ICCAT-GBYP TAG RECOVERY ACTIVITIES UP TO SEPTEMBER 2013

Antonio Di Natale[1], M'Hamed Idrissi[1], Ana Justel-Rubio[1]

SUMMARY

The ICCAT-GBYP tag recovery awareness activities were launched during the GBYP Phase 2 and being pursued during Phases 3 & 4. Up to date there have been 109 tags, conventional or electronic ones, recovered for which it was necessary to recover also all the information related to their release and recapture as well. A task which has been revealed very tough because only a few other tagging programmes report their tag release data, even in cases where the tags were provided by ICCAT. It takes always too much time before finding the tag release data as some tags were implanted many years ago. The main tag recoveries by GBYP have been made during the period 2012 – mid 2013, coinciding with the implementation of the ICCAT-GBYP Tag Recovery Programme. Based on these preliminary figures there would be possibilities to better improve this recovery actions and consequently increase rates of the tag recovery and the tag reporting for bluefin tuna in the ICCAT Convention area.

RÉSUMÉ

Les activités de l'ICCAT-GBYP de sensibilisation à la récupération des marques ont été lancées durant la phase 2 du GBYP et se sont poursuivies pendant les phases 3 et 4. Jusqu'à ce jour, 109 marques conventionnelles ou électroniques ont été récupérées ; il a également été nécessaire de récupérer toute l'information relative à leur remise à l'eau et récupération. Cette tâche s'est avérée particulièrement ardue car seul un petit nombre de programmes de marquage déclarent leurs données de remise à l'eau des marques, même dans les cas où les marques ont été fournies par l'ICCAT. Cela prend toujours trop de temps de trouver les données de remise à l'eau des marques étant donné que certaines marques ont été apposées il y a de nombreuses années. Le GBYP a réalisé les principales récupérations de marques entre 2012 et le milieu de 2013, moment qui a coïncidé avec la mise en œuvre du programme de récupération des marques ICCAT-GBYP. Sur la base de ces chiffres préliminaires, il serait possible d'améliorer davantage les actions de récupération et d'augmenter par conséquent les taux de récupération des marques et les taux de déclaration des marques pour le thon rouge dans la zone de la Convention de l'ICCAT.

RESUMEN

Las actividades del ICCAT-GBYP para la concienciación y recuperación de marcas se iniciaron durante la segunda fase del GBYP y continuaron durante la tercera y cuarta fase. Hasta la fecha, ha habido 109 marcas convencionales o electrónicas recuperadas para las que fue necesario recuperar también toda la información sobre su colocación y recuperación. Una tarea que fue muy dura porque sólo unos pocos programas de marcado comunican sus datos de colocación de marcas, incluso en los casos en los que las marcas las proporciona ICCAT. Se requiere siempre mucho tiempo para hallar los datos de colocación de las marcas ya que alguna marcas se habían colocado hace ya varios años. El mayor número de recuperaciones de marcas del GBYP se consiguió en 2012 hasta mediados de 2013, coincidiendo con la implementación del programa de recuperación de marcas ICCAT-GBYP. Basándose en estas cifras preliminares, habría posibilidades de mejorar estas acciones de recuperación y, por consiguiente, de incrementar las tasas de recuperación de marcas y de comunicación de marcas para el atún rojo en la zona del Convenio ICCAT.

KEYWORDS

Tagging, Bluefin tuna, Tag recovery Awareness

[1]ICCAT, GBYP, Corazón de Maria 8, 6a, 28002 Madrid, España.

1. Introduction

The main objectives of the ICCAT Atlantic-Wide Research Program on Bluefin Tuna (GBYP) are to improve: (a) the understanding of key biological and ecological processes, (b) current assessment methodology, (c) management procedures, and (d) advice.

Key tasks are to reduce uncertainty in stock assessment and to provide robust management advice. This requires improved knowledge of key biological processes and parameters. However, currently almost all the data used in stock assessments are obtained from the fisheries-dependent data. It is, therefore, important to obtain data from alternative sources, such as tagging studies, in order to verify the assumptions made when conducting the assessments. A well-designed tagging programme, being developed over several years and with a progressive methodological approach, will therefore be important to improve our understanding of bluefin tuna ecology and ethology and for developing better stock assessment methods.

