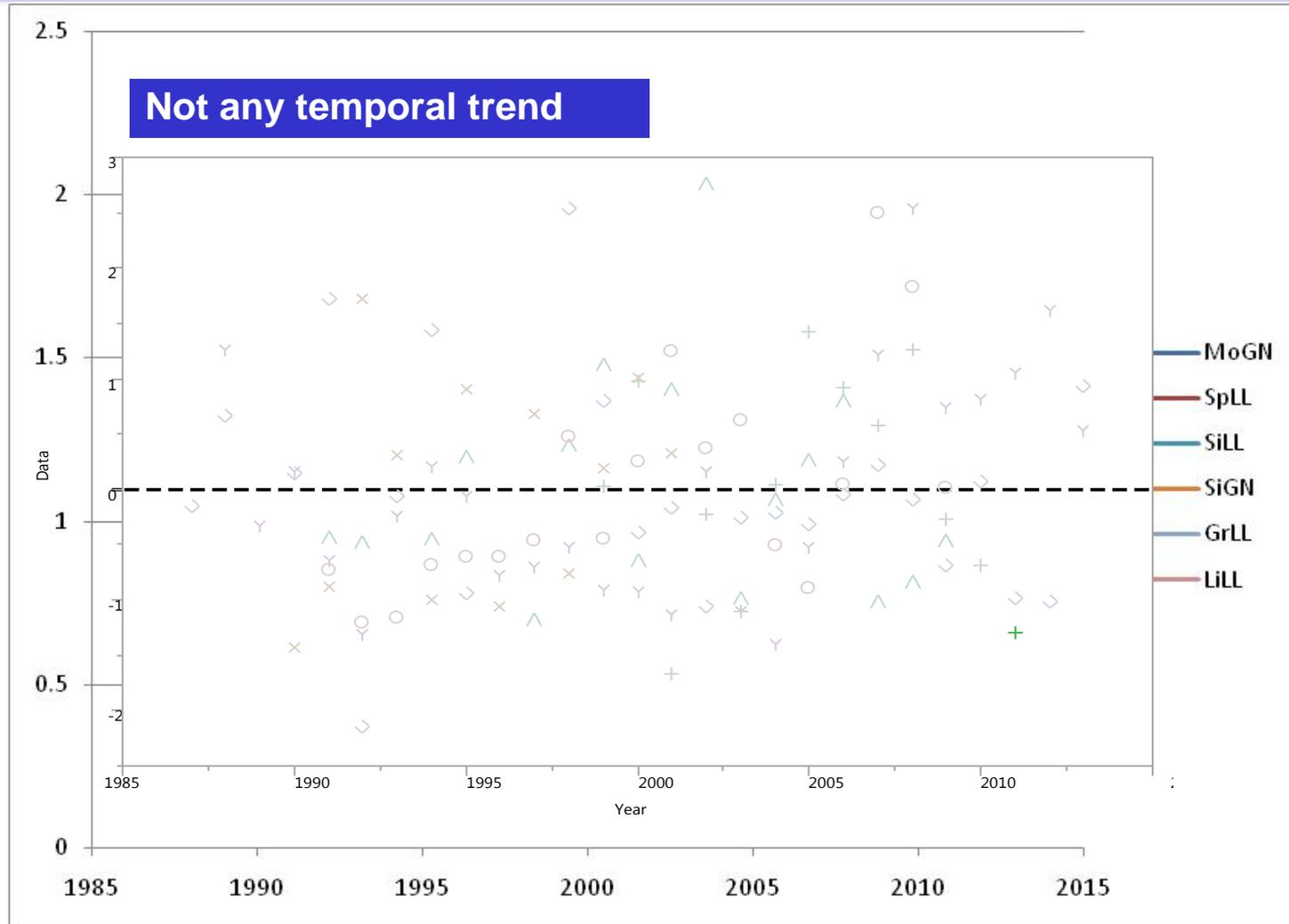
# Fisheries data

- Task I data: 1950-2013 (the catches in 2013 were the lowest in the last 30 years)
- Task II data: 1987-2013



