OVERVIEW OF THE BLUEFIN TUNA DATA RECOVERED BY GBYP IN LAST PART OF PHASE 6 AND THE FIRST PART OF PHASE 7

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SUMMARY

The Atlantic-wide research programme on bluefin tuna (GBYP), has the objective to improve the bluefin tuna data through mining and recovery from any potential data source not already included in the ICCAT bluefin tuna data base. The review of the results of the data recovery activity in last part of Phase 6 and the Phase 7 is here presented, for the incorporation in the ICCAT BFT data base. The work carried out in these last Phases includes additional historical catch data by year for some traps and new data which cover areas and traps not previously available. Substantial quantities of recent longline (LL) Bluefin tuna catches and data have been recovered. Those files also include additional data concerning other species that will be analysed in detail in the following months.

RÉSUMÉ

Le programme de recherche sur le thon rouge englobant tout l'Atlantique (ICCAT-GBYP) a pour objectif l'amélioration des données sur le thon rouge en explorant et en récupérant toutes les sources éventuelles de données qui ne sont pas encore incluses dans la base de données sur le thon rouge de l'ICCAT. L'examen des résultats de l'activité de récupération des données menée au cours de la dernière partie de la phase 6 et de la phase 7 est présenté ici aux fins de leur incorporation dans la base de données sur le thon rouge de l'ICCAT. Les travaux réalisés pendant ces dernières phases incluent des données de capture historiques par année de certaines madragues et de nouvelles données qui couvrent des zones et des madragues qui n'étaient pas auparavant disponibles. Un volume considérable de données de captures palangrières (LL) de thon rouge a été récupéré. Ces fichiers comprennent également des données additionnelles concernant d'autres espèces qui seront analysées dans le détail au cours des mois suivants.

RESUMEN

El Programa de investigación sobre atún rojo para todo el Atlántico (GBYP) tiene como objetivo mejorar los datos de atún rojo mediante la minería de datos y la recuperación de cualquier posible fuente de datos que no esté ya incluida en la base de datos de atún rojo de ICCAT. Se presenta aquí la revisión de los resultados de la actividad de recuperación de datos durante la última parte de la fase 6 y durante la fase 7 con miras a su incorporación en la base de datos de atún rojo de ICCAT. El trabajo realizado en las últimas fases incluye datos adicionales de captura histórica por año para algunas almadrabas y nuevos datos que cubren áreas y almadrabas que antes no estaban disponibles. Se han recuperado cantidades importantes de datos y capturas recientes de atún rojo con palangre. Estos archivos incluyen también datos adicionales sobre otras especies que se analizarán en detalle en los próximos meses.

KEYWORDS

*Bluefin tuna, large pelagic species,
longline catches, trap catches, data recovery*

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1. Introduction

Since the beginning of the GBYP, one of the main objective of the programme is the data mining and recovery, for which the details are set every year by the GBYP Steering Committee and by the SCRS. So far, this item of the ICCAT GBYP activity recovered data from many fisheries over a large range of years (more than 5 centuries), samples used for historical genetic analyses (covering more than 22 centuries), carried out analyses for several data sets and worked together with the SCRS, particularly the SCRS BFT Species Group) for recovering the data from electronic tags deployed so far by various institutions.

In Phase 7, the GBYP has the goal to recover, analyse and validate the data which are still not in the ICCAT BFT data base (both historical and recent). These datasets include historical trap catch data which fill some gaps in the time series recovered and presented in previous years, catch data for new traps were not identified yet and longline catches from Italian vessels.

Additional duties were included by the GBYP Steering Committee (the historical catches from the ICES area) and by the ICCAT Statistical Department (the Black Sea historical catches).

2. Bluefin tuna fishery data recovered in last part of Phase 6 and in the first part of Phase 7

In the second part of the Phase 6, GBYP discovered that an important Ph.D. thesis was carried out at the University of Tarragona in 2015 on tuna traps in the Kingdom of Aragon and many of these traps were not in the ICCAT GBYP historical data sets. After a recommendation of the Steering Committee, it was decided to provide an invitation to the author and, following a positive response, a direct contract was awarded for recovering these additional datasets.

