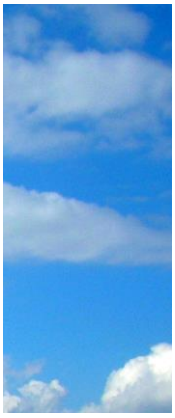
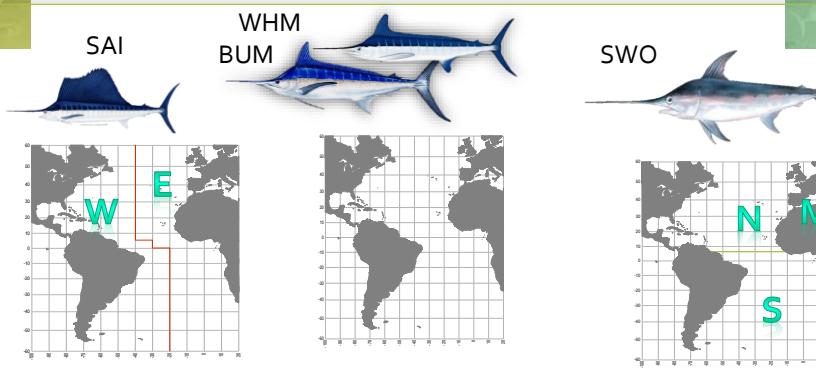
ICCAT SCRS Report 2016

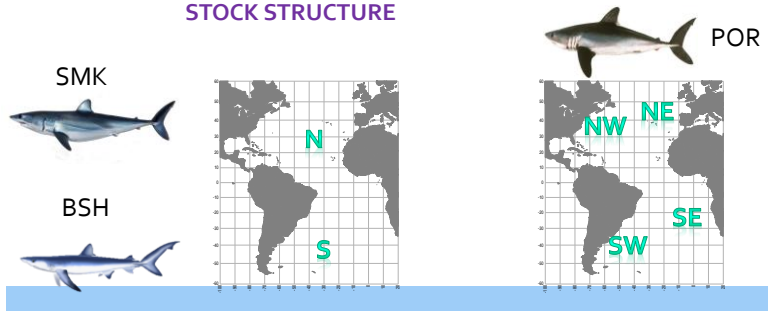
Panel 4-Swordfish, sharks, small tunas and billfish



- Overview of stock status for all species except Sailfish and Mediterranean Swordfish
- Results of Sailfish assessments
- Results of Mediterranean Swordfish assessment
- Response to the commission



STOCK STRUCTURE



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ICCAT Stock Status Report card 2016

SWO	N	2013	**2017**			
SWO	S	2013	**2017**			
SWO	M	**2016**	2021			
BUM		2011	2018			
WHM		2012	2019			
SAI	E	**2016**	2020			
SAI	W	**2016**	2020			
BSH	N&S	2015	2021			
SMA	N	2012	**2017**			
SMA	S	2012	**2017**			
POB	NE	2009	2019			
POB	NW	2009	2019			
POB	SW	2009	2019			

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OTHER SHARKS

2012 Ecological Risk Assessment

Stock	v_1	v_2	v_3
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

SMT

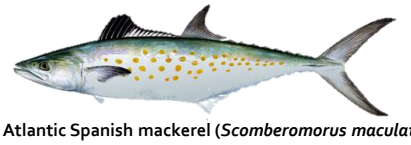
SMALL TUNAS
Regional stock structure, in most cases undefined

Atlantic bonito (*Sarda sarda*)

Frigate tuna (*Auxis thazard*)

King mackerel (*Scomberomorus cavalla*)

Little tunny (*Euthynnus alletteratus*)



Atlantic Spanish mackerel (*Scomberomorus maculatus*)

Most dominant species in the catches
(5 species, more than 80% in weight)

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SMALL TUNAS

For the most part, lack of basic biological data

SMT-Table 2. Summary of the life-history parameters currently available for small tunas species in the 5 stock/statistical areas: North and South Atlantic Ocean (both Eastern and Western) and the Mediterranean Sea.