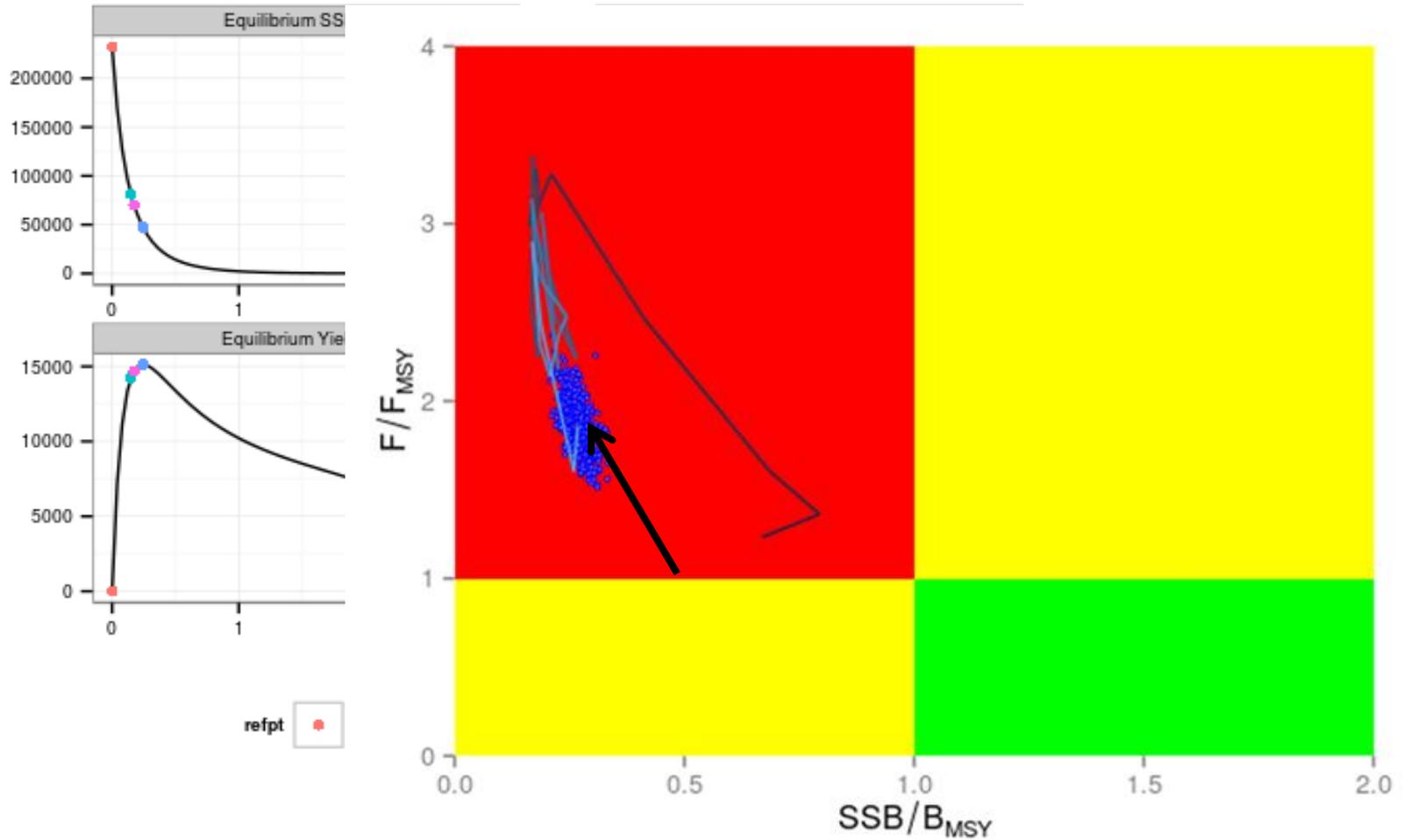
# Fishery trends - CPUE

Standardized abundance indices from six main fisheries



# Stock status (based on XSA)

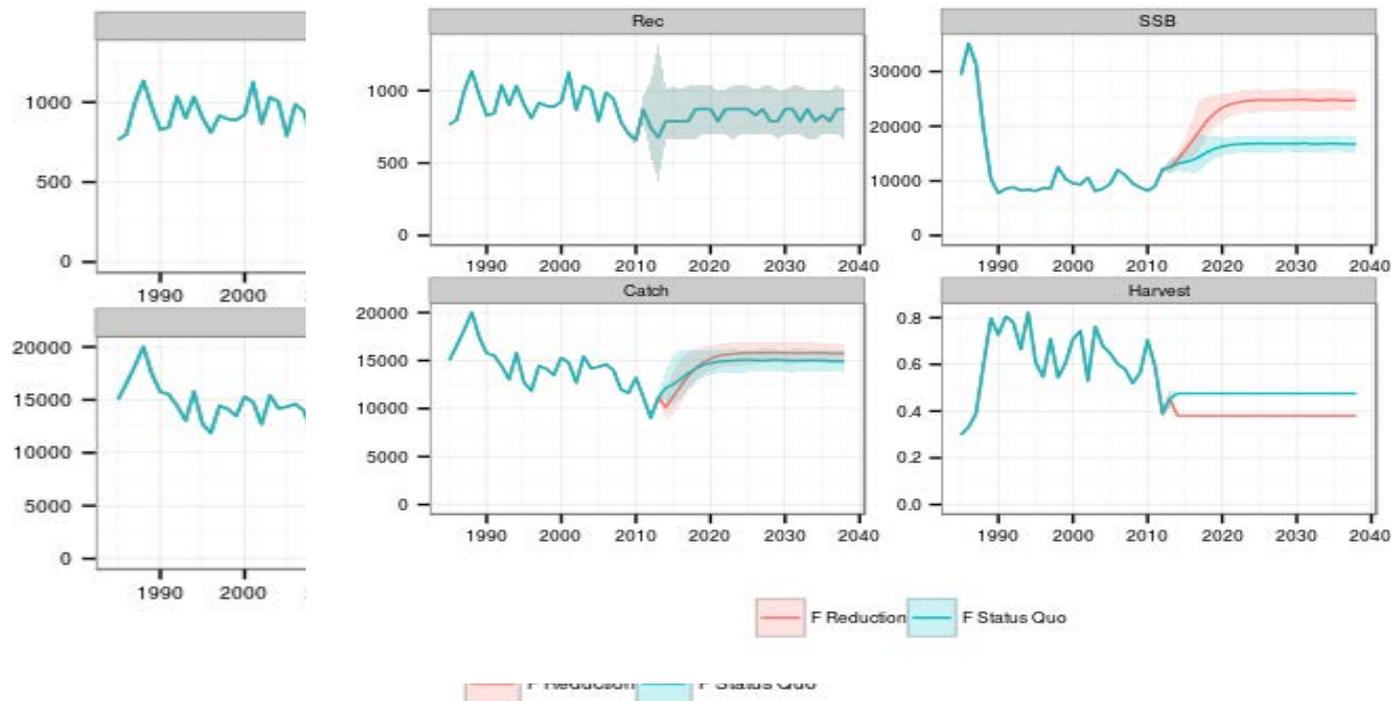
➤ *Stock is overfished and subject to overfishing*



# Projections (based on XSA)

➤ Assuming  $F$  reduction by 20% and two different selectivity patterns

current selection  $p_{50}$  50% current-mesopelagic



**Important note:** Catch of 2013 was overestimated during the assessment; thus SSB projections may be pessimistic

## Stock status (summary)

- The stock is far below the level which can support MSY (current SSB is ~30% of  $B_{MSY}$ )
- Current fishing mortality is about double of  $F_{MSY}$
- Biomass and recruitment levels stable over the last 20 years
- High uncertainty (not clear signal in the data, lack of historical series)

---

## MEDITERRANEAN SWORDFISH SUMMARY

---

Maximum Sustainable Yield	$\sim 15,000$ <sup>1</sup>
Current (2013) Yield	9,155 t <sup>2</sup>
Current (2013) Replacement Yield	9,540 t <sup>1</sup>
Relative Biomass ( $B_{2013}/B_{MSY}$ )	0.27 <sup>1</sup>
Relative Fishing Mortality	
$F_{2013}/F_{MSY}$	1.82 <sup>1</sup>
$F_{2013}/F_{0.1}$	2.97 <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), MLS regulations, and a license registry [Rec. 13-04]. <sup>3</sup>

---

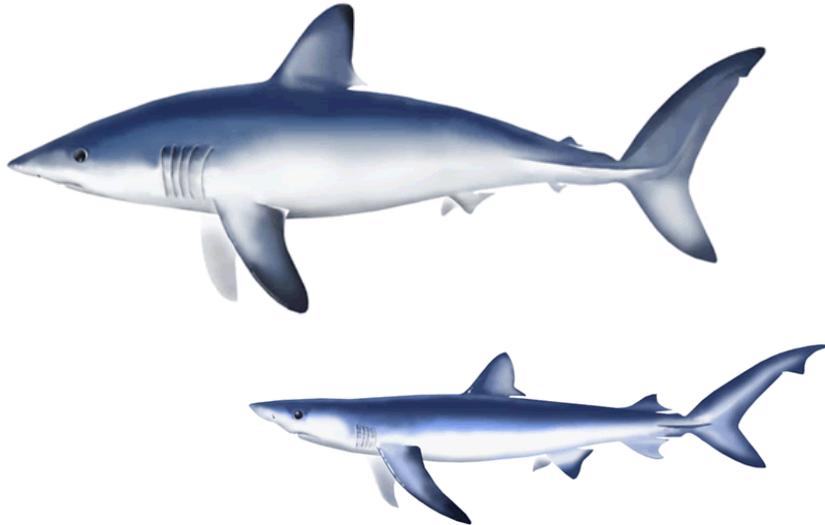
<sup>1</sup> Highly uncertain estimates based on the XSA and equilibrium analyses.

<sup>2</sup> As of September 2014.

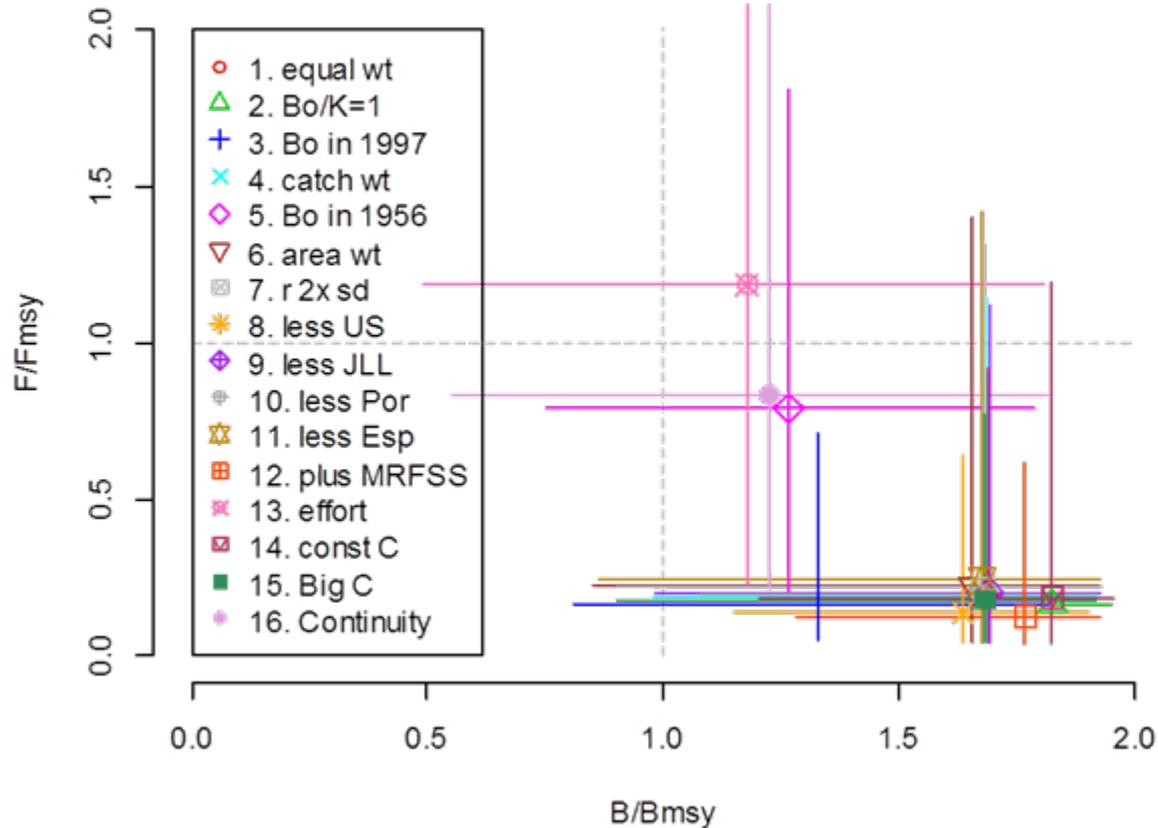
<sup>3</sup> Certain additional fishery restrictions are implemented at the national level.



