
GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

COMMISSION GÉNÉRALE DES PÊCHES POUR LA MÉDITERRANÉE


**SCIENTIFIC ADVISORY COMMITTEE (SAC)**

**Fourteenth Session**

**Sofia, Bulgaria, 20-24 February 2012**

# REVIEW OF THE BLACK SEA FISHERIES

**(by F. Colloca, R. Coppola)**

**(Draft GFCM Publication)**

particular species in a fishing area". At the same time the Law states that industrial fishery is not necessarily based on the TAC determination. It reads: "Industrial fishery in the internal waters of the Russian Federation, including the internal marine waters and the territorial sea of the Russian Federation is conducted for those species of biological resources which are subject to TAC determination and for those which are not subject to TAC determination". The Law does not give any further explanation, but instead calls for a special statute for TAC setting, which has to be issued by the Federal Government. Besides TAC setting for industrial fishery, all categories of fisheries are regulated by so-called Fishing Rules ("Pravila rybolovstva"), which are set separately for several major areas including the Black Sea–Azov Sea Basin. All Fishing Rules specify closed areas, seasonal closures, limitations of particular gear, minimum mesh sizes, minimum allowable size of catch, and allowable by-catch. The management of fishery has been changing since the breakup of the former USSR, and more changes are expected. Moreover, commercial fisheries are governed and further specified by an annual set of regulations called the 'Regimes of Fisheries' (Duzgunes & Erdogan, 2008). The quota for industrial fisheries in Russia's internal marine waters, territorial sea and the EEZ is provided by the annual Total Allowable Catch (TAC) proposed by the assessments of particular fisheries institutes and the administrative boundaries of the basins controlled by particular fisheries directorates (rybvods).

Governmental strategy to address the necessary development activities is presented in the "Concept for Development of the Fishery Industry of the Russian Federation until the year 2020" approved by the government of the Russian Federation on 2 September 2003.

## Ukraine

The fishing fleet of Ukraine operating in the Black and Azov Seas in 2008 incorporated 123 units of vessels more than 12 m long (Table 10).A reduction of about 13.4 % in the number of fishing vessels occurred from 2006 to 2008.

In Ukraine, the majority of vessels (74%) were from 20 to 40 meters long (48 units) or from 18 to 24 m (43 units). Among them multi-purpose vessels capable of fishing with trawls, purse seines, nets or long-lines were predominant. Only eight of them were designed to fish with trawls exclusively and four of them – to fish only with nets (Commission on the Protection of the Black Sea Against Pollution, 2010).

In 2002 most of the fishing vessels in Ukraine were at between 11 and 30 years old (70%), 23% were even older and only 7% were relatively new - not older than 10 years.

| | 2006 | 2007 | 2008 |
|---|---|---|---|
| 12-20 m | 34 | 33 | 32 |
| 20-40 m | 56 | 52 | 48 |
| 18-24 m | 52 | 50 | 43 |
| total | 142 | 135 | 123 |

Table 10. Composition by length class of the Ukrainian fleet from 2006 to 2008.

The catch level in 2008 of 27.400 tons, the lowest since 2000 (62.000 tons), was made up by more than 96% by sprat (80%) and anchovy (16%). Ukrainian fishermen seasonally fish anchovy in the waters of Georgia on the basis of a bilateral agreement. More than 90% of Ukrainian catches in the Azov and Black Seas are caught by small-tonnage motorized seiners and trawlers of 16–36 m LOA and 30–350 GRT. About 10% of the catch is taken by coastal fishing gears – set nets, set gillnets, traps and other stationary nets and hooked fishing gears (generally long-lines).

The FAO country profile for Ukraine[6] provides information about the evolution of fisheries until 2000–2001. In this period the catch quota for fisheries in the Black and Azov Seas was allocated to some 200 fisheries companies, cooperatives, fish canneries and private persons. About 20.000 people were involved in fisheries on a temporary or permanent basis. Starting from 2002, a fisheries license system was introduced. The legislative basis for fishing is the Fisheries Regulation ("Rules of Fisheries"). Control and surveillance for Fisheries Regulations compliance are carried out by the Regional State Inspectorates of Fish Protection, integrated into the Chief Administration for the Protection and Reproduction of Water Living Resources "Holovrybvod".

Mechanized fisheries in the Azov and Black Seas began to be developed in the 1960s. The most intensive purse seine and trawl fisheries for anchovy are in autumn and winter for the aggregations of this species in the Kerch Strait, along the Ukrainian and Russian coasts of the Azov and Black Seas, and in the waters of Georgia. Sprat is fished by trawl fisheries, mainly in summer, on the northwestern shelf of the Black Sea and near the Crimean coast. Turbot fisheries are distributed along the southern coast of Crimea. Harvesting of mussels and Rapa whelks is carried out over the northern shelf of the Black Sea using bottom dredges.