ZONES	NORTHEAST ATLANTIC		SOUTHEAST ATLANTIC		NORTHWEST ATLANTIC		SOUTHWEST ATLANTIC		MEDITERRANEAN	
Species	Growth Parameters	Reproduction parameter	Growth Parameters	Reproduction parameter	Growth Parameters	Reproduction parameter	Growth Parameters	Reproduction parameter	Growth Parameters	Reproduction parameter
LTA										
FRI										
BLT										
SSM										
MAW										
BON										
WAH										
BRS										
BLF										
KGM										
BOP										
CER										
DOL	Not yet reviewed by the WG-SMT									

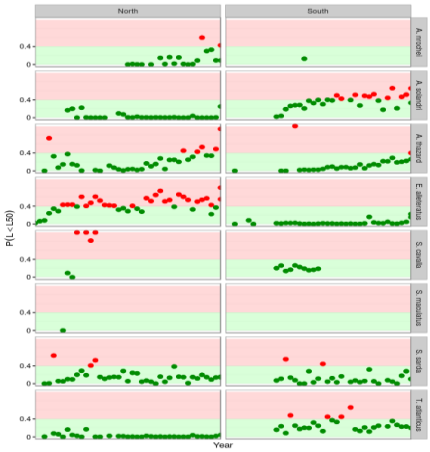
Data available, several studies and at least one of them was published in the last 10 years
Data available, single study or several older than 10 years
No existing data

SMALL TUNAS
Stock status (length-based analysis) « data poor methods »

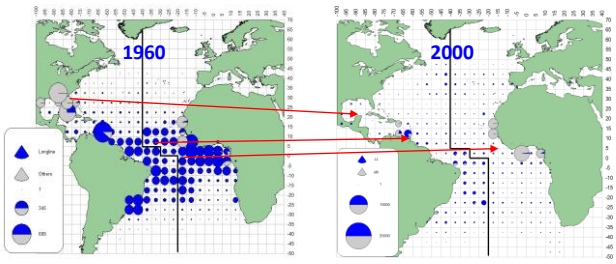
L50 is the size at which 50% of fish are mature

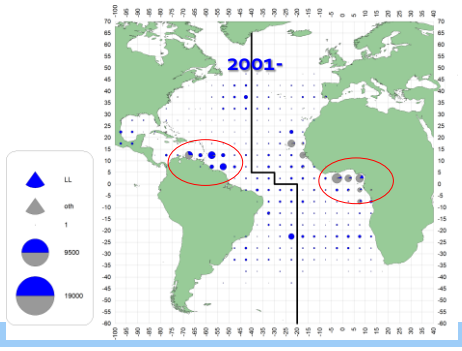
To avoid recruitment overfishing, L50 is used as a limit with a probability of 0.6

Recruitment overfishing is occuring in the most recent years for A. Solandri in South Atlantic and for *Auxis thazard* and *Euthynnus Alleteratus* in North Atlantic



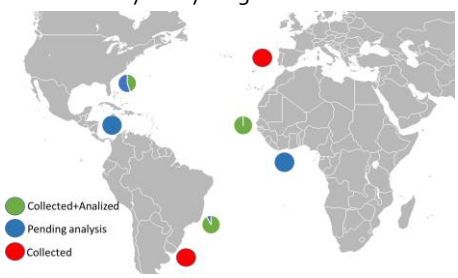
Sailfish assessment 2016





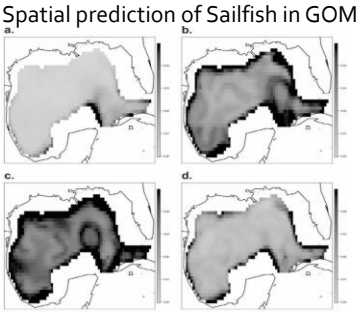
New information on Sailfish biology

Preliminary study on genetic differenciation (SCRS/2016/P/025)



Initial comparisons indicated a moderate to strong differentiation between northern and southern hemispheres, and moderate differentiation between eastern and western Atlantic samples.

