

TEMPLATE FOR RESOURCE EXECUTIVE SUMMARIES

PREPARED BY: IOTC SECRETARIAT, 13 JUNE 2011

PURPOSE

To encourage the Working Party on Billfish (WPB) to develop clear and concise draft Executive Summaries for billfish species for the consideration of the Scientific Committee.

BACKGROUND

Each year the IOTC Scientific Committee (SC) provides stock status advice and recommendations to the Commission in two main formats based on stock assessments or other stock status indicators determined by the relevant Working Party, for each of the tuna and tuna-like species under the IOTC mandate. Firstly, advice is tabulated at the front of the SC report and includes recent annual catches, maximum sustainable yield estimates and the ratio of average catch to the MSY levels, in conjunction with stock status advice to the Commission. Secondly, a more detailed stock status description is provided in the report text outlining the current stock status, recommendations to the Commission and in some cases an outlook section. These two forms of advice are generally combined into an Executive Summary for each stock during the SC meeting however, due to time limitations the SC places little emphasis on how the information is presented in the Executive Summaries.

In 2009, the IOTC performance review panel published a report outlining 75 recommendations to improve the functioning of the IOTC (Anon 2009¹). Recommendation 30 from the review states: “New guidelines for the presentation of more user friendly scientific reports in terms of stock assessments should be developed. ...”.

The advice provided by the working parties and the SC has at times, been unclear with some stocks being classified within one of the status categories based on fully quantitative stock assessments (e.g. yellowfin tuna) while others are given a status based on little more than qualitative evidence such as unstandardised catch-per-unit-effort series (e.g. skipjack tuna). As such, there is a clear need for the working parties to provide the SC with a clear set of recommendations and advice concerning stock status.

Stock status classifications: The IOTC currently uses the reference points of SB_{MSY} (or B_{MSY}) and F_{MSY} in providing its advice on stock status to the Commission and typically represents the advice as a ratio of current spawning biomass (SB_{curr}), total biomass (B_{curr}) or fishing rates/mortality to SB_{MSY} , B_{MSY} and F_{MSY} respectively; species with current spawning biomass estimates $<SB_{MSY}$ or $<B_{MSY}$ are considered **overfished**, and fishing mortality $>F_{MSY}$ is considered **overfishing**. There are currently no agreed harvest strategies, explicit target of limit reference points or decision rules that are followed when reference points are being approached or have been reached. Stocks of tuna and tuna-like species under the IOTC mandate are currently classified independently in each of the two categories described above (**overfished** and **overfishing**). Within these two categories there is a positive and a negative, as well as an uncertain status as detailed below:

Overfished refers to the spawning biomass or total biomass of a fish stock. A status of **overfished** would indicate that the spawning biomass or total biomass may be inadequate to sustain the stock in the long term—the stock has a spawning biomass or total biomass below the default limit reference point. The IOTC currently uses the spawning biomass or total biomass, depending on the stocks and assessment method that produces the maximum sustainable yield (SB_{MSY} or B_{MSY}) as a default. The ratio of current spawning biomass (SB_{curr}) to SB_{MSY} or of current total biomass (B_{curr}) to B_{MSY} is used as an indicator. On this basis a stock is considered **overfished** if the ratio of SB_{curr}/SB_{MSY} or B_{curr}/B_{MSY} is less than 1.

¹ Anon. 2009, Report of the IOTC Performance Review Panel, January 2009, Indian Ocean Tuna Commission.

Not overfished refers to the spawning biomass or total biomass of a fish stock. A status of **not overfished** would indicate that the spawning biomass or total biomass is adequate to sustain the stock in the long term and the stock has a spawning biomass or total biomass above the default limit reference point. The IOTC currently uses the spawning biomass or total biomass that produces the maximum sustainable yield as a default (SB_{MSY} or B_{MSY}). The ratio of current spawning biomass (SB_{curr}) to SB_{MSY} or of the current total biomass (B_{curr}) to B_{MSY} is used as an indicator. Therefore, a stock is considered **not overfished** if the ratio of SB_{curr}/SB_{MSY} or B_{curr}/B_{MSY} is greater than 1.

Subject to overfishing refers to the rate of fishing. The stock is subject to a level of fishing pressure that would move the stock to an **overfished** state, or prevent it from returning to a **not overfished** state; more technically, the rate of fishing exceeds the limit reference point. The IOTC currently uses the rate of fishing that produces the maximum sustainable yield (F_{MSY}) as a default. The ratio of current fishing rate/mortality (F_{curr}) to F_{MSY} is used as an indicator. Therefore, a stock is considered **subject to overfishing** if the ratio of F_{curr}/F_{MSY} is greater than 1. **Note:** Fishing mortality in excess of F_{MSY} (F_{curr}/F_{MSY} is greater than 1) is not defined as overfishing if the stock is well above the B_{MSY} level. However, this level is not currently defined.

