GFCM - General Fisheries Commission for the Mediterranean
CGPM - Commission Générale des pêches pour la Méditerranée

First Meeting of the GFCM *ad hoc* Working Group on the Black Sea

Constanta, Romania, 16–18 January 2012

BACKGROUND DOCUMENT ON THE BLACK SEA FISHERIES

- Preliminary Version -

by

GFCM Secretariat

January 2012

GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

COMMISSION GÉNÉRALE DES PÊCHES POUR LA MÉDITERRANÉE

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ABBREVIATIONS

ACCOBAMS – Regional Agreement on the Conservation of Cetaceans

AG FOMLR – Advisory Group on Environmental Aspects of Management of Fisheries and Other Marine Living Resources (Black Sea Commission)

BS – Black Sea

BlackSeaFish– Black Sea FAO Regional Project

BSC – Commission for the Protection of the Black Sea Against Pollution (Black Sea Commission, (www.blacksea-commission.org)

BSC PS – Black Sea Commission Permanent Secretariat

BSEP – Black Sea Environmental Programme

BSERP – Black Sea Environment Recovery Project

BSIS – Black Sea Information System

BSIMAP – Black Sea Integrated Monitoring System

CFP - Common Fishery Policy

CITES - Convention on International Trade in Endangered Species

CoMSBlack - The Cooperative Marine Science Programme for the Black Sea (FAO)

CPUE – Catch Per Unit of Effort

DCF – Data Collection Framework (EU)

EAF – Ecosystem Approach to Fisheries

EC – European Commission

EcoQOs – Long-term Ecosystem Quality Objectives (Black Sea Commission)

EEA - European Environment Agency

EEZ – Exclusive Economic Zone

EFF - European Fisheries Fund

FAO – Food and Agriculture Organization of the United Nations

FOMLR AG – Fisheries and Other Marine Living Resources Advisory Group of the BSC

GEF – Global Environment Facilities

GFCM - General Fisheries Commission For The Mediterranean

ICCAT – International Commission for the Conservation of Atlantic Tunas

MAFRD - Ministry of Agriculture, Forests and Rural Development (Romania)

MARA –Ministry of Agriculture and Rural Affairs (Turkey)

MEDFISIS – Fishery Statistics and Information System in the Mediterranean, MedFisis Project (Year 3) GCP/INT/918/

MEPNR – Ministry of Environment Protection and Natural Resources (Georgia)

MoA – Ministry of Agriculture (Georgia)

MSFD – EU Marine Strategy Framework Directive

NCFRM - National Company of Fisheries Resources Management (Romania).

PWGAM- Permanent Working Group on Stock Assessment Methodologies

RFMO - Regional Fisheries Management Organization

SAC - Scientific Advisory Committee

SCSA - Sub-Committee on Stock Assessment

SAP – Strategic Action Plan

SCSA – Sub Committee Stock Assessment (GFCM)

SCSI - Sub-Committee on Statistics and Information

SCESS - Sub-Committee on Economic and Social Sciences

SCMEE - Sub-Committee on Marine Environment and Ecosystems

STECF– Scientific, Technical and Economic Committee for Fisheries (European Commission)

TAC – Total Allowable Catch

TDA – Transboundary Diagnostic Analysis

UN – United Nations

UNDP – United Nation Development Program

UNEP – United nation Environment Program

UNFSA - United Nations Fish Stocks Agreement

WFD – Water Framework Directive

BACKGROUND

The first Permanent Working Group on Stock Assessment Methodologies (PWGAM), held in Istanbul in 2006, was organized jointly with the Black Sea Economic Cooperation Organization. The PWG of the SCSA in close collaboration with the Commission on the Protection of the Black Sea Against Pollution analyzed and compared different methodologies for stock assessment of both demersal and small pelagic species in the Mediterranean and in the Black sea.
Some objectives for a possible cooperation project were first drawn up at this meeting. Among these, the need to promote the development of common methodologies for collecting, processing and analyzing data for stock assessment of commercial species using experience and advice from GFCM and ICES was established.
In 2007, at its 31st Session, the Commission acknowledged the efforts made to strengthen cooperation with the Black Sea research institutions and reiterated the need for a major involvement of SAC, and requested the Secretariat to draft a project proposal on cooperation in support of fishery research and management for this sub region.
In 2008, at its 32nd Session, the Secretariat presented a draft project framework based on a study which produced four documents available at ftp://ftp.fao.org/fi/DOCUMENT/gfcm/gfcm_32/dma4e.pdf which were the first step towards the preparation of the Black Sea Cooperation Project (BlackSeaFish) with the objectives outlined below:

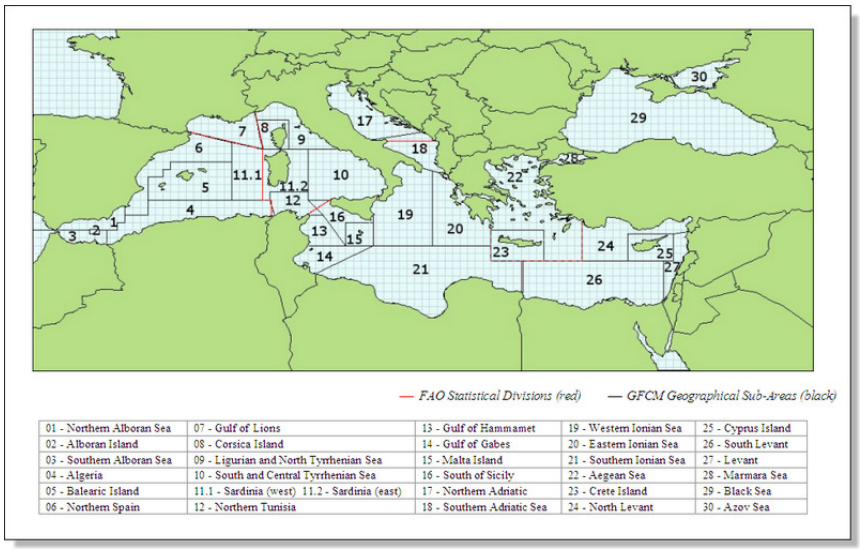
- To foster cooperation between fishery scientists and stakeholders from the Black Sea coastal area within the framework of an Ecosystem Approach to Fisheries.
- To promote technology transfer between countries and support capacity building .
- To develop multidisciplinary databases and regional information systems
- To conduct joint data collection schemes including surveys to complete information deficiencies and calibrate national systems, as appropriate.
- To cooperate with other initiatives by Black Sea scientific bodies, national entities and international projects, in order to achieve coordinated results.
- To promote the attendance of Black Sea national scientists at international fisheries scientific fora, and encourage their effective participation in GFCM Scientific Advisory Committee activities.
- To promote publication of the results.

In 2009, the GFCM Secretariat transferred the elaboration of the Preparatory phase for the Project Document, along with its eventual execution, to the FAO FIRF Division.

During its thirteenth session (Marseille, France, 7–11 February 2011) the Scientific Advisory Committee of GFCM, agreed on the need to strengthen the collaboration with the Black Sea countries by establishing an ad-hoc Working Group on the Black Sea open to all scientists of the region and to the partner Organizations. It also decided to hold the first meeting of this Working Group in Romania in early 2012 and invited the Secretariat to prepare draft Terms of Reference of this Working Group to be submitted for the consideration of the Commission at its Thirty-fifth Session to be held in Rome in May 2011.

INTRODUCTION

The Black Sea is the largest Sub-Area of the GFCM (Sub-Area 29) and one of the most complex ecosystem in the Region. It consists of six riparian countries (Bulgaria, Georgia, Romania, Russian Federation, Ukraine and Turkey. Romania, Bulgaria and Turkey are members of the GFCM.



During the SAC meetings of the Sub-Committees (SCSI, SCSA, SCESS, SCMEE) held in Malta in 2010, the GFCM Secretariat invited the SAC to provide guidelines for specific activities that could be included in short-term workplans to foster regional fisheries management of the Black Sea fisheries as soon as possible.

Finally, the GFCM Secretariat, in response to the GFCM/SAC recommendations regarding the revitalization of cooperation between the GFCM and Black Sea countries, reiterated once more during the 35th meeting of the GFCM Commission (held in Rome in May 2011), decided to strengthen its activities and cooperation in the Black Sea area by establishing a specific permanent Working Group (WG) on the Black Sea fisheries issues.

It was also stressed that the expectations of the first meeting of the WG were to identify priority actions and strategies to foster fisheries and aquaculture management in the Black Sea area within the GFCM framework, including the integration of the ecosystem approach.

As part of the preparation of this first meeting, the GFCM Secretariat prepared this background document related to the current knowledge of Black Sea fisheries on the basis of several documentary sources that were available and considered consistent and reliable and with a special focus on the GFCM contribution (e.g. LaMed project, GFCM studies). One of the purposes of the document was also to summarize the different aspects of the statistical data collection systems, as well as the scientific fishery components (e.g. research programs and stock assessment activities) which will be discussed during the meeting.

In order to present updated national data and information, the Secretariat also prepared and despatched two sets of questionnaires to be eventually completed by national experts, aimed at reporting the situation in the region in a more structured and comprehensive way. The preliminary results of questionnaires compiled until the

end of December 2011 are included in Annexes 3 and 4 to be discussed and eventually integrated during and after the meeting.

As stated earlier, this document has been produced to give the participants a general view of the situation as well as a path to follow in the discussions. The intention is that it be used as a basis to be further completed and extended through the active contributions from the participants who will provide additional information which is more updated, more comprehensive and of a wider spectrum. Such information, complemented with suggestions and recommendations that come out of the meeting, will be integrated into this document. Moreover, it is desirable that results of experimental works will be presented and new works and techniques introduced. At the same time, it is expected that the meeting will produce an agreed timetable of joint works to be implemented, even if this is limited to only some of the Black Sea needs, where the GFCM, through its structure and mandate, can directly or indirectly patronize.

OVERVIEW OF THE EFFECTS OF THE ECOSYSTEM CHANGE ON FISHERIES RESOURCES

The Black Sea ecosystem is one of the most investigated marine systems in the world. After the collapse of pelagic fisheries at the end of the 1980s and the abrupt shift toward a biological community dominated by gelatinous carnivores, several studies have been aimed at elucidating the factors that have been involved in the ecosystem change. Results of these studies pointed out that the Black Sea ecosystem has been subjected to dramatic changes since the early '70s, because of the combined effect of successive over-exploitation of fish stocks (i.e., fishing down the food web), the increased pollution and eutrophication of the basin, population outbursts of alien planktonic carnivorous and strong decadal-scale climatic fluctuations (Prodanov *et al.*, 1997, Gucu, 2002; Daskalov, 2007; Kideys, 2007; Oguz and Gilbert, 2007).
The major causes of ecosystem change in the Black Sea have been reviewed for the GFCM by Caddy (2008), who drafted an internal document. A causal analysis of the factors and drivers causing the decline of fish commercial stocks was developed by the Black Sea Environmental Programme – TDA (Transboundary Diagnostic Analysis, TDA, 2007) and listed in table 1. Recently, a global review of regime shifts in the Black Sea was also provided by Daskalov (2011).

The documented changes of the Black Sea ecosystem during the last 50 years clearly indicate the vulnerability of this large inland sea to the anthropogenic effects. The water exchange with the Mediterranean is rather limited and, at the same time, it receives each year about 350 km^3/year of freshwater from three big rivers (Danube, Dnieper, Don) which drain a basin of >2 million Km^2 (almost 1/3 of continental Europe) containing more than 160 million people (Heileman *et al.*, 2008).
These three rivers are the main source of nutrients input into the Black Sea basin, which is therefore sensitive to distant anthropogenic activities. In addition, due to the rather limited extension of the continental shelf and the anoxic nature of water masses below 150-200 m, fisheries resources are confined in a very reduced part of the basin where they have been exposed to a progressive increase of fishing exploitation during the last 50 years.
The pristine ecosystem phase of the Black Sea in the early 1960s was characterized by a top-down controlled food-web structure, involving relatively low phytoplankton standing stocks, moderate to high zooplankton standing stocks, low stocks of small pelagic fish and relatively high stocks of large pelagic predator fish species (Oguz and Gilbert, 2007).
The first regime shift[1] occurred in 1973–1974 when the system shifted from large predatory fish to a small planktivore fish-controlled system, which persisted until 1989 in the form of increasing small pelagic and phytoplankton biomass and decreasing zooplankton biomass (Daskalov, 2002; Oguz and Gilbert, 2007). The nutrient input via the major rivers, which started rapidly increasing in the 1970s, resulted in strong eutrophication which led initially to alterations in the composition and quantity of phytoplankton and later of secondary producers (Prodanov *et al.*, 1997, Kideys, 2002). At the same time, an increased fishing effort on large pelagics species reduced their stock abundance allowing small pelagic planktivorous fish to increase via a predatory release mechanism. The increased consumption by planktivorous fish causes a consequent decline in zooplankton biomass due to a reduced grazing

[1]Ecological regime shifts denote abrupt changes that result in reorganization of the structure and function of ecosystems from one to another contrasting, persistent state (deYoung et al. 2008).

pressure. This 'trophic cascade' mechanism was invoked by Daskalov (2002) to explain the observed changes in Black Sea ecosystem.

An abrupt shift toward a system dominated by planktonic gelatinous carnivores was observed in 1988–1990 as determined by the concurrent effects of over-exploitation of pelagic fish stocks and a sudden population explosion of the alien ctenophore *Mnemiopsis leidyi.* The main effect for fisheries was the collapse of pelagic fish stocks, also due to an excess of catch of immature specimens, which were no longer sustainable under heavy over-fishing, to their low stock regimes of the early 1960s (Oguz and Gilbert, 2007). Overexploitation combined with an increased eutrophication during the 1980s was identified as the main mechanism leading to the outburst of gelatinous organisms (Gucu, 2002). The phytoplankton biomass increased also under the positive effect of physical processes driven by climatic cooling and severe winter conditions in mid-1980s and early 1990s (Oguz, 2005).

Recently, the environmental disturbance was demonstrated to be one of the key factors explaining the anchovy – *Mnemiopsis* shift event observed in 1989–90. Simulations carried out by Oguz *et al.,* (2008) showed that a combination of direct and density-dependent effects of over-fishing, eutrophication-induced nutrient enrichment, climate-induced over-enrichment and temperature-controlled *Mnemiopsis* spring production were involved in the shift.

Mnemiopsis leidyi and *Aurelia aurita* basically filled the niche left empty by small pelagic fishes and the classical "phytoplankton–zooplankton–pelagic fish" type food chain was then shifted to the one dominated by opportunistic species and gelatinous carnivores which benefited also by the lack of predators (Oguz and Gilbert, 2007). In addition, *Mnemiopsis* competition on forage zooplankton and its predation upon fish eggs and larvae should have further exacerbated the collapse of small pelagic fish stocks (Kideys, 2002, Ozturk, 2010). A change in the zooplankton community, with an increasing of small species and a decreasing of larger zooplankton is also one of the mechanism involved in the shift toward a community dominated by gelatinous carnivores (Daskalov, 2002). Intense grazing of planktivorous fish eliminates larger zooplankton allowing for better growth of small zooplankton which favours jellyfish development.

During 1990s, fishing effort decreased because of scarcity of fish, and pelagic fish stocks started to recover (Daskalov, 2008) also in response to the expansion of *Beroe ovata* in the Black Sea, a ctenophore predator of *Mnemiopsis* (Kideys, 2002; Shiganova *et al.*, 2003; Shiganova, 2004). The ecosystem shifted again toward a top-down controlled food web by small pelagic fish, with an increasing of zooplankton biomass and a decreasing of phytoplankton and gelatinous carnivores. Gucu (2002) described the food-web regimes observed in the Black Sea in the 1960s, 1980s and 1990s quantifying the main changes in terms of mass transfer among the different trophic groups.

The role of fishing exploitation in triggering the trophic cascade process in food-web dynamics and in the observed large ecosystem regime shifts was described in several studies (Gucu, 2002; Daskalov, 2002, 2007; Oguz and Gilbert, 2007).

The fishing effort in the Black Sea sharply increased in the 1970s and 1980s with the introduction of large-scale purse seine and mid-water trawl fisheries of small pelagic fish (Grishin et al., 2007).

The Black Seas fisheries, which supported approximately two million fishers and dependents, suffered almost total collapse in the early 90s (Travis, 1993). Catch

values from the mid 1980s to early 1990s declined by about US$ 240 million (Caddy 1992, Campbell 1993).

Caddy (1992) estimated in US$ 1 billion annually the total losses from the decline of the Black Sea fishery including the losses due to both the demolition of fishing vessels and in the incomes and profits at processing plants. Separate estimates for Turkey alone suggest even higher losses, totaling US$300 million annually. Processing plant losses were roughly estimated at about US$20-30 million for the 50 plants in the Black Sea region, on the basis of the costs of switching over to an alternative production line (Knowler, 2005, 2007).

Up to 150,000 people were estimated to depend directly on the Black Sea fisheries. Income losses have been more difficult to estimate. Wages lost in processing plants alone totaled approximately US$10 million annually.

The most comprehensive economic valuation of the decline in Black Sea fisheries is provided by Knowler (2007), who modeled nutrient-induced eutrophication and its impact on the commercial anchovy fishery in the Black Sea. Results demonstrated that the *Mnemiopsis* had a dramatic impact on potential anchovy catches leading to a drop in profits for the Black Sea anchovy fishery from over $17 million per year to under US$300,000 per year, a decline of 98%.

As stated by Daskalov (2002) the combination of uncontrolled fisheries and eutrophication has caused important alterations in the structure and dynamics of the Black Sea ecosystem. In particular the removal of apex predators has strongly reduced the resilience of the ecosystem to other profound changes such as nutrient loading and warming (Llope *et al.*, 2011). This finding suggests that conserving and restoring natural stocks of fish and marine mammals can contribute greatly to sustaining viable marine ecosystems (Daskalov, 2002). Whether the Black Sea will recover from the major disturbances it has suffered, or revert to a low-diversity, eutrophic state will depend in large part on the economic and political decisions of the countries (Langmead *et al.,* 2009; LLope *et al., 2011*). According to Langmead *et al.*, (2009), even in the most optimistic scenario, the Black Sea will never come back to the pre-1960s state after the introduction of *Mnemiopsis*.

