

## RESULTS OF THE 2003 OBSERVER PROGRAM ON BOARD THE FRENCH PURSE SEINER TARGETING ATLANTIC BLUEFIN TUNA IN THE MEDITERRANEAN SEA

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### SUMMARY

*In 2003, IFREMER implemented an observer program on board of the French purse seiner targeting bluefin tuna (BFT) in the Mediterranean Sea to collect the size composition of catches. The protocol and the sampling design were established by IFREMER and the operations were carried out by two independent scientific observers (each one following a given boat over two distinguished fishing seasons). The 788 BFT measured by the two observers during the ~ 190 fishing days were mostly small/juveniles fish and solely represented 2.7% of the total catches. The sampling appears largely insufficient to be representative of this fleet and was furthermore strongly biased (big BFT being under-sampled). From our viewpoint, the implementation of a joint observer program on board of boats and cages would constitute the sole effective alternative, but this would imply international cooperation between several Mediterranean countries.*

### RÉSUMÉ

*En 2003, l'IFREMER a mené un programme d'observateurs à bord des thonnières senneurs français visant le thon rouge en Méditerranée pour estimer la composition en taille des captures. Le protocole et la stratégie d'échantillonnage furent définis par l'IFREMER et les opérations furent réalisées par deux observateurs scientifiques indépendants (chacun suivant un senneur au cours de deux saisons de pêche particulières). Les 788 BFT mesurés par les observateurs au cours des 190 jours de pêche étaient en grande majorité des juvéniles et ne représentaient que 2,7% du total des captures. L'échantillon obtenu est donc très insuffisant pour être représentatif de cette flottille et est de plus biaisé du fait que les gros BFT sont fortement sous-échantillonnés. De notre point de vue, seule l'élaboration d'un programme d'observateurs conjoints à bord des senneurs ET des cages permettrait de recouvrir la composition en taille des captures, mais ceci impliquerait une coopération internationale entre plusieurs pays méditerranéens.*

### RESUMEN

*En 2003, IFREMER implementó un programa de observadores embarcados en los cerqueros atuneros franceses que dirigen su actividad al atún rojo en el mar Mediterráneo para estimar la composición por tallas de la captura. IFREMER definió el protocolo y la estrategia de muestreo, y las operaciones fueron realizadas por dos observadores científicos independientes (cada un siguiendo un buque determinado durante dos campañas de pesca concretas). Los 788 atunes rojos medidos por los dos observadores durante 190 días de pesca eran en su mayor parte juveniles, y sólo suponían un 2,7% de las capturas. Por consiguiente, la muestra obtenida es insuficiente y no se puede considerar representativa de esta flota y, además, presentaba un fuerte sesgo dado que los atunes rojos de gran tamaño habían sido inframuestreados en gran medida. En nuestra opinión, únicamente la elaboración de un programa de observadores conjunto a bordo de los cerqueros Y en las jaulas permitiría abarcar la composición por tallas de las capturas, pero esto implicaría la cooperación internacional entre varios países mediterráneos.*

### KEYWORDS

*Atlantic bluefin tuna, catch, size composition, observer, purse seine, Mediterranean, by-catch*

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## 1. Introduction

The quality and the quantity of catch, effort and catch at size data available to conduct quantitative assessment of the East Atlantic bluefin tuna (BFT) stock has become worse and worse during the last few years, following the implementation of a quota and the emergence of BFT fattening operations (Fromentin 2003a, ICCAT 2003a,b). Knowing that catch information is more and more difficult to collect through traditional sampling systems (Liorzou and Bigot 1999, Di Natale, et al. 2003) and that EU log-books are not detailed enough to estimate the size-composition of the purse seiner fleets (Fromentin 2003b), IFREMER implemented, in 2003, an observer program on board of the French purse seiner (FPS) targeting BFT in the Mediterranean sea. The first and main objective of this program was to collect the size composition of BFT catches.

## 2. Protocol

To take into account the fisheries dynamics, two purse seiners (being representative of the fleet) were followed during the two main fishing seasons. The first boat (boat A, a purse seiner of 27 m long) was followed from the 01 May 2003 to the 10 July 2003, when it mainly targeted BFT spawners around the Balearic islands, then through September 2003 in the Gulf of Lions (when targeting BFT juveniles). The second boat (boat B, a purse seiner of 34 m long) was followed from mid May 2003 to mid July 2003 in Libyan waters (targeting BFT spawners), then through September 2003 in the Gulf of Lions (targeting BFT juveniles). Observer A were on board during ~100 fishing days and observer B during ~90 fishing days. The protocol and the sampling design were established by IFREMER and the operations were carried out by two independent scientific observers contracted by IFREMER (each one following the same boat over the two fishing seasons), according to a technical form set by IFREMER (which further included the collection of by-catch, see Appendix). According to the declarations of the observers and fishermen, the work on board went off properly (some collaborations taking place between observers and fishermen).

