

SCRS ANNUAL DASHBOARD: A NEW TOOL TO COMPLEMENT THE MANAGEMENT ADVICE TO THE COMMISSION

Josu Santiago¹, Haritz Arrizabalaga², Gorka Merino², Hilario Murua²

SUMMARY

One of the main lines of action of the 2015-2020 Science Strategic Plan of the SCRS is the improvement of dialogue and communication. The intended targets of the communication considered in the Plan are the Commission, the SCRS itself, the scientific community and the society. To contribute to this aim we have developed a first prototype of a shiny application that tries to integrate in a simple and interactive platform the basic information required to facilitate the provision of scientific advice to the Commission. It also integrates several level components to expand the utility to other users including scientists, stakeholders and the public in general.

RÉSUMÉ

L'une des principales lignes d'action du plan stratégique pour la science du SCRS pour 2015-2020 est l'amélioration du dialogue et de la communication. Les cibles visées de la communication envisagées dans le plan concernent la Commission, le SCRS, la communauté scientifique et la société. Afin de contribuer à cet objectif, nous avons développé un premier prototype d'application « Shiny » qui tente d'intégrer dans une plateforme simple et interactive les informations de base requises pour faciliter la formulation de l'avis scientifique à la Commission. Elle intègre également plusieurs composantes de niveau visant à élargir l'utilité à d'autres utilisateurs, dont les scientifiques, les parties prenantes et le public en général.

RESUMEN

Una de las principales líneas de acción del Plan estratégico para la ciencia del SCRS 2015-2020 es la mejora del diálogo y la comunicación. Los objetivos de comunicación considerados en el Plan son la Comisión, la reunión del SCRS, la comunidad científica y la sociedad. Para contribuir a este objetivo hemos desarrollado un primer prototipo de una aplicación "shiny" que trata de integrar en una plataforma sencilla e interactiva la información básica necesaria para facilitar asesoramiento científico a la Comisión. También integra varios componentes de nivel para ampliar su utilidad a otros usuarios, lo que incluye científicos, partes interesadas y el público en general.

KEYWORDS

Tuna fisheries, Fishery Management, Resource Conservation, Management Advice, Scientific Communication Tools

¹ AZTI, Txatxarramendi uhartea, 48395, Sukarrieta, Basque Country, Spain; E-mail: jsantiago@azti.es

² AZTI, Herrera Kaia Portualdea, 20110, Pasaia, Basque Country, Spain

1. Introduction

In accordance with the ICCAT Convention, the SCRS is responsible for developing and recommending to the Commission all policy and procedures for the collection, compilation, analysis and dissemination of fishery statistics. It is the SCRS' task to ensure that the Commission has at all times the best available science including the most complete and current statistics concerning fishing activities in the Convention area as well as biological information on the stocks that are fished. The SCRS also coordinates various national research activities, develops plans for special international cooperative research programs, carries out stock assessments, and advises the Commission on the need for specific conservation and management measures.

General principles relating to all science communication include providing synthesis, visualization, and context, assembling self-contained visual elements, conceptual diagrams and data, formatting content to define and simplify terms, and eliminating jargon and acronyms (Thomas *et al.*, 2007).

In the first independent performance review of ICCAT the Panel recommended that the SCRS endeavor to provide simple, succinct and user-friendly advice to fisheries managers and Commissioners on the status of ICCAT stocks and the expected effects of potential management measures (ICCAT, 2009). The Working Group on the organization of the SCRS (ICCAT, 2012) considered the possibility that automated report building (or at least standard forms) may be useful. The utility of such an approach would depend to a certain extent on the degree to which there are common denominators across species/groups. In any event, it would require that the inputs to such an automated process (values, tables, figures) be prepared in a standardized fashion (including formatting and location).

In the second independent performance review of ICCAT, the Panel found that the SCRS advice is presented consistently and that this has improved compared with the first review (ICCAT, 2016). However, because each advice is drafted and discussed first in a species group before being finalized by the SCRS, there is still room for improvement. The Panel considered that consistency across species would be improved if the SCRS agreed a list of "standard" statements on stock status and management recommendations.

One of the main lines of action of the 2015-2020 Science Strategic Plan of the SCRS is the improvement of dialogue and communication (ICCAT, 2015). The intended targets of the communication considered in the Plan are the Commission, the SCRS itself, the scientific community and the society. To contribute to this aim we have developed a first prototype of a shiny³ application that tries to integrate in a simple and interactive platform the basic information required to facilitate the provision of scientific advice to the Commission. It also integrates several level components to expand the utility to other users including scientists, stakeholders and the public in general.

2. Material and Methods

The application presented in this document has been prepared on R environment using several libraries, among which the following stand out: shiny and plotly.

