INTERNATIONAL SEAFOOD SUSTAINABILITY FOUNDATION

ISSF STOCK STATUS RATINGS – 2012

Status of the World Fisheries for Tuna

ISSF Technical Report 2012-04B | December, 2012

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EXECUTIVE SUMMARY

There are 23 stocks of the major commercial tuna species worldwide (6 albacore, 4 bigeye, 4 bluefin, 5 skipjack and 4 yellowfin stocks). This document summarizes the results of the most recent scientific assessments of these stocks, as well as the current management measures adopted by the RFMOs. In addition, this report ranks the status and management of the 23 stocks using a consistent methodology in terms of three factors: Abundance, Exploitation/Management (fishing mortality) and Environmental Impact (bycatch).

In 2011, the catch of major commercial tunas was 4.2 million tonnes. Fifty-eight percent of it was skipjack tuna, followed by yellowfin (26%), bigeye (10%) and albacore (6%). Bluefin tuna accounts for only 1% of the global catch.

Globally, 65% of the stocks are at a healthy level of abundance, 26% are overfished and 9% are at an intermediate level. In terms of exploitation, 39% of the stocks are experiencing a low fishing mortality rate, 22% are being over-exploited, and 39% have a high fishing mortality that is being managed adequately (Figure 1).

When viewed from the point of view of total catch (Figure 2), 94% of the catch comes from healthy stocks. This is due to the fact that skipjack stocks contribute more than one half of the global catch of tunas, and they are all in a healthy situation (Table 1). In contrast, most bluefin stocks and 3 out of 6 albacore stocks are overfished, but combined they make a relatively small fraction of the total catch.

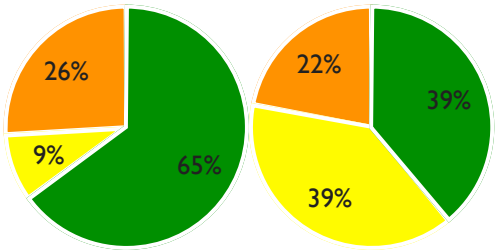


Figure 1. Distribution of stocks of major commercial tunas according to abundance ratings (left) and fishing mortality ratings (right). The percentages correspond to the number of stocks with a given ranking.

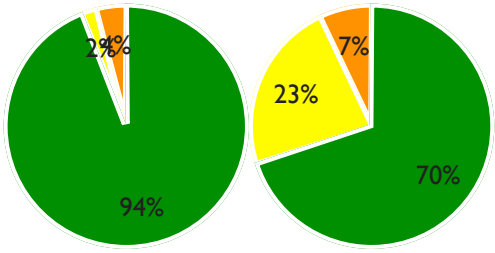


Figure 2. Distribution of stocks of major commercial tunas according to abundance ratings (left) and fishing mortality ratings (right). The percentages correspond to the total catch of all stocks with a given ranking.

Table 1. Biomass, Fishing Mortality (F) and Environmental Impact ratings for 23 tuna stocks. The table is sorted by species. Catch is for 2011 in thousands of tonnes.

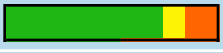
STOCK	CATCH	BIOMASS	F	BYCATCH
Albacore tuna				
PO-ALB-N	76			
PO-ALB-S	73			
AO-ALB-N	20			
AO-ALB-S	24			
AO-ALB-M	5			
IO-ALB	39			
Bigeye tuna				
EPO-BET	82			
WPO-BET	151			
AO-BET	78			
IO-BET	87			
Bluefin tuna				
PO-PBF	18			
AO-BFT-E	10			
AO-BFT-W	2			
SH-SBT	9			
Skipjack tuna				
EPO-SKJ	284			
WPO-SKJ	1,540			
AO-SKJ-E	173			
AO-SKJ-W	39			
IO-SKJ	398			
Yellowfin tuna				
EPO-YFT	203			
WPO-YFT	431			
AO-YFT	100			
IO-YFT	303			

Table 2. Biomass, Fishing Mortality (F) and Environmental Impact ratings for 23 tuna stocks. The table is sorted by ocean or ocean region. Catch is for 2011 in thousands of tonnes.

STOCK	CATCH	BIOMASS	F	BYCATCH
Eastern Pacific				
EPO-BET	82			
EPO-YFT	203			
EPO-SKJ	284			
Western Pacific				
WPO-BET	148			
WPO-YFT	431			
WPO-SKJ	1,540			
Pacific Ocean				
PO-ALB-N	76			
PO-ALB-S	73			
PO-PBF	18			
Atlantic Ocean				
AO-BET	78			
AO-YFT	100			
AO-SKJ-E	173			
AO-SKJ-W	39			
AO-ALB-N	20			
AO-ALB-S	24			
AO-ALB-M	5			
AO-BFT-E	10			
AO-BFT-W	2			
Indian Ocean				
IO-BET	87			
IO-YFT	303			
IO-SKJ	398			
IO-ALB	39			
Southern Hemisphere				
SH-SBT	9			

INTRODUCTION

Purpose

There are 23 stocks of the major commercial tuna species worldwide. These stocks are assessed and managed by five Tuna Regional Fishery Management Organizations (RFMOs). The purpose of this document is to summarize the status of the stocks according to the most recent scientific assessments, as well as the current management measures adopted by the RFMOs. Note that stock status can change between consecutive assessments because the stocks and fisheries are dynamic. While this report does not pretend to replace the information available directly from the RFMOs, it does serve as a single source in which the information is presented uniformly. The report is organized by Ocean or by Ocean Region to try to match as closely as possible the mandates of the different RFMOs.

In addition, this report ranks the status and management of the 23 stocks using a consistent methodology (further explained below) in terms of three factors: Abundance, Exploitation/Management and Environmental Impact (bycatch).

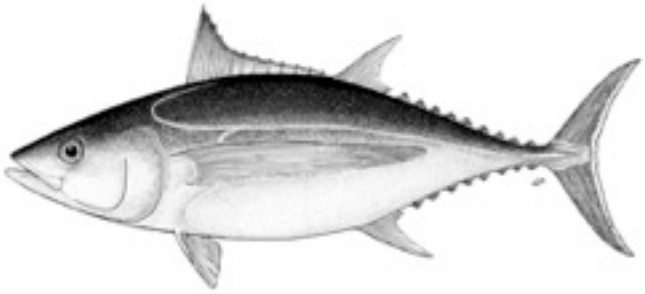
This report is updated several times each year, usually after an RFMO assesses the stocks it is responsible for, or adopts management recommendations. Appendix 2 provides a log of the updates.

Major commercial tunas

Seven species of tunas are of major commercial importance on a global scale: Three species of bluefin tuna, albacore, bigeye, yellowfin and skipjack. Due to differences in their distributions and the different fisheries that exploit them, the species are classified as "temperate" or "tropical". The temperate tunas are the bluefins, plus albacore; they are found in waters as cold as 10°C, but can also be found in tropical waters. Skipjack and yellowfin are classified as tropical and are found in waters with temperatures greater than 18° C (although they can dive in colder waters). Bigeye could be classified as intermediate, but is often treated as a tropical species in fishery statistics. Ages/sizes at maturity relate to when 50% of females are expected to be mature.

Albacore Tuna

Albacore (*Thunnus alalunga*) is a temperate tuna species, widely distributed in temperate and tropical waters of all oceans. The main fisheries are in temperate waters. In the Atlantic, their geographic limits are from 45-50° N and 30-40° S, while in the Indian Ocean, their distribution ranges from 5° N to 40° S with adults occurring from 5° N to 25° S. The are six albacore stocks assessed and managed by the RFMOs: North Pacific Ocean, South Pacific Ocean, North Atlantic Ocean, South Atlantic Ocean, Mediterranean Sea and Indian Ocean.



Albacore tuna. Courtesy of Fisheries and Aquaculture Department/Food and Agriculture Organization of the United Nations.

Albacore tend to travel in single species schools, without the level of mixing as seen in other species. Association with floating objects is not common, as seen with tropical tunas.

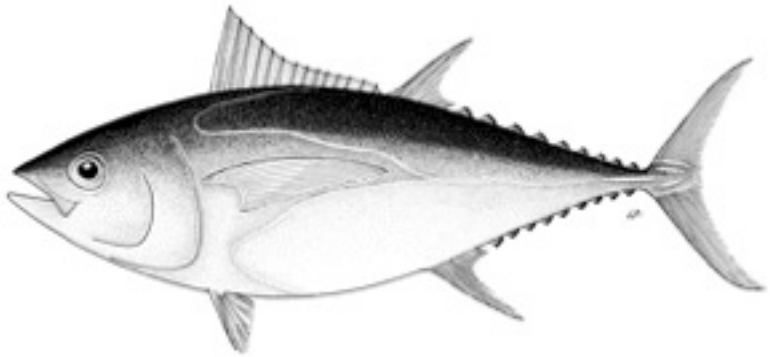
Albacore is one of the smaller major commercial tuna species, reaching sizes intermediate between skipjack and yellowfin.

Albacore: Approximate characteristics.

	Size (cm)	Weight (kg)	Age (y)
Common	40-100		
Maximum	130	40	15
Maturity	75-90	8-15	2-5

Bigeye Tuna

Bigeye (*Thunnus obesus*) are found in the subtropical and tropical areas of the Atlantic (but not in the Mediterranean), Indian and Pacific Oceans. Their geographical limits range from 55-60° N and 45-50° S. Juveniles and reproductively active adults are found in equatorial waters as well as at higher latitudes.. Four stocks are assessed and managed by the RFMOs: Atlantic Ocean, Eastern Pacific, Western Pacific and Indian Ocean.



Bigeye tuna. Courtesy of Fisheries and Aquaculture Department/Food and Agriculture Organization of the United Nations.

Bigeye can form either free schools or those associated with floating objects. Juvenile bigeye will form schools with juvenile yellowfin and skipjack tunas.

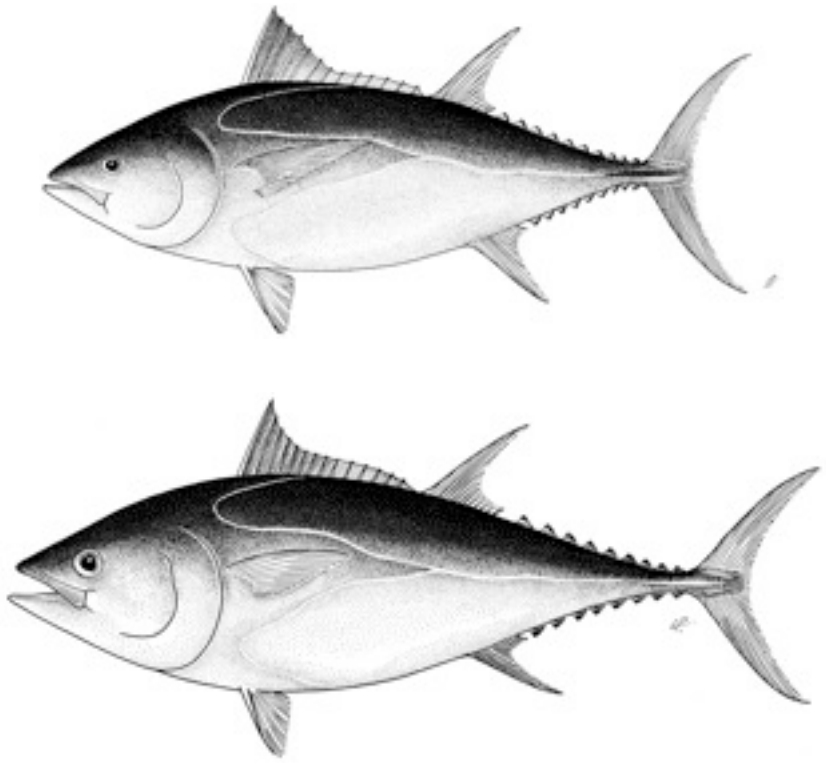
Bigeye reach similar maximum sizes to that of yellowfin. Individuals as large as 150 cm are common in some fisheries.

Bigeye: Approximate characteristics.

	Size (cm)	Weight (kg)	Age (y)
Common	40-180	1.4-130	
Maximum	230	210	15
Maturity	102-135	25-57	3-4

Bluefin Tuna

Bluefin tuna (*Thunnus spp.*) are a temperate water fish comprised of 3 species, North Atlantic bluefin (*Thunnus thynnus thynnus*), Pacific bluefin (*Thunnus orientalis*), and southern bluefin tuna (*Thunnus maccoyii*), with the widest geographical distribution of the tunas. The are four bluefin stocks assessed and managed by the RFMOs: Western Atlantic, Eastern Atlantic (including the Mediterranean), Pacific and Southern hemisphere.



Southern (top) and Atlantic (bottom) bluefin tunas. Courtesy of Fisheries and Aquaculture Department/Food and Agriculture Organization of the United Nations.

Bluefin are the largest of the tunas. Atlantic bluefin can reach 3 m in length.

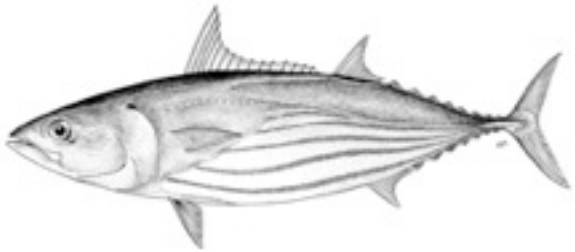
Bluefin: Approximate characteristics.

	Size (cm)	Weight (kg)	Age (y)
Common	80-200		
Maximum	300 (BFT)	668 (BFT)	25+
Maturity	110-190	30-120	4-14

Skipjack Tuna

Skipjack (*Katsuwonus pelamis*) are found mainly in the tropical areas of the Atlantic , Indian and Pacific Oceans. Their geographic limits are 55-60° N and 45-50° S, with the greatest abundance seen in equato-

rial waters. Five stocks are assessed and managed by the RFMOs: Eastern Atlantic, Western Atlantic, Eastern Pacific, Western Pacific and Indian Ocean.



Skipjack tuna. Courtesy of Fisheries and Aquaculture Department/Food and Agriculture Organization of the United Nations.

Skipjack form both free schools and schools associated with floating objects. They are the principal species associated with FADs and are caught in conjunction with juvenile yellowfin and bigeye tunas.

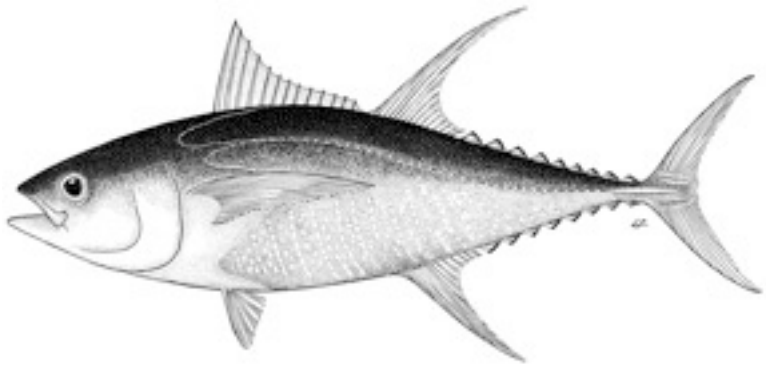
Skipjack are the smallest of the major commercial tuna species.

Skipjack: Approximate characteristics.

	Size (cm)	Weight (kg)	Age (y)
Common	40-80		
Maximum	108	33	6-10
Maturity	43	1.6	1-1.5

Yellowfin Tuna

Yellowfin (*Thunnus albacares*) are found in the subtropical and tropical areas of the Atlantic, Indian and Pacific Oceans. Yellowfin's geographic limits are from 45°-50° N and South, although in the Pacific they occur mainly from 20° N and South. Four stocks are assessed and managed by the RFMOs: Atlantic Ocean, Eastern Pacific, Western Pacific and Indian Ocean.



Yellowfin tuna. Courtesy of Fisheries and Aquaculture Department/Food and Agriculture Organization of the United Nations.

Yellowfin form both free and associated schools with adults generally forming schools of similarly sized individuals. The free-swimming schools tend to contain large individuals and are mono-specific. In the eastern Pacific, schools are often associated with dolphin pods, an association not common elsewhere.

Yellowfin tuna reach intermediate sizes between albacore and bigeye. Individuals as large as 150 cm are common in some fisheries.

Yellowfin: Approximate characteristics.

	SIZE (CM)	WEIGHT (KG)	AGE (Y)
COMMON	40-170	1.2-100	
MAXIMUM	205	194	8
MATURITY	85-108	12-26	2-3

Global summary of catches

The global catch of albacore, bigeye, bluefin, skipjack and yellowfin in 2011 was 4.19 million tonnes, a 3% decrease from 2010. Catches increased steadily until the early 2000s and have stabilized since then (Figure Global-1). This plateau is explained by continuously-increasing catches of skipjack, offset by declining catches of yellowfin and bigeye (Figure Global2). Ranked by species (using the 2007-2011 average = 4,354,600 tonnes), the majority of the catch is skipjack (57%), followed by yellowfin (26%), bigeye (10%), albacore (5%) and bluefin (1%). In terms of fishing gear, 62% of the catch is made by purse seining, followed by longline (13%), miscellaneous gears (gillnets, handline, traps, etc., 14%), and pole-and-line (11%).

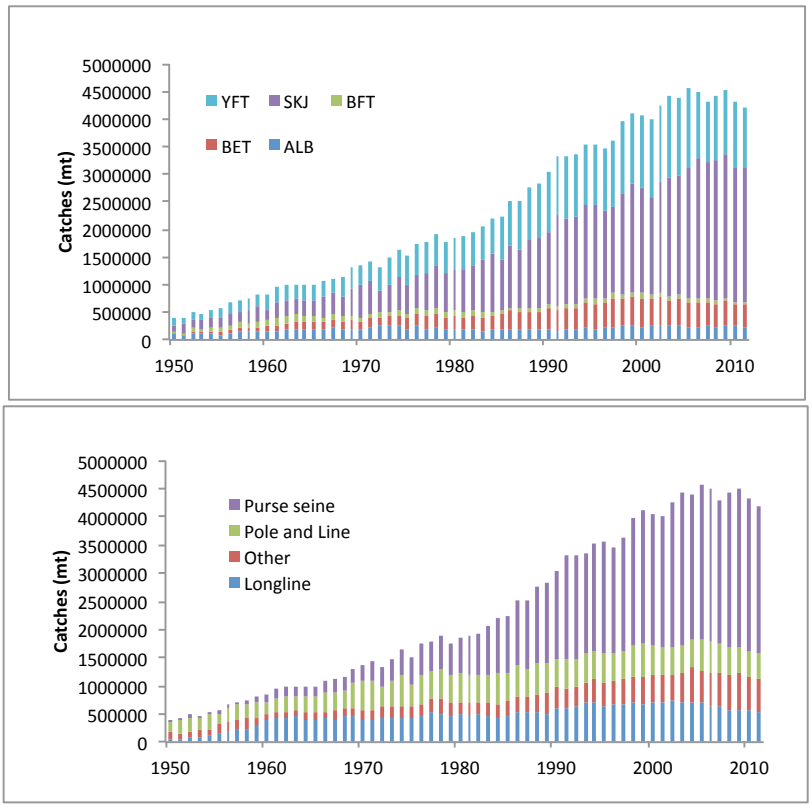


Figure Global-1. Global trends in catch (tonnes) of major commercial tunas, by species (top) and gear (bottom), 1950-2011.