Till the early 1990s, Ukraine's catch in the Azov and Black Seas was some 180 000–200 000 t, reaching in some years 230 000–260 000 t. Anchovy was the principal species caught, forming approximately 80% of the catch. In 1989–1991, Ukraine and other countries of the region faced a sharp decrease in biomass of anchovy and other small pelagic fishes, which resulted in a decline of the Black and Azov Seas catches. Moreover, the collapse in Ukrainian catches, as well as catches in other Black Sea countries (except Turkey), was aggravated by a sharp reduction in fishing effort due to the economic crisis. In 1993, Ukraine's catch in the Azov-Black Sea basins reached its lowest value for 50 years – 26 000 t, and then the catch began to grow again.

Ukrainian fishermen in the coastal fisheries use small vessels, mainly near the coastal cities and villages. The coastal fisheries are the oldest sources of employment and income for the coastal communities, the most important source of food, and successfully keep their ancient traditions. Most of these fisheries target species with higher market price. Till recently, coastal fisheries targeted sturgeons, but after the ban on sturgeon fisheries from 2000, they instead targeted mullets.

[6]http://www.fao.org/countryprofiles/index.asp?lang=en&iso3=UKR&subj=6

Fisheries Management

A complete review of fishery legislation in Ukraine was recently undertaken by Alexander Mikhaylyuk (consultant) for the GFCM project LaMed.

The central executive body in the fisheries sphere is the State Agency for Fisheries of Ukraine which activity is directed by the Cabinet of Ukraine through the Minister of Agrarian Policy and Food of Ukraine. Ministry of Agrarian Policy and Food of Ukraine being the central executive body on agrarian policy and food exercises the legal regulation (the adoption of fisheries rules, the approval of limits, etc.) in the fisheries sphere. The advisory body under the central executive body in the fisheries sphere is the Scientific Fisheries Council; currently his activity is regulated by "Regulations of the Scientific Fisheries Council of the State Committee for Fisheries of Ukraine.

In August 2011 the Ukrainian Law "On Fish Industry, Commercial Fisheries and Fish Resources Protection" (No. 3677-VI of 2011) took effect. It provides that the commercial fishing should be exercised on the basis of respective permits issued for 5 years. Currently, Ukrainian legislation does not limit fishing capacity.

Catch limits are set on almost all species of the living aquatic resources subjected to fisheries; then these limits are distributed on quotas between separate users by the specially authorized commission (and the commission is guided by the established principles); it is forbidden to transfer quotas to the other users, but they can be returned to the state in certain cases. For some objects of fishing limits are not distributed on quotas, and users carry out their capture within the overall limit.

The legislation of Ukraine provides the possibility of fishing effort regulation. Types, sizes and number of fishing vessels, fishing gears and their number can be regulated by the rules of commercial fishing. Usually fishing effort limits are established for a specific year. In addition, minimum legal size are set for each commercial species (e.g.: horse mackerel 10 cm, red mullet 8.5 cm, sprat 6 cm, whiting 12 cm, turbot 35 cm).

There are also a series of spatio-temporal regulations which imply area closures and temporal fishing bans along the Ukrainian coasts. In particular, commercial fishing is forbidden during the spawning periods (e.g.: turbot fishery is closed in May in EEZ and for 15 days in the territorial sea.

Fishing is prohibited within the following protected areas:

Karadag Nature Reserve;

State landscape reserve "Cape Aya";

Opuksky Nature Reserve;

Nature reserve "Cape Martian".

The fishing may be restricted in addition to the restrictions prescribed by fishing rules within the Botanical Sanctuary "The Phyllophora Field of Zernov", Black Sea Biosphere Reserve, Dzharylhatsky National Park and Sanctuary "Serpent Island".

An agreement between the Government of Ukraine and the Government of Georgia on Cooperation in Fishery Industry of 1996 is one of the fisheries agreements in the Black Sea concluded by Ukraine. This agreement provides the possibility of the placing at the other side's disposal the part of allowable catch not used by the given side on mutually acceptable terms. This agreement does not regulate the type and

characteristics of fishing vessels. Though the agreement provides that the sides develop and coordinate the measures on the regulation of fisheries for respective species of the living aquatic resources of the Black Sea on the basis of the most reliable scientific data, but actually it is not realized.

Finally, the protection of endangered species of animals are provided by Ukrainian Law "On the Red Data Book of Ukraine" (No. 3055-III of 2002). These species are included in documents "The Red Data Book of Ukraine: Animal Kingdom". The capture of animals and plants included in the respective Red Data Books are forbidden in cases of commercial and recreational fishing, and their accidental by-catch should be returned to the natural environment. Among fish, sturgeons are protected as well as marine mammals.

