STATISTICS FROM THE SPANISH ALBACORE (*THUNNUS ALALUNGA*) SURFACE FISHERY IN THE NORTH EASTERN ATLANTIC IN 2011

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SUMMARY

*The main features of the Spanish albacore (*Thunnus alalunga*) surface fishery in 2011 are presented. Fishing is conducted during summer and autumn seasons operating in offshore waters of the northeast Atlantic and Bay of Biscay. The catch of the bait boat fleet decreased 20 % with respect to 2010 yield and the troll fleet decreased 50% the catch compared to 2010 yield. The baitboat fleet increased its nominal fishing effort (fishing days) of about 28% while the troll effort decreased 10% in 2011 compare with previous 2010 year. Approximately, the 60% of the catch by the bait boat fleet was caught in September and October, while the 50% of the total catch for the troll fleet was registered in July. Size composition of catches obtained by these fleets in 2011, showed a high proportion of age class1 in the bait boat fleet, followed by a high proportion of age class 2 in the troll fleet. In the case of age 3 class, the largest observed proportion was obtained by the troll fleet. Monthly spatial distribution of nominal catch rates by fleet are presented for 2011 fishing season.*

RÉSUMÉ

*Les principales caractéristiques de la pêcherie espagnole de surface de germon (*Thunnus alalunga*) en 2011 sont présentées. La pêche a lieu pendant les mois d'été et d'automne dans les eaux situées au large de l'Atlantique Nord-Est et du golfe de Gascogne. La prise de la flottille de canneurs a diminué de 20% par rapport à la production de 2010 et la prise de la flottille de ligneurs a baissé de 50% par rapport à la production de 2010. La flottille de canneurs a augmenté son effort de pêche nominal (jours de pêche) d'environ 28% alors que l'effort des ligneurs a diminué de 10% en 2011 par rapport à l'année précédente. Environ 60% de la prise de la flottille de canneurs a été réalisée en septembre et octobre, tandis que la moitié de la prise totale de la flottille de ligneurs a été enregistrée en juillet. La composition par tailles des prises réalisées par ces flottilles en 2011 présentait une proportion importante de la classe d'âge 1 dans la flottille de canneurs, suivie d'une forte proportion de la classe d'âge 2 dans la flottille de ligneurs. Dans le cas de la classe d'âge 3, la proportion la plus élevée observée a été obtenue par la flottille de ligneurs. La distribution spatiale mensuelle des taux de capture nominale par flottille est présentée pour la saison de pêche 2011.*

RESUMEN

*En este documento se presenta un resumen sobre la actividad pesquera de las flotas de superficie españolas: cebo vivo y cacea dirigidas a la pesca de atún blanco (*Thunnus alalunga*) durante los meses de verano y otoño de 2011 en aguas del Atlántico nordeste y golfo de Vizcaya. La evolución de las capturas obtenidas por los barcos de cebo vivo y cacea, mostraron un descenso del 20% y 50% respectivamente para cada flota en 2010. El esfuerzo nominal, en días de pesca, aumentó un 28 % en la flota de cebo vivo y disminuyó un 10% en el caso de la flota de cacea, en comparación con el esfuerzo del año 2010. La composición de tallas de la captura, mostró un nivel elevado de capturas de edad 1 en la flota de cebo vivo, seguido de un porcentaje elevado de capturas de edad 2, cuya mayor proporción correspondió a la captura obtenida por la flota de cacea. En el caso de la edad tres, la mayor proporción de captura correspondió a la flota de cacea. La distribución geográfica mensual de las tasas de captura nominal de ambas flotas se presenta para 2011.*

KEYWORDS

Thunnus alalunga, troll fishery, bait boat fishery, catch, size composition, age composition, Northeast Atlantic,Bay of Biscay, albacore

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1. Introduction

Albacore (*Thunnus alalunga*) has been targeted by the Spanish surface fleet comprised of troll and bait boat vessels for decades in the North eastern Atlantic and Bay of Biscay offshore waters (Arrizabalaga *et al*., 2010, Ortiz de Zárate and Barreiro, 2010). The albacore fishery represents an important resource from the socio-economical activity reported in the north-western and northern fishing ports. In spring and early summer, as the water temperature rises, immature albacore migrates from the central Atlantic waters towards the north-eastern Atlantic and Bay of Biscay temperate surface waters, (Aloncle et Delaporte, 1973; Bard, 1981; Ortiz de Zárate and Cort, 1998; Arrizabalaga, 2003) where forage prey are abundant (Pusineri *et al*., 2005). The annual migratory behaviour of juvenile albacore drives the marked seasonality and area of this fishery that take place during summer and autumn months in the northern coast of Iberian Peninsula (Bard and Santiago, 1999).

