State of the Fishery Resources in the Romanian Marine Area (Gheorghe Radu, Valodia Maximov, Eugen Anton, Mădălina Cristea, George Țiganov, Aurelia Țoțoiu, Alina Daiana Spînu)	"Cercetări Marine" Issue no. 43 Pages 268-295	2013

STATE OF THE FISHERY RESOURCES IN THE ROMANIAN MARINE AREA

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ABSTRACT

The material presented in this paper is a brief description of the state of the main fish species of commercial interest at the Romanian littoral during the past five years.
The following data are presented and analyzed as well:
- Short biological characterization of the main fish species (sprat, anchovy, horse mackerel, turbot, dogfish, whiting);
- Distribution and abundance of fishing agglomerations (maps);
- Assessing the biomass of fishing agglomerations;
- Population structure by size classes;
- Growth parameters and mortality rates;
- The degree of parasitization;
- Recommendations for their management.

KEYWORDS: Black Sea, sprat, anchovy, horse mackerel, turbot, dogfish, whiting, distribution, abundance, biomass, population structure, growth parameters, mortality rates, parasites, recommendations

AIMS AND BACKGROUND

Fishery is the most affected sector by the changes of the Black Sea ecosystem. At the same time, fishing activities contribute themselves to the worsening of the ecological situation and to the depletion of the fish stocks. Changes in the ichthyofauna composition of the Black Sea have primarily involved alterations in the number of individuals in specific populations. For many species, fish populations have declined so sharply that they have lost their importance for commercial fishing, and remain within the Black Sea ichthyofauna only

as zoological representatives of the species [26]. The dynamics of catches obtained in the Black Sea is accurately mirroring the discrepancies between the size of the fishing effort and the productive capacity of the exploited stocks. These effects, on a given stock or population, are reflected in some changes, among them:
- decrease of the exploitable fraction of the total biomass;
- increase of renewable of a exploitable part;
- the quantity of old fish decreases rapidly in the exploitable biomass and catches;
- decrease of the mortality due to age;
- change of the mean growth ratio in terms of its increase;
- change of mortality through predation and cannibalism.

The majority of fish species having commercial value are shared within the EEZ of the Black Sea riparian countries [2, 3, 4, 5, 9]. Also, because in the Black Sea area there is not a regional fishery management organization, the fisheries regulatory framework is promoted by each coastal country, not being harmonized at regional level, even in the case of shared or migratory species.

MATERIAL AND METHODS

In view of obtaining the competitive and comparable data, the methods and tools for sampling, processing, analyzing and interpreting the data and information, as well as the fish stock assessment are standardized at regional level and in conformity with the international practice [6, 10, 13, 14, 15, 16, 20, 21, 22 and 23].

At the Romanian Black Sea coast, there is a routine in the implementation of catch sampling, age reading, establishing the qualitative and quantitative structure of catches, the population structure on age and length classes and also making surveys at sea. All the necessary parameters for participation at the joint assessment of the fish stocks were determined, as follows: catch and effort; structure on length and age classes of the catches; biologic data (maturation degree, relation length/weight etc.); general data about the species biology (reproduction season, migration etc.); growing parameters; mortality ratios; selectivity of gears, standardization of the fishing effort.

In order to study the fish populations, the method of random extracted samples is used; a sample represents a share from the whole population able to offer sufficient information for the characterization the population.

The biological material used for the identification of the parasites was represented by the fish species collected during sampling campaigns along the Romanian coast. In general, we worked on samples of 10-20 individuals (depending on the availability of biological material for analysis) and also on single specimens. Macroscopic and microscopic examination were performed, aiming at determining the extent of the parasites and the reactions of hosts to parasitisation degree and type of parasite. [1, 7].

The swept area method is used for assessing the biomass of fishing agglomerations of sprat, whiting, turbot, dogfish based on the statistic processing of productivity data obtained in sampling trawling and industrial trawling;

For pelagic species, the mid-water trawl 57/63-62m, with horizontal opening of 22 m, was used. The demersal species were sampled with the bottom trawl 22/27-34 with horizontal opening of 13 m. The average speed of the vessel was of 2.5 knots. The trawling time was standardized at 60 minutes [10, 13-16, 20-27].

Migration routes, spawning, feeding and wintering areas, the distribution of the fishing agglomerations are presented on maps.

The paper makes a brief description of the state of the main fish species of commercial interest in the Romanian marine area during the past five years (sprat, anchovy, horse mackerel, turbot, dogfish and whiting).

RESULTS AND DISCUSSION

Catch dynamics of the main fish species

Overall, during the past two decades, fish catches in the Romanian marine area have continuously decreased, but in the last two years, the trend is reversed due to the catches of rapana, which have begun to have an important share (Fig. 1 and 2) [2-5, 17, 18, 19, 20-27].

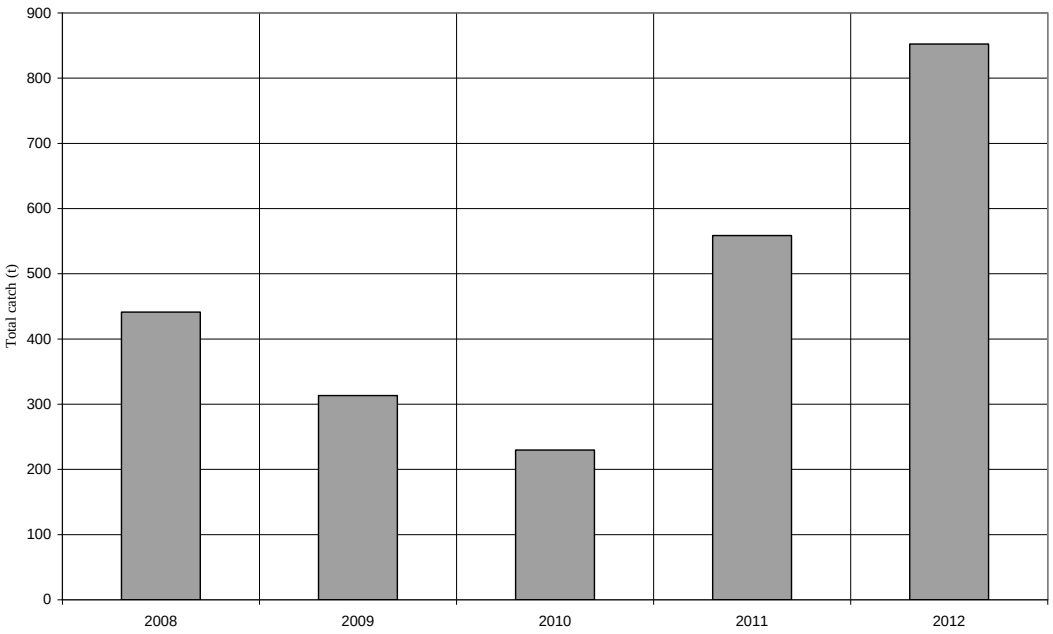

Fig. 1 - Total fish catches (t) obtained at the Romanian littoral during 2008-2012

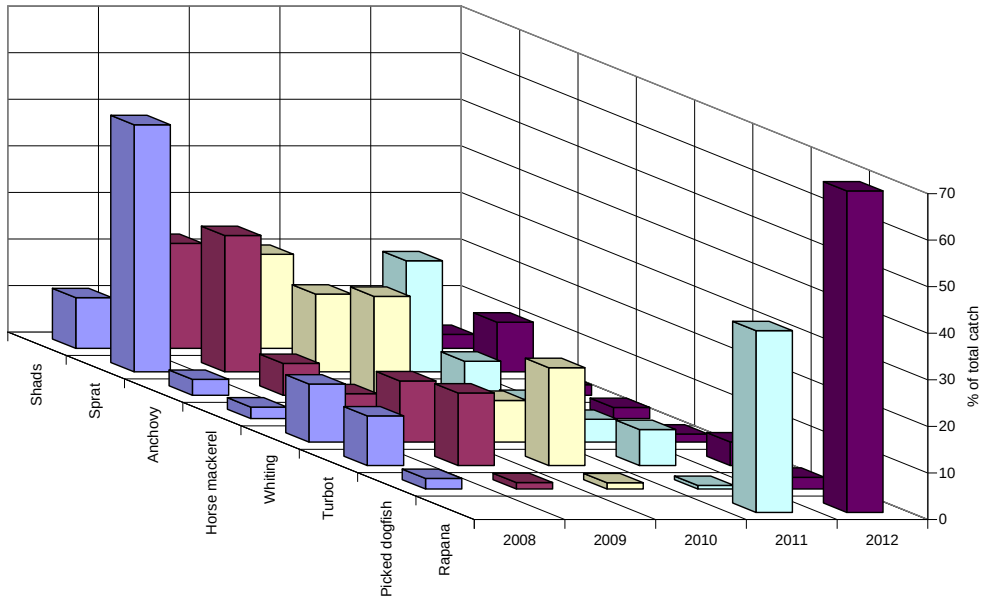

Fig. 2 - The share (%) of the main fish species in the total catch

Sprat - *Sprattus sprattus* L.,1758

Marine pelagic species. It forms important agglomerations and performs irregular migrations between feeding areas and spawning places determined by temperature conditions. In spring there is a tendency of movement of the shoals towards the coast and northwards and towards offing in the autumn, but there are not specific migrations of spawning or feeding. The sprat winters in the open sea at depths of 80-100 m; in April - May, it gets closer to the littoral area in exploitable quantities, while in summer it avoids high water temperature performing migrations from the coast to the offing [12].

