ICCAT GBYP REPORT ON ADDITIONAL ANCIENT TRAP DATA RECOVERED IN PHASE 4 AND 5

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SUMMARY

An important amount of catch data related to historical tuna traps in five countries (Italy 1595-1997, Morocco 1916-1973, Portugal 1797-1933, Spain 1525-1989 and Tunisia 1863-1997) were donated by Ph.D. Jean-Marc Fromentin to ICCAT GBYP in the last part of Phase 4. GBYP initiated a very complex check of all records, before checking the data against the already existing data base. This work, which required many months, is now showing several discrepancies between the two methods and therefore, before checking the last data against the GBYP data base, is necessary to agree about the method. This paper presents five examples from five different traps in different countries (Sant'Elia, Principe, Torre de Barra, Barbate and Ras el Ahmar) showing how the situation is for comparable series, for allowing the SCRS Species Group and the SCRS Sub-committee of Statistics to examine the methods and chose the most appropriate for including the data in the ICCAT GBYP data base after cross-checking them against the previous series.

RÉSUMÉ

Le Dr Jean-Marc Fromentin a fait don à l'ICCAT-GBYP d'un volume important de données sur les captures associées aux madragues historiques de thonidés dans cinq pays (Italie 1595-1997, Maroc, 1916-1973, Portugal 1797-1933, Espagne 1525-1989 et Tunisie 1863-1997) dans la dernière partie de la phase 4. Le GBYP a lancé une vérification très complexe de tous les registres, avant de vérifier les données par rapport à la base de données déjà existante. Ce travail, qui a nécessité de nombreux mois, fait maintenant apparaître plusieurs divergences entre les deux méthodes et c'est pourquoi, avant de vérifier les dernières données par rapport à la base de données du GBYP, il est nécessaire de s'accorder sur la méthode. Ce document présente cinq exemples de cinq madragues différentes dans différents pays (Sant'Elia, Principe, Torre de Barra, Barbate et Ras el Ahmar) montrant l'état des lieux pour des séries comparables, pour permettre au groupe d'espèces du SCRS et au sous-comité des statistiques du SCRS d'examiner les méthodes et de choisir la plus appropriée pour inclure les données dans la base de données ICCAT GBYP après les avoir recoupées avec celles de la série antérieure.

RESUMEN

En la última parte de la Fase 4, el Dr. Jean Marc Fromentin donó al ICCAT GBYP una importante cantidad de datos de captura relacionados con las almadrabas históricas de túnidos en cinco países (Italia 1595-1997, Marruecos 1916-1973, Portugal 1797-1933, España 1525-1989 y Túnez 1863-1997). El GBYP inició una comprobación muy compleja de todos los registros, antes de comprobar los datos con los ya existentes en la base de datos. Este trabajo, que requirió muchos meses, muestra ahora varias discrepancias entre los dos métodos y, por tanto, antes de comprobar los últimos datos con la base de datos del GBYP, es necesario llegar a un acuerdo sobre el método. Este documento presenta cinco ejemplos de cinco almadrabas diferentes en distintos países (Sant'Elia, Principe, Torre de Barra, Barbate y Ras el Ahmar) demostrando cual es la situación para series comparables, con el fin de permitir al Grupo de especies del SCRS y al Subcomité de Estadísticas del SCRS examinar los métodos y elegir el más adecuado para incluir los datos en la base de datos del ICCAT GBYP después de cruzarlos con la serie previa.

KEYWORDS

Bluefin tuna, Large pelagic specie, ICCAT,
Data collection, Data analysis, Trap, Data conversion

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1. Introduction

The objective of ICCAT GBYP data recovery and data mining activities is to fill the many gaps existing in several data series currently present in the ICCAT data base, concerning both recent and historical data, which causes a large amount of substitutions in the assessment process, increasing biases uncertainties. At the same time, data mining activities should provide reliable data series, longer that those previously available, recovering data from many sources, including archives having difficulties for the access. This activity will allow for a better understanding of the long-time catch series by gear, improving the data available for the assessment and possibly for replacing substitutions used for data gaps; old data will allow also for improving our knowledge about Atlantic bluefin tuna.