An ICCAT-GBYP Tagging Design and an ICCAT-GBYP Tagging Manual, written by IEO, were approved and officially adopted after the presentation to the SCRS at the beginning of GBYP Phase 2:
(http://www.iccat.int/GBYP/Documents/TAGGING/PHASE%201/Annex%201.%20Tag%20design%20report_fin_rev.pdf
and
http://www.iccat.int/GBYP/Documents/TAGGING/PHASE%201/ICCAT%20GBYP%20TAGGING%20MANUAL_fin_rev.pdf).

The adoption by the ICCAT Commission of the Rec. 11-06, which allows GBYP to use up to 20 tons per year of bluefin tuna for research purposes, permitting also derogation from the minimum size and allowing for the use of all fishing gears at any time of the year for biological sampling and tagging, was an essential step forward for carrying on the tagging programme.

Over the last decades, the tag recovery and the tag reporting rates for bluefin tuna in the eastern Atlantic and the Mediterranean Sea have been extremely low; these rates have been roughly estimated to be less than 5% in the eastern Atlantic and less than 1% in the Mediterranean Sea (STECF, 2008). This situation is possibly due to many factors, among which the lack of both awareness and an adequate communication, together with the unfortunate attitude of several fishermen and fisheries not to report the tags eventually found, undermining all efforts.

One of the tasks assigned to the ICCAT-GBYP is to improve this situation, also taking into account the larger number of networks and stakeholders concerned as compared to some years ago and the increasing number of communication possibilities existing now. One tool is the policy of improving "a reward per tag", which could be the way to thank the fishers and/or the stakeholders for their collaboration. At the same time, some "high rewards" were established (i.e., for the recovery of electronic tags, a GBYP annual lottery, etc.).

Another tool is the awareness and communication campaign, which is particularly difficult because of such a huge ICCAT Convention area which includes many countries, with a variety of peoples, languages, cultures and educational levels, as well as an extensive variety of fisheries and fishers (industrial, artisanal and recreational). Tag awareness posters, printed in 12 languages, have been disseminated by ICCAT-GBYP in all countries and in many fisheries (see: http://www.iccat.int/GBYP/images/mapamunditicks.jpg).

2. Objectives

The essential elements of the on-going ICCAT-GBYP tagging activity are:

- Carry out a challenging tagging scientific programme with the objective of improving the general and scientific knowledge of the bluefin tuna, which is essential to properly manage this important fish resource in a sustainable way. The specific objectives of the tagging design in relation to conventional tagging are:

1. Validation of the current stock status definitions for populations of bluefin tuna in the Atlantic and Mediterranean Sea. It is particularly important to consider possible sub-stock units and their mixing or population biomass exchange in the Mediterranean Sea.
2. Estimate the natural (M) and or total mortality (Z) rates of bluefin tuna populations by age or age-groups
3. Estimate tagging reporting rates for conventional tags, by major fishery and area, using the observer programs currently deployed in the Mediterranean fisheries.

   While in relation to the potential use of electronic tags the objectives are

4. Evaluate habitat utilization and movement patterns (spatio-temporal) of the spawning population with emphasis on: (I) vertical and horizontal distribution patterns of the spawning stock, to help calibrate the aerial surveys and estimate sighting probabilities; (II) investigating how mature specimens use the spawning grounds (e.g., do bluefin tuna visit the same spawning grounds every year to the exclusion of all others, or do they visit several spawning sites and, if so, over what periods).

- Define the most appropriate tagging techniques and approaches, by testing the tagging possibilities with various gears, in different areas and for different fish size.
- Test various types of conventional tags with the purpose of defining the most resistant and appropriate.
- Try to provide detailed results by using various types of electronic tags.
- Improve the tag reporting quality of the data.

