

# **RESERVES COMPLETION OF THE MAIN FISH SPECIES FROM THE ROMANIAN MARINE SECTOR IN 2006**

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## **ABSTRACT**

Surveys realized along of the years confirmed that productivity oscillations, namely completion volume, are closely linked with the environmental factors variation, between which decisive are water temperature and quantity and quality of the trophic base. Through modification of the spawning intensity, the fish populations create adaptations of self-control of the shoal size in concordance with degree of food insurance. A certain coincidence between growth of the fish juveniles and the stages of growth of the trophic plankton constitute sometimes one of the most important factors which determine respective generation productivity.

Studies realized along of the years evidenced the important role which has the reproductive behaviour, spatial and seasonal, of adults in the youth formation.

From fish juvenile sample analysis, sampled in 2006 for the study of distribution and abundance, it is observed that the qualitative structure is same as in the previous years and records an increase of the abundance as effect of improvement tendency of environmental factors.

**KEY WORDS:** Black Sea, Romanian littoral, juveniles, abundance, anchovy, horse mackerel, sprat, whiting, gobies

## **INTRODUCTION**

Each species of fish have a biotic potential concretized through descendents, potential which are obviously in the spawning period being influenced by the environmental pressure. This biotic potential is modified function of populations state which is directly related with environmental ecological factors. The numerical rising variations in frame of fish populations in a one year are determined by the ecological factor variations from the

marine ecosystem, the growth numerical rate being the consequences of their actions. Along the years the complex researches realised allowed to obtain data about the seasonal dynamic of fish structure, abundance, and spatial distribution of the fish juveniles.

This paper present data on the juveniles composition and distribution of the main fish species with economical and ecological interest at the Romanian littoral in 2006, emphasized the particularity of this year regarding the reserves completion.

## **MATERIAL AND METHODS**

In the frame of two complex research expeditions (April and October) carried out of the entire Romanian shelf, particularities regarding the reserves completion levels for the main fish species was evinced. The network stations was situated between  $43^{\circ}50'N$  -  $45^{\circ}00'N$  and  $28^{\circ}42'E$  -  $29^{\circ}45'E$ , at depths ranging between 10m to 60m.

The qualitative and quantitative structure of the fish juveniles was determined through the analysis of 25 biological samples. The sampling was made in conformity with the methodology applied for the Black Sea basin, using pelagic trawl for juveniles of Romanian manufacture. Was made surface hauling, with vessel speed of two nautical miles per hour, the time of hauling being 15 minutes and the horizontal opening of the trawl of 14 m. The samples was preserved in formaldehyde and analysed in the instate laboratory. For each station was registered: data of sampling, geographical coordinates, water depth (m), vessel speed and hauling time.

The results are presented in number of specimens/hauling and specimens/sq.m and are used for determination of the reserve completion of each fish species.

The juveniles spatial distribution was realised through marking on the distribution maps of the catch values obtained through the sampling hauling with juvenile trawl. The assessment of the juveniles fish abundance was realised through swept area method using the following parameters: the trawl opening, hauling time, vessel speed and catch values.

## **RESULTS AND DISCUSSION**

For assurances the most favourable condition of growing of the eggs and juveniles, especially for the protection of the early stages, many fishes elaborated some adaptation like “ spawning migration”. The period in which

the fish achieve the spawning migration usually precede the eggs launching period (NIKOLSKI, 1962).

In the following we analysing the results obtained after the processing of the juveniles samples collected in 2006.

In April 2006, 13 samples of fish juveniles was collected and processed in an area of 2646 sq.Nm, between Mangalia (southern part) and Sf. Gheorghe (northern part).The biological samples was more quantitative important comparatively with the last two years. Therefore, in April 2006 was harvested a number of 3606 specimens representing eight species (Fig. 1) compared with 2005 when was collected in total only 237 juveniles specimens.

