COMMISSION OF THE EUROPEAN COMMUNITIES

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COMMISSION STAFF WORKING DOCUMENT

BLACK SEA WG

SUBGROUP OF SGMED OF THE SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

STECF OPINION EXPRESSED DURING THE PLENARY MEETING

OF 14-18 APRIL 2008 IN HAMBURG

This report does not necessarily reflect the view of the European Commission and in no way anticipates the Commission's future policy in this area

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1. BACKGROUND

In order to establish the TAC for certain fish stocks in the Community waters of the Black Sea, the Commission is seeking scientific advice on sprat, turbot and possibly other stocks on the basis of relevant regimes already operating in Bulgaria and Romania. To this end an STECF working group meeting is being set up.

2. TERMS OF REFERENCE

The working group was requested to:

-Evaluate the status and trends of the sprat and turbot stocks with respect to their production potential, reproductive capacity and sustainable levels of exploitation. Provide elements for establishing catch limitations in order to limit the exploitation rates in line with sustainable exploitation of the stocks;

- Up-date the description of EU fisheries exploiting these stocks, in terms of fleets, fishing gears, deployed fishing effort (capacity in N°-GT-kW, activity in days at sea, gear characteristics), catches and catch composition, size composition, discards, fishing grounds and seasonality;

- Determine whether fishing fleets of non-EU countries exploit the same stocks and provide relevant information if available;

- Identify knowledge and monitoring gaps for fisheries, stocks, vital fish habitats and other environmental aspects relevant to fisheries in the area. Suggest monitoring and scientific actions that need to be developed in the short and mid-term to fill these gaps;

- Evaluate the progress made in addressing such gaps since last year;

- Address, in particular, the gaps in data identified in the report produced by the ad-hoc working group in Constantza in 2007;

- Prepare a plan for a joint acoustic survey on the sprat stock in Bulgarian and Romanian waters;

- Review all information on the selectivity of specific mesh sizes for turbot, in relation to MLS, and provide information for a possible harmonization of minimum mesh size and MLS for turbot;

- Identify other important fisheries and stocks that may be in need of specific management measures and analyze whether the scientific basis needs to be further developed.

3. STECF OBSERVATIONS AND RECOMMENDATIONS

The STECF WG on Black Sea fisheries began its work with a review and compilation of available data in preparation for stock assessments of the overall Black Sea populations of

sprat and turbot. STECF notes that this will be the first time that international stock assessments have taken place since 1995 (Prodanov et al. 1997). The report of this first stage will be finalised in mid-May 2008 and the follow up assessment meeting will take place in June 2008.

STECF considers that the WG made very good progress in reviewing the data and compiling input data matrices for stock assessment of sprat and turbot.

The preliminary review showed that data on sprat are extensive and reliable, particularly in the period up to1993. Data provided by Black Sea countries on catches, age compositions, individual weight at age and tuning data were reviewed and compiled for 1994-2007. These data will facilitate an age-structured stock assessment of Black Sea sprat using ICA and XSA during the WG meeting in June 2008. STECF notes that tuning data for this more recent period (1994-2007) are of slightly lower quality and also that some data still need to be compiled (the deadline for this 1st May 2008).

With respect to improving the quality of the tuning data, STECF notes that cooperative research surveys of juvenile abundance (NIMRD in Romania and Bulgaria) and acoustic surveys (IO-BAS in Bulgaria and Romania) for sprat are being considered and that there are proposals to seek funding under the EC DCR. STECF recommends that these survey initiatives are supported and that funding is provided for surveys employing techniques appropriate for the sprat in this area. STECF considers that development of fishery independent indices for this stock will enhance the assessment process and that their early commencement should be encouraged.

STECF notes that the Working Group considers the data for turbot to be less reliable than that for sprat. Since 1985 under-reporting of the catch may have increased. Data provided by the Black Sea countries on catches and age composition from the commercial fisheries and trawl survey were reviewed for 1989-2007. The catch and survey data will be utilised in age-structured and dynamic surplus models during the WG meeting in June 2008. STECF notes that some data still need to be compiled (the deadline for this is 1st May 2008) and furthermore, suggests the WG should attempt to assess the magnitude of unreported catch and include such estimates in the stock assessment.

STECF notes that the WG identified a number of information gaps in relation to potential tuning data for turbot. STECF recommends that the Commission request that fleet /métier data on fishing effort (days at sea and hours fishing) from logbooks and VMS be provided by the respective NAFAs. These data should be aggregated by month. In the short term, any existing data of this type covering the longest possible time period up to 2007 should be made available for the meeting in June 2008. Failure to supply such data will impair the ability of the WG to carry out assessments effectively. For the future, it is important that collection and provision of these data becomes an established routine so that a reliable time series can be built up. STECF requests that the WG propose a system to facilitate the data gathering and collation process.

STECF also requests that during the meeting in June 2008, the WG should review possibilities for future assessments of anchovy and horse mackerel.

ANNEX

COMMISSION STAFF WORKING DOCUMENT

BLACK SEA WG

SUBGROUP OF SGMED OF THE SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

OF 14-17 APRIL 2008 IN HAMBURG

4. INTRODUCTION

4.1. BACKGROUND

In order to establish the TAC for certain fish stocks in the Community waters of the Black Sea. the Commission is seeking scientific advice on sprat. turbot and possibly other stocks on the basis of relevant regimes already operating in Bulgaria and Romania. To this end an STECF working group meeting is being set up.

A working group worked in parallel to the STECF plenary and presented its results to the STECF in the afternoon of 17 April. The Black Sea working group will continue its work parallel to the SGMED-08-03 meeting in June 2008.

The main task of this first meeting of the Working Group (WG) is to review data available for stock assessment of sprat and turbot in the Black Sea. Since 1991 there were no regional assessments produced. The last regional assessments for fish stocks in the Black Sea were done in 1995 (Prodanov et al. 1997).

4.2. TOR

The working group is requested to:

- Evaluate the status and trends of the sprat and turbot stocks with respect to their production potential. reproductive capacity and sustainable levels of exploitation. Provide elements for establishing catch limitations in order to limit the exploitation rates in line with sustainable exploitation of the stocks;

- Up-date the description of EU fisheries exploiting these stocks. in terms of fleets. fishing gears. deployed fishing effort (capacity in N°-GT-kW, activity in days at sea, gear characteristics), catches and catch composition, size composition, discards, fishing grounds and seasonality;

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- Identify knowledge and monitoring gaps for fisheries. stocks. vital fish habitats and other environmental aspects relevant to fisheries in the area. Suggest monitoring and scientific actions that need to be developed in the short and mid-term to fill these gaps;

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- Address. in particular. the gaps in data identified in the report produced by the ad-hoc working group in Constantza in 2007;

- Prepare a plan for a joint acoustic survey on the sprat stock in Bulgarian and Romanian waters;

- Review all information on the selectivity of specific mesh sizes for turbot. in relation to MLS. and provide information for a possible harmonization of minimum mesh size and MLS for turbot;

- Identify other important fisheries and stocks that may be in need of specific management measures and analyze whether the scientific basis needs to be further developed.

4.3. PARTICIPANTS

Name	Institution	Email	Postal address
Dr. Georgi DASKALOV	Centre for Environment. Fisheries&Aquaculture Science (CEFAS). Lowestoft. UK	georgi.daskalov@cefas.co.uk	Centre for Environment. Fisheries&Aquaculture Science(CEFAS). Pakefield Road. Lowestoft. Suffolk NR33 OHT UK
Violin RAYKOV	Institute for Fish Resources (IFR). Varna. Bulgaria	vio_raykov@abv.bg	Institute of Fishing Resources. PO Box 72 Primorski blvd. 4. Varna. 9000 Bulgaria
Dr. Marina PANAYOTOVA	Institute of Oceanology (IO). BAS. Varna. Bulgaria	mpanayotova@io-bas.bg	Institute of Oceanology – BAS. P.O.Box 152 Parvi may 40 str. Varna. 9000 Bulgaria
Dr. Gheorghe RADU	National Institute for Marine Research and Development "Grigore Antipa". Romania	gpr@alpha.rmri.ro	National Institute for Marine Research and Development "Grigore Antipa".Bdul. Mamaia. nr. 300 900581 Constanta, Romania
Dr. Volodea MAXIMOV	National Institute for Marine Research and Development "Grigore Antipa". Romania	maxi@alpha.rmri.ro	National Institute for Marine Research and Development "Grigore Antipa". Bdul. Mamaia. nr. 300 900581 Constanta, Romania
Dr. Vladyslav SHLYAKHOV	Southern Research Institute of Sea Fisheries and Oceanography (YugNIRO). Kerch. Ukraine	fish@kerch.com.ua	YugNIRO. 2. Svredlov Str.. Kerch. Crimea. Ukraine
Dr. Mustafa ZENGIN	Central Fisheries Research Institute. Trabzon. Turkey.	mzengin@hotmail.com	Central Fisheries Research Institute. Trabzon. Turkey.
STECF SECRETARIAT			
Franco BIAGI	DG Maritime Affairs and Fisheries, Unit D.2. Mediterranean & Black Sea Directorate	franco.biagi@ec.europa.eu	Rue Joseph II, 99, J-99 02/055, 1042 Bruxelles, Belgium
Hans-Joachim RAETZ	Joint Research Centre (IPSC), Maritime Affairs Unit	hans-joachim.raetz@jrc.it	Via E. Fermi, 2749, 21027 Ispra (Varese), Italy

5. SPRAT IN THE BLACK SEA

5.1. STOCK UNIT AND DESCRIPTION (BIOLOGICAL FEATURES)

Sprat stock is presented by one unit stock (Ivanov & Beverton 1985; Prodanov et al. 1997; Shlykhov & Daskalov, in review; Avsar 1993; Raykov & Yankova 2006).

The Black Sea Sprat (*Sprattus sprattus phalericus*) is a key species in the Black Sea ecosystem. Together with the Anchovy (*Engraulis encrasicolus*) sprat is one of the most abundant, planktivorous, pelagic species. The level of its stocks depends on the conditions of the environment mainly and on the fishing effort (Raykov 2007a; Raykov et al. 2007). Sprat is a marine pelagic schooling species, sometimes entering in the estuaries (especially the juveniles), and tolerating salinities as low as 4‰. In the daytime, sprat remains at deeper depths and in the night moves near the surface. It forms big schools and undertakes seasonal movements between foraging (inshore) and spawning (open sea) areas (Ivanov and Beverton 1985). Adults tend to remain under the seasonal thermocline, penetrating above it only during the spring and autumn homothermia. Juveniles are distributed in a larger area near the surface. Sexual maturity is attained at the age of 1 year and length of 7 cm. In Turkey it was found that males reached maturity at 7.5 cm and females at 7.8 cm at age 1 year.

Spawning occurs during the entire year with maximum intensity in November – March. Sprat is serial spawner. Eggs are pelagic, spherical in shape. In winter, eggs are encountered from the surface down to 40-50 m of depth; but in summer only below 10 m (10-50 m).

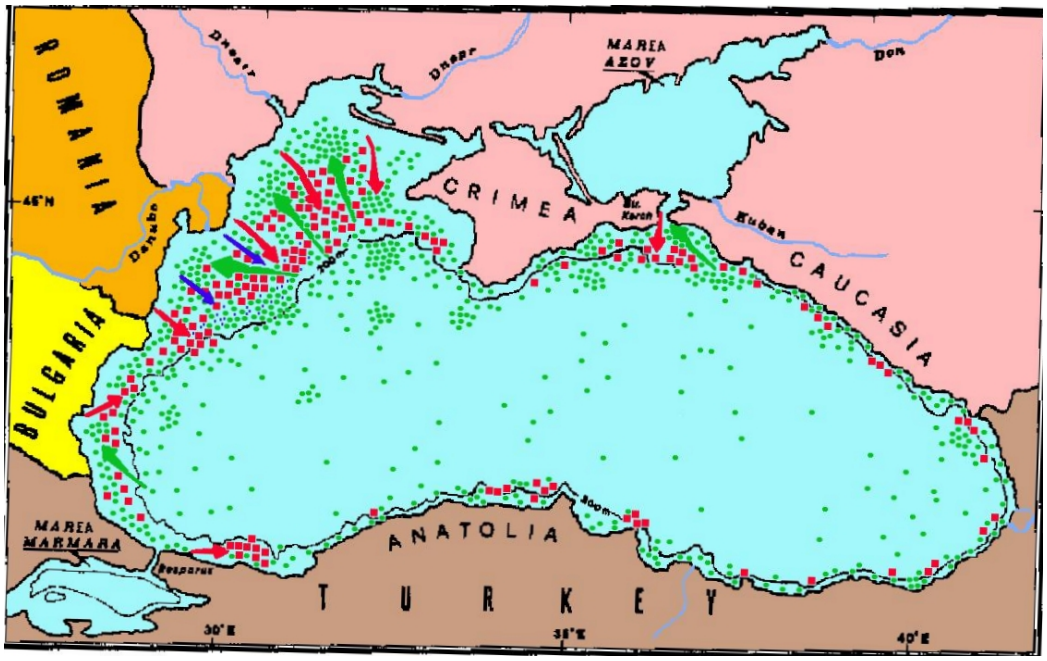


Fig. 1. Sprat migration routes in the Black Sea basin (Ivanov and Beverton, 1985)

The commercial fishery has a large impact on the Black Sea fish populations. As a result. the stock and catches have declined more noticeably in the early 1990s (Daskalov et al. 2007a).

The abundance of fish stocks in the Black Sea (including sprat) depends on numerous abiotic and biotic factors (Daskalov 1999; 2003). Among the major factors are: the level of

exploitation, predation, food competition with the planktivore ctenophore *Mnemiopsis leidyi*, algal blooms and climate fluctuation (Daskalov 1999; 2003; Daskalov et al. 2007b).

5.1.1. SPRAT FISHERIES IN THE BLACK SEA

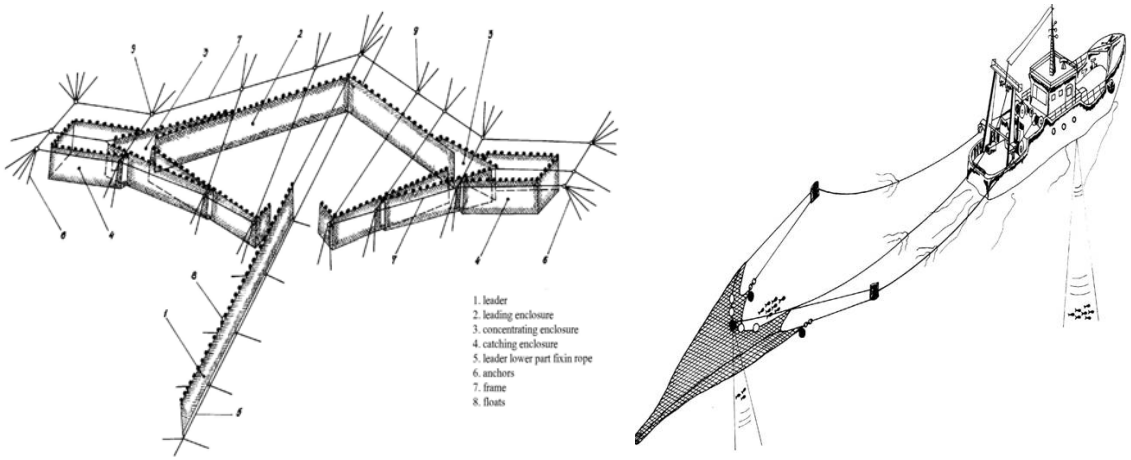
5.1.2. GENERAL DESCRIPTION

The main commercial fisheries in the Black Sea occur on the continental shelf, where the migration routes for the major fish concentrations are distributed (Fig 1).

5.1.3. BULGARIA

Almost all fishing activities have been carried out in the 12 miles zone off the Bulgarian coast (Fig. 3A). A part of the sprat catch is taken with stationary fishing gears: uncovered pound nets (trap-nets, Fig. 2A). The fishing grounds of the Bulgarian sector are of small depths (up to 100-120 m): from Cape Kartalburun (on the North) to Rezovo (in the South). Active fishing is carried out with small trawlers (12-30 m, Fig. 2B) (Tables 1 and 2). The warm period (April-October) is the main fishing season along the Bulgarian coast. The stationary pound nets are situated along the entire coastline from Cape Siviburun (in the northern part) to Rezovo (in southern part). Trawling activities with mid-water trawls are performed dominantly in the southern area (Bourgas, Sozopol, Nessebar, Cape Emine, Cape Maslen). Sprat fishing takes place on the continental shelf on 40-100 m of depth. The harvesting of the Black Sea sprat is conducted during the day time when its aggregations become denser and are successfully fished with trawls (TDA, 2007).

In Bulgaria the minimum allowable size of sprat is 7 cm total length. In 2007, an overall quota of 15 000 t for Bulgaria and Romania (Black Sea EU waters) has been set for 2008 (EC Council Regulation No 1579/2007).



A. B.

Fig. 2. Pound net (A) and mid-water trawl (B) operating in Bulgarian and Romanian waters.

Table 1. Capacity of the Bulgarian fishing fleet by metier (fishing gear OTM, mid-water trawls).