The specific objectives of the GBYP awareness campaign for the bluefin tuna tagging programme were set as:

- Improve the general knowledge about the ICCAT/GBYP tagging programme.
- Increase the awareness of all the bluefin tuna stakeholders about the GBYP Tagging Programme and tag recovery and reporting activities.
- Provide rewards and dedicated feedbacks for all tags reported.
- Improve tag recovery and reporting rates.

3. Methods

At first, ICCAT GBYP acquired a considerable amount of tags during these first Phases of the programme, allowing both the tag delivery to all stakeholders who have a bluefin tagging activity (either opportunistic or institutional) and to the GBYP contractors. In detail, ICCAT-GBYP acquired the followings:

- No. 30000 single barb conventional spaghetti tags
- No. 18000 double-barb small billfish conventional spaghetti tag
- No. 12000 double-barb large billfish conventional spaghetti tag
- No. 2400 applicators for single barb tags
- No. 5273 applicators for double-barb small billfish tag
- No. 5072 applicators for double-barb large billfish tag
- No. 85 mini-PATs pop-up electronic tags
- No. 10 applicators for mini-PATs
- No. 50 internal archival tags

Furthermore, GBYP acquired a total of 40 PIT readers, but then PIT tags, which have been planned in Phase 2, were not used because of some legal problems raised by an ICCAT CPC.

It was established to implant double conventional tags on a target of 40% of tagged tunas. One of the tags shall be a single-barb and the second a double-barb of one of the two types, depending on the size of each fish. This method should allow evaluating the more resistant type of tags to be used in future trials.

More than 11,000 posters were used for the tag awareness campaign, along with a similar number of stickers, in 12 languages. Dedicated funds were set for tag reporting.

The ICCAT-GBYP tagging activity was based on the recommendations provided by the GBYP Steering Committee and on annual contracts, released after public Calls for tenders.

In Phase 2 the conventional tagging activity was carried out by a Spanish Consortium, headed by IEO, which used baitboats in the Bay of Biscay and in the Strait of Gibraltar and purse-seiners in the Mediterranean, targeting mostly juvenile bluefin tunas. An experimental electronic tagging activity on adult bluefin tunas was organised in a Moroccan trap, under a cooperative agreement among the INRH, the Moroccan Tuna Trap industry, the Fuentes Group and WWF-MedPO, with the support of the Moroccan Fishery Authorities and ICCAT-GBYP.

In Phase 3 the conventional tagging and electronic tagging activities were carried out by another Spanish Consortium, headed by AZTI, which used baitboats in the Bay of Biscay, in the Strait of Gibraltar and in the Mediterranean, targeting juvenile bluefin tunas. The electronic tagging in the Moroccan traps was also conducted by the same cooperative team which was active in Phase 2.

The activities in Phase 4 were much more complex, trying to improve the tagging possibilities. In Phase 4 the conventional tagging and electronic tagging activities were carried out by a Spanish Consortium, headed by AZTI, which used baitboats in the Bay of Biscay and in the Strait of Gibraltar. The work in the Moroccan tuna traps was carried out by an international Consortium headed by INRH, who carried out both electronic and conventional tagging on adult bluefin. Adult bluefin tunas have been also conventionally tagged in Sardinian traps by an Italian Consortium headed by COMBIOMA, and using purse-seiners in the Tyrrhenian Sea by another Italian Consortium headed by UNIMAR. Juvenile bluefin tunas were conventionally and electronic tagged using purse-seiners and cages in the Adriatic Sea by a Croatian Company, Kali Tuna. Some of the tagging activities are still going on when this paper was set.

Complimentary tagging is carried out by various entities, including sport fishermen.

Up to 15 September 2013, ICCAT-GBYP has tagged 13,617 bluefin tuna through Phases 2, 3, and 4 (without counting those implanted this last phase in Strait of Gibraltar). Among these, 6,364 bluefin tunas were double tagged, reaching 46.7%, over the target. Electronic tags (both pop-up and archival) have been regularly implanted during these first Phases.

4. Data processing and analysis

The tag recovery data taken into account for this analysis were those from 2006 to 15 September 2013, in order to compare a normal ICCAT recovery activity with the one after the implementation of the first Phases of GBYP.

