Availability: 9 November, 2012
IOTC-2012-SC15-12 [E]

PROVIDED BY CCSBT

Report on Biology, Stock Status and Management of Southern Bluefin Tuna: 2012

The CCSBT Extended Scientific Committee (ESC) conducted a review of fisheries indicators in 2012 to provide updated information on the status of the stock. This report updates description of fisheries and the state of stock, and provides fishery and catch information.

1. Biology

Southern bluefin tuna (*Thunnus maccoyii*) are found in the southern hemisphere, mainly in waters between 30° and 50° S, but only rarely in the eastern Pacific. The only known spawning area is in the Indian Ocean, south-east of Java, Indonesia. Spawning takes place from September to April in warm waters south of Java and juvenile SBT migrate south down the west coast of Australia. During the summer months (December-April), they tend to congregate near the surface in the coastal waters off the southern coast of Australia and spend their winters in deeper, temperate oceanic waters. Results from recaptured conventional and archival tags show that young SBT migrate seasonally between the south coast of Australia and the central Indian Ocean. After age 5 SBT are seldom found in nearshore surface waters, and their distribution extends over the southern circumpolar area throughout the Pacific, Indian and Atlantic Oceans.

SBT can attain a length of over 2m and a weight of over 200kg. Direct ageing using otoliths indicates that a significant number of fish larger than 160cm are older than 25 years, and the maximum age obtained from otolith readings has been 42 years. Analysis of tag returns and otoliths indicate that, in comparison with the 1960s, growth rate has increased since about 1980 as the stock has been reduced. There is some uncertainty about the size and age when SBT mature, but available data indicate that SBT do not mature younger than 8 years (155cm fork length), and perhaps as old as 15 years. SBT exhibit age-specific natural mortality, with M being higher for young fish and lower for old fish, increasing again prior to senescence.

Given that SBT have only one known spawning ground, and that no morphological differences have been found between fish from different areas, SBT are considered to constitute a single stock for management purposes.

2. Description of Fisheries

Reported catches of SBT up to the end of 2011 are shown in Figures 1 - 3. However, a 2006 review of SBT data indicated that there may have been substantial under-reporting of SBT catches and surface fishery bias in the previous 10 - 20 year period and there is currently substantial uncertainty regarding the true levels of total SBT catch over this period. Historically, the SBT stock has been exploited for more than 50 years, with total catches peaking at 81,750t in 1961 (Figures 1 - 3). Over the period 1952 - 2011, 78% of the reported catch was taken by longline and 22% using surface gears, primarily purse-seine and pole&line (Figure 1). The proportion of reported catch made by surface fishery peaked at 50% in 1982, dropped to 11-12 % in 1992 and 1993 and increased again to average 35% since 1996 (Figure 1). The Japanese longline fishery (taking a wide age range of fish) recorded its peak catch of

77,927t in 1961 and the Australian surface fishery catches of young fish peaked at 21,501t in 1982 (Figure 3). New Zealand, the Fishing Entity of Taiwan and Indonesia have also exploited southern bluefin tuna since the 1970s - 1980s, and Korea started a fishery in 1991.

On average 79% of the SBT catch has been made in the Indian Ocean, 17% in the Pacific Ocean and 4% in the Atlantic Ocean (Figure 2). The reported Atlantic Ocean catch has varied widely between about 18t and 8,200t since 1968 (Figure 2), averaging about 817t over the past two decades. This variation in catch reflecting shifts in longline effort between the Atlantic and Indian Oceans. Fishing in the Atlantic occurs primarily off the southern tip of South Africa (Figure 4). Since 1968, the reported Indian Ocean catch has declined from about 45,000t to 8000t, averaging about 20,000t, and the reported Pacific Ocean catch has ranged from about 800t to 19,000t, averaging about 5500t, over the same periods (although SBT data analyses indicate that these catches may be under-estimated).

3. Summary of Stock Status

The 2011 assessment suggested that the SBT spawning biomass is at a very low fraction of its original biomass as well as below the level that could produce maximum sustainable yield. Rebuilding the spawning stock biomass would almost certainly increase sustainable yield and provide security against unforeseen environmental events. The current TAC has been set using the management procedure adopted in 2011, which has a 70% probability of rebuilding to the interim target biomass level by 2035.