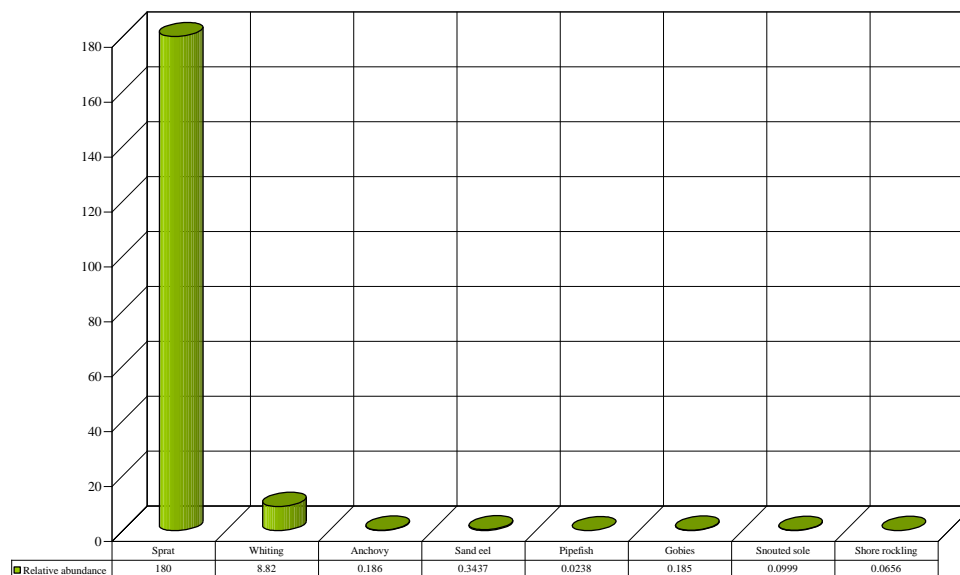


Fig. 1 - The qualitative and quantitative structure of the fish juveniles in the complex survey - April 2006

In April 2006, the sprat juveniles agglomerations (*Sprattus sprattus* (L., 1758)), was more dense in the northern part of the investigated area while the maximum of the average density (1306 specimens/hauling) was signalled in the southern part of the Romanian marine area. (Fig. 2).

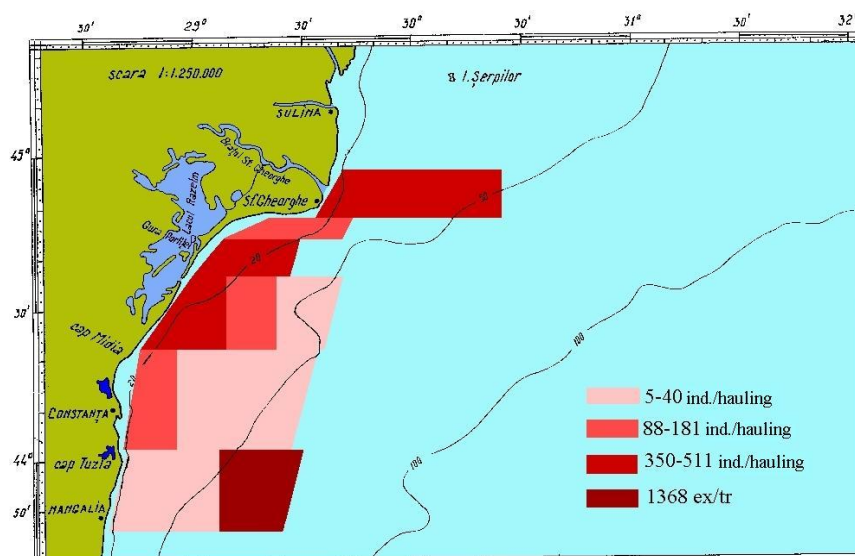


Fig. 2 - Sprat juveniles distribution in April 2006

The comparative analyse of the data regarding some analytical and synthetically indicators allowing us to signalise a better situation for sprat juveniles in 2006 compared with the previous years. So, in April 2006 the average density was of 0.022 specimens/sq.m (78,109 specimens/sq.Nm) beside 0.0014 specimens/sq.m (5,062 specimens/sq.Nm) in 2005. Regarding the relative abundance of the sprat juveniles was registered an increasing with over 20% in April 2006 ( $180.35 \times 10^6$  specimens) compare with  $8.904 \times 10^6$  specimens (May, 2005) (Table 1) (RADU *et al.*, 2006). These variations of the sprat juvenile abundance are close related of the environmental factors variations, among them very important being water temperature and the qualitative and quantitative trophic base (RADU *et al.*, 1998 a).

Comparatively with May 2005, whiting juveniles (*Merlangius merlangus euxinus*), is less dominant in April 2006 with a productive indicator of only 4.13. Whereas, the estimate abundance of  $8.92 \times 10^6$  specimens was higher than May 2005 (Table 1). Without important agglomeration the whiting juveniles were spread specially in the central and southern part of surveyed area, the number of specimens/hauling ranging between 1 to 74, the maximum being on Constanta profile out of the isobath of 40 m (Fig. 3).

