

## SCIENTIFIC ESTIMATES OF BIGEYE (*THUNNUS OBESUS*) BYCATCH LANDED BY THE SPANISH SURFACE FLEET IN THE NORTH EAST ATLANTIC: 1998-2000.

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### SUMMARY

*Bigeye (Thunnus obesus) by-catch data collected from the surface Spanish fleets are presented: troll and bait boat targeting albacore (Thunnus alalunga) and bluefin tuna (Thunnus thynnus) in the Bay of Biscay and northeastern Atlantic fishing grounds. Monthly catch and length composition of the catch has been collected in the main landing fishing ports monitored by the albacore RIM (Network of Sampling and Information) during summer season fishery for the years 1998 to 2001. Estimates of Task I and Task II data are included.*

### RÉSUMÉ

*Le présent document fournit les données de prises accessoires du thon obèse (Thunnus obesus) recueillies par les flottilles espagnoles de surface : ligneurs et canneurs ciblant le germon (Thunnus alalunga) et le thon rouge (Thunnus thynnus) dans le Golfe de Gascogne et dans des zones de pêche du nord-est de l'Atlantique. La composition mensuelle par taille de la capture a été échantillonnée dans les principaux ports de débarquement contrôlés par le Réseau d'échantillonnage et d'information (RIM) sur le germon au cours de la saison de pêche estivale pour les années 1998 à 2001. Les estimations des données de Tâche I et Tâche II sont incluses.*

### RESUMEN

*Se presentan los datos de captura fortuita de patudo (Thunnus obesus) recopilados por las flotas de superficie española: flotas de cebo vivo y curricán dirigidas al atún blanco (Thunnus alalunga) y al atún rojo (Thunnus thynnus) en el Golfo de Vizcaya y en los caladeros el Atlántico nordeste. Se han recopilado datos de composición por talla de la captura y capturas mensuales en los principales puertos de desembarque objeto de seguimiento en el marco de la RIM atún blanco (Red de Información y Muestreo) durante la pesquería de verano y para los años 1998 a 2001. Se incluyen las estimaciones de los datos de las Tareas I y II.*

### KEYWORDS

*Tuna Fishery, Biological sampling, Size composition, Bigeye tuna, Bycatch, Seasonal variability.*

## 1 INTRODUCTION

The Spanish albacore fishery develops during summer months in the Bay of Biscay area and adjacent waters of Northeastern Atlantic. Two fleets target albacore in this area: trollers and baitboats. The current summer ground fish areas and the autumn fishery area for trollers and bait boats are represented in **Figure 1**. The activity of these fleets is monitored in the main landing fishing ports where information on trips is recorded and length sampling of the landed catch is done. Along the

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northern coast of Spain a total of 22 fishing ports reported in an uneven way some landings of bigeye during 1997. Thus following years special effort was done to monitor those bigeye by-catches and measure the fish lengths.

Climatologic and oceanographic variables might have influenced the presence of bigeye in northward areas of the known distribution of this species. The year 1997 was the warmest in the 90's but this tendency of warmer anomalies of sea surface temperature has been lasting in the studied years although not as remarkable as in 1997 (Hurrell and Dickson, 2001).

In this paper, a description of the monthly distribution of bigeye by-catch landings by the above mentioned fleets and the length composition of those catches for the years 1998-2001 is presented. Data has been compiled according to Task I and Task II (biological information) statistics of ICCAT (Miyake, 1990).

## 2 MATERIAL AND METHODS

Information of albacore fishery is collected at main landing fishing ports in the Bay of Biscay and north western coast on monthly (daily in some ports) bases in order to monitor the activity of both fleets: trollers and bait boat in the summer surface fishery (Ortiz de Zárate and Rodriguez-Cabello, 2002).

In 1997, it was observed a non negligible amount of bigeye taken as a by-catch on the entire summer activity of both fleets. Thus following years 1998 to 2001 special attention was addressed to monitor the presence of bigeye on these fisheries (**Figure 1**). The information gathered is not equally collected through all the fishing ports and within years, therefore the data presented represents the best estimate in the main fishing ports. Landings data are collected from sales notes and revised, when necessary, with sampler's information.

The sample unit for length distributions was single trip and when a specimen of bigeye was landed, the length (FL) was measured to the lower centimeter and the weight (kg) was recorded. Trip samples were weighted along the period examined in some of the most important fishing ports concerning amount of tuna landings. When the weight was not taken the length-weight relationship (Parks *et al.* 1981) was used to estimate the weight of the sample and raised to total trip catch.

All the bigeye sampled from individual trips landings were added on monthly strata by gear and raised to the total catch reported by each fishing port. When the length distribution was not available for a given port reporting some captures of bigeye, that catch was raised with a length sample of the same gear and month available. If there was not sampling on a given month raising procedure followed was to use length distribution sample of the nearest month and same gear from another port.

## 3 RESULTS AND DISCUSSION

The catch information reported by the fishing markets and collected through the enquires and trip information monitored for albacore fishery is shown in **Table 1**, where are also included some very minor catches of bigeye taken by baitboats operating in the southern Atlantic area (San Vicente) in the autumn albacore fishery. In **Figure 2** the evolution of annual landings by the albacore fleets is presented. The largest amount of bigeye is taken by baitboats and it shows an increasing trend (**Table 1** and **Figure 2**) in the period studied from 1998 to 2001. In this period, the month of August represents the peak catches for trollers whilst for the baitboats the peak catches are taken either on August or September or both.

The length frequency distribution of catches by month and gear (Task II) are included in **Table 2.a** and **Figure 3.a** for trollers and **Table 2.b** and **Figure 3.b** for bait boats respectively.

