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QUANTITATIVE AND QUALITATIVE EVALUATION OF ICHTHYOPLANKTON IN THE ROSCI0066 DANUBE DELTA - THE MARIN AREA SITE – A CASE STUDY IN VERNAL SEASON 2012

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Abstract
Ichthyoplankton are the eggs and larvae of fish and is a component of the trophic spectrum of different consumers, but also is a new ichtyofauna for aquatic ecosystem. To assess the qualitative and quantitative structure of the ichthyoplankton in ROSCI0066 site, in vernal season 2012, the samples were collected using Bongo net in six stations (Sfantu Gheorghe, Zaton, Sahalin, Periteasca, Sulina, Portita). For each particular station were recorded the data like: date when the sample was taken; the geographical coordinates of the station; water depth (m); the number of revolutions of the net. The biological samples were stored in 4% formaldehyde and analyzed in the laboratory. To estimate the number of spawn and larvae per m^2 was used Tanaka's formula, by taking into consideration: the sampling depth, the surface net, the number of revolutions of the flow meter, the volume of filtered water (m^3), number of spawn or larvae collected. Ichthyoplankton results are expressed in number of individuals/sample and individuals m^{-2} and for juveniles in numbers/trawling and individuals m^{-2}. In the ROSCI0066 Danube Delta - the Marin Area site, in vernal season 2012, it is found that the diversity of species in the samples analyzed is very low, being identified only four species of fish from the Engraulidae, Clupeidae, Mullidae and Gobiidae families. According to the results, sprat prefers the south of the Romanian Black Sea coast and is prevalent in evidence by the presence of eggs and anchovy by the presence of larvae.

Keywords: larvae, Natura 2000, spawns

1. INTRODUCTION

The ROSCI0066 Danube Delta-the Marine Area site is a protected natural area in the national network and also a Ramsar and Unesco site, which corresponds to the geographical unit from the Danube Delta Biosphere Reservation and the Black Sea coast, at the mouth of the Danube - Chilia channel to Cap Midia, to the South, and up to 20 m isobaths, to the East (Figure 1). The habitats represented here are subject to the major influence of the Danube, being unique for Romanian seaside and showing a particular importance for biodiversity conservation.

The inventories of species that inhabit in specific habitats of ROSCI0066 site provide a concrete image of their conservation status. Based on the results, it may take appropriate management

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measures and halting the loss of biodiversity and preservation of natural resources in a Natura 2000 protected marine area. The ichthyoplankton is an important component of the aquatic food chain; it is food for other aquatic organisms and also for the new generation of fish.