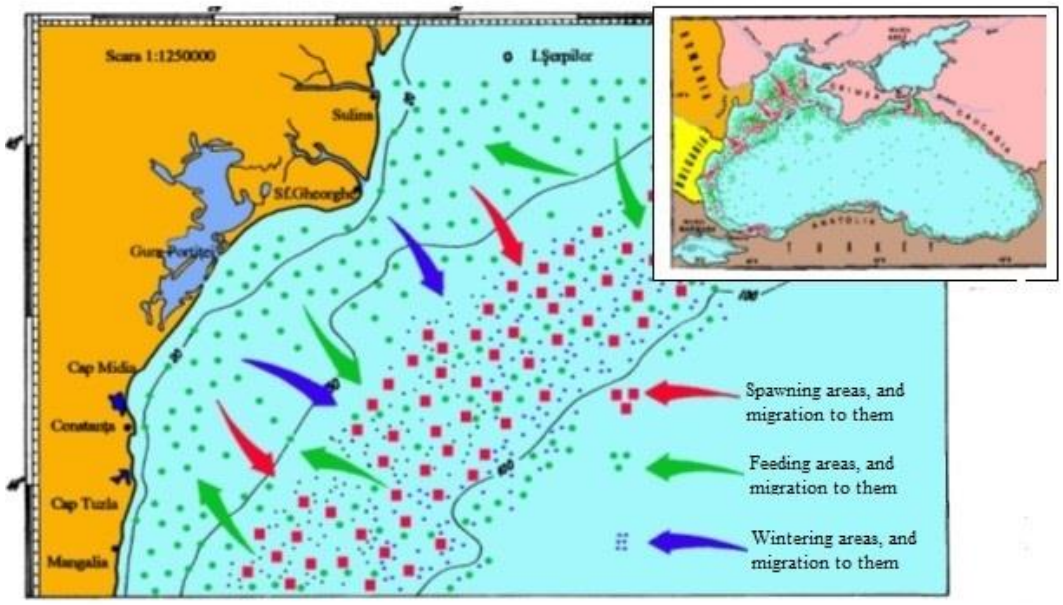

Fig. 3 - Migration routes, spawning, feeding and wintering areas for sprat

In Fig. 4 is presented the distribution of the sprat in the 2nd quarter of 2010-2012 in Romanian waters. Sprat is present over the entire shelf, but the concentration of fishing agglomerations is highly influenced by environmental conditions, especially the direction and intensity of wind and water temperature. The jellyfish agglomerations also worsened the fishing activity. During the spring period, the calculated biomass for sprat oscillated between 30,917 tons (2008) and 68887 tons in 2012 (Fig. 24) [8, 13-17, 20-25, 27].

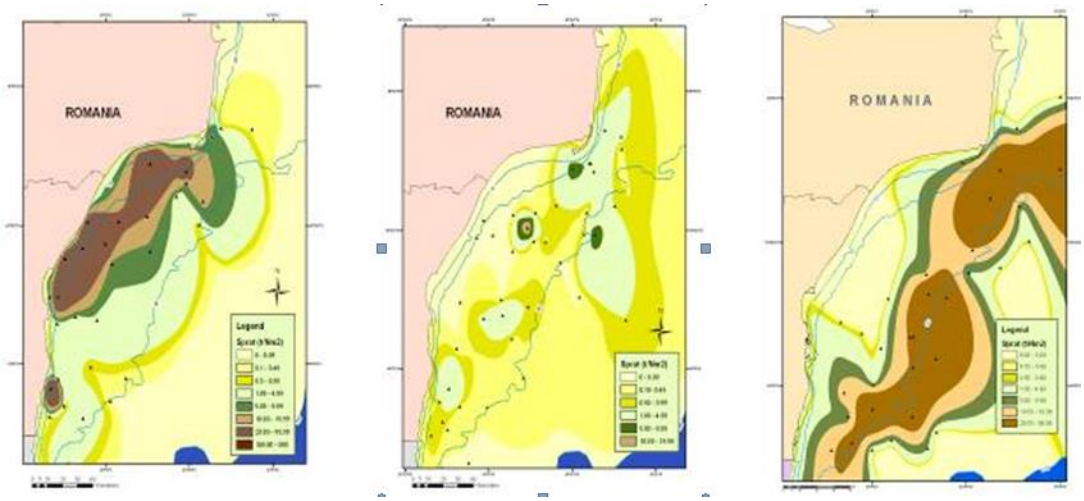

Fig. 4 - Distribution of the sprat agglomerations in the Romanian marine area in spring 2010-2012

Sprat has lengths comprised between 50 and 130 mm over the whole reference period, the highest frequency pertaining to the individuals 70-100 mm long.

The age corresponding to these lengths was 1 - 3:3+, the ages 1:1+ - 2.2+ having a significant participation. In the period analysed, the age classes 4;4+ years disappeared from the catch of this species, meaning the increase of the pressure through fishing exerted on the populations. While the share of this age decreased, the prevalence of 1;1+ ages became increased, reaching 60% (Fig. 5 and 6).

During past years, the 2;2+ and 3;3+ ages have been prevailing, meaning that the pressure through fishing on this species decreased in the commercial catches from the Romanian littoral [6, 10, 13-17, 20-25 and 27].

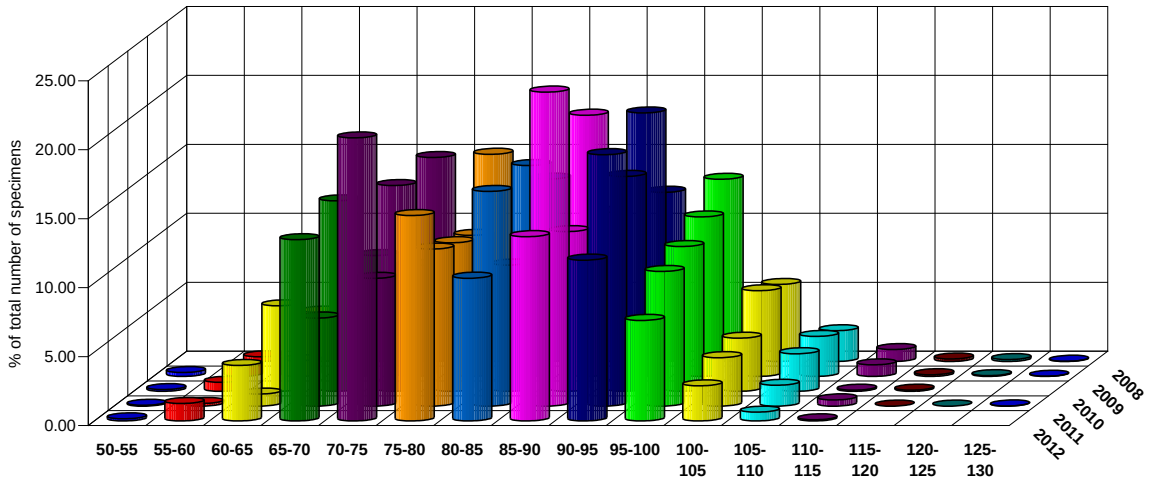

Fig. 5 - Percentage on length classes of sprat during 2008-2012

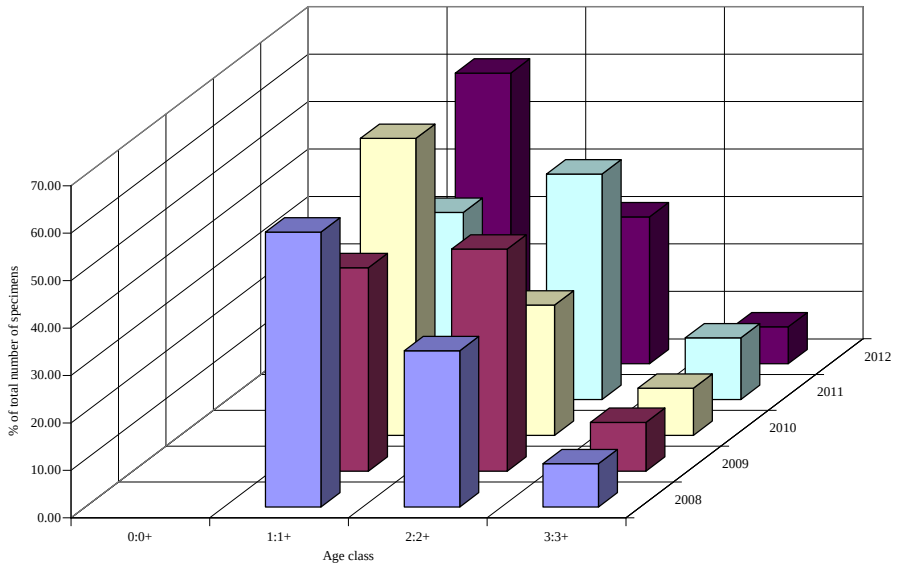

Fig. 6 - Percentage on age classes of sprat during 2008-2012

The following parameters were calculated for the growth and mortality rates of sprat:

a = 0.00898
b = 2.8121
r = 0.9976
K= 0.5334 - Gulland and Holt
t_o = -1.565 - Bertalanffy
L_∞ = 12.63 - empirical
Z = 1.075 - Beverton and Holt
Z = 1.065 - Ault and Erhart
Z = 1.33/year on number or specimens
M = 0.975 - Rikhter and Efanov
M = 0.93 - Pauly

For sprat, the Expert Working Group (EWG 12-16) calculated current F=0.811, that equals an exploitation rate of about E=0.46 (natural mortality M=0.95) and makes the EWG to considers the stock exploited unsustainably (Table 1) [3-5].

Anchovy - *Engraulis encrasicolus* L., 1758

Marine, pelagic, gregarious, coastal species, it forms large schools. Migrations are irregular, from open sea to coast and vice versa, depending on water temperature and food. In March - April (when water reaches the temperature of 13-14°C), it migrates towards the northern part of the western and eastern coast, where it feeds intensively (Fig. 7).

Migration for wintering begins in October and follows the same route (Fig. 7).

Larvae and juveniles are mostly found in the spawning area where they are also feeding [12].

