Specific Diversity of the Romanian Black Sea Fish Fauna *(Aurelia Țoțoiu, Tania Zaharia, Magda-Ioana Nenciu, Victor Niță, Alexandru Nicolaev, Cristian Danilov, Mădălina Galațchi, Mariana Golumbeanu, Gheorghe Radu, Valodia Maximov)*	**"Cercetări Marine" Issue no. 48** **Pages 50-58**	**2018**

SPECIFIC DIVERSITY OF THE ROMANIAN BLACK SEA FISH FAUNA

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ABSTRACT

The diversity of the Romanian Black fish fauna has undergone permanent changes, both qualitatively and quantitatively. These changes have occurred as a result of the deterioration of environmental conditions, but also due to inappropriate fisheries management. Some of these changes have had a major impact on both pelagic and benthic fish populations, affecting common and rare species, juveniles and adults, fish populations of commercial or non-commercial value, thus generating the disappearance of fish populations and, very rarely, the introduction of new species.

The quantitative analysis between 2016 and 2017 revealed the following: the dominant species in the samples analyzed from pound nets and beach seine were commercial species (sprat, anchovy, shads, horse mackerel etc.), followed in very small quantities (1 to 10 specimens) of non-commercial species.

Knowing and preserving the specific diversity of the Black Sea is a complex issue of concern. Over the last decades, due to pollution, eutrophication and unrealistic exploitation of bioresources, the total productivity of the marine ecosystem has greatly diminished, the Black Sea transforming from a rich and diverse ecosystem into a sea dominated by planktonic species reduced in number, incapable of bearing a rich fauna of large predators.

Keywords: fish fauna, biodiversity, Black Sea, bioresources, management

AIMS AND BACKGROUND

The evolution of the Black Sea ecosystem from the 1950s until the present is quite characteristic of inland seas subject to land-based pollutions and other human influences. In a period of only three decades (after the 1970's), the Black Sea environment has undergone dramatical changes in terms of biodiversity, habitats, fishery resources, aesthetic or recreational value and water quality.

The Black Sea ichthyofauna composition suffered changes due to the alterations of the living conditions in the sea. Some changes had an impact on coastal and shelf waters; others, on the pelagic zone, affecting common and rare species, both juveniles and adults, as well as commercial and non-commercial species (Zaitsev & Mamaev, 1997).

The Romanian coastline ichthyofauna diversity has undergone permanent changes from the qualitative and quantitative point of view. These changes occurred due to changes in environmental conditions, but also due to inappropriate fisheries management (Abaza et al., 2006; Radu et al., 2011).

Some of these changes had a major impact on both pelagic and benthic fish populations, affecting common and rare species, juveniles and adults, fish populations of commercial or non-commercial interest, leading to the disappearance of fish populations and seldom to the introduction of new species (Radu et al., 2013).

Long-term research has confirmed that each species and each length/age group may have some specific and distinct reactions to the environment.

Feeding, metabolism and growth rates are affected not only by food availability, but indirectly by water temperature. At a temperature outside the optimum limits, feeding is usually low. For species which perform a feeding migration, the role of temperature is much more important, the phenomenon being conditioned by the development of planktonic organisms that are the basic food (Daskalov, 2003; Ivanov et al., 1985; Sarbu et al., 2016; Zaitsev & Mamaev, 1997).

The oscillations of numerical growth within a fish population over a year are determined by ecological factors oscillations that occur in the marine ecosystem. Environmental factors generate various ecological processes, sometimes very complex, which continuously or intermittently, directly or indirectly, intensively or less intensely influence the quantitative - numerical composition of the fish population and its structure, respectively. In the numerical and structural regulation of the population, the ability of the fish population to respond to environmental regulators must be taken into consideration (Radu E. et al., 2007; Radu E. et al., 2008).

EXPERIMENTAL

The diversity of Romanian coast fish fauna was analyzed qualitatively and quantitatively from the fish samples collected from pound nets located along the Romanian coastline from Vadu to Vama Veche and from the surveys organized using the beach during 2016 - 2017 (Fig. 1). The marine pound net is a large-scale, trapping fishing gear that is set at depths of 5-12 m (Fig. 2). For marine trap nets, the concentration (enclosure) and restraint (catch) rooms of the fishing target are installed parallel to the shore, they can reach the length of 70 m, while the role of

directing the fish is held by the wings made from net, 300-500 m in length, situated perpendicular to the shoreline. The marine beach seine is a vertical fishing net that surrounds a certain surface of the water, delimiting it to the bottom of the basin, provided with reinforcement elements (floats, weights etc.) and which is launched from the boat, on a semicircle-like route, as symmetrical as possible, starting from the shore to the open sea and back to shore (Fig. 3). The restriction of the surrounded area is achieved by shortening the perimeter, following the recovery of the wings of the gear on the shore.

