INTERNATIONAL SEAFOOD SUSTAINABILITY FOUNDATION

STATUS OF THE WORLD FISHERIES FOR TUNA
STOCK STATUS RATINGS - 2011
(DECEMBER 2011 UPDATE)

This section describes the status of the 19 stocks of the four main species of tunas – yellowfin (YFT), bigeye (BET), skipjack (SKJ), and albacore (ALB) – in each of the ocean areas covered by the four regional fisheries management organizations (RFMOs) responsible for the conservation and management of these species, and presents a brief summary of the conservation and management measures taken for each of these species.

This status report differs from that prepared by ISSF in previous years primarily by the incorporation of a new rating factor related the environmental impact, in terms of bycatch, of the principal gear(s) used to fish each stock (see Appendix 1). The ratings are thus prepared for three factors: Abundance, Fishing Mortality and Environment (bycatch).

This version (Tech. Report 2011-04C, December 2011) has been updated to take into account the updated stock assessments conducted by IOTC in December 2011 and the management actions adopted by ICCAT in November 2011.

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COLORS AND SYMBOLS USED IN THIS REPORT

$B_{current}$ (B_c)	Current **spawning biomass** (B represents spawning biomass throughout this report, unless otherwise noted)
$F_{current}$ (F_c)	Current fishing mortality rate
F_{MSY}	Fishing mortality rate (F) corresponding to maximum sustainable yield (MSY)
B_{MSY}	Spawning Biomass corresponding to MSY
Red	This color is reserved for ISSF to use as an overall rating for stocks that are overfished, are still being subjected to overfishing, are not being adequately managed to end overfishing and rebuild, and whose main fishing gears have considerable bycatch problems or insufficient bycatch monitoring.
Orange	**Biomass Factor**: Spawning Biomass is below B_{MSY} and it has not been stable or increasing*. **Fishing mortality Factor**: F is above F_{MSY} and there are no adequate management measures to end overfishing, or the measures in place are insufficient. **Environment (Bycatch) Factor**: Adverse population effects on bycatch species are expected for a given fishing gear/fishing method, and there are no management measures or research programs in place expected to mitigate these effects. In addition, bycatch monitoring is inadequate.
Yellow	**Biomass Factor**: Spawning Biomass is below B_{MSY} but it has been stable or increasing*. Yellow is also used in the absence of a stock assessment. **Fishing mortality Factor**: F is above F_{MSY} but there are adequate management measures expected to end overfishing. **Environment (Bycatch) Factor**: Adverse population effects on bycatch species are expected for a given fishing gear/fishing method, but there are either management measures or research programs in place expected to mitigate these effects. In addition, there is adequate monitoring of bycatch.
Green	**Biomass Factor**: Spawning Biomass is at or above B_{MSY}. **Fishing mortality Factor**: F is below F_{MSY}. **Environment (Bycatch) Factor**: Adverse population effects on bycatch species are not expected for a given fishing gear/fishing method.

* As determined by the ISSF Scientific Advisory Committee based on the results of the stock assessment. Generally, a stable or increasing trend has to be observed for more than two years.

SUMMARY STOCK RATINGS

Stock	Catch	MSY	Biomass	F	Bycatch
Eastern Pacific Ocean					
BET	81	81			
YFT	255	263			
SKJ	147	N/A			
Western and central Pacific Ocean					
BET	117	77			
YFT	507	539			
SKJ	1,557	1,503			
Pacific Ocean					
ALB-S	89	85			
ALB-N	72	N/A			
Indian Ocean					
BET	72	103-114			
YFT	299	357			
SKJ	429	564			
ALB	44	30			
Atlantic Ocean					
BET	76	92			
YFT	108	139			
SKJ-E	164	143-170			
SKJ-W	18	30-36			
ALB-N	20	29			
ALB-S	19	28			
ALB-Med	2	N/A			

Notes:

- Catch and MSY are in thousand tonnes;
- Catch for all stocks is for 2010.
- See tables in the report for details on each stock

I. EASTERN PACIFIC OCEAN (EPO)

RFMO: Inter-American Tropical Tuna Commission (IATTC)
Last Scientific Committee (SAC) meeting: May, 2011
Last Commission meeting: July, 2011.
Tuna stocks managed: EPO Yellowfin, EPO Bigeye, EPO Skipjack, North Pacific Albacore (also managed by WCPFC), Pacific Bluefin (also managed by WCPFC). NOTE: Stock ratings for North Pacific Albacore are given in the Western Pacific Ocean report (Section II).
Data sources: The main sources of information for this section are Aires da Silva and Maunder (2011a and 2011b), and Maunder (2011).
Last update: July 25, 2011.

I.1. CATCHES

About 14 percent of the world production of tuna is from the eastern Pacific Ocean (EPO). Catches of skipjack, yellowfin, bigeye and albacore in 2010 were 491,000 tonnes (including dead discards), a 20% decline from 2009. This decline was particularly marked for skipjack. There has been a general tendency for the total catch to decline since 2003, when a record 877,000 tonnes were caught (**Figure I.1.1**).

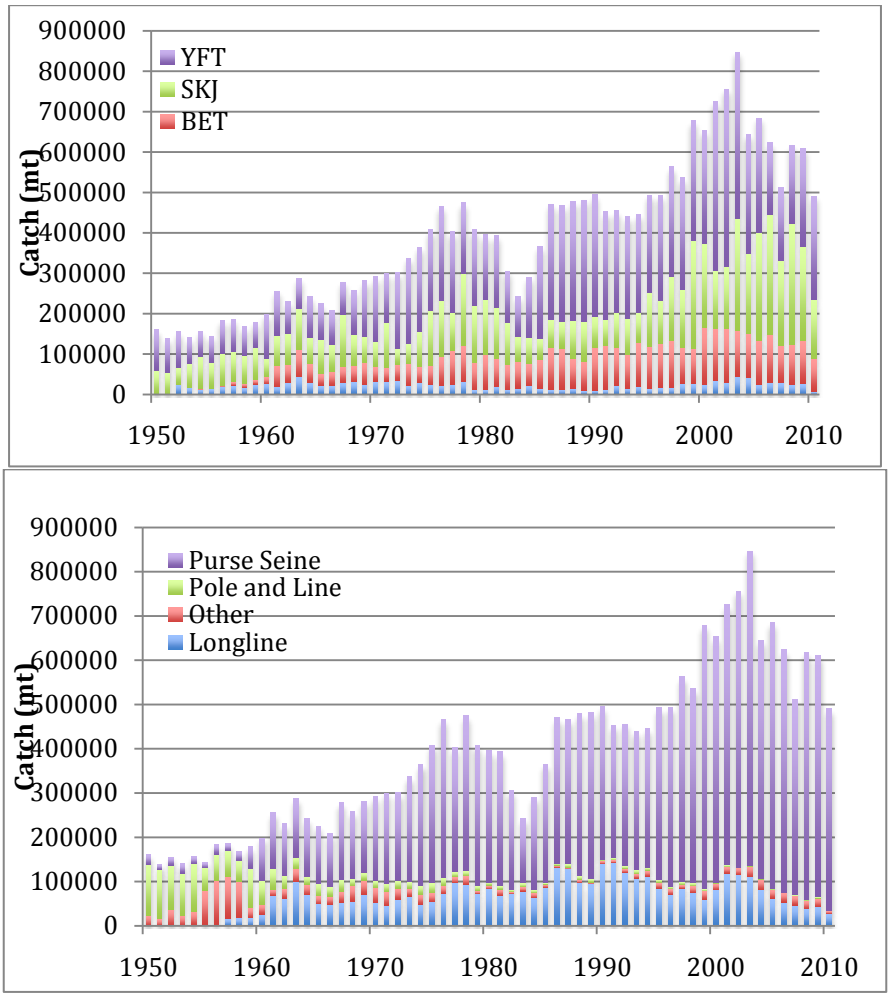

Figure I.1.1. Trends in catch (mt) of albacore, bigeye, skipjack and yellowfin in the EPO region, by species (top) and gear (bottom), 1950-2010.

Average catches for the five-year period 2005-2009 provide an indication of the recent performance of the fisheries (**Figure I.1.2**): Skipjack accounts for 42% of the catches in weight, followed by yellowfin (37%), bigeye (18%), and albacore (4%). Purse-seine vessels take the majority (89%) of the total catch, followed by longline (7%) and a variety of other gears.

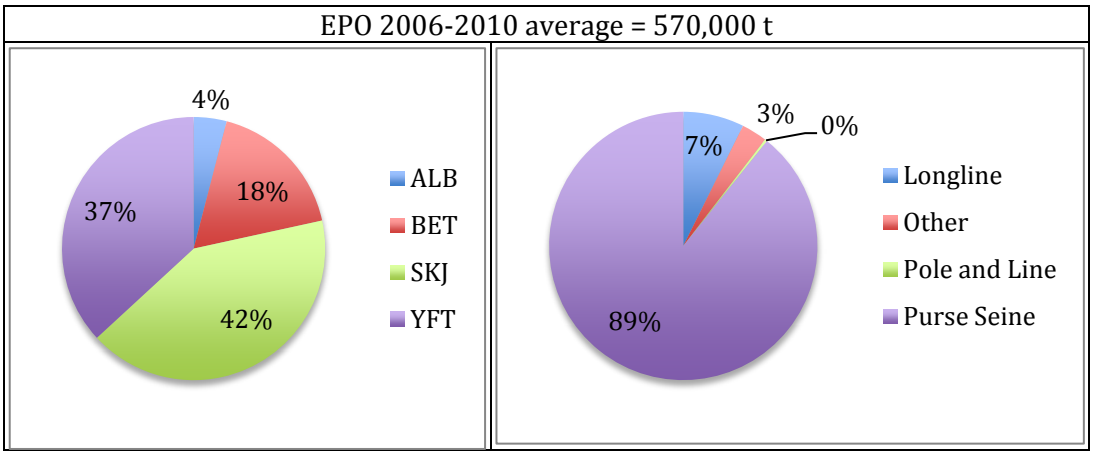

Figure I.1.2. Average 2006-2010 catches of skipjack, yellowfin, bigeye and albacore tuna in the EPO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

I.2 EPO STOCK STATUS

I.2.1 Bigeye in the EPO

Bigeye catches in 2010 were about 81,000 tonnes, a 24% decrease from 2009. Longline fishing dominated the catches in weight until the mid-1990s. Purse seine fishing accounts for the majority of catches in recent years, 2.5 times higher than longlining (**Figure I.2.1.1**). Bigeye catches in the EPO by other gears are very minor.

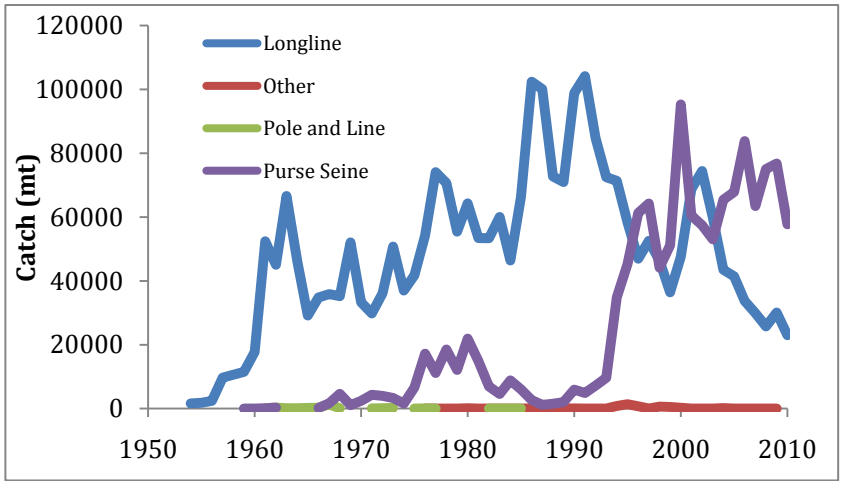

Figure I.2.1.1. Catches of bigeye tuna in the EPO from 1950 to 2010, by gear type.

Stock assessment

In 2011, the IATTC conducted an updated assessment of the stock. The results of this update indicate the following (**Figure I.2.1.2**):

- The current ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated at 1.21. This indicates that that **the stock is not in an overfished state**. Since 2005, there has been an increasing trend in biomass, subsequent to IATTC management measures initiated in 2004. However, under the current levels of fishing mortality, recent spikes in recruitment are predicted not to sustain this increasing trend.

- The ratio of $F_{current}/F_{MSY}$ is estimated at 1.08, indicating that **overfishing was occurring on average in the most recent three years (2008-2010)**.

- The estimate of MSY is 81,000 tonnes. MSY has been reduced to about half its level in 1993, when the expansion of the floating-object fishery began, as the overall selectivity from all fleets combined shifted towards smaller individuals. Since bigeye tuna can grow to be quite large (close to 200 cm), catching them when they are small results in a loss of potential yield, i.e. the catches that could be taken by other gears that target larger individuals, such as longlining. This is known as "growth overfishing".

- As for all stock assessments that use MSY-based reference points, the assessment of stock status is highly sensitive to the assumed relationship between spawning biomass and recruitment (the base case assessment did not assume one). The results are more pessimistic if a stock-recruitment relationship is assumed. The results are also more pessimistic if a higher value is assumed for the average size of the older fish, if lower rates of natural mortality are assumed for adult bigeye, and if only the late period of the fishery (1995-2009) is included in the assessment.

The estimated increase in biomass since 2005 is driven by an increasing trend in the catch rate of Japanese longline vessels. These catch rates appear to have leveled off in 2009 and 2010. In addition, stock projections at the 2008-2010 average level of fishing mortality indicates that the spawning biomass will fall below the MSY level. For these reasons, ISSF is taking a cautious view about the status of EPO bigeye.

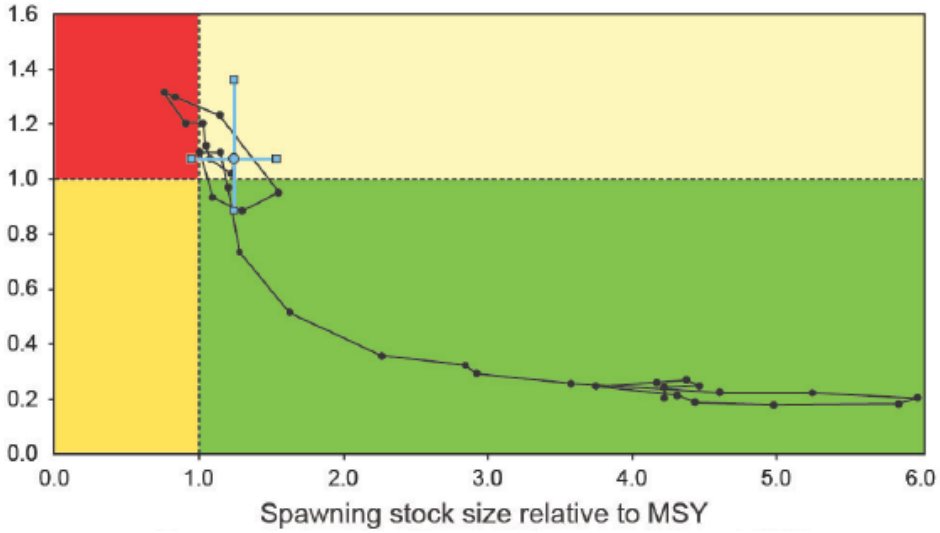

Figure I.2.1.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the EPO. The blue cross represents relative spawning biomass in 2010 and relative fishing mortality for 2008-2010. Colors are taken from IATTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main conservation measure established by the IATTC for bigeye is Resolution C-11-01, which includes an annual fishing closure for purse seine vessels greater than 182 tons carrying capacity. This measure calls for:

- A 62-day closure for purse seiners greater than 182 tons capacity in 2011, 2012 and 2013;
- A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;
- A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas during 2011 and 2012;
- Bigeye catch limits for the main longline fishing nations

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	81	2010	
Five-year average catch	100	2006-10	
MSY	81	2010	
F/F_{MSY}	1.08	2008-2010	
B/B_{MSY}	1.21	Start of 2011	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes. If catches continue to be above MSY, overfishing and a subsequent decline in biomass would be expected to occur in the near future.

Ratings for EPO Bigeye tuna		
Stock abundance	YELLOW	B > B_{MSY}. The much-improved perception of stock status in the 2010 assessment has been corroborated by the 2011 assessment. However, projections indicate that recent recruitments will not sustain the 2008-2010 average level of fishing mortality and the stock is expected to fall below B_{MSY} in a few years.

Fishing mortality	YELLOW	F > F_{MSY}. According to the 2010 assessment, the IATTC management measures in place appeared to be effectively limiting the fishing mortality on the stock. However, F is now above the MSY level and the regulations need to be strengthened.
Environment (Bycatch)	YELLOW ORANGE	70% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks, non-target species in general). There is 100% observer coverage on large purse seiners. 29% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). There will be 5% observer coverage on large longliners

September 2010 changes with respect to the April 2010 ISSF Stock Status Report (the EPO BET stock was rated Orange then): The 2010 assessment by IATTC estimated a much-improved status. Instead of rating it Green in its September 2010 update, ISSF chose Yellow to be precautionary.
May 25, 2011, Update: The 2011 assessment by IATTC corroborates that biomass is above the MSY level, and therefore the B factor could be rated Green. However, it is maintained in Yellow in this update because projections at the current F indicate that spawning biomass will soon fall below this level.
August 2011 update: Bycatch rating for longliners in the EPO has been changed from Yellow to Orange. Some of the major fleets using this gear did report catches of non-target species to IATTC (particularly sharks and billfishes) but the reporting is erratic. This situation may improve in the future with the new observer program for longliners.

I.2.2 Yellowfin in the EPO

Yellowfin catches in the EPO in 2010 were about 255,000 tonnes, a 4% increase from 2009. The main fishing gear is purse seine, and recent catches by this gear are about 60% of the record high caught in 2002 (**Figure I.2.2.1**). Catches from longline vessels have also declined substantially in recent years.