## STATISTICS AND INFORMATION SYSTEMS

This section treats the fishery statistics and information system issues, while biological and ecological issues are discussed separately.
From an overall appraisal of the scientific projects implemented in the Black Sea area it appears that the area was benefiting from a good number of projects funded from many different sources or agencies. It has also noted that, for technical and priority reasons the above projects were mostly targeting environmental, ecological and stock assessment studies. Was also observed that, in general, these projects were not complementary to each other and there did not seen to be continuity in their work programmes and progress. This is particularly evident regarding statistical domains (Fishery infrastructures, Fleet, Catch and effort, fishing practices, etc). In spite of some effort produced by some regional bodies such as the Commission on the Protection of the Black Sea against pollution, GFCM, EU and many recommendations issued in various contexts, national and regional data have rarely been produced to be easily consulted and assessed to make regional comparisons, analyses and, ultimately, to allow regional planning. The situation is different if the same consideration is made on a country level, where Bulgaria and Romania have already started the EC compliance. Turkey has a long history on systematic data collection and its intention is to adopt the EU-CFP and DCF. In addition these three countries are also GFCM members and submit each year fisheries data according to the Task 1 requirements.

The situation of the other countries is less clear and this WG could eventually propose some short-term actions by the GFCM to study their situations and propose solutions to improve national systems and, at the same time better integrated them with the existing BSIS regional system and GFCM Task 1.
Should this vision be confirmed by the national representatives participating in this meeting, it is expected that there should be some discussion on the issue and, possible actions be recommended.

In managing fishery resources in water bodies where shared stocks co-exist with localised fishery and, even more when such water body is a semi-closed environment, such as the Black Sea, and populated by several riparian countries the availability and the support of a "collective" fishery information system for a common fishery

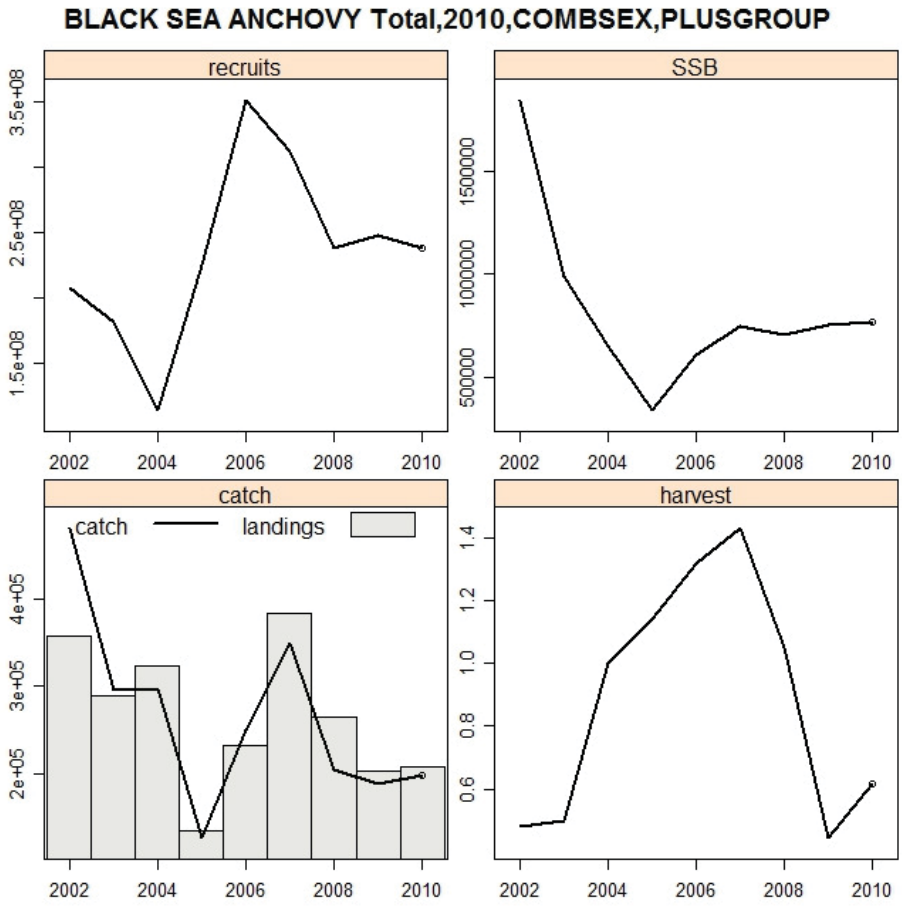


Fig. 7. Trend in recruitment, spawning stock biomass (SSB), catch and fishing mortality (harvest) of the Black Sea anchovy stock from 2002 to 2010.