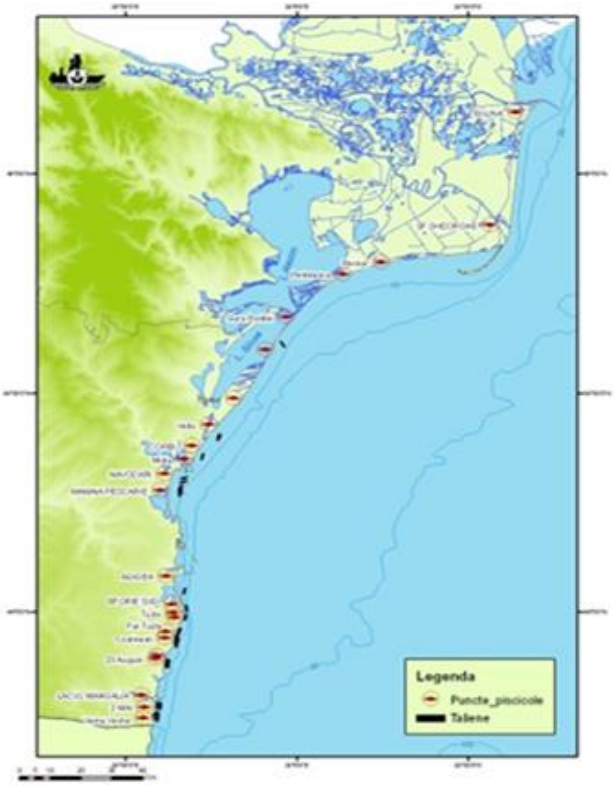

Fig. 1. Distribution of sampling pound nets.

Fig. 2. Pound net.

Fig. 3. Beach seine.

RESULTS AND DISCUSSION

Taking into consideration data from countries which are riparian to Black Sea (Bulgaria, Turkey, Ukraine, Romania, Georgia and Russia), accepted by the Black Sea Commission, a number of 180 fish species was recorded. Romanian specialists identified, according to IUCN criteria, 140 fish species in the Romanian Black Sea area, being taxonomically framed into 49 families.

From the obtained data, the DD (data deficient) criterion has a big percentage, being followed by LC (low concern), the smallest percentage being recorded by EN (Endangered) (Fig. 4). The following IUCN categories are utilized to show the fish status at the Romanian coast:

EN - Endangered
VU - Vulnerable
NT - Near Threatened
LC - Least Concern
DD - Data deficient
NE - Not evaluated

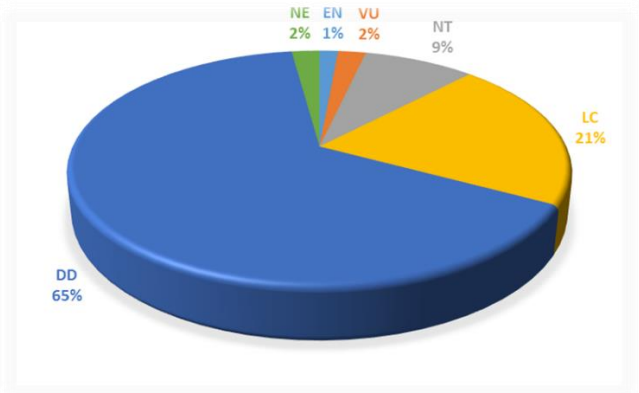

Fig. 4. Fish species from the Romanian coast according to IUCN criteria.

Photo 1. Pound net catches (horse mackerel).

Photo 2. *Sarda sarda* (NT).

Photo 3. *Sciaena umbra* (DD).

Of the 140 fish species identified at the Romanian coast, 88 are of Atlantic-Mediterranean origin, 29 are endemic species in the Black Sea, 13 species are of Mediterranean origin, one of Pontic origin, while cosmopolitan species are new on the Romanian coast (Fig. 5).

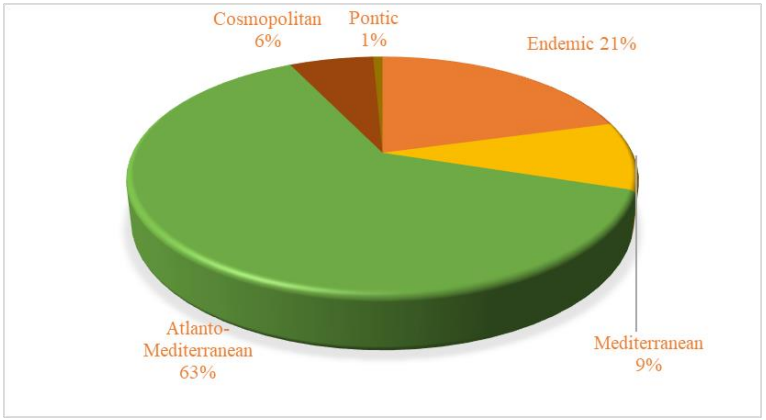

Fig. 5. Romanian seaside fish origin.