The only data mining activity which was carried out in the last part of Phase 4 was not originally included in the plan for this Phase. As a matter of fact, GBYP was already aware of a huge data base on historical tuna trap that was used for a Ph.D. Thesis by Christelle Ravier-Mailly (Ravier, 2003) and that was used also for several papers coordinated by Ph.D. Jean-Marc Fromentin (Ravier and Fromentin, 2001, 2002). This huge data base was kindly provided by Dr. Fromentin to GBYP, as a donation in kind, in the last part of Phase 4. The data were provided on an excel file, having 10 spreadsheets and 6384 records (**Table 1**). They cover the period 1525-1997 (**Table 2**), including about 50[2] traps from five countries. It was initially examined by GBYP and the ICCAT Statistical Department and it was clear that several data and traps were already present in the ICCAT GBYP data base and that the data on this last file had different formats. Therefore, it was necessary to plan a long and difficult work for checking all these data, to be done in Phase 5.

During this first part of the work, it was evident that the files had also additional problems, like typing mistakes or even some possible problems coming from the use of "." or "," before decimals, maybe deriving from original separate Excel files in English, French, Italian or Spanish. These very important problems will require additional work for cleaning the data.

During the first four months of work in GBYP Phase 5 it was clear that the system used for obtaining the total catch when this quantity was not available was based on a mean size by country, which is constant over the many years. This method is able to always provide a catch by year, but of course it is not able to catch any variability of the mean size by year, particularly taking into account that in some cases the catch was originally reported by weight or size categories. This method was not fitting the methodology used by the ICCAT Secretariat and therefore it was necessary to examine again the file and reconvert the number of fish to kg using the weight of the various size categories, when this information was available.

The ICCAT Statistical Department decided to propose the comparison between the two methods to the SCRS Sub-group of Statistics and to the SCRS BFT Species Group, for adopting the most suitable method; five data series (related to five traps, one in each country: Sant'Elia-IT, Principe-MO, Torre del Barra-PT, Barbate-SP and Ras el Ahmar-TN) were proposed to the groups.

When this decision will be adopted, then it will be necessary cross-check the last data from these files against the data already existing in the ICCAT GBYP historical trap data base (Di Natale *et al*., 2013, 2014; Anonimous, 2014), examining and solving any possible data conflict according to the best available knowledge, for eliminating duplicated data and for finally incorporating any missing data into the ICCAT GBYP data base, according to the format used by the Statistical Department at the Secretariat.

The creation a database of historical tuna traps data is most of the times hampered due to the different format of the data sources and they cannot be easily standardized. In this particular case, the problem for converting data from number of bluefin tunas into weight and vice versa for later comparison and analysis came from the adoption of diverse methodology used to store and manage the data for each working group.

This document was written for the purpose of showing the current situation and the different methodologies for converting the number of tunas to total catch and vice versa, and therefore define together with the SCRS bluefin tuna species Group and the SCRS Subcommittee of Statistics the most suitable methodology and standardize the conversion between different measurement units (essentially number of specimens and weight). This will allows for finally comparing the different data series at the ICCAT Secretariat.

[2] The total number of traps is uncertain, because some traps were reported with different names in different historical times, while they were exactly in the same location, just changing the name over the years.

The need to present this discussion to the SCRS Species Group and the SCRS Subcommittee of Statistics originated when, in Phase 4 and 5 of the GBYP it tried to go forward with other activities of historical tuna trap data mining, started in previous Phases, for filling the many gaps in several data series currently present in the ICCAT data base with other additional series.

2. Objectives

The objective of this paper is discussing the problem with the SCRS Species Group and the SCRS Subcommittee of Statistics about the real difficulties found and chose the most appropriate methodology for the data conversion. For this, GBYP shows five examples of traps from five countries (Sant'Elia - IT, Principe - MO, Torre de Barra - PT, Barbate – SP and Ras el Ahmar - TN). The data from these traps, converted using both the methodology originally adopted by the original data provider and the methodology currently used by the ICCAT Statistical Department, shows how results can be different; furthermore, we added the data series already existing in the ICCAT GBYP data base, which was previously revised and discussed during the Tenerife Meeting for Biological Parameters (Anon., 2014), providing bases for the discussion.

3. Results of data comparison with different conversion methodology from number into weight

The data compared for both historical and recent traps catches are deriving from two different original sources. One was obtained from calls for tenders in Phases 1, 2 and 3, while the other was donated by Ph.D. Jean-Marc Fromentin in the last part in Phase 4. In spite of the different origin, data for some traps and years are the same, especially for the historical data.