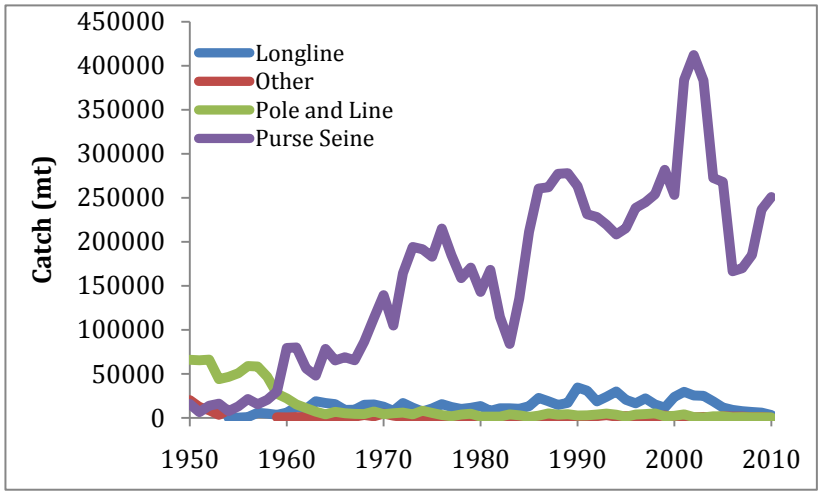

Figure I.2.2.1. Catches of yellowfin tuna in the EPO from 1950 to 2010, by gear type.

Stock assessment

The 2010 assessment used the same methodology as the previous one, with updated data. The assessment results indicated the following (**Figure I.2.2.2**):

- The current (beginning of 2011) ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated to be 0.71, indicating that **the stock is in an overfished state**. Spawning biomass has decreased since 2009 with a possible increase during the

fourth quarter of 2010; it is projected to increase again at the current level of fishing mortality.

- The ratio $F_{current}/F_{MSY}$ is estimated to be 0.86, indicating that **overfishing is not occurring**.

- MSY is estimated to be 263,000 tonnes. Increasing the average weight of the yellowfin caught could increase the MSY.

- The assessment of stock status is highly sensitive to the assumed relationship between spawning biomass and recruitment (the base case assessment did not assume one). The results are more pessimistic if a stock-recruitment relationship is assumed. The results are also sensitive to the natural mortality assumed for adult yellowfin and the length assumed for the oldest fish.

Analyses made using the base case assessment results indicate that increasing fishing mortality would change the long-term catches only marginally, while reducing the spawning biomass considerably. Because of this, and taking into account the more pessimistic estimates of stock status obtained when a stock-recruitment relationship is assumed, ISSF believes that fishing mortality for yellowfin tuna in the EPO should not be allowed to increase.

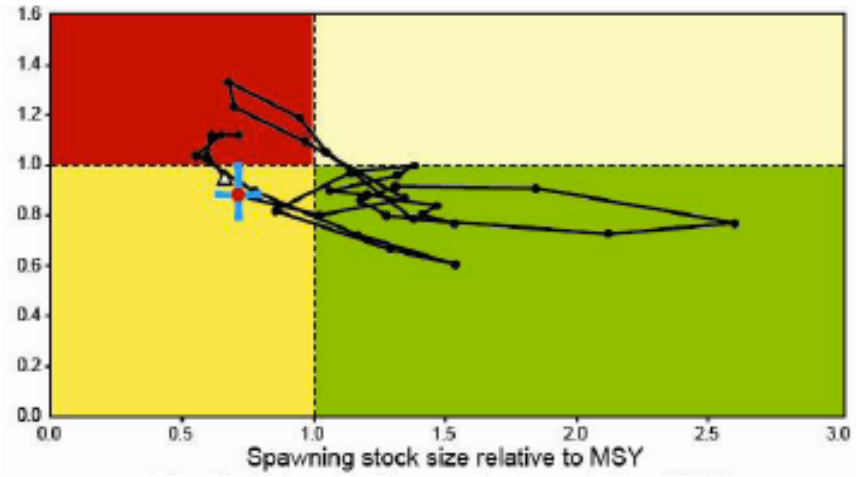

Figure I.2.2.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for yellowfin tuna in the EPO. The white dot represents relative spawning biomass in 2011 and relative fishing mortality for 2008-2010. Colors are taken from IATTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main conservation measure established by the IATTC for yellowfin is Resolution C-11-01, which includes an annual fishing closure for purse seine vessels greater than 182 tons carrying capacity. This measure calls for:

- A 62-day closure for purse seiners greater than 182 tons capacity in 2011, 2012 and 2013;
- A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;

- A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas during 2011 and 2012;

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	255	2010	
Five-year average catch	210	2006-10	
MSY	263	2010	
F/F_{MSY}	0.86	2008-2010	
B/B_{MSY}	0.71	Start of 2011	Decreasing since 2009
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for EPO Yellowfin tuna		
Stock abundance	ORANGE	B < B_{MSY}. Spawning biomass is projected to increase rapidly above B_{MSY} at the current level of fishing mortality, but this should be corroborated by the next assessment.
Fishing mortality	YELLOW	F < F_{MSY}. Although the point estimate of current F is below F_{MSY} (so it could be rated Green), it is highly unlikely that increased fishing effort will result in significantly increased sustained catches, but it will significantly reduce spawning biomass.
Environment (Bycatch)	GREEN	62% of the catch is made by purse seining on tuna-dolphin associations. Dolphin mortality is managed and closely monitored by AIDCP, with 100% observer coverage.
	YELLOW	17% of the catch is made by purse seining on FADs. Several bycatch mitigation measures are in place (turtles, sharks, non-target species in general). There is 100% observer coverage on large purse seiners.
	GREEN	17% of the catch is made by purse seining on free schools of yellowfin.
	ORANGE	3% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds).

September 2010 changes with respect to the April 2010 ISSF Stock Status Report (the EPO YFT stock was rated Yellow then): There has been no change in the ratings of B and F since then, other than separating F and B factors.
May 25, 2011, Update: The 2011 IATTC assessment indicates that spawning biomass has now dropped below the MSY level. The spawning biomass estimate for the start of 2011 indicates an upturn relative to the last quarter of 2010, and projections at the current level of F indicate that spawning biomass will soon increase above the B_{MSY} level. The B factor is rated Orange in this update, awaiting the results of the next assessment.
August 2011 update: Bycatch rating for longliners in the EPO has been changed from Yellow to Orange. Some of the major fleets using this gear did report catches of non-target species to IATTC (particularly sharks and billfishes) but the reporting is erratic. This situation may improve in the future with the new observer program for longliners.

I.2.3 Skipjack in the EPO

Skipjack catches in 2010 were about 147,000 tonnes, a large (36%) decrease from 2009. Catches have dropped to one-half of the 2009 level. Skipjack catches in the EPO are notoriously variable: A similarly large decline was observed between 1999 and 2001. Purse seine fishing dominates the catches (over 99% of the total) (**Figure I.2.3.1**).

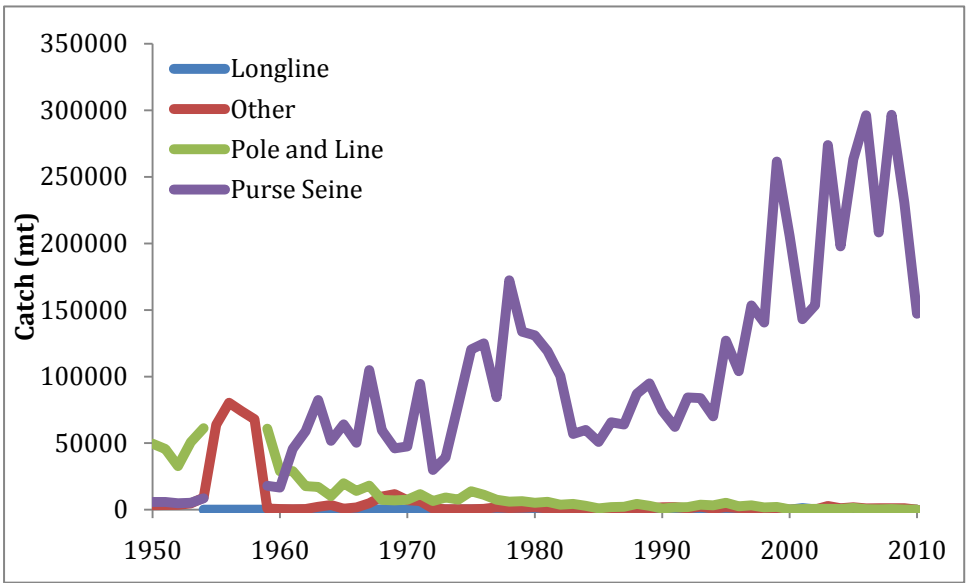

Figure I.2.3.1. Catches of skipjack tuna in the EPO from 1950 to 2010, by gear type.

Stock assessment

The last full assessment for skipjack tuna was in 2005, although an evaluation of a set of fishery indicators was given in 2011. The 2005 analyses demonstrated a high degree of uncertainty, particularly with respect to the determination of MSY reference points. To provide an alternative to using MSY-based reference points, in 2011 IATTC scientists used a simple assessment model to generate indicators for biomass, recruitment, and exploitation rate, which allows comparison of current indicator values with the levels observed historically. The average weight is below its lower reference level, which can be caused by one or more of the following: Over-exploitation, above-average levels of recruitment in recent years, or by shifts in the distribution of fishing effort to offshore areas.

The continued decline in average weight concerns some scientists and, combined with leveling off of catch rates and a decline in catch, may indicate that the exploitation rate is around the MSY level. The main concern with the skipjack stock is the constantly increasing exploitation rate. However, the data- and model-based indicators have yet to detect any adverse consequence of this increase.

A full stock assessment is planned for 2012.

Management measures

The main conservation measure established by the IATTC for skipjack is Resolution C-11-01, which includes an annual fishing closure for purse seine vessels greater than 182 tons carrying capacity. This measure calls for:

- A 62-day closure for purse seiners greater than 182 tons capacity in 2011, 2012 and 2013;
- A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;

- A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas during 2011 and 2012;

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	147	2010	
Five-year average catch	237	2006-10	
MSY	N/A		
F/F_{MSY}	≤1		
B/B_{MSY}	>1		
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for EPO skipjack tuna		
Stock abundance	GREEN	$B > B_{MSY}$.
Fishing mortality	GREEN	$F \leq F_{MSY}$. There is some concern with the constantly-increasing exploitation rate; however, fishery indicators do not show detrimental effects on the stock to-date.
Environment (Bycatch)	YELLOW	64% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks, non-target species in general). There is 100% observer coverage on large purse seiners.
	GREEN	34% of the catch is made by purse seining on free schools of skipjack.

September 2010 changes with respect to the April 2010 ISSF Stock Status Report (the EPO SKJ stock was rated Green then): There has been no change in the ratings of B and F since then, other than separating F and B factors.
May 25, 2011, Update: No change.

II. WESTERN AND CENTRAL PACIFIC OCEAN (WCPO)

RFMO: Western and Central Pacific Fisheries Commission (WCPFC)
Last Scientific Committee (SC) meeting: August, 2011
Last Commission meeting: December, 2010.
Tuna stocks managed: WCPO Yellowfin, WCPO Bigeye, WCPO Skipjack, North Pacific Albacore (also managed by IATTC), South Pacific Albacore, Pacific Bluefin (also managed by IATTC).
Data sources: The main sources of information for this section are WCPFC (2011) and Harley et al. (2011) for catch and stock status data.
Last update: November 20, 2011.

II.1. CATCHES

About 59 percent of the world production of tuna is from the western and central Pacific Ocean (WCPO). Catches of skipjack, yellowfin, bigeye and albacore in 2010 were 2,421,113000 tonnes, a 3% decrease from 2009. There has been a general tendency for the total catch to increase since 1980 (**Figure II.1.1**). This increase has been particularly pronounced for skipjack tuna.

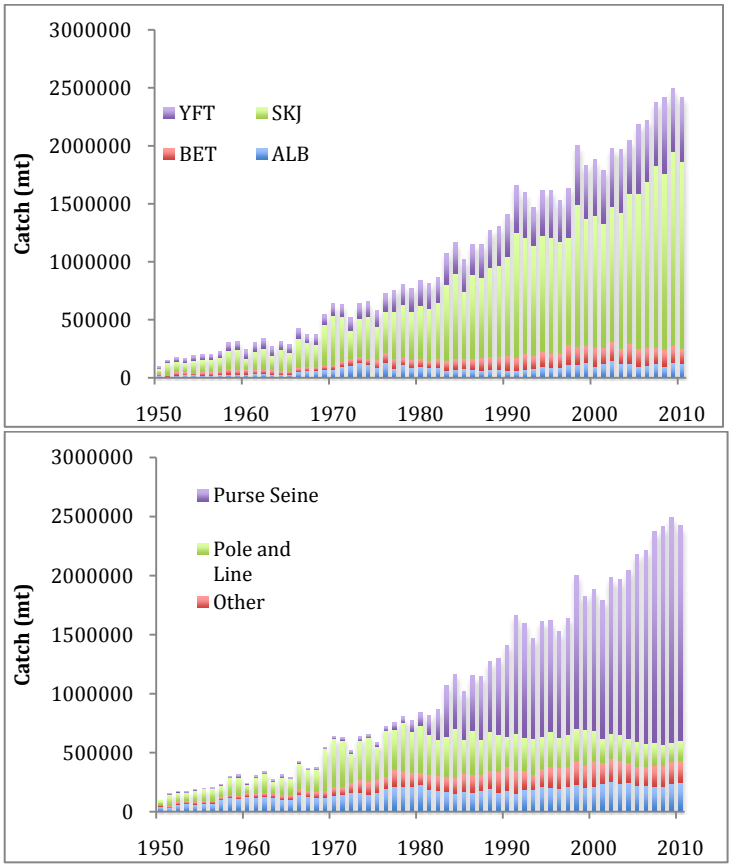

Figure II.1.1. Trends in catch (mt) of albacore, bigeye, skipjack and yellowfin in the WCPFC statistical atrea, by species (top) and gear (bottom), 1950-2010.

Average catches in the WCPO for the five-year period 2006-2010 provide an indication of the recent performance of the fisheries (**Figure II.1.2**): Skipjack accounts for 66% of

the catches in weight, followed by yellowfin (24%), albacore (5%), and bigeye (6%). Purse-seine vessels take about 75% of the total catch, followed by longliners (10%), pole-and-line vessels (8%), and a variety of other gears (7%).

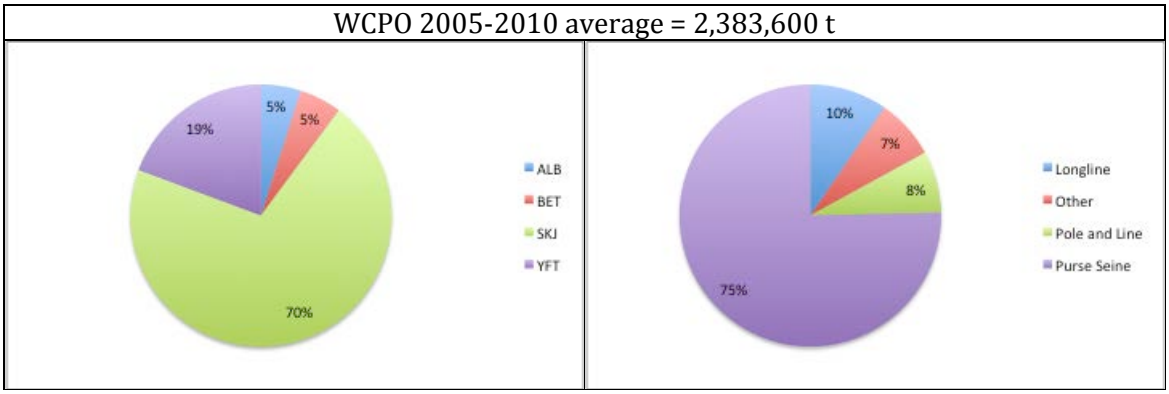

Figure II.1.2. Average 2006-2010 catches of skipjack, yellowfin, bigeye and albacore tuna in the WCPO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

II.2 WCPO STOCK STATUS

II.2.1 Bigeye in the WCPO

Bigeye catches in 2010 were about 125,757 tonnes, an 14% decline from 2009. The main fishing gear is longline, although catches by this gear have been declining from a high in 2004 (**Figure 2.1.1**).

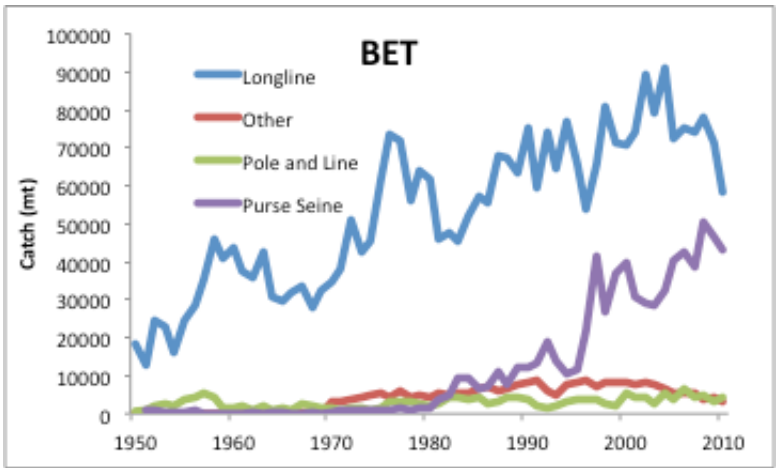

Figure I.2.1.1. Catches of bigeye tuna in the WCPO from 1950 to 2010, by gear type.

Stock assessment

The 2011 assessment conducted by SC7 (the 7th meeting of the WCPFC Scientific Committee) is comparable to the 2010 assessment, though there have been some

changes in the base case model used to derive management advice. Notably, the new assessment uses an index of abundance based on detailed (set-by-set) Japanese longline CPUE data. In addition, the base model fixed the value of a parameter that controls the degree with which recruitment is related to stock size ("steepness") to a level that SC7 considered to be more reasonable. The updated assessment indicated the following:

- The ratio of $F_{current}/F_{MSY}$ is estimated at 1.46, indicating that **overfishing is occurring**. In order to reduce fishing mortality to F_{MSY}, a 32% reduction in fishing mortality is required from the 2006–2009 level. Considering historical levels of fishing mortality, a 39% reduction in fishing mortality from 2004 levels is required (consistent with the aim of CMM2008-01), and a 28% reduction from average 2001–2004 levels.

