

BLUEFIN TUNA (*Thunnus thynnus*) FISHERY IN THE BAY OF BISCAY. EVOLUTION OF 5+ GROUP SINCE 1970.

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ABSTRACT

This study analyzes the evolution of the abundance of bluefin tuna spawners (group 5+) in the Bay of Biscay and since the beginning of the 1970s.

Using information since 1970, a sharp fall is observed in the abundance of group 5+ fishes (mainly age 5+, 62 kg mean weight), in a fishery in which there has been a clear dominance of juveniles over the last three decades.

Magnitude of group 5+ in catches over the last three decades (1970-2004).

The scientific information concerning the Bay of Biscay fishery during the 1940s and 1950s has been obtained from papers by French and Spanish scientists who reported data such as fishing seasonality, lengths of the specimens caught and other biological data of interest (Le Gall, 1950; Navaz, 1950). There is, however, no continuity in this information until the beginning of the 1960s, when the bluefin tuna working group was created within ICES, the committee on Escombriform fishes (Bakken *et al.*, 1980; Hamre & Tiews, 1964; ICES, 1966). It was then that the state of bluefin tuna fisheries began to be reported annually, including the Bay of Biscay, on which the group presented data of the French fleet in two categories: fishes < 30 kg (juveniles) and > 30 kg. Despite this important advance, it was only from 1970 (Bard *et al.*, 1973; Dao & Bessineton, 1974) that length samplings began to be made systematically (French and Spanish fisheries), which has permitted detailed demographic tables of catches to be obtained, and it was also from this year that fishing effort and

environmental data began to be collected by means of surveys in port and from logbooks. With all of this information it has been possible to build abundance indices for certain age groups and to know more about the characteristics of the fishery.

We have drawn up the demographic table of the catches of the fishery from 1970 to 2004, but only for the fleet targeting this species, which excludes fleets for which bluefin tuna represents an associated species, as is the case of those which catch albacore tuna (*Thunnus alalunga*). The results are presented in the following table (IEO, data):

TABLE 1

1970-2004

TARGETED FISHING	(In n° of fishes)	%
Age	Catch	
1	1067864	29.141
2	1697255	46.317
3	569743	15.548
4	205474	5.607
5	83892	2.289
6	25850	0.705
7	9785	0.267
8	4485	0.122
9	100	0.003
Total	3664447	100.000

Ages 1-4: 96,6 %

Group 5+: 3,4 %

The domination of the group of immature fishes throughout the series studied is outstanding, leaving just a small sample of the group of adult fishes of group 5+ (3.4 %).

If we look at the values obtained on applying the mean weight by age group, the result is similar even though the proportion of spawning fishes, logically, is greater (16.2 %).

TABLE 2
TARGETED
FISHING
1970-2004

(In weight)				
Weight (kg)/age	Age	Catch	Catch * weight (kg)	%
4.5	1	1067864	4805386	9.81
10.5	2	1697255	17821172	36.37
19	3	569743	10825122	22.09
37	4	205474	7602532	15.52
55	5	83892	4614056	9.42
73	6	25850	1887070	3.85
94	7	9785	919769	1.88
113	8	4485	506831	1.03
125	9	100	12454	0.03
Total		3664447	48994393	100.00

Ages 1-4: 83,8 %

Group 5+: 16,2 %

Performing the same exercise, but only for the years 1971-1973 (Cort, 1990), the last three years in which the highest catches of fishes aged 5+ in the whole series were recorded, noteworthy differences are observed: In this case the proportion of catches aged 5+, both in number of fishes (13 %) and in weight (46 %), increases significantly, as shown in the following table:

TABLE 3
1971-1973

Age	N° of fishes	%	Age	Catch * weight (kg)	%
1	26513	8	1	119308.5	1.8
2	214605	64.5	2	2253352.5	34.7
3	37469	11.3	3	711911	11
4	11280	3.4	4	417360	6.4
5	21515	6.5	5	1183325	18.2
6	11211	3.4	6	818403	12.6
7	6123	1.8	7	575562	8.9
8	3691	1.1	8	417083	6.4
9	0	0	9	0	0
Total	332407	100	Total	6496305	100

Ages 1-4: 87 %

Group 5+: 13 %

Ages 1-4: 54 %

Group 5+: 46 %

In order to get an idea of the size of fishes making up category 5+ in the Bay of Biscay fishery, the following table shows the evolution of mean weights over time (IEO data):

TABLE 4

Year	Mean weight, 5+ (kg)	Age (years)	Year	Mean weight, 5+ (kg)	Age (years)
1970	66	6	1988	65	5
1971	67	6	1989	65	5
1972	70	6	1990	60	5
1973	75	6	1991	62	5
1974	65	5	1992	60	5
1975	61	5	1993	61	5
1976	63	5	1994	60	5
1977	64	5	1995	59	5
1978	60	5	1996	58	5
1979	62	5	1997	58	5
1980	68	6	1998	62	5
1981	65	5	1999	60	5
1982	65	5	2000	65	5
1983	60	5	2001	67	6
1984	65	5	2002	60	5
1985	60	5	2003	64	5
1986	62	5	2004	64	5
1987	61	5			

Five year old fish predominate except for two isolated cases (1980 and 2001) and for the four years that begin the series studied.

