OBSERVATIONS ON THE CATCHES OF SMALL TUNAS FROM A TRAP OFF THE ALGARVE (SOUTHERN PORTUGAL)

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SUMMARY

*The current study aimed to characterise the catches from a tuna trap located off the Algarve coast (Southern Portugal), particularly of the small tuna species (*Auxis rochei, Euthynnus alletteratus *and* Sarda sarda*). Data was collected within the Portuguese sampling program undertaken by IPIMAR, between January 1996 and December 2004. Herein, we report data on the annual and monthly: catches, occurrence index, length frequencies distributions and mean sizes.*

RÉSUMÉ

La présente étude visait à caractériser les prises d'une madrague à thonidés située au large de la côte de l'Algarve (Portugal du sud), notamment en ce qui concerne les espèces de petits thonidés (Auxis rochei, Euthynnus alletteratus *et* Sarda sarda). *Les données ont été collectées dans le cadre du programme d'échantillonnage portugais, entrepris par l'IPIMAR, entre janvier 1996 et décembre 2004. Ce document inclut les données mensuelles et annuelles sur les prises, l'indice de présence, les distributions de fréquence de taille et les tailles moyennes.*

RESUMEN

*Este estudio tiene como objetivo caracterizar las capturas de las almadrabas de atún situadas en las aguas a la altura de la costa del Algarbe (Portugal meridional), sobre todo las capturas de pequeños túnidos (*Auxis rochei, Euthynnus alletteratus *y* Sarda sarda*). Los datos se recopilaron en el marco del programa portugués de muestreo emprendido por IPIMAR entre enero de 1996 y diciembre de 2004. En este documento comunicamos datos de capturas anuales y mensuales, índices de presencia, distribuciones de frecuencias de tallas y tallas medias.*

KEYWORDS

Tuna trap, Southern Portugal, Auxis rochei, Euthynnus alletteratus, Sarda sarda

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1 Introduction

Tuna fishery is one of the oldest in the Mediterranean Sea and adjacent waters. In the Algarve (southern Portugal), the tuna fishery remounts to the 14th century and becoming more complex through the centuries. Tuna traps result from the evolution of a primitive fishing system using passive and plug nets placed in the migratory path of the target species (Santos *et al.*, 2002). These traps are large structure which guided schools of hundreds or thousands of fish into enclosures, where they could be caught.

In Portuguese waters (this fishery as been limited to the Algarve waters - southern Portugal) tuna traps have been used prior to the 13th century. However, this fishery as changed both in terms of technology and number of traps. In 1903, 19 traps were operating in Portuguese waters, of which, only 6 remained in 1927 and none in 1972. The collapse of this fishery, in the Algarve, was mainly caused by the free increase of the fishing effort, in the Atlantic Ocean over the tuna species and the consequent depletion of their stocks. Big boats with ultra low freezing conditions allied to an intense coastal fishery turned the tuna trap fishery economically unsustainable for the Portuguese fishermen (Costa, 2000). Nowadays, in Portugal there is only one operational tuna trap, set off Fuzeta (37º 01'10"N and 007º 42'20"W) 2 nmi off-shore, covering a bathymetric range between 20 and 60m, and it is explored by a Japanese-Portuguese enterprise. This trap was set up in 1995, twenty-three years after the closure of the last trap in Portuguese waters.

Based on the fishermen solid knowledge about the migration patterns of bluefin tuna, those structures were generally set up close to shore catching the ones that came to Mediterranean Sea to spawn, in May and June, and later the ones that came from Mediterranean to North Atlantic after spawning season, in July and August. Thus, each fishing season comprised two periods known by the fishermen as "*direito*" and "*revés*", respectively (Leite *et al.*, 1986; Lemos and Gomes, 2004). Besides the fact that bluefin tuna is the target species, during the tuna trap fishing season, which traditionally extends from April to September, other tuna species are also exploited in this fishery. This is the case of several small tunas such as *Auxis rochei*, *Sarda sarda* and *Euthynnus alletteratus*.