## Sprat

*Sprattus sprattus* (Linnaeus, 1758)

There is agreement among scientific community that in the Black Sea sprat is represented by a unique stock. The migration routes and schools being strongly influenced by the environmental conditions and availability of trophic resources.

Sprat fishing takes place on the continental shelf on 15-110 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 mid-water trawls. The main fishing gears are mid-water otter trawl, pelagic pair trawls and uncovered pound nets. The main fishing season in Bulgarian, Romanian, Russian and Ukrainian waters is between April and October mostly by mid-water trawlers of 15-40 m length. Turkish pelagic pair trawlers exploit sprat mainly in the area in front of the city of Samsun at 20-40m depth in spring and 40-80m depth in autumn (STECF, 2011).

Fig. 8 shows the trend in sprat landing of Black Sea countries from 1993 to 2010 based on the data used at the STECF-EWG-11-16 (STECF, 2011), whit the Bulgarian

catch revised on the basis of expert judgment. The trend is basically the same reported by the GFCM (see fig. 2).
The most relevant aspect is the increased importance of the sprat fishery in Turkey in the last three years which reached 57.023 t in 2010. The total landing rose rapidly from 16600 tons in 1993 to 91000 tons in 2010 (62% from Turkey) as effect of an increasing catch of the Turkish, Bulgarian, Russian and Ukrainian fleets. Discard is considered negligible.

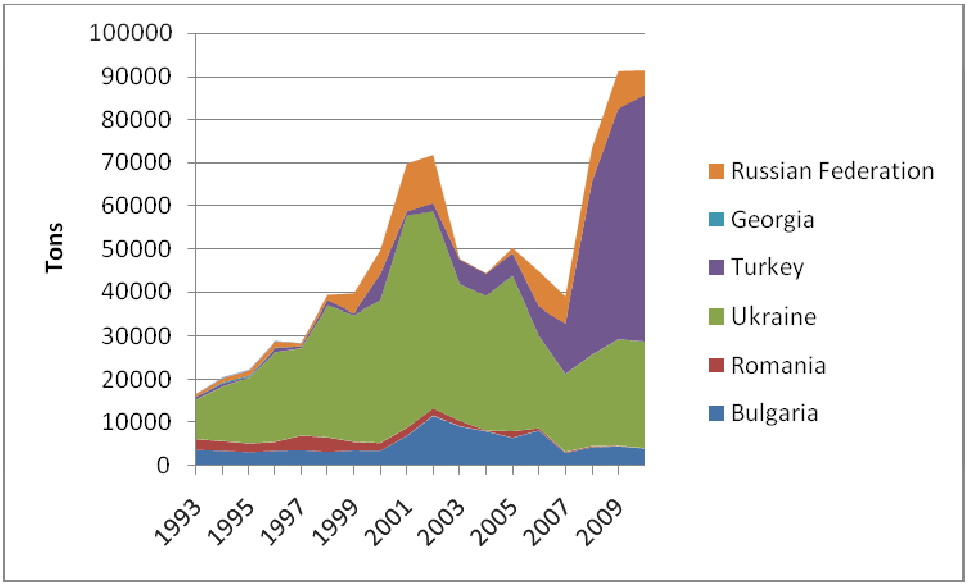


Fig. 8. Sprat landings of Black sea countries from 1993 to 2010 (from STECF, 2011).

Status of the stock

SGMED 09-01 assessed the Black Sea sprat stock using Integrated Catch-at-age Analysis (ICA; Patterson and Melvin, 1996). Catch and weight at age, CPUE of Bulgarian and Ukrainian trawling fleets, natural mortality, and age structured indices were used to run ICA. As tuning data were used survey indices from the Bulgarian and Romanian Pelagic Trawl Surveys (PTS).
Detailed results of the analyses can be found in STECF (2011). Figure 9 shows the results of ICA assessment carried during the last STECF-EWG-11-16. The stock has clearly recovered from the collapse in the early 1990s, with an increasing recruitment from 1991 to 1999-2001 After a negative trend in 2002-2004 the recruitment increased again to peak at about 170 billions in 2010. The biomass is also gradually increased over the 1990s to peak in 2001-2002 (about 500.000 tons). An SSB of 120.000 tons was estimated in 2010. High fishing mortalities ($F_{1-3}$) were observed during the stock collapse in the early 1990s, in 2005, and 2009-2010 when catches reached the third highest level due to the intensive development of the Turkish sprat fishery.