The data recovered for the former Kingdom of Aragon (Vidal Bonavila, in press) comprises the detailed datasets for the several tuna traps located in Sicily, Sardinia, Valencia and Catalonia mostly in the XVI-XVII century, but extending some data up to the beginning of the XIX century. Data were recovered for following traps in Sicily (EU-Italy): Favignana, Formica, Bonagia and "Tonnara dell'Ursa"; in Sardinia (EU-Italy): Pula, Carbonara, Pixini, Porto Scuso, Porto Palla, Santa Caterina di Pittinuri, Le Saline, Cala Vignola, San Marco, Porto Pi, Capo Bianco, Cala Agustina, Isola Piana and Argentiera; in Valencia (EU-Spain): Benidorm, El Palmar and Xàbia; and for one trap in Catalunia (EU-Spain): l`Hospitalet de l'Infant.

The above detailed traps were selected for the data recovery because not only these series were the most complete and detailed ones, but also because they were among the most productive traps in the area in the period taken into account. These historical trap data cover the period between 1580 and 1823, with 243 years having data; a total of 2,602,042 Bluefin tuna were included, along with 323,139 tons of catches.

ICCAT GBYP issued one Call for Tenders under this activity in Phase 7 (Call 03/2017, ICCAT Circular 0440/2017 on 21/03/2017), for recovering recent long-line data (by area, vessel, day, effort, catches in kg and number, length and weigh individual frequencies) from the Mediterranean Sea, trap data from the Mediterranean Sea and all fishery data from the ICES area. After the Call, 2 contracts were released, both for recovering recent long-line data (by area, vessel, day, effort, catches in kg and number, length and weigh individual frequencies) from the Mediterranean Sea.

The summary results of the data recovery activity carried out in the second part of the Phase 6 and Phase 7 are shown on **Table 1.** All data were provided on the Excel forms to the ICCAT Secretariat, in the format used by the ICCAT Statistical Department.

The data sets recovered from Mediterranean LL for the years 2011, 2012, 2014, 2015 and 2016 (which are additional data sets not already available in the ICCAT data base) have catches by vessel, area and day, partly with effort data (no. of hooks/day) and are related to a total catch of 20,702 bluefin tunas and a total weight of 1,076,569 kg. Additionally, 8130 Bluefin tunas have individual length or weight or both. The data have been made available to the SCRS scientists after checking their quality in detail, according to the procedures in place. The list of the vessels names was provided to GBYP for avoiding any potential risk of duplicating values, but under a strict confidentiality agreement included in the contract.

3. Trade, auction and market data evaluation

As agreed by the SCRS, the part of trade, auction and market data, which were validated by an external expert contracted by the GBYP in Phase 4, were officially considered fully validated, without the need of forming any specific expert group for further data examination, as initially planned.

Data sets, in their original format did not comply with the requirements for the direct incorporation into the ICCAT data base and therefore an additional work needed to be undertaken to modify and adapt them accordingly, in Phase 5. The GBYP Coordination made some minor modifications in the content and modified the format of the data, following the precise instructions and requirements of the ICCAT Statistical Department and provided the processed data to ICCAT, for incorporating them in the ICCAT data base.

The remaining part of the trade, auction and market data sets, which were not considered fully reliable because they were not validated ("form 3" of the sets), are kept in a separate data base, which is not public, and are subject to possible additional validation against statistical documents, BCDs or other support documentation, a work which would need much more additional time and efforts, and that would require the strict cooperation of the CPCs concerned, national experts and the ICCAT Secretariat.

According to the request made by the ICCAT GBYP Core Modelling MSE Group during its last meeting in Monterey, the data coming from the first two data sets that were validated so far, limiting them to those Bluefin tunas having RW and GGW individual data and considered reliable, were analysed and submitted by GBYP to the SCRS Bluefin tuna Intersessional Meeting in 2016 (Di Natale *et al.* 2017b) for improving the size frequencies for the EBFT.

In July 2016, the ICCAT GBYP Steering Committee, in line with the comments provided by the second external review of the GBYP, recommended further analysing all three market data forms for possibly assessing the total removals by year. The SC recommended awarding an external contract for this purpose. In August 2016, a Call for Tenders was released with the goal to re-analyse the market, auction and trade datasets, identify the reliable ones and provide the estimation of the total level of possible catches of Atlantic bluefin tuna that entered into the market for each year covered by the data, ideally by stock and under various hypotheses, including the expected CVs by year, for further analyses of the SCRS BFT Species Group. After selection, a contract was provided to MRAG (UK).

The results from the analysis of all three datasets, which were provided at the end of Phase 6, highlighted differences between the official catch statistics (Task I) used for stock assessment and catch estimates derived from the 3 new datasets (**Figure 1**). Those differences are more evident for the earlier years (before 2008) with estimated catches being much lower than official statistics while they were very close to (but still lower than) Task I data for the recent years. The lack of BCD data before 2008 could be one of the reasons for the higher differences in that period, while the fish going directly to local markets might possibly explain the negative differences. The analysis also showed that there is considerable ambiguity with regards to records of caged fish as the 3 Forms included a number of records showing fish transferred to cages but with no corresponding records of fish harvested after the fattening period. However, it is not clear whether this is due to records missing from the 3 datasets analysed or if it reflects actual discrepancies.

