EVOLUTION OF DEMERSAL FISH SPECIES CATCHES FROM THE ROMANIAN MARINE AREA BETWEEN 2000 AND 2007

V. MAXIMOV, I. STAICU
National Institute for Marine Research and Development
"Grigore Antipa" Constantza

ABSTRACT

Demersal fish species populating the Romanian continental shelf of the Black Sea represents the most important part of the regional fish potential considering the commercial interest, the demand in the hone and foreign market. Among the demersal fish species one of the most important commercial interest are in *Psetta maxima maeotica* (turbot), *Platichthys flesus luscus* (European flounder), *Huso huso* (beluga), *Acipenser gueldenstaedti* (Danube sturgeon), *Acipenser stellatus* (starrz sturgeon), *Gobiidae* (gobie), *Mullidae* (striped mullet) and *Squalus acantias* (picked dogfish).
Present paper, reviews actual state demersal fishing, in Romanian marine area of the Black Sea and the evolution in time of main demersal fish species.
Between 2000 and 2007, demersal species represented 15 to 20 % from total catch realized by commercial fishery, practicing demersal fishing. Demersal catch were realized both by the trawler vessels, a passive fishing, and by gill nets and installation the fishing within the coastal areas of small depth (traps net, gill net, long line and fishing rod).
In the paper, is presented the qualitative and quantitative structure of the demersal fish catches, from Romanian littoral sector, between 2000 and 2007.

KEY WORDS : Black Sea, demersal species, turbot, picked dogfish, whiting, striped mullet, flat-head goby, European flounder

1. INTRODUCTION

Over the last 50 years, the Black Sea ichtyofaune has undergone major changes concerning either its qualitative and quantitative structure and the behaviors of various species. These changes are consequences of human

activities, directly through the fishing pressure and indirectly through the deterioration of the environmental conditions, especially in the western part of the Black Sea.

A specific feature of the Pontic Basin is that most of the fish species cover large areas located within the exclusive zones of the riparian countries. In this connection the Romanian littoral is an important place for the feeding and spawning of the main fish species, although the catches got in this area don't exceed 2% of the total Black Sea catch.

The bottom fish species inhabiting the Romanian Black Sea shelf represent the most important part of the regional fishery potential considering the commercial interest, the demand in the home and foreign market. Among the bottom fish species, the turbot (*Psetta maeotica*), flounder (*Platichthys flesus luscus*), beluga (*Huso huso*), Danube sturgeon (*Acipenser gueldensteadi*), starry sturgeon (*Acipenser stellatus*) and picked dogfish (*Squalus acantias*) are suitable for a commercial fishing, and a good exploitation management and a good utilization of their catches could ensure the economic recovery of our national marine fisheries which could launch on the market valuable fishery products.

2. MATERIAL AND METHODS

The methodology and techniques that have been used are generally the ones accepted for the Black Sea basin, in concordance with the international methodology.

The qualitative and quantitative structure for the demersal fishes was made through gathering data from the commercial fishing units and fishermen interviews. The fishing effort was obtained through data gathering from economical agents in this field.

3. STATE OF FISHERIES AT THE ROMANIAN BLACK SEA LITTORAL

The marine demersal fishing along the Romanian Black Sea shore is made in two ways:

- **fishing with coast trawler vessels, *B-410, Baltica* and *T.C.M.N.* types, equipped with *pelagic trawl* and *gill nets,* which activates offing, at depths bigger than 20 meters;**
- fishing along the shore, practiced in the 28 fishing points, between *Sulina – Vama Veche,* in shallow waters (3,0 – 11,0 meters), using fix

tools (*trap nets, gill nets, long line, and beach* seine) and at depths of 40 – 60 meters, using gill nets and long line.

3.1. The offing fishing

Today, offing, almost all coastal trawlers have gill nets, and the installations needed for using them, but a specialized turbot fishing practice the vessels: ***DRAGONUL*** (ROU–P–040254 CT), ***YILDIRIMLAR – I*** (ROU–P–060030–CT), ***BARACUDA II*** (ROU–P–060244–CT), ***HENDEM MUSTAFA*** (ROU–P–040026–CT) (Table 1, photo).

Table 1
Vessels and fishing tools used In the fishing activity during 2004-2006

Vessel	**Corporation**	**Organization**	**no. gill nets**
DRAGONUL 1	S.C. *BRIVAS* SRL	Professional fishing organization ***RO - PESCADOR***	670
BARACUDA II	S.C *ANDREAS TRADING* SRL		500
HENDEM MUSTAFA	S.C. BALENA		1.000
BARACUDA	S.C. PLASFIRTEX SRL		400
CHEFAL 6	S.C. *FISHING MERIDIAN* SRL		610
FLAMINGO 4	S.C. *MIADMAR* SRL		100
MEDUZA 4			450
CYRUS	S.C BLACK SEA STURGEONS SRL		465
YILDIRIMLAR – I	S.C. *SMART FISH* SRL		1.000
MEDUZA 2	S.C. *EURO MOBILE* SRL		400
CHEFAL 10	S.C. *DUNARAF* TRANS SRL		
CHEFAL 12			
0178 SL	S.C. *GEO FISHING* SRL		380
MORUNUL	S.C. *MORUNUL* SRL		100
T O T A L			**6.075**

MEDUZA 2 (ROU-P-060244–CT) ***DRAGONUL*** (ROU–P–040254 CT)

BARACUDA II (ROU–P–060244–CT) ***HENDEM MUSTAFA*** (ROU–P–040026–CT)

Trawler types used for demersal fishing (Photo Maximov)

3.2. Coastal fishing

In the coastal zone of the Romanian shallow marine sector, the fishing is characterized by the concentration of the activity in the first three – four months of the season (April – July) when the turbot comes close to the shore for feeding and reproduction. The fishing is practiced along the coast, between Sulina and Vama Veche, in the 28 fishing points (Fig. 1 and Table 2).

For this, a number of 134 boats were licensed (114 with engine), and besides them 313 sportive fishing boats are practicing. In fishing, about 30 trap nets, 2.251 gill nets, 544 long lines, 1.172 de volts and 16 beach seine and a number of 905 fishermen personnel, of which 435 are professionals and 697 amateurs (Table 2).