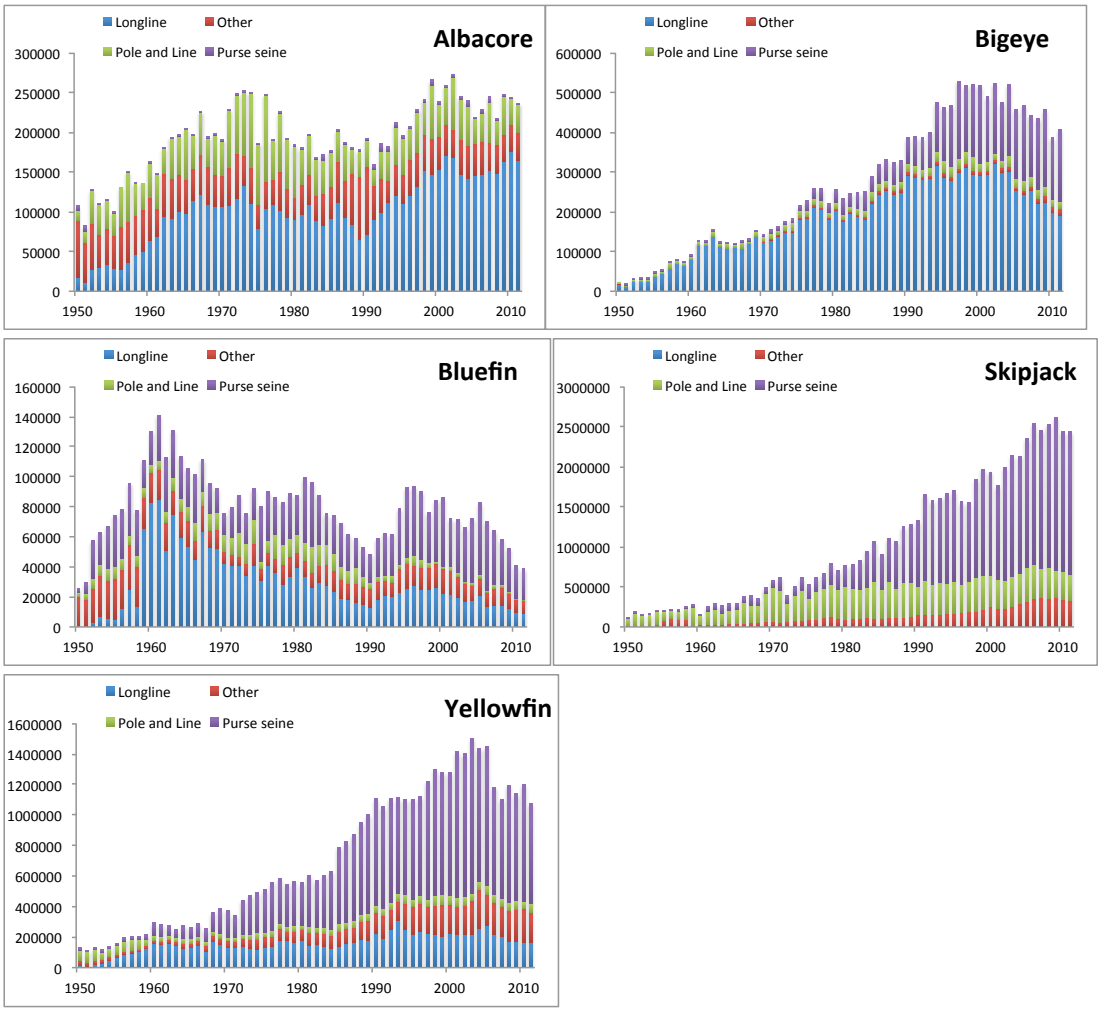


Figure Global-2. Global trends in catch (tonnes) of major commercial tunas, 1950-2011.

Ratings methodology

For each stock, ISSF applies simple color ratings (Green, Yellow, Orange) to each of three factors. The protocol used is as follows:

1. The Chair of the ISSF Scientific Advisory Committee drafts the text based on reports from the RFMOs and assigns ratings according to the decision table below.
2. Members of the Scientific Advisory Committee review the draft and may revise the ratings to make them more precautionary (but not less), based on their knowledge of the RFMO scientific committees.
3. The Scientific Advisory Committee approves the final report with changes as in step 2, above.

Color Ratings Decision Table

STOCK ABUNDANCE	GREEN	Spawning Biomass is at or above B_{MSY}.
	YELLOW	Spawning Biomass is below B_{MSY} but it has been stable or increasing*. Yellow is also used in the absence of a stock assessment.
	ORANGE	Spawning Biomass is below B_{MSY} and it has not been stable or increasing*.
FISHING MORTALITY	GREEN	F is below F_{MSY}.
	YELLOW	F is above F_{MSY} but there are adequate management measures expected to end overfishing.
	ORANGE	F is above F_{MSY} and there are no adequate management measures to end overfishing, or the measures in place are insufficient.
ENVIRONMENT	GREEN	Adverse population effects on bycatch species are not expected for a given fishing gear/fishing method.
	YELLOW	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.
	ORANGE	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.

* 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.

Environmental ratings are specific to different fishing methods. Appendix 1 provides the default ratings for major gear types.

Additional resources

ISSF produces other reports that are complementary to this one, which are published as part of the ISSF Technical Reports series (http://iss-foundation.org/science/technical-reports/). Two such reports can be particularly useful in providing additional information:

"Stock Assessment 101: Current practice for tuna stocks" gives a simple introduction to concepts and terms such as F, F_{MSY}, B_{MSY}, Recruitment, etc., which are encountered numerous times in this report.

"Status of the world fisheries for tuna: Management of tuna stocks and fisheries" (updated annually) provides additional information about the RFMOs: How they are structured, who are their members, how are decisions made, and what management measures they have adopted that are not strictly for tuna stock management or bycatch mitigation.

STOCKS IN THE EASTERN PACIFIC OCEAN

RFMO: Inter-American Tropical Tuna Commission (IATTC)

Last Scientific Committee (SAC) meeting: May, 2012

Last Commission meeting: June, 2012.

Tuna stocks managed by IATTC: EPO Yellowfin, EPO Bigeye, EPO Skipjack. Also, North Pacific Albacore, South Pacific Albacore and Pacific Bluefin (also managed by WCPFC; see Stocks in the Pacific Ocean)

Data sources: The main sources of information for this section are IATTC (2012), Aires da Silva and Maunder (2012a and 2012b), and Maunder (2012).

Last update: July, 2012.

About 14 percent of the world production of tuna is from the eastern Pacific Ocean (EPO). Catches of skipjack, yellowfin and bigeye in 2011 were 570,500 tonnes, a 13% increase from 2010. This increase was particularly marked for skipjack which bounced back from a low catch in 2010. There has been a general tendency for the total catch to decline since 2003, when a record 800,000 tonnes of these three species were caught (Figure EPO-1).

Catches of albacore and Pacific bluefin also occur in the EPO. These stocks are also distributed in the western Pacific and are covered in a different section of this report, under Pacific Ocean.

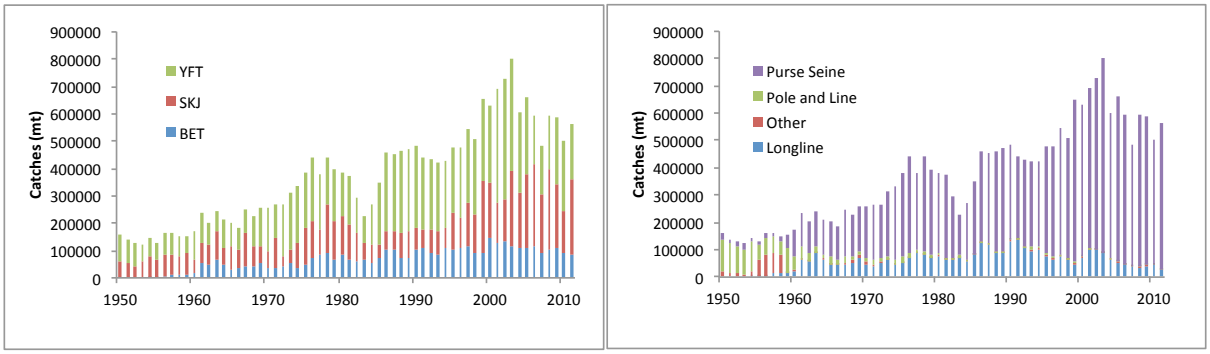


Figure EPO-1. Trends in catch (mt) of bigeye, skipjack and yellowfin in the EPO region, by species (left) and gear (right), 1950-2011.

Average catches for the five-year period 2007-2011 (546,000 tonnes) provide an indication of the recent performance of the fisheries (Figure EPO.2): Skipjack accounts for 43% of the catches in weight, followed by yellowfin (40%) and bigeye (18%). Purse-seine vessels take 93% of the total catch, followed by longline (7%).

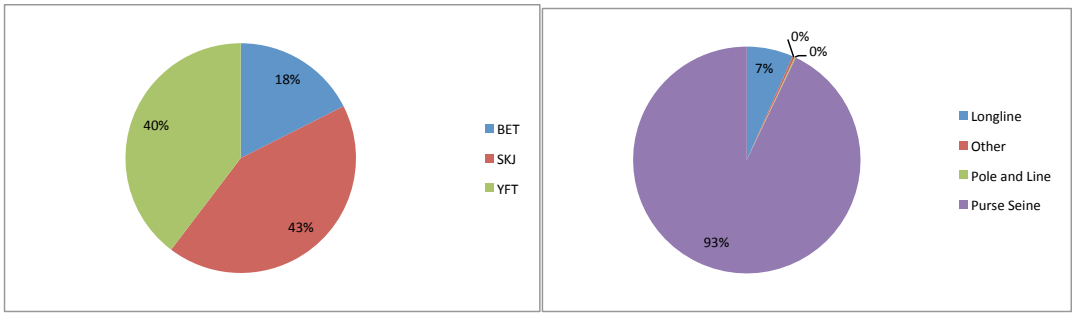


Figure EPO-2. Average 2007-2011 catches of skipjack, yellowfin and bigeye tuna in the EPO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

EPO Bigeye Tuna

Bigeye catches in 2011 were about 82,500 tonnes, a 13% decrease from 2010. 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 more than longlining (Figure EPO-3). Bigeye catches in the EPO by other gears are very minor.

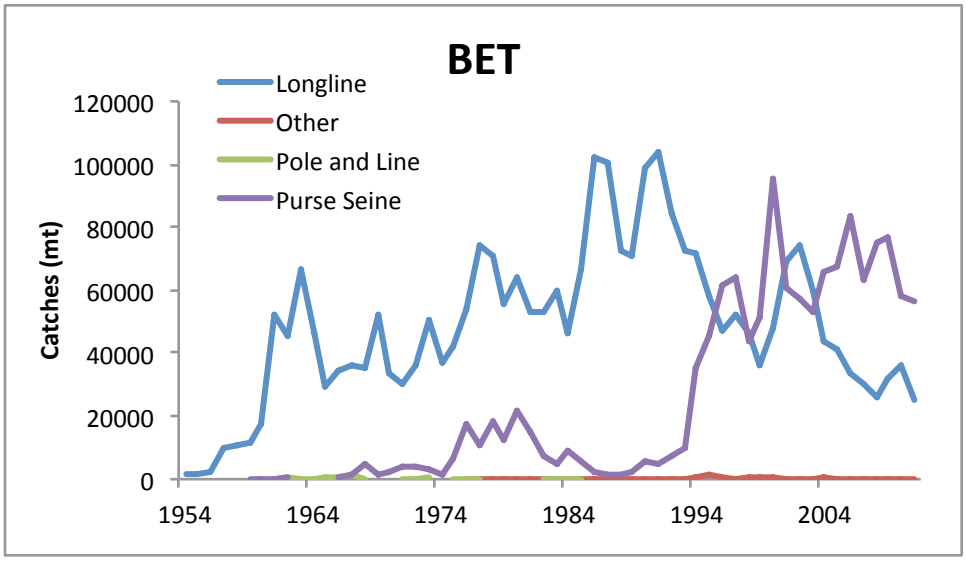


Figure EPO-3. Catches of bigeye tuna in the EPO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

In 2012, the IATTC conducted an updated assessment of the stock. The results of this update indicate the following (EPO-4):

1. The current ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated at 1.12. This indicates that that the stock is not in an overfished state. Between 2005 and 2010, there was 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.
2. The ratio of $F_{current}/F_{MSY}$ is estimated at 1.05, indicating that overfishing was occurring on average in the most recent three years (2009-2011).
3. The estimate of MSY is 82,000 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".
4. 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 as-

sumed 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 between 2005 and 2010 was driven by an increasing trend in the catch rate of Japanese longline vessels. which leveled off in recent years. In addition, stock projections at the 2009-2011 average level of fishing mortality indicates that the spawning biomass will fall below the MSY level. There is also concern that the active fishing capacity of the purse seine fleet in the EPO continues to increase. For these reasons, ISSF is taking a cautious view about the status of EPO bigeye.

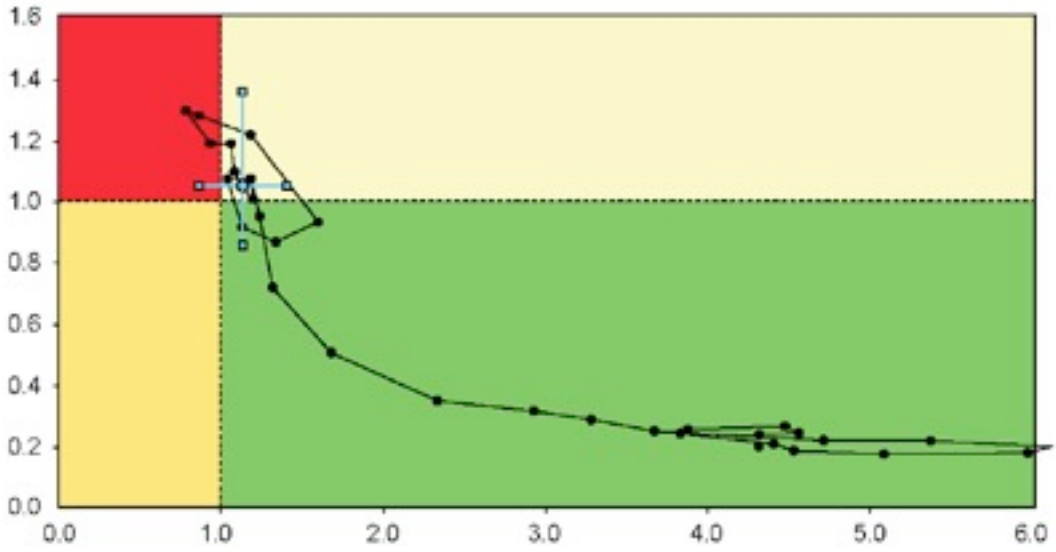


Figure EPO-4. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the EPO. The blue cross represents relative spawning biomass in 2011 and relative fishing mortality for 2009-2011. Colors are taken from IATTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

The main conservation measure established by the IATTC for bigeye is Resolution C-12-01, which includes an annual fishing closure for purse seine vessels greater than 182 tons carrying capacity. This measure calls for:

1. A 62-day closure for purse seiners greater than 182 tons capacity in 2012 and 2013;
2. 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;
3. A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;
4. Bigeye catch limits for the main longline fishing nations.

In 2012, the Commission failed to adopt measures (such as an extended closure or individual vessel catch limits) that would end overfishing of the bigeye stock.

SUMMARY

EPO BET	Estimate	Years	Notes
Recent catch	82	2011	
5-yr catch	96	2007-11	
MSY	82	2011	
F/F_{MSY}	1.05	2009-2011	
B/B_{MSY}	1.12	Start of 2012	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	YELLOW	B > B_{MSY}. Although spawning biomass is above the MSY level, projections indicate that recent recruitments will not sustain the 2009-2011 average level of fishing mortality and the stock is expected to fall below B_{MSY} in a few years.
FISHING MORTALITY	ORANGE	F > F_{MSY}. According to the 2012 assessment, the IATTC management measures in place are insufficient and need to be strengthened.
ENVIRONMENT	YELLOW	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.
	ORANGE	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

Last Updated: July, 2012.
Changes from previous (April 2012) version: The F rating changed from Yellow to Orange. In 2012, the SAC and the IATTC staff indicated that to end overfishing, the Commission needed to either adopt a longer closure or establish individual bigeye vessel limits. The 2012 IATTC meeting did not adopt any such measures.

EPO Yellowfin Tuna

Yellowfin catches in the EPO in 2011 were about 203,300 tonnes, a 22% decline from 2010. The main fishing gear is purse seine (99% of the catch), and recent catches by this gear are about 50% of the record high caught in 2002 (Figure EPO-5). Catches from longline vessels, although smaller in magnitude, have also declined substantially in recent years.

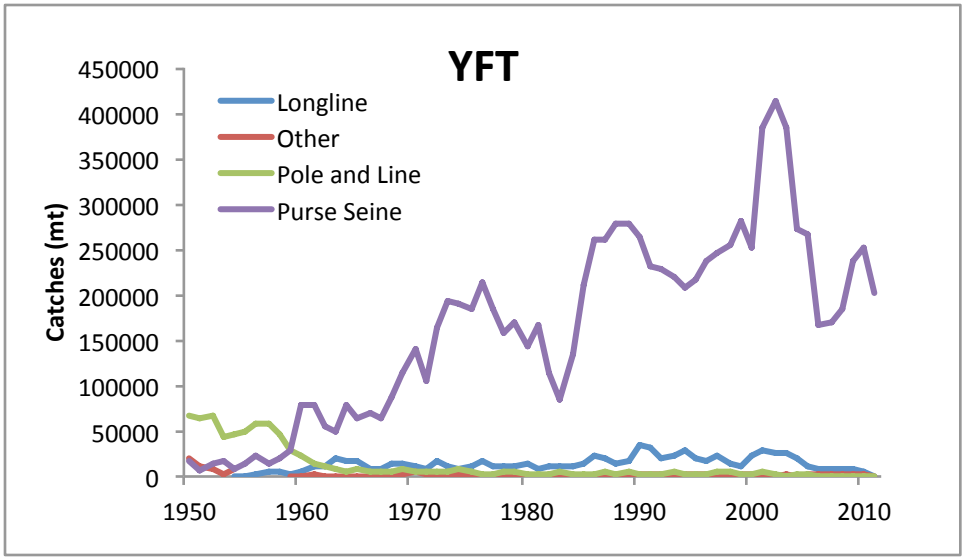


Figure EPO-5. Catches of yellowfin tuna in the EPO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

The 2012 assessment used the same methodology as the previous one, with updated data. The assessment results indicated the following (Figure EPO-6):

1. The ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated to be 1.0, indicating that the stock is in not in an overfished state. Spawning biomass has increased since the last (2011) assessment. This is due to a recent decline in the fishing mortality levels for middle-age and older individuals.
2. The ratio $F_{current}/F_{MSY}$ is estimated to be 0.87, indicating that overfishing is not occurring.
3. MSY is estimated to be 263,000 tonnes. Increasing the average weight of the yellowfin caught could increase the MSY.
4. 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.

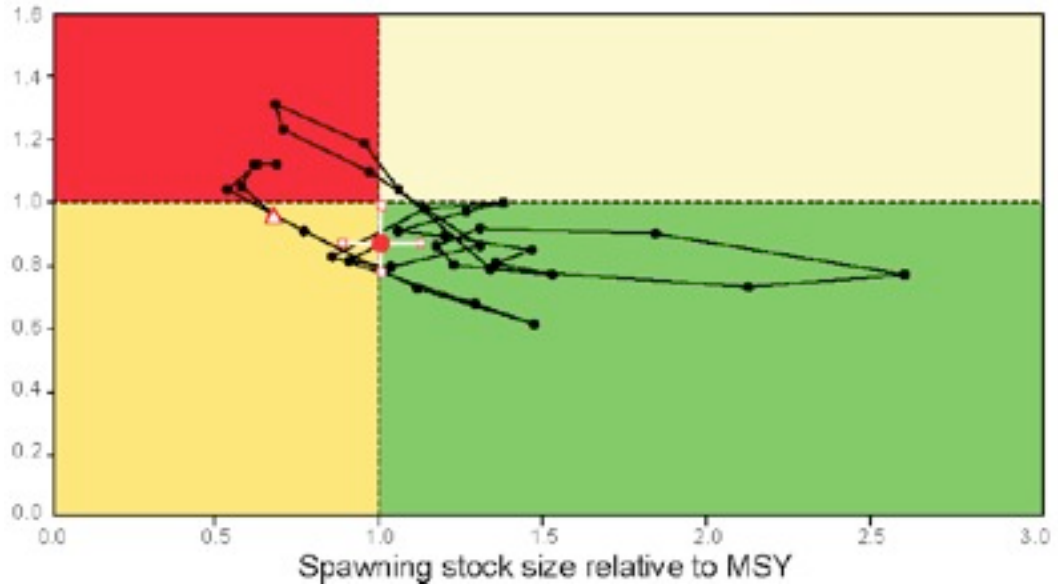


Figure EPO-6. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for yellowfin tuna in the EPO. The red dot represents relative spawning biomass in 2012 and relative fishing mortality for 2009-2011. Colors are taken from IATTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

The main conservation measure established by the IATTC for yellowfin is Resolution C-12-01, which includes an annual fishing closure for purse seine vessels greater than 182 tons carrying capacity. This measure calls for:

1. A 62-day closure for purse seiners greater than 182 tons capacity in 2012 and 2013;
2. 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;
3. A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas during;

SUMMARY

EPO YFT	Estimate	Years	Notes
Recent catch	203	2011	
5-yr catch	217	2007-11	
MSY	263	2011	
F/F_{MSY}	0.87	2009-2011	
B/B_{MSY}	1.0	Start of 2012	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B = B_{MSY}. Spawning biomass has increased in response to decreasing fishing mortality.
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	GREEN	65% 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	16% 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	15% 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).