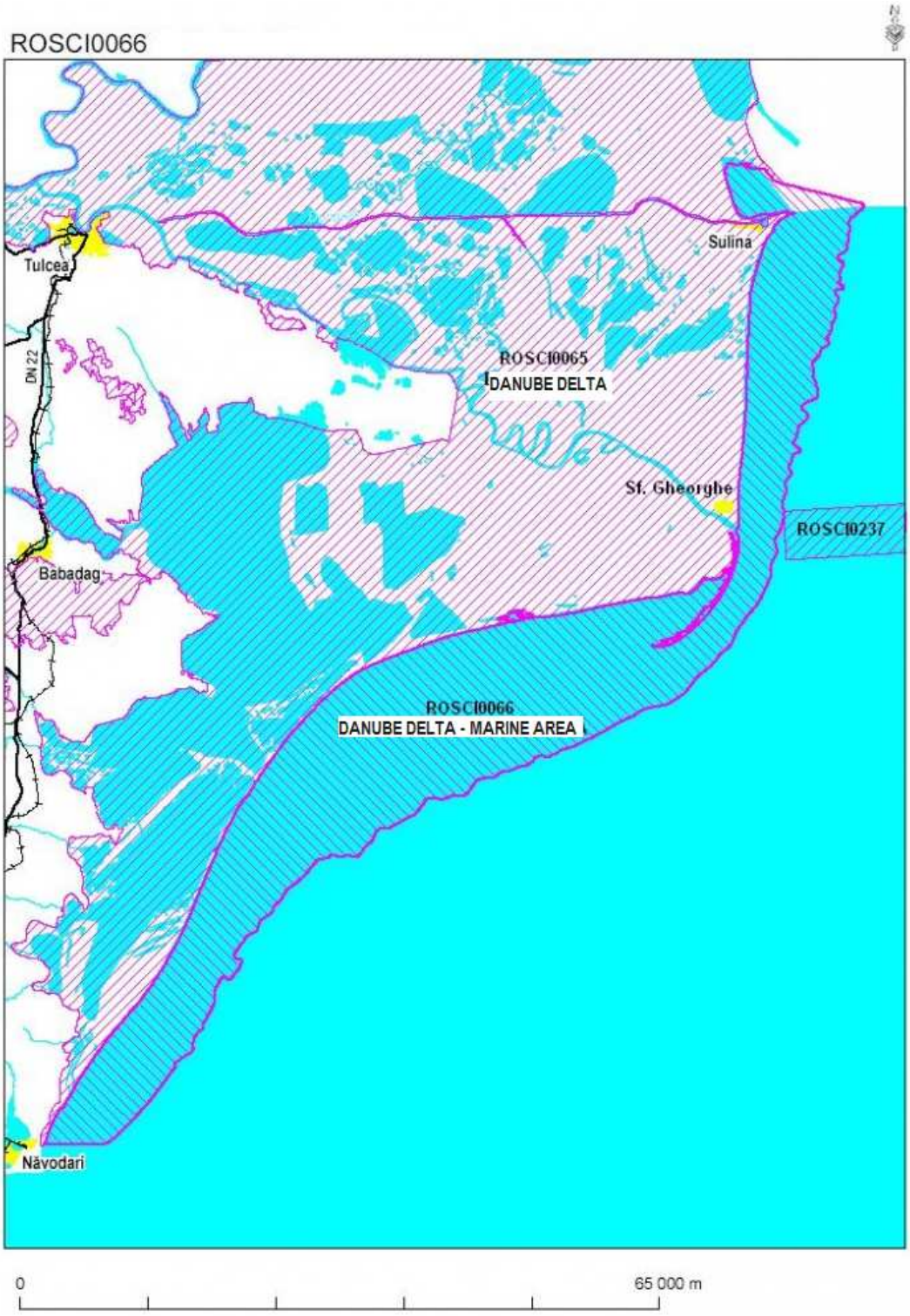

Figure 1. The location of ROSCI0066 Danube Delta - the Marine Area on the hydrographic map of Romania (Source: www.mmsm.usamv.ro, processed picture)

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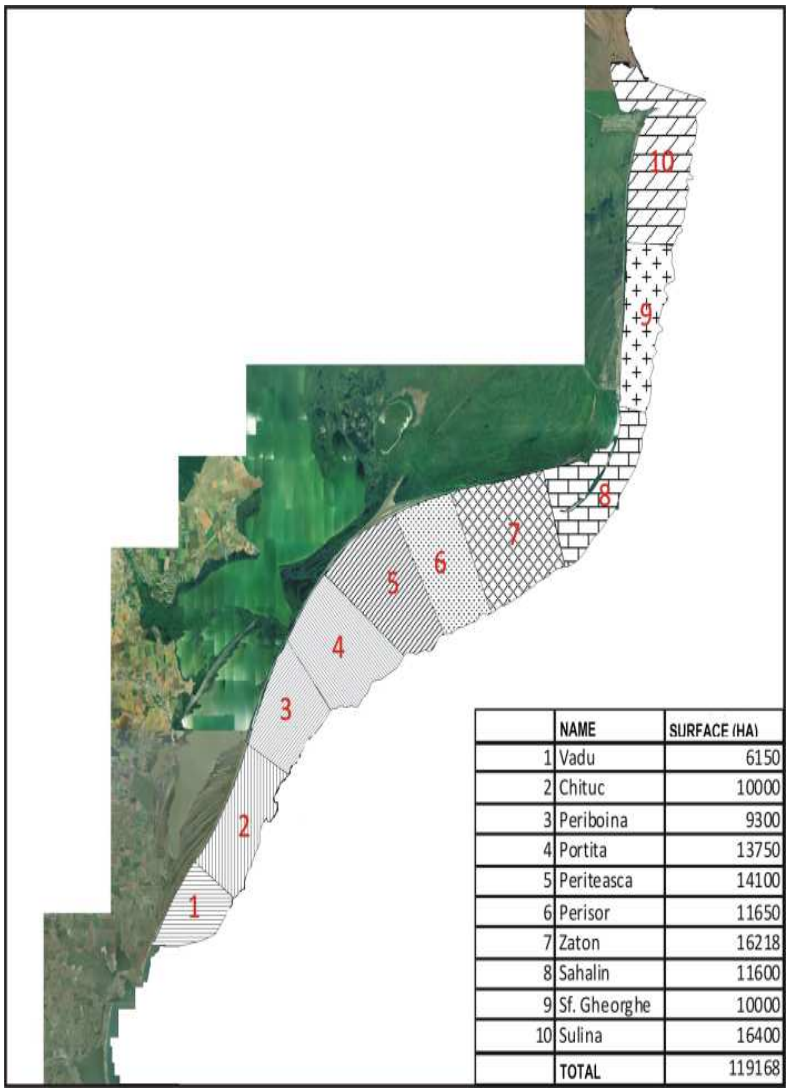
2. MATERIAL AND METHOD