The status of the stock was assessed adopting as limit reference point an exploitation rate (E=F/Z) of 0.4 (Patterson, 1992). Over the last few years the fishing mortality has piqued in 2005 and 2009 at a level of about F=0.59. This equals an exploitation rate of about E=0.38 (natural mortality M=0.95). Proposing a limit reference point of exploitation rate E≤0.4, the WG considers the stock of sprat in the Black Sea as

sustainably exploited. Status quo fishing implies catches in the range of 90 000 to 100.000 tons over 2011 – 2013 (STECF, 2011).

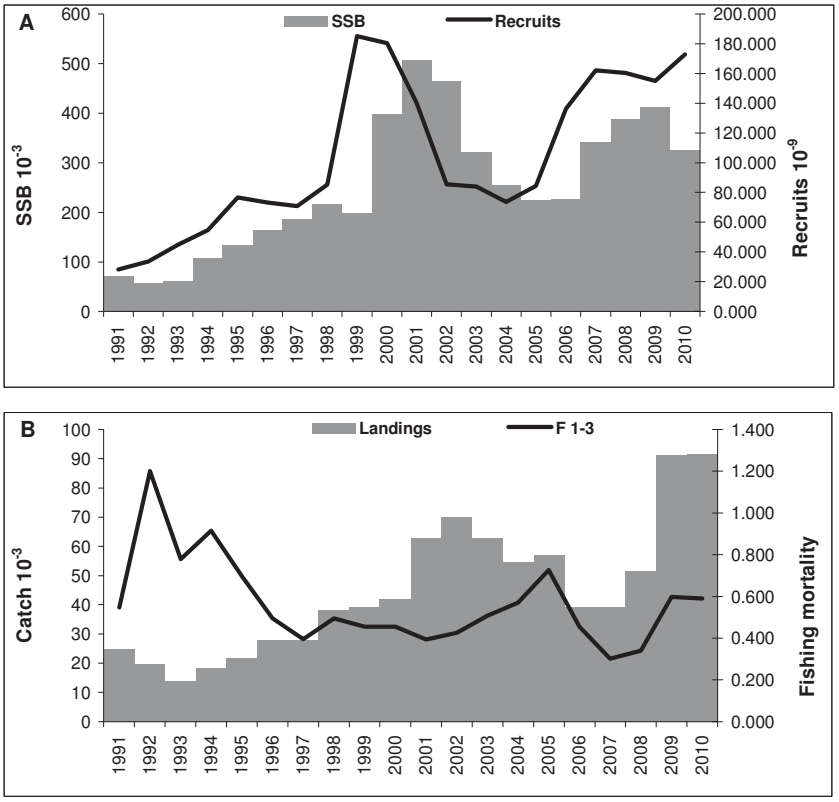


Fig. 9. Time-series of sprat population estimates: A. recruitment (line) and SSB (grey); B. landings (grey) and average fishing mortality (ages 2–4, line) (from STECF 2011).

Management measures

A quota is allocated in EU waters of the Black Sea (Bulgaria and Romania). No fishery management agreement exists between other Black Sea countries. In the EU Black Sea waters a global (both Romania and Bulgaria) TAC 12.750 tons has been allocated in 2009 and 2010. This figure is a result of a reduction of the 2008 TAC of 15.000 tons based on the precautionary principle. The Ukraine and Russian Federation also apply TAC in their national waters (Table 12). Minimum landing size of sprat is applied across the region except in Turkish waters (STECF, 2011).

| Year | Russian Federation | Ukraine | Romania and Bulgaria |
|---|---|---|---|
| 2005 | 42 000 | 60 000 | |
| 2006 | | 70 000 | |
| 2007 | | 40 000 | |
| 2008 | 21 000 | 50 000 | 15 000 |
| 2009 | 21 000 | 50 000 | 12 750 |
| 2010 | 21 000 | 50 000 | 12 750 |
| 2011 | | 60 000 | 11 475 |

* Council Regulation 1256/2010

Table 12. Sprat catch quotas (tons) applied in Ukraine, Russian Federation, Romania and Bulgaria in tons (from STECF, 2011).

**Mediterranean horse mackerel**
*Trachurus mediterraneus* (Steindachner, 1868)

The Black Sea horse mackerel is a subspecies of the Mediterranean horse mackerel forming in the basin a shared stock (Prodanov *et al.*, 1997) which accomplish large seasonal migrations. In spring it migrates to the north for reproduction and feeding. In summer the horse mackerel is distributed preferably in the shelf waters above the seasonal thermocline. In the autumn it migrates towards the wintering grounds along the Anatolian and Caucasian coasts (Ivanov and Beverton, 1985).
The horse mackerel matures at age 1-2 years during the summer, which is also the main feeding and growth season.

