8.8 SWO-ATL-ATLANTIC SWORDFISH

The last assessment for Atlantic swordfish was conducted in 2009 (Anon. 2010g). Other information relevant to Atlantic swordfish is presented in the Report of the Sub-Committee on Statistics, included as **Appendix 7** to this SCRS Report, and recommendations pertinent to Atlantic swordfish are presented in Section 17.

SWO-ATL-1. Biology

Swordfish *(Xiphias gladius)* are members of the family *Xiphiidae* and are in the suborder *Scombroidei.* They can reach a maximum weight in excess of 500 kg. They are distributed widely in the Atlantic Ocean and Mediterranean Sea. In the ICCAT convention area, the management units of swordfish for assessment purposes are a separate Mediterranean group, and North and South Atlantic groups separated at 5°N. This stock separation is supported by recent genetic analyses. However, the precise boundaries between stocks are uncertain, and mixing is expected to be highest at the boundary in the tropical zone. Swordfish feed on a wide variety of prey including groundfish, pelagic fish, deep-water fish, and invertebrates. They are believed to feed throughout the water column, and from recent electronic tagging studies, undertake extensive diel vertical migrations. SCRS 2011/134 provided new information on the food habits of South Atlantic swordfish. A Bayesian analysis of stomach contents of swordfish caught off the southern coast of Brazil indicated that the diet consisted primarily of cephalopods, and secondarily of fish. The authors noted, however, that the diet of swordfish is known to vary considerably, both geographically and seasonally.

Swordfish mostly spawn in the western warm tropical and subtropical waters throughout the year, although seasonality has been reported in some of these areas. They are found in the colder temperate waters during summer and fall months. Young swordfish grow very rapidly, reaching about 140 cm LJFL (lower-jaw fork length) by age three, but grow slowly thereafter. Females grow faster than males and reach a larger maximum size. Tagging studies have shown that some swordfish can live up to 15 years. Swordfish are difficult to age, but about 50% of females were considered to be mature by age five, at a length of about 180cm. However, the most recent information indicates a smaller length and age at maturity.

SWO-ATL-2. Fishery indicators

Due to the broad geographical distribution of Atlantic swordfish **(SWO ATL-Figure 1)** in coastal and off-shore areas (mostly ranging from 50ºN to 45ºS), this species is available to a large number of fishing countries **(SWO ATL-Figure 2)**. Directed longline fisheries from Canada, EU-Spain, and the United States have operated since the late 1950s or early 1960s, and harpoon fisheries have existed at least since the late 1800s. Other directed swordfish fisheries include fleets from Brazil, Morocco, Namibia, EU-Portugal, South Africa, Uruguay, and Venezuela. The primary by-catch or opportunistic fisheries that take swordfish are tuna fleets from Chinese Taipei, Japan, Korea and EU-France. The tuna longline fishery started in 1956 and has operated throughout the Atlantic since then, with substantial catches of swordfish that are produced as a by-catch of tuna fisheries. The largest proportion of the Atlantic catches is made using surface-drifting longline. However, many additional gears are used, including traditional gillnets off the coast of western Africa.

Total Atlantic

The total Atlantic estimated catch (landings plus dead discards) of swordfish (North and South, including reported dead discards) in 2010 (24,720 t) is close to the reported catch in 2009 (24,761 t). As a small number of countries have not yet reported their 2010 catches and because of unknown unreported catches, this value should be considered provisional and subject to further revision.

In an effort to quantify possible unreported catches in the Convention area during the 2009 stock assessment, the ICCAT Statistical Document data base was examined. The use of this information was complicated because of the lack of conversions factors available for products such as loin, fillet, and gilled/gutted swordfish. The comparison between the swordfish Statistical Document System (s.SDS) data from 2003 through 2007 and the reported Task I by flag indicates that Task I catches might not represent the total landed catch of Convention area swordfish, although the extent to which this occurs was highly uncertain. The largest discrepancy between the data sources is for flags with an unknown area of capture, and amounts to nearly 21,000 t over the 2003-2007 time period. Considering only the s.SDS data classified as coming from the Convention area, the discrepancy amounts to an estimate of less than 1,000 t over the time period. The comparison implies that international trade of Convention Area landed swordfish might represent less than 13% of the landed catch recorded in Task I and that a surprisingly low number of Contracting Parties engage in export of Convention area swordfish.

North Atlantic

For the past decade, the North Atlantic estimated catch (landings plus dead discards) has averaged about 11,523 t per year (**SWO-ATL-Table 1** and **SWO-ATL-Figure 3**). The catch in 2010 (12,154 t) represents a 40% decrease since the 1987 peak in North Atlantic landings (20,236 t). These reduced landings have been attributed to ICCAT regulatory recommendations and shifts in fleet distributions, including the movement of some vessels in certain years to the South Atlantic or out of the Atlantic. In addition, some fleets, including at least the United States, EU-Spain, EU-Portugal and Canada, have changed operating procedures to opportunistically target tuna and/or sharks, taking advantage of market conditions and higher relative catch rates of these species previously considered as by-catch in some fleets. Recently, socio-economic factors may have also contributed to the decline in catch.

Trends in nominal catch rates by fleets contributing to the production model are shown in **SWO-ATL-Figure 4**. Most of the series have an increasing trend since the late 1990s, but the U.S. catch rates remained relatively flat. There have been some recent changes in United States regulations that may have impacted catch rates, but these effects remain unknown.

The 2011 Swordfish Species Group reviewed new information from Canada, which provided updated age and sex-specific nominal catch rate series for its pelagic longline fishery (SCRS/2011/186) for the period from 2002 to 2011. The trend in CPUE indicates that relative abundance has continued to increase since the series low in 2006 and is near the historical high observed in 1990. Reports from the USA also indicate relatively high recent catch rates.

The most frequently occurring ages in the catch include ages 2 and 3 (**SWO-ATL-Figure 5**). There were reports of increasing average size of the catch in USA fisheries.

South Atlantic

The historical trend of catch (landings plus dead discards) can be divided in two periods: before and after 1980. The first one is characterized by relatively low catches, generally less than 5,000 t (with an average value of 2,300 t). After 1980, landings increased continuously up to a peak of 21,930 t in 1995, levels that are comparable to the peak of North Atlantic harvest (20,236 t). This increase of landings was, in part, due to progressive shifts of fishing effort to the South Atlantic, primarily from the North Atlantic, as well as other waters. Expansion of fishing activities by southern coastal countries, such as Brazil and Uruguay, also contributed to this increase in catches. The reduction in catch following the peak in 1995 resulted from regulations and partly due to a shift to other oceans and target species. In 2010, the 12,566 t reported catches were about 43% lower than the 1995 reported level (**SWO-ATL-Figure 3**). The SCRS received reports from Brazil and Uruguay that those CPCs have reduced their fishing effort directed towards swordfish in recent years.

In 2010, the SCRS noted that there was a considerable decline in the magnitude of the catch by Namibia in 2009 compared with 2008 (25 and 518 t, respectively) that appeared inconsistent with recent developments in capacity. In particular, the 2008 value appears to be low, compared with information from other sources such as compliance tables. While Namibian authorities were contacted with a request for an explanation for this apparent anomaly, a response has not yet been received

As observed in the 2006 assessment, the CPUE trend from targeted and non-targeted fisheries show different trends and high variability which indicates that at least some are not depicting trends in the abundances of the stock (**SWO-ATL-Figure 6**). It was noted that there was little overlap in fishing area and strategies between the by-catch and targeted fleets used for estimating CPUE pattern, and therefore the by-catch and targeted fisheries CPUE trends could be tracking different components of the population.

Discards

Since 1991, several fleets have reported dead discards (see **SWO-ATL-Table 1**). The volume of Atlantic-wide reported discards since then has ranged from 151 t to 1,139 t per year. Reported annual dead discards (in tonnes) have been declining in recent years.

SWO-ATL-3. State of the stocks

North Atlantic

Results from the base case production model are shown in **SWO-ATL-Figure 7.** The estimated relative biomass trend shows a consistent increase since 2000. The current results indicate that the stock is at or above B_{MSY}. The relative trend in fishing mortality shows that the level of fishing peak in 1995, followed by a decrease until 2002, followed by small increase in the 2003-2005 period and downward trend since then. Fishing mortality has been below F_{MSY} since 2005. The results suggest that there is greater than 50% probability that the stock is at or above B_{MSY}, and thus the Commission's rebuilding objective [Rec. 99-02] has been achieved (**SWO-ATL-Figure 8**). However, it is important to note that since 2003 the catches have been below the TAC's greatly increasing the chances for a fast recovery. Overall, the stock was estimated to be somewhat less productive than the previous assessment, with the intrinsic rate of increase, *r*, estimated at 0.44 compared to 0.49 in 2006.

Other analyses conducted by the SCRS (Bayesian surplus production modeling, and Virtual Population Analyses) generally support the results described for the base case surplus production model above.

South Atlantic

The results of the base case production model indicated that there were conflicting signals for several of the indices used. The model estimated overall index was relatively stable until the early 1980s when it started declining until the late 1990s and it reversed that trend about 2003. Estimated relative fishing mortality (F_{2008}/F_{MSY}) was 0.75 indicating that the stock is not being overexploited. Estimated relative biomass (B_{2009}/B_{MSY}) was 1.04 (**SWO-ATL-Figure 9**), indicating that the stock was not overexploited.

Because of the high level of uncertainty associated with the south Atlantic production models results, the SCRS conducted catch-only modeling analysis, including two explorations using different assumptions concerning the intrinsic rate of population increase. The distribution for MSY was skewed for both runs (**SWO-ATL-Figure 10)**. The median of MSY estimated for RUN 1 was 18,130 t and for RUN 2 was 17,934 t. **SWO-ATL-Figure 11** summarizes recent stock status, as determined from the catch-only model.

SWO-ATL-4. Outlook

North Atlantic

The base production model was projected to the year 2018 under constant TAC scenarios of 10, 11, 12, 13, 14 and 15 thousand tones. Catch in year 2009 was assumed to be the average of the last three years (2006-08) (11,515 t). The actual reported landings in 2009 were 12,655 t. Median trajectories for biomass and fishing mortality rate for all of the future TAC scenarios are plotted in **SWO-ATL-Figure 12**.

Future TACs above MSY are projected to result in 50% or lower probabilities of the stock biomass remaining above B_{MSY} over the next decade (**SWO-ATL-Figure 13**) as the resulting probability of F exceeding F_{MSY} for these scenarios would trend above 50% over time. A TAC of 13,000 t would provide approximately a 75% probability of maintaining the stock at a level consistent with the Convention objective over the next decade.

South Atlantic

Projections for the base case production model were performed for catch levels from 10,000 t to 16,000 t by increments of 1,000 t for 2010-2020. For 2009, all projection scenarios assumed a catch equal to the average catch for 2006-2008 (13,658 t). **SWO-ATL-Figure 14** shows the results of the projections. Because the SCRS considers that the production model estimated benchmarks are poorly estimated, the projections are shown as biomass changes rather than relative biomass. In general, catches of 14,000 t or less will result in increases in the biomass of the stock; catches on the order of 15,000 will maintain the biomass of the stock at approximately stable levels during the period projected. Catches on the order of 16,000 t or more will result in biomass decrease. The current TAC is 15,000 t.

For the catch only model projections, constant catch scenarios were evaluated ranging from 10,000 to 17,000 t, incremented by 1,000 t for a period of 10 years. For 2009, all projection scenarios assumed a catch equal to the average catch for 2006-2008 (13,658 t). In general, catches of 15,000 t will result in the biomasses being higher than B_{MSY} 80% of the time. **SWO-ATL-Figure 15** summarizes the probability of $B>B_{MSY}$ and $F<F_{MSY}$ for the

constant catch scenarios indicated over time. Catches on the order of 17,000 will result in a probability of 0.67 of the biomass being above B_{MSY} in ten years.

SWO-ATL-5. Effects of current regulations

In 2006, the Committee provided information on the effectiveness of existing minimum size regulations. New catch regulations were implemented on the basis of Rec. 06-02, which entered into effect in 2007 (Rec. 08-02 extended the provisions of Rec. 06-02 to include 2009)., Rec. 09-02 came into effect in 2010 and extended most of the provisions of Rec. 06-02 for one year only. Rec. 10-02 came into effect in 2011, and again extended those provisions for one year only, but with a slight reduction in total allowable catch (TAC).

For the South Atlantic, the most recent recommendation can be found in Rec. 09-03, which establishes a three year management plan for that stock.

Catch limits

The total allowable catch in the North Atlantic during the 2007 to 2009 period was 14,000 t per year. The reported catch during that period averaged 11,969 t and did not exceed the TAC in any year. In 2010, the TAC was reduced to 13,700 t, compared with catches of 12,154 t. Reports for 2010 are considered provisional and subject to change.

The total allowable catch in the South Atlantic for the years 2007 through 2009 was 17,000 t. The reported catch during that period averaged 13,482 t, and did not exceed the TAC in any year. In 2010, the TAC was reduced to 15,000 t, and the catch in that year was 12,566 t. Reports for 2010 are considered provisional and subject to change.

Minimum size limits

There are two minimum size options that are applied to the entire Atlantic: 125 cm LJFL with a 15% tolerance, or 119 cm LJFL with zero tolerance and evaluation of the discards.

For the 2006-2008 period, the estimate of the percentage of swordfish reported landed (throughout the Atlantic) less than 125 cm LJFL was about 24% (in number) overall for all nations fishing in the Atlantic (28% in the northern stock and 20% in southern stock). If this calculation is made using reported landings plus estimated dead discards, then the percentage less than 125 cm LJFL would be of the same order given the relatively small amount of discards reported. These estimates are based on the overall catch at size, which have high levels of substitutions for a significant portion of the total catch.

Other implications

The Committee is concerned that in some cases national regulations have resulted in the unreported discarding of swordfish caught in the North stock and, to a certain extent, could have influenced similar behavior of the fleet that fishes the South Atlantic swordfish stock. The Committee considers that these regulations may have had a detrimental effect on the availability and consistency of scientific data on catches, sizes and CPUE indices of the Atlantic fleet. The Committee expressed its serious concern over this limitation on data for future assessments.

SWO-ATL-6. Management recommendations

North Atlantic

The Committee continues to note that the allowable country-specific catch levels agreed in [Recs. 06-02, 08-02, and 10-02] continue to exceed the TAC adopted by the Commission and the scientific recommendations. Such potential catches could compromise the rebuilt state of this stock.

ATLANTIC SWORDFISH SUMMARY

	North Atlantic	**South Atlantic**
Maximum Sustainable Yield[1]	13,730 t (13,020-14,182)[3]	~15,000 t
Current (2010) TAC	13,700 t	15,000 t
Current (2010) Yield[2]	12,154 t	12,566 t
Yield in last year used in assessment (2008)	11,188 t[5]	12,363 t[5]
B_{MSY}	61,860 (53,280-91,627)	47,700
F_{MSY}	0.22 (0.14-0.27)	0.31
Relative Biomass (B_{2009}/B_{MSY})	1.05 (0.94-1.24)	1.04 (0.82-1.22)
Relative Fishing Mortality (F_{2008}/F_{MSY}[1])	0.76 (0.67-0.96)	0.75 (0.60-1.01)
Stock Status	Overfished: NO Overfishing: NO	Overfished: NO Overfishing: NO
Management Measures in Effect:	Country-specific TACs [Rec. 10-02]; 125/119cm LJFL minimum size	Country-specific TACs [09-03] 125/119cm LJFL minimum size

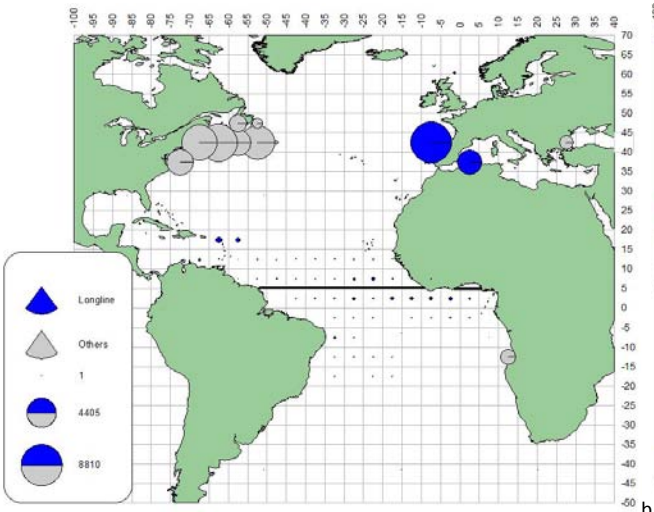
[1] Base Case production model (Logistic) results based on catch data 1950-2008.
[2] Provisional and subject to revision.
[3] 80% bias corrected confidence intervals are shown.
[4] Provisional and preliminary, based on production model results that included catch data from 1970-2008.
[5] As of 29 September 2010.

SWO-ATL-Table 1. Estimated catches (t) of Atlantic swordfish (Xiphias gladius) by gear and flag. (v03, 2011-10-04).

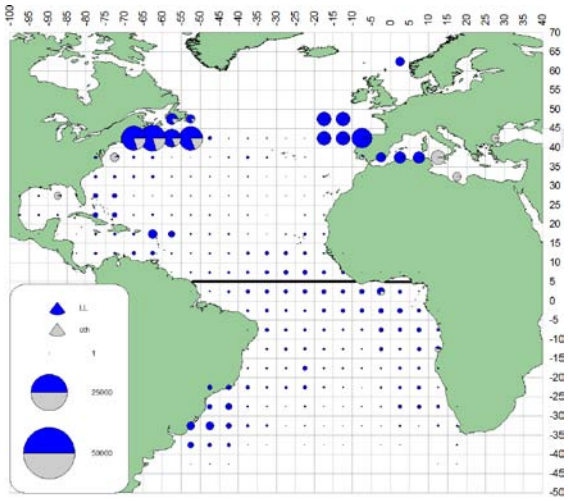
			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TOTAL			24380	26266	32685	34305	32976	28826	29207	32868	34459	38803	33511	31567	26251	27123	27180	25139	23758	24075	25252	25643	25718	27997	23596	24761	24720
	ATN		18486	20236	19513	17250	15672	14934	15394	16738	15501	16872	15222	13025	12223	11622	11453	10011	9654	11442	12175	12480	11473	12444	11188	12276	12154
	ATS		5894	6030	13172	17055	17304	13893	13813	16130	18958	21930	18289	18542	14027	15502	15728	15128	14104	12633	13077	13162	14245	15553	12408	12484	12566
Landings	ATN	Longline	18269	20022	18927	15348	14026	14208	14288	15641	14309	15764	13808	12181	10778	10449	9642	8425	8664	9997	11406	11527	10840	11617	10473	11341	11458
		Other surf.	217	214	586	1902	1646	511	723	689	484	582	826	393	961	643	672	685	374	822	449	620	409	546	471	778	550
	ATS	Longline	4951	5446	12404	16398	16705	13287	13176	15547	17387	20806	17799	18239	13748	14823	15448	14302	13576	11712	12485	12915	13723	14890	11623	11911	11832
		Other surf.	943	584	768	657	599	606	637	583	1571	1124	489	282	269	672	278	825	527	920	591	248	522	572	779	574	587
Discards	ATN	Longline	0	0	0	0	0	215	383	408	708	526	562	439	476	525	1137	896	607	618	313	323	215	273	235	151	141
		Other surf.	0	0	0	0	0	0	0	0	0	0	26	12	9	4	1	6	8	5	7	10	8	8	9	7	5
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	91	6	0	147
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Landings	ATN	Barbados	0	0	0	0	0	0	0	0	0	0	33	16	16	12	13	19	10	21	25	44	39	27	39	20	13
		Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	112	106
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	0	0	0	0	0	0	0	0	0	**0**
		Canada	1059	954	898	1247	911	1026	1547	2234	1676	1610	739	1089	1115	1119	968	1079	959	1285	1203	1558	1404	1348	1334	1300	1346
		China P.R.	0	0	0	0	0	0	0	73	86	104	132	40	337	304	22	102	90	316	56	108	72	85	92	92	73
		Chinese Taipei	157	52	23	17	270	577	441	127	507	489	521	509	286	285	347	299	310	257	30	140	172	103	82	89	88
		Cuba	636	910	832	87	47	23	27	16	50	86	7	7	7	7	0	0	10	3	3	2	2	0	0	0	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	30
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	
		EU.Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	9719	11135	9799	6648	6386	6633	6672	6598	6185	6953	5547	5140	4079	3996	4595	3968	3957	4586	5376	5521	5448	5564	4366	4949	4147
		EU.France	4	0	0	0	75	75	75	95	46	84	97	164	110	104	122	0	74	169	102	178	92	46	14	15	35
		EU.Ireland	0	0	0	0	0	0	0	7	0	0	15	15	132	81	35	17	5	12	1	1	3	2	2	1	1
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	468	994	617	300	475	773	542	1961	1599	1617	1703	903	773	777	732	735	766	1032	1320	900	949	778	747	898	1054
		EU.United Kingdom	0	0	0	0	0	0	0	2	3	1	5	11	0	2	1	0	0	0	0	0	0	0	0	2	0
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	36	48	0	82	48	17	90
		Faroe Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	
		Grenada	0	0	56	5	1	2	3	13	0	1	4	15	15	42	84	0	54	88	73	56	30	26	43	0	
		Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**0**
		Japan	807	413	621	1572	1051	992	1064	1126	933	1043	1494	1218	1391	1089	161	0	0	0	575	705	656	889	935	778	1047
		Korea Rep.	68	60	30	320	51	3	3	19	16	16	19	15	0	0	0	0	0	0	0	51	65	175	157	3	
		Liberia	16	30	19	35	3	0	7	14	26	28	28	28	28	28	0	0	0	0	0	0	0	0	0	0	
		Libya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
		Maroc	181	197	196	222	91	110	69	39	36	79	462	267	191	119	114	523	223	329	335	334	341	237	430	724	963
		Mexico	0	0	0	0	0	0	0	6	14	0	22	14	28	24	37	27	34	32	44	41	31	35	34	32	35
		NEI (ETRO)	0	0	76	112	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NEI (MED)	14	3	131	190	185	43	35	111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	44	5	0	8	0	22	28	
		Rumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**0**
		Senegal	0	0	0	1	0	6	6	0	0	0	0	0	0	0	0	0	0	0	108	108	0	180	138	223	191
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	
		Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	3	0	3	23	0	4	3	1	0	1	0	22	22	7	7	7	0	51	7	34	13
		Sta. Lucia	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	3	0	0	2	0	0
		Trinidad and Tobago	45	151	42	79	66	71	562	11	180	150	158	110	130	138	41	75	92	78	83	91	19	29	48	30	21
		U.S.A.	5210	5247	6171	6411	5519	4310	3852	3783	3366	4026	3559	2987	3058	2908	2863	2217	2384	2513	2380	2160	1873	2463	2387	2730	2714
		U.S.S.R.	18	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	0	0	0	0	0	0	0	0	0	1	1	5	5	3	3	2	0	0	1	1	0	3	4	3	3

			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	7	0	3	0	
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	29	14	0	0	0	13
		Venezuela	84	86	2	4	9	75	103	73	69	54	85	20	37	30	44	21	34	45	53	55	22	30	11	13	24
	ATS	Angola	815	84	84	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	
		Argentina	31	351	198	175	230	88	88	14	24	0	0	0	0	38	0	5	10	8	0	0	0	0	0	0	
		Belize	0	0	0	0	0	0	0	0	0	1	0	0	0	17	8	0	0	0	0	0	0	120	32	111	121
		Benin	39	13	19	26	28	28	26	28	25	24	24	10	0	3	0	0	0	0	0	0	0	0	0	0	
		Brasil	753	947	1162	1168	1696	1312	2609	2013	1571	1975	1892	4100	3847	4721	4579	4082	2910	2920	2998	3785	4430	4153	3407	3386	2926
		Cambodia	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	29	534	344	200	423	353	278	91	300	473	470	291	296
		Chinese Taipei	216	338	798	610	900	1453	1686	846	2829	2876	2873	2562	1147	1168	1303	1149	1164	1254	745	744	377	671	727	612	410
		Cuba	95	173	159	830	448	209	246	192	452	778	60	60	0	0	0	0	0	0	0	0	0	0	0	0	
		Côte D'Ivoire	10	10	12	7	8	18	13	14	20	19	26	18	25	26	20	19	19	43	29	31	39	17	159	100	114
		EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	66	0	4393	7725	6166	5760	5651	6974	7937	11290	9622	8461	5832	5758	6388	5789	5741	4527	5483	5402	5300	5283	4073	5183	5801
		EU.Lithuania	0	0	0	0	0	0	0	0	794	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	1	0	0	380	389	441	384	381	392	393	380	354	345	493	440	428	271	367	232
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49	0	0	3	
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	
		Ghana	13	123	235	156	146	73	69	121	51	103	140	44	106	121	117	531	372	734	343	55	32	65	177	132	116
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	
		Honduras	0	0	0	0	0	0	3	0	0	6	4	5	2	8	0	0	0	0	0	0	0	0	0	0	
		Japan	2913	2620	4453	4019	6708	4459	2870	5256	4699	3619	2197	1494	1186	775	790	685	833	924	686	480	1090	2155	1600	1340	1405
		Korea Rep.	369	666	1012	776	50	147	147	198	164	164	7	18	7	5	10	0	2	24	70	36	94	176	223	10	
		Mixed flags (FR+ES)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	
		NEI (ETRO)	0	0	0	856	439	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Namibia	0	0	0	0	0	0	0	0	22	0	0	0	0	730	469	751	504	191	549	832	1118	1038	518	25	417
		Nigeria	0	0	0	0	0	0	3	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	29	105	0	0	0	0	0	0	0	0	0	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	8	1	1	4	58	41	49	14
		S. Tomé e Príncipe	0	0	216	207	181	179	177	202	190	178	166	148	135	129	120	120	120	120	126	147	138	138	183	188	193
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	
		South Africa	5	5	4	0	0	5	9	4	1	4	1	1	240	143	328	547	649	293	295	199	186	207	142	170	145
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	7	16	4
		Togo	32	1	0	2	3	5	5	8	14	14	64	0	0	0	0	0	0	0	9	10	2	0	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	171	396	160	179	142	43	200	21	15	0	0	0	0	0	0
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Sta Helena	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	
		Uruguay	537	699	427	414	302	156	210	260	165	499	644	760	889	650	713	789	768	850	1105	843	620	464	370	501	222
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	26	6	3	0	4
Discards	ATN	Canada	0	0	0	0	0	0	0	0	0	0	0	5	52	35	50	26	33	79	45	106	38	61	39	9	15
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	598	567	319	263	0	0	0	0	0	0	**0**
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		U.S.A.	0	0	0	0	0	215	383	408	708	526	588	446	433	494	490	308	263	282	275	227	185	220	205	148	131
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	6	0	
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	147
		U.S.A.	0	0	0	0	0	0	0	0	0	0	1	21	10	6	1	0	0	0	1	0	0	0	0	0	0

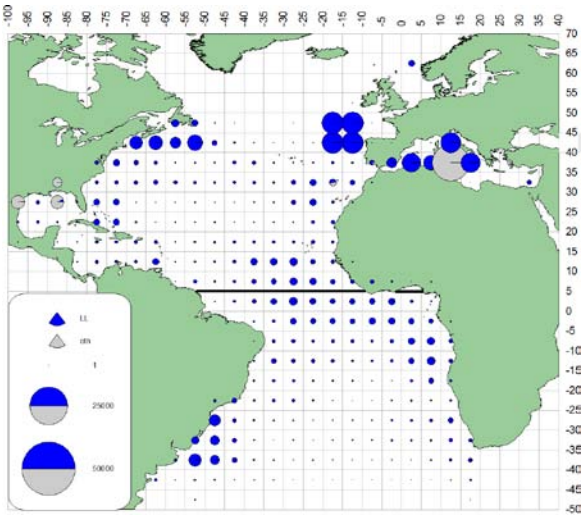
Korea also reported for 2010 an additional quantity of 10.2 t of swordfish live discards.



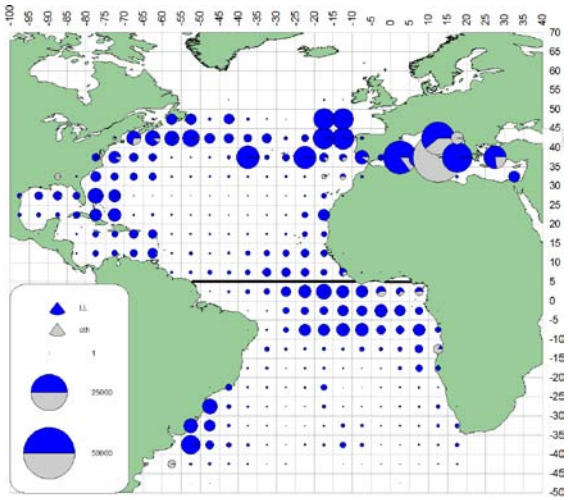
a. SWO(1950-59)



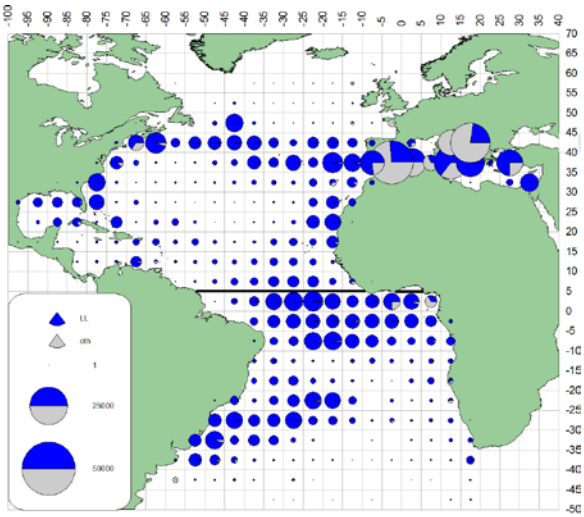
b. SWO(1960-69)



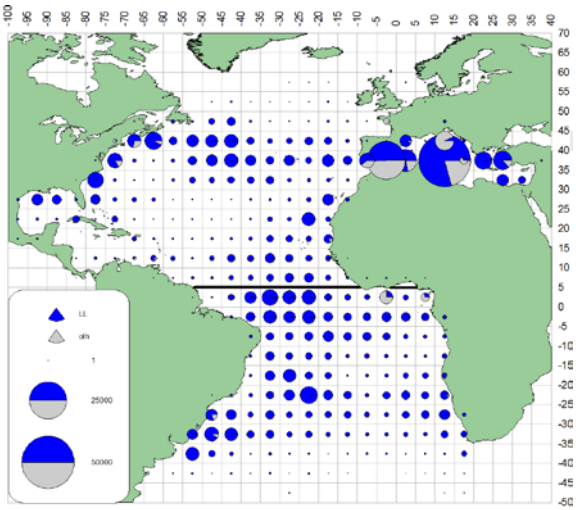
c. SWO(1970-79)



d. SWO(1980-89)

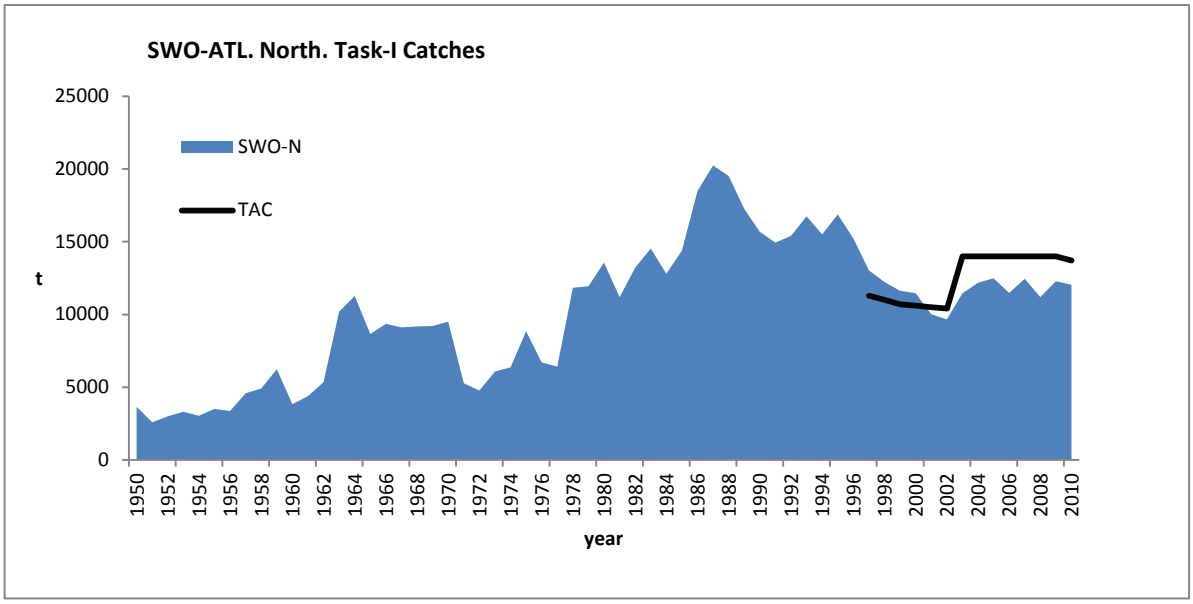


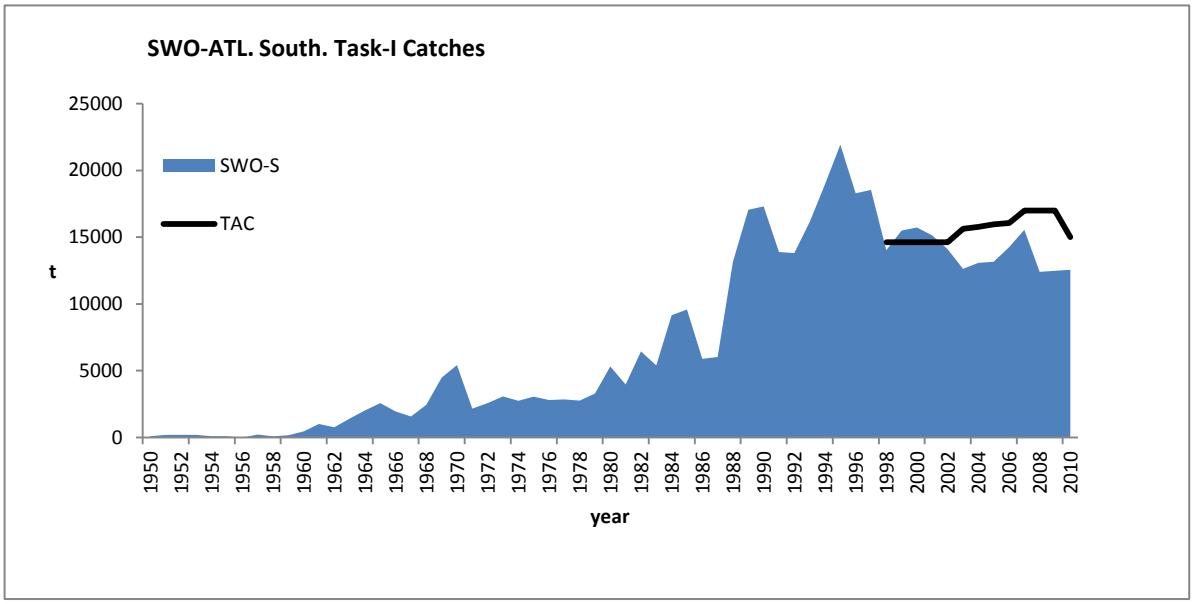
e. SWO (1990-99)



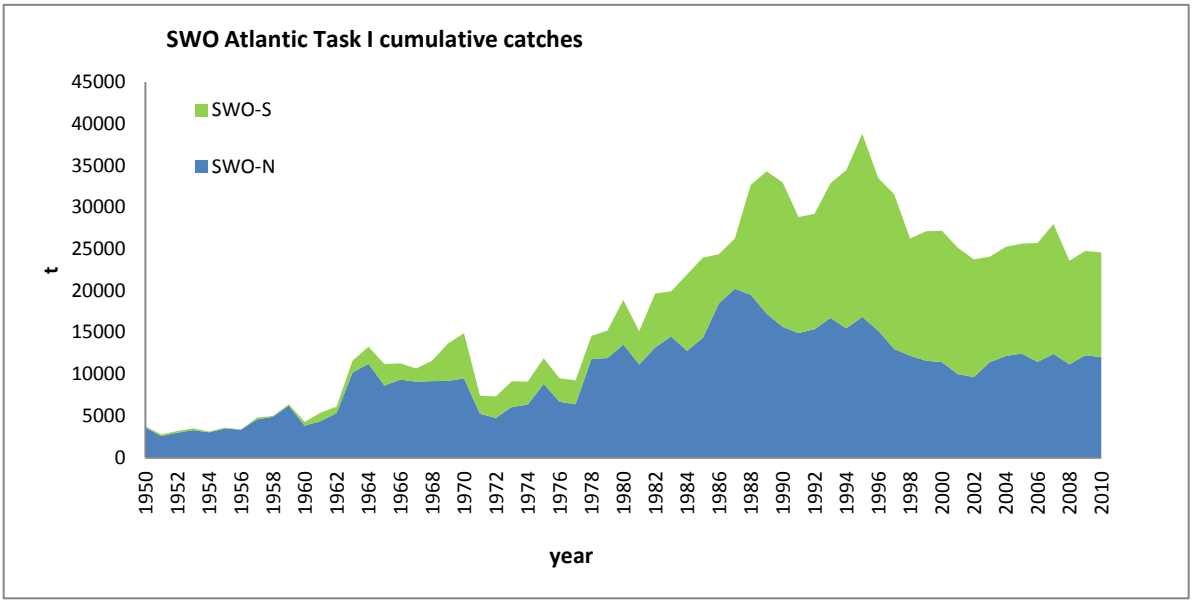
f. SWO (2000-09)

SWO-ATL-Figure 1. Geographic distribution of swordfish cumulative catch (t) by gear, in the Convention area, shown on a decadal scale. The more contemporary period (2000 to 2009) is shown on the bottom left. The symbols for the 1950s information (top left) are scaled to the maximum catch observed during the 1950s, whereas the remaining plots are scaled to the maximum catch observed from 1960 to 2009.

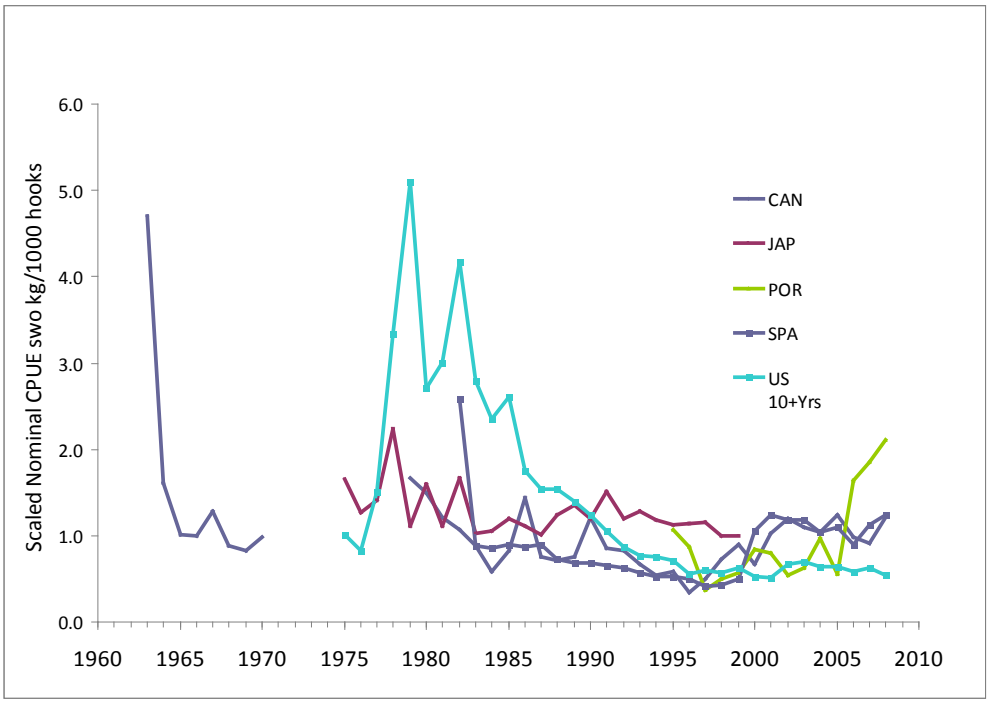




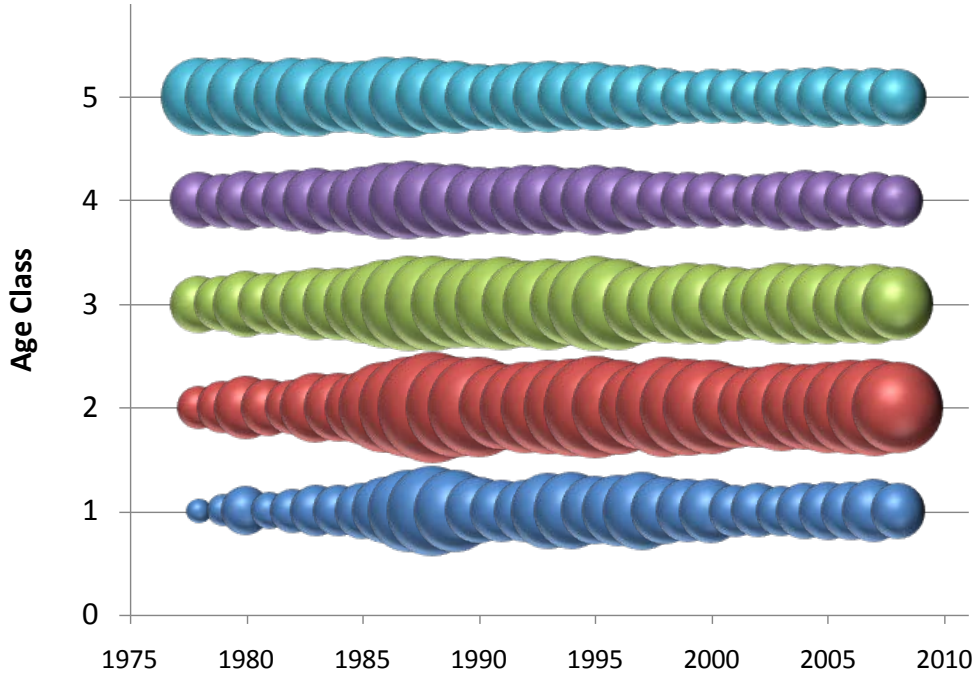
SWO-ATL-Figure 2. North and South Atlantic swordfish catch (t) by flag.



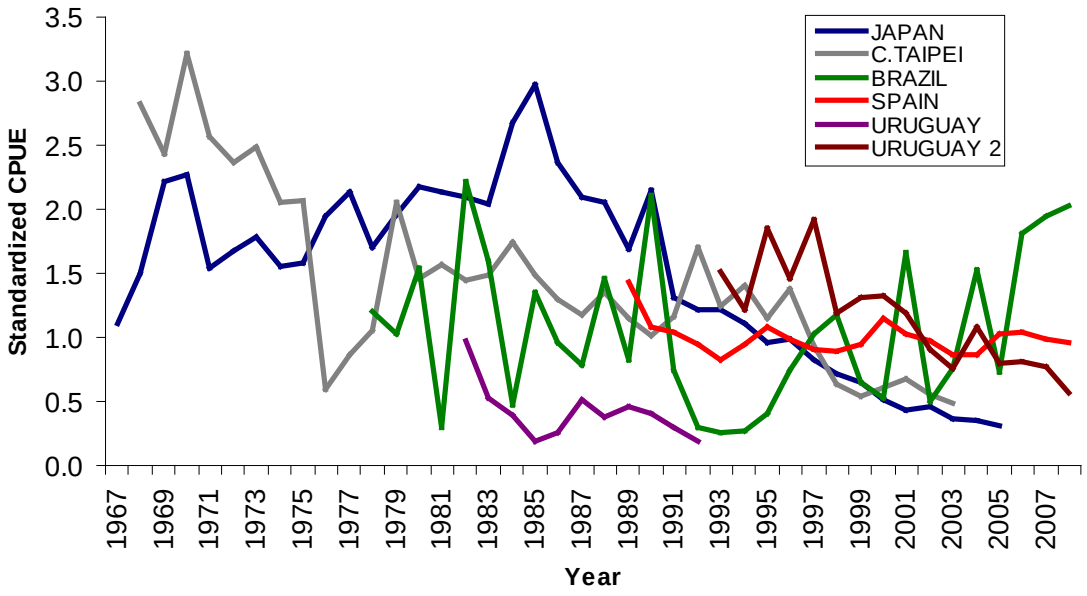
SWO-ATL-Figure 3. Swordfish reported catches (t) for North and South Atlantic, for the period 1950-2009 and the corresponding TAC.



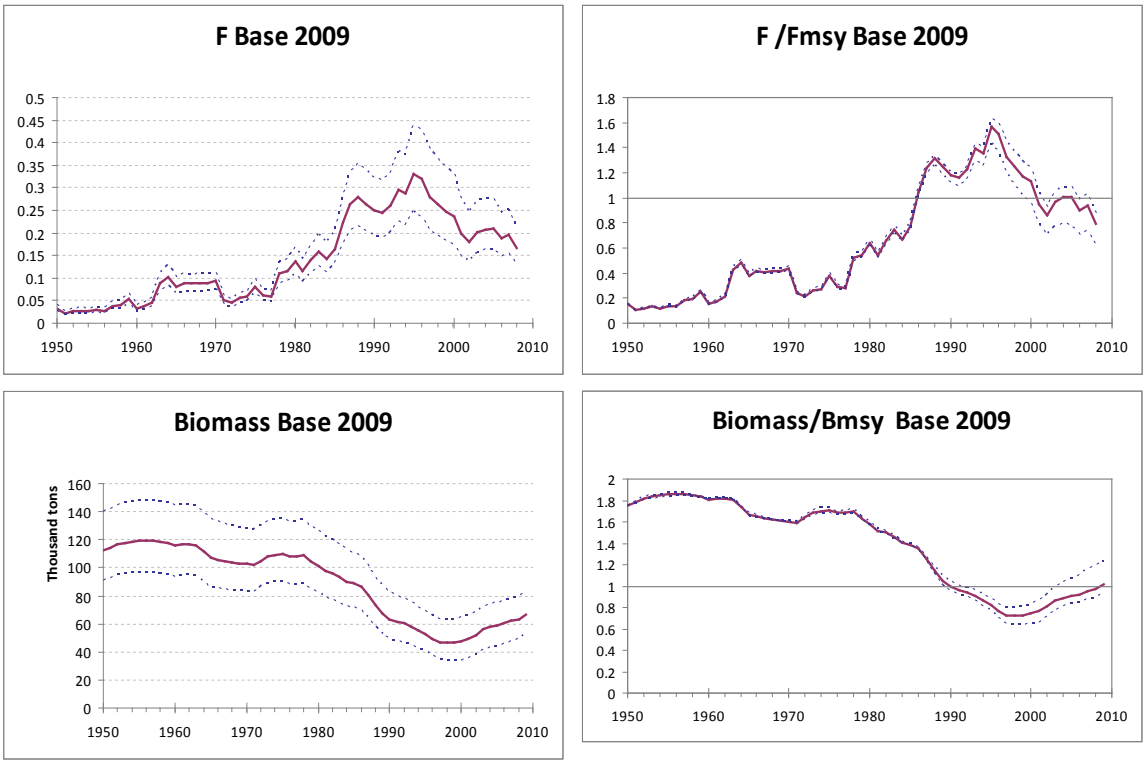
SWO-ATL-Figure 4. North Atlantic swordfish scaled nominal catch rate series used as input in the combined index of the base production model.



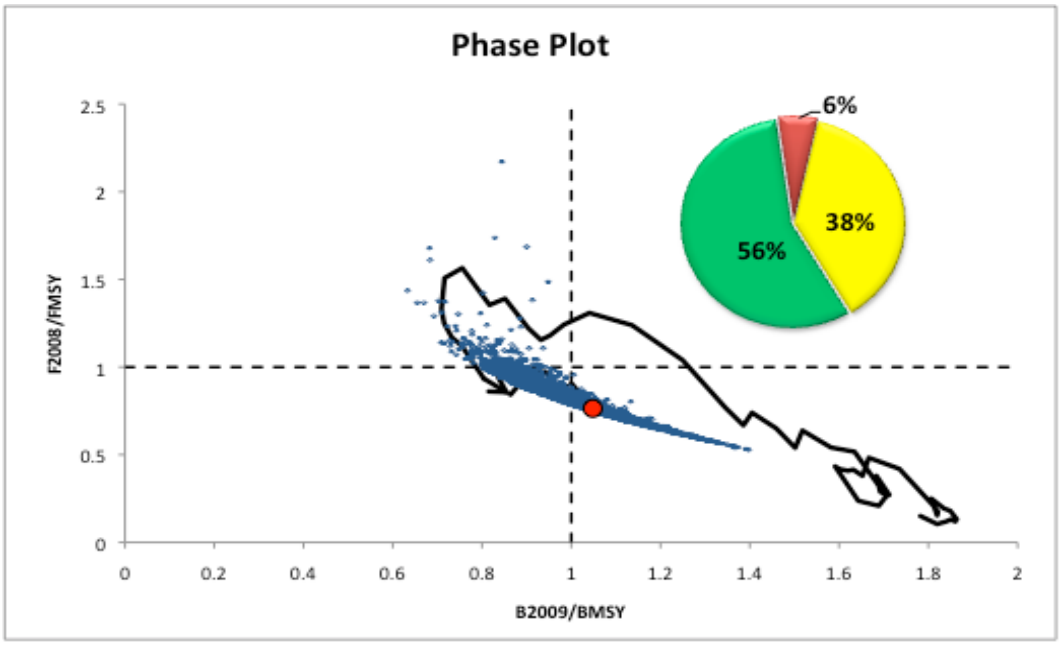
SWO-ATL-Figure 5. North Atlantic swordfish, catch at age (numbers) converted from catch at size. The area of the filled circle shows the proportional catch at age. Note: Age 5 is a plus group.



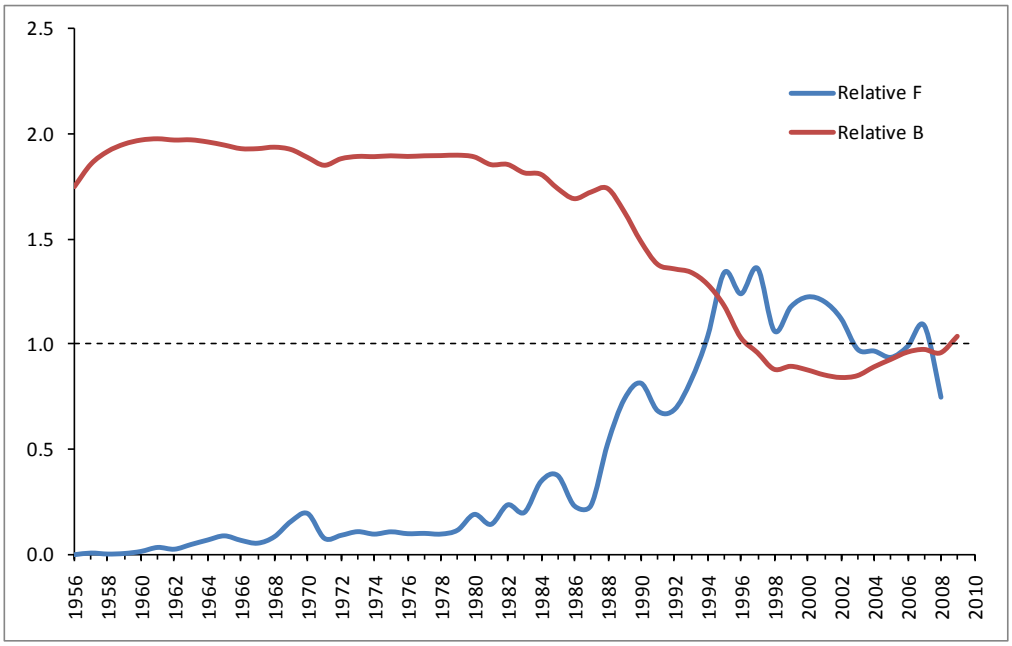
SWO-ATL-Figure 6. South Atlantic swordfish, standardized CPUE series for the production model (ASPIC) for characterizing the status of southern Atlantic swordfish (Scaled relative to mean of overlap).The series for Uruguay was treated as two series.