For instance, the environmental conditions of the northwestern shelf (NWS) of the Black Sea has improved in the last decade due to decreasing nutrient loads from the rivers (TDA, 2007, BSC, 2008). Oguz and Velikova (2010) found that this post-eutrophication regime is characterized by a low-energy, inefficient food web dominated by the dinoflagellate *Noctiluca scintillans* and jellyfish, and relatively low levels of phytoplankton, zooplankton and fish. The new state is therefore markedly different from the classical phytoplankton-mesozooplankton-fish chain of the similarly low nutrient 'pre-eutrophication' regime prior to 1970 and cannot be considered as a major improvement or restoration of the northwestern coastal ecosystem (Oguz and Velikova, 2010). As stated by Daskalov (2011), the aim of management in the Black Sea must be to restore the ecosystem to a balanced state with the potential to provide sustainable use of its essential goods and services. "*Recovery of a resilient ecosystem should mean restoring all important components (including top-predators) into the new desirable state: reducing the anthropogenic impact, normalizing species interactions, buffering trophic cascades, increasing biodiversity and improving environmental quality. Such a state of the ecosystem would provide strategic benefits, such as a clean marine environment, abundant and diverse fish stocks and sustainable economic activities (e.g. fishing, tourism), to a range of stakeholders and society as a whole*" (Daskalov, 2011).

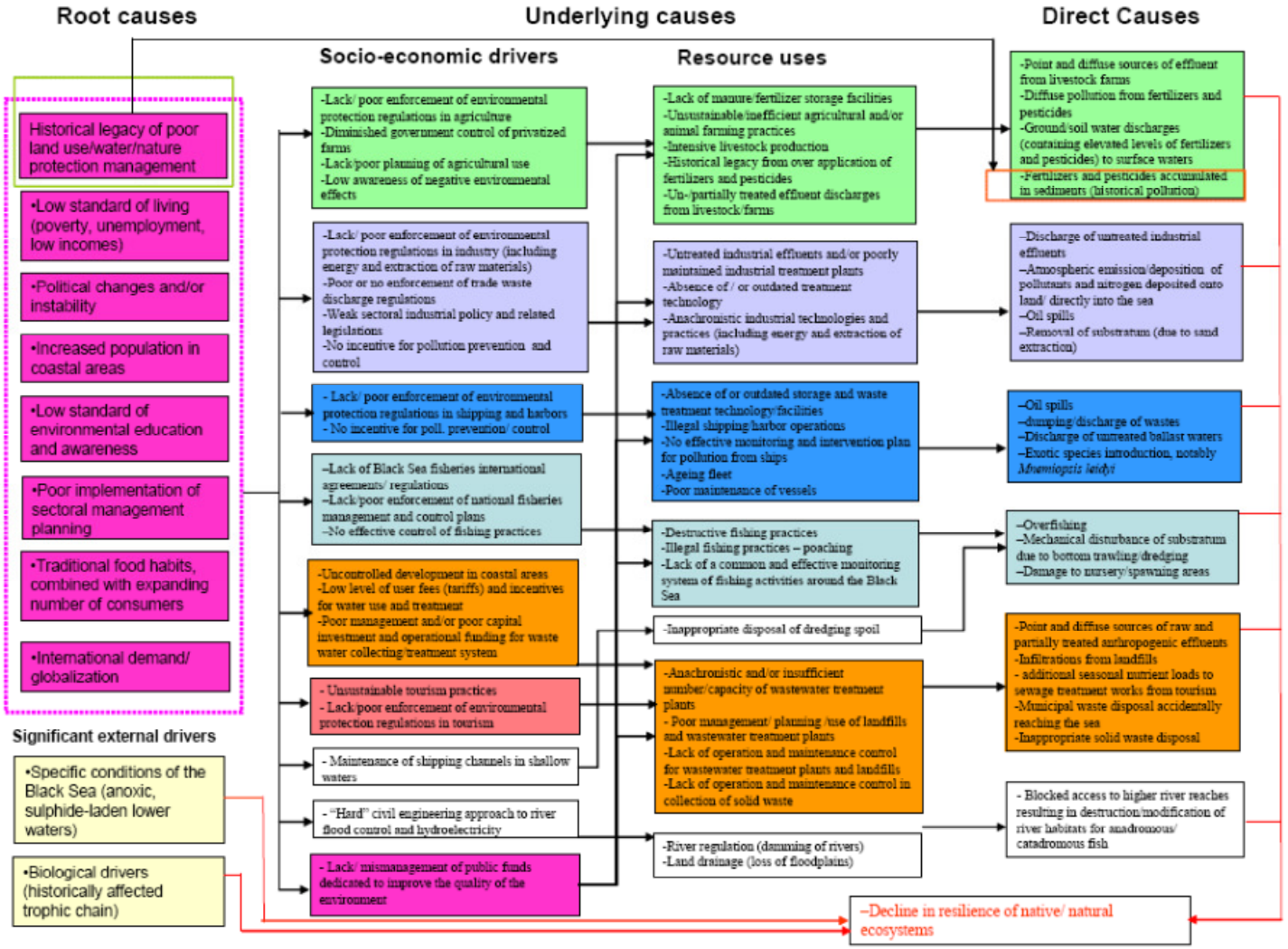


Table 1. Causal chain analysis for decline in commercial fish species/ stocks in the Black Sea (from the Black Sea Environmental Programme –Transboundary Analysis, TDA, 2007)

STOCKS AND FISHERIES

About 200 fish species inhabit the Black Sea (Black Sea Commission, 2009). Among the whole specific diversity, the greatest economic value, however, is not more than two dozens of species that produce about 98% of catch in 1996-2008 (Shlyakhov and Daskalov, 2008). Anchovy and sprat accounted for more than 90% of total annual catch in 2008 (table 2). These two big stocks are sustained by the very high primary production (>300 $gCm^{-2}year^{-1}$) associated with fluvial discharges (Balkas *et al.*, 1990). The rest of the catch included commercially less important fishes, such as the Mediterranean horse mackerel (15.300 tons), whiting (11.100 tons), Atlantic bonito (5.000-20.000 tons) and a few mollusks.

Table 2. Black Sea landing composition by country and species in 2008 (from GFCM production statistics database)

species	Bulgaria	Georgia	Romania	Russian fed.	Turkey	Ukraine	Total	%
Anchovy	28.0	25938.0	15.0	9070.0	225344.0	4298.2	264693.2	71.74
Sprat	4310.0	0.3	234.0	7814.0	38999.0	21110.8	72468.1	19.64
Horse mackerel	180.0	8.0	11.0		14741.0	365.6	15305.6	4.15
Whiting		15.0	55.0	96.0	10986.0	8.6	11160.6	3.02
Bluefish	25.0				1787.0		1812.0	0.49
Mullets nei		1.0	8.0	81.0	1518.0	91.5	1699.5	0.46
Turbot	55.0		47.0		458.0	251.4	811.4	0.22
Red mullet	17.0				706.0	45.2	768.2	0.21
Picked dogfish	23.0		10.0			79.2	112.2	0.03
Pontic shad	29.0		47.0	2.0		16.6	94.6	0.03
Raja nei						54.2	54.2	0.01

All the most important commercial stocks are considered shared between the riverine countries as reported in Table 3.

Tab. 3. Commercial species considered by Black Sea scientists to be shared resources, whose exploitation should be regulated cooperatively (from Caddy, 2008[2]).

Species	**Characteristic**
Engraulis encrasicolus (Anchovy)	Endemic
Trachurus m. ponticus (Black Sea horse mackerel)	Endemic
Sprattus sprattus (Black Sea sprat)	Endemic
Merlangius merlangus (Whiting)	Endemic
Squalus acanthias (Piked dogfish)	Endemic
Scophtalmus maeotica (Black Sea turbot)	Endemic
Mullus barbatus ponticus (Black Sea striped mullet)	Endemic
Liza aurata (Golden grey mullet)	Endemic
Mugil cephalus (Flathead grey mullet)	Endemic
Rapana thomasiana (Rapana whelk)	Introduced from the Pacific
Sarda sarda (Atlantic bonito)	Migratory
Scomber spp. (Mackerels)	Migratory
Alosa caspia (Caspian shad)	Anadromous
Pomatomus saltator (Bluefish)	Migratory

[2] Caddy J.F., 2008. Recent experience and future options for fisheries assessment and management in the Black Sea: a GFCM perspective. In GFCM 32 session. Strengthening Cooperation in the Black Sea. Rome, Italy 25-29 February 2008.

Fisheries has been one of the drivers for the environmental changes faced by the Black Sea ecosystem during the last 50 years, but at the same time they have also been dramatically affected by changes caused by other factors.
A review of the impact of fisheries on the Black Sea ecosystem was provided by Eremeev and Zuyev (2007). The authors indicated three main periods in the recent fisheries exploitation history (Fig. 1):

- 1970-1988 (fishery development): gradual catch increase in the catch with total landings attaining its maximum of almost 800 thousand tons;
- 1989-1991 (fishery crash): drastic catch decrease over three years till 200 thousand tons approaching its minimum since 1970s. A synchronous decrease was observed in all stocks and particularly in anchovy and other small pelagic fish whose catch decreased abruptly reaching levels of ~ 100 000 tons – similar to those during the pre-development period.
- 1992- 2004 (fishery recovery): partial increase of fish landings.

More recent data showed that this recovery period was interrupted in 2005 with another crash of the landing at about 250.000 tons. In the following year (2006-2007) the catch increased again up to 480.000 tons.
It is at this point relevant to understand which are the factors driving such large fluctuations in fisheries catch. Either biomass variations of the commercial stocks or changes in the market conditions and economic profitability of fisheries could be involved in the observed trend.

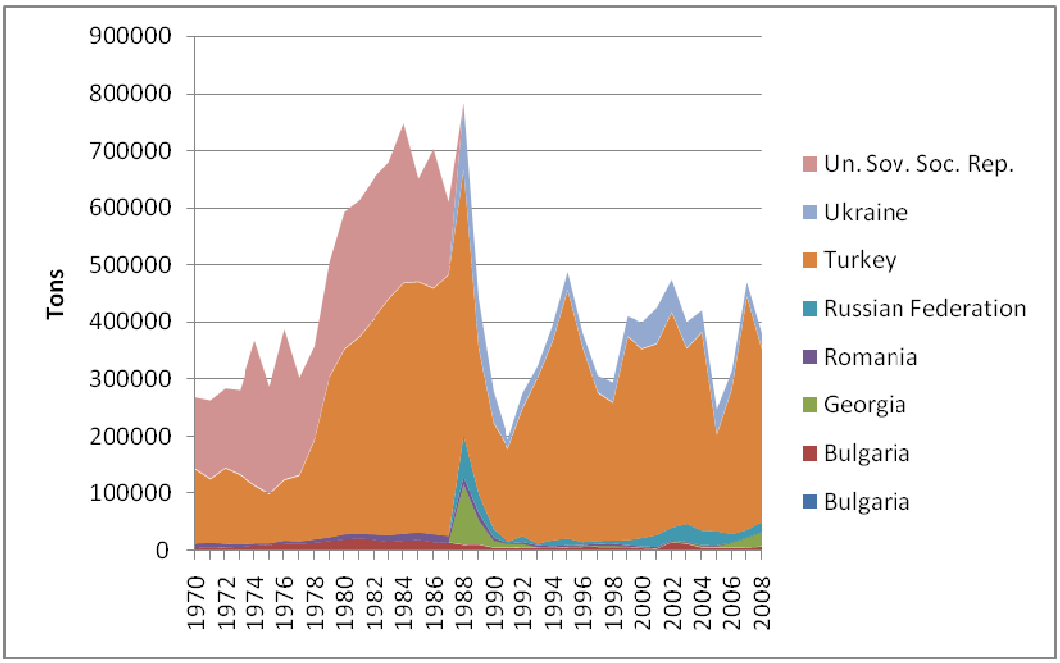


Fig. 1. Evolution of total landing in the Black Sea in the period 1970-2008 (from GFCM capture production 1970-2008[3])

Shlyakhov and Daskalov (2008) described a similar temporal pattern in the total mean annual catch of Black Sea fisheries in 1989 -2005. During 1995-2005 the catch was at the level of 410 thousand tons varying annually between 330 thousand tons and 500 thousand tons.

[3] Data retrieved from http://www.gfcm.org/gfcm/topic/17105/en

The changes in catch have been accompanied by a main change in species composition from 1960-70s to the end of 1980s. As documented in table 4, from the mid of 1960s a gradual reduction of large-sized, food valuable fishes such as turbot, bluefish, mackerel, Atlantic bonito, sturgeons and shad has occurred. They were replaced by several small-sized species such as anchovy, sprat, whiting, horse mackerel and others (Eremeev and Zuyev, 2007).

Species	1960 - 1970ss		1988s	
	Thousand tonnes	%	Thousand tonnes	%
Anchovy	53.6*	69.8	67.7*	93.4
Sprat	1.6*		8.6*	
Horse mackerel	12.5*		12.6*	
Whiting	2.1*		4.5*	
Atlantic bonito	16.1	30.2	1.7	6.6
Mackerel	1.2		1.5	
Bluefish	3.2		1.2	
Shad	0.8		0.2	
Turbot	2.0		0.2	
Picked dogfish	1.5		0.7	
Thornback ray	0.9		0.2	
Mugils	2.6		0.3	
Red mullet	1.7		0.5	
Sturgeons	0.2		~ 0.01	
Total	182.8	100	783.8	100

* Small short cycle fish species

Table 4. Species composition of Black Sea landings in the end of 1960s – beginning of 1970s and in 1988 (from Eremeev and Zuyev, 2007).

The recent history of Black Sea change in the fishing community is a clear example of fishing down the trophic web where stocks at the higher trophic levels are progressively depleted. Until the early 1970s the main targets were the large and mid-size predatory pelagic and demersal species like bonito, bluefish, mackerel, turbot until those stocks severely declined (Prodanov et al., 1997; Daskalov, 2002). By the end of the 1970s, commercial fishing of mackerel, bonito, bluefish, as well as tuna practically disappeared. As a consequence of the sharp decline of the predator populations, stocks of small pelagic fish, such as anchovies and sprat, increased and became the target of intense fishing. In a short time, small pelagic species contributed to up to 80% of total catches in the Black Sea. Only six (sprat, anchovy, horse mackerel, whiting, turbot, bonito) of the 26 commercial fish species once abundant in the Black Sea before the 1970s remained commercially viable in the mid 1990s (Stanners and Bourdeau, 1995, Knowler, 2007).

The main commercial fish stocks showed a different temporal catch trend across the last 40 years. After the catch collapse of the late 1980s beginning 1900s a recovering was observed for anchovy and sprat whereas the horse mackerel catch remained at very low catch values. Among demersal, the catch of both whiting, red mullet and picked dogfish continuously decreased from the early 1900s. The turbot catch shows large fluctuations which could be also related to the reliability of official catch data for this stock. In any case, its catch was significantly higher until the end of the 1980s than in the last 20 years. Different is the trend for the sturgeons which show a continuous decreasing since the 1970s (Fig. 2).

However, the problem of changing commercial marine living resources is not simply one of resource fluctuations, together with their associated socio-economic consequences. There are huge implications for marine ecology, biodiversity and the ability of the Sea to process the nutrient/pollutant loads which it receives. As recognized by the recent Transboundary Analysis carried out within Black Sea Environmental Programme (BSEP) of the Global Environment Facilities (GEF) and

UNDP (TDA, 2007), total catch statistics by themselves reveal very little about the sustainability of existing fisheries.

Major changes continue to occur in the underlying contribution of different species to overall "total catch" estimates, meaning that total catch statistics, reflecting human responses to the changing resource, may hide an underlying problem. It is for instance clear that the increases in total fish catches since the early-mid 1990s is largely due to increased catches of anchovy and sprat. Catches of many other species (e.g whiting, horse mackerel, red mullet, turbot, etc.) have declined over the same period.