Since the deployment of the trap in 1995, IPIMAR has been monitoring it's activity and report to ICCAT both task 1 and 2 data. Herein, we report some observations on the catches of small tunas between 1996 and 2004. These include data on the occurrence index, total catches, mean sizes and length frequencies distributions.

2 Material and method

Data Source

Data was collected within the Portuguese sampling program undertaken by IPIMAR on a weekly basis and from the national landings database between January 1996 and December 2004. The measurement of fish fork length (FL) was made with a tape measure to the nearest lower centimetre (cm).

Data Analysis

All small tuna catches (*Auxis rochei*: BLT; *Sarda sarda*: BON; and *Euthynnus alletteratus*: LTA) were analysed for their contribution (in weight) to the total catch and recorded according to an occurrence index expressed as:

$$S_{occ} = \frac{n_i}{N} 100$$

where, S_{occ} is the species occurrence index, n_i is the number of hauls in which the species occurred and N is the total number of hauls. The length frequencies distributions for each species and mean sizes were achieved by month (all years combined) and year.

3 Results and discussion

The tuna trap in the Algarve catch a wide range of species. Among the tuna and tuna like species, so far 9 species have been recorded (Santos et al, 2002). These included the small tunas: *A. rochei*, *E. alletteratus* and *S. sarda*.

Occurrence index

The catches of small tunas by the tuna trap are occasional. In fact, during the study period a total of 1635 trap operations were made. However, small tunas occur in less than 5% of the fishing operations. The occurrence indexes recorded for the studied species were as follows: Atlantic bonito (4.0%), followed by bullet tuna (3.5%) and the little tunny (0.9%).

Catches

The overall catch of small tunas between 1996 and 2004 represented 32% of the trap landings during this period. However, this relative percentage showed a strong variation among years, from 1.2% to 84.5% in 2001 and 2000, respectively (**Table 1**). Among the three species the bullet tuna was the most important species caught, representing 30.2% (0.3%-80.4%) of the total landings, followed by the Atlantic bonito and the little tunny, which amounted for 1.4% (0.8%-4.1%) and 0.4% (0.8%-1.6%), respectively (**Table 1**). The variations between years of the landings of *A. rochei* are mostly due to fact that this species shows a fluctuation trend. In fact, apparently it shows a peak every 3 to 4 years (of 200 to 300 t), followed by very low (less than 50 t) or even null catches. Contrasting to such pattern, *S. sarda* showed consistent landings (aprox. 3 t per year) during the study period, the exception being the peak observed in 2000. As regards *E. alleteratus* it was only caught in recent years, on an average of 6.5 t per year (**Figure 1**).

As regards to the monthly variation of the small tuna landings, the three species showed different patterns (**Figure 2**). *A. rochei* is caught between May and November, showing a clear peak in September. *S. sarda* is caught year-round, showing two peaks, in May and September, respectively. Macías *et al.* (2005) reported that during May, Atlantic bonito landings increase in Western Mediterranean. These results agree with our observations relating with important catches in May. *E. alleteratus* is also caught year-round showing a peak in September too. The fact that all three species showed a peak in September might be due to the usual occurrence of warmer waters during this month associated with the "Levante" wind from south-eastern (unpublished data).

Catch size

A. rochei is caught within the size range of 29 to 51 cm. The mean sizes observed for the bullet tuna showed similar values during the study period, ranging between 37 cm in 2002 and 2004 and 41 cm in 1997, the exception being the maximum of 46 cm registered in 1998 (**Figure 3**). The overall monthly length frequencies distribution revealed that apparently two cohorts are exploited during the fishing season. The first is caught from late winter until the middle spring, while the second cohort enters the fishery in May and remains in the area until October (**Figure 4**). In fact, the first cohort showed an increase in terms of mean size from 31 cm in February (31 cm FL) and to a maximum of 40 cm in April. Moreover, the second cohort showed stable mean sizes between May and July (37 and 36 cm) and an increase thereafter until October when the maximum mean size was observed (42 cm).