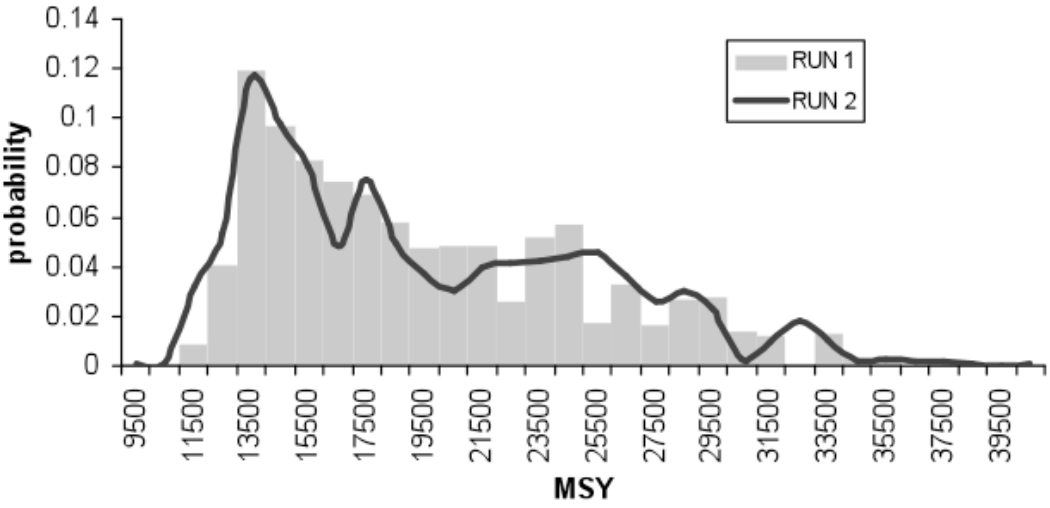
SWO-ATL-Figure 7. North Atlantic swordfish, biomass, fishing mortality and relative ratio trends for the base production model. The solid lines represent point estimates and broken lines represent estimated 80% bias corrected confidence intervals.



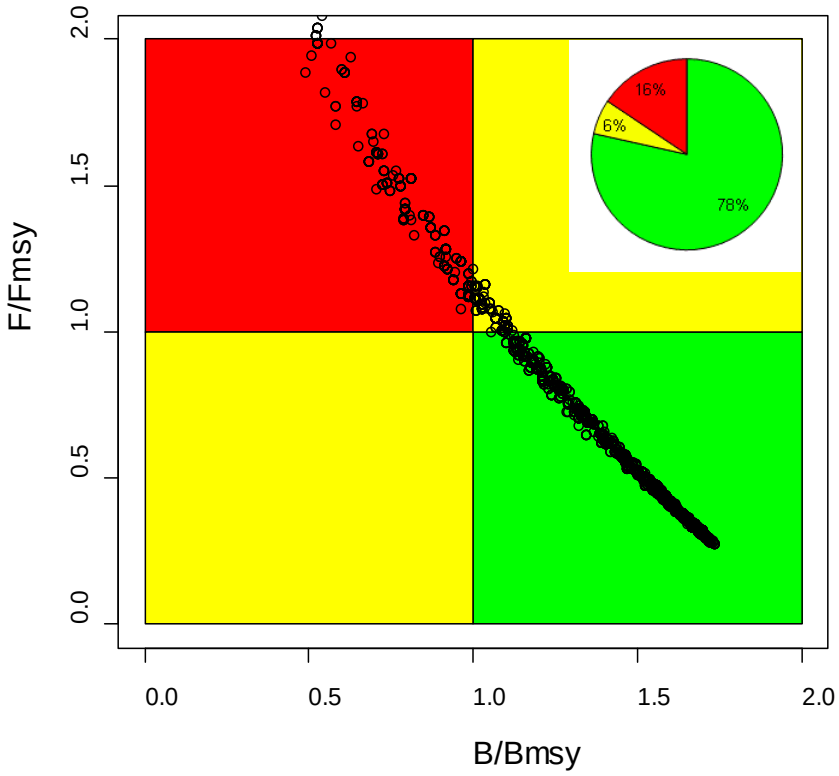
SWO-ATL-Figure 8. Summary figure of the current northern Atlantic swordfish stock status which includes different representation of the bootstraps results of the base ASPIC model: percentage, phase-plots (marked dot corresponds to the deterministic result) and stock status trajectories for the period 1950-2008. The x-axis represents relative biomass, and the y-axis relative exploitation rate.



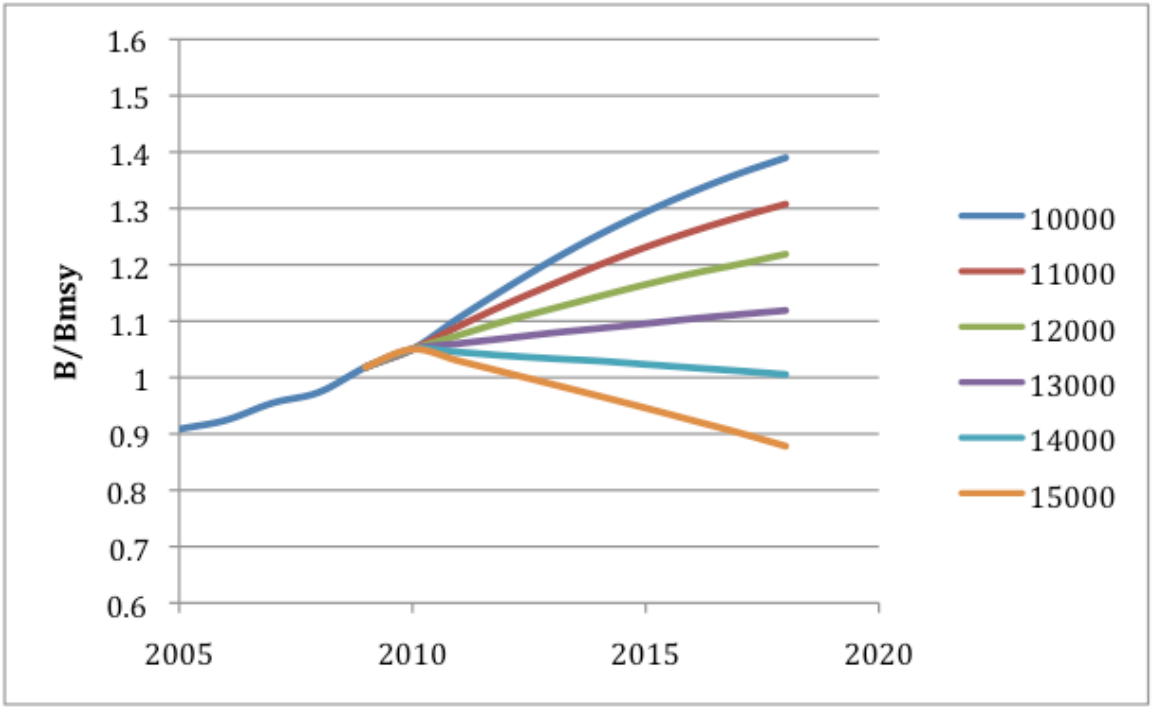
SWO-ATL Figure 9. South Atlantic, relative biomass (B/B_{MSY}) and relative fishing mortality (F/F_{MSY}) trajectories estimated by the base case production model.

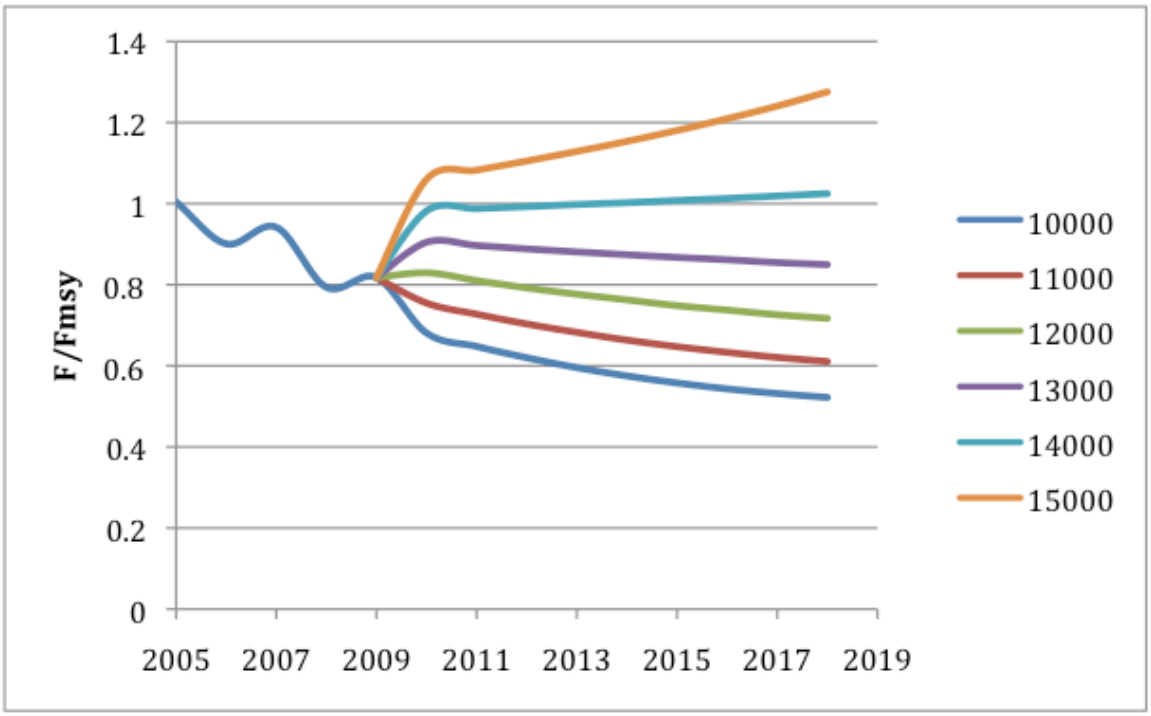


SWO-ATL-Figure 10. Posterior probability density estimates of MSY for South Atlantic swordfish from the catch-only model fitted to catch data from 1950 to 2009. Runs 1 and 2 refer to two scenarios with different assumptions for the intrinsic rate of population increase.

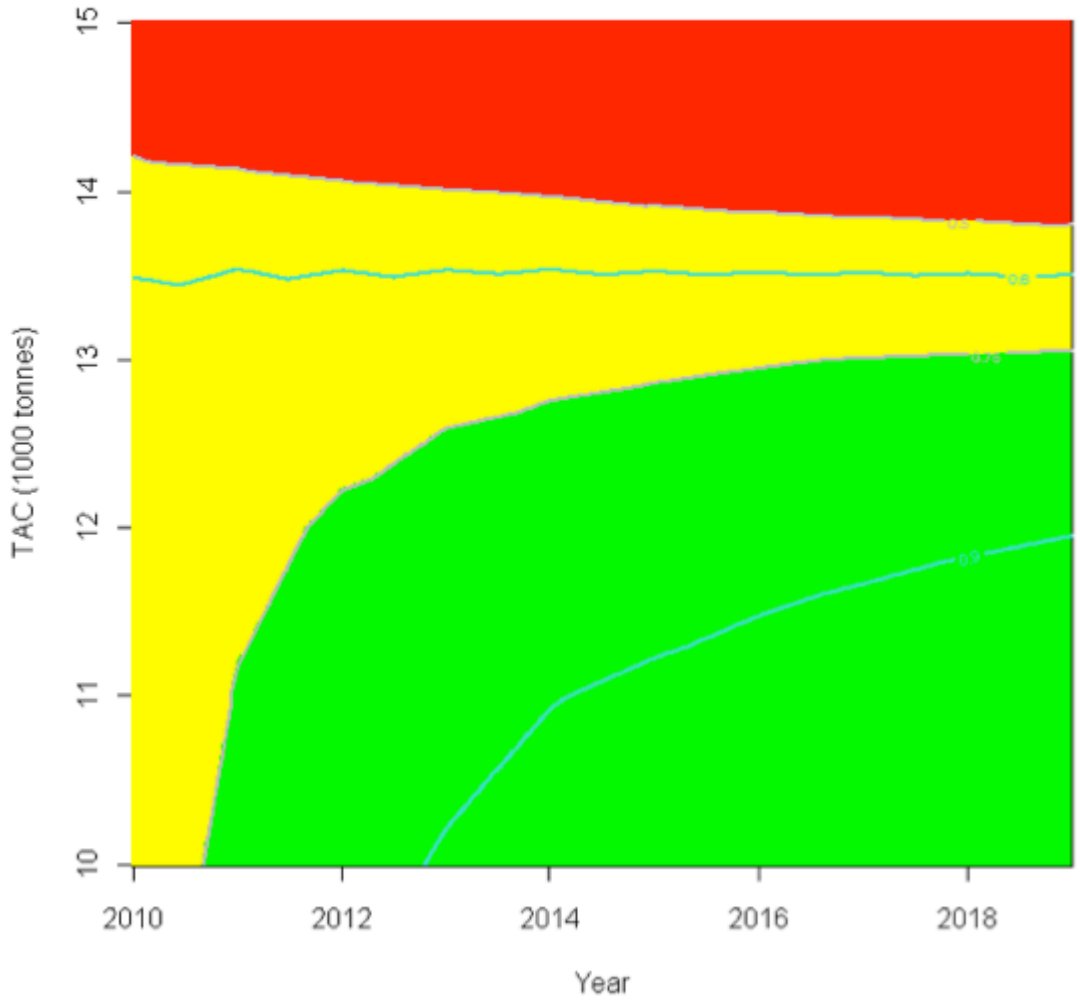


SWO-ATL-Figure 11. Summary figure of the current southern Atlantic swordfish stock status which includes the level of uncertainty on the knowledge of the state of the stock. Conditioned only on the catches**,** the model estimated a probability of 0.78 that the stock is not overfished and it is not undergoing overfishing.

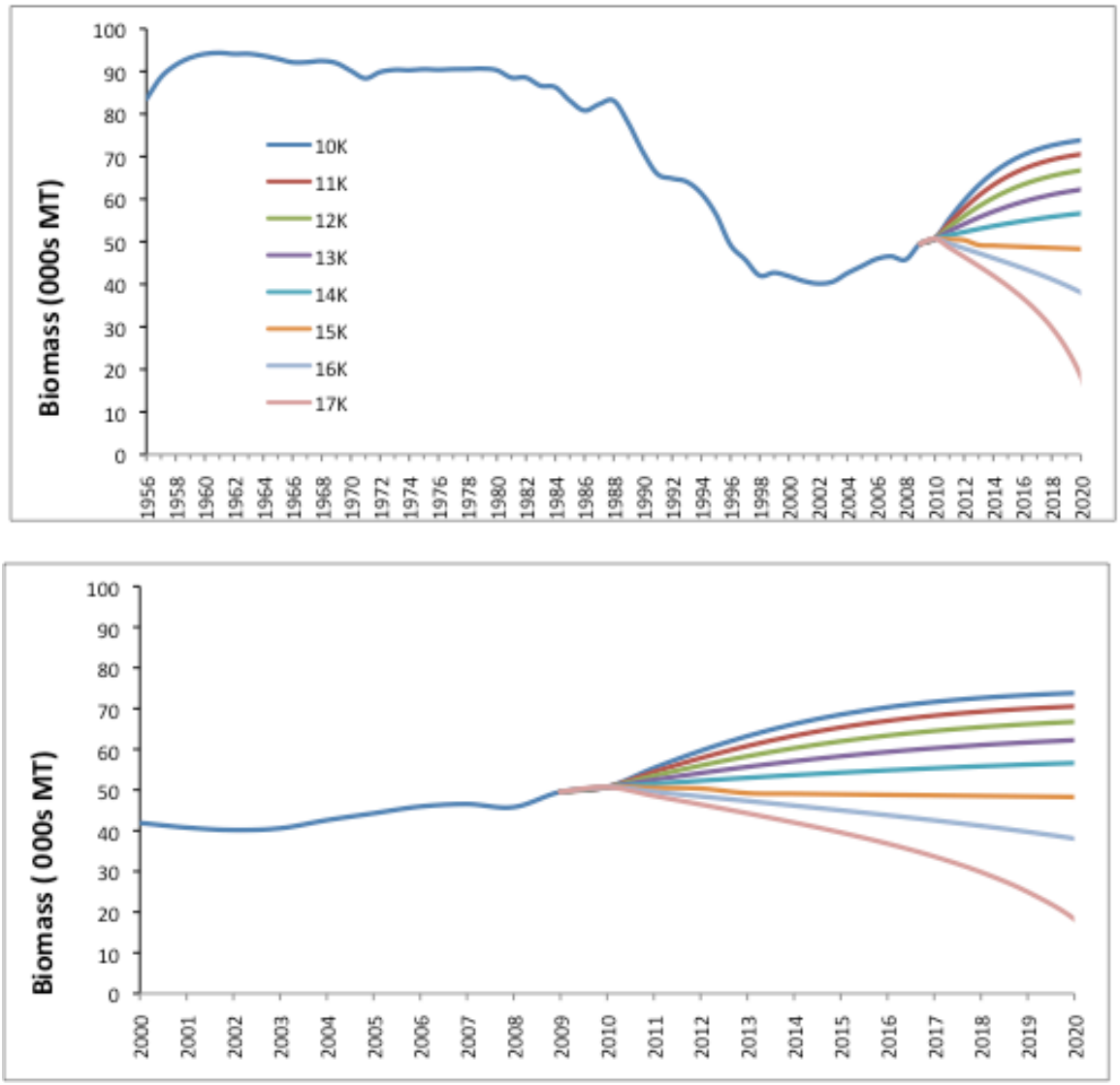




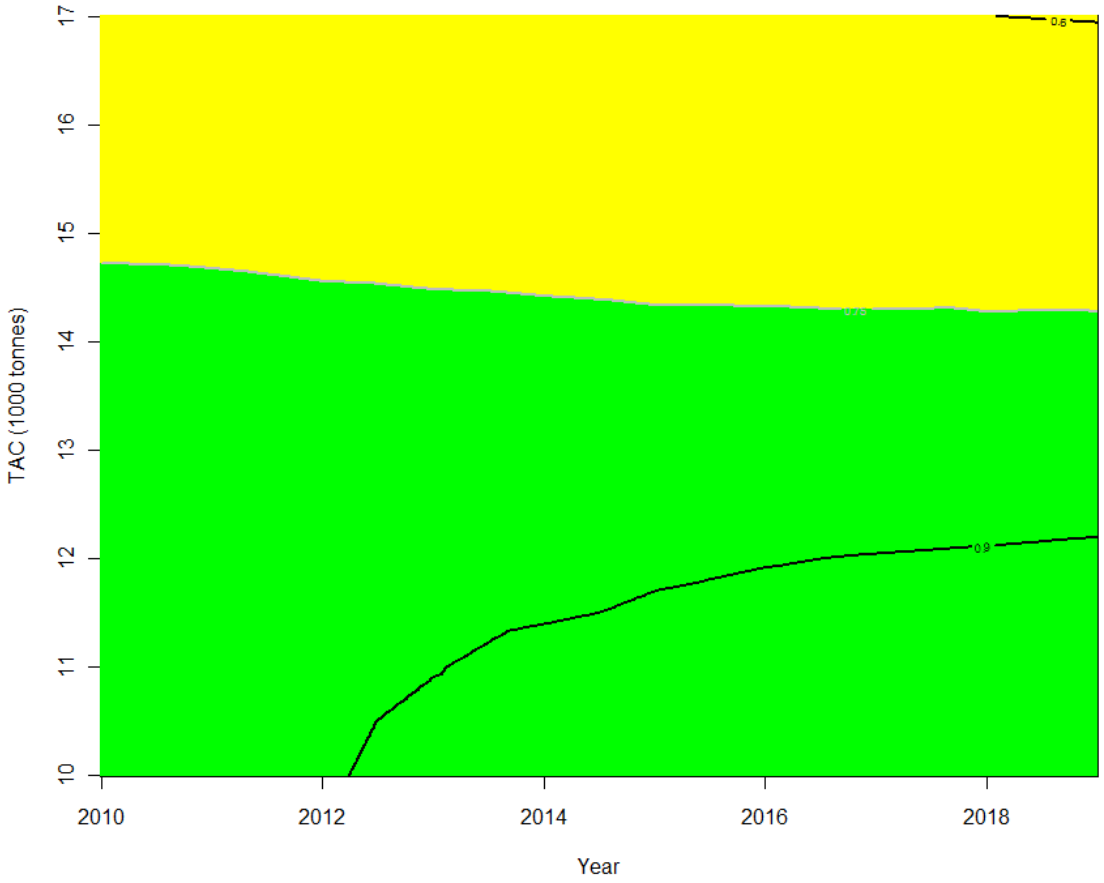
SWO-ATL-Figure 12. Projections of median relative North Atlantic swordfish stock biomass and F from the base ASPIC model under different constant catch scenarios (10\15 thousand tons) North Atlantic swordfish stock.



SWO-ATL-Figure 13. North Atlantic swordfish, probability contours of $B>B_{MSY}$ and $F<F_{MSY}$ for the constant catch scenarios indicated over time. Red areas represent probabilities less than 50%, yellow from 50-75%, and green above 75%. The 90th, 75th, 60th, and 50th probability contours are also depicted.



SWO-ATL-Figure 14. South Atlantic, projected biomass levels under various catch scenarios. The bottom panel provides the details of the projections over a reduced time interval.



SWO-ATL-Figure 15. South Atlantic swordfish, probability contours of $B>B_{MSY}$ and $F<F_{MSY}$ (from the catch only model, both runs combined) for the constant catch scenarios indicated over time. Yellow areas represent probabilities from 50-75%, and green above 75%. The 90th, 75th, probability contours are also depicted. No probabilities were below 50%.

8.9 SWO-MED-MEDITERRANEAN SWORDFISH

In the last 15 years Mediterranean swordfish production fluctuates without any specific trend at levels higher than those observed for bigger areas such as the North and South Atlantic. The most recent assessment was conducted in 2010, making use of catch and effort information through 2008. The present report summarizes assessment results and readers interested in more detailed information on the state of the stock should consult the report of the latest stock assessment session.

SWO-MED-1. Biology

Research results based on genetic studies have demonstrated that Mediterranean swordfish compose a unique stock separated from the Atlantic ones, although there is incomplete information on stock mixing and boundaries. However, mixing between stocks is believed to be low and generally limited to the region around the Straits of Gibraltar.

According to previous knowledge, the Mediterranean swordfish have different biological characteristics compared to the Atlantic stock, The growth parameters are different, and the sexual maturity is reached at younger ages than in the Atlantic, although more recent information for the Atlantic indicates that these differences may smaller than was previously thought. In the Mediterranean, mature females as small as 110 cm LJFL have been observed and the estimated size at which 50% of the female population is mature occurs at about 140 cm. According to the growth curves used by SCRS in the past for Mediterranean swordfish, these two sizes correspond to 2 and 3.5 year-old fish, respectively. Males reach sexual maturity at smaller sizes and mature specimens have been found at about 90 cm LJFL. Based on the fish growth pattern and the assumed natural mortality rate of 0.2, the maximum yield would be obtained through instantaneous fishing at age 6, while current catches are dominated, in terms of number, by fish less than 4 years old.

SWO-MED-2. Fishery indicators

Annual catch levels fluctuate between 12,000-16,000 t. in the last 15 years without any specific trend. Those levels are relatively high and similar to those of bigger areas such as the North Atlantic. This could be related to higher recruitment levels in the Mediterranean than in the North Atlantic, different reproduction strategies (larger spawning areas in relation to the area of distribution of the stock) and the lower abundance of large pelagic predators (e.g. sharks) in the Mediterranean. Updated information on Mediterranean swordfish catch by gear type is provided in **SWO-MED-Table 1** and **SWO-MED-Figure 1**. The total 2010 catch was 13,430 t, which is close to the mean of the 2006-2009 period. Gillnet catches show a declining trend in the last years due to the enforcement of a Mediterranean-wide driftnet ban. A complete closure of the Moroccan driftnet fishery is expected by the end of 2011. The biggest producers of swordfish in the Mediterranean Sea in the recent years are EU-Italy, Morocco, EU-Spain and EU-Greece. Also, Algeria, EU-Cyprus, EU-Malta, EU-Portugal, Tunisia and Turkey have fisheries targeting swordfish in the Mediterranean. Minor catches of swordfish have also been reported by Albania, Croatia, EU-France, Japan, and Libya. The Committee recognized that there may be additional fleets taking swordfish in the Mediterranean, for example, Egypt, Israel, Lebanon, Monaco and Syria, but the data are not reported to ICCAT or FAO.

Mediterranean swordfish landings showed an upward trend from 1965-1972, stabilized between 1973-1977, and then resumed an upward trend reaching a peak in 1988 (20,365 t; **SWO-MED-Table 1, SWO-MED-Figure 1**). The sharp increase between 1983 and 1988 may be partially attributed to improvement in the national systems for collecting catch statistics. Since 1988, the reported landings of swordfish in the Mediterranean Sea have declined fluctuating mostly between 12,000 to 16,000 t.

The main fishing gears used are surface longline and gillnets. Minor catches are also reported from harpoon, trap and recreational fisheries. Surface longlines are used all over the Mediterranean, while gillnets are still used in some areas and there are also countries known to be fishing with gillnets but not reporting their catches. However, following ICCAT recommendations for a general ban of driftnets in the Mediterranean, the gillnet fleet has been decreasing, although the total number of vessels cannot be determined from ICCAT statistics.

Preliminary results of experimental fishing surveys presented during the 2006 SCRS meeting indicated that selectivity of the surface longline targeting swordfish was more affected by the type and size of the bait, the depth of the set and the distance between branch lines rather than the type (circular vs. J-shaped) and the size of the hook. In general, American-style longlines capture less juvenile fish than the traditional Mediterranean longline gear, while a significant reduction of swordfish catches was found when using circle hooks.

A study based on fisheries data from the eastern Mediterranean presented during the 2009 SCRS suggested that there are no major differences in the age selection pattern among American and traditional longlines and confirmed previous findings regarding the higher catch efficiency of the American gear. It has been noted, however, that further studies in other Mediterranean areas are needed to verify that the estimated selection curves are independent of the stock distribution pattern.

Standardised CPUE series from the main longline and gillnet fisheries targeting swordfish, which were presented during the 2010 stock assessment session (Spanish longliners, Italian longliners, Greek longliners and Moroccan gillnetters), did not reveal any trend over time (**SWO-MED-Figure 2)**. CPUE series, however, covered only the last 10-20 years and not the full time period of reported landings. Similarly to CPUE, not any trend over the past 20 years was identified regarding the mean fish weight in the catches (**SWO-MED-Figure 3)**.

SWO-MED-3. State of the stocks

Two forms of assessment (production modelling and age-structured analysis - XSA), indicated that current SSB levels are much lower than those in the early 80's, although not any trend appears in the last 15 years. The extent of the decline differ among models, with the production model suggesting a decline of about 30%, while XSA results indicate that current SSB level is about 1/4 of that in the middle 80's **(SWO-MED-Figure 4)**. Results indicate that the fishery underwent a rapid expansion in the late 1980s resulting in Fs and catches above those that could support MSY. Estimates of population status from production modeling indicated that current stock level is slightly lower (~5%) to the optimum needed to achieve the ICCAT Convention objective, but these estimates have a high degree of uncertainty (CV~30%). Additionally, it should be noted that production model biomass estimates are very sensitive to the assumption made about the initial stock biomass ratio. In general, the low contrast in the available catch-effort series affects the reliability of biomass estimates, as well as, the predictions of effort changes on future catch levels.

Results of yield-per-recruit analyses based on the analytical age-structured assessment in which we have more confidence indicated that the stock is in overfished condition and slight overfishing is taking place. Current (2008) SSB is 46% lower than the value that would maximize yield per-recruit. Current F is slightly higher to the estimated F_{MSY} **(SWO-MED-Figure 5)**. Note, however, that these conclusions are based on deterministic analyses of the available data. The level of uncertainty in these estimates has not been evaluated.

The Committee again noted the large catches of small size swordfish, i.e., less than 3 years old (many of which have probably never spawned) and the relatively low number of large individuals in the catches. Fish less than three years old usually represent 50-70% of the total yearly catches in terms of numbers and 20-35% in terms of weight **(SWO-MED-Figure 6)**. A reduction of the volume of juvenile catches would improve yield per recruit and spawning biomass per recruit levels.

SWO-MED-4. Outlook

The assessment of Mediterranean swordfish indicates that the stock is below the level which can support MSY and that current fishing mortality slightly exceeds $F_{MSY.}$ Overall results suggest that fishing mortality (and near-term catches) needs to be reduced to move the stock toward the Convention objective of biomass levels which could support MSY and away from levels which could allow a rapid stock decline. A reduction of current F to the $F_{0.1}$ level would result to a substantial (about 40%) long-term increase in SSB **(SWO-MED-Figure 7)**.

Seasonal closure projections based on highly-aggregated data derived from the age-structured assessment and which assume no compensation in effort, no interaction with other management actions in place, and an improvement in recruitment with increasing spawning stock biomass (SSB), are forecast to be beneficial in moving the stock condition closer to the Convention objective, resulting in increased catch levels in the medium term, and reductions in the volume of juvenile catches. Although simulations suggest that the stock can be rebuild to the mid-1980s SSB levels only in the case of six month closures, SSB increases up to the optimum levels suggested by the yield-per-recruit analysis can be achieved within 2-3 generations (8-12 years) even under the current management status (2-month closure), provided that fishing mortality is kept on 2008 levels, which were quite lower than the previous years. Risk analysis, however, indicates that a small probability (<5%) of stock collapse still exists in this case. Benefits from seasonal closures would be diminished if closure is applied in months of low fishing activity (December-January). It should be noted that seasonal closures, especially the longer ones, would result in significant catch reductions within the first few years after their application. Capacity reductions of 20% assuming no compensation in effort, or quotas equal to the 80% of the mean yield of

the last decade assuming no change in the selection pattern, could also result to stock rebuilt to optimum SSB levels. Results of the seasonal closure projections are summarized in **SWO-MED-Figure 8**.

SWO-MED-5. Effects of current regulations

ICCAT imposed a Mediterranean-wide one month fishery closure for all gears targeting swordfish in 2008, followed by a two-month closure since 2009. Several countries have imposed technical measures, such as closed areas and seasons, minimum landing size regulations and license control systems. The EC introduced a driftnet ban in 2002 and in 2003 ICCAT adopted a recommendation for a general ban of this gear in the Mediterranean [Rec. 03-04]. Rec. 04-12 forbids the use of various types of nets and longlines for sport and recreational fishing for tuna and tuna-like species in the Mediterranean.

In past meetings, the Committee has reviewed the various measures taken by member countries and noted the difficulties in implementing some of the management measures, particularly that of minimum landing size.

SWO-MED-6. Management recommendations

The Commission should adopt a Mediterranean swordfish fishery management plan which ensures that the stock will be rebuilt and kept in levels that are consistent with the ICCAT Convention objective. Given the uncertainties on optimum SSB level estimates and the rapid fishery expansion in the 1980s, which resulted in severe stock biomass declines, the SSB levels in the late 1980s may be also considered as a good B_{MSY} proxy for the stock. These levels, are around to 60,000-70,000 t, not very far however, from the currently estimated B_{MSY} value (~62, 000 t). Analysis has suggested that the seasonal closures have beneficial effects and can move the stock condition to the level which will support MSY, but the effect of the recently employed two-month closure could not be evaluated during the 2010 assessment session due to incomplete 2009 data.

Given that the current capacity in the Mediterranean swordfish fishery exceeds that needed to efficiently extract MSY, management measures aimed at reducing this capacity should also be considered part of a Mediterranean swordfish management plan adopted by the Commission.

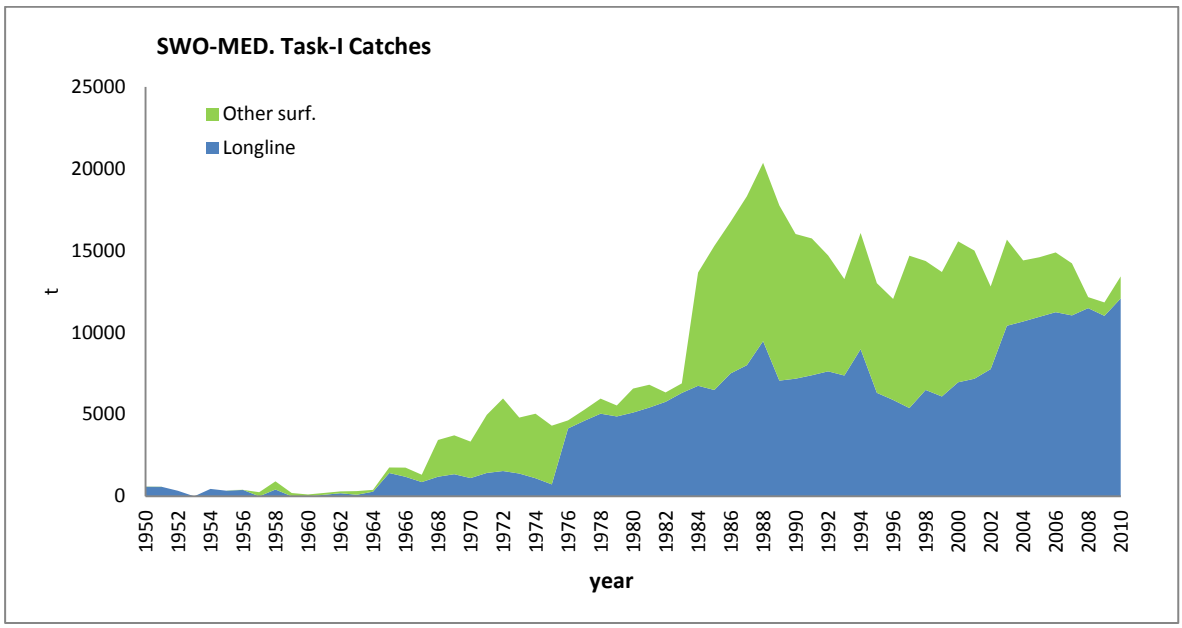
MEDITERRANEAN SWORDFISH SUMMARY

Maximum Sustainable Yield	~14,600 [1]
Current (2010) Yield	13, 430 t
Current (2008) Replacement Yield	~12,100 t[1]
Relative Biomass (B_{2008}/B_{MSY})	0.54 [1]
Relative Fishing Mortality	
F_{2008}/F_{MSY}	1.03 [1]
F_{2008}/F_{MAX}	0.91[1]
$F_{2008}/F_{0.1}$	1.52 [1]
$F_{2008}/F_{30\%SPR}$	1.32 [1]
Management measures in effect	Driftnet ban [Rec. 03-04] Two month fishery closure [2]

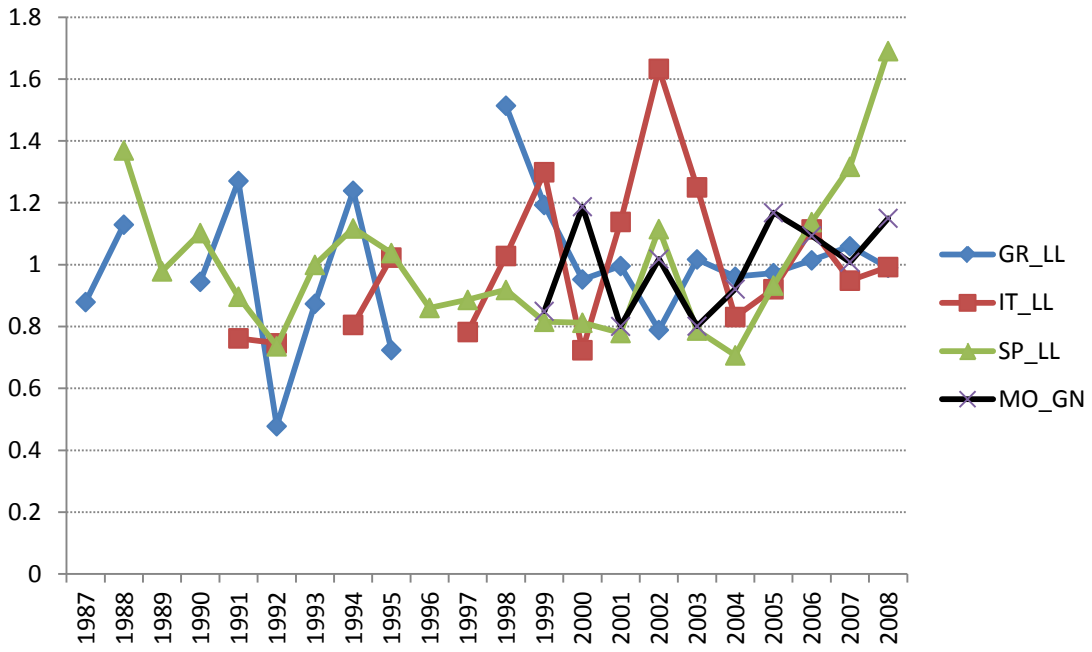
[1] Based on the age-structured analysis.
[2] Various technical measures, such as closed areas, minimum size regulations and effort controls are implemented at the national level.

SWO-MED-Table 1. Estimated catches (t) of swordfish (Xiphias gladius) in the Mediterranean by gear and flag. (v02, 2011-09-30)

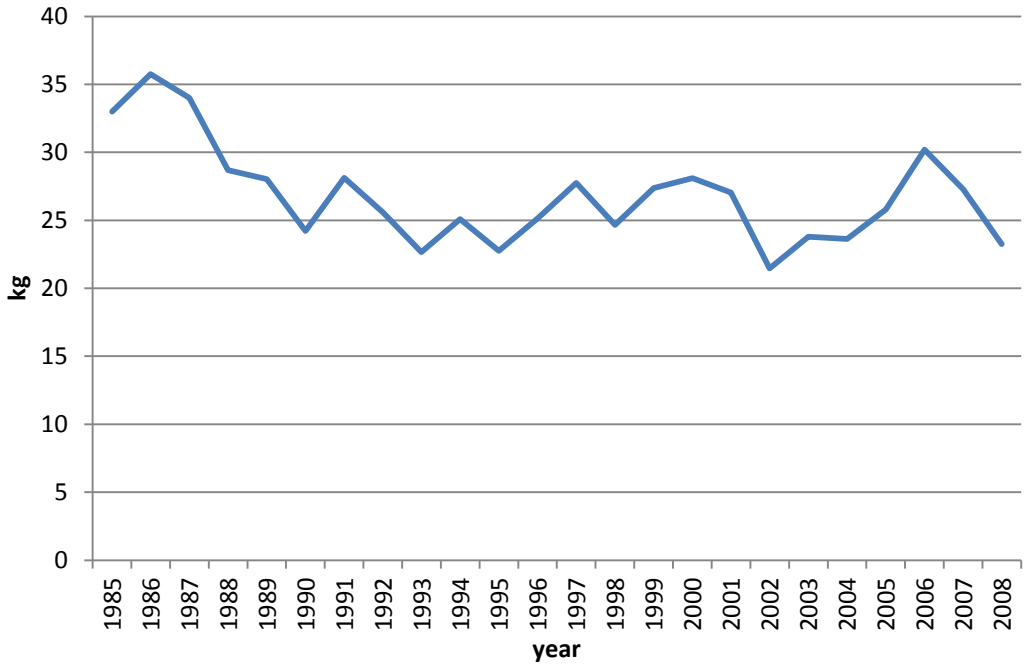
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TOTAL		16765	18320	20365	17762	16018	15746	14709	13265	16082	13015	12053	14693	14369	13699	15569	15006	12814	15674	14405	14600	14893	14227	12164	11840	13430
Landings	Longline	7505	8007	9476	7065	7184	7393	7631	7377	8985	6319	5884	5389	6496	6097	6963	7180	7767	10415	10667	10848	11228	11028	11465	11020	12083
	Other surf.	9260	10313	10889	10697	8834	8353	7078	5888	7097	6696	6169	9304	7873	7602	8606	7826	5047	5259	3729	3639	3649	3179	672	819	1347
Discards	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27	0	
Landings	Albania	0	0	0	0	0	0	0	0	0	0	13	13	13	13	0	0	0	0	0	0	0	0	0	0	
	Algerie	847	1820	2621	590	712	562	395	562	600	807	807	807	825	709	816	1081	814	665	564	635	702	601	802	468	624
	Chinese Taipei	0	0	0	0	0	0	0	1	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	
	Croatia	0	0	0	0	0	0	0	0	0	0	0	0	10	20	0	0	0	0	0	0	0	0	4	3	6
	EU.Cyprus	154	84	121	139	173	162	56	116	159	89	40	51	61	92	82	135	104	47	49	53	43	67	67	38	31
	EU.España	1337	1134	1762	1337	1523	1171	822	1358	1503	1379	1186	1264	1443	906	1436	1484	1498	1226	951	910	1462	1697	2095	2000	1792
	EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	27	0	19	0	0	14	14	16	78
	EU.Greece	1714	1303	1008	1120	1344	1904	1456	1568	2520	974	1237	750	1650	1520	1960	1730	1680	1230	1120	1311	1358	1887	962	1132	1494
	EU.Italy	11413	12325	13010	13009	9101	8538	7595	6330	7765	7310	5286	6104	6104	6312	7515	6388	3539	8395	6942	7460	7626	6518	4549	5016	6022
	EU.Malta	144	163	233	122	135	129	85	91	47	72	72	100	153	187	175	102	257	163	195	362	239	213	260	266	423
	EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	115	8	1	120	14	16	0	0	0	
	Japan	7	3	4	1	2	1	2	4	2	4	5	5	7	4	2	1	1	0	2	4	0	3	1	1	
	Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
	Libya	0	0	0	0	0	0	0	0	0	0	0	0	11	0	8	6	0	10	2	0	14	0	0	0	
	Maroc	92	40	62	97	1249	1706	2692	2589	2654	1696	2734	4900	3228	3238	2708	3026	3379	3300	3253	2523	2058	1722	1957	1587	1610
	NEI (MED)	767	828	875	979	1360	1292	1292	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	28	0	
	Tunisie	64	63	80	159	176	181	178	354	298	378	352	346	414	468	483	567	1138	288	791	791	949	1024	1011	1012	1016
	Turkey	226	557	589	209	243	100	136	292	533	306	320	350	450	230	370	360	370	350	386	425	410	423	386	301	334
Discards	EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	113	16	19	27	0	



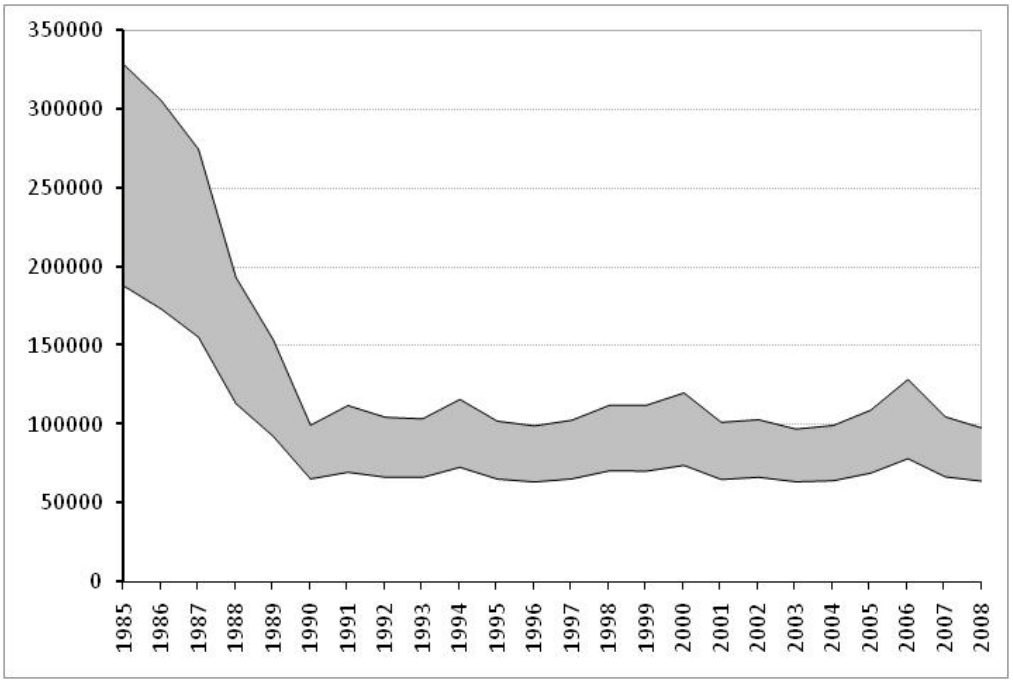
SWO-MED-Figure 1. Cumulative estimates of swordfish catches (t) in the Mediterranean by major gear types, for the period 1950-2010 (the 2010 data are provisional).



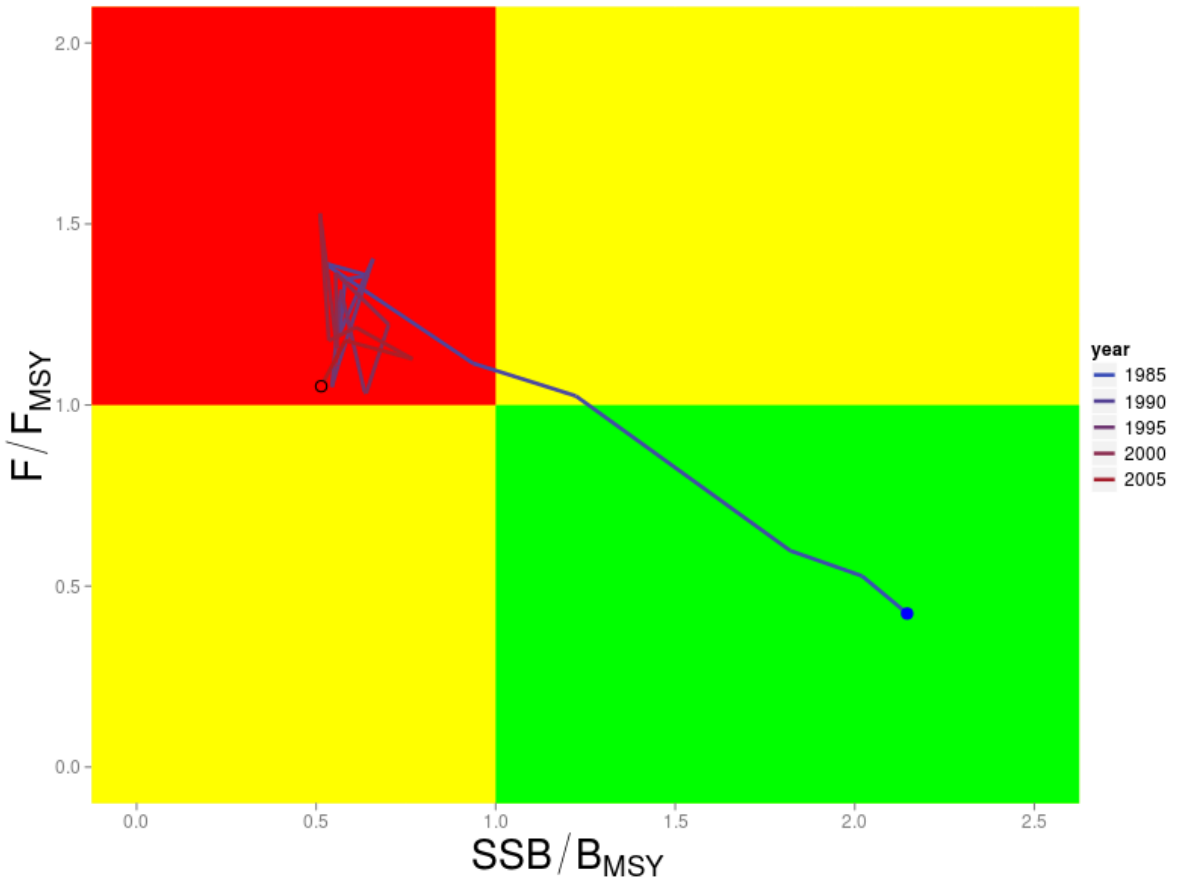
SWO-MED-Figure 2. Time series of standardized CPUE rates scaled to the corresponding mean value for the Spanish longliners (SP_LL), Italian longliners (IT_LL), Greek longliners (GR_LL), and Moroccan gillnetters (MO_GN).



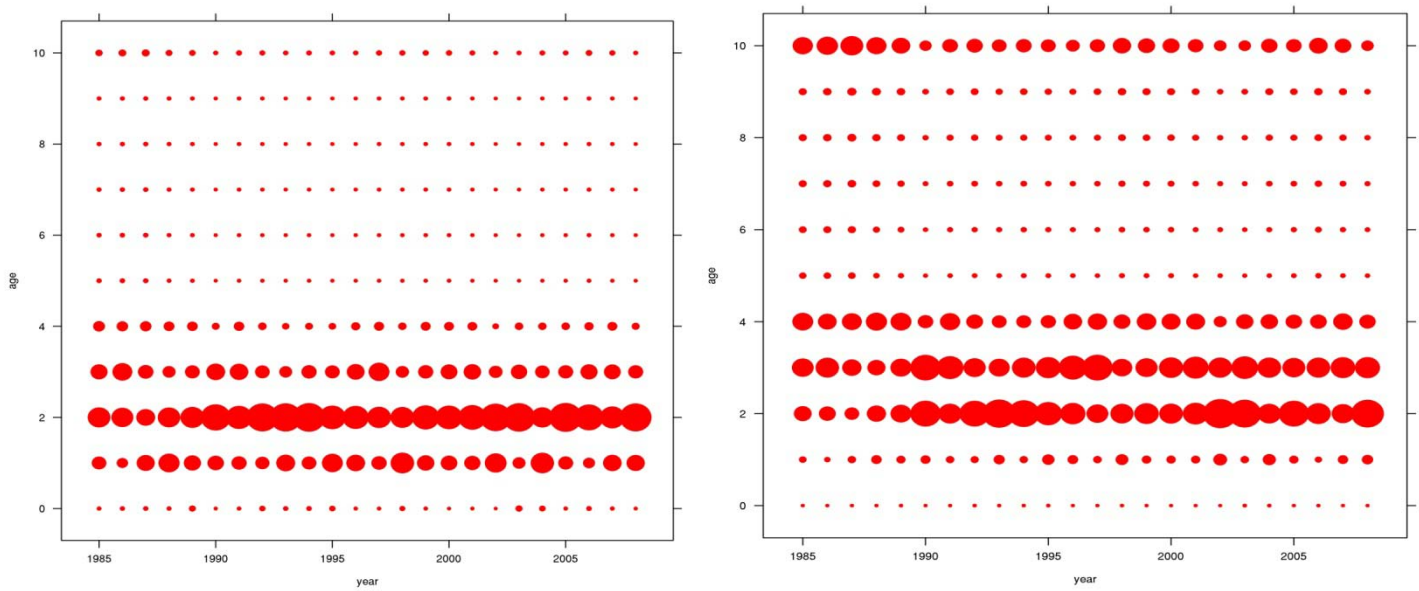
SWO-MED-Figure 3. Time series of mean fish weight in the catches.