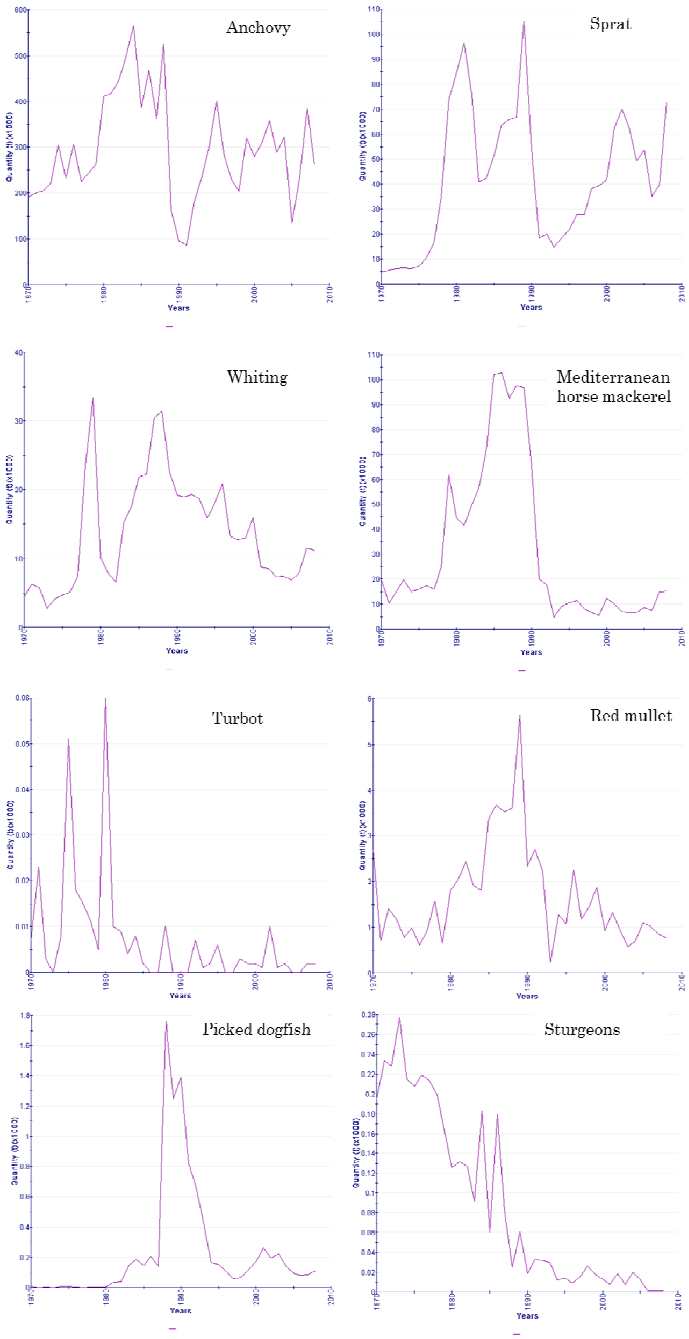


Fig. 2. Catch trend of the main Black Sea commercial stocks (GFCM capture production statistics, 1970-2008[4])

[4] Retrieved from www.GFCM.org

The recent evolution of Black Sea fisheries showed marked differences from country to country as shown in fig. 3. In Romania the fisheries did not recover after their collapse in the late '80s early '90s and the catch continuously decreased to very low values in 2007-2008 (400-500 tons) if compared with the fishery development phase (1970-1988). In Ukraine, the Russian Federation and Bulgaria, the partial recovering of the landings during the '90s was followed by a decreasing during the 2000s. The Georgian catch increase in recent years was almost entirely due to the catch of Turkish vessels licensed to exploit anchovy in Georgian waters. Completely different is the case of Turkey, where the fishery collapse at the end of the '80s was almost recovered in a few years. In the period 2000-08 the catch fluctuated between 186.000 and 468.000 tons. According to the official statistics (GFCM Capture production 1970-2008), in 2008 Turkey contributed to 80% of reported catch for the entire Black Sea.
In the same overexploitation situation and strong ecosystem change the national fisheries performed differently due to the different impact of a series of factors, including the reorganization of the sectors after the breakdown of the Soviet system, the impact of socio-economic drivers (e.g. increasing fuel cost), the availability of subsidies, etc. Unfortunately, the understanding of the main fisheries drivers in the different Black Sea areas is currently undermined by the lack of an organized system for the regular collection and registration of data on fish stock, fishery fleets and relevant socioeconomic variables for Black Sea fisheries (Knudsen *et al.*, 2010).
It is also important to consider that in the Russian Federation and the Ukraine, the interruption of the Soviet system meant that the state was less able to monitor and manage marine resource exploitation. The decrease in catches seen in official statistics may in fact reflect a decrease in official registration of catch, rather than a decrease in fishing; in effect, fish poaching is increasingly perceived as a large problem in Russian and Ukrainian fisheries (Knudsen and Toje, 2008).

In the diagnostic report of the Black Sea Commission of 2010, a series of gaps in catch data were identified (Raykov, 2010). In Russian Federation reports on catches, data are missing since 2005. Georgia reporting is discontinuous with lack of data for some years (e.g. 2004-06 and 2008) or species (e.g. turbot). Following this analysis, the main conclusion is that due to the described misreporting the total catch amount in the Black Sea is highly underestimated. For instance, the total landings in 2008 decreased up to 390 thousand tons (without RU and GE) compared to 482 thousand tons reported in 2007. In the recent STECF EWG 11-16 (STECF, 2011) the existing data for the assessment were revised. The main gaps concerned Georgia for several stocks in the last five years. In certain cases, e.g. horse mackerel in Turkey and Georgia, a catch estimate was provided by the experts.

An attempt to explain the role played by different forces that lead to increased fishing pressure and an altered state of the environment in the coastal areas near Samsun on the Turkish Black Sea coast was done by Knudsen *et al.* (2010). Applying a modified DPSIR model (European Environment Agency, 1999) the authors identify eight drivers of importance for the period 2000-2005. Although the authorities can impact all or most of those drivers, most of them are beyond the scope of conventional 'fisheries management'.

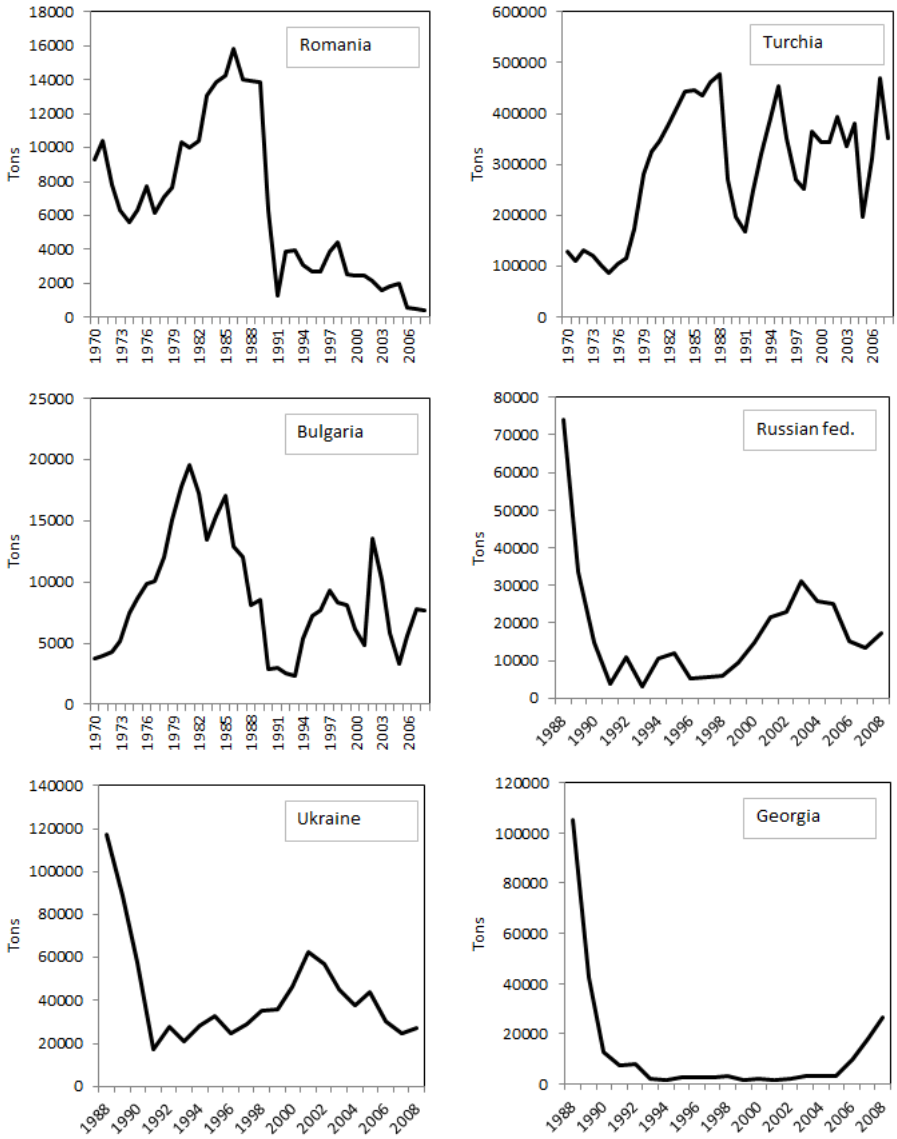


Fig. 3. Trend in landing of Black Sea countries (from GFCM Capture production 1970-2008).

In the next paragraphs the structure of fisheries is reviewed for each country, on the basis of the information available, with the objective to elucidate the role played by the main drivers on the fisheries performance during the last years.

Romania

A detailed analysis of the Romania fishing fleet in 2008 can be found in the Annual Economic Report on the EU fishing fleet (STECF, 2010). In 2008 the fishing fleet consisted of 440 registered vessels with a combined registered tonnage of 2,491 tons and a total power of 8,380 kW operating in Romanian Black Sea waters.

According to the FAO fleet statistics, an increase of the number of vessels in 2009-2010 was registered. Anyhow, this increase was due to small vessels of a length less than 13 m whereas there was a reduction of vessels over 24 m (table 5). The segmentation of the fleet is shown in table 6 (Radu *et al.*, 2010).

The overall average age of vessels was 25 years. Ninety-six percent of the fishing enterprises owned a single vessel. Total employment in the sector and more specifically in fishing activities was 875 and 649 respectively. The number of fishermen decreased from 190 to around 55 in the commercial fleet (vessels over 15m) between 2006 and 2008. A similar situation applies to the stationary fishing fleet along the Romanian littoral.

Table 5. N. of Romanian fishing vessels by length class in the period 2004-2010.

Motorization	Length Class (m)	2004	2007	2008	2009	2010
No Power	Up to 5.9	15	23	23	24	25
	6 - 11.9	206	193	198	200	211
Power	Up to 11.9	132	202	200	201	230
	12 - 17.9	2	6	6	5	4
	18 - 23.9	2	3	3	4	3
	24 - 29.9	9	10	6	7	2
	30 - 35.9	0	0			
	36 - 44.9	1	1			
	Grand Total	367	438	436	441	475

Table 6. Segmentation of the Romanian fleet in 2008 (from Radu *et al.*, 2010)

		< 6 m	6 – <12 m	12-18 m	18 – <24 m	24 – <40 m	> 40 m	Total
Total vessels registered		50	371	5	4	11	-	**441**
Active vessels		15	159	4	2	4	-	**184**
Midwater otter trawl	Mixed demersal and pelagic species					3		**3**
Pound nets	Small pelagic fish Demersal fish	5	34					**39**
Set gillnets	Demersal species		51	4	2	1		**58**
Artisanal fisheries (Hand lines, Set long lines, Beach seine)	Other finfish	10	74					**84**

In 2008 the fleet landed 426 tons of edible fish (235 tons of sprat, 77 tons of turbot, 55 tons of whiting), caught in a total of 3728 fishing days. In terms of the value of

landings, in 2008 turbot achieved the highest value of landings (299.000 euros), followed by sprat (164.000 euros) and then pontic shad (130.000 euros).
In 2008 the European Commission introduced quotas in the Black Sea for turbot and sprat which has been fixed at 3442.5 tons for sprat and 43.2 tons for turbot in 2011.
The total amount of income due to landings was 727.000 euros in 2008. The majority of income (435.000 euros) is generated by the passive gears 6-12m segment and the pelagic trawl 24-40m segment.
The total amount of expenditure by the Romanian fishing fleet in 2008 was 757.000 euros (including depreciation). Crew wages and energy costs alone amounted to 60% of total income. High expenditure levels in relation to income resulted in a lack of investment. Large vessels have high fuel consumption due to lack of investment in fuel efficient engines while smaller vessels struggle to afford the fuel price.

The key performance indicators of the seven fleet segments of the Romanian fishing fleet is showed in table 7.

Fleet segment	Number of vessels	FTEs	Days at Sea (1000 days)	Volume of landings (tons)	Value of landings (1000 euros)	Total Income (1000 euros)	Average wage per FTE (1000 euros)	GVA (1000 euros)	Operating cash flow (1000 euros)	Profit (1000 euros)	Capital Value (1000 euros)
PMP VL0006	45	45	0.2	1.1	2.6	2.6		-0.1	-0.4	-0.5	65.3
PMP VL0612	226	350	1.8	13.1	16.7	16.7	0.4	-10.9	-143.9	-144.2	327.7
TM VL1218	4										
TM VL1824	2										
TM VL2440	4										
PG VL0006	5										
PG VL0612	118	165	1.3	127	271.6	271.6	1.2	226.5	30	29	178.5
INACTIVE VL0612	26										0
INACTIVE VL1218	1										2.1
INACTIVE VL1824	2										115

Table 7. Romanian fleet composition and key indicators in 2008. PMP: combining mobile and passive gear, PG: passive gear. FTSe: full time employees (from STECF, 2010)

Maximov *et al.* (2010a, b) provided an overview of the evolution of marine fisheries and catch in the Romanian Black Sea coast during the last 20 years. In the last decade the new conditions of fishing practice, with the interruption of state subsidy to the principles of alignment and competitive economy, have led to radical changes in national marine fisheries. The lack of subsidies along with other socio-economic and market-dependent factors, such as the opening of imports on fishery products, the aging fishing fleet and especially the rising cost of fuel and maintenance have led to a drastic reduction of the active fleet. During the fishing period 1990-2009, the level of catches was quite low, ranging from around 1390 t in 2006 to 1940 t in 2005, except for the period 2001-2002 when they reached over 2000 tons (2431 t in 2001 and 2116 in 2002), and continued decreasing to 435 t in 2007, 426 t in 2008, 331 in 2009. The same trend is shown by vessels using mobile gear (Fig. 4). Their catch composition is made up for more than 70% by the sprat (80-95% of the catch in the period 2000-07). The level of catches in the last three years, the lowest in the last 20

years, was due either to a decreasing fishing effort (descending number of coastal trawlers, fishing nets and hence the number of personnel engaged in fishing) and growing production costs. Also the influence of hydro-climatic conditions on fish stocks may have played a role in determining the observed trend (Maximov *et al.*, 2010b).

The CPUEs showed a continuous decreasing trend since 1998 indicating also that fish stocks did not seem have taken advantage of the reduction in overall fishing effort (Fig. 4). It is however clear that the lack of recovering in CPUE should be due to a change in fishing strategy, from low priced species, such as sprat, to high priced but less abundant species like turbot. The total catch of turbot showed a continuous increasing in the last 10 years achieving 21% of the total catch in 2009 (Maximov *et al.*, 2010c).

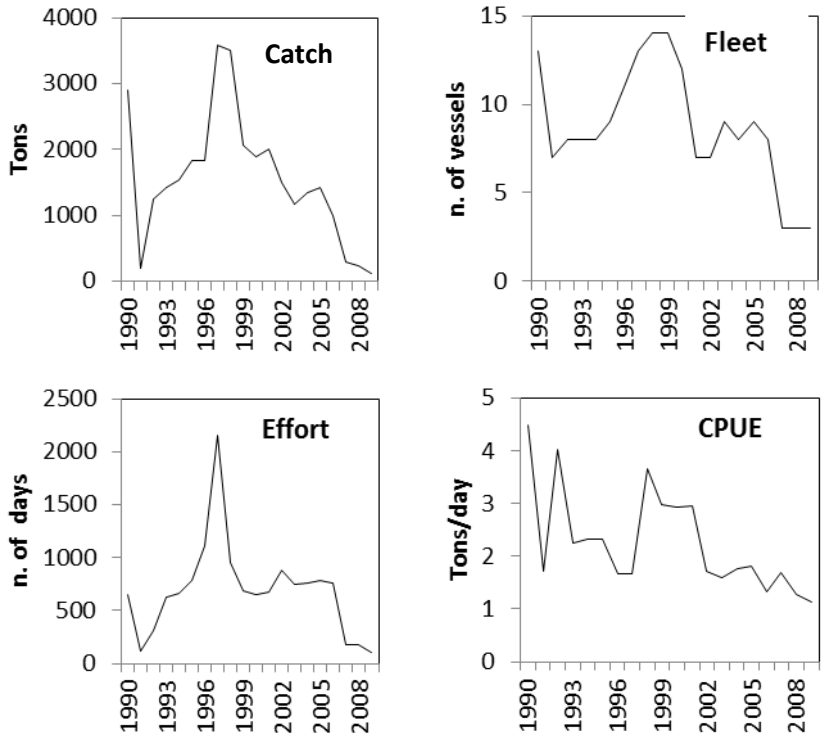


Fig. 4. Evolution of catch, effort and CPUE of the Romanian trawl fleet in the period 1990-2009 (from Maximov *et al.*, 2010a)

Fisheries management

Romania completed negotiations with EU in the area of fisheries in June 2001, accepting the entire "acquis communautaire" without requesting any derogation or transition periods. Romania is member country of EU since 2007. Fisheries have traditionally been managed by direct restrictions, including seasonal and area closures, minimum mesh size, and access limitations. In recent years, licensing and individual quota system were introduced as effort-control measures, in order to bring fishing effort more in line with the available resources. Licenses relate to a specific group of species or gear type, and usually delimit the fishing area. Ministry of Agriculture, Forests and Rural Development (MAFRD) is responsible for fisheries

policy in Romania through Directorate of Fisheries (DoF). Fisheries resources management is carried out by several institutions, under MAFRD coordination.
Enforcement in the Romanian fisheries is carried out by the Fishery Inspectorate (under MAFRD, which has 10 branches countrywide (Law no. 192/2001). Fishing activities are managed by different authorities according to their management areas. Quota allocations have primarily been based on historical catch rates, but now being allocated within the limit of the Total Allowable Catch (TAC), based on research studies. All commercial fishing vessels have to be recorded in the Fishing Vessel Register as a first condition for obtaining a fishing license and quotas.
Fishery and protection of the sturgeon stocks is based on fishing quotas and TAC approved by the Romanian Academy, as the highest scientific authority and guided by the Convention on International Trade in Endangered Species (CITES).
Marine fishing is based on fishing licenses issued by the National Company of Fisheries Resources Management (NCFRM).
In the coastal fisheries, the precautionary principle is applied by forbidden fishing activity by trawlers within the area of the Danube delta and in less than 20 m depth for the rest of the coast. The current enforcement system is mainly based on logbooks, landing declarations, and compulsory first-sale notes of the landings, with penalties for violations of the rules.
Fishery, by itself, receives no direct subsidies from the state, but there are some exemptions from VAT and excise taxes for fuel used by the fishing fleet in the Black Sea.

