

**CEPHALOPODS CAUGHT WITH TWO TYPES OF DRAGGED GEAR OFF THE CATALAN COAST (NORTHWESTERN MEDITERRANEAN)**

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In experimental tows a comparison was made between two different types of fishing gear, the bottom-trawl and a special type of dragged gear, locally known as "rastell", in depths ranging from 3.3 to 28.8 m in the case of the "rastell", and from 21.6 to 37.8 m in the case of the bottom-trawl. Both were utilized in the same area (the ports of Vilanova and Sant Carles in the Spanish Mediterranean). In the course of these tows, four species of cephalopod were caught with both gears.

In spite of the fact that both gears trawl the sea bottom, the structure of each of them determines the type of species which they catch. The "rastell" is distinguished by a mouth formed by an oval or rectangular metal structure with a small aperture (1.5 m). Because it is fitted with chains, it is dragged along the bottom. The bottom-trawl is characterized by otter boards and a large mouth aperture (more than 3 m), and it is not in such firm contact with the bottom as the "rastell". In addition, the speed of fishing with the bottom-trawl is somewhat greater than is fishing with the "rastell". These features made it possible to establish the lower distribution limit of each species, as well as their behaviour.

Of the four species caught with the two gears, two are nektonic (*Loligo vulgaris* and *Alloteuthis media*), and two are benthonic (*Octopus vulgaris* and *Sepia officinalis*). *L. vulgaris* was very rarely caught with the "rastell" (2 tows out of 59) and quite frequently taken with the bottom-trawl (10 out of 19). *A. media*, the other nektonic species, appeared in practically all the hauls made with the bottom-trawl (17 out of 19), but was taken only sporadically with the "rastell" (13 out of 59). *O. vulgaris* was caught more frequently with the bottom-trawl (10 out of 19) than with the "rastell", while *S. officinalis* was found more often in the "rastell" hauls (34 out of 59) than in the bottom-trawl hauls (10 out of 19).

The frequency of appearance in the catches is shown in terms of the abundance ( $\text{kg} \cdot \text{h}^{-1}$ ) of the species by fishing gear (Table 1). The two nektonic species present a very low mean biomass, although it was slightly higher in the hauls made with bottom-trawl than in those taken with the "rastell". The two benthonic species display a greater abundance, especially *O. vulgaris*; *S. officinalis* seems to be caught more efficiently with the "rastell" than with the bottom-trawl.

Given the difference in size of the adult individuals of the four species, and as a result in their weight, abundance in weight is not sufficient to provide a satisfactory picture of their abundance. For that reason, the number of specimens per hour of trawling was analyzed. The two nektonic species show a high mean number in those catches made with the bottom-trawl, which is not the case with the "rastell". The number of *O. vulgaris* caught is low and quite similar for the two gears, while the number of *S. officinalis* caught with the "rastell" is high.

There are several reasons which explain these results :

- 1) *A. media* and *L. vulgaris* are caught at the lower limit of their distribution (20 m), while the distribution of the two benthonic species is more coastal still, particularly that of the *S. officinalis*.

- 2) The nektonic species carry out daily migrations in which they are closer to the bottom during the daylight hours. This behaviour, together with the greater mouth size of the bottom-trawl, made it possible that, the nektonic specimens were more abundant in the catches obtained with this gear than in the "rastell" catches. The benthonic species closely linked to the sea bottom, particularly *S. officinalis*, which sometimes buries itself, are fished efficiently with both gears.

- 3) The number of specimens caught of each different species is a reflection of their behaviour. The nektonic species live together in schools, which is why, in spite of the sporadic nature of the catches and the fact that these gears are not ideal for their fishery, when they appear, they do so in relatively high numbers, particularly in the case of *A. media*. The benthonic species, especially *O. vulgaris*, are territorial and therefore live more dispersed. In spite of this, however, the number of *S. officinalis* taken with the rastell can be rather high.

		$(\text{kg} \cdot \text{h}^{-1})$		$(\text{no} \cdot \text{h}^{-1})$		DEPTH (m)	
		TRAWL	RASTELL	TRAWL	RASTELL	TRAWL	RASTELL
<i>Loligo vulgaris</i>	min	0.008	0.014	0.6	2.3	21.6	17.3
	max	1.644	0.042	73.0	4.7	36.9	23.8
	mea	0.250	0.028	20.8	3.5	27.4	20.5
	std	0.472	0.014	24.1	1.2	4.4	3.3
<i>Alloteuthis media</i>	min	0.023	0.003	10.1	1.2	21.6	17.3
	max	1.930	0.103	266.1	9.3	36.9	25.0
	mea	0.672	0.046	97.1	4.6	27.0	22.0
	std	0.597	0.029	83.9	2.6	4.7	2.2
<i>Octopus vulgaris</i>	min	0.021	0.006	1.0	0.7	21.6	6.0
	max	10.833	6.837	17.8	15.0	37.8	28.8
	mean	3.680	1.612	7.9	5.2	31.6	18.6
	std	3.284	1.995	5.5	4.0	5.0	5.9
<i>Sepia officinalis</i>	min	0.090	0.028	1.0	0.8	21.6	3.3
	max	3.440	13.330	32.0	205.7	36.9	28.8
	mean	0.663	1.938	7.2	23.5	28.6	17.4
	std	0.951	3.364	8.7	43.9	5.3	6.8

Table 1. Abundances ( $\text{kg} \cdot \text{h}^{-1}$  = kg per hour and  $\text{no} \cdot \text{h}^{-1}$  = number of individuals per hour) of the four species caught with the conventional dragged gear and with the rastell, as well as the depths at which they were caught.