Monthly length frequency distribution of catches for 1998-2001 years show a seasonal variability in length distribution within years and between gears and years. The size of the large proportion of bigeye caught range between 70 and 110 cm length for troll and 70-140 for bait boat. The evolution of monthly average size of bigeye catch by fleet is shown in **Figure 4**. For trollers, the mean average length is slightly larger at the end of the fishing season (September and October) with some variation between years but around the average size of 94 cm length. On the other hand for the baitboat fleet the monthly average size of bigeye catches varies more, showing an increase in the average size of bigeye caught at the end of the fishing season as well as among years and a slightly larger average size of 98 cm length for the period: 1998-2001. In general those mean averages sizes do not differ from the average size reported for the baitboat fleet targeting bigeye in the Canary Islands (Delgado de Molina et al. 2002).

Warming caused by the NAO positive anomalies has influenced the sea surface temperature in the northern latitudes of the North east Atlantic (Hurrell and Dickson, 2001). Likewise Gouveia et al. (2002) described a warming trend along the period from October 1994 to 1999 and strong inter-annual and seasonal catch variability for bigeye landed in Madeira. Those results might be interpreted as being caused by variation on the oceanographic conditions thus the distribution of bigeye to northern latitudes. Finally the data that is presented in this paper does not imply that bigeye has not been taken as a by-catch in previous years, however not data is available currently for the past years.

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**Table 1.** Catch (kg) of Bigeye caught in the Spanish albacore surface fishery.

**Bay of Biscay and North east Atlantic**

<i>Month</i>	1998		1999		2000		2001	
	Bait Boat	Troll	Bait Boat	Troll	Bait Boat	Troll	Bait Boat	Troll
June		528		823	2,393	1,159	123	1,343
July		5,138	27,452	4,522	18,155	12,245	19,523	19,450
August	110,402	12,842	21,141	20,317	339,097	86,856	148,047	41,239
September	120,406	5,282	256,480	11,150	54,717	40,265	285,510	40,328
October	243	208	17,600	2,016	6,096	853	3,058	144
November		496						
Total (kg.)	231,051	24,494	322,673	38,828	420,458	141,378	456,261	102,504
	<b>255,545</b>		<b>361,501</b>		<b>561,836</b>		<b>558,766</b>	

**San Vicente**

<i>Month</i>	1998		1999		2000		2001	
	Bait Boat	Troll	Bait Boat	Troll	Bait Boat	Troll	Bait Boat	Troll
November	666						149	
December	4,264							
Total (kg.)	4,930	0	0	0	0	0	149	0
	<b>4,930</b>		<b>0</b>		<b>0</b>		<b>149</b>	

**Table 2. a.** Catch at size distribution of bigeye caught by albacore troll fishery: 1998-2001.

TROLL 1998							TROLL 1999						
Size	June	July	August	Septembe	October	November	Size	June	July	August	Septembe	October	
40-44	0	0	0	0	0	0	40-44	0	0	0	0	0	
45-49	0	0	0	0	0	0	45-49	0	0	0	0	0	
50-54	0	3	0	0	0	0	50-54	0	0	0	0	0	
55-59	0	14	0	0	0	0	55-59	0	2	0	0	0	
60-64	0	8	0	0	0	0	60-64	0	2	0	0	0	
65-69	0	1	46	0	0	1	65-69	1	5	3	0	0	
70-74	1	0	93	1	0	0	70-74	3	46	33	0	0	
75-79	1	5	5	0	0	1	75-79	6	52	147	4	4	
80-84	9	9	22	1	0	0	80-84	11	65	312	8	5	
85-89	13	10	86	32	1	1	85-89	16	89	242	22	5	
90-94	9	25	33	34	1	1	90-94	13	28	40	32	13	
95-99	2	41	146	32	0	1	95-99	3	10	44	39	14	
100-104	0	49	126	34	0	7	100-104	0	13	44	44	17	
105-109	0	67	72	74	2	5	105-109	1	2	60	45	12	
110-114	0	9	35	10	2	1	110-114	1	2	36	65	11	
115-119	0	2	21	34	0	1	115-119	0	2	41	27	4	
120-124	0	9	3	2	0	0	120-124	0	0	18	47	2	
125-129	0	0	2	0	0	0	125-129	0	0	9	15	1	
130-134	0	0	1	0	0	1	130-134	0	0	5	13	1	
135-139	0	1	0	1	0	1	135-139	0	0	3	14	0	
140-144	0	8	0	1	0	0	140-144	0	0	0	0	0	
145-149	0	0	0	0	0	0	145-149	0	0	0	0	0	
150-154	0	0	0	0	0	0	150-154	0	0	1	0	0	
155-159	0	0	0	0	0	0	155-159	0	0	0	0	0	
160-164	0	0	0	0	0	0	160-164	0	0	0	0	0	
165-169	0	0	0	0	0	0	165-169	0	0	0	0	0	
N° fish sampled	27	151	49	18	2	0	N° fish sampled	42	78	140	45	0	
N° fish caught	36	262	690	255	9	19	N° fish caught	55	319	1039	374	88	
Catch in weighth	528	5138	12842	5282	208	496	Catch in weighth	823	4522	20317	11150	2016	