Fishing vessels metier 1	**Fishing port**	**Total lenght**	**GT**	**Power of the main engine**
Total length from 15 m to 22.50 m	Burgas	15.00	19.00	212.56
Fishing vessels metier 2	**Fishing port**	**Total lenght**	**GT**	**Power of the main engine**
Total length from22.50m to 25.50 m	Burgas	25.50	117.00	300.00
	Burgas	25.50	117.00	220.65
	Burgas	25.45	117.00	220.65
	Burgas	25.45	117.00	220.65
	Burgas	22.50	54.00	220.00
	Burgas	25.45	117.00	220.00
	Burgas	23.85	59.00	165.49
	Burgas	25.50	117.00	220.00
	Burgas	25.50	117.00	220.00
	Burgas	25.50	117.00	220.65
Fishing vessels metier 3	**Fishing port**	**Total lenght**	**GT**	**Power of the main engine**
Total length more than 25.50 m	Burgas	38.15	314.00	809.04

*source NAFA

Table 2. Sprat active fishery gear characteristics used in Bulgarian Black Sea fishery.

Fishing gears and characteristics:
Fishing boats metier 1
OTM –pelagic otter trawls with dimensions: 26m long. 8 m height. mesh size of codend 6.5mm
Fishing boats metier 2
OTM - pelagic otter trawls with dimensions: 31 m long. 8 m height. mesh size 6 mm.
OTM - pelagic otter trawls with dimensions: 29 m long. 8 m height. mesh size 6.5 mm.
Fishing boats metier 3
OTM – pelagic otter rope trawl: 68.5 m with mesh size 6 mm.
Main fishing grounds
Southern Bulgarian Black Sea region
Nessebar
Sozoplo
Tzarevo
3 to 5 Nm further the shore

*source NAFA

The total number of fishing vessels operating in the Bulgarian marine area is 36. The number of fishing vessels obtained licenses is 60 and is still increasing. The number of pound nets in the coastal area of Bulgaria is 51.

5.1.4. ROMANIA

The Romanian fishing area extends between Sulina and Vama-Veche; for over 240 km of coastline, and can be divided into two main geographical/geomorphological sectors (Fig. 3B):

1. The northern sector (about 158 km in length) lies between the Chilia branch of the Danube delta and Constantza, where the seabed is mainly made up of alluvial sediments;

2. The southern sector (about 85 km in length) lies between Constantza and Vama-Veche. It is characterised by promontories with active, high cliffs, separated by large zones with accumulative beaches, often protecting littoral lakes.

The distance from the sea shore to the shelf edge (200 m depth) varies from 100-200 km in the northern sector to 50 km in the south. The submarine slope of the shelf is very gentle in the north, with the 10 m depth contour immediately in front of Danube estuary, and steeper in the southern sector with the 10 m depth contour - almost 1.5 km offshore. In Romania, sea fishing, is conducted along the Romanian coastline, limited to the marine areas up to 60 m isobath as a consequence of the characteristics of the vessels and their limited autonomy. Romanian fleet operates up to 30–35 marine miles offshore.

Trawl fishing has a seasonal pattern and is linked to the presence of the fish on the fishing grounds.

An important fishing area is the Danube Delta Biosphere Reserve, where fishing activities are forbidden for trawlers. In addition, the near-shore area of the Black Sea coast up to 20 m isobath is out of limits (Order no. 397/11April 2008) of the Ministry of Agriculture and Rural Development) for fishing vessels that use towed gears. In this area, the fishing activities are limited to the utilisation mainly of pound nets.

Fishing gears used at the Romanian littoral

There are different types of fishing gears for the active and passive fishery practised in inshore and offshore waters of Romania (Fig 3B, Tables 3, 4, and 5). From a fleet of 20 fishing vessels in 1990, now only 3 vessels with length >15 m are active, as well as 22 pound nets.

Presently, the trawlers operating in the Black Sea use for discharging the fish the Mangalia, Constanta, Cape Midia and Sulina harbours. Non of them have facilities for trawlers. The infrastructure represented by fishing ports with specialized berths and deposit spaces, as well as locations for organizing the first sell of fish are altogether lacking.

Table 3. Main characteristics of the vessels that work at the Romanian littoral.

Main characteristics	Vessel type		
	B-410	Baltica	TCMN
Total length (m)	25.66(25.8)	25.45	25.35(25.65)
Width (m)	7.2	6.8	7.2
Draught (m)	2.7	2.39	2.4
Engine power (HP)	570	300	300
GRT (t)	131.9	98.0	98.0

Table 4. Technical characteristics of the trawls used at Romanian littoral.

Gear type	Opening		Trawling speed
	Vertical	Horizontal	
Pelagic trawl for vessel of 570 HP (50/35 – 74 m)	13 -14 m	20 m	3.2 – 3.4 Nd
Pelagic trawl for vessel of 300 – 365 HP (36/26 – 59 m)	11 – 12 m	22 m	3.2 – 3.4 Nd

Table 5. Dimension of the mesh size used for fishing of the main species.

Gear type	Mesh size and threads thickness/ fish size at full maturation		
	Sprat	Anchovy	Horse mackerel
Pelagic trawl for vessel of 570 HP (50/35 – 74 m)	8 mm. 6.350 m/Kg/ L_t = 7.8 cm. L_c = 7 cm	10 mm. 6.350 m/kg/ L_t = 8.4 cm. L_c = 7 cm	14 mm. 6.350 m/kg/ L_t = 13.5 cm. L_c = 12 cm
Pelagic trawl for vessel of 300 – 365 HP (36/26 – 59 m)	8 mm. 6.350 m/Kg/ L_t = 7.8 cm. L_c = 7 cm	10 mm. 6.350 m/kg/ L_t = 8.4 cm. L_c = 7 cm	14 mm. 6.350 m/kg/ L_t = 13.5 cm. L_c = 12 cm

The minimum mesh size for pound nets and trawl cod end is a=7 mm.

In 2007 an overall quota of 15 000 t for Bulgaria and Romania (Black Sea EU waters) has been set for 2008 (EC Council Regulation No 1579/2007). In Romania, areas up to 20 m depth are closed for sprat trawling.

5.1.5. GEORGIA

Information about sprat landing statistics is given in Table 6.

5.1.6. RUSSIA

Information about sprat landing statistics is given in Table 6.

5.1.7. TURKEY

The main fishing grounds in Turkey are situated in an area of shallower waters (20-60 m) in front of the Samsun region (Yesilirmak-Kizilirmak rivers basin). In this area sprat aggregations are formed in spring and autumn. During winter sprat schools do not form fishable aggregations because of intensive spawning. The main fishing gear for sprat in Turkey is a pair pelagic trawl. The mesh size of the cod end is 12 mm.The total number of fishing vessels operating on sprat is about 40-50. The mean length of vessels is between 20-25

m. All the landings are processed for fish meal. The maximum catch is recorded in October-November and March-May. During winter time sprat is caught in the anchovy purse seine fishery as a by-catch.

The only fishery regulation regarding the sprat fishery in Turkey is the limited fishing season from the 1st September till 15 May. The fishing activities are prohibited in areas below 20 m depth.

The commercial pelagic trawl studies on sprat populations are conducted in the trawling area of Samsun (Eastern part).

There are 3 different types of gears (specifically for codend). The mesh size of codend is 6 mm. Pair-trawl is used on board of the vessel with length around 20-30 meters.

1. The operational time is up to 2 hours (average).
2. At the same time are used for anchovy fisheries in October-November (mixed fishery). During winter –early spring time (up to May) pair trawls are used only for anchovy fishery and in spring time only for sprat.

5.1.8. UKRAINE

The Northwestern Area

In this fishing ground the shelf is wide with small depths (down to 100 m) (Fig. 3C). The surface waters are quickly warmed in summer and in winter cool down to 0ºC. In severe winters all the area from the cape Tarkhankut to Islet Zmeiny is covered with ice. The substantial warming of waters in summer period (up to 27ºC), and the inflow of large rivers (Danube, Dnestr, Dnepr) determine the hydrological regime in shallow waters.

The major fishing season take place in the warm period of a year (May-October). During this period the major commercial fishes are concentrated on the shelf for feeding and spawning, namely Black Sea sprat, horse mackerel and anchovy, but only Black Sea sprat is commercially harvested. In this period approximately two thirds of its total stock concentrate there. The most intensive fisheries of the Black Sea sprat is conducted from April to October with bottom and midwater trawls. The sprat fishing is most effective in the third quarter (July, August and September), characterised by large fishing concentrations and stable weather conditions. The harvesting of the Black Sea sprat is conducted during day time when its aggregations become denser and are successfully fished with trawls. The length of Black Sea sprat in catches is 6.5-13 cm TL.

In September-October, Black Sea sprat schools gradually move to depths of 80-100 m and disintegrate.

The Crimean Area

In this area (Fig. 3C) the coastline is irregular and characterised by bight sheltered from the dominant northeasterly winds. The Crimean mountains create additional protection from northern winds. The shelf is rather narrow - the 50 m of depth contour is close to the shore. This area is a preffered wintering ground for many fish species.

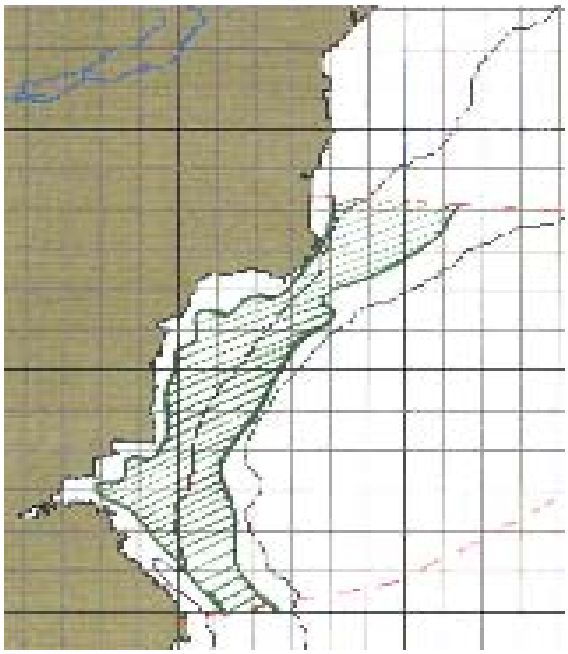
The main target species are Black Sea horse mackerel and anchovy in the period of their wintering, as well as Black Sea sprat. There are good opportunities for the whiting and elasmobranch fisheries, as well.

In summer the sprat consists the main catch, being harvested with bottom trawls. It is distributed down to 60 m of depth. The possible catches are 0.3-1.5 t per hour of trawling.

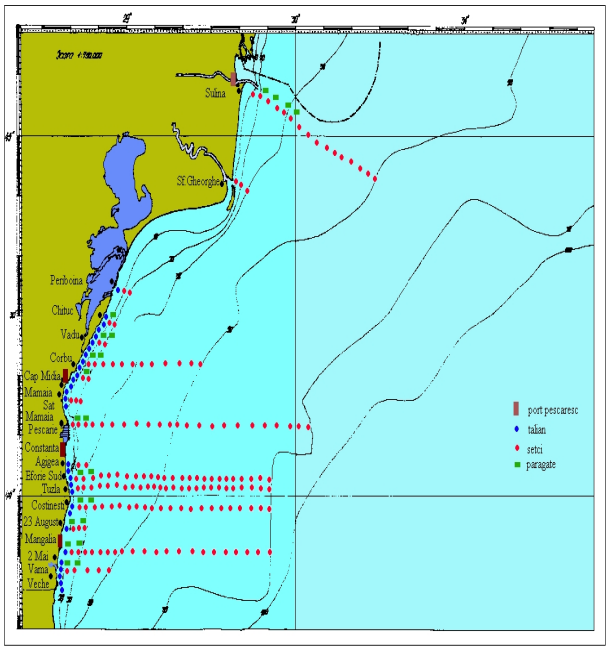
The Northeastern Area

In the warm period (May – September) the sprat becomes the major target species. Its schools are fished with trawls on the shelf over depths of 20-70 m. Large catches of sprat (up to 7-10 t/hour trawling) have been registered in July-August, when the density of fish aggregations in the near-bottom layer reaches its maximum. Usually with fall of temperature in late September the sprat schools disperse and the fishery stops.

In Ukraine minimum length in the landings of sprat is 6 cm fork length. TACs and quotas are established every year.



A.



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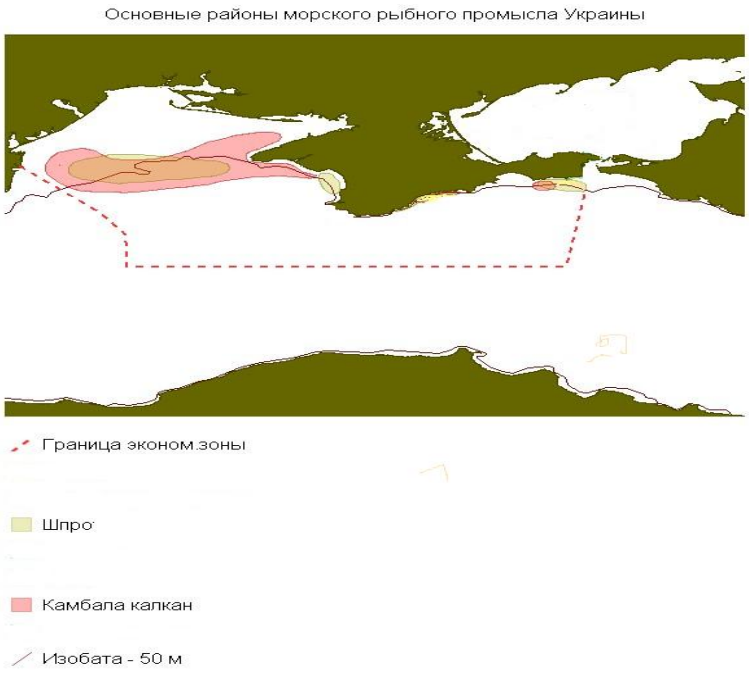

C.

Fig. 3. Sprat fisheries in Bulgaria A: shaded area is where commercial trawling area; Romania B: red points are gill nets, blue points are pound nets. green points are long-lines, and brown columns are fishing ports along the coast; and Ukraine C: Main regions for sprat fishery (yellow spots) and for turbot (pink spots).

5.2. OFFICIALLY REPORTED LANDINGS

Table 6. Official landings (t) of sprat in the Black Sea (FAO, Fishstat). Before 1991 data for Russia, Georgia and Ukraine – YugNIRO data.

	Bulgaria	*Bulgaria	Romania	Romania*	Ukraine	Turkey	Georgia	Russian Federation	Total
1970	1407		2678		353	0	0		4438
1971	2473		2517		846	0	0		5836
1972	2962		23		884	0	0	16	3885
1973	3383		22		878	0	0	22	4305
1974	4468		1245		477	0	0	23	6213
1975	5565		731		787	0	0	43	7126
1976	7199		161		1594	0	0	16	8970
1977	8754		1463		4346	0	0	2354	16917
1978	10596		149		1949	0	1	3317	16012
1979	13541		2269		36757	0	3466	17700	73733
1980	16568		989		47635	0	4571	14687	84450
1981	1888		2283		49175	0	5781	20165	79292
1982	16524		3004		3862	0	2462	15266	41118
1983	12023		3406		20755	0	886	3843	40913
1984	13921		4456		18021	0	847	5270	42515
1985	15924		6836		23657	0	1817	3365	51599
1986	1169		8979		33147	0	2939	7010	53244
1987	10979		9474		43158	0	697	8972	73280
1988	6199		6454		39835	0	7172	7157	66817
1989	7403		8911		63239	0	9708	16045	105306
1990	2651		3198		33174	0	6895	6955	52873
1991	271		729		11094	0	2313	2675	17082
1992	2353		2074		11492	0	830	3221	19970
1993	2174		2439		9154	640	32	694	15133
1994	22		2203		12615	700	308	1013	16861
1995	2874		1982		15218	157	288	1263	21782
1996	3535		2014		20720	937	185	1537	10280
1997	3646		3318		20208	468	85	706	28431
1998	3275		3293		30282	1236	24	1243	39353
1999	3595		1933		29238	421	45	4473	39705
2000	1737		1803		32644	6225	42	5543	47994
2001	695		1792		48938	1008	40	11122	63595
2002	11595		1617		4543	1965	34	11218	30972
2003	9155		1219		31366	5775	2	204	47721
2004	2889	7997*	135		30891	5186	12	143	39256
2005	2575	6500*	1487		35707	5271	19	1316	46375
2006	2655	8183*	492	1400*	21308	6681		8157	39293
2007	2559	July 2008**	208	400*	18013	July 2008**		6077	26857

*Expert assessments **To be delivered till July 2008

5.3. ASSESSMENT

The WG decided to perform two separate analyses:

- In the northern and western part of the Black Sea - based on data from Bulgaria, Romania, Ukraine, Russia.
- In whole Black Sea - based on data from Bulgaria, Romania, Ukraine, Russia, Georgia and Turkey.

These two approaches are planned in order to explore the quality of data and the sensitivity of the assessment results.

5.3.1. INPUT DATA

The group compiled international data required for age structured stock assessments.

5.3.2. INTERNATIONAL HISTORIC CATCH AT AGE ESTIMATES

5.3.2.1. LANDINGS

International landings are presented on Table 6.

5.3.2.2. DISCARDS AT AGE

There is yet no information available regarding the amount of discards in any of the sprat fisheries.