GBYP compared and analysed these data with the initial objective to obtain a single series for each traps catches, taking into account that some series cover a period of about 5 centuries. In most of the cases, the data are in number of fish, but at the same time, the data are in weight (originally, in different units as tons, barrels or quintals).

A first problem is related to the individual name of the historical traps on the files, because sometimes two different names over two different historical period were used for the same trap existing in the same location. In other cases, the production of several traps was joined under a cumulative name (i.e.: "Suratlantica"). These problems were partly resolved, while a few cases will be possibly resolved shortly, using both the knowledge of several experts dealing with tuna traps over the last 5 centuries and bibliographic sources.

The biggest problem found is to correlate the data in numbers with the data in weight. For converting these data series, GBYP uses the tuna size categories when this information was available in addition to the total number of fish. It is in these cases when GBYP adopt the ICCAT methodology conversion based in an average weight for each tuna category (shown on **Table 3**).

On the other hand, deeply examining the data and documents used in the last donated file, it is very clear that the methodology used for converting the data was different and it was usually based on different average weights for catches coming from traps based in different countries (Ravier and Fromentin, 2002).

The remarkably different results obtained with the two different methodologies for converting the number of fish to total weight and/or vice versa by year are presented in three different examples, related to traps in different countries: Sant' Elia in Italy (**Table 4** and **Figure 1**), Ras el Ahmar in Tunisia (**Table 5** and **Figure 2**) and Principe in Morocco (**Table 6** and **Figure 3**). Previous ICCAT GBYP data were available for the first two traps and they were also included in the tables, showing further important discrepancies.

In the case of the Portuguese trap of Torre de Barra, even if the time series is limited to only three years, differences are evident, but the number of fish is different between the ICCAT GBYP data and the JMF data (**Table 7** and **Figure 4**)

Additionally, in the case of Barbate (**Table 6** and **Figure 5**), the original data ICCAT GBYP included the number of fish, the fish sampled and the individual weight and these fish were used for obtaining the total weight; this figure is possibly the most realistic. The data coming from the recently donated file, converted with the two methodologies, shows important discrepancies. The conversion work (number into weight or vice versa) has been already done for the full data sets in the file and data shows similar discrepancies and inconsistencies in most of the cases.

Conclusions

The case of these data sets clearly shows how difficult it is when dealing with historical data sets and how necessary it is, before incorporating any data in the ICCAT data base, to select and agree upon the most suitable methodology, for avoiding misleading results.

In this case, at first, it is necessary to chose between the two methodologies here examined (average weight by country or weight conversion according to size/weight categories). Once the methodology will be agreed, the following work will be comparing the data already existing in the ICCAT GBYP data base with the new data, eliminate duplications by year and trap and trying to define all conflicts when data are different, checking these against the original data sources.

After this important part of the work, all data for periods previous to 1950 will be directly incorporated, while data sets after 1950 will be checked also by national scientists and agreed before incorporating them.

This huge and difficult work would finally provide the longest catch data series for a marine species, something certainly not available so far in any RFMO. The use of this extremely long data series will be a reference point for the ICCAT SCRS.

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Table 1. Additional tuna trap data recovered in the last part of Phase 4, which are still under check (origin: file kindly donated by Ph.D. Jean-Marc Fromentin).

Records	6.384
BFT (n)	17.441.811
BFT (t)	2.791.528

Table 2. Range of years covered by the tuna rap data recovered in the last part of Phase 4 for each country.

Country	*1st year*	*Last year*
Italy	1595	1997
Morocco	1916	1973
Portugal	1797	1933
Spain	1525	1980
Tunisia	1863	1997

Table 3. Size categories adopted by ICCAT GBYP for historical traps (mostly derived from the categories used for the western Mediterranean and eastern Atlantic).

Categories	*Size categories*	*Average weight*
Cachorretitas	Less than 10 kg	5 kg
Cachorretas	Between 10 and 30 kg	20 kg
Albacoras	Between 30 and 50 kg	40 kg
Atuarros	Between 50 and 90 kg	70 kg
Tunas	More than 90 kg until 250 kg approximately	170 kg

Table 4. Catch data series from the tuna trap of Sant' Elia (Italy), in numbers and weight (kg).