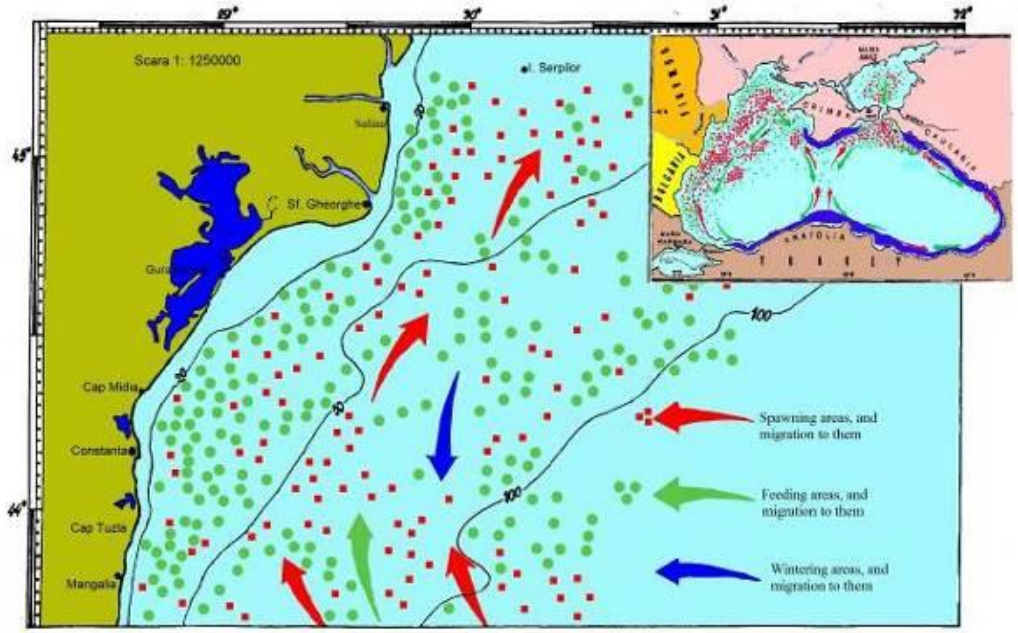

Fig. 7 - Migration routes, spawning, feeding and wintering areas of anchovy

Engraulis encrasicolus (anchovy) was present in catches with individuals of 45-145 mm in length; the dominance was due to the 80-105 mm length-classes, the mean length being 95 mm and the mean age 0+ - 3:3+ years old (Fig. 8 and 9).

By 2008, the composition on age-class shows the presence of individuals with ages comprised between 0+ to 4;4+ years, the classes 0+ and 3;3+ years prevailing. In this period, from the anchovy catches the 3;3+ and 4;4+ ages almost disappeared, only 0+, 1;1+ and 2;2+ years remaining, the groups 0+ and 1;1+ prevailing (Fig. 9). During this period, the anchovy stock suffered very much due to the overexploitation [6, 13-17, 20-25 and 27].

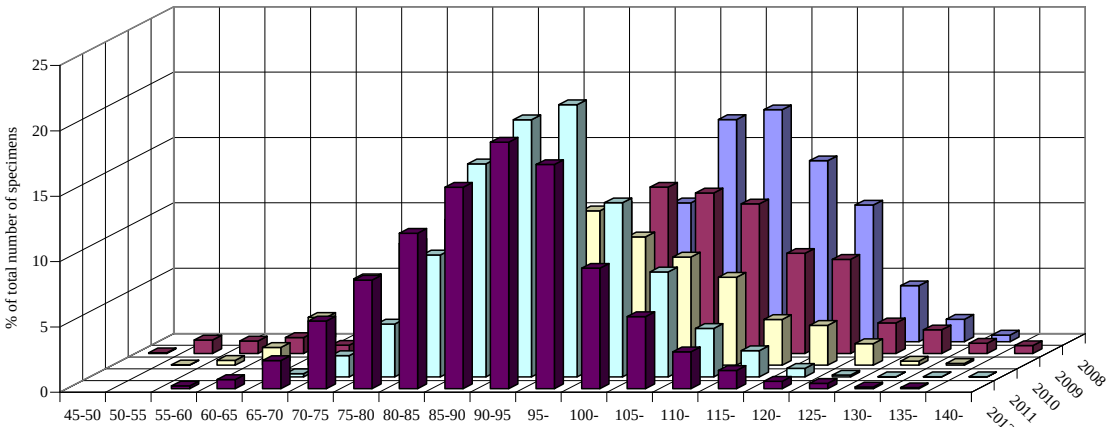

Fig. 8 - Percentage on length classes of anchovy during 2008-2012

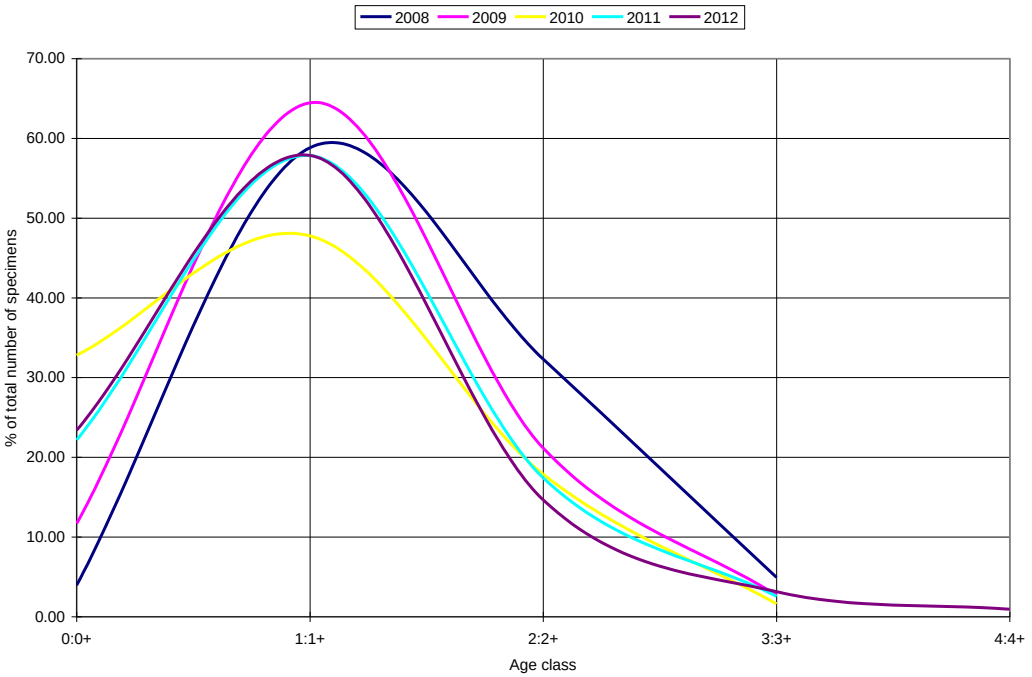

Fig. 9 - Percentage on age classes of anchovy in the period 2008-2012

The following parameters were calculated for the growth and mortality rates of anchovy:

a = 0.0057543
b =3.0256
k = 0.369 average
t_0 =- 1.396 Bertalanffy
L_∞ = 15.55 empirical
Z = 0.530 Beverton and Holt
Z = 0.420 Ault and Erhart
Z =0.693 on number or specimens
M =0.529 Rikhter and Efanov
M =0.836 Pauly

For anchovy, the estimated F(1- 3) = 1.295 exceeds such exploitation rate E≤0.4, which equals Fmsy(1-3) in the range of 0.54 given M 1-3 = 0.81. The stock is overexploited [3-5].

Horse mackerel - *Trachurus mediterraneus ponticus* Aleev, 1956

The occurrence of the horse mackerel at the Romanian littoral is closely related to water heating up to 14°C in the last decade of May. The nearness of the shoals to our littoral is favoured by the 12-16‰ salinity and southern winds. Horse mackerel remains in front of the Romanian littoral until October. During this period, depending on environmental variations, horse mackerel shoals perform movements along the whole littoral between coast and open sea (Fig.10) [12].

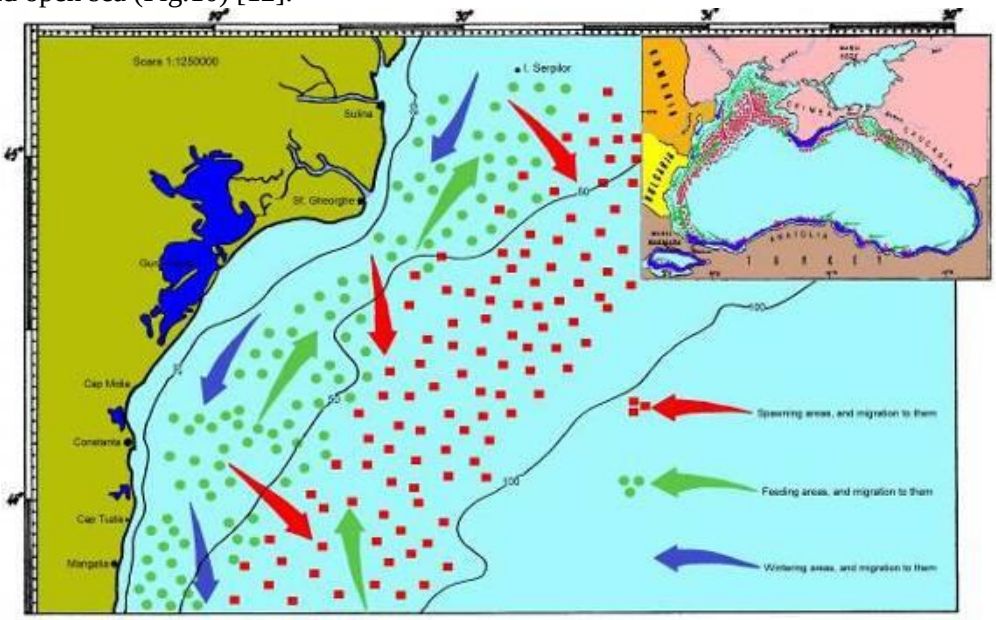

Fig. 10 - Migration routes, spawning, feeding and wintering areas of horse mackerel

Trachurus mediterraneus ponticus (horse mackerel) is one of the species whose population has suffered very much during the past 20 years. During the past years, the analyzed samples contained juveniles, but also mature individuals. The length spectrum ranged from 45 to 175 mm, and the age was mainly 2;2+ years.

By 2008, its catches were composed from age-classes up to 6 years, the ages between 1 and 3 years having prevailed. This shows the high pressure exerted by fishing on the stock [6, 13-17, 20-25, 27].

