

## UPDATED INDICATORS FOR ICCAT SPECIES THAT ARE RETAINED AND ASSESSED

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### SUMMARY

*An update of the assessed species indicator is provided. This indicator tracks the status ( $B/B_{msy}$  and  $F/F_{msy}$ ) of all assessed stocks over time. Additionally, the status of all stocks is shown for the terminal year assessed and a completed indicator checklist is included.*

### RÉSUMÉ

*Ce document présente une mise à jour de l'indicateur de l'espèce évaluée. Cet indicateur suit l'évolution de l'état ( $B/B_{PME}$  et  $F/F_{PME}$ ) de tous les stocks évalués au fil du temps. De plus, l'état de tous les stocks est présenté pour l'année finale évaluée et une liste de contrôle des indicateurs complète est incluse.*

### RESUMEN

*Se facilita una actualización del indicador de las especies evaluadas. Este indicador hace un seguimiento del estado ( $B/B_{RMS}$  y  $F/F_{RMS}$ ) de todos los stocks evaluados a lo largo del tiempo. Además, se muestra el estado de todos los stocks para el año terminal evaluado y se incluye una lista de comprobación del indicador cumplimentada.*

### KEYWORDS

*Assessed stocks, ICCAT, indicator, checklist*

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## 1. Introduction

In 2017 the ICCAT Sub-committee on Ecosystems developed a work plan that included a proposal to develop a prototype Ecosystem report card for the ICCAT Commission to review in 2018. The development and reporting process has been repeated in every year since then. In 2019 the Sub-committee discussed the update of the multispecies B/B<sub>MSY</sub> and F/F<sub>MSY</sub> indicators. It was noted that these indicators were not easily updated since the B/B<sub>MSY</sub> and F/F<sub>MSY</sub> ratios of some assessed species were undetermined (i.e., stock status based on F<sub>0.1</sub> strategy). The Sub-Committee recommended to update the multispecies B/B<sub>MSY</sub> and F/F<sub>MSY</sub> indicators and categorize those stocks with undetermined ratios in a different category. The Sub-Committee also recommended to plot the terminal B/B<sub>MSY</sub> and F/F<sub>MSY</sub> ratios of all stocks into one Kobe plot to provide a synoptic view of the state of all ICCAT assessed stocks.

This update reflects the recommendations of the Subcommittee and includes the outputs from assessments occurring before 2020.

## 2. Methods

### 2.1. Indicators

A suite of candidate indicators were described in Hanke et al. (2018) and considered for representing the impact of ICCAT management and fisheries on the assessed species. Some were rejected and others required further work. We repeat them here and comment on their current status.

*Proportion of retained stocks/species assessed in ICCAT over time (not accepted)*

This indicator was to reflect the progress made by ICCAT to assess the status of all retained species and should be considered for inclusion in the retained but non-assessed species component of the report card. Obtaining data for this indicator would involve reviewing the historical documents for evidence of first assessment and would also require a definition of what assessed means and the definition of an ICCAT species.

*Composite multi-stock B/B<sub>msy</sub> and F/F<sub>msy</sub> ratios over time (requires further work)*

Composite multi-stock B/B<sub>msy</sub> and F/F<sub>msy</sub> ratio indicators were reviewed by the Ecosystems Subcommittee in 2017 and the Group expressed concerns regarding not reflecting the uncertainty in the individual ratio estimates in the composite ratio. It was felt that there was no appropriate reference level for this type of indicator and that interpretation of trends would then be problematic. Representing the overall status of the assessed part of the ecosystem in this way was considered to be an approach to be explored further and was therefore not adopted here.

*Proportion or number of assessed stocks with a harvest strategy in place over time (not done)*

*Proportion or number of assessed stocks with adopted harvest control rules over time (not done)*

The development of indicators that focus on ICCAT's progress in implementing advanced management objectives for its assessed stocks was considered but not attempted due to time constraints.