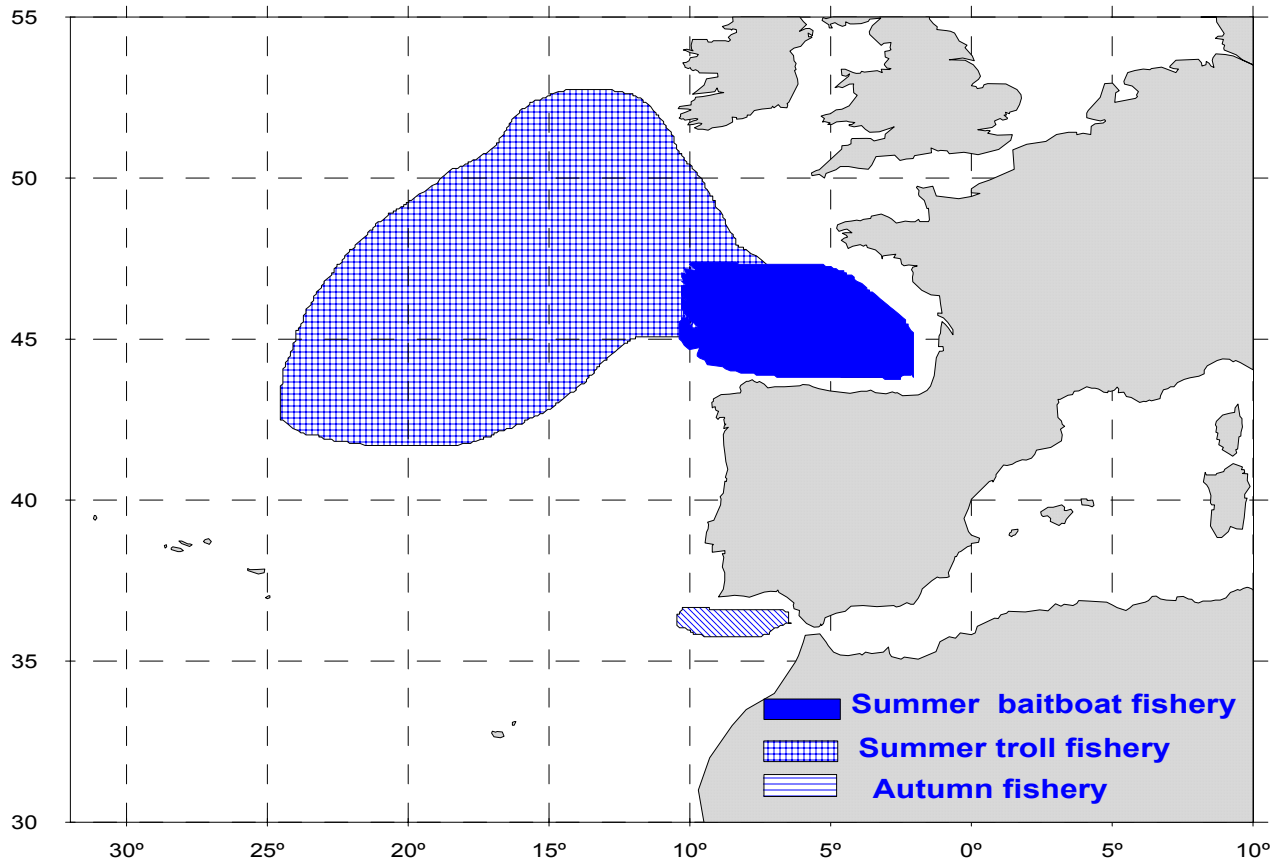
TROLL 2000						TROLL 2001					
Size	June	July	August	Septembe	October	Size	June	July	August	Septembe	October
40-44	0	0	0	0	0	40-44	0	0	0	0	0
45-49	0	0	0	0	0	45-49	0	0	0	0	0
50-54	0	0	0	0	0	50-54	0	20	0	0	0
55-59	0	0	0	0	0	55-59	0	2	0	0	0
60-64	0	0	0	1	0	60-64	0	0	0	0	0
65-69	3	0	0	2	1	65-69	0	0	0	0	0
70-74	7	0	0	0	0	70-74	39	30	1	0	0
75-79	13	32	36	0	0	75-79	51	45	168	11	0
80-84	14	170	214	33	2	80-84	7	85	420	10	5
85-89	18	135	370	99	5	85-89	7	223	350	6	4
90-94	10	104	346	36	3	90-94	5	95	72	68	0
95-99	4	97	482	86	5	95-99	7	210	390	168	0
100-104	4	75	326	119	7	100-104	0	197	148	169	0
105-109	3	21	204	90	6	105-109	0	41	193	137	0
110-114	1	0	135	3	1	110-114	0	25	199	126	0
115-119	1	17	71	35	2	115-119	0	10	78	11	0
120-124	0	0	36	18	1	120-124	0	0	3	22	1
125-129	0	0	58	4	1	125-129	0	0	8	9	0
130-134	0	0	13	1	0	130-134	0	20	0	0	0
135-139	0	0	4	1	0	135-139	0	0	0	7	0
140-144	0	0	2	0	0	140-144	0	0	0	6	0
145-149	0	0	2	0	0	145-149	0	0	0	0	0
150-154	0	0	3	0	0	150-154	0	0	0	0	0
155-159	0	0	0	0	0	155-159	0	0	0	0	0
160-164	0	0	0	0	0	160-164	0	0	0	0	0
165-169	0	0	0	0	0	165-169	0	0	0	0	0
N° fish sampled	48	45	151	30	0	N° fish sampled	20	27	60	41	5
N° fish caught	80	651	2301	533	35	N° fish caught	145	1038	2099	794	16
Catch in weighth	1159	12245	86856	40265	853	Catch in weighth	1343	19520	41239	40328	214