S. sarda is caught within the size range of 33 to 72 cm. During the study period, the Atlantic bonito mean annual length been fluctuating between 43 and 60 cm, in 2004 and 1997. Moreover, a decrease trend on the mean annual size has been observed since 1999 (**Figure 3**). In Tyrrhenian Sea, di Natale *et al.* (2005) registered in 2002 a mean length of 41 cm FL, smaller than that observed in the Algarve coastal waters (51 cm FL). In the Southern Black Sea (coast of Turkey) the length of landed Atlantic bonitos between 2000 and 2002 vary from 15.1 cm and 47.5 cm FL (Zengin *et al.*, 2005). In 2003, these authors observed again smaller specimens than those sampled in southern Portugal. Contrasting to what was observed for the bullet tuna, for this species it was not observed any clear pattern in terms of the monthly length frequencies distribution (**Figure 5**). Besides the fact that for several months the size distribution was not representative, due to the low number of specimens sampled, apparently several cohorts (3 to 4) were exploited. Orsi Relini *et al.* (2005) reported for the Mediterranean Sea, three age groups (0, 1 e 2).

Prior to 2003 the catches of *E. alleteratus* in the tuna trap were negligible. For this reason samples of the fish size were only obtain for 2003 and 2004, which is obviously a short period to establish any patterns for this species in Algarve coastal waters. The little tunny was caught within the size range from 31 to 45 cm FL. During this two year period the composition of catches changes significantly from one year to the other (**Figure 6**). Their mean size vary from 33 and 40 cm FL, in 2003 and 2004, respectively. As regards to the monthly size distribution, the specimen caught in 2004 showed a wider size range than in the previous year. Although, the samples were obtained in different periods of the year (October and February), apparently there is a great

increase in size between winter and early autumn. However, more data is needed before any conclusion can be drawn regarding the species increase in size along the year.

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Table 1. Small tunas relative percentage regarding the overall landings from the tuna trap between 1996 and 2004.

Year / Species	*Bullet tuna* (Auxis rochei)	*Bonito* (Sarda sarda)	*Little tunny* (Euthynnus alletteratus)	*Total*
1996	36.0%	3.3%		39.3%
1997	72.7%	0.9%		73.6%
1998	17.7%	0.8%		18.5%
1999	0.3%	3.9%		4.2%
2000	80.4%	4.1%		84.5%
2001		1.2%		1.2%
2002	9.7%	0.8%		10.5%
2003		1.1%	1.6%	2.6%
2004	41.3%	0.5%	0.8%	42.6%
Overall	**30.2%**	**1.4%**	**0.4%**	**32.0%**