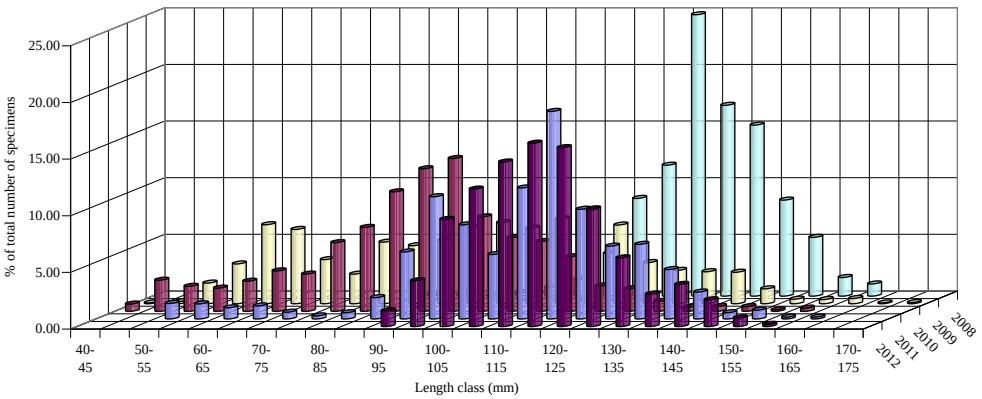

Fig. 11 - Percentage on length classes of horse mackerel during 2008-2012

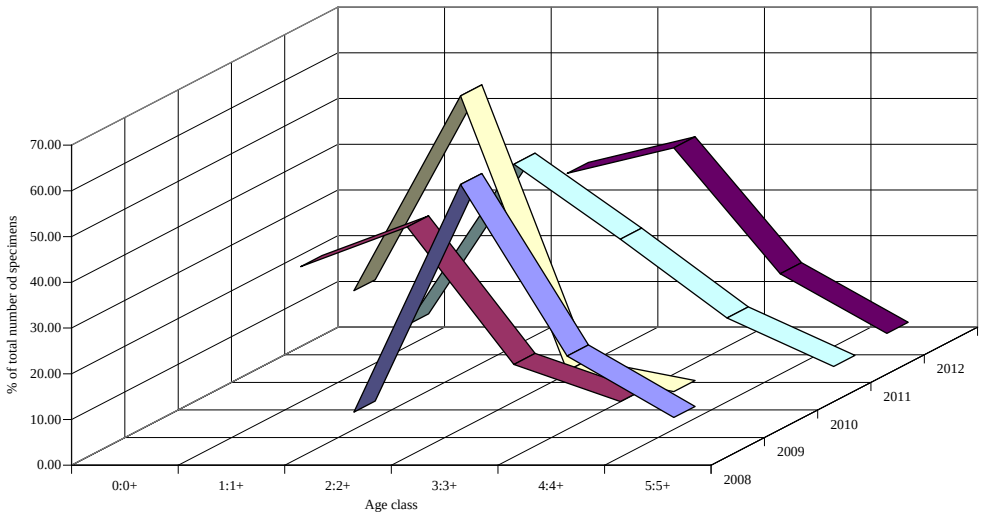

Fig. 12 - Percentage on age classes of horse mackerel during 2008-2012

The following parameters were calculated for the growth and mortality rates of horse mackerel:

a = 0.0111173
b =2.9065
k = 0.302 average
t_0 =- 0.467 Bertalanffy
L_∞ = 20.03 cm Gulland and Holt
Z =0.63 Beverton and Holt
Z = 0.554 Ault and Erhart
M =0.529 Rikhter and Efanov
M = 0.78 Pauly

Given the available data for the assessment of horse mackerel in the Black Sea, EWG 12-16 is unable to provide advice for the medium term future. But, taken into account the Romanian data, the stock is overexploited in the wintering area [3-5].

Turbot - *Psetta maxima maeotica* (Pallas, 1814)

Marine demersal species, specific for the sandy, rocky or mixed bottoms. In winter, adults are encountered at depths of 70-100 m; in spring (March - April) they come close to the shore until 18 - 30 m for breeding. After spawning, adults are spreading and retire again towards deeper water. Turbot migrations are relatively short and perpendicular on the shore (Fig. 13) [12].

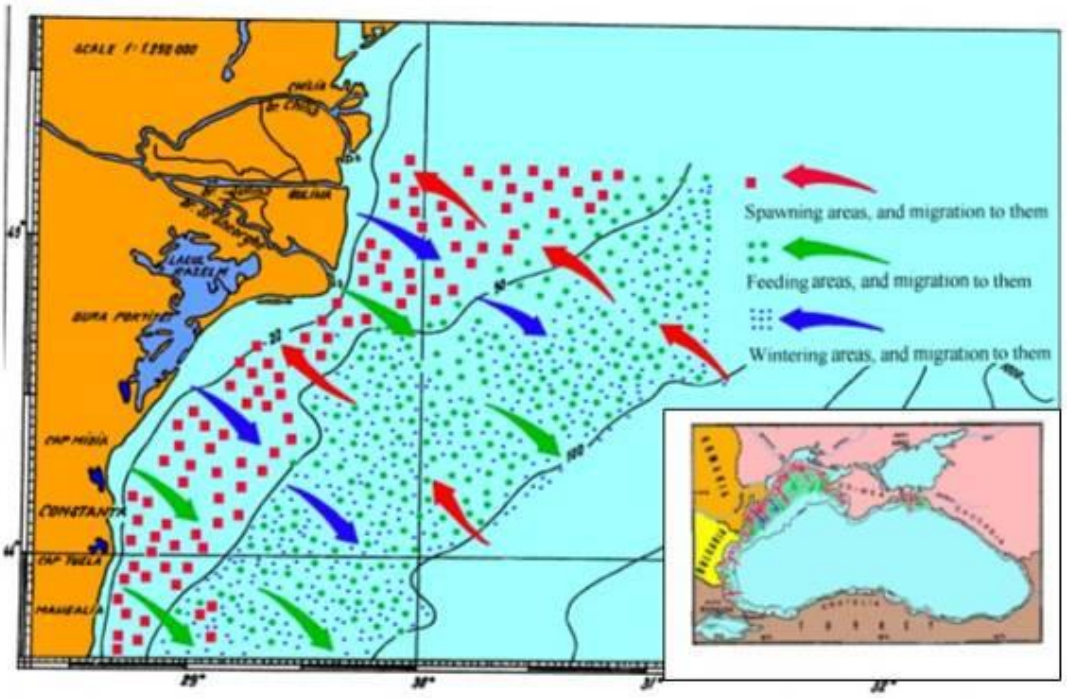

Fig. 13 - Migration routes, spawning, feeding and wintering areas of turbot

In Fig. 13 is presented the distribution of the turbot during the spring period of 2010-2012. Turbot is present over the entire shelf, but the concentration of fishing agglomerations decreased from year to year. The calculated biomass oscillated between 1,712 tons (2008) and 627 tons in 2012 (Fig. 24).

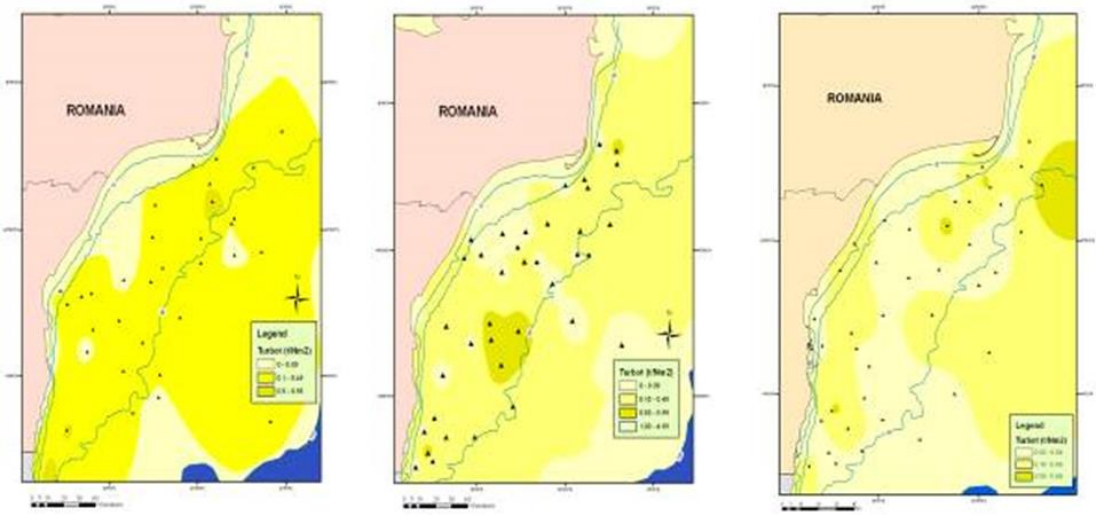

Fig. 14 - Distribution of the turbot agglomerations in the Romanian marine area in spring 2010-2012

The length spectrum of the turbot individuals ranged between 19-82 cm, dominant being the class of 49-52 cm (Fig.15).

The structure on age of the turbot catches indicates the presence of the individuals 1-9 years old, the catch basis is formed by 3 year old (24.107%), 4 year old (33.929%) and 4 year old (26.786%) individuals (Fig.16) [6, 10, 13-17, 20-25, 27].