Last Updated: July, 2012.
Changes from previous (August 2011) version: Biomass rating changed from Orange to Green due to improved stock status.

EPO Skipjack Tuna

In 2011, skipjack catches were about 284,700 tonnes, a large (87%) increase from 2010, which was substantially below average. Skipjack catches in the EPO are notoriously variable (Figure EPO-7). Purse seine fishing dominates the catches (over 99% of the total).

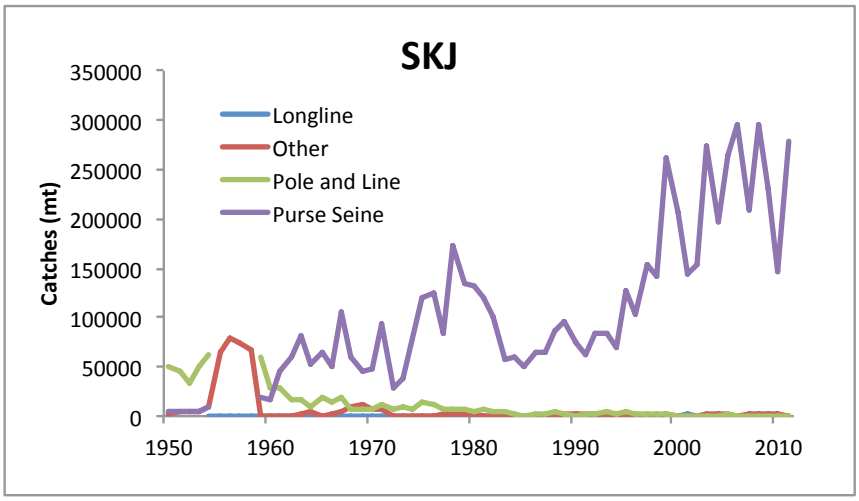


Figure EPO-7. Catches of skipjack tuna in the EPO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

The last assessment for skipjack tuna was in 2012, based on four alternative types of analyses. The analyses demonstrated a high degree of uncertainty, particularly with respect to the determination of MSY reference points and biomass levels. There may also be substantial differences between regions. The analyses indicate that exploitation rates may be near the MSY level. However, there is no indication of a credible risk to the stock from overfishing.

MANAGEMENT

The main conservation measure established by the IATTC for skipjack is Resolution C-12-01, which includes an annual fishing closure for purse seine vessels greater than 182 tons carrying capacity. This measure calls for:

1. A 62-day closure for purse seiners greater than 182 tons capacity in 2012 and 2013;
2. 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;
3. A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;

SUMMARY

EPO SKJ	Estimate	Years	Notes
Recent catch	284	2011	
5-yr catch	234	2007-11	
MSY	N/A		
F/F_{MSY}	≤ 1		
B/B_{MSY}	> 1		
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B > B_{MSY}.
FISHING MORTALITY	GREEN	F ≤ F_{MSY}.
ENVIRON-MENT	YELLOW	63% 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	35% of the catch is made by purse seining on free schools of skipjack.

Last Updated: July, 2012.
Changes from previous (April 2012) version: None.

STOCKS IN THE WESTERN AND CENTRAL PACIFIC OCEAN

RFMO: Western and Central Pacific Fisheries Commission (WCPFC)

Last Scientific Committee (SAC) meeting: August, 2012

Last Commission meeting: December, 2012.

Tuna stocks managed by WCPFC: WCPO Yellowfin, WCPO Bigeye, WCPO Skipjack. Also, North Pacific Albacore, South Pacific Albacore and Pacific Bluefin (also managed by IATTC; see Stocks in the Pacific Ocean)

Data sources: The main sources of information for this section are WCPFC (2012) and Harley et al. (2011) for catch and stock status data.

Last update: December, 2012.

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 2011 were 2,122,200 tonnes, a 10% decrease from 2010. There has been a general tendency for the total catch to increase between 1980 and 2009 (Figure WCPO-1). This increase has been particularly pronounced for skipjack tuna.

Catches of albacore and Pacific bluefin also occur in the EPO. These stocks are also distributed in the western Pacific and are covered in a different section of this report, under Pacific Ocean.

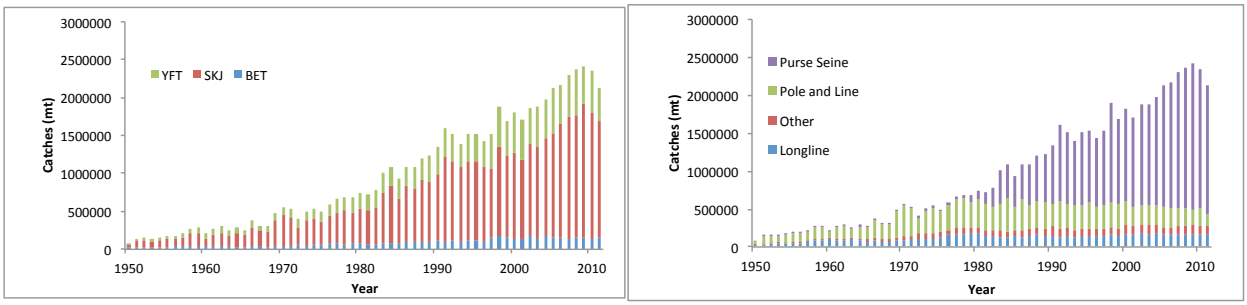


Figure WCPO-1. Trends in catch (mt) of bigeye, skipjack and yellowfin in the WCPO region, by species (left) and gear (right), 1950-2011.

Average catches for the five-year period 2007-2011 (2,311,300 tonnes) provide an indication of the recent performance of the fisheries (Figure WCPO-2): Skipjack accounts for 71% of the catches in weight, followed by yellowfin (23%) and bigeye (6%). Purse-seine vessels take 79% of the total catch, followed by longline (7%), pole-and-line (9%) and other gears.

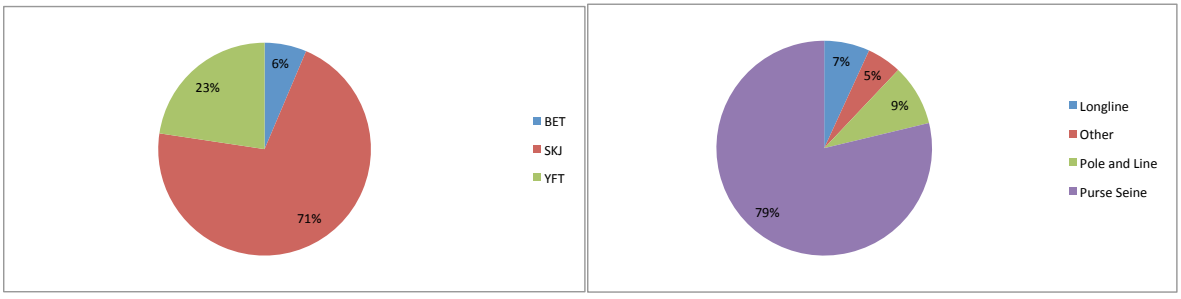


Figure WCPO-2. Average 2006-2011 catches of skipjack, yellowfin and bigeye tuna in the WCPO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

WCPO Bigeye Tuna

Bigeye catches in 2011 were about 151,500 tonnes, an 14% increase from 2010. The main fishing gears are longline (5-year average ~50%) and purse seine (43%) (Figure WCPO-3). Bigeye catches in the WCPO by other gears are relatively minor.

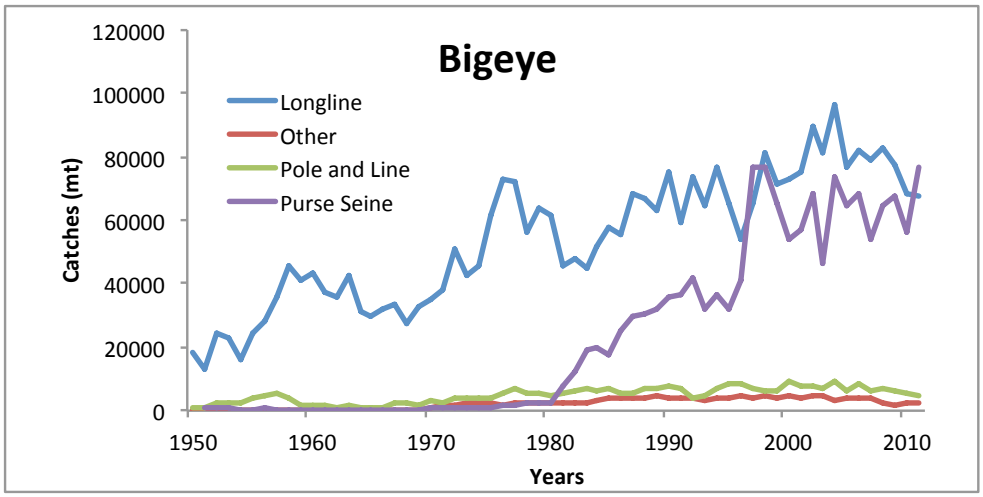


Figure WCPO-3. Catches of bigeye tuna in the WCPO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

The 2011 assessment reviewed 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 (Figure WCPO-4):

1. 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.
2. 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.
3. 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. Recent catches (2006-2009 average = 141,200 tonnes) are substantially than MSY. However, for the model in which MSY-based reference points were computed for the above-average recruitment period of the past 21 years, the estimate of MSY is considerably higher (131,400 tonnes), but still less than recent annual catches with the exception of 2010. Reducing the catch of small bigeye would increase the overall level of catches that could be obtained sustainably.

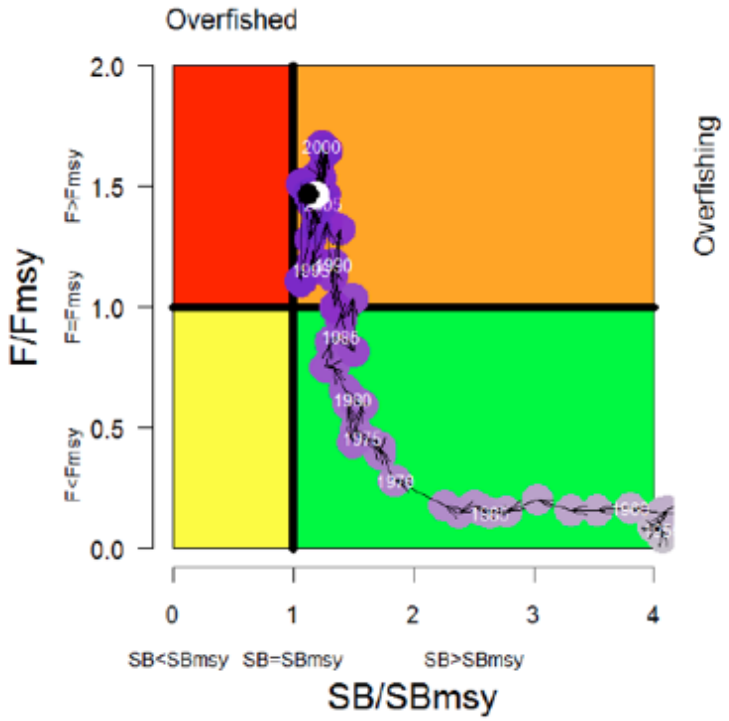


Figure WCPO-4. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the WCPO. The white dot represents the current (2006-2009 average) level. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

The main binding conservation measure for bigeye established by the WCPFC is CMM 2012-01 which aims to reduce fishing mortality to $F \leq F_{MSY}$ by the end of 2017. The measures call for the following in 2013:

1. A 3-month closure (July through September) of fishing on FADs in EEZ waters and on the High Seas between 20°N and 20°S;
2. In addition to (1), each member shall choose between extending the FAD closure through October, or limiting the number of FAD sets to be less than the number of sets made by its vessels in a reference period: For SIDs, the limit would be 8/9 of the 2009-2011 average; for others, the limit would be 8/12 of the 2001-2011 average.
3. A limitation in the number of vessel days: For PNA members, the limit in their EEZs is the 2010 level; For other coastal states with effort in their EEZs exceeding1,000 days annually over (2006-2010), the limit is either the 2001-2004 average or the 2010 level.
4. Each member shall not allow the number of fishing days in the high seas to increase;
5. A requirement to submit FAD management plans, including information on strategies used to implement the closure and other measures for reducing small bigeye mortality;
6. A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas between 20°N and 20°S;
7. 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 wa-

ters under the jurisdiction of two or more coastal States during the same trip; all purse seiners fishing between 20N and 20S must have an observer onboard.

8. Flag-specific catch limits for bigeye caught by longliners, with monthly reporting to monitor the utilization of the limits;

In addition, CMM 2009-02 provides more guidance on some elements of CMM 2012-01 that were ambiguous, particularly on the FAD closure and full retention requirements.

The first comprehensive management plan adopted for tropical tunas was CMM 2008-01. This measure was amended in through CMM-2011-01 and replaced by CMM 2012-01 in efforts by WCPFC members to reach a compromise and not allow the fisheries to go unmanaged. Overfishing of bigeye remains a concern, and the Commission has set up a working group to draft a new CMM to be adopted in 2013.

SUMMARY

WCPO BET	Estimate	Years	Notes
Recent catch	151	2011	
5-yr catch	148	2007-11	
MSY	77	2006-09	
F/F_{MSY}	1.46	2006-09	
B/B_{MSY}	1.19	2006-09	
TAC	N/A		

Catches and MSY in 1000 tonnes.

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	ORANGE	50% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.
	YELLOW	38% 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	5% of the catch is made with purse seining on free schools, with little impact on non-target species.
	YELLOW	3% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

WCPO Yellowfin Tuna

Yellowfin catches in the WCPO in 2011 were about 430,500 tonnes, a 20% decrease from 2010. The main fishing gear is purse seine (68% of the catch). Fifteen percent of the catches are also taken by a number of mixed gears in the Philippines and Indonesia, and 16% by longliners (Figure WCPO-5).

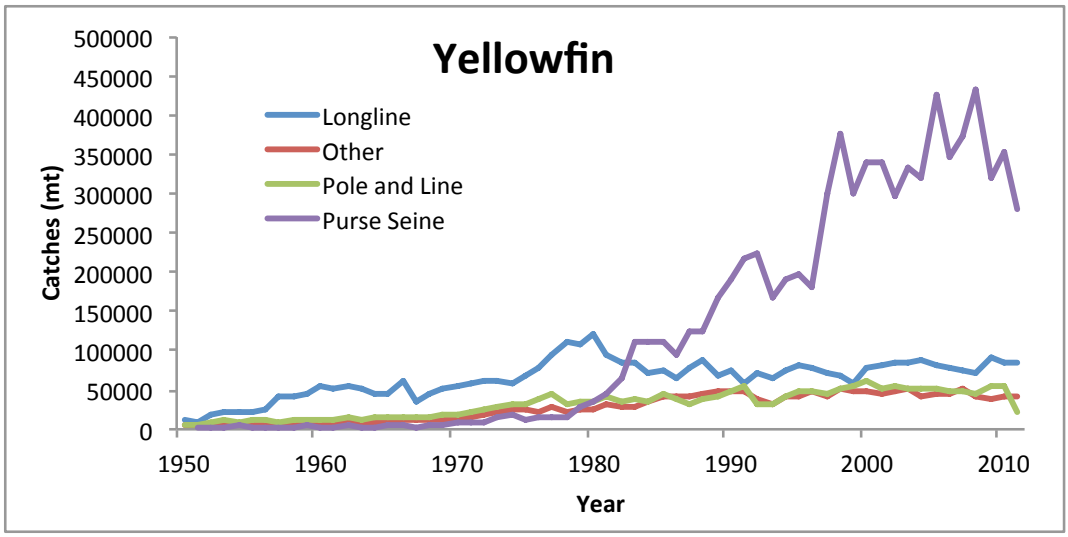


Figure WCPO-5. Catches of yellowfin tuna in the WCPO from 1950 to 2011, by gear type.

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 WCPO-6):

1. 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).
2. 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.
3. MSY is estimated to be 538,800 (range 432,000-645,000) tonnes.
4. 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.

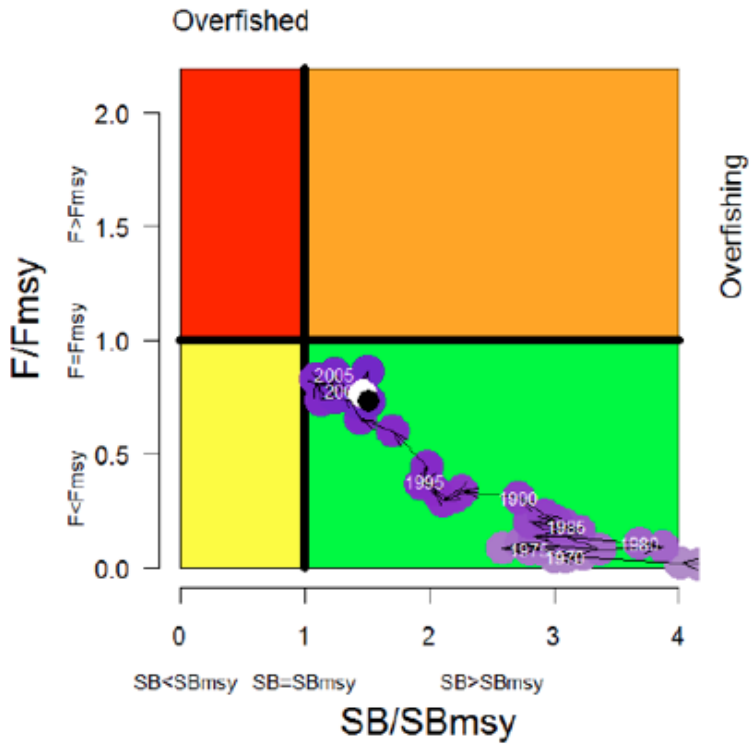


Figure WCPO-6. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for yellowfin tuna in the WCPO, 1952-2010. The white dot represents the current (2006-2009) situation. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

The main binding conservation measure for WCPO yellowfin established by the WCPFC is CMM 2012-01 which aims to ensure that yellowfin fishing mortality will not exceed the F_{MSY} level. The measure calls for:

1. A 3-month closure (July through September) of fishing on FADs in EEZ waters and on the High Seas between 20°N and 20°S;
2. In addition to (1), each member shall choose between extending the FAD closure through October, or limiting the number of FAD sets to be less than the number of sets made by its vessels in a reference period: For SIDs, the limit would be 8/9 of the 2009-2011 average; for others, the limit would be 8/12 of the 2001-2011 average.
3. A limitation in the number of vessel days: For PNA members, the limit in their EEZs is the 2010 level; For other coastal states with effort in their EEZs exceeding1,000 days annually over (2006-2010), the limit is either the 2001-2004 average or the 2010 level.
4. Each member shall not allow the number of fishing days in the high seas to increase;
5. A requirement to submit FAD management plans, including information on strategies used to implement the closure and other measures for reducing small bigeye mortality;
6. A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas between 20°N and 20°S;
7. 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 wa-

ters under the jurisdiction of two or more coastal States during the same trip; all purse seiners fishing between 20N and 20S must have an observer onboard.

In addition, CMM 2009-02 provides more guidance on some elements of CMM 2012-01 that were ambiguous, particularly on the FAD closure and full retention requirements.

In 2011, SC7 concluded that the CMM 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

WCPO YFT	Estimate	Years	Notes
Recent catch	431	2011	
5-yr catch	523	2007-11	
MSY	539	2006-09	
F/F_{MSY}	0.77	2006-09	
B/B_{MSY}	1.47	2006-09	
TAC	N/A		

Catches and MSY in 1000 tonnes.

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	YELLOW	36% 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	35% of the catch is made with purse seining on free schools, with little impact on non-target species.
	ORANGE	15% of the catch is made by other gears such as gillnets, with unknown impacts on non-target stocks.
	ORANGE	12% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

WCPO Skipjack Tuna

The WCPO Skipjack stock supports the largest tuna fishery in the world, accounting for 40% of world-wide tuna landings. Catches in 2011 were 1,540,000 tonnes, an 8% decrease from 2010. Purse seining, which accounts for 86% of the catches, increased steadily for three decades. In contrast, pole-and-line fishing (about 10%) has been declining steadily (Figure WCPO-7).

