



TUCAW¹ (TUna CATch Worldwide), a data base and user friendly software developed to analyze the yearly tuna catches worldwide

(by species, gear, country and oceanic areas)

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I-Introduction

There is a general need for various people interested in the tuna fisheries to have an easy access to the catch statistics. To solve this general problem of world wide fishery statistics, the FAO fishery division in Rome has developed and released routinely a worldwide statistical data base and its corresponding data processing software. The tuna species and fisheries are part of this system.

However, this very interesting FAO statistical data base and software may not be optimal to efficiently tackle the tuna statistics for various reasons. The two major problems in the FAO data set on tunas are that :

(a) the FAO data on tuna fisheries are often biased, being often official data submitted by fishery agencies, not reviewed and corrected when necessary by scientists (Those problems have been partly solved during recent years through contacts between FAO⁴ and the Tuna Agencies, but significant "anomalies" remain in the FAO data on tunas).

(b) the FAO data are always lacking the information on the fishing gear, a key parameter in the tuna fisheries.

Consequently the present purpose of this work, which was developed as an ORSTOM⁵ project was the following:

(1) to develop an optimal tuna data base, choosing for each ocean and fishery the best statistical information available on tunas, basically from ICCAT⁶, IPTP⁷, SPC⁸, IATTC⁹ and FAO. The methods and hypothesis used to select the "best" data for each area and fishery are described in chapter 2.

¹ TUCAW was developed in La Jolla in the IATTC laboratory, under the ORSTOM framework and funding (Département TOA, Terre Océan Atmosphère). ORSTOM is the Institut Français de Recherche Scientifique pour le Développement en Coopération, its headquarter being based, 213 rue Lafayette, 75480 Paris Cedex10, FRANCE).

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⁵ ORSTOM: Institut Français de recherche scientifique pour le développement en coopération

⁶ ICCAT: International Commission for the Conservation of Atlantic Tunas, Madrid

(2) this data base was developed using a standardized code and format system described in chapter 3.

(3) A user friendly software was then developed to analyze the yearly tuna catches worldwide or by ocean (or by sub areas), by species, gear and country. The present framework, use and output of this software will be reviewed in chapter 4.

All these tasks, building a world wide tuna data base and developing an analytical software, are now at an intermediate level: both the data set and the program are already operational and available for interested users¹⁰, at least for experimental use. However both the data base and the program TUCAW have not yet been extensively tested by users, and they will probably show some bugs, which will need some *ad hoc* corrective actions by their authors.

II- A data base on tuna catches worldwide by species, gear, country and oceanic areas

The world wide data base on tuna catches has been built for the period 1970 to 1993 (data are available since 1950 for the Atlantic ocean). The basic data have been selected in each ocean as described in the following summarized rules:

2-1- Atlantic ocean

The TASK 1 data obtained from ICCAT, yearly catches by species, gear and ICCAT area (corresponding to the ICCAT statistical bulletin), was used without corrections. It is assumed that this set of data is the most complete, fully and permanently corrected by the Atlantic scientists, and well managed by the ICCAT staff. This data set is aiming to cover 100% of the catches by the Atlantic ocean tuna fisheries, by all gears.

2-2-Indian Ocean (FAO areas 51 and 57)

The computerized data obtained from IPTP of yearly catches by species, gear and IPTP areas (corresponding to the IPTP statistical bulletin), was used without corrections for most fisheries. It was assumed that this set of data is the most complete, fully and permanently corrected by the Indian Ocean scientists, and well managed by the IPTP staff. This data set is aiming to cover 100% of the catches by the Indian ocean tuna fisheries, by all gears.

2-3-Eastern Pacific

The tuna statistics in this area are covered to a large extent by the IATTC. All the IATTC catch data have then been used to start building the TUCAW data base in the area. However and unfortunately, the IATTC published statistics do not presently cover 100% of the catches in the area: the longline fisheries in the Eastern Pacific and the artisanal tuna fisheries of various south American countries are not shown in the IATTC figures of yearly catches. Consequently, those catches have been taken from the FAO data base, after a detailed comparison (by year and flag) between the IATTC and FAO data bases, and added to the IATTC data. This selection was based upon the flag of the fishing nation, but was often difficult as the FAO statistics don't provide information on gears, and because the FAO and IATTC areas sometimes are mismatched. The information on the fishing gear is now always available in the area in

⁷ IPTP: Indo Pacific Tuna development and management Program, Colombo

⁸ SPC: South Pacific Commission, Noumea

⁹ IATTC: Inter American Tropical Tuna Commission, La Jolla

¹⁰ Interested users should contact the authors to obtain a copy of the TUCAW data base and program.

the TUCAW data base, but this information was often based upon indirect hypothesis for the artisanal and longline fisheries (i.e. taking the FAO figures minus the IATTC data for countries fishing with artisanal and longline gears). The IATTC figures do not include swordfishes and sailfishes catches.