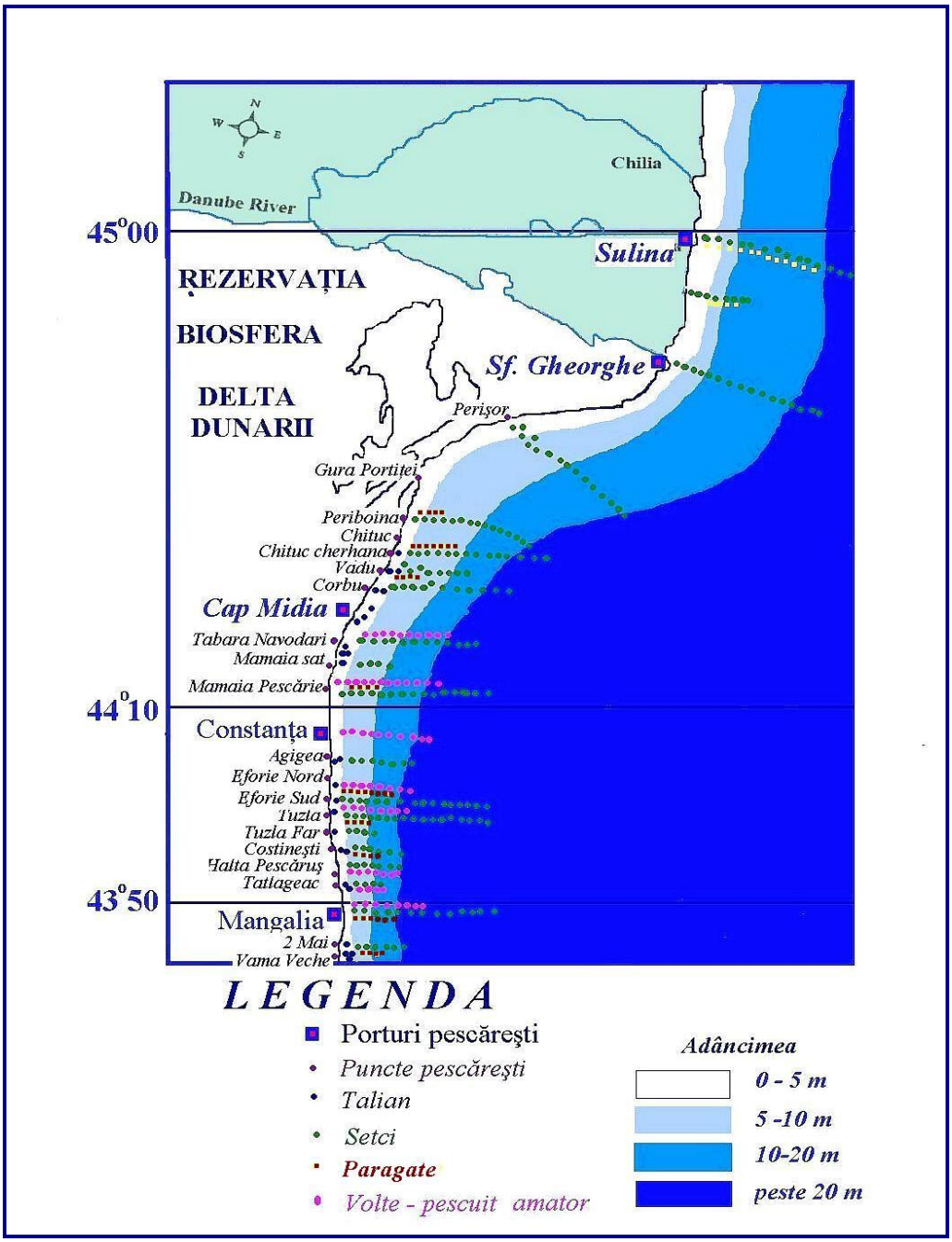

Fig. 1 – Romanian coastal zone of the Black Sea (Total coastal length – 245 km (6%); Continental shelf – 30 000 km^2 (16%); EEZ – 25 000 km^2)

Table 2

Boats number and fishing tools used in demersal marine fishing during 2004-2006

No.	Fishing point	Boats				Fishing gears							No. pers.*	
		Total	Licensed	With motor	Without	Trap nets	Gill nets	Gill alose	Gill gobids	Beach seine	Long-line	volts	P	A
1	Sulina	2	2	2	-	-	100	-	-	-	-	-	4	-
2	Sf. Gheorghe		1	1	-	1	100	-	-	1	-	-	3	-
3	Perisor	14	14	-	14	-	20	320	-		126	-	22	-
4	Periboina	7	7	-	7	-	20	50	-	1	-	-	14	-
5	Chituc pichet	2	2	-	2		2-	50	-	-	-	-	3	-
6	Chituc cherhana	5	5	2	3	2	200	60	-	4	40	-	6	-
7	Vadu	3	3	1	2	2	150	50	10	1	-	-	8	-
8	Corbu	3	3	-	3	3	200	50	-	1	30	-	7	-
9	Cap Midia	8	8	2	6	2	50	10	-	1	10	-	10	-
10	Cap Midia cherhana	6	6	3	3	2	50	20	-	-	-	-	12	-
11	Tabara Navodari	8	8	5	3	2	60		-	-	-	-	18	-
12	Mamaia sat	6	6	-	6	4	50	20	-	1	10	-	15	-
13	Mamaia pescarie	52	2	50	2	-	50	20	-	1	28	220	16	106
14	Constantza (As. Albatros)	40	2	40	-	-	50	10	-	-	-	140	5	70
15	Agigea	3	3	-	3	3	100	10	10	-	10	-	8	-
16	Eforie Nord	3	3	2	1	1	20	10	-	-	-	-	50	-
17	Eforie Sud	27	3	22	5	2	50	10	-	2	-	60	20	60
18	Tuzla (As. Delfinul)	70		56	14		20	20	10	1	10	150	14	150
19	Tuzla far	3	2	-	3	1	50	30	20	-	20	-	6	-
20	Costinesti	3	3	-	3	2	136	10	10	1	-	-	20	-
No.	**Fishing point**	**Boats**				**Fishing gears**							**No. pers.***	
		Total	**Licensed**	**With motor**	**Without**	**Trap nets**	**Gill nets**	**Gill alose**	**Gill gobids**	**Beach seine**	**Long-line**	**volts**	**P**	**A**
21	Golful Francezului	5		3	2	-	10	10	10	-	-	20	17	12
22	Halta Pescarus	32	8	30	2	-	180	50	160	-	20	200	16	48
23	Tatlageac (Olimp)	12	5	8	4	2	150	20	-	-	10	12	12	12
24	Jupiter Cap Aurora	4	4	2	2	-	10	-	10	-	-	20	2	8
25	Saturn	3	3	-	3	-	10	-	10	-	-	10	2	6
26	Mangalia	80	10	73	7	-	200	-	-	-	200	300	20	190
27	2 Mai	18	7	12	6	1	30	10	20	-	20	40	9	35
28	Vama Veche	8	4	-	8	6	65	20	30	1	10	-	8	-
TOTAL		**427**	**134**	**313**	**114**	**36**	**2151**	**810**	**200**	**16**	**544**	**1172**	**435**	**697**