5.3.2.3. CATCH AT AGE

As there are no discard estimates available to the group, landings at age data will be used as inputs to the assessment (Tables 7 and 8). To obtain the annual catch at age numbers, monthly catches were devided by monthly mean body weight and then distributed by age according to monthly age compositions. Monthly catch at age numbers were then summed to obtain annual catches. Monthly length-age keys from Bulgaria were applied to Ukrainian length composition in order to obtain the needed age compositions.

Table 7. Aggregated catch at age in numbers (in thousands) of Bulgaria, Romania, Ukraine and Russia (north and western Black Sea).

Age / Year	0	1	2	3	4
1994	8636	599224	3261789	813301	11023
1995	41846	2353666	2297110	362622	11846
1996	16747	3118918	2306451	725076	28710
1997	199007	4652851	2062680	486649	30667
1998	391586	3480913	3685494	651672	33849
1999	65786	8593904	2121969	254456	3610
2000	539857	6929215	3250213	562470	79961
2001	2334661	6916181	2249026	404163	50926
2002	103970	5530776	3283019	483479	36382
2003	1157592	5844662	4690326	1429668	153831
2004	1724391	4741090	1719104	233995	6808
2005	83142	2483200	1482867	278974	12657
2006	418818	3493927	1184825	213702	13888
2007	2917535	2920875	306490	91329	9233

Table 8. Catch at age in numbers (in thousands) of Turkey (southern Black Sea).

Age / Year	0	1	2	3	4	Sum
1993	4134	41775	66119	15691	281	128000
1994	271	16312	95871	27136	410	140000
1995	1044	80707	200946	30340	963	314000
1996	490	85983	79918	19781	1228	187400
1997	612	12847	50776	20800	6729	91765
1998	1734	129588	61977	41173	6934	241406
1999	711	13275	45516	13987	1422	74911
2000	21784	930772	453504	77234	5941	1489234
2001	0	92343	54233	17589	4397	168562
2002	6611	267729	175181	24239	5509	479268
2003	100174	596690	378920	156794	47909	1280488
2004	13894	388196	943122	56840	3368	1405420
2005	46962	515406	373347	130319	14089	1080123
2006	66480	763931	597698	99910	4320	1532339
2007	Official fisheries statistics are still not published					

5.3.3. INTERNATIONAL WEIGHT AT AGE ESTIMATES IN THE CATCH

5.3.3.1. WEIGHT AT AGE IN THE LANDINGS

There was no data available.

5.3.3.2. WEIGHT AT AGE IN THE DISCARDS

There is no data available to calculate the weight at age in the discards.

5.3.3.3. WEIGHT AT AGE IN THE CATCH

Table 9.Weight at age in the catch in g.

Age / Year	0	1	2	3	4	Mean weight
1994	2.33	3.37	4.03	4.69	7.73	3.91
1995	2.50	3.76	4.55	5.40	6.88	4.16
1996	2.47	3.82	5.18	5.96	7.38	4.59
1997	2.28	3.28	4.87	6.26	7.15	4.02
1998	2.35	4.00	5.10	7.62	9.44	4.68
1999	2.77	3.19	5.01	6.49	7.27	3.58
2000	2.26	3.49	4.51	6.01	7.79	3.87
2001	1.70	2.49	3.98	6.30	6.92	4.27
2002	1.92	2.73	4.15	6.24	7.17	4.58
2003	1.71	2.79	4.09	6.31	7.15	4.50
2004	1.93	3.02	4.36	6.01	7.33	4.32
2005	2.11	3.95	5.34	6.09	6.99	4.41
2006	2.03	3.42	4.59	6.03	7.61	4.38
2007	1.71	3.14	4.71	6.38	7.63	4.61

5.3.3.4. WEIGHT AT AGE IN THE STOCK

Weight-at-age in the stock were based on Bulgarian landings data from November of year *y-1* to February of year *y* (Table 10).

Table 10. Individual Weight-at-age (in kg) in the stock on the 1st of January.

Age / Year	0	1	2	3	4
1994	0.001	0.0035	0.0041	0.0048	0.0062
1995	0.001	0.0033	0.0043	0.0048	0.0055
1996	0.001	0.0028	0.0043	0.0047	0.0053
1997	0.001	0.0027	0.0047	0.0057	0.0069
1998	0.001	0.0034	0.0046	0.0064	0.0082
1999	0.001	0.0025	0.0047	0.0059	0.0073
2000	0.001	0.0032	0.0044	0.0056	0.0072
2001	0.001	0.0035	0.0044	0.0052	0.0067
2002	0.001	0.0036	0.0045	0.0061	0.0074
2003	0.001	0.0035	0.0044	0.0059	0.0074
2004	0.001	0.0034	0.0044	0.0060	0.0072
2005	0.001	0.0036	0.0046	0.0061	0.0074
2006	0.001	0.0036	0.0046	0.0057	0.0074
2007	0.001	0.0036	0.0047	0.0063	0.0076

5.3.4. MATURITY AT AGE

The maturity ogive applied is a knife edge assumed to reach 100% at age 1.

5.3.5. NATURAL MORTALITY AT AGE

The natural maturity is derived from Daskalov (1998).

Age 0=0.64 for the half of the year. Ages 1-5=0.95 for all years.

5.4. LPUE AND CPUE

CPUE data from selected Bulgarian, Romanian and Ukrainian pelagic trawl fisheries are presented in Tables 11-13. These data were used for tuning the catch-at-age assessment models.

Table 11. Bulgarian commercial fleet CPUE (kg/h) by years and quarters.

Year	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
1996		394	423	441
1997	196	416	315	268
1998	200	589	501	358
1999	209	532	482	288
2000	336	457	1090	507
2001	200	635	712	266
2002	200	618	966	385
2003	258	622	877	420
2004	211	543	845	287
2005	226	534		322
2006		488	787	
2007				

Table 12. Romanian commercial fleet fishing effort and CPUE by years.

Years	Catch	***E F F O R T***				Depth	***C.P.U.E.***			
	(t)	No. vessel	No. day	No. hour	No. hauls	(m)	t/vessel	t/day	t/hour	t/haul
1981	77					20 - 40	38.5	0.32	0.07	0.12
1982	664	3	346	1.543	951	20 - 40	221.3	1.92	0.43	0.70
1983	1.344	11	767	4.132	2.663	20 - 55	122.2	1.75	0.32	0.50
1984	2.946	11	1.030	5.650	3.466	20 - 60	267.8	2.86	0.52	0.85
1985	4.266	15	980	5.885	3.840	20 - 50	284.4	4.35	0.72	1.11
1986	5.954	14	1.709	8.756	5.456	20 - 60	425.3	3.48	0.68	1.09
1987	6.090	14	1.589	8.235	4.986	20 - 65	435.0	3.83	0.74	1.22
1988	4.661	14	1.317	7.559	4.806	20 - 70	332.9	3.54	0.62	0.97
1989	7.055	20	1.400	5.850	3.897	20 - 65	352.8	5.04	1.20	1.81
1990	2.105	13	650	3.503	1.964	20 - 65	161.9	3.24	0.60	1.07
1991	145	7	117	264	616	20 - 60	20.7	1.24	0.55	0.23
1992	1.087	8	310	1.553	936	20 - 65	135.5	3.49	0.69	1.16
1993	1.297	8	632	2.856	1.700	20 - 40	162.1	2.05	0.45	0.76
1994	1.340	8	664	3.024	1.589	20 - 45	167.5	2.02	0.44	0.84
1995	1.715	9	784	2.349	1.535	20 - 50	190.6	2.19	0.73	1.12
1996	1.658	11	1.112	4.521	3.245	23 - 97	150.7	1.49	0.37	0.51
1997	3.225	13	2.160	4.259	6.352	20 - 80	248.1	1.49	0.75	0.50
1998	3.201	14	959	4.404	3.515	20 - 70	228.6	3.33	0.72	0.91
1999	1.892	14	692	3.086	2.085	20 - 68	135.1	2.73	0.61	0.91
2000	1.750	12	646	2.984	2.028	20 - 68	145.8	2.71	0.58	0.86
2001	1.722	7	678	3.498	2.422	20 - 60	246.0	2.54	0.49	0.71
2002	1.443	7	878	2.922	1.971	20 - 68	206.2	1.64	0.49	0.73
2003	1.124	9	743	2.067	2.848	20 - 70	124.9	1.52	0.54	0.39
2004	1.255	8	762	2.035	2.675	20 - 60	156.9	1.64	0.62	0.47
2005	1.394	9	788	2.110	2.805	20 - 65	154.9	1.77	0.66	0.50
2006	430	8	760	2.020	2.605	20 - 70	53.8	0.56	0.21	0.17
2007	158	3	290	1.000	746	20 - 68	52.7	0.55	0.16	0.21

Table 13. Ukrainian commercial fleet CPUE by years.

Year	CPUE (t/h)
1992	0.95
1993	0.86
1994	0.95
1995	1.00
1996	0.82
1997	0.72
1998	0.92
1999	1.02
2000	1.81
2001	1.31
2002	1.78
2003	0.91
2004	0.96
2005	0.97
2006	1.07
2007	0.97

5.5. SCIENTIFIC SURVEYS

Bulgaria

Bulgarian research trawl surveys are conducted on annual basis. Abundance indices are given in Table 14. The technique applied is a "swept area" trawl survey using a standard mid-water trawl with following dimensions: OTM –pelagic otter trawls with dimensions: 26m long, 8 m height, mesh size of codend 6.5 mm;"effective" horizontal opening – 16 m. Stratified sampling is applied (Sparre & Venema, 1998). The area is divided to sub areas "strata" depending on the depth: first stratum is 35-50 m, second 50-75 m and third 75-100 m (Table 14). The examined area is divided to 55 equally sized fields; each sector was assessed as 63 Km^2 (5' Latitude × 5' Longitude). The trawling activities are carried out in meridian (north-south) direction. The duration of each trawling is between 30 and 60 min, average velocity 2.3 and 2.9 knots (3.889 to 5.37 km/h). In 2007 trawl survey in Bulgarian waters was carried out using mid-water otter trawl in 32 areas from 02.06.2007 to 15.06.2007. The total catch during the survey was 7047 kg and 7825 individuals were processed for analysis of the population parameters. Minimum catch was registered in area G14 from 75-100 m strata: CPUE = 1 kg/h (Fig. 4), CPUA = 13.499 kg/km^2. In the same area the lowest level of the biomass was registered: 844.8 kg. Maximum catch (in weight) was taken in area N2 (strata: 50-75 m, 1000 kg), CPUE = 1333.33 Kg/h and CPUA: 16 056.5 kg/km^2. Similar catch figures were recorded in area E19 30-50 m strata: catch = 880 kg, CPUE = 1313.4 kg/h, CPUA = 16 417.9 kg/km^2 and D17 strata 50-75 m: catch = 660 kg, CPUE= 985.07 kg/h, CPUA = 12 313.4 kg/km^2).The average catch from all areas was 220.2 kg, average CPUE from all areas was 336.5 kg/h and average CPUA = 4262.05 kg/km^2. The calculated biomass in Bulgarian Black Sea marine area (2007) was 29 189.9 t (Raykov, 2007b)(Fig. 5).

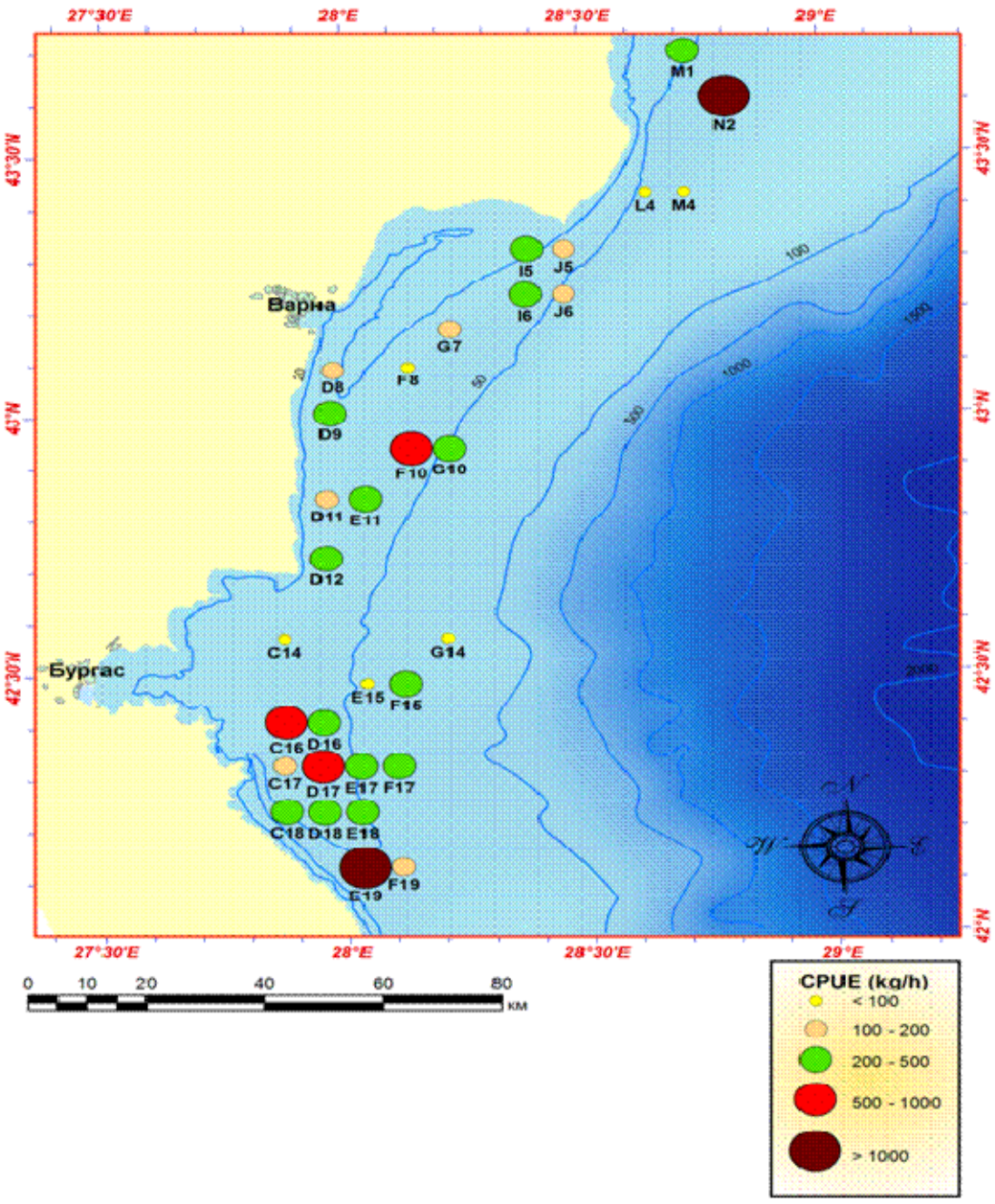

Fig. 4. CPUE from research trawl survey in Bulgarian waters in 2007.

Table 14. Results from Bulgarian biomass trawl survey in 2007.

CPUA (kg/km^2)	Strata (m depth)	Biomass (kg)	Area (km^2)	No. Area
3548	30-50	6438805	1815	29
6214	50-75	17109272	2754	44
2254	75-100	5641787	2503	40
Total		29 189864	7072	

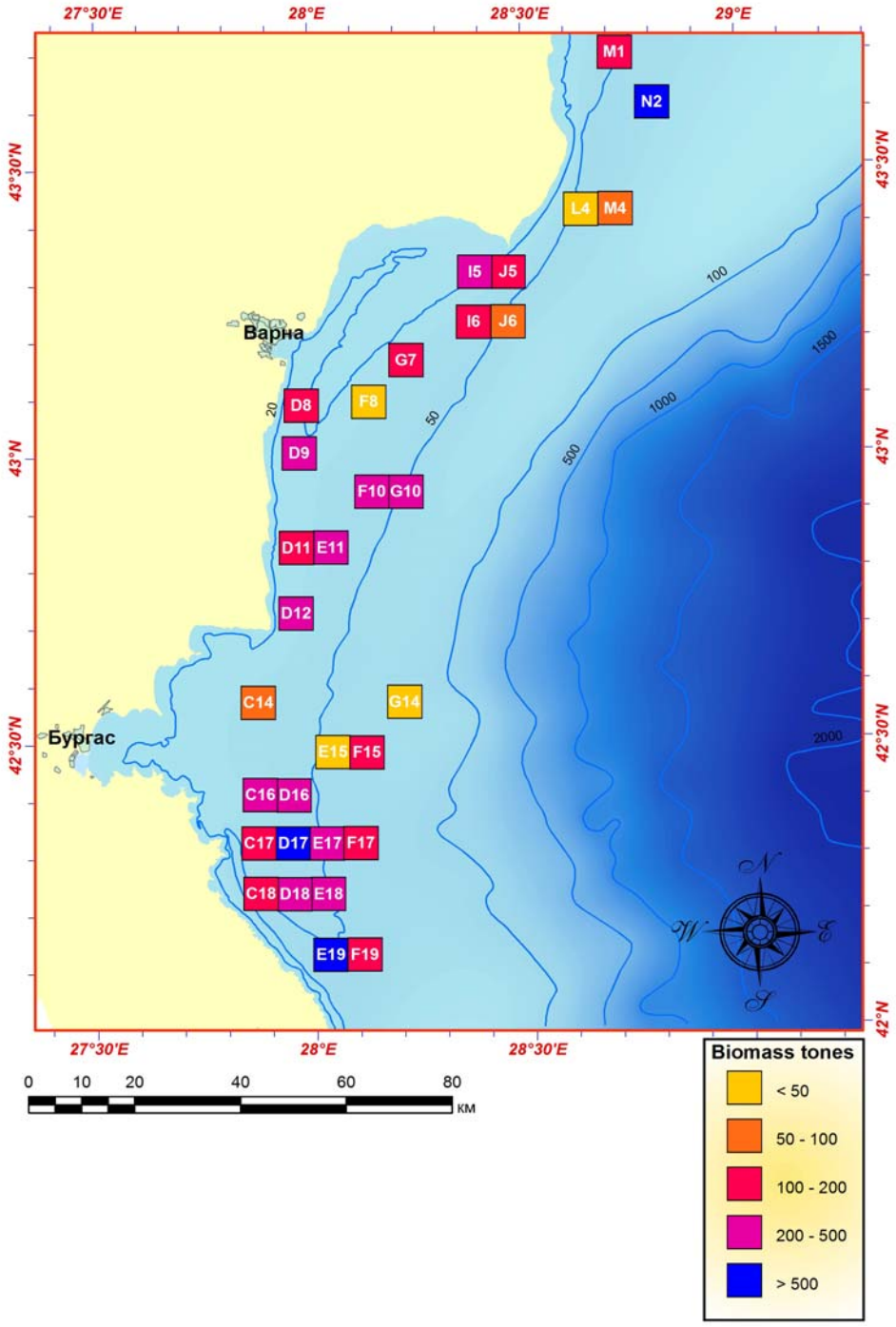

Fig. 5. Estimated Sprat stock biomass in Bulgarian waters in May-June 2007.