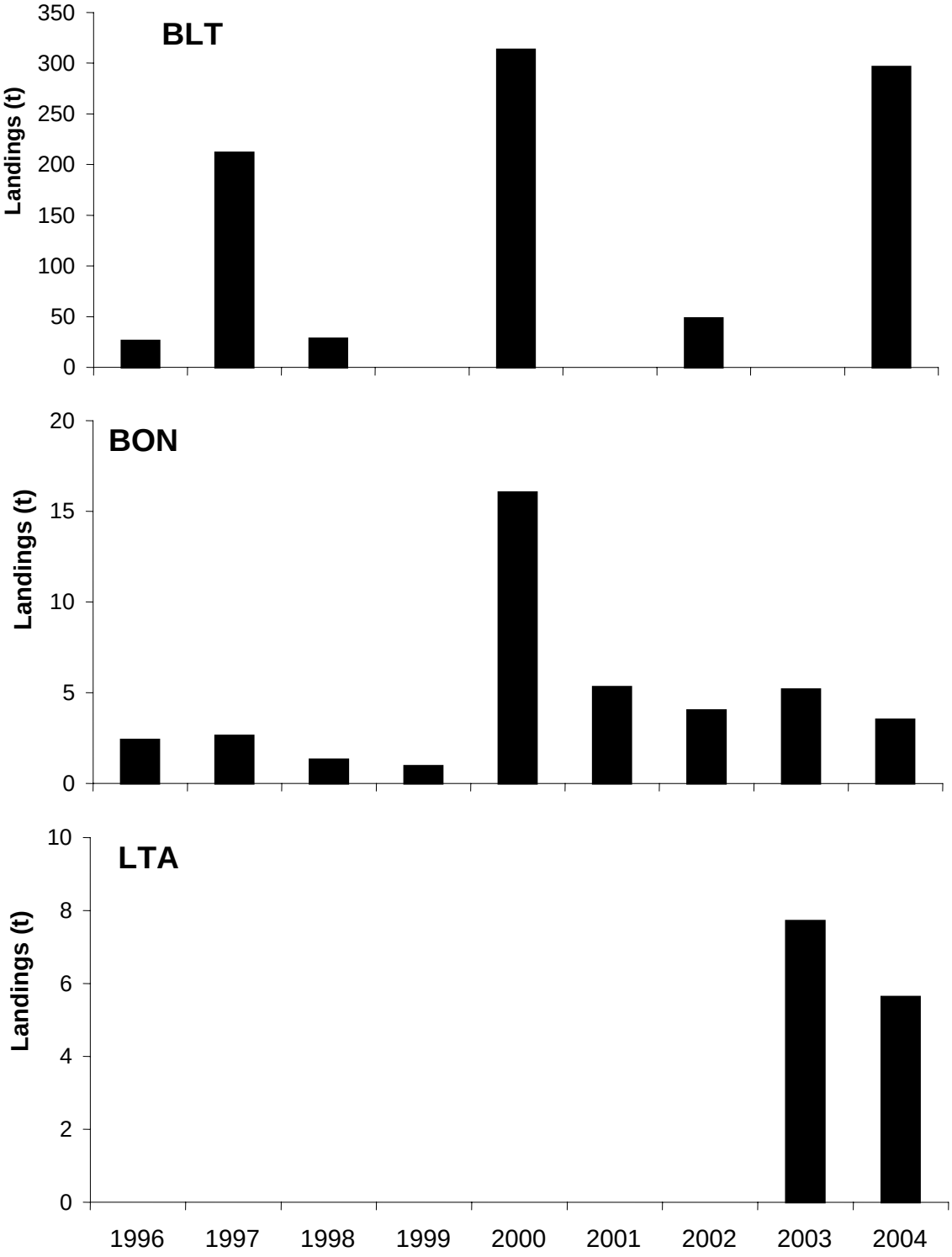

Figure 1. Annual landings (metric ton) of small tuna species caught in the Algarve tuna trap between 1996 and 2004. BLT: *Auxis rochei*; BON: *Sarda sarda* and LTA: *Euthynnus alletteratus.*