# Sharks

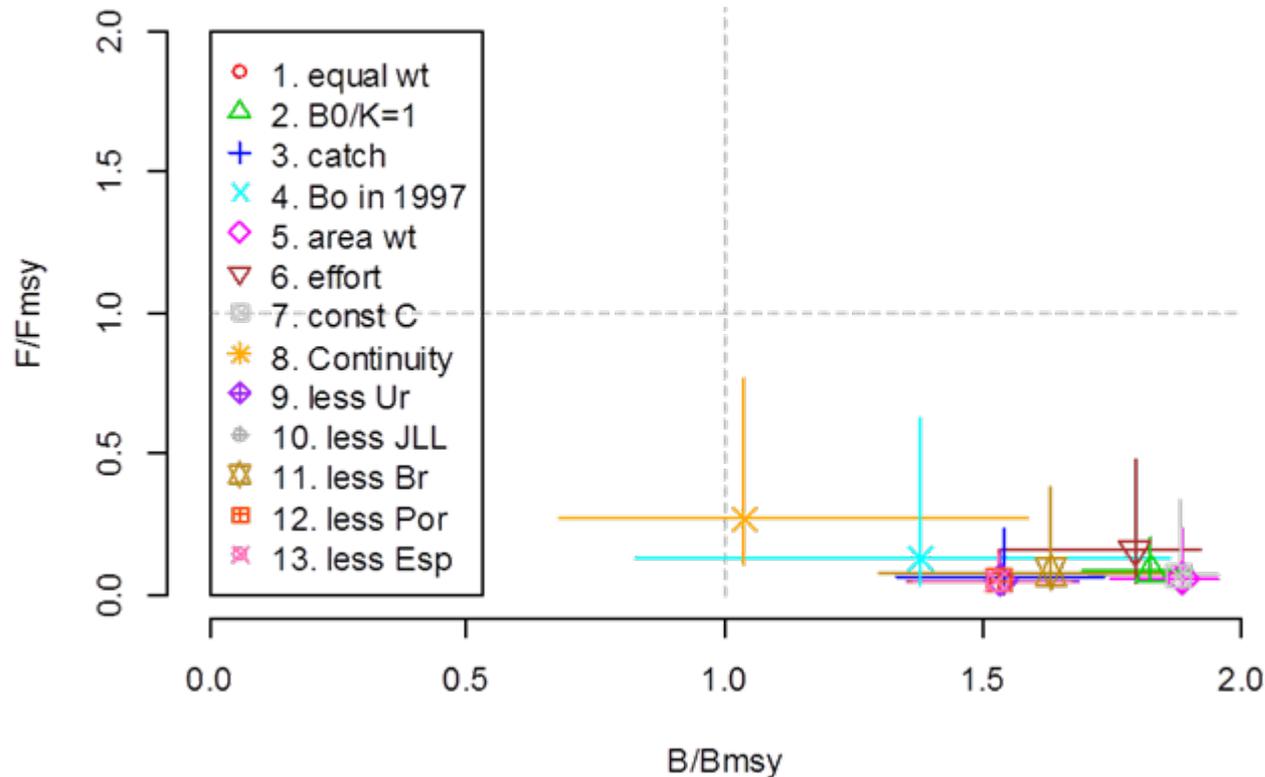


# Shortfin Mako Stock Status (NA)



Fifteen out of 16 model runs suggested that current (for 2010) biomass of North Atlantic shortfin mako is above  $B_{MSY}$  and fishing mortality rate below  $F_{MSY}$ . Bars indicate 80% credibility intervals.

# Shortfin Mako Stock Status (SA)



All 13 model runs suggested that current (for 2010) biomass of South Atlantic shortfin mako is above  $B_{MSY}$  and fishing mortality rate below  $F_{MSY}$ . Bars indicate 80% credibility intervals.

---

## NORTH ATLANTIC SHORTFIN MAKO SUMMARY

---

Provisional Yield (2013)		3,635 t <sup>1</sup>
Relative Biomass	$B_{2010}/B_{MSY}$	1,15-2,04 <sup>2</sup>
	$B_{2010}/B_0$	0,55-1,63 <sup>2</sup>
Relative Fishing Mortality	$F_{MSY}$	0,029-0,104 <sup>2</sup>
	$F_{2010}/F_{MSY}$	0,16-0,92 <sup>2</sup>
Overfished 2010 (Y/N)		No <sup>3</sup>
Overfishing 2010 (Y/N)		No <sup>3</sup>
Management Measures in Effect		[Rec. 04-10], [Rec. 07-06], [Rec. 10-06]

---

<sup>1</sup> Task I catch.

<sup>2</sup> Range obtained from BSP.

<sup>3</sup> The Committee considers that the results present a high level of uncertainty.

---

## SOUTH ATLANTIC SHORTFIN MAKO SUMMARY

---

Provisional Yield (2013)		1,907 t <sup>1</sup>
Relative Biomass	$B_{2010}/B_{MSY}$	1,36-2,16 <sup>2</sup>
	$B_{2010}/B_0$	0,72-3,16 <sup>2</sup>
Relative Fishing Mortality	$F_{MSY}$	0,029-0,041 <sup>2</sup>
	$F_{2010}/F_{MSY}$	0,07-0,40 <sup>2</sup>
Overfished 2010 (Y/N)		No <sup>3</sup>
Overfishing 2010 (Y/N)		No <sup>3</sup>
Management Measures in Effect		[Rec. 04-10], [Rec. 07-06], [Rec. 10-06]

---

<sup>1</sup> Task I catch.

<sup>2</sup> Range obtained from BSP.

<sup>3</sup> The Committee considers that the results present a high level of uncertainty.

Vulnerability ranks for 20 stocks of pelagic sharks calculated with three methods: Euclidean distance (v1), multiplicative (v2), and arithmetic mean (v3). A lower rank indicates higher risk. Stocks listed in decreasing risk order according to the sum of the three indices. Red highlight indicates risks scores 1-5; yellow, 6-10; blue, 11-15; and green, 16-20.

Stock	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>
BTH	3	1	1
LMA	5	3	2
SMA	1	8	2
POR	2	7	4
CCS	11	4	5
FAL SA	12	5	6
CCP	15	2	6
OCS	4	13	8
FAL NA	8	11	8
ALV	9	14	11
BSH NA	6	19	10
DUS	17	6	12
SPK	14	10	13
BSH SA	7	20	14
TIG	10	16	15
PLS SA	18	9	16
SPL NA	16	12	16
SPZ	13	17	18
SPL SA	19	15	19
PLS NA	20	18	20

Bigeye thresher, longfin and shortfin makos, porbeagle, and night sharks were the most vulnerable stocks.

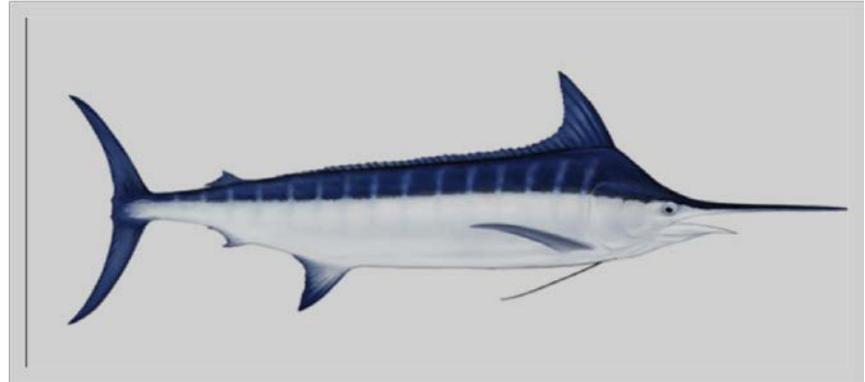
# SCRS Shark Management Recommendations

Taking into consideration the continued high vulnerability ranking in the ERA, results from the modeling approaches used in the assessment, the associated uncertainty, and the relatively low productivity of shortfin mako sharks, the committee recommends, as a precautionary approach, that **catches of shortfin mako sharks should not be increased with respect to current levels** until more reliable stock assessment results are available for both the Northern and Southern stocks

Considering the need to improve stock assessments of pelagic shark species impacted by ICCAT fisheries, the committee recommends that the **CPCs provide the corresponding statistics of all ICCAT fisheries, including recreational and artisanal fisheries, and to the extent possible non-ICCAT fisheries capturing these species.** The committee considers that a basic premise for correctly evaluating the status of any stock is to have a solid basis to estimate total removals

The Committee recommends that the Commission work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs (e.g., NAFO, CCSBT) to ensure recovery of North Atlantic porbeagle stocks and prevent overexploitation of South Atlantic stocks. In particular, **porbeagle fishing mortality should be kept to levels in line with scientific advice and with catches not exceeding current level. New targeted porbeagle fisheries should be prevented, porbeagles retrieved alive should be released alive, and all catches should be reported.** Management measures and data collection should be harmonized as much as possible among all relevant RFMOs dealing with these stocks, ICCAT should facilitate appropriate communication

The Committee recommends that **joint work with the ICES Working Group on Elasmobranch Fishes should be continued.** Species occurring in the Mediterranean Sea should also be discussed. Collaboration with the GFCM regarding these species should be explored