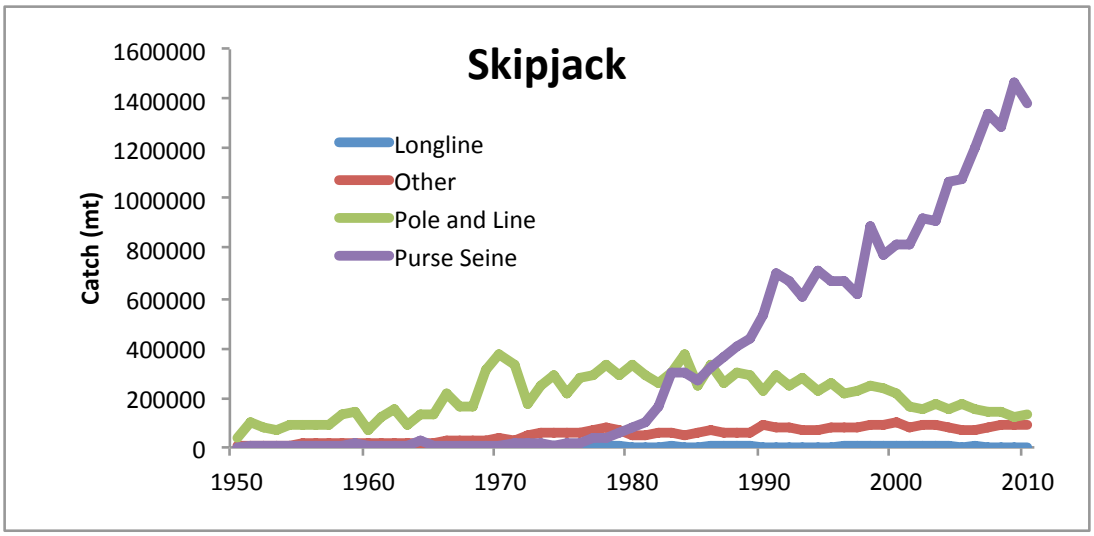


Figure WCPO-7. Catches of skipjack tuna in the WCPO from 1950 to 2010, by gear type.

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 WCPO-8):

1. 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.
2. The stock is not in an overfished state as spawning biomass is above the B_{MSY} level ($B_{current}/B_{MSY}$ = 2.94).
3. 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.

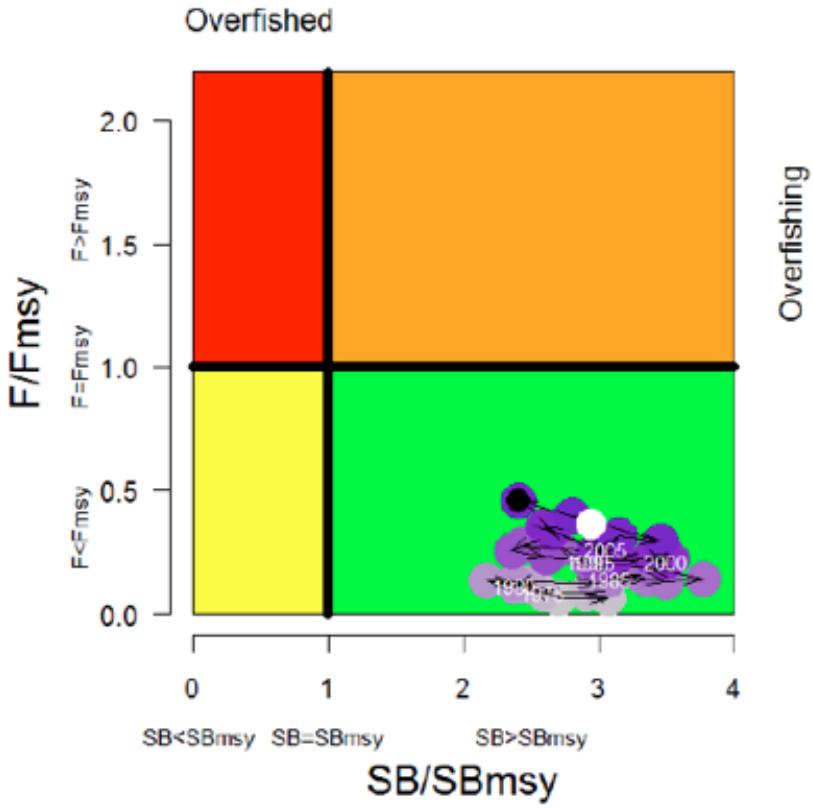


Figure WCPO-8. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for skipjack tuna in the WCPO. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

The main binding conservation measure for WCPO skipjack established by the WCPFC is CMM 2012-01 which aims to ensure that yellowfin fishing mortality will not exceed the F_{MSY} level. The measure calls for:

1. A 3-month closure (July through September) of fishing on FADs in EEZ waters and on the High Seas between 20°N and 20°S;
2. In addition to (1), each member shall choose between extending the FAD closure through October, or limiting the number of FAD sets to be less than the number of sets made by its vessels in a reference period: For SIDs, the limit would be 8/9 of the 2009-2011 average; for others, the limit would be 8/12 of the 2001-2011 average.
3. A limitation in the number of vessel days: For PNA members, the limit in their EEZs is the 2010 level; For other coastal states with effort in their EEZs exceeding1,000 days annually over (2006-2010), the limit is either the 2001-2004 average or the 2010 level.
4. Each member shall not allow the number of fishing days in the high seas to increase;
5. A requirement to submit FAD management plans, including information on strategies used to implement the closure and other measures for reducing small bigeye mortality;
6. A full-retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas between 20°N and 20°S;
7. 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 wa-

ters under the jurisdiction of two or more coastal States during the same trip; all purse seiners fishing between 20N and 20S must have an observer onboard.

In addition, CMM 2009-02 provides more guidance on some elements of CMM 2012-01 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

WCPO SKJ	Estimate	Years	Notes
Recent catch	1,540	2011	
5-yr catch	1,641	2007-2011	
MSY	1,503	2006-09	
F/F_{MSY}	0.37	2006-2009	
B/B_{MSY}	2.94	2006-2009	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	$B > B_{MSY}$.
FISHING MORTALITY	GREEN	$F \leq F_{MSY}$.
ENVIRONMENT	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.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

PACIFIC-WIDE STOCKS

RFMOs: Western and Central Pacific Fisheries Commission (WCPFC) and Inter-American Tropical Tuna Commission (IATTC)

Last Scientific Committee meetings:

- WCPFC: August, 2012
- IATTC: May, 2012
- ISC: July 2012

Last Commission meeting:

- WCPFC: April, 2012
- IATTC: June, 2012

Three of the major commercial tunas have Pacific-wide distributions: North Pacific albacore, South Pacific albacore and Pacific bluefin. The responsibility for their management is shared between IATTC and WCPFC. In terms of stock assessments, the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC) evaluates North Pacific albacore and Pacific bluefin; the SPC evaluates South Pacific albacore.

Data sources: The main sources of information for this section are WCPFC (2012), ISC (2010), ISC (2011) and Harley et al. (2011) for catch and stock status data. Information available publicly from ISC is often limited or difficult to find.

Last update: December, 2012.

Catches of Pacific Ocean albacore and bluefin in 2011 were 166,000 tonnes, a 7% decrease from 2010. This catch has been generally stable for the last 10 years (Figure PO-1).

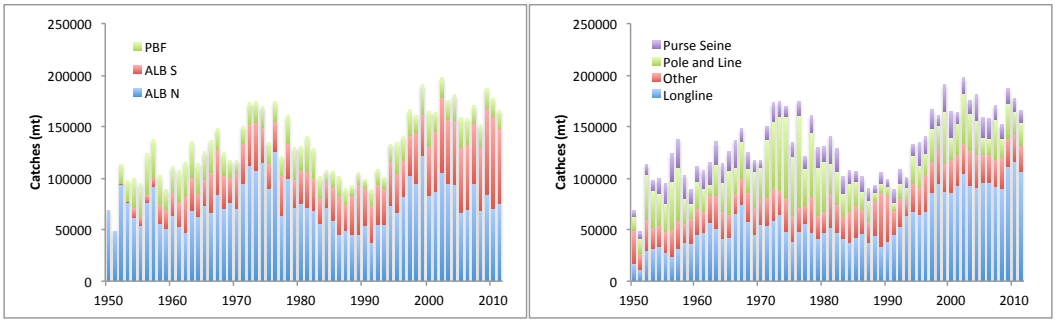


Figure PO-1. Trends in catch (mt) of albacore and Pacific bluefin in the PO, by stock (left) and gear (right), 1950-2011.

Average catches for the five-year period 2007-2011 (170,600 tonnes) provide an indication of the recent performance of the fisheries (Figure PO.2): North Pacific albacore accounts for 46% of the catches in weight, followed by South Pacific albacore (43%) and Pacific bluefin (11%). Longline vessels take 60% of the total catch, followed by pole-and-line and other gears (16% each) and purse seine (8%).

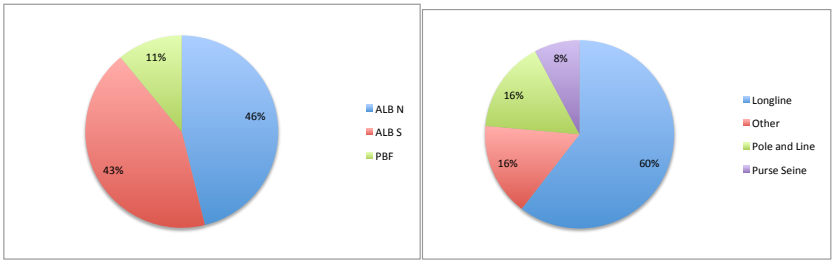


Figure PO-2. Average 2006-2011 catches of albacore and Pacific bluefin tuna in the PO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

PO North Pacific Albacore

North Pacific albacore catches in 2011 were about 75,600 tonnes, a 7% increase from 2010. The main fishing gears are longline (39%) and pole-and-line (34%), followed by trolling (24%) (Figure PO-3). Catches by longlining have shown a decreasing trend since 1997.

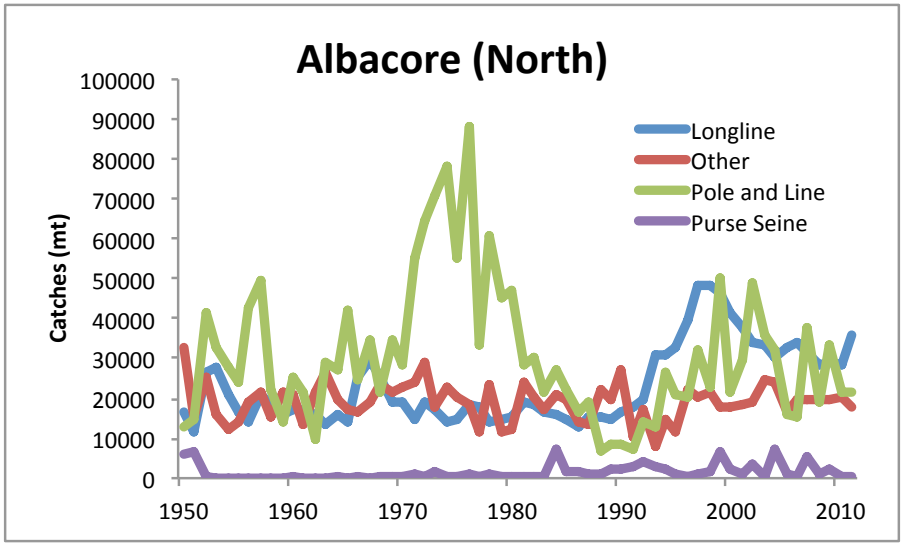


Figure PO-3. Catches of albacore tuna in the North PO from 1950 to 2011, by gear type.

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:

1. The stock is not in an overfished state.
2. Fishing mortality is lower than many commonly-used reference points that are used as proxies for F_{MSY}.
3. Increasing F beyond 2006-2008 levels will not result in proportional increases in yield.

MANAGEMENT

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

PO ALB-N	Estimate	Years	Notes
Recent catch	76	2011	
5-yr catch	79	2007-11	
MSY	N/A		
F/F_{MSY}	1<		
B/B_{MSY}	>1		
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B > B_{MSY}.
FISHING MORTALITY	YELLOW	F ≤ 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	ORANGE	40% of the catch is made by longlining. Several bycatch mitigation measures are in place (turtles, sharks, sea birds).
	YELLOW	33% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish species.
	GREEN	23% of the catch is made by trolling, with little impact on non-target species.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

PO South Pacific Albacore

South Pacific albacore extends beyond the WCPFC Convention Area. However, the stock is assessed by WCPFC for the area of the Pacific south of the Equator and between 140^{0}E and 110^{0}W. South Pacific albacore catches in 2011 were about 72,600 tonnes, an 18% decrease from 2010. The main fishing gear is longline, accounting for 96% of the catch. Relatively minor amounts are taken by other gears like trolling (Figure PO-4).

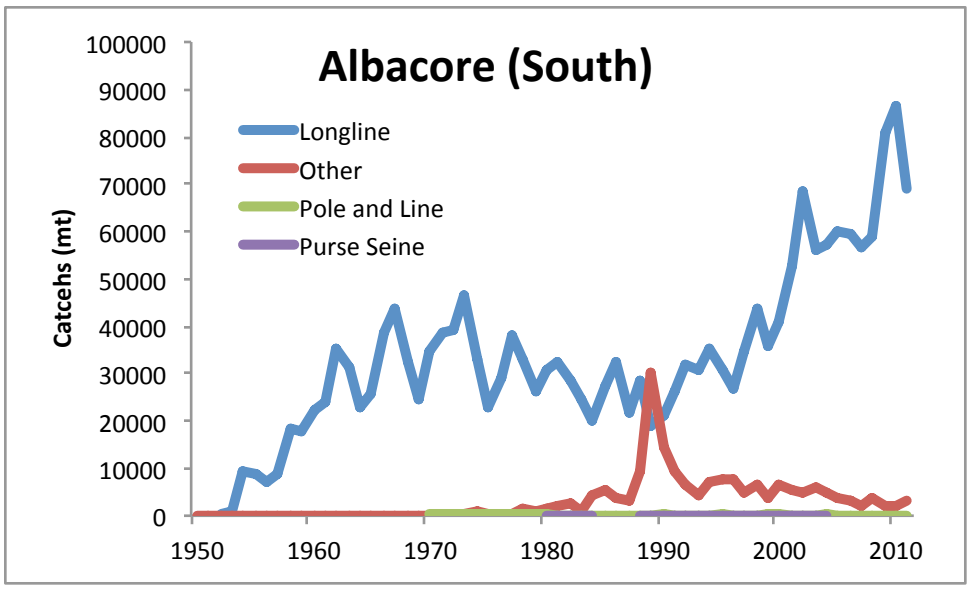


Figure PO-4. Catches of albacore tuna in the South PO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

The last assessment was conducted by SC8 (WCPFC) in 20112 using similar methods to the previous (2011) assessment. However, there were substantial revisions made to some of the longline data and biological parameters. The assessment results were similar to those in 2011 and indicated the following:(Figure PO-5):

1. The estimated ratio $F_{current}/F_{MSY}$ in 2009-2011 is 0.21, indicating that overfishing is not occurring.
2. The estimated ratio of spawning biomass $B_{current}/B_{MSY}$ in 2011 is 2.6. This indicates that that the stock is not in an overfished state.
3. The estimate of MSY is 99,000 tonnes.

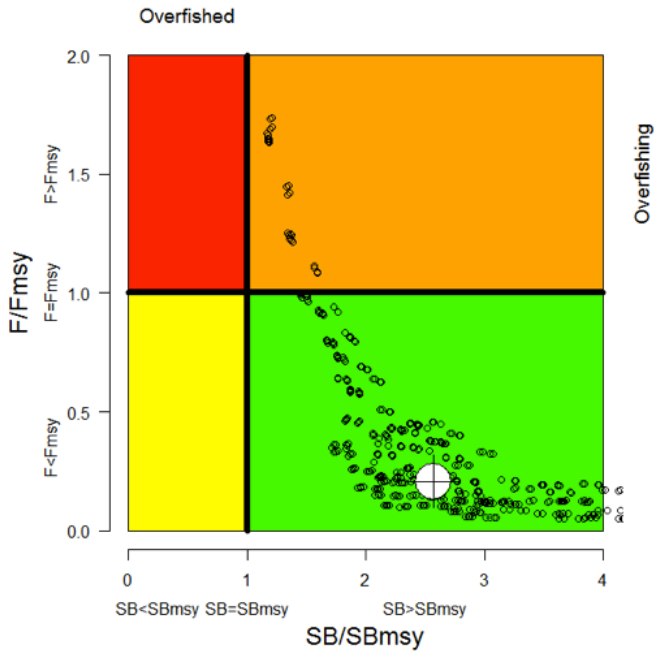


Figure PO-5. Ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for albacore tuna in the South Pacific Ocean. The white dot represents the median and the spread of points represents the uncertainty in the estimated ratios. Colors are taken from WCPFC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

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

PO ALB-S	Estimate	Years	Notes
Recent catch	73	2011	
5-yr catch	73	2007-11	
MSY	99	2011	
F/F_{MSY}	0.21	2008-10	
B/B_{MSY}	2.6	2011	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B > B_{MSY}.
FISHING MORTALITY	GREEN	F < F_{MSY}.
ENVIRON-MENT	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.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

PO Pacific Bluefin Tuna

Reported Pacific bluefin catches in 2011 were about 17,600 tonnes, a 2% decrease from 2010. Most of the catch (80%) occurs in the western Pacific. About 61% of the Pacific-wide catch is made by purse seine fisheries, followed by longline (11%), troll (11%), and a variety of gears such as coastal set nets (8%) (Figure PO-6).

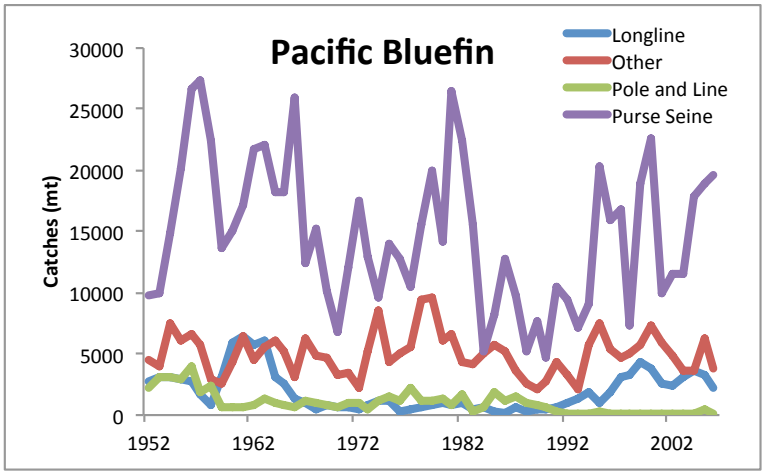


Figure PO-6. Catches of Pacific bluefin tuna from 1952 to 2011, by gear type.

STOCK ASSESSMENT

A full stock assessment was carried out by the Pacific Bluefin Working Group of the ISC in 2008. This was updated in 2010 with new data up to 2007, but the model was not modified. The assessment results were highly sensitive to the assumptions made about biological parameters, particularly natural mortality. The ISC has not estimated MSY benchmarks or other proxy reference points, so it is not possible to determine if the stock is overfished or being overfished. A new assessment is planned for 2012. The results indicate that:

1. Recruitment has fluctuated without trend over the assessment period, and does not appear to have been adversely affected by fishery exploitation;
2. Recent levels of spawning biomass are above the median historic level;
3. The bluefin catch (in weight and numbers) is dominated by recruits (0 years) and juveniles (1-3 years). Fishing mortality (F) on recruits has gradually increased and remained above median historic exploitation levels since the early 1990s. Fishing mortality on 1-2 year old fish has also increased since the early 1990s, but these levels have fluctuated around median historic levels.

The ISC recommended that F be decreased below the 2002-2004 levels, particularly on juvenile age classes.

MANAGEMENT

WCPFC CMM 2010-04 limits total fishing effort and catches of juveniles (age 0-3) during 2011-2012 by vessels fishing for Pacific bluefin tuna north of 20°N to below the 2002-2004 levels, except for artisanal fisheries. IATTC Resolution C-12-09 limits 2012 commercial catches in the Convention Area to not exceed 5,600 tons in 2012, and not to exceed 10,000 tons in 2012-2013 combined.

SUMMARY

PO-PBF	Estimate	Years	Notes
Recent catch	18	2011	
5-yr catch	19	2007-11	
MSY	N/A		
F/F_{MSY}	N/A		
B/B_{MSY}	N/A		
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	YELLOW	B relative to B_{MSY} is unknown. A default Yellow rating is used
FISHING MORTALITY	ORANGE	F relative to F_{MSY} is unknown. The F rating could be Yellow, but an Orange rating is given instead to reflect the ISC concern that F on juveniles is too high
ENVIRONMENT	GREEN	64% of the catch is made by purse seining on free schools.
	ORANGE	12% of the catch is made by longlining.
	GREEN	11% of the catch is made by trolling.
	YELLOW	8% of the catch is made by set nets

Last Updated: December, 2012.
Changes from previous (July 2012) version: None.