In order to characterize the quantitative and qualitative structure of ichthyoplankton in vernal season 2012, have been sampled using standard methodologies, with the research ship "Starfish", property of the National Institute for Marine Research and Development "Grigore Antipa" of Constanta. The ichthyoplankton samples were collected using Bongo net in the 6 perimeters from the ROSCI0066 Danube Delta - the Marine Area (Sfantu Gheorghe, Zaton, Sahalin, Periteasca, Sulina, Portita), in vernal season 2012 (Figure 2, Figure 3).

For each particular station were recorded the data like: date when the sample was taken; the geographical coordinates of the station; water depth (m); the number of revolutions of the net. The biological samples were stored in 4% formaldehyde and analyzed in the laboratory.

To estimate the number of spawn and larvae per m^2 was used Tanaka's formula, by taking into consideration: the sampling depth, the surface net, the number of revolutions of the flow meter, the volume of filtered water (m^3), number of spawn or larvae collected. Ichthyoplankton results are expressed in number of individuals/sample and individuals m^{-2} and where was juveniles in numbers/trawling and individuals m^{-2} (Maximov and Zaharia, 2010).



	NAME	SURFACE (HA)
1	Vadu	6150
2	Chituc	10000
3	Periboina	9300
4	Portita	13750
5	Periteasca	14100
6	Perisor	11650
7	Zaton	16218
8	Sahalin	11600
9	Sf. Gheorghe	10000
10	Sulina	16400
	TOTAL	119168

Figure 2. Sampling perimeters of ROSCI0066
(Progress Report no. 2, SOP-ENV Project, CNRS SMIS Code 17162)

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Figure 3. Ichthyoplankton sampling (Photo NIMRD / V. Maximov)

3. RESULTS AND DISCUSSIONS

The ichthyoplankton samples were collected using Bongo net from six stations in the ROSCI0066 Danube Delta-the Marine Area site: Sfantu Gheorghe, Zaton, Sahalin, Periteasca, Sulina, Portita.

The analyzed material can be framed in taxonomic terms as belonging to the families *Clupeidae*, *Engraulidae*, *Gobiidae* and *Mullidae*. In the taxonomic composition predominate species are pelagic group compared with the benthic species.

In the samples from Sfantu Gheorghe station prevailing mullet spawn (*Mullus barbatus*) and larvae of anchovy (*Engraulis encrasicolus*) (Figure 4, Figure 5).

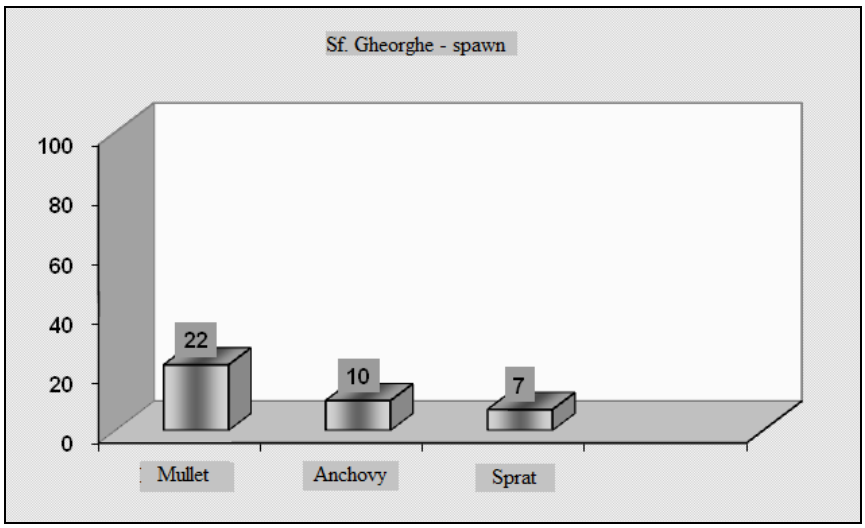

Figure 4. The numeric composition of spawn in Sfantu Gheorghe station

Mullet is a benthic species with breeding period between May and September. Spawn are pelagic and are deposited into three portions: 28% the first portion, 40% the second and the last 32%. The

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spawn are rounded with thinly and transparent membrane; have greater buoyancy and are developed in water superficiality (> 10 m) at a temperature of 17-18 °C.