The stock is mainly exploited by fishery in the wintering grounds of the southern Black Sea by purse seiners and mid-water trawls, whose catch is mostly composed of horse mackerel of age 1-3 years (STECF, 2011).
According to the official statistics almost the whole landing (96-97%) is produced by Turkey (Fig. 10) with a negligible contribution from the other countries. During the last 18 years the landing peaked in 1994 at 2500 tons, decreasing at 8.300 tons in 1998-99. In the 2000s the landing seems on an increasing trend with some peaks in 2000-01, 2005 and 2008.

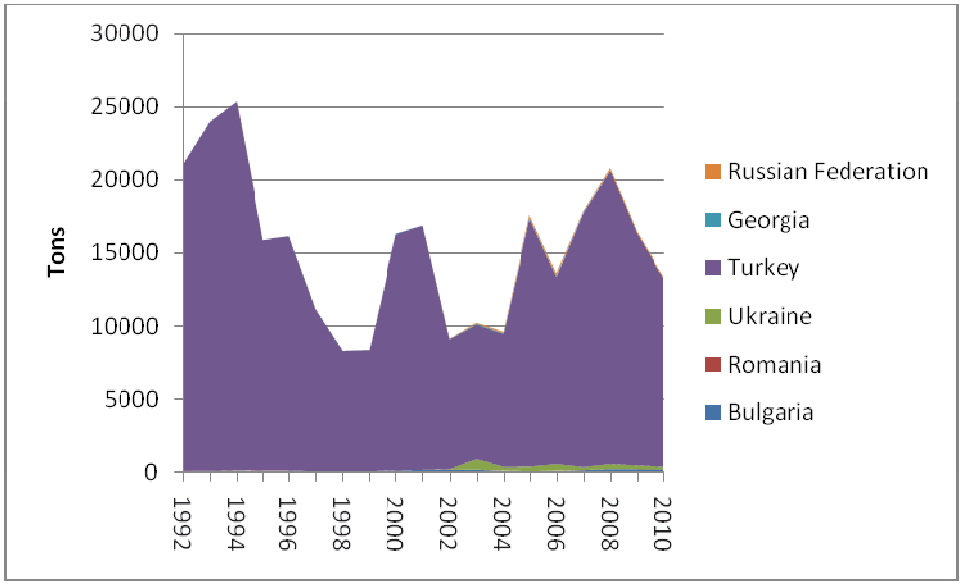


Fig. 10. Horse mackerel landings of Black sea countries from 1993 to 2010 (from STEC, 2011).

Status of the stock
Prodanov *et al.* (1997) estimated the dimension of the stock in the period 1950-1994 (Fig. 11). The stock showed large fluctuations in biomass with a peak in 1986 (520.000 tons of SSB) following the entrance of large year classes. As a consequence the fishing mortality experienced by the stocks showed large fluctuations in the

estimated values of F, stressing the necessity of annual assessment of stock size in order to set the appropriate catch or effort level. In years of reduced abundance of the stock (e.g. 1956-58) even low catch can determine higher F values that the F observed in years of higher stock biomass and higher catch (Prodanov, 1997).

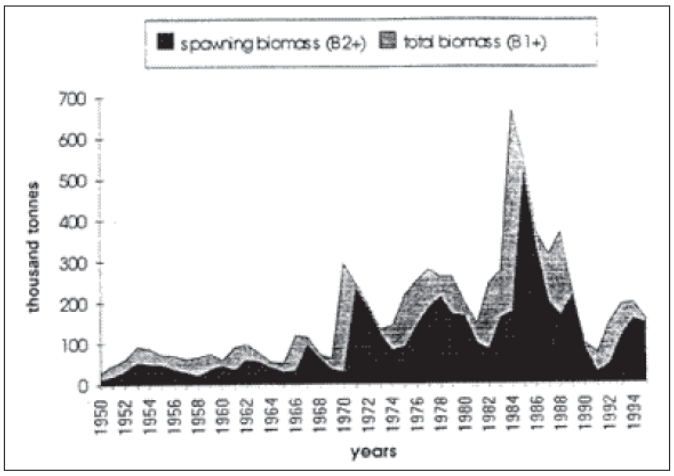


Fig. 11. Estimated spawning stock biomass and total biomass of horse mackerel in the period 1950-1994 (from Prodanov, 1997).