All entities contracted for tagging purposes since the first year of the ICCAT-GBYP tagging programme (Phases 2, 3 and 4) are requested to provide the tag release data in the specific ICCAT data base developed by the Secretariat. These data go through a quality control process set by GBYP before incorporating them in the ICCAT tagging data base. This is a process routinely developed along with the validation of all the reports (deliverables) provided by the ICCAT-GBYP contractors.

The necessary follow-up is the tag recovery. ICCAT-GBYP is currently in charge of taking care of all data recovered from bluefin tunas, independently from the entity which tagged the fish or the type of tag. Every time a tag is reported to ICCAT-GBYP, it activates a process in order to get all the necessary data. These recovery data are quality verified together with the tag release data and cross-checked. This quality process is extremely important and sometimes takes months to be finalized if not all data are available or if a tag was implanted by an entity which never reported to ICCAT the tag release data. If a recovered tag was implanted by an entity which is not an ICCAT-GBYP contractor, then the recovery data are transmitted to this entity as soon as all necessary data have been quality checked by ICCAT-GBYP. A tag reward can be released only when all necessary recovery data are properly reported to GBYP.

A separate GBYP specific data base “Tag Release / Tag Recapture” was created in order to handle this information without jeopardizing the ICCAT Data base. Each year, at the beginning of September, GBYP transmit all tag release and tag recovery data which have been fully quality-checked to the ICCAT tag data base, for officially incorporating them in the system. At the same time, the tag recovery data will be used for the annual ICCAT-GBYP lottery.

For the preliminary analysis of the tag recovered and reported to GBYP, a focus was made on:

- The summary number of each type of implanted tags.
- Their distribution among the different areas (fishing grounds).
- The tag recovery/reporting by the different fishing gears (fisheries).
- The annual trend of the tags recoveries, starting from 2006, the first year available in the data set, up to 2013 (ongoing phase 4 of ICCAT-GBYP).
- The recoveries by calendar seasons (1st, 2nd, 3rd and 4th quarters).

5. Results

While considering the results of the ICCAT-GBYP tag recovery/reporting activities, it is very important to consider that 92.3% of the conventionally tagged fish in Phases 2 and 3 were juveniles (age 0-3) (**Figure 1**); 70.5% were surely immature fish (age 0-2) and then it is difficult for these fish to be caught by most of the fisheries, particularly taking into account the ICCAT minimum size regulation.

Up to the 15th of September 2013, there have been 109 tags recovered (74 deployed by GBYP and 35 deployed by other tagging programmes). They are summarized in **Table 1** as follow:

- 76 Conventional "Spaghetti" tags (69.7% of the total)
- 19 Conventional "Double/Single barb" tags from double tagged fish (17.4% of the total)
- 10 External Electronic "mini-PATs" tags (9.2% of the total)
- 3 Internal Electronic "Archivals" tags (2.8% of the total)
- 1 Commercial "Trade" bluefin tuna tag (0.9% of the total)

In terms of fishing grounds (areas) where these 109 tags have been recovered. These are the details (**Table 2**):

1. East Atlantic: 53 tags (48.6%): 32 Spaghetti tags, 16 double tags and 5 miniPATs,
2. Mediterranean Sea: 47 tags (43.1%): 40 Spaghetti, 3 double tags, 3 miniPATs and 1 Archival,
3. North Atlantic: 4 tags (3.7%): 2 Spaghetti, 1 Archival and 1 Trade,
4. West Atlantic: 3 tags (2.8%): 2 Spaghetti ones and 1 Archival,
5. Unknown area: 2 tags (1.8%), all miniPATs[2]

Concerning the fishing gears (fisheries) used to catch the bluefin tuna individuals carrying these 109 different tags at the moment of their capture, they are as follow (**Table 3**):