The latter issue creates uncertainty in the interpretation of the records and our analysis has provided results under different combinations of data to capture that. Uncertainty in the estimated catches also comes from a number of other sources, including values of fattening ratios, conversion factors and allocation of fish to different fattening groups.

With regards to representativeness, the extent to which each Form captures the fishing activity varies but all of them have some gaps in the data they hold. Although the three Forms hold data that are largely complementary, gaps still remain even after the three Forms are combined (e.g. they do not include catches from Japanese vessels or EBFT fish going to the Japanese market through third-non-EU countries; furthermore, fish going to local markets outside Japan are possibly little represented). Several records of fish traded by triangulations in western Atlantic cannot be analysed in detail without the direct cooperation of the countries concerned. For all these reasons, the results of the analysis are considered to represent an underestimate of total catches or removals. The length distribution frequencies are shown on **Figure 2**.

Full results were made available by the document SCRS/2017/013 (Apostolaki *et al.*, in press) which has already been presented at the SCRS Bluefin tuna Data Preparatory meeting in March 2017.

4. Data mining in the ICES area.

Following the recommendation of the GBYP Steering Committee, the recovery of old purse-seine and tagging data from Norway was included in the Call for tenders 03/2017. The offer provided by the Norwegian Institute of Marine Research was finally not confirmed and it was agreed that the data will be recovered autonomously by the same Institute, thanks to the kind availability of Dr. Johannes Hamre and of domestic funds. This activity will be pursued as soon as possible and the data will be provided to the SCRS BFT Species Group.

The same Call 03/2017 included the recovery of Bluefin tuna fishery data from the ICES rea, but no offer was submitted for this item. Following the recommendation provided by the SCRS during the Bluefin tuna Data Preparatory Meeting in March 2017, the GBYP recovered some old ICES papers from the '70s, but all those seven papers had some restriction for using the data. A formal request was sent to ICES in March and finally the use of the data was authorized by the ICES Editor on 7 September 2017. After checking the data against those existing in the ICCAT BFT Data Base, the GBYP will recompile in the electronic format the data sets which are not already included in the ICCAT BFT data base and the files will be provided at the end of Phase 7.

5. Tentative recovery of the historical Black Sea Bluefin tuna fishery data.

Following a specific request provided by the ICCAT Statistical Department before the 2017 SCRS Bluefin tuna data preparatory meeting, the GBYP made all possible effort for recovering the available additional Bluefin tuna fishery data from the Black Sea. In previous GBYP Phases, the GBYP had already contacted various scientists from the ICCAT CPCs around the Black Sea for trying to collect data on the historical Bluefin tuna fisheries, but with no results.

Therefore, in 2017, the GBYP carried out an extensive analysis of the available literature, trying to get any possible numerical information about those fisheries but the final result was limited to a series of Bulgarian historical catches, that were reported to the SCRS Bluefin tuna data preparatory meeting in March 2017, with the document SCRS/2017/039 (Di Natale, in press). The data were also provided to the ICCAT Statistical Department.

6. Discussion.

In addition to the details provided above, the GBYP data recovery and mining activity in the last part of Phase 6 and in the first part of Phase 7 included other activities. Specifically, the GBYP finalized the full revision of the historical trap data (Pagá García *et al*., 2017), a work that was presented to the SCRS in 2016, and provided also a paper about the complexity of historical trap data and the way they should be interpreted (Pagá Garcia *et al*., in press).

It should be noted that the second ICCAT GBYP external review (Sissenwine and Payne, 2017) pointed out the high data quality control standards enforced by GBYP, being this critical for ensuring the following use of these data by the SCRS, taking into account the variety and volume of the many datasets.

A first overview of the most recent data recovery and mining activities was provided by Di Natale *et al*. (2017a and in press), while a total overview of the Bluefin tuna data recovered so far by the GBYP is provided on **Table 2**. The present paper follows the recommendations of the SCRS Bluefin tuna species group and the SCRS Sub-Committee of Statistics for the validation of the data collected within the ICCAT GBYP activities.

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Table 1. Data recovered in last part of Phase 6 and Phase 7 from traps (TRAP) and longliners (LL).