**Table 2.b.** Catch at size distribution of bigeye caught by albacore baitboat fishery: 1998-2001.

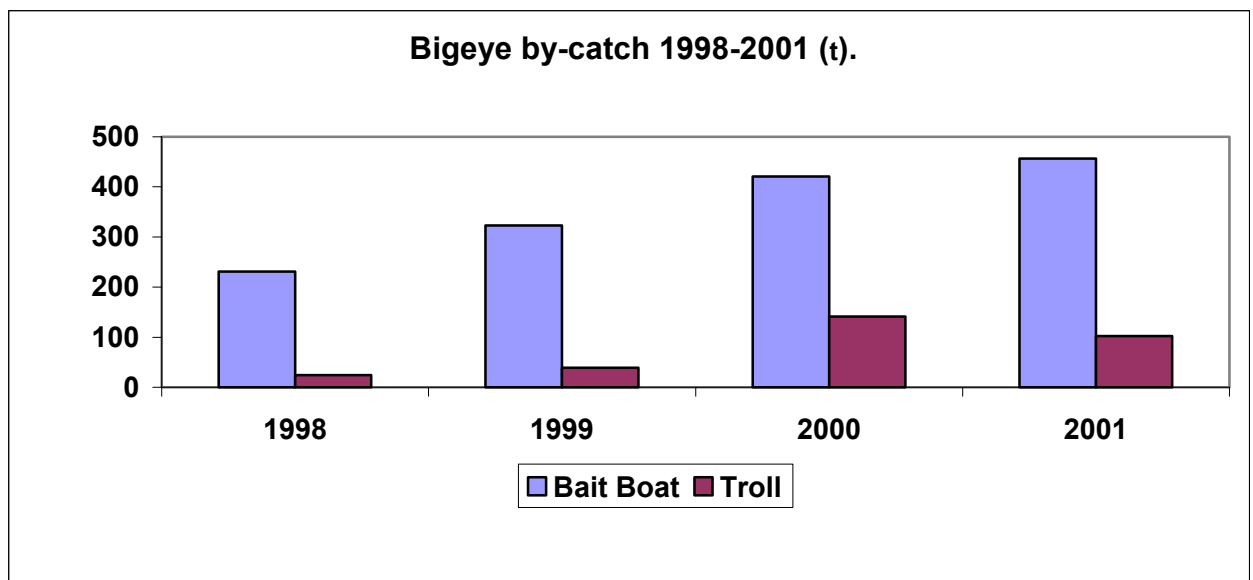
BAITBOAT 1998						BAITBOAT 1999					
Size	June	July	August	Septembe	October	Size	June	July	August	Septembe	October
40-44	0	0	0	0	0	40-44	0	0	0	0	0
45-49	0	0	0	0	0	45-49	0	0	0	0	0
50-54	0	0	0	0	0	50-54	0	0	0	0	0
55-59	0	0	0	0	0	55-59	0	0	0	0	0
60-64	0	0	0	0	0	60-64	0	0	0	0	0
65-69	0	0	19	163	1	65-69	0	0	0	0	0
70-74	0	0	0	0	0	70-74	0	584	71	0	0
75-79	0	0	19	163	1	75-79	0	292	284	63	30
80-84	0	0	404	0	0	80-84	0	292	709	0	13
85-89	0	0	443	325	2	85-89	0	876	497	0	0
90-94	0	0	712	163	1	90-94	0	0	0	0	0
95-99	0	0	1251	163	1	95-99	0	0	0	0	0
100-104	0	0	654	1627	10	100-104	0	0	0	0	0
105-109	0	0	751	1139	7	105-109	0	0	0	806	54
110-114	0	0	404	325	2	110-114	0	0	0	1747	117
115-119	0	0	77	325	2	115-119	0	0	0	806	54
120-124	0	0	38	0	0	120-124	0	0	0	1814	121
125-129	0	0	19	0	0	125-129	0	0	0	538	36
130-134	0	0	0	163	1	130-134	0	0	0	470	31
135-139	0	0	0	163	1	135-139	0	0	0	605	40
140-144	0	0	0	0	0	140-144	0	0	0	0	0
145-149	0	0	0	0	0	145-149	0	0	0	0	0
150-154	0	0	0	0	0	150-154	0	0	0	0	0
155-159	0	0	0	0	0	155-159	0	0	0	0	0
160-164	0	0	0	0	0	160-164	0	0	0	0	0
165-169	0	0	0	0	0	165-169	0	0	0	0	0
N° fish sampled	0	0	118	29	0	N° fish sampled	0	14	44	203	105
N° fish caught	0	0	4793	4719	29	N° fish caught	0	2044	1561	6849	496
Catch in weighth	0	0	110402	120406	243	Catch in weighth	0	27452	21141	256480	17600