1. Bait boat: 33 tags (30.3%): 22 Spaghetti and 11 double tags,
2. Farms: 17 tags (15.6%): 15 Spaghetti, 1 double tag and 1 miniPAT,
3. Non-fishermen: 15 tags (13.8%): 5 Spaghetti, 8 miniPATs, 1 Archival and 1 Trade tag,
4. Unclassified gears: 15 tags (13.8%): 14 Spaghetti and 1 miniPAT,
5. Long line fishery: 12 tags (11.0%): 8 Spaghetti, 3 double tags & 1 Archival,
6. Trolling: 6 tags (5.5%): 4 Spaghetti and 2 double tags,
7. Sport & Recreational: 3 tags (2.8%): 3 Spaghetti,
8. Purse seine: 3 tags (2.8%): 2 Spaghetti and 1 double tag,
9. Trammel: 2 tags (1.8%): 1 Spaghetti and 1 double tag,
10. Trap: 2 tags (1.8%): 1 Spaghetti and 1 Archival,
11. Rod & Reel: 1 tag (0.9%): 1 Spaghetti

Table 4 shows that 86.2% of the recoveries have occurred during the last two years (2012-2013) over the period of 2006-2013. The year 2012 (Phases 2-3 of GBYP), with 49.5% of these recoveries, is the first one after the beginning of the tag awareness activities enforced by GBYP. The recoveries in 2013 (34.9% of the total) correspond only to a part said year.

[2] These are tags reported by vessels, after a long fishing campaign, and the recovery location was not available. The location will be defined later, when the manufacturer will be able to recover the data stored inside the tags, if still possible.

The 3rd trimester (July – September) is the season during which most of the tag recoveries have occurred so far (53 tags, representing 48.6% of the total), followed by the 4th trimester (24 tags, representing 22.0% of the total) (**Table 5**). These data leave good chances for improving the 2013 tag recovery results.

5. Discussion

The important tag reporting improvement registered after the beginning of the tagging and tag awareness activities by ICCAT-GBYP is impressive: the average recovery for the period 2005-2010 was only 2 tags per year, while the average of the GBYP tagging activities (2011, 2012 and part of 2013) provides an average of 33 tags per year, with 1550% increase. The year 2012, the first after the tag awareness activity, had a total of 54 tags reported to ICCAT, about 50% of the total over the whole period. It is possible that 2013 recoveries will be at a similar level at the end of the year. This is the clear evidence that GBYP tag awareness campaign is producing positive effects.

It is extremely difficult and almost impossible at the moment to define a recovery rate for GBYP conventional tagging activities, taking into account that most of the conventionally tagged tunas were juveniles and they will be possibly available in most of the fisheries within the ICCAT Convention area only in future years. Whenever we consider, as a preliminary exercise, the number of GBYP tags recovered so far in comparison with the number of GBYP tags deployed in 2011 and 2012, then currently the provisional recovery rate is 0.6% (74/12810), but this rate is clearly negatively biased by the juvenile ages of more than 92.3% of the tagged fish.

At the same time, it is impossible assessing the recovery rate of tags which were not deployed by ICCAT-GBYP, because we don't have the number of implanted tags by each tagging entity.

As concerns the tag reporting by area, the fact that most of the tags were recovered in the Eastern Atlantic and the Mediterranean is logical when considering the quota available for this stock, compared to the quota of the Western Atlantic stock. In any case, the tag reporting rate from the Western Atlantic is lower than expected and it is suspected that some tags were reported to various entities in the West and were not reported to ICCAT so far.

It is quite a positive result that in 19 cases it was possible to recover both tags implanted by GBYP on bluefin tunas: these first recoveries provide the hope of having useful results for defining the best type of dart to be used in next years of tagging activities.

The high number of tags reported by the baitboat fishery in the Bay of Biscay is mirroring several peculiar facts: a) this fishery is used to work with various scientists and is well aware of the tagging activities; b) this fishery is traditionally targeting juvenile bluefin tunas and this is one of the few fisheries having a derogation from the minimum size regulation; c) several tagging activities were carried out so far in the Bay of Biscay, allowing for recaptures in the same area.