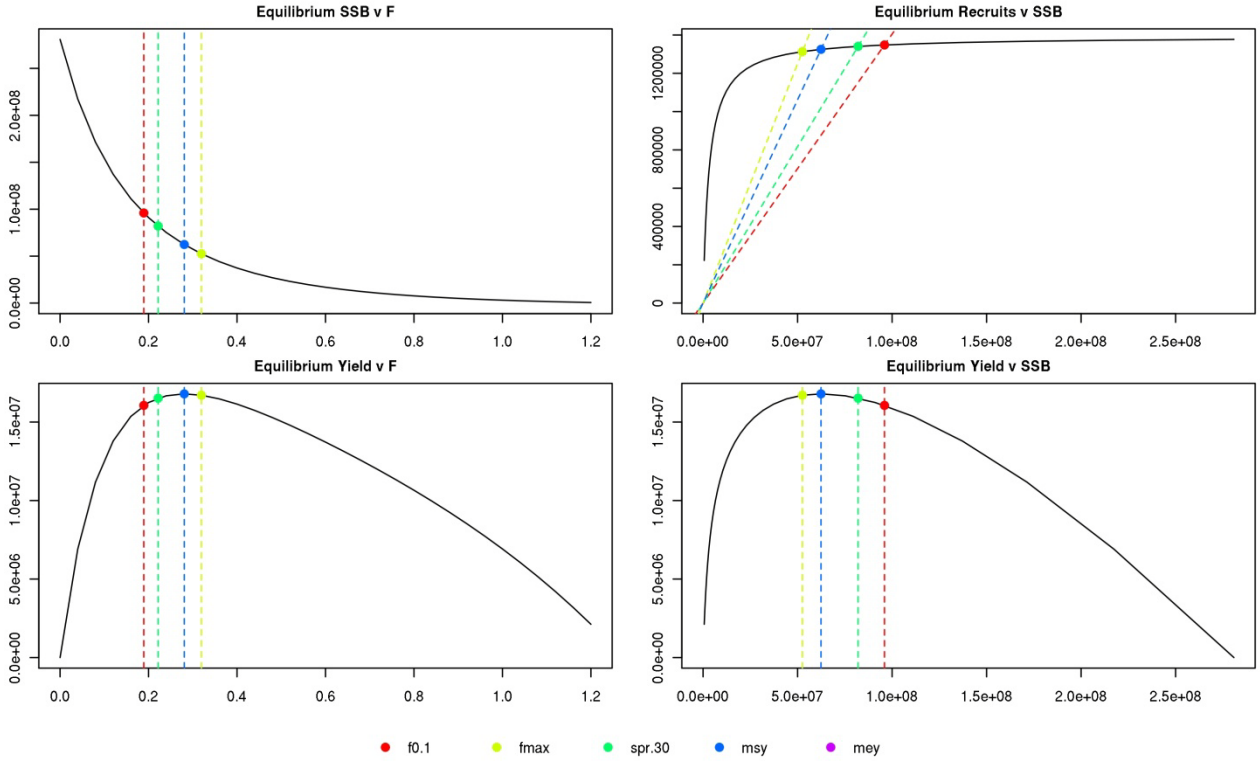
SWO-MED-Figure 4. Total and spawning stock biomass (SSB) estimates (grey color) obtained from the age-structured analysis.



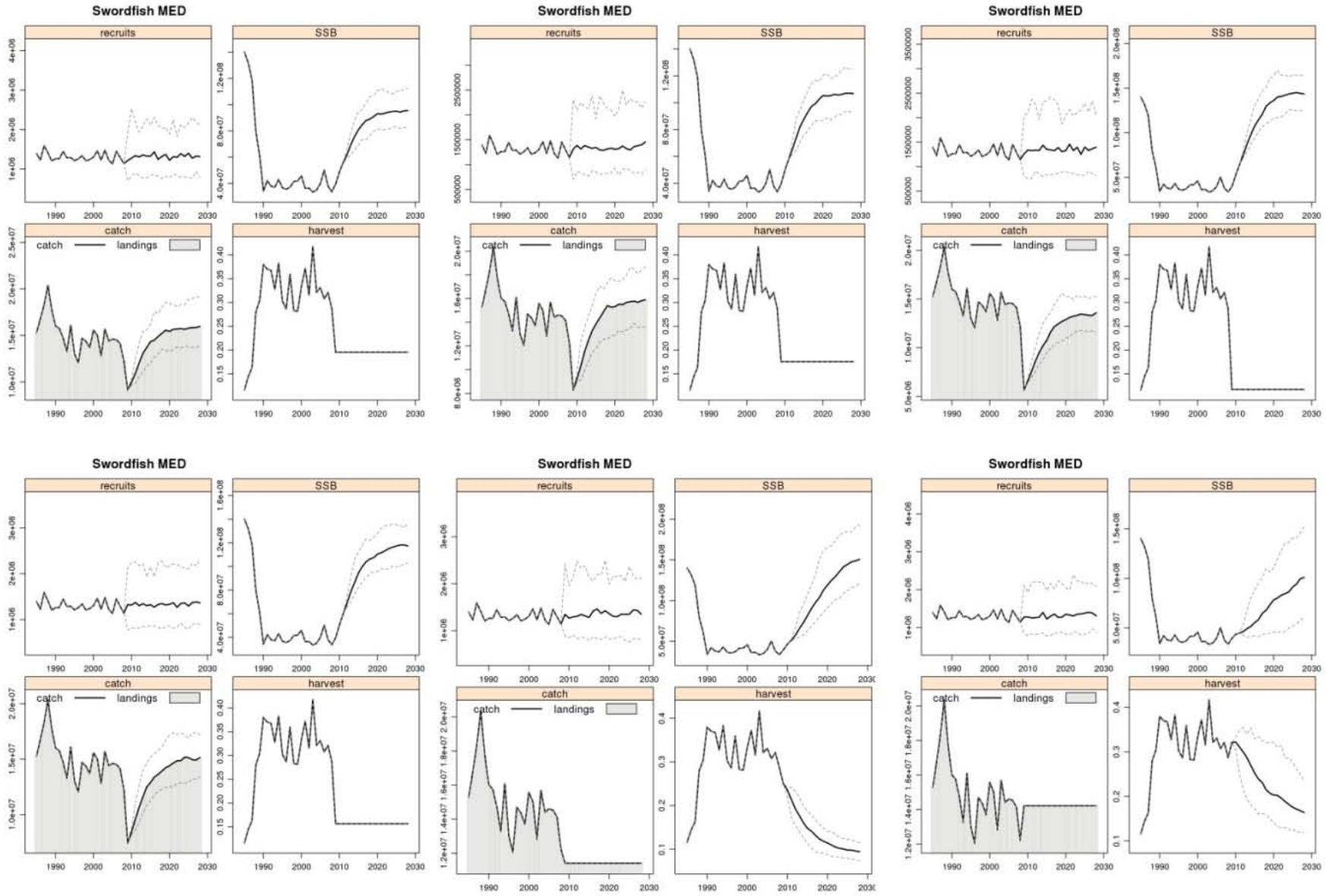
SWO-MED-Figure 5. Time trends for stock status (B/B_{MSY} and F/F_{MSY}) derived from the age-structured analysis. The open circle indicates the ratio estimates for the last assessment year (2008).



SWO-MED-Figure 6. Proportion of catch numbers (left) and catch weight (right) at age by year.



SWO-MED-Figure 7. Equilibrium curves estimated from the yield per recruit analysis.



SWO-MED-Figure 8. Scenario estimates assuming a Beverton-Holt stock/recruitment model. From left to right and top to bottom: current management, 4-month closure, 6-month closure, 20% capacity reduction, quota equal to 80% of the mean catch of the last decade, quota equal to the mean catch of the last decade.

8.10 SBF – SOUTHERN BLUEFIN TUNA

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is charged with assessing the status of southern bluefin tuna. The reports are available from CCSBT.

8.11 SMT - SMALL TUNAS

SMT-1. Generalities

Small tunas include the following species:

- BLF Blackfin tuna (*Thunnus atlanticus*)
- BLT Bullet tuna (*Auxis rochei*)
- BON Atlantic bonito (*Sarda sarda*)
- BOP Plain bonito (*Orcynopsis unicolor*)
- BRS Serra Spanish mackerel (*Scomberomorus brasiliensis*)
- CER Cero (*Scomberomorus regalis*)
- FRI Frigate tuna (*Auxis thazard*)
- KGM King mackerel (*Scomberomorus cavalla*)
- KGX Scomberomorus unclassified (*Scomberomorus spp*.)
- LTA Little tunny (*Euthynnus alletteratus*)
- MAW West African Spanish mackerel (*Scomberomorus tritor*)
- SSM Atlantic Spanish mackerel (*Scomberomorus maculatus*)
- WAH Wahoo (*Acanthocybium solandri*)
- DOL Dolphinfish (*Coryphaena hippurus*)

Knowledge on the biology and fishery of small tunas is very fragmented in several areas. Furthermore, the quality of the knowledge is very different according to the species concerned. This is due in large part because many of these species are often perceived to have little economic importance compared to other tuna and tuna-like species, and owing to the difficulties in conducting sampling of the landings from artisanal fisheries, which constitute a high proportion of the fisheries exploiting small tuna resources. The large industrial fleets often discard small tuna catches at sea or sell them on local markets mixed with other by-catches, especially in Africa (SCRS/2009/147). The amount caught is rarely reported in logbooks; however observer programs from purse seine fleets have recently provided estimates of catches of small tunas (SCRS/2009/146).

Small tuna species have a very high relevance from a socio-economic point of view, because they are important for many coastal communities in all areas and are a main source of food. The socio-economic value is often not evident because of the underestimation of the total figures, due to the above mentioned difficulties in data collection. Several statistical problems are also caused by misidentification. The small tuna species can reach high levels of catches and values in some years.

Scientific collaboration among ICCAT, RFOs and countries in the various regions is imperative to advance understanding of the distribution, biology and fishery of these species.

SMT-2. Biology

These species are widely distributed in the tropical and subtropical waters of the Atlantic Ocean and several are also distributed in the Mediterranean Sea and the Black Sea. Some species extend their range even to colder waters, like the North and South Atlantic Ocean. They often form large schools with other small sized tunas or related species in coastal and high seas waters.

Generally, the small tuna species have a varied diet with a preference for small pelagics (e.g., clupeids, mullets, carangids, etc.). These species feed also on crustaceans, mollusks and cephalopods. Many of these species are also prey of large tunas, marlins and sharks. The reproduction period varies according to species and areas and spawning generally takes place near the coast in oceanic areas, where the waters are warmer. The growth rate currently estimated for these species is very rapid for the first two or three years, and then slows as these species reach size-at-first maturity. Studies about the migration patterns of small tuna species are very rarely available, due to the practical difficulties in manipulating and tagging these species.

In general, there is a lack of information on biological parameters for these species, especially for West Africa and the Caribbean and South America. A new document regarding the length -weight relationship of dolphinfish (*Coryphaena hippurus*) as bycatch in the longline fisheries of the Western Mediterranean was presented to the species group meeting (SCRS/2011/183).

SMT-3. Description of the fisheries

Small tunas are exploited mainly by coastal fisheries and artisanal fisheries, although substantial catches are also made as target species and as by-catch by purse seine, mid-water trawlers (i.e., pelagic fisheries of West Africa-Mauritania), handline and small scale gillnets. Unknown quantities of small tuna also comprise the incidental catches of some longline fisheries. The increasing importance of FAD fisheries in the eastern Caribbean and in other areas has improved the efficiency of artisanal fisheries in catching small tunas. Various species are also caught by the sport and recreational fisheries. A new document describing the Venezuelan industrial surface fleets and small scale fisheries catching the blackfin tuna was presented to this species group (SCRS/2011/122).

Despite of the scarce monitoring of various fishing activities in some areas, all the small tuna fisheries have a high socio-economic relevance for most of the coastal countries concerned and for many local communities, particularly in the Mediterranean Sea, in the Caribbean region and in West Africa.

SMT-Table 1 shows historical landings of small tunas for the 1986 to 2010 period although the data for the last years are preliminary. This table does not include species reported as "mixed" or "unidentified", as was the case in the previous years, since these categories include large tuna species. There are more than 10 species of small tunas, but only five of these account for about 88% of the total reported catch by weight. These five species are: Atlantic bonito *(Sarda sarda)*, frigate tuna *(Auxis thazard)* which may include some catches of bullet tuna *(Auxis rochei)*, little tunny *(Euthynnus alletteratus)*, king mackerel *(Scomberomorus cavalla)*, and Atlantic Spanish mackerel *(Scomberomorus maculatus)* **(SMT-Figure 2)**. In 1980, there was a marked increase in reported landings compared to previous years, reaching a peak of about 147,202 t in 1988 **(SMT-Figure 1)**. Reported landings for the 1989-1995 period decreased to approximately 91,907 t, and then an oscillation in the values in the following years, with a minimum of 59,148 t in 2008 and a maximum of 129,353 t in 2005. Overall trends in the small tuna catch may mask declining trends for individual species because annual landings are often dominated by the landings of a single species. These fluctuations seem to be related to unreported catches, as these species generally comprise part of the by-catch and are often discarded, and therefore do not reflect the real catch.

A preliminary estimate of the total nominal landings of small tunas in 2010 is 72,195 t. The Small Tunas Species Group pointed out the relative importance of small tuna fisheries in the Mediterranean and the Black Sea, which account for about 28% of the total reported catch in the ICCAT area for the period 1980-2010.

Despite the recent improvements in the statistical information provided to ICCAT by several countries, the Committee also noted that uncertainties remain regarding the accuracy and completeness of reported landings in all areas. There is a general lack of information on the mortality of these species as by-catch, exacerbated by the confusion regarding species identification.

SMT-4. State of the stocks

There is little information available to determine the stock structure of many small tuna species. The Committee suggests that countries be requested to submit all available data to ICCAT as soon as possible, in order to be used in future meetings of the Committee.

Generally, current information does not allow the Committee to carry out an assessment of stock status of the majority of the species. Some analyses will be possible in future if data availability improves with the same trend of the latest years. Nevertheless, few regional assessments have been carried out. Assessments of stocks of small tunas are also important because of their position in the trophic chain where they are the prey of large tunas, marlins and sharks and they are predators of small pelagic. It may therefore be best to approach assessments of small tunas from the ecosystem perspective.

SMT-5. Outlook

Although there are some improvement in the availability of catch and biological data for small tuna species particularly in the Mediterranean and the Black Sea, biological information, catch and effort statistics for these species remain incomplete for many of the coastal and industrial fishing countries. Given that, many of these species are of a high socio-economic importance to coastal communities, therefore the Committee recommends that further studies be conducted on small tuna species due to the small amount of information available.

SMT-6. Effects of current regulations

There are no ICCAT regulations in effect for small tunas. Several regional and national regulations are in place.

SMT-7. Management recommendations

No management recommendations have been made.

SMT-Table 1. Reported landings (t) of small tuna species, by area and flag. (v03, 2011-10-04).

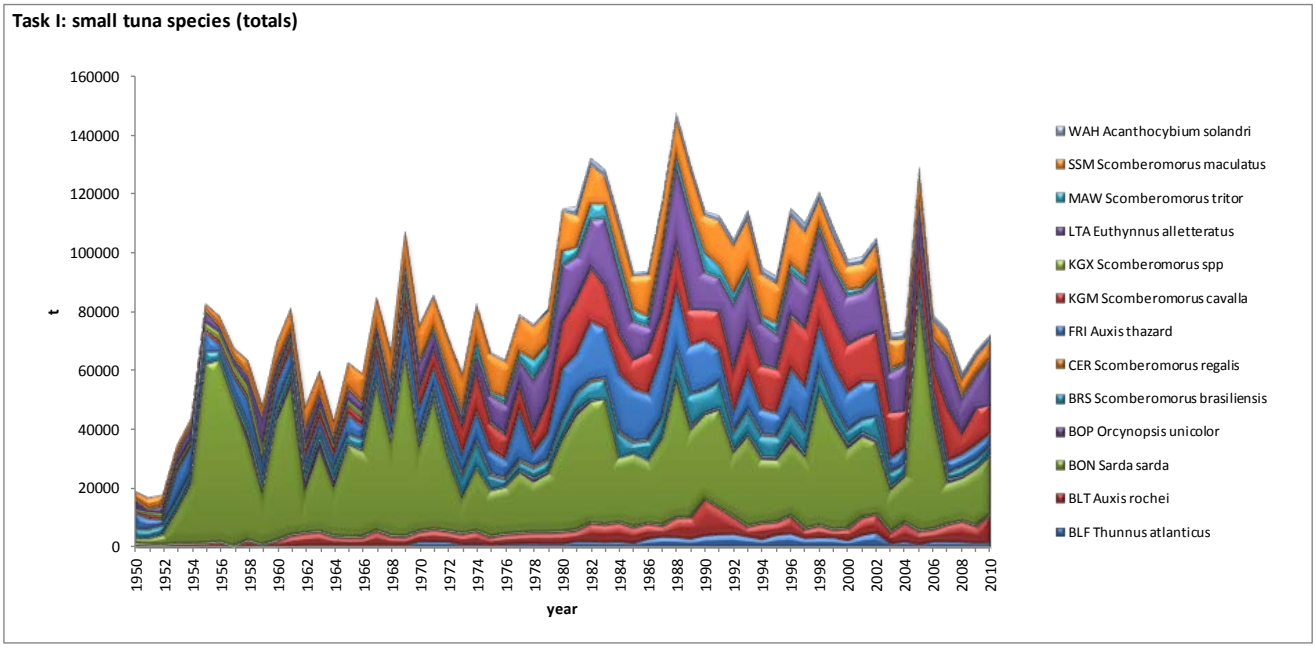
			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BLF	TOTAL		2822	3462	3322	2834	3888	4202	4353	3535	2719	4051	4488	3027	3238	3185	2358	4034	4756	1303	1926	1031	1937	1927	1793	1504	1609
	A+M	Brasil	172	254	229	120	335	130	49	22	38	153	649	418	55	55	38	149	1669	1	118	91	242	233	266	10	9
		Cuba	486	634	332	318	487	318	196	54	223	156	287	287	0	0	0	0	0	0	0	0	0	0	0	0	
		Curaçao	60	60	70	70	70	60	60	65	60	50	45	45	45	45	45	45	45	0	0	0	0	0	0	0	
		Dominica	0	0	1	4	19	10	14	15	19	30	0	0	0	79	83	54	78	42	20	38	47	29	37	45	41
		Dominican Republic	123	199	4	564	520	536	110	133	239	892	892	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	0	0	0	0	0	0	307	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	729	669	816	855	865	1210	1170	1140	1330	1370	1040	1040	1040	1040	1040	1040	1040	0	0	0	0	0	0	0	
		Grenada	256	141	220	134	293	195	146	253	189	123	164	126	233	94	164	223	255	335	268	306	371	291	290	291	291
		Jamaica	0	0	0	0	0	0	0	0	0	0	148	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Liberia	0	0	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	10	9	10	10	12	6	7	6
		NEI (ETRO)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	124	62	93
		St. Vincent and Grenadines	0	0	19	15	38	11	7	53	19	20	18	22	17	15	23	24	24	0	0	0	0	0	0	0	
		Sta. Lucia	0	2	1	1	17	14	13	16	82	47	35	40	100	41	45	108	96	169	96	126	182	151	179	165	203
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	5	5	5	5	5
		U.S.A.	32	44	154	87	81	112	127	508	492	582	447	547	707	617	326	474	334	414	675	225	831	422	649	619	621
		UK.Bermuda	17	11	7	14	13	8	6	5	7	4	5	4	6	6	5	4	5	9	4	5	8	7	6	7	9
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	
		Venezuela	947	1448	1240	652	1150	1598	2148	1224	21	624	758	498	1034	1192	589	1902	1210	319	732	225	237	777	231	293	331
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLT	TOTAL		5059	3740	6483	7110	11994	8777	5715	3421	5300	4301	5909	3070	3986	2646	3924	5819	6049	3798	6217	4438	4079	5701	6837	5557	9307
	A+M	Algerie	0	0	0	0	0	174	270	348	306	230	237	179	299	173	225	230	481	0	391	547	586	477	1134	806	970
		Croatia	0	0	0	0	0	24	21	52	22	28	26	26	26	26	0	0	0	0	0	0	0	0	0	0	8
		EU.España	1555	631	2669	2581	2985	2226	1210	648	1124	1472	2296	604	487	669	1024	861	493	495	1009	845	1101	3083	3389	726	3812
		EU.France	0	0	0	0	0	8	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		EU.Greece	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1426	1426	0	0	196	125	120	246	226	180	274	157	620	506	169
		EU.Italy	1344	906	609	509	494	432	305	379	531	531	229	229	229	462	462	462	2452	1463	1819	866	0	0	342	732	574
		EU.Malta	13	5	8	18	21	20	11	10	1	2	3	6	6	3	1	0	0	0	0	0	0	4	12	7	11
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	28	263	494	208	166	231	300	791	867	849	322	436	654
		Maroc	175	178	811	1177	2452	1289	1644	170	1726	621	1673	562	1140	682	763	256	621	246	326	50	199	35	83	336	525
		Russian Federation	0	0	0	0	0	2171	814	70	100	0	0	0	1672	0	420	1053	468	128	102	139	22	5	23	48	67
		Serbia & Montenegro	0	0	0	0	0	13	1	0	0	2	6	6	6	7	8	8	0	0	0	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Syria Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	75	87	81
		Tunisie	538	606	588	660	985	985	35	20	13	14	13	32	93	45	15	2300	932	989	1760	0	0	0	0	0	
		Turkey	0	0	0	0	0	35	0	324	77	0	0	0	0	316	316	316	316	0	284	1020	1031	993	836	1873	2436
		U.S.A.	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	0	0	357	723	3634	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Yugoslavia Fed.	32	14	41	42	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BON	TOTAL		21320	29712	46382	29721	28908	33334	21992	30595	21719	21219	25134	24519	45253	35702	27151	27637	24580	14424	15828	78766	38506	14174	14735	19483	19889
	ATL	All gears	5892	7395	22354	17766	6811	8079	6881	4598	6037	6030	7939	10441	15523	7532	5179	5400	8864	3307	4580	4391	6766	5542	4694	9461	7305
	MED	All gears	15428	22317	24028	11955	22097	25255	15111	25997	15682	15189	17195	14078	29730	28170	21972	22236	15716	11117	11247	74375	31740	8632	10042	10021	12584
	ATL	Angola	101	144	180	168	128	102	4	49	20	9	39	32	0	2	118	118	118	0	0	138	0	931	0	1979	990
		Argentina	699	1607	2794	1327	1207	1794	1559	434	4	138	108	130	12	68	19	235	1	129	269	110	0	0	0	0	
		Barbados	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	0	0	0	
		Benin	6	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	523	345	214	273	226	71	86	142	142	137	0	0	0	0	0	0	0	0	0	90	0	0	0	0	
		Cuba	0	23	173	26	28	0	0	0	0	0	0	0	230	0	0	0	0	0	0	0	0	0	0	0	
		Curaçao	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	539
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	755
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	16	16	9	4	
		EU.Bulgaria	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	145	41	91	57	18	8	39	5	3	2	2	1	0	12	12	10	5	23	9	2	15	14	13	36	45
		EU.Estonia	0	0	668	859	187	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	431	331	395	427	430	820	770	1052	990	990	610	610	610	24	32	0	18	0	0	0	0	122	59	25	208
		EU.Germany	0	0	0	0	53	0	0	0	0	0	714	0	0	0	0	0	38	0	0	0	0	0	0	0	
		EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	56	125
		EU.Latvia	0	0	1191	1164	221	7	4	0	3	19	301	887	318	0	416	396	639	0	0	0	0	0	0	0	
		EU.Lithuania	0	0	1041	762	162	11	10	0	0	0	0	0	0	0	0	0	793	0	0	0	0	0	0	0	
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	344	539	539	
		EU.Poland	0	0	0	0	0	0	0	0	0	0	225	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	168	371	377	80	202	315	133	145	56	78	83	49	98	98	162	47	61	40	50	38	318	439	212	124	476

			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	287	0	0	0	0	0	0	0	0	0	35	0	0	30	71
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	0	0	0	0	0	0	
		Georgia	0	0	39	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Germany Democratic Rep.	23	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	0	943	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Grenada	0	0	0	0	0	0	0	0	0	0	24	6	14	16	7	10	10	0	0	0	0	0	0	0	
		Jamaica	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	251	241	589	566	492	794	1068	1246	584	699	894	1259	1557	1390	2163	1700	2019	928	989	1411	1655	1053	1419	2523	109
		Mexico	241	391	356	338	215	200	657	779	674	1144	1312	1312	1632	1861	1293	1113	1032	1238	1066	654	1303	1188	1113	1063	1046
		Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	
		Rumania	71	3	255	111	8	212	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	948	29	0	0	0	0	0	4960	0	0	574	1441	461	16	79	316	259	52	368	1042
		Senegal	510	463	2066	869	525	597	345	238	814	732	1012	1390	2213	948	286	545	621	195	182	484	729	1020	1154	2545	1768
		Sierra Leone	10	10	10	10	10	4	6	0	0	0	0	0	0	0	11	245	44	0	0	0	0	0	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	18	0	16	23	27	15	6
		Sta. Lucia	0	0	1	0	3	3	3	4	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	
		Togo	138	245	400	256	177	172	107	311	254	145	197	197	197	197	0	0	0	0	1583	1215	2298	0	0	0	
		Trinidad and Tobago	0	0	0	0	0	0	0	17	703	169	266	220	30	117	117	56	452	188	280	81	7	16	38	68	68
		U.S.A.	84	130	90	278	299	469	498	171	128	116	156	182	76	83	142	120	139	44	70	68	40	97	47	50	46
		U.S.S.R.	1085	1083	8882	7363	706	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ukraine	0	0	1385	985	0	0	25	0	0	0	342	2786	1918	1114	399	231	1312	30	0	0	0	0	0	0	
		Uruguay	3	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Venezuela	1401	1020	1153	1783	1514	1518	1454	5	1661	1651	1359	1379	1659	1602	2	0	61	13	0	16	18	19	12	38	10
	MED	Albania	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Algerie	459	203	625	1528	1307	261	315	471	418	506	277	357	511	475	405	350	597	0	609	575	684	910	1042	976	1009
		Croatia	0	0	0	0	0	49	128	6	70	0	0	0	25	120	0	0	0	0	0	0	0	0	0	0	59
		EU.Bulgaria	0	13	0	0	17	17	20	8	0	25	33	16	51	20	35	35	35	0	0	0	0	0	0	0	16
		EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	10	10	6	4	3	0	0	0	
		EU.España	729	51	962	609	712	686	228	200	344	632	690	628	333	433	342	349	461	544	272	215	429	531	458	247	518
		EU.France	0	0	10	0	1	10	5	6	0	0	0	0	0	0	0	0	27	0	0	0	0	15	34	20	23
		EU.Greece	1027	1848	1254	2534	2534	2690	2690	2690	1581	2116	1752	1559	945	2135	1914	1550	1420	1538	1321	1390	845	1123	587	476	531
		EU.Italy	1437	2148	2242	1369	1244	1087	1288	1238	1828	1512	2233	2233	2233	4159	4159	4159	4579	2091	2009	1356	0	0	1323	1131	964
		EU.Malta	0	0	0	0	0	0	0	0	0	0	2	7	2	2	1	0	0	0	0	0	0	2	7	5	6
		Egypt	68	35	17	358	598	574	518	640	648	697	985	725	724	1442	1442	1128	1128	0	0	0	0	0	0	0	
		Libya	0	0	0	0	0	0	71	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	51	127	108	28	69	69	31	25	93	37	67	45	39	120	115	5	61	85	78	38	89	87	142	131	57
		NEI (MED)	359	537	561	342	311	311	311	300	300	300	300	75	0	0	0	0	0	0	0	0	0	0	0	0	
		Rumania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Serbia & Montenegro	0	0	0	0	0	45	0	3	2	6	10	12	12	14	17	17	0	0	0	0	0	0	0	0	
		Tunisie	504	500	600	422	488	305	643	792	305	413	560	611	855	1350	1528	1183	1112	848	1251	0	0	0	0	0	
		Turkey	10756	16793	17613	4667	14737	19151	8863	19548	10093	8944	10284	7810	24000	17900	12000	13460	6286	6000	5701	70797	29690	5965	6448	7036	9401
		U.S.S.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Yugoslavia Fed.	38	62	36	98	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BOP	TOTAL		87	564	1482	1116	473	608	641	630	791	703	2196	481	177	868	1207	1012	923	736	581	217	32	1047	533	449	289
	ATL	All gears	86	538	1474	1109	436	507	465	378	615	588	2064	254	47	651	1062	858	786	713	573	215	32	875	426	442	275
	MED	All gears	1	26	8	7	37	101	176	252	176	115	132	227	130	217	145	154	137	23	8	2	0	172	107	6	14
	ATL	Benin	3	1	2	1	1	1	1	1	1	1	1	3	1	1	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	1	2	11	23
		Maroc	33	487	1422	1058	369	486	423	348	598	524	2003	246	28	626	1048	830	780	706	503	132	0	634	391	273	199
		Mauritania	50	50	50	50	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Senegal	0	0	0	0	16	20	41	29	16	63	60	5	18	24	14	28	6	7	70	78	29	240	33	158	53
	MED	Algerie	0	0	0	0	0	87	135	198	153	92	119	224	128	216	135	145	128	0	0	0	0	0	0	0	
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
		Libya	0	0	0	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	1	26	8	7	37	14	1	14	23	23	13	3	2	1	10	9	9	20	7	1	0	172	107	6	14
		Tunisie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	
BRS	TOTAL		6549	6212	9510	10778	7698	8856	6051	8049	7161	7006	8435	8004	7923	5754	4785	4553	7750	5137	3410	3712	3587	2253	3305	2681	3006
	A+M	Brasil	5011	4741	5063	5927	2767	1437	1149	842	1149	1308	3047	2125	1516	1516	988	251	3071	2881	814	471	1432	563	1521	1042	1281
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	
		Guyana	0	0	0	0	0	0	0	0	0	0	211	571	625	1143	308	329	441	389	494	521	377	277	312	141	226
		Trinidad and Tobago	0	0	2704	2864	2471	2749	2130	2130	2130	1816	1568	1699	2130	1328	1722	2207	2472	1867	2103	2720	1778	1414	1472	1498	1498

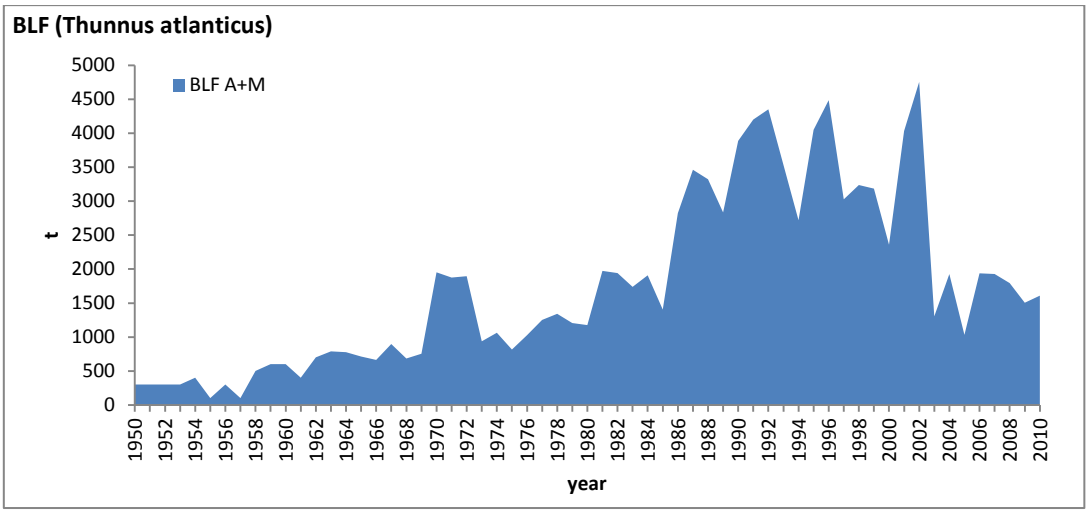
			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
		Venezuela	1538	1471	1743	1987	2460	4670	2772	5077	3882	3882	3609	3609	3651	1766	1766	1766	1766	0	0	0	0	0	0	0	
CER	TOTAL		500	392	219	234	225	375	390	450	490	429	279	250	250	0	3	5	1	2	1	1	1	0	0	0	0
	A+M	Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
		Dominican Republic	52	48	57	59	50	45	79	50	90	29	29	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	448	344	162	175	175	330	310	400	400	400	250	250	250	0	0	0	0	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	1	2	0	1	0	0	0	0	0
FRI	TOTAL		15476	21193	20573	16411	16738	10356	6367	12678	8407	7535	13809	14954	14197	13004	12910	12762	11627	4521	5451	4247	5009	4080	4051	4931	4359
	ATL	Angola	21	115	20	70	28	1	0	4	6	21	29	12	31	2	38	38	38	0	0	0	0	95	0	46	23
		Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Benin	1	3	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	941	1260	1904	700	592	746	291	608	906	558	527	215	162	166	106	98	1117	860	414	532	603	202	149	313	204
		Cape Verde	0	2	86	105	75	135	82	115	86	13	6	22	191	154	81	171	278	264	344	167	404	197	832	940	744
		Curaçao	0	0	0	0	0	0	0	0	0	0	590	1157	1030	1159	1122	989	710	505	474	0	150	106	485	364	
		Côte D'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	170	135	0	0	
		EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	3164	4538	3938	1877	2240	541	228	362	297	386	947	581	570	23	17	722	438	635	34	166	73	278	631	1094	950
		EU.Estonia	0	0	0	0	0	198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	1904	3392	3392	3008	3872	0	121	63	105	126	161	147	146	0	91	127	91	0	168	47	6	98	24	24	91
		EU.Latvia	0	0	0	0	0	243	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Lithuania	0	0	0	0	0	290	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	32	2	2	4	26	3	0	0	0	0	0	1	31	5	9	28	5	4	6	0	3	3	1	0	0
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
		Germany Democratic Rep.	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	3256	4689	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	151	0	0	0	
		Grenada	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	
		Guatemala	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98	74	81	78
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	302	465	194	599	1045	1131	332	274	122	645	543	2614	2137	494	582	418	441	184	542	61	48	135	179	9	19
		Mixed flags (FR+ES)	227	1526	1525	1350	1728	3633	4017	9674	3107	1919	7177	6063	6342	8012	9864	9104	7748	1623	1722	1527	1739	1072	614	1131	873
		NEI (ETRO)	0	17	381	155	237	1	4	32	68	70	180	120	309	491	291	420	186	71	180	297	149	140	0	0	
		Panama	0	0	0	0	0	243	57	118	341	328	240	91	0	0	0	0	0	0	394	975	970	1349	411	439	425
		Rumania	51	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	1078	627	150	405	456	46	500	761	477	0	0	300	50	56	63	6	1	12	113	270
		S. Tomé e Príncipe	0	0	23	32	35	41	39	33	37	48	79	223	197	209	200	200	200	200	234	215	290	0	275	282	290
		Senegal	0	0	810	784	1084	311	201	342	319	309	0	0	0	7	0	4	0	13	288	151	83	119	315	15	177
		Trinidad and Tobago	0	0	0	0	0	0	0	17	0	56	199	368	127	138	245	0	0	0	414	0	0	0	0	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.S.R.	3465	2905	5638	5054	2739	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ukraine	0	0	0	0	0	0	0	0	0	0	0	0	0	36	48	0	43	0	0	0	0	0	0	0	
		Venezuela	2109	2264	2654	2670	3037	1762	368	886	2609	2601	3083	2839	2164	1631	215	444	32	113	182	42	165	52	48	54	215
KGM	TOTAL		13990	13792	14331	12153	10420	13241	14691	16331	14777	14930	17782	19660	16394	17717	16161	15360	17258	15863	12830	11766	8185	17936	7344	12533	9816
	A+M	Antigua and Barbuda	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Argentina	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	2890	2173	2029	2102	2070	962	979	1380	1365	1328	2890	2398	3595	3595	2344	1251	2316	3311	247	202	316	33	0	0	1
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	36	35	2	0	0	0	0	0	0	0	0	
		Dominican Republic	0	0	20	29	33	34	47	52	0	0	0	589	288	230	226	226	226	0	0	0	0	0	0	0	
		Grenada	0	0	0	0	0	0	0	0	0	0	2	4	28	14	9	4	5	0	0	0	0	0	0	0	
		Guyana	0	0	0	0	0	0	0	0	0	0	0	270	440	398	214	239	267	390	312	245	168	326	174	91	132
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	0	0	
		Mexico	2643	3067	3100	2300	2689	2147	3014	3289	3097	3214	4661	4661	3583	4121	3688	4200	4453	4369	4564	3447	4201	3526	3113	3186	3040
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	9
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	1	4	0	0	9	1	1	0	1	1	1	2	0	1	3
		Trinidad and Tobago	38	82	752	541	432	657	0	1192	0	471	1029	875	746	447	432	410	1457	802	578	747	661	567	1043	1001	1001
		U.S.A.	7486	7530	7100	5681	4127	8213	9344	9616	7831	7360	7058	8720	7373	6453	6780	6603	6061	6991	7129	7123	2837	13482	3013	8247	5630
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
		Venezuela	933	940	1330	1500	1069	1228	1308	801	2484	2558	2140	2139	340	2424	2424	2424	2424	0	0	0	0	0	0	0	
KGX	TOTAL		149	261	491	105	131	225	266	301	508	512	824	156	251	1	229	48	0	15	0	1	26	16	0	2	20
	A+M	Barbados	138	159	332	68	51	45	51	55	36	42	49	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Colombia	11	102	159	37	25	7	12	21	148	111	539	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	0	0	0	0	0	0	0	0	0	0	0	0	236	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	26	16	0	2	20
		Gabon	0	0	0	0	0	0	0	0	140	145	79	0	0	0	0	0	0	0	0	0	0	0	0	0	

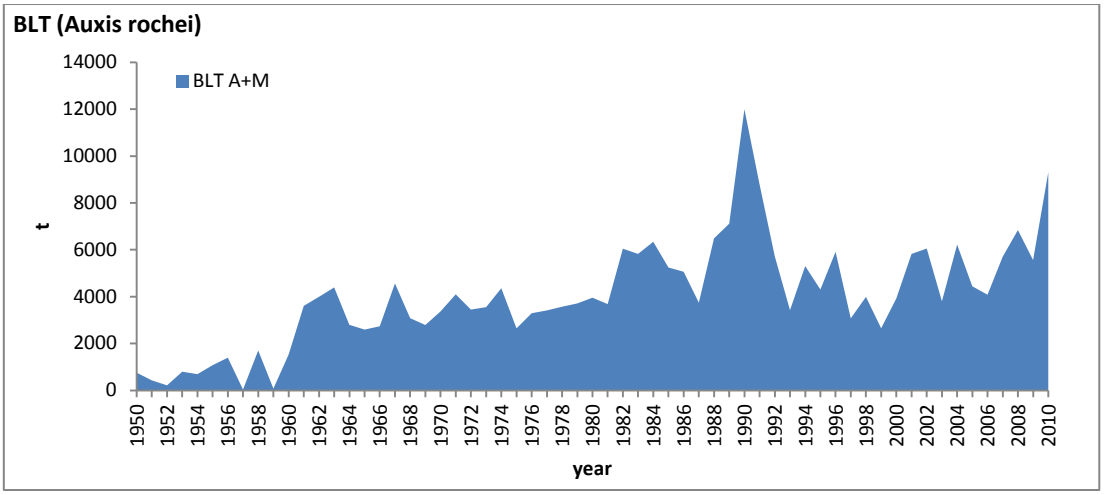
			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
		Grenada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Jamaica	0	0	0	0	0	0	0	0	0	0	0	155	0	0	44	48	0	0	0	0	0	0	0	0	
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Puerto Rico	0	0	0	0	0	0	53	84	86	134	106	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	15	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	1	1	1	1	138	0	0	0	0	0	0	0	0	0	0
		Sta. Lucia	0	0	0	0	55	79	150	141	98	80	50	0	0	0	48	0	0	0	0	0	0	0	0	0	
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ukraine	0	0	0	0	0	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LTA	TOTAL		8960	20759	26182	30791	12622	11214	22045	16562	14182	11701	14257	15099	15750	15382	16483	15347	18392	13747	15785	12188	8849	17354	12323	11261	15819
	ATL	All gears	6794	18335	23777	28756	10005	8891	20289	15296	12977	9799	12138	13495	12836	12506	13189	12484	15750	13065	14347	11148	7248	15668	10064	9156	13649
	MED	All gears	2166	2424	2405	2035	2617	2323	1756	1266	1205	1902	2119	1604	2914	2875	3294	2863	2642	682	1438	1040	1602	1686	2259	2104	2170
	ATL	Angola	1167	1345	1148	1225	285	306	14	175	121	117	235	75	406	118	132	132	132	0	0	2	0	4365	0	1644	822
		Argentina	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Benin	90	14	7	43	66	61	49	53	60	58	58	196	83	69	69	69	69	0	0	0	0	0	0	0	
		Brasil	479	187	108	74	685	779	935	985	1225	1059	834	507	920	930	615	615	615	0	320	280	0	0	0	0	
		Canada	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cape Verde	29	14	1	18	65	74	148	17	23	72	63	86	110	776	491	178	262	143	137	40	160	348	518	498	402
		Cuba	24	55	53	113	88	63	33	13	15	27	23	23	0	0	0	0	0	0	0	0	0	0	0	0	
		Curaçao	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	38
		Côte D'Ivoire	20	5300	38	4900	2800	100	142	339	251	253	250	114	108	0	108	0	0	0	0	270	298	404	1677	1041	1359
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	12	11	7	11	55	81	1	0	0	10	55	27	110	6	2	22	8	1	489	50	16	0	38	35	136
		EU.Estonia	0	0	0	0	0	66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.France	0	0	0	195	0	74	13	8	54	59	22	215	21	696	631	610	613	0	10	27	12	0	1	50	35
		EU.Germany	0	0	0	0	38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Latvia	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Lithuania	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	69	8	
		EU.Poland	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	80	21	86	91	2	61	73	45	72	72	218	320	171	14	50	0	2	16	19	21	24	43	10	6	5
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	15
		Gabon	0	0	0	0	0	0	0	0	0	0	182	0	18	159	301	213	57	173	0	0	0	0	0	0	
		Germany Democratic Rep.	10	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	649	5551	11588	12511	323	201	11608	359	994	513	113	2025	359	306	707	730	4768	8541	7060	5738	216	4449	3188	1497	2343
		Israel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Maroc	47	108	49	14	367	57	370	44	43	230	588	195	189	67	101	87	308	76	91	33	0	40	2	63	5
		Mauritania	50	50	50	50	50	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Mixed flags (FR+ES)	151	1017	1017	900	1152	2422	2678	4975	2071	1279	3359	2836	2936	3846	4745	4238	3334	1082	1148	1018	1159	715	410	1181	795
		NEI (ETRO)	0	0	0	0	0	0	0	8	20	0	0	0	0	0	0	0	33	2	0	22	0	0	0	0	
		Panama	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rumania	81	7	88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	0	0	0	617	306	265	189	96	49	0	88	0	0	0	74	13	0	0	0	0	0	0	268
		S. Tomé e Príncipe	0	0	30	36	52	46	48	41	40	43	40	50	39	37	33	33	33	33	178	182	179	0	183	188	193
		Senegal	2392	2985	6343	6512	1834	1603	1854	4723	4536	2478	1972	2963	2910	1607	1746	1857	1806	1430	3507	2694	3825	3885	2972	1691	6180
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	2	2	2	0	1	10	1	0	0	1	0	0	0	0
		U.S.A.	104	118	204	129	173	228	597	1286	1142	1312	2230	2015	1546	1623	1209	1451	1366	1492	1382	765	1351	1401	963	1244	1048
		U.S.S.R.	271	61	1707	543	667	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		UK.Bermuda	13	13	17	14	8	10	11	5	6	6	7	6	5	4	2	1	5	4	5	7	5	5	4	3	4
		Venezuela	1123	1467	1236	1374	1294	1963	1409	1889	2115	2115	1840	1840	2815	2247	2247	2247	2254	50	0	0	0	0	30	0	2
	MED	Algerie	0	0	0	0	0	522	585	495	459	552	554	448	384	562	494	407	148	0	158	116	187	96	142	119	131
		Croatia	0	0	0	0	0	2	3	2	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
		EU.Cyprus	13	25	41	20	23	25	21	11	23	10	19	19	19	16	19	19	19	0	0	0	0	6	5	4	
		EU.España	5	0	5	0	0	0	0	0	0	15	18	9	15	0	8	82	32	0	41	262	116	202	212	86	299
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
		EU.Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	132	0	0	112	69	72	183	148	165
		EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	24	38	34	0	0	486	243	365
		EU.Malta	0	0	0	0	0	8	1	8	8	8	3	3	0	0	0	0	0	0	0	0	0	1	5	8	7
		Israel	284	273	135	124	129	108	126	119	119	215	119	119	119	119	119	119	119	0	0	0	0	0	0	0	
		Libya	0	0	0	0	0	0	0	0	0	0	0	45	52	0	5	4	4	0	0	0	0	0	0	0	
		Maroc	0	0	12	0	16	0	0	0	0	1	0	1	14	8	0	0	3	1	0	9	0	331	19	24	1
		NEI (MED)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	0	0	0	0	0	0	0	0	0	0	

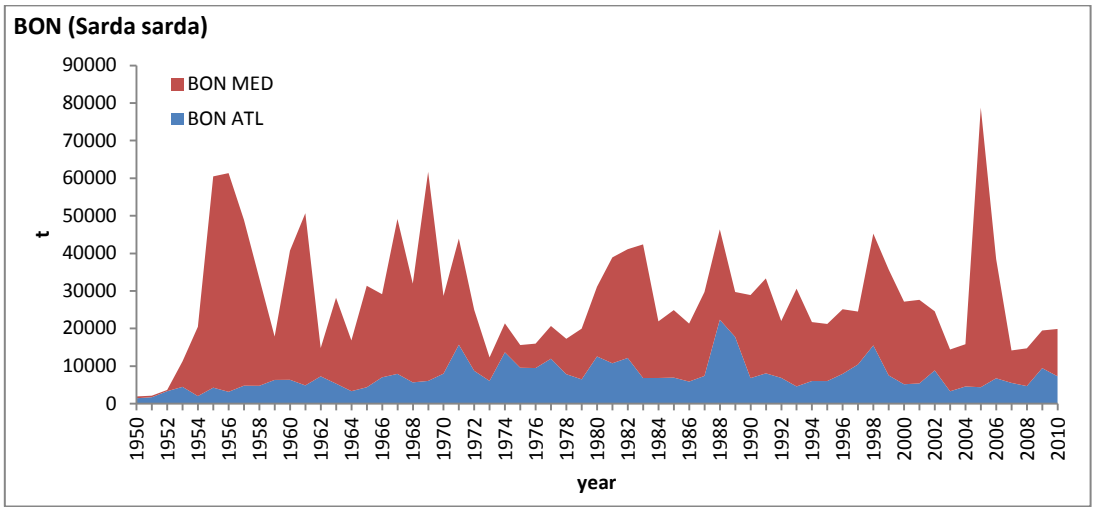
			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
		Palestina	0	0	0	0	0	0	0	0	0	0	90	59	61	60	60	60	129	0	0	0	0	0	0	0	
		Serbia & Montenegro	0	0	0	0	0	5	0	28	21	35	22	18	20	18	16	16	0	0	0	0	0	0	0	0	
		Syria Rep.	73	121	99	121	127	110	156	161	156	155	270	350	417	390	370	370	330	0	0	0	0	193	133	163	148
		Tunisie	1590	1803	1908	1566	2113	1343	664	242	204	696	824	333	1113	752	1453	1036	960	657	633	0	0	0	0	0	
		Turkey	0	0	0	0	0	0	0	0	0	0	0	0	500	750	750	750	750	0	568	507	1230	785	1074	1309	1046
		Yugoslavia Fed.	1	2	5	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MAW	TOTAL		3292	1799	3921	2938	6626	4160	3648	2741	2070	3414	2829	2249	2001	1397	1995	1236	1927	1072	528	824	389	845	281	399	337
	A+M	Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Benin	104	17	13	334	211	214	202	214	194	188	188	362	511	205	205	205	205	0	0	0	0	0	0	0	
		EU.Estonia	0	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
		EU.Latvia	0	0	0	0	208	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Lithuania	0	0	0	0	0	52	4	0	0	0	0	0	0	0	0	0	298	0	0	0	0	0	0	0	
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0	0	0	0	0	0	0	0	0	0	
		Germany Democratic Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ghana	1453	0	1457	1457	1500	2778	899	466	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Russian Federation	0	0	143	195	1032	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
		S. Tomé e Príncipe	0	0	6	4	6	5	3	5	6	6	8	7	8	5	6	6	6	6	21	12	13	0	91	94	96
		Senegal	1516	1754	2159	753	2429	1028	2450	2038	1870	3220	2633	1880	1397	1187	1763	1025	1376	1054	506	812	375	845	189	304	239
		U.S.S.R.	219	28	143	195	1240	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Ukraine	0	0	0	0	0	0	90	0	0	0	0	0	0	0	21	0	42	12	0	0	0	0	0	0	
SSM	TOTAL		14207	14461	12671	13845	12782	15318	16285	16317	14490	13697	16571	15403	8641	9837	8220	8383	9414	9793	8119	10470	6282	6102	5900	6197	5974
	A+M	Colombia	81	72	151	112	76	37	95	58	69	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Cuba	621	1606	803	746	665	538	611	310	409	548	613	613	0	0	0	0	0	0	0	0	0	0	0	0	
		Dominica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Dominican Republic	1271	1321	1415	1401	1290	728	735	739	1330	2042	2042	231	191	125	158	158	158	0	0	0	0	0	0	0	
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	265	0	0	0	0	0	0	0	
		Grenada	17	0	0	1	3	0	0	1	2	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
		Mexico	6170	6461	5246	7242	8194	8360	9181	10066	8300	7673	11050	11050	5483	6431	4168	3701	4350	5242	3641	5723	3856	3955	4155	4251	4128
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	27	0	0	0	0	0	0	0
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	6047	5001	5056	4343	2554	5655	5663	5143	4380	3363	2866	3509	2968	3282	3893	4524	4613	4552	4477	4747	2425	2147	1746	1946	1846
WAH	TOTAL		1151	1235	1635	1527	1498	1721	1834	2670	2143	2408	2515	3085	2488	2957	2020	2296	2202	2049	2580	1692	1611	2201	2046	1680	1770
	A+M	Antigua and Barbuda	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Aruba	120	90	80	80	70	60	50	50	125	40	50	50	50	50	50	50	50	0	0	0	0	0	0	0	
		Barbados	138	159	332	51	51	60	51	91	82	42	35	52	52	41	41	0	0	34	45	26	41	36	27	17	30
		Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Brasil	141	133	58	92	52	64	71	33	26	1	16	58	41	0	0	0	0	405	519	449	111	75	76	70	19
		Cape Verde	205	306	340	631	458	351	350	326	361	408	503	603	429	587	487	578	500	343	458	45	537	454	811	273	470
		Curaçao	250	260	280	280	280	250	260	270	250	230	230	230	230	230	230	230	230	0	0	0	0	0	0	0	
		Dominica	0	0	0	0	38	43	59	59	59	58	58	58	58	50	46	11	37	10	6	8	15	14	16	10	13
		Dominican Republic	0	0	1	3	6	9	13	7	0	0	0	325	112	31	35	35	35	0	0	0	0	0	0	0	
		EU.España	9	9	32	18	23	28	32	22	20	15	25	25	29	28	32	38	46	48	305	237	110	66	38	73	53
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	4	3	9
		Grenada	82	54	137	57	54	77	104	96	46	49	56	56	59	82	51	71	59	44	0	0	0	0	0	0	
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		Maroc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	240	120	86	111
		S. Tomé e Príncipe	0	0	23	20	28	34	27	36	39	46	80	52	56	62	52	52	52	52	94	88	76	0	131	235	241
		Saint Kitts and Nevis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	6	7	0	0	0	0	
		Senegal	0	0	0	0	0	0	0	64	0	0	1	0	0	5	0	0	0	5	0	1	1	0	0	2	6
		St. Vincent and Grenadines	0	0	4	4	28	33	33	41	28	16	23	10	65	52	46	311	17	40	60	0	241	29	24	31	40
		Sta. Lucia	0	0	0	0	77	79	150	141	98	80	221	223	223	310	243	213	217	169	238	169	187	0	171	195	199
		Trinidad and Tobago	0	0	0	0	0	118	1	0	0	0	0	1	1	1	2	1	9	7	6	6	7	6	6	5	5
		U.S.A.	13	57	128	110	82	134	203	827	391	764	608	750	614	858	640	633	846	789	712	558	89	1123	495	522	371
		UK.Bermuda	65	43	61	63	74	67	80	58	50	93	99	105	108	104	61	56	91	87	88	83	86	124	117	101	81
		UK.British Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	
		UK.Sta Helena	15	18	18	17	18	12	17	35	26	25	23	0	0	0	0	0	0	0	0	0	0	0	0	29	19
		UK.Turks and Caicos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Venezuela	113	106	141	101	159	302	333	514	542	540	487	488	360	467	4	17	13	9	7	16	13	33	9	25	28



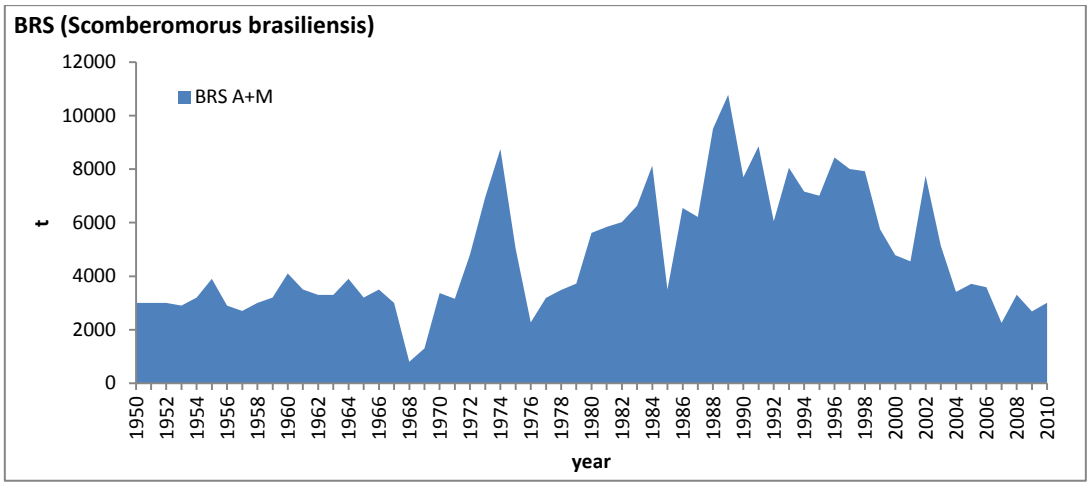
SMT-Figure 1. Estimated landings (t) of small tunas (combined) in the Atlantic and Mediterranean, 1950-2010. The data for the last three years are incomplete.