Other years in which fishes aged 5+ were possibly abundant in the Bay of Biscay fishery, although no biological samplings are available for the moment, were 1957 and 1958. In those seasons very important catches were obtained in this fishery and group 5+ can be assumed to have been very well represented in the catch.

The group 5+ CPUE index during the period 1970-2004

In the previous point we have seen how the catch of fishes of group 5+ was very large during the years 1970-73. We will now calculate a CPUE index for 1973, taking into account that ample information is available to do so. Obtaining an index for this year specifically will allow us, in addition, to estimate those corresponding to the three previous ones, taking into account that the number of vessels remained constant between 1970-1973 and as a result fishing effort was most probably also constant. CPUE indices from 1974 onwards are published in Cort (*op. cit.*) and Rodríguez-Marín *et al.* (2007).

Using the data from the French scientists, observations made in surveys on board Spanish fishing vessels (August, 1973) and biological samplings of

group 5+, a value for the CPUE index for 1970-1973 was obtained. The methods are described in Cort & Nøttestad (2007).

The final CPUE index for group 5+ in the Bay of Biscay since the beginning of the 1970s is shown in Figure 1.

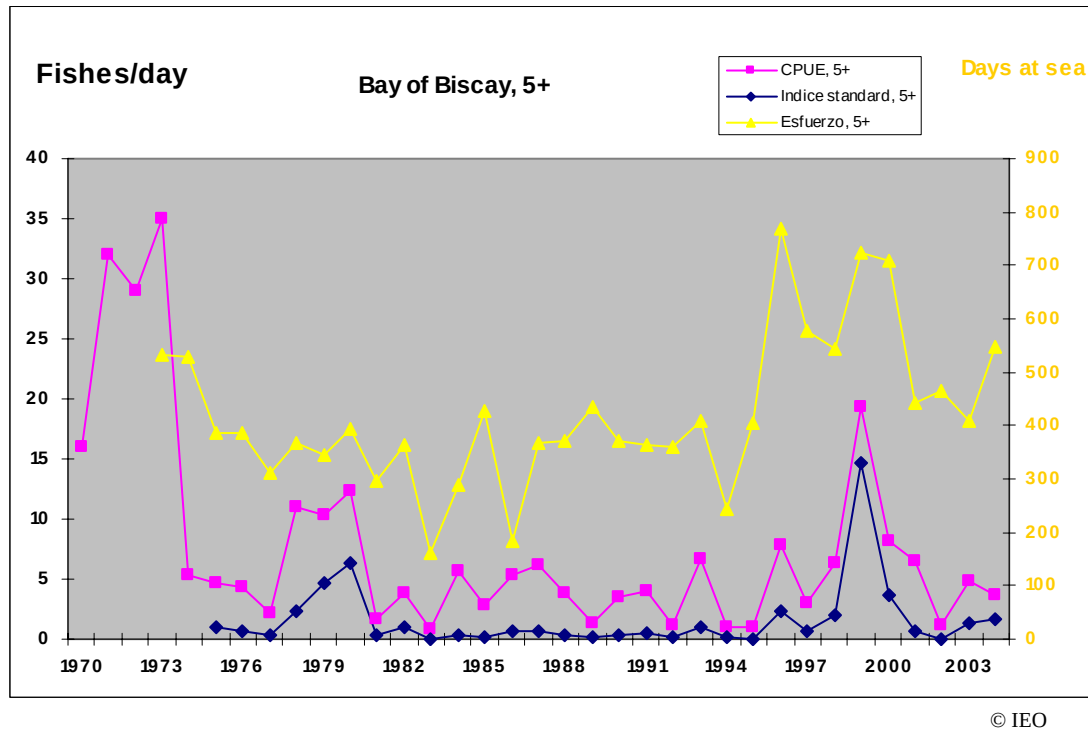


FIGURE 1. Abundance indices (fishes/day) of spawning bluefin tuna and fishing effort, in days at sea (axis on the right).

First of all, the evolution of the CPUE index (5+) shows that the apparent abundance of the spawning resource traditionally present in the Bay of Biscay from 1973 fell to the minimum values we see in the present day. Only the outstanding appearance of specimens aged 5+ in certain years (such as 1979, and 1999), belonging to fishes of abundant cohorts born five years before, prevents the curve from being practically flat since over thirty years ago.

With the aim of validating these results, the curve of the standard (5+) abundance index (Rodríguez-Marin, *et al.*, 2007) has been included, which presents the same trend albeit with lower values. The differences between the two may be due to the estimate of targeted fishing effort of fishes aged 5+, a very difficult job if we take into account that during the three last decades the presence of these specimens in the Bay of Biscay has been very scarce.

Lastly, Figure 1 includes the curve of fishing effort (in days at sea) targeting group 5+, of which the increase in effort that took place between 1996 and 2000 is noteworthy, years in which the albacore fleet joined the fishery, made up of baitboat vessels with greater GRT. This fleet can be considered opportunistic in relation to bluefin tuna fishing in the Bay of Biscay.

The trend in the abundance of spawning fishes (5+) in the Bay of Biscay fits in with the sharp fall in the fishing yield of the traps of the Strait of Gibraltar and with the disappearance of the bluefin tuna fisheries in the North Sea and Norwegian coast (Cort & Nøttestad, 2007). This would confirm that the biomass of spawning tuna in the Atlantic part of the eastern stock nowadays is very reduced.

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