As concerns the activity of both fleets: alive bait boat (BB) and trolling (TR), no major changes were observed during the 2011 fishing season in relation to fishing characteristics. The number of boats involved varies among years; the annual averaged number is 550 vessels (80% troll and 20% bait boat). The troll vessels are of lesser tonnage (mean of 50 GRT) than those of baitboat (mean 120 GRT). The catch composition by age is mainly made up of immature albacore 1 to 4 age groups, corresponding to 50 to 90 cm fork length fish.

The aim of this paper is to present an overall description of the main statistics and brief characteristics of the Spanish albacore surface fishery in 2011. The spatial evolution in nominal catch per unit of effort (in fishing days) as well as the catch-at-size composition of landings and the demographic structure of catches obtained by length slicing method are presented for both fleets.

2. Material and Methods

The monitoring of the Spanish bait boat and troll fleets in 2011 was done by means of collecting information through interviews to skippers at main fishing ports located along North western coast and the Cantabrian coast. The information collected by fleet was based on individual trip: number of days at sea, number of days fishing, catch in number of fish and weight (kg) and an approximate location of catch by 1ºx1º degrees latitude and longitude, recording at least one position per trip.

Smaller number of trips was also sampled to obtain the length frequency of the catch by applying random sampling stratified according to commercial categories of catches landed in the main fishing markets which were monitored. The following information was recorded: date of landing, gear, number of days at sea, number of fishing days, number of lines, approximation of the fishing area in 1ºx1º degree, catch in number, catch in weight (kg) and fish length (cm). Fish were measured to the fork length (FL) and to the nearest centimetre according to commercial categories in the fishing markets.

The catch, nominal effort expressed in fishing days and length frequency data were processed by gear on monthly basis following raising procedures to estimate the Task I and Task II (biological information) statistics of ICCAT (ICCAT, 2006-2010). Thus, the monthly length distribution of catch was estimated for the catches landed by both troll and bait boat fleets in 2011.

Based on the monitoring of fleets activity, the sampled information of catches and fishing effort by trip was aggregated by 1º x 1º latitude and longitude for each month and gear fleet. Then monthly nominal catch rates of both fleets were estimated according to the geographical locations in 1ºx1º degrees and represented for the 2011 fishing season. As well, the monthly percentage of catch by gear was calculated to describe the spatial temporal evolution of catches according to the fleets fishing activity in 2011.

Total age composition of catches by fleet was derived by using the mean length at age obtained for North Atlantic albacore stock based on the von Bertalanffy model estimated by Bard (1981), then the values obtained for the quarter 3 (July, August and September) (see **Table 2** in Arrizabalaga and Santiago, 2003) were used to split the catch at size distribution by applying a knife-edge deterministic slicing to calculate the number of fish caught by age group caught in 2011 by the surface fleets.

3. Results and Discussion

According to the information collected and processed a total of 79% of the bait boat catch obtained in 2011 was monitored meanwhile the troll fleet monitoring accounted for the 83% of the total catch loaded in 2011. Those percentages were calculated in comparison with the total albacore nominal catch (Task I data) obtained in 2011 by this surface fisheries. The estimated nominal catch rates for the bait boat fleet by month are represented in **Figure 1a**. Likewise the estimated nominal catch rates for troll fleet by month are included in **Figure 1b.** In the case of the bait boat fleet, also most of the catches were obtained in the offshore Atlantic waters, localized in two main areas in July and August and in the Bay of Biscay area in September and October as represented in **Figure 1a**. As shown, the troll fleet operated mainly in the offshore waters of the North eastern Atlantic from June to September. Only partially in September and during October the activity of this fleet took place in the Bay of Biscay area. The geographical distribution of bait boat catches were similar to the previous observed fishing ground in 2010 fishing season when catches were obtained in North east Atlantic waters and the Bay of Biscay area (Ortiz de Zárate *et al*., 2012). In 2011, the monthly spatial distribution of troll vessels interviewed shown a permanence of the albacore resource, in offshore Atlantic waters at early fishing season (June) extended to the end of summer season (September), meanwhile, in the autumn months the observed monthly troll trips showed a distribution closer to offshore waters of the Iberian Peninsula (**Figure 1.b**) in contrast with the previous troll fishing season in 2010, when catches were absent in the Bay of Biscay area (Ortiz de Zárate *et al*., 2012).