*Number of stocks in healthy, cautious and critical states over time*

Both B/B<sub>msy</sub> and F/F<sub>msy</sub> are available for all the assessed stocks except those using MSY reference points. This indicator identifies the number of stocks that fall between reference points set for the F and B ratios. The target and lower limit reference points for biomass are 1\*B<sub>msy</sub> and 0.4\*B<sub>msy</sub>, respectively and similarly for fishing mortality are 1\*F<sub>msy</sub> and 1.4\*F<sub>msy</sub>. When the stock is at or above the target it is considered healthy. If it is at or above the lower limit but below the target the stock is in the cautious zone. Below the lower limit the stock is in the critical zone.

The biomass and fishing mortality ratio data was sourced from the most recent assessments occurring up to the end of 2019. Eastern and Western Atlantic Bluefin tuna are the only stocks assessed against a F<sub>0.1</sub> reference point. Given that it was not determined if these stocks were overfished, this is reflected in the indicator plot by black points.

Species Working Groups provided the data upon request and in many cases provided results from multiple model runs and modeling platforms. When this occurred, representative biomass and fishing mortality ratios were derived from the median value across all available runs and models. Given the varied assessment schedule, stock status was not always available up to 2019 (**Table 1**) and so it was assumed that the status in the last year assessed was valid in the intervening period (i.e. from the terminal year of the assessment to 2019).

From this data, the total number of assessed stocks that met the biomass and fishing mortality criteria (defined below) was determined (**Table 2**). Indicator plots based on this data are provided in **Figure 1** and **Figure 2**.

*Kobe phase plot of overfishing and overfished state* (approved for use).

The Kobe Process integrates the status of stocks based on both biomass and fishing mortality targets and is best visualized by the Kobe Plot. **Figure 3** shows the  $B/B_{msy}$  and  $F/F_{msy}$  for all stocks in their terminal year.

## **2.2 Data**

Both  $B/B_{msy}$  and  $F/F_{msy}$  was available for all the assessed stocks, however accessing the information was not easy because, in most cases, it was not always part of the assessment document. Though the SCRS has introduced the task of data rapporteur at assessment meetings to ensure that all relevant model inputs and outputs have been preserved, this measure did not address the recovery of all past assessment model outputs. Furthermore it was not clear where this information currently resided and how one could obtain it. It is still recommended that a link to the information be made available on the ICCAT website homepage.

## **2.3 Regions**

The indicators reflect the convention wide success of ICCAT in achieving its management goals for the assessed stocks.

## **2.4 Goals and Objectives**

Goal: Ensure conservation and optimum utilization of the retained assessed stocks.

Objective: Determine if the status of retained assessed stocks, based on biomass and fishing ratio indicators, is improving.

## **2.5 Indicator Checklist**

The indicator checklist (**Table 3**) is a tool for evaluating whether a given indicator meets the component objectives and it identifies operational issues related to the data, expertise, capacity and the involvement of the Secretariat. The primary issue is in accessing the data. Minimal Secretariat resources are required on an annual basis.

## **3. Interpretation**

More than half of all assessed stocks are overfished and two are below  $.4B_{MSY}$  (**Figure 1** and **2**). Two stocks have an undetermined overfished status. The overfished state of all stocks has been improving slowly since the early 2000s and lags behind the reduction in overfishing. Since 2000 there has been a 100% increase in the number of stocks not subject to overfishing. Currently 2/3rds of all stocks are no longer experiencing overfishing but 5 of those that are are above  $1.4F_{MSY}$ .

The Kobe phase plot (**Figure 3**) identifies particular stocks that are overfished or experiencing overfishing. The stocks that are currently in the greatest jeopardy are Mediterranean Swordfish (SWO), eastern Atlantic Sailfish (SAI) and north Atlantic Shortfin mako (SMA). A feature that would improve the interpretation of each stock's status is an indication of the stock trajectory. The trajectory would indicate if stocks are responding positively to the implementation of management recommendations.

## References

Hanke, A.R., Juan-Jordá, M. J. and Coelho, R. 2028. Indicators for ICCAT species that are retained and assessed. Collect. Vol. Sci. Pap. ICCAT, 75(2): 285-293 (2018/069).