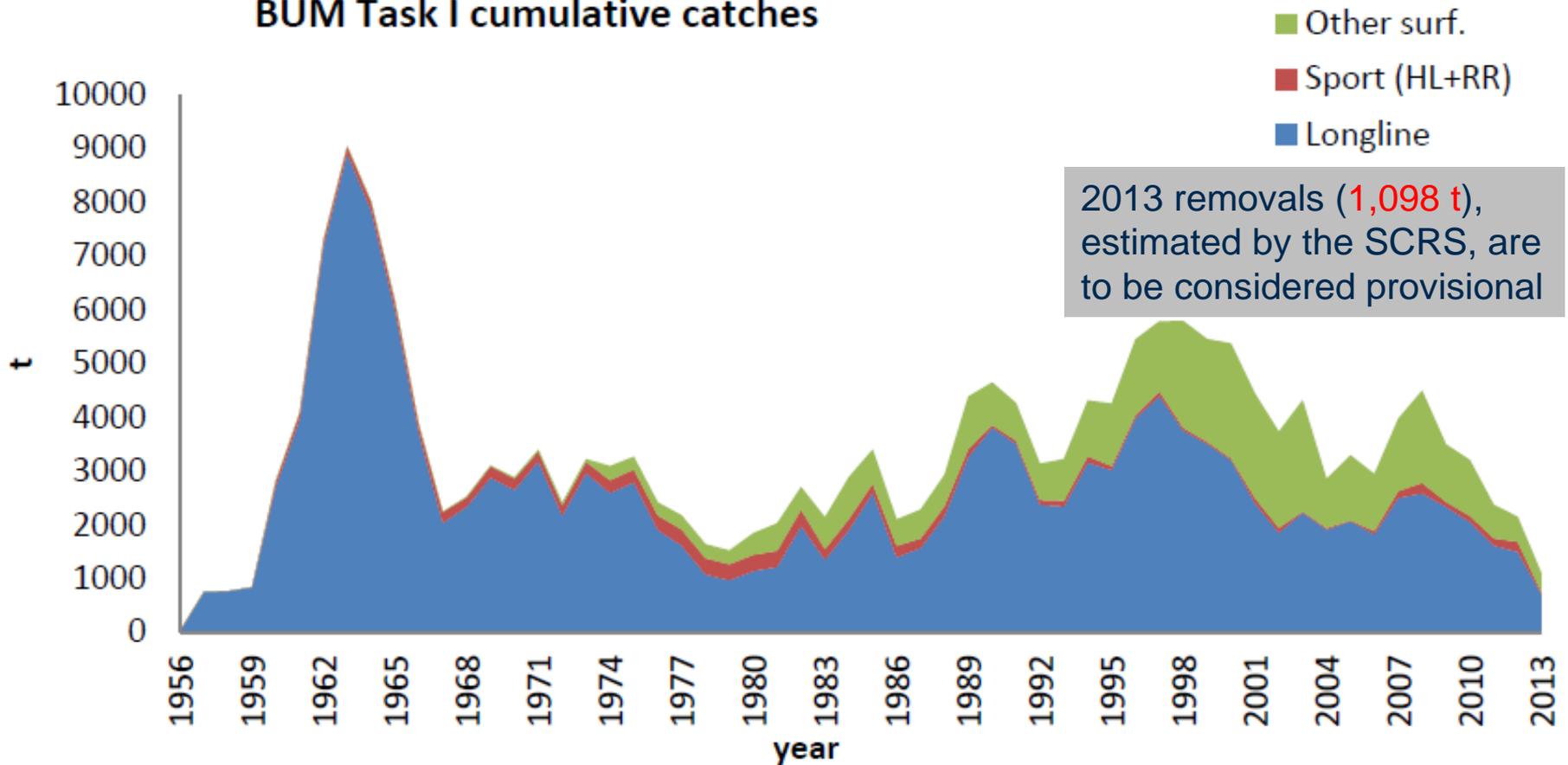


# Billfish



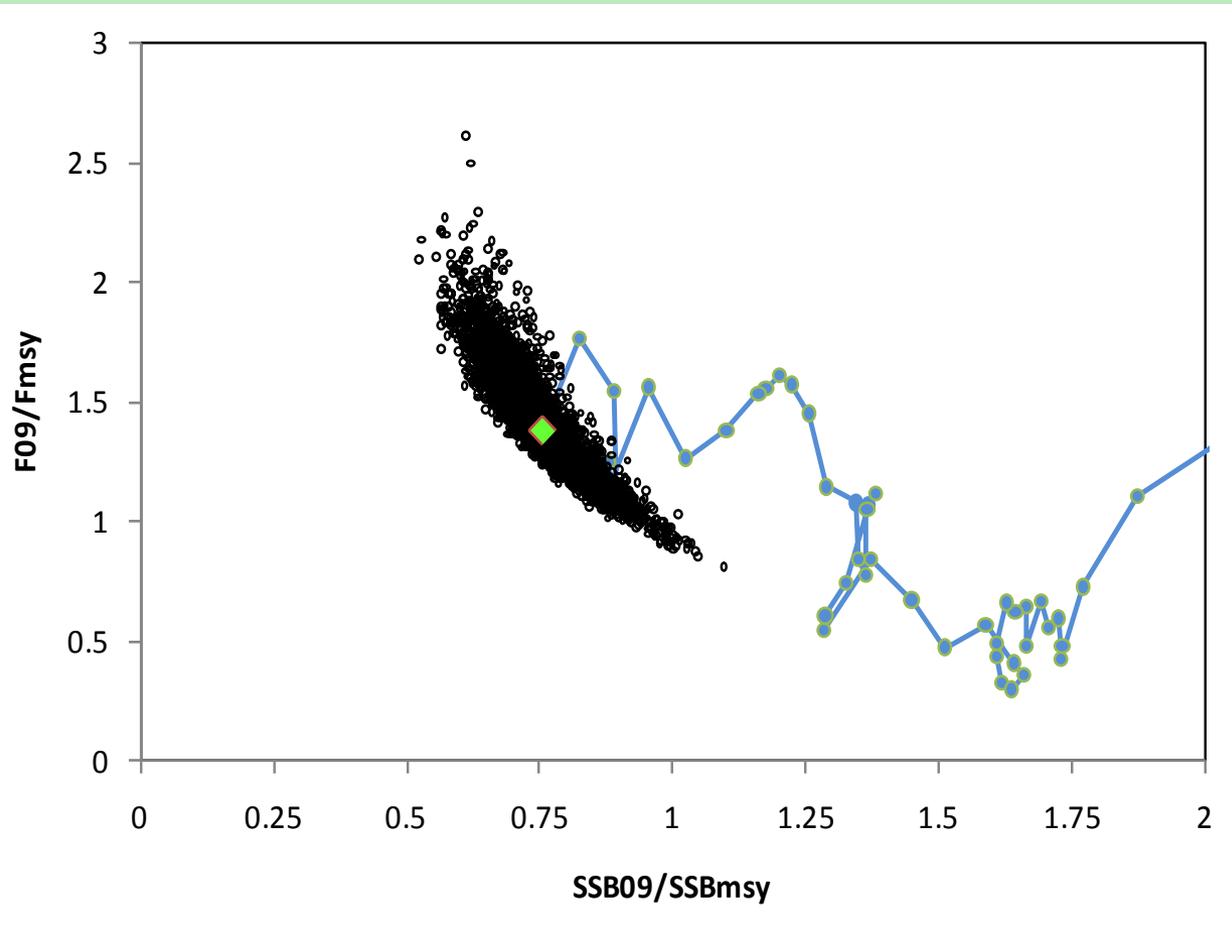
# Blue Marlin Landings North & South

BUM Task I cumulative catches



# Current BUM Stock Status

## Overfished and undergoing overfishing



---

## ATLANTIC BLUE MARLIN SUMMARY

---

### BUM

---

Maximum Sustainable Yield	2,837 t (2,343 – 3,331 t) <sup>1</sup>
Current (2013) Yield	<u>1,098 t<sup>2</sup></u>
Relative Biomass (SSB <sub>2009</sub> /SSB <sub>MSY</sub> )	0.67 (0.53 – 0.81) <sup>1</sup>
Relative Fishing Mortality (F <sub>2009</sub> /F <sub>MSY</sub> )	1.63 (1.11 – 2.16) <sup>1</sup>
Overfished	Yes
Overfishing	Yes
Conservation and Management Measures in Effect:	Recommendation [Rec. 12-04]. Reduce the total harvest to 2,000 t in 2013, 2014, and 2015