STOCKS IN THE ATLANTIC OCEAN

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

Last Scientific Committee (SCRS) meeting: October, 2012

Last Commission meeting: November, 2012.

Tuna stocks managed by ICCAT: AO Yellowfin, AO Bigeye, Eastern AO Skipjack, Western AO skipjack, North AO Albacore, South AO Albacore, Mediterranean Albacore, Western AO bluefin, Eastern AO bluefin.

Data sources: The main sources of information for this section ICCAT (2012).

Last update: December, 2012.

About 10 percent of the world production of tuna is from Atlantic Ocean (AO) stocks. Catches of skipjack, yellowfin, bigeye, albacore and bluefin in 2011 were 452,400 tons, a 6% increase from 2010. There was a general tendency for the total catch to decline since the mid 1990s, followed by small increases since 2009 (Figure AO-1).

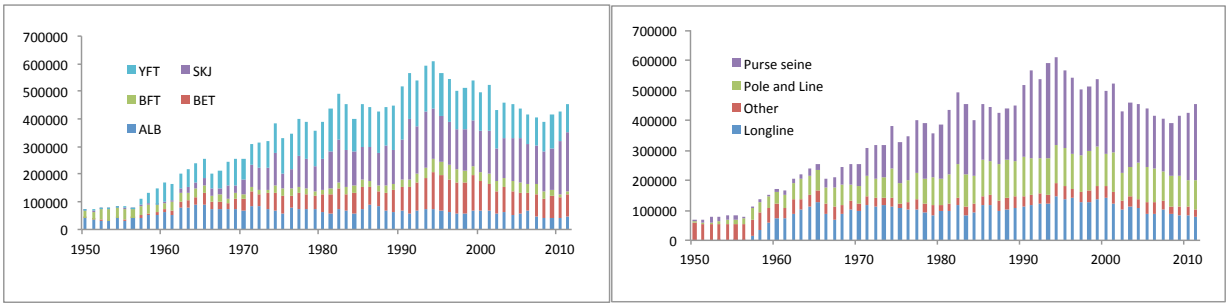


Figure AO-1. Trends in catch (mt) of bigeye, skipjack, yellowfin, albacore and bluefin in the AO region, by species (left) and gear (right), 1950-2011.

Average catches for the five-year period 2007-2011 (417,400 tonnes) provide an indication of the recent performance of the fisheries (Figure AO.2): Skipjack accounts for 40% of the catches in weight, followed by yellowfin (26%), bigeye (18%), albacore (11%), and bluefin (5%). Purse-seine vessels take 49% of the total catch, followed by pole-and-line (some of which operate jointly with purse seiners, 23%), longline (21%) and other gears (7%).

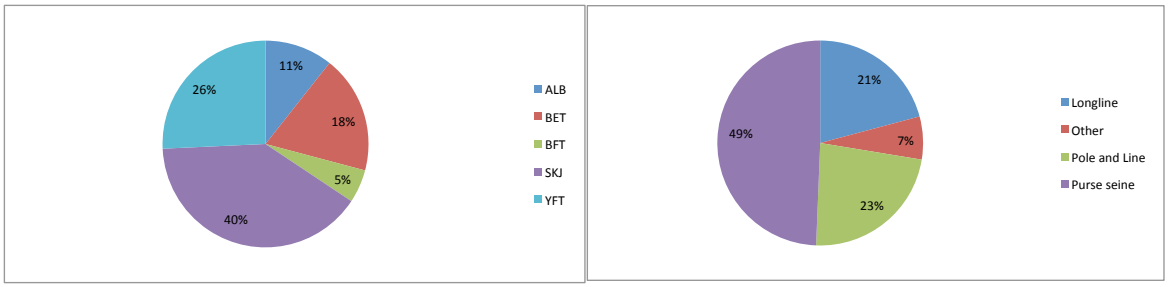


Figure AO-2. Average 2007-2011 catches of skipjack, yellowfin, bigeye, albacore and bluefin tuna in the AO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

AO Bigeye Tuna

Atlantic bigeye catches in 2011 were about 78,700 tonnes, a 4% increase from 2010. Catches by longline, the main fishing gear (55% 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 28% and 17% of the catches, respectively (Figure AO-3).

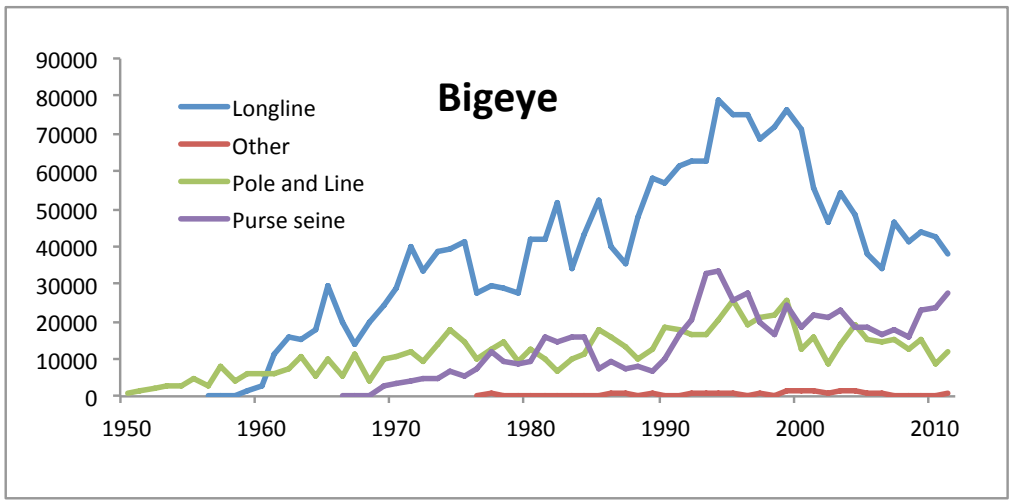


Figure AO-3. Catches of bigeye tuna in the AO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

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: (Figure AO-4):

1. 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.
2. 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.
3. 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 (78,700 tonnes) are below MSY.

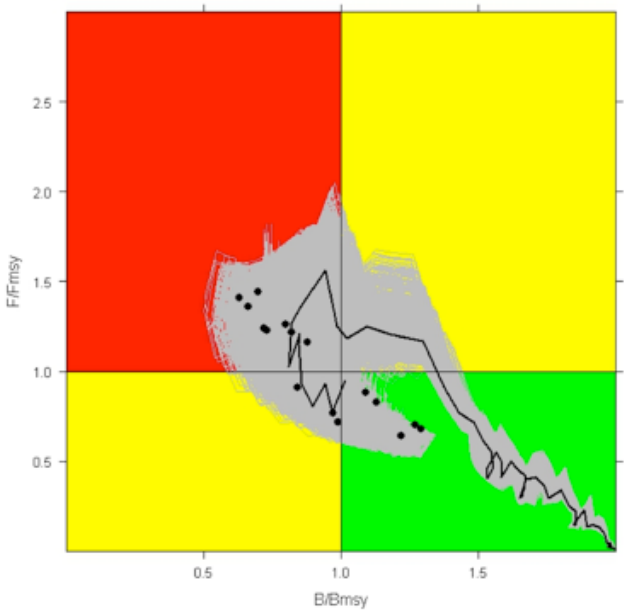


Figure AO-4. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the AO. The shaded area represents the 80% confidence limits for the historical trajectory (1950-2009) and the solid line represents the median estimated from several models. 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

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:

1. 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;
2. A capacity limitation (country-specific) for the number of longline and purse seine vessels over 20 m in length;
3. The establishment of a record of vessels actively fishing for bigeye;
4. A two-month prohibition of fishing on floating objects in an area off West Africa, with 100% observer coverage during this time/area closure;
5. Annual submission of FAD management plans by countries with purse seine and baitboat (pole-and-line) fisheries;

While a TAC of 85,000 tonnes is specified, consistent with SCRS advice, the permissible catch under [11-01] 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

AO BET	Estimate	Years	Notes
Recent catch	78	2011	
5-yr catch	77	2007-11	
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
TAC	85	2012-2015	

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	$B \approx B_{MSY}$.
FISHING MORTALITY	YELLOW	$F \approx F_{MSY}$. The 2011 catch was below the TAC. Recommendation 2011-01 includes catch limits and fishing capacity limitations.
ENVIRONMENT	ORANGE	55% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.
	YELLOW	22% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).
	YELLOW	17% 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	6% of the catch is made with purse seining on free schools, with little impact on non-target species.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

AO Yellowfin Tuna

Yellowfin catches in 2011 were about 100,400 tonnes, a 7% decrease from 2010. The main fishing gear is purse seining (about 65% of the catch) (Figure AO-5). Purse seine catches have shown a general decrease since the early 1990s, with a slight increase during the past three years. About 19% of the catch is made by longlining and 10% by pole-and-line vessels.

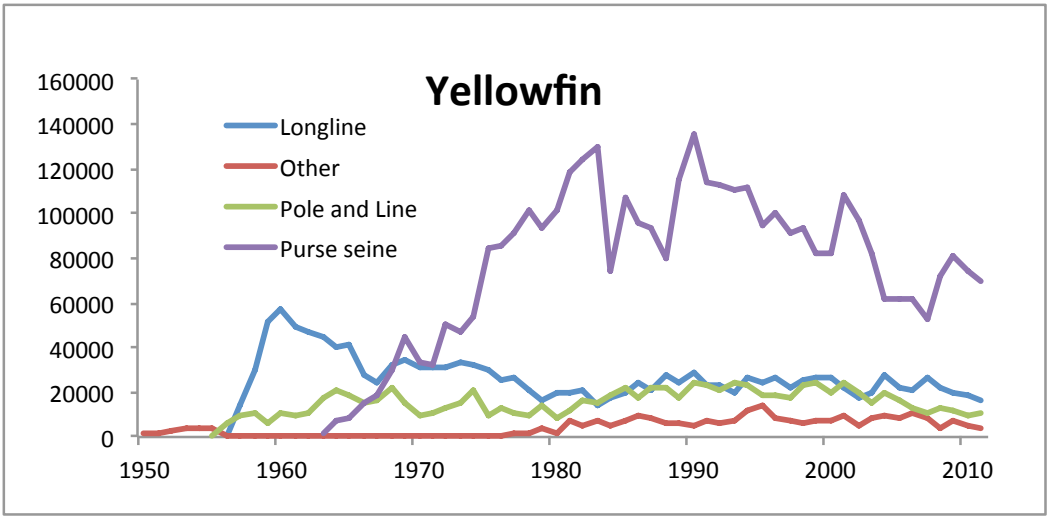


Figure AO-5. Catches of yellowfin tuna in the AO from 1950 to 2011, by gear type.

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 AO-6):

1. The (2010) ratio of $F_{current}/F_{MSY}$ is estimated at 0.87 (range 0.68-1.40), indicating that overfishing is not occurring.
2. 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.
3. 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. Current catch (100,400 t) is below MSY.

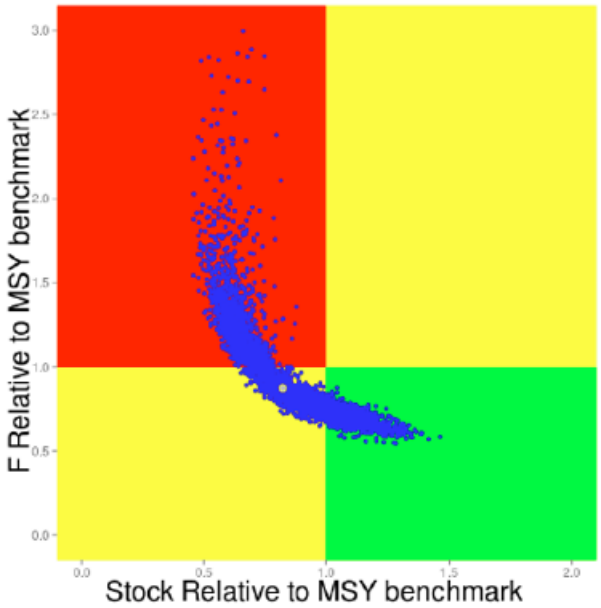


Figure AO-6. 2010 ratio of $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for yellowfin tuna in the AO. The gray point is the combined estimate from two types of models. The blue array of points reflects bootstrap estimates of uncertainty. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

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:

1. An overall TAC of 110,000 tonnes (unallocated by country);
2. The establishment of a record of vessels actively fishing for yellowfin;
3. A two-month prohibition of fishing on floating objects in an area off West Africa, with 100% observer coverage during this time/area closure;
4. 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

AO YFT	Estimate	Years	Notes
Recent catch	100	2011	
5-yr catch	107	2007-11	
MSY	145	2010	Range: 131-147
F/F_{MSY}	0.86	2010	
B/B_{MSY}	0.96	2010	
TAC	110		

Catches and MSY in 1000 tonnes.

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	GREEN	52% of the catch is made with purse seining on free schools, with little impact on non-target species
	ORANGE	19% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.
	YELLOW	10% 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.
	YELLOW	13% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

AO Eastern Skipjack Tuna

There are two (eastern and western) skipjack stocks in the Atlantic. Skipjack catches in the eastern Atlantic Ocean in 2011 were about 173,300 tonnes, a historical maximum, and a 6% increase from 2010. Purse seine (72%) and pole-and-line (25%) dominate the catches (Figure AO-7). The purse seine catches had been decreasing from the early 1990s to 2009, but increased substantially since then; catches by other gears have remained stable.

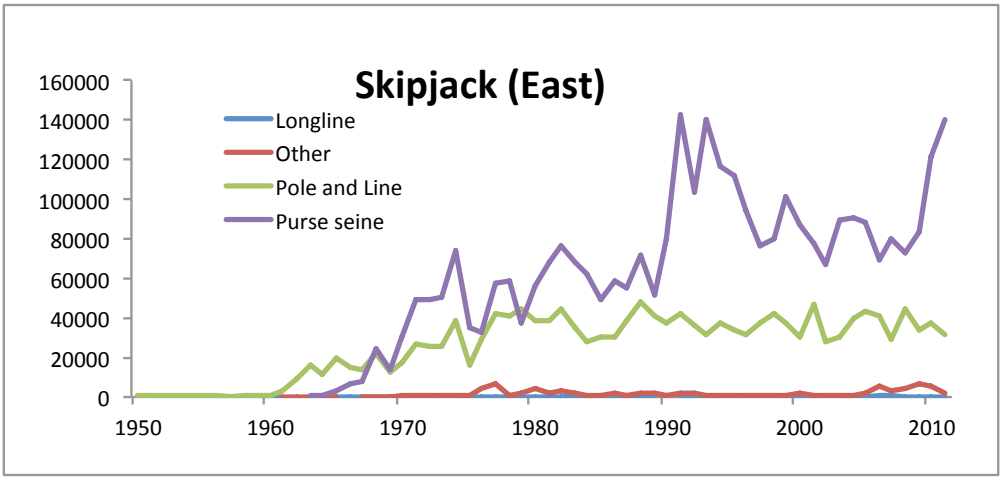


Figure AO-7. Catches of skipjack tuna in the Eastern AO from 1950 to 2011, by gear type.

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 AO-8).

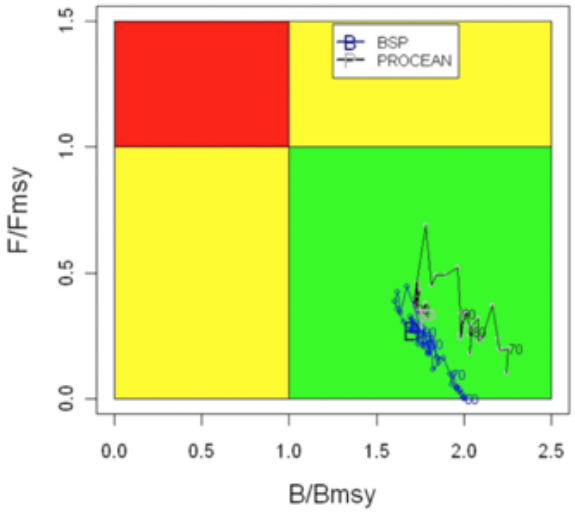


Figure AO-8. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for skipjack tuna in the eastern AO. The lines show the trends in the estimated biomass and fishing mortality ratios over time, using different assessment models. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

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

AO SKJ-E	Estimate	Years	Notes
Recent catch	173	2011	
5-yr catch	139	2007-11	
MSY	~157	2006	Range: 143-170
F/F_{MSY}	<1		
B/B_{MSY}	>1		
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B > B_{MSY}.
FISHING MORTALITY	GREEN	F < F_{MSY}.
ENVIRONMENT	YELLOW	66% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).
	YELLOW	25% 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	6% of the catch is made with purse seining on free schools, with little impact on non-target species.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

AO Western Skipjack Tuna

There are two (eastern and western) skipjack stocks in the Atlantic. Skipjack catches in the western Atlantic Ocean in 2011 were about 39,300 tonnes, a record high and a 56% increase from 2010. Pole-and-line fishing dominates the catches (84%), followed by purse seining (13%) (Figure AO-9). Pole and line catches have remained relatively stable (although highly variable) during the last two decades, while purse seine catches have declined.

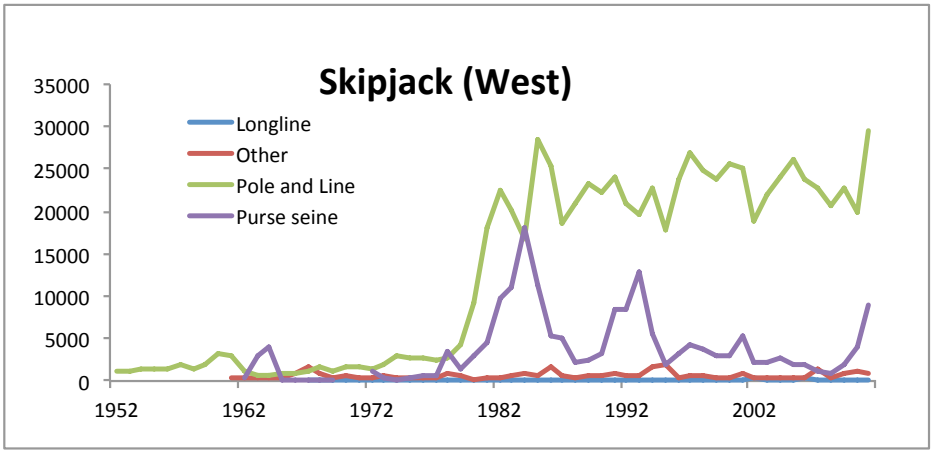


Figure AO-9. Catches of skipjack tuna in the Western AO from 1950 to 2011, by gear type.

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 AO-10).

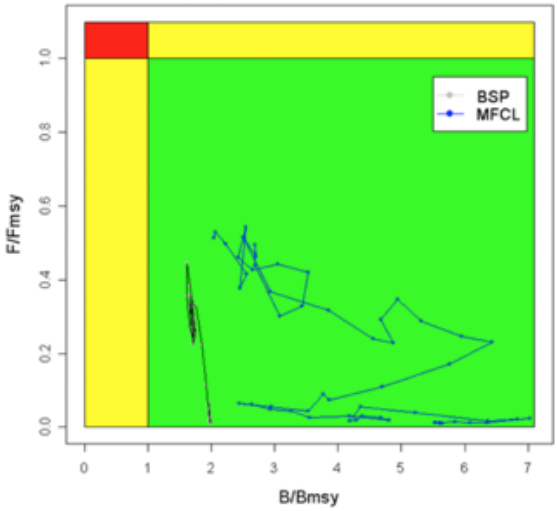


Figure AO-10. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for skipjack tuna in the western AO. The lines show the trends in the estimated biomass and fishing mortality ratios over time, using different assessment models. Colors are taken from ICCAT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

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

SUMMARY

AO SKJ-W	Estimate	Years	Notes
Recent catch	39	2011	
5-yr catch	28	2007-11	
MSY	33	2006	Range: 30-36
F/F_{MSY}	<1		
B/B_{MSY}	>1		
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B > B_{MSY}.
FISHING MORTALITY	GREEN	F < F_{MSY}.
ENVIRONMENT	YELLOW	87% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks.
	YELLOW	9% of the catch is made by purse seining on floating objects (including FADs). Several bycatch mitigation measures are in place (turtles, sharks).

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

AO Northern Albacore Tuna

There are three stocks of albacore tuna in the ICCAT Area: North Atlantic, South Atlantic and Mediterranean. Albacore catches in the North Atlantic in 2011 were about 20,000 tonnes, a 2% increase from 2010. Catches are made by a variety of fishing gears including pole-and-line (34%), troll (27%), trawl (20%) and longline (17%) (Figure AO-11).