* P – professional fishermen; A – amateur fishermen

The catches level and fishing productivity differed from year to year, depending on the fishing effort, the evolution of the hydro – climatic conditions and the turbot stocks state.

4. FISHING GEARS USED AT THE ROMANIAN LITTORAL

For capturing the demersal fish species, the fisheries at the Romanian sea shore use traditional passive fishing tools, such as: turbot gill nets, longlines and bottom lines, beach seine (NICOLAEV, 1988).

The turbot gill nets are made of net by the mesh size a = 200 mm and thread diameter $\varphi \leq 0.5$ mm. The turbot is especially caught during the spring season (March – June) when it migrates to the spawning grounds (Fig. 2). The Danube shad gill nets are installed perpendicular to the shore, while the turbot gill nets are placed parallel to the shore, at a greater depth at the beginning of the season and gradually at smaller depths.

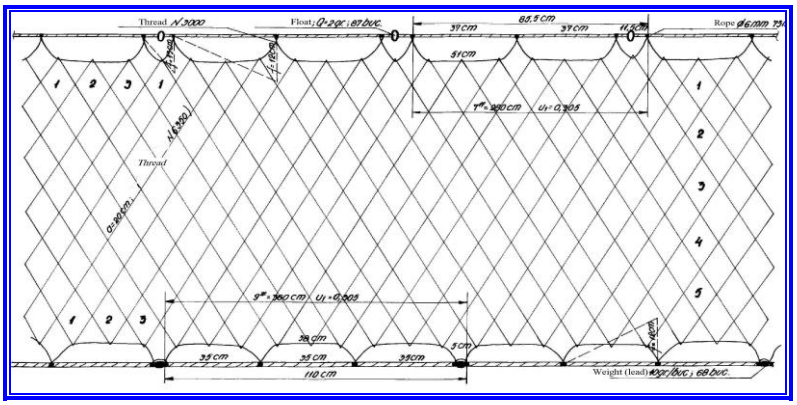

Fig. 2 - Gill net for turbot

The longlines and bottom lines are hook fishing gears for catching high commercial value fish. The longline is a row of hooks with baits alluring the fish which is caught when swallowing the hook with bait. The longlines are main fishing gears for some species (such as dogfish, goby) and auxiliary fishing gears for turbot, sturgeons, stingray, etc. At the Romanian Black Sea shore, the goby longlines are used in the southern area, a small number of goby longlines are used in the northern area, while the longlines for sturgeons, turbot and dogfish–along the entire littoral (Fig. 3).

The dolphins can become victims of these fishing gears if they are allured either by the bait in the hooks of the longlines for dogfish, or by the small fish (flounder, turbot juveniles) already caught in the longlines.

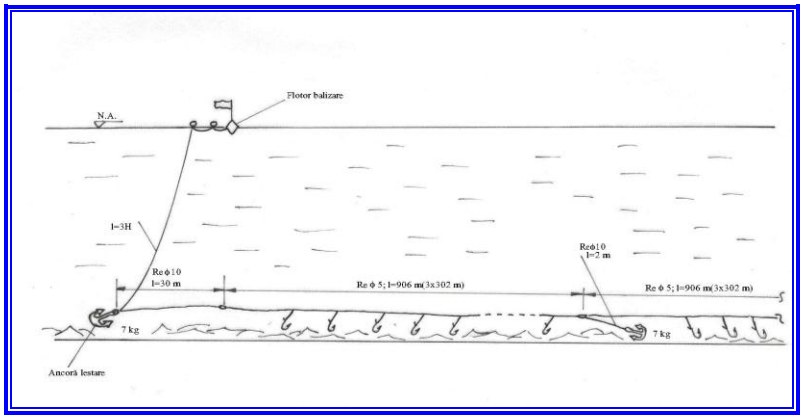

Fig. 3 - How to install a longline

By practicing specialized turbot fishing, most of the fishing boats equipped with mechanized installations (Fig. 4).

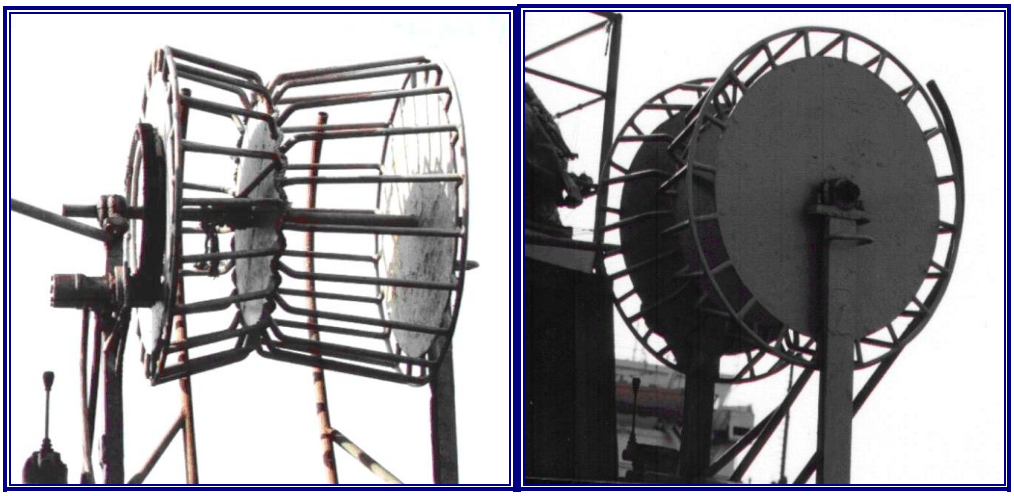

Fig. 4 – Fishing gears (photo Maximov)

5. DYNAMICS IN THE BOTTOM CATCHES IN THE ROMANIAN SECTOR

Although the Romanian littoral has a length of 244 km, before 1980 the Black Sea coastal fishery represented only 8% of the Romanian total marine and ocean fishery and mainly resulted from a passive fishery (with pound nets, beach seines, gillnets, trammel nets, bottom lines) along the seaside from Sulina to Mangalia. Beginning with the ‘80s, when the active

fishery started by the creation of the coastal fishing fleet, the volume of catches doubled and the major part represent the pelagic species.