Stock prognosis

There is a positive outlook for the SBT stock based on the 2011 assessment, including:

- a continued reduction in the total reported global catch;
- the current fishing mortality has reduced to below F_{msy}; and
- Stock is expected to increase at current catch levels, and future catch levels determined by the MP

Summary of indicators

There have been mixed signals from the indicators in 2012, including:

- longline CPUE has an increasing trend since 2007 and;
- a decrease in the aerial survey index in 2012 to a low level (also seen in the SAPUE and troll survey results). In relation to this, the ESC has identified the need to further examine the factors that may have impacted on the Aerial survey at its 2013 meeting.

4. Current Management Measures

At its Eighteenth annual meeting, the CCSBT agreed that a Management Procedure (MP) would be used to guide the setting of the SBT global total allowable catch (TAC) to ensure that the SBT spawning stock biomass achieves the interim rebuilding target of 20% of the original spawning stock biomass. The CCSBT will set the TAC from 2012 and beyond based on the outcome of the MP, unless the CCSBT decides

otherwise based on information that is not otherwise incorporated into the MP. The adopted MP has the following management parameters:

- The MP is tuned to a 70% probability of rebuilding the stock to the interim rebuilding target reference point of 20% of the original spawning stock biomass by 2035;
- The minimum TAC change (increase or decrease) is 100 tonnes;
- The maximum TAC change (increase or decrease) is 3,000 tonnes;
- The TAC will be set for three-year periods, subject to paragraph 7 of CCSBT's Resolution on Adoption of a Management Procedure; and
- The national allocation of the TAC within each three-year period will be apportioned according to CCSBT's Resolution on the Allocation of the Global Total Allowable Catch.

The CCSBT also adopted the meta-rule process described in Attachment 10 of the Report of the 15th Meeting of the Scientific Committee as the method for dealing with exceptional circumstances in the SBT fishery. The meta-rule process describes: (1) the process to determine whether exceptional circumstances exist; (2) the process for action; and (3) the principles for action.

Catch Limits for future Seasons

In adopting the MP, the CCSBT emphasised the need to take a precautionary approach to increase the likelihood of the spawning stock rebuilding in the short term and to provide industry with more stability in the TAC (i.e. to reduce the probability of future TAC decreases). For the first three-year TAC setting period (2012-2014), the TAC and allocation of the TAC will be as follows:

	2012	**2013**	**2014**[1]
Japan	2,519	2,689	3,366
Australia	4,528	4,698	5,147
Republic of Korea	911	945	1,036
Fishing Entity of Taiwan	911	945	1,036
New Zealand	800	830	909
Indonesia	685	707	750
Philippines	45	45	45
South Africa	40	80[2]	150[2]
European Union	10	10	10
TAC	**10,449**	**10,949**	**12,449**

In addition, some flexibility is provided to Members for limited carry-forward of unfished allocations within the three year period. This flexibility is described in CCSBT's Resolution on Limited Carry-forward of Unfished Annual Total Allowable Catch of Southern Bluefin Tuna within Three Year Quota Blocks.

[1] The allocations shown for 2014 and the proportional allocation shown for Japan are dependent on the TAC for 2014 (these figures assume a TAC of 12,449t) and a compliance review at CCSBT 20 (2013) as described in the Resolution on the Allocation of the Global Total Allowable Catch.

[2] The increased allocation to South Africa in 2013 and 2014 is subject to its accession to the Convention for the Conservation of Southern Bluefin Tuna.

Monitoring, Control and Surveillance Measures

On 1 June 2000, the CCSBT implemented a Trade Information Scheme (TIS) for SBT, in which a CCSBT TIS document must be issued for all exports of SBT. The scheme also requires all Members of the CCSBT to ensure that all imports of SBT are to be accompanied by a completed CCSBT TIS Document, endorsed by an authorised competent authority in the exporting country, and including details of the name of fishing vessel, gear type, area of catch, dates, etc. Shipments not accompanied by this form must be denied entry by Members and Cooperating Non-Members. Completed forms are lodged with the CCSBT Secretariat where they are used to maintain a database for monitoring catches and trade and for conducting reconciliations between exports and imports of SBT.