Table 1

Ecological indicators for sprat and whiting juveniles (May 2005 – April 2006)

Ecological Indicator		Sprat		Whiting	
		May 2005	April 2006	May 2005	April 2006
Structural indicator (%)		66.6	100.0	58.3	76.9
Productive indicator (%)		51.5	95.3	42.6	4.13
Ecological significance index(%)		34.0	95.3	24.8	3.17
Abundance ( $10^6$ )		8.9	180.35	5.5	8.92
Average number	(sp/sq.m)	0.00147	0.0227	0.00105	0.00141
	Sp./sq.Nm	5,062	78,109	3,634	4,844

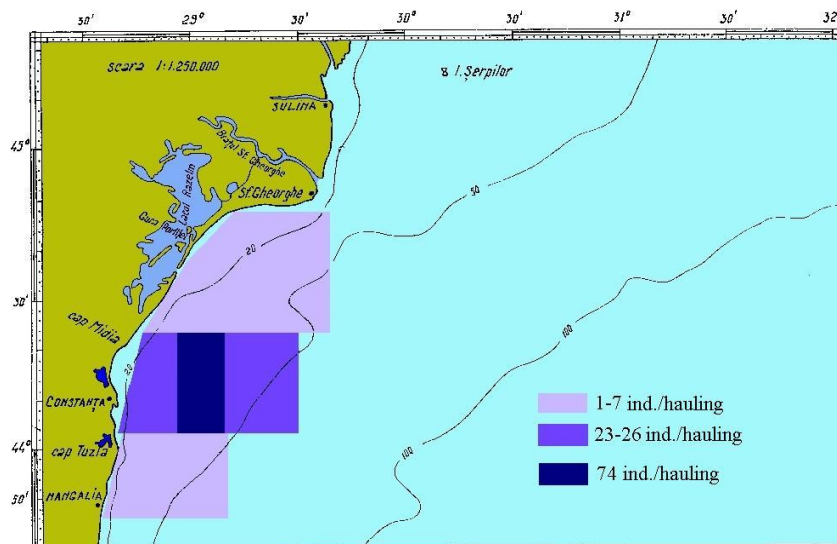


Fig. 3 - The distribution of the whiting juveniles in April 2006

Even the whiting is a species without economical important because has an inferior quality flesh, however, has an important role in the Black Sea trophic chain. The whiting represents the main food for sturgeons, turbot, spiny dogfish and dolphins (RADU *et al.*, 1998 a).

In April 2006, in the juveniles samples, with a sub-unit values of the productive indicator was found juveniles of: anchovy (*Engraulis encrasicolus*), gobies, sole (*Solea sp.*), shore rockling (*Gaidropsarus*

*mediterraneus*), sand eel (*Gymnammodytes cicerellus*) and pipefish (*Sygnathus sp.*) (Fig. 1, 4).

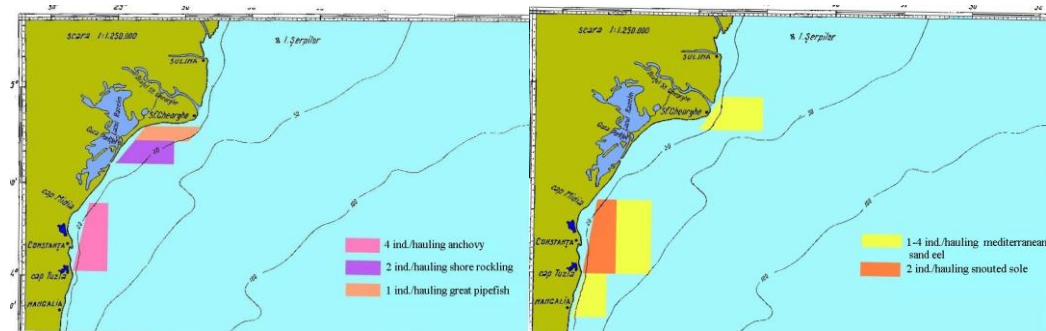


Fig. 4 – The distribution of the anchovy, shore rockling, pipefish, sand eel and sole juveniles in April 2006

Early October 2006 a survey for a qualitative and quantitative inventory of the juveniles of the species which are spawning in the warm period was realized. It was collected 12 juveniles fish samples. The qualitative structure of samples comprised seven species: anchovy, horse mackerel (*Trachurus mediterraneus ponticus*), blue fish (*Pomatomus saltatrix*), sprat, whiting, pipefish and sea horse (*Hippocampus ramulosus*). As in the previous years the dominant species remains anchovy. As regard the spatial distribution of the anchovy juveniles in October 2006 was observed its presence in all investigated area. Generally, smaller concentrations (5-10 specimens/hauling) was signalled at depths of 35-50 m (Mangalia and Constanta transects), and bigger concentration (329-688 specimens/hauling) on Constanta and Chituc transects, at depths of 20-40 m (Fig. 6).