- The ratio of spawning biomass $B_{current}/B_{MSY}$ in the base model is estimated at 1.19. This indicates that that **the stock is not in an overfished state**. However, other models considered plausible by SC7 estimated that $B_{current}/B_{MSY} < 1.0$. In particular, for a model in which MSY-based reference points were computed for the above-average recruitment period of the past 21 years, the estimate of spawning biomass $B_{current}/B_{MSY}$ was 0.61. Therefore, SC7 concluded that there is a possibility that bigeye tuna is currently in an overfished state.

- The estimate of MSY is 76,800 tonnes. MSY has been reduced to less than half its levels prior to 1970 through harvest of small bigeye. Current catches (116,900 tonnes) are 51% greater than MSY. Reducing the catch of small bigeye would increase the overall level of catches that could be obtained sustainably.

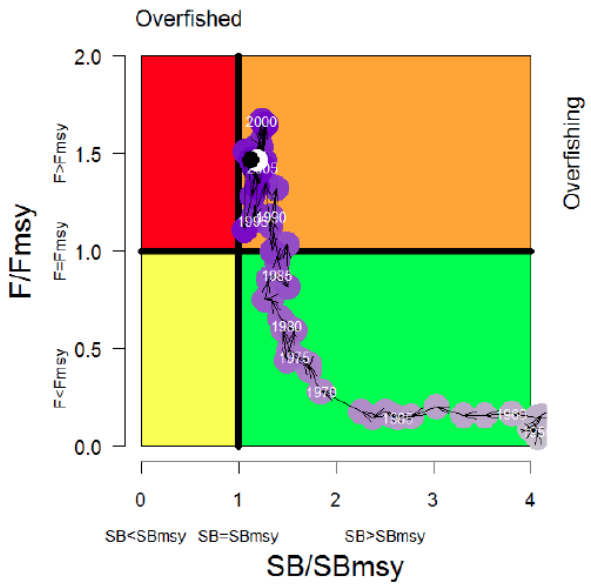

Figure II.2.1.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the WCPO. The white dot represents the current (2006-2009 average) level. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure for bigeye established by the WCPFC CMM 2008-01 which aims to reduce fishing mortality by 30%. The measure calls for:

- A 3-month closure of fishing on FADs in EEZ waters of PNA countries and on the High Seas;
- A limitation in the number of vessel days in PNA EEZs and equivalent measures for other EEZs;
- A high seas vessel day limit, allocated by flag;
- A closure of two high seas pockets;
- A requirement to submit FAD management plans, including information on strategies used to implement the closure and other measures for reducing small bigeye mortality;
- A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;
- 100% Regional observer coverage for all purse seine vessels fishing on the high seas, on the high seas and in waters under the jurisdiction of one or more coastal States, or vessels fishing in waters under the jurisdiction of two or more coastal States during the same trip;
- Gradual reductions in the bigeye catch by longliners of Members that caught more than 2,000 tonnes in 2004 (does not apply to Small Island Developing States);

In addition, CMM 2009-02 provides more guidance on some elements of CMM 2008-01 that were ambiguous, particularly on the FAD closure and full retention requirements.

SC7 evaluated the efficacy of CMM-2008-01 and considered that it was too early to quantitatively conclude whether it has reduced fishing mortality to the levels specified in the CMM. Projections made assuming that the fishing conditions observed in 2010 (which differed considerably from those in 2009) were to continue into the future, suggest that F may be reduced to the F_{MSY} level in about 10 years. SC7 recommended that the Commission adopt additional measures to ensure that F is reduced sufficiently. Measures that reduce fishing mortality across a range of fish sizes (e.g. fishing gears) are likely to produce the best results.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	117	2010	
Five-year average catch	125	2006-10	
MSY	77	2010	
F/F_{MSY}	1.46	2006-09	
B/B_{MSY}	1.19	2006-09	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for WCPO Bigeye tuna		
Stock abundance	GREEN	$B \geq B_{MSY}$. The stock has been subjected to overfishing for over one decade, but has not become overfished due to higher-than-average levels of recruitment in recent years.
Fishing mortality	ORANGE	$F > F_{MSY}$. The WCPFC management measures in place are insufficient to end overfishing in the short term.

Environment (Bycatch)	ORANGE	57% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.
	YELLOW	30% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks). There is 100% observer coverage on part of the purse seine fleet.
	GREEN	4% of the catch is made with purse seining on free schools, with little impact on non-target species.
	YELLOW	4% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks.

Note of changes with respect to the May 2011 ISSF Stock Status Report: No major change in ratings.

II.2.2 Yellowfin in the WCPO

Yellowfin catches in the WCPO in 2010 were about 558,761 tonnes, a 4% increase from 2009. The main fishing gear is purse seine (65% of the catch), which has been generally increasing. Catches are also taken by a number of mixed gears in the Philippines and Indonesia, and by longliners (**Figure II.2.2.1**).

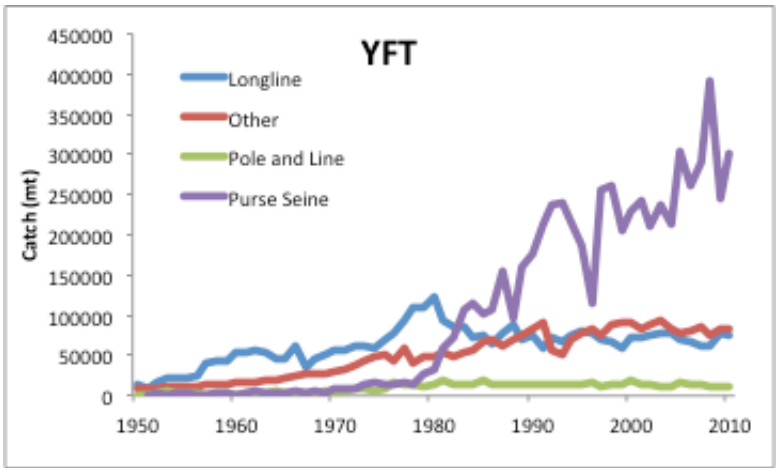

Figure II.2.2.1. Catches of yellowfin tuna in the WCPO from 1950 to 2010, by gear type.

Stock assessment

The last yellowfin assessment was conducted in 2011 and reviewed by SC7. While the model was similar to the previous (2009) assessment, there were revisions to various data sets (e.g. longline CPUE indices, catch and size data, purse-seine catch and size data, and the modeling of the Indonesian and Philippines domestic fisheries). The results were generally more pessimistic than those from the previous assessment and indicated that (Figure II.2.2.2):

- The yellowfin stock **is not in an overfished state** as spawning biomass is above the B_{MSY} level ($B_{current}/B_{MSY}$ = 1.47, range between 1.14 and 1.92).

- The ratio $F_{current}/F_{MSY}$ is estimated to be 0.77 (range between 0.54 and 1.15), indicating that **overfishing is not occurring**.

- MSY is estimated to be 538,800 (range 432,000-645,000) tonnes.

- The optimistic estimate of overall stock status should be tempered by the patterns estimated at a sub-regional level. The western equatorial Pacific, from which most of the catches are taken, is at least fully exploited with no potential for a substantial increase in catches to be sustainable.

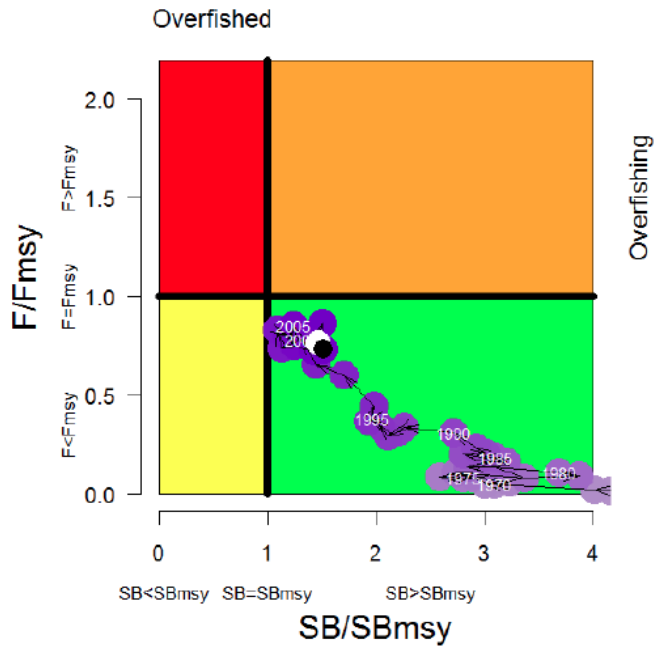

Figure II.2.2.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for yellowfin tuna in the WCPO, 1952-2010. The white dot represents the current (2006-2009) situation. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure for WCPO yellowfin established by the WCPFC is CMM 2008-01 which aims to ensure that yellowfin fishing mortality will not exceed the 2001-2004 or 2004 level. The measure calls for:

- A 3-month closure of fishing on FADs in EEZ waters of PNA countries and on the High Seas;
- A limitation in the number of vessel days in PNA EEZs;
- A closure of several high seas pockets;
- A requirement to submit FAD management plans;
- A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;
- 100% Regional observer coverage for all purse seine vessels fishing on the high seas, on the high seas and in waters under the jurisdiction of one or more coastal States, or vessels fishing in waters under the jurisdiction of two or more coastal States;

In addition, CMM 2009-02 provides more guidance on some elements of CMM 2008-01 that were ambiguous, particularly on the FAD closure and full retention requirements.

In 2010, SC7 concluded that CMM-2008-01 is achieving its objective of limiting overall fishing mortality on WCPO yellowfin to sustainable levels. However, considering that the western equatorial region is estimated to be fully exploited, the SC recommended that there be no increase in fishing mortality in this region.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	507	2010	
Five-year average catch	496	2006-10	
MSY	539	2010	
F/F_{MSY}	0.77	2006-09	
B/B_{MSY}	1.47	2006-09	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for WCPO Yellowfin tuna		
Stock abundance	GREEN	$B > B_{MSY}$.
Fishing mortality	YELLOW	$F < F_{MSY}$. Although the overall estimate of current F is well below F_{MSY}, this is not the case in the western equatorial region (where over 80% of the catch is taken). Due to heavy fishing effort in this region, there is little or no room for increased fishing pressure on the stock overall.
Environment (Bycatch)	YELLOW	33% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks). There is 100% observer coverage on part of the purse seine fleet.
	GREEN	32% of the catch is made with purse seining on free schools, with little impact on non-target species.
	ORANGE	18% of the catch is made by other gears such as gillnets, with unknown impacts on non-target stocks.
	ORANGE	15% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.

Note of changes with respect to the May 2011 ISSF Stock Status Report: No major change in ratings.

II.2.3 Skipjack in the WCPO

The WCPO Skipjack stock supports the largest tuna fishery in the World, accounting for 40% of worldwide tuna landings. Catches in 2010 were 1,610,,578 tonnes, a 4% decrease from 2009. Purse seining, which accounts for 86% of the catches, has been increasing steadily for three decades. In contrast, pole-and-line fishing has been declining steadily (**Figure II.2.3.1**).

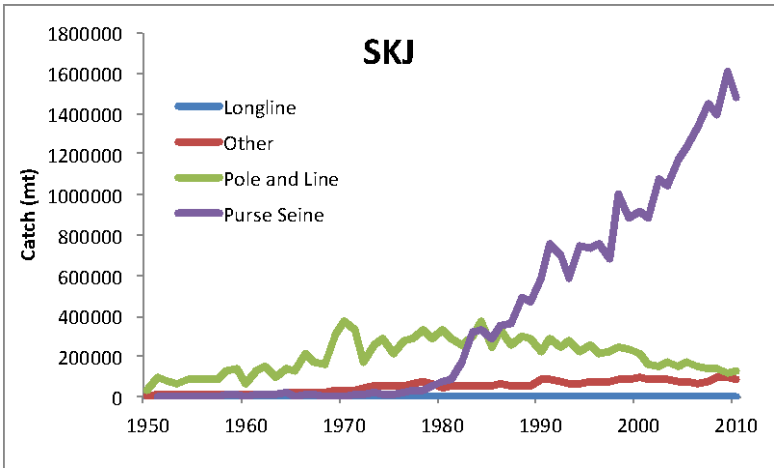

Figure II.2.3.1. Catches of skipjack tuna in the WCPO from 1950 to 2010, by gear type.

Stock assessment

The 2011 assessment incorporated improved data sets and a number of different assumptions compared to the previous (2010) assessment. The updated assessment gave similar results to the previous one, and indicated the following (**Figure I.2.2.2**):

- Fishing mortality rates tended to be higher during the last decade than for the preceding period. The ratio $F_{current}/F_{MSY}$ is estimated to be 0.37, indicating that the stock is moderately exploited and **overfishing is not occurring**.

- The **stock is not in an overfished state** as spawning biomass is above the B_{MSY} level ($B_{current}/B_{MSY}$ = 2.94).

- MSY is estimated to be 1.5 (range 1.3-1.8) million tonnes. The recent recruitment level has been higher than average, and using this recent level to calculate maximum sustainable catches would result in higher potential yield.

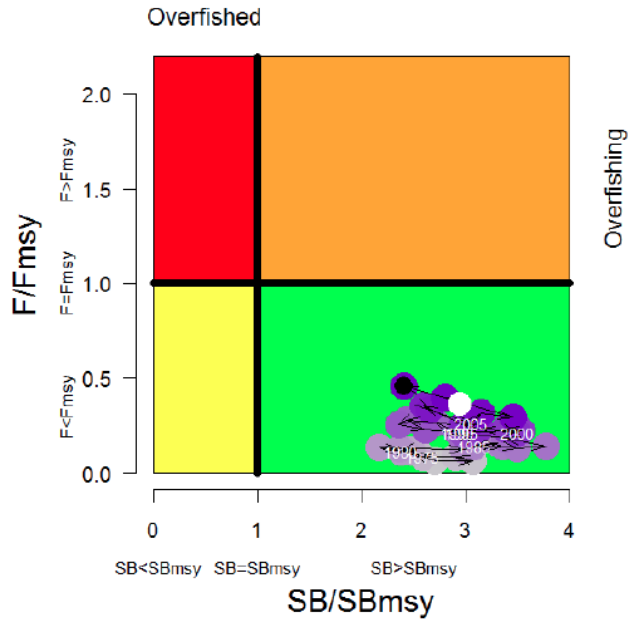

Figure 2.2.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for skipjack tuna in the WCPO. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure for WCPO skipjack established by the WCPFC is CMM 2008-01 which is targeted at conserving yellowfin and bigeye./ However, the measure also affects skipjack fisheries. The measure calls for:

- A 3-month closure of fishing on FADs in EEZ waters of PNA countries and on the High Seas;
- A limitation in the number of vessel days in PNA EEZs;
- A closure of several high seas pockets;
- A requirement to submit FAD management plans;
- A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;
- 100% Regional observer coverage for all purse seine vessels fishing on the high seas, on the high seas and in waters under the jurisdiction of one or more coastal States, or vessels fishing in waters under the jurisdiction of two or more coastal States;

In addition, CMM 2009-02 provides more guidance on some elements of CMM 2008-01 that were ambiguous, particularly on the FAD closure and full retention requirements.

SC7 noted that, if recent fishing patterns continue, catch and catch rates are likely to decline. For this reason, it recommended that the Commission consider developing limits on fishing for skipjack to limit the declines in catch rate associated with further declines in biomass.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	1,557	2010	
Five-year average catch	1,532	2006-09	

MSY	1,503	2010	
F/F_{MSY}	0.37	2006-2009	
B/B_{MSY}	2.94	2006-2009	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes. Overfishing is not taking place even if current catches are above MSY; that is because recent recruitment levels are higher than average.

Ratings for WCPO skipjack tuna		
Stock abundance	GREEN	$B > B_{MSY}$.
Fishing mortality	GREEN	$F \leq F_{MSY}$.
Environment (Bycatch)	YELLOW	56% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks). There is 100% observer coverage on part of the purse seine fleet.
	GREEN	30% of the catch is made with purse seining on free schools, with little impact on non-target species.
	YELLOW	8% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks.
	ORANGE	5% of the catch is made by other gears such as gillnets, with unknown impacts on non-target stocks.

Note of changes with respect to the May 2011 ISSF Stock Status Report: No major change in biomass or F ratings. A component for Other gears (5%) was added.

II.2.4 Albacore in the South Pacific Ocean

South Pacific albacore extends beyond the WCPFC Convention Area. However, the stock is assessed by WCPFC. Catches in 2010 were about 81,217 tonnes, a 6% increase from 2009. The main fishing gear is longline, accounting for 97% of the catch (**Figure II.2.4.1**). Relatively minor amounts are taken by other gears like trolling.

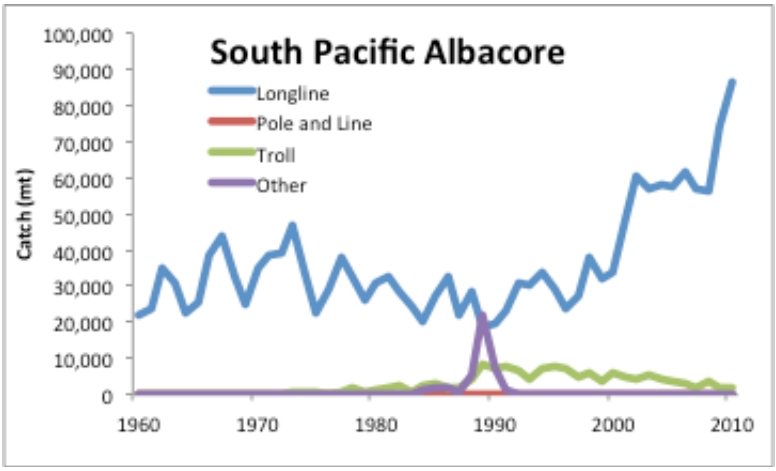

Figure II.2.4.1. Catches of albacore tuna in the southern Pacific Ocean from 1960 to 2010, by gear type.

Stock assessment

The last assessment was conducted by SC7 in 2011, using similar data and methods to the previous (2009) assessment. The assessment results were similar to those in 2009 and indicated the following:

- The estimated ratio $F_{current}/F_{MSY}$ in 2007-2009 is 0.26, indicating that **overfishing is not occurring**.