	ICCAT GBYP Data Methodology		*JMF Data ICCAT Method*		*JMF Data. JMF Method*	
Year	BFTn GBYP	BFTkg GBYP	BFTn JMFR	BFTkg JMFR	BFTn JMFO	BFTkg JMFO
1909	1159	114000	1159	197030	1159	127490
1910	759	64900	759	129030	759	83490
1911	710	37900	710	120700	710	78100
1912	601	91600	601	102170	601	66110
1913	814	94000	814	138380	814	89540
1915	142	15600	142	24140	142	15620
1916	715	125200	715	121550	715	78650
1917	262	39000	262	44540	262	28820
1918	440	91900	440	74800	440	48400
1924	144	10500	144	24480	144	15840
1925	55	8400	55	9350	55	6050
1926	71	14300	71	12070	71	7810
1927	77	7900	77	13090	77	8470
1928	124	20000	124	21080	124	13640
1929	32	6500	32	5440	32	3520

ICCAT GBYP Data: Data obtained in previous Phases and processed using the information provided by the various sources.

Fromentin's Data processed using ICCAT Methodology (JMFR = Jean-Marc Fromentin reviewed)

Fromentin's Data processed using Fromentin Methodology (JMFO = Jean-Marc Fromentin Original data)

Table 5. Catch data series from the tuna trap of Ras el Ahmar (Tunisia) trap in numbers and weight (kg).

	ICCAT GBYP Data Methodology		*JMF Data ICCAT Methodology*		*JMF Data JMF Methodology*	
Year	*BFTn GBYP*	*BFTkg GBYP*	*BFTn JMFR*	*BFTkg JMFR*	*BFTn JMFO*	*BFTkg JMFO*
1910	6637	415092	6637	1128290	6637	530960
1911	9087	542166	9087	1544790	9087	726960
1912	3126	230158	3136	533120	3136	250880
1913	1689	114887	1689	287130	1689	135120
1914	4022	323958	4022	683740	4022	321760
1915	3445	393697	3445	585650	3445	275600
1916	1684	135027	1684	286280	1684	134720
1917	1207	87290	1207	205190	1207	96560
1919	3249	241555	3249	552330	3249	259920
1920	1688	138588	1688	286960	1688	135040
1921	1132	67180	1132	192440	1132	90560
1922	4789	288500	4740	805800	4740	379200
1923	2359	150976	2359	401030	2359	188720
1924	4299	275136	4299	730830	4299	343920
1925	2504	160320	2508	426360	2508	200640
1926	1204	77056	1204	204680	1204	96320
1930	1166	140660	1182	200940	1182	94560
1931	3278	492524	1639	278630	1639	131120
1932	3556	407364	1773	301410	1773	141840

ICCAT GBYP Data: Data obtained in previous Phases and processed using the information provided by the various sources.
Fromentin's Data processed using ICCAT Methodology (JMFR = Jean-Marc Fromentin reviewed)
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Table 6. Catch data series from the tuna trap of Principe (Morocco) in numbers and weight (kg).

	JMF Data ICCAT Methodology		JMF Data JMF Methodology	
Year	BFTn JMFR	BFTkg JMFR	BFTn JMFO	BFTkg JMFO
1940	226	37820	226	36160
1941	205	34350	205	32800
1942	67	11390	67	10720
1943	384	62880	384	61440
1944	246	7465	246	39360
1945	305	51085	305	48800
1946	736	61415	736	117760
1947	2423	31360	2423	387680
1948	1559	73870	1559	249440
1951	2732	132445	2732	437120
1952	1340	112220	1340	214400
1953	950	21965	950	152000
1954	1790	123785	1790	286400
1955	217	10275	217	34720
1956	235	31600	235	37600
1957	504	73280	504	80640
1958	495	73725	495	79200
1959	637	102645	637	101920
1960	1101	165255	1101	176160
1961	303	42065	303	48480
1962	324	54215	324	51840
1963	640	89035	640	102400
1964	816	84835	816	130560
1965	1902	200510	1902	304320
1966	107	16190	107	17120
1967	175	28950	175	28000
1968	37	5390	37	5920
1970	321	53570	321	51360
1971	228	38760	228	36480
1972	252	42840	252	40320

Fromentin's Data processed using ICCAT Methodology (JMFR = Jean-Marc Fromentin reviewed)
Fromentin's Data processed using Fromentin Methodology (JMFO = Jean-Marc Fromentin Original data)

Table 7. Catch data series from the tuna trap of Principe (Morocco) in numbers and weight (kg).