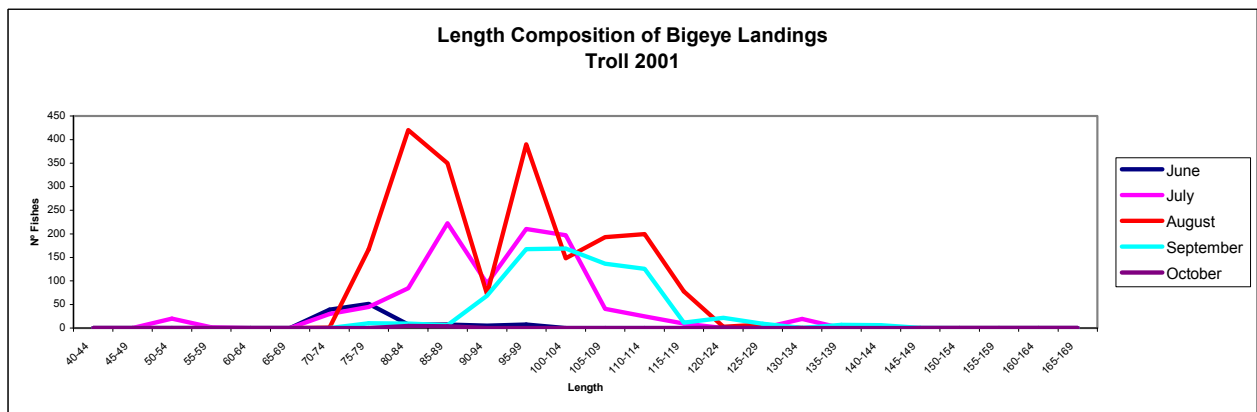
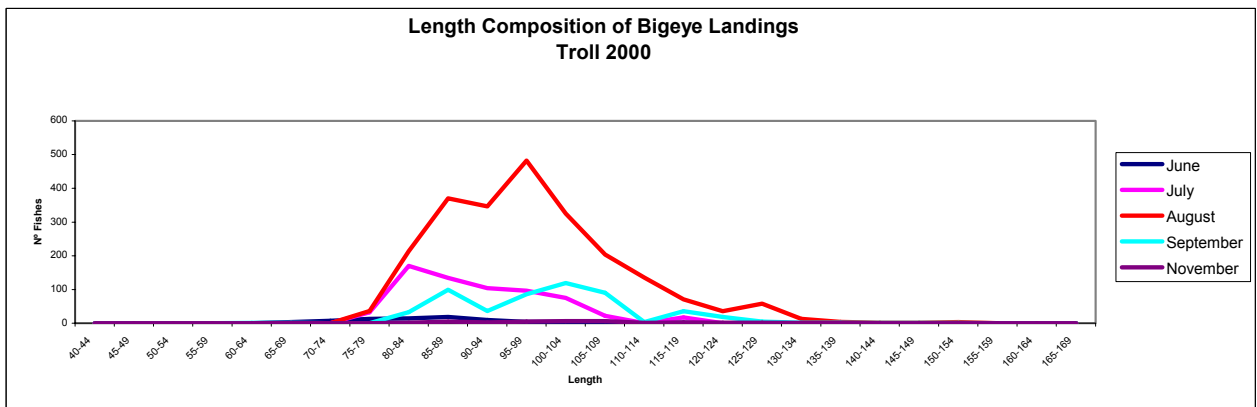
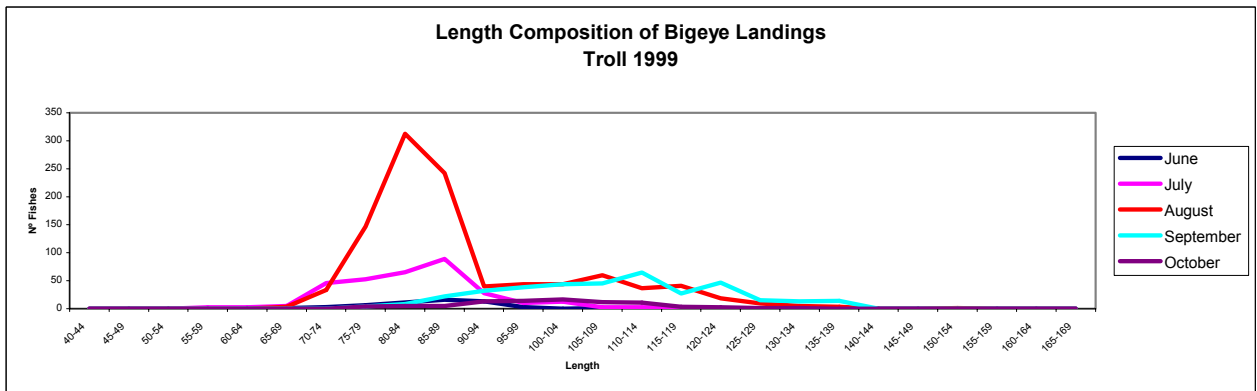
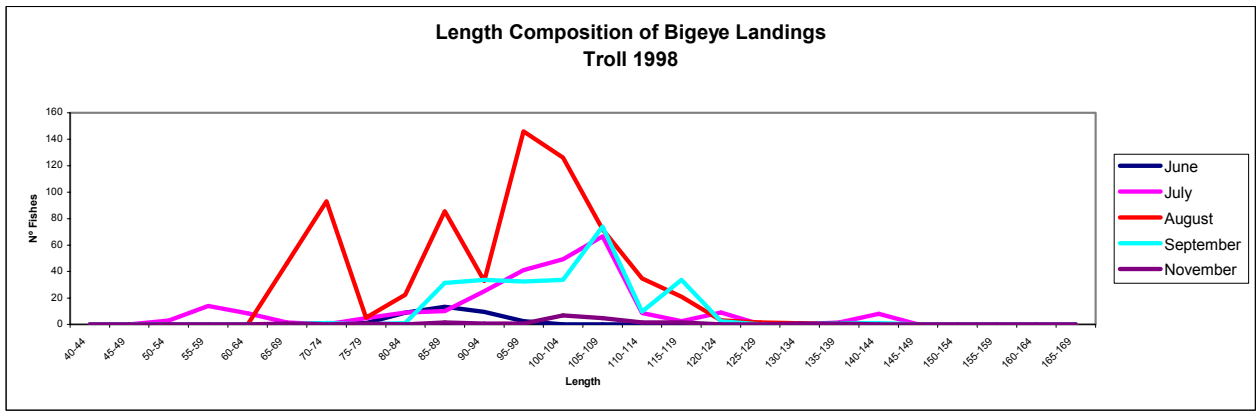
BAITBOAT 2000						BAITBOAT 2001					
Size	June	July	August	Septembe	October	Size	June	July	August	Septembe	October
40-44	0	0	0	0	0	40-44	0	0	0	0	0
45-49	0	0	0	0	0	45-49	0	0	0	0	0
50-54	0	0	0	0	0	50-54	0	0	0	0	0
55-59	0	0	0	0	0	55-59	0	0	0	0	0
60-64	0	0	0	46	4	60-64	0	0	0	0	0
65-69	0	0	0	92	8	65-69	0	0	0	0	0
70-74	0	0	0	0	0	70-74	6	54	114	0	0
75-79	0	0	81	0	41	75-79	6	68	540	443	0
80-84	0	509	109	0	21	80-84	0	104	1005	547	61
85-89	79	102	295	0	0	85-89	0	107	600	312	61
90-94	75	305	741	161	15	90-94	0	132	337	879	0
95-99	0	0	3101	185	17	95-99	0	192	710	4670	0
100-104	0	0	1213	185	17	100-104	0	121	1843	5062	0
105-109	0	0	1734	346	31	105-109	0	31	614	4109	0
110-114	0	0	1763	161	15	110-114	0	52	731	3438	0
115-119	0	102	1039	115	10	115-119	0	18	575	479	0
120-124	0	0	645	92	8	120-124	0	0	89	904	31
125-129	0	0	804	208	19	125-129	0	0	231	390	0
130-134	0	0	228	69	6	130-134	0	36	0	18	0
135-139	0	0	67	69	6	135-139	0	0	0	285	0
140-144	0	0	27	23	2	140-144	0	0	0	266	0
145-149	0	0	27	23	2	145-149	0	0	0	18	0
150-154	0	0	54	23	2	150-154	0	0	0	0	0
155-159	0	0	0	0	0	155-159	0	0	0	0	0
160-164	0	0	0	0	0	160-164	0	0	0	0	0
165-169	0	0	0	0	0	165-169	0	0	0	0	0
N° fish sampled	4	20	887	156	3	N° fish sampled	6	104	316	564	5
N° fish caught	154	1018	11928	1799	224	N° fish caught	13	914	7388	21820	153
Catch in weighth	2393	18155	339097	54717	6096	Catch in weighth	123	19523	148047	285510	3058