Fishing period	Gear	Fishing area/ Trap name	ICCAT CPC	BFT total catch (n)	BFT total catch (tons)	Individual fish data (size or weight)	number of vessels
1599-1817	TRAP	Favignana	EU-IT	17,750	1,331		
1599-1818	TRAP	Formica	EU-IT	23,541	1,766		
1599-1823	TRAP	Bonagia	EU-IT	3,171	238		
1592-1705	TRAP	Pula	EU-IT	12,526	940		
1591-1595	TRAP	Carbonara	EU-IT	505,582	85,949		
1594-1602	TRAP	Pixini	EU-IT	210,637	13,691		
1595-1654	TRAP	Porto Scuso	EU-IT	54,999	3,575		
1595-1654	TRAP	Porto Palla	EU-IT	12,894	838		
1597-1654	TRAP	Santa Caterina Pittinuri	EU-IT	5,208	339		
1598-1654	TRAP	Le Saline	EU-IT	21,819	1,418		
1604-1654	TRAP	Cala Vignola	EU-IT	148,895	9,678		
1603-1606	TRAP	San Marco	EU-IT	28,443	1,849		
1606-1608	TRAP	Porto Pi	EU-IT	9,143	594		
1604-1608	TRAP	Capo Bianco	EU-IT	11,345	1,929		
1611-1654	TRAP	Cala Agustina	EU-IT	611,914	104,026		
1632-1640	TRAP	Argentiera	EU-IT	331,454	56,347		
1702-1705	TRAP	Isola Piana	EU-IT	9,743	738		
1588-1613	TRAP	Ursa	EU-IT	8,203	533		
1583-1646	TRAP	Xàbia	EU-SP	14,643	952		
1612-1659	TRAP	Palmar	EU-SP	180,085	11,706		
1602	TRAP	Hospitalet Infant	EU-SP	329,708	21,431		
1580-1589	TRAP	Benidorm	EU-SP	50,339	3,272		
TOTAL TRAP DATA				**2,602,042**	**323,139**		
2011-2012, 2016	LL	Adriatic Sea	EU-IT	6942	234	163	9
2014-2016	LL	Ionian Sea	EU-IT	2463	116	2463	13
2016	LL	Sardinia	EU-IT	253	11	243	3
2011-2012, 2016	LL	Strait of Sicily	EU-IT	7062	433	2492	22
011-2012, 2014-201	LL	Tyrrhenian Sea	EU-IT	3982	283	2769	33
TOTAL LL DATA				**20,702**	**1,077**	**8,130**	
total PH 6 and 7				**2,622,744**	**324,216**	**8,130**	

Table 2. Overview of the Bluefin tuna data recovered by GBYP from Phase 1 to the first part of Phase 7.