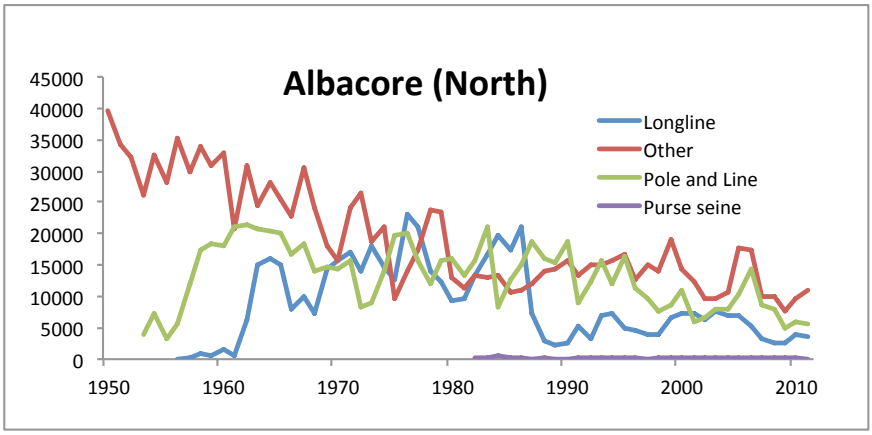


Figure AO-11. Catches of albacore tuna in the North AO from 1950 to 2011, by gear type.

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 (Figure AO-12):

1. 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.

2. 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.

3. MSY is estimated at 29,000 tonnes. Current (2011) catch is 20,000 t.

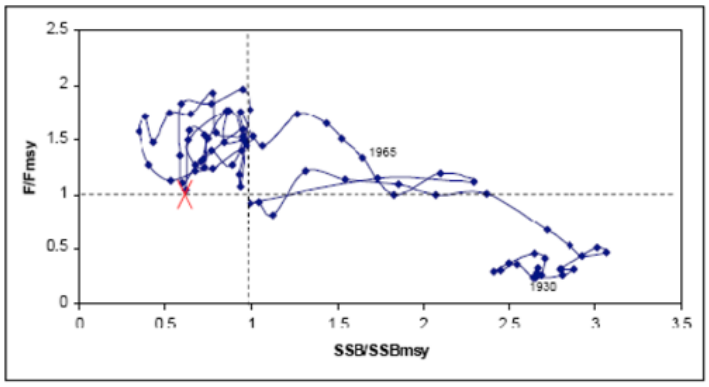


Figure AO-12. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for albacore tuna in the northern AO. The line shows the trend in the estimated biomass and fishing mortality ratios over time, using different assessment models. The red X marks the 2007 ratio 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

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

AO ALB-N	Estimate	Years	Notes
Recent catch	20	2011	
5-yr catch	20	2007-11	
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
TAC	28	2012-2013	

Catches and MSY in 1000 tonnes.

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	YELLOW	34% of the catch is made by pole-and-line fishing, with unknown impacts on baitfish stocks.
	GREEN	27% of the catch is made with trolling, with little impact on non-target species
	ORANGE	20% of the catch is made with pelagic trawling, with some impact on non-target species. Monitoring of bycatch is poor.
	ORANGE	17% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles). Monitoring is deficient.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

AO Southern Albacore Tuna

There are three stocks of albacore tuna in the ICCAT Area: North Atlantic, South Atlantic and Mediterranean. Albacore catches in the South Atlantic in 2011 were about 24,000 tonnes (Figure AO-13), a 28% increase from 2009. Catches are made primarily by longline (67%) and pole-and-line (29%)

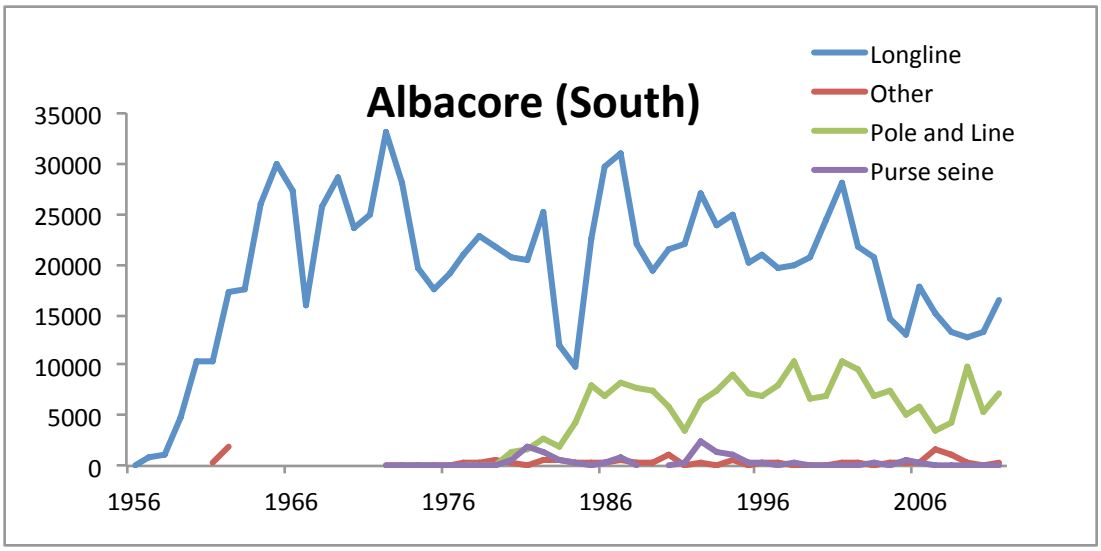


Figure AO-13. Catches of albacore tuna in the South AO from 1950 to 2011, by gear type.

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 AO-14):

1. 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.

2. 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.

3. MSY is estimated at 28,000 tonnes. Current (2011) catch is 24,000 t.

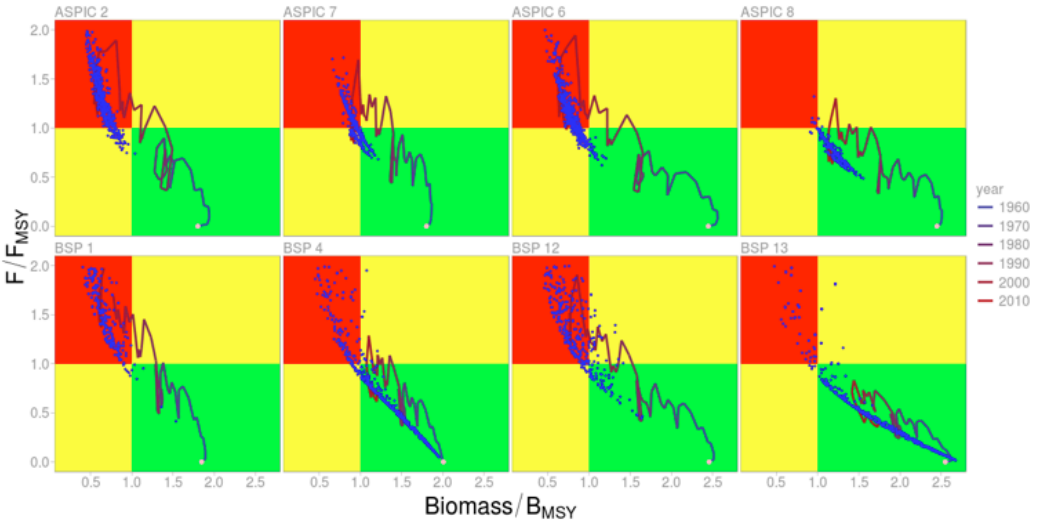


Figure AO-14. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for albacore tuna in the southern AO. The eight panels are the trajectories from eight different models that were used in combination by the SCRS to produce advice. In each plot, the scatter of 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

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

AO ALB-S	Estimate	Years	Notes
Recent catch	24	2011	
5-yr catch	21	2007-11	
MSY	28	2009	
F/F_{MSY}	1.07	2009	
B/B_{MSY}	0.88	2009	
TAC	24	2012	

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	ORANGE	$B < B_{MSY}$.
FISHING MORTALITY	YELLOW	$F \approx F_{MSY}$. The overall TAC has been lowered to 24,000 t following scientific advice to allow the stock to rebuild.
ENVIRONMENT	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.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

AO Mediterranean Albacore Tuna

There are three stocks of albacore tuna in the ICCAT Area: North Atlantic, South Atlantic and Mediterranean. Albacore catches in the Mediterranean in 2011 were about 4,700 tonnes, a 119% increase from 2010. Catches are highly variable and are made primarily by longline (61%) and the remainder by other surface gears (Figure AO-15).

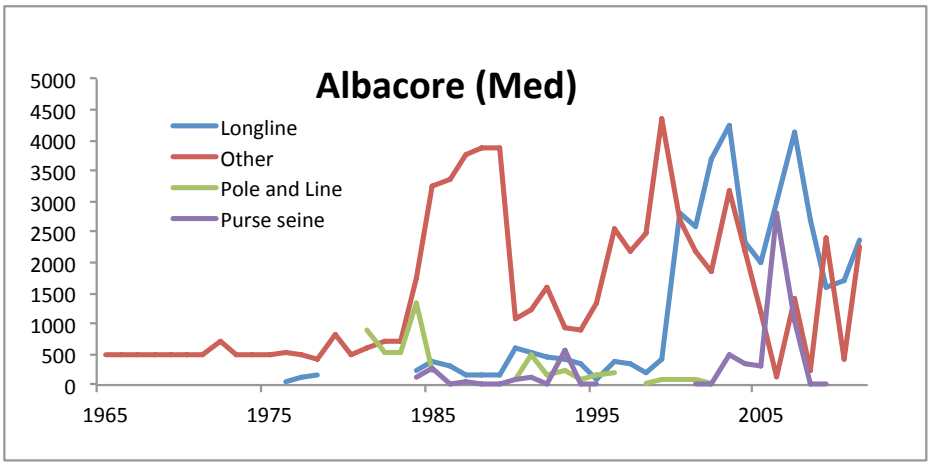


Figure AO-15. Catches of albacore tuna in the Mediterranean Sea from 1950 to 2011, by gear type.

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:

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

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

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

MANAGEMENT

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 and 2012 Commission meetings did not adopt any conservation measures for the stock.

SUMMARY

AO ALB-M	Estimate	Years	Notes
Recent catch	5	2011	
5-yr catch	4	2006-10	
MSY	N/A		
F/F_{MSY}	≤ 1	2009	
B/B_{MSY}	N/A		
TAC			

Catches and MSY in 1000 tonnes.

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≤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	ORANGE	61% of the catch is officially reported as made by longlining. Several mitigation measures are in place (sharks, turtles). Monitoring is very deficient.
	ORANGE	43% of the catch is made by other surface gears, including gillnets. Monitoring is very deficient.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

AO Eastern Atlantic and Mediterranean Bluefin Tuna

Atlantic bluefin tuna (*Thunnus thynnus*) are found in the entire North Atlantic and its adjacent seas, primarily the Mediterranean Sea. ICCAT recognizes two stocks: Western Atlantic, and eastern Atlantic and Mediterranean bluefin. There is considerable mixing between the two.

Eastern Atlantic bluefin catches have been subject to a high degree of mis-reporting between the mid-1990s and the recent past, although for the most recent few years, such mis-reported catch levels are thought to have diminished considerably. In 2011, reported catches were about 9,800 tonnes (Figure AO-16), a 13% decrease from 2010 (due to TAC reductions and strengthened controls). Purse seiners take 57% of the catch, followed by longline (17%), traps (15%), and a variety of surface gears, including pole-and-line, handline and trolling.

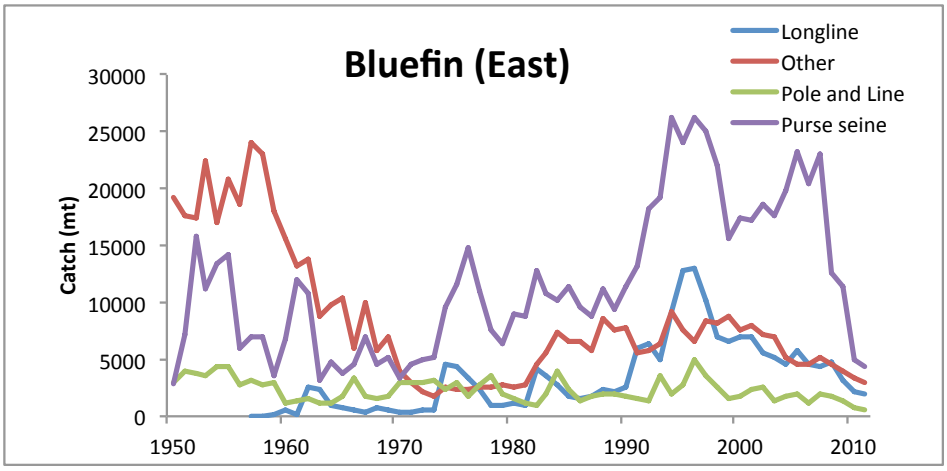


Figure AO-16. Catches of Eastern Atlantic and Mediterranean bluefin from 1950 to 2011, by gear type.

STOCK ASSESSMENT

The eastern Atlantic bluefin tuna stock was reassessed by ICCAT's SCRS in 2012, using the same model and data types as in 2010. The stock assessment is subject to considerable uncertainties due to scarcity of CPUE data and to high levels of mis-reporting that took place primarily in the 2000s. The SCRS concluded the following (Figure AO-17):

1. The current ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated at 0.63-0.76 (ranging between 0.37 and 1.16 for different assumed levels of recruitment and the level of assumed mis-reporting in the past). Therefore, the stock remains in an overfished state.

2. The ratio of $F_{current}/F_{MSY}$ is estimated at 0.36-0.70, depending on the level of assumed mis-reporting in the past. Thus, overfishing is not taking place anymore. Catches have been reduced by over 70% since 2007 due to strict limits and controls.

3. The estimate of MSY is about 30,700-35,900 tonnes (ranges between 21,500 and 74,900 tonnes, depending on the assumed recruitment level).

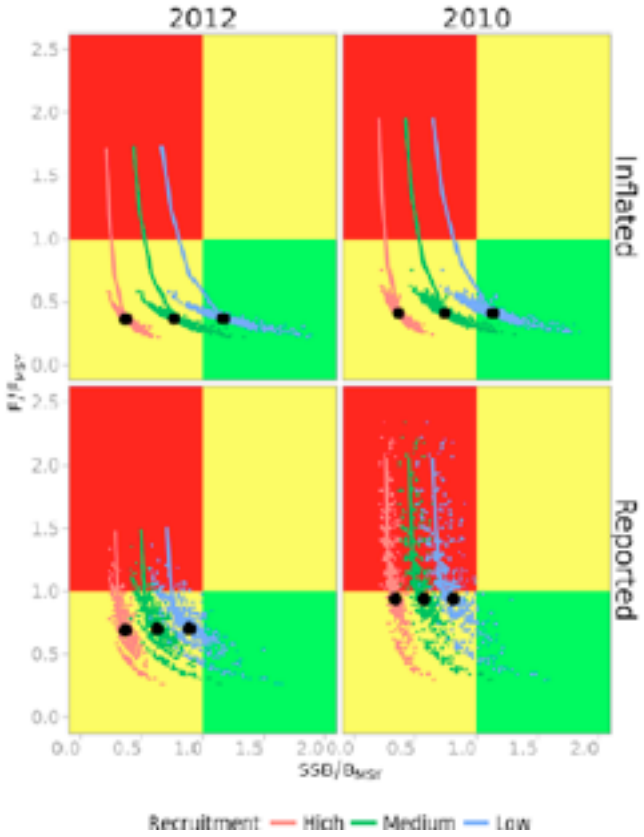


Figure AO-17. Current ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for eastern Atlantic bluefin tuna assuming inflated or reported catch (upper and lower panels) and considering low, medium and high recruitment levels (blue, green and red lines). Blue, green and red dots represent the distribution of the terminal year obtained through bootstrapping for the corresponding three recruitment levels. Left panel (2012): 2011 SSB and F relative to reference points calculated during the 2012 stock assessment. Right panel (2010): 2011 SSB and F relative to the reference points that have calculated during the 2010 stock assessment.The spread of symbols represents uncertainty in the estimate of the current ratios.

MANAGEMENT

The eastern Atlantic and Mediterranean bluefin stock has been the subject of a rebuilding program since 2006 (ICCAT Rec. 06-05), which has been amended every year in 2007-2010 and again in 2012 (Rec. 12-03). The plan aims to rebuild the stock to B_{MSY} by 2022 with at least 60% probability.

The rebuilding program (Rec. 12-03) is a very comprehensive management plan that combines multiple conservation elements with enforcement ones. The 2013-2014 TAC is 13,500 tonnes each year, which represents a 5% increase from the 2012 TAC.increased slightly . In addition to the TACs, the plan includes the following measures, among others:

1. Manages fishing capacity (including mandated capacity adjustments to make fishing capacity more commensurate with quotas) and farming capacity;
2. Establishes closed fishing seasons for longliners (six months), purse seiners (11 months), and for pole and line, pelagic trawl and sport fishing vessels (eight months each);
3. Sets minimum sizes of 8 and 30 kg, depending on the fishery;
4. Establishes records of authorized fishing vessels and authorized farming facilities;

5. Requires weekly catch reports to national agencies and monthly catch reports to ICCAT;
6. Establishes an observer program with 100% coverage for purse seiners and for transfers to cages;
7. Requires VMS on every vessel over 15 m in length, and transmissions of the VMS data to ICCAT;
8. Prohibits trade of bluefin not accompanied by valid catch documents (Rec. 09-01);
9. Establishes procedures for at-sea boarding and inspection;
10. Allows SCRS to access all MCS data from the management plan.

The multiple amendments made to the management plan since 2006 have resulted in increasingly tighter controls of the actual catches. Combined with lower quotas, fishing mortality rates have been reduced (current F is below F_{MSY}). The SCRS projections indicated that catches above the 2012 TAC (12,900 tonnes) could allow the stock to rebuild to B_{MSY} even before the planned rebuilding date (2022) with greater than 60% probability. At its annual meeting in 2012, the Commission acted prudently in view of the uncertainty in the assessment and increased the TAC only slightly, to 13,500 tons.

SUMMARY

AO BFT-E	Estimate	Years	Notes
Recent catch	9.8	2011	
5-yr catch	19.8	2007-11	
MSY	33	2010	Range: 22-75
F/F_{MSY}	0.7	2010	Using reported catch
B/B_{MSY}	.37-0.89	2010	Using reported catch
TAC	13.5	2013-2014	

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	ORANGE	$B < B_{MSY}$.
FISHING MORTALITY	GREEN	$F < F_{MSY}$. Fishing mortality has clearly been reduced through a TAC and strict controls.
ENVIRONMENT	GREEN	57% of the catch is made by purse seiners that set on free schools.
	ORANGE	17% of the catch is made by longlining. Several mitigation measures are in place.
	GREEN	13% of the catch is made by fixed traps that have minor impact on sensitive species.
	YELLOW	6% of the catch is made by pole-and-line fisheries that have some impact on baitfish stocks.

Last Updated: December, 2012.
Changes from previous (April 2012) version: The fishing mortality factor has been changed from Orange to Green.

AO Western Atlantic Bluefin Tuna

Atlantic bluefin tuna are found in the entire North Atlantic and its adjacent seas, primarily the Mediterranean Sea. ICCAT recognizes two stocks: Western Atlantic, and eastern Atlantic and Mediterranean bluefin. There is considerable mixing between the two.

Western Atlantic bluefin catches in 2011 were about 2,000 tonnes, a 7% increase from 2010. Sport gears (hand line, rod-and-reel) take 55% of the catch, followed by longline (37%) and other surface gears. Purse seine catches in recent years have been very minor (Figure AO-18).