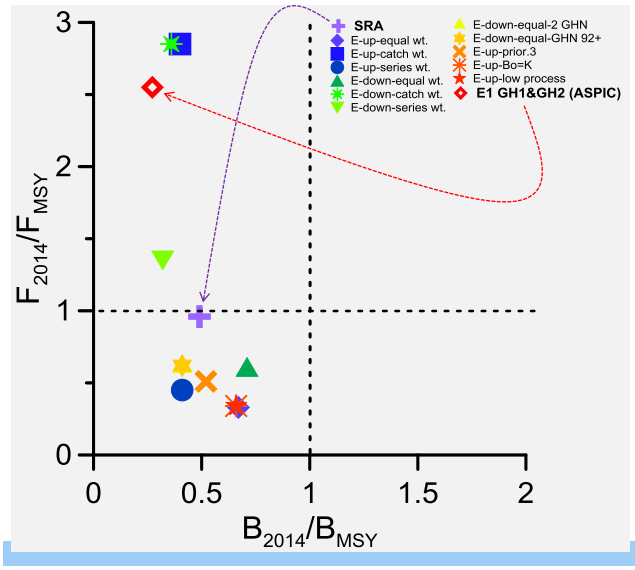
Spatial prediction of Sailfish in GOM (SCRS/2016/099)



- A delta approach was used to fit GAMs; with model factors that included operational, and environmental factors.
- Results indicated that the probability of catching a sailfish and the CPUE are most influenced by sea bottom depth and sea surface temperature.
- Estimated profiles indicated a seasonal flux, with increased sailfish CPUE between April and September, and higher catch rates associated to fronts.

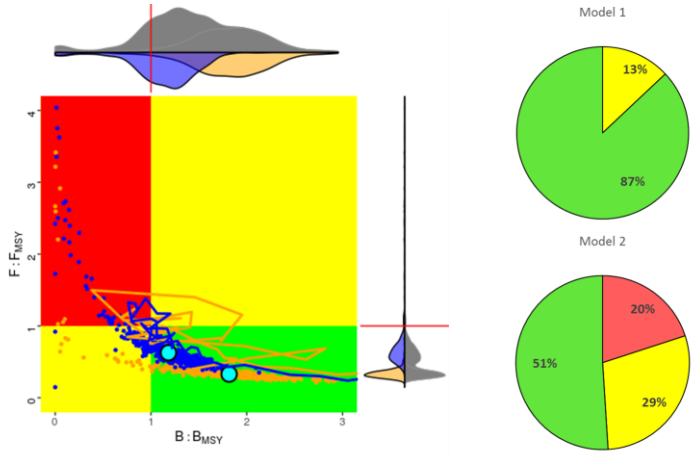
Sailfish_east

- OVERFISHED
- POSSIBLY EXPERIENCING OVERFISHING



Sailfish_west

- OVERFISHED : Not likely
- OVERFISHING: Not likely



ATLANTIC SAILFISH SUMMARY

ATLANTIC SAILFISH SUMMARY		
	West Atlantic	**East Atlantic**
Maximum Sustainable Yield (MSY)	1,438-1,636 t [1,2]	1,635-2,157 t [3]
Current (2015)	892 t	1,271 t
SSB_{2014}/SSB_{MSY}	1.81 (0.51-2.57)[1] 1.16 (0.18-1.69)[2]	
B_{2014}/B_{MSY}		0.22-0.70 [3]
F_{2014}/F_{MSY}	0.33 (0.25 – 0.57)[1] 0.63 (0.42 – 2.02)[2]	0.33-2.85 [3]
Overfished	Not likely	YES
Overfishing	Not likely	Possibly
Management Measures in Effect	None	None

[1] Stock Synthesis estimate utilizing increasing CPUE trends, with approximate 95% confidence intervals.
[2] Stock Synthesis estimate utilizing decreasing CPUE trends, estimate with approximate 95% confidence intervals.
[3]Range obtained of plausible estimates from bootstrapped ASPIC, BSP-JAGS, and SRA models.

*SS estimate utilizing different CPUE trends, with approximate 95% confidence intervals.