The overall nominal catch in 2011 amounted to 7,910 t, a decrease of near 36% compared to the 2010 catch of 12,442 t. In fact, both fleets showed a decrease of 20% in the case of bait boat and the 50% for troll fleet catches in 2011. The bait boat caught 4,346 t compared to 5,432 t in 2010 and the troll fleet caught 3,564 t compared to 7,009 t in 2010 (Ortiz de Zárate *et al*., 2012).

In 2011 fishing season the decreasing trend showed in previous years (Ortiz de Zárate and Barreiro, 2010) continued after some increase in total catch recorded in 2010 (Ortiz de Zárate *et al*., 2012), although to a lower level than the high catch of 24,133 t obtained in 2006 by the two fleets. The monthly evolution of the nominal catches, Task I, taken in 2011 fishing season by the bait boat fleet is shown in **Figure 2a**. Similarly, monthly evolution of the troll fleet Task I catches is shown in **Figure 2b.** For comparison reason it is included previous fishing season 2010 and the median catch for the time period from 2005 to 2009. During 2011 fishing season, the bait boat fleet completed 60% of the total catch at the end of fishing season, in September and October, while the troll fleet obtained 50 % of the total catch by the month of July, which represented the peak catch for troll fleet. Comparison with the median seasonal pattern of catch for the estimated period 2005-2009 permits to conclude that in the case of the troll fleet, the 2011 fishing season diverged in August from the average seasonal pattern and was similar to 2010 along the season, with the highest catch being taken in July and followed by August and September in catch rank. Meanwhile, the 2011 fishing season for the bait boat fleet presented a different pattern from the average seasonal pattern as well as from previous year 2010, with the highest proportion of catch in October and lower catches in July and August.

In 2011, the length distribution of catch was obtained from a sample size of 47,081 fish measured, representing a sampling coverage in number of fish of 1.1 % for bait boat and 6 % for troll fleets respectively. The monthly catch at size distribution (Task II data) is shown in **Figure 3.a** for the bait boat fleet and in **Figure 3b.** for the troll fleet. Three main modes can be clearly identified in the length distribution of catches taken by troll vessels by visual inspection. In the case of the bait boat catch at size distribution it is not possible to identify such clear modes. When total catch at size distribution was aggregated and compared for both fleets then three main modes were identified and some overlap between total length distribution of catch corresponding to the different selectivity patterns (**Figure 3c**) associated with the two gears targeting albacore in different spatial and temporal strata.

The age composition of catch for the bait boat and troll fleets was obtained by length slicing of the catch at size that showed different proportion at age, ranging from age 1 to age 4 group obtained from the different exploitation pattern (**Figure 4**). The estimated proportions of age 1 was larger in bait boat fleet (78%) as compared to the troll proportion (37%). In the case of age 2 group, the proportion was four times higher in the case of troll vessels (44%) than in bait boat (10%). The presence of age 3 (10%) was smaller in bait boat catch in respect to troll catch of age 3 (18%). The age 4 group, very scarce in the composition of catch, represented the 2% of total albacore caught by the bait boat fleet. As overall, the proportion of age 1 and age 2 in both fleets was notably high in 2011. The abundance of age 1 in the commercial catch could be an indicator of the recruitment of the North Atlantic stock.

Inter annual changes in temporal and spatial distribution of albacore targeted by the surface fishery (Ortiz de Zárate *et al*. 2012, SCRS/2012/170) observed in the results of 2011 season as well as population structure merit to be studied in relation to factors such the availability of prey to forage, the habitat utilization by immature albacore (Pusineri *et al*., 2005; Goñi *et al*., 2009) along with knowledge of climatic and oceanographic conditions in the northeast Atlantic waters and Bay of Biscay off shore waters. All these related variables impacting the migratory behaviour of albacore (Dufour *et al.,* 2010) require further research and comprehensive studies.

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References

Aloncle, H. et F. Delaporte. 1973. Populations, croissance et migrations du germon (*Thunnus alalunga*) dans le nord-est Atlantique essai de synthèse. *Rev. Trav. Inst. Pêches marit*., 37(1): 97-115.

Arrizabalaga, H. 2003, Estructura poblacional del atún blanco (*Thunnus alalunga* Bonn. 1788): una aproximación multidisciplinar. PhD, Universidad de Vigo, 161 pp.

