

## Preliminary data on the Ichthyofauna Structure from the Northern Part of the Romanian Black Sea Coast

George ȚIGANOV, Cristian-Sorin DANILOV, Cătălin Valentin PĂUN,  
Mădălina GALAȚCHI\*

National Institute for Marine Research and Development “Grigore Antipa”, Romania

\* Corresponding author e-mail: mglatchi@alpha.rmri.ro

### Abstract

In the context of climate change observed in recent decades and taking into account the Danube input from the northern part of Romanian Black Sea waters, a research survey was conducted in order to obtain data regarding the ichthyofauna structure. During the survey conducted with the research vessel “Steaua de Mare 1” in 2019, 20 pelagic hauls and 4 fishing stations with gillnets of different mesh sizes were carried out. In pelagic trawling, 20 fish species have been identified, the dominant species being sprat (*Sprattus sprattus*) and whiting (*Merlangius merlangus euxinus*). In gillnet experimental fishing, 16 species were identified, Caspian shad (*Alosa tanaica*) and Danube shad (*Alosa immaculata*) being dominant. Also, in order to estimate the ichthyofauna biological diversity, the Margalef Index was calculated, values between 3.07-6.15 being recorded, indicating a high species diversity in the studied area.

**Keywords:** ichthyofauna, pelagic trawl, gillnets, diversity

### Introduction

Studies conducted in order to analyze the ichthyofauna composition in recent years have shown a slight increase in the number of species observed on the Romanian Black Sea coast [5].

Biodiversity is important for the future sustainable development of marine natural resources, which include fish species [2, 3].

In the northern part of the Romanian coast, the ichthyofauna has some peculiarities due to the freshwater input from the Danube; in the area being identified euryhaline fish species.

### Experimental

The methodology and techniques that have been used both for data collection and analysis, as well as for fish stocks assessment are those accepted for the Black Sea basin and in accordance with the international demands [1].

The scientific fishing survey was carried out with the research vessel “Steaua de Mare 1”, equipped with fishing gears (demersal and pelagic trawls) and with a motorboat for fishing survey with gill nets.

During the expedition, 20 fishing hauls were carried out and 4 stations were analyzed with gillnets (Photo 1, 2), cover all types of habitats and depths; fish samples were collected for further analysis in the laboratory.



**Photo 1.** Pelagic trawl (original)



**Photo 2.** Experimental gillnets (original)

The samples were brought to the laboratory and the species were classified in systematic groups.

Biometrics analysis were made by performing somatic (total length, total weight) and meristic (scales, radii, spines) measurements. For measurements, an ichthyometer or a ruler and an electronic scale were used (Photo 3, 4).



**Photo 3.** Analysis samples



**Photo 4.** Determinating weight

To estimate the biological diversity, the Margalef Index was applied [4]:  $D_{Mg} = (S-1)/\ln N$ ; where  $S$  is the number of species in the sample and  $N$  is the total number of species.

Values below 2 show a low species diversity in the analyzed community and values over 5 indicate a high species diversity [4].

### Results and discussion

A number of 20 fishing hauls with the pelagic trawl were carried out, on depths between 22.1 m and 39.7 m, almost the entire perimeter of the ROSCI0066 Danube Delta site being covered and a number of four gillnet experimental fishing stations were performed in sectors Chituc, Sf. Gheorghe, Sahalin, Periboina, in which were used two gillnets strings, with a length of 200 m/each, and the mesh size varying between 20÷ 36 mm. (Photo 5, 6). Fishing effort realized in the survey was 10 hours of trawling and over 46 hours of gillnet fishing.



