

PRELIMINARY ANALYSIS OF ALBACORE TAG-RETURN OBSERVATIONS FROM SURFACE FLEETS  
IN NORTH ATLANTIC

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Ortiz de Zarate\*, V., N. Cummings-Parrack\*\*

\* Instituto Español de Oceanografía, Apartado 240, 39080 Santander, Spain

\*\* Southeast Fisheries Science Center, National Marine Fisheries Service,  
75 Virginia Beach Drive, Miami, Florida 33149, USA

SUMMARY

Albacore tag return observations are investigated from the point of view of identifying the annual spatial distribution through plots and through analysis of returns reported by different surface fleets in the summer grounds of adjacent northeastern Atlantic waters and the Cantabrian Sea.

RESUME

Les observations sur les retours de marques de germon sont étudiées dans le but d'identifier la distribution spatiale annuelle par le biais de graphiques et d'analyses de retours signalés par différentes flottilles de surface dans les lieux de pêche estivale dans les eaux adjacentes de l'Atlantique nord-est et la mer Cantabrique.

RESUMEN

Se investigan las observaciones sobre devoluciones de marcas en atún blanco bajo el punto de vista de la identificación de la distribución espacial anual mediante gráficos y mediante análisis de las devoluciones comunicadas por diferentes flotas de superficie que faenan en los caladeros de verano en aguas adyacentes al Atlántico nordeste y Mar Cantábrico.

INTRODUCTION

The Special Program of Albacore (PSG) initiated by ICCAT in 1990, was designed to enhance the knowledge of biology, ecology and population dynamics of this species (*Thunnus alalunga*) in the Atlantic Ocean.

Among the activities developed include the intensive tagging campaigns carried out by Spain (Ortiz de Zarate et al, 1991; Cort et al, 1992).

Several objectives were addressed to be investigated through the information obtained from those campaigns: migration patterns, the spatial-temporal distribution of recoveries, dispersion by age and the status of interaction within the different surface fleets by means of analysis of catch rate tag return by gear (Anon., 1990; Anon., 1991)

The first attempt to analyze the spatial/temporal distribution of recaptures by size group individuals was done by Cort et al, 1992.

This preliminary study focussed on the analysis of the recaptures obtained from these campaigns (1989-1991) reported by different surface fleets. The emphasis in analysis was the differential tag recapture rate return.

MATERIALS

From 1989 to 1991 period when the important tagging campaigns were realized, a total amount of 11.669 tagged albacores were released.

The set of data used in the tag rate return analysis is integrated by the nominal catch in number of fish and number of the tags reported for the period 1989-1992, on annual basis and by fleet, as well. The data base used in this study is presented in Table 1 and Table 2, respectively.

Information recorded for every tag- return fish was date, location (latitude and longitude) and gear. Total number of recaptures eligible for the analysis is 333, which represent the 2,85% of recapture rate reported.

## ANALYSIS PROCEDURES

For this initial analyses of the tag return data to investigate differential catching rate of this species two simple categorizations of the data was made. First the observations were partitioned by year and by fleet and then chi square analysis (Zar, 1984) carried out of the observed number of recaptured fish.

The null hypothesis of equal recapture rate by fleet was then tested. Analysis were performed within years for this test because it might be expected for the number of returns to diminish by year.

Next, a second hypothesis was formed to test the effects of area on recapture rate by partitioning the observations by area (gear). This assumes the distributions are unchanging across years.

## RESULTS AND DISCUSSION

The results of the first chi square test, in Table 3, infer rejecting at 95% confidence level the  $H_0$  = Equality between gears in return rates when analyzing by fleet within each year. Some reflections can be annotated.

The difference among observed and expected returns by fleets within year, show a lack of expected tags from troll and drifnet fleets, being larger the difference for troll fleet. Mostly all the recaptures reported by troll fleet are localized in the Bay of Biscay (Cantabrian sea), in contrast to the main fishing ground which is the Atlantic eastern waters, where this fleet exert their effort, along with the drifnet fleet during summer season. The larger number of troll vessels operate in Atlantic waters, meanwhile a smaller number of the same fleet is present in the Bay of Biscay, where the recaptures come. It should be expected less difference of reporting tags among drifnet and troll fleets targetting albacore in Atlantic area. A simple reason that could alter the analysis would be the under-reporting of tags by different troll fleets operating in Atlantic Waters and Cantabrian sea.

At the contrary there are more tags reported than expected for baitboat and mid-water trawl fleets. Tags reported by those last fleets come from Bay of Biscay (Cantabrian sea), where albacore are more concentrated caused by their trophic migration. It should be mentioned the effect caused in these two fleets by the recaptures obtained in the same year and area of release as is mentioned in table 2.

Those recaptures included in the analysis might have an effect on the analysis. The concentration of recoveries taken after being released in the area of Bay of Biscay is described in Figures 1,2,3 and 4 for the years being analyzed.

