TEMPLATE FOR RESOURCE EXECUTIVE SUMMARIES

PREPARED BY: IOTC SECRETARIAT, 3 NOVEMBER 2011

PURPOSE

To encourage the Working Party on Neritic Tunas (WPNT) to develop clear and concise draft resource Executive Summaries 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 2009[1]). 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.

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

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

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 than1.

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 WPNT may more readily communicate its opinion of stock status to the Scientific Committee.

RECOMMENDATION

That the WPTT **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 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

3) the new Executive Summary format to be used in developing the draft resource Executive Summaries for the Scientific Committee's consideration.

That the WPTT **recommends**:

1) that the IOTC Secretariat **update** the draft stock status summaries with 2010 catch data once obtained, and for these to be provided to the Scientific Committee as part of the Draft Executive Summaries, for its consideration.

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 stock status assessment**
			YYYY[2]
Indian Ocean	Catch yyyy:	xx,xxx t	Example only
	Average catch yyyy–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)	

[1]Boundaries for the Indian Ocean stock assessment are defined in Fig. 1 [or – as the IOTC area of competence.]
[2]The 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 ($SB_{year}/SB_{MSY} \geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY} > 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$)		

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 ($F_{2010}/F_{MSY} < 1$; $SB_{2010}/SB_{MSY} > 1$) (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; Tables 5 and 6).

TABLE 5. Best scientific estimates of the catches of (species) by gear and main fleets [or type of fishery] for the period YYYY–YYYY (in tonnes). Data as of MMMM 2011. [example row and column heading only]

	By decade (average)						By year (last ten years)									
Fishery	**1950s**	**1960s**	**1970s**	**1980s**	**1990s**	**2000s**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
AUEL																
EUEL																
ISEL																
JPLL																
TWLL																
TWFL																
ALGI																
Total																

Fisheries: Swordfish longline Australia (**AUEL**); Swordfish longline EU and assimilated (**EUEL**); Swordfish longline semi-industrial (**ISEL**); Longline Japan and assimilated (**JPLL**); Longline Taiwan,China and assimilated (**TWLL**); Fresh tuna longline (**TWFL**); Other fisheries (**ALGI**)

TABLE 6. Best scientific estimates of the catches of (species) by fishing area for the period 1950-2009 (in metric tons). Data as of MMMM YYYY. [example row and column heading only]

	By decade (average)						By year (last ten years)									
Area	**1950s**	**1960s**	**1970s**	**1980s**	**1990s**	**2000s**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
NW																
SW																
WS																
NE																
SE																
ES																

Areas: Northwest Indian Ocean (**NW**); Southwest Indian Ocean (**SW**); South Indian Ocean, western (**WS**); Northeast Indian Ocean (**NE**); Southeast Indian Ocean (**SE**); South Indian Ocean, eastern (**ES**)

Uncertainty of time–area catches

Retained catches are [well or poorly] known (Fig.5); however catches are uncertain for [example text only]:

- **Drifting gillnet** fisheries of **Iran** and **Pakistan**: To date, Iran has not reported catches of swordfish for its gillnet fishery. Although Pakistan has reported catches of swordfish they are considered to be too low for a driftnet fishery.
- **Longline** fishery of **Indonesia**: The catches of swordfish for the fresh tuna longline fishery of Indonesia may have been underestimated in recent years due to insufficient sampling coverage. Although the new catches estimated by the Secretariat are thought to be more accurate, swordfish catches remain uncertain, especially in recent years.
- **Longline** fishery of **India: India** has reported very incomplete catches and catch-and-effort data for its longline fishery. Although the new catches estimated by the Secretariat are thought to be more accurate, catches of swordfish remain uncertain.

Effort trends

(Text describing the latest Effort trends in terms of what factors have influence the trends) (Fig. 6).

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

(Text describing the latest CPUE trends) (Fig. 7).

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

(Text describing the latest fish size or age trends) (Fig. 8).

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 7). 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 ~xx,xxx t. The WPB considered that the Kobe plot from one of the models (Fig. 9) 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 7. (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. Uncertainty of time-area catches for swordfish (Data as of MMM YYYY)

Figure 6. 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. Standardised catch–per–unit–effort (CPUE) trends.

Figure 8. Trends in average size of (species) per gear in the Indian Ocean from YYYY to YYYY.

Figure 9. Kobe plot illustrated the result of the xxxxx model**.**