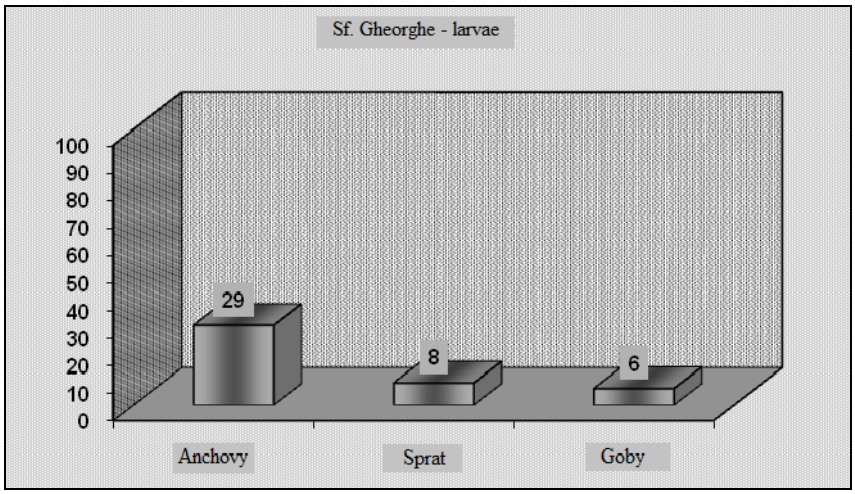

Figure 5. The numeric composition of larvae in Sfantu Gheorghe station

At the age of three days, the larvae of anchovy reach on average 3.88 mm; have a big mouth and eyes intensely pigmented with elliptical shape. As in previous years, in ichthyoplankton from Sfantu Gheorghe area, anchovy is the dominant species by larvae and mullet predominates by spawn.

In ichthyoplankton samples taken from Zaton station predominates spawn sprat (*Sprattus sprattus*) and *Gobiide* larvae (Figure 6, Figure 7)**.**

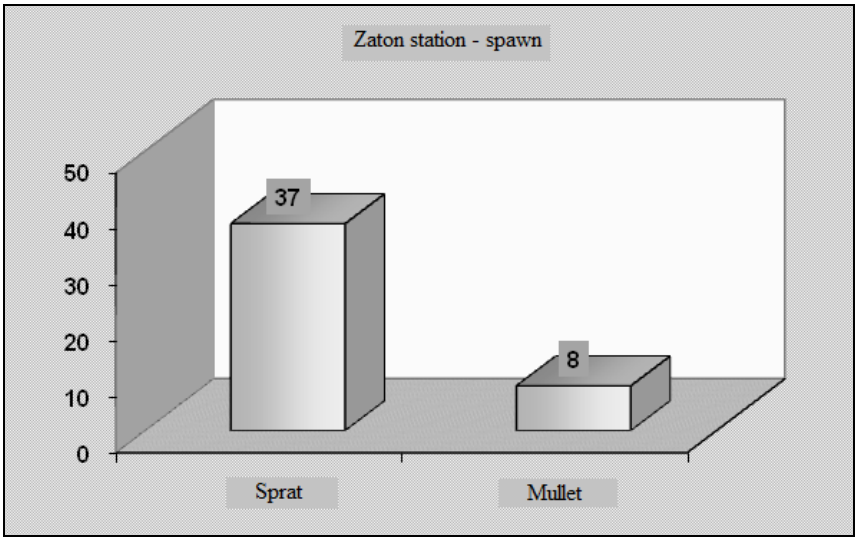

Figure 6. The numeric composition of spawn in Zaton station

The species which spawn in portions, the total duration of reproduction is much higher, and therefore the survival rate is higher.