In 2008 the trawl survey was conducted in the 36 areas divided to sub areas "strata" depending on the depth: first stratum is 35- 50 m, second 50-75 m and third 75-100 m. The technique applied is a "swept area" trawl survey using a standard mid-water trawl with following dimensions: OTM –pelagic otter trawls with dimensions: 26m long. 8 m height. mesh size of codend 6.5mm; "effective" horizontal opening – 16 m. The duration of each trawling is 60 min with velocity 2.6 – 2.7 knots.The catch varied from 0 kg (75-100 m) to 1650 (30-50 m). In May 2008, the greatest agglomerations and highest CPUE were detected in the 30-50 m stratum. In stratum 50-75 m, two areas show high values of CPUE (750 and 744 kg/h) and in the 75-100 m stratum only one area with CPUE = 984 kg/h was detected.

Table 15. Results from Bulgarian biomass trawl survey in 2008.

CPUA (Kg/km^2)	Strata (m depth)	Biomass (kg)	Area (km^2)	No Area
6891.066	30-50	12506044.99	1814.82	29
4260.709	50-75	11731948.71	2753.52	44
1886.895	75-100	4723276.417	2503.20	40
Total		28 961270	7071.54	

The highest values of CPUA was established in the 30-50 m stratum. The biomass of the sprat agglomerations in May 2008 in front the Bulgarian Black Sea coast was assessed as 28 961.270 tons.

Romania

Romanian scientific trawl surveys are not age disaggregated, but provide trends in relative indices in stock biomass and juvenile sprat abundance (Tables 16 and 17). The techniques used for the standard survey are described as follows.

The sprat biomass and distribution is explored using the mid water trawl with a rigging system insuring it works near bottom. The number of the hauls is of 15-20 for each survey depending on weather conditions.

Romania also conducts a juvenile survey targeting the 0-group using a special juvenile trawl manufactured in NIMRD (Fig. 6). The trawling is carried out at the surface, at a speed of 1.5 knots for 15 min, with a horizontal opening of the trawl of 14 m. After each haul, the samples are qualitatively and quantitatively analyzed.,or are preserved with formaldehydes for laboratory analysis. The results are used to estimate the relative size of sprat annual recruitment (Table 17).

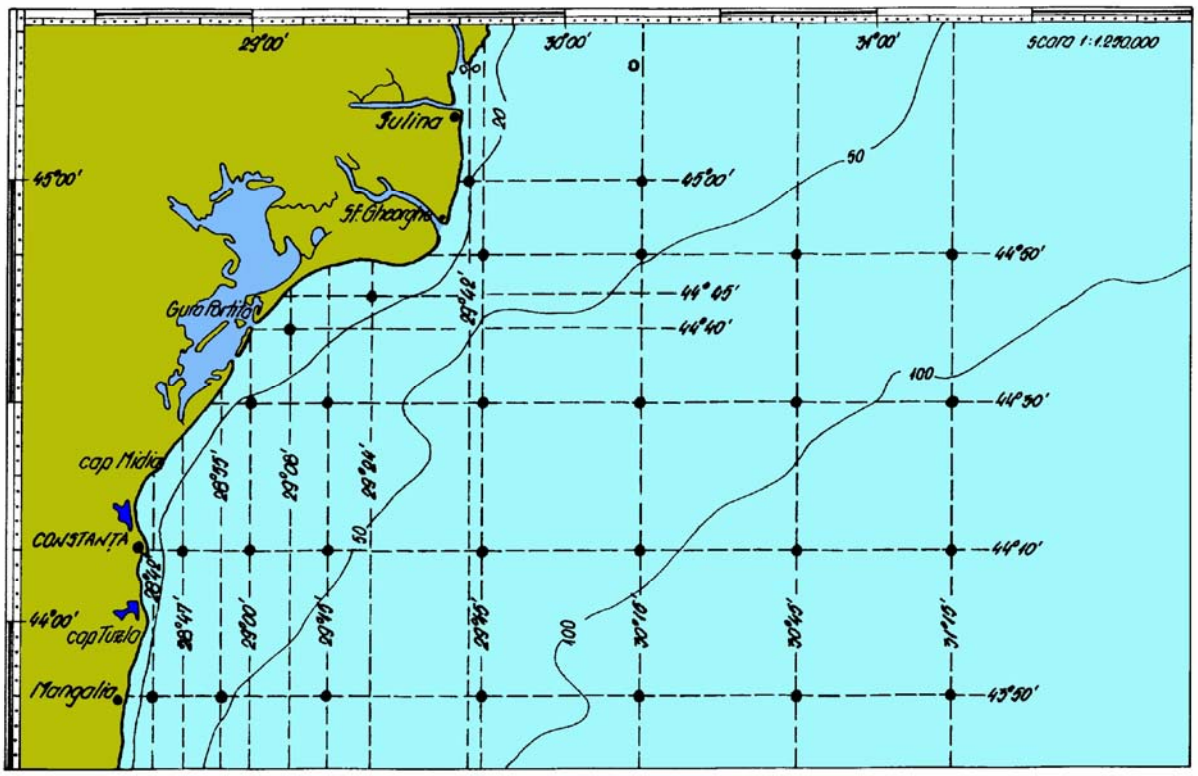

Fig. 6. Network of larvae and juvenile sampling (3-4 stations on transect up to 50-60m depth).

Table 16. Biomass of sprat in Romanian waters estimated from trawl suveys.

	Biomass (t)									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sprat	40.000	45.000	35.000	35.000	30.000	45.000	45.000	65.000	19.000	60.000

Table 17. Relative abundance and density of juvenile sprat (0-group) from Romanian waters.

	May	May	July	July	Aug-Sept	Aug-Sept
	Abundance (10^{-6})	Density (ex/m^2)	Abundance (10^{-6})	Density (ex/m^2)	Abundance (10^{-6})	Density (ex/m^2)
1995	29.9135	0.0071				
1996	15.3737	0.0037269				
1997	0.95	0.00032				
1998	9.797	0.001349				
1999	15.411	0.0016				
2001	52.666	0.0063			0.6888	0.000237
2002	5.3099	0.00218591			0.04322	0.000064
2003	10440.65	2.073	1.006	0.00034		
2004					0.457	0.000264
2005	8.9037	0.001475				
2006	180	0.0227			0.345	0.0001025
2007	8.15	0.001213004			0.175	0.000128026

In May 2008 the situation was difficult enough from a fishery point of view. The fishing schools have been influenced by the jellyfish blooms (Tables 18 and 19).

Table 18. Assessment of the jellyfish agglomerations in May 2008 (sampling gear - commercial trawl).

No. polygon	Polygon area (Nm^2)	Range (t/Nm^2)	Average (t/Nm^2)	Total tons in polygon	Total on the shelf (t)
1	120	4.86	4.86	583.2	
2	85.5	9.62	9.62	822.5	17.312.7
3	183.5	0	0	0	
4	108	6.44	6.44	695.5	
5	48	1.94	1.94	93.12	
6	128	4.53	4.53	579.84	
Total	673			2.744.16	

Table 19. Assessment of the sprat agglomerations in May 2008 (sampling gear - commercial trawl).

No. polygon	Polygon area (Nm^2)	Range (t/Nm^2)	Average (t/Nm^2)	Total tons in polygon	Total on the shelf (t)
1	108	4.86	4.86	524.88	
2	70	0.97	0.97	67.9	9.285
3	63	0.97	0.97	61.11	
4	264	0.03	0.03	7.92	
5	84	8.36	8.36	700.56	
6	84	1.493	1.493	125.41	
Total	673			1.487.78	

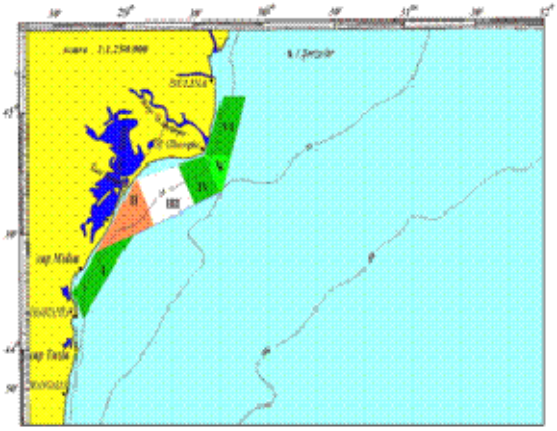

Fig.7 Distribution and abundance of the jellyfish in May 2008.

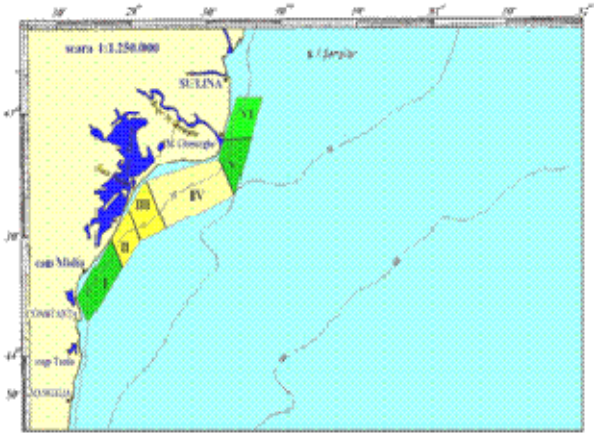

Fig. 8. Distribution and abundance of sprat in May 2008.

Biomass of the sprat agglomerations computed for a surveyed area of 673 Nm^2 was of 1.488 tons, extrapolated to 9.285 tons for shelf area up to 50 Nm from seashore.

Given the period 2007, in May 2008 the fishing agglomerations have been influenced considerably by the jellyfish agglomerations. The situation was the same as during the 2006 period. For the surveyed area, the jellyfish biomass was appreciated at 2.744 tons, extrapolated to 17.313 tons for shelf area up to 50 Nm from seashore.

In summary we can say that for the majority of the pelagic fish species from Romanian littoral, the distribution of fish schools and their availability to the fishery are strongly influenced by the environmental conditions e.g. jellyfish outbursts. The changes in fish distribution may be misinterpreted as modifications in the stock size, and induce incorrect management decisions. The spring period of 2008 was extremely unfavourable for trawl fishing for sprat because of large swarms of jellyfish. The biomass of sprat in 2007 was estimated as 60 000 t (STECF 2007).

6. TURBOT IN THE BLACK SEA

6.1. STOCK UNIT AND DESCRIPTION (BIOLOGICAL FEATURES)

Turbot (*Psetta maxima*) occurs all over the shelf area of all Black Sea coastal states (Fig. 9), at depths of about 100 m -140 m in the North-western Black Sea area and makes grouped local shoals. Turbot inhabits sandy, mixed bottoms or mussel beds.

It is a large-size fish with long life cycle, which reaches length of 85 cm, weight of 12 kg and age of more than 17 years in the Black Sea (Svetovidov, 1964). In Romanian waters the age of 23 years was reported (Carausu, 1952).

Spawning of turbot takes place in spring from April to the middle of June, and peaks during the first half of May at water temperature between 8-16°C. Salinity is a limiting factor for larval survival in the region of the Danube estuary. Turbot are batch spawners and the eggs are pelagic. Fecundity is high, up to 12.8 million eggs per female per year and initially the larvae have a pelagic mode of life. Turbot grow rapidly and in approximately 2 months, they reach length of 30 mm on average and enter their demersal phase (Stoyanov, 1963). Turbot mature at the age of 3-5 years. Adults feed mainly on fish, both demersal (whiting, red mullet and gobies) and pelagic species (anchovy, sprat, horse mackerel, shad). The diet of turbot also includes crustaceans (shrimps, crabs, etc.), mollusks and polychets. Turbot does not undertake distant transboundary migrations. Local migrations (spawning, feeding and wintering) have a general direction from the open sea towards the coast and vice versa.

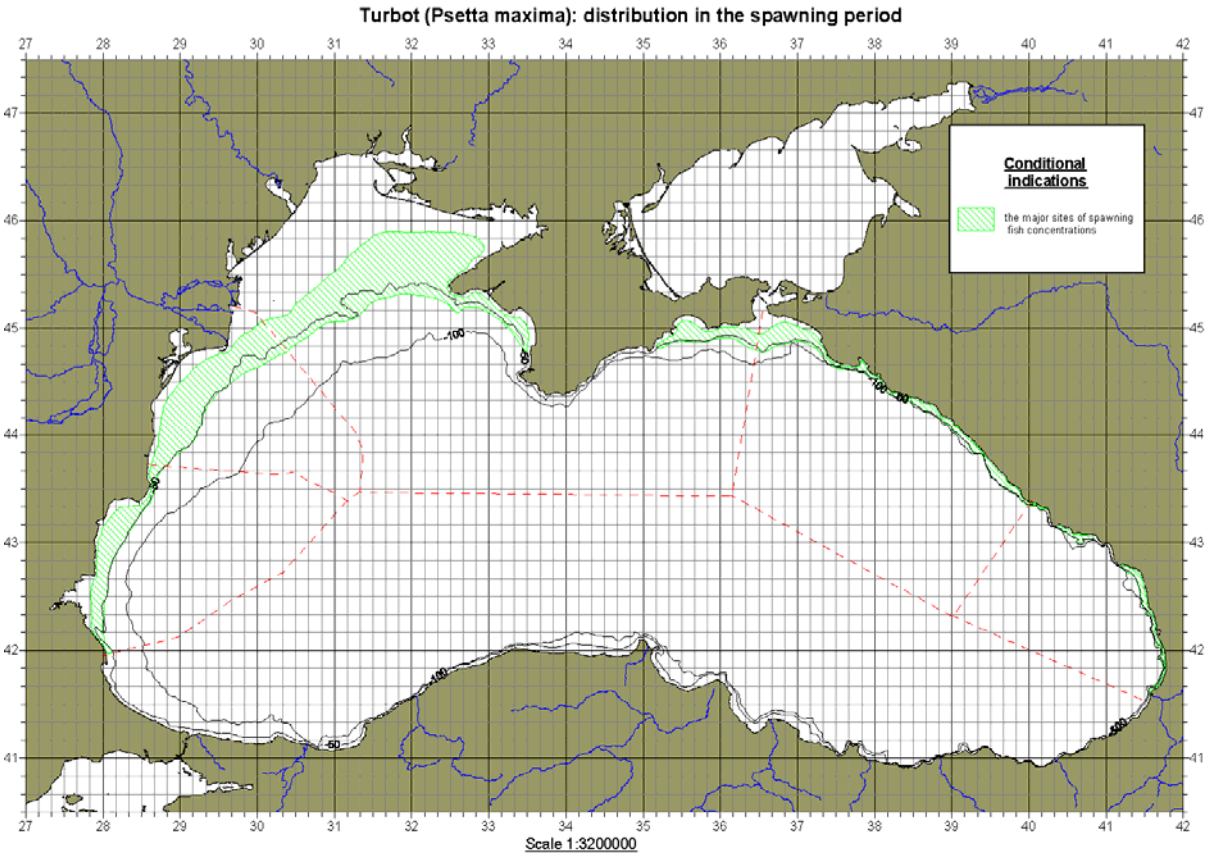

Fig. 9. Distribution of turbot during the spawning season in the Black Sea without Turkey area. (Presentation of results, obtained during the project "Development of the habitat mapping for commercial fish and invertebrate species", funded by BSERP GEF).

In addition to the seasonal migrations offshore and towards the coast, adult turbot show a tendency to migrate in north-south direction. Juvenile turbot are largely confined to the coastal areas during all seasons, but as they grow older they move offshore and to deeper waters. Tagging experiments in Bulgaria, Romania, Ukraine and Turkey have been undertaken using conventional tags, but to better understand the migration behavior it would be desirable to undertake studies using electronic data storage tags.