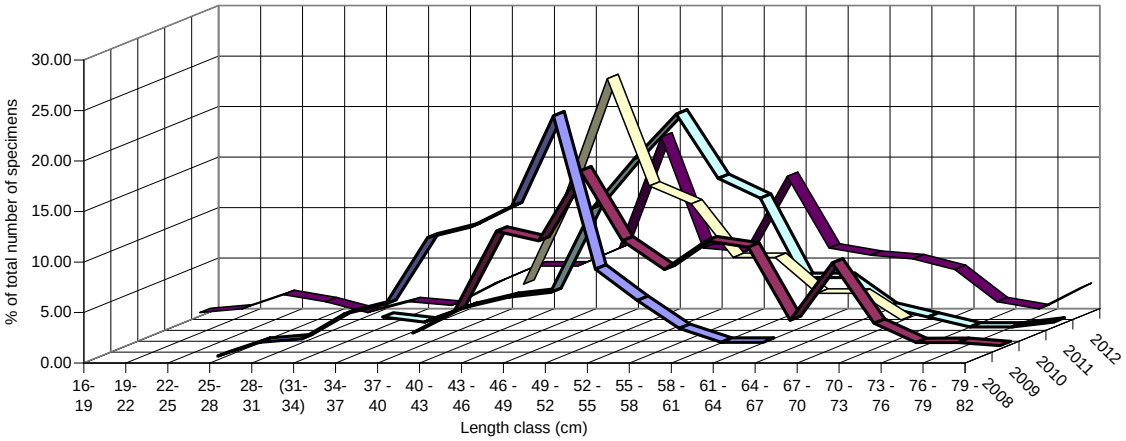

Fig. 15 - Percentage on length classes of turbot during 2008-2012

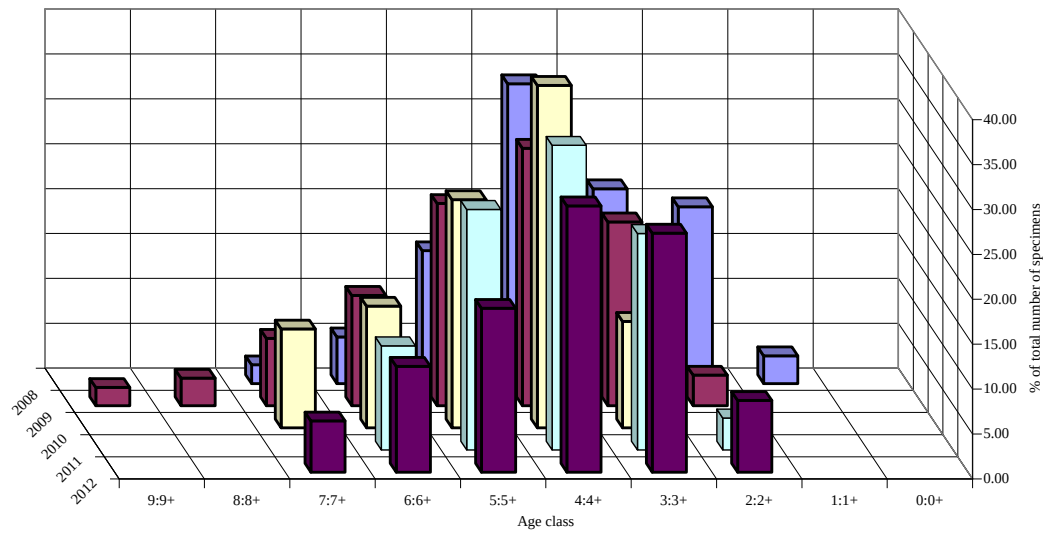

Fig. 16 - Percentage on age classes of turbot during 2008-2012

The following parameters were calculated for the growth and mortality rates of turbot:

a = 0.0898
b = 2.812
r = 0.9911
K= 0.21 - average
t_o = -1.638 - Bertalanffy
L_∞ = 82.9 cm - Gulland and Holt
Z = 0.572 - Beverton and Holt
Z = 0.439 - Ault and Erhart
M = 0.317- Rikhter and Efanov
M = 0.36 Pauly

For turbot, F is at the historical high level around 1.00, almost 6 times Fmax. The EWG classifies the stock of turbot in the Black Sea as being exploited unsustainably. The EWG notes that, despite the recently low TACs in the communitarian area (Romania and Bulgaria), the fishing mortality remains at a level with no signal of reduction [3-5].

STECF advises on the basis of precautionary considerations that there should be no fisheries for turbot and individuals caught unintentionally should be promptly released. STECF considers also that a management plan should be initiated to restore spawning stock biomass to the level capable of producing the maximum sustainable yield [3-5].

Whiting - *Merlangius merlangus* (Linnaeus, 1758)

Marine benthopelagic species, living in cold water, it is mostly encountered in coastal waters until 200 m depth, on the continental shelf from 10 to 130 m, on mud and gravel bottoms, but also on sand and rock. In spring and autumn, it is found near shore while in summer, when the temperature increases, it moves towards the offing and nears the coast only with cold-water streams. Juveniles are found closer to the shore, from 5 m to 30 m depth (Fig. 17) [12].

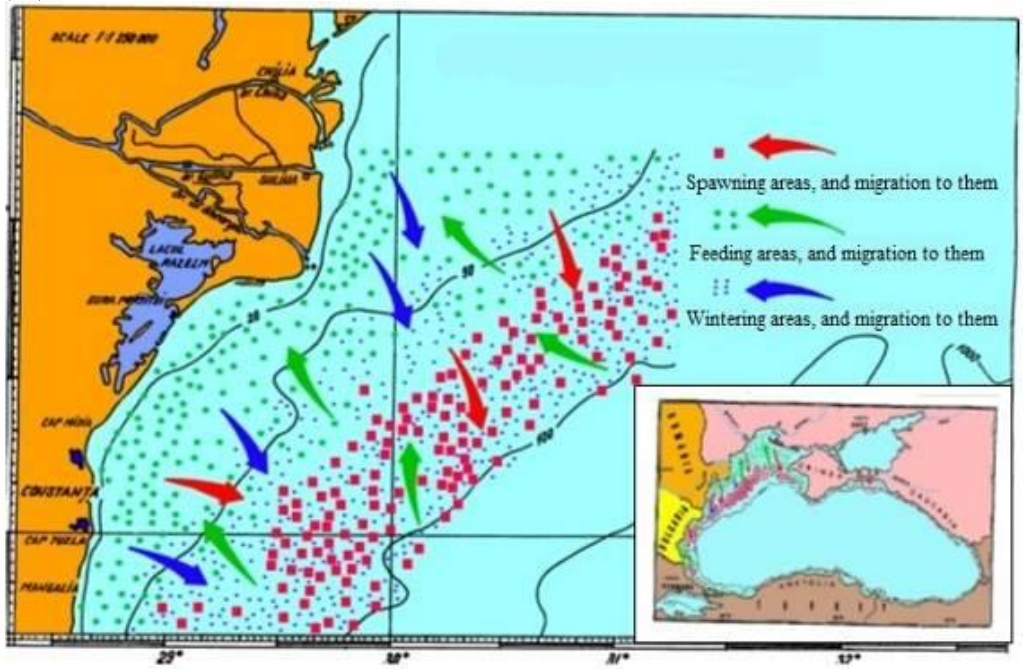

Fig. 17 - Migration routes, spawning, feeding and wintering areas of whiting

Whiting is present over the entire shelf, but the concentration of fishing agglomerations is highly influenced by environmental conditions, especially the direction and intensity of wind and water temperature (Fig. 18). The calculated biomass ranged between 26,171 tons (2011) and 6,565 tons in 2012 (Fig. 24).

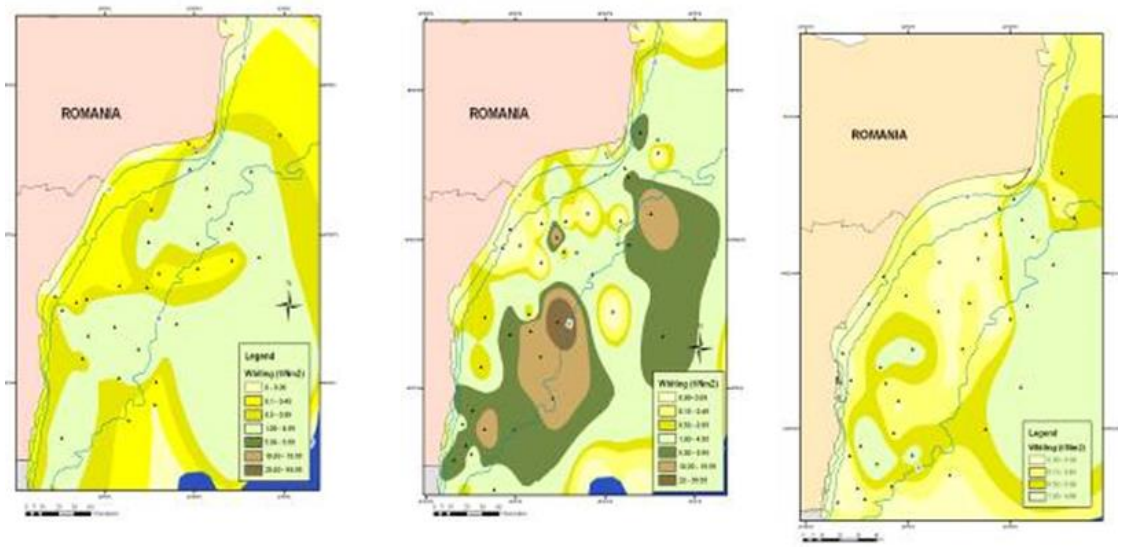

Fig. 18 - Distribution of the whiting agglomerations in the Romanian marine area in spring 2010-2012

The catches of *Merlangius merlangus euxinus* (whiting) also had the 5 year old age in the age-class composition, but little by little the age spectrum reached 0+ and maximum 3;3+ years during last years; the 1+ and 2;2+ groups prevailed (Fig. 19 and 20).

Like sprat, the phenomenon means that the pressure through fishing on the species populations increased once with the decrease of the importance of anchovy and mackerel. As soon as the stocks of the last two species, especially of anchovy, have begun to recover, the pressure on whiting decreased, leading to a slight restoration of its stock [6, 13-17, 20-25, 27].