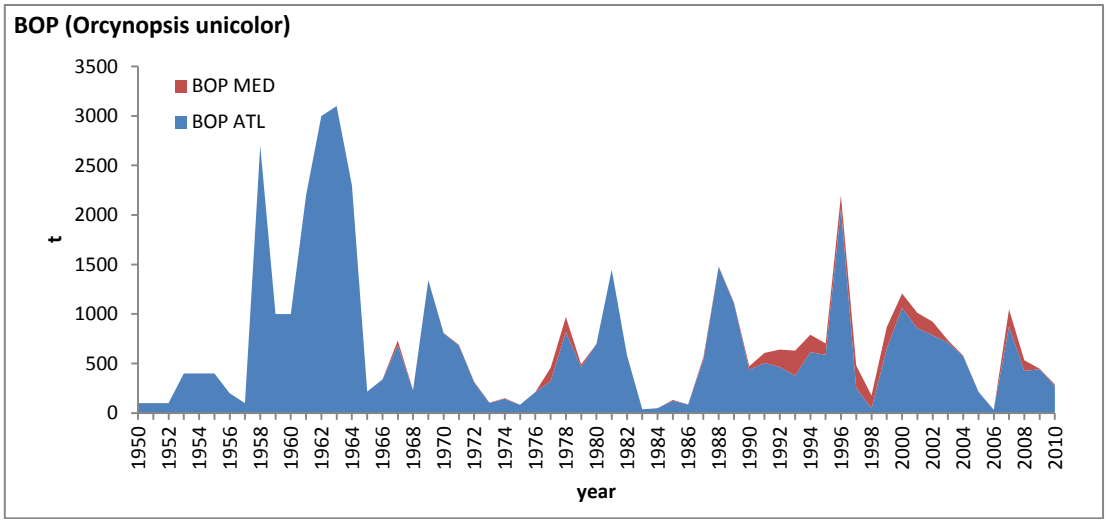


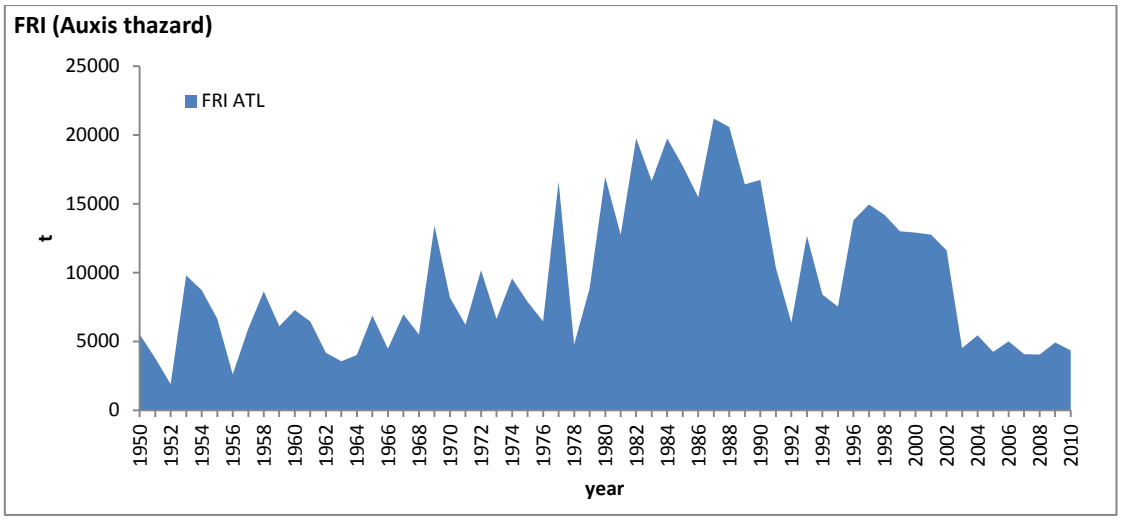




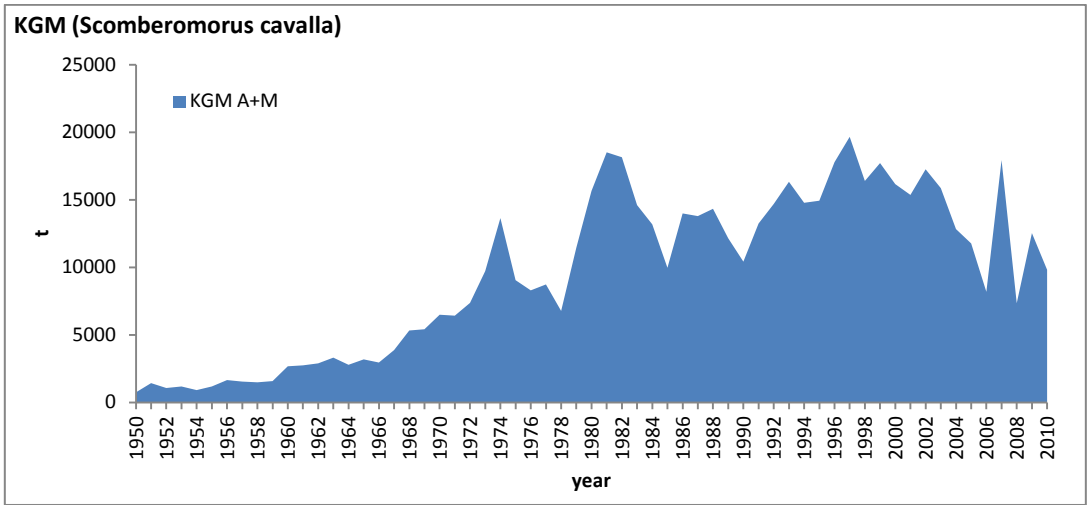
SMT-Figure 2. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2010. The data for the last years are incomplete.

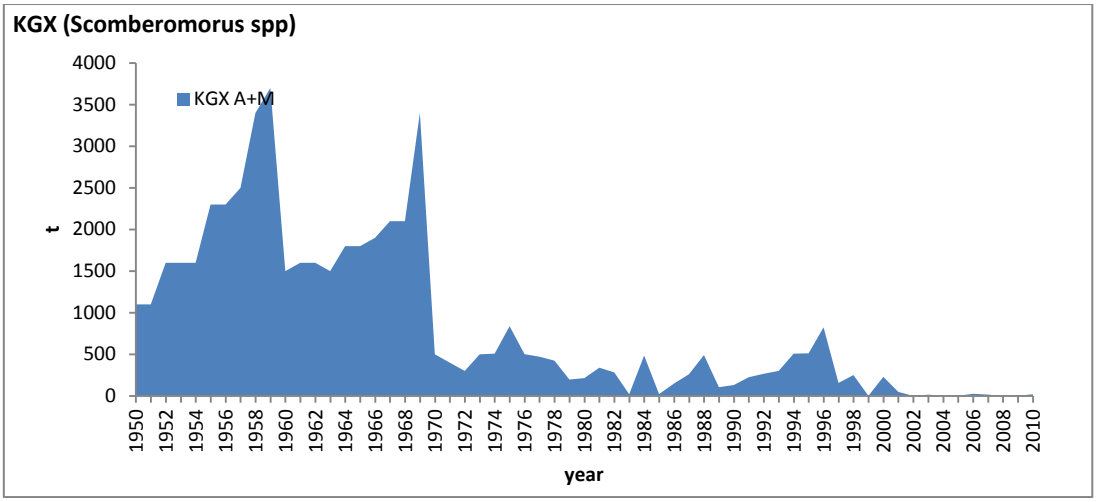


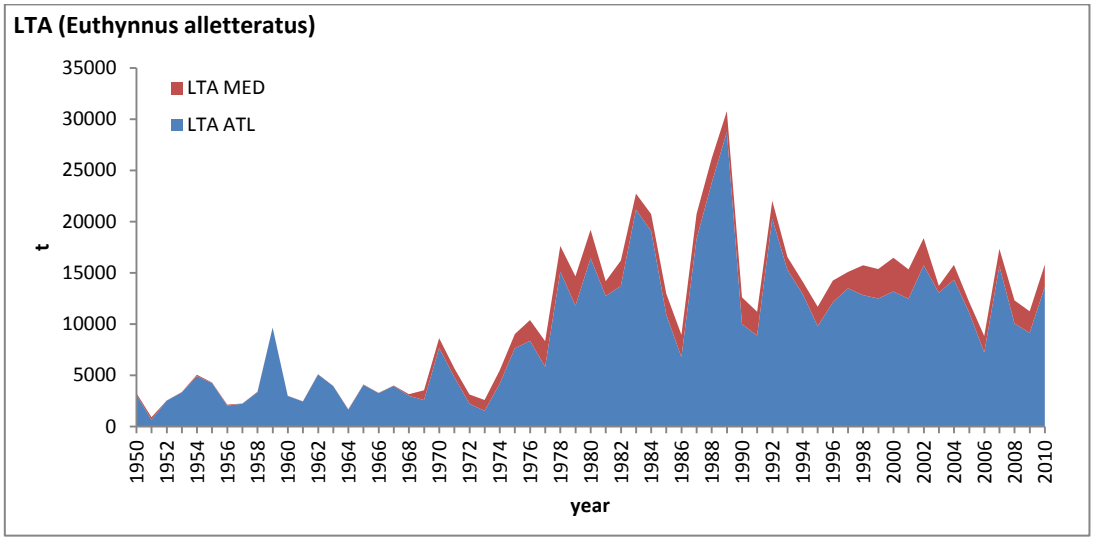




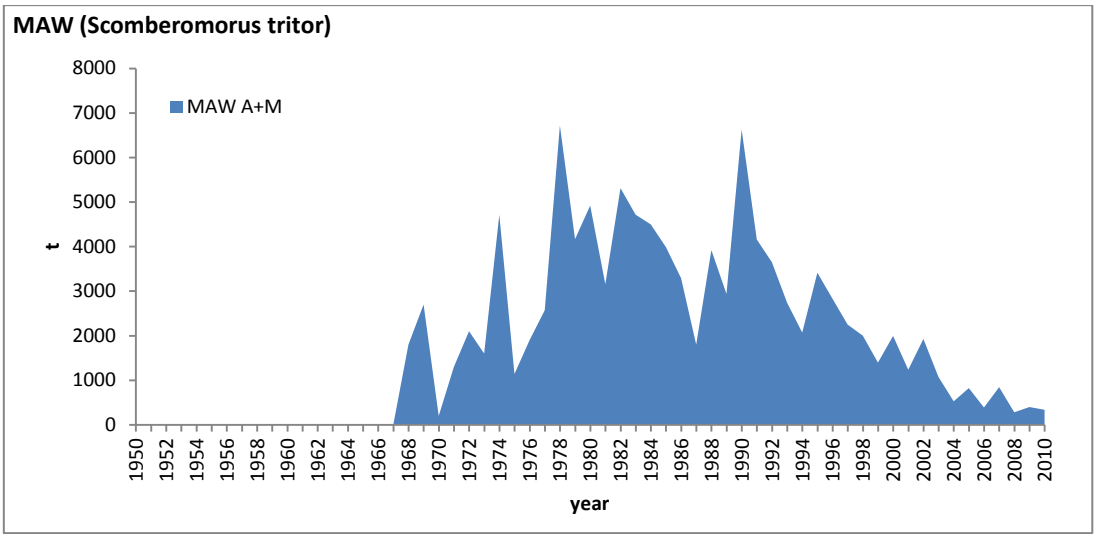
SMT-Figure 2. Cont. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2010. The data for the last years are incomplete.

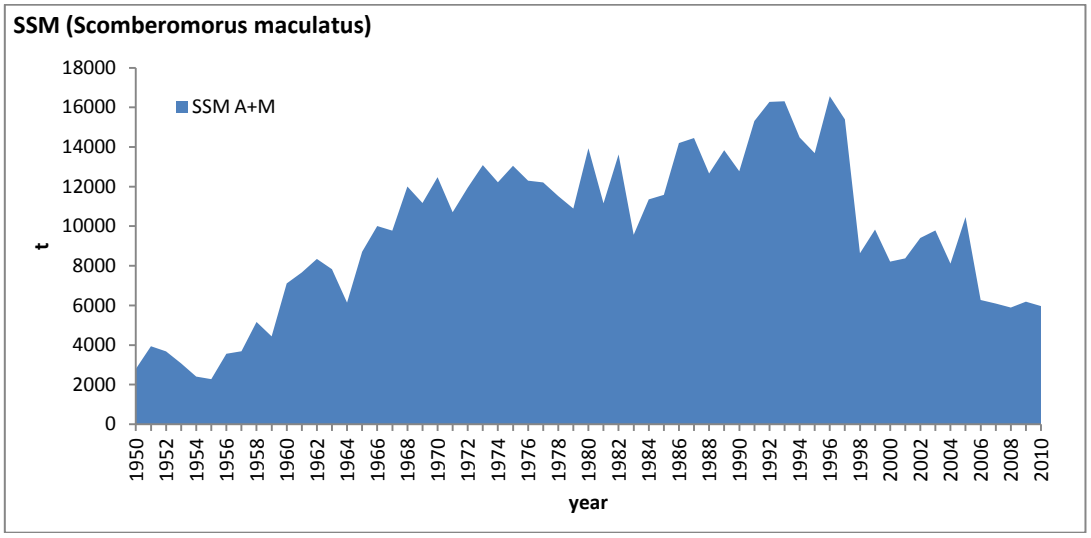


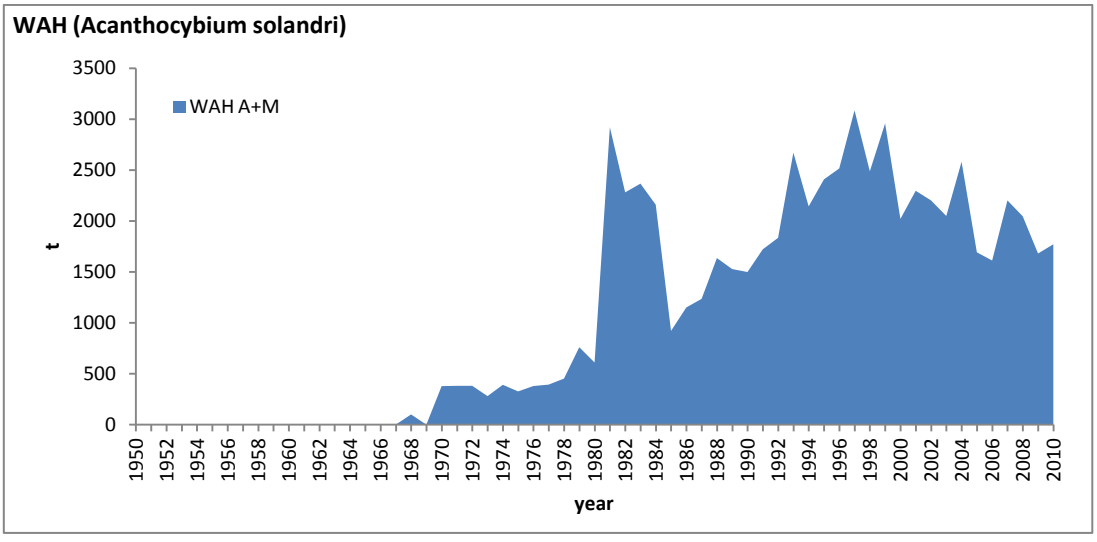




SMT-Figure 2. Cont. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2010. The data for the last years are incomplete.







SMT-Figure 2. Cont. Estimated landings (t) of the major species of small tunas in the Atlantic and Mediterranean, 1950-2010. The data for the last years are incomplete.

8.12 SHK - SHARKS

The status of the stocks of blue shark (*Prionace glauca*) and shortfin mako (*Isurus oxyrinchus*), resulting from the 2008 ICCAT assessment, and the stock of porbeagle (*Lamna nasus*), which was assessed jointly with ICES in 2009, are given in the 2010 SCRS Report. The information from the Ecological Risk Assessment (ERA) for nine species of pelagic elasmobranches carried out in 2008 is also included in the 2010 SCRS Report.

In 2011, a data preparatory meeting was held in response to the *Recommendation by ICCAT on Atlantic Shortfin Mako Sharks Caught in Association with ICCAT Fisheries* [Rec. 10-06] and to define the steps to follow in carrying out the ERA envisaged for 2012. The full report of the data preparatory meeting is included in SCRS/2011/017.

SHK-1. Biology

A great variety of shark species are found within the ICCAT Convention area, from coastal to oceanic species. Biological strategies of these sharks are very diverse and are adapted to the needs within their respective ecosystems where they occupy a very high position in the trophic chain as active predators. Therefore, generalization as regards to the biology of these very diverse species results in inevitable inaccuracies, as would occur for teleosts. To date, ICCAT has prioritized the biological study and assessment of the major sharks of the epipelagic system as these species are more susceptible of being caught as by-catch by oceanic fleets targeting tuna and tuna-like species. Among these shark species there are some of special prevalence and with an extensive geographical distribution within the oceanic-epipelagic ecosystem, such as the blue shark and shortfin mako shark, and others with less or even limited prevalence, such as porbeagle, hammerhead sharks, thresher sharks, white sharks, etc.

Blue shark and shortfin mako sharks show a wide geographic distribution, most often between 50ºN and 50ºS latitude. On the contrary, porbeagle show a distribution that is restricted to cold-temperate waters, preferably close to the continental shelf of both hemispheres where this species rarely overlaps with the fishing activity directed at tunas and tuna-like species. These three species have an ovoviviparous reproductive strategy, which increases the probability of survival of their young, with litters from only a few individuals in the case of shortfin mako and porbeagle, to abundant litters of about 40 pups in the case of blue shark. Their growth rates differ between sexes and among these three species. Females often reach first maturity at a large size. A characteristic of these species is usually their tendency to segregate temporally and spatially by size-sex, according to their respective processes of feeding, mating-reproduction, gestation and birth. Numerous aspects of the biology of these species are still poorly understood or completely unknown, particularly for some regions, which contributes to increased uncertainty in quantitative and qualitative assessments.

SHK-2. Fishery indicators

Earlier reviews of the shark database resulted in recommendations to improve data reporting on shark catches. Though global statistics on shark catches included in the database have improved, they are still insufficient to permit the Committee to provide quantitative advice on stock status with sufficient precision to guide fishery management toward optimal harvest levels. Reported and estimated catches for blue shark, shortfin mako and porbeagle are provided in **SHK-Table 1** and **Figures 1 to 4**.

A number of standardized CPUE data series for blue shark and shortfin mako were presented in 2008 as relative indices of abundance. The Committee placed emphasis on using the series that pertained to fisheries that operate in oceanic waters over wide areas. **SHK-Figure 5** presents the central tendency of the available series for the four stocks of these species.

Considering the quantitative and qualitative limitations of the information available to the Committee, the results presented in 2008, as those of the 2004 assessment (Anon. 2005c), are not conclusive. During the porbeagle assessment in 2009 (SCRS/2009/014), standardized CPUE data were presented for three of the four stocks (NE, NW and SW; **SHK-Figure 6)**. These series when referring to fisheries targeting porbeagle could fail to reflect the global abundance of the stock and where they refer to sharks caught as by-catch they could be highly variable. In 2010, only new information from Japan on the CPUE of shortfin mako and Porbeagle was presented. However, it was suggested that the recently developed method used for the stratification of the areas for the analysis of CPUE should be sent to the ICCAT Secretariat.

With regard to the species for which ERAs were conducted, the Committee understands that, in spite of existing uncertainties, results make it possible to identify those species that are more vulnerable to prioritize research and management measures **(SHK-Table 2)**. These ERAs are conditional on the biological variables used to estimate productivity as well as the susceptibility values for the different fleets.

SHK-3. State of the Stocks

Ecological risk assessments for 11 priority species of sharks (including *blue shark and shortfin mako*) caught in ICCAT fisheries demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. Specifically, the analyses indicated that bigeye threshers, longfin makos, and shortfin makos have the highest vulnerability (and lowest biological productivity) of the shark species examined (with bigeye thresher being substantially less productive than the other species). All species considered in the ERA, particularly smooth hammerhead, longfin mako, bigeye thresher and crocodile sharks, are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end. **SHK-Table 2** provides a productivity ranking of the species considered. ERAs should be updated with improved information on the productivity and susceptibility of these species.

SHK-3.1 Blue shark

For both North and South Atlantic blue shark stocks, although the results are highly uncertain, biomass is believed to be above the biomass that would support MSY and current harvest levels below F_{MSY}. Results from all models used in the 2008 assessment (Anon. 2009c) were conditional on the assumptions made (*e.g.*, estimates of historical catches and effort, the relationship between catch rates and abundance, the initial state of the stock in the 1950s, and various life-history parameters), and a full evaluation of the sensitivity of results to these assumptions was not possible during the assessment. Nonetheless, as for the 2004 stock assessment (Anon. 2005c), the weight of available evidence does not support hypotheses that fishing has yet resulted in depletion to levels below the Convention objective (**SHK-Figure 7**).

SHK-3.2 Shortfin mako shark

Estimates of stock status for the North Atlantic shortfin mako obtained with the different modeling approaches applied in 2008 were much more variable than for blue shark. For the North Atlantic, most model outcomes indicated stock depletion to about 50% of biomass estimated for the 1950s. Some model outcomes indicated that the stock biomass was near or below the biomass that would support MSY with current harvest levels above F_{MSY}, whereas others estimated considerably lower levels of depletion and no overfishing (**SHK-Figure 7**). In light of the biological information that indicates the point at which B_{MSY} is reached with respect to the carrying capacity which occurs at levels higher than for blue sharks and many teleost stocks. There is a non-negligible probability that the North Atlantic shortfin mako stock could be below the biomass that could support MSY. A similar conclusion was reached by the Committee in 2004, and recent biological data show decreased productivity for this species. Only one modeling approach could be applied to the South Atlantic shortfin mako stock, which resulted in an estimate of unfished biomass which was biologically implausible, and thus the Committee can draw no conclusions about the status of the South stock.

SHK-3.3 Porbeagle shark

In 2009, the Committee attempted an assessment of the four porbeagle stocks in the Atlantic Ocean: Northwest, Northeast, Southwest and Southeast. In general, data for southern hemisphere porbeagle are too limited to provide a robust indication on the status of the stocks. For the Southwest, limited data indicate a decline in CPUE in the Uruguayan fleet, with models suggesting a potential decline in porbeagle abundance to levels below MSY and fishing mortality rates above those producing MSY (**SHK-Figure 8**). But catch and other data are generally too limited to allow definition of sustainable harvest levels. Catch reconstruction indicates that reported landings grossly underestimate actual landings. For the Southeast, information and data are too limited to assess their status. Available catch rate patterns suggest stability since the early 1990s, but this trend cannot be viewed in a longer term context and thus are not informative on current levels relative to B_{MSY}.

The northeast Atlantic stock has the longest history of commercial exploitation. A lack of CPUE data for the peak of the fishery adds considerable uncertainty in identifying the current status relative to virgin biomass. Exploratory assessments indicate that current biomass is below B_{MSY} and that recent fishing mortality is near or above F_{MSY} (**SHK-Figure 9**). Recovery of this stock to B_{MSY} under no fishing mortality is estimated to take ca.

15-34 years. The current EU TAC of 436 t in effect for the northeast Atlantic may allow the stock to remain stable, at its current depleted biomass level, under most credible model scenarios. Catches close to the current TAC (e.g. 400 t) could allow rebuilding to B_{MSY} under some model scenarios, but with a high degree of uncertainty and on a time scale of 60 (40-124) years.

An update of the Canadian assessment of the northwest Atlantic porbeagle stock indicated that biomass is depleted to well below B_{MSY}, but recent fishing mortality is below F_{MSY} and recent biomass appears to be increasing. Additional modelling using a surplus production approach indicated a similar view of stock status, i.e., depletion to levels below B_{MSY} and current fishing mortality rates also below F_{MSY} (**SHK-Figure 10**). The Canadian assessment projected that with no fishing mortality, the stock could rebuild to B_{MSY} level in approximately 20-60 years, whereas surplus-production based projections indicated 20 years would suffice. Under the Canadian strategy of a 4% exploitation rate, the stock is expected to recover in 30 to 100+ years according to the Canadian projections.

SHK-4. Management Recommendations

Precautionary management measures should be considered for stocks where there is the greatest biological vulnerability and conservation concern, and for which there are very few data. Management measures should ideally be species-specific whenever possible.

For species of high concern (in terms of overfishing), and for which a high survivorship is expected in fishing gears after release, the Committee recommends that the Commission prohibit retention and landing of the species to minimize fishing mortality. The Committee recognizes that the difficulty in identifying look-alike species may complicate compliance with management measures adopted for those species

For all the species, but particularly for those which can be easily misidentified, it is essential that the Committee advances data collection and research on life history, together with the interactions with tuna fisheries, with the final objective of assessing the status of the stocks. Until such information is made available, the Commission should consider taking effective measures to reduce the fishing mortality of these stocks. These measures may include minimum or maximum size limits for landing (for protection of juveniles or the breeding stock, respectively); and any other technical mitigation measures such as gear modifications, time-area restrictions, or others, as appropriate. Such management actions should be combined with research activities, in order to provide information on their effectiveness.

The SCRS welcomed the conservation and management measures adopted by the Commission in the past two years regarding the species ranked as the most vulnerable in the last Ecological Risk Assessment and for which almost no data have been submitted (bigeye thresher, oceanic whitetip shark and hammerhead shark). At the same time, the SCRS expressed concern with the fact that no conservation and management measures have been adopted so far for the top ranked species in the ERA, the silky shark, *Carcharhinus falciformis.* Accordingly, the SCRS recommended that proper conservation and management measures, similar to those adopted for those species, be also adopted for the silky shark.

Both porbeagle stocks in the northwest and northeast Atlantic were estimated to be overfished, with the northeastern stock being more highly depleted. The main source of fishing mortality on these stocks is from directed porbeagle fisheries which are not under the Commission's direct mandate. Those fisheries are managed mostly by ICCAT Contracting Parties through national legislation which includes quotas and other management measures.

The Committee also recommends that countries initiate research projects to investigate means to minimize by-catch and discard mortality of sharks, with a particular view to recommending to the Commission complementary measures to minimize porbeagle by-catch in fisheries for tuna and tuna-like species. For porbeagle sharks, the Committee recommends that the Commission work with countries catching porbeagle, particularly those with targeted fisheries, and relevant RFMOs 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. In addition, stocks of mutual interest and areas of overlap, particularly species occurring in the Mediterranean Sea, should be discussed.

The Committee recommends that scientific observers be allowed to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs) from species whose retention is prohibited by current regulations.

The Committee recommends that the CPCs explore methods to estimate catches of sharks in purse seine and artisanal fisheries.

NORTH ATLANTIC BLUE SHARK SUMMARY

2007 Yield		61,845 t[1]
Provisional Yield (2010)		37,238 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	1.87-2.74[3]
	B_{2007}/B_0	0.67-0.93[4]
Relative Fishing Mortality:	F_{MSY}	0.15[5]
	F_{2007}/F_{MSY}	0.13-0.17[6]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] Range obtained from the Bayesian Surplus Production (BSP) (low) and the Catch-Free Age Structured Production (CFASP) (high) models. Value from CFASP is SSB/SSB_{MSY}.
[4] Range obtained from BSP (high), CFASP and Age-Structured Production Model (ASPM) (low) models.
[5] From BSP and CFASP models (same value). CV is from CFASP model.
[6] Range obtained from BSP (high) and CFASP (low) models.

SOUTH ATLANTIC BLUE SHARK SUMMARY

2007 Yield		37,075 t[1]
Provisional Yield (2010)		27,729 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	1.95-2.80[3]
	B_{2007}/B_0	0.86-0.98[4]
Relative Fishing Mortality:	F_{MSY}	0.15-0.20[5]
	F_{2007}/F_{MSY}	0.04-0.09[6]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is $SSB/SSB_{MSY.}$
[4] Range obtained from BSP (high) and CFASP (low) models. Value from CFASP is SSB/SS_{B0}.
[5] Range obtained from BSP (low) and CFASP (high) models.
[6] Range obtained from BSP (low) and CFASP (high) models.

NORTH ATLANTIC SHORTFIN MAKO SUMMARY

2007 Yield		5,996 t[1]
Provisional Yield (2010)		4,016 t[2]
Relative Biomass:	B_{2007}/B_{MSY}	0.95-1.65[3]
	B_{2007}/B_0	0.47-0.73[4]
Relative Fishing Mortality:	F_{MSY}	0.007-0.05[5]
	F_{2007}/F_{MSY}	0.48-3.77[6]
Management measures in effect		[Rec. 04-10], [Rec. 07-06]

[1] Estimated catch used in the 2008 assessments.
[2] Task I catch.
[3] Range obtained from BSP (low) and CFASP (high) models. Value from CFASP is $SSB/SSB_{MSY.}$
[4] Range obtained from BSP (low), ASPM, and CFASP (high) models. Value from CFASP is SSB/SS_{B0}.
[5] Range obtained from BSP (low) and CFASP (high) models.
[6] Range obtained from BSP (high) and CFASP (low) models.

NORTHWEST ATLANTIC PORBEAGLE SUMMARY

Current Yield (2008)		144.3 t[1]
Relative Biomass:	B_{2008}/B_{MSY}	0.43-0.65[2]
Relative Fishing Mortality:	F_{MSY}	0.025-0.075[3]
	F_{2008}/F_{MSY}	0.03-0.36[4]
Management measures in effect		TAC of 185, 11.3 t[5]

[1] Estimated catch allocated to the Northwest stock area.
[2] Range obtained from age-structured model (Canadian assessment; low) and BSP model (high). Value from Canadian assessment is in numbers; value from BSP in biomass. All values in parentheses are CVs.
[3] Range obtained from BSP model (low) and age-structured model (high).
[4] Range obtained from BSP model (low) and age-structured model (high).
[5] The TAC for the Canadian EEZ is 185 t (MSY catch is 250 t); the TAC for the USA is 11.3 t.

SOUTHWEST ATLANTIC PORBEAGLE SUMMARY

Current Yield (2008)		164.6 t[1]
Relative Biomass:	B_{2008}/B_{MSY}	0.36-0.78[2]
Relative Fishing Mortality:	F_{MSY}	0.025-0.033[3]
	F_{2008}/F_{MSY}	0.31-10.78[4]
Management measures in effect		None

[1] Estimated catch allocated to the southwest stock area.
[2] Range obtained from BSP (low and high) and CFASP models. Value from CFASP model (SSB/SSB_{MSY}) was 0.48 (0.20).
[3] Range obtained from BSP (low) and CFASP (high) models.
[4] Range obtained from BSP (low and high) and CFASP models. Value from CFASP model was 1.72 (0.51).

NORTHEAST ATLANTIC PORBEAGLE SUMMARY

Current Yield (2008)		287 t[1]
Relative Biomass:	B_{2008}/B_{MSY}	0.09-1.93[2]
Relative Fishing Mortality:	F_{MSY}	0.02-0.03[3]
	F_{2008}/F_{MSY}	0.04-3.45[4]
Management measures in effect		TAC of 436 t[5]
		Maximum landing length of 210 cm FL[5]

[1] Estimated catch allocated to the northeast stock area.
[2] Range obtained from BSP (high) and ASPM (low) models. Value from ASPM model is SSB/SSB_{MSY}. The value of 1.93 from the BSP corresponds to a biologically unrealistic scenario; all results from the other BSP scenarios ranged from 0.29 to 1.05.
[3] Range obtained from the BSP and ASPM models (low and high for both models).
[4] Range obtained from BSP (low) and ASPM (high) models. The value of 0.04 from the BSP corresponds to a biologically unrealistic scenario; all results from the BSP scenarios ranged from 0.70 to 1.26.
[5] In the European Union.

BSH-Table 1. Estimated catches (t) of blue shark (Prionace glauca) by area, gear and flag. (v02, 2011-09-30)

			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TOTAL			1482	1614	1835	1810	3028	4307	3643	9577	9562	9634	9560	37610	33809	35093	39101	34447	32735	35572	36304	43071	40351	47044	53900	58830	65183
	ATN		1482	1614	1835	1810	3028	4299	3536	9566	8084	8285	7258	29053	26510	25741	27965	21022	20037	22911	21740	22357	23215	26925	30722	35201	37238
	ATS		0	0	0	0	0	8	107	10	1472	1341	2301	8409	7238	9332	11091	13378	12682	12650	14438	20642	16957	20068	23097	23444	27729
	MED		0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	125	72	178	51	82	185	216
Landings	ATN	Longline	0	0	0	0	1387	2257	1583	5734	5880	5871	5467	27618	25288	24405	26473	20013	18426	21936	20304	21033	22090	25966	30443	34434	36347
		Other surf.	1482	1088	1414	1330	900	1270	1768	2696	1632	1793	1086	1255	1030	1228	1355	904	1543	975	1372	1258	1080	905	150	664	727
	ATS	Longline	0	0	0	0	0	8	107	10	1472	1341	2294	8398	7231	9305	11091	13376	12678	12645	14339	20638	16898	19998	22708	23438	27716
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	1	4	6	99	3	59	10	375	6	14
	MED	Longline	0	0	0	0	0	0	0	0	6	8	2	148	61	20	44	47	17	10	44	72	83	49	81	18	50
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	0	95	2	1	167	165
Discards	ATN	Longline	0	526	421	480	741	772	184	1136	572	621	602	180	170	104	137	105	68	0	63	66	45	53	129	102	163
		Other surf.	0	0	0	0	0	0	0	0	0	0	103	0	22	4	0	0	0	0	1	0	0	0	1	1	1
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	60	14	0	
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Landings	ATN	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	114	461
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	
		Canada	320	147	968	978	680	774	1277	1702	1260	1494	528	831	612	547	624	581	836	346	965	1134	977	843	0	0	0
		Cape Verde	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	185	104	148	0	0	0	367	109	88	53
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	171	206	240	588	292	110	78	133
		EU.Denmark	0	0	0	2	2	1	1	0	1	2	3	1	1	0	2	1	13	5	1	0	0	0	0	0	0
		EU.España	0	0	0	0	0	0	0	0	0	0	0	24497	22504	21811	24112	17362	15666	15975	17314	15006	15464	17038	20788	24465	26094
		EU.France	50	67	91	79	130	187	276	322	350	266	278	213	163	399	395	207	221	57	106	120	99	167	119	84	122
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	66	31	66	11	2	0	0	0	0	0	0	0
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		EU.Portugal	0	0	0	0	1387	2257	1583	5726	4669	4722	4843	2630	2440	2227	2081	2110	2265	5643	2025	4027	4338	5283	6167	6252	8261
		EU.United Kingdom	0	0	0	0	1	0	0	0	0	12	0	0	1	0	12	9	6	4	6	5	3	6	6	96	8
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
		Japan	0	0	0	0	0	0	0	0	1203	1145	618	489	340	357	273	350	386	558	1035	1729	1434	1921	2531	2007	1793
		Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	254	892	613	1575	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	456	0	0	0	0	43	134	255	56
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	2	1	1	0	2	8	9
		U.S.A.	1112	874	355	271	87	308	215	680	29	23	283	211	255	217	291	39	0	0	7	2	2	1	8	4	8
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	26	10	18	7	71	74
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	259	0	236	109	0	273
		Benin	0	0	0	0	0	0	0	0	0	0	0	6	4	27	0	0	0	0	0	0	0	0	0	0	
		Brasil	0	0	0	0	0	0	0	0	0	0	743	1103	0	179	1683	2173	1971	2166	1667	2523	2591	2258	1986	1274	1500
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	565	316	452	0	0	0	585	40	109	41
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	521	800	866	1805	2177	1843	1341	1594
		EU.España	0	0	0	0	0	0	0	0	0	0	0	5272	5574	7173	6951	7743	5368	6626	7366	6410	8724	8942	9615	13099	13953
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	847	867	1336	876	1110	2134	2562	2324	1841	1863	3184	2751	4493	4866	5358	6338
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	239	0	0	14	
		Japan	0	0	0	0	0	0	0	0	1388	437	425	506	510	536	221	182	343	331	209	236	525	896	1789	981	1123
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2213	0	1906	6616	0	0	1829	207	2352
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	168	22	0	0	0	0	0	0	0	521	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	0	**0**
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	23	21	0	83	63	232	128	154	90	82	126	119	125
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	
		Uruguay	0	0	0	0	0	8	107	10	84	57	259	180	248	118	81	66	85	480	462	376	232	337	359	942	208
	MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	3	6	5	0	0	0	0	
		EU.España	0	0	0	0	0	0	0	0	0	0	0	146	59	20	31	6	3	3	4	8	61	3	2	7	48
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
		EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	113	1	95	46	75	175	165
		EU.Malta	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	2	2	2	1
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	41	14	3	0	56	22	0	0	0	2
		Japan	0	0	0	0	0	0	0	0	5	7	1	1	0	0	0	0	0	1	1	2	0	0	2	0	**0**
Discards	ATN	U.S.A.	0	526	421	480	741	772	184	1136	572	618	704	180	192	100	137	106	68	0	65	66	45	54	130	103	164
		UK.Bermuda	0	0	0	0	0	0	0	0	0	3	1	0	0	8	0	0	0	0	0	0	0	0	0	0	0
Discards	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	14	0	
		U.S.A.	0	0	0	0	0	0	0	0	0	0	7	5	4	1	0	0	0	0	0	0	0	0	0	0	

POR-Table 1. Estimated catches (t) of porbeagle (Lamna nasus) by area, gear and flag. (v02, 2011-09-30).

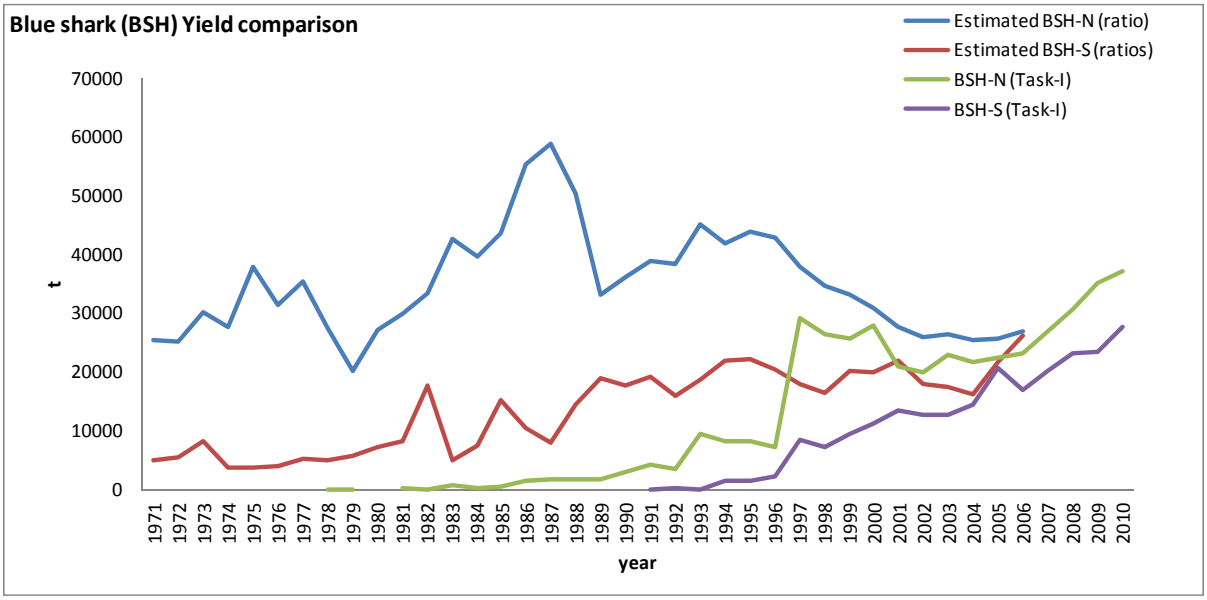
			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TOTAL			732	844	1025	1013	1309	1990	2603	1910	2729	2140	1560	1859	1469	1403	1469	999	848	648	745	571	507	515	600	475	134
	ATN		732	844	1024	1013	1309	1990	2603	1909	2726	2136	1556	1833	1451	1393	1457	998	838	604	725	539	470	502	513	412	120
	ATS		0	0	1	0	0	0	0	1	2	3	3	26	17	10	11	1	11	43	17	31	37	13	85	62	14
	MED		0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2	1	1
Landings	ATN	All gears	732	844	1024	1013	1309	1990	2601	1909	2725	2136	1556	1833	1451	1393	1457	998	838	604	725	539	470	502	512	412	117
	ATS		0	0	1	0	0	0	0	1	2	3	3	26	16	9	11	1	11	43	17	31	37	13	85	62	14
	MED		0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	3	2	1	0	2	1	1
Discards	ATN		0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	ATS		0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	
Landings	ATN	Canada	24	59	83	73	78	329	813	919	1575	1353	1051	1334	1070	965	902	499	237	142	232	202	192	93	124	62	83
		EU.Denmark	114	56	33	33	46	85	80	91	93	86	72	69	85	107	73	76	42	0	0	0	0	0	0	0	0
		EU.España	26	30	69	42	26	47	15	21	52	19	41	25	25	18	13	24	54	27	11	14	34	8	41	77	
		EU.France	260	280	446	341	551	300	496	633	820	565	267	315	219	240	410	361	461	303	413	276	194	354	311	228	
		EU.Germany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	1	3	0	0	0	0	0	0	0	
		EU.Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	6	3	11	18	0	4	8	7	3	0
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	3	3	2	2	1	0	0	0	0	0	0	0	0	7	4	10	101	50	14	6	0	3	17	7
		EU.Sweden	8	5	3	3	2	2	4	3	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
		EU.United Kingdom	6	3	3	15	9	0	0	0	0	0	0	0	1	6	8	12	10	0	0	24	11	26	15	11	0
		Faroe Islands	270	381	373	477	550	1189	1149	165	48	44	8	9	7	10	0	0	0	0	0	0	0	0	0	0	
		Iceland	0	0	0	0	0	0	1	3	4	6	5	3	4	2	2	3	2	1	1	0	1	0	1	0	1
		Japan	0	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	12	10	13	13
		Norway	24	25	11	25	43	32	41	24	24	26	28	17	27	32	22	11	14	19	0	8	27	0	0	0	12
		U.S.A.	0	1	0	2	2	5	1	50	106	35	78	56	13	3	1	1	1	0	1	0	0	0	1	1	1
	ATS	Benin	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	
		Chile	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Bulgaria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.España	0	0	0	0	0	0	0	0	0	0	0	2	2	2	7	1	2	9	4	0	3	5	4	13	
		EU.Netherlands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Poland	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0	
		Falklands	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
		Guinea Ecuatorial	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Japan	0	0	1	0	0	0	0	1	0	0	3	14	0	1	0	0	0	0	0	0	0	5	41	34	8
		Seychelles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Uruguay	0	0	0	0	0	0	0	0	0	3	0	5	13	2	4	0	8	34	8	28	34	3	40	14	6
	MED	EU.Italy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	2	0	0
		EU.Malta	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	0	0	0	1	0	0	0	1	0
Discards	ATN	U.S.A.	0	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
	ATS	Uruguay	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	

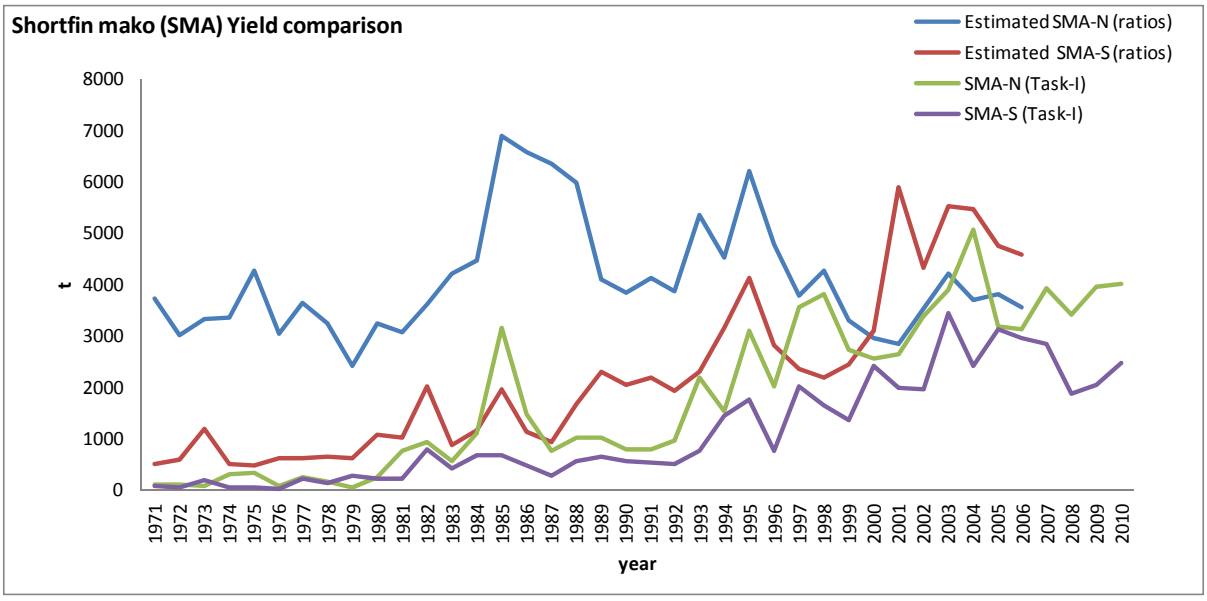
SMA-Table 1. Estimated catches (t) of Shortfin mako (Isurus oxyrinchus) by area, gear and flag. (v02, Oct 1 2011 2:15PM).

