

## BLUEFIN TUNA (*THUNNUS THYNNUS*) TAGGING SURVEY IN THE BAY OF BISCAY IN SUMMER 2005

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### SUMMARY

*A brief summary of the conventional tagging survey carried out during the summer fishing season in 2005 in the Bay of Biscay is presented. A total of 1696 juveniles of bluefin tuna have been tagged, corresponding to group ages 1 and 2. Two different conventional tags have been used. Fifty-one recaptures have been recovered up to date.*

### RÉSUMÉ

*Le présent document fournit un résumé de la campagne de marquage conventionnel de thon rouge menée au cours de l'été 2005 dans le Golfe de Gascogne. Au total, 1.696 juvéniles de thon rouge ont été marqués, correspondant aux groupes d'âge 1 et 2. Deux types distincts de marques conventionnelles ont été utilisés. Cinquante-et-une marques ont été récupérées à ce jour.*

### RESUMEN

*Se presenta un resumen de la campaña de marcado convencional de atún rojo llevada a cabo durante el verano del 2005 en el Golfo de Vizcaya. En total se han marcado 1696 ejemplares de 1 y 2 años de edad. Se han utilizado dos modelos distintos de marcas convencionales. Hasta la fecha se han recapturado cincuenta y un ejemplares.*

### KEYWORDS

*Thunnus thynnus, Conventional Tagging, Northeast Atlantic*

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## 1 Introduction

In the research into highly migratory species, such as tuna and similar species, conventional and electronic tagging techniques are basic tools. The debate on the management of the two Atlantic bluefin tuna stocks (west and east, including the Mediterranean), their distribution limits and their degree of mixing is a burning question requiring a great effort in the field of research on the part of countries belonging to ICCAT. The lesser tagging effort exerted in the eastern Atlantic compared with the west is also certain. The resolutions and recommendations of ICCAT regarding the need to carry out tagging and research activities based on bluefin tuna tagging, particularly in the eastern Atlantic are many (ICCAT 2001 Workshop on Bluefin Mixing, ICCAT Resolution 01-9; 2002 Report of the ICCAT Bluefin Year Program (BYP); 2003 Report of the ICCAT Bluefin Tuna Research Program Planning Meeting; ICCAT 2003 SCRS General recommendations to the Commission).

In response to the ICCAT recommendation to perform tagging activities, several European countries have developed an electronic and conventional bluefin tuna tagging program (First European Planning Meeting for Tuna Tagging, Bari 2005). Spain is a participant in this activity, and has planned conventional tagging surveys in the Mediterranean (Strait of Gibraltar) and the Bay of Biscay.

In the survey described in this paper, conventional tagging of bluefin tuna juveniles in the Bay of Biscay is proposed with the aim of studying horizontal distribution and the influence of spatial-temporal changes in the availability of this resource to the baitboat fishery targeting this species in the area. This baitboat relative abundance index is used in the calibration of the model applied to the Eastern and Mediterranean stock assessment. This tagging survey is coordinated with another one carried out by the IEO in the Mediterranean sea. The results of these surveys will serve to study trophic migrations to the Bay of Biscay, quantify transfer movements between different areas and estimate fidelity to birthplace in the Mediterranean. Similarly, the results can be used to estimate growth and natural mortality.

The bluefin tuna tagging survey in the Bay of Biscay is led by the Spanish Institute of Oceanography (IEO) in Santander and is in collaboration and/or co-financed by the IEO in Malaga, IEO in A Coruña, the European Union, Marine Research Institution of the Basque country (AZTI) and the International Commission for the Conservation of Atlantic Tuna (ICCAT).

## 2 Material and methods

A conventional bluefin tuna tagging survey was performed in the Bay of Biscay between the 19<sup>th</sup> July and the 2nd of August 2005. The survey was conducted on board a professional tuna fishing vessel of 26 m length and 970 h.p. whose base port is Hondarribia and which is habitually dedicated to bluefin tuna baitboat fishing .

External “spaghetti” tags were used, also known as conventional or “streamer” tags. Two types of streamer tags were placed, which differed in the system of attachment to the fish (**Figure 1**). The tags were placed in the dorsal flank at the level of the first dorsal fin. Specimens damaged during the tagging procedure were put down and used for biological sampling.