## 3. Size composition

**Boat A:** During the Balearic fishing season (mid-May to early July), a total of 341 BFT were measured over a total of 21,117 BFT being caught by this boat, so that 1.6% of the size composition of the catches of boat A were recovered during this season. Qualitatively, 96% of the BFT being measured were small and juvenile fish (<140 cm, **Figure 1**), although substantial catches of big BFT occurred. During the Gulf of Lions season (September), a total of 214 BFT were measured over a total of 3,842 BFT, i.e., 5.5% of the size composition of boat A during this season. 100% of the BFT being measured were juveniles BFT (<140 cm, **Figure 1**).

**Boat B:** During the Libyan fishing season (mid-May to mid July), only 84 BFT could have been measured over a total of 3,440 BFT being caught by this boat, i.e., 2.4% of the size composition of boat B during this season. Qualitatively, 51% of the BFT being measured are juveniles BFT <140 cm (**Figure 1**). During the Gulf of Lions season (September), a total of 149 BFT were measured over a total of 2,849 BFT being caught, i.e., 3.2% of the size composition of boat B during this season. Here again, 100% of the BFT being measured were juvenile BFT (<140 cm, **Figure 1**).

All together, the 788 BFT measured during the Balearic, Libyan and Gulf of Lions fishing seasons were thus mostly small and juvenile fish (**Figure 1**).

## 4. By-catches

Skipjack and then frigate tuna constituted the majority of the tuna and tuna-like by-catches of the two FPS (**Table 1**). Skipjack was exclusively caught by boat A in May-June around the Balearic islands, when frigate tuna was solely caught by boat B in May in Libyan waters. On the contrary, swordfish were caught independently of the season and location and seem to represent a regular (although minor) by-catch of the FPS fleet. Stingray, moonfish and dolphinfish were almost exclusively caught in the Gulf of Lions in September (the occurrence of moonfish and dolphinfish in the Gulf of Lions, as this of skipjack in the Balearic area, was surprising but occurred during an exceptional hot summer). The four loggerhead turtles were caught around the Balearic Islands by boat A and were all discarded alive, whereas the 3 striped dolphins were caught all together by the same boat in the Gulf of Lions and were apparently dead when on board (**Table 1**).

## 5. Conclusion

All together, the 425 BFT measured during the Balearic and Libyan fishing season represented 1.7% of the total catches of boats A and B, whereas the 363 BFT measured during the Gulf of Lions season accounted for ~5% of the total catches of boats A and B. Over the two main fishing seasons, we so got the size composition of 2.7% of the catches of the two boats. Globally, the sampling appears largely insufficient to be representative of these two boats and consequently of the FPS fleet (although the coverage during the Gulf of Lions season was slightly better). Furthermore, the size composition was strongly biased because of the under-sampling of big BFT (> 140 cm) during the Balearic and Libyan fishing seasons. This bias simply resulted from the fact that all the big BFT directly went into cages, whereas most of the small BFT were put on board. Therefore, the observer could easily access to a substantial and random sample of small fish, but could only measure a small number of big fish; i.e., the few dying during the fishing operations and which were put on board. One may further see that the proportion of big BFT (dead) *versus* small BFT can greatly vary between boats: 4% and 49% for boat A and B, respectively, during the first fishing season, because of different densities of cages within the two fishing locations, various strategies decided by the fishermen and different environmental conditions.