Arrizabalaga, H. and J. Santiago. 2003. Assessment sensitivity to different north Atlantic albacore catch at age estimates. ICCAT, Col. Doc. Cient., Vol. 55 (1): 272-279.

Arrizabalaga, H., J. Santiago, Y. Sagarminaga, I. Artetxe. 2010. Daily CPUE database for Basque albacore trollers and baitboats Collect. Vol. Sci. Pap. ICCAT, 65(4): 1291-1297

Bard, F.X. 1981. Le thon germon (Thunnus alalunga) de l'Ocean Atlantique. De la dynamique de population à la stratégie démographique. Thèse Doctorat ès Sciences Naturelles, Universitè de Paris VI, 330 p.

Bard, F.X and J. Santiago. 1999. Review of albacore (T. alalunga) historical surface fisheries data (1920-1975) for possible relationships with north Atlantic oscillation. SCRS/98/106. ICCAT, Col. Doc. Cient. Vol. 49 (4): 311-323.

Dufour, F., H. Arrizabalaga, X. Irigoien, J. Santiago. 2010. Climate impacts on albacore and bluefin tunas migrations phenology and spatial distribution. Progress in Oceanography, 86, 283-290.

Goñi, N. I. Arregui, A. Lezama, H. Arrizabalaga and G. Moreno. 2009. Small scale vertical behaviour of juvenile albacore in relation to their biotic environment in the Bay of Biscay. J.L.Nielsen et al. (eds.). Tagging and tracking of Marine Animals with Electronic Devices. Reviews: Methods and Technologies in Fish Biology and Fisheries 9, DOI 10.1007/978-1-4020-9640-2-4. © Springer Science+Business Media B.V.

ICCAT. 2006- 2009. *ICCAT Manual. International Commission for the Conservation of Atlantic Tuna. In: ICCAT Publications* [on-line]. Updated 2009. [Cited 01/27/]. ISBN (Electronic Edition): 978-92-990055-0-7

Ortiz de Zárate, V. and J. L. Cort. 1998. Albacore (*Thunnus alalunga*, Bonnaterre) stock structure in the Atlantic Ocean, as inferred from distribution and migration patterns. ICCAT, Col. Vol. Sci. Pap. 50 (1): 251-260.

Ortiz de Zárate, V. and S. Barreiro. 2010**.** Statistics from the Spanish albacore (*Thunnus alalunga*) surface fishery in the North eastern Atlantic in 2008. Collect. Vol. Sci. Pap. ICCAT, 65(4): 1437-1445.

Ortiz de Zárate, V., B. Pérez and M. Ruiz. 2011. Statistics from the Spanish albacore (*Thunnus alalunga*) surface fishery in the North eastern Atlantic in 2009. Collect. Vol. Sci. Pap. ICCAT, 66(5): 1931-1939.

Ortiz de Zárate, V., B. Perez and M. Ruiz. 2012. Statistics from the Spanish albacore (*Thunnus alalunga*) surface fishery in the North eastern Atlantic in 2010. Collect. Vol. Sci. Pap. ICCAT, 68(2): 639-647.

Pusineri, C., Y. Vasseur, S. Hassani, L. Meynier, J. Spitz, and V. Ridoux. 2005. Food and feeding ecology of juvenile albacore, *Thunnus alalunga*, off the Bay of Biscay: a case study. ICES Journal of Marine Science, 62: 116e122. doi:10.1016/j.icesjms.2004.09.004