The straight fork length (FL) of specimens was measured to the lower centimetre. Two tagging equipments, placed on bow and stern, were employed simultaneously (**Figure 2**). In some cases the length of fish of over 70 cm was estimated since it was not possible to carry out the measurement. The date, catch position and the state of the sea, wind and surface water temperature were recorded.

## 3 Results

A total of 1696 bluefin tuna were tagged in 27 tagging operations, whose positions are shown in **Figure 3**. Specimens of between 54 cm and 105 cm FL were tagged, and the length distribution of bluefin tuna tagged during the survey appears in **Figure 4**. The age groups are very marked, which, based on the growth curve by Cort (1991), permits us to estimate at 1270 the specimens of age 1, 423 aged 2 and just one of age 3.

At the end of the fishing season a total of 51 specimens of bluefin tuna have been recovered. Most of the recaptures are close to the tagging area with the exception of one specimen that covered 193 miles in one month (**Figure 5**). The time of liberty varied between 8 and 107 days. Forty-four of the recaptures belonged to 1-year-

old fish and seven corresponded to 2 years old tagged fish. Nearly 50% of the recaptures were within 3 months at liberty and only four were recovered in the first month.

#### 4 Discussion

The attachment of tags and the loss rate is an important issue in tagging programs. Our experience from the survey appears to indicate that the steel attachment of the streamer tags (**Figure 1 bottom**) is much more secure. The tags with a plastic harpoon (**Figure 1 top**) broke easily, in such a way that the harpoon end point became separated from the tag on its attachment to the fish. For this reason we have recorded 44 null tags, due to their breaking at the base or because the barb point was so weak that the tag became detached on taking out the steel-tagging needle. We have used both tags in two years old bluefin tuna, nearly 100 with steel fixing point and around 300 with plastic harpoon, the outcomes will show as if there is a big difference in the recaptured rates.

Conventional bluefin tuna tagging surveys were carried out systematically in the Bay of Biscay by the IEO between 1977 and 1991, and since then there has been no conventional tagging activity except occasionally thanks to opportunistic tagging using recreational vessels. In those years most of the specimens tagged were of age 1, although individuals of up to age 7 were tagged (**Table 1**). The total percentages of specimens tagged of ages 1 and 2 historically are around 75% and 25% respectively. These percentages were maintained in the 2005 survey. The difficulty of tagging specimens increases with age due to the greater resistance they put up, the problem of bringing them aboard without causing them any harm or without putting the fishermen in danger and because it is more difficult to keep the big tuna schools close to the vessel once the tagging activity has begun.

The longest distance has been covered by one-year-old fish, which traveled 192 miles in one month (0,46 km/h). Nevertheless most of the recaptures showed small displacements. These movements around the tagging area, are in agreement with Cort's (1990). This author reported that migration speed is rather low due to fish not moving away from the feeding area, he found that the speed inside the feeding area hardly reached 1 km/h.

Due to the fact that the management measures of ICCAT do not permit the capture of bluefin tuna in the NE Atlantic below 6,4 k, which corresponds to around 68 cm FL (ICCAT Rec. 2004-07) the possibility of obtaining recoveries of specimens of age 1 is small, and this misreporting increases when undersized bluefin tuna is caught by non selective gears targeting to other species rather than bluefin tuna. Because of this it is not very advisable to carry out tagging of specimens aged 1 year, except at the end of the fishing season, from the middle of September, when fish have reached the permitted weight and remains in the Bay of Biscay before returning to the wintering areas. Taking the misreporting rate that there may be for tagged bluefin tuna of age 1, it is preferable to increase tagging effort for specimens of age 2 or older, despite the difficulty this may involve.