2-4-Western Pacific

The data on tuna catches from this area are probably the most difficult to estimate. Several tuna bodies are covering various and non overlapping regions of the area, and there is a lack of a regional Tuna Commission covering 100% of the tuna catches, and a routinely published statistical bulletin (as the ICCAT and IPTP). Furthermore, various data on the fisheries are highly confidential. Because of those difficulties to cover the entire Western Pacific using the IPTP or the SPC¹¹ data sets, the present TUCAW data set was built entirely from the FAO data set, with minor corrections from other sources (Mexico, Russia, Indonesia, Malaysia, Philippines). This choice was made after an extensive comparison of the catches by year-species-country of the various data base available (IPTP, SPC, FAO). As a consequence, no information on the fishing gear are available in the present statistics from this area (this problem should be solved).

2-5-Conclusion on data

All the detailed practical choice used to build the TUCAW data base will be presented and discussed in an ad hoc technical document which will be released in the near future.

III- Present codes and format of the world wide tuna data base

Four ASCII files, one per ocean-area, have been created using a standardized coding of all species, gears, areas and fishing countries. The standardized internal codes used in the catch statistics of those files are derived from the codes used by FAO and ICCAT. The users of TUCAW don't need to know those internal codes; the correspondence between those internal codes and the parameters are given in various *ad hoc* ASCII files (Countries, gear, species, area) on the TUCAW diskette.

IV- TUCAW: A software to analyze the world tuna catches

The TUCAW software is a software running on PC under WINDOWS. This software is activated clicking with the computer's mouse on the TUCAW logo.

A startinfo click with the mouse gives if necessary detailed information (in English) in order to efficiently use TUCAW. Any serious inconsistencies in the data selection will put a message on the screen explaining why the selection was not consistent.

The present program is basically built as described in the figure 1:

Step-1:-A *user friendly* program, written in Visual Basic, allows to makes a simple selection (clicking with the computer's mouse on the selected parameters) of the areas, gears, countries and species to be selected. Only seven species (*Yellowfin, bigeye, skipjack, albacore, bluefin, swordfish and sailfish* or

¹¹ SPC data: the log book data managed by SPC are of good or very good quality (depending on the fleets), but their geographical coverage is quite limited; consequently the total tuna catches in the Western Pacific (temperate and tropical tunas) are presently difficult to estimate from the SPC data base.. Further plans are develop to solve this problem and to make full use of the SPC data and to estimates all the tuna catches by gear in the Western Pacific.

all) can be selected in the present screen, but this limitation could easily be overcome (for instance using the DOS version of the TUCAW and the TUCAW.ESP file giving the ICCAT codes for all species, which allows to select any combination of species ICCAT codes and to modify directly the file TUCAW.PAR).

The PC screens which allows to make those selections are given in the figure 3.

Step-2:- The same program initiates the FORTRAN program (Tucaw.for) which will execute the selected calculus.

Step-3:- The results obtained from this program can be either printed, or transferred to the QUATTRO PRO software in order to make a plot of the results or to WORD to use the results in a text. These outputs are selected clicking with the computer's mouse on the selected output (These options could be modified in the near future).

Some examples of the output tables and some figures obtained by this software are shown in the figure 2 and table 1.

V- Conclusion

This TUCAW data base and software was a large task conducted in a short period of time with very little facilities. The feeling of the authors is that this work may be potentially very useful to a large group of users, from the scientific field, the administration and the industry. Most of the technical choice presently used to build the data base as a working hypothesis should be discussed by the local experts of each tuna fisheries; the present data base could then be improved significantly in the short term. TUCAW can still be used temporarily in a very simple and useful manner, always keeping in mind these technical provisional limitations.

Furthermore, this TUCAW should in the future:

- (1) Have its data routinely corrected and updated on a systematic basis. Special improvement should be done in the entire Pacific ocean, where, because of the lack of a single Tuna Commission, the data base of tuna catches by gear and area is very difficult to build.
- (2) Have permanent development and correction in the software following the needs and requests of the users.
- (3) Have an administrative system to release and disseminate copies of TUCAW (data and software) to its potential users.