The number of tags reported by two important activities in the Eastern Atlantic and in the Mediterranean Sea (purse-seiners/cages and tuna traps) are surprisingly very low. The purse-seine fishery is historically the most productive in the last decades, reaching over 70% of the total catch in some years; since 1999, almost all catches are moved to cages and then to fattening farms and these activities are strictly monitored by ICCAT observers (ROPs). Consequently, the GBYP was supposed to have a high tag recovery and reporting rate from purse-seiners/farms, but the data are showing a different reality: so far, only one Spanish Farm (Balfegó), one Maltese farm (Azzopardi) and one Greek farm (Hellas) had recovered some tags, of various types. Even considering that most of the recent tagging activities were targeting juveniles, the recovery and reporting rate is unrealistically too low.

The same considerations can be done for the traps, because only one Spanish tuna trap (Tarifa) had reported tags to ICCAT within the period taken into account. Even in this case, the recovery and reporting rate is unrealistically too low.

A similar consideration is applicable to the long-line fishery; including both the bluefin tuna targeted fishery and the many long-liners targeting other pelagic species having the bluefin tuna as a by-catch.

The relative high number of mini-PATs recovered and reported to ICCAT in these last years is indicative of both the curiosity induced by these tags (which are sometimes found stranded on the beach by tourists) and the effect of the high reward policy adopted by ICCAT-GBYP. Even in this case, a better communication using all media will certainly increase the reporting rate.

Unfortunately, we are aware that many tags of various types, including the precious internal archival ones (which are able to store up to 9 years of detailed data), have been recovered so far by several fishermen and fisheries and never reported to ICCAT for various reasons:

a) Orders by some traders, owners or captains, for providing them the tags, avoiding reporting them to ICCAT.
b) Recovery of bluefin tuna tags during IUU fishing operations, including those targeting juveniles, or fishing outside the quota, or fisheries conducted in months or areas when the bluefin tuna fishery is not permitted (this is also the case of some miniPATs, which were taken during fishing operations and later discarded at sea).
c) The well-known historical attitude of several fishermen to never inform anybody about any detail of their fishing activity, linked to ancestral fears.
d) The lack of information or ignorance about the relevance of reporting a tag.

During the first part of the ICCAT-GBYP it was also noticed the extreme importance of having all tag release data related to all tagging activities carried out on bluefin tuna (but also on all other species under the management of ICCAT) concentrated in the ICCAT tag data base. That is essential because recoveries can be logically reported to ICCAT at any time and it is not always easy, rather time/effort consuming finding the entity which implanted the tags if data are not properly stored. At the moment this tag release communication is not mandatory, but it should be, because it has a general interest, including for the various entities and institutions carrying out this activity.

However, without the conscientious collaboration of the various stakeholders, fishermen, traders, scientists, ICCAT-ROPs and any other people in direct contact with BFT individuals at the moment of their capture, the tremendous effort being deployed by ICCAT would not be rewarding. In this, it is to be mentioned the important cooperation, also in terms of awareness, of all GBYP Contractors, the scientists concerned and the ROPs.

In terms of awareness, besides all the material spread out over all the world and particularly in the ICCAT Convention area, there are still large spaces for improvements: direct field contacts with all stakeholders, more articles on the press, use of all communication media, use of education/awareness tools for pupils and students in coastal areas, etc. The scientific relevance of a successful tagging programme is high and invaluable.

Acknowledgments

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A special acknowledgement is given to the professional field job accomplished or being undertaken by all teams engaged in ICCAT-GBYP Tagging activities, contracted in these first phases of the programme, either for the tag release activities, the awareness campaign and the tag recovery assistance.

Bibliography

STECF, 2008, Report of the Working Group on Research Needs (SGRN-08-02). 6. Bluefin tuna and swordfish tagging activities in the period 2005-2007: summary of actions undertaken by MS and evaluation. JRC Scientific and Technical reports, EUR 23631: 115-123.

BELDA E., et al., 2011, Tagging design for the Atlantic-wide research programme for bluefin tuna (ICCAT - GBYP).