#### Acknowledgements

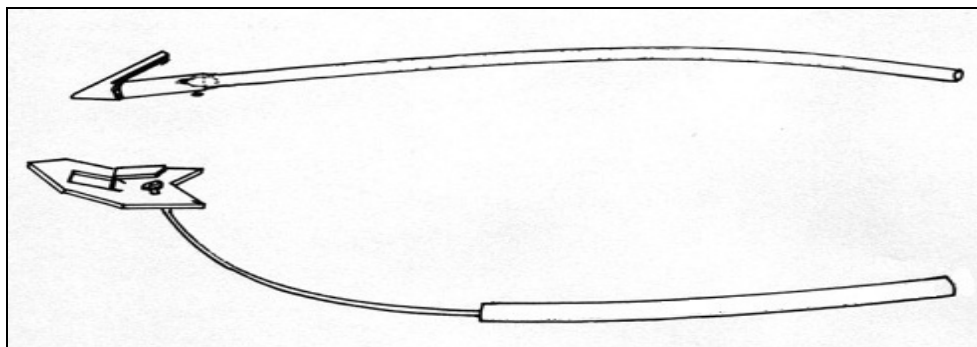
Thanks are extended to the crew of the fishing vessel "Maria Reina de los Cielos" for their help and collaboration and to all the fishermen for providing information on bluefin tuna recoveries.

#### References

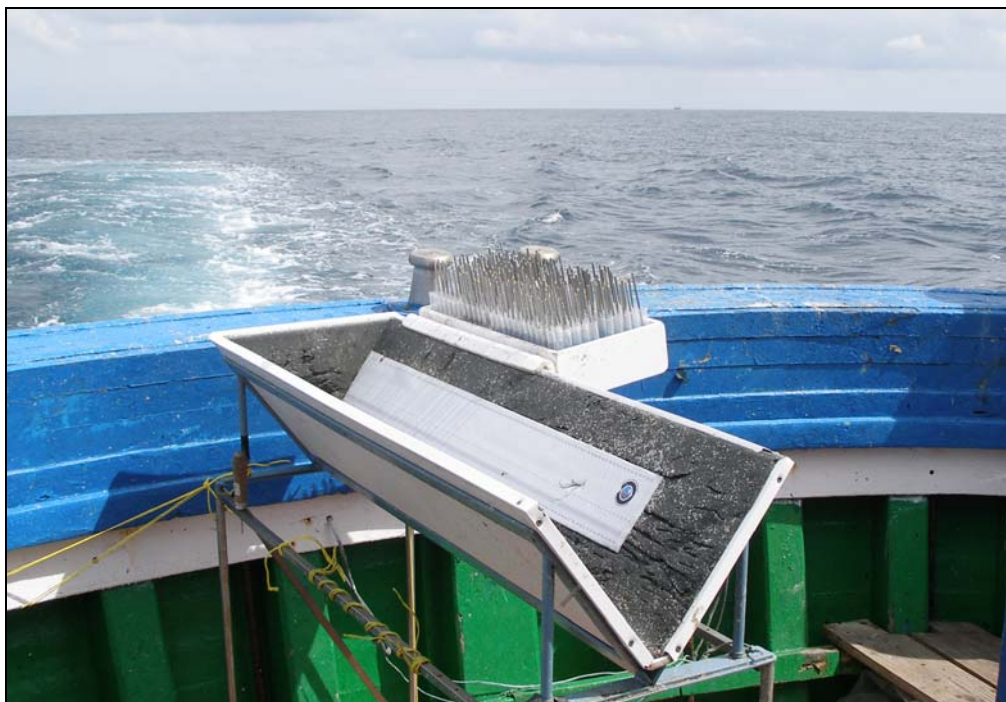
CORT, J.L. 1990. Biología y pesca del atún rojo, *Thunnus thynnus* (L.), del mar Cantábrico (Tesis doctoral). *Publicaciones Especiales. Instituto Español de Oceanografía*. Num. 4, 272 pp.