In the Romanian maritime area, over the past few years, there have been reported about 50 species from the qualitative point of view, with great dominance being the small species.

From a qualitative point of view, the following families and fish species appeared frequently at the Romanian Black Sea coast (Table 1).

Table 1. Qualitative structure of the ichthyofauna biodiversity at the Romanian Black Sea coast.

Family	Species	Popular name
Atherinidae	*Atherina hepsetus*	sand smelt
Blenniidae	*Coryphoblennius galerita*	blennies
Belonidae	*Belone belone euxini*	garfish
Callionymidae	*Calliumymus pusillus*	dragonet
Clupeidae	*Sprattus sprattus*	sprat
	Alosa immaculata	Pontic shad
	Alosa tanaica	Azov shad
	Clupeonella cultriventris	kilka
Carangidae	*Trachurus mediterraneus ponticus*	horse mackerel
Engraulidae	*Engraulis encrasicolus*	anchovy

Gadidae	*Merlangius merlangus euxinus*	whiting
	Gaidropsarus mediterraneus	shore rockling
Gobiidae	*Neogobius melanostomus*	round goby
	Mesogobius batrachocephalus	flat-head goby
	Gobius niger	black goby
	Neogobius fluviatilis	monkey goby
	Pomatoschistus microps leopardinus	marbled goby
Gasterosteidae	*Gasterosteus aculeatus*	threespine stickleback
Ophididae	*Ophidion rochei*	cuskeel
Mullidae	*Mullus barbatus*	red mullet
Mugilidae	*Mugil cephalus*	flathead grey mullet
Pleuronectidae	*Platichthys flesus*	flounder
Rajidae	*Raja clavata*	thornback ray
	Dasyatis pastinaca	common stingray
Sciaenidae	*Sciaena umbra*	brown meagre
	Umbrina cirrosa	shi drum
Sciaenidae	*Sarda sarda*	Atlantic bonito
Scophthalmidae	*Psetta maxima*	turbot
Serranidae	*Serranus cabrilla*	cabrilla seabass
Syngnathinae	*Syngnathus variegaus*	deep-snouted pipefish
	Syngnathus typhle	deep-snouted pipefish
	Hippocampus guttulatus	long-snouted seahorse
Squalidae	*Squalus acanthias*	spiny dogfish
Trachinidae	*Trachinus draco*	greater weever
Triglidae	*Trigala lucerna*	tub gurnard

The May survey was dominated by anchovy and sprat, being followed by red mullet and whiting. In June, the dominant species was anchovy (*Engraulis encrasicolus*), followed by sprat and red mullet, the other non-commercial species being present as 1-10 specimens. The quantitative dominant species of July was also anchovy, followed by horse mackerel, non-commercial species being present as 1-30 specimens / species. Species such as sand smelt, horse mackerel, and Azov shad had the highest quantitative value in August, being followed by anchovy. Red mullet had the highest numerical value in September, followed by horse mackerel, anchovy and sand smelt. In October, the dominant species were: horse mackerel, anchovy and sand smelt, followed by sprat and Azov shad (Fig. 6).