---

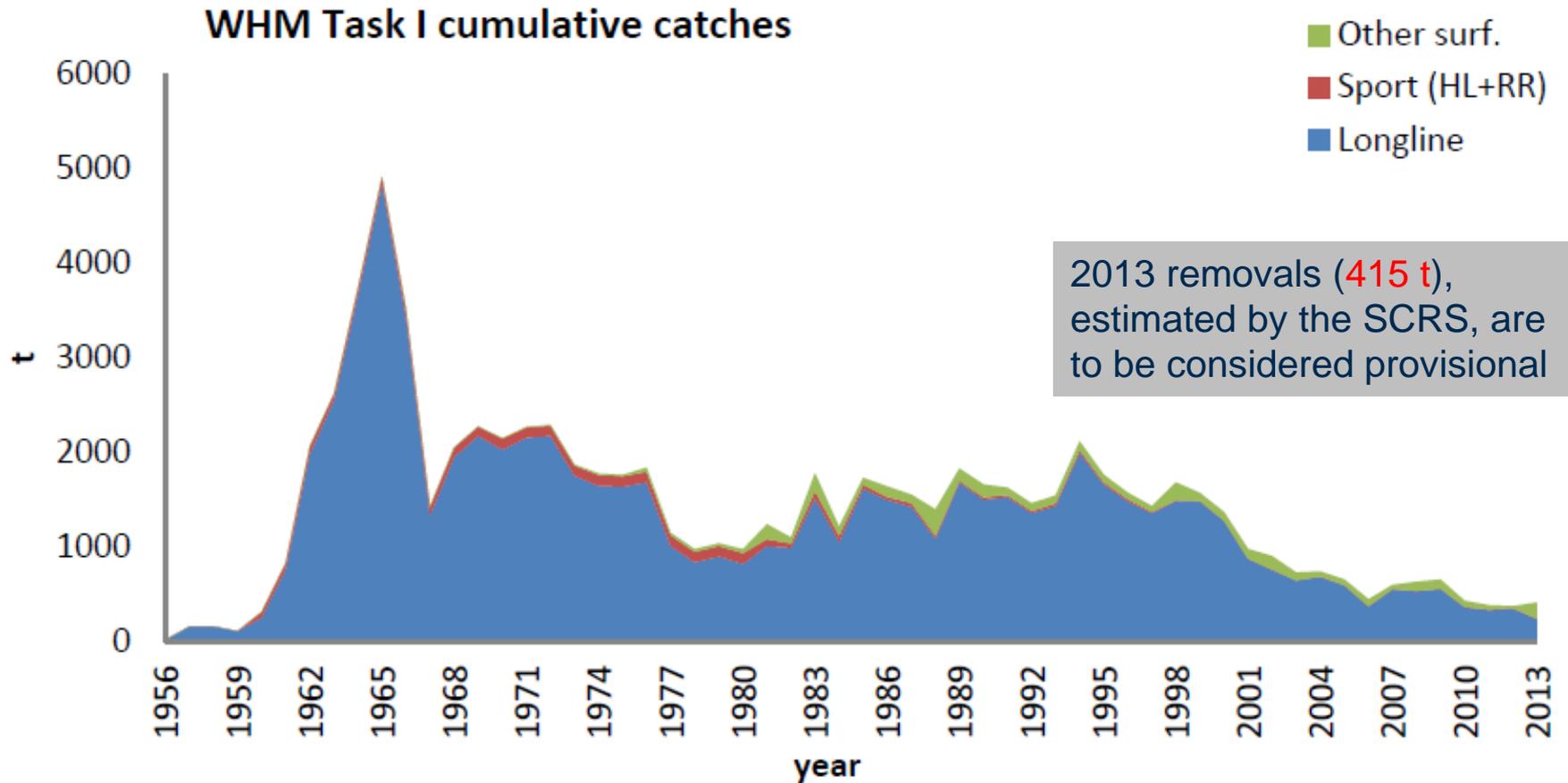
<sup>1</sup> Stock Synthesis version 3.2.0.b model results. Values correspond to median estimates, 95% confidence interval values are provided in parenthesis.

<sup>2</sup> 2013 yield should be considered provisional.

# White Marlin Landings

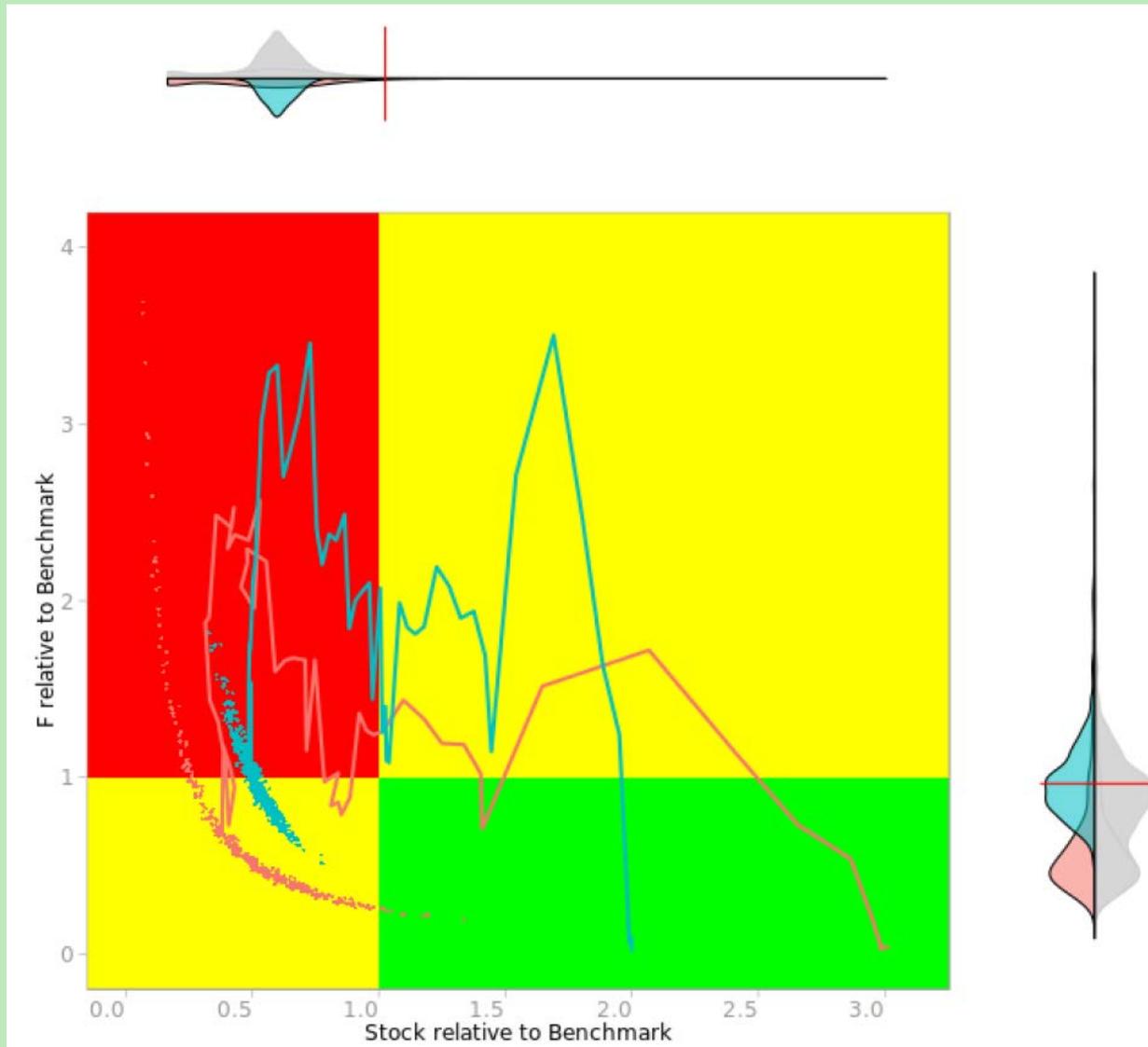
## North & South

It has been confirmed that white marlin catches reported to ICCAT include significant numbers of round scale spearfish which can be between 22-27% in some areas of the Atlantic, and no contamination in other areas.



# Current WHM Stock Status

## Overfished and undergoing overfishing



## ATLANTIC WHITE MARLIN SUMMARY

---

MSY	874 t <sup>1</sup> - 1604 t <sup>2</sup>
Current (2013) Yield	<u>415 t</u> <sup>3</sup>
Relative Biomass:	
B <sub>2010</sub> /B <sub>MSY</sub>	0.50 (0.42-0.60) <sup>4</sup>
SSB <sub>2010</sub> /SSB <sub>MSY</sub>	0.322 (0.23-0.41) <sup>5</sup>
Relative Fishing Mortality:	
F <sub>2010</sub> /F <sub>MSY</sub>	0.99 (0.75-1.27) <sup>4</sup> 0.72 (0.51-0.93) <sup>5</sup>
Catch <sub>recent</sub> <sup>6</sup> /Catch <sub>1996</sub> Longline and Purse seine	0.30
Overfished	Yes
Overfishing	Not likely <sup>7</sup>
Conservation and Management Measure in Effect:	Recommendation [Rec. 12-04]. Reduce the total harvest to 400 t in 2013, 2014, and 2015

---

<sup>1</sup> ASPIC estimates.

<sup>2</sup> SS3 estimates.

<sup>3</sup> 2013 yield should be considered provisional.

<sup>4</sup> ASPIC estimates with 10 and 90 percentiles.

<sup>5</sup> SS3 estimates with approximate 95% confidence intervals.

<sup>6</sup> Catch<sub>recent</sub> is the average annual longline and purse seine catch for 2009-2011.