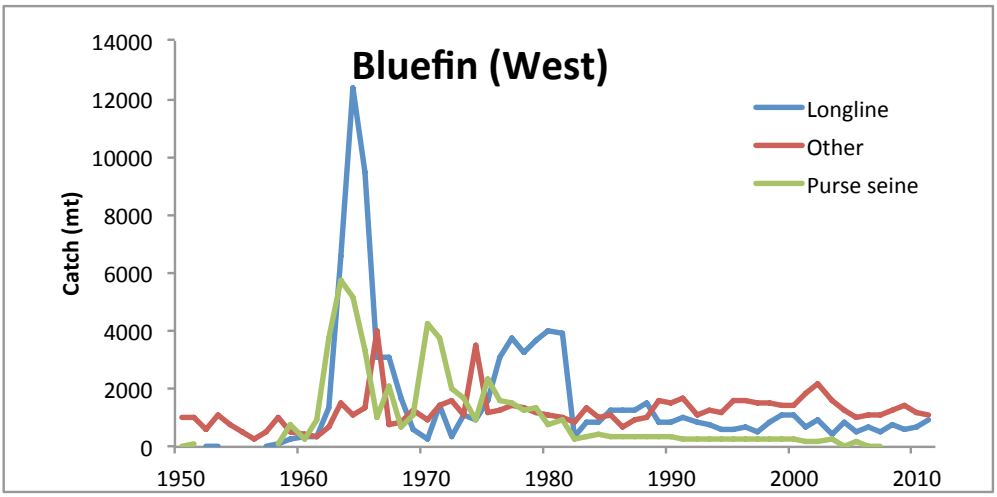


Figure AO-18. Catches of Western Atlantic bluefin tuna from 1950 to 2011, by gear type.

STOCK ASSESSMENT

The Western Atlantic bluefin tuna stock was last assessed by ICCAT's SCRS in 2012, using the same model and data types as in 2010. The stock assessment model estimates that recruitment in the early 1970s was very high compared to the level estimated since the 1980s. The assessment also indicates spawning stock biomass was also much higher in the 1970s and earlier compared to the levels estimated since the 1980s. In calculating the status of the stock relative to MSY reference points, the SCRS considers two alternative hypothesis: One is that the high recruitment levels of the 1970s can be achieved again if the stock is allowed to rebuild substantially; the other hypothesis is that there has been a "regime shift" and environmental conditions can no longer support those high levels of recruitment, even if the stock is allowed to rebuild. These two are known as "high potential recruitment" and "low potential recruitment" hypotheses. Using these, the SCRS concluded the following (Figure AO-19):

1. The current ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated at 0.19 (assuming high potential recruitment) or 1.4 (assuming low potential recruitment). Thus, the stock is either severely overfished, or not overfished at all, depending on the assumed level of potential recruitment.
2. The ratio of $F_{current}/F_{MSY}$ is estimated at 1.57 (assuming high potential recruitment) or 0.61 (assuming low potential recruitment). Thus, overfishing is either taking place, or not, depending on the assumed level of potential recruitment.
3. The estimate of MSY is 6,500 tonnes (assuming high potential recruitment) or 2,600 tonnes (assuming low potential recruitment.

Clearly, the status of the western Atlantic bluefin stock is highly dependent on the potential recruitment assumption. For years, the SCRS has been unable to give an idea about which of the two assumptions is more plausible. ISSF considers that SCRS should revisit this issue as a matter of priority so that it can provide unambiguous advice that is based on one of the two assumptions. Until then, given the lack of

clear indication of a regime shift, ISSF believes that it is more precautionary to assume that the high-recruitment hypothesis applies and that the stock can be rebuilt to the higher levels estimated in the 1960s and 1970s. As a result, ISSF considers that the western Atlantic bluefin stock is overfished and that overfishing is occurring.

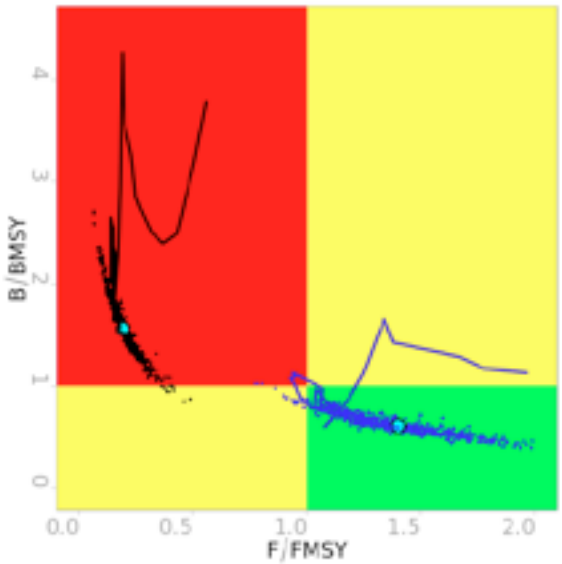


Figure AO-19. Temporal trend in the median ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for western Atlantic bluefin tuna assuming two levels of potential recruitment. The blue symbols represent uncertainty in the estimate of the current ratios.

MANAGEMENT

Western Atlantic bluefin has been the subject of a rebuilding program since 1998 (ICCAT Rec. 98-07), which has been amended in every other year since 2002. The plan aims to rebuild the stock by 2018 with at least 50% probability, mainly through TACs (the 2013 TAC is 1,750 tonnes, under Rec. 12-02, unchanged from the 2012 level). The management plan also establishes a 30-kg minimum size and prohibits directed fisheries in the Gulf of Mexico (the only known spawning area for the stock).

SUMMARY

AO BFT-W	Estimate	Years	Notes
Recent catch	2	2011	
5-yr catch	1.9	2007-11	
MSY	6.5	2008-2010	
F/F_{MSY}	1.57	2008-2010	Range: 1.2-1.9
B/B_{MSY}	0.19	2011	Range: 0.13-0.29
TAC	1.75	2013	

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	ORANGE	B < B_{MSY}. Stock biomass is very low under the "high potential recruitment" hypothesis.
FISHING MORTALITY	ORANGE	F > F_{MSY}. According to SCRS, if the two alternative hypotheses about potential recruitment levels are combined, the current TAC will not rebuild the stock to B_{MSY} by 2018 with 50% probability or greater (the year and target of ICCAT's management plan).
ENVIRONMENT	GREEN	55% of the catch is made by sport fishing gears (rod-and-reel, handline) with minor amounts of bycatch.
	ORANGE	35% of the catch is made by longlining. Several mitigation measures are in place.

Last Updated: December, 2012.
Changes from previous (December 2011) version: None

STOCKS IN THE INDIAN OCEAN

RFMO: Indian Ocean Tuna Commission (IOTC)

Last Scientific Committee (SAC) meeting: December, 2012

Last Commission meeting: April, 2012.

Tuna stocks managed by IOTC: IO Yellowfin, IO Bigeye, IO Skipjack, IO Albacore.

Data sources: The main sources of information for this section IOTC (2012).

Last update: December, 2012.

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 2011 were 828,000 tonnes, a 2% decline from 2010. There has been a general tendency for the total catch to decline since 2005, when a record 1.2 million tonnes were caught (Figure IO-1). Catches of southern bluefin tuna occur substantially in the IO Convention Area. This stock is covered in a different section of this report, under Southern Hemisphere.

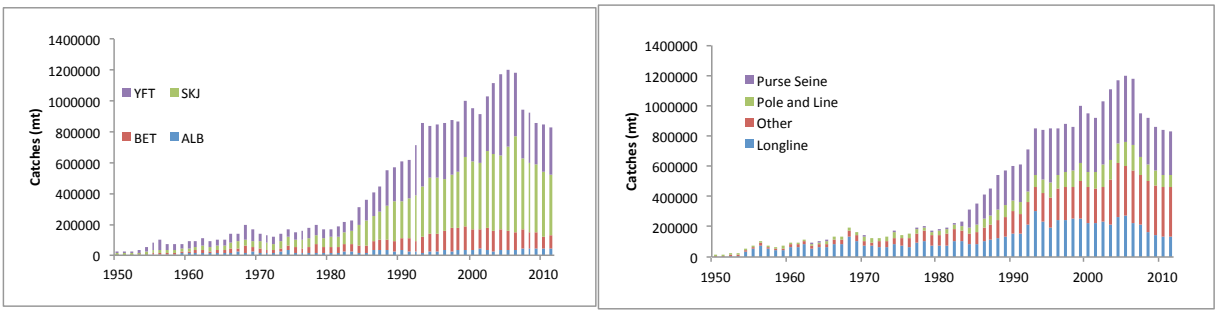


Figure IO-1. Trends in catch (mt) of bigeye, skipjack, yellowfin and albacore in the IO region, by species (left) and gear (right), 1950-2011.

Piracy in the western Indian Ocean has had an important impact in the tuna fisheries. 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 2007-2011 (881,000 tonnes) provide an indication of the recent performance of the fisheries (Figure III.1.2): Skipjack accounts for 49% of the catches in weight, followed by yellowfin (34%), bigeye (12%), and albacore (5%). Purse-seine vessels take about 34% of the total catch, followed by longline (20%) and pole-and-line (12%). In the Indian Ocean, a variety of other gears such as hand line and gillnets take a substantial amount of the catch (35%). These fisheries are generally poorly sampled.

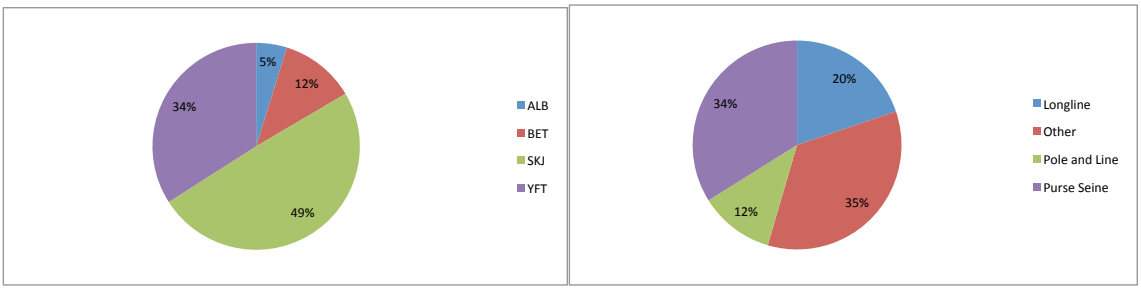


Figure IO-2. Average 2007-2011 catches of skipjack, yellowfin, bigeye and albacore in the IO. The graph on the left shows the percentages by species, and the graph on the right shows the percentages by gear type.

IO Bigeye Tuna

Bigeye reported catches in 2011 were about 87,400 tonnes, an 8% increase from 2010. The main fishing gear is longline (65%). Catches by this gear have declined dramatically from a high in 2004 (Figure IO-3), due to vessels moving away from the main fishing grounds to escape piracy. In contrast, catches from purse seine vessels (26%) have been relatively stable since 2000.

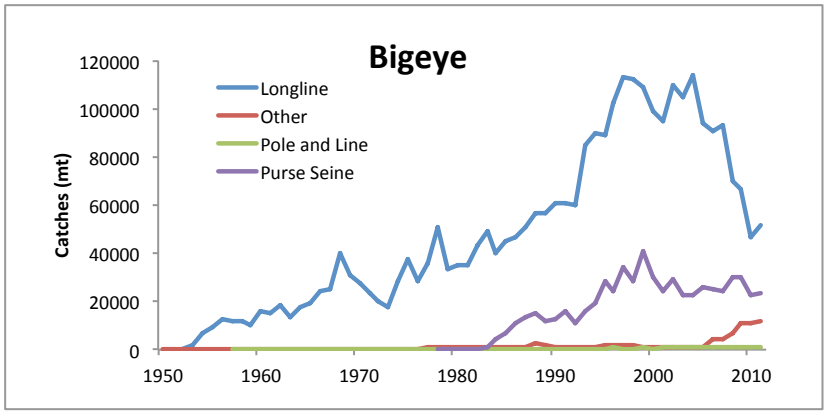


Figure IO-3. Catches of bigeye tuna in the IO from 1950 to 2010, by gear type.

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 (Figure IO-4):

1. The ratio of $F_{current}/F_{MSY}$ is estimated to be less than 1.0 (0.67 to 0.79, depending on the assessment model used), indicating that overfishing is not occurring.
2. 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 model), indicating that the stock is not in an overfished state.
3. The estimate of MSY ranges from 102,000 to 114,000 tonnes, depending on the model used.

Recommendation 12/14 (non-binding) established interim limit reference points for bigeye as $0.5B_{MSY}$ and $1.3F_{MSY}$. These are not being exceeded.

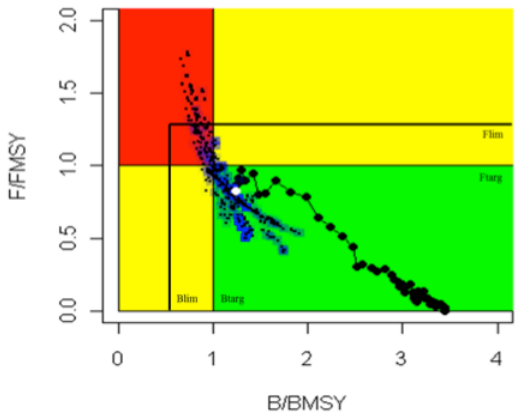


Figure IO-4. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for bigeye tuna in the IO. Black circles represent the annual median values over time (white circle is 2009). Dots and blue squares indicate uncertainty in the current status estimated from models 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

The main binding conservation measure established by the IOTC for bigeye is Resolution 12/13, 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 different months) in an area of size 10°x20°. The effect of the closure in Resolution 12/13 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.

SUMMARY

IO BET	Estimate	Years	Notes
Recent catch	87	2011	
5-yr catch	102	2007-11	
MSY	102-114	2010-11	
F/F_{MSY}	0.67-0.79	2009-2010	
B/B_{MSY}	1.0-1.20	2009-2010	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B > B_{MSY}.
FISHING MORTALITY	GREEN	F < F_{MSY}.
ENVIRONMENT	ORANGE	65% 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.
	ORANGE	9% of the catch is made by other gears such as gillnet. There is poor reporting by these fisheries which are thought to have substantial amounts of bycatch.

Last Updated: December, 2012.
Changes from previous (April 2012) version: Added Other gears.

IO Yellowfin Tuna

Yellowfin catches in 2011 were about 303,000 tonnes, a 2% increase from 20010. The main fishing gears for which catches have declined recently are purse seine (35% of the catch) and longline (21%) (Figure IO-5). In contrast, catches from pole-and-line vessels (5%) have been relatively stable. Catches by gillnet and handline (classified as "other" in the figure, which account for 39% of the catch) have become very important in recent years, currently dominating over other gears, and are poorly estimated. Overall catches have declined by 43% from a record high of 530,000 tonnes in 2004.

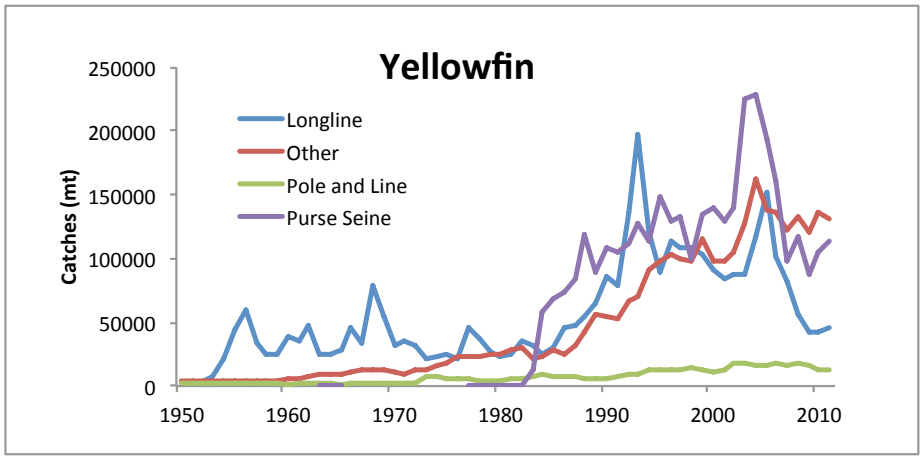


Figure IO-5. Catches of yellowfin tuna in the IO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

The 2012 updated assessment using two different models gave similar results to the 2011 assessment, indicating the following (Figure IO-6):

1. The ratio of $F_{current}/F_{MSY}$ is estimated at 0.61 or 0,69 depending on the model, indicating that overfishing is not occurring. The trajectories explained by the two models differ in that one of them suggests that FMSY was exceeded during the period of high catches of yellowfin tuna from 2003 to 2006, while the other model does not. However, both models estimate a similar status at the present time.
2. The stock is not in an overfished state as spawning biomass is above the B_{MSY} level ($B_{current}/B_{MSY}$ = 1.24 to 1.35, depending on the model).
3. The value of MSY is estimated to be 320,000 to 344,000 tonnes depending on the model. During the period 2003-2006, catches substantially exceeded this level and the stock experienced a rapid decline.

Recommendation 12/14 (non-binding) established interim limit reference points for yellowfin as $0.4B_{MSY}$ and $1.4F_{MSY}$. These are not being exceeded.

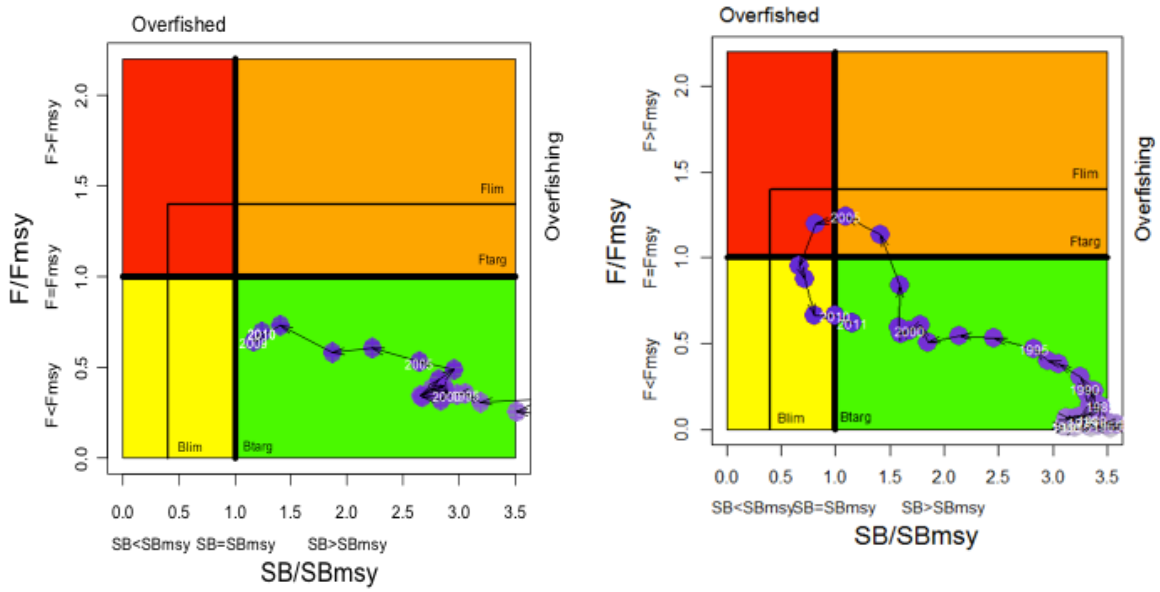


Figure IO-6. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for yellowfin tuna in the IO. The two graphs correspond to two different models (the value in the last year is very similar for both models). Colors are taken from IOTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

The main binding conservation measure established by the IOTC for yellowfin is Resolution 12/13, 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 12/13 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. However, this trend could be easily reversed if the piracy situation in the IO improves and fishing effort increases. 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

IO YFT	Estimate	Years	Notes
Recent catch	303	2011	
5-yr catch	302	2007-11	
MSY	320-344	2011	
F/F_{MSY}	0.61-0.69	2011	
B/B_{MSY}	1.24-1.35	2011	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B > B_{MSY}. The 2012 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	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	21% 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.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

IO Skipjack Tuna

Skipjack catches in the Indian Ocean in 2011 were about 398,000 tonnes, a 6% decline from 2010. Purse seine (38%) and gillnets (41%) dominate the catches, followed by pole-and-line (20%) (Figure IO-7). The pole-and-line catches have been decreasing since 2005.

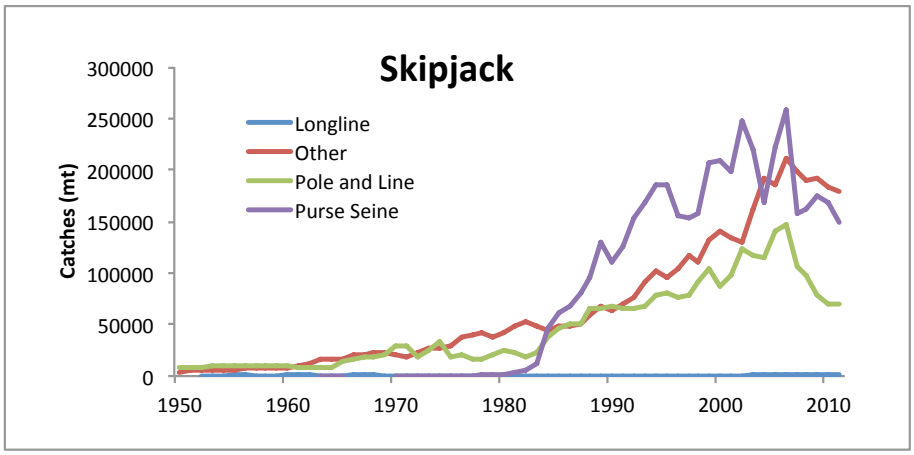


Figure IO-7. Catches of skipjack tuna in the IO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

A stock assessment of skipjack was conducted for the first time in 2011 and updated in 2012. The results indicate that (Figure IO-8):

1. The ratio of $F_{current}/F_{MSY}$ is estimated to be less than 0.80 . Therefore, overfishing is not occurring.
2. The stock is not in an overfished state as spawning biomass is above the B_{MSY} level ($B_{current}/B_{MSY}$ = 1.2).
3. The median estimate of MSY is estimated to be 478,000 tonnes (range: 359,000 to 598,000 t).