The reduced percentage of the turbot catches due the costal vessels which fished primarily small pelagic species (sprat, horse mackerel, anchovy), their objectives being an important material production, not taking care of the diversity and commercial value, and maintaining low prices on the internal market.

After 2000, the economic operators that activates in the Romanian marine sector changed their options, by doting their vessels with equipments and fishing tools specialized in turbot fishing (MAXIMOV *et al*., 2006).

The demersal catches made at the Romanian littoral between 2000-2006, were dependant both on the activity area and the used fishing technology. The average catches were between 375 t / 2003 and 158 t / 2002 (Fig. 5).

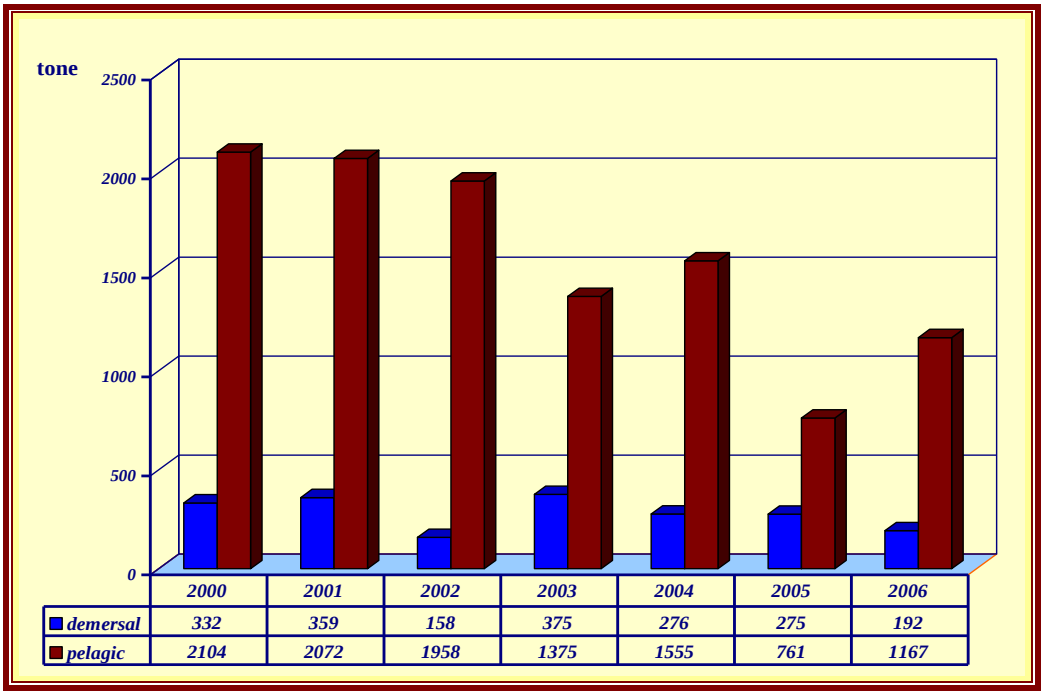

Fig. 5 - Dynamics in the bottom catches, during 2000 - 2006

Also in the last three years the demersal catches had a decrease tendency, from 375 t / 2003 to 192 t / 2006, in the annual statistics the increase of the valuable species, especially turbot catches was noticed (24t / 2003 la 37 t / 2005).

6. SPECIES STRUCTURE OF BOTTOM CATCHES

The F.A.O. Statistics for the Black Sea include more than 20 species; only 10 of them (belonging to 7 families) are listed for the Romanian marine sector. The same as for the entire Black Sea, the highest proportion in the catches at the Romanian littoral belongs to *Gadidae* family *(Merlangius merlangus euxinus /* whiting*)* with more than 42% - it is a less valuable species owing to its poor quality meat. The other bottom species with high nutritious and commercial values are included in small proportions in the catches: 15,98 % *Scophthalmidae* (*Psetta maeotica/*turbot), 28,40% - *Gobiidae* (*Mesogobius batracephalus/*knout goby, *Neogobius cephalarges/*ginger goby, *Neogobius melanostomus/*round goby), and 6,0% *Mullidae* (*Mullus barbatus ponticus/* red mullet), 5,7% *Soleidae* (*Solea vulgaris* /sole, 1% - *Acipenseridae* family (*Huso huso* /beluga; *Acipenser guldenstaedti/*Danube sturgeon , *Acipenser stellatus/* starry sturgeon), 1% - *Squalidae* (*Squalus acanthias/* picked dogfish)(Maximov et al. 2002, 2006) (Fig. 6).