Shiny is an open source R package from RStudio that can be used to build interactive web pages with R. Every Shiny app is composed of two parts: UI (user interface) and server. UI is a kind of web document – HTML written using functions of Shiny. The file Server is responsible for the logic of the app; it's the set of instructions that tell the web page what to show when the user interacts with the page. The Shiny system is designed to simplify the creation of interactive web applications. It provides automatic "reactive" linkage between inputs and outputs: when the user clicks on one of the radio buttons, sliders, or selections, the output is re-rendered.

Plotly is an advance data visualization tool. The plot is interactive and drawn with D3.js, a popular JavaScript visualization library. It allows zooming by clicking and dragging, pan, and see text on the hover by mousing over the plot. The later utility is especially relevant because eliminate the need to deal with multiple tables with different possible entries which is especially interesting to deal with series of fisheries data.

³ Shiny is an RStudio project. © 2016 RStudio, Inc.

The following input files are used in the application:

- t1nc_all_20161014.csv: csv version of t1nc_all_20161114.xlsx, MS Excel file available in the ICCAT website with nominal catches of Atlantic tunas and tuna-like fish, by gear, region and flag [https://www.iccat.int/Data/t1nc_20161114.rar]
- cdis5014_all9sp.csv: ICCAT Task II catch data raised to total landings (5x5 degree squares, quarter, gear) [https://www.iccat.int/Data/Catdis/cdis5014_all.rar, updated 7/2016]
- ICCAT_biology.csv. Biological information including the following fields: species code [species], stock [stock], species name [name], scientific name [sci_name], distribution [dist], spawning grounds [spa_ground], maturity [mat], life span [life_span], maximum size [max_size] and natural mortality [M].
- ICCAT_stock_status.csv: species code [species], stock [stock], year of the last assessment [year], models used in the assessment [method], stock status [status: G/Y/R], Overfished situation [Overfished], Overfishing situation [Overfishing], Proportion of Red [red], Proportion of Yellow [yellow], Proportion of Green [green], B/Bmsy [BBmsy], SSB/SSBmsy [SBSBmsy], F/Fmsy [FFmsy], MSY [MSY], other relevant information [comment]
- ICCAT_stock_trends.csv: species code [species], stock [stock], year [Year], spawning stock biomass [SSB], biomass [B], recruitmet [R], fishing mortality of juveniles [Fjuv], fishing mortality of adults [Fadu], Overall fishing mortality [F], SSB/SSBmsy [SBSBmsy], B/Bmsy [BBmsy], F/Fmsy [FFmsy], additional trajectory of B/Bmsy [BBmsy2], additional trajectory of F/Fmsy [FFmsy2]
- ICCAT_Recs.csv: species code [species], stock [stock], recommendation number [5 fields, acro1 to acro5], recommendation title [5 fields, rec1 to rec5], URLto the recommendation [dir1 to dir5]
- ICCAT_TAC.csv: : species code [species], stock [stock], year [Year], TAC [TAC]
- Flags.csv: Flag name [Flag1], Flag ICCAT code [Flag2]

The current beta version of the app includes tropical and temperate tuna stocks, swordfish and billfishes. Small tuna and sharks have not been included. Task 1 and CATDIS data have been obtained from the ICCAT website. The rest of the information have been extracted from the most recent SCRS detailed reports and executive summaries. Not all the fields of the different files have been completed because of the difficulty of accessing to the stock assessment model inputs and outputs for some stocks.

3. Results

The shiny application can be found in <https://josusb.shinyapps.io/ICCAT/>. It includes five navigable components: Summary, Task 1, Task 1 by flag/gear, Task 2 and Task 1-Pivot (**Figure 1**).

- Summary: it is subdivided in 3 tabsets: biology, stock status and current regulations.
 - o Biology includes basic information on distribution, spawning ground, maturity, life span, maximum size and natural mortality.
 - o Stock status summarizes the state of the stock using a Kobe plot and a pie chart showing the proportion of model outputs that are within the green, yellow and red quadrants of the Kobe plot. It also indicates the year of the last assessment, the modelling approaches used, whether the stock is overfished and/or undergoing overfishing (including B/Bmsy and F/Fmsy ratios) and the estimate of MSY (Figure 2).
 - o Current regulations. This tabset shows the regulations currently in place of the selected stock.
- Task 1, shows the evolution of the total catches reported to ICCAT and the TAC, is applicable. This information can be shown by gear and country. Thanks to the plotly capabilities it allows to see the catch values on the hover by mousing over the plot.
- Task 1 by flag/gear shows for a specified year the catches in the ICCAT convention area, by country and gear, ordered from left to right, according to the importance of catches reported of the concerned stock. The blue dots indicate the cumulative proportion of catches.
- Task 2 (Spatial Distribution of the Catch). This tabset shows the geographic distribution of accumulated catch for a selected period by major gears by 5x5 degree squares. Plots are scaled to the maximum catch observed. This information is also available by country as an option.

- Task 1-Pivot includes a pivot table with the Task 1 data used in the different stocks by year, gear and flag.