- The estimated ratio of spawning biomass $B_{current}/B_{MSY}$ in 2009 is 2.25. This indicates that that **the stock is not in an overfished state**.

- The estimate of MSY is 85,200 tonnes.

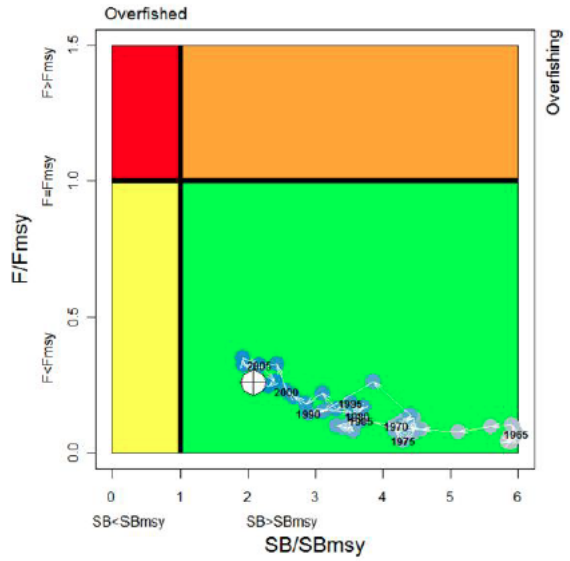

Figure II.2.4.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for albacore tuna in the South Pacific Ocean, starting in 1960. The white dot represents the 2007-2009 average F and 2009 B levels. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure for south Pacific albacore established by the WCPFC is CMM 2010-05 which aims to limit fishing mortality by establishing a cap on the number of vessels by each Commission member, with some exemptions for small island developing states. This capacity limitation is for the number of vessels not to increase over the 2005 level, or the 2001-2004 average.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	89	2010	
Five-year average catch	70	2006-10	
MSY	85	2009	
F/F_{MSY}	0.26	2007-09	
B/B_{MSY}	2.25	2009	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for South Pacific albacore tuna		
Stock abundance	GREEN	B > B_{MSY}.
Fishing mortality	GREEN	F < F_{MSY}.
Environment (Bycatch)	ORANGE	96% of the catch is made by longlining. Several bycatch mitigation measures are in place (turtles, sharks, sea birds).
	GREEN	4% of the catch is made by trolling, with little impact on non-target species.

Note of changes with respect to the May 2011 ISSF Stock Status Report: No major change in ratings.

II.2.5 Albacore in the North Pacific Ocean

North Pacific albacore extends beyond the WCPFC Convention Area. It is managed jointly by WCPFC and IATTC, and it is assessed by the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC). Catches in 2010 were about 71,690 tonnes, a 14% decrease from 2009. The main fishing gears are longline (44%) and pole-and-line (30%), followed by other (25%) (**Figure II.2.5.1**). Catches by longlining have shown a decreasing trend since 1997.

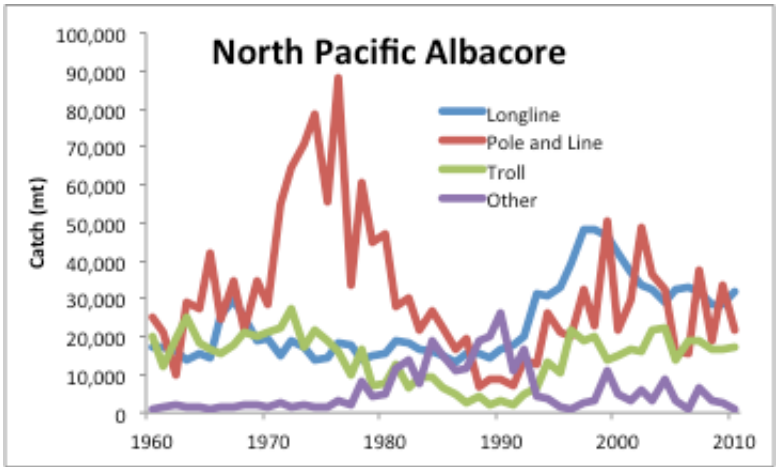

Figure II.2.5.1. Catches of albacore tuna in the northern Pacific Ocean from 1960 to 2010, by gear type.

Stock assessment

The most recent assessment of north Pacific albacore was in 2011, using data through 2009 (ISC 2011). The assessment indicated that recent levels of fishing mortality have declined relative to the last (2006) assessment and concluded that:

- The stock is not in an overfished state.

- Fishing mortality is higher than many commonly-used reference points that are used as proxies for F_{MSY}.

- Increasing F beyond 2006-2008 levels will not result in proportional increases in yield.

Management measures

The main binding conservation measure for North Pacific albacore established by the WCPFC is CMM 2005-03 which called for members not to increase fishing effort directed at North Albacore beyond the "current level". Similarly, in the IATTC, Resolution C-05-02 called for members not to increase fishing effort directed at North Albacore beyond the "current level". Neither resolution defines "current" explicitly.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	72	2009	

Five-year average catch	77	2005-09	
MSY	N/A	2005	
F/F_{MSY}	1<	2002-05	
B/B_{MSY}	>1	2002-05	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for North Pacific albacore tuna		
Stock abundance	GREEN	$B > B_{MSY}$.
Fishing mortality	YELLOW	$F \leq F_{MSY}$. Although the point estimate of current F is below various F_{MSY} proxies (so it could be rated Green), it is highly unlikely that increased fishing effort will result in significantly increased sustained catches, but it will significantly reduce spawning biomass. Both IATTC and WCPFC have measures in place to limit fishing effort or fishing capacity targeted on this stock.
Environment (Bycatch)	ORANGE YELLOW GREEN	40% of the catch is made by longlining. Several bycatch mitigation measures are in place (turtles, sharks, sea birds). 33% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish species. 23% of the catch is made by trolling, with little impact on non-target species.

Note of changes with respect to the May 2011 ISSF Stock Status Report: No major change in ratings.

III. INDIAN OCEAN (IO)

RFMO: Indian Ocean Tuna Commission
Last Scientific Committee (SAC) meeting: December, 2011
Last Commission meeting: March, 2011.
Tuna stocks managed: IO Yellowfin, IO Bigeye, IO Skipjack, IO Albacore.
Data sources: The main source of information for this section is IOTC (2011).
Last update: December, 2011.

III.1. CATCHES

About 24 percent of the world production of tuna is from the Indian Ocean (IO), making this the second largest region for tuna fishing after the western and Central Pacific Ocean. Catches of skipjack, yellowfin, bigeye and albacore in 2010 were 843,000 tonnes, a 4% decline from 2009. There has been a general tendency for the total catch to decline since 2005, when a record 1.2 million tonnes were caught (**Figure III.1.1**).

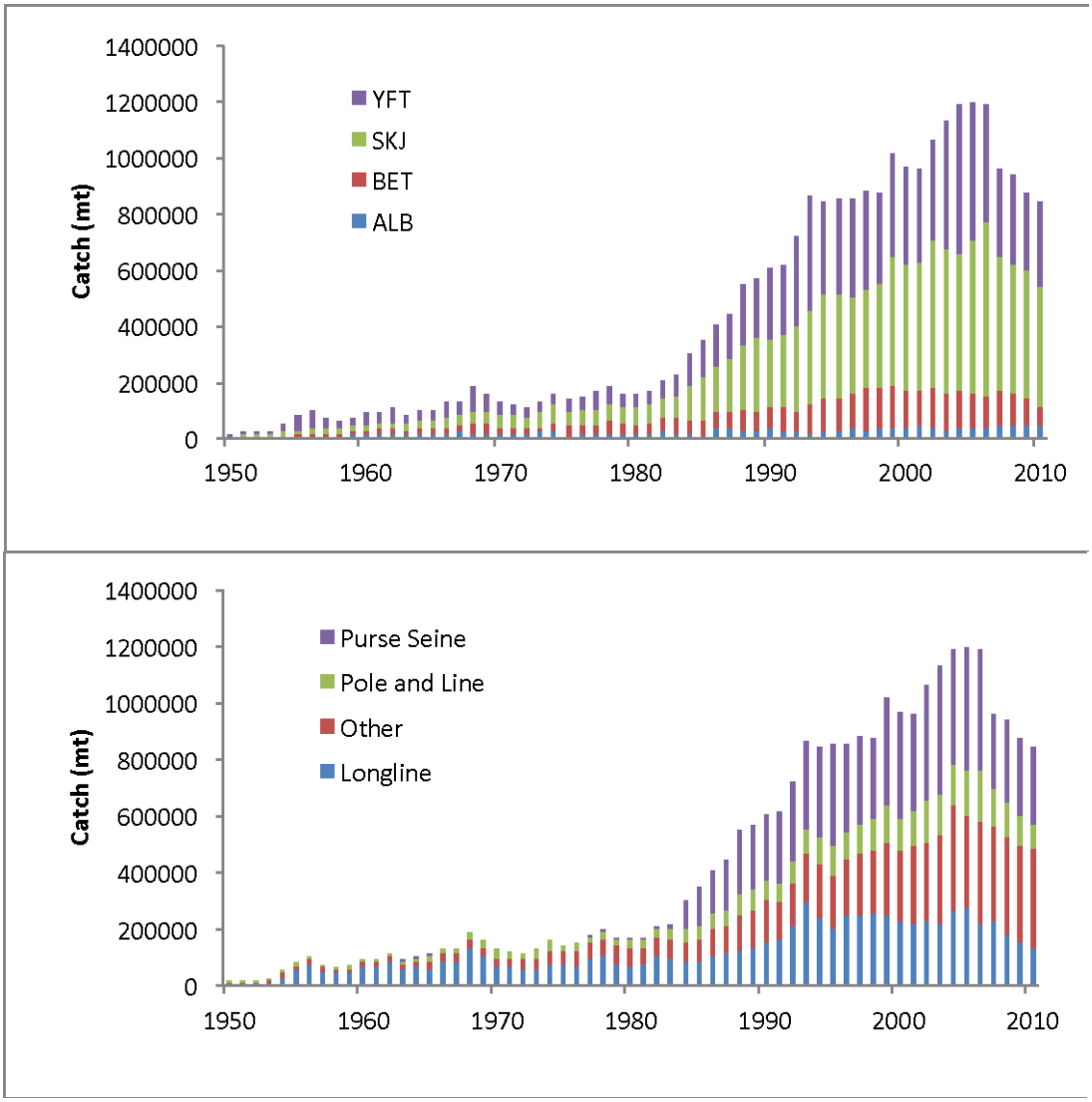

Figure III.1.1. Trends in catch (mt) of albacore, bigeye, skipjack and yellowfin in the IO region, by species (top) and gear (bottom), 1950-2010.

It should be noted that the problem of piracy in the western Indian Ocean has had an important impact in the tuna fisheries. For example, the fishing capacity of the European purse seine fleet has decreased by 30% (in number of vessels) from the 2005-2008 average due to vessels leaving the IO to fish in other regions. Similarly, vessels from other fleets such as Japanese, Taiwanese and Korean longliners have shifted their areas of operation, sometimes to other oceans; some local fleets such as those of Kenya and Seychelles have been affected as well.

Average catches for the five-year period 2006-2010 provide an indication of the recent performance of the fisheries (**Figure III.1.2**): Skipjack accounts for 51% of the catches in weight, followed by yellowfin (34%), bigeye (11%), and albacore (4%). Purse-seine vessels take about 32% of the total catch, followed by longline (19%) and pole-and-line (13%). In the Indian Ocean, a variety of other gears such as hand line and gillnets take a substantial amount of the catch (36%). These fisheries are generally poorly sampled.

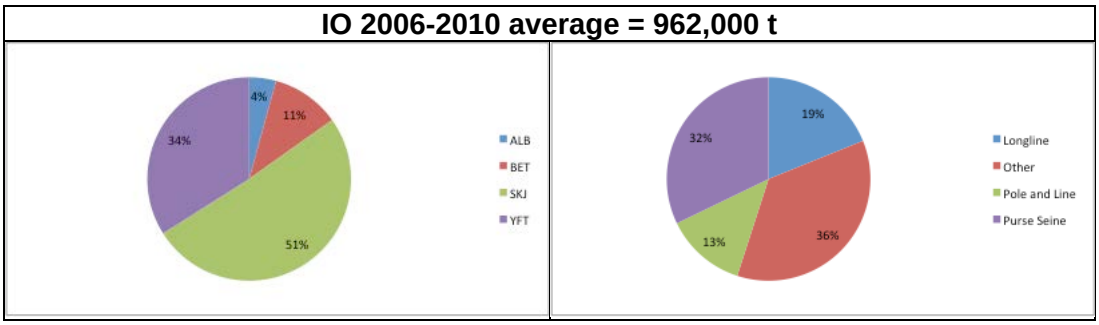

Figure III.1.2. Average 2006-2010 catches of skipjack, yellowfin, bigeye and albacore tuna in the IO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

III.2 IO STOCK STATUS

III.2.1 Bigeye in the IO

Bigeye reported catches in 2010 were about 71,500 tonnes, a 30% decline from 2009. The main fishing gear is longline. Catches by this gear have declined dramatically from a high in 2004 (**Figure III.2.1.1**), due to vessels moving away from the main fishing grounds to escape piracy. In contrast, catches from purse seine vessels have been relatively stable since 2000.

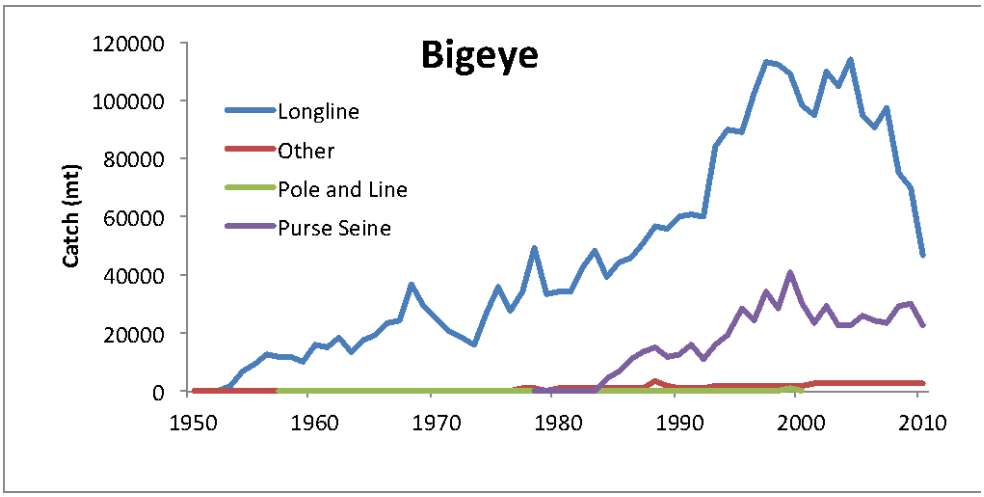

Figure III.2.1.1. Catches of bigeye tuna in the IO from 1950 to 2010, by gear type.

Stock assessment

The 2011 assessment conducted by the Scientific Committee (SC14) gave similar tendencies to the 2010 assessment in terms of average trends. The SC advice is based on the results of the 2010 and 2011 assessments, which indicated the following:

- The ratio of $F_{current}/F_{MSY}$ is estimated to be less than 1.0 (0.67 to 0.79, depending on the assessment), indicating that **overfishing is not occurring**.

- The ratio of spawning biomass $B_{current}/B_{MSY}$ is greater than or close to 1.0 (1.0 to 1.2, depending on the assessment), indicating that **the stock is not in an overfished state**.

- The estimate of MSY ranges from 103,000 to 114,000 tonnes, depending on the model used.

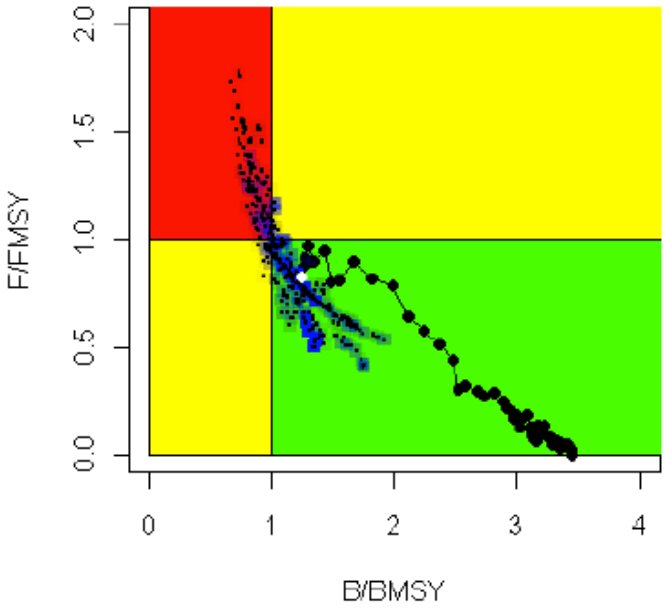

Figure III.2.1.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the IO. Black circles represent the annual median values over time (white circle is 2009). Dots and blue

squares indicate uncertainty in the current status estimated from models that make different assumptions. Colors are taken from IOTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure established by the IOTC for bigeye is Resolution 10/01, which affects vessels greater than 24 m as well as smaller vessels fishing on the high seas. This measure calls for a one-month closure for purse seiners and longliners in an area of size 10°x20°. The effect of the closure in Resolution 10/01 on the status of IO tuna stocks cannot be evaluated yet, but preliminary analyses based on historical catches indicate its effect is likely to be very small.

The 2011 SC recommended that catches not exceed 102,900 tonnes.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	72	2010	
Five-year average catch	105	2006-10	
MSY	103-114	2010-11	
F/F_{MSY}	0.67-0.79	2009-2010	
B/B_{MSY}	1.0-1.20	2009-2010	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for IO Bigeye tuna		
Stock abundance	GREEN	$B > B_{MSY}$.
Fishing mortality	GREEN	$F < F_{MSY}$.
Environment (Bycatch)	ORANGE	72% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.
	YELLOW	20% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).
	GREEN	5% of the catch is made with purse seining on free schools, with little impact on non-target species.

Note of changes with respect to the May 2011 ISSF Stock Status Report: There has been no change in the ratings of B and F since then, other than separating F and B factors.