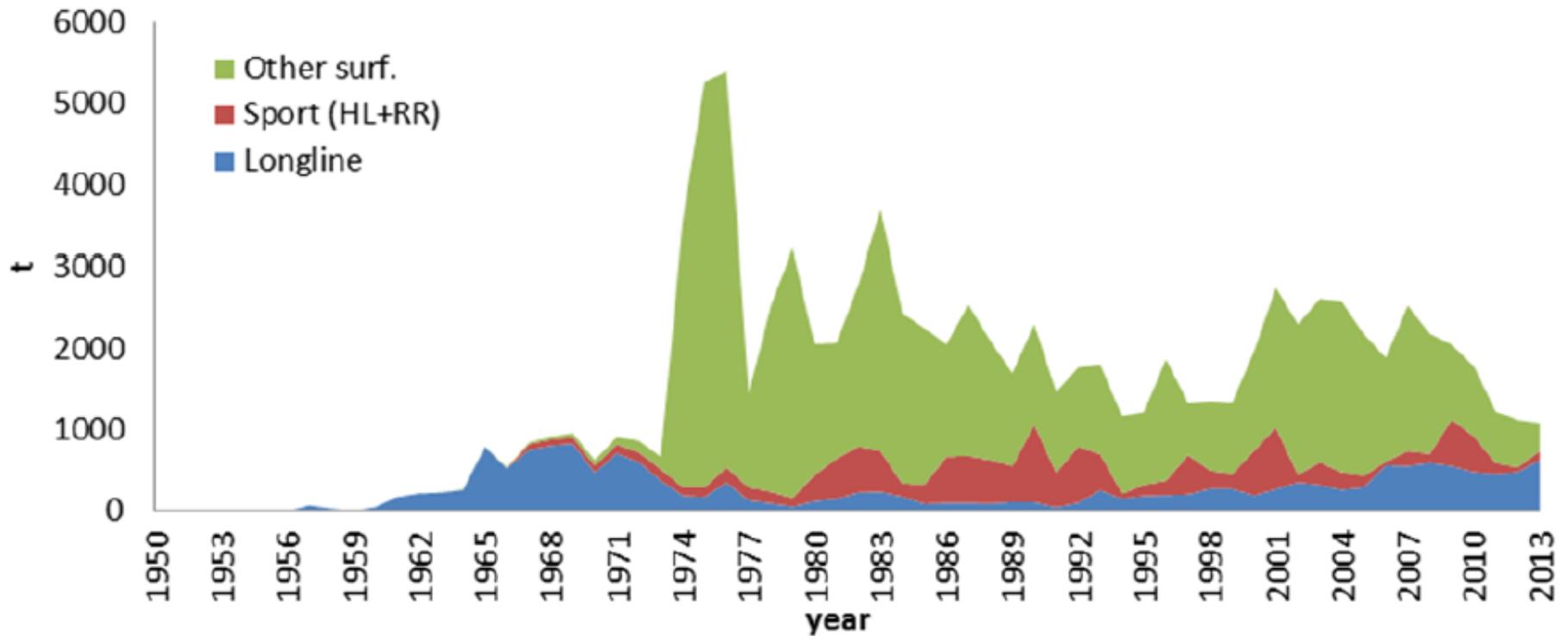
<sup>7</sup> Overfishing could be occurring if catches are under reported.

# ***SAILFISH Fishery indicators***

## ***SAI East stock***

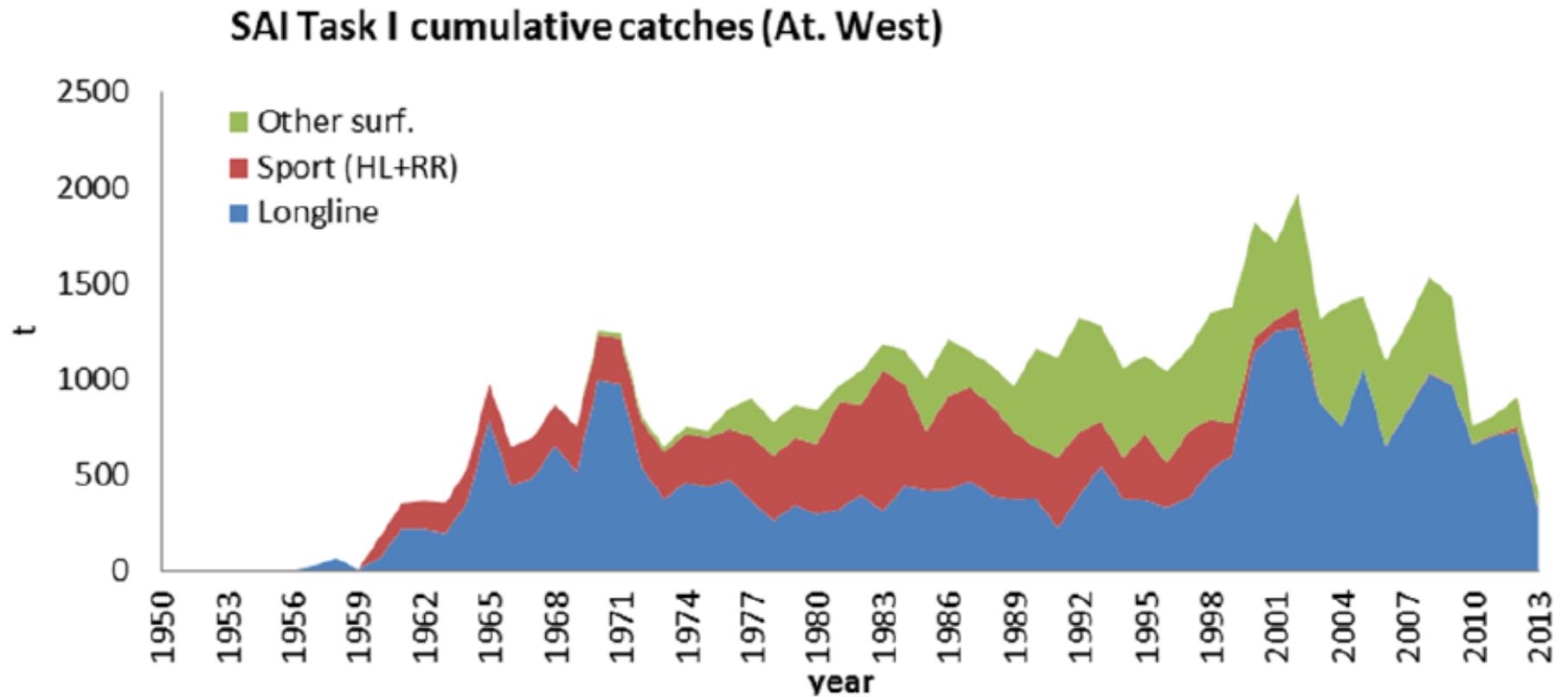
***2013 Yield = 1,090 mt***

**SAI Task I cumulative catches (At. East)**



# SAI west stock

2011 Yield = 412 mt



---

## ATLANTIC SAILFISH SUMMARY

---

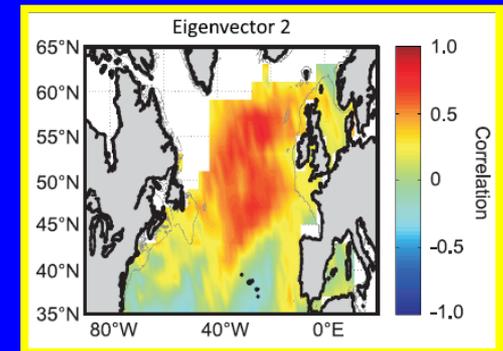
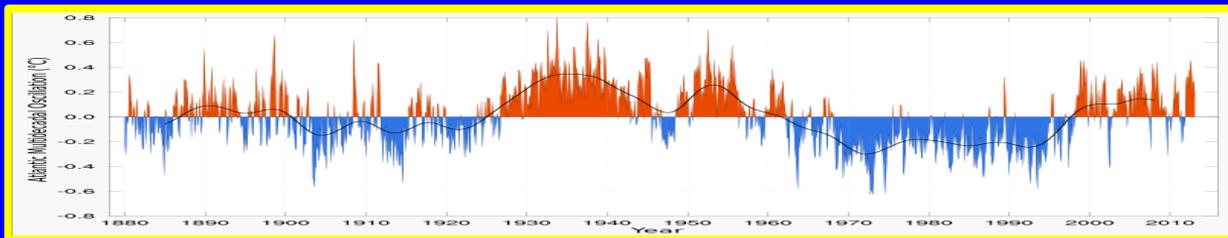
	<b>West Atlantic</b>	<b>East Atlantic</b>
Maximum Sustainable Yield (MSY)	600-1,100 <sup>1</sup> t	1,250-1,950 <sup>1</sup> t
2013 Catches (Provisional)	<u>412 t</u>	<u>1,090 t</u>
$B_{2007}/B_{MSY}$	Possibly < 1.0	Likely < 1.0
$F_{2007}/F_{MSY}$	Possibly > 1.0	Likely > 1.0
Overfished	Possibly	Likely
Overfishing	Possibly	Likely
2008 Replacement Yield	Not estimated	Not estimated
Management Measures in Effect:	None <sup>2</sup>	None <sup>2</sup>

<sup>1</sup>Results from Bayesian production model with informative priors. These results represent only the uncertainty in the production model fit. This range underestimates the total uncertainty in the estimates of MSY.