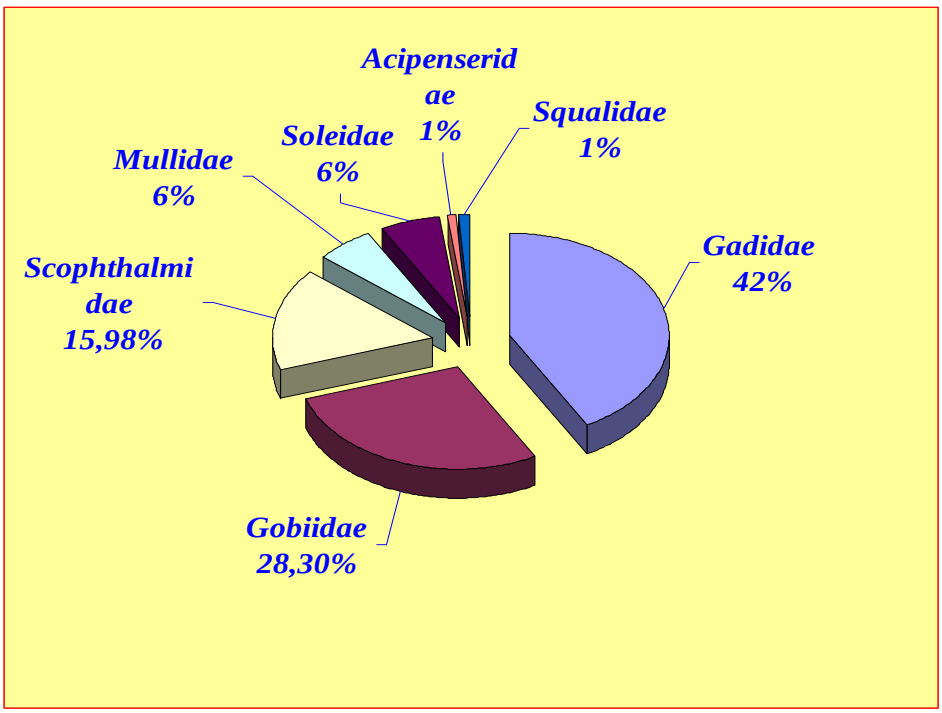

Fig. 6 - Percentage of the most important demersal fish species for fishing along the Romanian seaside, during 2000 – 2006

Besides, some species occurred in isolated individuals, in catches: *Dasyatis pastinaca*; *Raja clavata*; *Platychthys flesus luscus*; *Sciaena cirrosa*;

Symphodus ocellatus, *Symphodus (Crenilabrus) cinereus*, *Scorpena porcus*, *Scorpena notata*, *Parablennius sanguinolentus*, *Syngnathus typhle*, *Parablennius tentacularis*, *Neogobius platyrostris*; *Gaidropsarus mediterraneus*; *Callionymus pussillus*) (MAXIMOV *et al.*, 2002, 2006).

7. THE EVOLUTION OF THE MAIN DEMERSAL SPECIES CATCHES

7.1 ***Psetta maxima maeotica*** Pallas, 1831 (turbot)

Marine demersal species, belonging to soft bottoms. The young stay close to the shore, on sandy bottoms and as they grow up they retire to bigger depths. The adults are located in winter at depths of 60 – 70 meters. In spring (*March – April*) they come close to the shore, to a depth of 18 – 30 meters (the inferior limit of the *Corbulomya* facies), but not everywhere, only in specific places, where they form big reproduction crowds. The species reproduce along the whole Black Sea shore (8 – 12ºC temperature, 16,29 – 19,3‰ salinity), from the end of March to July, close to the shore, at depths of 50 meters. After they reproduce, they dissipate on the whole surface of the Romanian continental platform and than retire again at depths of over 60 – 70 meters (BACESCU, 1960; MAXIMOV *et al*., 2002, 2006).

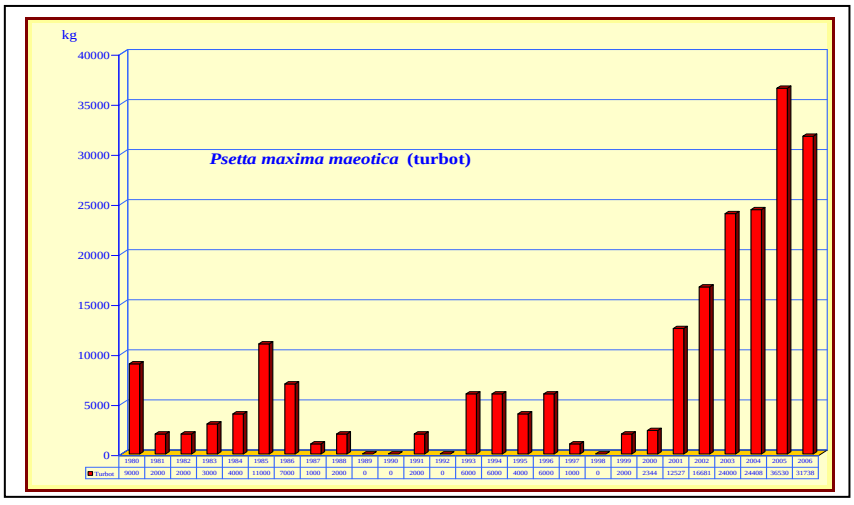

Fig. 7 – Total catch (kg) of species turbot (*Psetta maxima maeotica* P.) in from Romanian Black Sea coast, during 1980 - 2007

Also the turbot is one of the important demersal species; its catches were marked only between 1950-1970. After ’70, with the collapse of the Scombreidae fishing, the turbot catches are reducing from year to year (from 124 t/1970, to 11 t/1978), and between 1980-2000 the catches were under 10 t/year. After 2000, the interest for turbot fishing comes back, and the catches are growing 2 t/2000, 19 t/2001, 37 t/2002, to about 50 t/2005 (Fig. 7, 8).