			1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
TOTAL			1951	1028	1562	1648	1349	1326	1446	2966	2972	4870	2778	5570	5477	4097	4994	4654	5361	7324	7487	6336	6073	6753	5284	5987	6500
	ATN		1481	766	1014	1011	785	797	953	2193	1526	3109	2019	3545	3816	2738	2568	2651	3395	3895	5063	3190	3113	3917	3403	3947	4016
	ATS		471	262	548	637	564	529	493	773	1446	1761	759	2019	1652	1355	2422	1996	1964	3426	2423	3130	2951	2834	1880	2039	2482
	MED		0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1	1	2
Landings	ATN	Longline	184	295	214	321	497	573	660	1499	1173	1633	1770	3369	3648	2645	2254	2424	3129	3792	4755	3172	3105	3901	3367	3552	3548
		Other surf.	1297	462	795	681	278	213	254	670	331	1447	248	177	168	91	313	227	266	104	308	18	8	10	27	375	459
	ATS	Longline	471	262	548	637	564	519	480	763	1426	1748	744	1997	1642	1345	2413	1979	1949	3395	2347	3116	2907	2792	1798	2032	2482
		Other surf.	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	18	15	31	76	14	43	30	82	7	1
	MED	Longline	0	0	0	0	0	0	0	0	0	0	0	6	8	5	4	7	2	2	2	17	10	2	1	1	2
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Discards	ATN	Longline	0	9	5	9	10	11	38	24	21	29	1	0	0	0	0	0	0	0	0	0	0	7	9	20	9
		Other surf.	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0
	ATS	Longline	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	
Landings	ATN	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	28
		Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Canada	0	0	0	0	0	0	0	0	0	111	67	110	69	70	78	69	78	73	80	91	71	72	43	53	41
		China P.R.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	16	19	29
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	84	57	19	30	25	23	12	15
		EU.España	0	0	0	0	0	0	0	0	0	0	0	2416	2199	2051	1566	1684	2047	2068	3404	1751	1918	1816	1895	2216	2091
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	2
		EU.Portugal	0	0	0	0	193	314	220	796	649	657	691	354	307	327	318	378	415	1249	473	1109	951	1540	1033	1169	1432
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	1	1	1	0	0	0	1	15	0
		FR.St Pierre et Miquelon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	4
		Japan	120	218	113	207	221	157	318	425	214	592	790	258	892	120	138	105	438	267	572	0	0	82	131	98	117
		Mexico	0	0	0	0	0	0	0	0	0	10	0	0	0	0	10	16	0	10	6	9	5	8	6	7	8
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	49	33	39	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	
		Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	17	21	
		St. Vincent and Grenadines	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	
		Sta. Lucia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Trinidad and Tobago	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	3	1	2	1	1	1	1	1
		U.S.A.	1361	540	896	795	360	315	376	948	642	1710	469	407	347	159	454	395	415	142	411	187	130	216	188	202	217
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
		Venezuela	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	20	6	11	2	35	22
	ATS	Belize	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	0	17	2	0	32
		Brasil	0	0	0	0	0	0	0	0	0	0	83	190	0	27	219	409	226	283	238	426	210	145	203	99	128
		China P.R.	0	0	0	0	0	0	0	34	45	23	27	19	74	126	305	22	208	260	0	0	0	77	6	24	32
		Chinese Taipei	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	626	121	128	138	211	124	123	146
		Côte D'Ivoire	0	0	0	0	0	9	13	10	20	13	15	23	10	10	9	15	15	30	15	14	16	25	0	5	7
		EU.España	0	0	0	0	0	0	0	0	0	0	0	1356	1141	861	1200	1235	811	1158	703	584	664	654	628	939	1192
		EU.Portugal	0	0	0	0	0	0	0	0	0	92	94	165	116	119	388	140	56	625	13	242	493	375	321	502	336
		EU.United Kingdom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	11	
		Japan	428	234	525	618	538	506	460	701	1369	1617	514	244	267	151	264	56	133	118	398	0	0	72	115	108	107
		Korea Rep.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
		Namibia	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	459	0	509	1415	1243	1002	295	23	307
		Panama	0	0	0	0	0	0	0	0	0	0	0	0	0	24	1	0	0	0	0	0	0	0	10	0	
		Philippines	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	
		Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		South Africa	0	0	0	0	0	0	0	0	0	0	0	0	19	13	0	79	19	138	126	125	99	208	136	100	144
		U.S.A.	0	0	0	0	0	0	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0	0	0	
		Uruguay	43	28	23	19	26	13	20	28	12	17	26	20	23	21	35	40	38	188	249	146	68	36	41	106	23
		Vanuatu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	12	13	1	0	0	
	MED	EU.Cyprus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
		EU.España	0	0	0	0	0	0	0	0	0	0	0	6	7	5	3	2	2	2	2	2	4	1	0	0	1
		EU.France	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		EU.Portugal	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	0	0	15	5	0	0	0	0
		Japan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Discards	ATN	Mexico	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		U.S.A.	0	9	5	9	10	11	38	24	21	28	1	0	0	0	0	0	0	0	0	0	0	7	10	20	9
		UK.Bermuda	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	
	ATS	Brasil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	

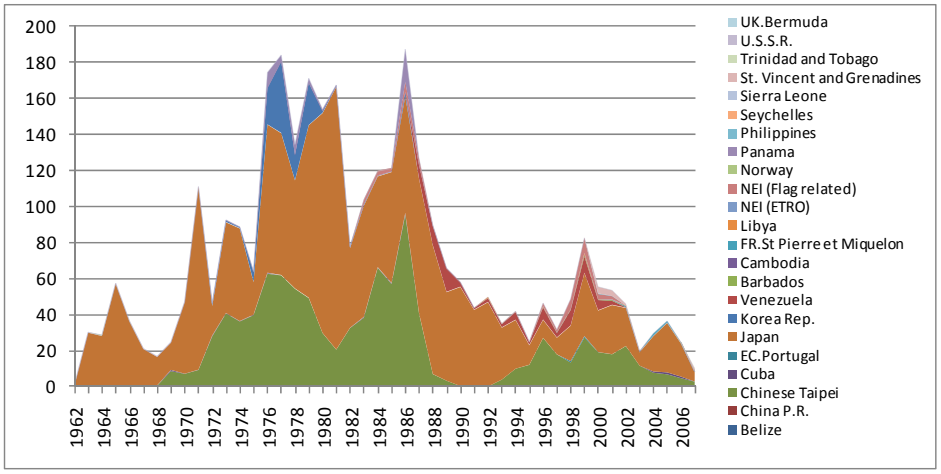
SHK-Table 2. Productivity values ranked from lowest to highest.

Species	*Productivity (r)*	*Productivity rank*
BTH (*Alopias superciliosus*)	0.010	1
SMA (*Isurus oxyrinchus*)	0.014	2
LMA (*Isurus paucus*)	0.014	3
POR (*Lamna nasus*)	0.053	4
FAL (*Carcharhinus falciformis*)	0.076	6
OCS (*Carcharhinus longimanus*)	0.087	7
SPL (*Sphyrna lewini*)	0.090	8
SPZ (*Sphyrna zygaena*)	0.124	9
ALV (*Alopias vulpinus*)	0.141	10
PST (*Pteroplatytrygon violacea*)	0.169	11
BSH (*Prionace glauca*)	0.301	12
CRO (*Pseudocarcharias kamoharai*)	-	-

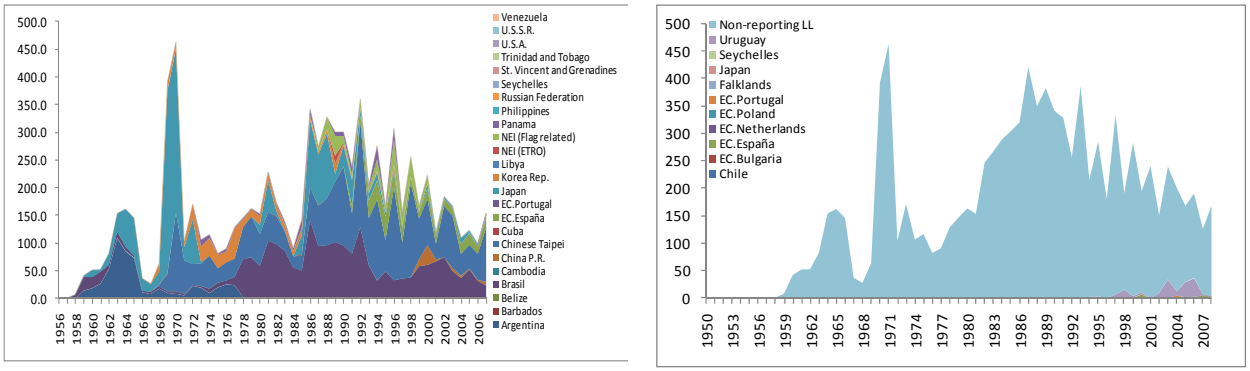




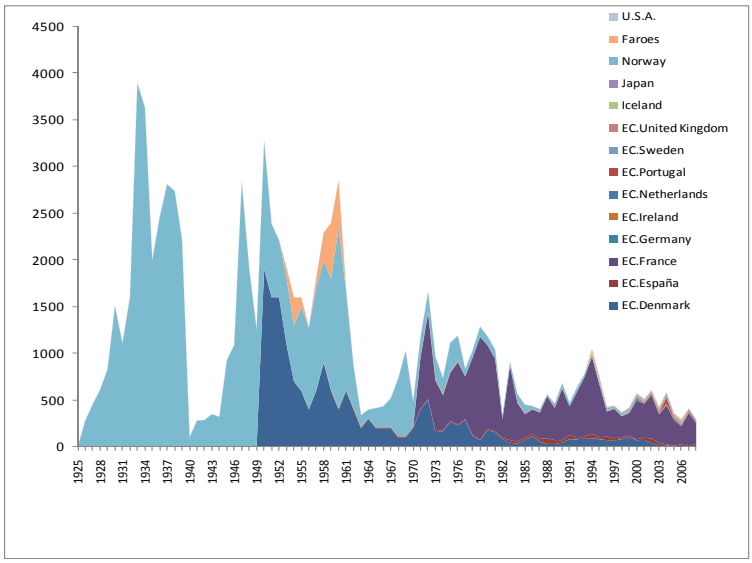
SHK-Figure 1. Blue shark (BSH) and shortfin mako (SMA) catches reported to ICCAT (Task-I) and estimated by the Committee.



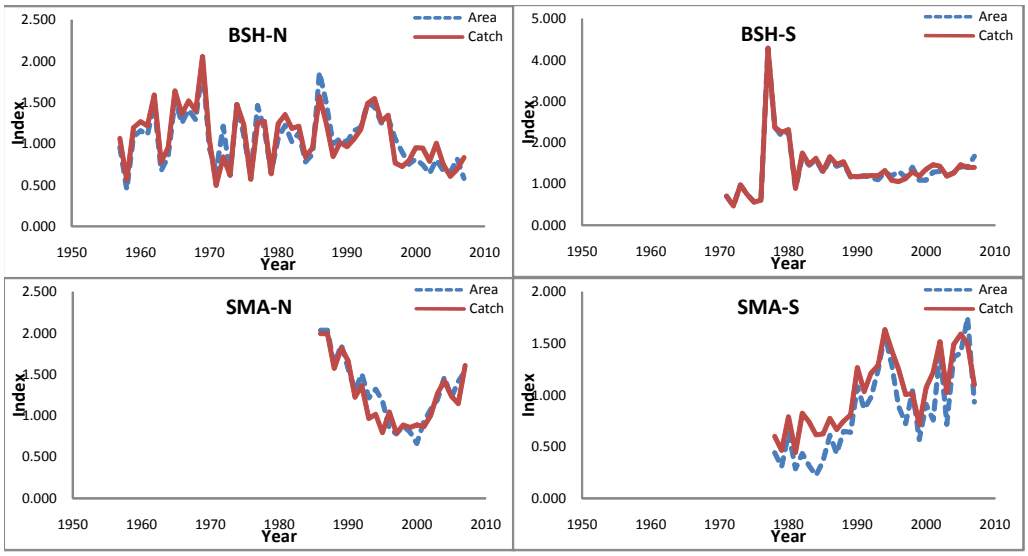
SHK-Figure 2. Potential catch of porbeagle by non-reporting longline fleets using catch ratios for the NW stock. Limited observations across the time-series result in an unquantified uncertainty in the estimates.



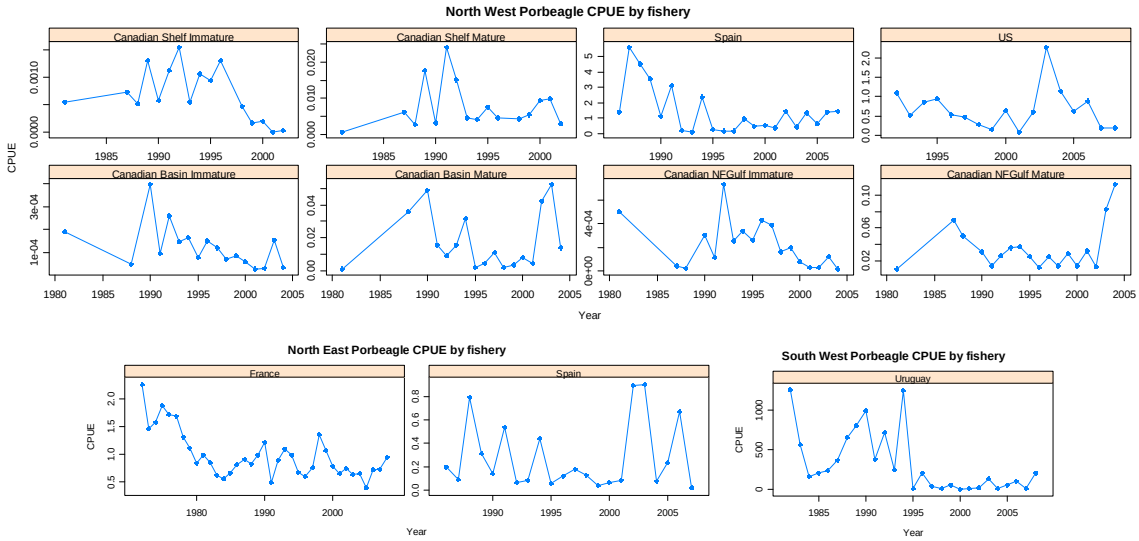
SHK Figure 3. Left plate: Estimated catch of porbeagle by non-reporting longline fleets using catch ratios for the SW stock. Very limited observations across the time-series result in a high but unquantified uncertainty in the estimates. Right plate: Comparison of estimates for non-reporting longline fleets with reported catch levels held in the Task I data set for the SW stock area.



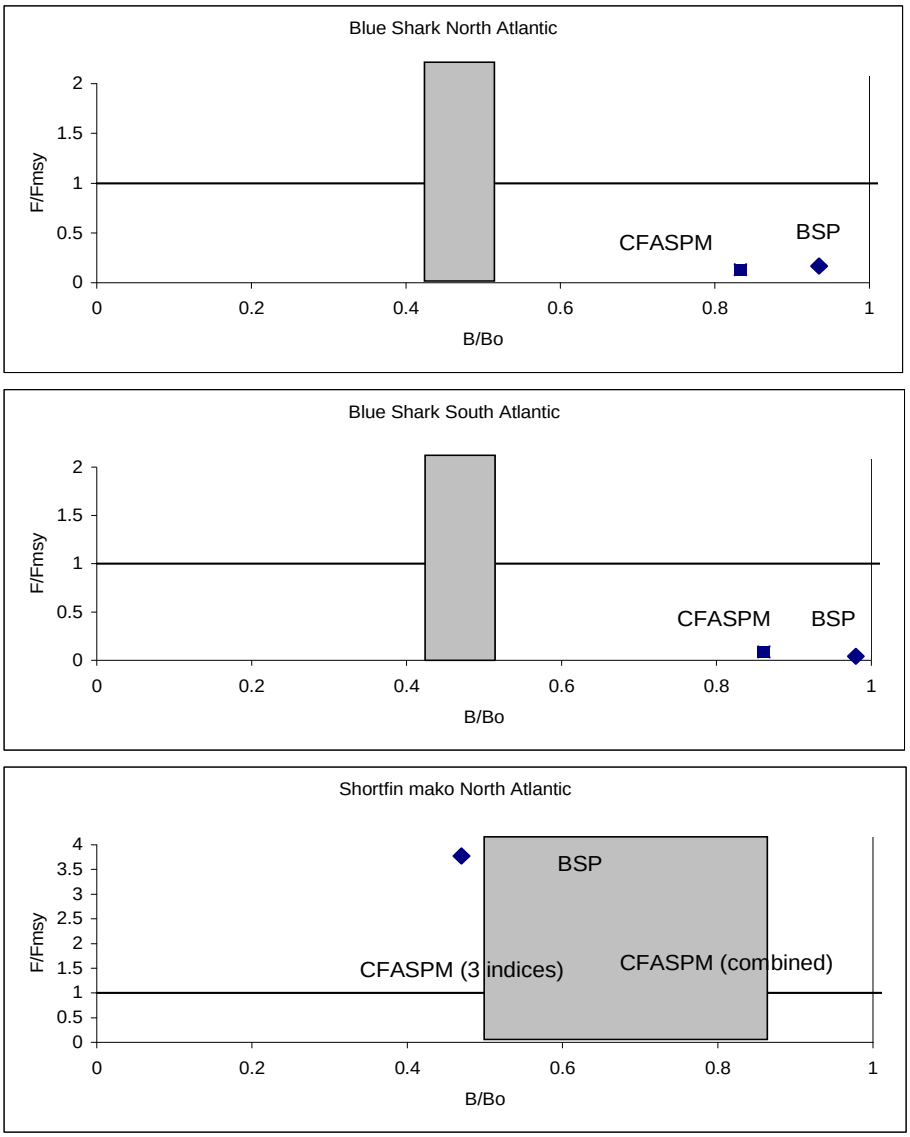
SHK Figure 4. Catch by flag of porbeagle sharks from the northeastern Atlantic used in the assessment. While these catches are considered the best available,, they are believed to underestimate the pelagic longline catches for this species.



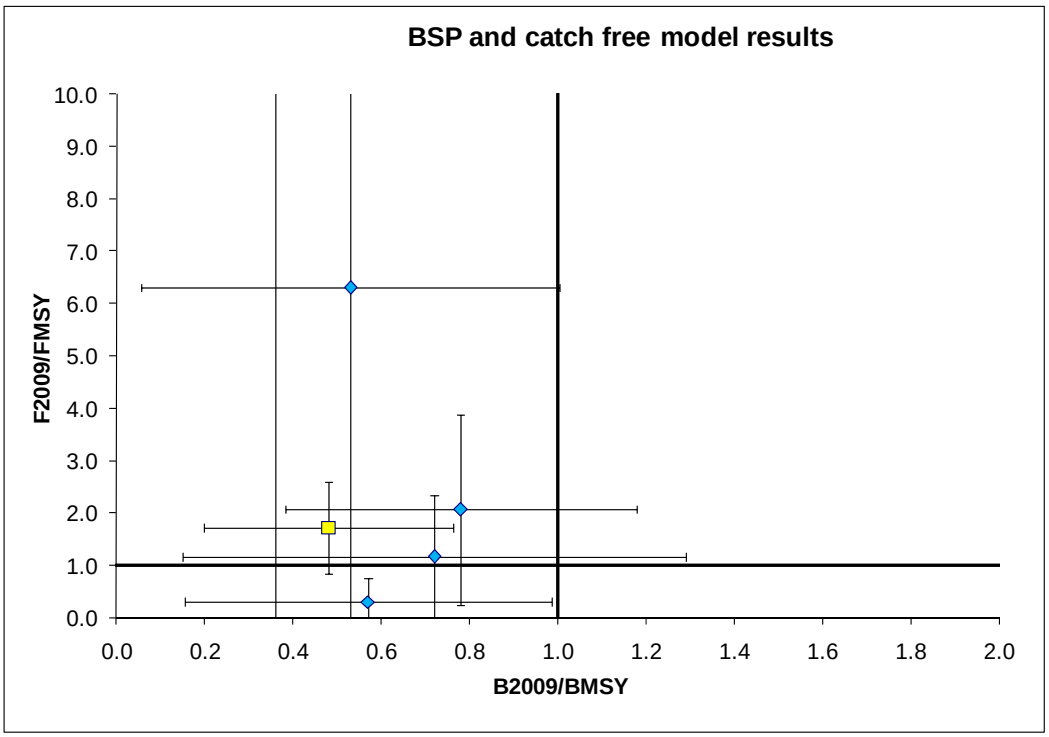
SHK-Figure 5. Average trends in the CPUE series used in the assessments of blue shark (BSH) and shortfin mako (SMA). The averages were calculated by weighting the available series either by their relative catch or by the relative spatial coverage of the respective fisheries.



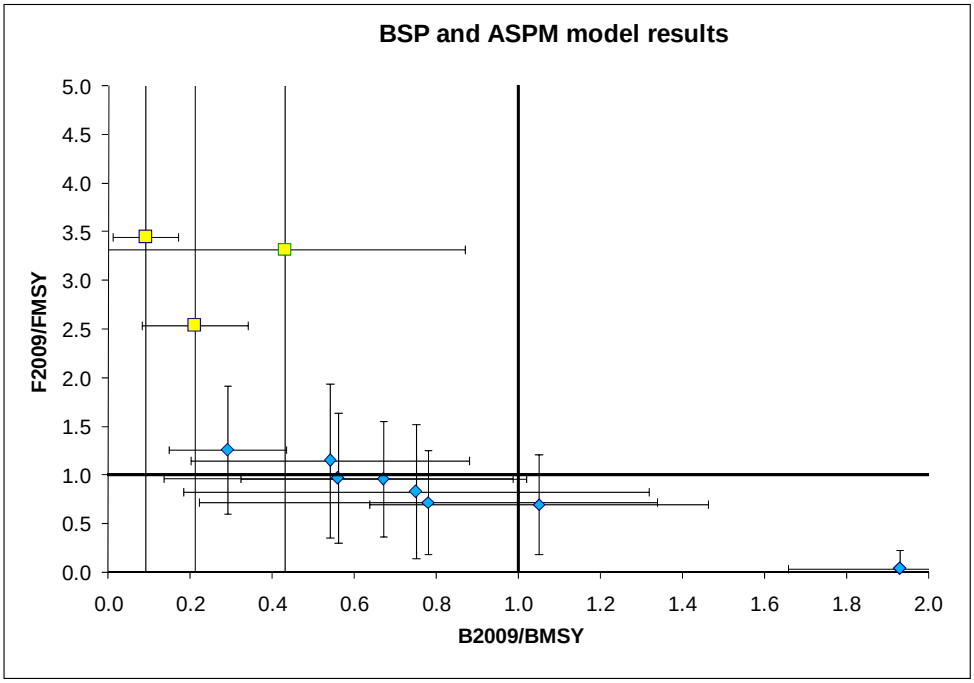
SHK-Figure 6. CPUE series for the porbeagle NW stock (upper figures), NE stock (lower left figures) and SW stock (lower right figure).



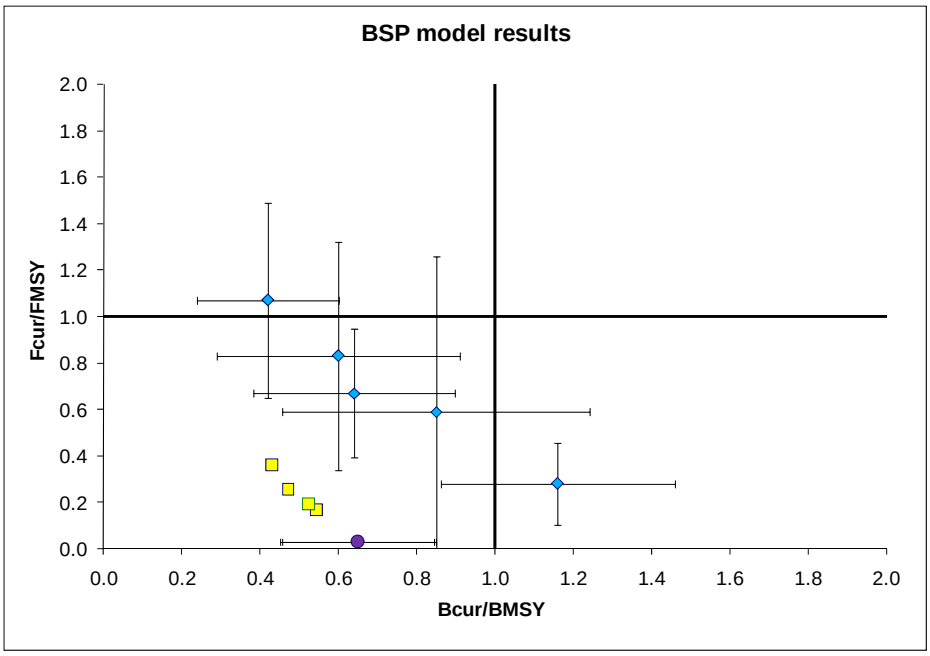
SHK-Figure 7. Phase plots summarizing base scenario outputs for the current stock status of blue shark (BSH) and shortfin mako (SMA). BSP=Bayesian surplus production model; CFASPM=catch-free, age-structured production model. The shaded box represents the area at which the biomass at MSY is estimated to be reached. Any points inside or to the left of the box indicate the stock is overfished (with respect to biomass). Any points above the horizontal line indicate overfishing (with respect to F) is occurring.



SHK-Figure 8. Phase plot for the southwest Atlantic porbeagle, showing status in 2009 from both the BSP model runs (diamonds) and the catch free age structured production model (square) results. Error bars are plus and minus one standard deviation.



SHK-Figure 9. Phase plot showing current status of northeast Atlantic porbeagle for the BSP model (diamonds) and the ASPM model (squares). Error bars are plus and minus one standard deviation.



SHK-Figure 10. Phase plot showing the northwest Atlantic porbeagle expected value of B/B_{MSY} and F/F_{MSY} in the current year, which is either 2005 (diamonds) or 2009 (circles), as well as approximate values from Campana *et al.* (2010) (squares). B/B_{MSY} was approximated from Campana *et al.* (2010) as N2009/N1961 times 2. Error bars are plus and minus one standard deviation.

9. Report of inter-sessional meetings

The reports of the inter-sessional meetings held in 2011 were presented, with special emphasis not directly related to the stock assessments because their results are not included and presented in the Executive Summaries. The following meetings were presented.

9.1 Workshop on the use of R tools in the data preparatory work ICCAT-SCRS

The workshop was held in Madrid, February 7-11, with the objective of developing the skills needed within Species Groups; both during data preparatory meetings and stock assessments. Participants came from a range of CPCs, both developed and developing states (with help from the various ICCAT funds). The topics covered were working with data, accessing ICCAT databases and conducting exploratory data analyses. The types of tasks performed in stock assessment were also covered, *i.e.* conversion of catch-at-size to catch-at-age, standardisation of CPUE as well as conducting stock assessments and presentation of advice in the form of "Kobe Strategy Matrices".

9.2 Working Group on the Organization of the SCRS

The meeting on the organisation of the SCRS, Madrid, March 2-4, reviewed various issues related to the increased demands on the SCRS and implications for Secretariat support. Topics included the Secretariat's role in providing scientific support to the SCRS and participation of CPC scientists at meetings of the SCRS. It was also recognised that the work load of the SCRS had increased due to the need to address a wide variety of recommendations from the Commission. In particular, in relation to the implementation of the Precautionary Approach and the incorporation of advice on the Ecosystem Based Approach to Fisheries Management. Other issues considered were the importance of agreeing a data confidentiality policy to ensure scientific access to data, and the implications for the Secretariat and SCRS discussed.

Other topics covered were how to agree a standard format for scientific reports and collaboration with other tRFMOs.

Recommendations included the need for increased scientific analytical support if more use was to be made of statistical stock assessment methods and Management Strategy Evaluation. Currently: data analyses and research supporting stock assessments are the joint responsibility of CPC scientists and Secretariat professional staff. The increased demands on the SCRS and the need for additions to Secretariat staff, e.g. for data management and by-catch coordination, were discussed. The importance of capacity building and methods for quality assurance and transparency were also discussed.

Document SCRS/2011/012 contains the detailed report of the meeting.

9.3 2011 Blue Marlin Stock Assessment Session and White Marlin Data Preparatory Meeting

The meeting for the blue marlin stock assessment and white marlin data preparatory was held in Madrid in April 25 to 29, 2011. The meeting had the dual purpose of producing an assessment of blue marlin to estimate reference points and update management recommendations, and preparing the general basic fishery data, such as estimates of total harvest and relative abundance estimates, and the specific data to support the models to be used in the next white marlin assessment in 2012. The blue marlin assessment meeting achieved its main goals by producing new benchmarks for the stock and suggesting new management recommendations to rebuild the stock. During the white marlin data preparatory meeting, in addition to obtaining estimates of total removals and partial information on abundance indices, it was recognized that the next white marlin assessment be considered as a mixed species stock assessment because of the mixture with other similar species.

The detail report of the meeting is presented as document SCRS/2011/013.

Discussion

The Committee acknowledges the analyses and presentation regarding the blue marlin assessment. It was noted that the implementation of complex models such as statistically integrated models (SS3) are sensitive to the assumptions of the parameters estimated. Considering the condition of blue marlin being a by-catch species in some important fisheries, the inherent uncertainty with regard to data and the productivity of the stock was recognized.

9.4 Inter-Sessional Meeting of the Sub-Committee on Ecosystems

The inter-sessional meeting of the Sub-Committee on Ecosystems was held in Miami, Florida, USA from May 9 to 13, 2011. During this meeting, the Sub-Committee discussed the following:

1. Spatial production models for multi-species and multi-area stock assessments.
2. The integration of environmental variables in the standardization of CPUE (e.g. effect of expansion in oxygen minimum zones).
3. Ecosystem based indicators.
4. By-catch estimation procedures and measures of precision.
5. Seabird and sea turtle by-catch mitigation measures.
6. Safe release and handling protocols for sea turtles.

The Group also considered a summary of the International Circle Hook Symposium, made recommendations to ICCAT regarding the job description of the proposed by-catch coordinator, and recommended a reorganization of the Sub-Committee, specifically the addition of an Ecosystems Rapporteur.

The Detail Report of the meeting is presented as document SCRS/2011/014.

9.5 Tropical Tuna Species Group Intersessional Meeting on the Ghanaian Statistics Analysis (Phase II)

An intersessional meeting of the Tropical Tuna Species Group on the Ghanaian Statistics Analysis (Phase II) met in Madrid, on May 30 to June 3, 2011. The objective of the meeting had been defined in the 2011 Work Plan for Tropical Species approved by the SCRS (ICCAT, 2011). This included the revision of the data for the eastern tropical purse seine fisheries, in particular the Ghanaian statistics, as well as the accounting of *faux poissons*.

This year thorough review of data has been conducted in order to better understand aspects of the data collection, processing and reporting systems.

The work during the meeting focused on obtaining the best scientific estimates of catch, effort and size data for the three main species of tropical tunas. These estimates are important in order to allow the SCRS to better estimate the stock status and to provide more accurate responses to the Commission.

The Detail Report of the meeting is presented as document SCRS/2011/016.

9.6 Sharks Data Preparatory Meeting to apply Ecological Risk Assessment

The Shark Species Group met on Madrid in June 20 to 24, 2011, to increase the current database in order to update in 2012 the Ecological Risk Assessment (ERA) carried out in 2008. On this occasion, the Group increased the number of species to 18 to apply the ERA.

The Detail Report of the meeting is presented as document SCRS/2011/017.

Discussion

Discussion focused on the use of the ERA as a first approach to the stock assessment of the resources and the importance of this approach against the traditional stock assessment methods.

The Committee considered that this type of analysis does not replace the traditional stock assessment methods, but that they were alternative and/or supplemental methods which were applied when the available data did not allow the use of conventional models. Likewise, it was considered that the report of the meeting (SCRS/2011/017) included detailed information on the scope of the ERA.

The Committee recognized that currently this approach was only applied to industrial longline and that it would be positive if, in the future, it could include more information on other fleets, in particular, the artisanal fleets. The Committee valued the information which these methods contributed in providing scientific advice to the Commission when the available data were insufficient.

9.7 Joint Meeting of the ICCAT Working Group on Stock Assessment Methods and the Bluefin Tuna Species Group to analyze assessment methods developed under the GBYP and electronic tagging

The meeting was held in Madrid, Spain, June 27-July 1, 2011 with the objective of reviewing of current development of stock assessment methods (GBYP), conducting Meta-analysis for investigation of key parameters such as steepness, virgin biomass or K, r and M and investigating limit, threshold and target reference points as part of HCRs to manage risk of exceeding key reference points.

The Detail Report of the meeting is presented as document SCRS/2011/018.

9.8 South Atlantic Albacore and Mediterranean Albacore Assessment Sessions

The meeting was held in Madrid, Spain, July 25-29, 2011. The Mediterranean stock was evaluated for the first time. An update of the 2007 assessment was carried out for the Southern stock. The Albacore executive report summarizes the main results for both stocks.

The Detailed Report of the meeting is presented as document SCRS/2011/019.

9.9 Yellowfin Stock Assessment Session

The SCRS conducted a comprehensive assessment of Atlantic yellowfin tuna on September 5-12, 2011, using the available data (catch, effort and size statistics).

The Detailed Report of the meeting is presented as document SCRS/2011/020.

10. Report of Special Research Programs

10.1 Atlantic-wide Bluefin Tuna Research Programme (GBYP)

Dr. Antonio Di Natale, Program Coordinator, presented the report on the Atlantic-wide Bluefin Tuna Research Programme (GBYP) activities carried out in 2011.

The Report was adopted and is attached as **Appendix 5**.

10.2 Enhanced Research Program for Billfish

The report of the Program for Enhanced Research on Billfish, together with the proposed budget for 2012, was presented by the Program Coordinator, Dr. David Die.

The report was adopted and is attached as **Appendix 6**.

11. Report of the Sub-Committee on Statistics

Dr. Gerald Scott presented the Report of the Sub-Committee on Statistics (**Appendix 7**) which held its session in Madrid, September 26 and 27, 2011. With regards to the official statistics submitted by CPC (Task I and II) the following was noted: (a) The importance and potential use of the Fleet Characteristic data, but given the variability of the information provided it was recommended to crosscheck it with other vessel lists submitted to the Secretariat for validation; (b) The decreasing trend of conventional and electronic tag reports, thus it was recommended that the Secretariat update the list of CPC Tagging Correspondents and remind them to submit this information to the Secretariat; (c) Under the recently adopted Data Confidentiality policy by the Commission, the SCRS may further utilize more detailed information for scientific purposes, such the VMS data. With respect to VMS data it recommends to increase the resolution of the information received by the VMS signal, and to extend the VMS requirements to all main tuna operations.

The Sub-Committee also noted the importance of the documentation of the ICCAT database, and reiterated it as a priority task for the Secretariat. As regards to data quality and the impact on stock evaluations, the Sub-Committee recommended to update the evaluation of data availability and focus more on methods or protocols to

perform data quality evaluations rather than compliance submission controls. To this respect it was also proposed as future work for this Sub-Committee to seek expertise to explore evaluation of auxiliary data compiled by the Secretariat such as the market related reports.

In response to the Commission Rec. 10-10, this Sub-Committee reviewed and summarized the responses provided by CPCs regarding the CPC Observer programs in tuna fisheries. The low response by CPCs, and the different level of information provided was noted. It was recommended to send a simple form by the Secretariat to CPCs and update the information received in preparation for the response to be provided to the Commission in 2012.

Clarification of the quality and usefulness of the cannery data provided by ISSF to the Secretariat was requested regarding comments raised in earlier discussions. The Sub-Committee Chair reported that this data was fully utilized in the revision of the Ghanaian and other tuna fisheries statistics. Scientists that participated in this evaluation commented on the importance and high value of the information provided by ISSF cooperating canneries in support of the work of the Committee. It was noted that use of these data are in fact critical in identifying possible problems in species classification and enabled the Group to develop hypotheses that can be tested through controlled experiments to explain differences and thus advise on methods to overcome possible inconsistencies. The Committee agreed that the value of data provided by ISSF cooperating canneries was high and encouraged the continued reporting of these data to ICCAT.

Finally, the record high participation of scientists at SCRS Species Working Group meetings was noted to have led to a very crowded meeting room. The Secretariat noted that larger facilities (larger meeting rooms) or improvement(s) at the Secretariat location is limited by the regulations of the hosting administration.

12. Report of the Sub-Committee on Ecosystems

Dr. Shannon Cass-Calay, the Convener of the Sub-Committee on Ecosystems, presented the report of the intersessional meeting held in Miami (USA), May 9 to 13, 2011, and the recommendations and conclusions of the Joint Technical By-catch Working Group (JTBWG), which met at the Kobe III tuna RFMOs meeting. The JTBWG agreed to meet electronically every three months and to meet in person whenever possible in conjunction with Kobe meetings or, in the absence of a Kobe meeting, every three years. Over the next several years the Working Group proposes the following work plan:

- Harmonization of data collection
- Development of harmonized identification guides and release protocols
- Identify and recommend research priorities
- Prioritization of collaborative work
- Progress BMIS information sharing website
- Funding sources
- Compliance with data reporting requirements

The Committee approved the recommendations adopted by the Sub-Committee on Ecosystems which are included in the general recommendations of the SCRS.

13. A Consideration of Implications of the "Working Group on the Organization of the SCRS" that met in Madrid in February

Dr. Josu Santiago, the Chair of the SCRS, presented the conclusions and recommendations from the meeting. The critical need for capacity building and support for attendance at SCRS meetings was emphasized, particularly given the need to provide advice on the Commission's increasingly important areas of concern, such as the Ecosystem Approach to Fisheries Management.

The need was noted to provide advice that more fully considers uncertainty (such as the Kobe II Strategy Matrix) requiring the application of more complex methods such as fully integrated statistical modelling frameworks and Management Strategy Evaluation. The problem is, therefore, to ensure that there is sufficient capacity within the SCRS to apply such approaches. It was thought that there were two main ways to do this, e.g., recruit skilled staff at the Secretariat or to contract experts as required.

The benefits of both responses were discussed. Recruitment of staff at the Secretariat would ensure continuity across and between working groups but would require an agreement from the Commission. However, it was thought that for reasons of transparency, full participation by CPCs in working groups, would still be essential.

14. Consideration of Implications of the "Future of ICCAT" meeting in Madrid in May

Dr. Josu Santiago, the Chair of the SCRS, presented the conclusions and recommendations made to the Commission from the Meeting of the Working Group on the Future of ICCAT.

Important areas discussed were the needs to provide advice on the Precautionary Approach and an Ecosystem Approach on Fisheries Management. It was recognized that to provide advice on both areas requires greater consideration on issues such as the management of by-catch species and advice that more fully considers uncertainty.

15. A Consideration of Implications of the Third Meeting of Tuna RFMOs held in July in La Jolla, USA

Dr. Josu Santiago, the Chair of the SCRS, presented the conclusions and recommendations of the meeting relating to the SCRS.

The importance to develop common data confidentiality rules and a draft protocol for data sharing was recognized. Therefore, the development of a protocol to specify the types of data to be shared, how these data can be used, and who can have access to these data, was recommended.

The importance of the Kobe II Strategy Matrix (K2SM) to communicate between stakeholders and to assist in the decision-making process was recognized as was the fact that substantial uncertainties still remain in the assessments. Therefore, it was recommended that the Scientific Committees and Bodies of the tRFMOs develop research activities to better quantify the uncertainty and understand how this uncertainty is reflected in the risk assessment inherent in the K2SM.

As it was also recognized that a Management Strategy Evaluation (MSE) process needs to be widely implemented in the tRFMOs in line with implementing a precautionary approach for tuna fisheries management, it is recommended that a Joint MSE Technical Working Group be created and that this Joint Working Group work electronically, in the first instance, in order to minimize the cost of its work. It was agreed that ICCAT take a leading role in this work.

16. Consideration of plans for future activities

16.1 Annual Work Plans

The rapporteurs summarized the 2012 Work Plans for the various Species Groups. These Plans were adopted and are attached as **Appendix 4.**

Regarding the tropical tunas proposal of implementing a large-scale tagging program in 2012 and beyond, the Committee considered the possibility of getting funds from the Directorate General for Development and Cooperation of the European Commission. In order to activate the procedure it was decided to create a task force among the tropical group members. With respect to the small tunas proposal, it was requested that the Secretariat explore alternative sources of funding for data collection and research of important local small tunas fisheries, particularly in developing countries. Côte d'Ivoire and Senegal expressed their support and willingness to participate in this research initiative. There was a general recommendation to support scientific quota allocations to support financially different research programs, with priority for the bluefin year program (GBYP). Norway expressed their favorable experience in this area and offered to share their expertise. The United States, Canada and the EU endorsed this recommendation.

16.2 Inter-sessional meetings proposed for 2012

Taking into account the assessments mandated by the Commission and the Committee's recommendations for research coordination, the proposed inter-sessional meetings for 2012 are shown as in **Table 16.2**. The

Committee noted that the schedule needs to maintain some flexibility in order to account for any changes that may result from the deliberations held by the Commission in November 2012 and the meetings scheduled by other RFMOs.

Depending on the decision of the Commission, the inter-sessional meetings next year will include the Methods Working Group and the Tropical Tunas Species Group in April 2012, the white marlin assessment in May, the Sharks Species Group meeting in June, the Working Group on Ecosystems in July, and the bluefin tuna stock assessment in early September. Portugal expressed its wish of holding the Shark Species Group meeting. The meeting will be held in the Algarve region.

Table 16.2 Proposed calendar of ICCAT scientific meetings in 2012.

ICCAT MEETINGS 2012

	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	Sat
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		

16.3 Date and place of the next meeting of the SCRS

The next meeting of the SCRS will be held in Madrid from the October 1 to 5, 2012; the Species Groups will meet from the September 24 to 29, 2012.

17. General recommendations to the Commission

The SCRS noted that attendance at inter-sessional meetings is becoming an increasing concern. During the last Atlantic swordfish and South Atlantic and Mediterranean albacore assessments the lack of scientists familiar with the analyses being present at the meeting and/or conducted in the previous assessment made it difficult to conduct and/or evaluate some of the analyses. This important issue was analyzed in detail by the Working Group on the Future Organization of the SCRS. Based on the result of these analyses, the Committee recommends that actions beyond encouraging participation in scientific meetings of CPC scientists and providing short-term training workshops should be further encouraged and supported with capacity building funds to involve developing economy scientists in the work of the SCRS. Actions such as supporting visiting scientist opportunities at national laboratories or the Secretariat could accelerate more participation and involvement in the work of SCRS. Broad participation in the SCRS by CPC national scientists is an important element in promoting scientific transparency in the methods, data, and assumptions used in development of scientific advice to the Commission. While capacity building funds have been used to encourage a broader attendance of scientists from developing economies, there is evidence that scientific contributions from all but a few developing economies are not improving to a measurable degree and additional actions are needed for improvement.

The Committee endorsed the recommendations of the working group on SCRS Organization. The Committee noted in particular, the following:

Increase analytical and data base management support at the Secretariat

The recommendations for increased data base, analytical, and by-catch coordination support were endorsed by the Sub-Committee on Statistics and were recommended to Plenary. These positions should be included in the 2012 Budget of the Secretariat, but because the proposed budget was already circulated in July and only included the by-catch coordinator position, it presents a difficulty. The timing between preparation of the Budget and the identified needs of the SCRS needs to be better coordinated. The Committee recommended the SCRS Chair and Executive Secretary consult on procedures to avoid such difficulties.

Quality assurance and transparency

The Committee endorsed the recommendations to use the data fund to contract help to develop stock assessment documentation during meetings and to invite experts from other tRFMOs to participate in our stock assessments.

17.1 General recommendations to the Commission that have financial implications

The acquisition of new biological information is necessary to reduce uncertainties in key biological parameters and processes that affect the outputs of the stock assessment models, such as growth, reproduction, stock delimitation and stock mixing. Fisheries-independent information, such as tagging operations or aerial/acoustic surveys, has been also shown, for many pelagic exploited fish species of various oceans, to be crucial to get better estimates of natural and fishing mortality and to track trends in population size; and thereby to provide more robust and more precise scientific advice to the commission. Finally, more sophisticated (but also more demanding) modeling approaches are increasingly used in RFMOs while the Kobe process further encourages original approaches, such as the Management Strategy Evaluation to better take into account for uncertainties in the scientific advice. The establishment of scientific quota in several fisheries worldwide, such as the small pelagic fisheries of the North Atlantic, contributed to generate higher revenue for the fisheries.

All these needs are fully justified from a scientific and management viewpoint. Because such needs apply for all the tuna and tuna-like species, the SCRS recently requested funding of large-scale research program for several species, such as bluefin tuna, albacore tuna, billfish and the three major tropical tuna species. However, research programmes have also a high cost and can hardly be supported by CPCs if they are planned at the same time. Furthermore, the development of fisheries-independent surveys and original modeling approaches imply continuous effort over several years to be fruitful, so that it is crucial to secure funding over the whole duration of the research program. Finally, it worth noting that large research programme will be attractive to academic scientists and could thus contribute to the strengthening and the renewal of the SCRS.

For all these reasons the SCRS recommends that the Commission consider the possibility of establishing a "scientific TAC" for each tuna and tuna-like species for which a TAC is already implemented and for which a large-scale research programme is needed. Such a scientific quota would be part of the TAC but would not exceed a small percentage of this TAC. It could further be managed by the ICCAT secretariat which could, according some terms of reference, sell it on the market at the best offering fisheries entity during an annual official auction or subcontract a fishing vessel to sell the catch on the market. The modalities of such scientific quota need, however, to be deeper investigated and could be studied by the SCRS in 2012, according to existing scientific TAC in other fisheries worldwide.

Albacore

The Committee reinforces the recommendation of initiating and focusing on an albacore research program for North Atlantic albacore, given the large uncertainties identified by the Committee and in the light of the observed changes in availability of the stock in the northeast Atlantic during the last few years. The research plan will be focused on three main research areas: biology and ecology, fisheries data, and management advice during a four-year period. Detailed research aims are presented in document SCRS/2010/155. The requested funds to develop this research plan have been estimated at a cost of 4.3 million Euros. Details of the economic plan are provided in the Albacore Work Plan **(Appendix 4).**

Billfishes

Noting the misidentification problems between white marlin, roundscale and longbill spearfishes, the SCRS recommended conducting an Atlantic-wide survey of WHM-RSF-SPF distribution and abundance with the collaboration of CPCs with fleets covering the entire Atlantic, particularly in the eastern and southwestern Atlantic fishing areas.

The Committee strongly recommended that the Commission provide additional funding (15K Euros) to the Enhanced Billfish Research Program for a genetic study in order to accelerate the data acquisition and analysis for separating white marlin from spearfishes to be undertaken in the immediate future.

Bluefin tuna

The SCRS strongly supports the Atlantic-wide Research Programme for Bluefin Tuna (GBYP) and the continued acquisition of new biological information and fisheries-independent information as well as to investigate new and original modeling approaches. Without continued effort in these areas, it is very unlikely that the SCRS will be able to reduce the uncertainty in its scientific advice.

The SCRS recommends that the Commission and all CPCs concerned reaffirm their commitments to GBYP by:

- Developing a funding schedule by which CPCs may calculate their voluntary contributions;
- Ensuring assistance for the necessary permits concerning the GBYP activities in their territorial waters or airspace;
- Providing the necessary contacts at the national level for ensuring the regular development of the GBYP;
- Providing official derogations to allow the sampling of fish below the minimum size limit, the use of any type of fishing gear and the possibility of fishing even during the closed fishing season.
- Implementing a "research mortality allowance" up to 20 t for incidental mortality of bluefin tuna during GBYP conventional tagging and biological sampling programmes. Those dead fish could not be sold.

The development of fisheries-independent surveys and original modeling approaches imply continuous effort over several years to a decade to be fruitful and allow us to detect trend in population size. Therefore, it is crucial to secure funding over several consecutive years to avoid any potential waste of money and effort due to a premature stop in the funding of the scientific operations.

To do so, the SCRS strongly encourages the Commission to consider a research TAC set aside to help fund the GBYP for the coming year. A research allocation up to of 50 t could be quite beneficial in supporting the GBYP research enterprise while reducing the necessity for voluntary contributions for the program. For year 2013 and hereafter, such a scientific TAC could fully fund the GBYP (so that no voluntary contributions will be needed) if the allocation may reach up to 320 t / year (about 2.5% of the current TAC). This scientific quota could be managed by ICCAT secretariat which could, for instance, sell it on the market at the best offering fisheries entity

during an annual official auction or subcontract a fishing vessel to sell the catch on the market. The modalities of such scientific quota need, however, to be deeper investigated and could be studied by the GBYP steering committee or the SCRS, according to existing scientific TAC in other fisheries worldwide.

Tropical tunas

1. The Committee encourages the continuation of the cooperation with Ghanaian scientists. A proposal for collaboration between Ghanaian and IRD scientists is presented as an Addendum to the Tropical Tuna Species Group Work Plan for 2012.

2. The Committee reiterates the importance of the implementation of a large-scale tagging program for tropical tuna species in 2012 and beyond (see Addendum 2 to Appendix 5 of the 2010 SCRS Report).

Sharks

The Committee recommended incorporating the description of the six shark species that have been included in recent Recommendations (ALV, BTH, OCS, SPL, SPZ, SPM) in Chapter 2 of the *ICCAT Manual* in the by-catch species section.

Sub-Committee on Ecosystems

The Committee noted that the By-catch Coordinator position remains unfilled and strongly recommends that this position be recruited promptly.

Small tunas

The Committee recommends the establishment of an ICCAT Year Research Programme for small tuna species as detailed in the Addendum to the Small Tunas 2012 Work Plan.

17.2 Other recommendations

Albacore

The SCRS recommended continuing the work towards integrating the various studies relating life history parameters and ecology for Mediterranean albacore.

Billfishes

The SCRS recommended that the study on age and growth of blue marlin continue, stressing the need to include in the study anal spine sections from large specimens in subtropical and temperate areas.

The SCRS recognized the complexity of white marlin reported catches where historical catches may comprise a mixture of species, like roundscale spearfish (RSP) and longbill spearfish (SPF) in addition to white marlin. Therefore, the Committee recommended that the white marlin stock assessment to be conducted in 2012 be considered as mixed species stock assessment.

In noting that estimation of relative abundance indices is always best done at the highest spatiotemporal resolution warranted by the available data, the SCRS recommended that all CPCs, and especially those that have important catches of white marlin, provide updated relative abundance indices obtained from such high resolution CPUE data and also to take into consideration the effect of current regulations in the standardization process. For instance, when only information on retained fish is available, the effect of implementing regulations requiring the release of live fish from longlines should be accounted for, such as by developing separate indices before-after implementation.

The SCRS recommended that the surplus production models conducted in the 2000 white marlin stock assessment be updated in the 2012 stock assessment meeting.

Bluefin tuna

The Committee reiterated that it is essential to obtain representative samples of otoliths and other tissues from all major fisheries in all areas. Such collections will provide direct estimates of the age composition of the catch

(avoiding the biases associated with determining age from size), direct estimates of the stock of origin (a key factor to improve our ability to conduct mixing analyses) and will help in verifying current assumptions concerning age-at-maturity and fecundity-at-age. This activity should be coordinated with the GBYP.

The SCRS recommends that the Secretariat conduct cross-validation of the ICCAT bluefin tuna size database.

Pilot studies using dual camera systems to retrieve the size of fish at the location of the catch (or close to) were presented at the SCRS in 2011. The results being encouraging, the SCRS strongly recommends that the CPCs carry on these studies, so that stereoscopic camera systems become operational as soon as possible.

In order to improve the utility of BCD for scientific use, the Commission should implement electronic reporting forms and formats for transmission of the data to the Secretariat in order to improve the availability of complete data to the SCRS for cross-validation.

Tropical tunas

Several recommendations concerning improvement of research and the statistics of tropical tunas can be found in the Detailed Report of the 2011 Tropical Tuna Species Group Inter-sessional Meeting on the Ghanaian Statistics Analysis (Phase II) (SCRS/2011/016) and in the Detailed Report of the 2011 ICCAT Yellowfin Tuna Stock Assessment Session (SCRS/2011/020).

Sharks

The SCRS is pleased with the conservation and management measures adopted by the Commission in the last two years regarding the species classified as the most vulnerable in the last ecological risk assessment and for which no data were presented (bigeye thresher, oceanic whitetip and hammerhead). At the same time, the SCRS expressed its concern that no conservation and management measures have been adopted up to now on silky shark (*Carcharhinus falciformis*), classified in the ERA among the most vulnerable species. Consequently, the SCRS recommended that adequate conservation and management measures, similar to those adopted for the aforementioned species also be adopted for silky shark.

The Committee recommended that observers be allowed to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs) from those species whose retention is prohibited by current regulations. The Committee recommended that CPCs explore methods to estimate the catches of sharks in the purse seine and artisanal fisheries.

Sub-Committee on Ecosystems

1. The Committee recommends that the Secretariat attempt to collate user manuals or protocols describing data collection from CPC observer programs. Also, an attempt should be made to identify historical changes to the data collection protocols that might complicate data analyses and interpretation.

2. The Committee recommends that guidelines for the presentation and analysis of by-catch statistics be developed in conjunction with the Working Group of Stock Assessment Methods (WGSAM) and that these guidelines be made available as part of the *ICCAT Manual*. Furthermore, the Sub-Committee on Eco-Systems should work with WGSAM to evaluate how these data can be used as part of a risk management advice framework.