Fishing strategy has not changed in general, although there are differences between years. Moving fleets monthly according to displacement of albacore schools and presence in the fishing grounds. The occurrence of recaptures on annual basis and all fleets combined are shown in Figures 1, 2, 3 and 4.

Fishing pattern is common to all fleets, catching same range sizes (60-85 cm) as summarized in Anon., 1991. Therefore, differences in selectivity of gear is not likely to happen and will not be expected to affect the probabilities of capturing tagged fish by either fleet.

Second test performed gives the results shown in Table 4, that make reject at 95% confidence level, the null hypothesis ( $H_0$ ) for drifnets, troll and bait boat fleets and accept it for mid-water trawl.

It infers that the assumption of testing the hypothesis considering the effect of different fishing area (Atlantic waters and Bay of Biscay) it only explains the recapture return rate for mid-water trawl across years. Therefore the unequal return rate by fleet can either be explained by the effect caused by different areas.

## ACKNOWLEDGEMENTS

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## REFERENCES

- ANON., 1990. Report of the First Albacore meetings. ICCAT, Colec. Doc. Cient., 31: 73-243.
- ANON., 1991. Report of the Second Albacore Workshop. ICCAT, Colec. Doc. Cient., 34: 1-170.
- CORT, J.L., J. SANTIAGO, J. MEJUTO, and V.ORTIZ de ZARATE, 1992. Evolución espacio/temporal de las recapturas de atún blanco (*Thunnus alalunga*, Bonn.) obtenidas a partir de campañas de marcado españolas en el mar Cantábrico (1976-1990). ICCAT, Colec. Doc. Cient., 39 (1): 201-208.
- ORTIZ de ZARATE, V., J.L. CORT y J.M. de la SERNA., 1991. Resultados de las campañas de marcado de atún blanco en el mar Cantábrico (1988-1989). ICCAT. Colec. Doc. Cient., 34: 152-159.
- ZAR, J.H., 1984. Biostatistical Analysis. Prentice-Hall, Inc. Englewood Cliffs: New Jersey.

Table 1. Annual Catch in Number for all Fleets.  
(Source: ICCAT)

Year		BB	TROL	DRIFNET	MWT	TOTAL
89	N	1.956.927	1.646.836	271.722	317.228	4.192.713
90	N	2.337.298	1.663.764	383.822	132.172	4.517.056
91	N	1.521.099	1.738.719	659.438	72.702	3.991.958
92	N	1.605.879	1.341.110	682.852	395.626	4.025.467

BB = Bait Boat  
TROL = Trolling

DRIFNET = drifnet  
MWT = Mid water trawl

Table 2. Annual reported number of tag-recapture by fleet.

Year	Frequency	Fleets			
		Baitboat	Troll	Drifneters	Mid-water Trawl
1989	Observed	20 (15*)	0	1	6 (5*)
1990	" "	65 (11*)	21 (9*)	3	6 (2*)
1991	" "	54 (30*)	18 (15*)	6	5 (5*)
1992	" "	88	15	15	10

(\* ) means recaptures obtained in the same year of release.

Table 3. Results of Chi Square Analysis between Fleets within Year. First Test.

Year	Test Statistics	Decision
1989	22.93	Reject Ho
1990	17.60	Reject Ho
1991	37.33	Reject Ho
1992	41.94	Reject Ho

Critical test statistics = 8.71 for df= 3 at 95% confidence level.

Table 4. Results of Chi Square Analysis between Areas across Years Second Test.

Gear	Test Statistics	Decision
BB	59.10	Reject Ho
TROL	19.27	Reject Ho
DRIFNET	7.86	Reject Ho
MWTRAWL	6.39	Accept Ho

Critical test statistics = 7.81 for df= 3 at 95% confidence level.

Albacore Tag Returns in 1989

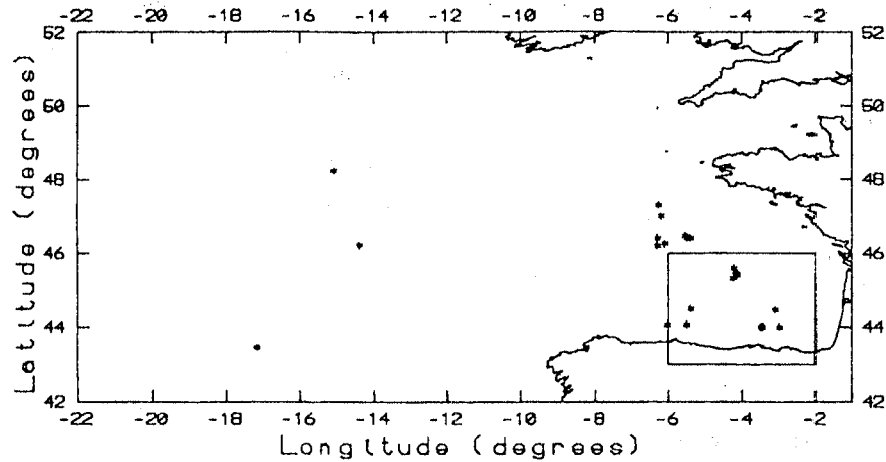


Figure 1.- Distribution of tags recovered in the North East Atlantic in 1989. Square represents releases area.