There are different opinions in the scientific community about identification of turbot stock (Popova, 1954; Karapetkova, 1964; Prodanov and Mikhailov, 2003; Maximov et al. 2003; 2006; Suzuki et al. 2004). The working group agreed to prepare two different assessments. The first one will deal with unit stock of turbot. involving turbot from Ukrainian, Romanian, Bulgarian waters and waters along the Western coast of Turkey. In the second assessment, the data of total turbot landings of all Black Sea countries will be used with the assumption of one unit stock in the Black Sea.

6.2. TURBOT FISHERIES IN THE BLACK SEA

6.2.1. GENERAL DESCRIPTION

In all Black sea countries turbot is one of the most valuable fishery resource. Apart of the specialized fisheries targeting turbot, it is also caught as a by-catch by other fisheries using trawls, long-lines and purse seines (e.g. the sprat fishery).The mesh size of gillnets have been synchronised between Bulgaria and Romania in order to protect the stock and improve reproductive capacity. The twine thickness of gillnets is an important factor and has an effect on the marine mammals populations. In order to protect dolphins, the thickness should be reduced to 6.350 m/kg according to experiments made in Romania. Acoustic devices allowing escapement of dolphins should be introduced.

6.2.2. BULGARIA

Specialised turbot fishery is conducted by bottom (turbot) gill nets with minimum mesh size 200 mm. The use of bottom trawls has been prohibited since 1984. The gillnets are deployed in the shelf area during the spring and autumn seasons. Turbot fishery has been regulated using TAC since 2004. Seasonal fishing closure of 60 days during spawning season (April – June) is in force in Bulgaria. The minimum admissible landing body length for turbot is 45 cm total length.

6.2.3. ROMANIA

The marine demersal fishing along the Romanian Black Sea shore is conducted 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 – 11 meters), using fix tools (*trap nets, gill nets and beach seine*) and at depths of 15 – 60 meters, using gill nets.

The offshore fishing - today, almost all coastal trawlers have gill nets and the installations needed for using them (8 trawlers), but a specialized turbot fishing is practiced by four vessels. In this fishing about 6.075 gill nets are used and a number of 80 professionals fishermen are involved.

Coastal fishing **-** in the Romanian coastal zone, fishing is characterized by the concentration of the activity during the first five – six months of the season (April – September) when turbot comes close to the shore for feeding and reproduction. The fishing is practiced along the coast, between Sulina and Vama Veche. For this, a number of 134 boats were licensed (114 with engine). In fishing, about 23 trap nets and 2.250 gill nets are used and a number of 435 professionals fishermen are involved.

Specialised turbot fishery is conducted with bottom (turbot) gill nets with minimum mesh size 200 mm . The gillnets are deployed on the shelf area during the whole year, while the use of bottom trawls has been prohibited. Turbot fishery has been regulated using TAC since 2005. Seasonal fishing closure of 60 days during spawning season (April – June) is in force in Bulgaria. The minimum admissible landing body length for turbot is 45 cm total length.

6.2.4. GEORGIA

The only information are the official FAO statistics on landings (FAO, Fishstat) (Table 20).

6.2.5. RUSSIA

Specialised turbot fishery is conducted with bottom (turbot) gill nets with minimum mesh size 180 - 200 mm.

6.2.6. TURKEY

Specialised turbot fishery is conducted with bottom (turbot) gill nets with minimum mesh size 160 – 200 mm (Tonay and Öztürk 2003). as well as with bottom trawls with minimum mesh size 40 mm. The minimum admissible landing body length in Turkey is 40 cm total length.

According to Zengin (2003) the proportions of the turbot catch taken with various gears in Turkish waters is as follows: 72% with bottom gill nets, 26% with trawls and 2% as by-catch from purse seine fishery. Turkish turbot fishery is not regulated using TAC. Seasonal fishing closures in Turkey are: for bottom trawls from 1st September – 1st April and for gillnets – from 1st May up to 1st June.

6.2.7. UKRAINE

Specialised turbot fishery is conducted with bottom (turbot) gill nets with minimum mesh size 180 - 200 mm. The use of bottom trawls has been prohibited. Turbot exploitation in Ukraine has been regulated using TAC since 1996. Ukrainian turbot catches registered by official statistics were obtained by more than 80% from gill nets. The rest is obtained as by-catch from nets with mesh size 100 – 110 mm (used for dogfish fishery), long-lines (used for dogfish fishery) and sprat trawl fishery.

The Regulations of Fisheries determine the following standards for the fisheries of the Black Sea turbot:

- minimum commercial body size – 35 cm (standard length);
- allowable by-catch of juveniles in non-target fisheries is restricted to no more than 2% of total catch in weight, During the target fisheries with nets (with mesh size 180 mm) no more than 5% of the total catch in numbers should be juveniles.

- in long-line fisheries of picked dogfish (*Squalus acanthias*) and rays (*Rajiformes*) the allowed by-catch of juvenile turbot could be no more than 20% of the total catch in numbers (total catch in number of all species (dogfish + ray + turbot).

- turbot by-catch is allowed in trawl catches of sprat: no more than 4 individuals of regular commercial fishing length per ton of catch.

- in the period of peak spawning (April – May)of turbot in the coastal 12-mile zone a temporal prohibition for fishing with trawls, nets and long-lines is implemented for 15 – 30 days (such a prohibition may be imposed gradually for various gears).

6.3. OFFICIALLY REPORTED LANDINGS

Table 20. Official landings by countries and areas (t).

Year	Bulgaria	Romania	Ukraine west	Ukraine east	Turkey west	Turkey east	Russian Federation	Georgia	Black Sea total	Black Sea west
1950	195.3									
1951	160	156								
1952	95.9	195								
1953	103	470								
1954	255.1	678								
1955	198.9	383								
1956	234	402								
1957	458.4	169								
1958	368.6	80								
1959	247.5	275								
1960	215.8	214								
1961	174.3	164								
1962	431.7	182								
1963	435.3	317								
1964	460.2	393								
1965	324.9	247								
1966	425.6	134								
1967	312.3	62								
1968	304.3	92								
1969	200.2	112								
1970	268	124								
1971	222	43								
1972	175	70								
1973	249	118								
1974	312	29								
1975	204	16								
1976	217	36								
1977	63	15								
1978	121	11								
1979	70	7								
1980	89	9								
1981	9	2								
1982	9	2								
1983	7	3								
1984	21	4								

Year	Bulgaria	Romania	Ukraine west	Ukraine east	Turkey west	Turkey east	Russian Federation	Georgia	Black Sea total	Black Sea west
1985	51	11								
1986	12	7								
1987	3	1								
1988	4	2								
1989	0.9	0	2	0	448	1001	0	8	1459.9	450.9
1990	0	0	9	0	908	475	0	1	1393	917
1991	0	2	17	1	600	315	0	0	935	619
1992	0	1	18	1	308	110	1	0	439	327
1993	0	6	10	0	400	1185	2	0	1603	416
1994	0	6	18	1	1293	821	5	0	2144	1317
1995	60	4	10	0	2006	844	19	0	2943	2080
1996	62	6	37	2	1414	510	17	0	2048	1519
1997	60	1	40	2	777	134	11	0	1025	878
1998	64	0	40	2	1056	412	14	0	1588	1160
1999	54	2	69	4	1579	225	15	5	1953	1704
2000	55.1	2	76	4	2321	318	4	9	2789.1	2454.1
2001	56.5	13	123	6	2169	154	24	11	2556.5	2361.5
2002	135.5	17	99	5.47	193	142	15	11	617.97	444.5
2003	40.8	24	118	5.876	126	93	15	1	423.676	308.8
2004	16.2	42	126	7.157	118	116	2	7	434.357	302.2
2005	12.69	37	123	6	273	275	15	6	747.69	445.69
2006	14.81	32	154	8	266	481	7		962.81	466.81
2007	20	45	205	10.8	**Staistics not published**		7		288	270

6.4. ASSESSMENT

The WG compiled the international data available to estimate the status of the turbot stock(s) as well as stock assessments performed up to date (Table 21).

The WG prepared data for two separate analyses to be conducted by means of VPA 3.1 (Lowestoft), as follows:

- On the stock of turbot in the Western part of the Black Sea - based on data from Bulgaria, Romania, Western Ukraine and Western sub-area of Turkey
- On the stock of turbot in whole Black Sea - based on data from Bulgaria, Romania, Ukraine and Turkey.

Table 21. Biomass assessments performed using trawl survey and VPA (catchability or efficiency coefficient of the trawl equal to 1.0).

Year	$Y_{official}$. tons		SURVEYs. tons		$B_{VPA.\ tons}$
	Black Sea total	Western part of Black Sea	Former USSR waters	Ukrainian waters	
1977	1912		2000	1320	24400
1978	2028		2200	1450	24800
1979	5327		5400	3560	25800
1980	2723		2800	1850	23100
1981	3155		3300	2180	21700
1982	4552		4700	3100	20000
1983	5226		5300	3500	15900

1984	2802			4700	3100	10700
1985	467					8000
1986	418					7500
1987	839					7000
1988	1116					6100
1989	1450	451				
1990	1383	917				
1991	919	619				
1992	427	327			2080	
1993	1609	416			1640	
1994	2139	1317			1640	
1995	2924	2080				
1996	2031	1519				
1997	1014	878				
1998	1574	1160			1680	
1999	1933	1704				
2000	2776	2454				
2001	2522	2362			1980	
2002	592	445			2000	
2003	408	209			2000	
2004	465	342			1700	
2005	727	446			2040	
2006					2080	

Table 21. continued.

Year	Bulgaria		Romania	
	SURVEYs. tons	$B_{VPA.\ tons}$	SURVEYs. tons	$B_{VPA.\ tons}$
1992	100			
1993				
1994				
1995				
1996				
1997				
1998				
1999				
2000				
2001				
2002		761.7 – 866.7		
2003			1066	
2004			980	
2005			1080	
2006	447.38- 1441.06		1150	
2007	1778.76 - 1896.56		1300	

6.4.1. INPUT DATA

6.4.2. INTERNATIONAL HISTORIC CATCH AT AGE ESTIMATES

After a review of the available data the WG concluded that official landing statistics grossly underestimate the real catches much of which are unreported mainly due to illegal fishing. Biological data and data from research biomass surveys are also not robust. The WG realised that the uncertainty in the available data may prevent absolute estimates of the state of the

turbot stocks but may allow the estimation of relative changes in stock size and exploitation rates using the available data.

The WG prepared input data for age structured assessment (e.g. VPA) using officially reported landings only.

After observing and comparing the available age composition data, the WG noted a discrepancy between age data from Ukraine and Romania/Bulgaria/Turkey (Fig. 10). This may be due to different age interpretation and a joint age reading/calibration workshop will be needed in the future.

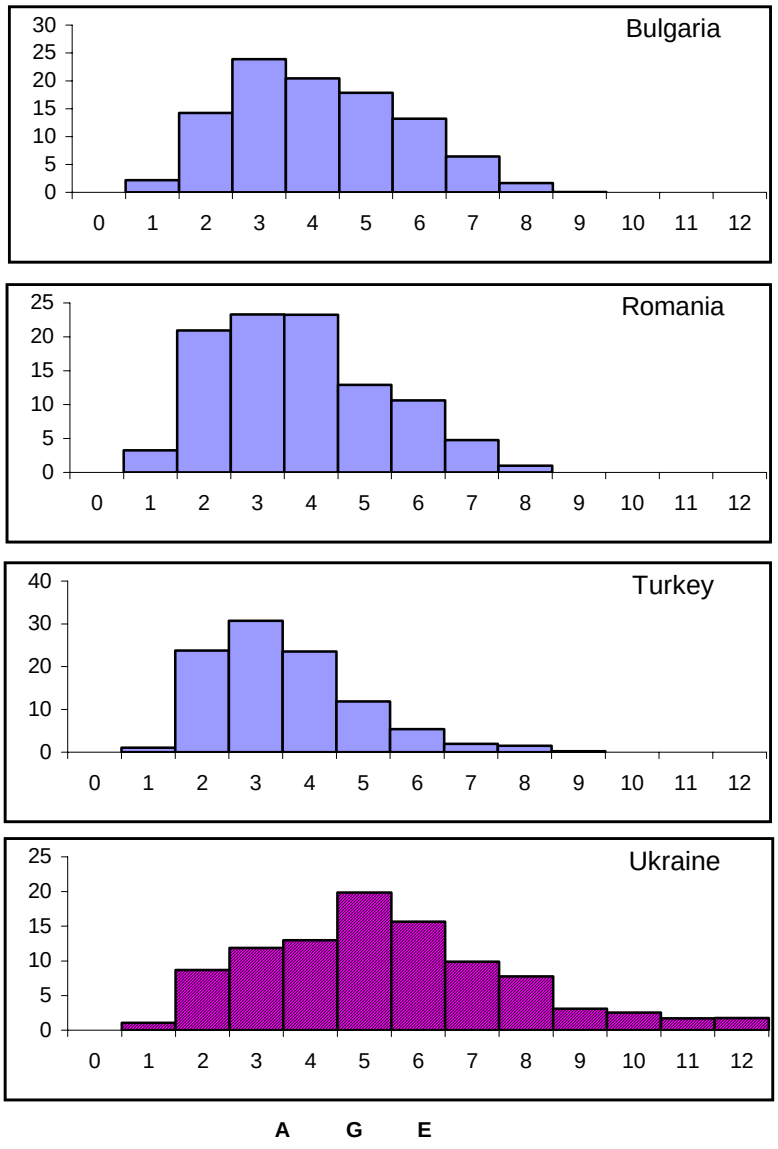

Fig. 10. Average (2000-2007) age composition from survey data from different countries.

The group used for analyses all the available data from Bulgaria, Romania, Turkey and Ukraine for developing landings-at-age data. Due to lack of age compositions data for Bulgaria, Romania and Turkey, the Ukrainian age composition from surveys was used in order to estimate catch-at-age of Bulgarian, Romanian and Turkish catches during the period 1989 – 2001. Age composition data from Romanian surveys was used to estimate catch-at-age

of Bulgarian catches during the period 2002 – 2005. The Turkish and Ukrainian catches have been divided for the Western and Eastern parts of the sea. Age composition of Eastern Turkish waters is available for the period 1990-1996, 2000 and 2005. Age composition data from Ukrainian surveys in the Western and Eastern part of the Black Sea was used to estimate catch-at-age in the Western and Easthern parts of Turkey respectively, for all years when Turkish data are missing. For 2002-2006 Romanian age composition was used to estimate catch-at-age in the Western Turkish waters.

Two separate input data sets are prepared, based on official landings and age and weight data: for the whole Black Sea and for the Western Black Sea (Tables 22 and 23).

Table 22. Catch at age (numbers, 10^3) of turbot in the Black Sea.

Year	1	2	3	4	5	6	7	8	9	10+
1989	3.690	11.740	32.871	40.921	59.034	67.755	34.548	16.771	15.765	52.326
1990	20.240	56.477	68.957	105.919	95.652	37.452	29.574	20.968	13.084	36.027
1991	50.695	65.044	111.160	80.626	55.577	43.289	33.490	7.741	5.626	5.626
1992	21.979	52.976	36.172	36.776	21.370	16.726	18.868	12.291	2.819	3.045
1993	244.303	529.756	444.536	182.992	77.134	31.439	17.854	17.841	13.911	3.943
1994	0.751	134.215	310.266	245.465	223.977	68.808	48.811	43.179	36.796	11.280
1995	18.946	67.477	47.242	312.768	488.344	247.768	87.393	18.823	2.455	2.455
1996	70.261	35.131	37.227	119.117	154.502	192.271	88.846	38.864	9.148	
1997			61.642	48.228	43.118	49.825	68.030	31.939	13.414	3.194
1998			8.872	25.562	72.902	174.631	96.235	54.292	11.101	
1999			69.125	113.114	75.410	182.240	144.535	25.137	12.568	6.284
2000	3.680	109.187	97.545	131.344	106.807	77.977	195.864	109.884	56.477	17.191
2001		28.094	42.015	131.454	244.382	319.140	102.601	21.883	2.554	7.662
2002		30.403	58.957	44.650	52.585	36.658	26.046	2.154	0.468	0.562
2003	1.340	8.515	14.844	13.837	23.158	32.754	35.114	5.872	0.330	0.198
2004	3.772	9.881	19.766	21.196	25.240	30.482	20.914	11.222	1.285	
2005	1.559	26.966	80.917	82.865	57.747	27.747	22.893	15.170	1.320	0.425
2006	0.010	11.250	52.329	69.633	93.432	68.208	41.631	35.661	6.870	8.913

Table 23. Catch at age (numbers, 10^3) of turbot in the Western Black Sea.