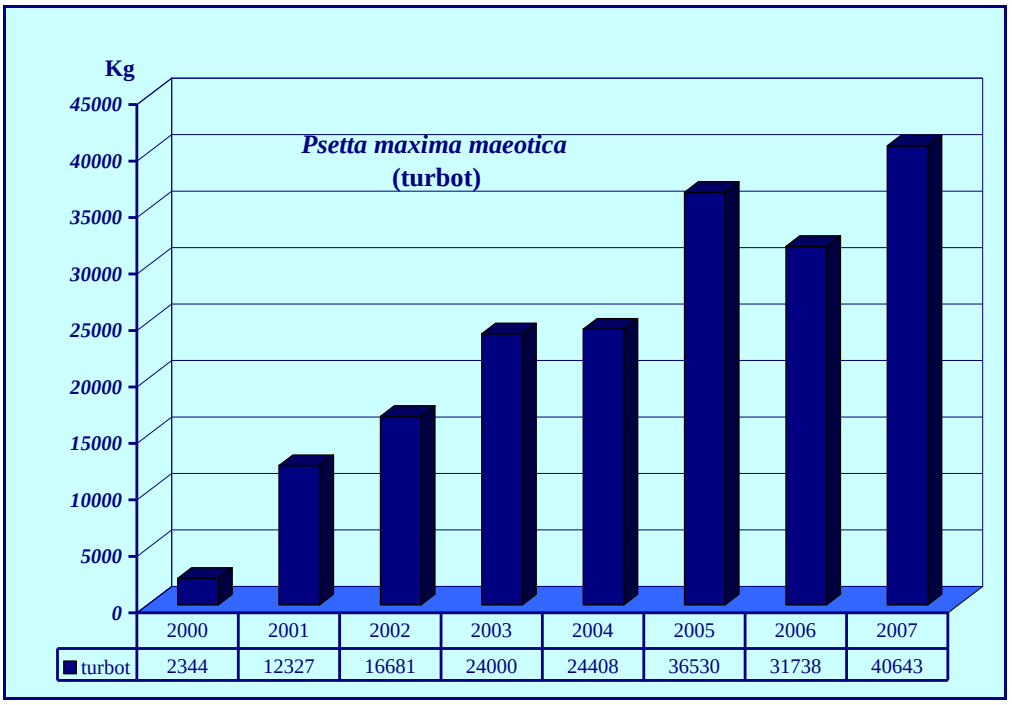

Fig. 8 - Total catch (kg) of species turbot (*Psetta maxima maeotica* P.)
in from Romanian Black Sea coast, during 2000 – 2007

The results obtained in 2006 (31 738 kg) was smaller with 15.09%, comparing with 2005, but bigger with 24.38% comparing with 2004 and 2003. The best period for the fishing was in the interval May – September, the same period for the approaching of the turbot agglomerations on the coast, for reproduction and feeding, the catches being between 6 266 kg / May and 4 810 kg / September (Fig. 9).

7.2 ***Merlangus merlangius euxinus*** Nordmann, 1940 (whiting)

Marine, benthonic, cold water species, often found near the shore, on sandy bottoms, in spring and autumn, at depths of 30 – 120 m. Until 2001 it

was an important shallow water fishing species, than the percentage dropped below 10%, today being between 81,5 t and 117,6 t (Fig. 10).

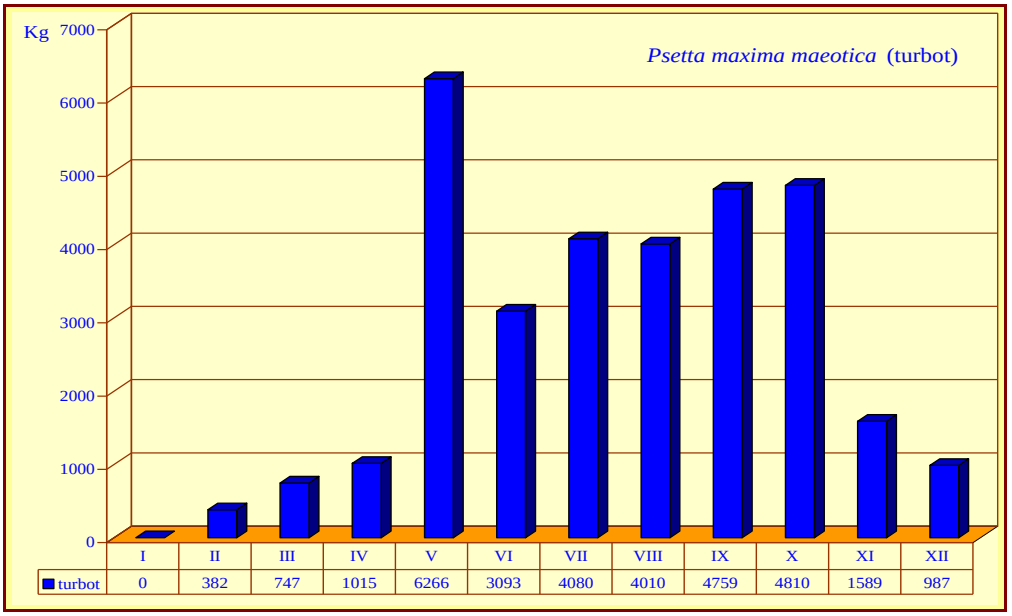

Fig. 9 - Total catch (kg) of species turbot from Romanian Black Sea coast, during 2006

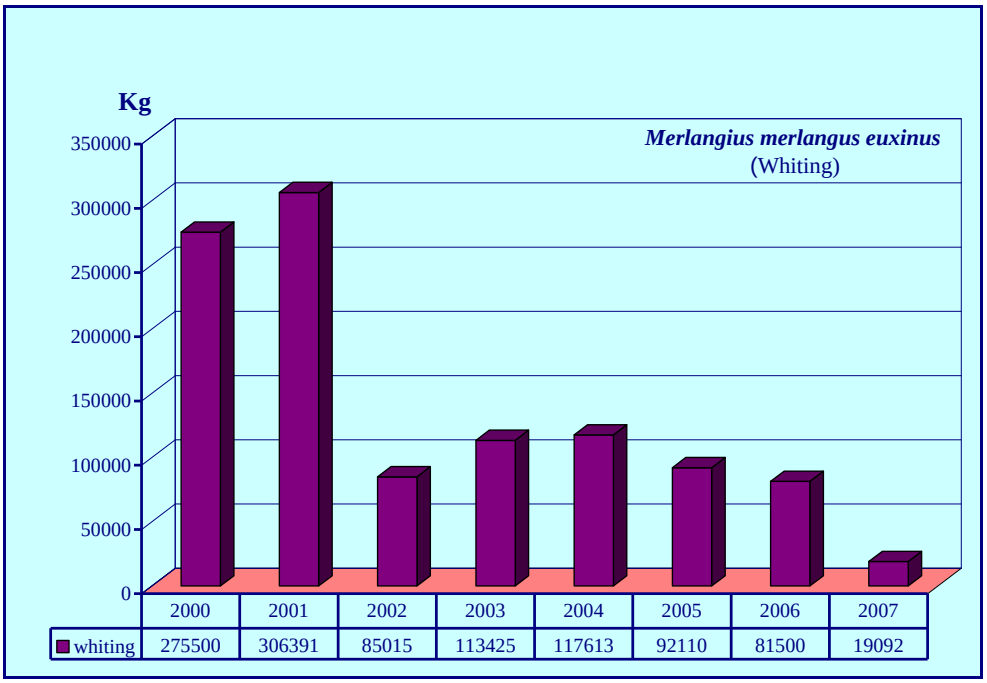

Fig. 10 - Total catch (kg) of species whiting from Romanian Black Sea coast, during 2000 - 2007

7.3 ***Mullus barbatus ponticus*** Essipov, 1927 (red mullet)

Marine demersal species, very representative for the catches made between Baia Mamaia – Vama Veche especially Costinesti – Mangalia, it had catches of over 100 t/year (146t/1975), and dropped to 4-6 t/year between 2000-2003 (Fig. 11).