Assessments and methods

1. Meta-analysis and methods for informing key parameters: It was recommended to pursue Robin Hood approaches in order to evaluate their use for providing management advice and continue pursuing meta-analyses but identifying biases due to model assumptions. The Robin Hood approach is where stock assessments are conducted for multiple stocks at the same time. This allows information from data-rich stock assessments, e.g. trends in fishing mortality, values for parameters of selectivity functions and biological parameters to be provided to data-poor assessments. This leads to stock assessments for the most data-poor stocks being informed by those for the most data-rich stocks, i.e. taking from the rich and giving to the poor (Punt *et al.*, 2011).

2. Harvest Control Rules: Simulated HCRs should be based on the advice provided by the 2010 Working Group Stock on Assessment Methods and Appendix 6 of the 2011 Future of ICCAT meeting report unless shown otherwise. Alternative harvest control rules, including empirical rules (ISSF, 2011) should be developed and evaluated, although it thought that these will supplement rather than replace more comprehensive analytical harvest control rules. Management Strategy Evaluation should be a participative approach involving all stakeholders, from scientists to managers, the industry and the fishing communities. It should be developed for ICCAT tuna fisheries and it is recommended that MSE be actively pursued to develop robust management practices which can achieve the Convention objectives within time frames and tolerable risks that the Commission decides appropriate. As part of this process, it is necessary to work toward a full characterization of scientific uncertainty in stock status to improve estimates of risk.

Sub-Committee on Statistics

The Committee recommended that VMS signals should be reported at no more than two hour interval. Furthermore, the Committee recommended requesting VMS data from other ICCAT fisheries and from VMS associated to FADs.

During the Yellowfin Stock Assessment Session, Japan submitted revised CAS of YFT-LL for the period 1995-2010. Documentation supporting the review of the data was also provided during the yellowfin assessment in an SCRS document. The Committee inquired if the newly applied methodology could be extended to other species caught by the Japanese LL fleet and recommended that Japanese scientists consider if the methodology used for yellowfin tuna is also appropriate for other species.

The Committee agreed with the recommendation from the Billfish Species Group to develop ID cards for Istiophorids.

The Committee supported the Secretariat's proposal to contract out the development of the LL gear chapter of the *ICCAT Manual*. The Committee agreed with the recommendations to update the description of white marlin and spearfishes (RSP, *Tetrapturus georgei*, SPF, *Tetrapturus pfluegeri*) and to expand the description of several shark species to the corresponding chapter.

The Committee endorsed the recommendations of the Ghanaian statistics Working Group.

The Committee discussed and endorsed the recommendation to use market-based information to validate logbook catch reports and recommended expanding such approaches to other species, when such information is available.

The Committee reiterated that there is a need to quantify the quality of the information reported and the quality/representativeness of size samples from different fisheries is a question that fits within this issue. A 10% sampling fraction could be adopted as a general rule that could be revised on a fisheries basis. It was also indicated that for the future analysis to better characterize the level of sampling that will provide information to improve management recommendations should be conducted.

The Sub-Committee on Statistics discussed the need of forms to submit seabird, sea turtle, other by-catch, and observer data. It is expected that this task will be taken by the by-catch coordinator. The Secretariat indicated that it only received observer data from one CPC. The Committee recommended that CPCs report observer data to help the Secretariat to develop electronic forms for the submission of this type of data. The Committee approved the Secretariat's recommendation of adding spearfish to the list of main ICCAT species.

18. Responses to Commission's requests

18.1 Develop a Limit Reference Point (LRP) for the North Atlantic swordfish stock Rec. [10-02]

Rec. [10-02] paragraph 6 requests the SCRS to develop a Limit Reference Point (LRP) for the North Atlantic swordfish stock in advance of the next assessment of North Atlantic swordfish. On the basis of the LRP established by the Committee, future decisions on management shall include a measure that would trigger a rebuilding plan, should the biomass decrease to a level approaching the defined LRP.

An updated framework model for evaluation of biomass based limit reference points for the north Atlantic swordfish stock was reviewed by the Committee (SCRS/2009/029). The objective was to determine the variability on biomass due to the particular biological characteristics of the stock.

In the case of North Atlantic, only the variability associated with the stock-recruitment (SRR) assumption as was considered as the source of "normal" variations of the total biomass. Preliminary results indicated that, at this level of variation under equilibrium age structure conditions 80% of the northern swordfish biomass is expected to be between -0.20 and +0.25 fraction of the reference biomass. Using as an example, a biomass limit point (B_{lim}) defined as $B_{lim} = B_{MSY}*(1-M)$, there is a low probability of $B < B_{lim}$ (< 5%), if the stock is fished at the F_{ref} reference harvest rate. This probability would represent the changes of false negatives (trigger a response, when actually the B is just responding to natural variations). The results also indicated that the response of the recovery once an overexploitation is realized can take several years, even at relatively moderate overfishing levels when its duration continues over several years.

It is recommended to conduct further evaluations of biomass based reference limit points, to include alternative stock-recruitment hypothesis, and different selectivity patterns. Consideration of alternative biomass limits, based on percentiles of other targets levels (B_{MSY} %) is also advised.

Once candidate limit reference points are identified, SCRS/2011/195 describes a simulation framework that will allow the evaluation of their performance (*i.e.*, how well management objectives are met), and their robustness to uncertainty.

The SCRS plans to continue with this work towards identifying and testing of a limit reference point prior to the next assessment (proposed for 2013), and this task is identified in the Species Group Work Plan. Finally, the SCRS noted that development of a limit reference point which increased the probability of remaining within the rebuilt condition for North Atlantic swordfish would be fully consistent with the principles of decision-making considered by the 2011 Working Group of the Future of ICCAT (**Figure 18.1**).

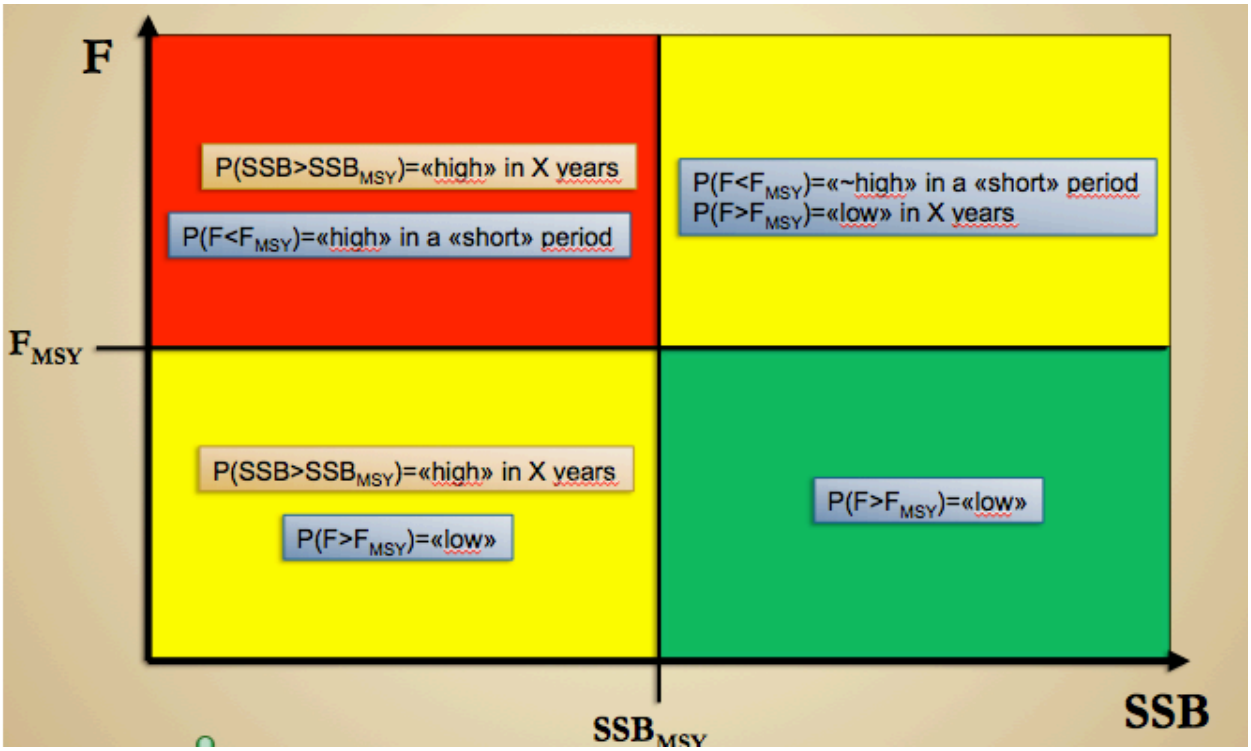


Figure 18.1. Principles of decision-making for ICCAT conservation and management measures (Working Group on the Future of ICCAT Meeting, 2011).

18.2 Review of North Atlantic swordfish data requested under [Rec. 10-02]

[Rec. 10-02] paragraph 12 calls for the SCRS to provide an evaluation of the best available data submitted by all CPCs. Those data should include catch, catch at size, location and month of capture on the smallest scale

possible, as determined by the SCRS. The data submitted shall be for broadest range of age classes possible, consistent with minimum size restrictions, and by sex when possible. The data shall also include discards and effort statistics, even when no analytical stock assessment is scheduled.

While no specific responses to this request were submitted by CPCs, the SCRS tabulated the information currently available to the SCRS for stock assessment purposes (see **Table 2,** Report of the Sub-Committee on Statistics). The information is ranked for the main CPC/gear combinations by percent catch (averaged over 1990-2009), and to make the information manageable, only the combinations comprising the top 95% of landings is shown. The summary indicates an improving trend in the availability of catch and effort information, but provides no indication of the quality or completeness of the available data (see also the Report of the Sub-Committee on Statistics). Over the recent past (2000-2010), CPCs providing information on dead discards include USA, Canada and Japan for the North Atlantic stock.

18.3 Exploration of operationally viable technologies and methodologies for determining the size and biomass at the points of capture and caging [Rec. 10-04]

The 2010 *Recommendation amending previous Recommendations by ICCAT to Establish a Multi-annual Recovery Plan for Bluefin Tuna in the eastern Atlantic and Mediterranean* [Rec. 10-04] requests the CPCs to initiate pilot studies on how to better estimate both the number and weight of bluefin tuna at the point of capture and caging including through the use of stereoscopic systems and report the results to the SCRS.

During the BFT Species Group held in September 2010, four SCRS documents regarding the use of stereoscopic camera systems were presented to the SCRS (SCRS/2011/173, SCRS/2011/189, SCRS/2011/190 and SCRS/2011/191). These documents describe some work in progress on board of Mediterranean cages in 2011. The estimates of fork length remain incomplete because of a few technical issues that remain to be solved. However, the first results are encouraging and confirm the potential of stereoscopic camera to recover the length composition of the fish that are transferred alive into cages. The SCRS strongly encourages the CPCs to carry on and complete these studies in 2012, so that stereoscopic camera systems become operational as soon as possible.

While the cages do not correspond to the exact points of captures, the information from cages may be, however, adequate to reconstruct the size composition of the catch if the measurements are performed at the arrival of the towing vessel. Trials with stereoscopic camera on board of fishing vessel have been also investigated in 2011, but the results of these operations were not provided to the SCRS.

18.4 Reporting on the scientific aspects of the national observer programmes on the basis of the information provided by CPC [Rec. 10-04] [Rec. 10-10]

18.4.1 Reporting on the bluefin scientific data coverage level achieved by each Contracting Party observer program [Rec. 10-04]

Rec. 10-04 establishes obligations to CPCs to conduct national observer programs to ensure specific observation coverage on vessels active in the bluefin tuna fishery. This provision affects purse seines equal or less than 24 m in 2011 (20 m in 2012), pelagic trawlers (over 15 m), longliners (over 15 m) and baitboats (over 15 m), tuna traps and towing vessels.

The main work of the observers on board is related to compliance activities but, in addition, when required by the Commission and based on the instructions of the SCRS, the observers could carry out scientific work, such collecting Task II data.

The SCRS has been requested to report on the coverage level achieved by each CPC and to provide a summary of the data collected and any relevant findings associated with the data. The SCRS has been also requested to provide any recommendations to improve the effectiveness of CPC observer programmes.

The Secretariat informed that few CPCs had provided information on their national observer programs. The information received presented insufficient degree of detail, except for China and Japan. The SCRS was aware that more CPCs had observer programs in place but details hadn't been made available to the Secretariat. Therefore due to the limitation of the data provided, the SCRS didn't have enough elements to conduct a detailed analysis on the coverage level achieved or on any relevant findings associated with the national observers data.

The SCRS recommends that the CPCs transmit as soon as possible all scientific information of the 2011 national observer programmes to the national scientists. If provided in due time, the national scientists could analyze this information and transmit all relevant processed data to the ICCAT Secretariat, according to the deadline of the 2012 bluefin tuna Work Plan.

18.4.2 Reporting Information on national observer programs based on the information provided by CPCs [Rec. 10-10]

In response to the Commission's request 18.4, the Secretariat has received the responses from 12 CPCs so far (September 15, 2011). To date, only a low proportion of responses that could have been submitted have yet been received by the Secretariat. The level of detail and information provided was quite variable among CPCs. The Committee reviewed the information provided and recommended the Secretariat elaborate a questionnaire form to distribute to all CPCs to facilitate gathering the information requested under Rec 10-10.

18.5 Completing the sharks identification guide [Rec. 10-06]

The second part of the identification sheets for Atlantic shark species was presented to the Committee. The new guide is pending final revision and will be available in the three official ICCAT languages over the next few days.

18.6 Evaluating the information provided by CPCs on alternative scientific monitoring approach to observer program to apply in vessels less than 15 m. [Rec. 10-10]

As of the start of the meeting of the Committee only partial information from one Contracting Party had been received on alternative methods for the collection of detailed information on vessels less than 15 m, which did not allow the Committee to carry out an assessment and prepare a response to the Commission regarding this matter.

18.7 Continuation of the evaluation of data elements pursuant to [Rec. 05-09]

In response to the Commission Rec. [05-09], the SCRS through the Sub-Committee on Statistics and the Secretariat, prepare each year a summary of the impact on stock assessment and evaluations from the lack of, deficiencies and limitations of data available for the Working Groups. Since 2007, a questionnaire has been distributed to the Rapporteurs of each Species Group that had an assessment or data preparatory meeting during the year. The questionnaire attempts to collect the working group data availability and impact on their analysis, as well specific recommendations to improve their assessment work. During 2011, several ICCAT species were assessed: blue marlin, southern and Mediterranean albacore, and yellowfin tuna. Document SCRS/2011/207 includes the response to the questionnaires by the Chairs of the respective Working Groups in 2011.

18.8 Response to the Commission Regarding Rec. 10-09

During the 2011 Species Groups meetings the Sub-Committee on Ecosystems met and reviewed progress toward meeting the data submission requirements outlined in Rec.10-09.

In 2011, the Sub-Committee on Ecosystems reviewed five working papers and two presentations addressing turtle by-catch in the Convention area. As with seabirds, factors were identified contributing to the number of encounters along with effective mitigation measures. The Group also viewed documentation geared towards educating fishers on proper gear removal and handling techniques. A description of a capacity building program, the Trans Atlantic Leatherback Conservation Initiative Program, was provided.

To expedite the evaluation of the impact of ICCAT fisheries on sea turtle populations [Rec. 10-09], the ICCAT Secretariat, the SCRS Chair and the Convener of the Sub-Committee on Ecosystems developed a call for tenders to hire a Sea Turtle Expert. The contract has been awarded and work is scheduled to begin in the first quarter of 2012. The contract is for a 6 months term and one of the final deliverables will be the database containing the information needed to conduct the impact assessment. The Sea Turtle Expert, through the Secretariat, will also coordinate efforts to identify and contact national scientists with expertise in sea turtles, by-catch estimation procedures or analytical techniques used to conduct impact assessments on by-catch species. The Sub-Committee on Ecosystems will coordinate with the Sea Turtle Expert to facilitate this process.

The Sub-Committee on Ecosystems also established a work plan for activities in 2012 relating to Rec. 10-09. During 2012, the Sea Turtle Expert, in cooperation with the Sub-Committee on Ecosystems and the Secretariat, will identify and compile the following:

1. Sea turtle by-catch data sources
2. Gaps in knowledge
3. Methodologies used to extrapolate total by-catch using data from the reporting fleets
4. Methods to estimate post-release mortality.
5. Impact assessment methodologies that may appropriate to implement given the available data.

The Sub-Committee will meet in 2012 to review this information and make recommendations with regard to the utility of the methodologies described in items 3-5. National scientists identified by the CPCs and selected by the Sea Turtle Expert as possessing expertise in these methodologies will be encouraged to attend.

19. Other matters

The issue of having two rapporteurs for the Sub-Committee on Ecosystems was discussed and it was agreed to have a rapporteur devoted on ecosystem issues and a second rapporteur focused on by-catch would help in addressing the increasing workload of this Sub-Committee.

At the Kobe III meeting it was agreed to create a joint Management Strategy Evaluation (MSE) working group and it was agreed that ICCAT would take the lead on this increasingly important approach for providing management advice. This would be handled within the Working Group on Stock Assessment Methods.

Although southern bluefin tuna is managed by CCSBT, it is found within the ICCAT Convention area. In the past, the SCRS was informed of the results of the assessment conducted by the CCSBT. However, in the most recent years, the SCRS decided it would no longer deal with issues related to southern bluefin leaving this to CCSBT, although it was felt that understanding the dynamics of southern bluefin was therefore important for the SCRS.

20. Adoption of the report and closure

The US thanked the Chair of the SCRS for his guidance throughout the meeting and hoped he would be here to guide the SCRS through many more with the same skill.

The Chair responded by saying that chairing the SCRS was a great honour but also a great responsibility. He thanked the members of the Committee for their hard work not only during this week but also throughout the whole year. Dr. Santiago thanked everyone for their support and singled out Dr. Gerry Scott, the previous Chair of the SCRS. The SCRS Chair also expressed his appreciation for the support of the Secretariat as well as his thanks to the Interpreters who have a key task in allowing us all to understand each other. Finally, he emphasized that we now have the responsibility of giving our advice to the Commission.

The Executive Secretary then closed the meeting and thanked the chair for his guidance and leadership through this his first meeting. He then thanked all the members of the Committee and noted that there is always something new that crops up that stimulates the occasion. Mr. Meski thanked the Committee, the Secretariat and the Interpreters for their hard work this week on behalf of the Commission and wished everybody a safe journey home.

The Report of the 2011 SCRS meeting was adopted.

The 2011 Meeting of the SCRS was adjourned.

Appendix 1

AGENDA

1. Opening of the meeting
2. Adoption of Agenda and arrangements for the meeting
3. Introduction of Contracting Party delegations
4. Introduction and admission of observers
5. Admission of scientific documents
6. Report of Secretariat activities in research and statistics
7. Review of national fisheries and research programs
8. Executive Summaries on species:

   YFT-Yellowfin, BET-Bigeye, SKJ-Skipjack, ALB-Albacore, BFT-Bluefin, BIL-Billfishes, SAI-Sailfish, SWO-Atl. Swordfish, SWO-Med. Swordfish, SMT-Small Tunas, SHK-Sharks
9. Report of inter-sessional meetings
   - 9.1 Workshop on the use of R tools in the data preparatory work ICCAT-SCRS
   - 9.2 Working Group on the Organization of the SCRS
   - 9.3 2011 Blue marlin stock assessment session and white marlin data preparatory meeting
   - 9.4 Inter-Sessional Meeting of the Sub-Committee on Ecosystems
   - 9.5 Tropical tuna species group inter-sessional meeting on the Ghanaian statistics analysis (Phase II)
   - 9.6 Sharks data preparatory meeting to apply Ecological Risk Analysis
   - 9.7 Joint Meeting of the ICCAT Working Group on Stock Assessment Methods and the bluefin tuna species group to analyze assessment methods developed under the GBYP and electronic tagging
   - 9.8 South Atlantic albacore and Mediterranean albacore assessment sessions
   - 9.9 Yellowfin stock assessment session
10. Report of Special Research Programs
    - 10.1 Atlantic Wide Research Programme for Bluefin tuna (GBYP)
      - 10.1.1 GBYP working group on the aerial surveys analysis, conventional tagging and biological sampling
      - 10.1.2 Symposium on Trap Fishery for Bluefin Tuna
      - 10.1.3 Working Group to analyze assessment methods developed under the GBYP
    - 10.2 Enhanced Research Program for Billfish
11. Report of the Sub-Committee on Statistics
12. Report of the Sub-Committee on Ecosystems
13. A Consideration of Implications of the "Working Group on the Organization of the SCRS" met in Madrid in February.
14. A Consideration of Implications of the "Future of ICCAT" meeting in Madrid this May
15. A Consideration of Implications of the third meeting of Tuna RFMOs held in July in La Jolla, USA.
16. Consideration of plans for future activities
    - 16.1 Inter-sessional meetings proposed for 2012
    - 16.2 Date and place of the next meeting of the SCRS
17. General recommendations to the Commission
    - 17.1 General recommendations to the Commission that have financial implications
    - 17.2 Other recommendations

18. Responses to Commission's requests

    18.1 Develop a Limit Reference Point (LRP) for the North Atlantic swordfish stock Rec. [10-02]
    18.2 Review of North Atlantic swordfish data requested under [Rec. 10-02]
    18.3 Exploring operationally viable technologies and methodologies for determining the size and biomass at the points of capture and caging [Rec. 10-04]
    18.4 Reporting on the scientific aspects of the national observer programmes on the basis of the information provided by CPC [Rec. 10-04]
    18.5 Completing the sharks identification guide [Rec. 10-06]
    18.6 Evaluating the information provided by CPCs on alternative scientific monitoring approach to observer program to apply in vessels less than 15 m. [Rec. 10-10]
    18.7 Continuation of the evaluation of data elements pursuant to [Rec. 05-09]
    18.8 Response to the Commission Regarding Rec. 10-09

19. Other matters

20. Adoption of report and closure

Appendix 2

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Appendix 3

LIST OF 2011 SCRS DOCUMENTS

Number	*Title*	*Author(s)*
SCRS/2011/011	Report of the GBYP Working Group on the Aerial Surveys Analysis, Conventional Tagging and Biological Sampling (Madrid, Spain - February 14 to 18, 2011).	Anonymous
SCRS/2011/012	Report of the Working Group on the Organization of the SCRS (Madrid, Spain - March 2 to 4, 2011).	Anonymous
SCRS/2011/013	Report of the 2011 Blue Marlin Stock Assessment Session and White Marlin Data Preparatory Meeting (Madrid, Spain - April 25 to 29, 2011).	Anonymous
SCRS/2011/014	Report of the 2011 Inter-sessional Meeting of the Sub-Committee on Ecosystems (Miami, USA - May 9 to 13, 2011).	Anonymous
SCRS/2011/015	Report of the Symposium on G-BFT Trap Fishing and Related Data Sets (Tangiers, Morocco - May 23 to 25, 2011).	Anonymous
SCRS/2011/016	Report of the Tropical Tuna Species Group Inter-sessional Meeting on the Ghanaian Statistics Analysis (Phase I) (Madrid, Spain - May 30 to June 3, 2011).	Anonymous
SCRS/2011/017	Report of the 2010 Sharks data preparatory meeting to apply Ecological Risk Analysis (Madrid, Spain - June 20 to 24, 2011).	Anonymous
SCRS/2011/018	Report of the 2010 Joint Meeting of the ICCAT Working Group on Stock Assessment Methods and the Bluefin Tuna Species Group to Analyze Assessment Methods Developed under the GBYP and Electronic Tagging (Madrid, Spain - June 27 to July 1, 2011).	Anonymous
SCRS/2011/019	Report of the 2011 South Atlantic Albacore and Mediterranean Albacore Assessment Sessions (Madrid, Spain - July 25 to 29, 2011).	Anonymous
SCRS/2011/020	Report of the 2011 Yellowfin Stock Assessment Session (Madrid, Spain - September 5 to12, 2011).	Anonymous
SCRS/2011/021	Sex ratio at size of blue marlin (*Makaira nigricans*) from the Venezuelan fishery off the Caribbean Sea and adjacent waters.	Arocha, F., Marcano, L., and Silva, J.
SCRS/2011/022	Spatial and temporal characteristics of recent landings of western Atlantic bluefin tuna in the Canadian zone, in relation to a program of biological sampling proposed as part of the grande bluefin tuna year program.	Neilson, J.D., Hanke, A. and Paul S.D.
SCRS/2011/023	Thirty Five Years of Collective Endeavour, A Review of SCRS Papers.	Kell, L. and Pallarés P.
SCRS/2011/024	Revision of the Detailed Report's Structure.	Pallarés, P., Ortíz, M., Kell, L. and Palma, C.
SCRS/2011/025	Tagging Manual for the Atlantic-wide Research Program on Bluefin Tuna (GBYP)	Cort, J.L., Abascal, F, Belda, E. Bello, G., Deflorio, M., de la Serna, J.M., Estruch, V. Godoy, D. and Velasco, M.

SCRS/2011/026	Captura, distribución y composición de tallas del aguja blanca, *Tetrapturus albidus*, observada en la flota de palangre uruguaya (1998-2010),	Domingo A., Forselledo, R. and Pons, M.
SCRS/2011/027	Índice de abundancia estandarizado de las capturas de atún rojo (*Thunnus thynnus*) obtenidas por las almadrabas españolas y marroquíes.	Abid, N., Ortiz de Urbina, J.M. and de la Serna, J.M.
SCRS/2011/028	Annual mean weight of bluefin tuna (*Thunnus thunnus*) caught by the traps in the south of Spain between 1914-2010.	Cort, J.L., de la Serna, J.M. and Velasco, M.
SCRS/2011/029	Encomienda de la SGM al IEO para el estudio del atún rojo (*Thunnus thynnus*) del Atlántico este y Mediterráneo empleando las almadrabas españolas como observatorios científicos.	De la Serna, J.M., Macías, D., Ortiz de Urbina, J.M., Abascal, F. and Rodríguez Marín, E.
SCRS/2011/030	La migración del atún rojo (*Thunnus thynnus*) a través del Estrecho de Gibraltar mediante el seguimiento de las pesquerías de almadrabas españolas y marroquíes.	de la Serna, J.M., Abid, N., Godoy, D. and Rioja, P.
SCRS/2011/031	Series históricas de capturas del atún rojo (*Thunnus thynnus*) en las almadrabas del Golfo de Cádiz.	López, J.A. and Ruiz, J.M.
SCRS/2011/032	Prospecciones aéreas en el Mediterráneo Occidental durante la concentración de juveniles de atún rojo (*Thunnus thynnus*) en el Golfo de León.	Sorell, J.M.
SCRS/2011/033	Standardized catch rates for white marlin (*Tetrapturus albidus*) from the Venezuelan pelagic longline fishery off the Caribbean Sea and the western central Atlantic: Period 1991-2010.	Arocha, F. and Ortiz, M.
SCRS/2011/034	Catch rates for white marlin (*Tetrapturus albidus*) from the small scale fishery off La Guaira, Venezuela: period 1991-2010.	Arocha, F., Barrios, A. and Marcano, L.A.
SCRS/2011/035	Observaciones sobre la aguja blanca (*Tetrapturus albidus*) a bordo de la flota española de palangre de superficie dirigida al pez espada, durante el periodo 1993-2010.	Mejuto, J., García-Cortés, B. and Ramos-Cartelle, A.
SCRS/2011/036	The iconography of tuna traps: An essential information for the understanding of the technological evolution of this ancient fishery.	Di Natale, A.
SCRS/2011/037	The literature on eastern Atlantic and Mediterranean tuna trap fishery.	Di Natale, A.
SCRS/2011/038	Tuna trap data in the ICCAT database and GBYP contributions.	Di Natale, A. and Idrissi, M.
SCRS/2011/039	Factors to be taken into account for a correct lecture of tuna traps catch series.	Ortiz, M., Palma, C., Pallarés, P., Kell, L., Idrissi, M. and Di Natale, A.
SCRS/2011/040	Brief information on Japanese trap fisheries capturing Pacific bluefin tuna (*Thunnus orientalis*) - fishery and socio-economic roles.	Suzuki, Z. and Kai, M.
SCRS/2011/041	Abundance index of young Pacific bluefin tuna (*Thunnus orientalis*) estimated from the Japanese set-net fishery's data.	Kai, M.
SCRS/2011/042	Movement of Atlantic bluefin tuna toward the Strait of Gibraltar inferred from Japanese longline data.	Suzuki, Z. and Kai, M.
SCRS/2011/043	Standardized CPUE of blue marlin caught by Japanese longliners in the Atlantic Ocean using GLM model.	Kimooto, Ai and Yokawa, K.
SCRS/2011/044	Standardized CPUE of white marlin caught by Japanese longliners in the Atlantic Ocean using GLM model.	Kimooto, Ai and Yokawa, K.

SCRS/2011/045	Standardization of blue marlin (*Makaira nigricans*) CPUE for the Taiwanese longline fishery in the Atlantic Ocean.	Sun, C-L., Su. N-J. and Yeh, S-Z.
SCRS/2011/046	Possible stock production models for blue marlin in the Atlantic Ocean up to 2009.	Schirripa, M. and Babcock, E.
SCRS/2011/047	An evaluation of methods for standardizing catch rates of highly migratory by-catch species.	Lynch, P.D., Shertzer, K.W., and Latour, R.J.
SCRS/2011/048	Preliminary analyses of simulated longline Atlantic blue marlin CPUE with HBS and generalized linear models.	Goodyear, C.P. and Bigelow, K.A.
SCRS/2011/049	Length composition and spatiotemporal distribution of blue marlin (*Makaira nigricans*) in the South Atlantic Ocean.	Frédou, T., Frédou, F.L., Hazin, F.H.V. and Travassos, P.
SCRS/2011/050	Standardized CPUE series of blue marlin and white marlins caught by Brazilian tuna longline fisheries in the southwestern Atlantic Ocean (1980-2010).	Hazin, H.G., Mourato, B., Hazin, F., Carvalho, F., Frédou, T., Travassos, P. and Pacheco J.C.
SCRS/2011/051	Inter-annual variability in the proportion of roundscale spearfish (*Tetrapturus georgii*) and white marlin (*Kajikia albida*) in the western North Atlantic Ocean.	Graves, J.E. and McDowell, J.R.
SCRS/2011/052	Preliminary studies on the possible influence of environmental factors on the catchability of the Blue marlins off the western coast of Ghana.	Bannerman, P.
SCRS/2011/053	Cory's shearwater by-catch in the Mediterranean Spanish commercial longline fisheries: Implications for conservation.	Báez, J.C., García-Barcelona, S., Mendoza, M., Ortiz de Urbina, J.M., Real, R. and Macías, D.
SCRS/2011/054	An example application of the SEMIPRO (Spatial Explicit Multispecies Integrated Production model) to Atlantic tuna and billfish.	Carruthers, T. and McAllister, M.
SCRS/2011/055	Optimizing the spatial distribution of effort to achieve management goals in a multi-species, multi-fleet fishery.	Carruthers, T. and McAllister, M.
SCRS/2011/056	Pelagic longline seabird by-catch mitigation measures: update of current research.	Anderson, O.R.J.
SCRS/2011/057	Movements of juvenile loggerhead turtles in the southwestern Atlantic Ocean.	Barceló, C., Domingo, A., Miller, P., Ortega, L., Giffoni, B., Sales, G., McNaughton, L., Marcovaldi, M., Heppell, S.S., Swimmer, Y.
SCRS/2011/058	Setting deeper, catching fewer? Sea turtle by-catch on deep set pelagic longlines in Uruguayan waters.	Miller, P., Pons, M., Domingo, A.
SCRS/2011/059	"J" hooks vs. "C" hooks in the Uruguayan monofilament longline fishery.	Domingo, A., Pons, M., Miller, P., Barceló, C., Jiménez, S., Swimmer, Y.
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SCRS/2011/167	Preliminary length-weight relationship for bluefin tuna (*Thunnus thynnus*) caught by Moroccan Atlantic traps.	Abid, N., Benchoucha, S. , Lamtai, A. and El Fanichim C.
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SCRS/2011/198	Preliminary view of by-catch hotspot: distribution of seabirds from tracking data, interaction map between seabird distribution and longline effort and by-catch distribution in the ICCAT Convention area of the southern hemisphere.	Inoue, Y., Yokawa, K., Minam, H. and Ochi, D.
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SCRS/2011/200	Report of Japan's scientific observer program for tuna longline fishery in the Atlantic Ocean in the fishing years of 2008 to 2010.	Japan
SCRS/2011/201	Estimates of seabird incidental catch by pelagic longline fisheries in the South Atlantic Ocean.	Yeh, Y., Huang, H., Dietrich, K.S. and and Melvin, E.
SCRS/2011/202	Reproduction of the albacore, *Thunnus alalunga* (Bonaterre, 1778), caught by the Brazilian longline fleet in the southwestern Atlantic Ocean.	Pedrosa V., Travassos P., Oliveira P., Hazin F., Fernandes C and Hazin H..
SCRS/2011/203	Scientific documents presented in the BFT 2011 Species Group Meeting.	Anon.
SCRS/2011/204	Scientific documents presented in the SC-ECO 2011 Species Group Meeting.	Anon.
SCRS/2011/205	Alternative Virtual Population Analyses of yellowfin tuna (*Thunnus albacares*), 1970-2010.	Tropical Tunas Species Group
SCRS/2011/206	A proposal for the smooth introduction of effective mitigation measures for seabirds into longline fishery in the Atlantic Ocean.	Minami, H., Yokawa, K., Ochi, D. and Inoue, Y.
SCRS/2011/207	Responses to the data deficiencies and its impact in assessments.	Ortiz, M. and Scott, G.

Appendix 4

WORK PLANS OF THE SPECIES GROUPS FOR 2012

Tropical Tunas Work Plan

No stock assessment(s) are planned for yellowfin tuna, bigeye tuna or skipjack tuna in 2012. Nonetheless, scientists are encouraged to update the fishery indicators for all three stocks in 2012. The Working Group on Tropical Tunas considered that an inter-sessional meeting is necessary to:

1. To revise biological parameters for the three species. National scientist should continue to carry out studies on biological parameters for tropical tunas. Some estimates on reproduction, maturity, length-weight relationships, growth and other biological parameters are based on studies carried out many years ago. Changes might have occurred in the population during this period that should be considered. Furthermore, new information from other oceans should also be taken in consideration.
2. Evaluation of alternative methods for estimation of catch at age inferred from catch at size need to be conducted.
3. Problems were identified concerning standardized CPUE series for some fleets, which results in uncertainties in the assessment. Stock assessments rely heavily upon CPUE data, and, their representativeness as indices of abundance is of concern. Therefore, it is recommended to:
   a) Explore methods to combine the data from different fisheries in a single longline index.
   b) Explore methods to improve and combine the indices provided from different fisheries in a single combined index.
4. Stock assessments lack information on abundance of recruits and juveniles. Therefore, it is important to find alternative indices of abundance. Obtaining a better understanding of the factors that affect CPUE in purse seine (FADs, echo-sounders, satellites, etc.) and baitboat fisheries (FADs, schools associated with BB) and subsequent development of standardized abundance indices could result in improvements of the use of these data in stock assessments.
5. It was noted that ISSF will hold a workshop on this very topic in March 2012. The Committee expressed support for the workshop and encourages ICCAT scientists to participate since it will contribute to the goals of the inter-sessional meeting.
6. It is noted that the Methods Working Group is looking at methods to develop procedures for select indices that are suitable for each assessment method. It is of interest of the Tropical Working Group to participate in their work.
7. The Working Group encourages the continuation of the cooperation with Ghana scientists. A proposal of collaboration between Ghanaian and IRD scientists is presented in the ***Addendum to the Tropical Tunas Work Plan***.

In addition, the Tropical Tunas Working Group strongly endorses the implementation of a large-scale tagging program in 2012 and beyond (see Addendum 2 to Appendix 5 of SCRS 2010). In preparation for this program, the Working Group will develop contacts with the industry to test the feasibility of different tagging protocols for tropical tunas.

Addendum to Tropical Tunas Work Plan

Collaboration IRD/Ghana

ICCAT Working Group on Ghanaian tuna statistics held in Madrid (Phase II, May 30 to June 3, 2011), revised historic Ghanaian Tasks I and II, proposed some corrections and elaborated some technical recommendations to improve future data collection such as greater collaboration between Ghanaian, Ivoirian and EU sampling teams due to the frequent Ghanaian landings in Abidjan. The persons in charge of tuna statistics in these CPC had a brief meeting with the ICCAT Secretary on September 28, 2011 and identified the following actions to be held in the near future:

Port and observer sampling

Objective: Insure that all vessels from any flag landing in each country being sampled according to established and common procedures agreed by ICCAT.

- Insure training of Ghanaian sampling teams in the field and vessels and verify correct collection and management of data
- Adopt measures allowing any vessels landing in either country to be sampled by national sampling team
- Identify and adopt data exchange protocols for logbook, sampling data and carrying capacity data collection
- Analyze the species composition from scientific sampling and from canneries

Data management

Objective: Insure that the Ghanaian team has at their disposal and handles the same tools for data entry, management and processing used by the European and associated tropical surface fleets.

- Update AVDTH English version used by Ghana and train the local team using it
- Translate and improve data validation software (Akado)
- Translate and adapt processing software (T3 +) for Ghanaian statistics case taking into account mix fisheries (*i.e.*, purse seiners cooperating with baitboats and large purse seiners operating alone)
- Transfer and eventually adapt software ObServe for introduction and management of observer data

Coordination and data processing

Objective: Insure a good coordination between technical and scientific teams. Insure adequacy and evolution of procedures and tools. Enhance common analysis and scientific contributions to ICCAT Working Group.

- Participation of Ghana to the annual coordination meeting of EU and associated scientific teams monitoring tuna surface fisheries. During these annual meeting organized alternatively in France and Spain, sampling collection activities, database and tools are regularly discussed and revised and common scientific contributions to the ICCAT Working Group are identified and planned.

The project should consider:

- Equipment (Computers, ichtyometers, etc.)
- Software development (Akado; T3 and ObServe)
- Travel funds:

a) IRD team in Ghana (1 week/yr)
b) Participation of Ghanaian team in Europe for annual coordination meetings (1 week/yr)
c) Participation of Ghanaian team to the Observer Program inter RFMOs meeting which will take place in France in April 2012 (probably associated with (b)).

Work Plan for North and South Atlantic and Mediterranean Albacore

The Albacore Species Group does not envisage a stock assessment in 2012. Moreover, it reiterates the fact that several key uncertainties remain and significantly affect our understanding of albacore dynamics and stock status. Thus, the working group plans to focus on improving statistics as well as conducting biological research and modeling during 2012.

North Atlantic Stock Proposed Work Plan for 2012

Given the uncertainties identified by the group, and considering the abnormal situation in the north east Atlantic fisheries during the last three years, the Group reiterates the need to carry out a comprehensive research program (SCRS/2010/155) that had been presented for support by the Contracting Parties and allocation of funds. The main research objectives identified by the Albacore Species Group are:

1. Improved knowledge of the population dynamics of albacore in the North Atlantic.
2. Improved understanding of the interactions between the biological and ecological processes of the albacore stock and the fisheries.
3. Reduced uncertainty in stock assessment, e.g. modeling of biological processes and indices of abundance, considering spatial, environmental, behavioural and targeting issues.

4. The provision of robust management strategies for the sustainable exploitation of the stock at MSY that take into account social and economic objectives.

The Committee endorses the proposed research plan in SCRS/2010/155 and the ***Addendum to the Albacore Work Plan*** and recommends funding be initiated in 2012 or as soon as possible.

South Atlantic Stock Proposed Work Plan for 2012

During 2012, the group will focus effort on:

- Updating time series of standardized CPUE for the main surface and longline fleets
- Exploring the influence of spatial and environmental variables on CPUE standardization
- Research on biological parameters (e.g. reproduction)

Mediterranean Albacore Stock Proposed Work Plan for 2012

During 2012, the group will try to improve the "data poor" situation of this stock by focussing on the following tasks:

- Revision and completion Task 1 and Task II series
- Update and, where ever possible, extend back in time the existing CPUE series, so that long enough, consistent CPUE series become available for the group.
- Considering that biological data have likely been collected in different data collection programs (e.g. EU/DCR), it is recommended that a concerted effort be made to consolidate these data in an appropriate form for analyses.
- Pursue biological studies (e.g. integrated growth analysis)

Addendum to Albacore Work Plan

North Atlantic Albacore ICCAT Research Program

The Albacore species Group reiterates the last year proposal to initiate a coordinated, comprehensive research program on North Atlantic albacore to advance knowledge of this stock and provide more accurate scientific advice to the Commission.

The research plan will be focussed on three main research areas: biology and ecology, fisheries data and management advice during four-year period. Each of these main topics includes more detailed research aims as is presented in document SCRS/2010/155. The requested funds to develop this research plan have been estimated in a cost of 4,3 million Euros. The research program will be an opportunity to join efforts from European scientists from research institutes involved in the albacore fisheries as well as CPC's scientists involved in the research of longline fisheries of North Atlantic albacore.

Research aim	*Feasibility*	*Priority*
1. Biology and Ecology	1 to 4	1 to 3
- Reproductive biology (maturity, spawning area and season, and sex-ratio)	2	1
- Growth (validation, growth modelling by sex)	1	1
- Stock structure, genetics	1	1
- Natural mortality, conventional tagging (*)	4	3
- Habitat and migration (wintering and feeding areas; horizontal and vertical distribution),electronic tags (*)	2	1
- Feeding ecology (isotopes)	1	3
2. Fishery data		
- Recovery of catch, effort and size from logbooks and increase the number of size samples for longline and surface fleets	1	1
- Efficiency of fleets	1	1

3. Modelling		
- Environmental influence on the population dynamics	2	1
- Improve relative abundance indices by means of CPUE's analyses	2	1
- Improve conversion of catch-at-size into catch-at-age	2	1
- evaluate uncertainties under alternative hypothesis and models used	1	1
- Evaluate robustness of alternative management strategies, uncertainties	1	1

Cost estimates in Euros (*) all tagging activities: conventional and electronic

Biology and ecology: estimated budget	€3.790.000
Fishery data: estimated budget	€250.000
Modelling: estimated budget	€300.000
Total estimated cost for a 4 year program	€4.340.000

Bluefin Tuna Work Plan

1. Overview

The last bluefin tuna stock assessment (East and West) was conducted in 2010 and the next has been scheduled by the Commission for 2012. This short intermission has not allowed time for key research projects to be completed; therefore the Group plans to focus on updating the analyses used to provide management advice in 2010. Seven days in early September are deemed to be sufficient to conduct this work and write the report.

The Bluefin Species Group reiterates that a three to four year period between assessments would be more appropriate because bluefin tuna is a long-lived species and it takes several years to detect changes in bluefin biomass in response to changes in exploitation or management. A longer period would also allow scientists more time for inter-sessional work focusing on the research activities outlined within the Bluefin Research Plan, such as large-scale tagging, aerial surveys, otolith micro-constituent analyses, genetics and reproductive biology. Moreover, such an interim would provide an opportunity for the Bluefin Tuna Species Group to improve models for evaluating bluefin dynamics and status (which can hardly be done during a stock assessment year), including forecasting and operating models that incorporate spatial variability and mixing.

The group recommends an inter-sessional meeting in 2013 to incorporate new data and biological information that have been collected during the recent national research programs and GBYP and to review progress in modeling approaches, including mixing.

2. Data submission

Task I and II data for the eastern and western stock through 2011 should be submitted to the Secretariat by the June 30rd (before the July 31 deadline) so that the Secretariat can incorporate the statistics into the database. *Action National Scientists and Contracting Parties.*

The standardized CPUE series used in the 2010 assessment (East and West) should be updated including 2011 and made available as working papers by the first day of the meeting. The length database of ICCAT should be also checked and validated. *Action National Scientists and Secretariat.*

3. Catch and VMS summaries

The Secretariat should prepare summaries of the available catch data, catch-at-size, catch-at-age and VMS data (i.e. effort by gear/year/month/area) by the start of the meeting. *Action Secretariat.*

4. Assessment

The stock assessment work should focus on updating the analyses conducted in 2010 that were used to provide management advice. Mainline advice should be based on results from validated and documented software retained in the ICCAT catalog. These catalog entries need to be completed by April 2012. *Action National Scientists.*

Billfish Work Plan

Background

The Working Group initially proposed to conduct a Data Preparatory Meeting in 2009 and the next assessment of blue marlin and white marlin in 2010. These meetings were later postponed to 2010 and 2011 to better accommodate the 2009 Atlantic sailfish stock assessment. Due to genetic analyses and model projections results reported by Beerkircher *et al. (*2010), historical catches of white marlin may also inadvertently reflect significant numbers of roundscale spearfish and even longbill spearfish. For this reason, the working group felt that a white marlin assessment would not be possible in 2011, until this problem is resolved.

In 2009 the Working Group proposed to conduct the assessment through a three stage process:

1. Hold a data preparatory meeting for blue marlin in the first half of 2010 to produce catch estimates, update biological parameters, and estimate relative abundance indices for blue marlin which was successfully completed.
2. Conduct an assessment of blue marlin in 2011 and develop white marlin catch estimates, including a major effort to separate catches of roundscale spearfish (and other spearfish) from white marlin catches to the extent possible. We anticipate this effort will require an investment of funds by ICCAT through the Enhanced Research Program for Billfish (ERPBF) to accelerate the genetic analyses currently being conducted on this topic. Update biological parameters and estimate relative indices of abundance for white marlin if possible. Data in support of the blue marlin assessment and white marlin data preparatory meeting evaluation must be available at least two weeks in advance (Task I and Task II, including any revisions to historical time series, through 2009, submission of more recent data is also encouraged, but not required) of the assessment meeting.
3. Conduct an assessment of white marlin in 2012.

The last stock assessment for blue marlin was conducted in 2011 and for white marlin in 2006. No assessments have ever been conducted on spearfishes (*Tetrapturus spp.*). During 2009 the Working Group conducted the first successful assessments for western and eastern Atlantic sailfish stocks.

Proposed work for 2012

Blue marlin

All countries catching blue marlin (directed and by-catch) should contrast their information with the blue marlin catalog for Task I and II detailed in the 2010 Report of the Blue Marlin Data Preparatory Meeting, and provide the updated information by next SCRS meeting.

The new catch estimates of blue marlin from FAD fisheries of Martinique and Guadalupe (EU France) used in the recent blue marlin assessment need to be documented and presented as an SCRS document in the next species group meeting, in order to incorporate them into the Task I database.

The group will explore the development of the historical Japanese longline fine-scale catch rate index.

Continue the Atlantic-wide study on age and growth of blue marlin.

White marlin

Data in support of the white marlin assessment meeting must be available at least two weeks in advance (Task I and Task II, including any revisions to historical time series, through 2010, submission of more recent data is also encouraged, but not required) of the assessment meeting.

During the white marlin data preparatory meeting, it was concluded that the amount of variability in the observed ratios between white marlin and round scale spearfish (annual and inter-annual) and the insufficient spatial sampling coverage would preclude the ability to reliably estimate proportions of roundscale spearfish from white marlin catches at present. It was decided to base the white marlin assessment (2012) on the information being reporting as white marlin.

All countries catching white marlin (directed and by-catch) should contrast their information with the white marlin catalog for Task I and II given in the Detailed Report of the Blue Marlin Stock Assessment Session and White Marlin Data Preparatory Meeting, and provide the updated information at least two months prior to the white marlin assessment.

Prior to the stock assessment, CPCs should provide historical series of numbers of white marlin discarded dead and released alive so that the effect of discarding and releasing can be fully integrated in the stock assessment. Efforts should be made to obtain reliable estimates of discards with regard to quantity and length composition.

In addition to the surplus production model to be used in the assessment, the application of statistically integrated assessment models should be explored to take into consideration, seasonal catch, effort, size information for all gears, and alternative geographic stratification. Review of input parameters required for the statistically integrated model will be conducted via web-based.

During the 2012 white marlin assessment the group will explore the use of informative priors of the stock recruitment steepness parameters.

Update biological parameters for white marlin (sex ratio at size, age and growth).

All Istiophorid species

Continue to support the improvement of biological sampling of all billfish species.

Continue to support on the age and growth of sailfish and longbill spearfish.

Continue to support on sailfish reproduction off the West Africa and Atlantic coast of South America.

Swordfish Work Plan

Background

The last assessments for North and South Atlantic swordfish were conducted in 2009. The next assessment is proposed for 2013.

For the Mediterranean stock, the last assessment was conducted in 2010. The next assessment should take place not before 2013 except if negative indicators arise from the fisheries.

Proposed work

North Atlantic and South Atlantic

The Species Group, with the assistance of the Secretariat, should complete its work evaluating possible limit reference points for North Atlantic swordfish, as requested by the Commission in Rec. 10-02.

A list of recommended work has been provided in the Report of the 2009 ICCAT Atlantic Swordfish Stock Assessment Session (Anon. 2010g). Among those recommendations, the following were identified as high priority areas where continued efforts are required:

- Data Preparatory and Methods Meetings. Due to time constraints, recent sessions of the Swordfish Working Group have provided assessments that have updated past results using methods and approaches available at the time. The Group recognizes that newer stock assessment approaches are now available which more fully incorporate biological data and provide more complete representations of uncertainties in stock status. To allow the Group time to explore the new approaches and to assemble the data in advance of the stock assessment session, it is recommended that a working session of five days duration be convened prior to the next assessment. Based on experience with other stocks, it is recommended that the data preparatory and methods meeting take place in the same year that the assessment meeting is scheduled (2013).
- Catch. All countries catching swordfish (directed or by-catch) should report catch, catch-at-size (by sex) and effort statistics by a small an area as possible, and by month. These data must be reported by the

ICCAT deadlines, even when no analytical stock assessment is scheduled. Historical data should also be provided.

- CPUE series. It is recommended that given the similarity between part of the Brazilian and Uruguayan swordfish fishing fleets and taking into account that the CPUE standardization studies of both fleets submitted at the meeting differ in their methods and results it would be desirable that scientists from Brazil and Uruguay hold inter-sessional meetings to deal with the standardization of CPUE series and processing of data from their respective fleets.
- Assignment of ages. The computer codes used for ageing swordfish in the Atlantic should be updated. The new sex-specific growth curves (Arocha *et al.* 2003) should be incorporated, and its impact in terms of the catch-at-age estimation, as well as its consistency with the tagging data should be evaluated before a new set of growth curves is formally adopted by the Group.
- Discards. Information on the number of undersized fish caught, and the numbers discarded dead and released alive should be reported so that the effect of discarding and releasing can be fully included in the stock assessment. Observer sampling should be sufficient to quantify discarding in all months and areas in both the swordfish directed fisheries and the tuna fisheries that take swordfish as by-catch. Studies should be conducted to improve estimation of discards and to identify methods that would reduce discard mortality of swordfish. Studies should also be conducted to estimate the subsequent mortality of swordfish discarded alive; these are particularly important given the level of discarding due to the minimum size regulatory recommendation.
- Target species. All fleets should record detailed information on log records to quantify which species or species group is being targeted. Compilation of detailed gear characteristics and fishing strategy information (including time of set) are very strongly recommended in order to improve CPUE standardization. The recommendations made by the 2002 meeting of the Working Group on Methods for looking at diagnostics in this context should be followed. The Group recommended the investigation of alternative forms of analyses in the south that deal with both the by-catch and target patterns, such as age- and spatially-structured models.
- Recruitment indices. The Group's ability to forecast stock status within the VPA is contingent on the availability of reliable indices of abundance at the youngest ages. For example, age-1 indices of abundance are only available up to 2001. Countries that have traditionally provided such indices should update their time series, as a matter of high priority. This research should be supported at the Contracting Party level.