**Figure 1.** Albacore troll and baitboat Spanish fisheries

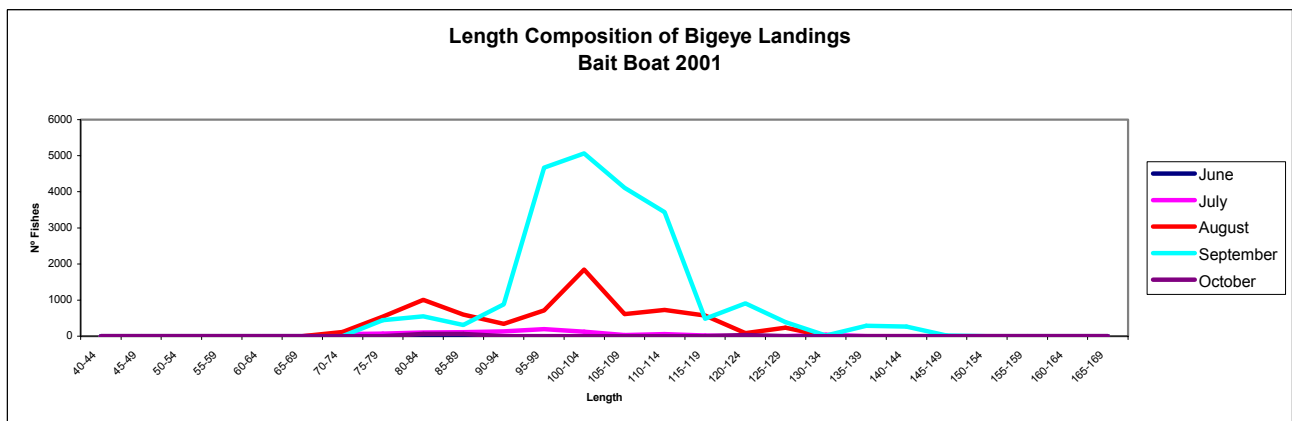
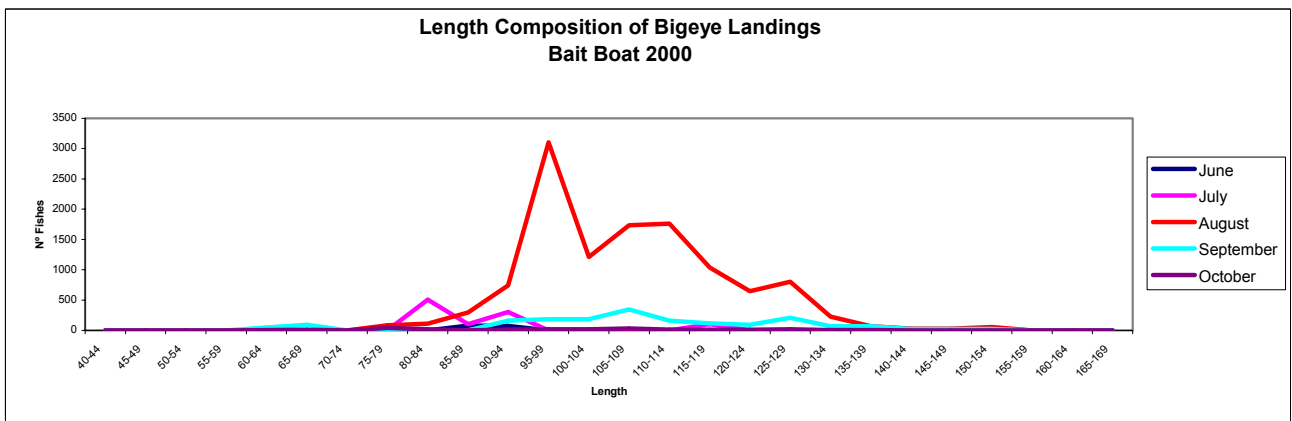
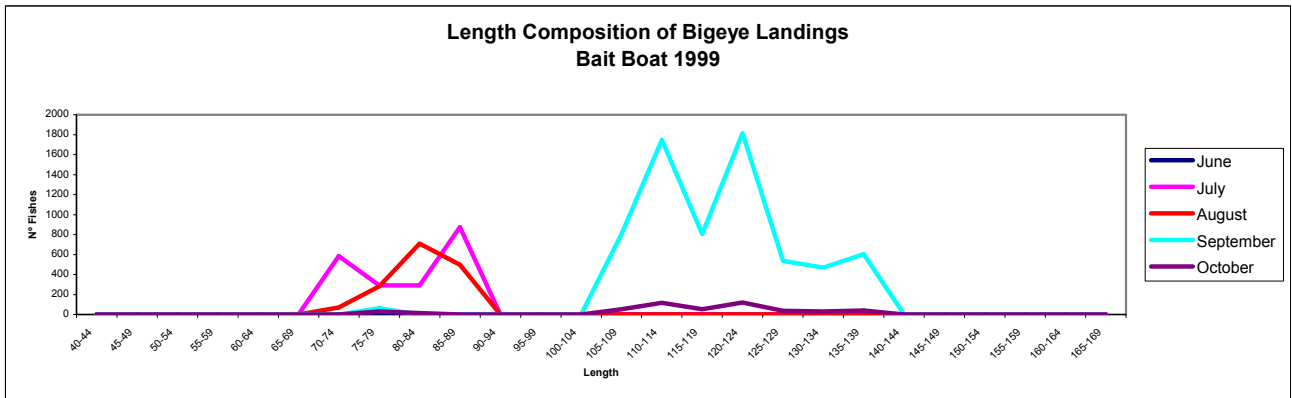
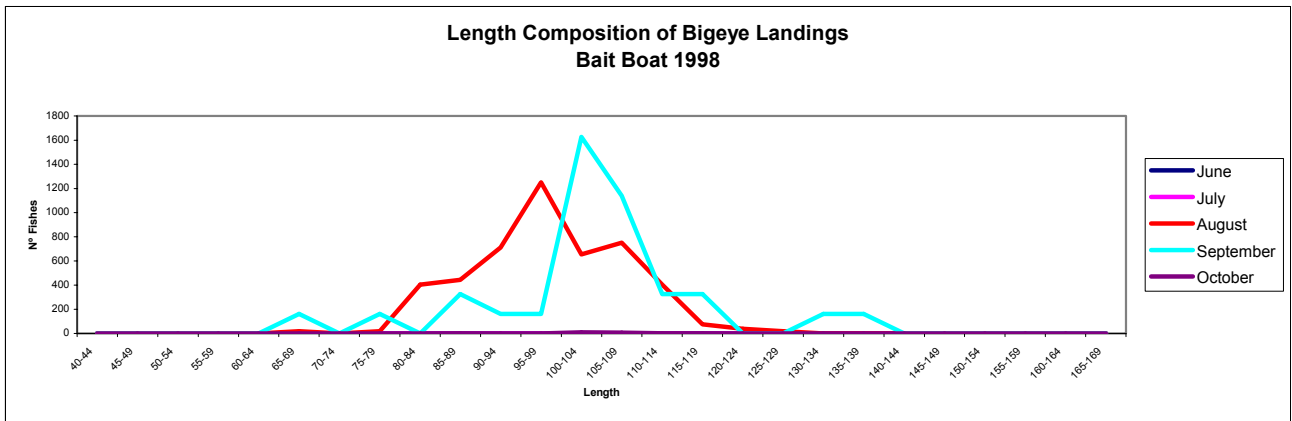


**Figure 2.** By-catch in weight (t) for bigeye landed by Spanish albacore fleets in the North east Atlantic and Bay of Biscay areas.