The app is under development and further versions will be developed following the ideas generated during the discussions of the Working Group on Stock Assessment Methods and the SCRS. In the future, if the app was felt to be useful, the databases used in the shiny app could be updated by ICCAT Secretariat/WGs after the SCRS report is adopted, for its use for any communication between scientists, stakeholders, and the society (e.g. during the Commission meeting).

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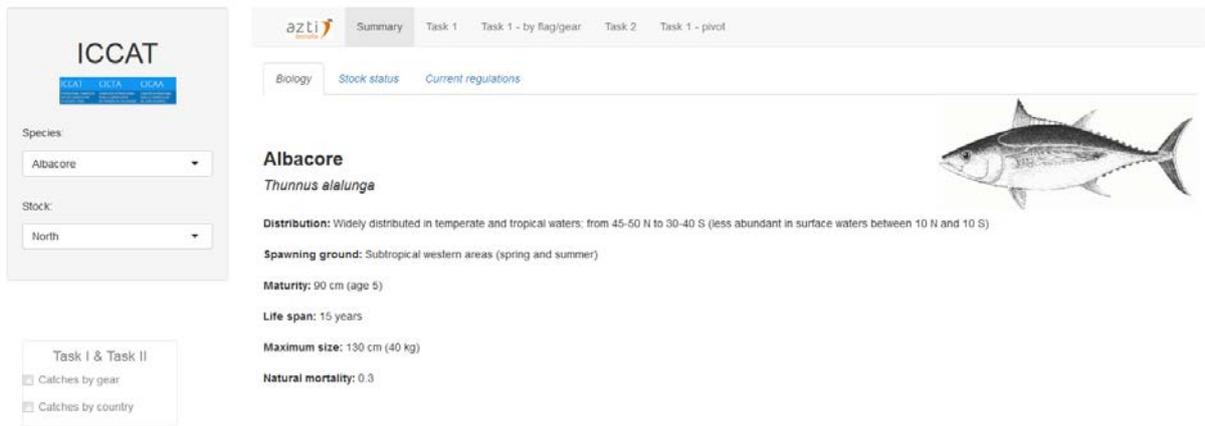


Figure 1. Initial layout of the dashboard which can be changed and specified by interactive navigation.

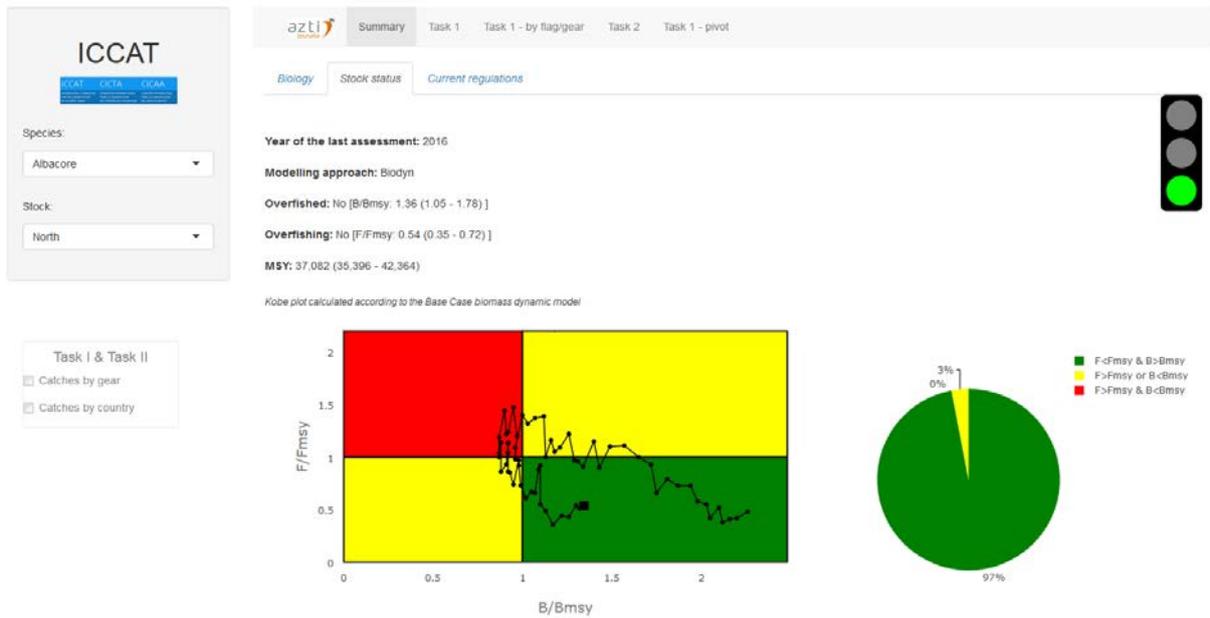


Figure 2. Summary of stock status of North Atlantic albacore