**Table 1.** Number of bluefin tuna tagged in the Bay of Biscay from 1976 to the present by age.

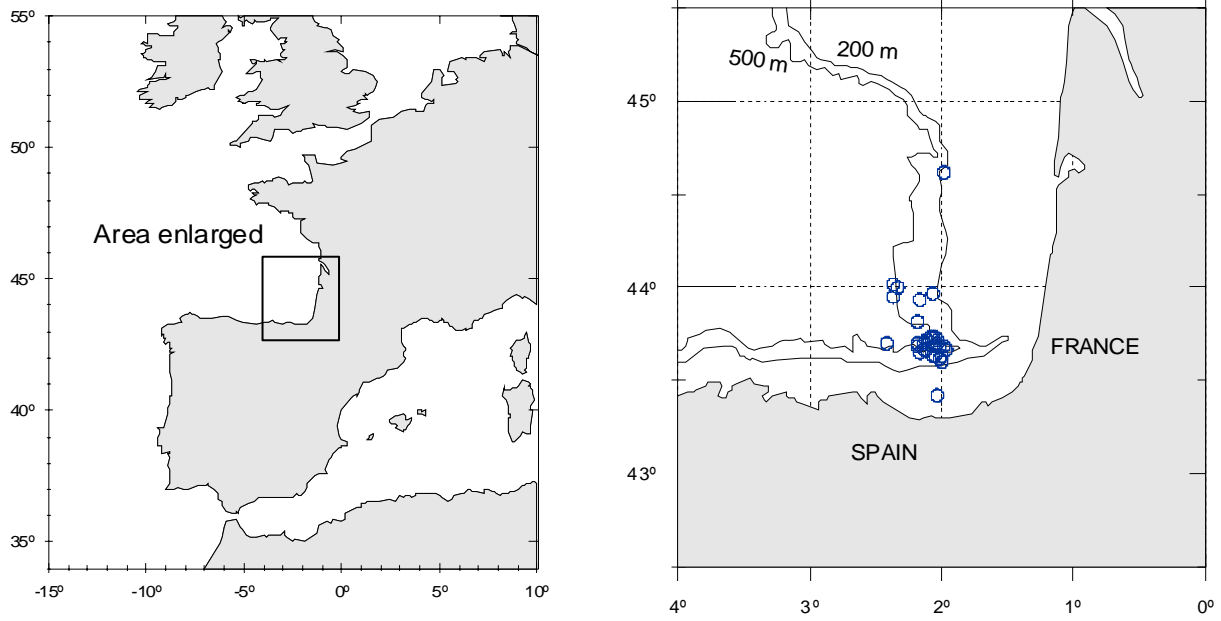
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1988	1989	1990	1991	2003	2005	Total
< 1 year					1													1
1 to 2 years	0	4	126	9	230	78	216	38	3	56	811	1129	122	845	30	4	1270	4971
2 to 3 years	1	6	39	90	50	222	79	329	405	215	26	24	1	3	1	0	423	1914
3 to 4 years			5	1	10	1	79	1	88	41	4	1					1	232
4 to 5 years			1		3		16		10	1	2							33
5 to 6 years					2		1	2	2									7
6 to 7 years					3		1											4
7 years									2									2



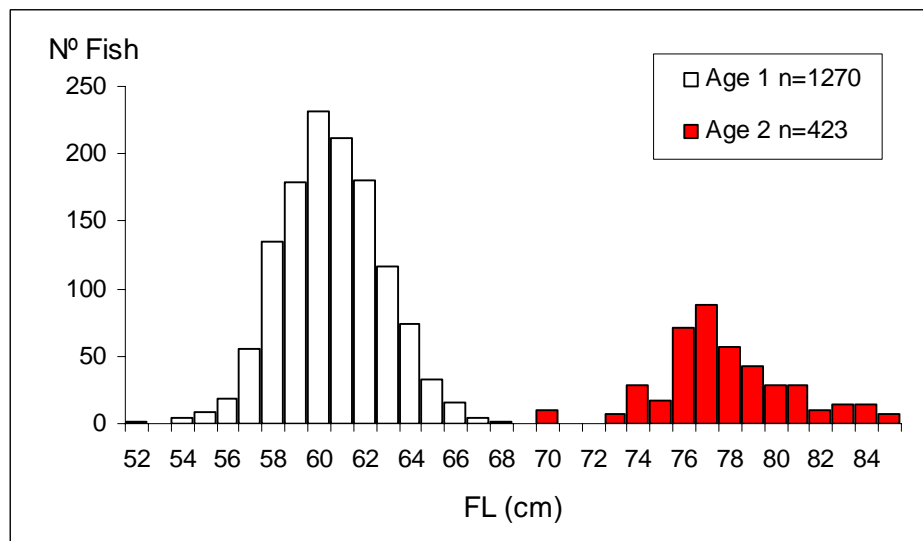
**Figure 1.** Conventional tags used in the tagging survey.