Recommendation 12/14 (non-binding) established interim limit reference points for skipjack as $0.4B_{MSY}$ and $1.5F_{MSY}$. These are not being exceeded.

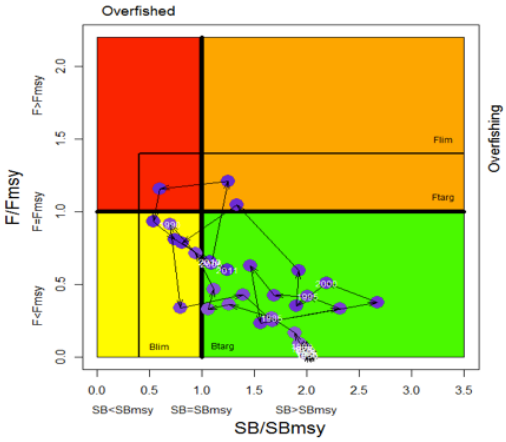


Figure IO-8. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for skipjack tuna in the IO. Black circles indicate the median trajectory. The probability distribution contours are provided as a rough visual guide of the uncertainty in current estimates. Colors are taken from IOTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

The main binding conservation measure established by the IOTC for skipjack (indirectly) is Resolution 12/13, 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 12/13 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.

SUMMARY

IO SKJ	Estimate	Years	Notes
Recent catch	398	2011	
5-yr catch	436	2007-11	
MSY	478	2011	
F/F_{MSY}	0.8	2011	
B/B_{MSY}	1.2	2011	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B < B_{MSY}. The stock was assessed for the first time in 2011.
FISHING MORTALITY	GREEN	F < F_{MSY}.
ENVIRONMENT	ORANGE	41% 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	20% 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.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

IO Albacore Tuna

Albacore catches in the Indian Ocean in 2011 were about 38,900 tonnes, a 9% decrease from 2010. Almost all catches are made by drifting longlines (Figure IO-9). The estimates of catches since 2003 have increased substantially compared to earlier years, primarily due to revised values.

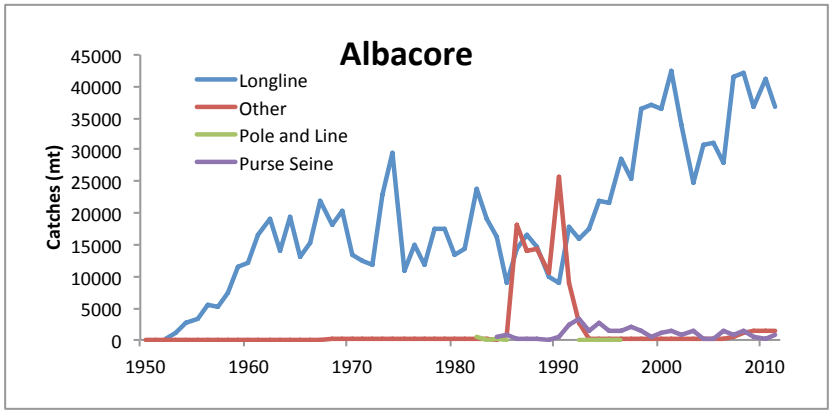


Figure IO-9. Catches of albacore tuna in the IO from 1950 to 2011, by gear type.

STOCK ASSESSMENT

In 2012, the SC updated the assessment. The conclusions from the assessment are somewhat more optimistic than those of 2011 and indicate that (Figure IO-10):

1. The ratio of $F_{current}/F_{MSY}$ is estimated to be 1.33 (range: 0.90 - 1.76). 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 2011 were 49% higher than in 2003.
2. The stock is not in an overfished state as spawning biomass is slightly above the B_{MSY} level ($B_{current}/B_{MSY}$ = 1.05; Range: 0.541.56).
3. The median estimate of MSY is estimated to be 33,300 tonnes (range: 31,100 to 35,600 t).

Recommendation 12/14 (non-binding) established interim limit reference points for albacore as $0.4B_{MSY}$ and $1.4F_{MSY}$. Projections indicate that if catches remain the same in 2013, there is a 26% probability that the F limit reference point will be exceeded.

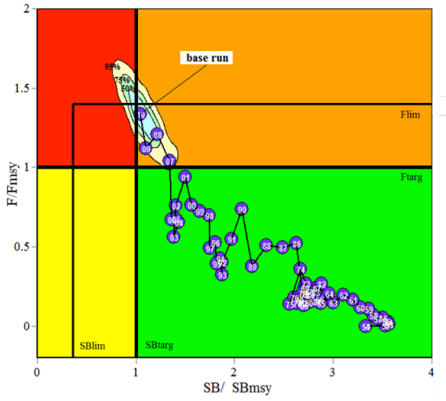


Figure IO-10. Temporal trend in the ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for albacore tuna in the IO (TB = Total biomass). Circles indicate the median trajectory and the probability distribution contours are provided as a rough visual guide of the uncertainty in current estimates., Colors are taken from IOTC reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

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

IO ALB	Estimate	Years	Notes
Recent catch	39	2011	
5-yr catch	42	2007-11	
MSY	33	2010	
F/F_{MSY}	1.33	2010	
B/B_{MSY}	1.05	2010	
TAC	N/A		

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	GREEN	B ~ B_{MSY}. If overfishing continues, the stock size is expected to go below the B_{MSY} level.
FISHING MORTALITY	ORANGE	F > F_{MSY}. In addition, there is a substantial probability that the interim Limit Reference Point will be exceeded at the current catch level.
ENVIRONMENT	ORANGE	Almost 100% of the catch is made by longlining. Several mitigation measures are in place (sharks, turtles, sea birds). Monitoring is deficient.

Last Updated: December, 2012.
Changes from previous (April 2012) version: Abundance rating was changed from Orange to Green given the result of the 2012 assessment. Fishing mortality rating was changed from Yellow to Orange.

SOUTHERN HEMISPHERE STOCKS

RFMO: Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

Last Scientific Committee meeting: August, 2012

Last Commission meeting: October, 2012.

Tuna stocks managed by CCSBT: Southern bluefin tuna.

Data sources: The main sources of information for this section CCSBT (2011).

Last update: December, 2012.

SH Southern Bluefin Tuna

Southern bluefin tuna (*Thunnus maccoyii*) is found in the southern hemisphere, mainly in waters between 30° and 50° S. The stock is assessed and managed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). While the IATTC, ICCAT, IOTC and WCPFC have in principle a mandate to manage all tunas in their respective Convention Areas, in practice they defer to CCSBT for management of southern bluefin. Practically all of the catches are made in the IOTC, ICCAT and WCPFC convention areas (79% in the Indian Ocean, 17% in the Pacific Ocean and 4% in the Atlantic Ocean).

Southern bluefin catches in 2011 were about 9,300 tonnes, a 3% decrease from 2010. Virtually all of the catches are made by longline (56%) and purse seine (44%). Current catches are nearly one-tenth of what they were at their peak, in 1961. (Figure I.2.1.1).

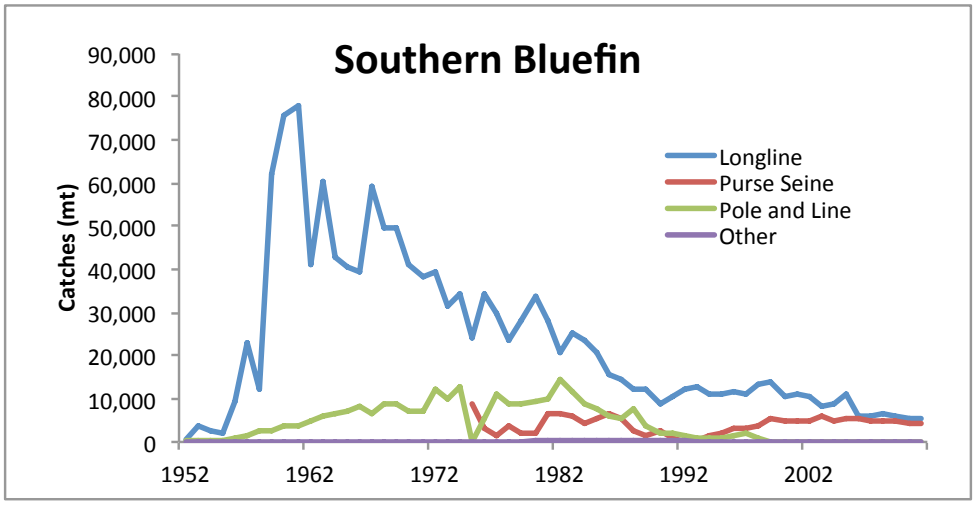


Figure SH-1. Catches of southern bluefin tuna from 1952 to 2011, by gear type.

STOCK ASSESSMENT

Southern bluefin tuna is assessed by the Extended Scientific Committee (ESC) of the CCSBT. In 2011, the ESC indicated the following (Figure SH-2):

1. The current ratio of spawning biomass $B_{current}/B_{MSY}$ is estimated at 0.23 (range: 0.15-0.32). This indicates that that the stock is in a severely overfished state. Spawning biomass is estimated to be between 3% and 7% of the unfished level.

2. The ratio of $F_{current}/F_{MSY}$ is estimated at 0.76 (range: 0.52-1.07), indicating that overfishing is not occurring. While overfishing was taking place in recent years, current fishing mortality has been reduced below the MSY level following reductions in overall catch.
3. The estimate of MSY is 34,500 tonnes.

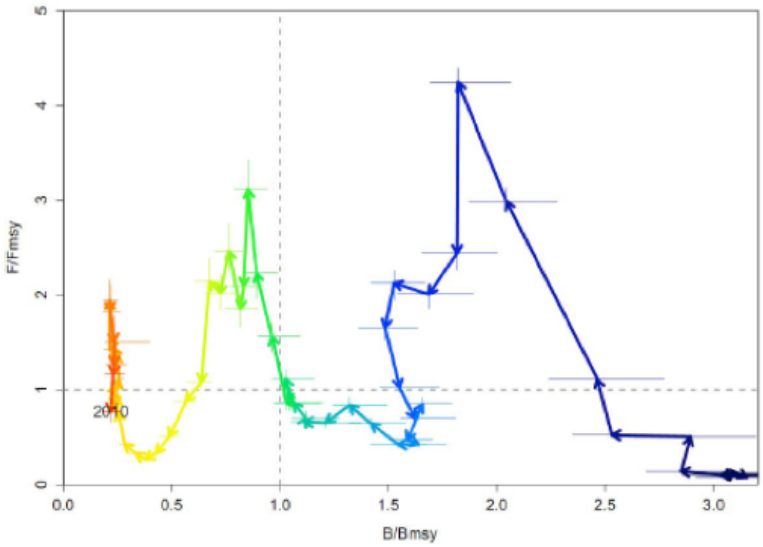


Figure SH-2. Temporal trend in the median ratios $B_{current}/B_{MSY}$ (x-axis) and $F_{current}/F_{MSY}$ (y-axis) for southern bluefin tuna. Vertical and horizontal lines provide an idea of the relative uncertainty in the estimates. Colors are taken from CCSBT reports and do not necessarily correspond to the colors used for ratings in the ISSF Stock Status Report.

MANAGEMENT

Southern bluefin tuna is managed primarily through annual TACs that aim, as an interim target, to rebuild the stock to 20% of the unfished level by 2035. The TACs are set through a process known as a Management Procedure (MP), adopted in 2011, that specifies the actions to be taken depending on the outcomes of the assessment made by the ESC (in essence, a Harvest Control Rule).

TACs under the MP are set for three-year periods to maintain the stock on the planned rebuilding trajectory. The MP specifies the minimum and maximum permissible changes in TAC (either increase or decrease, depending on stock status relative to the rebuilding trajectory). The TAC for 2013 is set to 10,949 tonnes. The 2014 TAC is specified to be the lesser of two levels (unless CCSBT decides otherwise based on compliance issues): At 12,449 tonnes or at the level based on the MP outcomes for 2015-2017 (the next 3-year TAC period).

SUMMARY

SBT	Estimate	Years	Notes
Recent catch	9.3	2011	
5-yr catch	10.4	2007-11	
MSY	34.5	2010	
F/F_{MSY}	0.76	2010	Range: 0.52-1.07
B/B_{MSY}	0.23	2011	Range: 0.15-0.32
TAC	10.9 and 12.4	2013 and 2014	

Catches and MSY in 1000 tonnes.

STOCK ABUNDANCE	ORANGE	B << B_{MSY}. Stock abundance is very low, about 5% of the unfished level.
FISHING MORTALITY	YELLOW	F < F_{MSY}. The rating could be Green. However, overfishing was taking place in previous years and given the depleted condition of the population, a precautionary Yellow rating is given.
ENVIRONMENT	ORANGE	56% of the catch is made by longlining. Several mitigation measures are in place (sea birds).
	GREEN	44% of the catch is made by purse seining on free schools of southern bluefin.

Last Updated: December, 2012.
Changes from previous (April 2012) version: None.

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GLOSSARY AND ACRONYMS

TERM	MEANING
AIDCP	The Agreement on the International Dolphin Conservation Program
ALB	Albacore tuna, *Thunnus alalunga*.
AO	Atlantic Ocean
BET	Bigeye tuna, *Thunnus obesus*.
BFT	Atlantic bluefin tuna, *Thunnus thynnus*.
B_{MSY}	(also "Biomass at MSY" or "MSY Biomass Level"). This is the stock size (biomass) that would result on average if F_{MSY} was applied constantly year after year. B_{MSY} is sometimes measured by the total biomass of the stock and sometimes by the biomass of the spawners ("spawning biomass", or SSB).
CCSBT	Commission for the Conservation of Southern Bluefin Tuna (www.ccsbt.org)
EPO	Eastern Pacific Ocean
F	Instantaneous fishing mortality rate, a measure of the intensity with which a stock is being exploited. The catch of a stock is roughly proportional to F multiplied by abundance.
FAD	Fish Aggregating Device. An inanimate object that attracts tunas and other marine life. In this report, "FAD" is used broadly for natural logs, as well as man-made objects, both anchored and drifting.
F_{MSY}	(also "Fishing Mortality at MSY" or "MSY Fishing Mortality Level"). This is the level of fishing intensity that, if applied constantly year after year, would result in MSY.
IATTC	Inter-American Tropical Tuna Commission (www.iattc.org)
ICCAT	International Commission for the Conservation of Atlantic Tunas (www.iccat.int)
IO	Indian Ocean
IOTC	Indian Ocean Tuna Commission (www.iotc.org)
ISC	International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (isc.ac.affrc.go.jp)
MSY	The largest average catch or yield that can continuously be taken from a stock under existing environmental conditions. (For species with fluctuating recruitment, the maximum might be obtained by taking fewer fish in some years than in others.)
PBF	Pacific bluefin tuna, *Thunnus orientalis*
PO	Pacific Ocean
RFMO	Regional Fishery Management Organization
SBT	Southern bluefin tuna, *Thunnus maccoyii*
SH	Southern hemisphere
SKJ	Skipjack tuna, *Katsuwonus pelamis*

TERM	MEANING
SPC/OFP	Secretariat of the Pacific Community (Oceanic Fisheries Programme)
SSB_{MSY}	See B_{MSY}.
TAC	Total Allowable Catch
WCPFC	Western and Central Pacific Fisheries Commission (www.wcpfc.int)
WCPO	Western and Central Pacific Ocean
YFT	Yellowfin tuna, *Thunnus albacares*

APPENDIX 1. BYCATCH

Impacts by gear type

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), IATTC (2012), 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. 

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

Pole-and-line fishing. 

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. 

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

Purse seining on FADs. 

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. 

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 (2011) 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. 

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

Tuna traps. 

Migrating schools of bluefin tuna have been caught by traps that are fixed near the shoreline, especially in the eastern Atlantic and Mediterranean. Most of the catch in these traps consists of scombrids, including bluefin, and up to 99% of it is utilized. There are no major bycatch issues known with this passive gear, although it occasionally catches sharks.

RFMO bycatch mitigation and monitoring

The following is a summary of the major mitigation and monitoring measures adopted by the various tuna RFMOs.

CCSBT
Sea birds, sharks and turtles: With only one exception, all CCSBT Members and Cooperating Non-Members are also Parties or Cooperating Parties to IOTC, WCPFC and/or ICCAT. As a consequence, any binding bycatch mitigation measure of these RFMOs is in practice binding on the CCSBT Member/Cooperating Non-Member when fishing within that Convention Area. Additionally, the non-binding Recommendation to Mitigate the Impact on Ecologically Related Species - ERS - of Fishing for Southern Bluefin Tuna (updated 2011) strongly encourages CCSBT members to comply with mitigation measures on sea birds, sharks and sea turtles adopted by ICCAT, IOTC and WCPFC.
Sea birds. Mandatory use of Tori poles is required by all members in all southern bluefin longline fisheries South of 30°S.
Monitoring and mitigation research. CCSBT members are required to exchange information concerning new or refined

techniques to reduce incidental catch of seabirds and cooperate in developing and assessing the effectiveness of such techniques. Most CCSBT Members and Cooperating Non-Members have achieved 10% scientific observer coverage (in catch and effort) for their fisheries; the 10% level is a non-binding target.

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.

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 12-05 requires all parties in 2013 to report on their compliance with Recs. 04-10, 07-06, 09-07, 10-08, 10-07, 11-08, and11-15). 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 and other fisheries also take Atlantic blue and white marlin as bycatch, both of which are thought to be overfished. ICCAT adopted Recommendation 06-09, later superseded by 12-04, a rebuilding plan with catch limits by country.
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.

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 12/09 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 12/09 requires data reporting to IOTC, especially for fisheries targeting sharks.
Sea Turtles. Resolution 12/04 (which supersedes various prior measures) 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 12/06 (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.

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-2010-07 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. CMM-2011-04 prohibits the retention on board of oceanic white tip sharks. CMM-2012-xx prohibits deliberate purse seine sets around whale sharks and requires reporting of interactions. 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 2012-xx requires longliners operating north of 23°N and south of 23°S to use at least two of several mitigation measures such as weighted branch lines or tori (bird-scaring) lines. The measure also encourages mitigation research to be conducted by WCPFC members.
Cetaceans. CMM-2011-03 prohibits deliberate purse seine sets around cetaceans and requires reporting of interactions.
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.

APPENDIX 2. VERSION LOG

DATE	TECH REP.	CHANGES
12/2012	2012-04B	- Updated ICCAT stock status and management - Updated WCPFC stock status and management for tropical tunas - Updated Pacific-wide stock status - Updated CCSBT status and management - Updated general introduction - Modified life-history tables (K. Schaefer review)
07/2012	2012-04A	- Updated EPO stock status - Updated WCPFC, IOTC and IATTC conservation measures adopted in 2012 - Corrected F status for North Pacific albacore - Updated Pacific bluefin catches
04/2012	2012-04	- Added 4 bluefin stocks. - Reformatted entire report - Added Exec. Summary, Glossary and Introductory sections - Reorganized presentation of stocks to match regions
12/2011	2011-04C	- Updated IO stock status to reflect 12/2011 IOTC SC meeting - Updated AO management to reflect 11/2011 ICCAT Comm. meeting
11/2011	2011-04B	- Updated AO stock status to reflect 10/2011 ICCAT SCRS meeting - Updated WCPO stock status to reflect 08/2011 WCPFC SC meeting
08/2011	2011-04A	- Updated EPO management to reflect 06/2011 IATTC Comm. meeting Note: Doc header erroneously labeled "May" instead of "August"
05/2011	2011-04	- Updated EPO stock status to reflect 05/2011 IATTC SAC meeting - Added new rating factor Environment (bycatch) - Added more exhaustive information on RFMO resolutions
02/2011	--	- IOTC stock status update
10/2010	--	- ICCAT stock status update
09/2011	--	- WCPFC stock status update
09/2011	--	- IATTC stock status update
05/2010	--	- Updated entire report - Added color ratings for F and Biomass
05/2009	--	- First stock status report for 19 stocks