III.2.2 Yellowfin in the IO

Yellowfin catches in 2010 were about 299,000 tonnes, an 8% increase from 2009. The main fishing gears for which catches have declined recently are purse seine and longline (**Figure III.2.2.1**). In contrast, catches from pole-and-line vessels have been relatively stable. Catches by gillnet and handline (classified as "other" in the figure) have become more important in recent years and are poorly estimated. Overall catches have declined by 44% from a record high of 530,000 tonnes in 2004.

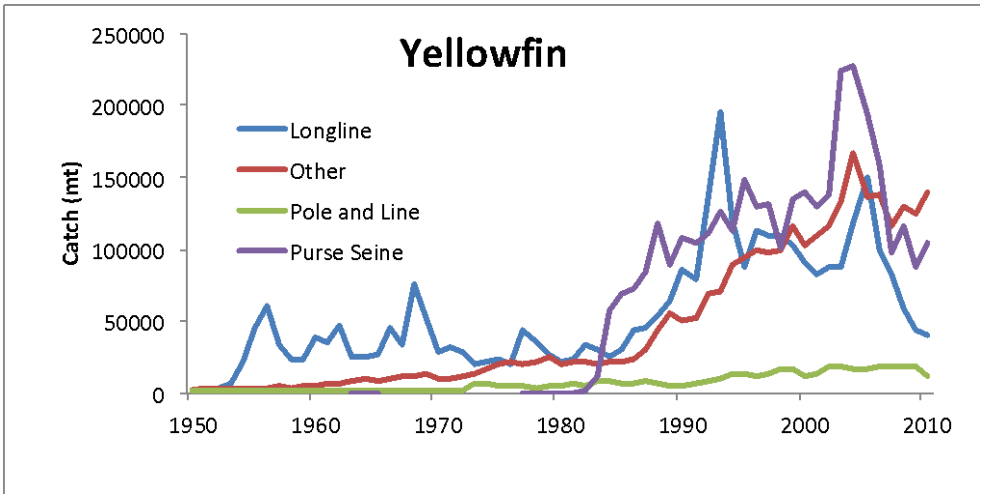

Figure III.2.2.1. Catches of yellowfin tuna in the IO from 1950 to 2010, by gear type.

Stock assessment

The 2011 updated assessment gave an optimistic view of stock status, indicating the following (**Figure III.2.2.2**):

- The ratio of $F_{current}/F_{MSY}$ is estimated at 0.84 (range: 0.63-1.1), indicating that **overfishing is not ocurring**. The SC noted that the model results do not explain the high catches of yellowfin tuna from 2003 to 2006. Recent reductions in catches have lowered fishing mortality on the stock. SC14 cautioned that if the longline and purse seine fishing effort that has been displaced recently due to piracy returns to traditional yellowfin fishing areas, then catches (and F) will likely increase.

- The **stock is not in an overfished state** as spawning biomass is above the B_{MSY} level ($B_{current}/B_{MSY}$ = 1.61. Range: 1.47-1.78).

- The median estimate of MSY is estimated to be 357,000 tonnes (range: 290,000 to 435,000 t). During the period 2003-2006, catches substantially exceeded this level and the stock experienced a rapid decline.

Previously, ISSF took a cautious view about the status of IO yellowfin, taking into consideration the statements made by SC13 (in 2010) that the stock may be approaching an overfished condition and that overfishing took place recently. The 2011 updated assessment indicates that fishing mortality has decreased and the stock is in good condition.

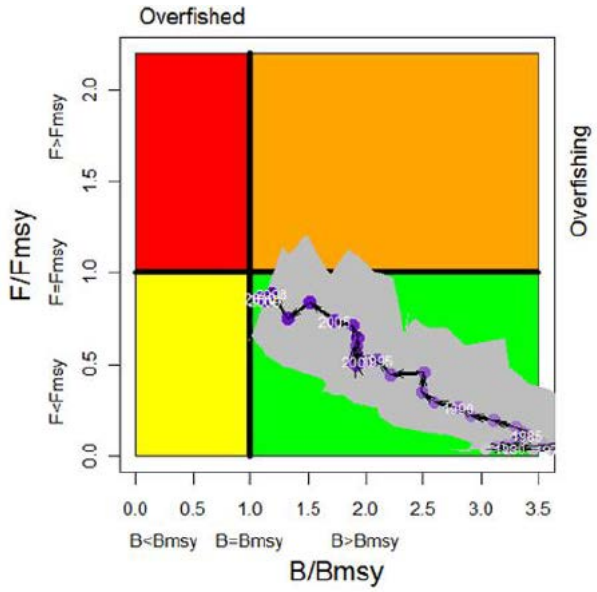

Figure III.2.2.2. Temporal trend in the ratios Bcurrent/B_{MSY} (x-axis) and Fcurrent/F_{MSY} (y-axis) for yellowfin tuna in the IO. The line indicates the median results, while the gray region shows the uncertainty from the different model trajectories. Colors are taken from IOTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure established by the IOTC for yellowfin is Resolution 10/01, which affects vessels greater than 24 m as well as smaller vessels fishing on the high seas. This measure calls for a one-month closure for purse seiners and longliners in an area of size 10°x20°. The effect of the closure in Resolution 10/01 on the status of IO tuna stocks cannot be evaluated yet, but preliminary analyses based on historical catches indicate its effect is likely to be very small.

The IO yellowfin stock has been of concern because the catches in 2003-2006 substantially exceeded the MSY level. Since then, catches have decreased considerably and the 2011 SC estimated that the stock is in good health. The SC once again recommended that catches not exceed 300,000 tonnes, which is at the lower end of the range of MSY estimates.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	299	2010	
Five-year average catch	327	2006-10	
MSY	357	2009	Range: 290-435
F/F_{MSY}	0.84	2009	Range: 0.63-1.1
B/B_{MSY}	1.61	2009	Range: 1.47-1.78
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for IO Yellowfin tuna		
Stock abundance	GREEN	B > B_{MSY}. The 2011 assessment indicates that the stock is in a healthy state. Declines in biomass due to intensive fishing in the mid 2000s have been halted with reduced catches.
Fishing mortality	GREEN	F < F_{MSY}. If fishing effort displaced because of the piracy problem returns to traditional fishing areas, an increase in F

		could be expected. The situation needs to be monitored closely.
Environment (Bycatch)	ORANGE	26% of the catch is made by gillnets and handlines, which are poorly monitored. Gillnets are thought to have high bycatch rates. No mitigation measures are in place and monitoring is extremely deficient.
	ORANGE	20% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.
	YELLOW	17% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).
	GREEN	17% of the catch is made with purse seining on free schools, with little impact on non-target species.
	GREEN	8% of the catch is made by handlines, expected to have little impact on bycatch species.
	GREEN	6% of the catch is made by trolling, expected to have little impact on bycatch species.
	YELLOW	5% of the catch is made by pole-and-line fishing, with small bycatch of non-target species but unknown impacts on baitfish stocks.

Note of changes with respect to the May 2011 ISSF Stock Status Report: The B rating has changed from Yellow to Green, reflecting the SC 2011 assessment that the stock is in a healthy state.

III.2.3 Skipjack in the IO

Skipjack catches in the Indian Ocean in 2010 were about 429,000 tonnes, a 6% decline from 2009. Purse seine (35%) and gillnets (44%) dominate the catches, followed by pole-and-line (22%) (**Figure III.2.3.1**). The pole-and-line catches have been decreasing since 2005.

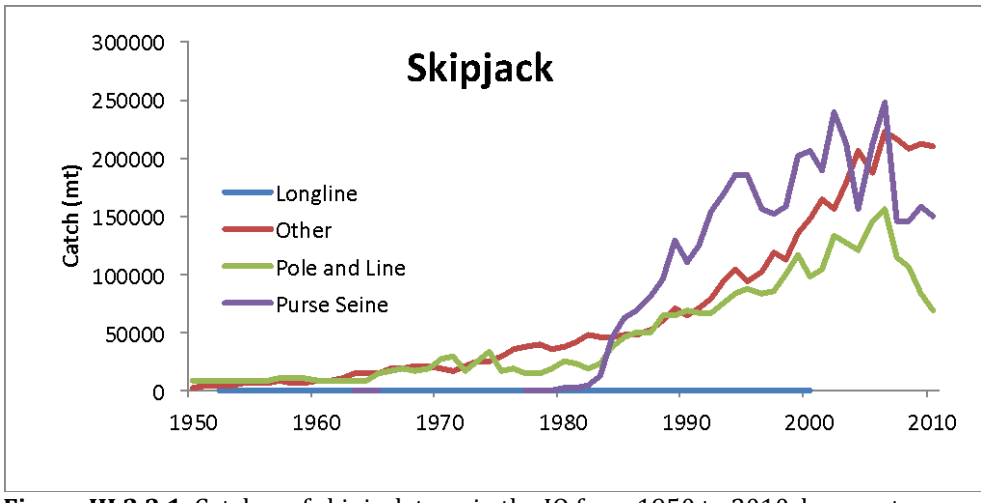

Figure III.2.3.1. Catches of skipjack tuna in the IO from 1950 to 2010, by gear type.

Stock assessment

A stock assessment of skipjack was conducted for the first time in 2011. The results indicate that (**Figure III.2.3.2**):

- The ratio of $F_{current}/F_{MSY}$ is estimated to be less than 1.0 (the ratio of catch to MSY, used as a proxy for $F_{current}/F_{MSY}$, is estimated to be 0.81). Therefore, **overfishing is not occurring**.

- The **stock is not in an overfished state** as spawning biomass is above the B_{MSY} level ($B_{current}/B_{MSY}$ = 2.56; Range: 1.09-5.83).

- The median estimate of MSY is estimated to be 564,000 tonnes (range: 395,000 to 843,000 t).

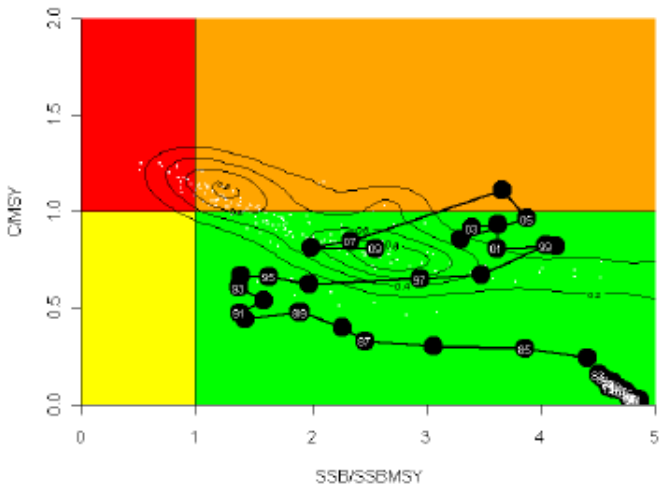

Figure III.2.3.2. Temporal trend in the ratios Bcurrent/B_{MSY} (x-axis) and Fcurrent/F_{MSY} (y-axis) for skipjack tuna in the IO. Black circles indicate the median trajectory and the probability distribution contours are provided as a rough visual guide of the uncertainty in current estimates. The proxy reference point C/MSY is reported instead of F/F_{MSY}, Colors are taken from IOTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure established by the IOTC for skipjack (indirectly) is Resolution 10/01, which affects vessels greater than 24 m as well as smaller vessels fishing on the high seas. This measure calls for a one-month closure for purse seiners in an area of size 10°x20°. The effect of the closure in Resolution 10/01 on the status of IO tuna stocks cannot be evaluated yet, but preliminary analyses based on historical catches indicate its effect is likely to be very small.

In 2011, the SC recommended that catches not exceed 512,300 tonnes, the 2005-2009 average.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	429	2010	
Five-year average catch	489	2006-10	
MSY	564	2009	Range: 395-843

F/F_{MSY}	<1	2009	C/MSY = 0.81
B/B_{MSY}	2.56	2009	Range: 1.09-5.83
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for IO skipjack tuna		
Stock abundance	GREEN	B < B_{MSY}. The stock was assessed for the first time in 2011.
Fishing mortality	GREEN	F < F_{MSY}.
Environment (Bycatch)	ORANGE	44% of the catch is made by gillnets, a gear expected to have high bycatch rates. No mitigation measures are in place and monitoring is extremely deficient.
	YELLOW	31% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).
	YELLOW	22% of the catch is made by pole-and-line fishing, with small bycatch of non-target species but unknown impacts on baitfish stocks.
	GREEN	4% of the catch is made with purse seining on free schools, with little impact on non-target species.

Note of changes with respect to the May 2011 ISSF Stock Status Report: The B rating has changed from Yellow to Green, reflecting the SC 2011 assessment that the stock is in a healthy state.

III.2.4 Albacore in the IO

Albacore catches in the Indian Ocean in 2010 were about 43,700 tonnes, a 9% increase from 2009. Allmost all catches are made by drifting longlines (**Figure III.2.4.1**). It is worth noting that the estimates of catches since 2003 have increased substantially compared to earlier years, primarily as a result of a revision of catches by Indonesia.

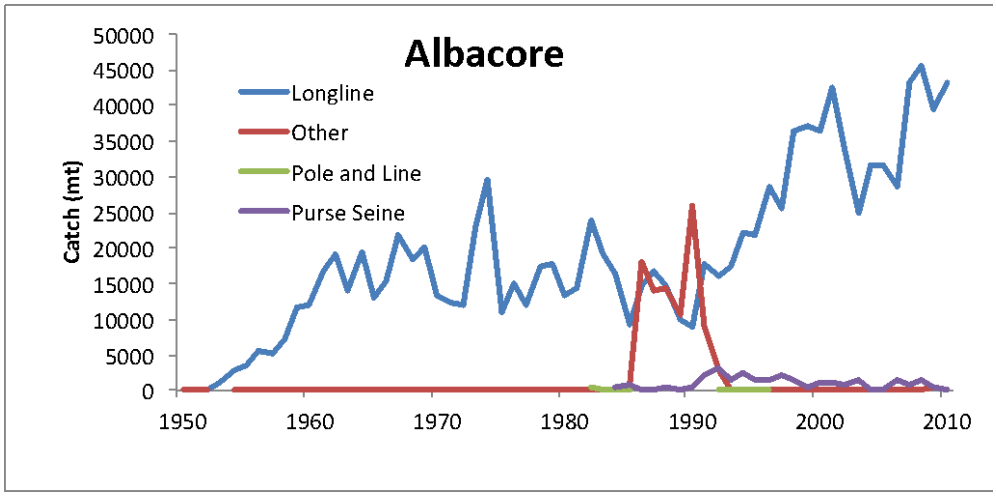

Figure III.2.4.1. Catches of albacore tuna in the IO from 1950 to 2010, by gear type.

Stock assessment

In 2011, the SC conducted a formal stock assessment of the albacore stock for the first time. The conclusions from the assessment are more pessimistic than what was

previously believed on the basis of preliminary analyses that had been conducted in 2008. The results of the assessment indicate that (**Figure III.2.4.2**):

- The ratio of $F_{current}/F_{MSY}$ is estimated to be 1.61 (range: 1.19 - 2.22). Therefore, **overfishing is occurring**. Piracy in the western tropical Indian Ocean has displaced much of the longline fishing effort to the South and East, which are traditional fishing grounds for albacore. Albacore catches in 2010 were 66% higher than in 2003.

- The **stock is in an overfished state** as spawning biomass is below the B_{MSY} level ($B_{current}/B_{MSY}$ = 0.89; Range: 0.65-1.12).

- The median estimate of MSY is estimated to be 29,900 tonnes (range: 21,500 to 33,100 t).

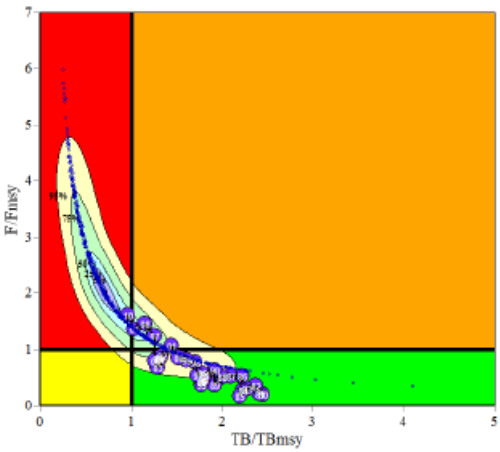

Figure III.2.4.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for albacore tuna in the IO (TB = Total biomass). Circles indicate the median trajectory and the probability distribution contours are provided as a rough visual guide of the uncertainty in current estimates. The proxy reference point C/MSY is reported instead of F/F_{MSY}, Colors are taken from IOTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

IOTC Resolution 09/02 is a limitation of fishing capacity applicable in 2010 and 2011. It limits the number of vessels greater than 24 m fishing for albacore to the number and capacity that existed in 2007.

The SC noted that there are considerable uncertainties in the 2011 assessment caused by data quality issues. SC14 concluded that "the available evidence indicates considerable risk to the stock status at current effort levels." While the SC did not recommend a specific catch limit or effort reduction, it is evident that IOTC needs to address the situation to end overfishing of the stock at its 2012 meeting.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	44	2010	

Five-year average catch	41	2006-10	
MSY	30	2010	
F/F_{MSY}	1.61	2010	
B/B_{MSY}	0.89	2010	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for IO albacore tuna		
Stock abundance	ORANGE	$B < B_{MSY}$.
Fishing mortality	YELLOW	$F > F_{MSY}$. At the time of issuing this report, the IOTC Commission has not met to consider the results of the 2011 assessment (the annual Commission meeting is scheduled for April 2012). The previous Yellow rating will be maintained and reviewed after that meeting
Environment (Bycatch)	ORANGE	Almost 100% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.

Note of changes with respect to the May 2011 ISSF Stock Status Report: The B and F ratings were Yellow because of a lack of a stock assessment. Based on the 2011 assessment, the B rating has been changed to Orange. The F rating has not been modified awaiting a Commission meeting following the SC. If the IOTC fails to take adequate measures to end overfishing, the F rating will change to Orange.