Year	1	2	3	4	5	6	7	8	9	10+
1989	1.146	3.646	10.208	12.708	18.334	21.042	10.729	5.208	4.896	16.250
1990	3.226	4.302	7.707	19.716	20.792	27.244	29.574	17.565	13.084	33.876
1991	7.814	20.756	33.698	55.676	40.292	39.071	29.303	6.349	5.616	5.616
1992	2.361	7.196	16.079	21.026	16.528	14.505	16.641	12.256	2.811	3.036
1993	0.246	6.763	13.280	14.141	25.699	16.723	15.985	14.141	12.050	3.935
1994	0.750	20.628	40.506	43.132	78.388	51.008	48.758	43.132	36.756	11.267
1995	0.000	10.639	18.823	227.510	303.620	153.037	82.657	18.823	2.455	2.455
1996	0.000	0.000	7.106	93.900	114.203	164.452	81.211	37.560	9.136	0.000
1997	0.000	0.000	53.375	41.759	37.335	43.142	58.906	27.655	11.615	2.766
1998	0.000	0.000	6.530	19.590	56.157	124.394	71.176	37.547	11.101	0.000
1999	0.000	0.000	60.936	99.714	66.476	160.650	127.412	22.159	11.079	5.540
2000	0.000	0.000	15.324	74.781	84.588	66.812	193.082	106.042	55.166	17.163
2001	0.000	28.098	40.018	123.460	238.406	303.117	88.551	17.880	2.554	7.663
2002	0.000	30.403	53.801	35.123	35.549	24.329	15.958	0.865	0.188	0.226
2003	1.340	8.034	13.911	11.942	18.285	25.023	23.863	3.195	0.180	0.108
2004	3.772	8.589	13.932	11.176	17.135	22.956	14.323	6.056	1.285	0.000
2005	0.000	8.255	19.436	31.779	27.447	14.231	16.729	11.977	1.320	0.425
2006	10.577	44.763	57.356	48.049	26.928	15.167	8.975	2.436	1.791	0.000
2007	0.090	3.370	13.152	40.546	28.430	12.447	7.986	1.714	2.245	0.241

6.4.2.1. DISCARDS AT AGE

Data on discards are not available from any of the countries.

6.4.3. INTERNATIONAL WEIGHT AT AGE ESTIMATES IN THE CATCH

The WG prepared a set of weight-at-age data (kg) which are available from demersal trawl surveys (Table 24). These data was used for the whole Black Sea and Western Black Sea area. The WG agreed to assume them as representative for the commercial landings due to lack of such data.

Table 24. The weight-at-age data (kg) for turbot for the Black Sea area.

Year	1	2	3	4	5	6	7	8	9	10+
1989	0.500	1.000	1.400	1.800	2.200	3.300	4.000	5.300	6.600	12.595
1990	0.457	0.730	1.247	1.777	2.160	3.243	2.600	5.447	4.333	8.183
1991	0.383	0.777	1.153	1.710	2.120	3.030	4.257	5.467	6.600	10.092
1992	0.727	0.947	1.427	1.997	2.647	3.907	7.925	6.300	8.800	11.107
1993	0.453	0.893	1.100	1.543	2.087	2.963	4.443	5.820	8.340	9.694
1994	0.600	0.760	1.070	1.593	2.083	2.597	4.200	5.900	8.300	7.323
1995	0.090	0.720	0.953	1.570	2.220	2.993	4.423	6.000	8.500	9.179
1996	0.418	0.829	1.000	1.600	2.100	2.800	4.300	6.000	9.500	9.179
1997	0.418	0.829	1.000	1.600	2.100	2.800	4.300	6.000	9.500	9.179
1998	0.418	0.829	1.300	1.700	2.200	3.100	4.300	6.000	7.000	9.179
1999	0.418	0.829	1.300	1.700	2.200	3.100	4.300	6.000	7.000	9.179
2000	0.180	0.430	1.227	1.567	2.223	2.870	3.913	5.233	6.620	9.823
2001	0.547	0.829	1.300	1.700	2.300	3.100	4.100	5.700	9.500	8.733
2002	0.547	0.852	1.283	1.938	2.532	3.197	4.117	5.400	6.600	5.250
2003	0.477	0.793	1.292	1.975	2.400	3.116	4.078	5.400	6.600	9.179
2004	0.486	0.973	1.429	1.953	2.517	3.183	4.238	5.796	6.800	9.179
2005	0.160	0.843	1.321	1.938	2.545	3.436	4.388	5.780	7.500	8.989
2006	0.621	0.999	1.507	2.114	2.680	3.501	4.467	5.828	7.400	9.179
2007	0.306	0.893	1.372	1.928	2.481	3.207	4.627	6.060	7.500	9.179

6.4.3.1. WEIGHT AT AGE IN THE STOCK

For the Weight-at-age in the stock the WG agreed to use the same data, derived from demersal trawl surveys (Table 24).

6.4.4. MATURITY AT AGE

Maturity-at-age data is obtained from demersal trawl surveys, carried out in the Romanian Black Sea area during the period 2002 - 2007 (Table 25).

Table 25. Stages of the maturation for turbot (*Psetta maxima*)(%) from Romanian catches during in the period 2002 – 2007.

Years	Month	Sex	*Stages of the maturation*										**Total**
			II	II-III	III	III-IV	IV	IV-V	V	V-VI	VI	VI-II	
2002	IV	F		5.6	23.5	14.6	21.2	19.7	15.4				**79**
		M		3.1	31.9	26.6	33.5	4.9					**51**
2003	IV	F		5.2	14.6	9.7	35.4	24.8	10.3				**27**
		M		4.2	24.2	20.1	28.3	19.5	3.7				**23**
	V	F		3.7	22.2	18.5	22.2	11.2	11.2		5.5	5.5	**56**
		M		5.3	18.4	50.0	13.2		5.2		2.6	5.3	**43**
	VI	F	3.7				7.6		8.4	15.6	33.9	30.8	**31**
		M			27.6		28.4	11.5	18.2		17.9	19.4	**20**
	VII	F	37.6									62.4	**23**
		M	73.2									26.8	**26**
	IX	F	65.7	34.3									**39**
		M	59.7	40.3									**64**
2004	IV	F		8.7	17.5	10.7	33.5	28.7	0.9				**72**
		M		1.5	25.8	35.8	21.9	11.3	3.7				**48**
	V	F		2.5	18.9	24.7	28.2	5.3	10.9		2.6	6.9	**81**
		M			2.4	46.6	36.9	10.8	3.3				**54**
	VI	F						8.9	25.9	22.5	26.8	15.9	**51**
		M					2.3	10.0	22.2	18.5	29.2	17.8	**33**
	VII	F	24.6									75.4	**30**
		M	20.0								11.6	68.4	**15**
2005	IV	F			15.8	28.1	34.8	21.2	0.1				**69**
		M		13.5	42.9	25.7	12.6	5.3					**50**
	V	F					43.7	33.9	12.8		7.2	2.4	**48**
		M			12.9	21.0	27.9	12.7	15.7	2.9	6.9		**28**
	VI	F						10.0	17.7		42.5	29.8	**17**
		M						5.7		25.8	52.8	15.7	**8**
2006	IV	F		6.5	13.9	26.8	31.5	15.6	5.7				**73**
		M		19.2	24.4	27.5	28.0		0.9				**48**
	V	F			6.7	12.8	36.8	25.3	14.8		3.6		**49**
		M					56.8	27.3		9.6	5.4	0.9	**36**
	VI	F						5.0		45.8	33.6	15.6	**28**
		M						12.5	25.6	37.7	17.8	6.4	**24**
	VII	F	20.7								5.8	73.5	**13**
		M	26.6								13.7	59.7	**7**
2007	V	F			18.5	31.5	28.6	19.7	1.7				**79**
		M		8.6	10.5	34.5	38.6		7.8				**61**
	VI	F					21.3	29.7	20.2	15.8	6.3	6.7	**48**
		M				2.4		48.5	39.6	9.5			**34**
	VII	F						8.8		23.3	31.3	36.6	**14**
		M							21.4	52.8		25.8	**14**

6.4.5. NATURAL MORTALITY AT AGE

Constant natural mortality was applied for all ages and years as used in Prodanov et al. (1997).

6.5. LPUE AND CPUE

The data concerning LPUE and CPUE were derived from two different sources – commercial catches and research surveys. Romanian and Ukrainian data cover both commercial gill nets and trawls surveys, but only data from surveys are available for Bulgaria (Tables 26-28).

Table 26. Turbot catches (t), fishing effort and CPUE for the fisheries along the Romanian coast.

Year	Catch (t)	*E F F O R T*			*C.P.U.E.*		
		Number gill net	Number days	Number hours	t /gill net	t / day	t / hour
2001	13.00	980	100	2.400	0018	0131	0005
2002	17.00	1.267	125	3.000	0013	0136	0005
2003	24.00	2.765	150	3.600	0009	0160	0006
2004	42.00	4.350	225	5.400	0009	0186	0007
2005	37.00	3.856	205	4.920	0009	0.193	0007
2006	32.00	3.794	192	4.608	0008	0166	0007
2007	45.00	3.789	250	6.000	0012	0180	0007

The total number of vessels involved in Romanian turbot fishery is 4 trawlers and 134 boats which operate about 4000 gillnets and 10 beach seines. In Bulgaria, the total number of fishing vessels is 1261 and the number of registered fishing gears till September 2007 was 2453.

Table 27. Effort (number of gill nets) and CPUE (kg/gill net) of Ukrainian fishing fleet in Crimean waters working on turbot fishery.

Year	Effort	CPUE
1991	950	2.1
1992	2140	4.2
1993	1066	8.6
1994	1482	11.6
1995	1571	6.2
1996	1331	27.3
1997	1500	25.6
1998	1792	20.5
1999	2000	32.1
2000	1937	24.6
2001	4728	24.8
2002	3006	23.3
2003	3913	20.9
2004	3840	21.8
2005	8097	15.9
2006	7044	23.0

Table 28. CPUE (kg/hour) of turbot trawl catches from research surveys along the Bulgarian and Romanian coasts.

Year	**CPUE**	
	Bulgaria	Romania
2003		4.9
2004		7.1
2005		7.9
2006	7.87	8.4
2007	9.46	9.8

6.6. SCIENTIFIC SURVEYS

The WG reviewed all scientific bottom trawl survey activities undertaken in the Black Sea relevant to the turbot stock (Table 29).

Table 29. Studies on turbot biomass and exploitation reference points in the Black Sea.

Researchers	Location	Years and periods	Biomass assessment (tons)	MSY (tons)	Methods
Martino and Karapetkova (1957)	Bulgarian coasts	March-1955	850	-	Swept area method
Popova (1967)	NW Black Sea coasts ″ ″ ″	1950-1960 1970 1975 1980	12 300 av 10 000 6 000 800	-	Swept area method
Kutaygil and Bilecik (1979)	West. Black Sea coasts. Turkey(Samsun-Kefken)	1969-1973	(ave) 180.4	-	Swept area method
Bingel et al. (1996)	South. Black Sea (Sinop-Georgia board)	1990 1991 1992	124 410 766	-	Swept area method
Zengin (2000)	Western Black Sea South. Black Sea (Sinop- Georgia board)	1990 1990 1991 1992 1993	130.5 686.3 250.4 222.4 134.3	 96.1 26.3 24.5 15.4	Swept area method
Shlyakhov and Charova (2003)	Waters of Ukraine and the Russian Federation	1992	12200	-	Swept area method
Shlyakhov and Charova (2003)	Ukraine coasts	1992-2002	9180 (8200-10400)	-	Swept area method
Shlyakhov and Charova (2003)	Waters of Ukraine and the Russian Federation	1992-1994	(av.) 13370	-	VPA and trawl surveys .(Baranov'model)
Shlyakhov and Charova (2003)	Ukraine coasts	1992-2002	10590 (8200-13700)	-	VPA and trawl surveys (Baranov' model)
Maximov et al. (2004)	Waters of Romania	2003-2006	980-1080	-	Swept area method (trawl surveys)
Shlyakhov and Charova (2003; 2006)	Waters of Ukraine	1992-1995 1996-2002 2003-2005	8830 (8200-10400) 10980 (8400-13700) 9570 (8500-10200)	-	Swept area method (trawl surveys)
Shlyakhov and Charova (2003; 2006)	Waters of Ukraine	1992-2002 2003-2005	10590 (8200-13700) 8900 (8200-10200)	-	Trawl surveys and Baranov's modified equation
Panayotova et al. (2006)	Waters of Bulgaria (spring)	2006	447.38	-	Swept area method (trawl surveys)
Panayotova et al. (2006)	Waters of Bulgaria (autumn)	2006	1440	-	Swept area method (trawl surveys)
Maximov et al. (2005)	Waters of Romania	2007	1150	-	Swept area method (trawl surveys)

Researchers	Location	Years and periods	Biomass assessment (tons)	MSY (tons)	Methods
Maximov et al. (2006)	Waters of Romania	2007	1300	-	Swept area method (trawl surveys)
Panayotova et al. (2007)	Waters of Bulgaria (spring)	2007	1779	-	Swept area method (trawl surveys)
Panayotova et al. (2008)	Waters of Bulgaria (autumn)	2007	1896.56	-	Swept area method (trawl surveys)

Bulgaria

To establish the exploited turbot stock in front of the Bulgarian Black Sea coast swept area method and standard methodology for stratified sampling was employed (Gulland 1966; Sparre and Venema 1998; Sabatella and Franquesa 2004). The region was divided in three strata according to depth – stratum 1 (35 – 50 m), stratum 2 (50 – 75 m) and stratum 3 (75 – 100 m). The study area was partitioned into 128 equal in size, but not overlying fields situated at depth 15 – 100 m, of which 70 in the Northern region and 58 in the Southern region. In the Northern region for the aims of the study additional forth stratum was introduced, which covered depths between 15 and 35 m because in this area the bottom structure allows bottom trawling in shallow waters as distinguished from Southern region. At 42-44 of the fields chosen at random, sampling by means of bottom trawling is carried out .

The seabed area covered during a single haul represents a basic measurement unit, which is very small compared to the total study area. nevertheless deemed representative since turbots do not aggregate in dense assemblages (Karapetkova, 1957). Each field is a rectangle with sides 5' Lat × 5' Long and area around 62.58 km^2 (measured by application of GIS), large enough for a standard lug extent in meridian direction to fit within the field boundaries. The fields are grouped in larger sectors – so called strata, which geographic and depth boundaries are selected according to the density distribution of the species under study. As a result of the trawling survey a biomass index was calculated. The duration of a haul is between 1.5 – 2 hours with velocity 1.6 – 1.8 knots. The trawl employed has horizontal opening of 12 m and vertical opening – 1.5 m, mesh size – 10 cm.

The trawl surveys, carried out during spring and autumn seasons of 2007 in front of Bulgarian Black Sea coast, estimated that turbot exploited biomass varied between 1778.76 and 1896.56 tons. The average CPUE range is between 8.89 and 10.03 kg/hour (Fig. 11) and correspondingly CPUA vary at average from 216.72 to 256.91 kg/km^2. The spring survey in 2008 assessed turbot exploited biomass at 1966.19 t., CPUE – 9.32 kg/hour and CPUA – 233.06 kg/km^2 respectively.

According to the results from trawl surveys carried out during the period 2006 – 2008 along the Bulgarian Black Sea coast, the relatively stable trend in stock abundance index was observed.

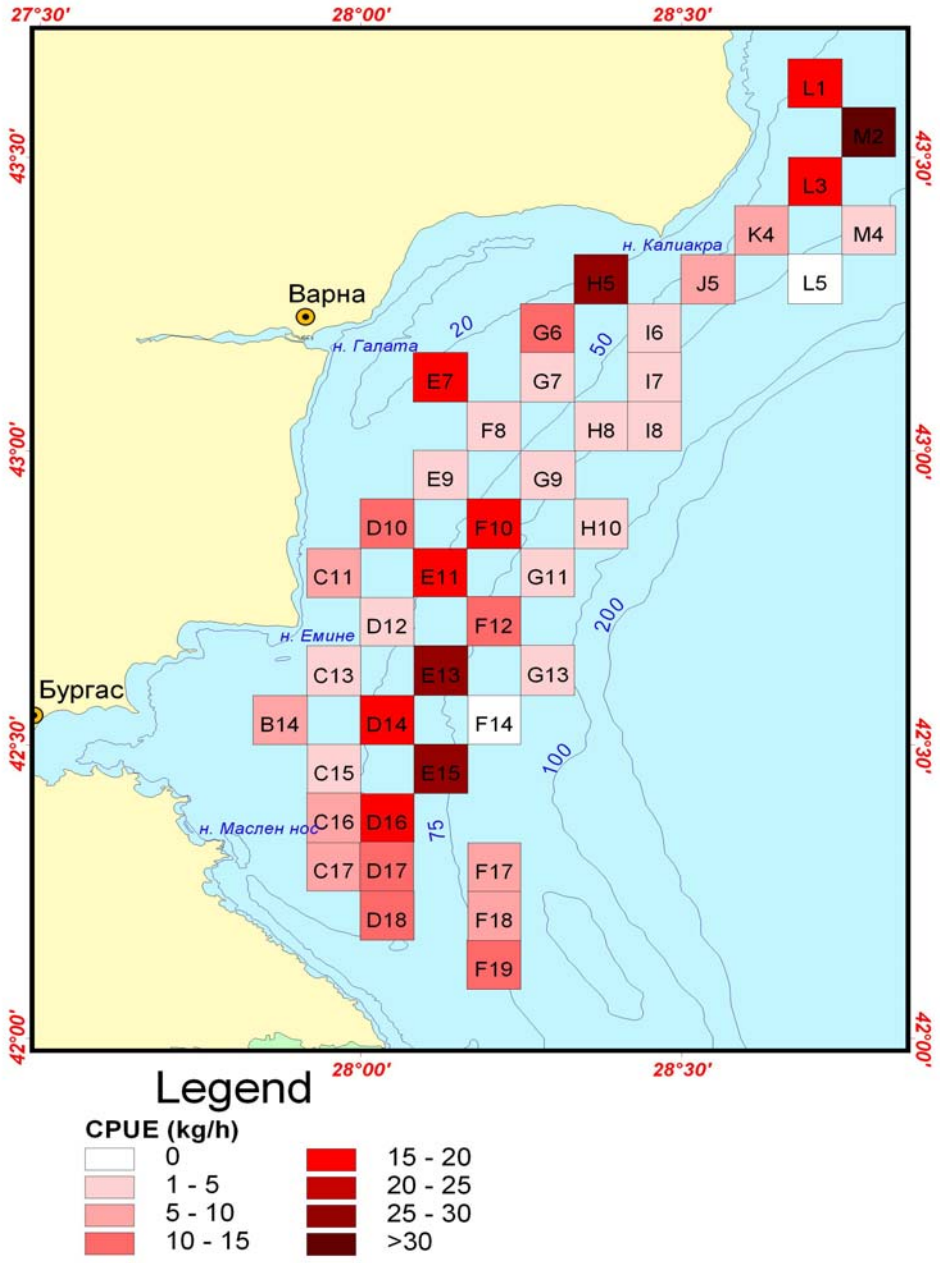

Fig. 11. Distribution of CPUE from research survey along the Bulgarian Black Sea coast (autumn, 2007).