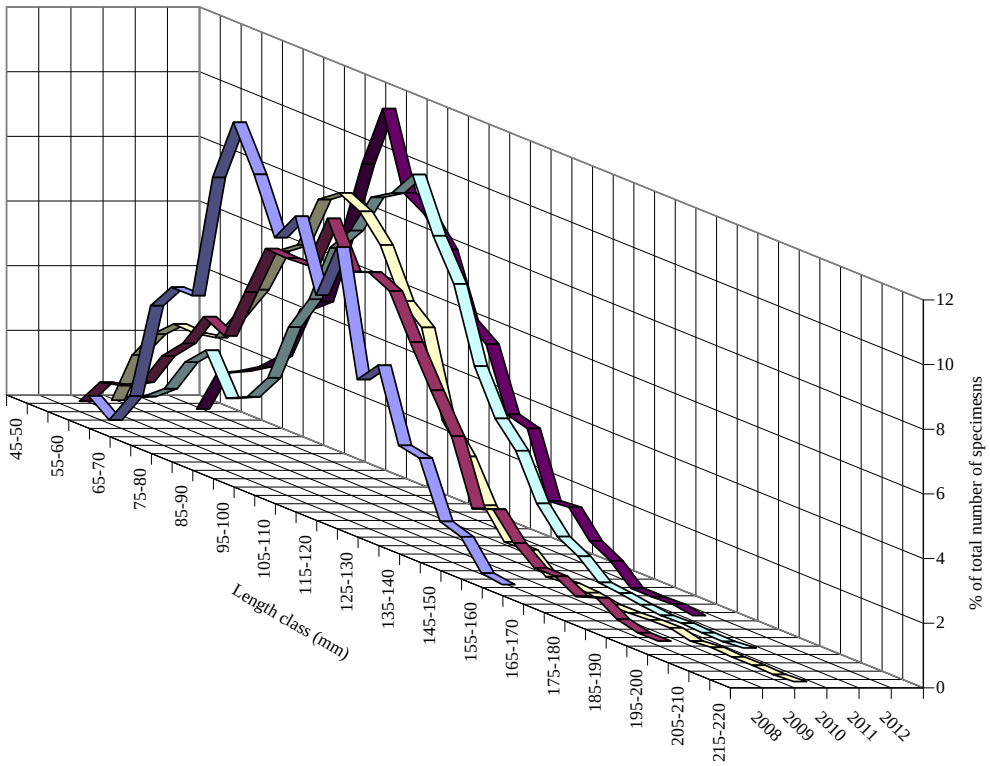

Fig. 19 - Percentage on length classes of whiting during 2008-2012

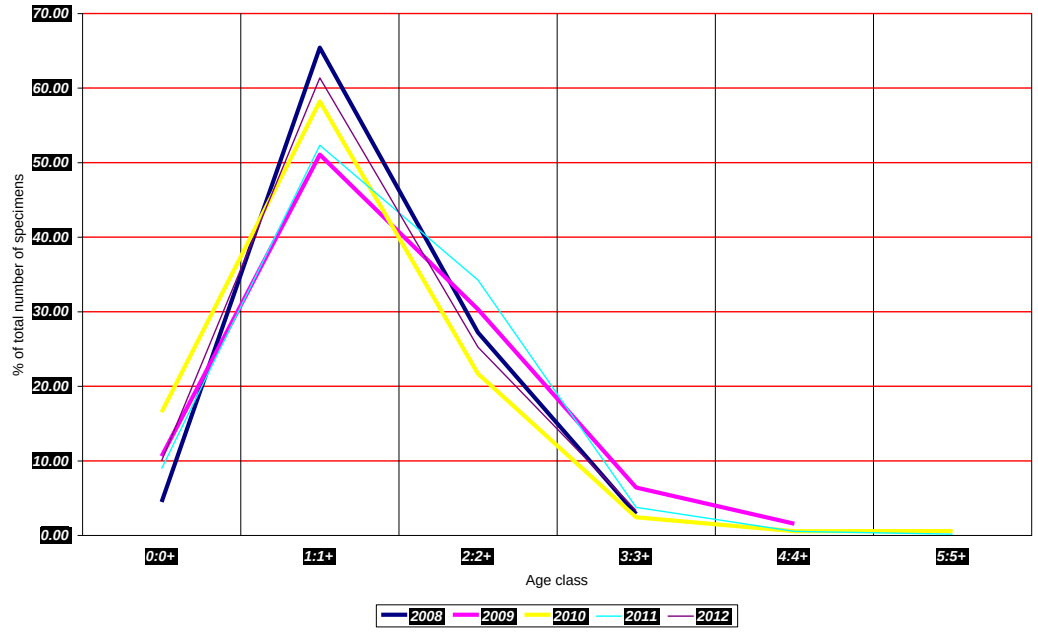

Fig. 20 - Percentage on age classes of whiting during 2008-2012

The following parameters were calculated for the growth and mortality rates of whiting:

a =0.00544

b =3.1471

K= 0.1559 average

t_0 = - 1.344 - Bertalanffy

L_∞ = 31.65cm - Gulland and Holt

Z =0.598 Beverton and Holt

Z = 0.588 Ault and Erhart

Z = 0.689 on number or specimens

M =0.457 Rikhter and Efanov

M = 0.323 Pauly

For whiting, the estimated F(1-4)= 0.66 exceeds F_{MSY}. The EWG 12-16 classifies the stock of whiting in the Black Sea as being exploited unsustainably [3-5].

Spiny dogfish *Squalus acanthias* Linnaeus, 1758

Migratory species, it lives in cold water. Concerning the spatial and temporal distribution at the Romanian littoral of this species, research has demonstrated that dogfish has two seasons when approaching the shore: first in April - June and second in October - November, at a depth ranging between 20-50 m. In winter and during spring time, dogfish inhabits the marine areas with depths over 65 m up to 120 m, while in June - August it is encountered at depths up to 60 m, being dispersed in the water mass (Fig. 21) [12].

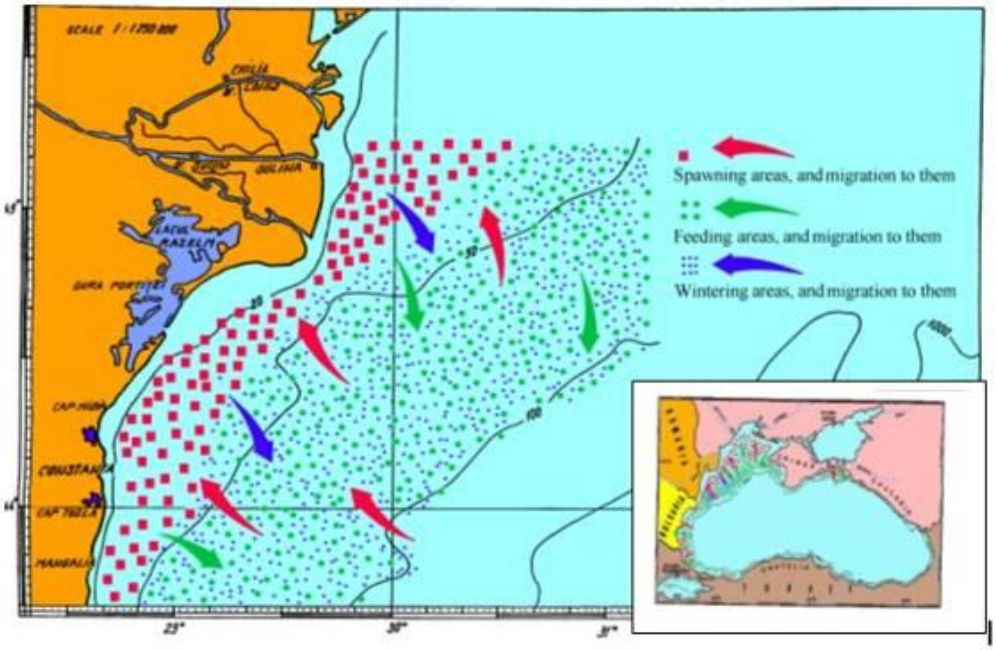

Fig. 21 - Migration routes, spawning, feeding and wintering areas of the spiny dogfish

A predatory species, dogfish agglomerates especially in the places where it finds prey species and environmental conditions favourable for breeding and feeding (Fig. 22). The calculated biomass ranged between 967 tons (2009) and 5,635 tons in 2010 (Fig. 24).

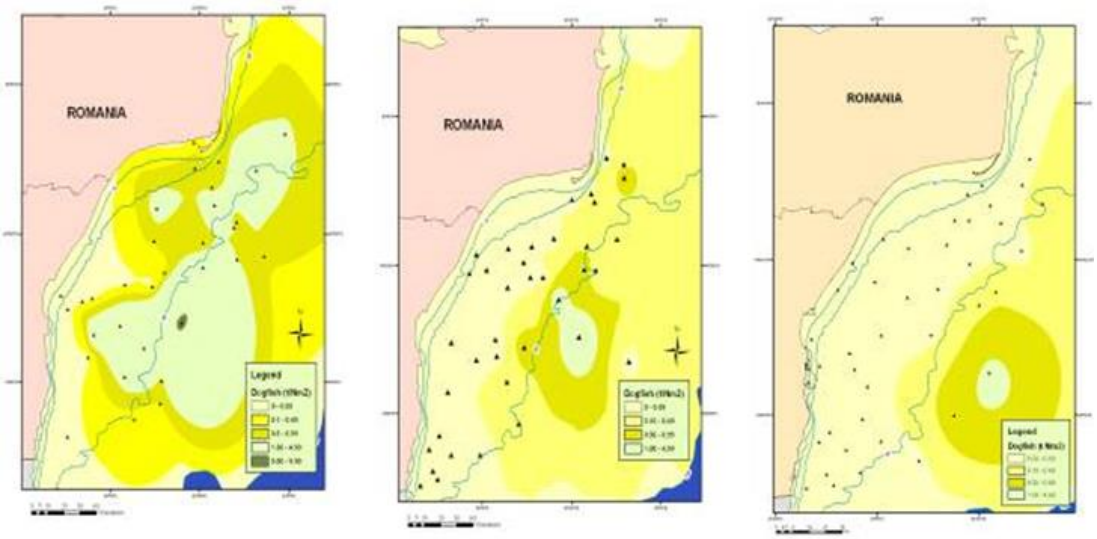

Fig. 22 - Distribution of the spiny dogfish agglomerations in the Romanian marine area in spring 2010-2012

Structure analysis on length and mass class of the spiny dogfish during 2010-2012 pointed-out the presence of medium size individuals, the length spectrum ranged between 89-134 cm, dominant being the classes 107-122 cm (Fig. 23) [6, 13-17, 20-25, 27].