**Table 1.** Terminal year of assessment for assessed species by stock.

<b>Stock</b>	<b>Species</b>	<b>Year</b>
South Atlantic	ALB	2014
North Atlantic	ALB	2015
Atlantic	BET	2017
East Atlantic	BFT	2017
West Atlantic	BFT	2017
North Atlantic	BSH	2015
South Atlantic	BSH	2015
Atlantic	BUM	2016
Northeast Atlantic	POR	2009
Northwest Atlantic	POR	2009
Southwest Atlantic	POR	2009
West Atlantic	SAI	2014
East Atlantic	SAI	2015
West Atlantic	SKJ	2013
North Atlantic	SMA	2015
South Atlantic	SMA	2015
Mediterranean	SWO	2014
North Atlantic	SWO	2015
South Atlantic	SWO	2015
Atlantic	WHM	2017
Atlantic	YFT	2018

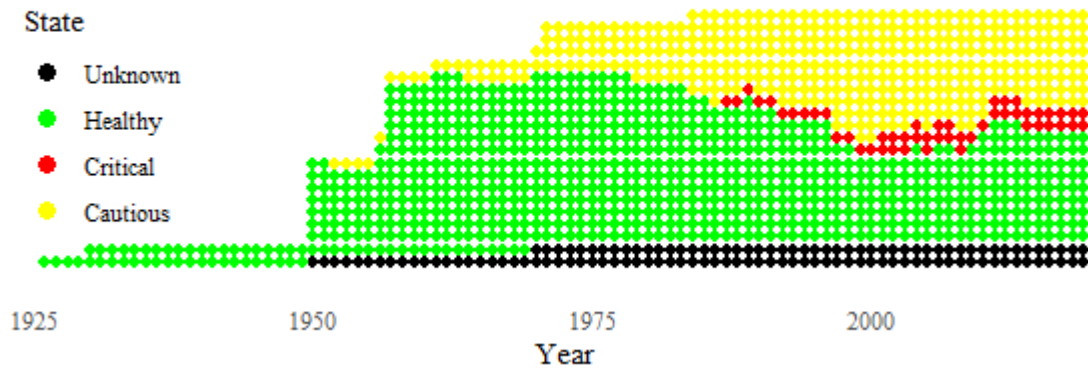
**Table 2.** Raw indicator data for the assessed species where Bref is the number of stocks with  $B/B_{msy} \geq 1$ , Fref is the number of stocks with  $F/F_{msy} \leq 1$  and N is the total number of stocks.

Year	Bref	Fref	N	1976	14	16	20	1998	8	9	21
1955	7	8	9	1977	14	17	20	1999	7	11	21
1956	9	11	12	1978	14	15	20	2000	7	8	21
1957	14	15	16	1979	13	15	20	2001	7	10	21
1958	14	15	16	1980	13	16	20	2002	7	10	21
1959	14	15	16	1981	13	16	20	2003	7	10	21
1960	14	15	16	1982	13	15	20	2004	8	9	21
1961	15	15	17	1983	13	15	20	2005	7	10	21
1962	15	14	17	1984	12	16	21	2006	8	10	21
1963	15	15	17	1985	12	13	21	2007	8	10	21
1964	14	13	17	1986	11	13	21	2008	7	13	21
1965	14	13	17	1987	11	11	21	2009	8	13	21
1966	14	15	17	1988	11	13	21	2010	9	14	21
1967	14	14	17	1989	12	12	21	2011	10	14	21
1968	14	14	17	1990	11	11	21	2012	10	13	21
1969	14	14	17	1991	11	12	21	2013	10	15	21
1970	14	16	18	1992	10	10	21	2014	9	13	21
1971	14	17	20	1993	10	8	21	2015	9	14	21
1972	14	17	20	1994	10	9	21	2016	9	13	21
1973	14	17	20	1995	10	9	21	2017	9	14	21
1974	14	16	20	1996	10	9	21	2018	9	14	21
1975	14	16	20	1997	8	9	21	2019	9	14	21