On 1 July 2004, the CCSBT established a list of fishing vessels over 24 metres in length which were approved to fish for SBT. The list was extended to include all vessels, regardless of size, from 1 July 2005.

On 31 December 2008, the CCSBT established a list of authorised farms that are approved to operate for farming SBT and on 1 April 2009, the CCSBT established a list of carrier vessels that are authorised to receive SBT at sea from large scale fishing vessels. Members and Cooperating Non-Members will not allow the trade of SBT caught by fishing vessels and farms, or transhipped to carrier vessels that are not on these lists.

The CCSBT Vessel Monitoring System (VMS) came into effect immediately after the Fifteenth Annual Meeting of the Commission, on 17 October 2008. It requires CCSBT Members and Cooperating Non-Members to adopt and implement satellite-linked VMS for vessels fishing for SBT that complies with the IOTC, WCPFC, CCAMLR, or ICCAT VMS requirements according to the respective convention area in which the SBT fishing is being conducted. For fishing outside of these areas, the IOTC VMS requirements must be followed.

The CCSBT Transhipment monitoring program came into effect on 1 April 2009. The program applies to transhipments at sea from tuna longline fishing vessels with freezing capacity (referred to as “LSTLVs”). It requires, amongst other things, for carrier vessels that receive SBT transhipments at sea from LSTLVs to be authorised to receive such transhipments and for a CCSBT observer to be on board the carrier vessel during the transhipment. The CCSBT transhipment program is harmonized and operated in conjunction with those of ICCAT and IOTC to avoid duplication of the same measures. ICCAT or IOTC observers on a transhipment vessel that is authorised to receive SBT are deemed to be CCSBT observers provided that the CCSBT standards are met.

The CCSBT Catch Documentation Scheme (CDS) came into effect on 1 January 2010 and replaces the existing TIS system. The CDS provides for tracking and validation of legitimate SBT product flow from catch to the point of first sale on domestic or export markets. As part of the CDS, all transhipments, landings of domestic product, exports, imports and re-exports of SBT must be accompanied by the appropriate CCSBT CDS Document(s), which will include a Catch Monitoring Form and possibly a Re-

Export/Export After Landing of Domestic Product Form. Similarly, transfers of SBT into and between farms must be documented on either a Farm Stocking Form or a Farm Transfer Form as appropriate. In addition, each whole SBT that is transhipped, landed as domestic product, exported, imported or re-exported must have a uniquely numbered tag attached to it and the tag numbers of all SBT (together with other details) will be recorded on a Catch Tagging Form. Copies of all documents issued and received will be provided to the CCSBT Secretariat on a quarterly basis for compiling to an electronic database, analysis, identification of discrepancies, reconciliation and reporting.

5. Scientific Advice

Consistent with the MP, the ESC recommended, based on the Review of indicators, the 2011 stock assessment, MP inputs and the preliminary outcomes of the close kin analysis, that there is no need to revise the Commission's 2011 TAC decision.

6. Biological State and Trends

The ESC did not conduct a model based assessment at its 2012 meeting, so the information presented here is from the 2011 meeting of the ESC. Analyses suggest the SBT spawning biomass is at a very low fraction of its original biomass as well as below the level that could produce maximum sustainable yield. Rebuilding the spawning stock biomass would almost certainly increase sustainable yield and provide security against unforeseen environmental events. Catches at the current TAC are expected to achieve rebuilding.