**Photo 5.** Trawl catch



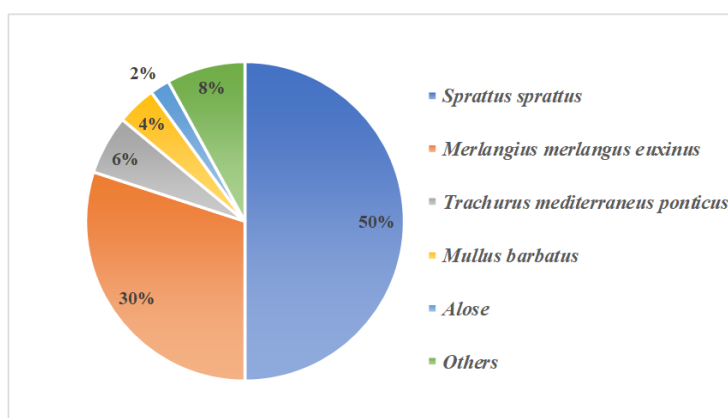
**Photo 6.** Gillnet catch

During the research period a total number of 24 fish species have been identified, 20 species in pelagic trawling activities and 16 species in gillnet experimental fishing (Table 1).

**Table 1.** List of species identified

Order	Family	Species
Acipenseriformes	Acipenseridae	<i>Acipenser gueldenstaedti</i> <i>Acipenser stellatus</i>
Clupeiformes	Clupeidae	<i>Sprattus sprattus</i> <i>Alosa immaculata</i> <i>Alosa tanaica</i>
Gadiformes	Engraulidae Gadidae	<i>Engraulis encrasicolus</i> <i>Merlangius merlangus euxinus</i> <i>Gaidropsarus mediterraneus</i>
Perciformes	Blenniidae Labridae Callionymidae Carangidae Gobiidae	<i>Parablennius tentacularis</i> <i>Symphodus rostratus</i> <i>Callionymus pusillus</i> <i>Trachurus mediterraneus ponticus</i> <i>Neogobius melanostomus</i> <i>Gobius niger</i>
Pleuronectiformes	Mullidae Pomatomidae Trachinidae Soleidae Pleuronectidae Scophthalmidae	<i>Mullus barbatus</i> <i>Pomatomus saltatrix</i> <i>Trachinus draco</i> <i>Solea lascaris</i> <i>Platichthys flesus</i> <i>Scophthalmus maximus</i>
Rajiformes	Rajidae	<i>Dasyatis pastinaca</i>
Scorpeniformes	Scorpaenidae	<i>Scorpaena porcus</i>
Squaliformes	Squalidae	<i>Squalus acanthias</i>
Syngnathiformes	Syngnathidae	<i>Hippocampus guttulatus</i>

The species considered dominant in pelagic experimental fishing were sprat (*Sprattus sprattus*) and whiting (*Merlangius merlangus euxinus*), these species recorded the highest biomass and abundance (Figure 1). The catches of sprat oscillated in hauls between 20 and 500 kilograms, as for whiting between 5 and 150 kilograms.

**Fig. 1.** The dominant fish species in pelagic trawling activities

Regarding gillnet experimental fishing, was made in the most representative areas of the site, the highest catch was recorded in Sf. Gheorghe area with a value of 61.952 kilograms, followed by sectors Sahalin (20.221 kilograms), Chituc (16.286 kilograms) and Periboina (6.536 kilograms). Biomass and abundance obtained by sectors is presented in tables bellow (Table 2, 3, 4, 5).

**Table 2.** Biomass and abundance by species of the catch in Chituc sector

<i>Species</i>	<b>Biomass (kg)</b>		<b>Abundance (no.)</b>
	<i>Total</i>	<i>%</i>	
<i>Acipenser stellatus</i>	2,650	90.26	4
<i>Alosa immaculata</i>	0,250	8.51	1
<i>Merlangius merlangus euxinus</i>	0,014	0.48	1
<i>Mullus barbatus</i>	0,022	0.75	1
<i>Total</i>	2,936	100.00	

**Table 3.** Biomass and abundance by species of the catch in Sf. Gheorghe sector

<i>Species</i>	<b>Biomass (kg)</b>		<b>Abundance (no.)</b>
	<i>Total</i>	<i>%</i>	
<i>Merlangius merlangus euxinus</i>	1,43	2.32	94
<i>Nerophis ophidion</i>	0.0005	0.00	1
<i>Acipenser stellatus</i>	1,13	1.84	3
<i>Engraulis encrasicolus</i>	0,05	0.09	5
<i>Platichthys flesus</i>	0,02	0.03	1
<i>Solea lascaris</i>	1,25	2.04	44
<i>Alosa tanaica</i>	52,35	85.12	813
<i>Scorpaena porcus</i>	0,10	0.16	1
<i>Squalus acanthias</i>	0,39	0.63	1
<i>Alosa immaculata</i>	4,78	7.77	20
<i>Total</i>	61,49	100.00	