If the TUCAW data base and software were estimated to be a useful tool, those maintenance and development tasks and responsibilities should preferably be handled in the future by an ad hoc organization interested in tuna problems world wide (such as FAO?).

Acknowledgment

This work was made possible only because of the close cooperation and permanent help from the various fisheries agencies involved, namely the FAO, the ICCAT, the IPTP, the IATTC and the SPC. Deep thanks are given to the scientific and technical staff of those bodies for their active help which made possible to build TUCAW. Special thanks should be given to the experts who have prepared for us the *ad hoc* data set, especially P. Kebe from ICCAT, M. Hinton from the IATTC, D. Ardill from the IPTP and T. Lawson from the SPC. A special reference in those acknowledgment should be given to David Ardill, as the idea to develop TUCAW came from discussion with him about the excellent tuna data base and software recently developed in the Indian Ocean by his team. Dr Lima, State Secretary for Agriculture and Fisheries in the Acores Islands, kindly accepted to allow us to use his "week of fishery logo", as the Windows icon of TUCAW. Sincere special thanks are given to him.

Table 1 : Example of the standard results obtained by the TUCAW program

SPECIES_____	YFT								
OCEAN_____	INDIAN								
REGION_____	WEST								
GEAR_____	PS								
YEARS_____	1980 1988								
COUNTRIES_____	SPAIN FRANCE								
DET.OUTPUT_____	1								
YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988
SPAIN	.0	.4	.1	.0	13.8	15.4	17.5	20.4	43.2
FRANCE	.3	.5	1.4	11.0	33.8	32.4	35.7	37.3	54.4
TOTAL	.3	.9	1.5	11.0	47.6	47.8	53.2	57.6	97.5

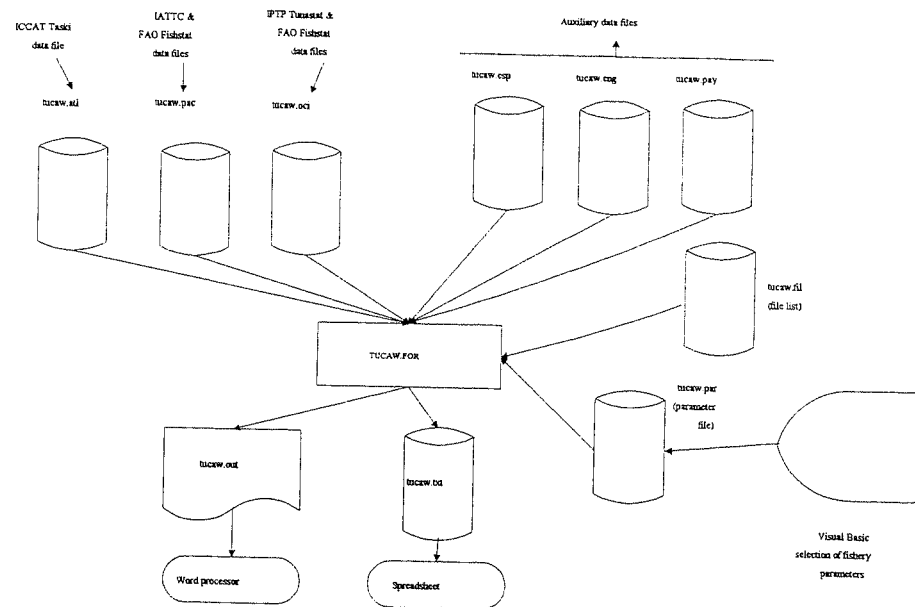


Figure 1: Framework of the TUCAW data base, programs and data handling

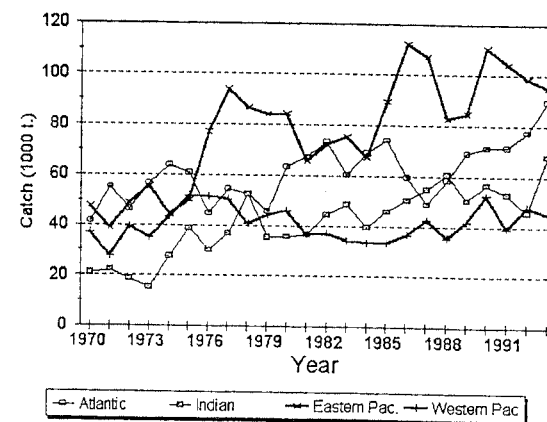


Figure 2: Example of figures obtained from the TUCAW program.