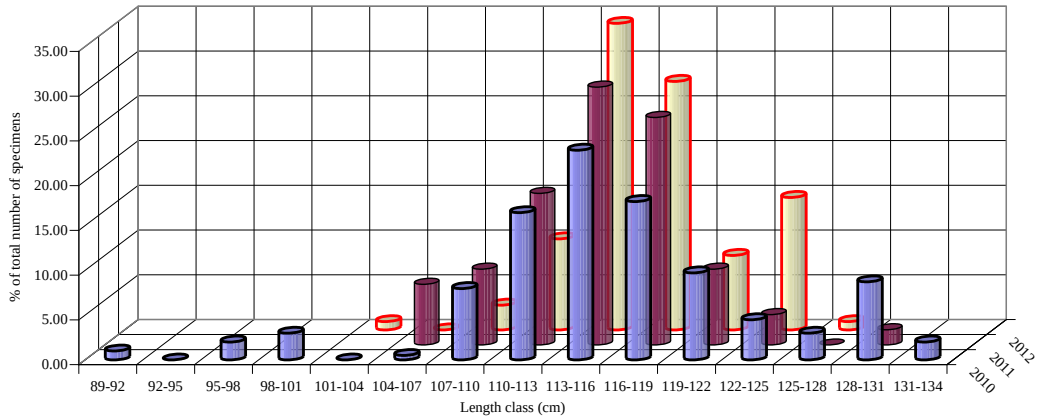

Fig. 23 - Percentage on length classes of spiny dogfish during 2010-2012

The following parameters were calculated for spiny dogfish:

a = 0.0117
b = 2.7694
q = -1.9328
M = 0.31 (Pauly)
M = 0.258 (Rikhter and Efanov)

For dogfish, the estimated F = 0.264 exceeds $F_{0.1}$, which classifies the stock of dogfish in the Black Sea as being exploited unsustainably [3-5].

The biomass of the main fish species

The calculated biomasses by the swept area method for the main species at the Romanian littoral ranged between: sprat (30,917 tons and 68,887 tons); turbot (627 t and 1,712 t); whiting (6,565 t and 26,171 t) and dogfish (967 t and 5,635 t) [13-17, 20-25, 27].

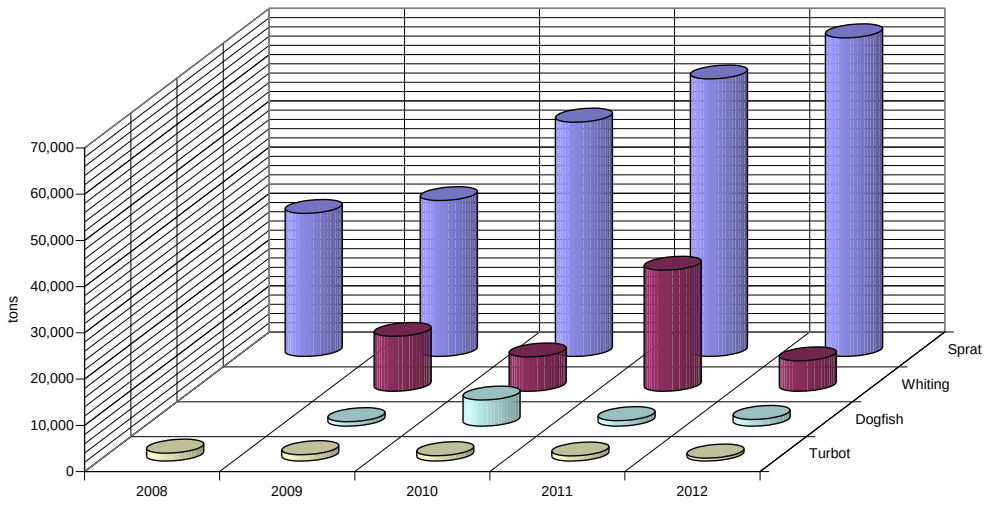

Fig. 24 - The biomass of the main fish species from the Romanian littoral (t)

Limit reference points

Four of the stock assessments undertaken by the Expert Working Group (EWG) 12-16, sprat, turbot, anchovy and whiting, were of sufficient quality to provide analytical estimates of recent exploitation rates and stock status in relation to proposed biological reference points. Although the assessments for sprat, anchovy and whiting are considered sufficiently reliable to be used as a basis for short-term catch forecasts, the assessment results for turbot and dogfish are less reliable and are indicative of relative trends only.

Based on the results of assessments for sprat, turbot, anchovy and whiting, the Scientific, Technical and Economic Committee for Fisheries (STECF) proposes that the following limit reference points be adopted as appropriate proxies for F_{MSY} and which are consistent with high long-term yields [3-5].

Sprat: $F_{MSY} = F \leq 0.64$, consistent with the exploitation rate $E \leq 0.4$

Turbot : F_{MSY} = Range ($F_{0.1}$-F_{MAX}) is F=0.07 - F= 0.15

Anchovy $F_{MSY} = F \leq 0.54$, consistent with the exploitation rate $E \leq .0.4$

Whiting: $F_{MSY} = F \leq 0.40$

Dogfish: $F_{0.1} = F \leq 0.227$

The lack of an adequate management in the Black Sea fisheries is evidenced by the fact that, in spite of evident decline of stocks, the fishing effort continued to increase at regional level [3-5].

Taking into account that the majority of fish species are shared within the EEZ of the Black Sea riparian countries, the stocks being common, the Romanian catches are regionally almost insignificant, a situation reflected in rows 1 and 5 (Table 1). Romania can completely shut-down marine fishing, but as long as stocks are not managed at regional level, this will not improve the state of stocks.

Table 1 - Ratio between F estimated and F target for 2012

		Sprat	Turbot	Anchovy	Whiting	Dogfish	All other species and total
1	Catch in Fleet or metier segment	134	43.2	41	27	4	568.197
2	Total catch at BS level	120,710	485.6	238.153	8.249	104.207	500,000
3	Current F (Stock assessment)	0.8	0.15	1.3	0.66	0.26	unknown
4	Current F applied to Romanian fleet (row 4 times (row 1 divided by row 3))	0.0010	0.0134	0.0003	0.0022	0.0001	unknown
5	Target F (stock assessment)	0.64	0.15	0.54	0.4	0.227	unknown

Degree of parasite infestation

In ordr to identify the parasite fauna of the marine fish, 16 species were analyzed, as follows: *Squalus acanthias* - spiny dogfish, *Sprattus sprattus* - sprat, *Alosa caspia nordmanni* - Caspian shad, *Alosa immaculata* - Danube shad, *Engraulis encrasicholus* - anchovy, *Merlangius merlangus euxini* - whiting, *Belone belone euxini* - garfish, *Gaidropsarus mediterrneus* - shore rockling, *Atherina hepsetus* - sand smelt, *Trachurus mediteraneus ponticus* - horse mackerel, *Mullus barbatus ponticus* - red mullet, *Mesogobius batrachocephalus* - flathead goby, *Psetta maxima maeotica* - turbot, *Platichthys flesus luscus* - European flounder, *Scorpaena porcus* - black scorpionfish, *Solea nasuta* - snouted sole.

At the fish examined, 19 species of parasites were found, including: five species of ectoparasites (protozoa - *Trichodina domerguei* and *Cryptocaryon irritans;* flat worms - *Mazocraes alose, Axine belones* and nematodes *Cystoopsis acipenseris)* and 14 species of endoparasites (protozoa - *Eimeria clupearum, Glugea anomala;* flat worms - *Stepahanostomum sp., Lecithaster tauricus, Bucephalus sp., Tentacularia sp., Bothriocephalus scorpii;* species of nematode worms - *Contracaecum aduncum, Contracaecum sp., Anisakis sp., Porrocaecum sp., Philometra sp.;* acanthocephalan - *Teleosentis exiguus, Pomphorhynchus laevis).*

The degree of parasite infestation of the fish, pursued by parasitisation intensity (number of parasites/host) and parasitisation extension (number of fish with parasites) varied depending on the parasite and the species affected.

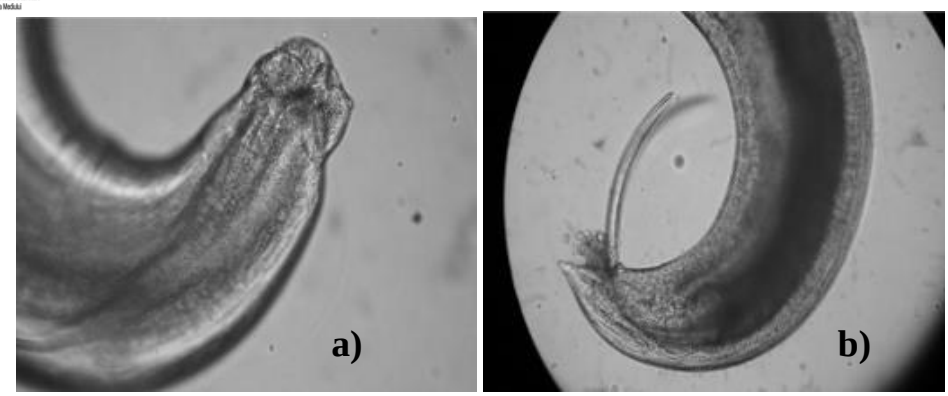

Fig. 25 - *Contracaecum aduncum* (a - the front part; b - rear part of the male)

The most common species of parasites were the nematode worms *Contracaecum aduncum*, *Contracaecum* sp., *Porrocaecum* sp., reported in all fish species analyzed, affecting their abdominal cavity and internal organs, especially the liver (Fig. 25).

The degree of infestation with these parasites has registered maximum values for sprat, Caspian shad, horse mackerel, anchovy (expandable up to 80-100% and intensities up to 20-40 parasites/host).

In the 2 Mai-Vama Veche area, 62% of the specimens examined were parasitized, the highest values being reported in the 11-12 cm long specimens, 80-86% extent. In small specimens 8-9 cm long, the average invasion intensity was 4.7 to 8.9 parasites/host, while in 10-12 cm long specimens this parameter reached 13.8 - 19.3 parasites/host, the peak being 26 parasites/host.

In the Danube's Delta marine zone, the average number of parasites/infected fish as compared to the average number of total fish parasitized analyzed also showed higher values in 11-12 cm long anchovy (10-11 parasites/host) and lower in specimens of smaller size (3-5 parasites/fish) (Fig. 26, 27, 28).