From the estimated abundance point of view, in autumn 2006, it was remarked a better situation for anchovy juveniles than the previous years. Therefore, in 2006, the average density was 0.0154 specimens/sq.m given the situation from 2004 when was registered 0.006048 specimens/sq.m. As regard the relative abundance of the anchovy juveniles, in 2006 is registering an increasing about 20% ( $114.167 \times 10^6$ ) given the same period of the year 2003 ( $6.033 \times 10^6$ ) (RADU *et al.*, 2006).

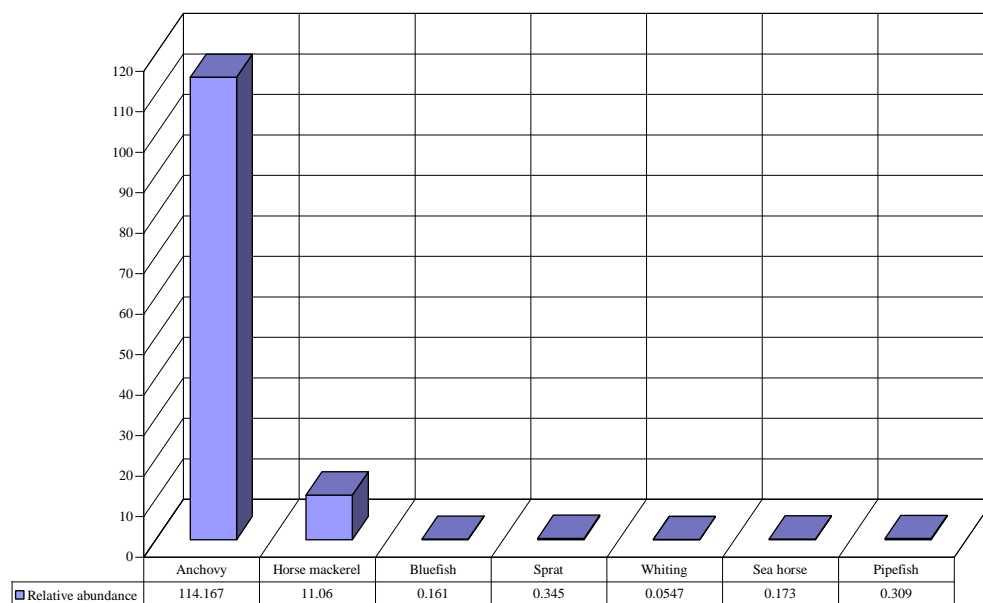


Fig. 5 – Qualitative and quantitative structure of the fish juveniles in October 2006 survey

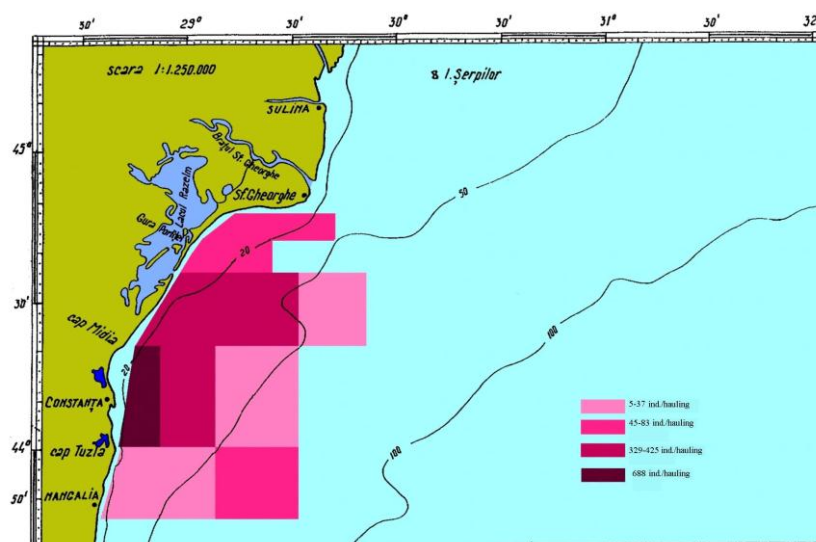


Fig.6 – The distribution of the anchovy juveniles in October 2006

The fish populations abundance registering variation from one year to another and from one season to other one. These variation are determinate both the environmental factors instability at the Romanian littoral and the fishing pressure exert on the anchovy populations and, implicitly on spawning stock. Therefore, to prevent an excessive reduction of the fish population reproductive capacity it should be avoided the immature individuals capture (RADU *et al.*, 1998 b).