The stock was assessed recently by the STECF-EWG-11-16 using available official data of riverine countries using the separable VPA run under different arbitrary values of terminal fishing mortality $F_{term}$ ($F_{term}$=0.4, 0.8 and 1.2), given the lack of tuning series to estimate $F_{term}$. A fixed value of natural mortality was also used (M=0.4). The lack of a fishery independent scientific survey to monitor horse mackerel all over the Black Sea to indicate trends in total mortality and recruitment reduces the reliability of the assessment performed. This can be considered only indicative of relative stock trends (STECF-EWG-11-16). According to the results obtained with the three VPA runs, the SSB in 2010 was reduced from a higher level and the recruitment had varied without a clear trend since 2004 with the highest value in 2010 (Fig. 12). The STECF WG was not in the position to evaluate the status of the stock using an appropriate biological reference point consistent with high long-term yield. Fishing mortality, however, was estimated in an increasing trend since 2007.

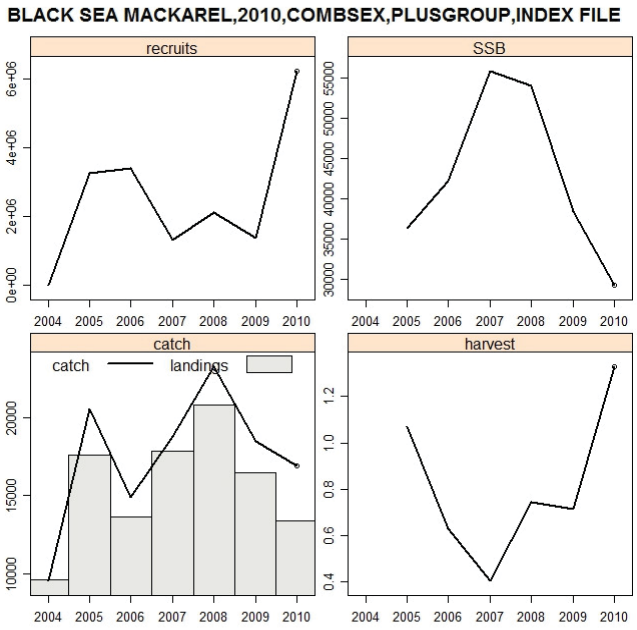


Fig. 12. Trend in recruitment, stock spawning biomass (SSB), landings and fishing mortality of horse mackerel stock in the Black Sea (F =0.8). From STECF (2011).

***Demersal species***

## Turbot

*Scophthalmus maeoticus* (Pallas, 1814)

Commercially the Black Sea turbot is one of the most valuable species in the basin, and currently is exploited with gillnets in all the region as well as with bottom trawls with minimum mesh 40 mm in Turkey. The number of Turkish fishing vessels targeting the turbot in the Black Sea area was 225 in 2010 (STECF, 2011).
The use of bottom trawls is currently prohibited in the other riverine countries. The main fishing seasons are spring and autumn.

It occurs all over the shelf area of all Black Sea coastal states. According to the results of national surveys carried out in Bulgaria and Romania, the species is distributed all along the continental shelf of the Black Sea, with the largest abundance in the depth range between 50 – 75 m. Adults aggregate in the coastal area up to 40 m during the spawning period in spring, moving to deeper (100-140 m) waters after spawning (STECF, 2009).

The official landings of Black Sea countries in the period 1999-2010 are shown in Fig. 13 (STECF, 2011). The highest annual catches were registered in 1994-96 (2.048-2.943 tons) and in 1999-01 (1.953-2.789). In recent years (2008-2010) the catch was below 1000 tons per year (620-815 tons). Turkey and Ukraine were the countries which gave the highest contribution to the annual landing, with an increasing trend for Ukraine (Fig. 13). Anyhow, according to Radu *et al.* (2010), even though the highest catch in the region are realized by Turkey, there is a large non-reported catch of turbot that exceeds the official catch by many times.

According to IUCN Red List the six species of sturgeons native to the Danube River basin are globally classified as either 'Vulnerable', 'Endangered' or 'Critically Endangered':

- *Acipenser gueldenstaedti* (Russian sturgeon) Endangered
- *Acipenser nudiventris* (Ship sturgeon) Endangered
- *Acipenser ruthenus* (Sterlet) Vulnerable
- *Acipenser stellatus* (Stellate sturgeon) Endangered
- *Acipenser sturio* (Common or Atlantic sturgeon) Critically Endangered
- *Huso huso* (Beluga sturgeon) Endangered

Recently, the Black Sea Sturgeon Management Action Group (BSSMAG) was founded as a consultative body to improve transboundary cooperation among countries in Lower Danube Region.
In April 2006, Romania banned sturgeon fishing for the next ten years.