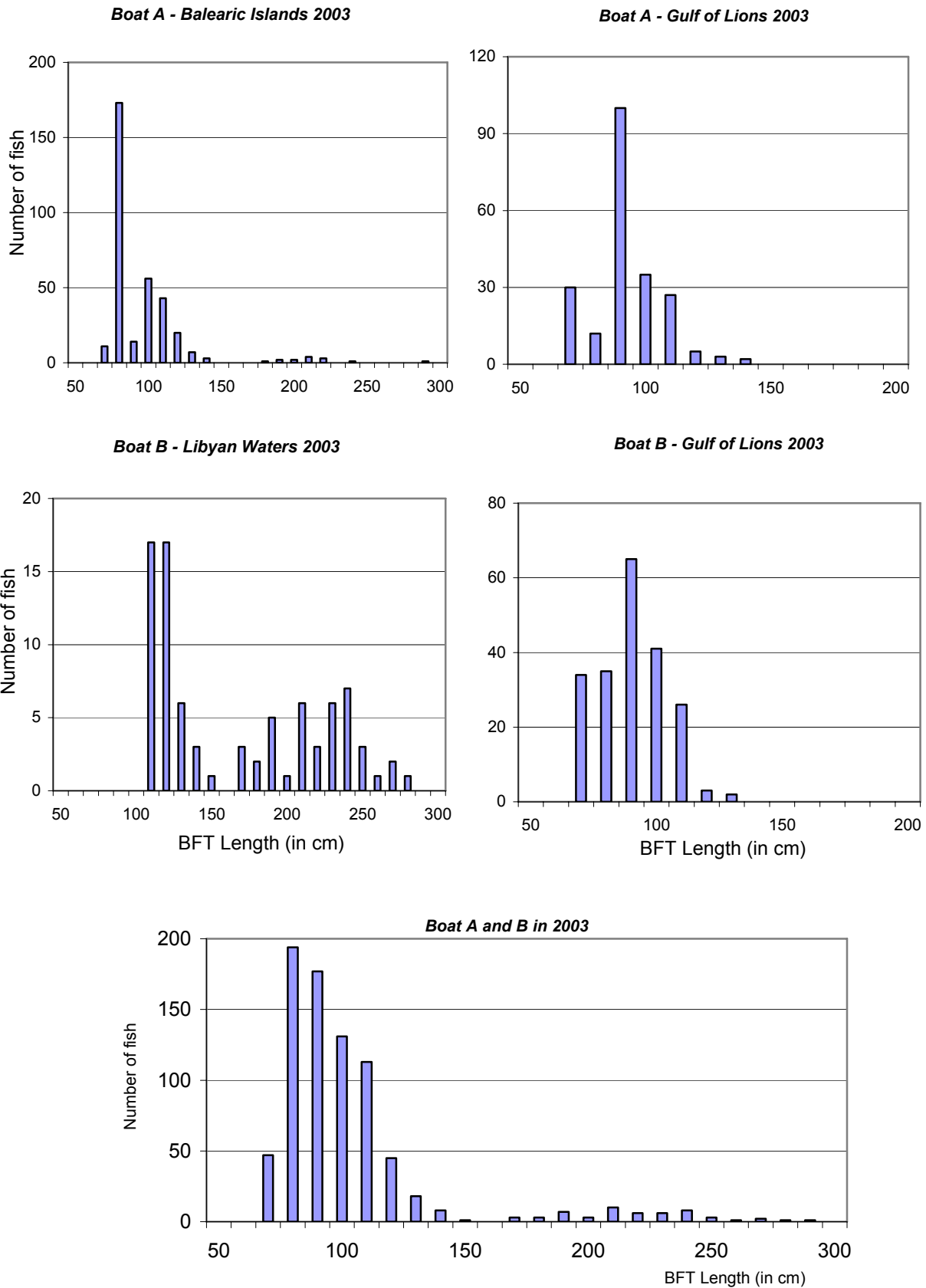
Finally, this observer program clearly appears non satisfactory to estimate the size composition of FPS targeting BFT in the Mediterranean Sea. To remedy this problem, one could substantially multiply the number of observer and get all the information per boat about the number of fish being transferred into cages (especially trading information). Such a solution would be, however, too costly and furthermore difficult to implement. From our viewpoint, the implementation of a joint observer program on board of boat AND cage would constitute the sole effective alternative, but this would imply international cooperation between several Mediterranean countries.

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**Table 1.** Total by-catches and discards as estimated by 2 observers on board of two French purse seiners during 190 fishing days in the Mediterranean.

Group	Species	By-catch (number)	Discard (alive)
Tuna and Tuna-like species	Albacore - <i>Thunnus alalunga</i>	5	0%
	Skipjack - <i>Katsuwonus pelamis</i>	241	0%
	Frigate tuna - <i>Auxis thazard</i>	55	0%
	Swordfish - <i>Xiphias gladius</i>	17	20%
Other fish	Stingray - <i>Dasyatis pastinaca</i>	35	20%
	Moonfish - <i>Mola mola</i>	34	12%
	Dolphinfish - <i>Coryphaena hippurus</i>	15	0%
Other	Loggerhead sea turtle - <i>Caretta caretta</i>	4	100%
	Striped dolphin - <i>Stenella coeruleoalba</i>	3	0%



**Figure 1.** Histograms of size composition of catches of bluefin tuna as estimated by 2 observers on board of two French purse seiners (boats A and B) during 190 fishing days in the Mediterranean.