IV. ATLANTIC OCEAN (AO)

RFMO: International Commission for the Conservation of Atlantic Tunas (ICCAT)
Last Scientific Committee (SCRS) meeting: October, 2011
Last Commission meeting: November, 2011.
Tuna stocks managed: AO Yellowfin, AO Bigeye, Eastern AO Skipjack, Western AO skipjack, North AO Albacore, South AO Albacore, Mediterranean Albacore.
Data sources: The main source of information for this section is ICCAT (2011).
Last update: December, 2011.

IV.1. CATCHES

About 10 percent of the world production of tuna is from the Atlantic Ocean (AO). Catches of skipjack, yellowfin, bigeye and albacore in 2010 were 407,000 tons, a 4% increase from 2009. There was a general tendency for the total catch to decline since the mid 1990s, followed by small increases in 2009 and 2010 (**Figure IV.1.1**).

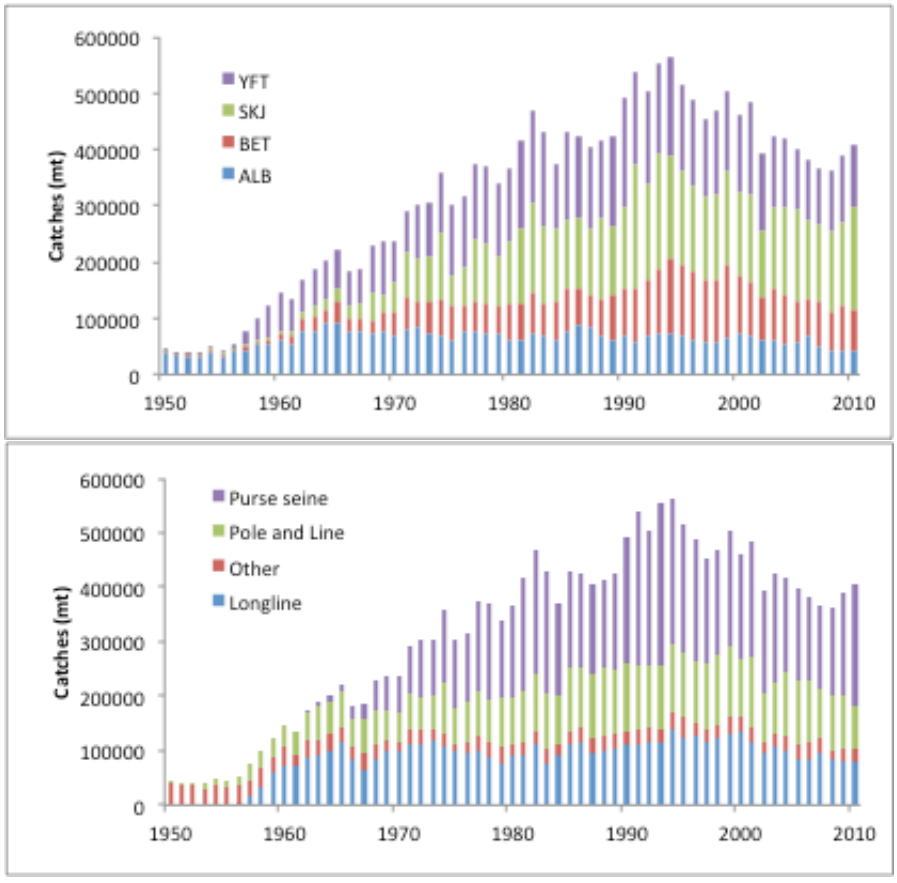

Figure IV.1.1. Trends in catch (mt) of albacore, bigeye, skipjack and yellowfin in the AO region, by species (top) and gear (bottom), 1950-2010.

Average catches for the five-year period 2006-2010 provide an indication of the recent performance of the fisheries (**Figure IV.1.2**): Skipjack accounts for 40% of the catches in weight, followed by yellowfin (28%), bigeye (19%), and albacore (13%). Purse-seine vessels take about 46% of the total catch, followed by pole-and-line vessels (25%),

longliners (23%), and a variety of other gears (6%). It should be noted that, in the Gulf of Guinea, many pole-and-line vessels operate jointly with purse seine vessels and share the catch. The species and size composition of those operations are atypical of pole-and-line trips. Nevertheless, ICCAT statistics do not distinguish between different types of pole-and-line operations.

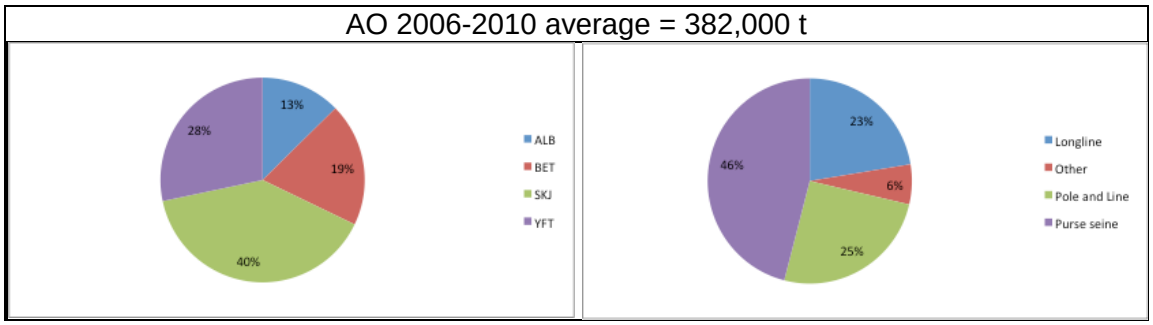

Figure IV.1.2. Average 2006-2010 catches of skipjack, yellowfin, bigeye and albacore tuna in the AO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

IV.2 AO STOCK STATUS

IV.2.1 Bigeye in the AO

Atlantic bigeye catches in 2010 were about 75,800 tonnes, a 7% decrease from 2009. Catches by longline, the main fishing gear (56% of the catch), declined sharply between 1999 and 2006, but they have been stable during the last few years. Purse seine and pole-and-line vessels account for about 26% and 18% of the catches, respectively (**Figure IV.2.1.1**).

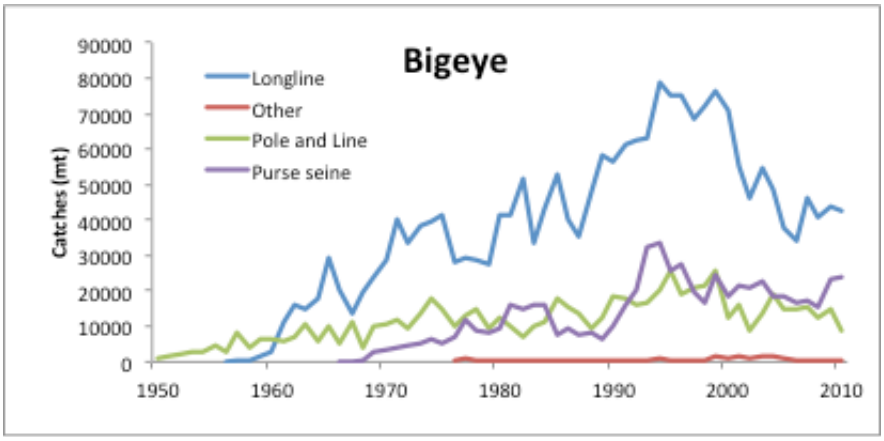

Figure IV.2.1.1. Catches of Atlantic bigeye tuna from 1950 to 2010, by gear type.

The last (2010) assessment conducted by SCRS (ICCAT Standing Committee on Research and Statistics) gave somewhat more optimistic results than the 2007 assessment. The following conclusions were reached by SCRS, based on combining several model-data sets:

- The ratio of $F_{current}/F_{MSY}$ in 2009 is estimated at 0.95, indicating that **overfishing is not occurring**. However, there is uncertainty in this estimate. Estimates of $F_{current}/F_{MSY}$ from the model runs considered plausible ranged from 0.65 to 1.55.

- The ratio of spawning biomass $B_{current}/B_{MSY}$ in 2009 is estimated at 1.01. This indicates that that **the stock is not in an overfished state**. There is also uncertainty in this estimate. Estimates of $B_{current}/B_{MSY}$ from the model runs considered plausible ranged from 0.72 to 1.34.

- The estimate of MSY is 92,000 tonnes (range: 79,000 to 102,000 tonnes). MSY has been reduced considerably through harvest of small bigeye. Current catches (76,000 tonnes) are below MSY.

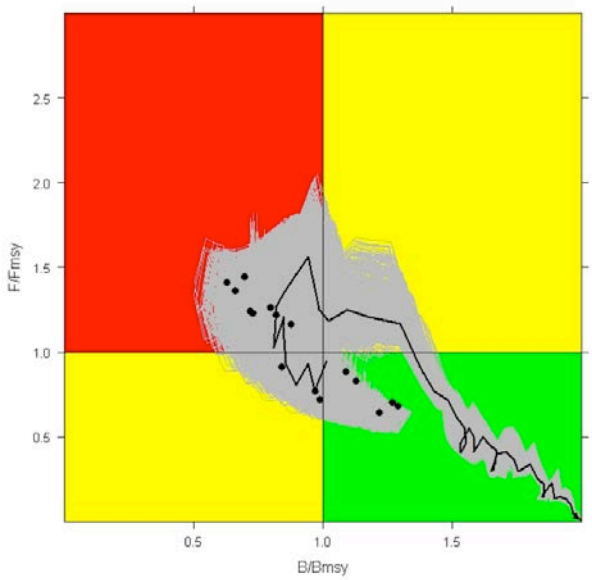

Figure IV.2.1.2. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the AO. The shaded area represents the 80% confidence limits for the historical trajectory (1950-2009) and the solid line represents the median estimated from several models. Points depict structural uncertainty in current status from various other models. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure established by ICCAT for bigeye is Recommendation 11-01, which amended several previous Recommendations. This 2012-2015 management plan calls for:

- A Total Allowable Catch of 85,000 tonnes, with catch limits given to ICCAT members. The measure includes detailed provisions for countries to be penalized with lower quotas if their limits are exceeded;
- A capacity limitation (country-specific) for the number of longline and purse seine vessels over 20 m in length;
- The establishment of a record of vessels actively fishing for bigeye;
- A two-month prohibition of fishing on floating objects in an area off West Africa, with 100% observer coverage during this time/area closure;

- Annual submission of FAD management plans by countries with purse seine and baitboat fisheries;

While a TAC of 85,000 tonnes is specified, consistent with SCRS advice, the permissible catch under [10-01] exceeds 85,000 tonnes by a noticeable amount due to catch allowance made for CPCs not included in the allocation table. There is concern that fishing capacity remains high, and is probably growing due to longline and purse seine vessels moving from the IO into the AO due to piracy.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	76	2010	
Five-year average catch	75	2006-10	
MSY	92	2009	Range: 79-102
F/F_{MSY}	0.95	2009	Range: 0.65-1.55
B/B_{MSY}	1.01	2009	Range: 0.72-1.34
Catch at F_{MSY}	N/A		
TAC	85	2011	

NOTES: Catches and MSY are in thousand tonnes.

Ratings for AO Bigeye tuna		
Stock abundance	GREEN	$B \approx B_{MSY}$.
Fishing mortality	YELLOW	$F \approx F_{MSY}$. The 2010 catch was below the TAC. Recommendation 2011-01 includes catch limits and fishing capacity limitations.
Environment (Bycatch)	ORANGE	56% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.
	YELLOW	21% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).
	YELLOW	18% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks. Some of the baitboats in the Gulf of Guinea fish together with the purse seiners, thus becoming like a single fleet.
	GREEN	5% of the catch is made with purse seining on free schools, with little impact on non-target species.

Note of changes with respect to the November 2011 ISSF Stock Status Report: Updated to reflect management measures adopted by ICCAT in November 2011.

IV.2.2 Yellowfin in the AO

Yellowfin catches in 2010 were about 107,900 tonnes, an 8% decrease from 2009. The main fishing gear is purse seining (about 63% of the catch) (**Figure IV.2.2.1**). Purse seine catches have shown a general decrease since the early 1990s, with a slight increase during the past three years.

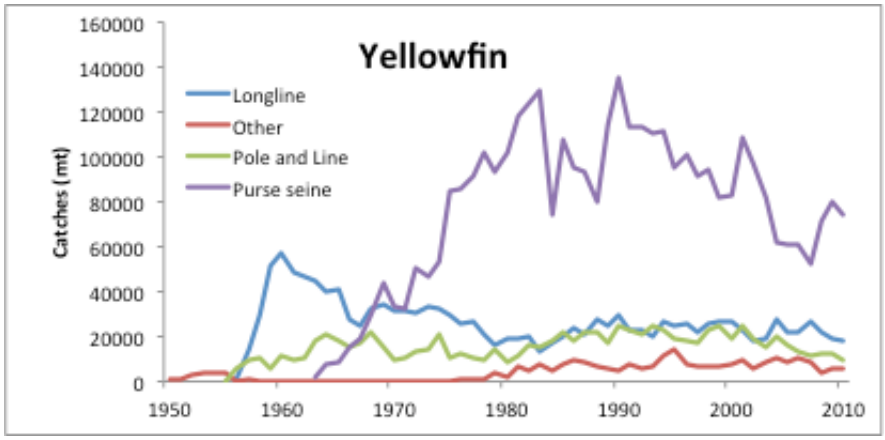

Figure IV.2.2.1. Catches of yellowfin tuna in the AO from 1950 to 2010, by gear type.

Stock assessment

The most recent full assessment of yellowfin tuna was carried out by SCRS in 2011. The SCRS advice is based on averaging the results from two types of models. These results are somewhat more pessimistic than those of the previous (2007) assessment and indicate that (**Figure IV.2.2.2**):

- The (2010) ratio of $F_{current}/F_{MSY}$ is estimated at 0.87 (range 0.68-1.40), indicating that **overfishing is not occurring**.

- The (2010) ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated at 0.85 (range 0.61-1.12). This indicates that that **the stock in 2006 is in an overfished state**. However, the SCRS notes that the two types of models used show conflicting trends in the last few years: An increasing trend in biomass with one model, and a decreasing one with the other.

- The estimate of MSY is 144,600 tonnes (range 114,200-155,100). MSY is lower than in previous decades because the overall fishery selectivity has shifted towards smaller yellowfin, mainly through fishing on FADs.

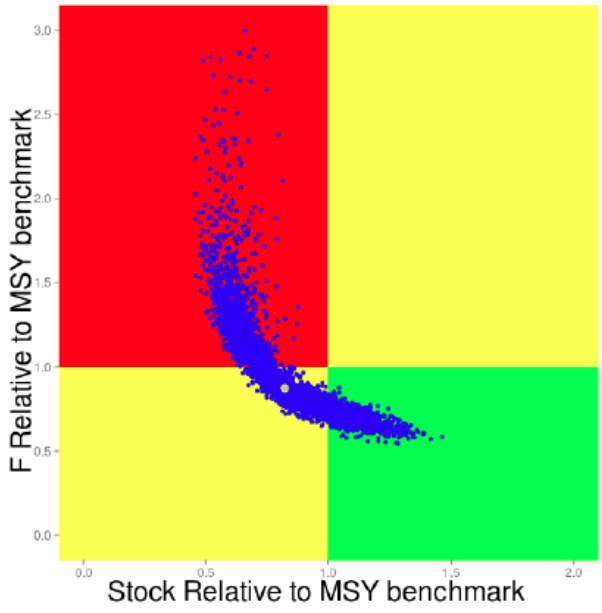

Figure IV.2.2.2. 2010 ratio of Bcurrent/B_{MSY} (x-axis) and Fcurrent/F_{MSY} (y-axis) for yellowfin tuna in the AO. The gray point is the combined estimate from two types of models. The blue array of points reflects bootstrap estimates of uncertainty. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The main binding conservation measure established by ICCAT for yellowfin is Recommendation 11-01, which amended several previous Recommendations. This 2012-2015 management plan calls for:

- An overall TAC of 110,000 tonnes (unallocated by country);
- The establishment of a record of vessels actively fishing for yellowfin;
- A two-month prohibition of fishing on floating objects in an area off West Africa, with 100% observer coverage during this time/area closure;
- Annual submission of FAD management plans by countries with purse seine and baitboat fisheries;

The TAC adopted by ICCAT is consistent with the advice provided by SCRS. While recent catches have been slightly below the TAC, there is concern that fishing pressure on the stock could increase in the near future with the recent movement of purse seine and longline vessels from the IO into the AO due to piracy. This situation should be monitored closely.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	108	2010	
Five-year average catch	108	2006-10	
MSY	131-147	2006	
F/F_{MSY}	0.86	2006	
B/B_{MSY}	0.96	2006	
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for AO Yellowfin tuna		
Stock abundance	ORANGE	B < B_{MSY} in 2010. Recent trends in spawning biomass are uncertain because the two assessment models used give conflicting results (one increasing and one declining).
Fishing mortality	YELLOW	F < F_{MSY}. Although the point estimate of current F is below F_{MSY} (and thus it could be rated Green), it is highly unlikely that increased fishing effort will result in significantly increased sustained catches, but it will significantly reduce spawning biomass.
Environment (Bycatch)	GREEN ORANGE YELLOW	50% of the catch is made with purse seining on free schools, with little impact on non-target species 20% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient. 11% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks. Some of the baitboats in

	YELLOW	the Gulf of Guinea fish together with the purse seiners, thus becoming like a single fleet. 13% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).

Note of changes with respect to the November 2011 ISSF Stock Status Report: Updated to reflect management measures adopted by ICCAT in November 2011.

IV.2.3 Skipjack in the Eastern AO

There are two (eastern and western) skipjack stocks in the Atlantic. Skipjack catches in the eastern Atlantic Ocean in 2010 were about 164,200 tonnes, a 34% increase from 2009. Purse seine (67%) and pole-and-line (29%) dominate the catches (**Figure IV.2.3.1**). The purse seine catches had been decreasing from the early 1990s to 2009, but increased substantially last year; catches by other gears have remained stable.