**Table 3.** Indicator checklist responses for the Assessed Species component of the ecosystem report card.

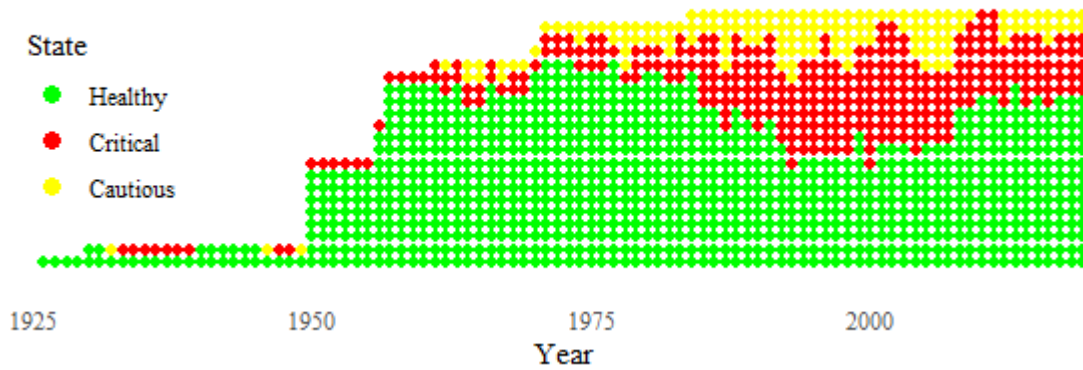
Component Questions	Assessed
<b>Goal</b> What is the conceptual management objective to be reflected in the report	Ensuring long-term sustainability and optimum utilization of the retained stocks
<b>Objective</b> What is the question that can be represented by an indicator(s)	Determine if the status of retained assessed stocks, based on biomass and fishing ratio indicators, is improving.
<b>Status:</b> (accepted, rejected, development)	The indicator has been accepted. Development continues on alternatives.
<b>Updates</b> • Frequency • Scripted/automatic	<ul style="list-style-type: none"> <li>• Annually, provided there has been a stock assessment in the prior year.</li> <li>• The script creates the indicator plots from an Excel file but it is a manual exercise to request the data and convert to proper format for inclusion in the master data file.</li> </ul>
<b>Responsibility</b>	Currently updated by the Assessed Species team.
<b>Reference</b>	Hanke, A.R., Juan-Jordá, M. J. and Coelho, R. 2028. INDICATORS FOR ICCAT SPECIES THAT ARE RETAINED AND ASSESSED. Collect. Vol. Sci. Pap. ICCAT, 75(2): 285-293 (2018/069).
<b>Indicator</b> <ul style="list-style-type: none"> <li>• What is the indicator?</li> <li>• Scientific basis?</li> <li>• Responsive to pressure?</li> <li>• Ecosystem relevance?</li> <li>• Does it achieve the objective?</li> <li>• Possible to set targets?</li> <li>• State alternative indicators?</li> </ul>	<ul style="list-style-type: none"> <li>• The indicator shows the fraction of assessed stocks over time that are in a healthy, cautious or critical state with respect to being overfished and overfishing. An additional indicator shows overfished and overfishing status for all stocks in the terminal year of the assessment.</li> <li>• The indicators are based on assessment outputs which have a scientific basis.</li> <li>• Indicator shows collective response of stocks to fishing pressure and management recommendations.</li> <li>• Achieving objective should promote a healthy ecosystem</li> <li>• It achieves objective.</li> <li>• Target is for all stocks to not be overfished or subject to overfishing.</li> <li>• Composite multi-stock B/Bmsy and F/Fmsy ratio indicators was proposed</li> </ul>
<b>Data</b> <ul style="list-style-type: none"> <li>• Does the data exist?</li> <li>• Where does it reside?</li> <li>• Is it readily accessible?</li> <li>• How to improve access?</li> </ul>	<ul style="list-style-type: none"> <li>• The data exists.</li> <li>• Data is on the OwnCloud within separate analysis folders for each species and modeling platform or alternatively on the computer of the analysts that ran the models used for advice.</li> <li>• The data is not easily accessed.</li> <li>• Data should be available on the ICCAT website on the stock assessment page.</li> </ul>
<b>Capacity &amp; Expertise</b> <ul style="list-style-type: none"> <li>• Level of participation</li> <li>• Knowledge of participants</li> </ul>	<ul style="list-style-type: none"> <li>• Updating the indicator is easy once the data has been collected. No special capacity issues.</li> <li>• Expertise of the participants is sufficient for interpreting the indicator.</li> </ul>
<b>Regions</b> <ul style="list-style-type: none"> <li>• Data conforms to ICCAT regions</li> <li>• Data conforms to Pelagic regions</li> <li>• Regionalize?</li> </ul>	<ul style="list-style-type: none"> <li>• The data conforms to ICCAT stock boundaries.</li> <li>• Not possible to conform to Pelagic regions.</li> <li>• It's possible to regionalize the indicator but the regions would need to be broad (North Atlantic, South Atlantic, Mediterranean). Indicator currently represents convention area wide performance.</li> </ul>
<b>Secretariat</b> <ul style="list-style-type: none"> <li>• Is support required?</li> <li>• Type?</li> </ul>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• One time Secretariat support required in establishing access to data. Ongoing support required to update data after a stock assessment.</li> </ul>