Mediterranean

- Catch and effort. All countries catching swordfish (directed or by-catch) should report catch, catch-at-size (by sex) and effort statistics by as small an area as possible (5-degree rectangles for longline, and 1-degree rectangles for other gears), and by month. It is recommended that at least the order of magnitude of unreported catches and discards be estimated. The Group noted that it is important to collect size data together with the catch and effort data to provide meaningful CPUEs by age.
- Gear selectivity studies. Although some work has been already done, further research on gear design and use is encouraged in order to minimize catch of age-0 swordfish and increase yield and spawning biomass per recruit from this fishery.
- Stock mixing and management boundaries. Considering differences in the catch and CPUE patterns between different Mediterranean fisheries, further research, including tagging investigations, in defining temporal variations in the spatial distribution pattern of the stock will help to improve stock assessment and management.

Small Tunas Work Plan for 2012-2013

The following recommendations should be taken into account for improving Task I and Task II data and conducting future assessment in order to provide ICCAT with appropriate management advice for fisheries targeting small tuna:

1. All countries should report Task I and Task II data and make effort to improve knowledge on the biology and the stock structure and other relevant aspects of these species;

2. National scientists should review their catches and try to classify them by species;
3. Support national scientists working on small tuna species to participate in the ICCAT meetings;
4. CPCs should ensure a large distribution of the ICCAT small tunas species identification sheets to improve their Task I statistics data;
5. Set up an ICCAT Year Research Programme for small tuna species, the details of this program are attached as the ***Addendum to the Small Tunas Work Plan***;
6. Continue studies on stock structure and species distribution;
7. Develop simple indicators of stock sustainability such as proportion of juveniles within the catch and statistical trends in historical catches;
8. Collaborate, as much as possible through joint Working Groups, with RFOs (GFCM, CRFM, COPACE, and CECAF) to improve and exchange basic fisheries data on SMT; Include blackfin tuna (*Thunnus atlanticus*) in the small tunas chapter of the *ICCAT Manual;*
9. Follow progress of blackfin tuna aquaculture experiments being performed by the University of Miami (United States).

Addendum to Small Tunas Work Plan

A Proposal to Set Up an ICCAT Year Research Programme or Small Tunas (SMTYP)

Overview

The status of small tuna stocks in the ICCAT Convention area is generally unknown. Nevertheless these species have a high socio-economic relevance for a considerable number of local communities at the regional level, which depend on landings of these species for their livelihoods.

Fisheries statistics and biological data which can provide a basis for assessing these resources and thus providing the Commission with the appropriate scientific advice for their sustainable exploitation are generally unavailable for these species.

To deal with this issue and to achieve the objectives established by the 2008 joint ICCAT GFCM working group, it is now high time to establish an ICCAT Year Research Programme for Small Tunas (SMTYP), whose the main objective for the first two years will be the collection of statistics and biological data as well as the recovery of all the historical available data in the main fishing areas, with a focus on the priority species identified by the ICCAT/GFCM in 2008. This program has a wide geographical sampling coverage to include also the Caribbean Sea.

The work plan for this programme would be as follow:

January 2012- June 2013: Priority for the collection of all the available data (statistical and biological data) in the main fishing area:

- Mediterranean and Black Sea: Bullet tuna, Atlantic bonito, Little tunny and Plain Bonito;
- West Africa: Atlantic bonito, Little tunny, Bullet tuna and West African Spanish mackerel; Frigate tuna, wahoo
- Caribbean area: Blackfin tuna and Serra Spanish mackerel, king mackerel

July 2013- A small tuna data preparatory meeting to gather and analyze the recovered data in the main area mentioned above. Exchange of information and data between national responsible scientists in each area by email, after an agreement between ICCAT and other RFOs concerned (GFCM, CECAF, CRFM, and WECAF).

September -October *2013*

Presentation of the preliminary results obtained to the SCRS Species Group.

Estimation of the preliminary budget:

Sampling area	*Participating countries*	*Species sampled*	*Total budget (Euros)*
East Mediterranean	Turkey Egypt	Bullet tuna, Atlantic bonito, Little tunny and Plain Bonito;	15 000,00
Central Mediterranean	Tunisia Italy	Bullet tuna, Atlantic bonito, Little tunny and Plain Bonito;	15 000,00
West Mediterranean	Morocco Spain	Bullet tuna, Atlantic bonito, Little tunny and Plain Bonito	15 000,00
West Africa	Morocco Mauritania Senegal Cape Vert Côte d'Ivoire	Atlantic bonito, Little tunny, Bullet tuna and West African Spanish mackerel; Frigate tuna, wahoo	35 000,00
Caribbean area (western Atlantic)	CARICOM countries Brazil Venezuela	Blackfin tuna and Serra Spanish mackerel	15 000,00
Total			95 000,00

Sharks Work Plan

General comments

As on other occasions, the Group noted the absence of scientists from the Parties that catch shark species, thereby limiting the possibilities of access to information. This situation is not unique to this Group and this poses a problem that should be resolved by a strong commitment of the Parties.

Work Plan

− Carry out the Ecological Risk Assessment (ERA)

Two coordinators were selected (E. Cortés and A. Domingo) to compile the necessary information provided by the national scientists to develop the ERA. The information required, which is given in detail in the report of the inter-sessional meeting (Item 3 and Appendix 4), should be available prior to the end of 2011.

− Assessment of *Isurus oxyrinchus*

Contact the national scientists who could assist in running the models. Request the CPCs to conduct a review of their historical catches and carry out the following tasks two months prior to the assessment:

- Catches (Secretariat)

  a) Comparison of shark catches available in the ICCAT databases compared to the Eurostat data.
  b) Estimation of catch series using the tuna:sharks ratios.
  c) Estimation of catch series using shark fin trade information.

- Effort (Secretariat)

  Updating of the time series of estimated longline effort (EFFDIS) prior to the assessment

- Specific gear/fleet selectivities (U.S. scientists)

  Estimation of the gear/fleet selectivities to use in those models that do not estimate them internally, revising the methodology and the biological data used.

- Biological data (Uruguayan scientists)

  Review of the biological data on shortfin mako used in the last assessment and update them if necessary.

- Catch rates (U.S. scientists)

  Compile the catch series sent by the national scientists and estimate the combined CPUE series.

Working Group on Methods Work Plan

The plans for 2012 include:

1. The Blue Marlin and Shark Working Groups requested the Working Group on Stock Assessment Methods to investigate and test the GLMtree model for CPUE standardization and especially for use for by-catch species.
2. Generic methods for combining and standardizing multiple CPUE series for inclusion in stock assessment models will be investigated and generic methods for these procedures will be developed.
3. Methods for selecting appropriate CPUE series for inclusion in assessment models are crucial. For many species groups there has been concern as to which CPUE series have been included in the assessments in 2011. The Group aims to develop generic protocols for the inclusion or use of CPUE series in assessment models (rigorous assessment of CPUE series including hind casting).
4. As requested by the Sub-Committee on Statistics, methods for monitoring and evaluating recreational fisheries will be investigated.
5. The Group aims to generate simulated data sets for testing generic assessment techniques and methods (multiple sets for multiple species life histories).

Appendix 5

ICCAT GBYP
ATLANTIC-WIDE BLUEFIN TUNA RESEARCH PROGRAMME
ACTIVITY REPORT FOR 2011 (PHASE 2)

1. Introduction

The Atlantic-wide Research Programme for Bluefin Tuna was officially adopted by SCRS and the ICCAT Commission in 2008, and it started officially at the end of 2009, with the objective to:

a) Improve basic data collection, including fishery independent data;
b) Improve understanding of key biological and ecological processes;
c) Improve assessment models and provision of scientific advice on stock status.

The total budget of the programme was estimated at about 19 million Euros in 6 years, with the engagement of the European Community and some other Contracting Parties to contribute to this programme in 2009 and in the following years. The initial year had a budget of 750.000 euro, while the second phase had a total budget of 2.502.000 Euros (against the original figure of 3.476.075 Euros).

Phase 1 and Phase 2 activities were jointly committed by the European Community (80%), Canada, Croatia, Japan, Libya, Morocco, Norway, Turkey, United States of America, Chinese Taipei and the ICCAT Secretariat. Some private entities provided funds or in kind support; the detailed list is available on http://www.iccat.int/GBYP/en/Budget.htm.

2. Coordination activities

The GBYP Phase 2 officially started on 22 December 2010, with the signature of the agreement between the European Community and the ICCAT Secretariat. A detailed weekly work-plan for 2011 was set up in the very first period of this second Phase. The GBYP coordination staff was reinforced with a Coordinator Assistant. Dr. M'Hamed Idrissi was selected and he started his duties on 1 March 2011. The ICCAT Secretariat nominated Dr. Laurence Kell as internal focal point for the GBYP activities.

A relevant activity at the early beginning of Phase 2 was the organisation of the three meetings planned in February, which required considerable effort. The participation of 44 scientists from 11 countries and the extremely positive comments received compensated all efforts and confirmed the positive reaction of the scientific community and stakeholders to the GBYP activities. Another meeting (the Symposium on Traps) was organised in Tangier in May 2011, with the participation of 58 scientists.

During this Phase 2 it was necessary to issue nine Calls for Tenders on various items and a total of 18 contracts were signed by the ICCAT Secretariat. The EC Grant Agreement includes 19 deliverables (periodic reports) and many have been already delivered. The administrative and desk work behind these duties was quite important. In Phase 2 of GBYP, the coordination staff participated officially in 14 meetings in various countries. Furthermore, the GBYP coordination is providing scientific support to all the national initiatives which are potentially able to increase the effectiveness of the GBYP and its objectives.

The detailed report is available in document SCRS/2011/166.

3. Steering Committee

The GBYP Steering Committee was renewed after the 2010 ICCAT Commission meeting. The members are the Chair of SCRS, Dr. Josu Santiago, the BFT-W Rapporteur, Dr. Clay Porch, the BFT-E Rapporteur, Dr. Jean-Marc Fromentin, the ICCAT Executive Secretary, Mr. Driss Meski, and an external expert, Dr. Tom Polacheck, who was duly contracted.

The activity of the Steering Committee included continuous and constant e-mail contacts with the GBYP coordination, which provided the necessary information. The Steering Committee held two meetings (February 17, 2010; June 27-July 1, 2011), discussing various aspects of the programme, providing guidance and opinions.

A third meeting is planned during the SCRS Species Group meeting, to define the activities and the budget options for Phase 3.

4. Data mining and data recovery

The data mining and data recovery activity continued following the objectives recommended by the Steering Committee, with a particular focus on tuna trap data series. Two Calls for Tenders were issued and seven contracts were awarded. A very important amount of data, previously not included in the ICCAT database, was recovered, particularly for tuna trap series, which now start from 1525, including about 25 million new entries for tuna trap catches and about 33.000 new entries for other fisheries. With these data, GBYP is filling many of the existing gaps, but not all, extending the historical data series back in centuries. All data were provided on the forms provided by the ICCAT Secretariat, according to the needs of the ICCAT database.

GBYP also acquired SST data for the three months of the main spawning period (May-June-July) for the years 2000-2011. These data are used for the spatial analysis of the aerial survey data and they are also available for further analyses by SCRS. Following the same approach agreed in Phase 1, aerial survey data have been analised also within the data recovery budget and the final results will be available at the end of 2011. In Phase 2, the team elaborating on the data has been requested to provide extensive survey scenarios for setting up the GBYP working programme for 2012 and the following years.

5. Aerial surveys

The aerial surveys have the scope to provide fishery-independent indices on various fractions of the stock. The aerial surveys targeting spawning aggregations can potentially provide trends and indices for the spawning stock biomass, while aerial surveys targeting aggregations of juveniles can potentially provide indices for recruitment. Surveys shall be conducted with a statistically sound design and for several years in order to get reliable indices. Since the beginning of the GBYP, it was decided to concentrate all efforts on spawning aggregations, while the surveys on juveniles should be conducted by the various countries concerned.

In Phase 2, as planned, the activity was preceded by a Workshop on Aerial Survey (February 14-16, 2011). The Workshop discussed how improving the methodology and which technical requirements should be necessary. The Steering Committee endorsed most of the recommendations.

A training course for pilots, professional observers and scientific observers concerned with the GBYP Aerial Survey activity was organised at the ICCAT Secretariat on May 17-18, 2011.

5.1 Aerial survey design

The preliminary work was devoted to updating the identification of the most relevant areas and this was carried out at the ICCAT Secretariat using the 2008 to 2010 VMS data from tuna purse seine vessels. It was agreed to concentrate efforts only on areas where the PS fishing activity was more intense in these last three years and 4 or 5 sub-areas were identified, under two different scenarios.

The study for the tagging design was committed to the same team who provided the design for Phase 1, adopting the same methodological approach (DISTANCE software). The design was provided on March 30, 2010 and the ICCAT Secretariat provided the revised file to submit the survey data.

5.2Aerial survey on spawning aggregations

The aerial survey on spawning aggregations was carried out by three companies, selected over four tenders and the contracts were discussed and agreed on May 17, 2011. All tenders were able to get the flight permits from Spain, Italy, and Malta in due time, but it was not possible to get flight permits from Syria, while the permit from Turkey was released after the expiry date of the survey. All these problems imposed a revision of one contract and, at the same time, a revision of the aerial survey design, limiting the areas to three (Balearic area, South Tyrrhenian Sea and central Mediterranean), in agreement with the Steering Committee. The aerial survey started at the beginning of May and was completed on July 15, 2011.

The monitoring of the sea surface temperatures and sea state and winds was carried out by the coordination team and data were provided to the various teams in real time. The wind in the western Mediterranean and in the Tyrrhenian Sea, some international constrains in the central Mediterranean, and some technical problems of two

aircraft created additional operational problems for the aerial survey in Phase 2. Three aircraft and teams conducted the surveys in the various sub-areas, while a fourth aircraft and its team was stopped in Turkey. The aerial survey data have been provided on schedule by all teams and the individual reports are already available.

A contract was provided to the same team that provided the data elaboration in Phase 1, to analyse the aerial survey data. The interim report was provided in due time (September 19, 2011) and the results are considered very useful for improving and developing the aerial survey activities in the following years, also providing the various scenarios for a comprehensive Mediterranean survey in Phase 3, as requested by the Steering Committee. This second year activity of aerial surveys confirmed the validity of the methodological approach in general, as one of the very few able to provide fishery independent data and trends. At the same time, the problems encountered showed the need to get very precise commitments from the CPCs concerned, in order to carry out the necessary flight permits on time.

The final report concerning the elaboration on aerial survey data, the spatial analyses and the complete range of scenarios and designs for the comprehensive surveys will be provided before the end of Phase 2, according to the contract.

6. Tagging

The GBYP tagging activity was planned from Phase 2. The tagging design, elaborated as a draft in Phase 2, was better defined in the first part of Phase 2. The operational meeting on biological sampling was held at the ICCAT Secretariat in Madrid on February 17, 2011, to discuss the many aspects of this complex activity and the GBYP Tagging Design, including the GBYP Tagging Manual, which were officially adopted. The meeting was attended by 42 scientists.

The Tagging Design was officially adopted by the Steering Committee and it is considered extremely relevant, because an appropriate tagging activity is a better estimate of natural mortality rates (M) by age or age-groups and/or total mortality (Z), of course if the tag reporting rate substantially improves, reaching a sufficient level by major fisheries and areas, and this should improve knowledge on the habitat utilisation and movement patters of bluefin tuna in the various areas. It is the base for carrying out the tagging activities in the following years, with important implications on the GBYP budget.

A sufficient number of conventional tags were acquired on time (10.000 single barb dart, 8.000 double barb small darts and 2.000 double barb big darts), along with a sufficient number of tag applicators and 50 PIT readers.

6.1 Tagging activity

The GBYP tagging activity was defined by the Steering Committee on February 17, 2011 and refined during the summer meeting (June 27-July 1, 2011). A Call for Tenders was issued on May 12, 2011 and only one bid was received. The bid was not awarded and another Call for Tenders was issued on June 11, 2011. Another bid was submitted and awarded on July 9, while the contract was released on July 29, 2011 to a Spanish consortium of six entities.

The tagging activity will be carried out on juvenile bluefin tunas (age 0 to age 3) in the Bay of Biscay by baitboats (about 1250 tunas), in the area of Gibraltar by baitboats (about 1250 tunas), in the western Mediterranean by a purse seiners (about 1250 tunas) and in the central Mediterranean by a purse seiners (about 1250 tunas). A complementary tagging activity will be carried out, on an opportunistic basis, by the sport fishermen (possibly 500-700 tunas).

The tagging activity started immediately, and several operational problems were encountered, mostly due to bad weather conditions, but the first mid-term report, submitted by September 23, 2011, shows that about 2,000 tunas have been tagged to date and that the tagging activity will continue until the end of the period.

Another tagging activity, not included in Phase 2 due to budgetary problems, was carried out with electronic tags in a Moroccan trap, thanks to the cooperation of several institutions, the tuna industry and WWF-MEDProgramme (the details are included in the detailed report). A total of 11 large tunas were tagged and several tags are providing surprising and extremely interesting data.

6.2 Tag awareness campaign

According to the recommendations provided by the Steering Committee in all meetings, the GBYP started a tag awareness campaign, for the purpose of improving the tag recovery and reporting rates. This activity, which was carried out by ICCAT and SCRS for all species since various years, needed to be strengthened and further improved, particularly after the start of the massive tagging activities by the GBYP. For this reason, it was decided to find a specific slogan, a dedicated logo, two types of posters and a leaflet, to be translated in Arabic, English, French, Greek, Japanese, Italian, Portuguese, Spanish and Turkish, and distributed capillary in the entire ICCAT Convention area for the purpose of reaching all stakeholders in all fisheries. A Call for Tenders was issued on July 28, 2011, and three bids were received. One bid was partially awarded and the first report was submitted on September 23, 2011 and the drafts of the various designs are now available. The final version will be available soon for printing the material before completing the tagging campaign. The tagging awareness campaign is coupled by a tag rewarding campaign strongly recommended by the Steering Committee. It was decided to improve the ICCAT annual lottery with GBYP rewards for tags recovered from bluefin tuna and regularly reported to ICCAT. High level rewards will be given for the recovery of each electronic tag from bluefin (1000 Euros) or for additional prizes for the annual ICCAT tagging lottery (an annual prize of 1000 Euros for the first tag drawn and two prizes of 500 Euros each, respectively for the second and third tags drawn, to be delivered during the ICCAT Tag Lottery. Within the same item, the ICCAT Secretariat and the GBYP coordination are working to detect an attractive design for the T-shirts to be used as rewards for each conventional tag recovered. It is also considered very important to provide immediate feedback to the tagging teams and the tag recovery person, informing both of them about the history of each tag.

7. Biological and genetic sampling and analyses

Biological and genetic sampling and analyses have been planned from Phase 2. The details were discussed during a specific operational meeting held at the ICCAT Secretariat on February 17, 2011, which was attended by 42 scientists. The meeting discussed in depth all the various aspects and suggested having a common scheme. The Steering Committee, on the same day, endorsed this suggestion and recommended issuing a Call for Tenders for a "Biological Sampling Scheme" to be used to more precisely establish the sampling levels in the various areas and fisheries in the Phase 2 activity. The Call was issued on March 11, 2011, and only one bid was received, which was awarded to a consortium of 13 institutions from 8 countries on July 14, 2011.

Taking into account that some areas and fisheries included in the "Biological Sampling Scheme" cannot be sampled due to concurrent geo-political factors, the sampling activity under contract includes now a total of 1950 samples, including 50 larvae, 1300 for genetic tissue, otoliths and spines, and 600 for genetic tissue, otoliths, spines and gonads. A first report was received on September 24, 2011 and 900 tunas have been sampled as of that date, while the analytical works had already started.

The GBYP activity will be supported by a twin programme carried out by NOAA-NMFS, which will focus the research activities on the western Atlantic Ocean.

8. Modelling approaches

To ensure that modelling work would be started this year, the GBYP issued a Call for Tenders on March 15, 2011 for Stock Assessment Modelling, for a first set of contracts. These were: (a) one contract for a risk analysis to identify the main perceived sources of uncertainty related to assessment and advice, and (b) two contracts to help develop new assessment and advice based on various data sets being collected and the new knowledge being gained under the GBYP. Unfortunately, only one bid was received for the second theme. Two contracts were awarded on April 5, 2011 and the methodologies were presented at the ICCAT Working Group on Stock Assessment Methods (WGSAM) on June 27-July 1, 2011, where one day (June 28) was devoted to bluefin tuna issues. The preliminary reports on the work done were presented at the Bluefin Tuna Species Group on September 29, 2011. Additional work was developed by a team of SCRS scientists together with Dr. Laurie kell of the ICCAT Secretariat and presented at the WGSAM.

9. Cooperation with ROP

The GBYP coordination, together with the ICCAT Secretariat, is maintaining the contacts between the two consortiums in charge of the biological sampling and tagging and the ROP observers, for strengthening the cooperation and providing opportunities.

10. Definition of GBYP publication policy, editorial and data rules

The GBYP publication policy, along with editorial and data use rules adopted in Phase 1 were updated by the GBYP Steering Committee during the last meeting (June 26-July 1, 2011). They are attached herewith as Annex 3.

11. GBYP web page

The ICCAT-GBYP web page, which was created in the last part of Phase 1, is usually regularly updated with all documents produced by GBYP; in some cases, due to the huge workload, some sets of documents are posted all together. The updating also includes the budget page, where all contributions (monetary of in kind) are regularly listed, to ensure full transparency.

12. Following activities

The next phases of the Atlantic-Wide Research Programme for Bluefin Tuna will mostly include activities able to provide fishery independent data and indices within the time-frame of the whole programme and in agreement with the GBYP general plan adopted by the SCRS and the ICCAT Commission. Additional activities will be developed for the modelling approaches.

The Steering Committee and the GBYP Coordination agreed to continue the discussion during the SCRS meeting, where the various options will be discussed and selected, with the necessary budget variations. It is to be noted that the current budget figure is very far from the budget figure adopted by the Commission in 2009 for Phase 3, which was on the order of about 6.3 million Euros and this is caused by the announcement of the reduced contribution available from some CPCs.

GBYP Phase 3 (still temporarily under the reduced minimum budget perspective) will include, in principle, the following activities:

1) **Coordination**.
2) **Data mining, data retrieval and data elaboration**, including data input in the ICCAT database.
3) **Aerial surveys,** including the updating of the aerial survey design and the third year survey on spawning aggregations. Based in the results of the analyses of the 2010 and 2011 aerial surveys data, the Steering Committee recommended, and the SCRS approved, the extension of the survey area in 2012 and forward as the only way to obtain reliable independent indices of spawners from aerial surveys to be used for monitoring the stock. This extension will imply additional costs on the order of 1,2 - 2,5 million Euros per year[1] for more than one year (up to and including 2022 considering CV=0,4); the figure in the budget includes the minimum amount for conducting an extended survey and the additional activities required by the Steering Committee). Without the adequate financial support and the guarantee of flight permits these surveys would not secure obtaining reliable results.
4) **Tagging**, including conventional tagging, a limited electronic tagging (50 tags) and activities to improve tag reporting, with the related rewards; a recapture campaign was also requested by the Steering Committee and approved by the SCRS;
5) **Biological sampling**, including hard parts sampling for ageing and micro-constituent analysis, genetic sampling and related analysis.
6) **Modelling,** including two workshops, risk analysis, alternative MF and modelling trials.

The GBYP Phase 3 budget and activities will be revised by the Steering Committee and the SCRS in the last part of Phase 2, according to the updated budget perspectives and the research needs. The provisional calendar for the meetings in Phase 3 will be defined after these decisions.

[1] The Steering Committee noted that, in addition to the budgetary implication, any type of survey has serious scientific problems if the coverage will not include all the areas where the bluefin tuna spawning activity is usually occurring with the highest intensity, e.g., the far eastern Mediterranean Sea. **If the new budget proposed or the permits to operate in these areas are not guaranteed**, then the survey should be suspended. At the same time, the commitment for the aerial survey should be for a number of years sufficient to provide a reliable trend.

Table 1. GBYP reduced minimum budget for Phase 2 (2010-2011) and Phase 3 (2011-2012).

GBYP PHASE 2 (2010-2011)		*GBYP PHASE 3 (2011-2012)*	
Allocation	*Amount (€)*	*Allocation*	*Amount (€)*
Coordination	453.000,00	Coordination	463.980,00
Data mining, data recovery, data elaboration, Trap Symposium	149.000.00	Data mining, data recovery, data input and processing	133.000,00
Aerial survey (including updating design, workshop and training course)	465.000,00	Aerial survey (including updating design and the workshop)	1.370.000,00
Tagging (conventional, PITs, tag recovery and reporting, rewards)	890.000,00	Tagging (conventional, PATs, tag recovery campaign and reporting, rewards) and an operational meeting	1.776.000,00
Biological sampling (including hard parts, genetic sampling and analysis)	505.000,00	Biological sampling (including hard parts, genetic sampling and analysis) and an operational meeting	540.000,00
Modelling (workshop)	40.000,00	Modelling trials and two workshops	135.000,00
Total	**2.502.000,00**	**Total**	**4.417.980,00**

Appendix 6

ICCAT ENHANCED RESEARCH PROGRAM FOR BILLFISH
(Expenditures/Contributions 2011 & Program Plan for 2012)

Summary and Program objectives

The ICCAT Enhanced Research Program for Billfish, which began in 1987, continued in 2011. The Secretariat coordinates the transfer of funds and the distribution of tags, information, and data. The General Coordinator of the Program is Dr. David Die (USA); the East Atlantic coordinator was Mr. Paul Bannerman (Ghana), while the West Atlantic Coordinator is Dr. Eric Prince (USA).

The original plan for the ICCAT Enhanced Research Program for Billfish (IERPB, SCRS 1986) included the following specific objectives: (1) to provide more detailed catch and effort statistics, particularly for size frequency data; (2) to initiate the ICCAT tagging program for billfish; and (3) to assist in collecting data for age and growth studies. During past Billfish Species Group meetings, the Billfish Species Group requested that the IERPBF expands its objectives to evaluate habitat use of adult billfish, study billfish spawning patterns and billfish population genetics. The Billfish Species Group believes that these studies are essential to improve billfish assessments. Efforts to meet these goals continued during 2011 and are highlighted below.

The program depends on financial contributions, including in-kind support, to reach its objectives. This support is especially critical because the largest portion of billfish catches are coming, in recent years, from countries that depend on the support of the program to collect fishery data and biological samples. In recent years most of the financial support came from ICCAT funds but in 2009 and 2010 there were also contributions from Chinese Taipei.

2011 Activities

The following is a summary of the activities of the Program; more details of activities conducted in the western Atlantic can be found in SCRS/2011/163. Ten observer trips onboard Venezuelan longline vessels were completed by July 2011 and some more may be completed before the end of the year. Sampling of Venezuelan artisanal catches also continued in the central coast of Venezuela. Biological sampling from both the pelagic longline and artisanal Venezuelan fisheries has continued collecting biological samples of sailfish for reproductive studies, and for white marlin and spearfish for genetic identification. This year this program recovered 7 tagged billfish by July 2011.

The IERPB continued to support Brazil in their collaboration with United States institutions for testing the performance of circle hooks on board commercial vessels, deploying pop-up satellite tags, tissue sampling for genetic identification of white marlin and spearfish, and fin spine sampling for age and growth studies. With IERPB support, Uruguay continued to collect samples this year for age, growth and genetic identification of billfish onboard longline vessels.

In West Africa the program continued to support a review of billfish statistics in Ghana, Senegal and Cote d'Ivoire. Improvements of catch records from these countries are reflected in the Task I tables for billfish, and were obvious during the blue marlin assessment and white marlin data preparatory meeting of 2011. Support of this program facilitated the estimation of relative abundance indices for blue marlin from Ghana, and studies of blue marlin spawning off Côte d'Ivoire. The program also profited from the cooperation with Spanish scientists that collected genetic samples of billfish on-board longline vessels for the study on white marlin and spearfish identifications and of U.S. scientists involved in the processing of genetic samples.

Documents that were produced in 2011 with the benefit of direct support of the IERPB were SCI/2011/021, SCI/2011/026, SCI/2011/033, SCRS/2011/034, SCRS/2011/049, SCRS/2011/050 and SCRS/2011/163.

2012 Plan and activities

The highest priorities for 2012 are to support the collection and preparation of data relevant to the upcoming white marlin stock assessment. Such priorities will require to:

- support the monitoring of the Uruguayan, Venezuelan and Brazilian longline fleets through onboard observers, reporting of conventional tags, and biological sampling,
- support the monitoring of the Venezuelan artisanal fleet,
- support the collection of biological samples in West Africa,
- support the collecting and processing of samples of billfish for genetic studies, and
- support the monitoring billfish catches from west African fishing fleets.

All these activities depend on successful coordination, sufficient financial resources and adequate in-kind support. Details of IERPB funded activities for 2012 are provided below. Some of these will complement general improvements in data collection made with the support of the ICCAT data improvement program.

Shore-based sampling

Sampling of artisanal and small scale fisheries to support the estimation of catch and effort statistics will be focused on fleets contributing the largest parts of the catch and/or those having traditionally provided the higher quality data in the past, to ensure the preservation of an uninterrupted time series of catch and relative abundance indices.

West Atlantic

Sampling at landing sites will be conducted for gillnet landings in central Venezuela.

Eastern Atlantic

Monitoring and sample collection will be supported for the artisanal fisheries of Ghana, Sao Tome, Côte d'Ivoire, and Senegal.

At-sea sampling

West Atlantic

Continued support will be provided to the sampling made onboard the Uruguayan, Venezuelan, and Brazilian vessels that have been supported in the past by IERPB.

Tagging

The program will need to continue to support the conventional tagging and recapture reporting conducted by program partners.

Biological studies

The biological sampling program for collecting and processing genetic samples from billfish, particularly white marlin and spearfish, will continue in 2012. This program will aim to determine the ocean-wide ratio of white marlin to roundscale spearfish, including how this ratio has changed through time. The later will be done by taking advantage of the spine collections (from Venezuela, Uruguay, Brazil, Spain, and the United States) collected in the past with the support of the IERPB. Additionally the program will this year fund and provide sample kits for additional collection of samples for genetic identification of white marlin and spearfish. These sample kits and corresponding instructions will be distributed to scientists that can facilitate collection of genetic samples of white marlin and spearfish.

Efforts to collect biological samples for reproduction, age and growth studies requires IERPB support to facilitate cooperation from fleets that are monitored with IERPB funds. The emphasis of biological sampling for age, growth, and reproductive studies will be directed at sailfish and longbill spearfish.

Coordination

Training and sample collection

Program coordinators need to travel to locations not directly accessible to promote IERPB and its data requirements. This includes travel to West African countries, as well as the Caribbean and South America by the

general coordinator and the coordinator from the west. Strong coordination and between activities of the IERPB and the ICCAT data fund and financial support from the data fund will continue to be required.

Program management

Management of the IERPB budget is assumed by the program coordinators, with the support of the Secretariat. Reporting to the SCRSC is responsibility of the coordinators. Countries that are allocated budget lines for program activities need to contact the respective program coordinators for approval of expenditures before the work is carried out. Invoices and brief reports on activities conducted need to be sent to the program coordinators and ICCAT to obtain reimbursement. These funding requests need to be done according to the ICCAT protocol for the use of funds from ICCAT (2011 Report of the Sub-Committee on Statistics (see **Appendix 7**).

2011 Budget and Expenditures

This section presents a summary of the contributions and expenditures for the ICCAT Enhanced Research Program for Billfish during 2011. The 2011 budget recommended by the Billfish Working Group for IERPB was €46,850.00. The contributions made to the IERPB for the 2011 program were an allocation of €30,600.00 from the regular ICCAT budget and a contribution of €8,000 from Chinese Taipei. Carryover funds remaining from previous year were €7,259.30 thus total funds available for 2011 were €45,859.30 **(Table 1)**. As a consequence most planned activities of the program will be able to be carried out. Expenditures to date in 2011 have been €17,011.00 but an additional €27,700.00 are already committed to other activities that have either taken place in 2011 or will take place between October and December. The estimated balance of the program at the end of 2011 will be €1,148.30€ **(Table 2)**.

In-kind contributions to the program continued to be made during 2011. INIA and the University of Oriente (Venezuela), *Universidad Federal Rural de Pernambuco* (Brazil), and *Instituto Dirección Nacional de Recursos Acuáticos* (Uruguay) have provided personnel time and other resources as in-kind contributions to the at-sea biological sampling program, thereby reducing the amount of funds needed for this activity from the ICCAT billfish funds. The *Instituto Espanol de Oceanografia* (Spain) contributed by paying for the costs of collecting and shipping biological billfish samples for genetic analyses collected on board Spanish vessels. The U.S. National Marine Fisheries Service funded a part of the cost of processing genetic samples for identification of white marlin and spearfish. Travel costs and personnel time of the program coordinators were absorbed by the U.S. National Marine Fisheries Service, the University of Miami, the Ghana department of fisheries and by the ICCAT Data fund.

2012 Budget and requested contributions

The summary of the 2012 proposed budget, totaling €45,850.00 is attached as **Table 3**. The Working Group requests that the Commission maintain its contribution of €30,600.00 for 2012 but that it increases to €35,000 for 2013 to cover increasing needs of the IERPB program (see **Table 4**). The requested contributions from ICCAT are necessary to fully implement the IERPB 2012 and 2013 program plans. During 2012 the Program will continue to require contributions of €14,100 from other sources, such as those so generously provided recently by Chinese Taipei, to achieve all its objectives.

The consequence of the Program failing to obtain the requested budget will be to stop or reduce program activities for 2012 including: (1) important at-sea observer trips in Venezuela, Uruguay and Brazil; (2) coordination travel for eastern coordinators; (3) sampling of artisanal fleets in the western and eastern Atlantic (4) sampling and processing of genetic, age and growth samples; (6) promotion of conventional tagging activities, including distribution of tag recovery incentives. All these activities are critical to continue the improvement of the information available to the SCRS for the assessment of billfish.

Conclusion

The IERPB has been credited for major improvements in the data supporting the last ICCAT billfish assessments. The Program needs to continue to facilitate the collection of biological and fishery information. The IERPB Program will continue to require support from ICCAT and other sources to operate and to address the needs of the Commission, specially the upcoming assessment meeting for white marlin. Although considerable benefits will accrue from various outputs of the ICCAT data improvement program, the IERPB is the only program that exclusively focuses on billfish. By having this focus it is in the best position to ensure that the

research and monitoring activities not covered by the ICCAT data improvement program are given some minimal resources. The IERPB is an important mechanism towards completing the goal of having the highest quality information to assess billfish stocks.

Table 1. Summary budget for 2011 for the Billfish Program.

Source	*Euros (€)*
Budget recommended by the Working Group	46,850.00
Balance at start of Fiscal Year 2011	7,259.30
Income (ICCAT Regular Budget and others)	38,600.00
Expenditures and obligations (for details see **Table 2)**	-44,711.00
Estimated BALANCE	**1,148.30**

Table 2. Detailed 2011 Budget & Expenditures (as of October 1, 2011).

		Euros (€)
Balance transferred from 2010		**7,259.30**
Income	**Total**	**38,600.00**
	ICCAT Commission	30,600.00
	Chinese Taipei	8,000.00
Available funds		**45,859.30**
Expenditures		**-17,011.00**
	Venezuela	-11,000.00
	Ghana	3,000.00
	Senegal	3,000.00
	Bank charges	-11.00
Balance (as of October 1, 2011)		**28,848.30**
Funds obligated until end of 2011		**-27,700.00**
	Uruguay	-2,000.00
	Brazil	-5,000.00
	São Tomé	-2,000.00
	Côte d'Ivoire	-3,000.00
	Tag reward	-500.00
	Genetic samples	-15,000.00
	Bank charges	-200.00
Total estimated expenditures		**-44,711.00**
Estimated balance December 31, 2011		**1,148.30**

Table 3. Summary budget of the ICCAT Enhanced Research Program for Billfish for 2012.

Source	*Euros (€)*
Balance at start of Fiscal Year 2012 (estimated)	1,148.30
Income (Requested from ICCAT Regular Budget)	30,600.00
Other contributions)	13,100.00
Expenditures (see **Table 4)**	44,800.00
BALANCE	**48.30**

Table 4. Detail of expenditures planned for 2012.

Source	*Amount (€)*
STATISTICS & SAMPLING	
West Atlantic shore-based sampling:	
Venezuela	5,000.00
West Atlantic at-sea sampling:	
Venezuela	6,000.00
Uruguay	2,000.00
Brazil	5,000.00
East Atlantic shore-based sampling:	
Senegal	3,000.00
Ghana	3,000.00
Côte d'Ivoire	3,000.00
Sao Tome	2,000.00
Processing of Genetic samples *	10,000.00
Collection of genetic samples *	5,000.00
Lottery rewards – tagging billfish	500.00
COORDINATION	
Mailing & miscellaneous	100.00
Bank charges	200.00
GRAND TOTAL	**44,800.00**

Authorization of all these expenditures depends, on sufficient funds being available by ICCAT and from other contributions.
* Number of samples collected and processed will depend on the final budget of the Program.

Appendix 7

REPORT OF THE MEETING OF THE SUB-COMMITTEE ON STATISTICS
(Madrid, Spain, September 26-27, 2011)

1. Opening, adoption of Agenda and meeting arrangements

The Sub-Committee on Statistics met at the ICCAT Secretariat (Madrid, Spain) on September 26-27, 2011. The meeting was chaired by Dr. Gerald Scott and Dr. Guillermo Diaz served as rapporteur. The Agenda was accepted and adopted by the Sub-Committee **(*Addendum 1 to Appendix 7*)**.

2. Review of fisheries and biological data submitted during 2011

The Secretariat presented information held in the 2011 Secretariat Report on Research and Statistics related to fisheries and biological data submitted in 2010, including revisions to historical data.

2.1 Task I (nominal catches and fleet characteristics)

Based on the percentage of CPCs that reported data on landings and those that reported data by the deadline, the Sub-Committee recognized that improvements in data reporting had occurred during the past few years. The Sub-Committee therefore requested the Secretariat to prepare some statistics demonstrating the observed improvement in data reporting. The Secretariat also noted an improvement in the reporting of fleet characteristics since 2005. Once again, the Sub-Committee acknowledged the improvement in reporting these data that has traditionally been overlooked by many CPCs and requested the Secretariat to explore the possibility of requesting CPCs the submission of historical fleet characteristic data.

As in previous years, the Sub-Committee once again discussed how to differentiate between non-reporting (no compliance) or the lack of reporting due to no catches. The Sub-Committee discussed the possibility of preparing electronic forms with a default value of 'zero landings' for all species or another suitable alternative, so CPCs only would have to update those species for which they have landings. Although this was viewed as a potential solution, there was some concern about the impact that such approach would have on the ICCAT databases by incorporating very large amounts of observations for 'zero catches'.

The Sub-Committee discussed extensively the deadlines of data reporting requirement. It was noted that the table prepared by the Secretariat that indicated compliance with data submission requirements did not take into consideration the specification of the data needs provided in the species work plans. Therefore, the Sub-Committee requested the Secretariat to review the table based on that information. Furthermore, the Sub-Committee discussed that tables showing compliance with data submission deadlines should only used the July 31 deadline. The Secretariat requested that the species work plans be specific enough with respect to data requests so to facilitate the work of the Secretariat.

The Sub-Committee also noted that although Ghana has reported data prior to the meeting on "Review of Ghanaian Statistics", the Secretariat's table showed that there were some concerns with Ghana's data submission. The Secretariat indicated that Ghana did not use the approved electronic forms for the submission of its data.

The Sub-Committee discussed that reviewing compliance with data submission requirements had resulted in drifting the role of the Sub-Committee from a scientific endeavour toward a role more related to a compliance committee. There was a general agreement that the Sub-Committee should be more involved on reviewing the submitted data for its scientific value for stock assessment purposes instead of only focusing on submission deadlines. The Sub-Committee generally agreed on the need to develop a system to better characterize the quality of the submitted data beyond if they were submitted by the deadline or not and recommended that future work of the Sub-Committee be oriented more toward data quality evaluations.

2.2 Task II (catch & effort and size samples)

Like with Task I data, the Sub-Committee acknowledged the improvements observed in the reporting of Task II data. However, the Secretariat noted that there are still cases when the Catch and Effort data are reported without

reporting effort or with unconventional effort units (e.g., longline effort expressed as number of fishing days). The Secretariat indicated that in these cases the data are still useful because they can be included in the CatDis estimation. However, the Secretariat indicated that in these cases it still follows up with these CPCs to attempt to obtain the correct information.

2.3 Tagging

After the presentation of the received tagging information, the Secretariat clarified that the Moroccan bluefin tuna tagging information was included in the EU Spain data as part of a collaborative project. Uruguay asked the Secretariat about reporting additional tagging information beyond the point of release and recapture such as more detailed information collected by the electronic tags and also maps. Canada informed the Sub-Committee that they have additional tagging information for 2010-2011 that still has to be reported. Similarly, Brazil indicated that it is preparing a comprehensive report with Brazilian tagging activities.

2.4 Trade information

The Secretariat summarized the available Trade-based information in 2011 "Secretariat Report on Statistics and Coordination of Research in 2011". The Sub-Committee discussed that at present, these data are most applicable for compliance related issues, but that historically, at least for some species, data similar to these have been used to estimate unreported catch. Now that a wider array of species is being tracked, especially through the transhipment observer data, these data should be further evaluated for use in verifying catch reports. To do this, a fuller range of conversion factors for product to whole weight would be needed along with careful evaluation to avoid double counting of the same fish and to account for lags between time of capture and market.

2.5 Other relevant statistics

Observer programs

− Discussion relevant to Rec. [10-10]

The Secretariat presented a table summarizing the information received from different CPCs on their national observer programs. **Table 1** compares the reports received against the number of flag-gear combinations from which such reports might be expected under [Rec. 10-10]. At the time of the Sub-Committee meeting, only a low proportion of responses that could have been submitted have yet been received by the Secretariat. This information will be further reviewed by the 2012 SCRS in order to develop its response to the Commission as called for under [Rec. 10-10].

It was recommended that the Secretariat develop a simple form to be filled out by CPCs to better characterize and compare the different observer programs in addition to the table already developed by the Secretariat. This form should promote improved reporting by CPCs regarding the information requested under [Rec. 10-10].

The Sub-Committee interpreted [Rec. 10-10] to mean that reporting requirements of domestic observer coverage only applied to longline, purse seine, and bait boat fisheries.

The Sub-Committee requested those CPCs that have implemented or are experimenting with monitoring schemes alternative to observer programs for vessels less than 15 m (e.g., cameras, etc.) to present such information to the SCRS in 2012.

− Discussion Relevant to Rec. [10-04]

Information was received on the Moroccan observer program on the trap fishery which has 100% observer coverage. This information was referred to the Bluefin species group for preparation of a response to the Commission on this particular recommendation.

3. Updated report on the ICCAT relational database system

The "Secretariat Report on Statistics and Coordination of Research in 2011" provided an update on the ICCAT relational database system. The Sub-Committee acknowledged the progress made on data bases and noted the following.

E-BFT-VMS data

The Sub-Committee indicated that VMS data from Mediterranean purse seines and other vessels fishing for bluefin tuna could be used to identify spawning grounds. However, as previously indicated by the Sub-Committee, the 6 hr time interval between VMS reports does not have enough resolution to be used for more useful scientific purposes, such as evaluation of PS catch-effort patterns. The Sub-Committee recommended that VMS signals should be reported at no more than two hour interval. The Secretariat indicated that the presented data was filtered so data received from vessels docked in a port were not included. The Sub-Committee encouraged the Secretariat to use algorithms that can identify fishing activities from 'searching times'. It was also noted that the data presented by the Secretariat showed fishing activities in the Black Sea. The Secretariat clarified that these data could correspond to registered bluefin tuna vessels that were fishing for other species such as small pelagic species.

The Sub-Committee briefly discussed the value of requesting VMS data from other ICCAT fisheries and from VMS associated to FADs.

4. National and international statistical activities

The "Secretariat Report on Statistics and Coordination of Research in 2011" summarized the activities undertaken by the Secretariat regarding international statistical activities.

The Sub-Committee encouraged the Secretariat to continue with these efforts.

5. Report on data improvement activities

5.1 ICCAT-Japan Data and Management Improvement Project

Discussion of the JDMIP activities was deferred to Plenary.

5.2 Data Funds from [Res. 03-21] and other ICCAT funds

The Secretariat presented a series of proposed guidelines to standardize the use of and the process to access these funds. In general, the Sub-Committee agreed that some of the guidelines drafted by the Secretariat were not flexible enough to accommodate the needs of the SCRS. The Sub-Committee proposed that the guidelines for use and access to these funds as provided in ***Addendum 2 to Appendix 7***, be further considered by Plenary for adoption.

5.3 Data recovery activities

The "Secretariat Report on Statistics and Coordination of Research in 2011" described a number of data recovery activities undertaken in this year. The Sub-Committee discussed a number of aspects of these activities, as follows.

The Sub-Committee reviewed the major finding of the intersessional meeting that reviewed the Ghanaian fishery statistics. It was recognized that some segments of the Ghanaian fleet seemed to have been underreporting their catches. The inter-sessional meeting indicated that for 2010 Ghana may have underreported a total of 20,000 t of tropical tunas, all species together. Furthermore, during the yellowfin tuna stock assessment carried out in 2011 it was concluded that the corresponding underreporting yellowfin tuna catch would have an impact on the results of the assessment which would result in a worsening of the estimated stock status. Therefore, the Sub-Committee recognized the need to solve this particular issue with respect the Ghanaian Task I reported data. The Sub-Committee was also concerned about the effect of this underreporting with respect to bigeye tuna.

In the case of bluefin tuna landing updates for Turkey and Algeria, there is no documentation supporting the proposed revisions and these data have not been used in any assessments, yet. Therefore, approval of these revisions is pending upon the receipt of supporting documentation. S. Tome submitted revisions for 2005-2007 for several species. This was a reclassification of landings by species, and the amount of total remained the same. Although documentation supporting the changes has been provided by S. Tome, such document has not yet been

reviewed by the SCRS. Pending this review, the Sub-Committee recommended adoption of these revisions since they identified total landings at species level, compared to the aggregated values previously available. The Sub-Committee requested the Secretariat to contact these CPC to request the missing supporting documents.

[Senegal provided new shark landings data from its artisanal fisheries. However, the Sharks working group has not reviewed these data or the supporting document yet. Pending that review, the Sub-Committee recommended adoption of these revisions as they are at the species level and provide much finer resolution than previously available].

Revisions or new submission

− C&E data

Regarding the updates to the C&E data base, it was questioned if the different flags proposing revisions provided documentation supporting the changes to be made. The Secretariat indicated that, in some cases, the changes corresponded to data that was reported as NEI and then reclassified with a flag. This information is not new, and it has been used in past assessments as NEI (PS and BB only). In the case of Venezuela, the updated data corresponded to data that was resubmitted using the electronic forms. The changes to the Ghanaian data are pending approval by the species group, but these data were used in the most recent yellowfin stock assessment in sensitivity runs. EU-Portugal (mainland) submitted a revision of data (LL) now reported by 1x1, but there is no supporting documentation yet available. The Sub-Committee recommended that this finer-scale data be admitted to the data base, pending adequate documentation. In summary, the revised data submitted by Venezuela, Trinidad Tobago, and EU-Portugal is missing the supporting documentation and, therefore, it cannot be incorporated to the ICCAT database yet, although the Sub-Committee recommended these data revisions be incorporated into the database as soon as adequate documentation is made available.

− CAS or Size data

During the Yellowfin Tuna Stock Assessment Session, Japan submitted revised CAS of YFT-LL for the period 1995-2010. Documentation supporting the review of the data was also provided during the YFT assessment in an SCRS document. The Sub-committee inquired if the newly applied methodology could be extended to other species caught by the Japanese longline fleet and recommended that Japanese scientists consider if the methodology used for yellowfin tuna is also appropriate for other species.

5.4 BFT-E Observer data

These data should be reported by the company in charge of the observer program during the Bluefin Tuna Species Group meeting and as such, was not commented upon by the Sub-Committee.

5.5 Weekly catch reports

The Sub-Committee considered this a compliance issue, although the data may provide some basis for validation of recent year catch for use in projections.

5.6 Transhipment observer data

Transhipment observer data has been used in the past for bigeye tuna to identified IUU. It was noted that the data is reported using a variety of product types (fillet, etc.). The Sub-Committee indicated that there is a need to develop conversion factors and to identify method to avoid double counting the same fish. It was indicated that in the development of such conversion factors it will be necessary to take into consideration that these factors are most probably fleet specific. The Sub-Committee also requested clarification of the different product definition. It was suggested that an analysis of using transhipment data to validate landing and to identify the limitation of these approach should be conducted by the trade specialists.

The Sub-Committee was concerned regarding commenting on issues that are related more to compliance than to science being the transhipment data one of them. The Sub-Committee emphasized the need to look at these data as a scientific tool instead of using them to make compliance determinations.

6. Review of publications and data dissemination

The "Secretariat Report on Statistics and Coordination of Research in 2011" provided a summary of publications and data dissemination efforts over this year. The Sub-Committee acknowledged this work and approved the progress made.

6.1 Review of the results of the ICCAT-ALR publication agreement

The Sub-Committee recommended that the ICCAT-*Aquatic Living Resources* publication agreement be continued.

6.2 Development of sharks and other species identification sheets

The Sub-Committee was informed that the shark identification sheets would be available in the coming week. The Sub-Committee applauded the progress made on this topic and remained anxious to view the final product. The Sub-Committee agreed with the recommendation from the Billfish Species Group to develop ID cards for Istiophorids.

7. Review of progress made for a revised ICCAT manual

The Sub-Committee supported the Secretariat's proposal to contract out the development of the LL gear chapter of the ICCAT manual. The Sub-Committee agreed with the recommendations to update the description of white marlin and spearfishes (RSP, *Tetrapturus georgei,* SPF, *Tetrapturus pfluegeri*) and to expand the description of several shark species to the corresponding chapter.

8. Consideration of recommendations from 2011 inter-sessional meetings

Addendum 4 to Appendix 7 contains the Recommendations from Inter-sessional Meetings referred to the Sub-Committee. Discussion points raised by the Sub-Committee are reported below.

8.1 Recommendations of the Working group on the organization of the SCRS

The Sub-Committee endorsed the recommendations of the working group. The Sub-Committee noted in particular, the following:

− *Increase analytical and data base management support at the Secretariat.*

The recommendations for increased data base, analytical, and by-catch coordination support were endorsed by the Sub-Committee and were recommended to Plenary. These positions should be included in the 2012 Budget of the Secretariat, but because the proposed budget was already circulated in July and only included the by-catch coordinator position, it presents a difficulty. The timing between preparation of the Budget and the identified needs of the SCRS needs to be better coordinated. The Sub-Committee recommended the SCRS Chair and Executive Secretary consult on procedures to avoid such difficulties.

− *Quality assurance and transparency*

The Sub-Committee endorsed the recommendations for use data fund to contract help to develop stock assessment documentation during meetings and to invite experts from other tRFMOs to participate in our stock assessments.

8.2 ICCAT-GBYP Symposium on Trap Fisheries for Bluefin Tuna

The Sub-Committee could not endorse the recommendation to keep traps open after quotas were achieved without further consideration and justification offered by the Bluefin Tuna Species Group.