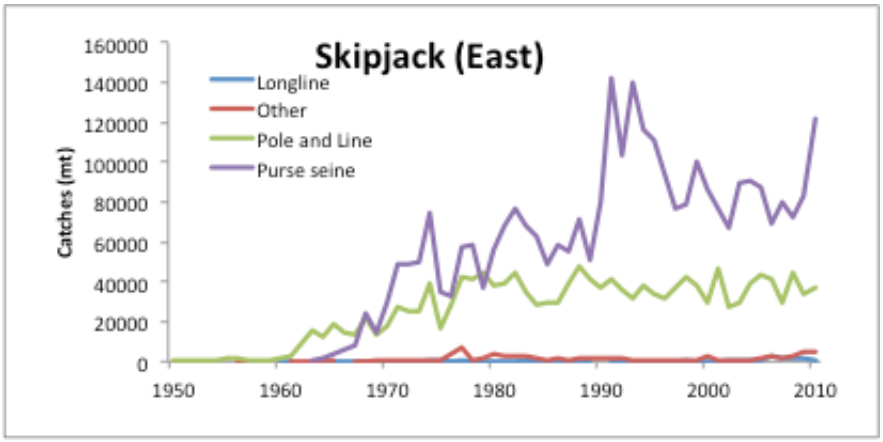

Figure IV.2.3.1. Catches of skipjack tuna in the eastern AO from 1950 to 2010, by gear type.

Stock assessment

The stock was assessed by SCRS in 2008, using data up to 2006. Different models were used, and the results were characterized by high uncertainty. The SCRS concluded that **overfishing is not occurring and the stock is not overfished** (**Figure IV.2.3.2**).

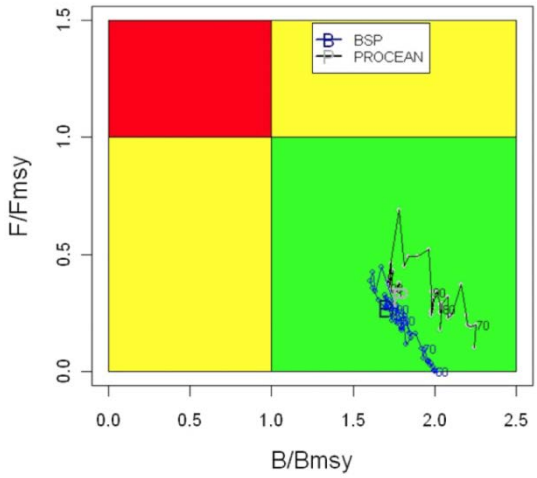

Figure IV.2.3.2. Temporal trend in the ratios Bcurrent/B_{MSY} (x-axis) and Fcurrent/F_{MSY} (y-axis) for skipjack tuna in the eastern AO. The lines show the trends in the estimated biomass and fishing mortality ratios over time, using different assessment models. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The time-area closure established for bigeye and yellowfin through Recommendation 11-01 also affects this skipjack stock. SCRS has recommended that catches not be allowed to exceed MSY.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	164	2010	
Five-year average catch	127	2006-10	
MSY	143-170	2006	
F/F_{MSY}	<1		
B/B_{MSY}	>1		
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for Eastern AO skipjack tuna		
Stock abundance	GREEN	$B > B_{MSY}$.
Fishing mortality	GREEN	$F < F_{MSY}$.
Environment (Bycatch)	YELLOW	62% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).
	YELLOW	27% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks. Some of the baitboats in the Gulf of Guinea fish together with the purse seiners, thus becoming like a single fleet.
	GREEN	5% of the catch is made with purse seining on free schools, with little impact on non-target species

Note of changes with respect to the November 2011 ISSF Stock Status Report: Updated to reflect management measures adopted by ICCAT in November 2011.

IV.2.4 Skipjack in the Western AO

There are two (eastern and western) skipjack stocks in the Atlantic. Skipjack catches in the western Atlantic Ocean in 2010 were about 18,100 tonnes, a 30% decrease from 2009. Pole-and-line fishing dominates the catches (87%), followed by purse seining (9%) (**Figure IV.2.4.1**). Pole and line catches have remained relatively stable (although highly variable) during the last two decades, while purse seine catches have declined.

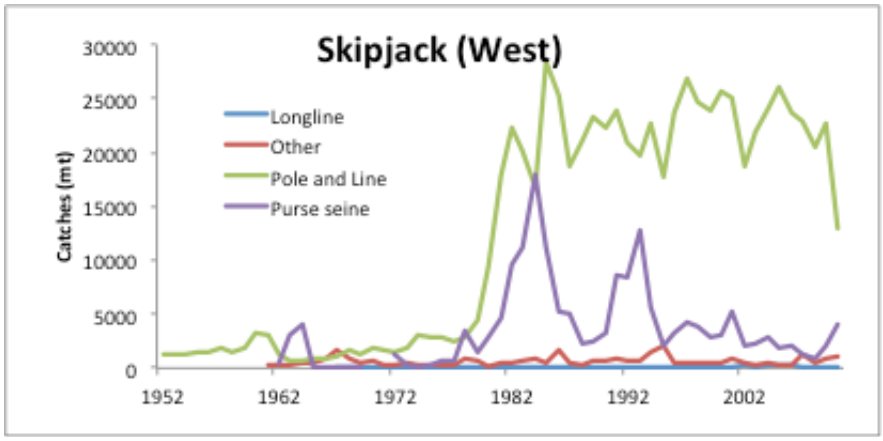

Figure IV.2.4.1. Catches of skipjack tuna in the western AO from 1950 to 2010, by gear type.

Stock assessment

The stock was assessed by SCRS in 2008, using data up to 2006. Different models were used, and the results were characterized by high uncertainty. The SCRS concluded that **overfishing is not occurring and the stock is not overfished** (**Figure IV.2.4.2**).

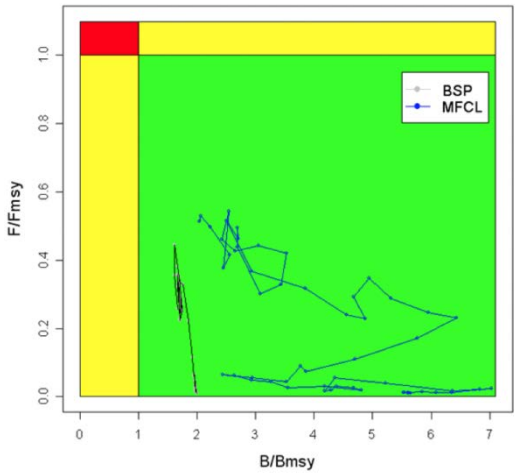

Figure IV.2.4.2. Temporal trend in the ratios Bcurrent/B_{MSY} (x-axis) and Fcurrent/F_{MSY} (y-axis) for skipjack tuna in the western AO. The lines show the trends in the estimated biomass and fishing mortality ratios over time, using different assessment models. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

ICCAT has not adopted conservation and management measures for this stock. SCRS has recommended that catches not be allowed to exceed MSY.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	18	2010	
Five-year average catch	24	2006-10	
MSY	30-36	2006	
F/F_{MSY}	<1		
B/B_{MSY}	>1		

Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for Western AO skipjack tuna		
Stock abundance	GREEN	B > B_{MSY}.
Fishing mortality	GREEN	F < F_{MSY}.
Environment (Bycatch)	YELLOW YELLOW	87% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks. 9% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).

Note of changes with respect to the November 2011 ISSF Stock Status Report: None.

IV.2.5 Albacore in the North AO

There are three stocks of albacore tuna in the ICCAT Area: North Atlantic, South Atlantic and Mediterranean. Albacore catches in the North Atlantic in 2010 were about 19,600 tonnes, a 28% increase from 2009. Catches are made by a variety of fishing gears including pole-and-line (35%), troll (29%), trawl (18%) and longline (17%) (**Figure IV.2.5.1**). Between 2006 and 2009, catches have declined by 38%.

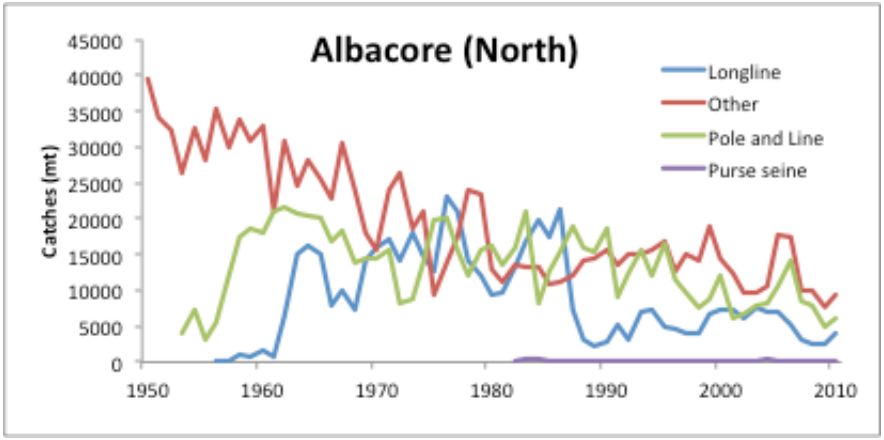

Figure IV.2.5.1. Catches of albacore tuna in the North Atlantic Ocean from 1950 to 2010, by gear type.

Stock assessment

The most recent assessment for the northern stock of albacore was conducted by SCRS in 2009 using data from 1930 to 2007. The analyses indicate that:

- The ratio of $F_{current}/F_{MSY}$ in 2007 is estimated at 1.05 (range 0.85-1.23), indicating that **overfishing was occurring**. This ratio has been greater than 1.0 almost every year since 1955, indicating that overfishing has been going on for five decades. The catches have declined substantially below MSY since 2007, and it would be expected that F has decreased below F_{MSY} by now. However, this cannot be confirmed until a new assessment is conducted.

- The ratio of spawning biomass $B_{current}/B_{MSY}$ in 2007 is estimated at 0.62 (range 0.45-0.79). This indicates that that **the stock is in an overfished state**.

- MSY is estimated at 29,000 tonnes.

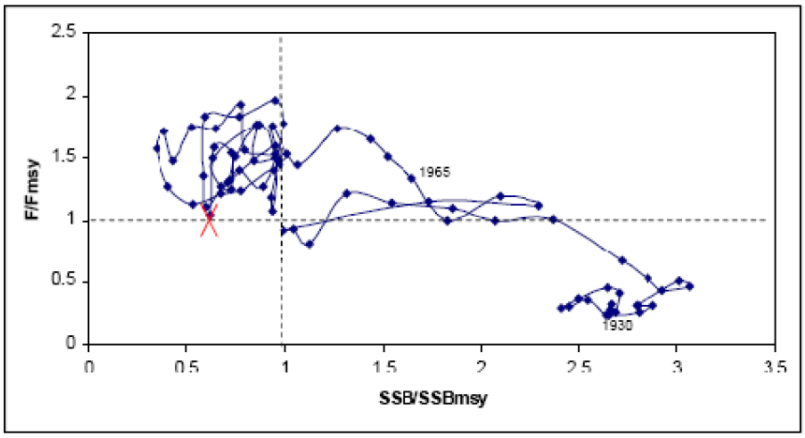

Figure IV.2.5.2. Temporal trend in the ratios Bcurrent/B_{MSY} (x-axis) and Fcurrent/F_{MSY} (y-axis) for albacore tuna in the northern AO. The line shows the trend in the estimated biomass and fishing mortality ratios over time, using different assessment models. The red X marks the 2007 ratio values. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

ICCAT Recommendation 98-08 limits the number of vessels targeting northern Atlantic albacore in each member country to the average level of 1993-1995.

Recommendation 11-04 established a Total Allowable TAC of 28,000 tonnes for 2012-2013, following the advice of the SCRS. However, permissible catch under [11-04] exceeds 28,000 tonnes due to catch allowance made for CPCs not included in the allocation table.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	20	2010	
Five-year average catch	23	2006-10	
MSY	29	2007	
F/F_{MSY}	1.05	2007	Range: 0.85-1.23
B/B_{MSY}	0.62	2007	Range: 0.45-0.79
Catch at F_{MSY}	N/A		
TAC	28		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for North AO albacore tuna		
Stock abundance	ORANGE	B < B_{MSY}. Abundance increased between 2000 and 2005, but then decreased again. There is no clear evidence of a sustained increase in biomass or a stable one.
Fishing mortality	YELLOW	F ≈ F_{MSY}. The 2007 ratio was slightly above 1.0. Since catches have been substantially below the MSY level since then, it is expected that F has fallen below F_{MSY}. However, this should be confirmed through the next assessment. There is a TAC to reduce fishing mortality that has been set following scientific

		advice to rebuild the stock.
Environment (Bycatch)	YELLOW	36% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks.
	GREEN	29% of the catch is made with trolling, with little impact on non-target species
	ORANGE	18% of the catch is made with pelagic trawling, with some impact on non-target species. Monitoring of bycatch is poor.
	ORANGE	16% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles). Monitoring is deficient.

Note of changes with respect to the November 2011 ISSF Stock Status Report: Updated to reflect management measures adopted by ICCAT in November 2011.

IV.2.6 Albacore in the South AO

There are three stocks of albacore tuna in the ICCAT Area: North Atlantic, South Atlantic and Mediterranean. Albacore catches in the South Atlantic in 2010 were about 18,900 tonnes, a 17% decrease from 2009. Catches are made primarily by longline (68%) and pole-and-line (27%) (**Figure IV.2.6.1**).

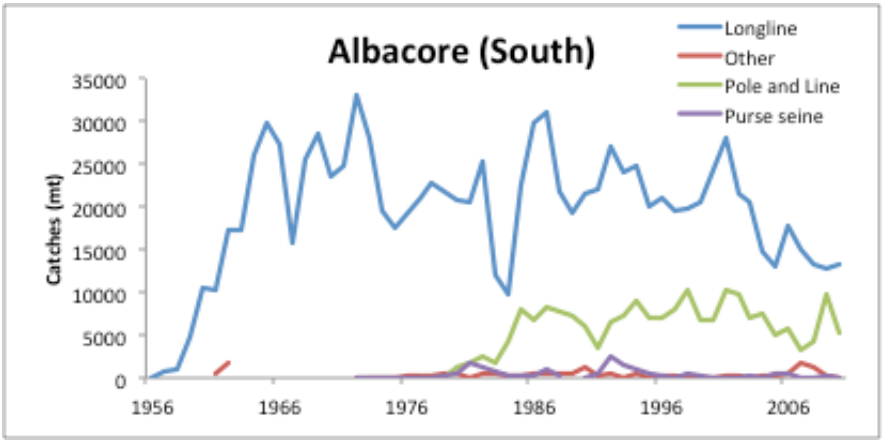

Figure IV.2.6.1. Catches of albacore tuna in the south Atlantic Ocean from 1950 to 2010, by gear type.

Stock assessment

The most recent assessment for the southern stock of albacore was conducted by SCRS in 2011. The new assessment consisted of eight different models that were considered to be equally plausible. The overall analysis gave somewhat more pessimistic results than the previous (2007) assessment. The new analyses indicate that (**Figure IV.2.6.2**):

- The ratio of $F_{current}/F_{MSY}$ in 2009 is estimated at 1.07 (range 0.44-1.95), indicating that **overfishing has been occurring**.

- The ratio of spawning biomass $B_{current}/B_{MSY}$ in 2009 estimated at 0.88 (range 0.55-1.59). This indicates that that **the stock is in an overfished state**.

- MSY is estimated at 28,000 tonnes.

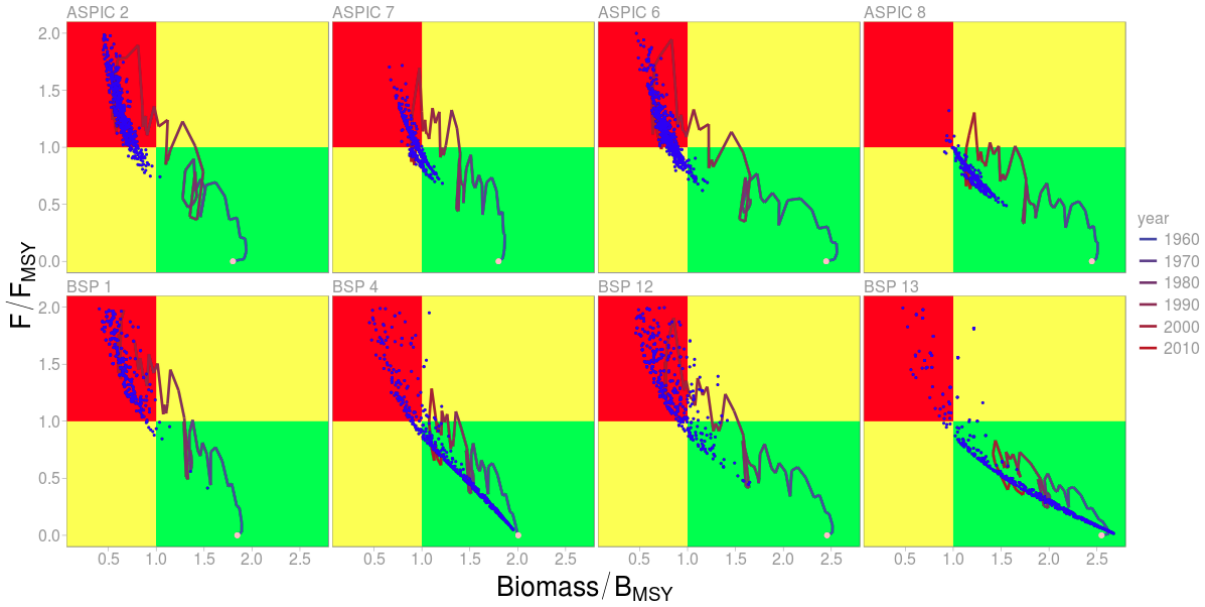

Figure IV.2.6.2. Temporal trend in the ratios Bcurrent/B_{MSY} (x-axis) and Fcurrent/F_{MSY} (y-axis) for albacore tuna in the southern AO. The eight panels are the trajectories from eight different models that were used in combination by the SCRS to produce advice. In each plot, the scatter of points represents uncertainty around the 2009 ratios. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

Management measures

The 2008-2011 TAC for the South Atlantic albacore stock had been set at 29,900 tonnes. In 2011, following SCRS advice, the TAC was lowered to 24,000 tonnes (ICCAT Recommendation 11-05). However, permissible catch under the Recommendation exceeds 24,000 tonnes by a considerable amount due to individual allocations. The new measure includes provisions to reduce future catch limits if the TAC is exceeded, and requires major fishing countries to submit semi-annual catch reports in order to prevent overharvests. In addition, carry-overs of underharvests are no longer allowed.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	19	2010	
Five-year average catch	21	2006-10	
MSY	28	2009	
F/F_{MSY}	1.07	2009	
B/B_{MSY}	0.88	2009	
Catch at F_{MSY}	N/A		
TAC	30		

NOTES: Catches and MSY are in thousand tonnes.