| TOTAL PHASES 1 to 7	origin	data	total data
# Records	OG	102,011	500,080
	TP	36,557	
	TAMD	311,415	
	FARM	49,364	
	HGEN	733	
BFT (no.)	OG	80,589	30,355,240
	TP	29,220,326	
	TAMD	1,004,228	
	FARM	49,364	
	HGEN	733	
BFT (tons)	OG	123,043	1,705,688
	TP	1,501,762	
	TAMD	80,408	
	FARM	475	
	HGEN	-	
# BFT sampled **(size and/or weigth or historical genetics)**	OG	114,116	997,288
	TP	7,610	
	TAMD	825,485	
	FARM	49,364	
	HGEN	713	
Legend: OG = Other Gear; TP = Trap; TAMD = Trade, Auction and Market Data; FARM = Farmed tunas; HGEN = Historical Genetic samples;			
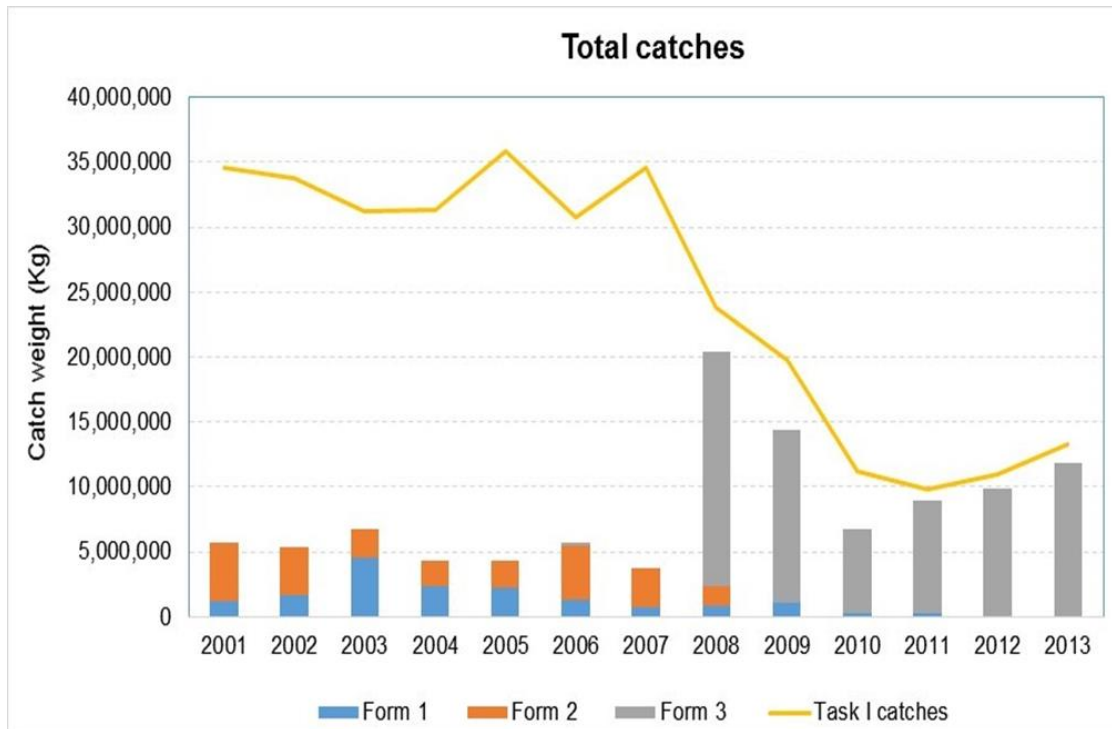
Figure 1. Estimated catches of Eastern Atlantic bluefin tuna as a result of analysis of 3 auction/market datasets compared to ICCAT official statistics (Task 1).
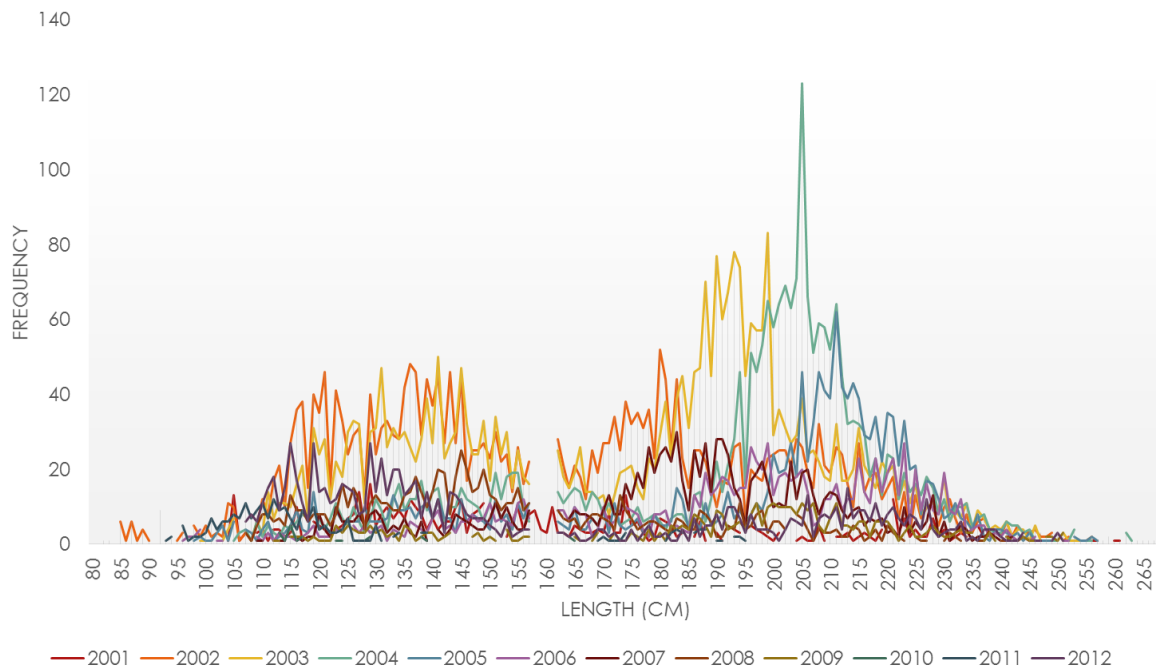

Figure 2. Bluefin tuna length distribution frequencies from auction/market data, as a result of analysis of all 3 forms.

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