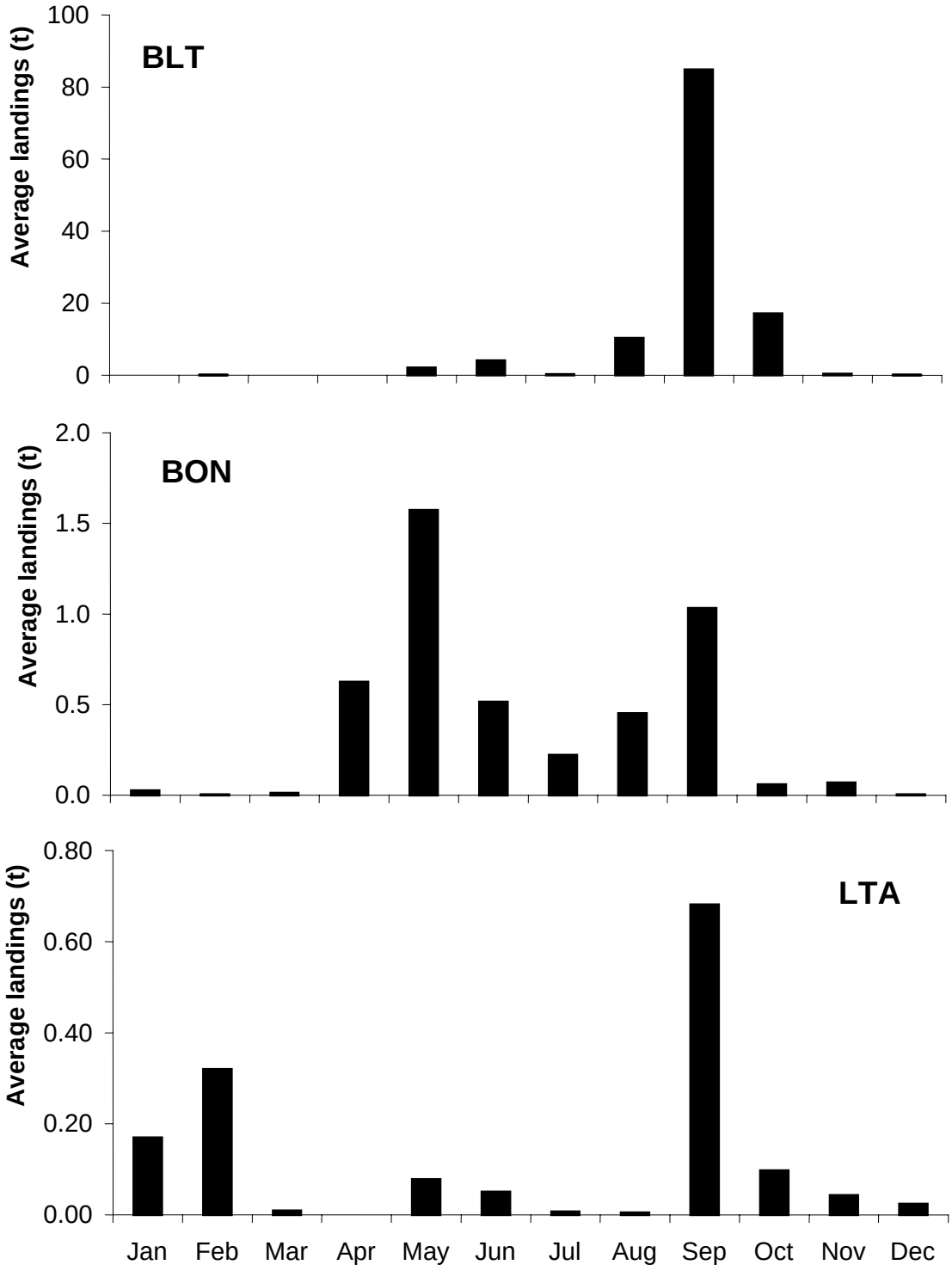

Figure 2. Mean monthly landings (metric tonnes) of small tuna species caught by the tuna trap between 1996 and 2004. BLT: *Auxis rochei*; BON: *Sarda sarda* and LTA: *Euthynnus alletteratus.*