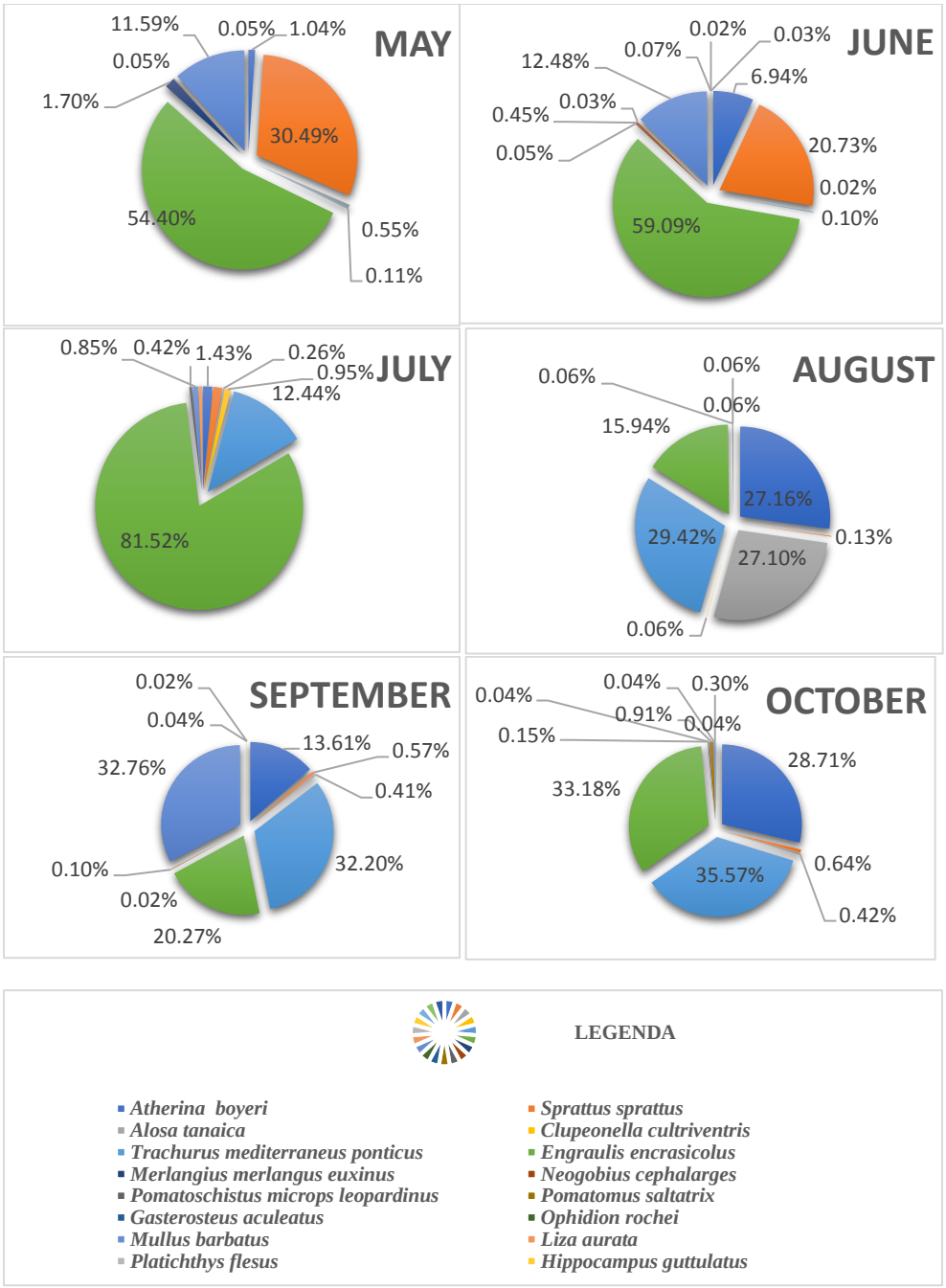

Fig. 6. Graphic representation of the ichthyofauna's biodiversity in May - October 2017.

The analysis of the samples collected with the beach seine revealed the presence of sand smelt and sprat species in August and of sand smelt and golden grey mullet populations in October (Fig. 7).

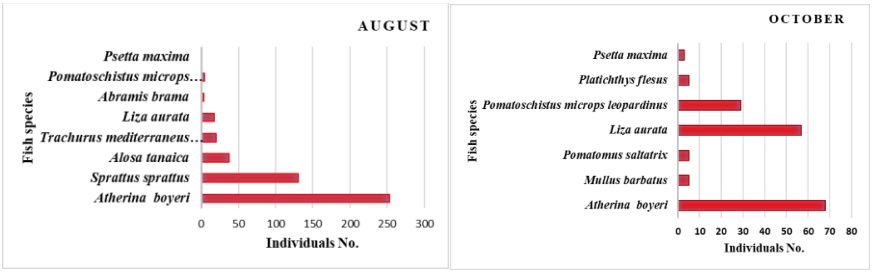

Fig. 7. Graphical representation of the species collected during the beach seine survey.

The disappearance or reduction of fish species is caused by changes in ecological factors that occur in the marine ecosystem, excessive fishing, inappropriate tools used for fishing, and anthropogenic impact.

CONCLUSIONS

The exploitation and sustainable management of the ichthyofauna in the Romanian marine area must be in accordance with the quality, diversity and availability of fishery resources in enough quantities for current and future generations, in the context of food security and sustainable development.

The Black Sea ichthyofauna changed because of modifications occurred in the environment and of inadequate fishery management. Some of these changes had an impact over shallow and deep waters, both on benthic and pelagic habitats, affecting common and rare species, juveniles and adults, commercial and non-commercial species, leading to habitat disappearance.

Ichthyofauna exploitation and sustainable management must take into consideration quality maintenance, fish diversity and availability in enough quantities for present and future generations, in the frame of alimentary security and sustainable development.

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