Bulgaria

The Bulgarian landings dropped from 19.500 tons in 1981 to less than 3000 tons in 1992. In the last 20 year a partial recovery occurred up to 5.600-7.700 tons in 2006-08 (see Fig. 3).
The Bulgarian fishing fleet was state owned before 1989. To meet domestic demand, the Bulgarian national fleet significantly over-fished the Black Sea, and the main stocks dramatically declined also due to pollution and invasive species. Privatization of the fishing fleet started in 1989 has caused a decline in the total catch from the Black Sea (Prodanov *et al.* 1997). Private companies became fully functional by 1999 allowing an increases of the national catch (Duzgunes and Erdogan, 2008).

The Bulgarian fisheries have been reviewed by the STECF (2010) on the basis of the EU-DCR data. In 2008 the Bulgarian fishing fleet consisted of 2,546 registered vessels, with a combined registered tonnage of 8,231 GT, a total power of 65,511 kW and an average age of 15 years. The 2008 landing was 7700 tons of fish (mostly sprat and Mediterranean horse mackerel) and mollusks caught in 11500 fishing days.
According to Radu *et al.* (2010) only 716 vessels were active (28% of the total fleet) in 2008. The composition of this fleet by length class and fishing gear is showed in table 8 (Radu *et al.*, 2010). The main segment is made up of vessels of 6-12 m (n=1548) using mainly passive gears. There were 24 pelagic trawlers, of which 11 of length class between 24-40 m. These data are not completely in line with data submitted to Task 1, particularly for the estimated number of pelagic trawlers (Task1: 56 vessels, see Annex 1).

		<6 m	6 -12 m	12-18 m	18-24 m	24-40 m
Total vessels registered		**842**	**1598**	**68**	**27**	**12**
Active vessels		**213**	**434**	**45**	**13**	**11**
Using 'Active' gears	Pelagic trawlers		3	8	2	11
	Vessels using other gears*	22	115	17	4	
Using 'Passive' gears	Vessels using hooks	14	23	2		
	Drift and/or fixed netters	166	224	8	1	
	Vessels using pots and/or traps	3	33	1		
	Vessels using other passive gears		1			
	Vessels using polyvalent 'passive' gears only	2	10			
Using Polyvalent gears	Vessels using active and passive gears	6	25	9	6	

Table 8. Segmentation of the Bulgarian fishing fleet in 2008 (from Radu *et al.*, 2010)

The GFCM Task 1 data reported in Annex 1 indicated that in 2008 most of the fleet was represented by polyvalent small-scale vessels either with engine (461 units) or without engine (69) which used mainly gillnets and entangling nets to target turbot. Another fleet of 46 polyvalent vessels longer than 12 m exploit mainly turbot. Pelagic trawlers are 51, mainly fishing sprat.

According to STECF (2010), the total number employed in the Bulgarian fleet in 2008 was 1.802 crewmembers. The total amount of income generated by the Bulgarian fishing fleet in 2008 was around 4,3 million euros. This consisted of 3,2 million in landings values (74% of total income) and 1,1 million in non-fishing income (26% of total income). The total amount of expenditure by the Bulgarian fishing fleet was around 3,5 million euros in 2008, of which 1.4 million euros were due to fuel costs (32% of income).
Turbot is the most commercially important species for Bulgaria with a high market demand. The greater part of the Bulgarian catches is exported, mainly to Turkey.

The processing industry is relevant in Bulgaria with 26 working plants and 2.230 employees involved. The processing of *Rapana venosa* has become a significant activity, with six active companies receiving live *Rapana* directly from fishermen. Most of the product is exported to Japan. (information retrieved from www.eurofish.dk).

Fisheries Management

Bulgaria is member country of EU since 2007. Various management strategies have been formulated to control fishing effort and promote rehabilitation and conservation of aquatic resources and ecosystems. These measures include:

- *Direct limitation of fishing effort* through licensing of fishing gear and fishing vessels. Licenses are valid from 1 April to 31 March.
- *Controls on size and power of fishing vessels*.
- *Registration of fishers.* This programme controls entry of new individuals into the fishing industry. Every fisher is required to be registered and anybody working, living or staying on a fishing vessel must have a fisher's registration card.
- *Closed seasons* to ensure reproduction and survival of juveniles of commercially important fish species.
- *Closed fishing areas*. These are indirectly applied through close seasons and prohibition of bottom trawling and dredging.
- *Management zones*. Two fishing zones have been established through a licensing scheme. The two management zones attempt to provide equitable allocation of resources and reduce conflict between traditional and commercial fishermen. Basically, the two zones are: Fishing Zone 1, from shoreline out to 3 nautical miles. Fishing Zone 2, from the outer limit of the first fishing zone to the EEZ limit.
- *Establishment of artificial reefs* (outside mussel installations) is one of the measures considered for the rehabilitation of marine resources along the continental shelf.
- *Restocking of the Danube and the inland water bodies* with sturgeon and cyprinid juveniles has been developing since 1998.

Under the Fisheries and Aquaculture Act (promulgated SG No. 41/20.04.2001) fishing gears destructive to the environment and fisheries resources are banned. Banned gears includes explosives; poisons and narcotics; electrical fishing; bottom trawls; dredges; firearms; and harpoons (prohibited solely in freshwater basins) (FAO, 2010).

Turkey

A fleet profile of the Black Sea Turkish fishing fleet is provided by Saglam and Duzgunes (2010). In 2007 there were 6.631 vessels operating in the Black Sea of which 137 trawlers, 164 purse seiners, 309 purse seiners-trawlers, 117 carrier vessels and 5.904 small-scale vessels. The number of vessels over 20 m length were 404 with an average Gross Tonnage (GT) and horse power (Kw) of 160±16.2 and 495±23.0 respectively. Some of the bigger purse seiners (approximately 85 vessels) targeting pelagic species like anchovy, pilchards, sprat, bonito and blue fish often move in May to June in the Mediterranean to catch blue fin tuna. The composition of fishing activities conducted by the vessels over 10 m length is shown in table 9.

According to 2008 data submitted to the GFCM task 1 the total fleet in the Black Sea is made up by 5.884 vessels of which 4.681 are small-scale vessels of less than 12 m

length, 1.240 are dredgers over 6 m length, 500 and 460 are respectively purse seiners and trawlers over 12 m. The polyvalent vessels are 223 (see Annex 1).

The Turkish fleet, also in the Black Sea, experienced two main growth periods. The first was at the beginning of the 1970s and the second from 1990 to 1994. The first growth was generated right after the establishment of the first fisheries law which led to the release of new governmental subsidies for the construction of new ships, fishing gears, fish finders, navigation instruments. The second growth between 1990 and 1994 was created by similar drivers, including governmental subsidies for fish food processing plants. The increase in the capacity of the processing units created a huge increase in the demand from the capture fisheries (Saglan and Duzgunes, 2010). Turkish fisheries were therefore affected in a lesser extent by the collapse of small pelagics stocks respect to the northern Black Sea fisheries (see fig. 3).

After 2000 subsidized fishery credits have not been a driver for fishing pressure (Knudsen *et al.*, 2010). Since March 2002 it has not been possible to obtain new licenses, but there is no regulation restricting the number of licenses in individual provinces or fisheries. Enlargement of existing boats (up to 20% every second year) was however accepted as well as to construct new boats under the license of older boats that discontinue fishing. Although the stated aim has been to freeze catch capacity, loopholes, amnesties, the right to enlarge boats has instead led to a substantial increase in catch effort (Knudsen *et al.*, 2010).

Fishing type	Black sea	
	#	%
Purse seining	737	17.11
Trawling	717	16.65
Dredging	63	1.47
Beach seining	6	0.14
Gill netting	203	4.72
Long lining	8	0.18
Undefined	3	0.07
Total	1737	40.34

Table 9. Fishing activities of vessels longer than 10 m in 2007 (from Saglam and Duzgunes, 2010).

In the period 2006-2008 the Turkish fleet operating in the Black Sea landed 300-500 thousand tons (see Fig. 3) made up mostly by anchovy, followed by sprat and Mediterranean horse mackerel.
This landing contributed in a large proportion to the global value of capture fish production in Turkey which was about 764 million € in 2007. Recently export of sea food (18953 tons) provided over 89 million €.

Fisheries management
Management of fisheries in Turkey is under the jurisdiction of the MARA (the Ministry of Agriculture and Rural Affairs) which is responsible for the formulation of fisheries regulations and development programs (Duzgunes & Erdogan, 2008).

The Fisheries Law, enacted in 1971, is under amendments. Biannual circulars specify rules and regulations that apply to fishing in Turkey (General Directorate of Protection and Control, MARA). Licenses are required for all fishing boats and fishers.
At present, there is no Total Allowable Catch (TAC) or quota system in Turkey due to lack of fish stock assessments. Fleet registry, licensing and VMS (over 24 m vessels) has already been completed.
According to the Fisheries Law of 1971 and 1986, licensing both fishermen and their vessels has become compulsory. During the fishing season fishermen can fish in all waters any species by any amount with fewer exceptions as closed areas and gear type in the specific areas which are identified in the annual circular. Fishing regulation is based on the following criteria (Duzgunes & Erdogan, 2008):

- Minimum mesh size (i.e. trawl net 20 mm in the Black Sea),
- Minimum fish size (length (cm) and/or weight (g),
- Closed area and terms for specified gears and/or vessels,
- Closed season and area,
- Species under full conservation (dolphin, seal, salmon, sea turtle, sponge, corals and sturgeons),
- Completely banned fishing methods and fishing gears,
- Gear restriction for identified species,
- Gear or fishing method restrictions,
- Some restrictions concerning pollutants.

Seasonal prohibition protects spawning stocks as it bans the use of trawl and purse seines between May and September. Zone restriction refers to the law against fishing within three miles from the coastline.

Georgia

In 2006 FAO provided technical assistance to the Government of Georgia in the field of sustainable development and management of the fishery and aquaculture sector in the country. A document reviewing the actual status of fisheries resources and their utilization was provided in the framework of this assistance (Khavtasi *et al.* 2010). The lack of recovering of fisheries and catch after the collapse occurred in 1980s was due to the almost complete disappearance of the fleet after the restoring of independence in 1991. The marine fishing fleet virtually disappeared, and catches sharply decreased. As a result, marine resources are neither fully nor properly exploited with also consequences for fish consumption which dropped down to an average of 3,8 kg per capita each year from the 19 kg per capita consumed yearly before the independence.

In the early 1990s most of the marine fishing vessels were sold to Ukraine and even the remaining vessels could not be operated properly because of the lack of gears, equipment and fuel. Therefore, the yearly catches dropped from about 60.000 tons to about 1.400 tons by the late 1990s. In the 2000s the catch increased but this was almost entirely owing to the large anchovy fishery of Turkey (Khavtasi *et al.* 2010). In 2005, the marine fleet of Georgia consisted of 36 seiners with a power ranging between 110 and 225 HP using purse-seine and trawl nets to catch anchovy. The

small-scale fleet was made up of 342 coastal vessels using mainly seine nets, gillnets and longlines. The two main fishing ports are Poti and Batumi.
The total annual quota for pelagic fish was declared as 60,000 tons by the Georgian authorities in 2007.
At present 14 Georgian enterprises are permitted to hire a fixed number of foreign fishing ships with no restriction on vessel size to help catch the yearly quota. As a result, in 2009 some 20 large Turkish seiners supported by 20 Turkish catch transport ships were fishing for the Georgian license holders. The total amount of Turkish anchovy catch in the Georgian waters between 2003 and 2009 was estimated at about 61,000 tons (fig. 5; Özturk *et al.*, 2011). There are, however, discrepancies with catch estimates provided by Khavtasi *et al.* (2010). These authors estimates that the CPUE of a Turkish seiner fishing in Georgian waters is about 300-500 tons of anchovy per day, more than 100 times higher than the daily catch of a small Georgian trawler (3–4 tons per day). The anchovy season begins in mid-November and lasts until 1 April, but the Turkish seiners might start fishing in Georgian waters only on 1 January.

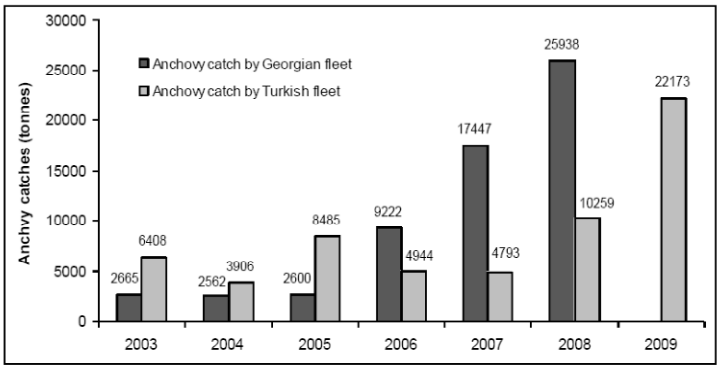


Fig. 5. The anchovy catch by Georgian fleet from 2003 to 2008 and Turkish fleet from 2003 to 2009 (from Öztürk et al., 2011)

Fisheries Management

The Ministry of Agriculture (MoA) is preparing a Master Plan for Fishery Sector Development in Georgia, 2005-2020, in collaboration with other relevant ministries and fishery sector stakeholders such as fishers' associations, research institutes and fishing companies. The Ministry of Environment Protection and Natural Resources (MEPNR), through the Fishery Branch of its Department of Biodiversity, has the responsibility for the conservation of fisheries resources and the ecosystems.

Fisheries have not been recognized as priority sector in the current governmental Economic Development and Poverty Reduction Program which provides an established overall framework of national economic policy (Duzgunes and Erdogan, 2008). The state Department of Statistics is responsible for gathering, analyzing and publishing fishery sector data. There are several collection programs for fishery data, involving the Department of Statistics, the Ministry of Environment Protection and National Resources, and the Department of Fisheries of the Ministry of Agriculture.
Data collection for estimating fishing effort did not use sampling techniques. Basic variables such as production by species and prices were obtained directly from the landings of licensed fishing units and/or from market research. Information gaps appeared to exist in the small-scale fishing units sector. Production was usually

reported for the species included in the license. Transboarding of fish and seasonal migration of fishing units seem to constitute two possible factors for unreported catch. A third factor concerns fishing activities that take place using beach seines and other methods that do not use a registered or licensed fishing craft (Duzgunes and Erdogan, 2008).

Russian Federation

Knudsen and Toje (2008) revised the post-Soviet transformation of the Russian and Ukraine fisheries. Black Sea coastal fisheries are traditionally based on a distinction between two different catching techniques:

- Middle–size vessels (25–30 m) working out at sea with active gear, mainly purse seine and trawl;
- Coastal brigades, usually belonging to cooperatives, consisting of groups of fishermen with permanent bases along the Black Sea coast. They use small boats (4–5 m) and work with passive fishing gear, particularly fishing weirs ('stavniki').

The breakdown of the Soviet system caused the disruption of the state support to the fishing sector. At the same time, the capacity of monitoring and manage resource exploitation was undermined making it difficult to obtain an overview of the sector through official statistics. The decrease in catches seen may in fact reflect a decrease in the official registration of catch, rather than a decrease in fishing (Knudsen and Toje, 2008). Between 1991 and 2002, the registered catch in Russia declined by 52.5%, from 6.93 million to 3,29 million tons. In the Russian exclusive economic zone (EEZ), including the Black Sea, the catch decreased by 58.5%.

Even considering an underestimation of the catch the reduction in official catch from about 200-250 thousand tons in 1980s to the current 15.000-30.000 tons clearly reflects a strong reduction of the fishing effort of the Russian fleet in the Black Sea. After the privatization in 1992 most of the private enterprises have not been able to support maintenance or technological and infrastructure investments. In the transition period, many of the fishing boats were used for other purposes. Now there is a lack of vessels and the fishing fleet is characterized by technological stagnation and lack of maintenance (Knudsen and Toje, 2008).

Fisheries management

In Russian Federation, the Federal Law "On Fishery and Protection of Aquatic Biological Resources" (2004) and the Federal Law "On Environmental Protection" (2002) ensure the conservation of living resources and its sustainable use and protection of the Black Sea as a whole. There are no special management plans for the Black Sea in Russia, however, the Russian coast is free of seriously polluting land-based sources, the designation of protected areas is advanced and environment safety aspects of human activities are well recognized and paid attention[5]

The Law "On Fishery and Protection of Aquatic Biological Resources" of December 2004 requires setting Total Allowable Catch (TAC) levels for fishery stocks, and defines it as "scientifically justified annual catch of aquatic biological resources of

[5] BSC, 2010. From Black Sea regional programs and fishery management. CREAM kick-off meeting, 23-26 May, FAO, Rome

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

management is a **must**. It is now time to accept this position unconditionally. If any of the modern management and assessment tools are to be applied for regional management (i.e.: EAF), the desk availability of concerned data must be available a-priori. If indispensable information at regional level is not available for some countries or data for some thematic areas are missing , or they are not compatible and comparable with information from the all the other countries (on a space-time-unit basis) setting up any regional plan for fishery management becomes both an enormous effort and a risk.
In this context, by regional fishery information system, is intended a sort of "Data warehouse" where each of its interrelated components (databases, tables, data coding and definitions, etc.) dealing with the main data required for a sound regional fishery management are stored, processed and made available. In these few lines we want to stress the need for planners, administrators and scientists to operate not only with data from all participating countries covering the main data requirements but also be sure that they are presented over a common space/time grid and at a certain (proved) level of precision. We think that this can be achieved only through an ongoing national exercise regionally coordinated with full participation of all the countries and for all the thematic data concerned.