In October 2006, comparing with previous years, both the relative abundance and average density calculated for horse mackerel juveniles reveal bigger values of the two parameters.

As regard the agglomeration, the distribution of the horse mackerel juveniles in the areas relieve an enough balanced situation on the transects.

Therefore, in southern part on the Mangalia transect was signalled for 4 to 22 specimens/hauling, on Constantza transect, 6 to 45 specimens/hauling while in the central area on Chituc – Zaton transects the capture values are situated between 3 to 26 specimens/hauling (Fig. 7).

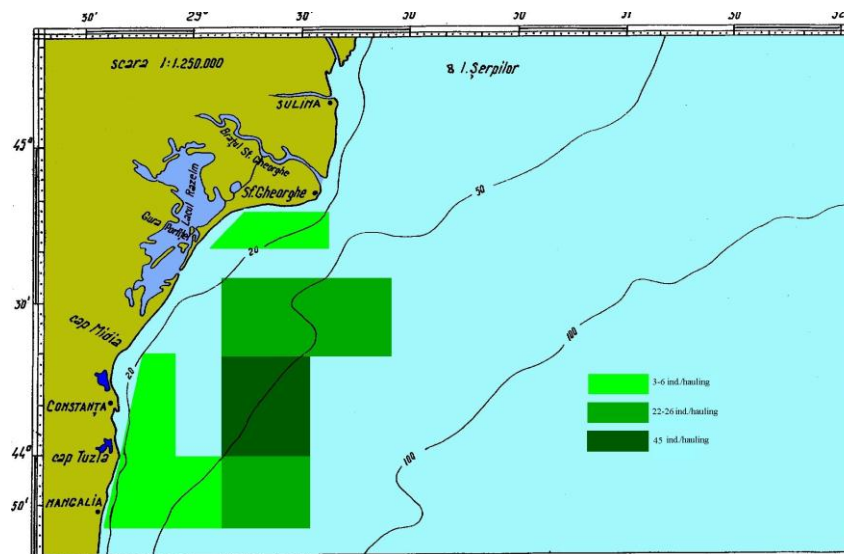


Fig.7 – Distribution of the horse mackerel juveniles in the survey in 2006 period

Early October 2006, appear the blue fish juveniles with 15% frequency, with an estimated abundance of  $0.161 \times 10^6$  and an average density of 0.00007712 specimens/sq.m. These were distributed on 27 % of the surveyed area.



At the sampling hauling carried out in October 2006, the sprat juveniles was signalled only in southern part of the investigated area with an estimated abundance of  $0.345 \times 10^6$  specimens.

In 2006, was remarked the smaller values both for abundance and average density registered for sprat juveniles, comparatively with autumn of the 2001, 2003 and 2004 years.

The analysis of the juvenile samples reveals that by species with economical importance (anchovy, horse mackerel, blue fish, sprat) are found non-commercial species with ecological importance, also, such as: pipefish, sea horse.

## CONCLUSION

- ✓ The estimation of the relative abundance of the main fish species juveniles from the Romanian littoral allow us to determinate completion (recruitment);

- ✓ The distribution of the fish juveniles from the Romanian marine area is affected through other of: quality and quantity of the spawning population, seasonal character of reproduction, the variability of relative proliferation, the consumption of the eggs and larvae by predators, the planktonic life, oceanographic characteristics which affect the qualitative and quantitative trophic base;

- ✓ On the Romanian Black Sea shelf, in the warm period of the year, the specific diversity of fish juveniles is bigger comparatively with the rest of the year. Also, the densities are closely related with environmental conditions.

- ✓ The analysis of the fish juveniles samples reveal the dominance of sprat in samples from April – May and of the anchovy in samples collected early autumn. In 2006 were registered higher values of abundance both for sprat and anchovy juveniles;

- ✓ To restore the commercial fishing from Black Sea, with a view to rehabilitation some fish populations which declined in the last years are necessary the protection measures of the fish juveniles.

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