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Fromentin Data processed using ICCAT Methodology (JMFR = Jean-Marc Fromentin reviewed)
Fromentin Data processed using Fromentin Methodology (JMFO = Jean-Marc Fromentin Original data)

Table 8. Catch data series from the tuna trap of Torre da Barra (Portugal) in numbers and weight (kg).

	ICCAT GBYP Data Methodology		JMF Data ICCAT Methodology		JMF Data JMF Methodology	
Year	BFTn GBYP	BFTkg GBYP	BFTn JMFR	BFTkg JMFR	BFTn JMFO	BFTkg JMFO
1898	2657	353670	2922	397440	2922	511350
1899	381	48910	431	62580	431	75425
1900	929	121350	992	140810	992	173600

ICCAT GBYP Data: Data obtained in previous Phases and processed using the information provided by the various sources.
Fromentin's Data processed using ICCAT Methodology (JMFR = Jean-Marc Fromentin reviewed)
Fromentin's Data processed using Fromentin Methodology (JMFO = Jean-Marc Fromentin Original data)

Table 9. Catch data series from the tuna trap of Barbate (Spain) trap in numbers and weight (kg).

	ICCAT Data ICCAT Methodology		*JMF Data ICCAT Methodology*		*JMF Data JMF Methodology*	
Year	*BFTn GBYP*	*BFTkg GBYP*	*BFTn JMFR*	*BFTkg JMFR*	*BFTn JMFO*	*BFTkg JMFO*
1914	11.105	1.394.700	8.204	1.394.700	8.204	1.312.640
1922	10.997	1.522.021	10.762	1.810.440	10.762	1.721.920
1925	4.562	667.461	8.486	1.429.020	8.486	1.357.760
1926	10.997	1.522.021	11.689	1.959.930	11.689	1.870.240
1929	16.849	2.313.000	39.039	4.706.600	39.039	6.246.240
1930	18.012	2.417.800	16.735	2.840.800	16.735	2.677.600
1931	19.905	2.770.700	16.817	2.815.920	16.817	2.690.721
1932	14.184	2.088.900	12.436	2.094.420	12.436	1.989.814
1933	12.722	1.759.900	10.719	1.780.860	10.719	1.715.048
1934	4.697	656.100	3.958	657.180	3.959	633.373
1935	4.278	608.000	3.631	608.040	3.631	580.992
1936	18.582	2.381.400	12.371	2.102.040	12.371	1.979.379
1937	20.501	2.728.200	14.789	2.476.700	14.789	2.366.306
1938	21.188	2.367.000	16.212	2.704.900	16.212	2.593.956
1939	15.626	2.036.400	10.772	1.810.920	10.772	1.723.595
1940	12.491	1.343.200	9.047	1.448.080	9.047	1.447.497
1941	9.139	1.207.300	7.472	1.252.220	7.472	1.195.507
1942	7.645	946.800	5.916	979.420	5.916	946.621
1943	23.056	2.763.600	18.759	3.144.300	18.759	3.001.492
1944	24.196	2.703.100	18.466	3.099.840	18.466	2.954.485
1945	16.938	1.949.200	12.645	2.125.040	12.645	2.023.211
1946	23.250	2.034.200	15.860	2.663.720	15.860	2.537.592
1947	26.601	2.566.600	16.732	2.753.880	16.732	2.677.057
1948	18.836	2.272.200	13.904	2.275.620	13.904	2.224.590
1949	43.429	5.882.600	34.751	5.876.200	34.751	5.560.121
1950	17.285	2.209.000	13.527	2.205.600	13.527	2.164.296
1951	10.542	1.177.400	7.221	1.177.680	7.221	1.155.390
1952	21.330	2.456.900	15.006	2.457.340	15.006	2.401.006
1953	23.304	2.892.000	17.300	2.892.660	17.300	2.768.070
1954	20.995	2.733.000	16.230	2.733.300	16.230	2.596.854
1955	20.278	2.887.800	17.060	2.887.840	17.060	2.729.678
1956	21.280	3.041.900	18.185	3.071.280	18.185	2.909.534
1957	26.769	4.285.800	25.091	4.251.400	25.091	4.014.494
1958	27.523	5.192.700	24.821	4.195.180	24.821	3.971.322
1959	16.724	2.439.300	14.466	2.440.840	14.466	2.314.518
1960	17.627	2.373.000	14.040	2.373.400	14.040	2.246.427
1961	18.655	2.704.200	16.013	2.711.000	16.013	2.562.017
1962	13.225	2.188.900	11.891	2.013.900	11.891	1.902.561
1963	5.820	969.400	5.737	969.200	5.737	917.970
1964	9.121	1.689.700	9.662	1.639.600	9.662	1.545.976
1965	8.286	1.521.600	9.004	1.523.020	9.004	1.440.597