Not subject to overfishing refers to the rate of fishing. The stock is not subject to a level of fishing pressure that would move the stock to an **overfished** state—the rate of fishing does not exceed the limit reference point. The IOTC currently uses the rate of fishing that produces the maximum sustainable yield (F_{MSY}) as a default. The ratio of current fishing rate/mortality (F_{curr}) to F_{MSY} is used as an indicator. Therefore, a stock is considered **not subject to overfishing** if the ratio of F_{curr}/F_{MSY} is less than 1.

Uncertain refers to the overfished or overfishing status of a fish stock for which there is inadequate information to determine status.

DISCUSSION

The advice and recommendations provided to the Commission varies greatly among the reports of the various Working Parties depending on the indicators used to determine stock status and the level of information available to the Working Parties and SC. Where possible, indicators should be standardised and a minimum level of information be contained in the resource Executive Summaries. To this aim, a Template for Resource Executive Summaries has been developed (Attachment A) so that the WPB may more readily communicate its opinion of stock status to the Scientific Committee.

RECOMMENDATION

That the WPB **note**:

- 1) that Recommendation 30 from the IOTC performance review panel states: “New guidelines for the presentation of more user friendly scientific reports in terms of stock assessments should be developed. ...”.)
- 2) that, at the 15th Session of the Indian Ocean Tuna Commission, the Commission made the following request of the Scientific Committee, and by default, the Working Parties: “*The Commission noted the provision by the Scientific Committee of the Kobe II matrix for bigeye tuna and swordfish, and recognized that it is a useful and necessary tool for management. The Commission requests that such matrices be provided for all stock assessments by the species Working Parties, in particular for yellowfin tuna, and for these to be included in the report of the Scientific Committee in 2011 and all future reports.*” (IOTC-2011-S15-R, para. 37)
- 3) the new Executive Summary format to be used in developing the draft resource Executive Summaries for the Scientific Committee’s consideration.

That the WPB **recommends**:

- 1) that the Scientific Committee **note** the current definition of overfishing used by the IOTC, where fishing mortality is in excess of F_{MSY} (F_{curr}/F_{MSY} is greater than 1) is considered overfishing

- 2) that the Scientific Committee **note** that fishing mortality in excess of F_{MSY} is not usually defined as overfishing if the stock is well above the B_{MSY} level, although no specific threshold has been defined
- 3) that the Scientific Committee **consider** the current definition of overfishing ($F_{curr}/F_{MSY} > 1$), and determine that if in situations where the biomass of a given stock is well above B_{MSY} , but $F_{curr}/F_{MSY} > 1$, under what circumstances should a stock be classified as subject to overfishing.

ATTACHMENTS

Attachment A: Revised template for resource Executive Summaries.

**ATTACHMENT A:
TEMPLATE FOR RESOURCE EXECUTIVE SUMMARIES
STATUS OF THE INDIAN OCEAN [XXXXXXX] RESOURCE
(*SCIENTIFIC NAME*)**

TABLE 1. Status of [*species common name*] (*scientific name*) in the Indian Ocean.

Area ¹	Indicators – YYYY assessment		YYYY assessment
			YYYY ²
Indian Ocean	Average catch yyyy–yyyy:	xx,xxx t	Example only
	Catch YYYY:	xx,xxx t	
	MSY (define range):	xx,xxx t (xx,xxx t–xx,xxx t)	
	F _{yyyy} /F _{MSY} (define range):	x.xx (x.xx–x.xx)	
	SB _{yyyy} /SB _{MSY} (define range):	x.xx (x.xx–x.xx)	
	SB _{yyyy} /SB ₀ (define range):	x.xx (x.xx–x.xx)	

¹Boundaries for the Indian Ocean stock assessment are defined in Fig. 1.

²The stock status refers to the most recent years' data used for the assessment.

Colour key	Stock overfished (SB _{year} /SB _{MSY} < 1)	Stock not overfished (SB _{year} /SB _{MSY} ≥ 1)
Stock subject to overfishing (F _{year} /F _{MSY} > 1)		
Stock not subject to overfishing (F _{year} /F _{MSY} ≤ 1)		

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status

(text describing the current stock assessment outputs in terms of MSY-based ref points) e.g. Comparison across models suggests that current catches are near the level of MSY. However, MSY-based reference points were not exceeded for the Indian Ocean population as a whole (F₂₀₁₀/F_{MSY} < 1; SB₂₀₁₀/SB_{MSY} > 1) (Table 1). Spawning stock biomass was estimated to have declined by approximately xx% in 2010 from unfished levels (Table 1).