<sup>2</sup> Some countries have domestic regulations.

# Sub-Committee on Ecosystems and Bycatch

September 1-5, 2014  
Olhão, Portugal



# 2014 Agenda: SC-ECO/Bycatch

1. Review the inputs for Ecological Risk Assessment (ERA).
2. Incorporate recommended improvements to ERA.
3. Provide revised advice based on the updated ERA.
4. Review seabird by-catch mitigation measures [Rec. 11-09].
5. Review/Recommend observer data reporting forms.



© T. Montford

## 2. Incorporate Improvements to ERA

- A draft ERA (Angel et al. 2013) was reviewed by SC-ECO in 2013.
- In 2013, SC-ECO made short and longer term recommendations to improve the ERA:
  - LL Fleet be classified by deep and shallow sets
  - Stratify fleet and bycatch information by season.
  - Identify missing information, and fill if possible.
  - Review proxies for natural mortality and fishing mortality (Low, Medium, High).
- In 2014, the data was not available to incorporate these recommendations.

### 3. Provide Revised Management Advice

- The SC-ECO reviewed the body of work provided and compiled by CPCs and two contractors.

SCRS/2012/049

Collect. Vol. Sci. Pap. ICCAT, 69(4): 1788-1827 (2013)

**A REVIEW OF FISHERIES WITHIN THE ICCAT CONVENTION  
AREA THAT INTERACT WITH SEA TURTLES**

Rui Coelho<sup>1,2</sup>, Joana Fernandez-Carvalho<sup>2</sup>, Miguel N. Santos<sup>2</sup>

SCRS/2012/050

Collect. Vol. Sci. Pap. ICCAT, 69(4): 1828-1859 (2013)

**A REVIEW OF METHODS FOR ASSESSING THE IMPACT  
OF FISHERIES ON SEA TURTLES**

Rui Coelho<sup>1,2</sup>, Joana Fernandez-Carvalho<sup>2</sup>, Miguel N. Santos<sup>2</sup>

SCRS/2012/051

Collect. Vol. Sci. Pap. ICCAT, 69(4): 1860-1866 (2013)

**A REVIEW OF SEA TURTLE MITIGATION MEASURES  
ACROSS THE FIVE TUNA RFMO  
AND OTHER FISHERIES MANAGEMENT ORGANIZATIONS**

Rui Coelho<sup>1,2</sup>, Joana Fernandez-Carvalho<sup>2</sup>, Miguel N. Santos<sup>2</sup>

### 3. Provide Revised Management Advice

- The SC-ECO reviewed the body of work provided and compiled by CPCs and two contractors.

## Ecological Risk Assessment of sea turtles to tuna fishing in the ICCAT region

Andrea Angel, Ronel Nel, Ross M. Wanless, Bernice Mellet, Linda Harris & Ian Wilson

September 2013

Plus  
Numerous  
SCRS Docs

- Represents a significant contribution to the effort to assess the impact of ICCAT fisheries on sea turtles.

### 3. Provide Revised Management Advice

- Nevertheless, the SC-ECO agreed that at this time, there was insufficient information to improve the sea turtle ERA developed in 2013.
- Consequently, the SC-ECO agreed it is premature to develop further management advice.
- SC-ECO reviewed the bycatch mitigation measures [Rec. 13-11] and found them sufficient.

# 2015 Work Plan SC-ECO/Bycatch

1. Support update of EFFDIS.
2. Determine “best practices” for estimation of total extrapolated bycatch.
3. Map sea turtle bycatch rates against EFFDIS effort estimates.
4. Review and compile indirect bycatch mortality estimates for sea turtles, and the estimation methodologies.
5. Review the efficacy of seabird bycatch mitigation measures.
  1. Review the extent that ICCAT mitigation measures reflect best practices.
  2. Propose candidate indicators to evaluate the efficacy of mitigation measures.
  3. Identify data insufficiencies.
6. Review data received by CPCs reporting bycatch. Make recommendations to revise the data collection forms as needed.

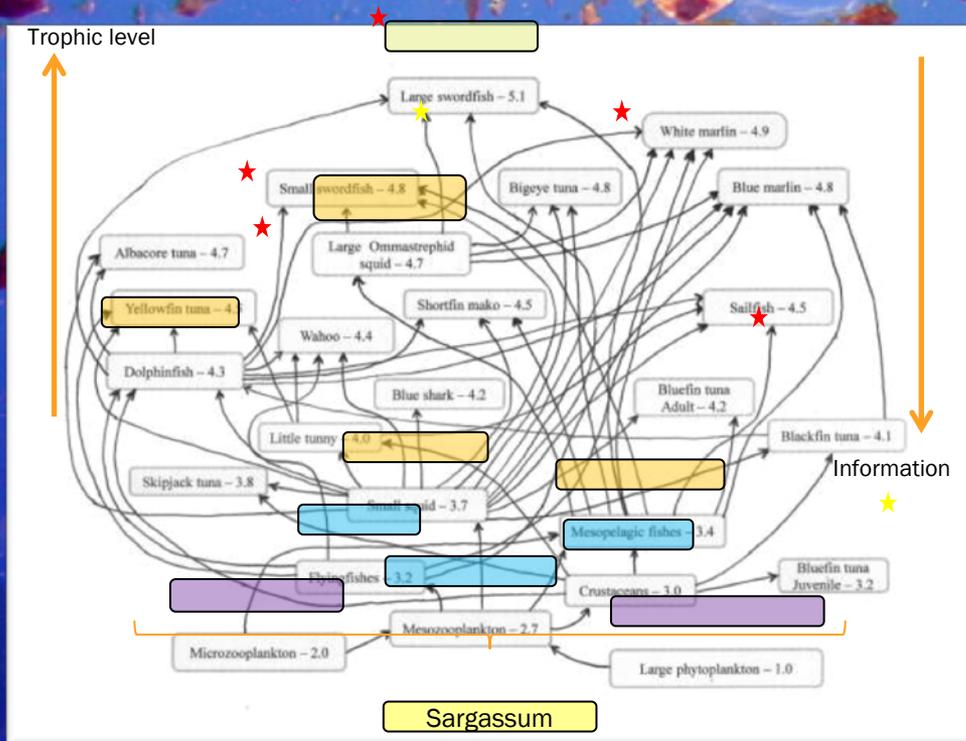
An underwater photograph of a large whale shark swimming in the center, surrounded by numerous smaller fish of various species in a clear blue ocean. The scene is brightly lit, suggesting a shallow depth.

# 2014 Agenda: SC-ECO/Ecosystems

1. Assess the importance of the *Sargasso Sea ecosystem* to ICCAT species (Resolution 12-12)
2. Review the progress that has been made in *implementing ecosystem approaches* in enhanced stocks assessments (e.g. multispecies models) or EBFM
3. Explore *environmental factors* that affect the global distribution of highly migratory fish and their productivity

# Sargasso Sea

*A preliminary food web of the pelagic environment of the Sargasso Sea with a focus on the fish species of interest to ICCAT ~ Luckhurst B.E.  
SCRS/2014/120*

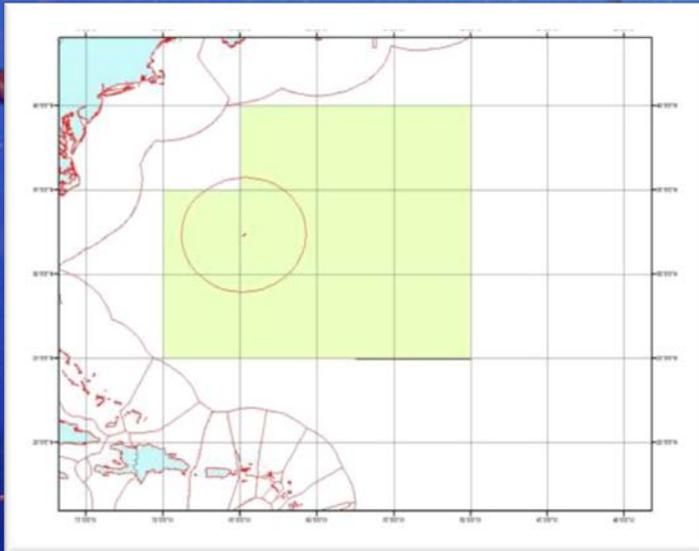


- Trophic level of 15 fish species and 8 prey
- ICCAT species are top predators
- Juveniles
- Less information on prey
- Complex relationships
- Dependence on flying fish, small squid and Sargassum