CORT, J. L., et al., 2011, Tagging manual for the Atlantic-wide research programme for bluefin tuna (ICCAT-GBYP).

CORT, J. L., *et al*., 2012, Informe final programa de marcado GBYP-ICCAT Fase 2, GBYP 08/2011.

GOÑI, N., *et al*., 2012, Final report on the activities of the ICCAT/GBYP – Phase 3 Tagging Program (2012).

QUÍLEZ-BADIA, G., *et al*., 2012, ICCAT-GBYP pop-up tagging activity, in Larache (Morocco). SCRS/2012/143.

Table 1. Overall summary of tags recovered by ICCAT-GBYP (2006-2013), in numbers and percent.

Overall Summary	Spaghetti Tags	Single/Doube Barb Tags	External Elec. Tags	Internal Elec. Tags	Commercial Tag	Grand Total
Grand Total	**76**	**19**	**10**	**3**	**1**	**109**
%ge	**69,7%**	**17,4%**	**9,2%**	**2,8%**	**0,9%**	**100,0%**

Table 2. Geographical distribution of the areas where the tags´ recoveries occurred, in numbers and percent.

Fishing Area / Tags	Spaghetti Tags	Single/Doube Barb Tags	External Elec. Tags	Internal Elec. Tags	Commercial Tag	Grand Total	Percent
East Atl	32	16	5	0	0	53	48,6%
Med	40	3	3	1	0	47	43,1%
North Atl	2	0	0	1	1	4	3,7%
West Atl	2	0	0	1	0	3	2,8%
Unknown	0	0	2	0	0	2	1,8%
Grand Total	**76**	**19**	**10**	**3**	**1**	**109**	**100%**

Table 3. Details of tag recovery by fishery, in numbers and percent.

Fishery -Gear / Tags	Spaghetti Tags	Single/Doube Barb Tags	External Elec. Tags	Internal Elec. Tags	Commercial Tag	Grand Total	%ge
Bait Boat	22	11	0	0	0	33	30,3%
Farms	15	1	1	0	0	17	15,6%
Non-fishermen	5	0	8	1	1	15	13,8%
UNCL	14	0	1	0	0	15	13,8%
Long line	8	3	0	1	0	12	11,0%
TROL	4	2	0	0	0	6	5,5%
Sport & Recr.	3	0	0	0	0	3	2,8%
Purse seine	2	1	0	0	0	3	2,8%
Trammel	1	1	0	0	0	2	1,8%
Trap	1	0	0	1	0	2	1,8%
Rod & Reel	1	0	0	0	0	1	0,9%
Grand Total	**76**	**19**	**10**	**3**	**1**	**109**	**100%**

Table 4. Annual trend of the BFT tags recovered under GBYP, in numbers and percent.

Recovery Year / Tags	Spaghetti Tags	Single/Doube Barb Tags	External Elec. Tags	Internal Elec. Tags	Commercial Tag	Grand Total	%ge
2006	1	0	0	1	0	2	1,8%
2008	1	0	0	0	0	1	0,9%
2009	1	0	0	0	0	1	0,9%
2010	3	0	0	0	0	3	2,8%
2011	8	0	0	0	0	8	7,3%
2012	39	7	6	1	1	54	**49,5%**
2013	22	11	4	1	0	38	34,9%
Undefined (2012 or 2013)	1	1	0	0	0	2	1,8%
Grand Total	**76**	**19**	**10**	**3**	**1**	**109**	**100%**

Table 5. BFT tag recoveries by season, in numbers and percent.