Exploitation rate: Moderate (Below F_{MSY})
Exploitation state: Overexploited
Abundance level: Low abundance

SOUTHERN BLUEFIN TUNA SUMMARY FROM ESC in 2011 (global stock)	
Maximum Sustainable Yield	34,500 t (31,100-36,500t)[13]
Reported (2010) Catch	9547t
Current Replacement Yield	27,200 t (22,200–32,800 t)
Current (2011) Spawner Biomass	45,400 (31,022–72,700 t)
Current (2011) Depletion	0.055 (0.035–0.077)
Spawner Biomass (2011) Relative to SSB_{msy}	0.229 (0.146–0.320)
Fishing Mortality (2010) Relative to F_{msy}	0.76 (0.52–1.07)
Current Management Measures	Effective Catch Limit for Members and Cooperating Non-Members combined averaged 9449t annually over 2010-2011, 10449t in 2012, and 10949t in 2013.

[3] Median and range from lower 5th to upper 95th percentile of 320 models contained in the base case

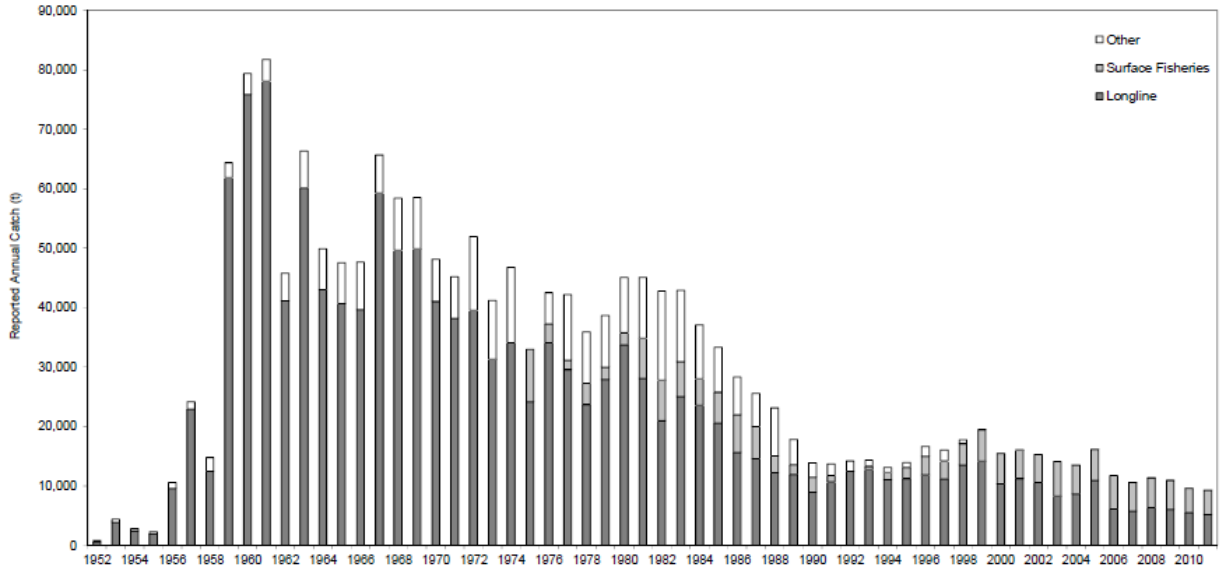

Figure 1: Reported southern bluefin tuna catches by fishing gear, 1952 to 2011. Note: a 2006 review of SBT data indicated that catches over the past 10 to 20 years may have been substantially under-reported.