Figure 3 (a): Overview of the WINDOWS screens and selection used to choose the fishery parameters.

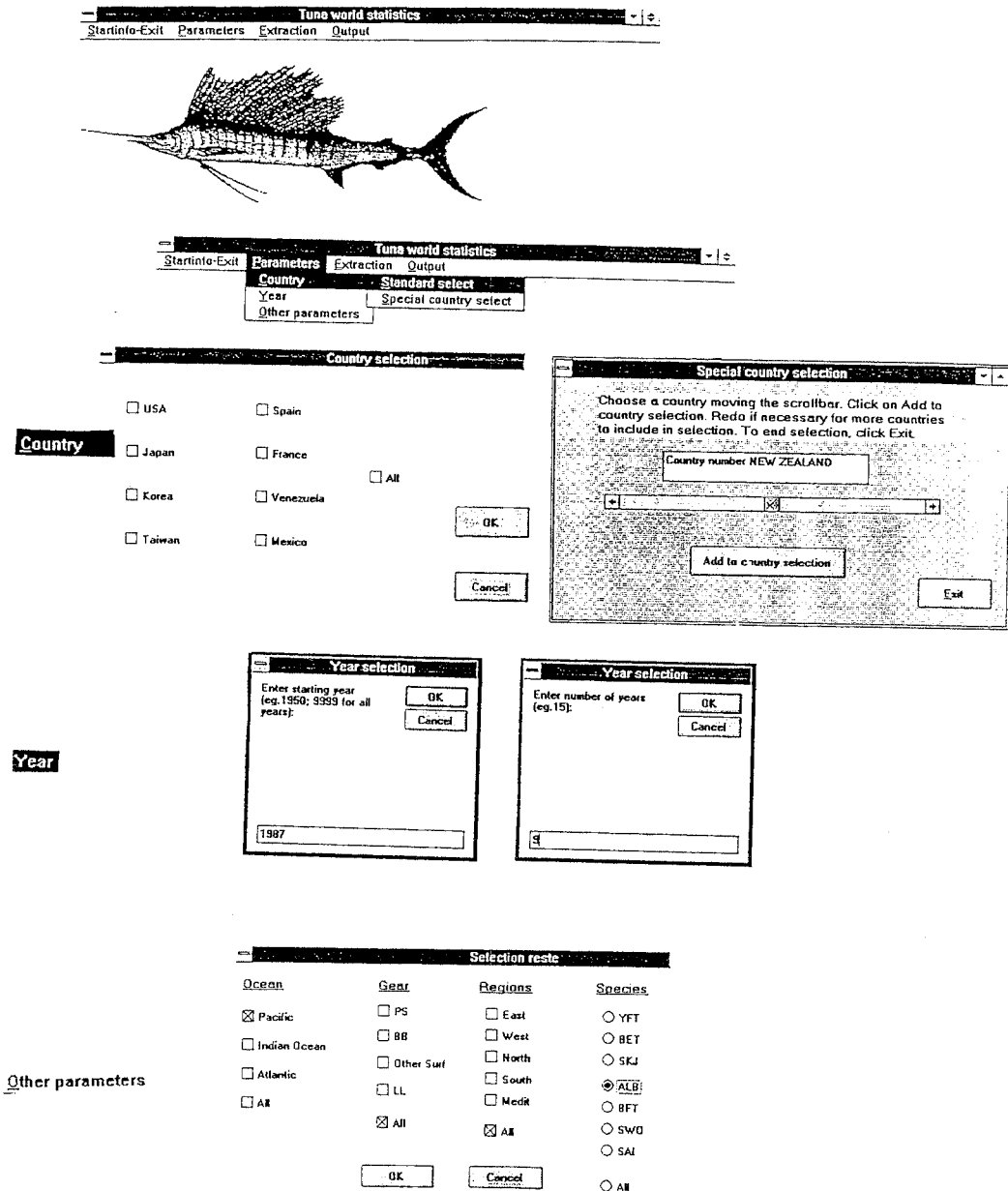


Figure 3 (b): Overview of the WINDOWS screens used to verify the selection, to run the program and to select the types of the output.