Recovery Season / Tags	Spaghetti Tags	Single/Doube Barb Tags	External Elec. Tags	Internal Elec. Tags	Commercial Tag	Grand Total	%ge
1	5	1	2	1	0	9	8,3%
2	16	1	3	1	0	21	19,3%
3	40	12	1	0	0	53	48,6%
4	14	4	4	1	1	24	22,0%
NA	1	1	0	0	0	2	1,8%
Grand Total	**76**	**19**	**10**	**3**	**1**	**109**	**100%**

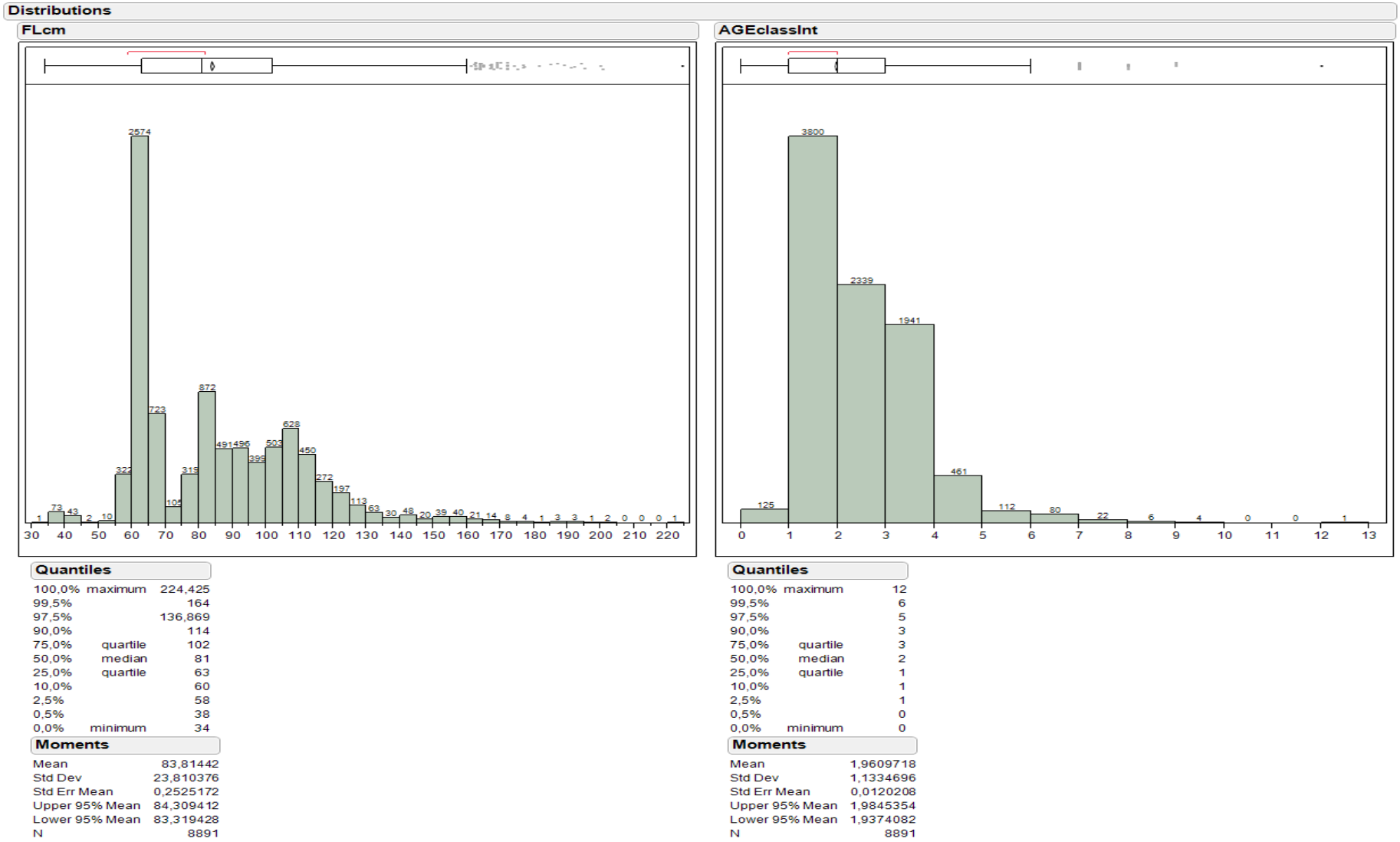

Figure 1. Demographics (length, at left, and age, at right) of the 8891 BFT individuals conventionally tagged by ICCAT-GBYP (Phases 2 & 3) for which size info is available.