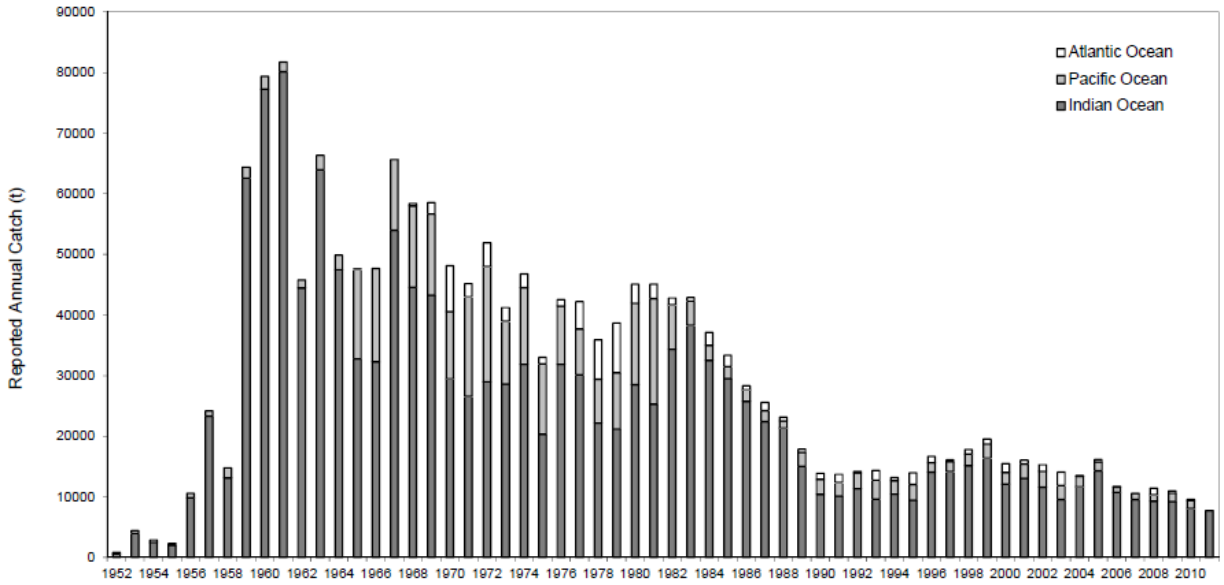

Figure 2: Reported southern bluefin tuna catches by ocean, 1952 to 2011. Note: a 2006 review of SBT data indicated that catches over the past 10 to 20 years may have been substantially under-reported.

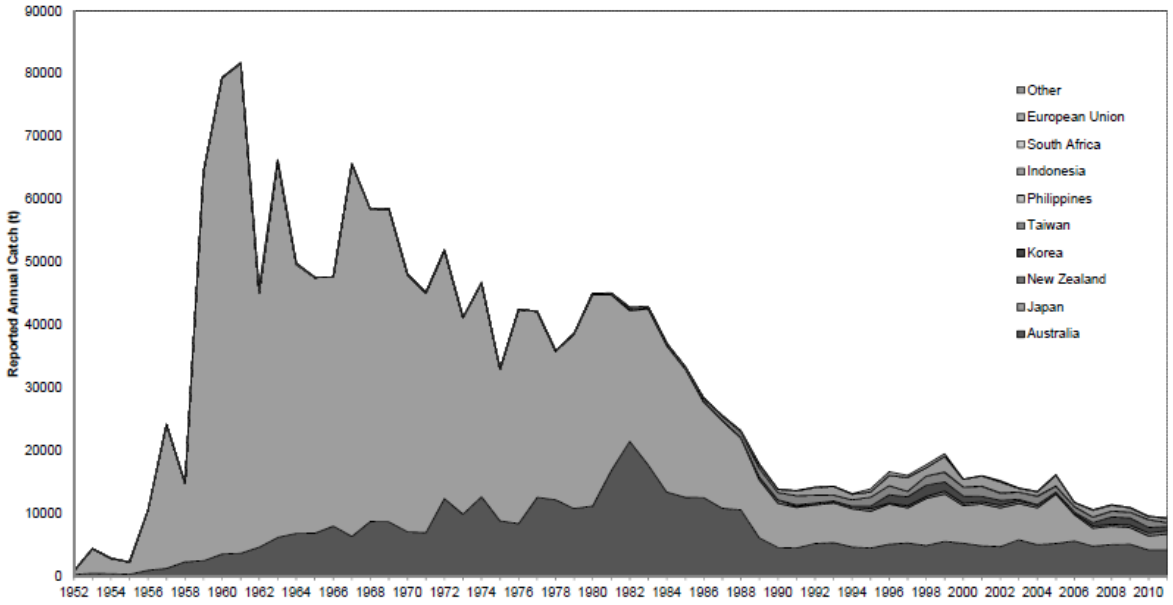

Figure 3: Reported southern bluefin tuna catches by flag, 1952 to 2011. Note: a 2006 review of SBT data indicated that catches over the past 10 to 20 years may have been substantially under-reported.