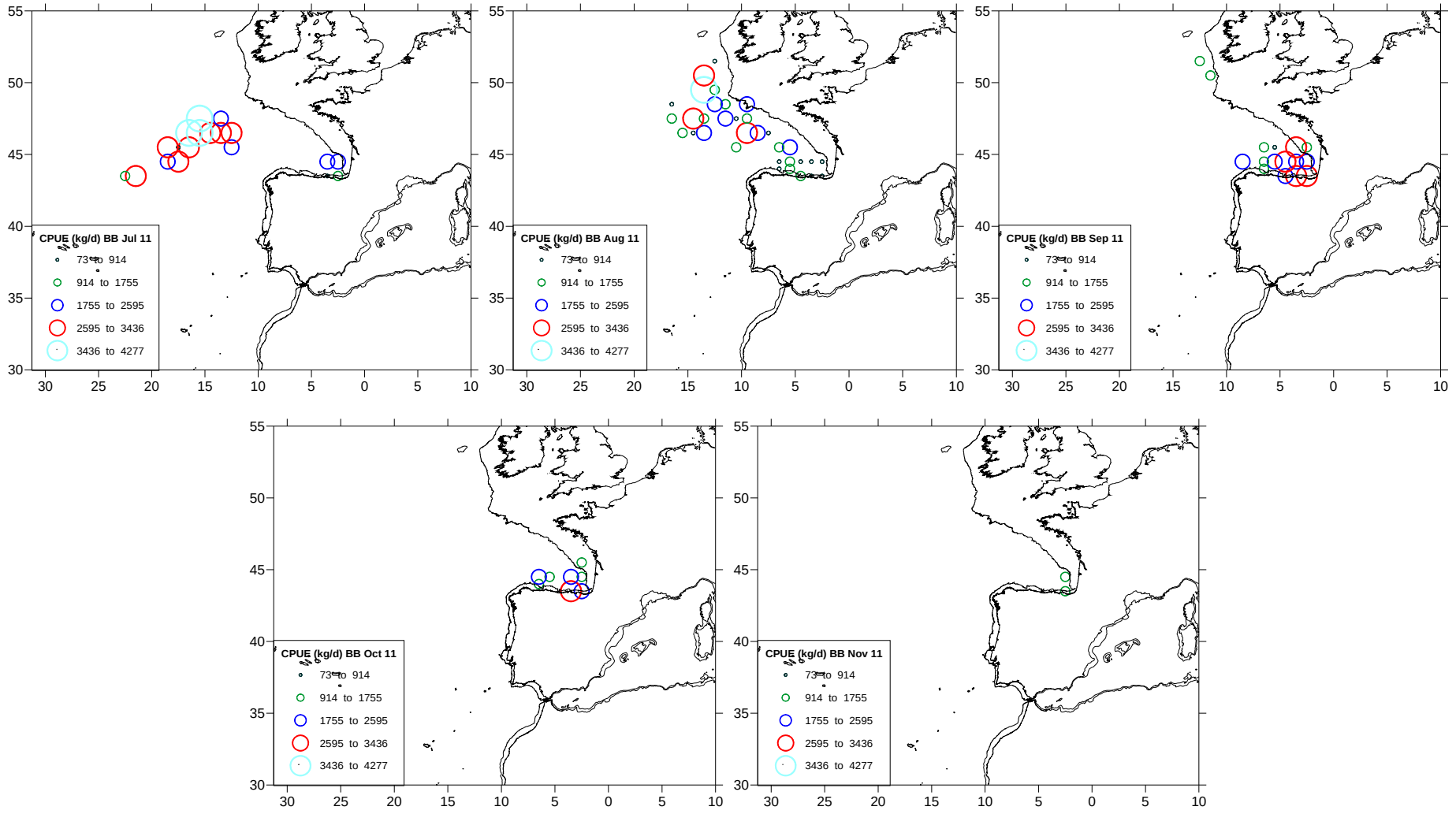

Figure 1a. Spanish baitboat nominal CPUE distribution in 2011 fishing season derived from interviews to skippers.