Outlook

(text outlining what the likely impact on the stock will be given recent fishing trends) e.g. The continued decrease in longline catch and effort in recent years has substantially lowered the pressure on the Indian Ocean stock as a whole, indicating that current fishing mortality does not represent an immediate sustainability risk. However, as recent catches exceed some of the more pessimistic MSY estimates, a precautionary management approach is warranted.

Recommendations to the Scientific Committee

The WPB agreed that:

- 1) the Maximum Sustainable Yield estimate for the (area) is xx,xxx t and annual catches of (species common name) should not exceed this estimate.
- 2) (rec 2)
- 3) [text about the Kobe matrix required].

TABLE 2. Kobe II Strategy Matrix for the xxxxxx assessment. Table entries are the probability of violating the MSY-based reference points for three constant catch projections (current catch level – 0% change, catches 20% less than, 20% above current catches, projected for 3 and 10 years. The catch levels are provided in brackets.

Stock Status Reference Point	Projection Time frame	Alternative Catch Projections		
		C(year) -20% (x,xxx t)	C(year) (x,xxx t)	C(year)+20% (x,xxx t)
P(F _t /F _{MSY})	In 3 years	x.xxx	x.xxx	x.xxx
	In 10 years	x.xxx	x.xxx	x.xxx
P(SB _t /SB _{MSY})	In 3 years	x.xxx	x.xxx	x.xxx
	In 10 years	x.xxx	x.xxx	x.xxx

SUPPORTING INFORMATION (EXAMPLE ONLY)

(Information collated from reports of the Working Party on Billfish and other sources as cited)

CONSERVATION AND MANAGEMENT MEASURES

[resource] in the Indian Ocean are currently subject to a number of conservation and management measures adopted by the Commission:

- Resolution 09-02 *On the implementation of a limitation of fishing capacity of contracting parties and cooperating non-contracting parties*. This resolution applies a freezing of fishing capacity for fleets targeting [resource] in the Indian Ocean to levels applied in 2007. The resolution limits vessels access to those that were active (*effective presence*) or under construction during 2007, and were over 24 metres overall length, or under 24 meters if they fished outside the EEZs. At the same time the measure permits CPCs to vary the number of vessels targeting [resource], as long as any variation is consistent with the national fleet development plan submitted to the IOTC, and does not increase effective fishing effort. This resolution is effective for 2010 and 2011.
- Resolution xx-xx
- Resolution xx-xx

FISHERIES INDICATORS

General

[resource] (*scientific name*) is a large oceanic apex predator that inhabits all the world's oceans. Throughout the Indian Ocean, [resource] are primarily taken by longline fisheries, and commercial harvest was first recorded by the Japanese in the early 1950's as a bycatch/byproduct of their tuna longline fisheries (ref). [resource] life history characteristics, including a relatively late maturity, long life and sexual dimorphism, make the species vulnerable to over exploitation. Table 4 outlines some of the key life history traits of swordfish specific to the Indian Ocean.

TABLE 4. Biology of Indian Ocean [resource] (*scientific name*)

Parameter	Description
Range and stock structure	Northern coastal state waters to 50°S. Juvenile [resource] are commonly found in tropical and subtropical waters and migrate to higher latitudes as they mature. Large, solitary adult [resource] are most abundant at 15–35°S. Males are more common in tropical and subtropical waters. By contrast with tunas, [resource] is not a gregarious species, although densities increase in areas of oceanic fronts and seamounts. Extensive diel vertical migrations, from surface waters during the night to depths of 1000 m during the day, in association with movements of the deep scattering layer and cephalopods, their preferred prey. For the purposes of stock assessments, one pan-ocean stock has been assumed. However, spatial heterogeneity in stock indicators (catch-per-unit-effort trends) indicates the potential for localised depletion of [resource] in the Indian Ocean.
Longevity	30+ years
Maturity (50%)	Age: females 6–7 years; males 1–3 years Size: females ~170 cm lower-jaw FL; males ~120 cm lower-jaw FL
Spawning season	Highly fecund batch spawner. May spawn as frequently as once every three days over a period of several months in spring. Spawning occurs from October to April in the vicinity of Reunion Island.
Size (length and weight)	Maximum: 455 cm lower-jaw FL; 550+ kg total weight in the Indian Ocean. Sexual dimorphism in size, growth rates and size and age at maturity—females reach larger sizes, grow faster and mature later than males. Most [resource] larger than 200 kg are female. Recruitment into the fishery: varies by fishing method; ~60 cm lower-jaw FL for artisanal fleets and methods. By one year of age, a [resource] may reach 90 cm lower-jaw FL (~15 kg). The average size of [resource] taken in Indian Ocean longline fisheries is between 40 kg and 80 kg (depending on latitude).

SOURCES: Froese & Pauly (2009); Poisson & Fauvel (2009);other.....

Catch trends

(Text describing the latest Catch trends in terms of what factors have influence the trends) (Figs. 2, 3 and. 4).