Romania

The research surveys in Romania cover the following activities and have been conducted from April to November, as follows:

- stationary fishing using traps net and gill nets – practiced in three locations along the Romanian seashore: in 2 Mai – Vama Veche, Constanța/Tăbăcărie and Cap Midia – Vadu sectors (Fig. 12);

- fishing using beach seine – practiced from April to July, in two sectors: 2 Mai – Vama Veche and Constanța – Cap Midia (Fig. 12);

- fishing using bottom trawl – practiced from April to November by organizing four expeditions on sea on the whole continental shelf up to 80 meters depth, practiced between Sulina and Vama Veche (Fig. 12).

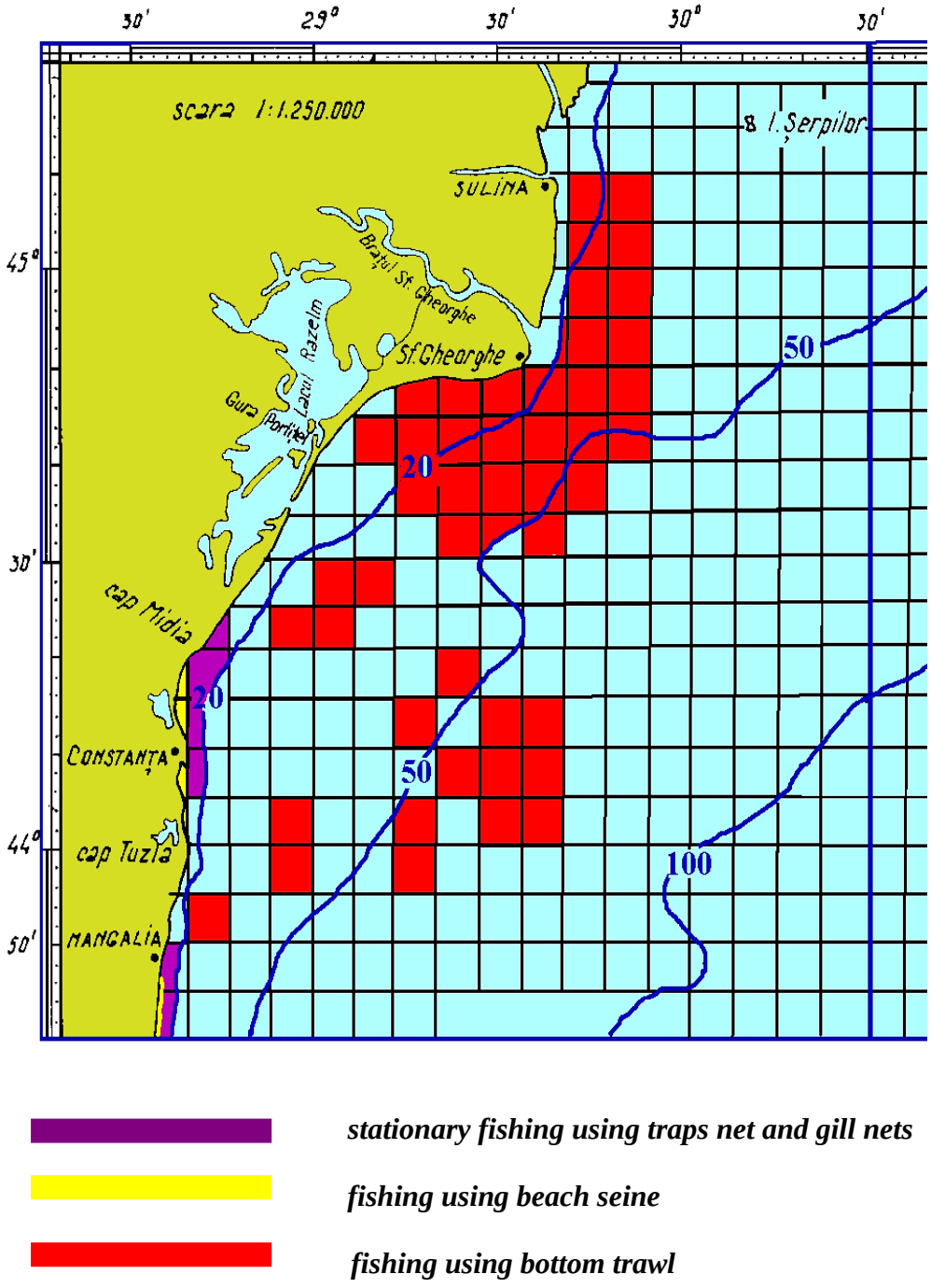

Fig. 12. Distribution of Romanian turbot fisheries.

Between 2003 – 2006 four research cruises were organized (in April – May, July - November) (Table 30). Over 50 hauls were made at different depths (10, 20, 30, 40, 50, 60 and 70 m). The trawling duration was of 60, 120 and 180 minutes, with a trawling speed of 3 – 3.3 N/h and a trawl opening of 20 m. The research area covers the whole Romanian continental platform between Sulina and Mangalia.

Table 30. Catch, fishing effort and CPUE during the research survey with RV Steaua de Mare-1 in front of the Romanian sector of the Black Sea between 2003 – 2006.

Month	Catch (kg)	Fishing effort			CPUE			Depth limits (m)
		Number of days	Number of hauls	Number of hours trawling	Kg/ day	Kg/ haul	Kg/ hour	
IV	1740	6	36	72	290	48.33	24.16	8 – 70
V	5382	10	32	48	538	168.18	112.12	8 – 70
VII	4699	10	30	36	470	156.66	130.55	8 – 40
XI	2090	5	15	28	418	139.33	88.39	11 – 58
Total	**13911**	**31**	**113**	**184**	**448.74**	**123.11**	**75.60**	**8 - 70**

In May 2007, for a surveyed surface of 450 Nm^2, the turbot biomass was apreciated at 144 tons, extrapolated to 1300 tons for shelf area up to 50 Nm from seashore. Important values of the catches have been realized between the isobaths of 20 and 30 m (Table 31, Fig. 13).

Table 31. Assessment of the turbot agglomerations in May 2007 (fishing gear-commercial bottom trawl).

No. polygon	Polygon area (Nm^2)	Average (t/Nm^2)	Range (t/Nm^2)	Total tons in polygon (t)
1	106.25	0.0	0.0	0.0
2	318.75	0.358	0.17 - 0.57	114.11
3	25	1.18	1.18	29.5
Total	**450**			**143.6**

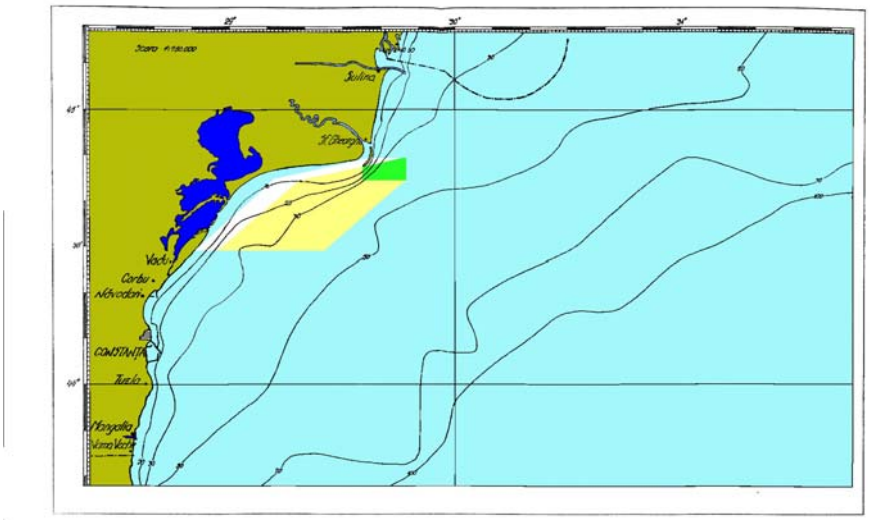

Fig. 13. Distribution of the turbot in May 2007.

In May 2008, for a surveyed surface of 673 Nm^2, the turbot biomass was apreciated at 80.8 tons, extrapolated to 504.2 tons for shelf area up to 50 Nm from seashore (Table 32, Fig. 14)

Table 32. Assessment of the turbot agglomerations in May 2008 (fishing gear-commercial bottom trawl).

No. polygon	Polygon area (Nm^2)	Range (t/Nm^2)	Average (t/Nm^2)	Total tons in polygon	Total on the shelf (t)
1	673	0.113 – 0.129	0.12	80.8	
Total					**504.2**

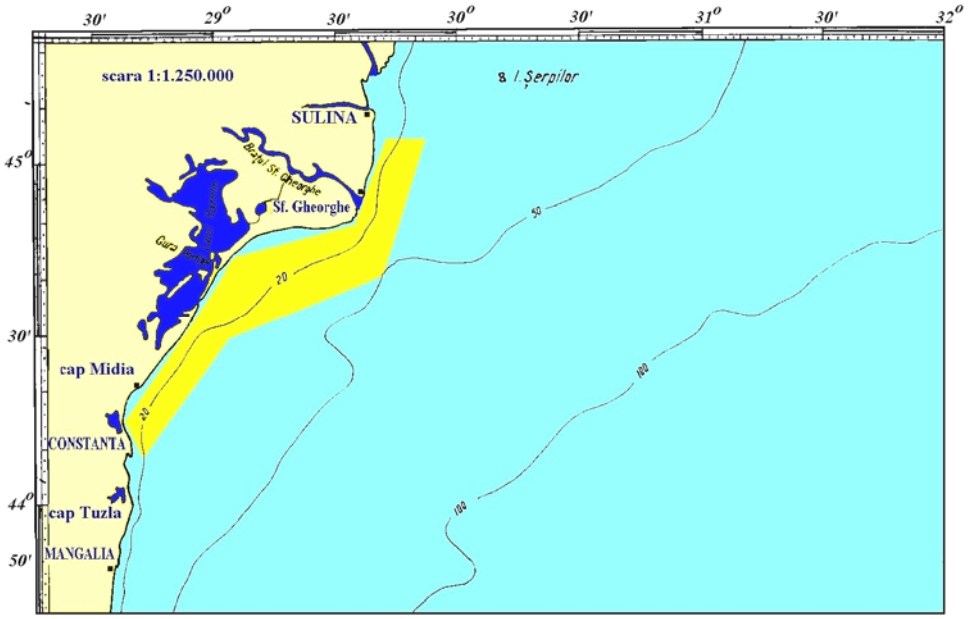

Fig. 14. Distribution and abundace of the turbot agglomerations in May 2008.

After analyzing the obtained data, the following conclusions can be drawn:

- The biomass values of the analysed species presented seasonal oscillations, their fishing agglomerations being influenced by the fluctuation of the environmental factors.

- The turbot, the most important economically species, achieved fishing agglomerations whose biomass oscillated in 2003 between 247 and 1,066 tons, the highest values being obtained in November, when the distribution area was largest also. In May 2007, the biomass was appreciated at 1300 tons. In May 2008, the assessed biomass was 504 tons.

Ukraine

For turbot stock assessment, independently from commercial catches in Ukraine and Russia, the area method is employed (practically identical with swept area method) (Mayskiy, 1939).

After 2001 the turbot research area in Ukrainean waters covers 17.300 km^2 (Fig. 15). The whole area is divided into two subregions (North-Western and North - Easthern + South coast of Crimea). Each subregion includes two layers with corresponding depth ranges: 0 – 50 m and 51 – 100 m. During the years, one or two turbot stock assessment (or demersal fishes) surveys were carried out annually. The bottom trawl employed during the surveys has 24.6 m horizontal opening and codent mesh size 6.5 mm (sometimes trawls have headrope 31 – 32 m long). The trawl is towed by average tonnage vessel with speed of 2.8 – 3.2 knots. In Table 27 for Ukraine are given assessments of turbot stock by trawl surveys with catchability coefficient between 0.1 – 0.3, average 0.2. In Table 21 Ukrainian turbot stock assessments are given without applying catchability coefficient. i.e., the coefficient value is equal to 1.0 (like assessments in Bulgaria, Romania and Turkey).

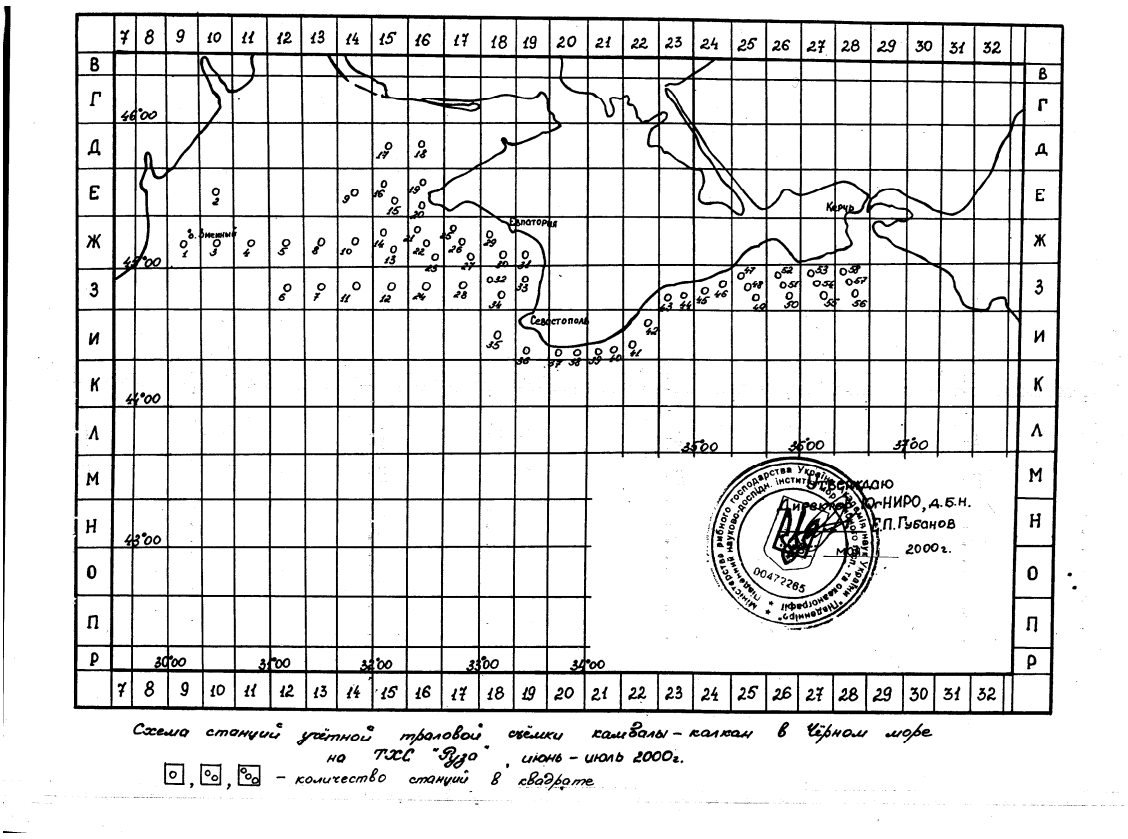

Fig. 15. Reserch area for turbot stock assessment in Ukrainian waters.

The accuracy of turbot stock assessments is estimated by standard algorithms (Gasukov, 1979). For example, for 2006 the following results were obtained after turbot stock assessments in Ukrainean waters (Tables 33 and 34):

Table 33. Abundance index of Black Sea turbot (North – Western part of The Black Sea. Ukraine) according to trawl surveys (Demersal fishes survey, June 2006).

Group 1		
Number of Layers: 2		
Number of hauls: 48		
Area/ S 1 haul per group: .8650000E+05		
Abundance Index: .109888E+02		
Index variance: .190981157E+01		
Standard deviation: .1458322E+01		
Variation coefficient: .1271511E+00		
Confidence Interval. Lower limit: .8369963E+01		
Confidence Interval. Upper limit: .1432384E+02		
Stock assessment in weight. . t:	.724001E+07	.950531E+07
	.1177061E+08	
Stock assessment in numbers:	.219396E+07	.2880394E+07
	.3566970E+07	

Table 34. Abundance index of Black Sea turbot in Ukrainean waters (North – Easthern part of The Black Sea) according to trawl surveys (Demersal fishes survey, October 2006).