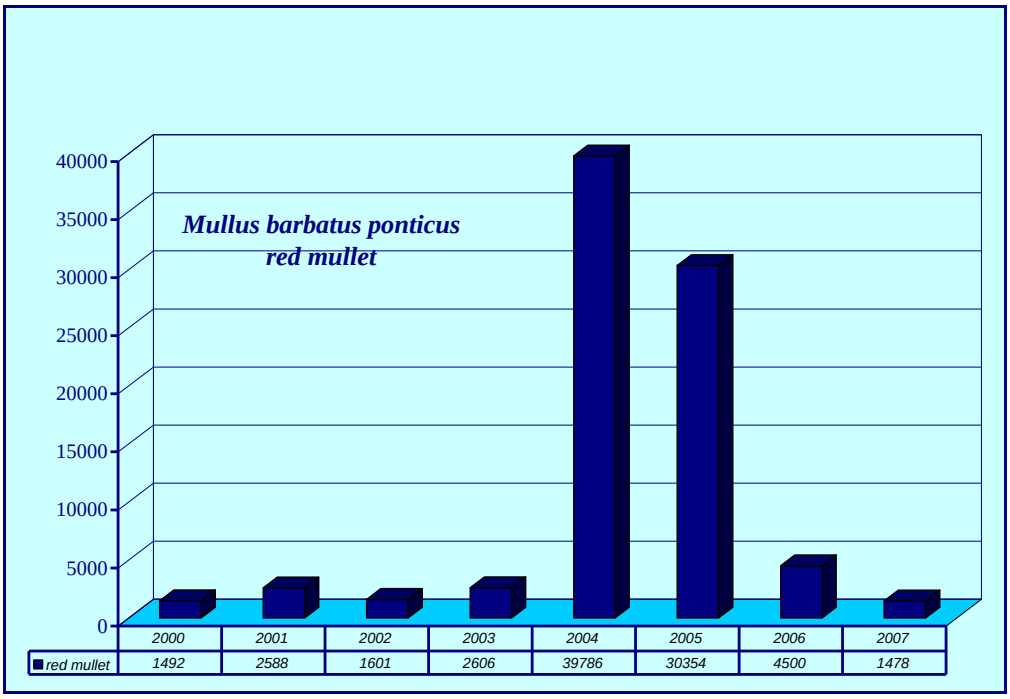

Fig. 11 - Total catch (kg) of species red mullet (*Mullus barbatus ponticus* E.) in from Romanian Black Sea coast, during 2000 - 2007

7.4. ***Squalus acanthias*** Linnaeus, 1758 (picked dogfish)

Marine, solitary species, it groups only for reproduction. Picked dogfish is a complementary species of the offing catches (30-40 meters), representing 4.8% of the total catch between April - September, oscillating between 1.64% (May) and 6.9% (November).

The picked dogfish catches were high only between 1975-1990 (115 t/1975 and 134 t/1985). After 1990 the captures reduced to 10 t/an, and for many years they lacked completely (Fig. 12).

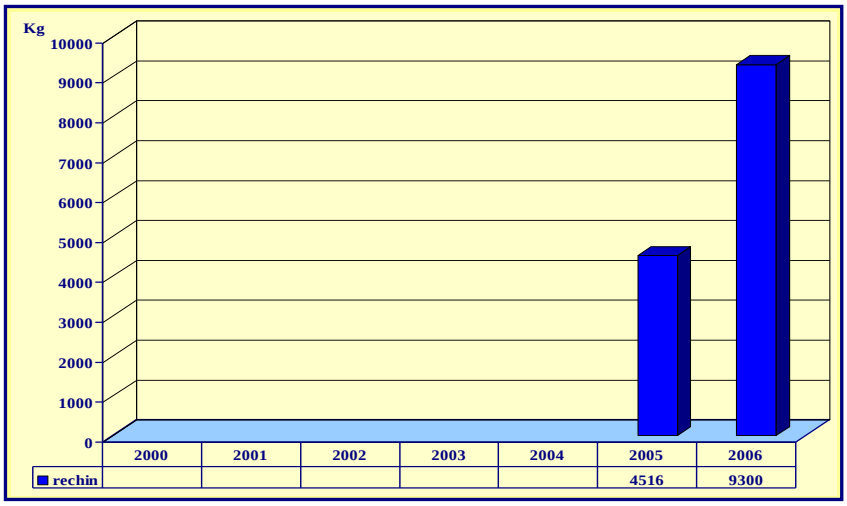

Fig. 12 - Total catch (kg) of species picked dogfish (*Squalus acanthias* L.) in from Romanian Black Sea coast, during 2000 - 2006

7.5. *Gobiidae*

Eurihaline species, living both in the sea and in the perimarine lakes, on rocky and sandy bottoms, at depths of 10-15 m. At the Romanian shore, important is only *Mesogobius batracocephalus/* knout goby and *Neogobius melanostomus*/round goby, their catches being of about 100-150 t/an between 1970 - 1980 and under 100 t/an between 2000 - 2006 (Fig. 13).