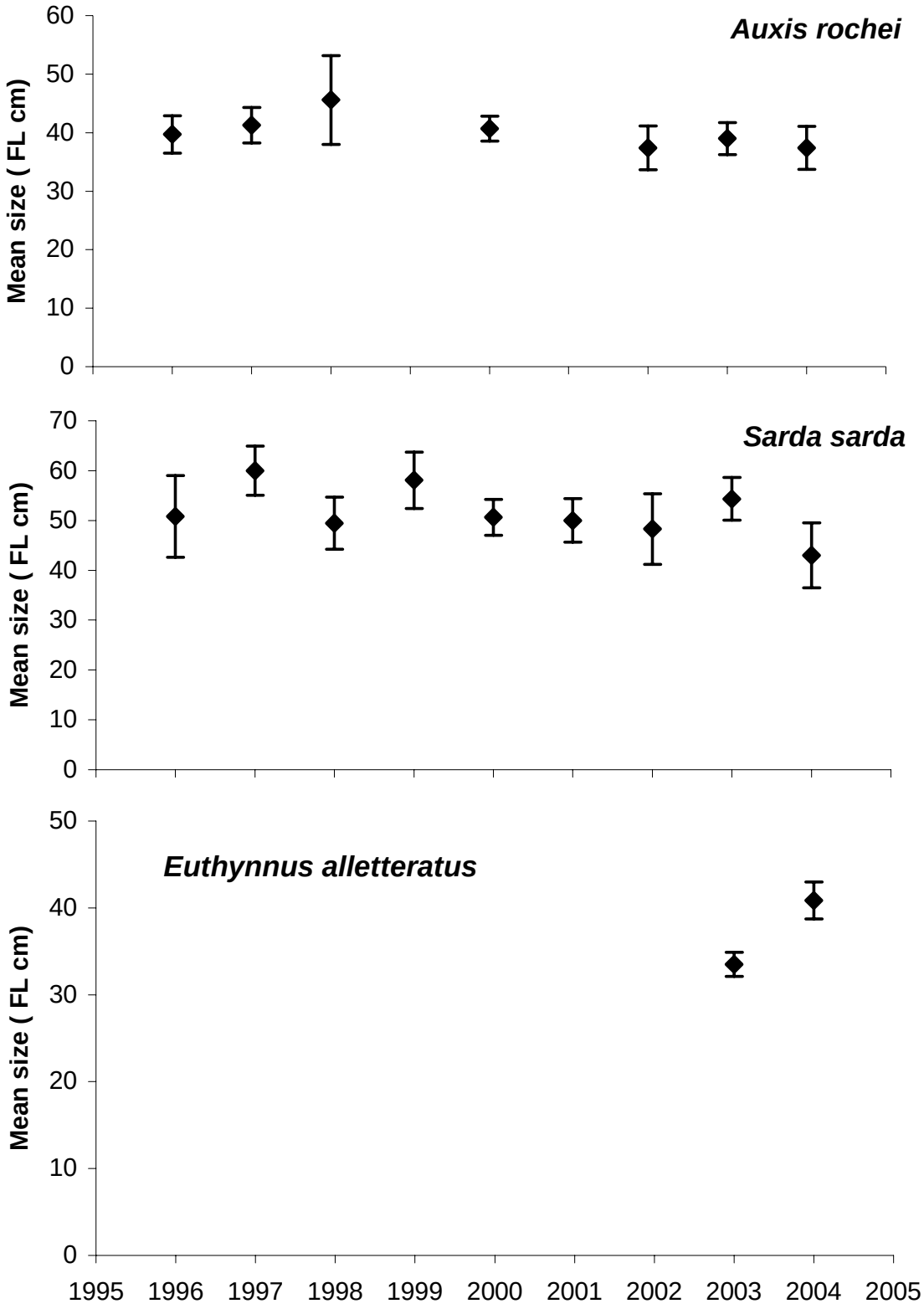

Figure 3. Mean size (Fork Length in cm) for small tuna caught by the tuna trap between 1996 and 2004.