# Sargasso Sea

*Analysis of ICCAT reported catches of tunas and swordfish in the Sargasso Sea (1992-2011) ~ Luckhurst, B.E. SCRS/2014/119*

CATDIS Study Area



Species	Catch range (%)	20 yr mean (%)
Albacore	0.06 - 8.23	2.98
Swordfish	0.10 - 6.15	2.21
Bluefin	0.05 - 8.44	1.39
Yellowfin	0.23 - 3.57	1.24
Bigeye	0.02 - 2.35	0.65
Skipjack	0.00 - 0.07	0.01

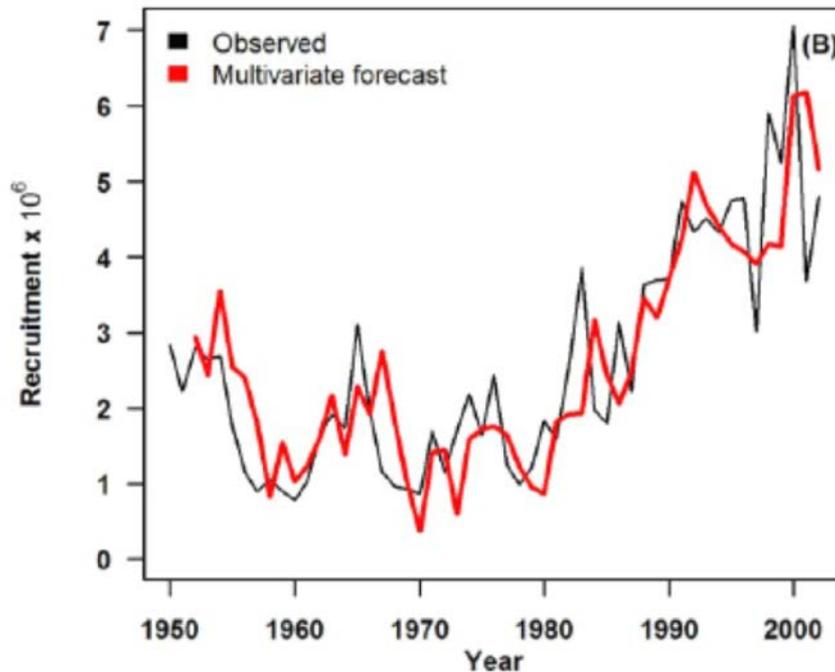
Outside EEZ; Insignificant but increasing catch; Reasons for low catch

Sargasso Sea Ecosystem

## Ecosystem Indicators

### NON-LINEAR FORECASTING OF SEA SURFACE TEMPERATURE EFFECTS ON BLUEFIN TUNA RECRUITMENT

W. Harford, Mandy Karnauskas, J. Walter & H. Liu  
SCRS/2014/125



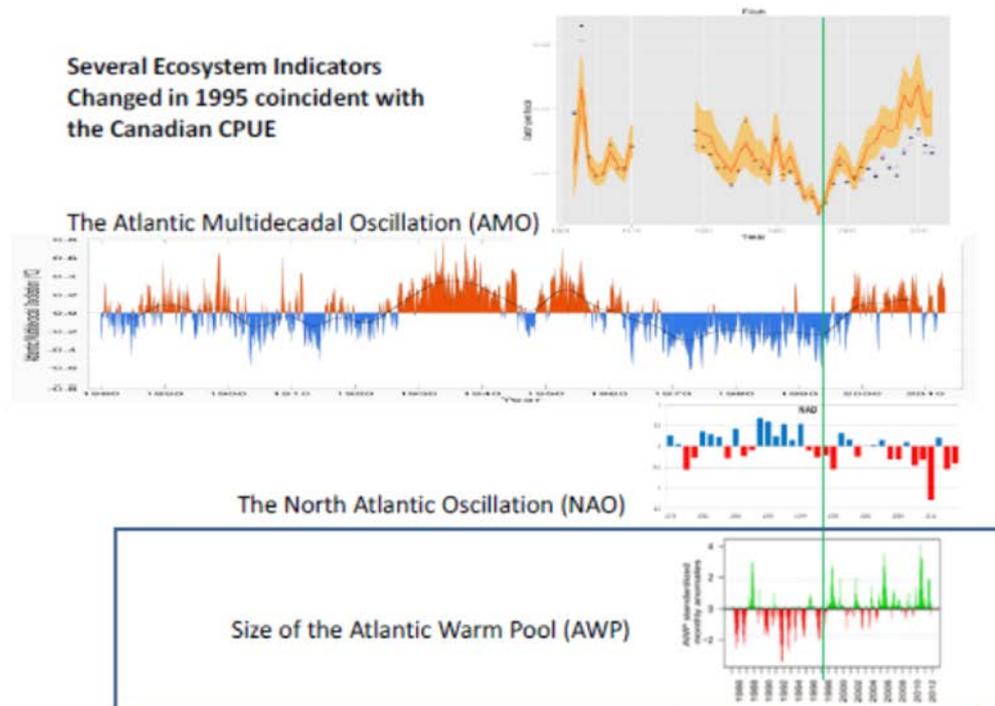
- Estimate recruitment for cohorts not yet in the fishery.
- SST improves 1 yr ahead forecasts of BFT recruitment.

# A Hypothesis of a Recent Poleward Shift in the Distribution of North Atlantic Swordfish

Michael Schirripa

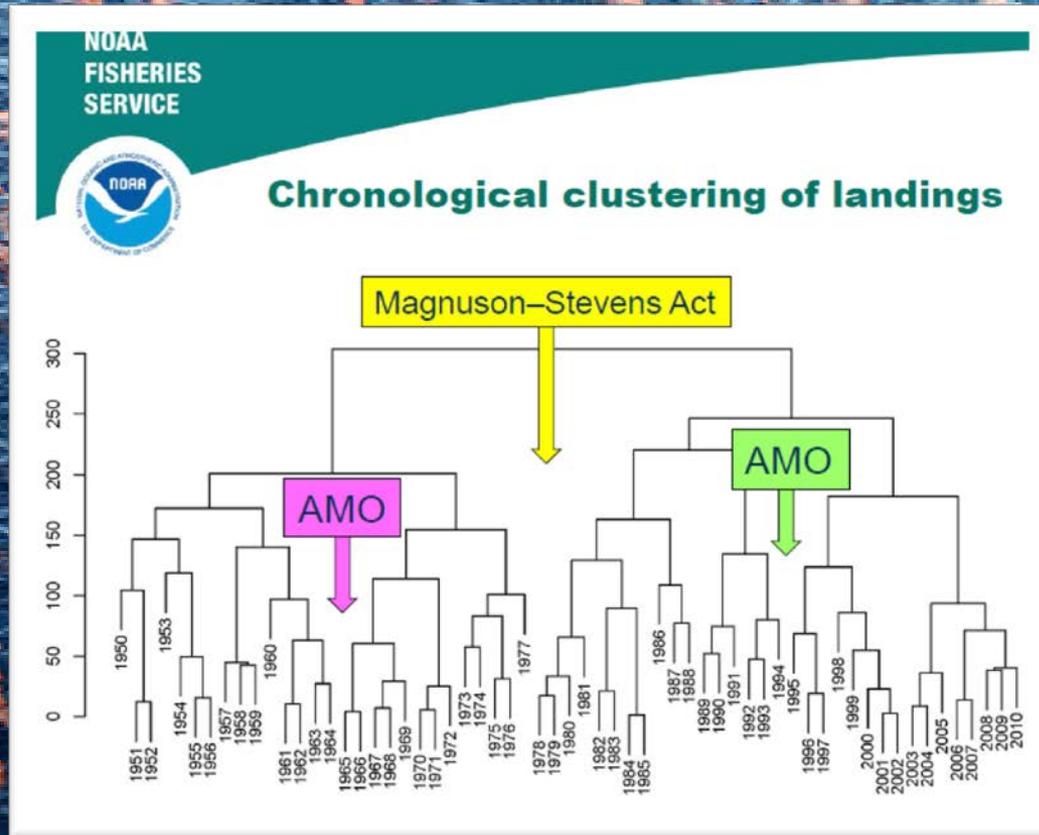
SCRS/2013/161

- Pressure indicators driving stock status: *AMO*
- *Model with area specific CPUEs and AMO decreased uncertainty in stock status*



# Evidence of climate-driven ecosystem reorganization in the Gulf of Mexico

Mandy Karnauskas Presentation



- Analysis framework involving >100 physical, biological, economic indicators
- Ecosystem wide changes in landings in mid 60s, late 70s and mid 90s
- Drivers were the AMO and fisheries management policy

# 2015 SCRS Meeting Schedule

	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue							
Jan					1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Feb								1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28			
Mar								1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
										BFT DATA PREP.																													
Apr				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30						
May							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
										BET DATA PREP.																													
Jun										1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30	
										SC-ECOSYSTEMS																													
Jul				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					
Aug							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			
Sep				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30						
Oct					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
Nov								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	30				
Dec				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					

SCRS meetings