**Figure 3.a.** Catch at size distribution of bigeye caught by albacore troll fishery: 1998 –2001.





**Figure 3.b.** Catch at size distribution of bigeye caught by albacore bait boat fishery: 1998 –2001

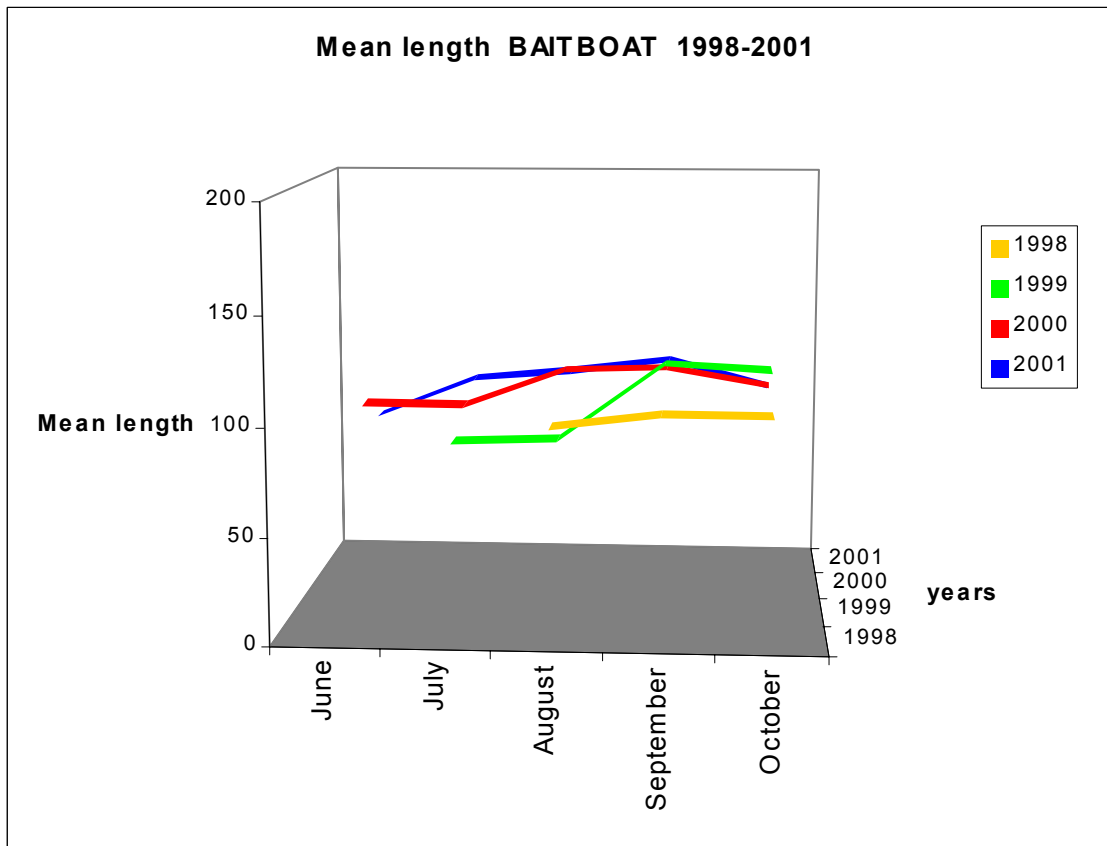
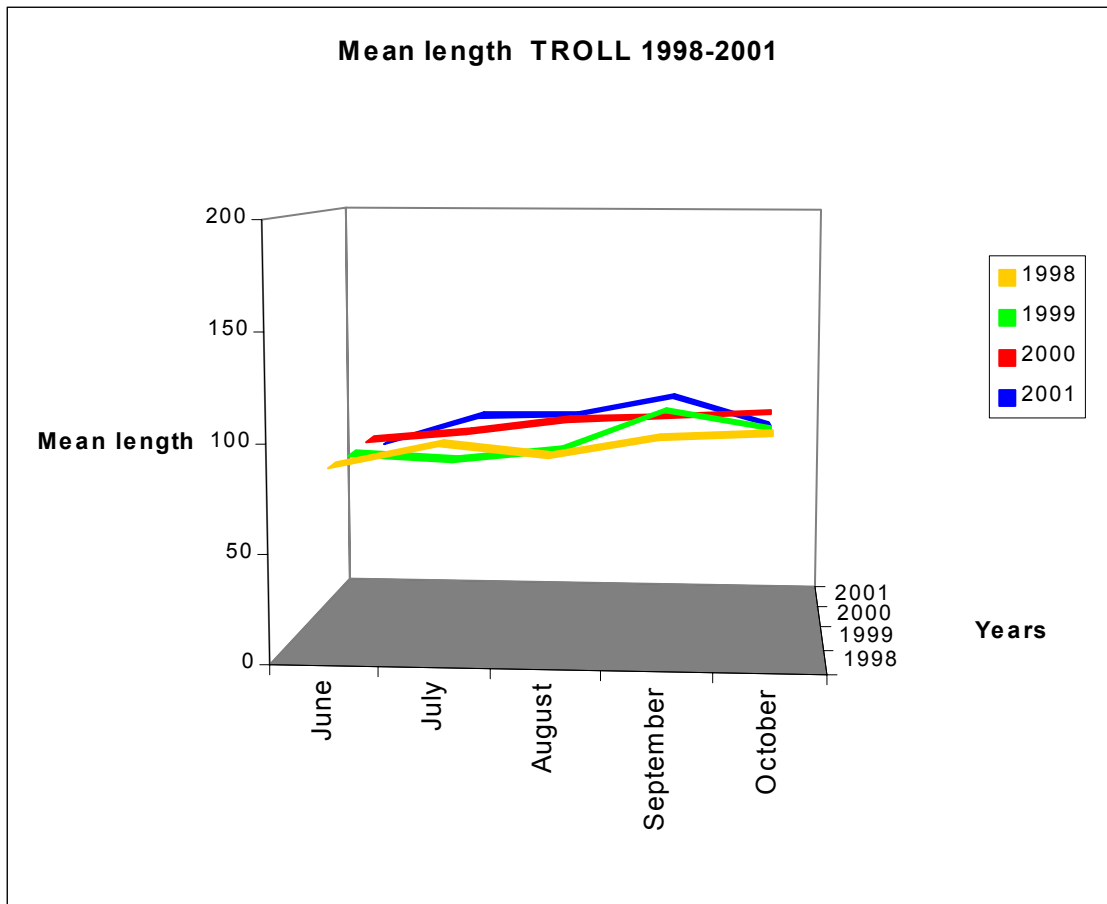


Figure 4. Seasonal average size (FL cm) of bigeye caught during 1998-2001.