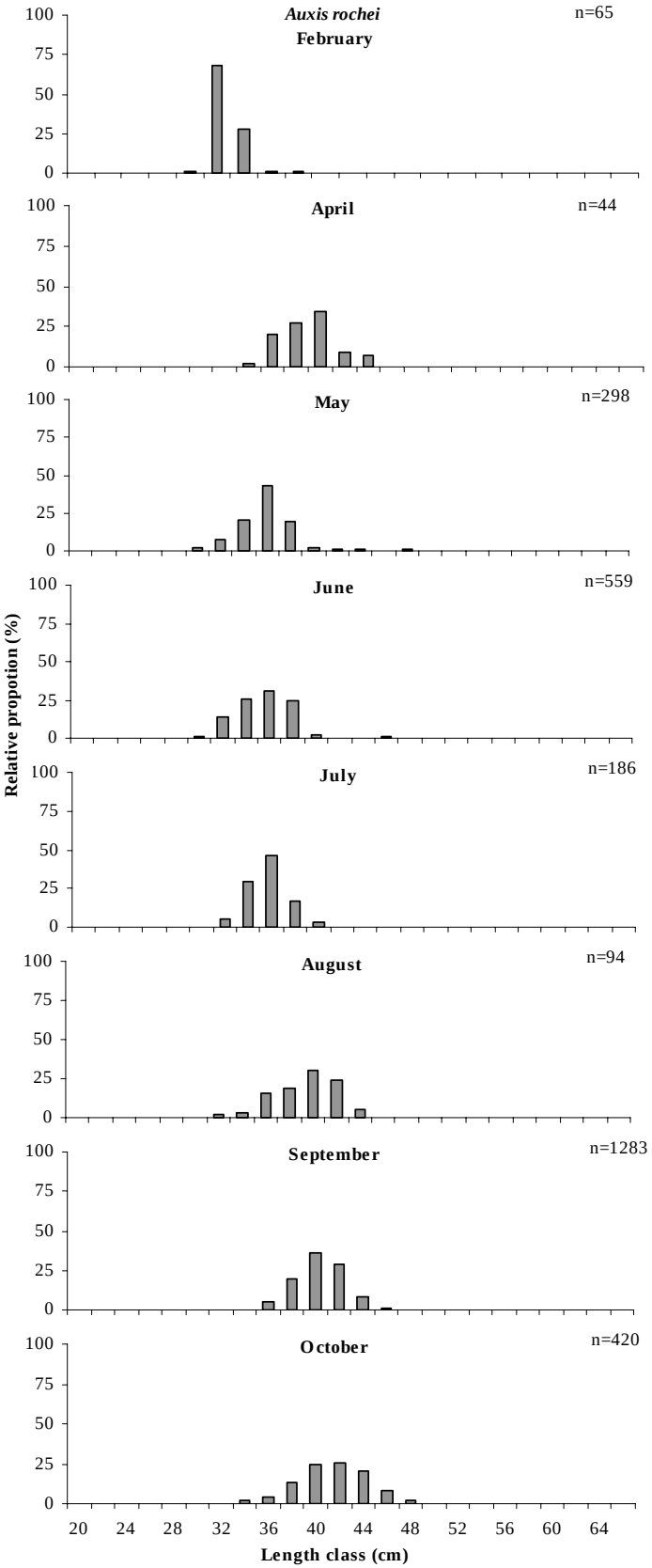

Figure 4. Monthly length frequency distributions for *Auxis rochei* caught by the tuna trap between 1996 and 2004.