Although the number of analyzed fish was quite low, they showed some of the specific changes caused by parasites, when the intensity of parasites was greater than 30 parasites/host, as relatively severe degeneration and atrophy consisting of liver lesions and bleeding in the digestive tract. However, these changes were noted only in a few fish individuals. If the number of fish with such infestation intensities were representative and knowing that the effects of parasites can be fatal, stock size would be severely damaged.

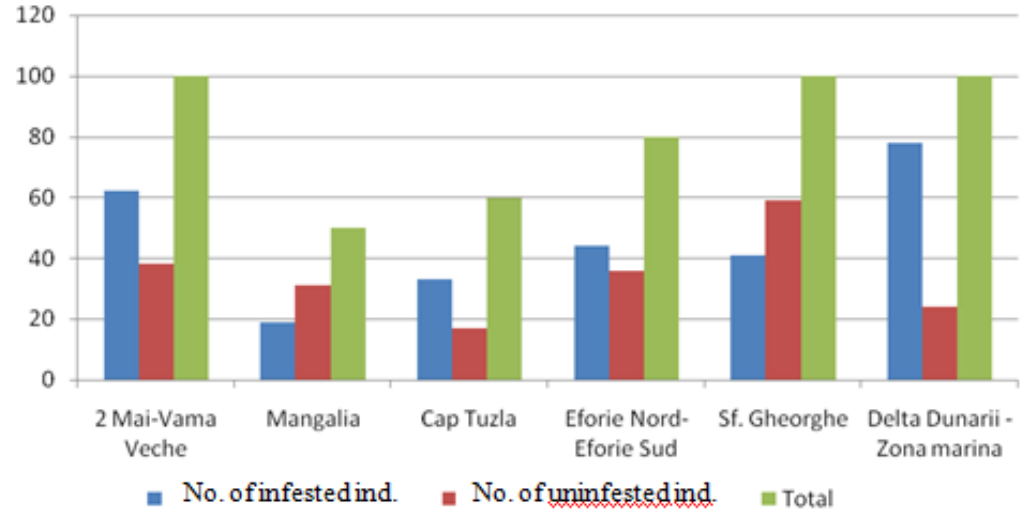

Fig. 26 - The parasitization of anchovy with nematode worms

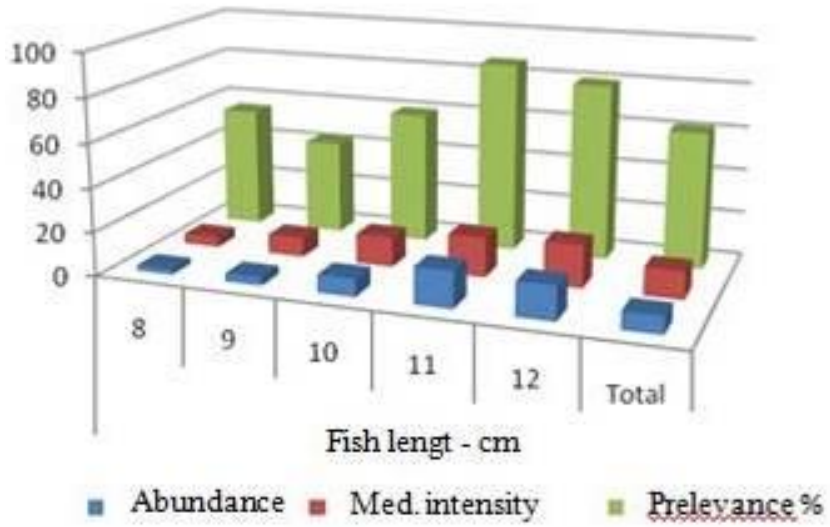

Fig. 27 - The parasitization of anchovy on length classes in the Vama Veche - 2 Mai area

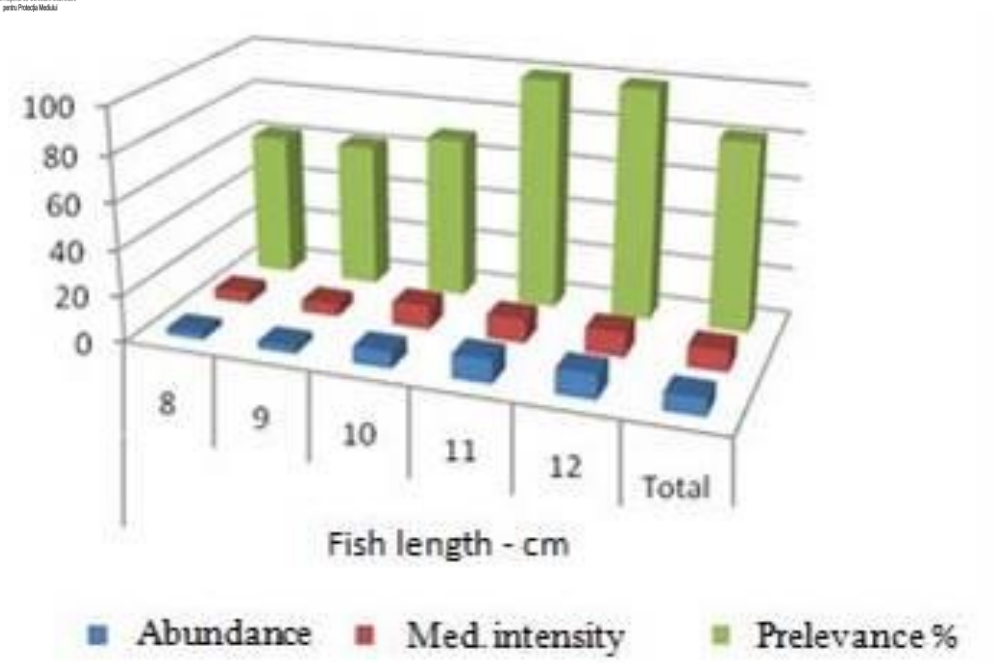

Fig. 28 - The parasitization of anchovy on length classes in the marine area of the Danube Delta

Management recommendations

Black Sea needs a special policy to preserve and improve the situation of fishery resources and ensure that the fisheries sector is suited to the Black Sea basin, bearing in mind the specificities of the Black Sea region [8, 11]. The creation of a common mechanism for the six countries bordering the Black Sea should be examined from a long-term perspective in order, among other things, to guarantee the protection of the environment and to facilitate the economic and social development of littoral areas, taking into account that:

- The problems of the Black Sea are the result of the lack of an appropriate institutional structure that coordinates and carries-out the management of Black Sea fisheries at a professional and specialized level.
- At regional level, catches and fishing effort increase beyond the natural recovery capacity of stocks in spite of evident decline of stocks, in particular in the case of threatened species as sturgeons, turbot, spiny dogfish, bonito etc.
- There is no regionally agreed system to adjust the catches to the status of these stocks; fisheries regulatory framework promoted by each country is not harmonized regionally (prohibition periods, minimum admissible fish length etc.).

Required activities

- Facilitate the exchange of national information on regulations regarding fishing right allocation, fishery efforts, impact of aquaculture and fisheries on natural ecosystems, and good environmental practices for fisheries and aquaculture;
- Create, maintain and upgrade the Black Sea Fisheries Database comprising information on fisheries statistics, environmental conditions, stock assessments and interdisciplinary

research programs in the Black Sea Region as a component of the Black Sea information system;
- Develop and promote standardized techniques of the catch estimates, assessment methods for stocks and exploitable biomass of key species;
- Facilitate annual exchanges of national fisheries statistics data and National Fishery Researches Reports;
- Coordinate regular stock assessments and common vessel surveys;
- Prepare recommendations for management plans for selected key fish stocks and draft common fisheries management procedures, taking into account those promoted by EU, FAO and other international specialized institutions;
- Prepare and coordinate the specific projects for the protection and rehabilitation of the critical habitats and threatened key species, in particular spawning and nursery grounds for demersal species like sturgeons, spiny dogfish and turbot;
- Prepare and coordinate specific projects for the development of marine aquaculture in the Black Sea area;
- Cooperate with relevant international and regional fisheries organizations: FAO/GFCM, ICES, BSEC, Fisheries Commission for the Baltic Sea and for the Mediterranean Sea etc.

CONCLUSIONS

- Fishery is the most affected sector by the changes of the Black Sea ecosystem.
- Changes in the ichthyofauna composition of the Black Sea have primarily involved alterations in the number of individuals in specific populations.
- The majority of fish species having commercial value are shared within the EEZ of the Black Sea riparian countries.
- The fisheries regulatory framework is promoted by each coastal country, not being harmonized at regional level, even in the case of shared or migratory species.
- The methods and tools for sampling, processing, analyzing and interpreting the data and information, as well as the fish stock assessment are standardized at regional level and in conformity with the international practice.
- The paper makes a brief description of the state of the main fish species of commercial interest in the Romanian marine area during the past five years (sprat, anchovy, horse mackerel, turbot, dogfish and whiting).
- During the past two decades, fish catches in the Romanian marine area continuously decreased, but, in the past two years, the trend is reversed due to the catches of rapana, which has begun to have an important share.
- The Romanian catch is regionally almost insignificant, having a very low contribution to the depletion of the stocks.
- For sprat, EWG considers the stock is exploited unsustainably.
- For anchovy, the stock is overexploited.
- Given the available data for the assessment of horse mackerel in the Black Sea, EWG 12-16 is unable to provide advice for the medium term future. But, taken into account the Romanian data, the stock is overexploited in the wintering area.
- The EWG classifies the stock of turbot in the Black Sea as being exploited unsustainably. STECF advises on the basis of precautionary considerations that there should be no fisheries for turbot.

- The EWG 12-16 classifies the stock of whiting in the Black Sea as being exploited unsustainably.

- The EWG 12-16 classifies the stock of dogfish in the Black Sea as being exploited unsustainably.

- Although the number of analyzed fish was quite low, they showed some of the specific changes caused by parasites, when the intensity of parasites was greater than 30 parasites/host. However, these changes were noted only in a few fish individuals.

- The problems of the Black Sea are the result of the lack of an appropriate institutional structure that coordinates and carries-out the management of Black Sea fisheries at a professional and specialised level.

- Black Sea needs a special policy to preserve and improve the situation of fishery resources and ensure that the fishery sector is suited to the Black Sea basin.

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