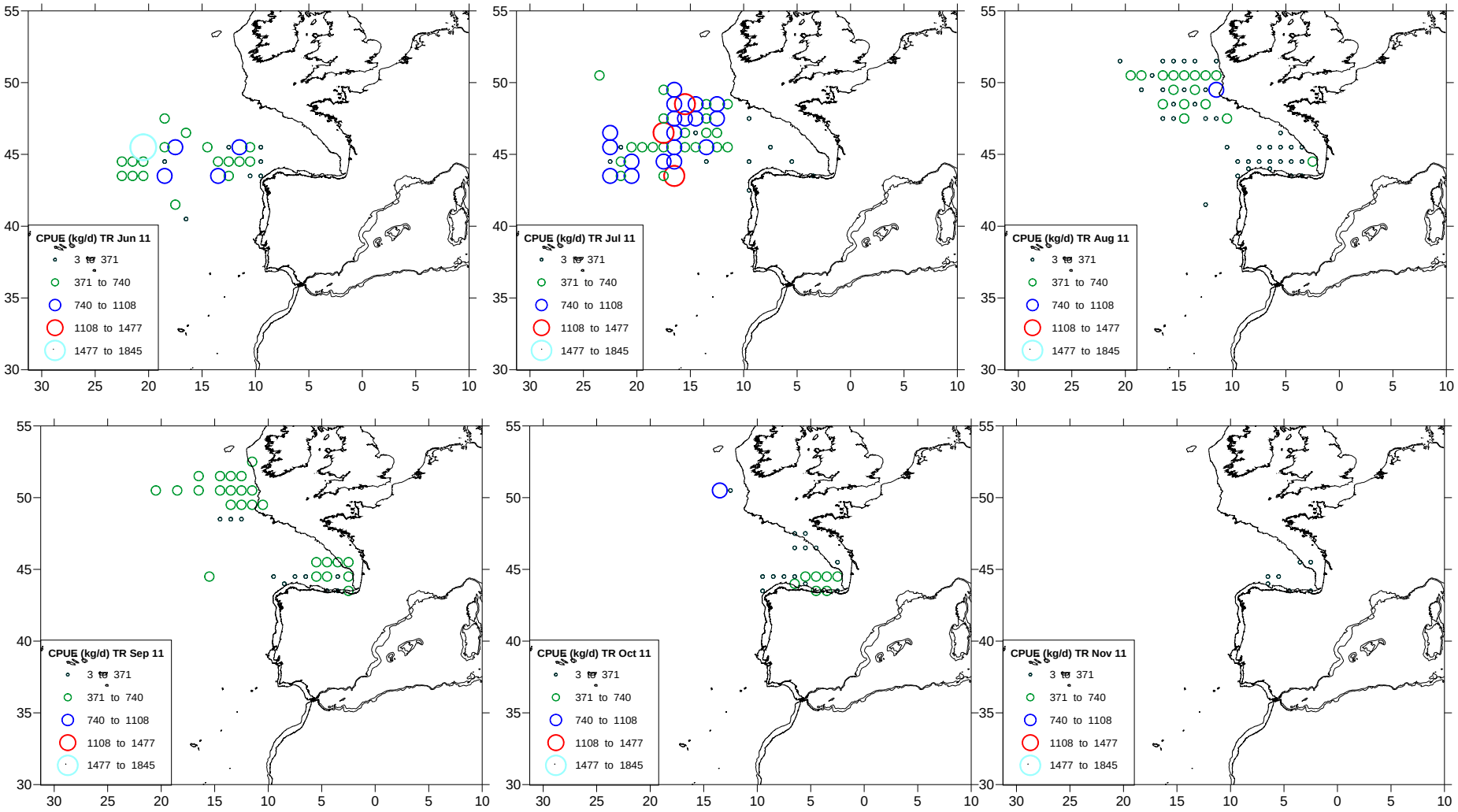

Figure 1b. Spanish troll nominal CPUE distribution in 2011 fishing season derived from interviews to skippers.

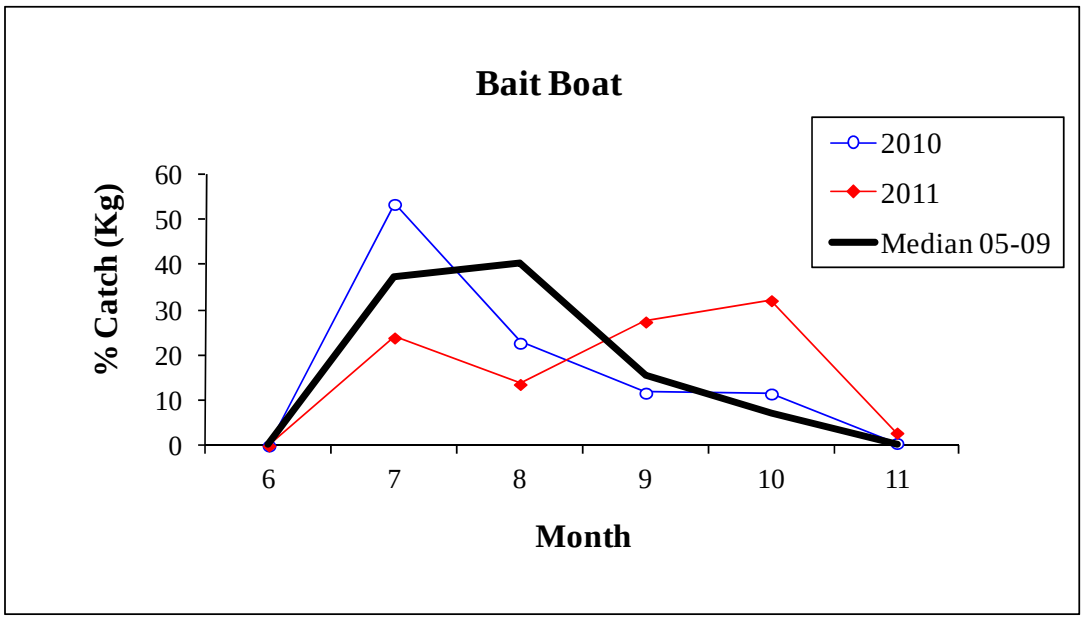

Figure 2a. Seasonality of Spanish albacore catch by bait boat fleet in 2010 and 2011 and median for the period 2005-2009.