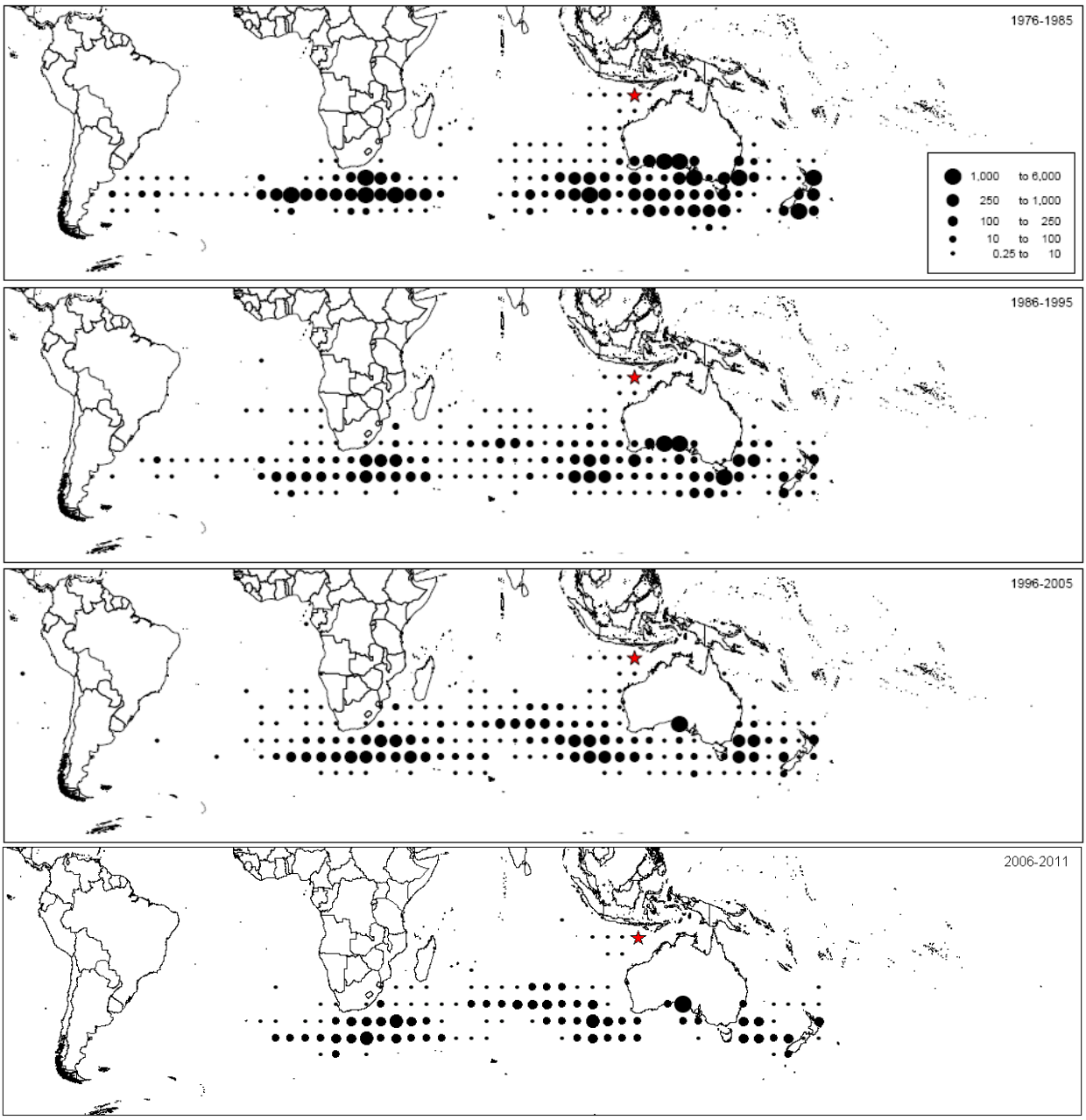

Figure 4: Geographical distribution of average annual southern bluefin tuna catches (t) by CCSBT members and cooperating non-members over the periods 1976-1985, 1986-1995, 1996-2005 and 2006-2011 per 5° block by oceanic region. The area marked with a star is an area of significant catch in the breeding ground. Block catches averaging less than 0.25 tons per year are not shown. Note: This figure may be affected by past anomalies in catch.