As far as a typical regional information system is concerned, this should contain infrastructural data, fishing fleet statistics (fishing vessel register), catch and effort statistics, associated to ecological, biological, economic data, etc.
Setting up a regional statistical and information system based on national systems is not a standard routine and it is not recommended to "copy" or "replicate" what has been produced for other situations. It should mostly depend on a national/regional assessment, country by country and by area of interest. In the preparation for this meeting, the GFCM has prepared a set of questionnaires (See Annexes 3 and 4) to assess the present situation (in a general way) of the Black Sea countries in the field of fishery infrastructures, fleet, and catch and effort statistics. A small test has also been conducted by sending the questionnaires to some officials in the region. Items of information considered in the questionnaires vary from technical and non- technical issues, from the availability of resources to the level of each country in technical and technological areas, from theoretical to practical experience, etc. Participants are kindly requested to prepare, prior to the meeting in Constanta, comments on the questionnaires (if any) as well as answers to complete them.
The purpose of this exercise is to study and jointly propose, if this is the case, a structure for a sub-regional information system for the Black Sea and a road-map to achieve it, in a situation where:

As far as the statistical and data processing eventually required in the Sub-Region is important to report that the GFCM is co-author of all the statistical material produced under the FAO/EC MEDFISIS project which is assembled in the MedStat System. As MedStat is being implemented through FAO Mediterranean projects and the GFCM, it will help countries develop their national fishery statistical systems in a coordinated and regionally compatible way, and at the same time enable them to better manage the sustainable development of their fisheries. In parallel with this, the implementation of MedStat will create a compatible regional system at the GFCM level which will serve as an important tool for international bodies to monitor

the state of their fisheries resources and the well-being of the whole ecosystem in the Mediterranean.

MedStat consists of a set of databases and associated statistical data collection and implementation methodologies, techniques, and procedures, including training and technical support covering the Fleet Census, the Catch and Effort Survey and other surveys and tools targeting monitoring and management issues. It has modular and made-to-measure components to enable each country to progress according to its priorities and available resources and, at the same time, to ensure that each step is achieved and established before a new step is initiated so as not to jeopardy work already done.

MedStat focuses on the whole national statistical organisation and concerns a set of databases which follow a tailored statistical design, and procedures to cover the main fishery surveys.

- The GFCM has already the backbone of a Regional system and has developed part of it in full collaboration with FAO and the EC (GFCM TASK 1)
- The GFCM has the opportunity to implement the whole MedStat national systems duly customized for any of the Black Sea countries and possess adequate skill and resources
- Three countries of the Black Sea are member of the GFCM (Romania, Bulgaria and Turkey) and have to follow GFCM requirements.
- Two of them are also members of the EU and have to follow the common fishery policy (CFP) of the of the EU.
- The three other countries may or may not be members of sovereign national organizations.
- All the six countries are members of FAO.
- An unbalanced situation from the data collection viewpoint as well as from the technical and technological side may exist between some countries.
- An eventual request for technical support to the GFCM is therefore unknown and cannot be estimated or planned.
- Moreover, it is not known whether the whole basic data requirement for a regional information system, nor its completeness and consistency, are available in all countries at the same level.

STATUS OF THE MAIN COMMERCIAL STOCKS

A summary of events in Black Sea fisheries and ecosystem until the 1980' early 1990's can be found in several issues of the GFCM Studies and Reviews:
- Ivanov and Beverton (1985)
- GFCM (1993)
- Caddy and Griffiths (1990)
- Zaitsev (1993)

Prodanov *et al.* (1997) provided an assessment of the main Black Sea stocks for the period 1979-1991, including a review of the knowledge on the biology and ecology of the species, the fisheries and the catches.

Caddy (2006), considering the need to take into account both impacts of fishing and environmental/ecosystem change, proposed the use of indicators and reference points in active management of Black Sea fisheries. Two main indicators were suggested to this aim:
a) rate of decline (e.g. in biomass and catch);
b) extent of decline from a benchmark or "baseline period" (presumably when the ecosystem was in a "safe" condition). In both cases, critical values for extent and rate of decline could be used to establish reference points that trigger stock restoration.
A review of possible approaches to setting RPs and indicators for Black Sea fisheries emphasizes the dynamic nature of recent ecosystem change. This means that models using steady state assumptions may not be appropriate, and an empirical approach to defining indicators is explored. The traffic light approach is suggested as a means of following dynamic changes and gaining abroad perspective on events at the ecosystem level.

Recently, Shlyakhov and Daskalov (2008) summarized the status of exploited stocks in the Black Sea until 2005 (Table 11) using the Caddy's method. Authors suggest a general recovering of exploited resources in 2000-05 with respect to the collapse period (1989 - 1992) but the overall situation is still inferior when compared with the baseline state (1970 - 1988). They suggest that the highly variable stock dynamics and the lack of effective control measures for the fisheries quite likely may lead to sharp stock declines in the future. In order to avoid this risk and to achieve sustainable development of fisheries in the Black Sea, implementation of a regional fisheries management strategy is considered necessary.

The FOMLR AG of the BSC through the *Diagnostic Report to guide improvements to the regular reporting process on the state of the Black Sea environment* (BSC, 2010) reviewed the suitability of BSIS data for calculation of a set of fisheries indicators.

The participation of Black Sea scientists to the stock assessment working groups of the GFCM was rather limited and any formal assessments was presented during the GFCM stock assessment working groups.

Category/ Species	Baseline (1970-1988)		"Collapse years" (1989-1992)		"Post-collapse" years (1993-2005)	Present decade (2000 - 2005)			
	Trend	Average tons/year	Trend	Average tons/year	Trend	Trend	Average tons/year	Landings as % of baseline	Landings as % of "collapse years
Resident pelagic species									
Anchovy	+	341060	-	131100	0	-	280757	82%	214%
Horse mackerel	+	52684	-	50048	0	-	13323	25%	27%
Sprat	+	40042	-	49412	+	0	60537	151%	123%
Migrants									
Bluefish	+	8250	-	6501	+	+	10120	123%	156%
Bonito	0	8303	+	9275	+	+	16137	194%	174%
Demersal									
Turbot	-	2807	-	1045	-	-	1250	45%	120%
Whiting	+	13737	-	20059	-	-	9091	66%	45%
Spiny dogfish	+	4633	-	3684	-	-	1132	24%	31%
Барабули	-	1119	+	1198	-	-	1770	158%	148%
Mullets (Mugilidae)	0	2401	+	2765	-	-	6538	272%	236%
Rapana	N/A	N/A	-	5918	+	+	9832	122% of 1993-2005	166% 166%
Ratio (trends)	6/3		3/8		4/5	3/7			
+ve/-ve	=2.00		=0.38		=0,80	=0.43			

Table 11. Indicators for the fisheries in the Black Sea for 1970-2005 (Caddy's method).

Results of stock assessments done by the STECF Working group on the Black Sea

Following the accession of Bulgaria and Romania to the European Union, the Community has taken over the responsibility to ensure sustainable exploitation of fish stocks in the Black Sea. With a view to start implementing, at Community level, adequate management measures for important fisheries in the Black Sea Community Waters the Commission was seeking scientific advice on sprat and turbot stocks on the basis of relevant regimes already operating in Bulgaria and Romania.

To this end an ad-hoc Working Group on sustainable exploitation of sprat and turbot in the Black Sea was convened under the Chairmanship of Dr. Georgi. M. Daskalov in Constanta, Romania 10-14 September, 2007 (European Commission, 2007).

The *ad-hoc* WG agreed to establish a permanent and operational sub-group on Fisheries Assessment and Management in the Black Sea under the auspices of the STECF (Scientific, Technical and Economic Committee for Fisheries).

The European Union adopted for the first time in 2008 and then for subsequent years catch limitations and associated technical measures for sprat and turbot fisheries in the Romanian and Bulgarian Black Sea waters. Those measures were adopted in the light of scientific advice provided by STECF Black Sea Working Group.

The stocks assessed within the STECF sub-group were sprat, turbot, anchovy, whiting, horse mackerel, piked dogfish and rapa whelk. Of these, in 2011 were considered acceptable those accomplished for sprat, turbot, anchovy and whiting. The assessment for sprat, anchovy and whiting were considered sufficiently reliable to form the basis of catch forecasts assuming a range of management options, whereas the assessment results for turbot were considered to be indicative of relative changes and could not be used as a basis for catch forecasts (STECF, 2011).

Data used

The Black Sea subgroup pointed out that the fisheries data used for the assessment are affected by deficiencies resulting by either lack of standardization or consistent methodology to raise national landings and/or discards to derive reliable international estimates (STECF, 2011).
Also the fishery independent scientific surveys to monitor the living resources in the Black Sea are either lacking or very limited in area coverage and cover short periods only. This generally increases the uncertainty in the recent parameters of the stock assessments and the short term predictions of stock size and catch. Accordingly STECF suggests that steps should be taken to establish internationally coordinated fishery independent scientific surveys to monitor the living resources across all national waters of the Black Sea.

Small pelagic species

Anchovy
Engraulis encrasicolus (Linnaeus, 1758)

The Black Sea anchovy is considered one shared stock of the European anchovy, *Engraulis encrasicolus* even though other authors consider it a distinct subspecies (Prodanov *et al.*, 1997). The Black Sea anchovy is the most important commercial stock in the basin considering the amount and the value of annual landing. It supports the largest commercial fishery in the Black Sea. From an ecological point of view, anchovy play a key role for the Black Sea trophic web as being one of the main consumers of zooplankton, thus also competing with other planktivores, and for its role of important prey species for piscivorous predators (Daskalov *et al.*, 2007).

The Black Sea anchovy is distributed over the whole Black Sea (Chashchin, 1996). In October - November, it migrates to the wintering grounds along the Anatolian and Caucasian coasts and forms dense wintering concentrations until March and becomes subject to intensive commercial fishery. It occupies its usual spawning and feeding habitats in the rest of the year with preferentially in the shelf areas including the north western part of the sea being the largest and most productive shelf (Shlyakhov and Daskalov, 2008).
On this account, there has been extensive interest in this fish and appreciable effort was devoted to studying its biology, ecology and exploitation parameters. A review can be found in Prodanov *et al.*, (1997).

Anchovy is mostly exploited by the commercial purse-seines fishery, first of all from Turkey which is responsible of more than 97% of total Black sea catch. The catch of the Black Sea countries increased until 1984 up to 566.000 tons, remained at high level until 1988 (526.000 tons) to abruptly drop to 86.000 tons in 1988. From 1995 to 2010 the catch ranged with wide oscillations from year to year in the range 135.000-400.000 tons (Fig. 6). Such fast fluctuations in catch could be attributed to change in the target species of the Turkish purse seiners, increasing of predators (e.g. bonito) and climate effects, other than overfishing. In 2010, total Black Sea catch has reached to 208.192 tons and the major part is harvested by Turkey as 203.026 tons (STECF, 2011).

During the collapse phase the stock experienced an abrupt decline to less than 300 thousand tons in 1990 that was the lowest level over the period 196 –1993. In this period the stock structure shifted toward a predominance of small, immature individuals and the content was lower by 40-60% than the previous years (Shlyakhov and Daskalov, 2008 and references therein). The main environmental effect on anchovy stock by the end of the 1980s was probably the food competition with and predation by the invasive ctenophore *M. leidyi* (Oguz *et al.*, 2008). *M. leidyi* outburst combined with the excessive fishing rapidly led to the catastrophic reduction of the Black Sea anchovy stock in the late 1980s (Daskalov et al., 2007; Grishin *et al.*, 2007).

Knowler (2005) modelled the population dynamics of the Black Sea anchovy incorporating the effect of *Mnemiopsis* as a structural change in the anchovy stock-recruitment relationship. Then the economic loss associated with this structural change was assessed, using a discrete, dynamic bioeconomic model. The main results indicated that the anchovy stock declined due to the impact of *Mnemiopsis* from 1914 metric tons (Mt) in the pre-*Menemiopsis* period (1971-1986) to 986 Mt in 1987-1993. Similarly the harvest dropped to 40 Mt from about 400 Mt and the estimated sustainable effort decreased from 72 to only 13 vessels.

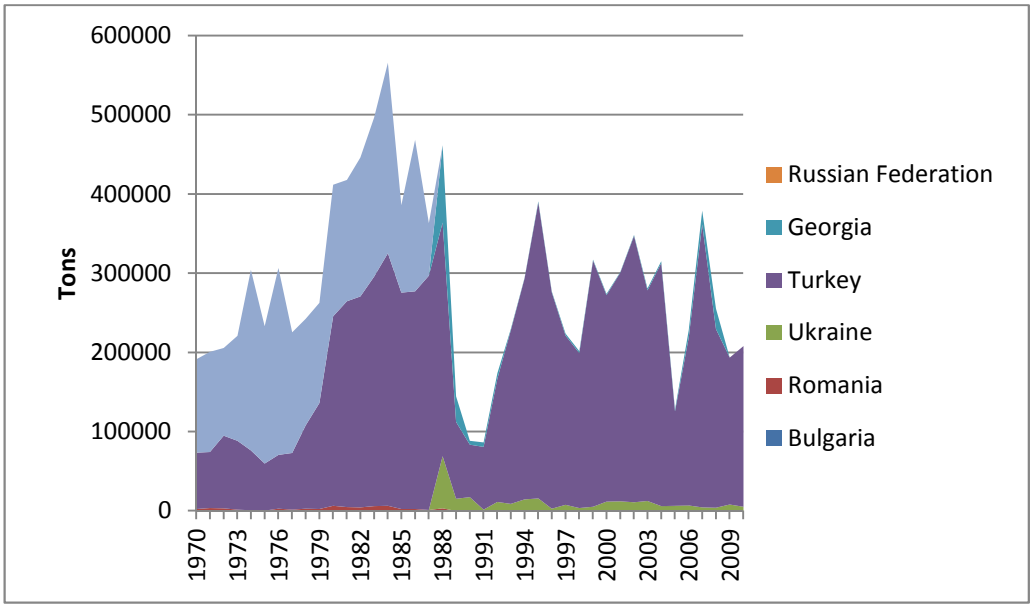


Fig. 6. Anchovy landings of Black sea countries from 1970 to 2010 (from STECF, 2011).

Status of the stock

Prodanov (1997) and Prodanov and Stoyanova (2001) provided VPA estimates of stock biomass and fishing mortality for the period 1967-1994 and 1979-1993 respectively. According to the obtained results, the initial anchovy exploited biomass varied from 1421 (1979) to 314 thousand tons (1992). The comparatively low level of fishing activity from 1968-1977 (mean value of F was 0.2407) and the increase in Black Sea productivity predetermined the increase in anchovy biomass during the period 1979-1983. The mean value of F was 0.7348 during the period 1983-1986 and reached 1.2487 in 1987-1988. F decreased in 1991 and 1992, to 0.3889 and 0.6353, respectively, allowing a recovery of anchovy biomass during the period 1992-1995.

A recent assessment of anchovy stock has been done by STECF-EWG-11-06 (STECF, 2011). An XSA was run on official catch data 2002-2010 and tuned with the CPUE at age derived from the Turkish commercial purse seiner fishery and using a natural mortality at age vector. Following a drastic reduction from 2002 to 2005 in stock size, the SSB is indicated to have remained rather stable around 800.000 tons since 2007. During the period 2002 to 2010 the recruitment has varied without a clear trend, attaining a peak (350 billions) in 2006 (Fig. 7). The status of the stock was assessed adopting as limit reference point an exploitation rate (E=F/Z) of E<0.4 (Patterson, 1992), which is considered consistent with high long term yield and low risk of fisheries collapses. The WG classified the stock as being subject to overfishing as the estimated F_{1-3}=0.62 exceeded such exploitation rate E≤0.4, which equals F_{1-3}=0.41, assuming an M(1-3)=0.62.

The STECF-EWG-11-06 recommended the exploitation of anchovy to be sustainable and the catch in 2012 not to exceed 200 000 tons (STECF, 2011). According to Chashchin (1996) the introduction of catch quotas and measures aimed at avoiding further degradation of the ecosystem (pollution, curtailment of fresh water inflow) is quite evidently necessary.

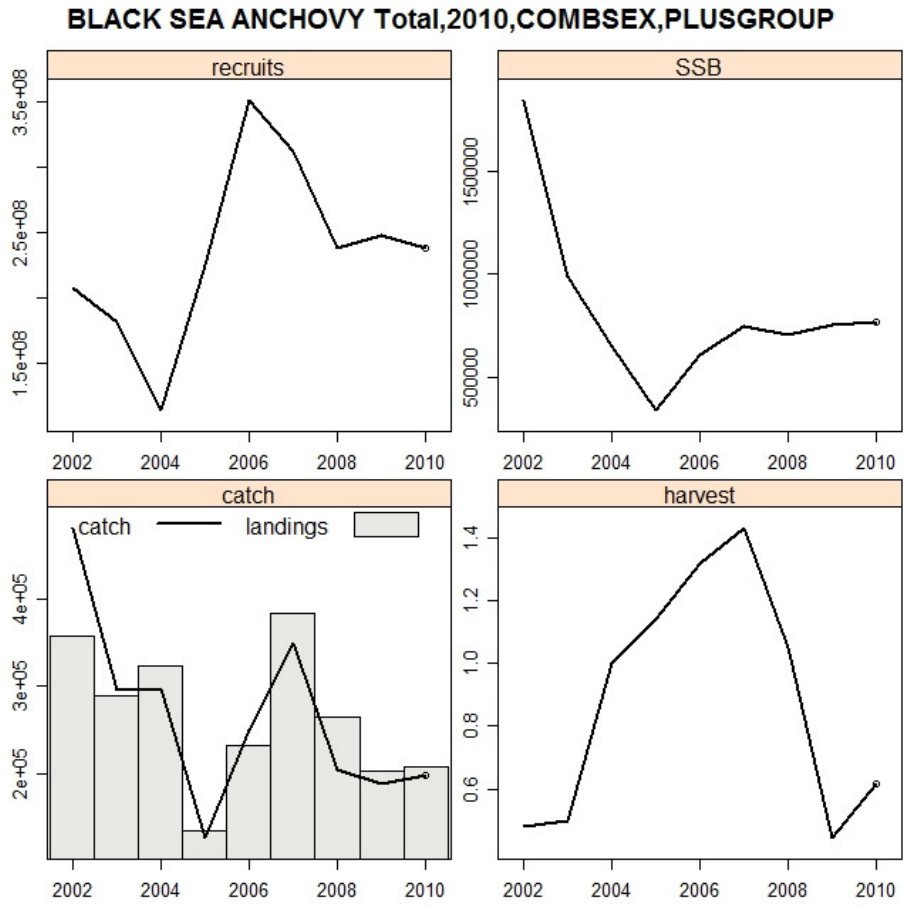


Fig. 7. Trend in recruitment, spawning stock biomass (SSB), catch and fishing mortality (harvest) of the Black Sea anchovy stock from 2002 to 2010.