8.3 Tropical Tuna Species Group Inter-sessional Meeting on the Ghanaian Statistics Analysis (Phase II)

The Sub-Committee endorsed the recommendations of the Ghanaian statistics working group and recommended Plenary to adopt them.

8.4 Atlantic Yellowfin Stock Assessment Sessions

The Sub-Committee discussed and endorsed the recommendation to use market based information to validate logbook catch reports and recommended expanding such approaches to other species, when such information is available.

8.5 Sharks Data Preparatory Meeting for the Application of the Ecological Risk Assessment

The Secretariat indicated that the tagging database was missing a number of shark tagging information from the United States, and they are currently working directly with scientists from this CPC to solve this issue. The Sub-Committee agreed that these data should be acquired as soon as possible and inquired if the reporting of tagging data should still be done through a CPC's tagging correspondents. In response, the Secretariat indicated that there was still a list of tagging correspondents, but it should be reviewed and updated as appropriate with the help of the CPCs.

The Sub-Committee also asked for clarification with respect to the recommendation of exploring methods to estimate shark catches from purse seines fisheries. It was indicated that there are some publications that indicated the existence of shark by-catch in purse seine fisheries, and therefore the need to quantify these catches since the majority of shark catch information is only from longline fisheries. The Sub-Committee recommended that such estimates should be incorporated into the ICCAT data base as soon as possible.

8.6 Inter-sessional Meeting of the Sub-Committee on Ecosystems

The Sub-Committee recommended that the Sub-Committee on Ecosystems should continue to develop the protocols for collection of by-catch data.

The Secretariat asked about what species will be considered as "by-catch" for the purpose of reporting. The Sub-Committee on Ecosystems pointed out the lack of consensus on a "by-catch species". The Sub-Committee on Statistics indicated that the focus should be on quantifying the total catch regardless of if a particular species is considered target catch or by-catch.

8.7 GBYP Steering Committee Meeting

It was indicated that in the case of bluefin tuna there is a precedent that requires a minimum of 10% sampling. It was indicated that for some large fisheries a 10% sampling effort might not be necessary and instead of quantity it is more important to obtain representative samples from the different fishery strata.

The Sub-Committee reiterated that there is a need to quantify the quality of the information reported and the quality/representativeness of size samples from different fisheries is a question that fits within this issue. It was commented that a 10% sampling could be adopted as a general rule that could be revised on a fisheries basis. It was also indicated that for the future analysis to better characterize the level of sampling that will provide information to improve management recommendations should be conducted. However, this decision still does not address the problem of assuring that the collected samples are representative.

8.8 2011 Blue Marlin Stock Assessment Session and White Marlin Data Preparatory Meeting

There is information available on marlin by-catch by European purse seine fisheries which could be used to validate the information that has already been reported to ICCAT. It was indicated that using observer data estimates of total marlin by-catch in this fishery have been obtained; however, the estimates have a large level of uncertainty.

The Sub-Committee also indicated that a recommendation emphasizing the need to report live releases could be included to the list of general recommendations.

9. Implication of data deficiencies

9.1 Current data catalogues of major species by stock

The Secretariat presented to the Sub-Committee the updated data catalogues (**Table 2**). The Sub-Committee indicated that cross checking Task I landing with size reports is a good approach to identify data deficiencies.

9.2 Implications of identified deficiencies in future stock assessments

The Sub-Committee agreed that these deficiencies should be discussed by each species group, particularly by those that conducted an assessment in 2011.

9.3 Proposals for data recovery plans and improvement on data collection systems

There was a recommendation of improving data sharing and collection from entities that collect data on Mediterranean albacore. Similarly, there was a proposal to continue with efforts to collect shark historical data.

10. Review of existing data submission formats and procedures

The Sub-Committee discussed the need of forms to submit seabird, sea turtle, other by-catch, and observer data. It is expected that this task will be taken by the by-catch coordinator. The Secretariat indicated that it only received observer data from one CPC. The Sub-Committee recommended that CPCs report observer data to help the Secretariat to develop electronic forms for the submission of this type of data. The Sub-Committee approved the Secretariat's recommendation of adding spearfish to the list of main ICCAT species.

11. Future plans and recommendations

11.1 Infrastructure and technology

The Group acknowledged the important improvements carried out by the Secretariat with respect to infrastructure and related support. It noted that additional improvements to the databases should be pursued.

11.2 Data bases

Documentation of database structures and data quality issues that are not to be addressed in 2011-2012 are a reflection of the Secretariat's increasing work load. It was suggested that if the Secretariat increases accessibility to the data bases, the species working group could do their own data extractions and therefore allowing the Secretariat to focus their effort on other areas. The Secretariat commented that increasing data accessibility and developing the corresponding documentation is a time consuming task and that the current ICCAT schedule does not permit the Secretariat to conduct this type of work. However, the Secretariat is slowly moving into that direction. The Secretariat also indicated that because the data base documentation is not completed it will be difficult for scientists that are not familiarized with the details of the data bases to extract the proper data for particular analysis. This particular situation emphasizes the recommendation of the Sub-Committee on the need to provide more support to the Secretariat in the form of more staff.

12. Other matters

12.1 Third Joint Meeting of the Tuna RFMOs (Kobe III)

The SCRS Chair presented to the Sub-Committee information on the last Kobe III meeting held in La Jolla, USA, in July of the present year. The explanation of the Chair focused on the science discussions in the meeting. The discussions focused on the review of past Kobe recommendations on science, the Joint Technical Working Group on By-catch, and specific issues to be considered by the Kobe III participants. The Technical Working Group prepared a work plan that included the harmonization of data collection among tRFMOs, identification guides, and release protocols among tRFMOs and to develop a centralized by-catch data base. The specific science issues that were discussed during the meeting included data confidentiality rules and addressing common issues in RFMO's scientific bodies. The Secretariat indicated that it has already been contacted by the joint

technical working group on by-catch to request information on the ICCAT by-catch metadata base in order to integrate it into a common system (BMIS) and it is pending SCRS approval for this activity. The Sub-Committee recommends Plenary that this activity be conducted as soon as possible.

12.2 Sport fishing information

The Sub-Committee inquired if the Secretariat has received any more information on sport fishing. The Secretariat indicated that some CPCs continue reporting their sport fishing catches which could be reported to the Commission. In addition, the Secretariat indicated that no new questionnaires with sport fishing information have been submitted by any CPC.

In view of this, the Sub-Committee updated a response to the Commission drafted by the 2010 Committee, but which was not taken up by the Commission's Working Group on Sport and Recreational Fishing (***Addendum 4 to Appendix 7***).

13. Adoption of the report and closure

After review by the Sub-Committee, the report was adopted and the meeting was closed on 27 September 2011. The Convener thanked all participants for their work.

Table 1. Metiers for which observer programs might be expected under the definitions of Rec [10-10]. Green shaded cells represent metiers for which reports responsive to Rec [10-10] have been received and reviewed at the Sub-Committee on Statistics meeting in 2011. Blank cells represent metiers for which such reports might be expected based on recent (2000s) reported catches for these flag-gear combinations indicated. Grey cells indicate flag-gear combinations for which no recent (2000s) catches have been reported and therefore such reports are not expected. This information is not necessarily applicable for compliance issues.

		GearGrp		
Status	Flag	BB	LL	PS
CP	Algerie			
	Angola			
	Barbados			
	Belize			
	Brasil			
	Canada			
	Cape Verde			
	China P.R.			
	Côte D'Ivoire			
	Croatia			
	Egypt			
	EU.Bulgaria			
	EU.Cyprus			
	EU.Denmark			
	EU.España			
	EU.Estonia			
	EU.France			
	EU.Germany			
	EU.Greece			
	EU.Ireland			
	EU.Italy			
	EU.Latvia			
	EU.Lithuania			
	EU.Malta			
	EU.Netherlands			
	EU.Portugal			
	EU.Sweden			
	EU.United Kingdom			
	FR.St Pierre et Miquelon			
	Gabon			
	Ghana			
	Guatemala			
	Guinea Ecuatorial			

		GearGrp		
Status	Flag	BB	LL	PS
CP	Guinée Conakry			
	Iceland			
	Japan			
	Korea Rep.			
	Libya			
	Maroc			
	Mexico			
	Namibia			
	Norway			
	Panama			
	Philippines			
	Russian Federation			
	S. Tomé e Príncipe			
	Senegal			
	Sierra Leone			
	South Africa			
	St. Vincent and Grenadines			
	Syria Rep.			
	Trinidad and Tobago			
	Tunisie			
	Turkey			
	U.S.A.			
	UK.Bermuda			
	UK.British Virgin Islands			
	UK.Sta Helena			
	UK.Turks and Caicos			
	Uruguay			
	Vanuatu			
	Venezuela			
NCC	Chinese Taipei			
	Colombia			
	Guyana			
	Netherlands Antilles			

Table 2. SWO-N. Catalog of northern Atlantic SWO Stock available: Task I (T1, in tonnes) and Task II (T2 availability; yellow= t2-CE only; light green= t2-SZ only; dark green= T2-CE + SZ) statistics, between 1980 and 2010. For t2sz, either size frequencies and CAS were considered.

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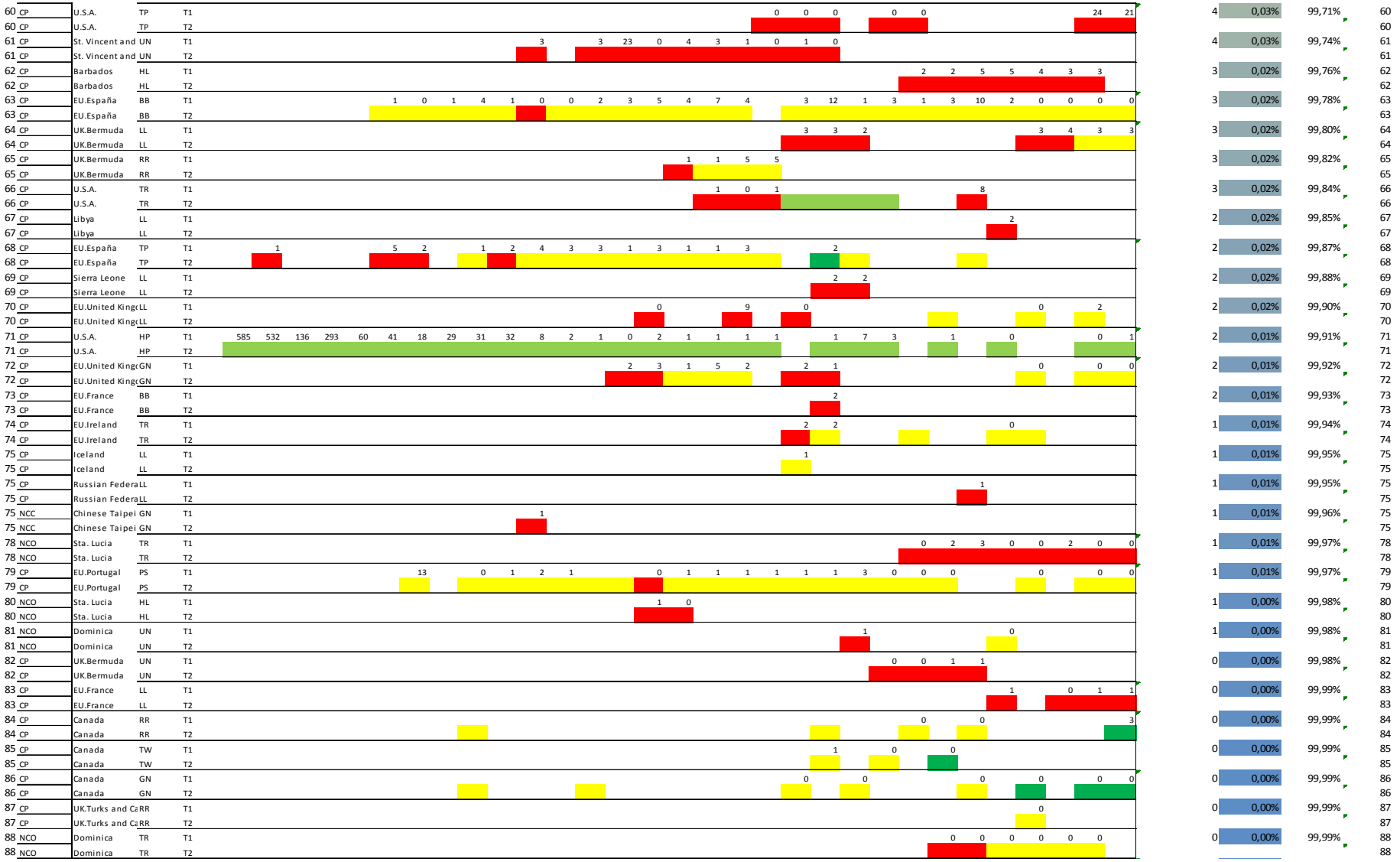

89 CP EU.Portugal BB T1 15 8 7 6 7 1 0 0 0 0,00% 100,00% 89
89 CP EU.Portugal BB T2 89
90 NCO Dominica HL T1 0 0 0 0 0 0,00% 100,00% 90
90 NCO Dominica HL T2 90
91 CP Canada TL T1 0 0 0,00% 100,00% 91
91 CP Canada TL T2 91
92 CP EU.Portugal TP T1 0 0 0 0 0 0 0 0,00% 100,00% 92
92 CP EU.Portugal TP T2 92
93 NCO Dominica GN T1 0 0 0,00% 100,00% 93
93 NCO Dominica GN T2 93
94 CP EU.France TN T1 0 0 0 0,00% 100,00% 94
94 CP EU.France TN T2 94
95 CP EU.Netherlands TW T1 0 0 0,00% 100,00% 95
95 CP EU.Netherlands TW T2 95
96 CP EU.France HL T1 0 0 0 0,00% 100,00% 96
96 CP EU.France HL T2 96
97 CP Trinidad and To SU T1 0 0 0,00% 100,00% 97
97 CP Trinidad and To SU T2 97
98 CP Senegal SU T1 0 0 0 0,00% 100,00% 98
98 CP Senegal SU T2 98
99 CP EU.United King HL T1 0 0 0,00% 100,00% 99
99 CP EU.United King HL T2 99
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999 CP EU.España PS T1 2 999
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999 CP EU.United King TW T1 0 999
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999 CP Maroc SU T1 3 2 999
999 CP Maroc SU T2 999
999 CP U.S.A. SP T1 999
999 CP U.S.A. SP T2 999
999 CP EU.Denmark UN T1 0 999
999 CP EU.Denmark UN T2 999
999 CP EU.Poland UN T1 1 999
999 CP EU.Poland UN T2 999
999 CP U.S.S.R. LL T1 21 69 16 13 18 999
999 CP U.S.S.R. LL T2 999
999 CP U.S.S.R. SU T1 4 999
999 CP U.S.S.R. SU T2 999
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999 NCO Singapore (fore LL T1 999
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999 NCO Cuba (ICCAT pro LL T1 999
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999 NCO Mixed flags (KR LL T1 999
999 NCO Mixed flags (KR LL T2 999

Addendum 1 to Appendix 7

Agenda of the Sub-Committee on Statistics

1. Opening, adoption of Agenda and meeting arrangements
2. Review of fisheries and biological data (new and historical revisions) submitted during 2011
   2.1 Task I (nominal catches and fleet characteristics)
   2.2 Task II (catch & effort and size samples)
   2.3 Tagging
   2.4 Trade information (BFT Catch Documentation Scheme; SWO/BET Statistical Documents)
   2.5 Other relevant statistics (North Atlantic detailed data including discards and effort statistics
3. Updated report on the ICCAT relational database system
4. National and international statistical activities
   4.1 International and inter-agency coordination and planning (FAO, CWP, FIRMS)
   4.2 National data collection systems and improvements
5. Report on data improvement activities
   5.1 ICCAT/Japan Data and Management Improvement Project
   5.2 Data Funds from [Res. 03-21]
   5.3 Data recovery activities
   5.4 BFT-E VMS data
   5.5 BFT-E observer data
   5.6 BFT-E weekly catch reports
   5.7 Transhipment observer data
6. Review of publications and data dissemination
   6.1 Review of the results of the ICCAT-Aquatic Living Resources publication agreement
   6.2 Development of sharks identification species sheets
7. Review of progress made for a revised ICCAT Manual
8. Consideration of recommendations from 2011 inter-sessional meetings
9. Evaluation of data deficiencies pursuant to [Rec. 05-09]
   9.1 Current data catalogues of major species by stock
   9.2 Implications of identified deficiencies in future stock assessments
   9.3 Proposals for data recovery plans and improvements on data collections systems
10. Review of existing data submission formats and procedures
    10.1 Formats and e-FORMS improvement (to account for current fishery practices)
    10.2 Improvements to the ICCAT coding system
    10.3 Rules applied to historical data revisions
    10.4 Rules used to determine deadlines for submitting statistics
    10.5 Other related matters
11. Future plans and recommendations
12. Other matters
13. Adoption of the report and closure

Addendum 2 to Appendix 7

Protocols to Follow for the Use of Data Funds & Other ICCAT Funds

Introduction

Among the existing ICCAT funds, some like those available in the JDIMP or the EU Fund for Capacity Building, have their own user protocol defined by the Steering Committee or by the terms of reference of the corresponding contracts. In other cases, the Secretariat establishes the criteria in collaboration with the SCRS.

Considering that these funds were created to support the active participation in the work of the SCRS of scientists of countries with less resources, this document aims to define the objectives of funding and to establish protocols for more fluid and productive usage. The proposal has been developed based on the most recent recommendations and requirements of the SCRS.

The lines defined in this document and the protocols established will be applied to those funds available that do not have their own protocol.

Use of funds

Three large groups are considered: Improvement of Statistics, Capacity Building, and Supporting Work of the SCRS

1. Improvement of statistics

The improvement of statistics can be considered at various levels:

1.1 Recovery of historical data. The reconstruction of historical data series is fundamental, both for the overall assessment of the resources, and for the analysis of fishery dynamics. This section would include:

- Data searches and incorporations from various sources.
- Computerization of the data (e.g., logbooks) which are available in other formats (in paper copy, etc.).
- Data analysis, including sampling systems, observer programs, etc.

1.2 Development of support material. Sampling and observer programs require additional information such as observer manuals, species identification sheets, etc. The funds could be used for the preparation and publication of this material.

1.3 Development of programs for data entry and processing. The development of data entry and processing programs is essential and the funds should finance this work.

In any of the abovementioned sections, and if so warranted, the funds can be applied to hire experts or to finance the travel expenses of the Secretariat's staff to carry out tasks to support the work teams involved. These tasks can be achieved through data analysis, support *in situ* for the collection of information and sampling, observers, development of support material, development of data processing programs, etc.

These funds would also be used to finance the participation of scientists from countries that do not have their own means to be able to participate in the SCRS meetings.

Protocol for the allocation of funds

To finance the improvement of statistics the following conditions must be met:

1. There should be an explicit recommendation from the SCRS or a formal approval by the SCRS Chair on the need and/or interest of the data to be recovered, development of support material and/or development of the data processing programs, i.e. explicitly referring to the identification of the period to be recovered, the fishery, type of data, type of support material, data processing programs, etc.

2. The SCRS, through the corresponding Species Groups and the Sub-Committee on Statistics (SC-STAT), or the SCRS Chair will develop a work plan.

3. The SCRS or the SCRS Chair will define the procedure to carry out the work plan (e.g., hiring of experts, funding local teams, etc.).

4. The Secretariat will facilitate the process defined in the work plan.

5. The decision on the selection/approval of the projects and contracting experts will be made by the SCRS or the SCRS Chair. The selection of the experts will be made by the Secretariat after consulting the SCRS Chairman and, if contemplated in the defined procedure, with a Selection Committee.

The conditions for financing the participation of scientists at SCRS would be the following:

1. Pertain to developing countries that do not participate by their own means.

2. Present a request, within a deadline defined in the protocol approved by the SCRS in 2010, including a detailed description of the applicant's contribution to the meeting.

3. The Secretariat will process the request and, after obtaining agreement from the rapporteurs of the Species Groups involved and/or from the SCRS Chairman, will carry out the necessary procedures in accordance with the protocol approved by the Committee.

4. The invited scientists are expected to participate actively in the meeting and likely present scientific documents.

2. Capacity building

The Working Group on the Organization of the SCRS noted a decreasing trend in the participation of scientists of CPCs in the work of the SCRS and stressed the need to strengthen their active involvement in this work. One of the causes pointed out by the Group referred to the increasing complexity of the models used and the difficulty to access them. Faced with this, the Group stressed the need to establish capacity building policies which continually develops skills that will result in an overall understanding of the assessment procedures that are carried out within the SCRS.

In this sense, the third meeting of tuna RFMOs insisted on the need to coordinate efforts among the different organizations to develop a more efficient training policy.

In line with these recommendations, the funds could be used to:

2.1 Develop training programs structured by levels and impart training courses.

2.2 Develop supporting learning materials (manuals, applications, web pages, etc.). This section could include both the development of specific applications such as the payment of fees for the use of the material already developed, as well as potential expenses linked to a tutorial in training modules.

2.3 Exchange of scientists between research centres. In 2011, for the first time, a scientist from a developing country spent training time at the IRD-IFREMER centre in Sète.

2.4 Finance the participation at the SCRS meetings of scientists from countries which do not have their own means to support the participation of this scientist in the meetings.

The financing of participants at training courses will be limited to scientists from countries which do not have their own resources to support its participation. However, the funds can be applied towards hiring experts to give courses and/or to develop the learning material, independent of the degree of development of their country of origin.

Protocol for the allocation of funds related to Capacity Building

1. A training course may be requested by a developing Country and/ or may be proposed by the SCRS;

2. When requested by a developing country, a work plan for the training Course should be submitted for the approval by the SCRS or by the SCRS Chair. When proposed by the SCRS, the corresponding Species Groups and/or the Sub-Committee on Statistics will develop a work plan.

3. The SCRS or the SCRS Chair with the Secretariat will define the procedures to carry out the work plan (e.g., hiring of experts, funding local teams, etc.), in coordination with the relevant developing State.

4. The Secretariat will facilitate the process defined in the work plan.

5. The decision on the selection/approval of the projects and contracting experts will be made by the SCRS Chairman, in coordination with, if contemplated in the defined procedures, a Selection Committee and in consultation with the Secretariat.

In the case of a request for a stay at research centres, the protocol shall remain the same as above; however it will include some additional conditions:

- The request, which must be presented at least two months before initiating the stay, should include:

  a) A justification supporting the stay and a work plan describing the activities to be undertaken.
  b) A letter of consent from the director of the center where the researcher works.
  c) A letter from the director of the center accepting the scientist's stay.
  d) In case a visa is required, the applicant should negotiate it directly with the country of the center where he/she will carry out the stay.
  e) ICCAT will not provide any health and/or accident insurance during the stay).

- -Following the stay, a document must be presented to the SCRS including a detailed description of the work carried out during the stay and the results obtained.

3. Support the work of the SCRS

One consequence of the decreasing participation of CPC scientists at SCRS meetings is that the Secretariat has increased its participation during the meetings of the SCRS, which went from supporting the work carried out by the SCRS scientists to, in some cases, carrying out a major part of the assessment work. This situation does not correspond with the philosophy of the work of the SCRS or with the structure and means which the Secretariat has available. This preparatory work would be particularly indicated in the application of integrated or similar statistical models which require a large volume of data. The current ICCAT funds could support the work of the SCRS in different ways:

3.1 Contracting experts to develop models, analysis, data preparatory work, and/or participate in the assessments.

3.2 Financing the participation of external experts at the SCRS meetings. In the case that the expert is associated with a tRFMO, such participation would have a double benefit of a peer review (ICCAT Performance Review recommendation) and encouraging the coordination and exchange among tuna RFMOs (Kobe III recommendation).

As in the section above, financing could be applied to any expert who meets the required conditions.

Protocol for the allocation of funds

1. The SCRS Chair, after consultation with the appropriate subsidiary body of SCRS, should specify the profile of the experts in detail, the work to be carried out and, in some cases (e.g., for peer review) provide the Secretariat with a list of potential reviewers.

2. The SCRS Chair, after consultation with the appropriate subsidiary body of SCRS and in consultation with the Secretariat, will define the procedure to carry out the work plan (e.g., hiring of experts, funding local teams, etc.).

3. The Secretariat will facilitate the process defined by the SCRS or SCRS Chair.

4. The decision on the selection/approval of the projects and/or contracting experts will be made by the SCRS or the SCRS Chair. The contracting of the experts will be made by the Secretariat after consulting the SCRS Chairman and, if contemplated in the defined procedure, with a Selection Committee.

Addendum 3 to Appendix 7

Recommendations from Inter-sessional Meetings
Referred to the Sub-Committee on Statistics

2011 ICCAT South Atlantic and Mediterranean Albacore Stock Assessment Sessions

- The Group recommended continuing the work towards integrating the various growth estimate attempts for the Mediterranean albacore. If possible, by including the original datasets in the various works being published so far.
- It was recommended to further investigate on the nature and magnitude of the historical trap catches of albacore in southern Portugal, as well as implications for the assumed stock structure.
- The Group noted that information on some albacore fisheries exists (e.g. FAO, GFCM, Eurostat) which is not incorporated into the ICCAT database. Moreover, the group detected some datasets with either too small (<30 cm in 2009) or too large (>150cm) individuals reported, or important catches by "unclassified" gears. The group emphasizes the need for complete and accurate Task I and Task II data from the main fisheries catching albacore in the Atlantic and the Mediterranean in order to be able to give adequate management advice. Thus, it recommends that all CPCs make an effort to revise the available information and submit it to ICCAT, following the ICCAT standards, before the next assessment.

Meeting of the Working Group on the Organization of the SCRS

Secretariat support for SCRS

- **Further additions to data management staff at the Secretariat should be made to assure that current and future demands, which are likely to increase further, for rapid processing and summarization of the needed information sets is possible**. The pace of increasing demand on just the database management aspects for the Secretariat has occurred at double the rate of the addition of staffing to deal with the increased workload of the Secretariat. This is especially true since the mid-2000s with rapid increases in the amount of information the Secretariat is expected to process and rapidly summarize.
- **Given the success realized following the requirement that Task I and II data be submitted in specific electronic formats, a similar requirement for compliance information should be implemented.** Although compliance issues are not normally within the purview of the SCRS, it is clear that the workload associated with compliance monitoring, compounded by the fact that the vast majority of compliance documentation is submitted in paper/pdf rather than in a standard electronic format, has adversely impacted the ability of the Secretariat to fulfil SCRS data processing needs in a timely and complete manner.

Quality assurance and transparency

- **In support of further quality assurance and transparency, a checklist for stock assessment documentation should be developed and implemented to improve the current situation and allow easy location of the model inputs, software, and outputs (including the underlying data supporting tables and figures).** As the complexity of stock assessment workshops has increased, the amount of documentation needed to support the management advice provided to the Commission has increased. There is wide variability in the quality and quantity of documentation, including the basic input data, models applied, and outputs from the assessments. In addition, stricter guidelines streamlining reports (both detailed and executive summaries) need to be implemented in order to improve the quality of the documentation and advice provided.

– **Collaboration between tRFMOs scientific committees should be further enhanced as such collaboration provides a good basis for quality assurance through peer review and exchange of expertise and experience**. In line with the outcomes of the Kobe2 (Barcelona) discussions, benefits from joint, horizontal working groups devoted to cross-cutting issues such as seabird by-catch and data standardizations issues, should be pursued.

ICCAT-GBYP Symposium on Trap Fisheries for Bluefin Tuna

− The historical data series from the tuna trap fishery archives that have been recovered in the last two years provide an important improvement of the ICCAT data base. The Symposium recommends that further details be made available by national scientists, for a better understanding of the natural fluctuations of the stock, and to improve the standardised CPUEs taking into account the most relevant variables.

− It is also recommended that these traps be considered as "ICCAT Tuna Observatories", by increasing their full cooperation with ICCAT and its scientific programs, by providing full access to their detailed catch and effort data, by providing that biological sampling can be carried out, and by allowing the tag and release of bluefin tunas.

− For standardizing the CPUE series from trap fisheries, it is recommended that:

  - Records be kept of landed fish as well as released fish from the traps.
  - Records be kept of size and/or age information of the fish caught, and indices be developed by age or age groups if there are changes in the size distribution of fish caught in the traps.
  - Regional-wide studies be promoted on the trends of catch rates at size-age from different tuna traps.

− The Symposium participants also recommended that these traps be kept open for a time period long enough to maintain the consistency of their long-term statistical series.

Tropical Tuna Species Group Inter-Sessional Meeting on the Ghanaian Statistics Analysis (Phase II)

− The Group recognized the extraordinary work conducted by Ghanaian scientists with very limited resources for sampling and collection of fishery statistics corresponding to the Ghanaian fleet fishing tropical tunas. However, taking into consideration the relevance of tropical tuna catches landed in Tema by this fleet and fleets of other nationalities and the very limited material and human resources currently available, the Group remains concerned. While some positive steps have been taken Ghana to address staffing and infrastructure issues previously identified by SCRS, current levels are not yet sufficient to fully meet data collection obligations for Task I and II statistics for the overall fleet.

− The Group found that for several fleet segments, very little sample data were available and only partial or no total annual catch was available through official data collection mechanisms. The behaviour of certain segments of the fleet, which includes transfer of catch at sea to carrier vessels for landing at various ports, prevents adequate sampling of catch (by gear) and makes access to logbooks at port, difficult, if not impossible, to achieve for some fleet segments. While the Group made attempts to estimate catch and size characteristics for those fleet segments, these estimates remain highly uncertain. The Group is concerned that a fraction of the Ghanaian fleet behaves in ways that could be considered in contravention of the objectives of the ICCAT Convention. In particular, because obligatory data collection and reporting is generally not possible under the current practices, proper monitoring of the full fleet activity is not carried out.

− The Group reemphasized the SCRS view of convenience for the Ghanaian sampling program to follow, as closely as possible, the sampling scheme protocol used in the EU fishery in order to facilitate the joint analysis of standardized data. In that sense, as different teams are responsible for the Ghanaian and European purse seine sampling in Côte d'Ivoire, it would be convenient to continue enhancing collaboration and coordination between both groups.

Improvements in data collection infrastructure and procedures to fully address data reporting obligations

− The Group recommends development of a permanent structure, adequately equipped, with the necessary human resources, in charge of collecting detailed information on the tropical tuna fisheries (Task I, Task II (C/E) and sampling of catches (Task II size, biological parameters).

- The Group recommends the Ghanaian authorities make the necessary efforts to conduct a proper monitoring of the activities of their fleet in order to guarantee the necessary coverage for the collection of statistical data required. Such monitoring should include at-sea observations, including sampling catches, as well as collection of complete and accurate fishing logbooks from the vessels.
- Furthermore, the Group recommends that data collection protocols be instituted in Ghana which in make it possible to sample catches landed, regardless of flag, as is the process used in Abidjan.

Mechanisms for meeting data obligations

- The Group recommended that mechanisms to improve capacity for meeting data collection and reporting obligations, including industry financial contributions or inter-governmental arrangements, be instituted to enhance financial support for staffing and infrastructure improvements needed to meet the above recommendations.

Technical recommendations

- The Group noted a difference in the percentage of skipjack sampled on Ghanaian landings by scientists and at the cannery. This divergency in species composition remains unexplained. The Group recommended that an intensive multispecies sampling scheme should be done in Tema, validating in parallel the tunas sampling and data entries done by scientists and at the cannery. This comparative sampling should be done under the responsibility of a scientist fully experienced in multispecies tuna sampling.

- The Group noted a relative lack of larger yellowfin tuna in the sample records from Ghana for a series of years. While the Group found that very large yellowfin are infrequently encountered in the Ghanaian fleet, compared to the European purse seine fleet, it was discovered during a site visit to Ghana and in subsequent discussion, that while larger fish are sampled, they are measured in a different way and recorded on separate sheets, which may not have been computerized. The Group recommended that all measures of fish should be on the same sheet, to avoid loss of these measures.

- The Group noted that there are some observer data now available and becoming available for the tropical tuna fleets for characterizing size composition and potentially species composition of the catches as well. Currently these data are not used in the processes for estimating species and size composition of the catches for the European fleet because of concerns about their potential bias. The TGG recommends that observer data be fully analyzed and compared to port sampling information to judge the adequacy of current observer sampling protocols for these purposes.

- The Group noted that the metrics used for comparing Ghanaian and European fleet performance make use of somewhat different components of the catch. For Ghanaian vessels landing in Tema, *"market fish"* which do not go to canneries are recorded and officially reported in Task I data. For European vessels and Ghanaian vessels landing outside of Tema, the landed fish which do not go to canneries are characterized as *"faux poisson"* but are not recorded or officially reported as part of Task I. While there is now ongoing sampling to estimate *"faux poisson"*, it is not yet considered part of official Task I. The TGG recommends that official Task I statistics should include all sources of fishery induced mortality and that CPCs endeavour to achieve this recommendation.

- The Group also noted that the procedures used during the meeting for re-estimating Ghanaian species and size composition made use of both newly available observations and assumptions for time-area combinations where no direct observations were available. While the Group considered the assumptions used to be plausible and resulting in a substantial improvement in the available Task II data base, there are other assumptions that are also plausible and the Group did not have sufficient time to evaluate sensitivity of the outcomes to a range of plausible assumptions. The Group recommends that such evaluations be carried out in the future before accepting any one set of assumptions as the best available.

- The Group recommended working toward development of an improved and harmonized sampling and data processing process for the Ghanaian fleet. In this sampling scheme, it is necessary to separate free school from FAD sets in the data collection and processing. The data validation software (AKADO) needs to be English-language and the processing system made more user friendly and should be introduced into the ICCAT software catalogue as one means of validation. Furthermore, the Working Group recommended that data recovery efforts continue.

- The Group recommends that discrepancies identified between the ICCAT authorized vessel list and the results of in-field investigation of active vessels in the Ghanaian fleet be further evaluated.

Atlantic Yellowfin Stock Assessment Sessions

- The Group recommended that historical and present samples of size frequency (in contrast to raised and substituted size-frequency) be recovered and provided to the Secretariat in support of conducting stock evaluations that make use of the sampling fraction in calculations.

- Recalling the previous SCRS recommendation, the he Group reaffirmed that catch and catch at size necessary for fine-scale scientific analysis be reported by CPCs in at most 5x5 degree resolution.

- The Group recommended that procedures for collection of size samples should be reviewed to assure that there is no size bias in sampling, as the Group suspects that such size-bias may be occurring in certain fisheries.

- The Group recommended the evaluation of market information sources or other alternative ways to improve the accuracy of catch estimates coming from logbooks.

- The Group recommended re-evaluation of the length-weight and associated relationships which were developed on historical information. It is possible that such relationships have changed as the stock condition has changed over time.

Sharks Data Preparatory Meeting for the Application of the Ecological Risk Assessment

- Urge scientists to participate in the 2012 assessment of shortfin mako and comply with the deadlines for the submission of data and documents (see item 5).

- The Group recommended that the CPCs provide data to analyze conventional tag shedding rates.

- The information on tagging should specify the sex of sharks tagged by scientific personnel.

- Allow scientific observers to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs) from species whose retention is prohibited by current regulations that are dead at haulback.

- The Group recommended that the CPCs explore methods to estimate catches of sharks in purse seine fisheries.

- The Group recommended that CPCs report shark Task II size data by sex since this information can be easily collected by observers in most cases.

- The Group suggested to incorporate the description of the 6 species of sharks that have been included in recent Recommendations (ALV, BTH, OCS, SPL, SPZ, SPM) in Chapter 2 of the ICCAT Manual in the by-catch species section.

Recommendations Pertinent to the Sub-Committee on Statistics from the Inter-sessional Meeting of the Sub-Committee on Ecosystems

- The Sub-Committee recommends that guidelines for the presentation and analysis of by-catch statistics be developed in conjunction with the Working Group of Stock Assessment Method (WGSAM) and that these guidelines be made available as part of the *ICCAT Manual*. Furthermore, the Sub-Committee should work with WGSAM to evaluate how these data can be used as part of a risk management advice framework.

- The Sub-Committee re-iterated the need for all CPCs to collect and provide by-catch data to the SCRS, and highlighted the need for further analysis combining species distribution and by-catch data to fill existing data gaps, and to monitor levels and impacts of by-catch.

- With regard to sea turtle by-catch mitigation, the Sub-Committee reminds the obligations of CPCs to provide the by-catch information as required in Rec. 10-09 in 2012.

- The Sub-Committee noted that the By-catch Coordinator position remains unfilled and strongly recommends that this position be recruited promptly. The Sub-Committee also recommended modifications to the job description (Section 5) to better reflect its needs at this time, and to facilitate the ability to recruit an individual with the appropriate skills.

- The Sub-Committee recommends that national scientists from CPCs provide available information which would facilitate to provide a response to the Commission regarding Resolution 05-11 (Sargassum).

- The Sub-Committee recommends that the Secretariat attempt to collate user manuals or protocols describing data collection from CPC observer programs. Also, an attempt should be made to identify historical changes to the data collection protocols that might complicate data analyses and interpretation.

GBYP Steering Committee Meeting

- *Excluding data of the year*. The Steering Committee discussed about the limits to be adopted in the data recovery policy, particularly taking into account the discussions raised after some proposals in Phase 2. It was recognised that although the ICCAT rules are very precise for Task I data, they do not define a minimum level of sampling for Task II data by fishery. This fact makes problematical a precise definition of the policy to be adopted for GBYP data recovery. The Coordinator provided some examples of data sets which are collected and provided according to the general rules under Task II, which are not very useful for scientific purposes. It was very clear that GBYP cannot pay for data that have been collected under national sampling schemes by ICCAT CPCs to fulfil their Task II obligations. It was also clear that many data are not usually provided to ICCAT even though they may be collected. This is because they are collected by various entities on their own costs and for various purposes. The Steering Committee recommended that a reasonable policy for GBYP is to limit the data recovery to data collected in previous years, excluding the data of the year. This policy would thus make a clear distinction between data recovery (which is a legitimate task under this part of the GBYP, and paying for the collection of data which are the responsibility of the CPCs (such as Task II). The Steering Committee also recommended that the focus in these cases should be on the last two decades and particularly for those data which could be directly used for stock assessment purposes, such as CPUEs or Task II data for fisheries poorly represented in the ICCAT bluefin tuna data base. At the same time, the Steering Committee recommended the GBYP Coordinator to contact the chair of ICCAT Sub-Committee on Statistics in order to initiate an exercise among all CPCs for establishing a minimum level of sampling for the provision of Task II data for bluefin (eventually this exercise could be extended to all species under the competence of ICCAT) and for eventually defining, in agreement with the scientists concerned, a minimum level of sampling coverage to be officially adopted by the ICCAT.

First Meeting of the Joint Tuna RFMO Technical Working Group on By-Catch

Data collection and harmonization

- The Working Group agreed that there should be minimum data standards, with data fields that are collected across all RFMOs with a view to allowing interoperability.
- All members of RFMOs are encouraged to improve the quality of data collection system to improve fisheries and by-catch assessments.
- All members of RFMOs are strongly encouraged to share data or information within RFMOs collected from observer and log book programs for the purposes of by-catch management and research.
- The Working Group will prepare a short report on data harmonization using all existing data forms from all tuna RFMOs by December 31, 2011. To facilitate this process, the IATTC forms will be circulated for a comparison with the other tuna RFMOs.
- Noting that there is a working group to be convened between IATTC and WCPFC on observer data harmonization, including by-catch, the Working Group recommends involving the other tuna RFMOs at this workshop.
- Seabird identification: the tuna Secretariats will provide ACAP with existing seabird identifications, and ACAP will develop a standardized identification guides. The drafts of the identification guides will be reviewed by the Working Group working group and Tuna RFMO working groups.
- Shark identification: the Working Group, with WCPFC and ICCAT taking the lead, will harmonize guidance for shark identification, in collaboration with the IUCN shark specialist group and others.

- Sea turtle identification: the Secretariats will provide the Working Group Chair with the materials currently in use for turtle identification so these can be harmonized and distributed to all tuna RFMOs.
- The Working Group should consider a process to develop harmonized marine mammal identification guides for the fisheries for which they are not available.

Blue Marlin Stock Assessment Meeting

- The Group recommended on the need to stress that CPCs should report Task I and Task II for Inter-sessional meetings by the deadlines provided by the Secretariat.
- The Group recognized the important new catch estimates of blue marlin from FAD fisheries of Martinique and Guadalupe and recommended that detail of estimation be presented as an SCRS document in the next species group meeting. The Group also recommended that other Caribbean countries with FAD fisheries report detail specific billfish catches.
- The Group encouraged the Secretariat to reach out to other RMFO in the Greater Caribbean to explore sharing data pertinent to ICCAT fisheries.
- The Group strongly recommended that the Commission provide additional funding (50K Euros) to the Enhanced Billfish Research Program for a genetic study in order to accelerate the data acquisition and analysis for separating white marlin from spearfishes to be undertaken in the immediate future.
- The Commission should require the reporting of catches of white marlin and roundscale spearfish separated.

Addendum 4 to Appendix 7

Response to the Resolution by ICCAT to Establish a Working Group on Sport and Recreational Fisheries [Res. 06-17]

In 2006, the Commission resolved that the SCRS should establish a Working Group to evaluate sport and recreational fishing activities. The Working Group would:

a) Examine the biological and economic impact of recreational and sport fishing activities on ICCAT managed stocks and assess the level of harvest.

b) Based on available information, identify approaches for managing the recreational and sport fishing activities in ICCAT fisheries.

c) Report the results of deliberations to the Commission and, as appropriate, propose recommendations for next steps to manage the recreational and sport fishing activities in the Convention area. CPCs shall report prior to the Working Group meeting the techniques used to manage their sport and recreational fisheries and methods used to collect such data.

With regard to item (a), the group recognized that recreational and sport fishing activities can have considerable biological and economic impact on ICCAT managed stocks. Furthermore, these impacts are not currently estimable due to a general lack of data.

With regard to item (b), the group recognized that the evaluation of suitable management measures requires reliable statistics be reported by all CPCs with non-trivial recreational and sport fisheries, and would be further improved by concomitant socio-economic data. The group recommended enhanced efforts by CPCs to collect and report such information.

With regard to item (c), the CPCs that attended the group made reports on their sport and recreational fishing activities, and the techniques used to collect data and manage these activities. These reports have been compiled, and are summarized below.

Taking into account the need to improve stock assessments by obtaining reliable estimates of total removals (harvest + dead discards) of ICCAT managed stocks; the Committee reiterated its following recommendation:

1. In order to develop appropriate estimates of harvest and dead discards by recreational and sport fishing activities, the SCRS recommended that each CPC:

a) Identify the "universe" of recreational fishing participants.
b) Sample that universe with appropriate coverage to allow estimation of total removals with sufficient accuracy and precision.
c) Produce or obtain estimates of release mortality to facilitate the quantification of fish released alive that subsequently die due to interaction with fishery.

2. The Committee concluded that sufficiently accurate and precise estimates of total recreational removals require CPCs to collect the following information through national and/or regional sampling programs. This data would be retained by CPCs, but used to develop the estimates of total recreational removals that are reported to ICCAT. The following should be considered minimum standard practices. These are the essential components for estimation of Task I and Task II data to meet reporting obligations.

   a) Catch by species
   b) Length/Weight of landed fish
   c) Discards by species
   d) Length/Weight of discarded fish
   e) Disposition of discards (e.g. released alive and likely to survive, released alive but unlikely to survive, discarded dead, used for bait).
   f) Location and time of fishing trip
   g) Estimates of release mortality by species

The Group acknowledged that some CPCs have already developed successful sampling programs, and currently use data collected by these programs to report recreational Task I and Task II statistics to ICCAT. Several of these programs were identified by the group, and the methodologies were discussed. These issues will be further taken up at a future meeting of the Working Group on Stock Assessment Methods.

Appendix 8

REPORT OF THE SUB-COMMITTEE ON ECOSYSTEMS
(Madrid, Spain – September 27-30, 2011)

The Meeting was held at the ICCAT Secretariat on September 27 to September 30, 2011. Mr. Cleo Small (BirdLife International) and Mr. Anton Wolfaardt (ACAP) volunteered to serve as rapporteurs.

1. Review of new scientific information

The Sub-Committee discussed and made recommendation regarding these documents. This discussion can be found in SCRS/2011/204.

Document SCRS/2011/150 provided an updated review of seabird by-catch mitigation measures for pelagic longline fisheries, undertaken by the Seabird By-catch Working Group of the Agreement on the Conservation of Albatrosses and Petrels (ACAP) in August 2011. The review includes the scientific evidence in support of the effectiveness of each mitigation measure, recommendations on appropriate combinations of measures, along with recommended technical specifications, monitoring requirements, and research needs.

Document SCRS/2011/151 presented a summary of the ACAP best practice advice for mitigating seabird by-catch in pelagic longline fisheries. Currently, no single mitigation measure can reliably prevent incidental mortality. The most effective approach is to use simultaneously weighted branchlines, night setting and bird scaring lines. It is recommended that these three measures should be applied in high risk areas such as the high latitudes of southern hemisphere oceans, and lower to mid-latitude fisheries of both the northern and south east Pacific, to reduce the incidental mortality to the lowest possible levels. Other factors such as safety, practicality and the characteristics of the fishery should also be recognised. ACAP best practice advice on bird scaring lines is that vessels >35m use two bird scaring lines, one on each side of the longline. For vessels <35 m, a single bird-scaring line, using either long and short streamers or short streamers only, has been found effective.

Current recommended minimum standard for branchline weighting configurations are:

- Greater than 45 g attached within 1 m of the hook or;
- Greater than 60 g attached within 3.5 m of the hook or;
- Greater than 98 g weight attached within 4 m of the hook.

On the basis of the evidence currently available, ACAP does not currently recommend the following as seabird by-catch mitigation options: line shooters, olfactory deterrents, hook size and design, side-setting, the use of blue-dyed bait and bait thaw status.

Document SCRS/2011/187 assessed the impact of the Uruguayan pelagic longline fishery on populations of albatrosses and petrels. The paper applied Productivity and Susceptibility Analysis (PSA) and the concept of "Potential Biological Removal" (PBR). This two-step approach allowed an estimate of the relative impact of the Uruguayan pelagic longline fleet for most of the populations or species of albatross and petrel that have high association with this fishery. Of 15 species addressed, 11 were fully evaluated, and a ranking of risk was obtained. The concept of PBR was applied to the eight most at risk species. The assessment found that the impact of fishing on populations could not be straightforwardly presumed from their by-catch rates. The results indicate that great albatrosses (*Diomedea* spp) and Atlantic yellow-nosed albatross *Thalassarche chlororhynchos* were more affected than the species caught in highest numbers by the fishery (i.e. black-browed albatross *Thalassarche melanophrys* and white-chinned petrel *Procellaria aequinoctialis*). Wandering albatross *Diomedea exulans* from South Georgia would be the population most affected by the Uruguayan fleet. This work should be seen as a case study of the fisheries operating in the southwestern Atlantic, particularly over part of the Brazil Malvinas Confluence (BMC). Considering the fishing effort that several pelagic longline fleets expend over the region of the BMC, this paper highlights that some populations of albatross and petrel are likely to be seriously affected.

Document SCRS/2011/198 presented seabird distribution maps based on seabird tracking data, interaction maps between longline fishery effort and seabird distribution, and data on the distribution of by-catch CPUE of seabird species in the South Atlantic, based on Japanese by-catch data, to identify by-catch hotspots. Tracking data indicate highest concentrations of the seabird breeding distribution in the area between 5-10W, 35-40S, and 35-

40S, 10W-15E, and also 35-60S, 55-65W during non-breeding. The available by-catch data confirm the distributions shown by the tracking data but there are exceptions in each species and degree of concentration of seabird distribution did not necessarily agree with the degree of CPUE in each species. The degree of interaction data was low level for the latitude 40-45S while CPUE of by-catch data was quite high. Interaction data showed concentration for latitudes 25-40S longitudes 55-40W, where there is no by-catch data. It was suggested that three methods should be integrated to define the hotspot. Distribution of by-catch CPUE in albatrosses was high especially off South African waters and in the south-eastern Indian Ocean. Thus, there two area and the SW Atlantic would be considered as risk area for seabird by-catch, and it is necessary to introduce appropriate mitigation measure there.

Document SCRS/2011/201 reported the results of a study to estimate seabird by-catch by Taiwanese vessels in the Atlantic. Sixty one trips with 6,181 observed sets on Taiwanese longline vessels in the Atlantic Ocean from March 2004 to February 2008 were used to record the interaction between seabirds and longline fisheries. At least twenty eight species of seabirds were sighted, including two species in the north, fifteen species in the tropics and thirteen species in the South Atlantic. Eight species were albatrosses, the group of greatest conservation concern. 198 seabirds of eight major species were caught and 23 were live-released. The major by-catch species included yellow-nosed albatross, black-browed albatross, wandering albatross, spectacled petrel and southern giant petrel in the southern Atlantic Ocean. Major by-catch areas were 20°~40°S, 10°W~15°E and 35°~45°S, 45°~55°W. The nominal by-catch per thousand hooks ranged from 0 in the North Atlantic Ocean to 0.064 in the Southeast Atlantic Ocean. The observer coverage rate was too low for an accurate estimate of seabird by-catch in the northern Atlantic Ocean. In the tropical area, the level of observer coverage was high and indicated the seabird by-catch rate was low with low risks for seabirds. As for the South Atlantic Ocean, by-catch rates were influenced by the number of birds sighted and location using generalized additive models (GAMs). Total ICCAT pelagic longline effort was used in the final GAM to predict total by-catch in the South Atlantic Ocean. The predicted annual by-catch number with the bootstrapped 95% confidence interval was from 3,446 to 6,083 per year by pelagic longline fleets from 2004 to 2008. The study highlights the need for all pelagic longline vessels operating south of 20S to use bird scaring lines and other mitigation measures in order to reduce seabird by-catch. Continued collection of those data could provide information on the effectiveness of the current conservation measures. For future research and conservation, more international cooperation on research and data sharing is critical to ensure the sustainability of marine ecosystems and fisheries.

Document SCRS/2011/206 presented a proposal by Japan for the application of seabird by-catch mitigation measures in the South Atlantic. This paper is thoroughly described in the document SCRS/2001/204. Unfortunately, the Sub-Committee could not properly evaluate this paper because it dealt with policy issues, rather than a scientific evaluation.

2. Tuna RFMO Joint By-catch Technical Working Group

The Sub-Committee discussed the outcomes of the first meeting of the Joint By-catch Technical Working Group (JBTWG), which was a one-day meeting held on 11 July 2011 during the KOBE 3 Meeting. The Sub-Committee reviewed the general recommendation for the standardization and harmonization of data collection and the list of research priorities and discussed their relevancy to ICCAT. The Sub-Committee also produced a list of research recommendations of high importance in the ICCAT fisheries. This discussion and is summarized in SCRS/2011/204.

3. Ecosystem considerations

A National Scientist from the United States presented progress made in describing the Oxygen Minimum Zone in the tropical Atlantic Ocean. This feature has expanded since the 1960s resulting in a reduced proportion of the Atlantic Ocean possessing sufficient dissolved oxygen for high-oxygen demand species such and yellowfin tuna and blue marlin. The expansion of this feature (both in depth and surface area) has implications for stock since it may alter catchability and/or carrying capacity as the fish become compressed in the surface waters where the dissolved oxygen remains sufficient.

4. Recommendations

Given current ICCAT requirements of a minimum of 5% observer coverage, and the need to collect and report data for a number of by-catch species, the SC-ECO recommends the development and implementation of capacity building programmes to improve sampling protocols, observer training and species identification (e.g. through identification guides or sending photos and samples to experts).