Effort trends

(Text describing the latest Effort trends in terms of what factors have influence the trends) (Fig. 5).

Standardised catch-per-unit-effort (CPUE) trends

(Text describing the latest CPUE trends) (Fig. 6).

Fish size or age trends (e.g. by length, weight, sex and/or maturity)

(Text describing the latest fish size or age trends) (Fig. 7).

STOCK ASSESSMENT

(text detailing the most recent stock assessments) e.g. A new stock assessment for [resource] was undertaken in 2011, including a range of models and stock structure assumptions. ASPIC and ASIA models assumed a single homogenous Indian Ocean population. The SS3 model assumed a single spawning population, with the potential for differential depletion in each of four areas. The stock status reference points obtained from the range of models varied considerably, but a number of general consistencies were evident. This summary attempts a qualitative summary across models and data-based indicators.

e.g. The stock status reference points from the range of models for the aggregate Indian Ocean were generally consistent, in that the point estimates suggested $B > B_{MSY}$ and $F < F_{MSY}$ for all models, although there was a large range in the uncertainty estimates (Table 5). The central tendency of the depletion and MSY estimates are very similar, and the variability is mostly in the degree of uncertainty expressed. All of the models suggest that depletion is moderate, within the range $x.xx - x.xx (B_{2008}/B_0)$. MSY estimates varied from xx,xxx t to xx,xxx t, with many models having point estimates of $\sim xx,xxx$ t. The WPB considered that the Kobe plot from one of the models (Fig. 8) provided a useful descriptive summary of the general trends of the Indian Ocean models for recent years (although the uncertainty is understated relative to the full range of results and B/B_{MSY} is on the pessimistic end of the range).

TABLE 5. (Common name) stock status summary.

Management quantity	YYYY Assessment	YYYY Assessment
Most recent catch estimate	xx,xxx t (YYYY)	xx,xxx t (YYYY)
Mean catch over the last 5 years (YYYY-YYYY)	xx,xxx t	xx,xxx t
Maximum Sustainable Yield	xx,xxx t ⁽¹⁾ Range ⁽¹⁾ : $xx,xxx - xx,xxx$ t	xx,xxx t ⁽¹⁾ Range ⁽¹⁾ : $xx,xxx - xx,xxx$ t
Current data period (Current)	End of YYYY	End of YYYY
$F_{Current}/F_{MSY}$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$
$B_{Current}/B_{MSY}$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$
$SB_{Current}/SB_{MSY}$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$
$B_{Current}/B_0$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$
$SB_{Current}/SB_0$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$
$B_{Current}/B_{Current,F=0}$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$
$SB_{Current}/SB_{Current,F=0}$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$	$x.xx$ ⁽¹⁾ Range ⁽¹⁾ : $x.xx - x.xx$

⁽¹⁾Central point estimate is adopted from the XXXX model, the range represents the most extreme value from the XXXX bootstrap results and the XXXX estimates from the XXXX and XXXX models.

LITERATURE CITED

Froese, R, & Pauly, DE 2009. *FishBase*, version 02/2009, FishBase Consortium, <www.fishbase.org>.

Others.....etc. etc.....

Figure 1. Areas of the Indian Ocean used in the stock assessments from YYYY.

Figure 2. Catches of (species) per gear and year recorded in the IOTC Database (YYYY to YYYY). Data as of MMM YYYY.

Figure 3. Trends of the (species) catches in the western and the eastern area of the Indian Ocean from YYYY to YYYY. Division between east and west is determined based on the boundary between FAO statistical areas 51 and 57. Data as of MMM YYYY.

Figure 4. Mean annual catches of (species) (t) for the periods YYYY to YYYY and YYYY to YYYY for longline, gillnet and other fisheries in the Indian Ocean.

Figure 5. Fishing effort targeting (species) for the periods YYYY to YYYY and YYYY to YYYY for longline, gillnet and other fisheries in the Indian Ocean.

Figure 7. Trends in average size of (species) per gear in the Indian Ocean from YYYY to YYYY.

Figure 8. Kobe plot illustrated the result of the xxxxx model.

APPENDIX A. Best scientific estimates of the catches of (species) (as adopted by the IOTC Scientific Committee) by gear and main fleets for the period 1999-2010 (in tonnes). Data as of MMMM 2011.

Fishery	Percentage	Year											
		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 ³
ALGI													
AUEL													
EUEL													
ISEL													
JPLL													
TWFL													
TWLL													
Total	100												

APPENDIX B. Best scientific estimates of the catches of (species) (as adopted by the IOTC Scientific Committee) by region for the period 1999-2010 (in tonnes). Data as of MMMM YYYY.

Area	Percentage	Year											
		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010 ³
NE													
NW													
SE													
SW													
Total	100												