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.

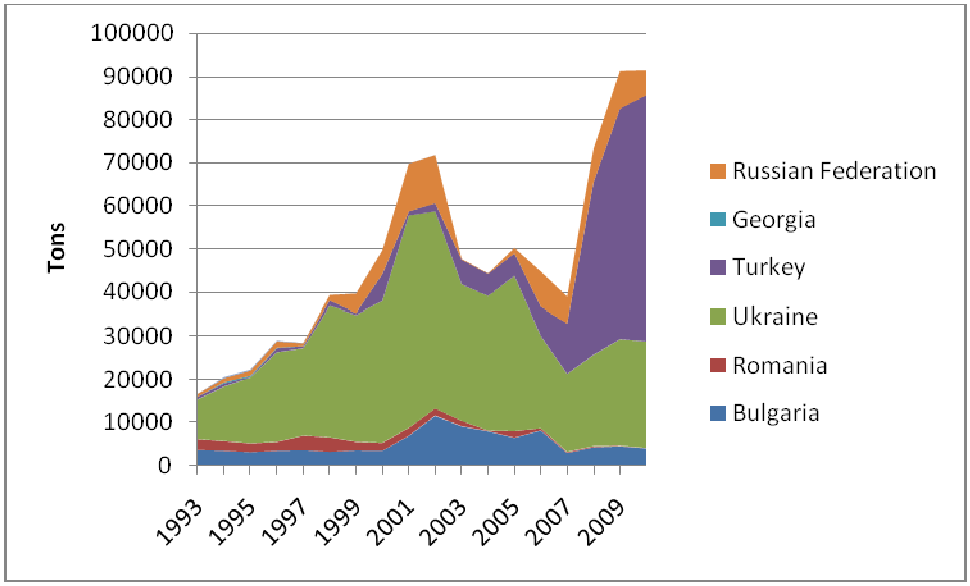


Fig. 8. Sprat landings of Black sea countries from 1993 to 2010 (from STECF, 2011).

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).

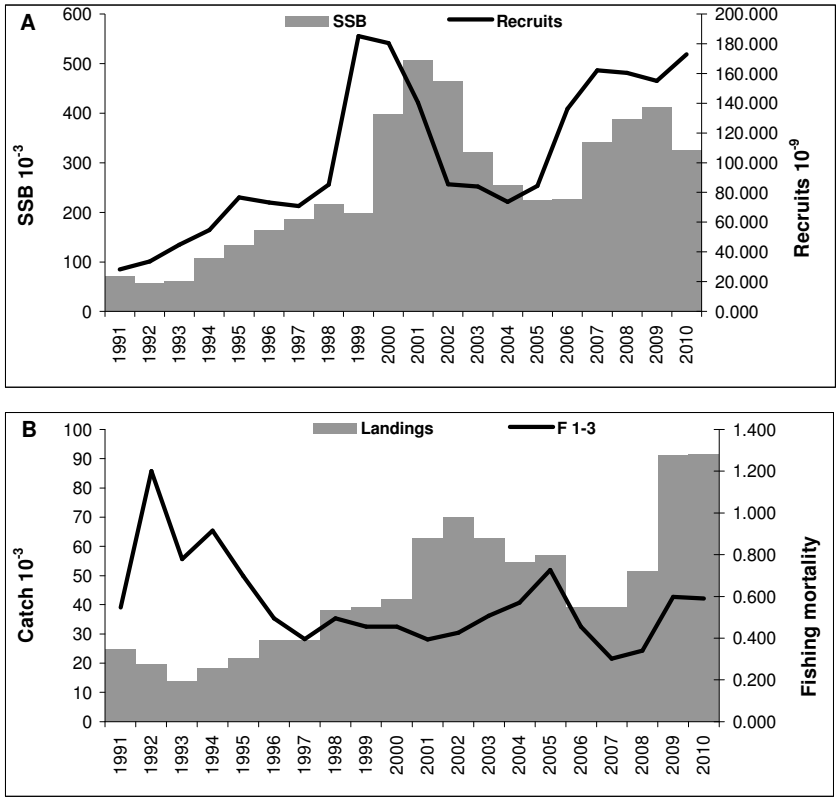


Fig. 9. Time-series of sprat population estimates: A. recruitment (line) and SSB (grey); B. landings (grey) and average fishing mortality (ages 2–4, line) (from STECF 2011).

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.

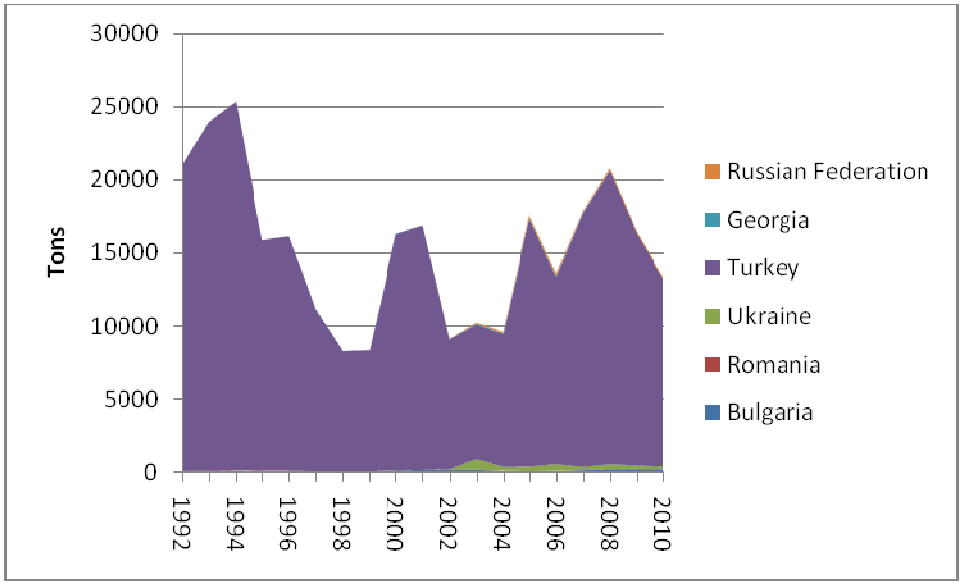


Fig. 10. Horse mackerel landings of Black sea countries from 1993 to 2010 (from STEC, 2011).

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).

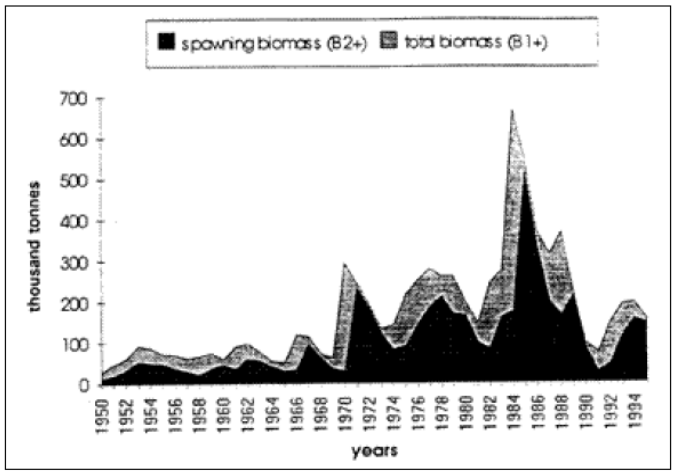


Fig. 11. Estimated spawning stock biomass and total biomass of horse mackerel in the period 1950-1994 (from Prodanov, 1997).

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.

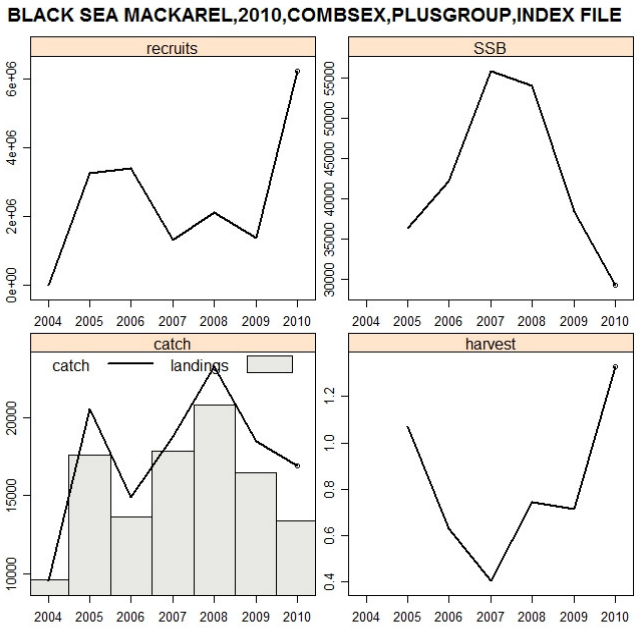


Fig. 12. Trend in recruitment, stock spawning biomass (SSB), landings and fishing mortality of horse mackerel stock in the Black Sea (F =0.8). From STECF (2011).

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.

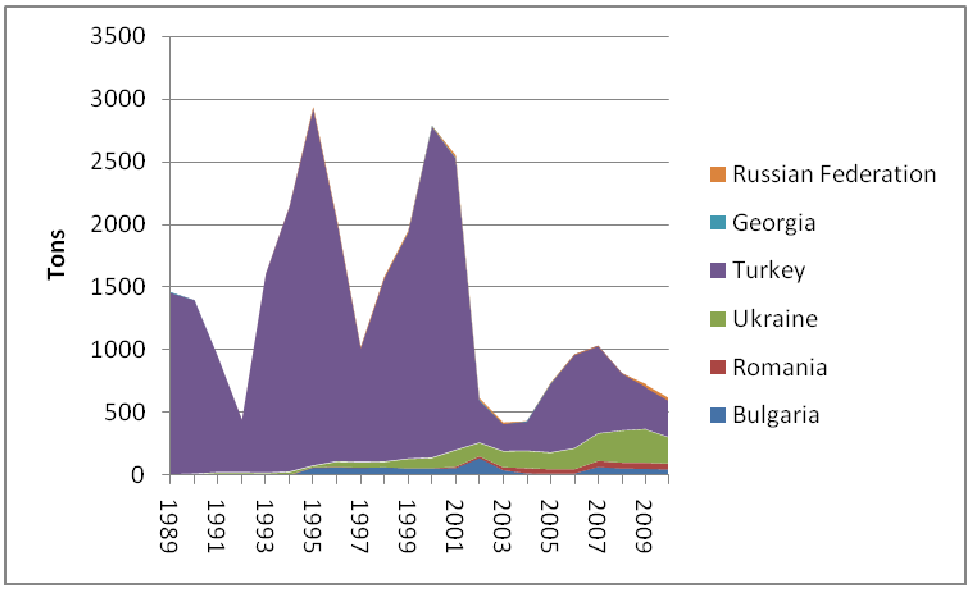


Fig. 13. Turbot landings of Black sea countries from 1989 to 2010 (from STECF, 2011).

Survey data shows that the trends in the biomass index in Bulgaria and Romania have been similar from 2003. A clear and fast decreasing was observed from 2008 to 2010 (Fig. 14).

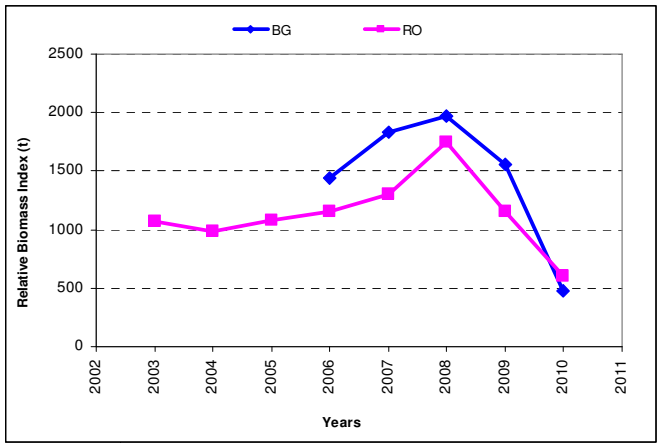


Fig. 14. Biomass indices of turbot obtained during national surveys in Bulgaria and Romania in the period 2003 - 2010.

Status of the stock

An XSA assessment of the stock was recently done by the STECF-EWG-11-16 (STECF, 2011).The data (1970-2010) of total landings, catch at ages, weights and maturity at age were used (Fig. 15). Data from three surveys and one commercial CPUE series were compiled to be used for tuning. Assessment and qualitative assumptions about the illegal and unreported catches of turbot were made to adjust the official statistics. The estimated total catch was about 2.44 times higher than the reported landings on average for 2002-2010.

An average natural mortality (M) of 0.19 was applied in all ages and years. The XSA was tuned with different combinations of the four series of CPUE from Bulgarian, Romanian, Ukrainian and Turkish fleets, ages 2-10+ over the period 1987-2010.

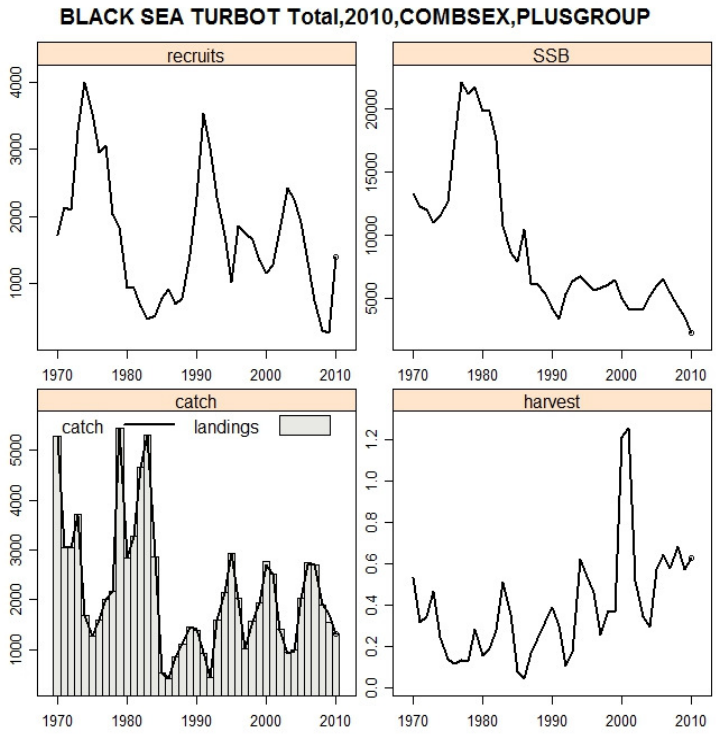


Fig. 15. XSA trend in recruitment, stock spawning biomass (SSB), landings and fishing mortality (F_{4-8}) of turbot stock in the Black Sea, from STECF (2011).

Because of uncertainties about actual catch the STECF EWG Black Sea 11-16 interprets the assessment only in relative terms – i.e. they are considered indicative of trends only. In the absence of precautionary reference points the EWG was unable to fully evaluate the stock size. However, survey indices and the XSA analyses indicated that the stock size is at a historic low levels (Fig. 15).
The recruitment did not show a clear temporal trend notwithstanding very low levels in 2008-09. The STECF EWG 11-16 has proposed F_{msy}=0.18 as limit reference point consistent with high long term yield. Both assessment approaches, with and without estimated illegal catches, result in recent high F in the range of 0.6-0.8.
The EWG classifies therefore the stock of turbot in the Black Sea as being subject to overfishing. The EWG notes that despite the recently low TACs the fishing mortality remains at a level with no signal of reduction (STECF, 2011)

Management measures
The Council Regulation (EU) No 1256/2010 established a TAC of 86.4 tons for Bulgaria and Romania turbot fishery for 2011.
In Bulgaria a minimal mesh size (180 mm) has been established for gillnets, and in 1989-1993 the turbot fishery was closed with a view to promoting the recovery of the

stock along the Bulgarian coast. Currently the ban is valid only for the spawning season (May-June).
In Romania the followings measures are enforced:
No fishing activity for turbot from 15 April to 15 June in the European Community waters of the Black Sea.
The minimum legal mesh size for bottom-set nets used to catch turbot is 400 mm
The minimum landing size for turbot is 45 cm total length.

In Turkey turbot target fishing is conducted with bottom (turbot) gill nets with minimum mesh size 160 – 200 mm (Tonay and Öztürk, 2003) and with bottom trawls with minimum mesh size 40 mm. The minimum admissible landing size in Turkey is 40 cm total length. In Turkey there is no TAC regulation of turbot catches. Seasonal fishing closures in Turkey are: for bottom trawls from 1st September – 15th April and for gillnets – from 1th May up to 30th June.
Trawling is forbidden within three nautical miles from the shore. Since the early 1980s all kinds of trawling is illegal in the region east of the provincial border between Samsun and Ordu (i.e. slightly east of Terme). A small area from Sinop to Gerze is also closed to trawling. These boundaries have been stable since the early 1990s.

In Ukraine, the number of gillnets used for the capture of turbot and ray and stingray should not exceed 7700 units; the gillnet length should not exceed 100 m. - The fishing of turbot with gillnets is permitted from February 1 to October 31 (except the spawning period prohibition in May). The minimum landing size is 35 cm.

Whiting
Merlangius merlangus (Linnaeus, 1758)

The Black Sea whiting is one of the most abundant demersal species. It is considered a shared stock in the region even though, according to Prodanov *et al.*, (1997) whiting from the eastern Black Sea have a growth rate quite different from that in the western half of the basin. It spawns mainly in the cold season producing pelagic juveniles, which inhabit the upper 10-meter water layer for about a year. The adult whiting is cold-living, preferring temperatures 6-10º C. The species occurs all along the shelf and dense commercial concentrations, formed by 1-3 year old fishes in the water of deeper shelf (most often at 60-120 m depths) of Bulgaria, Georgia, Romania, the Russian Federation and Ukraine appear at periods of 4-6 years, following the years of appearance of highly productive year classes (STECF, 2011).