1966	4.415	703.700	4.158	703.820	4.158	665.316
1967	9.640	1.835.700	10.800	1.835.700	10.800	1.727.987
1968	4.180	819.300	4.822	819.400	4.822	771.469
1969	5.661	1.073.400	6.548	1.077.260	6.548	1.047.626
1970	5.559	1.007.800	5.559	945.030	5.559	889.440
1971	1.466	327.400	1.466	249.220	1.466	234.560
1972	388	57.200	388	65.960	388	62.080
1973	1.952	399.400	1.952	331.840	1.952	312.320
1975	1.848	445.200	1.848	314.160	1.848	295.680
1976	2.119	417.500	1.680	285.600	1.680	268.800
1977	1.268	263.500	1.268	215.560	1.268	202.880
1978	1.963	417.400	1.963	333.710	1.963	314.080
1979	2.030	412.800	2.030	345.100	2.030	324.800
1980	4.074	662.500	4.074	692.580	4.074	651.840

ICCAT GBYP Data: Data obtained in previous Phases and processed using the information provided by the various sources.
Fromentin's Data processed using ICCAT Methodology (JMFR = Jean-Marc Fromentin reviewed)
Fromentin's Data processed using Fromentin Methodology (JMFO = Jean-Marc Fromentin Original data)

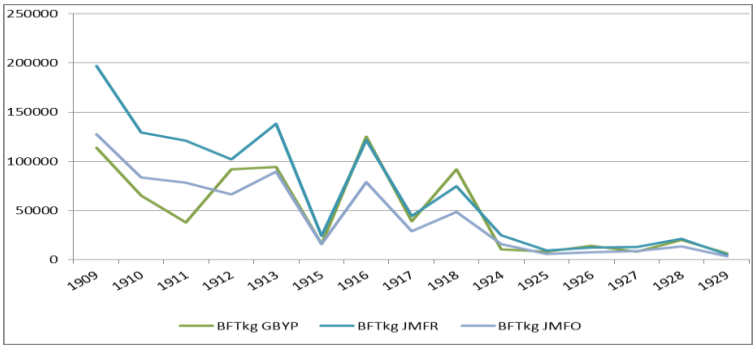

Figure 1. Comparison of catches in kg using different methodology in the tuna trap of Sant' Elia.

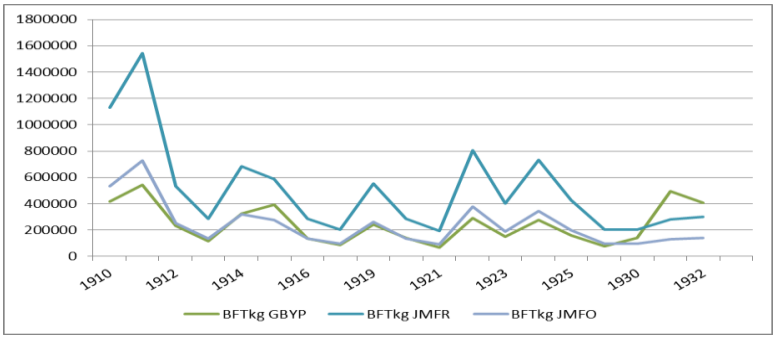

Figure 2. Comparison of catches in kg using different methodology in the tuna trap of Ras el Ahmar.