Ratings for South AO albacore tuna		
Stock abundance	ORANGE	B < B_{MSY}.
Fishing mortality	YELLOW	F ≈ F_{MSY}. The overall TAC has been lowered to 24,000 t following scientific advice to allow the stock to rebuild.
Environment (Bycatch)	ORANGE	68% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.

	YELLOW	27% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks.

Note of changes with respect to the November 2011 ISSF Stock Status Report: Updated to reflect management measures adopted by ICCAT in November 2011.

IV.2.7 Albacore in the Mediterranean

There are three stocks of albacore tuna in the ICCAT Area: North Atlantic, South Atlantic and Mediterranean. Albacore catches in the Mediterranean in 2010 were about 2,100 tonnes, a 47% decrease from 2008. Catches are highly variable and are made primarily by longline (61%) and the remainder by other surface gears (**Figure IV.2.7.1**).

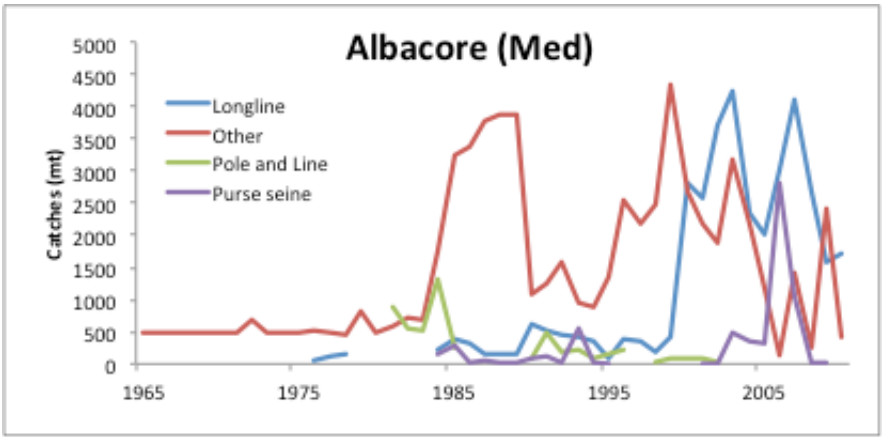

Figure IV.2.7.1. Catches of albacore tuna in the Mediterranean Sea from 1950 to 2010, by gear type.

Stock assessment

The Mediterranean albacore stock was assessed for the first time in 2011. The data sets used are extremely sparse and indices of abundance are generally lacking. In addition, there is considerable uncertainty with reported catches. The SCRS concluded that:

- The ratio of $F_{current}/F_{MSY}$ in 2010 is less than or equal to 1. Therefore, **overfishing is probably not occurring**.

- The ratio of $B_{current}/B_{MSY}$ cannot be estimated with the available data. Therefore **it is not known if the stock is overfished**.

- The level of MSY cannot be estimated with the available data.

Management measures

There are no conservation and management measures for Mediterranean albacore. The 2011 SCRS recommended that the Commission adopt measures designed to limit increases in catch and fishing effort directed at Mediterranean albacore. However, the 2011 Commission meeting did not adopt any conservation measures for the stock.

Summary

QUANTITY	ESTIMATE	YEARS	Notes
Most recent catch	2	2010	

Five-year average catch	4	2006-10	
MSY	N/A		
F/F_{MSY}	≤ 1	2009	
B/B_{MSY}	N/A		
Catch at F_{MSY}	N/A		
TAC	None		

NOTES: Catches are in thousand tonnes.

Ratings for Mediterranean albacore tuna		
Stock abundance	ORANGE	Unknown. Monitoring of basic fishery statistics is extremely poor and has made it impossible to estimate abundance in the stock assessment.
Fishing mortality	YELLOW	$F \leq F_{MSY}$. While the F level could be rated Green, there is so much uncertainty in the assessment results that a Yellow rating is given on a precautionary basis.
Environment (Bycatch)	ORANGE ORANGE	61% of the catch is officially reported as made by longlining. Several mitigation measures are in place (sharks, turtles). Monitoring is very deficient. 43% of the catch is made by other surface gears, including gillnets. Monitoring is very deficient.

Note of changes with respect to the November 2011 ISSF Stock Status Report: Updated to reflect management measures adopted by ICCAT in November 2011.

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APPENDIX 1. SUMMARY OF IMPACTS BY MAIN GEAR TYPES ON NON-TARGET SPECIES

All fishing gears have some level of environmental impact, and bycatch is one of the most noticeable ones. This summary presents the overall ratings given by default to various gear types. Deviations from these color ratings may occur for individual stocks, due to advice from the ISSF Scientific Advisory Committee; these are noted for each particular stock in which deviations may occur.

This summary is presented only for non-target (non-tuna) species. Note that in some ocean regions, fishing modes such as FAD-based purse seining and pole-and-line fishing can result in high catches of small individuals of bigeye and yellowfin, which are undesirable. In this stock status report, these impacts are measured directly under the status section for these stocks.

Sources of information used for these ratings include the following: Amandè et al. (2010), Clarke and Harley (2010), FAO (2009), Gillett (2011), Gilman (2011), Harley, et al. (2011), IOTC (2005), Matsumoto and Bayliff (2008), Morizura el al. (1999), Olson (2010), Pianet et al. (2010a), Pianet et al. (2010b), SPC/OFP (2008), and SPC/OFP (2010).

Gillnet fishing. 

Gillnet fisheries take substantial amounts of tunas in various ocean regions, especially in the Indian Ocean. For the most part, these are poorly monitored but it is known that they tend to catch many different species at the same time. Bycatch rates of many non-target species tends to be high. Large-scale driftnets are generally prohibited on the high seas but appear to continue to be used.

Sharks. Silky, oceanic whitetip and scalloped hammerhead sharks are common in gillnet fisheries. All of these species are of concern because of their low productivity and vulnerability to overfishing.

Sea Turtles. Sea turtle bycatch is thought to be highest in gillnet fisheries compared to other gears.

Sea birds. The incidental catch of sea birds in gillnet fisheries is largely unknown.

Other finfish. Gillnet operations catch a number of other finfishes. Some of these include very productive species such as dolphinfish ("mahi-mahi") that are not of immediate concern.

Handlines. 

This mode of fishing typically results in small bycatch rates.

Longlining. 

Sharks. Longline fisheries tend to have very high catch rates of sharks (in some areas, 30% of the longline catches are sharks). In some cases the sharks can be a target of the fishing operations, at least for parts of a trip. Sharks caught include a wide range of species, some of which are thought to be resilient to fishing (blue

shark), and others which are likely to be more vulnerable because of their low reproductive rates (e.g., porbeagle and thresher sharks).
Sea Turtles. Some turtles are also caught in longline operations as bycatch, many of which are discarded (including live releases). All RFMOs have some type of mitigation measure in place. Roughly one half, or more, of the turtles caught are alive, so the main mitigation measures aim to dehook them and release them alive.
Sea birds. Some sea birds are also caught in longline operations as bycatch, especially in higher latitudes. Most (~90%) sea birds caught are dead when brought onboard, so the best practice for mitigation is to avoid their being hooked, which is the main type of mitigation measure used by the RFMOs. Of particular concern are albatrosses and petrels.
Other finfish. After tunas and sharks, longline operations catch a number of other finfishes. Some of these include very productive species such as dolphinfish ("mahi-mahi") that are not of immediate concern. Longlining also catches marlins, some of which are estimated to be overfished.

Mid-water trawling. ORANGE

This mode of fishing has a small bycatch rate of cetaceans.

Pole-and-line fishing. YELLOW

There are no major concerns with the catch of vulnerable non-target species by this gear. However, the method requires the use of live baitfish (small pelagics) that are used to keep the schools of tunas attracted to the fishing vessels while they are fished. The effects of fishing on these populations is largely unknown; however, they should be managed in order to support pole and line fisheries. Gillett (2011) notes that the amount of baitfish available in the WCPO is a limiting factor to the amount of pole and line fishing that can occur. In addition, the bait species captured are generally more fragile than temperate baitfish species.

Purse seining on free schools: GREEN

This mode of fishing typically results in small bycatch rates of non-target species.

Purse seining on FADs: YELLOW

Purse seining on FADs (anchored FADs, drifting FADs and natural logs) generally has bycatch rates of non-target species that are higher than those of free school sets.
Sea Turtles. The number of turtles that die in purse seine fishing operations is very small. Nevertheless, it is relatively easy to release turtles when caught alive and this is the main mitigation measures used by RFMOs.
Sharks. FAD purse seine fishing operations catch several species of sharks, some of which, based on catch trends, may have been declining in abundance in recent years, such as oceanic white tip and silky sharks.
Sea birds. Mortality of other sensitive species like seabirds in FAD operations is almost nonexistent.
Other finfish. FAD fishing does result in large catches of other finfish such as dolphinfish ("mahi-mahi"). Currently, it appears that these catches do not

adversely impact the abundance of these species which are very productive and resilient to fishing. Rather, the main problem with these bycatches is one of utilization (waste), since the majority of these are discarded at sea so that the fish holding tanks can be reserved for the more valuable tunas.

Purse seining on tuna-dolphin associations. GREEN

Marine mammals. In the EPO, purse-seine fishermen have learned to take advantage of the association between yellowfin schools and herds of dolphins that is prevalent in the region. Fishermen maximize their catches of yellowfin by setting their nets around these associations. Mortality of dolphins was very high early on, but the IATTC estimates that it has since the late 1980s declined by 98% after fishermen and scientists developed techniques for releasing the dolphins alive after a set, and retaining the tunas. Some scientists believe that there is an un-quantified level of mortality after the sets, caused by stress, and this remains a controversial issue. However, based on fishery-independent surveys, the abundance of most dolphin populations in the region is estimated to be either stable or increasing, while a few may be declining. The Agreement on the International Dolphin Conservation Program (AIDCP) establishes allowable dolphin mortality limits; current (2009) levels are one-fourth of that level. There is a 100%-coverage observer program in place for these operations. Catches of non-target species in these operations are very small.

Trolling. GREEN

This mode of fishing typically results in very small bycatch rates of non-target species.

RFMO-SPECIFIC BYCATCH MONITORING AND MITIGATION MEASURES

IATTC

General: Resolution 04-05 requires the release of non-target species caught in purse seine fisheries.

Sea Turtles. Resolution C-07-03 requires fishermen to release sea turtles entangled in FADs or caught in longlines and to avoid encircling them with purse seine nets. The resolution also calls for research to mitigate sea turtle bycatch, especially with gear modifications.

Sharks. Resolution C-05-03 discourages shark retention and establishes a limit in the amount of shark fins that can be landed, relative to the total weight of shark bodies that must be retained. This ratio of fin-to-body-weight acts as a disincentive to target sharks because the shark carcasses occupy hold space on the vessel and have little market value. The Resolution also mandates reporting of shark catches to IATTC. Resolution C-11-10 prohibits the retention of oceanic whitetip sharks and requires the release of specimens that are alive when caught.

Sea birds. The IATTC Resolution C-11-02 requires longline vessels operating in high latitudes (North of 23°N, South of 30°S and around the Galapagos Islands) to employ at least two sea bird mitigation techniques such as night setting or weighted branch lines.

Dolphins. The AIDCP establishes total per-stock and per-year limits on incidental dolphin mortality (DMLs), with a structured protocol for allocating and keeping track of DMLs (using observers). A vessel must stop setting on dolphin associations for the rest of the year once its DML has been reached.

Monitoring and mitigation research. Through the Agreement on the International Dolphin Conservation Program (AIDCP), there is 100% observer coverage on all large purse seiners (> 363 tons in carrying capacity) and lower coverage on smaller vessels. This level of observer coverage, coupled with the information from fishing logbooks, allows the IATTC to maintain a very complete accounting of the bycatch taken in purse seine fisheries in the EPO. Several IATTC Recommendations and Resolutions encourage research that could make FAD-based purse seining and longlining more species-selective. These are non-binding, however, and depend on the IATTC member nations making the necessary resources available. ISSF has a research program for bycatch mitigation in purse seine fisheries, and IATTC scientists are taking part in this program (IATTC, 2010b). Resolution C-11-08 now requires 5% scientific observer coverage for large longliners.

NOTE: Major fleets such as Japan that use longlining in the EPO reported catches of non-target species to IATTC (particularly sharks and billfishes; Matsumoto and Bayliff, 2008), and in this sense they were relatively better than longline fleets elsewhere. However, it is apparent that this level of monitoring and reporting has not been maintained.

WCPFC

Sea Turtles. CMM 2008-03 instructs WCPFC members to implement the FAO (2009) guidelines for reducing sea turtle mortality, and requires longline operators to use line cutters and de-hookers to handle and promptly release sea turtles caught or entangled. The measure also requires purse seine operators to avoid setting on turtles if possible and to disentangle/release them when caught alive.

Sharks. CMM-2009-04 requires reporting of shark catches and discards by gear type and species. The measure also established a limit on the ratio of shark fins to total shark weight that can be retained onboard fishing vessels, and encourages the release of live sharks. WCPFC has initiated a research plan aimed at improving statistics and observer coverage on sharks and conducting assessments for key shark species (Clarke and Harley, 2010).

Sea birds. CMM 2007-04 requires longliners operating south of 30°S or north of 23°N to use at least two of several imitigation measures such as weighted branch lines or tori (bird-scaring) lines. The measure also encourages mitigation research to be conducted by WCPFC members.

Other finfish. Striped marlin are also caught as bycatch in longline fisheries; this species is of more concern because it has been declining in abundance. The WCPFC adopted CMM 2010-01 which sets a cap on the catch of striped marlin for each member relative to historical levels.

Monitoring and mitigation research. With the exception of sharks under CMM 2009-04, reporting of bycatch species is not mandatory at WCPFC, so much of the information available comes from observer programs. The WCPFC has a Regional Observer Program that, since 2010, is intended to have 100% coverage on purse seine vessels that fish on the high seas or between two or more EEZs. As these

data become available and are analyzed by the Scientific Committee, monitoring should improve. National observer programs are also run by WCPFC members, but it is not clear that all of the bycatch information collected in those programs is made available to the SC for integrated analyses. For longline fisheries, observer coverage is poor overall. Much of the information available is from bilateral EEZ access agreements in Pacific Island countries. Observer coverage for distant-water fleets is extremely low.

IOTC

Sharks: The IOTC has adopted measures that address shark conservation concerns. Resolution 05/05 established a limit on the ratio of fin weight to total shark weight that can be retained onboard a fishing vessel, and encouraged the release of live sharks in fisheries that do not target sharks. Resolution 10/12 prohibits the retention on board of all species of thresher sharks, a group that is thought to be particularly vulnerable due to its low productivity. In addition, Resolution 10/12 requires data reporting to IOTC, especially for fisheries targeting sharks.

Sea Turtles. Resolution 09/06 requires IOTC members to mitigate sea turtle mortality and to provide data on turtle bycatch to the SC. The measure has specific requirements for longline and purse seine operators to facilitate the appropriate handling and release of live turtles.

Sea birds. Resolution 10/06 (which supersedes various prior measures) requires longliners operating south of 25°S to use at least two of several imitigation measures such as weighted branch lines or tori (bird-scaring) lines. The measure also requires IOTC members to provide data on interactions between fisheries and sea birds to the SC.

Monitoring and mitigation research. Resolution 10/04 established a regional observer program that requires at least 5% coverage for vessels over 24 m, and for smaller vessels operating in the high seas. Resolution 08/04 requires longliners greater than 24 m overall, as well as smaller longliners operating in the high seas, to have electronic logbooks and record and report data on target and non-target species to the SC. Monitoring of bycatches in the gillnet fisheries is extremely poor.

ICCAT

Sharks: Recommendations 04-10, 05-05 and 06-10 established a limit on the ratio of fin weight to total shark weight that can be retained onboard a fishing vessel, and encouraged the release of live sharks in fisheries that do not target sharks. Recommendation 07-06 limits mortality on porbeagle and North Atlantic shortfin mako. Recommendations 09-07, 10-07, 10-08 and 11-08 prohibit the retention on board of bigeye thresher, oceanic white tip, several species of hammerhead sharks, and silky sharks. All of these measures have a reporting requirement associated with them; Recommendation 10-06 prohibits the retention of shortfin mako onboard vessels flagged to countries that do not report catches for this species.

Sea Turtles. Recommendation 10-09 set up reporting requirements for sea turtle interactions and mandates its scientific committee to assess, by 2013, the impact of tuna fisheries on sea turtle populations. The measure has specific

requirements for longline operators to be trained on appropriate handling and release of live turtles so as to maximize their survival.

Sea birds. Recommendation 07-07 required longliners operating south of 20°S to use at least two of several mitigation measures such as weighted branch lines or tori (bird-scaring) lines. The measure also required ICCAT members to collect and report data on interactions between fisheries and sea birds. Recommendation 11-09 strengthened the mitigation measures in 07-07, especially for longliners fishing south of 25°S, and in the Mediterranean.

Other finfish. Longliners also take Atlantic blue and white marlin as bycatch, both of which are thought to be overfished. ICCAT adopted Recommendation 06-09 (extended through 2012 by Recommendations 10-05 and 11-07), a rebuilding plan that limits the amount of marlins that longliners can catch and land. The SCRS has noted that the stocks can potentially rebuild under this plan, but verification is needed through a new assessment.

1. Monitoring and mitigation research. ICCAT has specific requirements for reporting data on sharks, sea turtles and sea birds. For the most part these are not complied with fully, but the situation is improving over time. Recommendation 10-10 requires members to have at least 5% observer coverage (for vessels over 15 m) in their national observer programs for longline, purse seine and pole-and-line fisheries. Recommendation 11-10 requires CPCs to collect and report data on bycatch and discards either through observer programs and logbooks (for vessels to which Rec. 10-10 applies) or via alternative means (for artisanal and semi-industrial fisheries). Recommendation 11-15 establishes penalties for CPCs that do not report annual catch data (including zero catches) by prohibiting them from retaining such species in the following year.