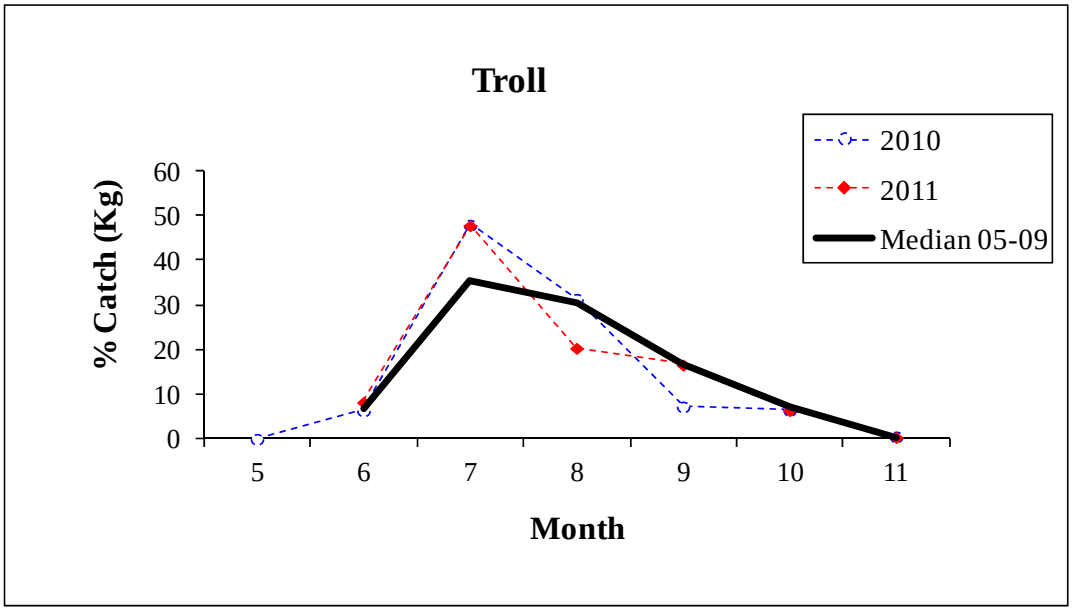

Figure 2.b. Seasonality of Spanish albacore catch by troll fleet in 2010 and 2011 and median for the period 2005-2009.

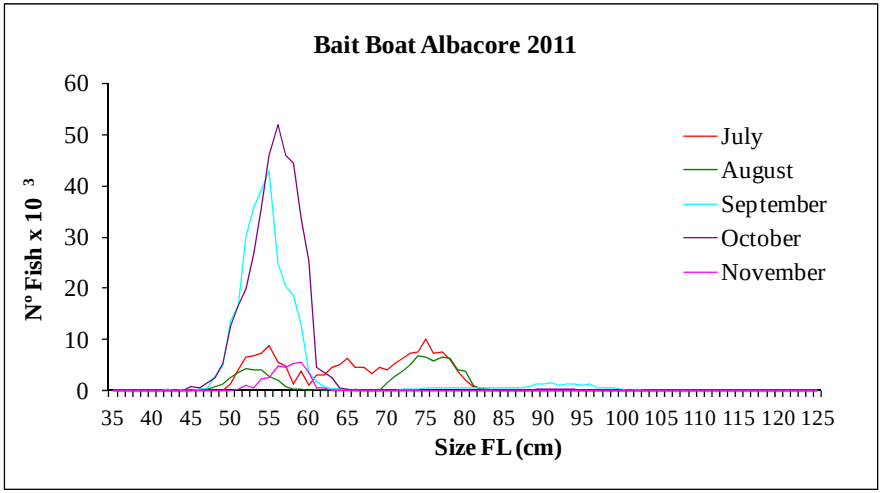

Figure 3a. Monthly length distribution of albacore catch by bait boat fleet in 2011.