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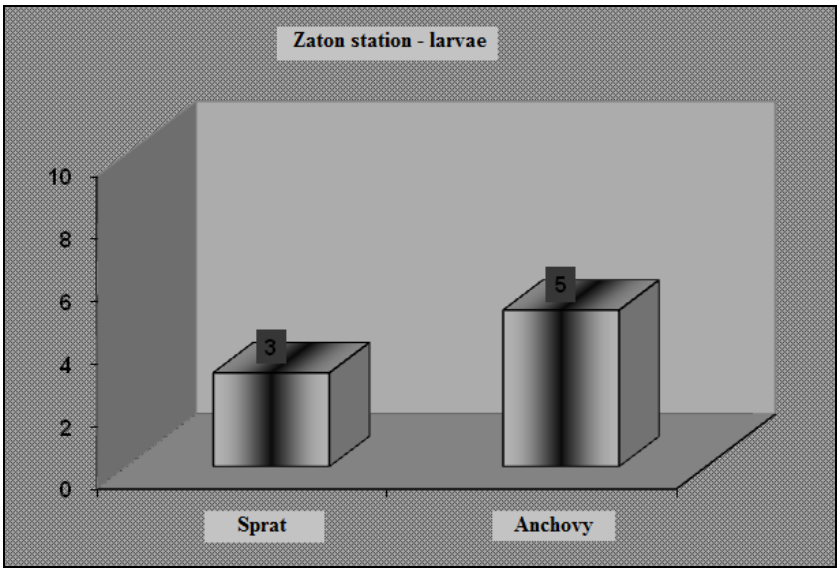

Figure 7. The numeric composition of larvae in Zaton station

In the Sacalin station the larvae have not been reported. There were found only spawn, sprat spawn predominated (Figure 8).

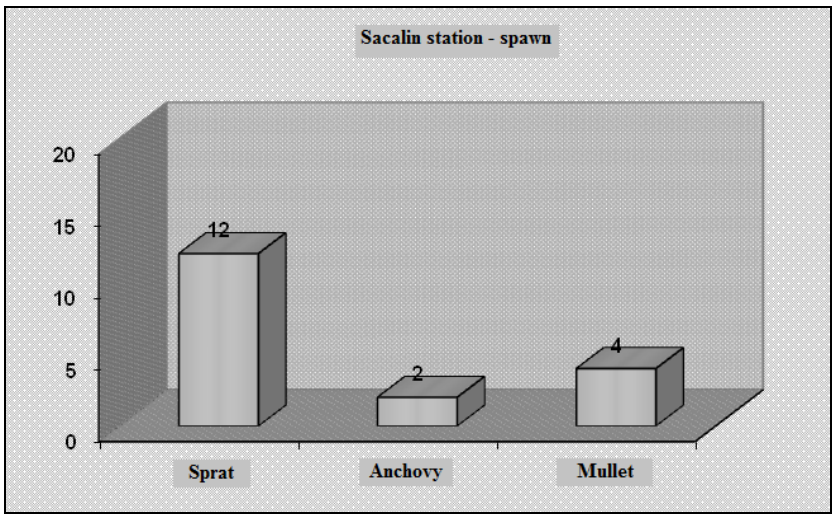

Figure 8. The numeric composition of spawn in Sacalin station

In Periteasca station has been identified only spawn mullet (Figure 9) and as regards larvae were identified sprat and mullet larvae (Figure 10).
In Periteasca station, the dominant species in terms of presence of spawn is mullet, and in terms of the larvae is sprat. The two species belong to the species of commercial value, but in recent years the stock size was greatly reduced as a result of intensive fishing. Dynamics of sprat larvae density registered some fluctuations in recent years. Variations are correlated with abiotic and biotic environmental factors on the Romanian seacoast; where an important role is influence of Danube River.