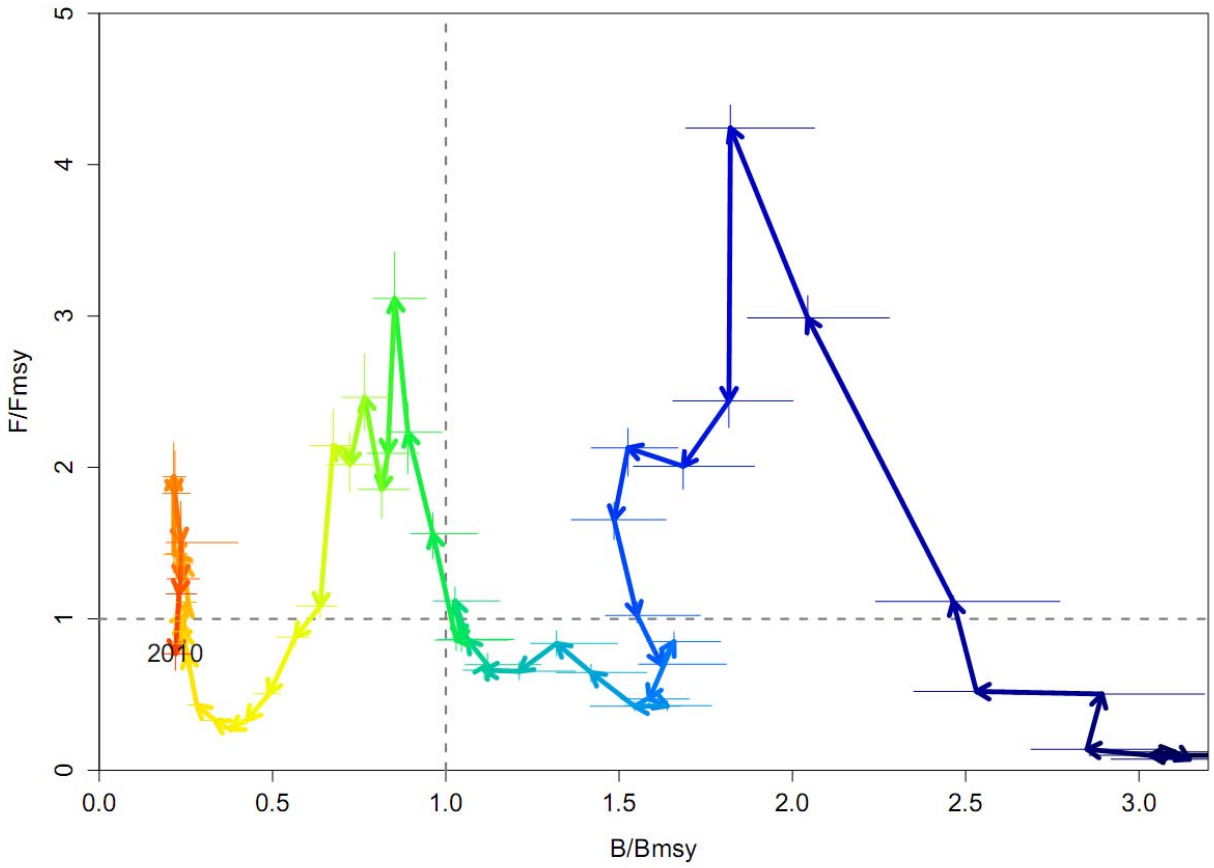

Figure 5. Time trajectory from 1952 to 2010 of median fishing mortality over the F_{msy} (for ages 2-15) versus spawning biomass (B) over B_{msy}. The fishing mortality rates are based on biomass-weighted values and the relative fishery catch composition and mean SBT body weights in each year. Vertical and horizontal lines represent 25^{th}-75^{th} percentiles from the operating model grid.