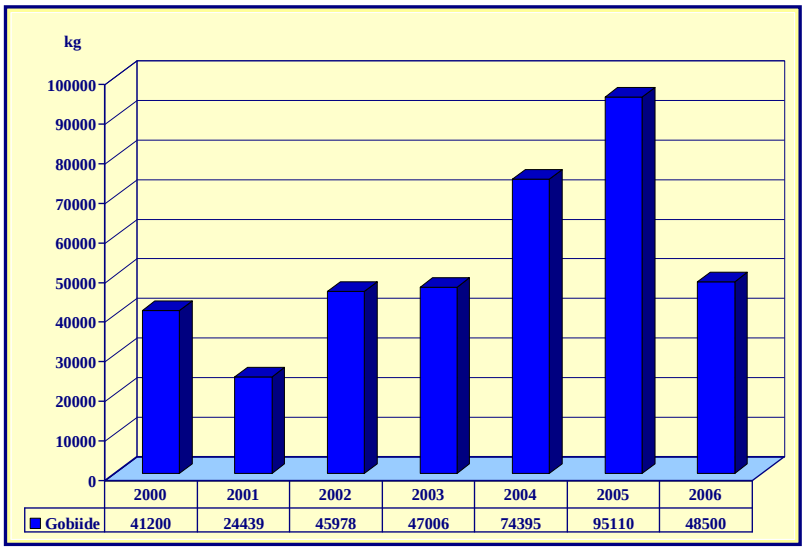

Fig. 13 - Total catch (kg) of species gobiidae in from Romanian Black Sea coast, during 2000 - 2006

7.6. ***Solea vulgaris*** Quensel, 1806

The *Solea* agglomerations were big in the shallow waters, between April – November. Because of its small size, the species is considered complementary, the catches being under 15t/year (Fig.14).

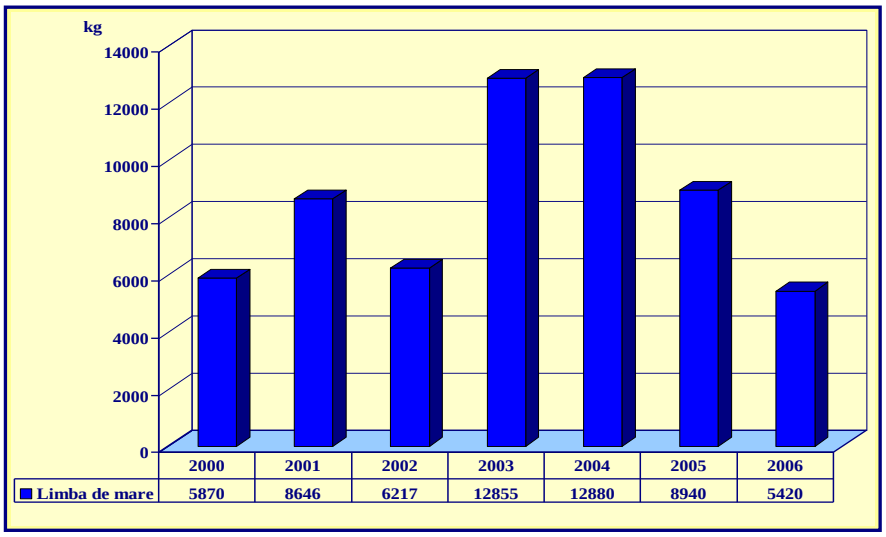

Fig. 14 - Total catch (kg) of species sole (*Solea vulgaris* Q)
in from Romanian Black Sea coast, during 2000 - 2006

8. CONCLUSIONS

An analysis of those before presented can point out the following:

- the demersal species are the most important for the regional fishing potential under the commercial aspect;
- the marine demersal fishing along the Romanian Black Sea shore is made in two ways: fishing with coast trawler vessels, equipped with *gill nets*, which activates offing, at depths bigger than 20 meters; and fishing along the shore, practiced in the 28 fishing points, between *Sulina – Vama Veche*, in shallow waters (3,0 – 11,0 meters), using fix tools (*trap nets, gill nets, longline, and beach* seine) and at depths of 40 – 60 meters, using gill nets and longline;
- the demersal catches represent only about 12,46 – 15,71%, of the total catch made at the Romanian sea shore;

- also in the Romanian marine sector many demersal species are signaled, from the industrial point of view, only *Merlangius merlangus ponticus*/whiting, *Psetta maeotica*/turbot, *Neogobius melanostomus*/round goby, *Mesogobius batrachocephalus*/knout goby and *Squalus acantias*/picked dogfish are important. The biggest amount belongs *Gadidae* (42.0%) and *Gobiidae* (28,45%), followed by *Scophthalmidae* (15,98%) and *Squalidae* (1%);
- the main demersal fish species, both economically and commercially is the turbot (***Psetta maxima maeotica***)
- the turbot catches made in 2006 (31.738 kg), were smaller with 15,09%, compared to 2005, but bigger with 24,38 % compared to 2004 and 2003. The best fishing period is May – September, that coincides to the approaching of the turbot to the shelf for reproduction and feeding.

REFERENCES :

BACESCU M. *et al.,* 1960 - Cercetari ecologice bentale in Marea Neagra. Analiza cantitativa, calitativa si comparativa a faunei bentale pontice, *Ecologie marina* **4**: 1-274.

F.A.O. 2005 - *Fishery statistics*. Capture production, Roma, **93**: 725.

MAXIMOV V., ZAHARIA T., 2002 - *Sinteza datelor si informatiilor privind situatia actuala a pescuitului demersal din zona litoralului romanesc al Marii Negre*; AGRAL Bucuresti: 29.

MAXIMOV V., RADU G., STAICU I., 2006 – Contributions a la connaissance des caracteristique biologiques de certaines especes de poissons demersaux de la zone marine roumaine de la mer Noire. *Cercetari Marine/Recherches Marines,* INCDM Constanta, , ISSN: 020-3069, **36**: 153-172.

NICOLAEV S., 1988 - *Tehnologia pescuitului prin traulare cu nave de mic tonaj in Marea Neagra*, IRCM Constanta: 155 p.

NICOLAEV S., RADU G., BUTOI G., ANTON E., 1994 - Structura pescariilor romanesti la Marea Neagra, evolutia capturilor si mutatiile structurale produse in ultimii 10 ani. *Romanian National Report*. Working Party on Fisheries Constantza, (11-13 aprilie).

RADU E., RADU G., ANTON E., STAICU I., MAXIMOV V**.,** 2006 - Evolution des captures de poissons pelagiques dans le secteurs marin roumain pendant la periode 2000-2004, *Cercetari Marine/Recherches Marines*, INCDM Constanta, ISSN: 020-3069, **36**: 253-270.

RADU E., RADU G., ANTON E., STAICU I., MAXIMOV V., 2006 - Evolution du recrutement des principales especes de poissons du secteurs marin roumain pendant la periode 1995-2005, *Cercetari Marine/Rechercshes Marines*, INCDM Constanta, ISSN 020-3069, **36** : 237-252.