**Table 4.** Biomass and abundance by species of the catch in Sahalin sector

<i>Species</i>	<b>Biomass (kg)</b>		<b>Abundance (no.)</b>
	<i>Total</i>	<i>%</i>	
<i>Merlangius merlangus euxinus</i>	0,17	0,91	11
<i>Scorpaena porcus</i>	0,28	1,55	2
<i>Engraulis encrasicolus</i>	0,22	1,21	22
<i>Mullus barbatus</i>	0,04	0,24	3
<i>Trachurus mediterraneus ponticus</i>	0,17	0,95	10
<i>Alosa immaculata</i>	4,12	22,49	16
<i>Alosa tanaica</i>	6,94	37,86	113
<i>Acipenser gueldenstaedti</i>	0,29	1,58	1
<i>Acipenser stellatus</i>	1,88	10,24	7
<i>Pomatomus saltatrix</i>	0,06	0,34	1
<i>Platichthys flesus</i>	0,01	0,05	2
<i>Trachinus draco</i>	0,04	0,20	1
<i>Solea lascaris</i>	4,10	22,38	159
<b>Total</b>	<b>18,32</b>	<b>100,00</b>	

**Table 5.** Biomass and abundance by species of the catch in Periboina sector

<i>Species</i>	<b>Biomass (kg)</b>		<b>Abundance (no.)</b>
	<i>Total</i>	<i>%</i>	
<i>Alosa tanaica</i>	3,11	80,40	41
<i>Engraulis encrasicolus</i>	0,17	4,27	16
<i>Neogobius melanostomus</i>	0,07	1,76	1
<i>Mullus barbatus</i>	0,01	0,23	1
<i>Solea lascaris</i>	0,26	6,80	10
<i>Pomatomus saltatrix</i>	0,25	6,54	4
<b>Total</b>	<b>3,868</b>	<b>100,00</b>	

Dominant species in gillnet experimental fishing were Caspian shad (*Alosa tanaica*) with biomass values between 3.11 and 52.35 kilograms and Danube shad (*Alosa immaculata*) with biomass values between 4.12 and 4.18 kilograms.

Regarding the biological diversity, the Margalef Index was calculated, values between 3.07-6.15 being recorded, indicating a high species diversity in the studied area.

### Conclusions

(1) In pelagic trawling activities 20 fish species have been identified, the dominant species being sprat (*Sprattus sprattus*) and whiting (*Merlangius merlangus euxinus*).

(2) In gillnet experimental fishing activities, 16 species were identified, Caspian shad (*Alosa tanaica*) and Danube shad (*Alosa immaculata*) being dominant. In total, 24 fish species were identified in the scientific survey.

(3) Taking into consideration the values that Margalef Index recorded (3.07-6.15), the ichthyofauna biological diversity from the northern part of the Romanian coast is a high one.

### Acknowledgement

This work has been carried-out with financial support from the POIM 123322 Project - “Revision of the Management Plan and Regulation of the Danube Delta Biosphere Reserve“.

### References

- [1] Carpentieri, P., Bonanno, A. and Scarcella, G. 2020. Technical guidelines for scientific surveys in the Mediterranean and the Black Sea. FAO Fisheries and Aquaculture Technical Papers No. 641. Rome. FAO.
- [2] Dulvy, N.K., Metcalfe, J.D., Glanville, J., Pawson, M.G., Reynolds, J.D. 2000. Fishery stability, local extinctions and shifts in community structure in skates. *Conserv. Biol.* 14, 283–293.
- [3] Hilborn, R., Quinn, T.P., Schindler, D.E., Rogers, D.E., 2003. Biocomplexity and fisheries sustainability. *Ecol. Monogr.* 75, 3–36.
- [4] Magurran E. Anne, 2004. *Measuring biological diversity*, Blackwell Publishing: Oxford, UK, 256 pp.
- [5] Report on the State of the Marine and Coastal Environment in 2019, NIMRD internal document