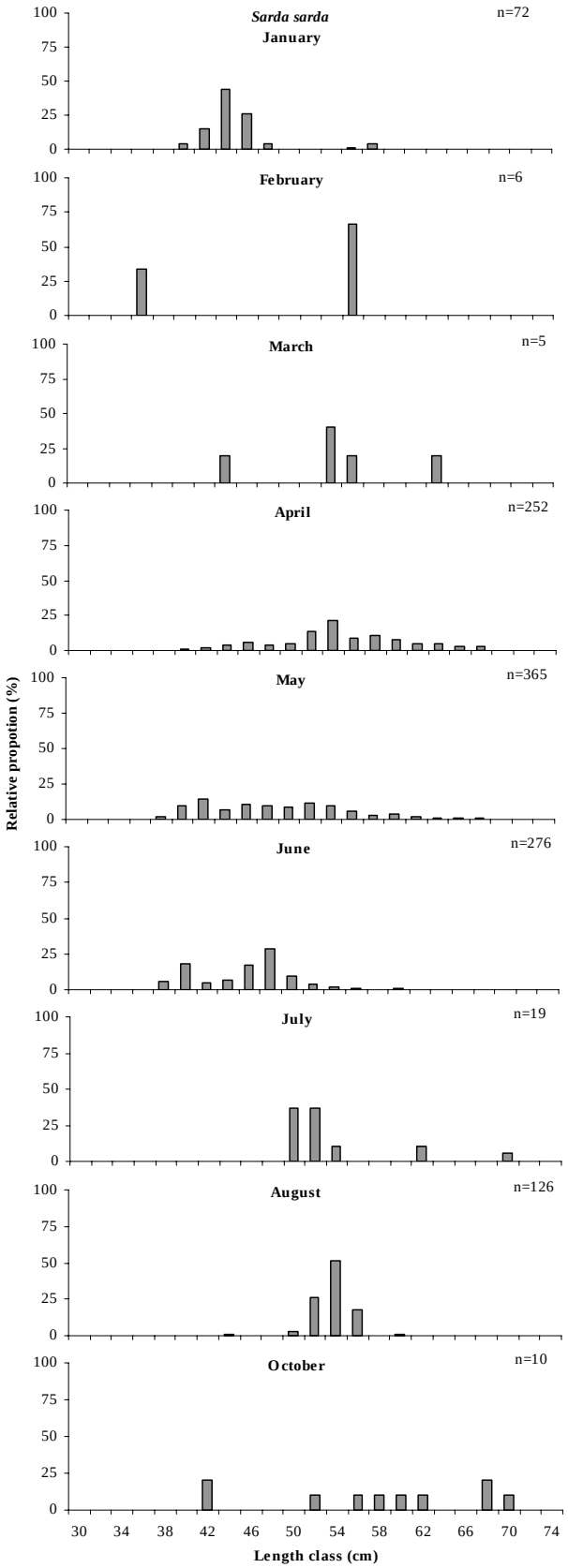

Figure 5. Monthly length frequency distributions for *Sarda sarda* caught by the tuna trap between 1996 and 2004.

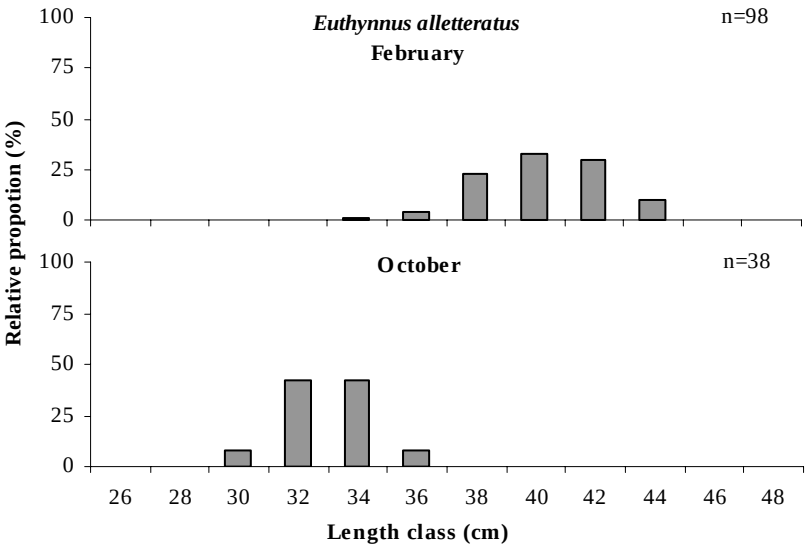

Figure 6. Monthly length frequency distributions for *Euthynnus alletteratus* caught by the tuna trap between 1996 and 2004.