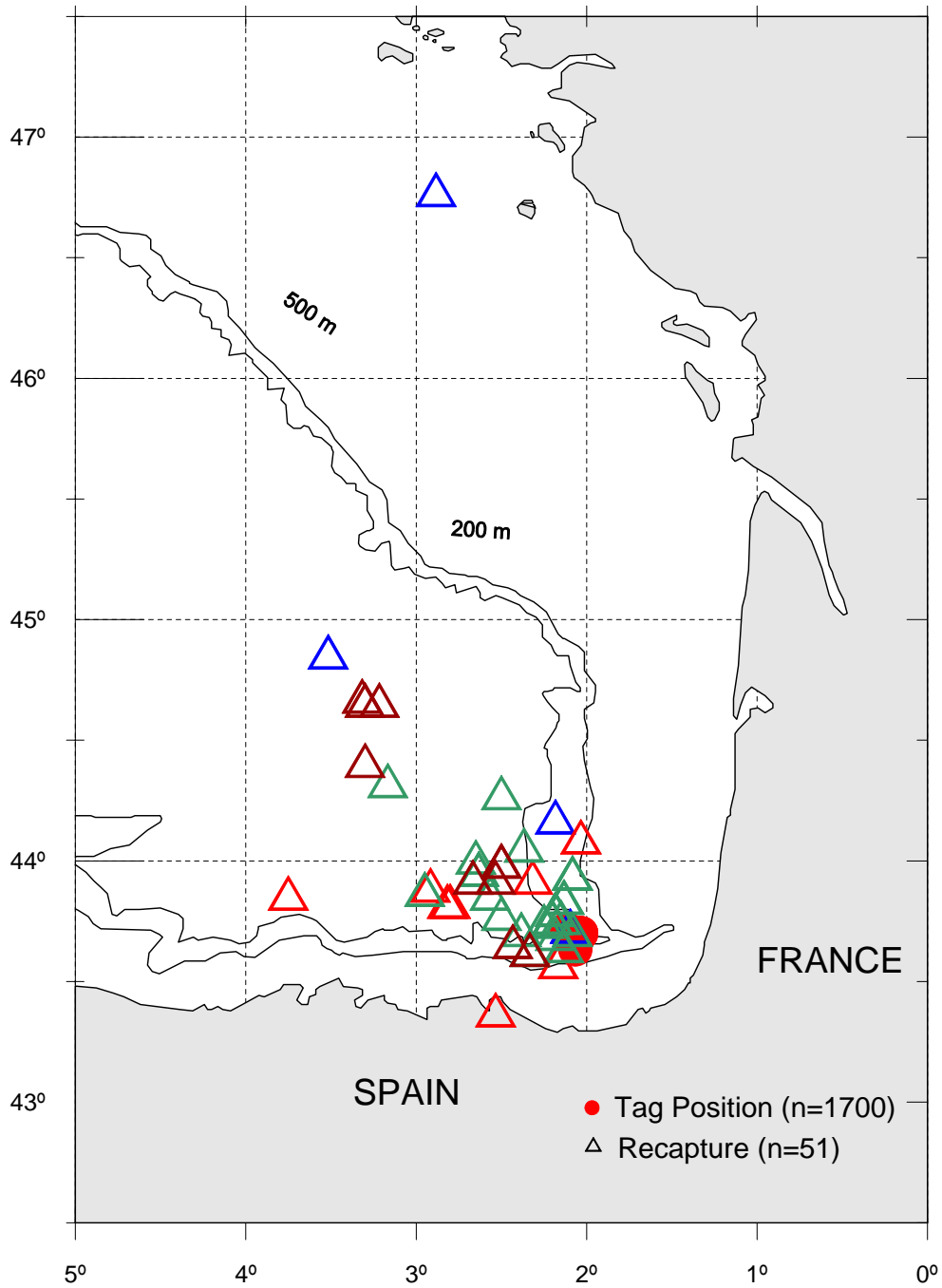
**Figure 2.** Tagging cradle and tags prepared to be used in the tagging survey.



**Figure 3.** Bluefin tuna tagging locations in the Bay of Biscay.



**Figure 4.** Length frequency distribution of bluefin tuna tagged in 2005 survey.



**Figure 5.** Recaptures up to date of bluefin tuna tagged in the Bay of Biscay in summer 2005. In blue those with up to 1 month of time at liberty, in red from 1 to 2 months, in green from 2 to 3 months and in brown more than 3 months. One fish (on land in the map) was recaptured in a bay near the coast by a purse seiner.