### Stock status based on B ratio



**Figure 1.** Stock status of all assessed ICCAT species based on  $B/B_{msy}$ . Refer to the text for the definition of the limit reference points. Note that the status of the stocks was projected forward to 2019 from terminal year of the assessment. Refer to Table 1 for the terminal year of the assessments.

### Stock status based on F ratio



**Figure 2.** Stock status of all assessed ICCAT species based on  $F/F_{msy}$ . Refer to the text for the definition of the limit reference points. Note that the status of the stocks was projected forward to 2019 from terminal year of the assessment. Refer to Table 1 for the terminal year of the assessments.



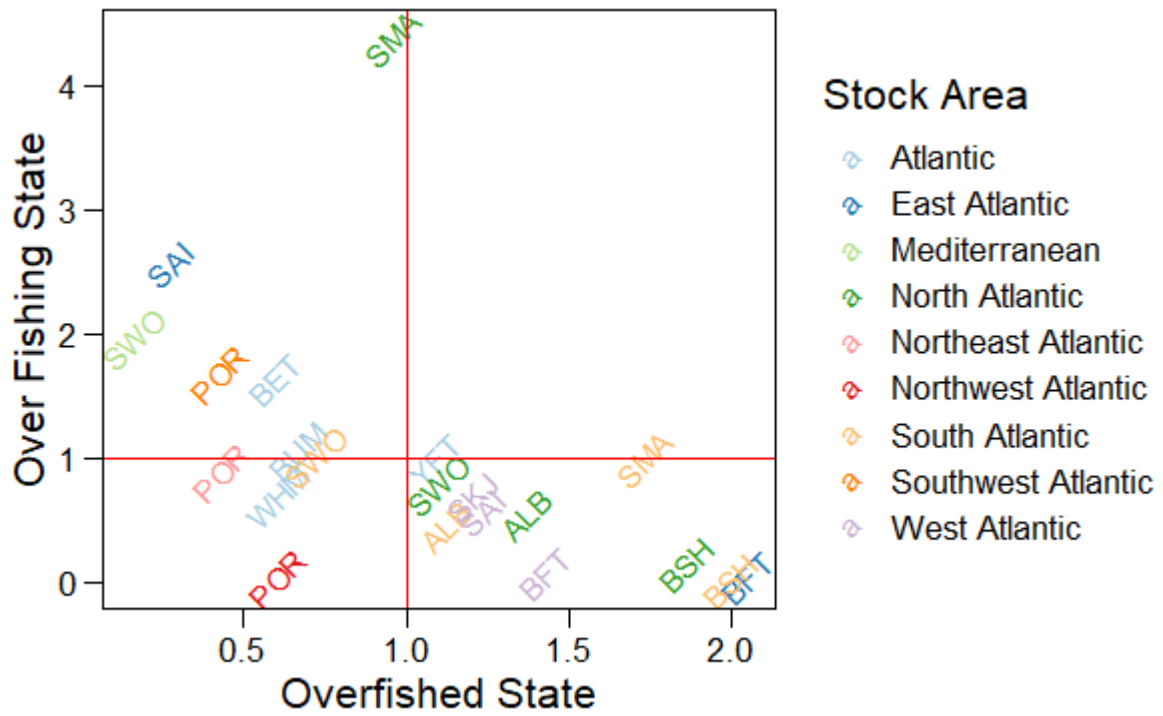


Figure 3. A Kobe plot depicting B/BMSY and F/FMSY ratios for all of ICCAT's assessed stocks.