**Range obtained of plausible estimates from bootstrapped ASPIC, and SRA models

Management recommendations

Considerable uncertainty still remains in the assessments of both the eastern and western stocks.
Nonetheless, significant improvements, due to more abundance indices available, and the standardizations have seen general improvement, fostered in part by the CPUE workshop held in advance of this meeting.

Eastern stock

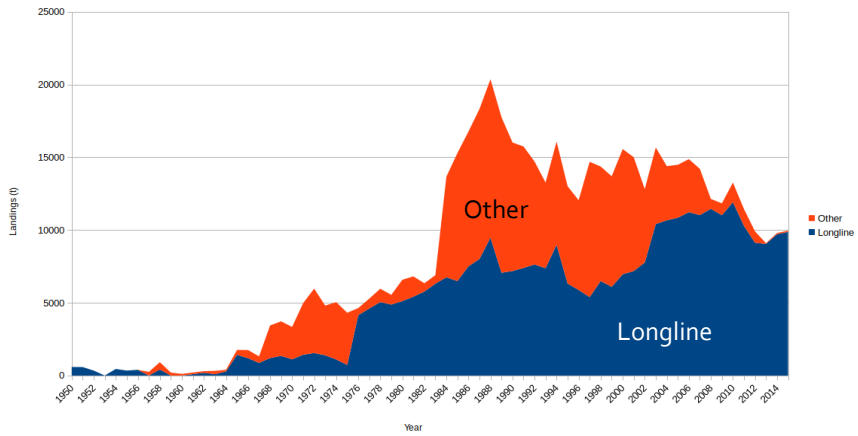
It is recommended at a minimum that catches should not exceed current levels. Furthermore, taking into account the possibility that overfishing may be occurring, the Commission may consider reductions in catch levels.

Western stock

It is recommended at a minimum that catches should not exceed current levels.

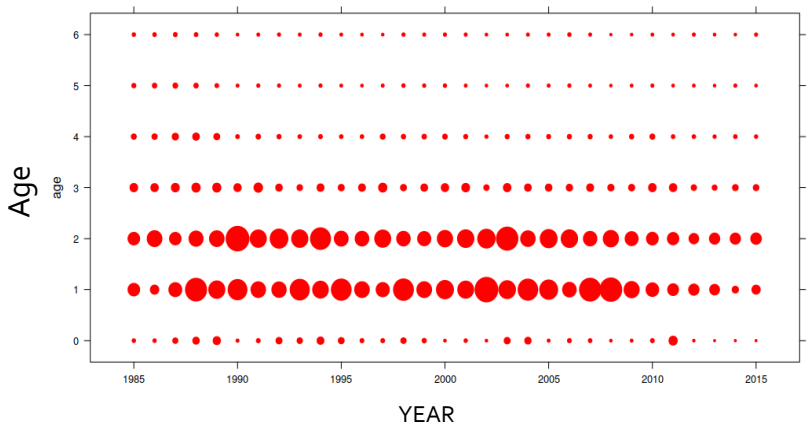
Mediterranean swordfish fisheries

- Main gears: Longlines (surface, mesopelagic) & Gillnets (up to 2012)
- Production around to 10,000 t in the recent years



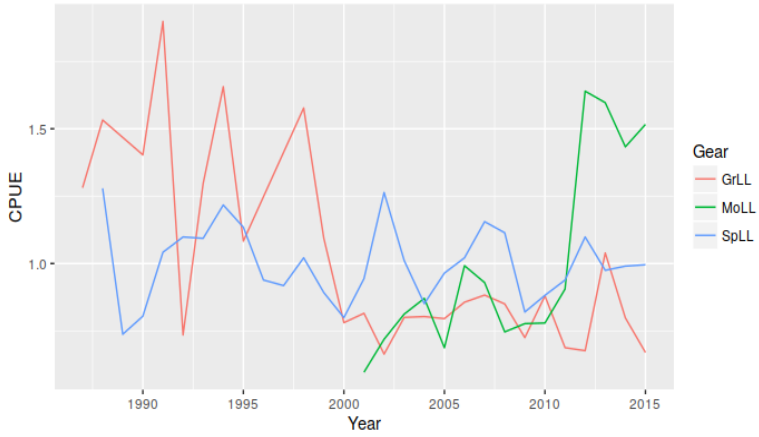
Catch at age

Juveniles (<3yr old) dominate the catches (50-70% in terms of numbers)