Albacore Tag Returns in 1991

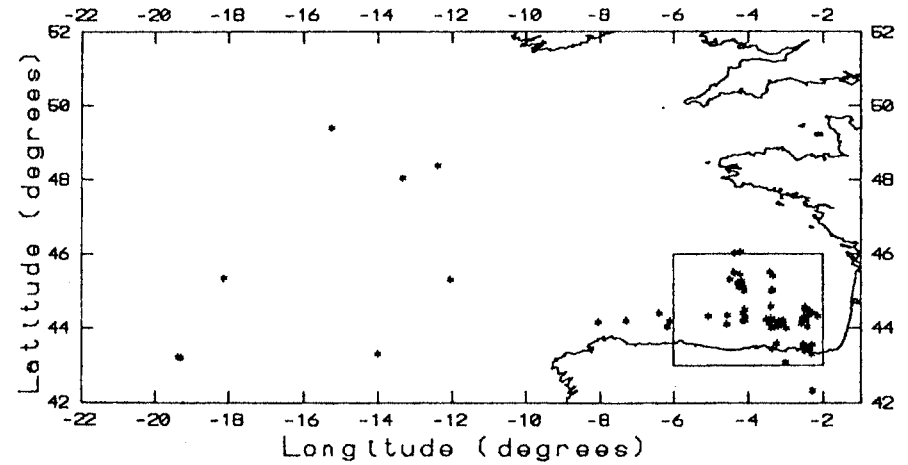


Figure 3.- Distribution of tags recovered in the North East Atlantic in 1991. Square represents releases area.

Albacore Tag Returns in 1990

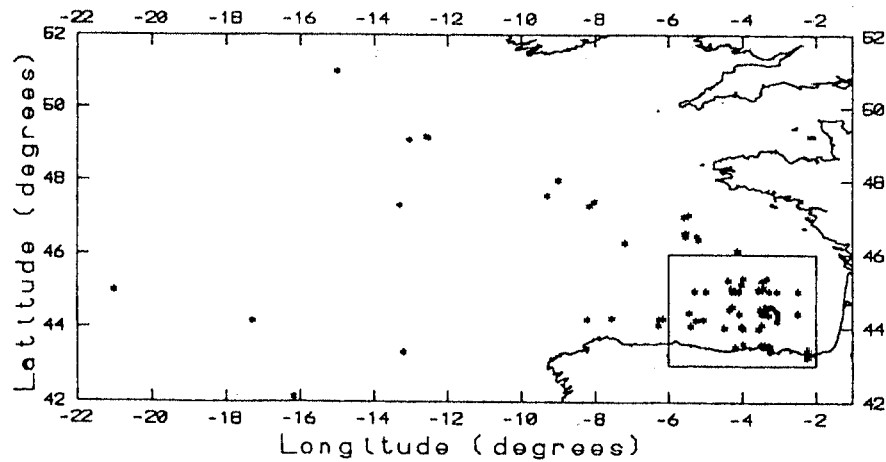


Figure 2.- Distribution of tags recovered in the North East Atlantic in 1990. Square represents releases area.

Albacore Tag Returns in 1992

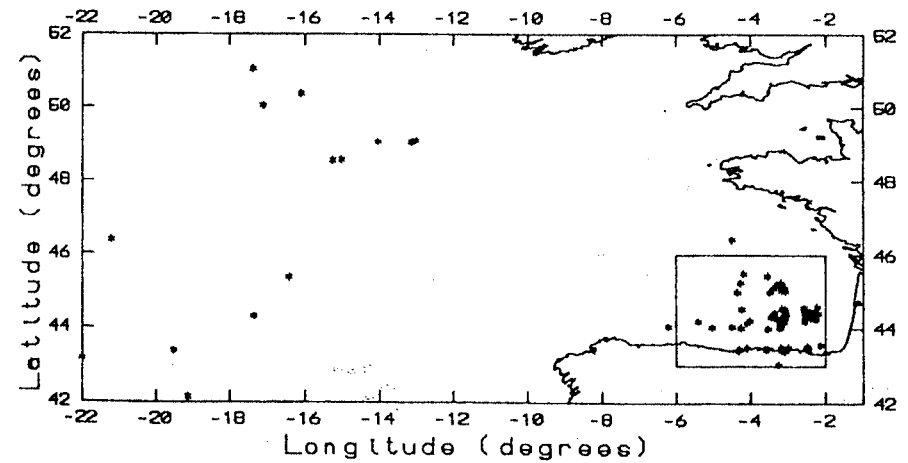


Figure 4.- Distribution of tags recovered in the North East Atlantic in 1992. Square represents releases area.