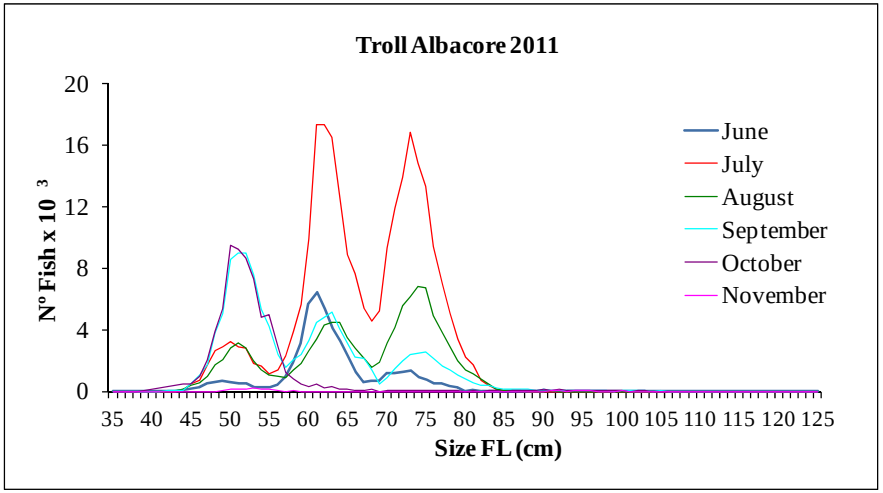

Figure 3b. Monthly length distribution of albacore catch by troll fleet in 2011.

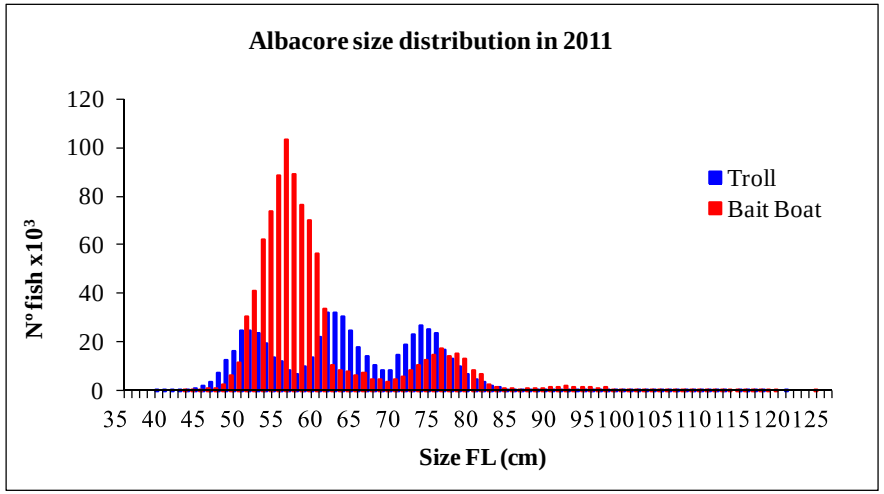

Figure 3c. Length distribution of albacore catch by surface fleets in 2011.

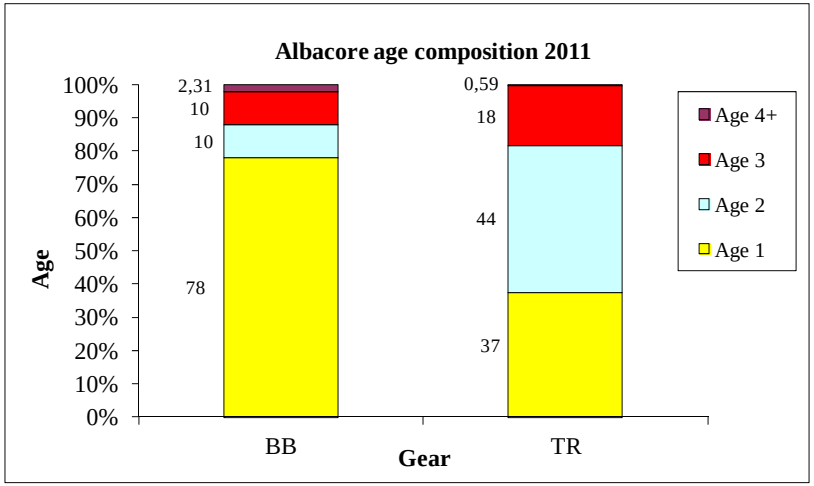

Figure 4. Age composition of Spanish albacore surface catch in 2011.