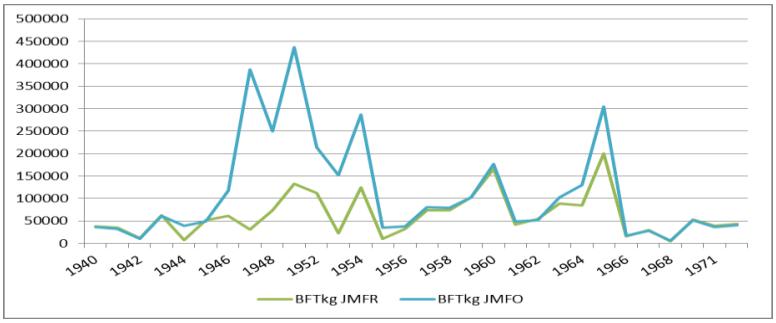

Figure 3. Comparison of catches in kg using different methodology in Principe.

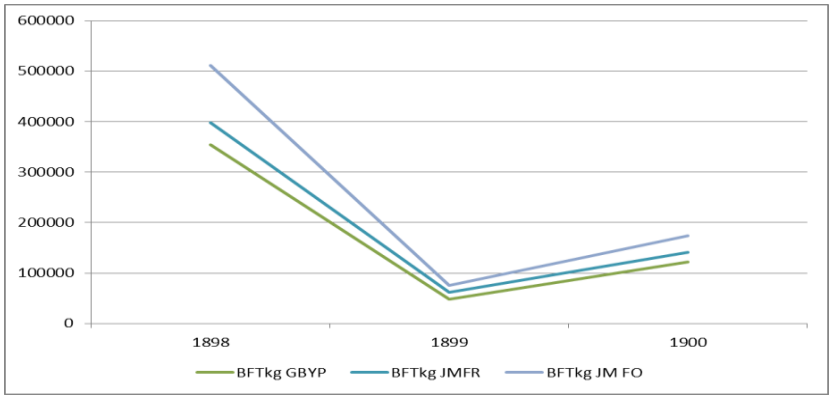

Figure 4. Comparison of catches in kg using different methodology in tuna trap of Torre da Barra (Portugal).

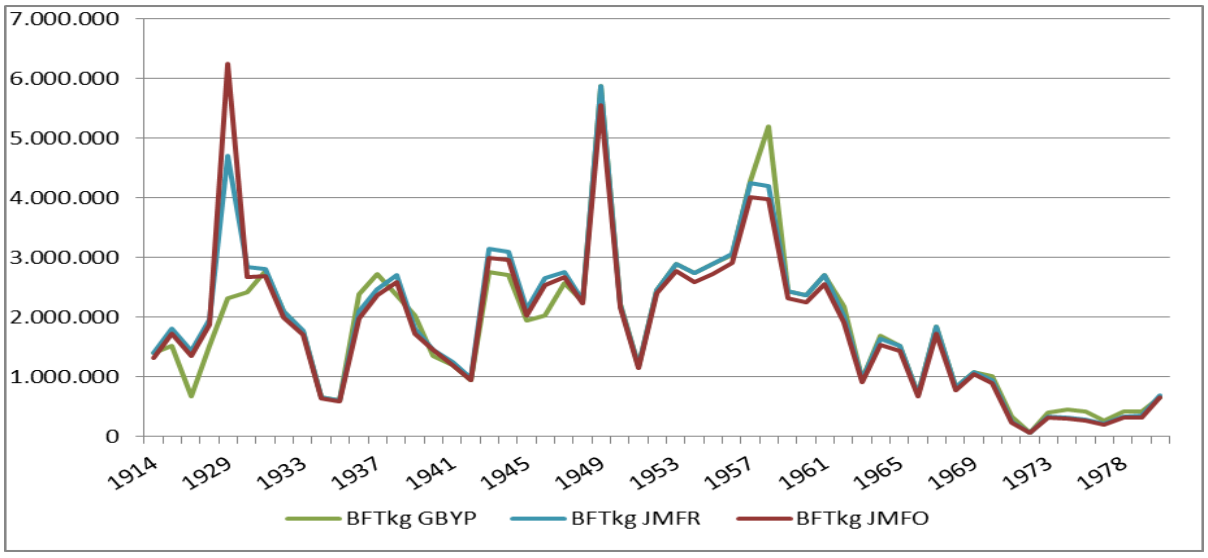

Figure 5. Comparison of catches in kg using different methodology in the tuna trap of Barbate.