Group 1
Number of Layers: 2
Number of hauls: 22
Area/ S 1 haul per group: .4937500E+04
Abundance Index: .2005507E+02
Index variance: .2117913E+02
Standard deviation: .4602079E+01
Variation coefficient: .2294722E+00
Confidence Interval. Lower limit: .1085091E+02
Confidence Interval. Upper limit: .2925922E+02
Stock assessment in weight. . t: .5357635E+0 .9902188E+06 .1444674E+07
Stock assessment in numbers: .2130625E+06 .3943520E+06 .5753365E+06

Turkey

Field studies were carried out in the Eastern Turkish Black Sea coasts from 1990 to 1993. Monthly surveys were conducted to gather basic fishery data in three stations up to 100 m depth by a research vessel (RV-1 Central Fisheries Research Institute) (Fig. 16). Samples were taken by bottom trawl nets with mesh size 14 mm using 30 min standard hauls. Sub-sampling strategy (Holden and Raitt, 1974) could not be applied due to insufficient amount of catch, so all the turbot caught treated as sample. All fish were measured and aged using the otoliths (Chugunova, 1963). In order to determine a common hatching day and to prevent confusions, age readings were given full cohort (Williams and Beford, 1974).

Using these vital data as an input, some basic fishery parameters such as length and age distribution according to depths up to 100 m and years, mortality, survival rates and exploitation rate were estimated. Two different methods were used for estimating the mortality rates (Ricker, 1975; Sparre and Venema, 1998). Exploitation rate (E) was calculated by the empirical equation derived by Pauly (1980).

"Sub Area Biomass Estimation" method (Sparre et al., 1989) was employed to assess the turbot stocks in the South-eastern Black Sea. Trawl surveys had been conducted at eight sub regions and two sub layers at 0-50 and 50-100 m depths, in the area between Cape Sinop and Georgian border from 1990 to 1993 (Fig. 17). It was intended to include both juvenile and adult stock to the samples, so operations were mainly carried out in autumn season. Catchability coefficient (q) of the trawl net used for the sub layers assumed as the one in the method of "swept area" (Bingel, 1985). Opening rate of the buoy line was taken as 0.5 (Pauly, 1980). Trawl operation (hauling) time was limited to 30 minutes with the fixed speed of 1.5 (1.4-2.2) knots. Maximum sustainable yield (MSY) or the potential yield (Pauly, 1980; Sparre et al., 1989) was estimated by the equation proposed by Gulland (1975) which consists of natural mortality and total biomass parameters.

Exploitable turbot biomasses during autumn seasons were estimated as 686, 250, 222 and 134 tons from 1990 to 1993 respectively (Table 35, Fig. 17). Highest biomass was observed in 0-50 m depth contour with the combined data for all years. Mean turbot biomass was 128.3 kg per km^2 for 0-50 m and 44.1 kg per km^2 for 50-100 m. These results showed that both recruited juveniles and adult stocks were found together at the shallow waters in the littoral zone in autumn (Zengin and Düzgüneş, 2000).

Fig. 16. Study area along South-Eastern Black Sea coast of Turkey.

Table 35. Turbot catches by trawl net in the South-Eastern Black Sea during the autumn season 1990-1993 (M: instantaneous natural mortality rate, Py: potential yield. n: operation number).

Years	Layer (m)	Mean Yield (kg/km^2)	[1]Biomass (kg)	M	[2]Py (kg)
	0-50	269.6±56.4 (n=25)	484558.7		
1990	50-100	54.8±15.6 (n=13)	100094.8	0.28	96081.1
	0-100	179.4±34.9 (n=38)	686293.4		
	0-50	118.2±50.9 (n=29)	152153.8		
1991	50-100	57.6±21.8 (n=24)	75841.6	0.21	26294.1
	0-100	95.4±41.9 (n=53)	250419.6		
	0-50	68.5±13.2 (n=26)	132110.4		
1992	50-100	60.8±18.2 (n=21)	101913.3	0.22	24467.9
	0-100	59.9±9.5 (n=47)	222436.0		
	0-50	56.7±23.2 (n=26)	94970.9		
1993	50-100	3.1±3.6 (n=22)	2622.5	0.23	15415.1
	0-100	37.5±13.6 (n=48)	134044.5		

1: Biomass estimation model in stratified sampling commented by Sparre et al. (1989)

($B = \sum B_i = \sum_{i=1}^{n} (cwi / ai * qi) * Ai$; B: Biomass of total area (kg). Bi: Biomass of layer i (kg). cwi: mean biomass of sub layer i. ai: swept area in sub layer i. (m^2). qi: catchability coefficient of the trawl net in layer i. Ai: area of sublayer i (m^2))

2: (Py=0.5*M*Bv; M: instantaneous natural mortality rate. Bv: less or never exploited stock) as commented by Gulland (1975)

The average stock size as 323.3 tons in this area from 1990 to 1993 was very close to the estimation of 433 tons obtained from the study carried out by Bingel et al. (1995). On the other hand, comparing the estimates of two previous surveys which were 180 tons (for 1969/1973; Kutaygil and Bilecik, 1979) and 130 tons (in 1990; Bingel et al. 1995) less than current estimations it is very clear that Eastern sublittoral zone appears to be more productive than the Western Black Sea areas.

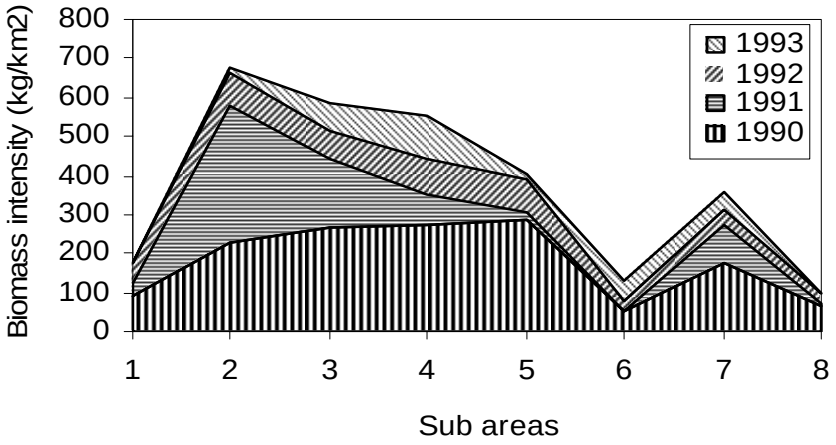

Fig. 17. Biomass intensity of turbot in the sub areas in the South-Eastern Black Sea coast of Turkey in 1990-1993.

Mean biomass abundance was 323 tons and calculated optimum potential yield (Py) was 40.8 tons for 1990/1993 but the actual catch was more than 8 fold of the expected amount. Another useful approach is the exploitation rate (E=F/Z) and all the rates calculated for the period of 1990 to 2000 are given in Table 37. The exploitation rate has minimum in 1995 (0.61) and maximum in 2000 (0.77). Values are higher than optimum level (E_{opt}=0.5) for all years and it is another evident sign of over fishing due to high fishing intensity on turbot stocks during these years in the Southeastern Black Sea. These results were also reflected to the landing statistics. In this area the turbot catch was 1300 tons in 1980's and it decreased almost half of this level in 1990's with the exceptions of 1993, 1994 and 1995.

Age of the oldest turbots in the samples was 9^{+}, while the age of recruitment (Tr) was estimated as 2, using the survival rate equation of Ricker (1975) (Table 36). Instantaneous total mortality rate was Z = 0.61-1.13 for *Scopthalmus maeoticus* which are well known as long lived species. Survival rate was very low, S_{mean}=0.47 (ranged between S= 0.35 - 0.55) (46 % of turbot population can survive). It is also another indication of the negative effect of the high fishing (F) and natural mortality (M).

Table 36. Some population parameters of the turbot stock in 1990-2000 (Tr: age of recruitment, S: survival rate, M: instantaneous natural mortality rate, F: instantaneous fishing mortality rate, Z: instantaneous total mortality rate, E: exploitation rate).

Years	[1]Age Interval	[1]Tr	[2]S	M	[3]F	[3]Z	[4]E
1990	1-8	3	0.44	0.28	0.57	0.85	0.67
1991	0-8	3	0.50	0.21	0.55	0.76	0.72
1992	0-7	2	0.49	0.22	0.55	0.77	0.71
1993	0-9	2	0.38	0.23	0.71	0.93	0.76
1994	2-6	3	0.53	0.30	0.49	0.79	0.62
1995	1-7	2	0.35	0.25	0.69	1.13	0.61
1996	0-8	1	0.55	0.20	0.41	0.61	0.67
2000	0-9	-	0.54	0.14	0.47	0.61	0.77
Overall	0-9	2	0.47	0.23	0.56	0.81	0.69

1: Smaller fish at lengths which are not available for commercial fish nets

2: Relationship between the survival rate and total mortality; Ricker (1975); $S=e^{-Z}$

3: Two different method used for to estimate M; Ricker (1975). and Sparre and Venema (1992) then average is taken.

4: According to Pauly (1983); if E=F/Z ‹ 0.5 stock is under exploited. if E=F/Z=0.5 it is exploited on optimum level and if E=F/Z › 0.5 stock is over exploited.

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ANNEX I

Scientific, Technical and Economic Committee for Fisheries (STECF)
DECLARATION of COMMITMENT
EXTERNAL EXPERTS

I undertake to:

act independently in the public interest of the European Union and to make complete declarations of any direct or indirect interests that might be considered prejudicial to my independence.

NAME	SIGNATURE
ANDRES URIARTE	
SONIA SANCHEZ	
LIONEL PAWLOWSKI	
PABLO ABAUNZA	
BEGOÑA VILLAMOR	
Yves Perrandeau	
Mustafa Zengin	
Vladyslav Shlyakhov	
Vitalii Raykov	
Marina Panayotova	
Gheorghe RADU	
VALODIA MAXIMOV	
GEORGI DASKALAV	
IKERNE DEL VALLE	

Done at on

ANNEX III

Scientific, Technical and Economic Committee for Fisheries (STECF)
DECLARATION CONCERNING CONFIDENTIALITY
EXTERNAL EXPERTS

I hereby declare that I am aware of my obligation to respect confidentiality. I know that I am obliged not to divulge information acquired as a result of the work of the Committee, or one of its Working groups.
I am aware that when informed that an agenda item is confidential in accordance with Article 14 (2) of Commission Decision 2005/629/EC only members of the STECF and Commission representative shall be present at that working group.
I shall also respect the confidential nature of the scientific opinions expressed by members of the Committee or the external experts during discussions in Committee or in working groups.
I undertake not disclose such information even after my participation in the work of the STECF has ceased.
I undertake also to destroy any information and document I have received under the clause of confidentiality.

NAME	SIGNATURE
ANDRES URIARTE	
SONIA SANCHEZ	
LIONEL PAWLOWSKI	
PABLO ABAUNZA	
NEGONA VILLAMOR	
Yves PERRAUDEAU	
Mustafa Zengin	
Vladyslav Shlyakhov	
Vitin Raykov	
Marina Panayotova	
Gheorghe RADU	
VALODIA MAXIMOV	
GEORGI DINSKALOV	
IKERNE DEL VALLE	

ANNEX II

DECLARATION of INTERESTS
(to be filled in by STECF external experts)

Name: GEORGI DASKALOV

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries[1], I hereby notify the Commission that I have the following economic or ethical interests[2] which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

I work with Cefas, Lowestoft, UK

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

[1] OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

[2] Links which could be considered interests might include:
- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

Declaration
I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest[3] concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at Hamburg on 16/04/2008

Signature

[3] See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

DECLARATION of INTERESTS
(to be filled in by STECF external experts)

Name: MAXIMOV VALODIA

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries[1], I hereby notify the Commission that I have the following economic or ethical interests[2] which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

I am working in the National Institute for Marine Research „Grigore Antipa" Constanta. Romania

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

NO

Interests deriving from the professional activities of the applicant or his/her close family members:

NO

[1] OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

[2] Links which could be considered interests might include:
- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

No

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

NO

Declaration
I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest[3]1 concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at Hamburg on 16.04.2007

Signature

[3] See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

DECLARATION of INTERESTS
(to be filled in by STECF external experts)

Name: Vladyslav Shlyakhov

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries[1], I hereby notify the Commission that I have the following economic or ethical interests[2] which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

I'm working in the Southern Scientific Research Institute of Marine Fisheries and Oceanography (YugNIRO) Focal Point at Advisory Group FOMLR, BSC

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

No

Interests deriving from the professional activities of the applicant or his/her close family members:

No

[1] OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

[2] Links which could be considered interests might include:
- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

AG FOMLR Black Sea Comission

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

No

Declaration
I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest[3]1 concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at Hamburg on

16.04.2008

Signature

[3] See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

DECLARATION of INTERESTS
(to be filled in by STECF external experts)

Name: Marina Panayotova

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries[1], I hereby notify the Commission that I have the following economic or ethical interests[2] which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

Tamworking in the Institute of Oceanology, Bulgarian Academy of Sciences, Varna, Bulgaria

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

NO

Interests deriving from the professional activities of the applicant or his/her close family members:

NO

[1] OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

[2] Links which could be considered interests might include:
- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

NO

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

NO

Declaration
I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest[3]1 concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at Hamburg on 16. 04. 2008

Signature

[3] See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

DECLARATION of INTERESTS
(to be filled in by STECF external experts)

Name: Violin Stoyanov Raykov

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries[1], I hereby notify the Commission that I have the following economic or ethical interests[2] which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

I am working at Institute of Fishing Resources - VARNA, BULGARIA. I am a FOCAL POINT of Advisory Group of FOMLR in Black Sea Commission and I am a member of WG "FISHERIES" to the MINISTRY of AGRICULTURE and Food Supply

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

NO

Interests deriving from the professional activities of the applicant or his/her close family members:

NO

[1] OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

[2] Links which could be considered interests might include:
- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

AG FOMLR in BSC

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

NO

Declaration
I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest[3] concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at Hamburg on 16.04.2008

Signature

[3] See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

DECLARATION of INTERESTS
(to be filled in by STECF external experts)

Name: RADU GHEORGHE

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries[1], I hereby notify the Commission that I have the following economic or ethical interests[2] which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

I am working in the National Institute for Marine Research and development "Grigore Antipa" Constanta, Romania. I am also, Focal Point for Fishery in the Black Sea Commission.

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

N/o

Interests deriving from the professional activities of the applicant or his/her close family members:

N/o

[1] OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

[2] Links which could be considered interests might include:
- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

N/O .

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

A.G. FOWLER in the Black Sea Commission. (Advisory Groups for Fishery Management and Other Marine Living Resources)

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

N/O .

Declaration
I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest[3]1 concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at HAMBURG on 16.04.2008

Signature

[3] See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.

ANNEX II

DECLARATION of INTERESTS
(to be filled in by STECF external experts)

Name: Dr. Mustafa Tanyan

☐ In accordance with Article 13(2) of Commission Decision 2005/629/EC of 31 August. 2005 establishing a Scientific, Technical and Economic Committee for Fisheries[1], I hereby notify the Commission that I have the following economic or ethical interests[2] which might be considered prejudicial to my independence:

Direct interest (for example related to employment, contracted work, investments, fees etc.):

→ I have work related to MARA., → My Institutes is Central Fisheries Research Inst. → I am a senior researcher → I have several project leader and researcher.

Indirect interests e.g. grants, sponsorships, or other kind of benefits such as gifts, invitations and honorariums.

Interests deriving from the professional activities of the applicant or his/her close family members:

—

[1] OJ L 225, 31.08.2005, p.18 as corrected by OJ L 316, 02.12.2005, p.23.

[2] Links which could be considered interests might include:
- one's job (university, institute, public service, enterprise)
- being a member of a board of directors, board of management or any other supervisory body within a company, association, Member State administration, non-governmental organization, governmental organization etc.
- having carried out scientific research or provided an expert opinion at the request of a company, public service, Member State administration, non-governmental organization, governmental organization etc.

Any membership role or affiliation that you have in organizations/bodies/club with an interest in the work of the STECF:

→ Advisory Committee of the Black Sea Commission (BSC) of fisheries (2003--2008)
→ Black Sea fisheries workshop by JRC - 2006-October, I was local focal point.
→ GFCM / Demersal / Pelagic Stock Assessment Sub Committee expert.

Other interests or facts that the undersigned considers pertinent as a member of an independent STECF:

→ MARA and EU Fisheries Negotiations → New Twinning project on the Research (fish) Facilities in 2008-2009. I joined preliminary meeting for Turkey side expert.

Declaration
I declare that the information provided above is true and complete.

I shall immediately and explicitly inform the STECF of any specific interest[3]1 concerning any question submitted by the Commission on the occasion of the meeting at which the relevant question is to be examined by the Committee. I shall inform the Commission of any change with regard to my interests which could be prejudicial to my independence.

Done at Hamburg on 15 April 2008.

Signature

[3] See previous footnote 1: a special interest could, in particular, comprise any prior activity concerning the subject of the question.