A specialized fishery for this stock exist only in the eastern part of the basin the, while in its western part it is fished primarily as a by-catch of trawl fishery for sprat and by trap nets. For this reason it has always been considered that in the west the species is under a lighter exploitation than in the east. A revision of historical assessments of whiting can be found in Prodanov *et al.* (1997). A specific trawl fishery for this species can be found only in Turkey (STECF, 2011). According to the official statistics the current landing is about 15.000 tons, 99.5% coming from the Turkish fleet (Fig. 16)

Whiting is also an important component of the Black Sea ecosystem, being one of the most important prey of Turbot and picked dogfish (Prodanov *et al.*, 1997).

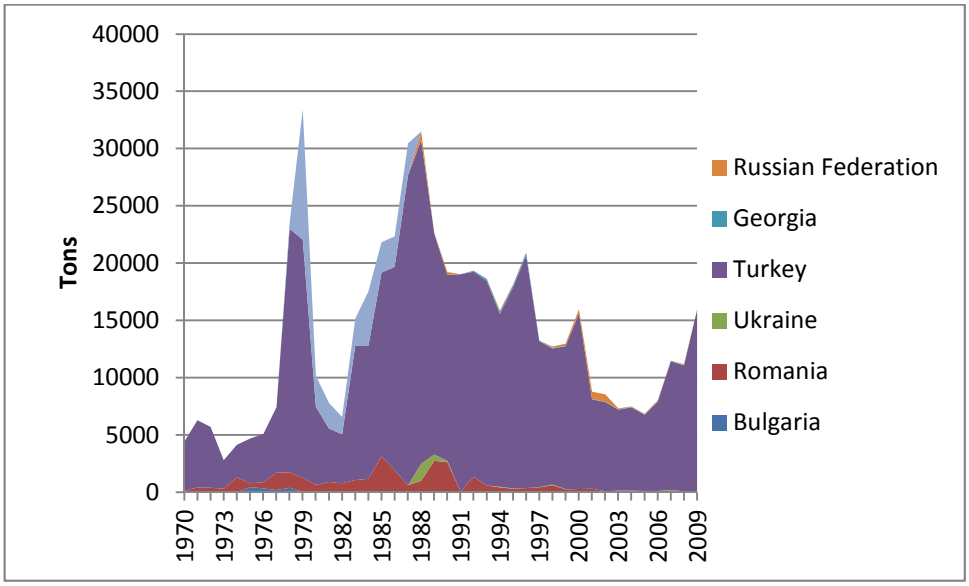


Fig. 16. Whiting landings of Black sea countries from 1993 to 2010 (from STECF, 2011).

Status of the stock

The whiting stock was assessed by Prodanov *et al.* (1997) using data available for the period 1971 – 1993 separately for the «western» and «eastern» parts of the Black Sea Recently, the whiting stock has been assessed by the STECF-EWG-11-16 (STECF, 2011), using official landing data since 1994 to carry out an XSA with trawl survey indices from Bulgaria and Romania, used as tuning data (Fig. 17). These data were complemented with weight, natural mortality and maturity at age data. It is however important to consider that the lack of data on discards, either in quantity or age composition, might impair the reliability of the assessment.

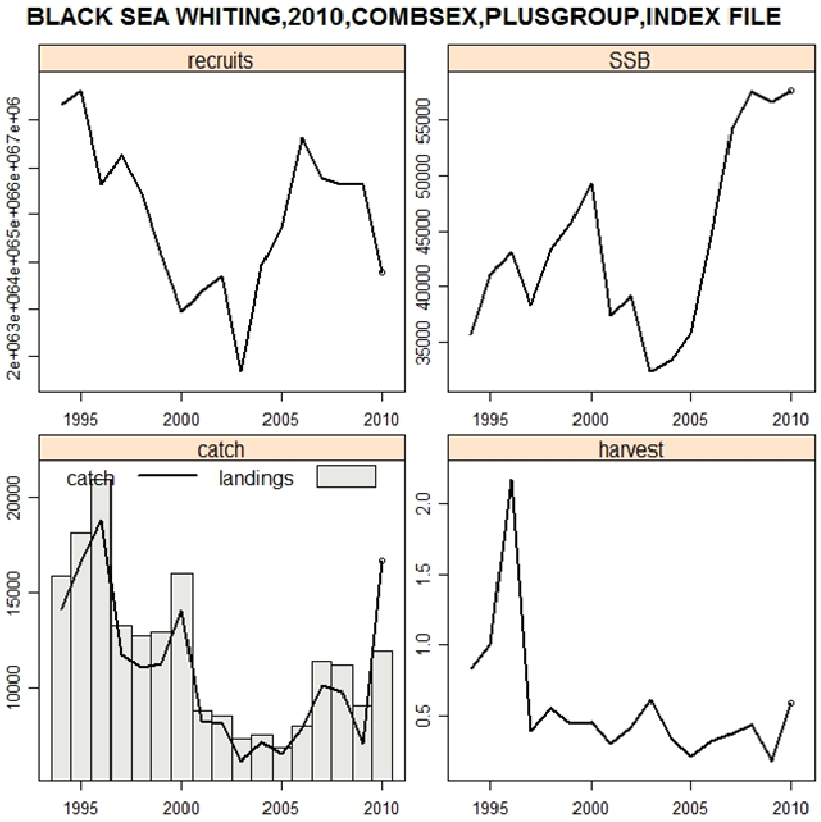


Fig. 17. XSA trend in recruitment, stock spawning biomass (SSB), landings and fishing mortality (F_{4-8}) of whiting stock in the Black Sea, from STECF (2011).

In the last three years (2007-2010) the spawning stock biomass (SSB) achieved the highest levels (56.700-57.700 tons) since 1994. The recruitment has decreased continuously from 1994 to 2003 to increase again in 2004-06. In the last four years a sharp decrease in recruitment was observed (Fig. 17). There is no fishery independent recruitment indices (survey) to confirm this trend, since none of the surveys cover the entire stock area (STECF, 2011).
The STECF-EWG-11-16 proposes $F_{msy}(1\text{-}4)\leq 0.4$ as limit reference point consistent with high long term yields and low risk of fisheries collapse. As the estimated $F_{1\text{-}4}=0.59$ exceeds such reference point the stock was considered as being subject to overfishing. The sub-group recommended a sustainable fishing in 2012 which implies a total catch of 8.500 tons not to be exceeded. Future management actions at regional scale should however consider that the exploitation of this sedentary species is mostly concentrated in the southern part of the basin (Turkish waters), as evident by the distribution of the landings.

Picked dogfish
Squalus acanthias (Linnaeus, 1758)

Piked dogfish is a long-lived viviparous fish distributed in the whole Black Sea shelf. Feeding and reproductive migration have been described (Shlyakhov and Daskalov, 2008). In autumn it accomplish feeding migrations in the wintering grounds of anchovy and horse mackerel in the Crimean, Caucasus and Anatolian coasts.

Spawning migrations of picked dogfish take place in spring and autumn at coastal shallows at 10 - 30 m depths zones. The main spawning grounds have been locate along the Crimean coastal waters.
Picked dogfish is not a target species of fisheries, and it is mostly caught as by-catch in trawl and purse seine operations mainly during their wintering period. The largest catches of picked dogfish are along the coasts of Turkey. In the Ukrainian waters, picked dogfish is mainly harvested in spring and autumn months by target gillnet and longline fisheries (Fig. 18)

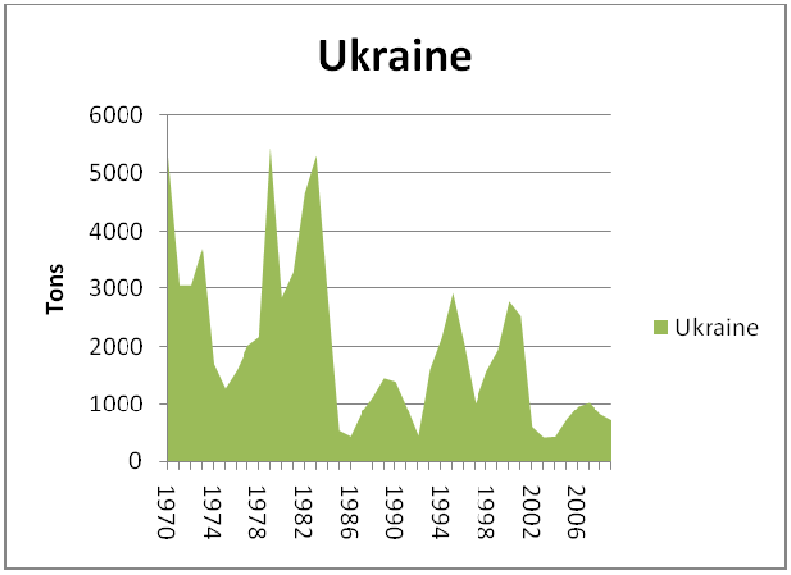


Fig. 18. Picked dogfish landings of Ukraine from 1970 to 2009 (from STECF, 2010).

Status of the stock

A VPA assessment for the whole stock of the picked dogfish in the Black Sea was carried out by Prodanov *et al.* (1997). More recently, Shlyakhov and Charova (2006) assessed the stock using and trawl surveys and mathematical modelling and in 2011 the data available for the assessment have been revised by the STECF- EWG Black Sea 11-16.

According to the assessments of Prodanov *et al.* (1997), the picked dogfish stock increased until 1981 due to increased abundance of their main prey species (whiting, sprat, anchovy and horse mackerel), and then started decreasing due to intensification of the dogfish fishery.
According to Shlyakhov and Daskalov (2008) the role of fisheries in reduction of picked dogfish stock was over-estimated at that time, because the catch was low (3.5-4.0%) compared with the estimated initial population and the mean size of the specimens caught by trawlers increased. The authors believe that the main causes of reduction of picked dogfish stock should therefore be related to the changes in the Black Sea ecosystem due to pollution and subsequent progressive deterioration of reproductive ability of females.

Large pelagic species

According to the ICCAT data bank on catch statistics, it seems that the small tunas are quite important in the Mediterranean Sea and Black Sea, reaching a total production of about 80.000 tons/year.
It is reasonable to estimate that catches of all small tuna species combined in the Mediterranean and in the Black Sea might reach a total of about 150.000 tons in some years, which should result in a quantity much larger than all the other tuna species in the same area (Di Natale *et al.*, 2009). Unfortunately no data are available for the Black Sea, even if it is known that important quantities are fished there (Srour and Di Natale, 2008)
In 2008, the GFCM summarized the available information about the small tuna species in the Mediterranean and Black Sea (Di Natale *et al.*, 2008). The study provides data on their biology and ecology, their exploitation, including the fishery statistics by species, and the socio-economic aspects of these fisheries.
In the seventies severe environmental decay occurred in the Black Sea and since then large migratory species such as bluefin, swordfish and little tunny have disappeared.

Atlantic bonito

Sarda sarda (Bloch, 1793)

In the Black Sea the most important commercial species is the Atlantic bonito. Adults enter in the Black Sea from the Marmara Sea in May–August for spawning and feeding. There are large spawning grounds in the Black Sea, which give huge quantities of young fish not only moving along the Turkish coast of the same sea, but also migrating in autumn to the Marmara Sea and in part to the North Aegean(Ateş et al., 2008; Di Natale et al., 2009; Zengin and Dinçer, 2006).

This fish species has a short life span and a high growth rate, attaining sexual maturity at 1 to 2 years of age and at lengths of 40-45 cm (Prodanov *et al.*, 1997). The stock is no longer available throughout the area being apparently limited mainly to the southern part of the Black Sea (Di Natale *et al.*, 2009).
For its role a piscivorous predator, the Atlantic bonito play a key role in the trophic web of the Black Sea pelagic ecosystem and fluctuation in its stock abundance can affect the abundance of the stocks of small pelagic fish (Prodanov *et al.,* 1997).

Zengin and Dinger (2006) described the Turkish fisheries for this stock. Turkey is the country responsible for most of the bonito catch of the Black Sea. The Turkish annual landing of the stock decreased especially starting from 1980 showing also fluctuations with peaks every approximately five-year intervals. In 2002 the landing was estimated to be about 4.000 tons. In 2005 the Turkish production showed an historical record of more than 60.000 tons (Fig. 19).
The main fishing season is between August and February, reaching the highest level in September and October. The stock is exploited either by artisanal boats of 6.0-14.0 m length using drift gillnets and purse seiners of length up to 48 m. The amount

landed by driftnets was estimated to be the 15.4% of the total with average value for the CPUE was 83,1 kg/vessel/fishing operation. For the months of September, October and November, in which the bonito fishing is more intensive, the values of CPUE were between 150 and 820 kg/vessel/haul (Zengin and Dinger, 2006).

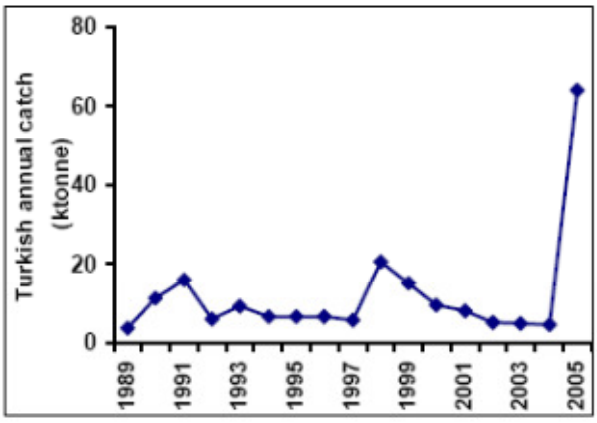


Fig. 19. Trend in Turkish landing of Atlantic bonito from 1980 to 2005 (from Zengin and Dinger, 2006).

A reconstruction of historical catches can be found in Di Natale *et al.* (2009) who identified in the period 1970-75 the longest and most severe decline in the abundance of the stock. The causes of this phenomenon are still not clear, even though it might be correlated to a corresponding decline in immigration of the adult stocks into the Black Sea from the Sea of Marmara and the Aegean Sea.. Another possible reason for the decline was the overfishing by international fleets in the Black Sea from 1970 to 1980 (Ivanov and Beverton, 1985).

Management measures

Turkey

- The use of fixed nets is prohibited in the Turkish territorial waters between 1 April to 31 August. The use of longlines for bonito is permitted between 15 and 31August. In Black Sea the fishery targeting Atlantic bonito is only permitted in the moonlight with gillnets, outside the previous reported closure, in the territorial waters from Kerempe Capeto the Bulgarian border.
- The minimum size for the Atlantic bonito is 25 cm.
- Harvesting by surrounding nets is prohibited in the following areas: a) in the Bosphorus Strait, b) in the Strait of Dardanelles; c) in the traffic navigation zone between the Bosphorus and the straits of Dardanelles; d) in the Istanbul Islands,
- Purse seining is prohibited a) in the Black Sea, Marmara Sea, the Bosphorus and the Straits of Dardanelles between 1 May to 31 August;
- Purse seining is prohibited in all Turkish territorial waters shallower than 18 m, while fishing with cast nets is prohibited in waters shallower than 11 m. However, purse seining in waters up to a depth of 11 m is permitted in the territorial waters in the Black sea between Köpekkaya Cape in Cide District of Kastamonu Province and the Bulgarian border, and in the Marmara Sea from 1st September to 1st December;

Bulgaria and Romania

- As a Member of the European Union, Bulgaria is subject to the CFP and EU fisheries regulations. There is a minimum size for the Atlantic bonito, set at 28 cm. Data on national legislation on fishery for small tunas are not available for this report.

Anadromous fish

The Black Sea populations of sturgeons are endangered by the combined effect of excessive fishing, poaching and destruction of spawning habitats. During the last 50 – 60 years, the majority of rivers draining into the Black Sea have been changed, with an irreversible impact on the spawning habitats and behaviour of anadromous/catadromous fish. The building of dams and weirs has greatly reduced the breeding areas for fish such as sturgeons, concentrating them at the base of dams and increasing their vulnerability to poaching. Likewise, draining of riparian meadows has led to changes in river flows, currents and losses/blockage of freshwater spawning gravels (by infilling with finer substrates), with consequent changes in fish behavior (TDA, 2007).

Shlyakhov and Daskalov (2008) summarized the current knowledge on the status of anadromous fish stocks in the Black Sea. *Alosa pontica* (pontic shad) and the three most common sturgeon species, out of six inhabiting the Black Sea, *Acipenser gueldenstaedtii* (Russian sturgeon), *Acipenser stellatus* (starred sturgeon), *Huso huso* (beluga). Their total production suggests a reduced stock abundance in 1996 - 2005 as compared with the 1989-1994 period. An increasing trend of annual catches was however observed from 2000 to 2005 following the minimal catch occurred in 1999. The observed catch increase was due particularly to the recovery of Pontic shad.
Sturgeon species showed a different trend trough time. The Russian sturgeons' abundance acquired a continuous growth in 1981 - 1993, but started decreasing in subsequent years. On the contrary, the abundance of starred sturgeon remained more or less stable around 1.5 millions of individuals until 1994 and reduced gradually afterwards to less than 0.5 millions of individuals at the end of the 1990s and the early 2000s. The abundance of beluga juveniles decreased from 0.4 to around 0.1 million individuals, and then remained steady around 0.1 - 0.15 million individuals up to 2002 that was about one third of the level in 1981 (Shlyakhov and Daskalov, 2008).

Most of the sturgeons of the Black Sea belong to the Danube and Dnieper populations which have their main fattening and wintering grounds in the coastal waters of Ukraine. The Danube, the Dnieper and the Rioni Rivers offer are the main spawning habitats for their reproduction (Shlyakhov and Daskalov, 2008).
For Russian sturgeon, artificial reproduction and restocking is important to maintain the populations above a certain level.

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).