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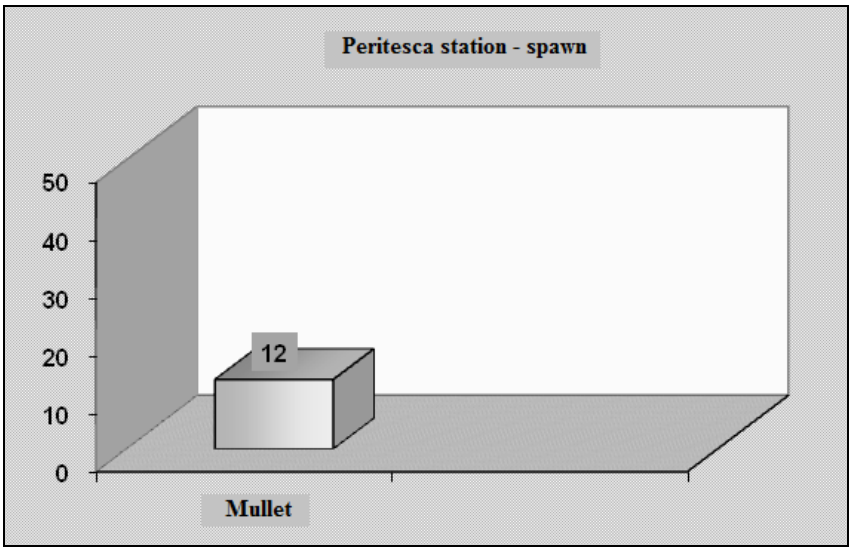

Figure 9. The numeric composition of spawn in Periteasca station

Also were sampled Sulina and Gura Portitei stations, but that they were not identified spawn or larvae. In samples collected prevailed zooplankton, insects and shellfish waste.

Each species of fish has a certain potential biotic manifested during reproductive potential that ensures the perpetuation of the species, supplementing of population with a new generation and conservation population balance, equilibrium can be disturbed under the influence of some environmental factors. Optimal reproduction is determined, most times, adaptability to environmental factors, different from an annual cycle to another, depending on concrete conditions of climate year in compliance with the rule of seasonality.

Quantitative composition of the identified species in the analyzed stations was: 42% sprat, 31% anchovy, 19% mullet and 8% goby.

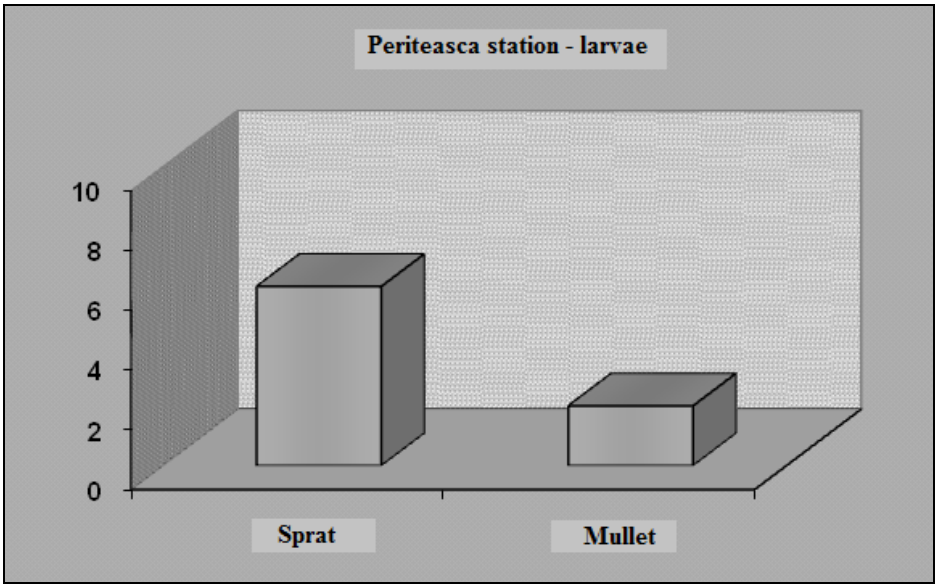

Figure 10. The numeric composition of larvae in Periteasca station

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Comparing the results with previous years, it appears that sprat prefer southern of Romanian Black Sea coast and are prevalent in evidence by the presence of spawn and anchovy by the presence of larvae.

4. CONCLUSIONS

After processing the ichthyoplankton samples in vernal season 2012, in the ROSCI0066 Danube Delta – the Marine Area site have found the following:

- Structure and distribution of spawn and larvae of fish in ROSCI0066 are directly affected by: seasonality and reproductive periodicity, fecundity and population reproductive physiological, influence of environmental factors;
- Analysis of samples from six stations has shown enlarged abundance of larval anchovy and spawn sprat;
- It is found that the diversity of species in the samples analyzed is very low, being identified only four species belonging to *Engraulidae*, *Clupeidae*, *Mullidae* and *Gobiidae* families.

5. ACKNOWLEDGEMENTS

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*** Progress Report no. 2 (2012). SOP-ENV Project, CNRS SMIS Code 17162.