***Benthic species***

**Rapa whelk**
*Rapana venosa* (Valenciennes, 1846)

*Rapana venosa* is a native of the Yellow Sea, Bohai Sea, East China Sea, and the Sea of Japan. It was introduced to the Black Sea in the 1940s, the first record being from 1946 (Micu *et al.*, 2008), and between 1959 and 1972 it spreads to most of the Black and Azov Seas[7] up to 40m depth. Currently, the highest densities have been registered along the Ukrainian and Bulgarian coasts (ICES, 2004). The population bloom of *R. venosa* in the Black Sea is also related to the lack of natural predators of this species (Knudsen and Zengin, 2006). This gastropod is a predator of bivalves, including commercial species as oysters. Its introduction to the Black Sea has been correlated with the collapse of local oyster production as well as seriously impacting mussel populations in particular near the coasts of Anatolia and Caucasus. In the Ukrainian waters sea snail destroyed the oyster banks in the area of the Kerch Strait and in Karkinitsky Bay, biocenoses of other mollusks associated with depth down to 30 m suffered as well (Shlyakhov and Daskalov, 2008).In addition an impact on the *Chamelea gallina* stock has been documented in the region between the Turkey-Georgia border and Terme (Knudsen and Zengin, 2006).
The spatial distribution change seasonally, with an increasing near shore in summer for spawning. After the reproduction, at the end of the summer Rapa whelk moves to deeper waters and buried in substratum (Knudsen and Zengin, 2006).
A large-scale fishery for Rapa whelk begun in Turkey since the mid-1980s and the landing increased substantially during 2000s. An important fishery for this species occur also in Bulgaria from 1990s, whereas in the other countries the catch is noticeably lower (Fig. 20). In Ukraine *R. venosa* uses are limited to local subsistence fishery and souvenir manufacture/trade. Demand for *Rapana* meat on the international market increased the commercial value of this resource.

[7]Global Invasive Species Database: http://www.issg.org/database

An analysis of the evolution of the artisanal fishery for Rapa whelk along the Turkish coasts, which was characterized by booms followed by irreversible bust, can be found in Knudsen and Koçak (2011).

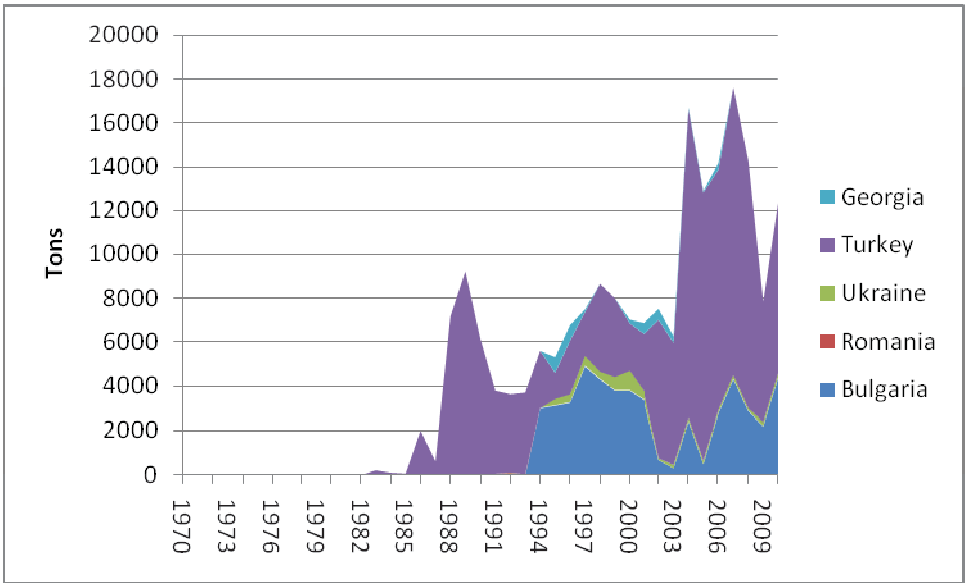


Fig. 20. Landing of *R. venosa* in Black Sea countries in the period 1977-2010

*Status of the stock*

A complete review of the quantitative catch and effort data on Rapa whelk in Black Sea countries, as well as on the length structure of the populations can be found in the report of the STECF- EWG Black Sea 11-16 (STECF, 2011). Even though a standard assessment has not been done, the evaluation of the biomass-at-sea in some Black Sea areas (e.g. Ukraine) as well as the mean shell size showed a decline through time which could the effect t of overexploitation.

*Management measures*

Sea snail dredging is regulated in Turkey as follows (from Knudsen *et al.*, 2010)

- Dredging/diving license required.
- Seasonal closures apply. There has been a large variation in the length of the closure period over the years. Since 2000 the seasonal closure for dredging has been between 1 May and 31st August;
- Each boat may take no more than one dredge.
- Dredging for sea snails during the night and closer than 500 m to shore is forbidden.
- Regulations pertaining to mesh size and dredge construction apply.