Fishery trends - CPUE

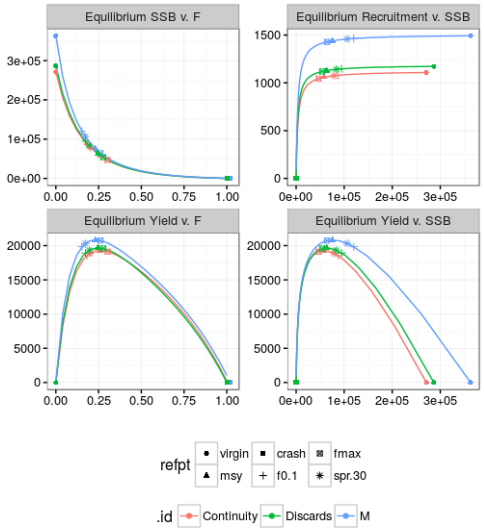
Standardized abundance indices from three fisheries



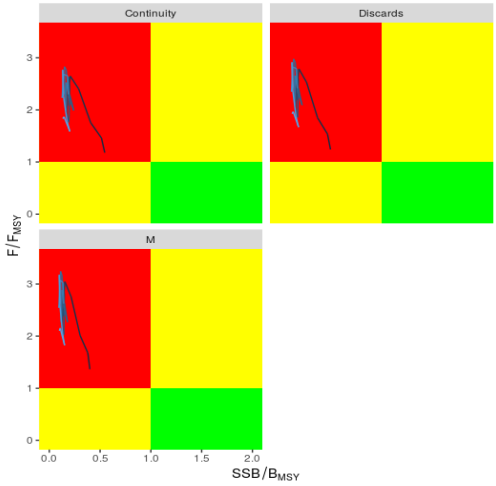
Stock status (equilibrium curves based on XSA)

- *High steepness on S/R*
- *Curves very sensitive to F changes*

- *Stock is overfished and subject to overfishing*



Status of stocks Kobe plots



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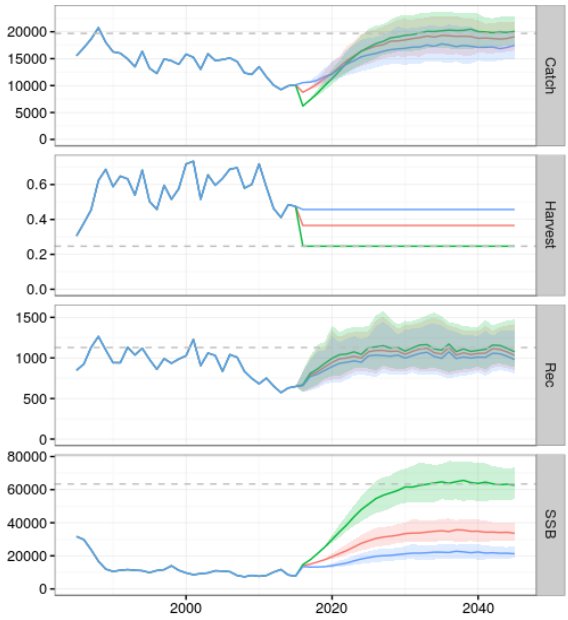
Projections

Three F scenarios:

- Current F (blue)
- F=o.8*F_{cur} (red)
- $F=F_{MSY}$ (green)



Projections

F multiplier		F/F_{cur}	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
0	F_{MSY}	0	0	0	0	0	100	100	100	100	100	100
0.25	F_{MSY}	0.14	0	0	0	0	7	100	100	100	100	100
0.5	F_{MSY}	0.29	0	0	0	0	0	10	69	96	98	100
0.75	F_{MSY}	0.43	0	0	0	0	0	1	3	20	53	72
1	F_{MSY}	0.57	0	0	0	0	0	0	0	2	4	8
1.25	F_{MSY}	0.71	0	0	0	0	0	0	0	0	0	0
1.5	F_{MSY}	0.86	0	0	0	0	0	0	0	0	0	0
1.75	F_{MSY}	1	0	0	0	0	0	0	0	0	0	0
2	F_{MSY}	1.14	0	0	0	0	0	0	0	0	0	0
2.25	F_{MSY}	1.28	0	0	0	0	0	0	0	0	0	0
2.5	F_{MSY}	1.43	0	0	0	0	0	0	0	0	0	0
1	F_{sq}	1	0	0	0	0	0	0	0	0	0	0
0.8	F_{sq}	0.8	0	0	0	0	0	0	0	0	0	0

Kobe II Strategy matrix showing probabilities (%) of being in the green quadrant by year for each level of fishing mortality. F_{cur} refers to the current F (2015).

os of F values

Synthesis on stock status

High uncertainty on future recruitment levels makes projections and stock status estimates questionable :

(a) If recruitment can return to the 1980s and 1990s levels, then the stock is severely overfished and will require long recovery times before it reaches B_{MSY} (basic scenario assumed in projections).

(b) If the recruitment tendency is an artifact of the estimation process (e.g. underestimation due to discarding), then current recruitment may be underestimated. The stock could recover faster than in case (a), if undersized fish mortality is reduced.

(c) If recruitment has changed because of a regime shift or changes in ecological conditions, then current stock productivity may be lower than in the 1990s and current reference points do not represent current stock conditions

MEDITERRANEAN SWORDFISH SUMMARY	
Maximum Sustainable Yield	19,683 t[1]
Current (2015) Yield	10,068 t (9,966 t[2])
SSB_{MSY}	63,426 t[1]
F_{MSY}	0.25 [1]
Relative Spawning Biomass (SSB_{2015}/SSB_{MSY})	0.12[1]
Relative Fishing Mortality	
F_{2015}/F_{MSY}	1.85[1]
$F_{2015}/F_{0.1}$	2.64[1]
Stock Status (2015)	Overfished: Yes[1] Overfishing: Yes[1]
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 list of authorized vessels [Rec. 13-04]. [3]

[1] Estimates based on the XSA and equilibrium analyses (see text for details).
[2] As of July 2016.
[3] Certain additional fishery restrictions are implemented at the national level.

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Management recommendations

- Substantial decreases in harvest rates so that responses from the population can be detected.
- Increased monitoring of landing and discards
- The impact of the albacore fisheries, which occur at the same time as the swordfish fishery, on swordfish recruits needs to be taken into account

Research achievements and recommendations

Sharks

- Current program has advanced work on growth, ageing, population genetics, migration and stock boundaries of Shortfin mako
- Shark Research and Data Collection Programme (SRDCP) should be extended beyond 2017.
- Historical catch recovery project, observer and dockside training workshops in 2018

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Billfish

- Current program has improved (1) fishery statistics, particularly for size frequency data; (2) initiated the ICCAT tagging programme for billfish; and (3) assist in collecting data for age and growth studies (4) genetics and migration.
- Comprehensive analyses of species-specific billfish catch and effort statistics from small scale (or artisanal) fisheries for the Caribbean Sea and off the West Africa.
- CPUE standardization workshop for W Africa prior to the proposed 2018 Blue marlin stock assessment.

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Small tunas

- Conducted data mining and biological studies in the Mediterranean and in the North-eastern Atlantic
- Continue with the ICCAT SMTYP research programme activities in 2017 to further improve the biological information (growth and maturity) for the priority species

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Med Swordfish

- Population genetics, electronic tagging, life history, and to use fine-scale (e.g. 1º squares) and quarterly sampling strata.
- Data recovery plan: so that the entire history of the fishery is taken into account in the stock assessment models. Particularly information from the major fisheries of the early years.
- Regional differences in size and age at maturity
- Habitat use and availability to the different gears

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Swordfish N and S

- External expertise to assist the Group with its modelling work using other modelling platforms, in preparation for the 2017 stock assessment.
- Synthesizing existing information, and to collect additional critical new data (including tissue samples, size, sex and maturity information), in order to properly identify stock composition within the areas identified as mixing zones.