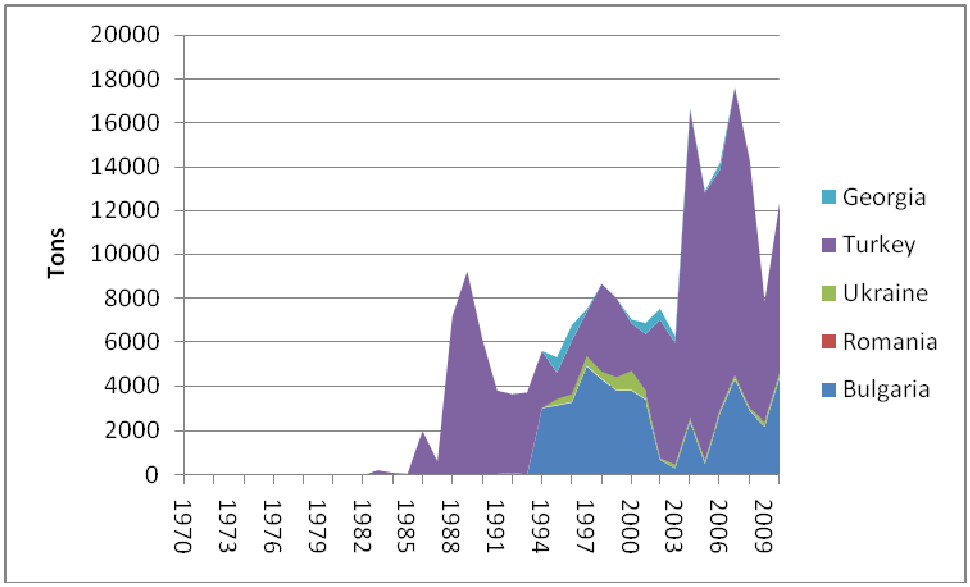


Fig. 20. Landing of *R. venosa* in Black Sea countries in the period 1977-2010

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.

ENDANGERED SPECIES

Today, there are more than 50 threatened fish species included in Black Sea Red Data Book, some of them once commercially exploited such as: e.g. sturgeons, tuna, sole, and turbot. The anadromous species, especially sturgeons are endangered due to both the overfishing and the deterioration of the environmental conditions of their native rivers, spawning grounds and benthic area in the Black Sea.
Although at the national level there are regulations for the protection of red listed species, at the international level there are no universal agreements among all Black Sea countries extending protection to Red Listed species except mammals.
Measures to conserve the cetacean population include the tripartite agreement concluded in 1966 between Bulgaria, Romania and the Russian Federation to stop dolphin catches. Recently all countries have signed the Agreement on Cetaceans of the Black and Mediterranean Seas and Contiguous Atlantic Area (ACCOBAMS).
The three cetacean species in the Black Sea; *Phocoena phocoena* (harbour porpoise), *Tursiops truncatus* (bottlenose dolphin) and *Delphinus delphis* (common dolphin) are endangered by water pollution, food shortage, microbial contamination, lost of habitats, and incidental catch (Öztürk, 1999). The impact of fisheries on cetacean populations is consistent considering that at least 2000-3000 individuals of harbour porpoise and bottlenose dolphin are estimated to be by-caught in the Turkish Black Sea each year (Tonay and Öztürk, 2003).
A Conservation Plan for Black Sea cetaceans, with action required to mitigate the impact of fisheries on cetacean populations was provide in 2006 by ACCOBAMS in collaboration with the BSC[8].

ALIEN SPECIES

Alien species can cause irreversible environmental impact at the genetic, species and ecosystem levels in ways that cause significant damage to the goods and services provided by ecosystems, including fisheries resources. An inventory of aquatic and semi-aquatic alien species introduced to the Black Sea and coastal habitats has been done by the Black Sea Environmental Programme (TDA, 2007).
Recently, in January 2010 during the twelfth session of the GFCM-SAC, a document reviewing the alien species issue in the Black Sea was presented by Prof. Öztürk [9].

8 ACCOBAMAS-BSC, 2006. Conservation Plan for Black Sea cetaceans. Compiled by Birkun A.,

9 General Fisheries Commission For The Mediterranean - Scientific Advisory Committee. Twelfth Session. Budva, Montenegro, 25-29 January 2010. Draft document on the alien species in the Mediterranean and the Black Sea (by Bayram Ozturk).

In recent years, the Black Sea has become home for a large number of alien plants and animals. There are three main vectors for alien species to reach the Black Sea: a) shipping activities, which is the most common way; b) intentional or unintentional introduction by humans; c) Mediterranization, which means that Mediterranean originated species pass all ecological barriers in the Turkish Straits and penetrate to the Black Sea, probably due to climate change (Ozturk, 2010).
Shiganova and Ozturk (2010) provided a review about the alien species issue in the Black Sea.

They described the main changes occurred in the species composition of the Black Sea under the influence of climatic and anthropogenic factors. Among them the most relevant are the following:

1) eutrophication leading to an increase in the primary production (twofold on the average over the entire sea and tenfold in its north western part) and subsequent outbursts of native gelatinous species such as *Aurelia aurita* and *Noctiluca scintillans*;

2) high pressure of fishery resulted in decreasing stocks of large pelagic fishes – migrants from the Aegean and Marmara seas and dolphins;
3) invasion of non-native species, some of which negatively affected the communities in which they introduced or replaced native species.
4) increasing trend during last decades of the temperature of both the surface mixed and the cold intermediate layers..

The disturbance of the Black Sea has favoured in particular the establishment of the new gelatinous representative of macroplankton such as the predatory warm-water ctenophore *M. leidyi* which produced the well documented impact on the Black Sea ecosystem. In addition the warmer waters are facilitating the increase population of thermophilic species and their northward expansion from the Mediterranean.

Considering all together the alien species established in the Black Sea are 156 (or 171 according to other sources), which belong to different taxonomical groups, mostly coming from the Mediterranean (Fig. 21). The majority (68 %) of the introductions are human-mediated and only 13 % are a result of the natural expansion of species (TDA, 2007).

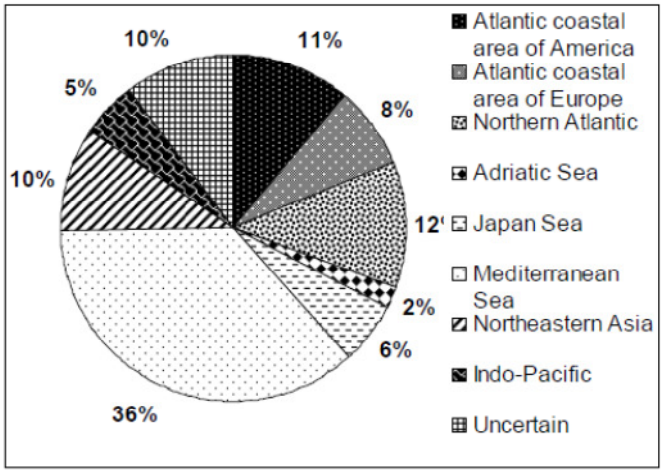


Fig. 21. Donor areas of the non-native species and their share (%) in the Black Sea (from Shiganova and Ozturk, 2010)

The effects on fisheries of alien species can be both indirect, through trophic cascade, and direct due to the exploitation of new commercial stocks. The most relevant example for the Black Sea fisheries is the Japanese snail *Rapana venosa*. It is a habitat generalist which prey mainly upon bivalves which is since several years a well established in the benthic ecosystem of the Bulgarian, Romanian and Turkish Black Sea and has become a commercially valuable living resource.
Positive economic effects from *R. venosa* fishery are however counteracted by negative ecological side-effects of destructive fishing practices used in different countries (TDA, 2007).

According to the Black Sea non-native fish list (Commission on the Protection of the Black Sea Against Pollution, 2010), there are 20 non native species of fish. Among these the most commercially important is the Pacific mullet (*Mugil soiuy*), which appeared in coastal areas of the Black Sea since early 1990s. It is now a relevant economic resources for artisanal vessels along the Turkish coasts which exploits the stock using gillnets in late spring and summer. The Turkish Ministry of Agriculture and Rural Resources (MARA) after the developing of a specific fishery established a minimum landing size of 35 cm for the species.

REGIONAL FISHERIES MANAGEMENT

Fisheries management has very different traditions in the various Black Sea countries, with some practice for applying TACs (Total Allowable Catches) and vessel quotas in the states that were formerly united in the Soviet Union. Turkey uses a range of different regulatory mechanisms, but does not apply TACs/quotas in the Black Sea.

The Black Sea fishery resources are shared by Bulgaria, Georgia, Romania, Russia Federation, Ukraine and Turkey. And even though Black Sea countries had been agreed on EEZ of 200 nautical miles zone and have national sovereignties in their EEZ, intergovernmental agreements for the management of fisheries resources in the

region are unavoidable. Following Radu *et al.* (2011), fisheries management in the Black Sea still requires strengthening and regional harmonisation of the regulatory and legal framework, especially with regard to the conservation and protection of the migratory and shared marine living resources. The states have, however, thus far been unable to agree on a joint fishery convention, and cross-border fishing activities remain largely unregulated (Knudsen and Toje, 2008).

Except for some bilateral agreements (e.g. between Georgia, Turkey and Ukraine about anchovy fishing in Georgian waters) there is no overall agreement about regional management of Black Sea fish stocks.

A draft text on a fisheries convention, Legally Binding Document for fisheries and conservation of living resources of the Black Sea (LBDF), has been negotiated since at least 1996, and there have been articulated ambitions to set up a regional fisheries commission. A draft version of the document is available on the BSC web site (http://www.blacksea-commission.org/_draftLBDfisheries.asp).
The objectives of the LBDF shall be to provide for proper conservation, rational use and management of the living resources in the Black Sea, to ensure that any use of the Black Sea living resources be on a sustainable basis that will maintain and enhance these resources for present and future generations as well as to set up mechanisms for the effective cooperation with the existing international instruments in the field of protection of the biological diversity.
In order to achieve the objective of the LBDF, the following basic principles and approaches are pursued:

- Precautionary approach: capture of the scientifically justified (on multi annual basis) part of living resources that ensure their restoration (naturally, or if necessary by artificial reproduction and introduction) and ensures the maintenance of individual populations and the stock as a whole (FAO)
- · Ecosystem-based approach: the comprehensive integrated management of human activities based on best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of the marine ecosystem, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity.

It seems that at present, the most likely way forward now to agree on a legally binding document on Black Sea fisheries is to sign a protocol to the Bucharest Convention. This way, Black Sea fishery policy will be thoroughly embedded in an institutional structure that takes the larger environmental view on Black Sea fisheries into consideration (Knudsen, 2008). Some more details about the process of approval of a Legally Binding Document (LBD) on BS fisheries can be found in the document "GFCM Black Sea programme: preliminary elements for a project framework" Knudsen (2008)"

Knudsen and Toje (2008) and Ozturk (2011)summarized the effort done by riverine countries to enforce a regional governance during the last 50 years. A fishery convention concerning the Black Sea was signed in Varna on 7 July 1959 between Bulgaria, Romania and Soviet Union but Turkey was excluded from this convention in that time. In the early 2000s, the Black Sea Economic Cooperation (BSEC)

unsuccessfully attempted to implement a fisheries convention in the region through negotiations among riverine countries. However, BSEC takes part as an observer in continued negotiations about a fisheries convention under the auspices of the Black Sea Commission. Furthermore, the ongoing dialogue between the EU and the BSEC concerning the EU Green Paper on maritime policy may result in the establishment of a permanent unit with overall responsibility for maritime matters within the BSEC (Knudsen and Toje, 2008).

The RFMOs covering the Black Sea are the GFCM and the International Commission for the Conservation of Atlantic Tunas (ICCAT), responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. Turkey, Bulgaria and Romania are members of GFCM and with Russia also ICCAT contracting parties.

In recent years, Romania and Bulgaria have become members of the European Union and a part of the Common Fishery Policy of the European Union. Except for these two states, the Black Sea riparian countries are not members of the European Union and to harmonize common strategies seem to be difficult in terms of living resource management.

In the Black Sea, most of the stocks are recognized as shared (e.g. turbot, anchovy, sprat, horse mackerel, bonito, bluefish), occurring within the economic zones of the two or more coastal states and an effort to assess their status was recently done by the EU STECF. The regional stock assessment framework is not however included in a regional management strategy, hence the advice coming from stock assessments is not implemented into management measures on a basin scale.
Enforcement measures and decreased pollution loads in the most of the Black Sea coastal states are also important for the sustainability of fisheries (Radu *et al.*, 2011).

The Commission for the Protection of the Black Sea Against Pollution

The Convention on the Protection of the Black Sea Against Pollution was signed in Bucharest in April 1992, and ratified by all six legislative assemblies of the Black Sea countries in the beginning of 1994. Also referred to as "Bucharest Convention", it is the basic framework of agreement and three specific Protocols, which are:
(1) the control of land-based sources of pollution;
(2) dumping of waste; and
(3) joint action in the case of accidents (such as oil spills).
The implementation of the Convention is managed by the Commission for the Protection of the Black Sea Against Pollution (also sometimes referred to as the Istanbul Commission), and its Permanent Secretariat in Istanbul, Turkey.

As an integral part of the Black Sea Commission institutional structure the Advisory Group on Environmental Aspects of Management of Fisheries and Other Marine Living Resources (AG FOMLR) provides the Commission with best possible advice and the technical support for protection and rehabilitation of marine ecosystem in particular for conservation and sustainable use the marine living resources.

The AG FOMLR is comprised of the national focal points nominated by the member of the Black Sea Commission, director of the relevant activity center and is responsible for facilitation of links between the Black Sea Commission, the relevant national authorities and regional and national scientific expertise; the national focal points are responsible for the accurate and timely delivered national information on the management of fisheries and other living resources as it deems necessary for the Black Sea Commission..

In 2009 the contracting parties of the Black Sea Commission adopted the new *Strategic Action Plan* (SAP) *for the Environmental Protection and Rehabilitation of the Black Sea* (Sofia, Bulgaria, 17 April 2009).

The SAP adopt as key management approach for fisheries the ecosystem approach and identified the so called Long-term Ecosystem Quality Objectives (EcoQOs).
The Ecosystem Quality Objectives (EcoQOs) adopted are those identified in the TDA 2007.
Each EcoQO is assigned a number of management targets that address the immediate, underlying and root causes of the concern areas. For regional level interventions, the Black Sea coastal States and the international partners shall work collectively to take the required steps to fulfill those interventions. National level supporting interventions will be the responsibility of individual states.

Fisheries monitoring

The 'Diagnostic Report' project of the Black Sea Commission aims to identify the achievements and gaps in the existing BSIS (Black Sea Information System) and BSIMAP (Black Sea Integrated Monitoring System), to assess the suitability of data for calculation of Black Sea Commission and European Environment Agency indicators, and the relevance of the monitoring system in the BS region to meet the requirements of regional commitments, stipulated in BS legal/policy documents and of the MSFD. Hence, the gap analyses allows identifying areas where further efforts are needed to improve the monitoring and reporting systems in the Black Sea region so that the assessments of pressures, state and impacts could serve in decision-making in the region (BSC, 2010).
For fisheries the following indicators are used:

- Fishing fleet capacity /fishing effort (P)
- Fish stock biomass (S) and its sub-indicators
- Fish catches / biomass
- Total landings
- Fishing mortality
- Spawning Stock Biomass
- Aqua. Production

The fisheries indicator analysis done in 2010 by Raykov achieved a series of conclusions and recommendations for improving the indicators based monitoring system of Black Sea fisheries (see Annex 2B).

The Black Sea Environmental Programme

Prior to the 1990s, little or no action had been taken to protect the Black Sea. In 1992 the Black Sea countries signed the Bucharest Convention followed closely by the first Black Sea Ministerial Declaration (the Odessa Declaration) in 1993. This inspired the GEF-BSEP/UN and other donors, particularly the European Union, to provide more than US$17 million support to the region to help implement the Odessa Declaration and to formulate the longer-term Black Sea Strategic Action Plan (TDA, 2007).

The Black Sea Environmental Programme (BSEP) was launched in June 1993. The Programme included a number of interventions by the Global Environment Facility (GEF-BSEP/UN)[10], including the development of the first Black Sea Transboundary Diagnostic Analysis (TDA), finalised in June 1996. On the basis of this comprehensive report senior government officials negotiated the Black Sea Strategic Action Plan (BS-SAP), signed on October 31st at a Ministerial Conference in Istanbul (see TDA, 2007).

In the last TDA analysis for fisheries (TDA, 2007) a list of recognized gaps in regional fisheries management and recommendations to bridge gaps was defined (see Annex 2A)

The Ecosystem Quality Objectives (EcoQOs) are statements regarding the vision that reflect how stakeholders would like the state of the Black Sea to be over the long term, based on a resolution of priority problems identified in the Transboundary Diagnostic Analysis.

The TDA 2007 reconfirmed four priority transboundary environmental problems, described above, requiring coordinated efforts by all Black Sea coastal States. It was determined that these areas of concern, and their causes, could be most effectively and appropriately addressed through the aims of four Ecosystem Quality Objectives (EcoQOs). The four EcoQOs and associated Sub EcoQOs are:
EcoQO 1: Preserve commercial marine living resources.
EcoQO 1a: Sustainable use of commercial fish stocks and other marine living resources.
EcoQO 1b: Restore/rehabilitate stocks of commercial marine living resources.
EcoQO 2: Conservation of Black Sea Biodiversity and Habitats.
EcoQO 2a: Reduce the risk of extinction of threatened species.
EcoQO 2b: Conserve coastal and marine habitats and landscapes.
EcoQO 2c: Reduce and manage human mediated species introductions
EcoQO 3: Reduce eutrophication.
EcoQO 4: Ensure Good Water Quality for Human Health, Recreational Use and Aquatic Biota.
EcoQO 4a: Reduce pollutants originating from land based sources, including atmospheric emissions.

[10]The Global Environment Facility (GEF) unites 182 member governments — in partnership with international institutions, civil society organizations (CSOs), and the private sector — to address global environmental issues (see www.thegef.org)

EcoQO 4b: Reduce pollutants originating from shipping activities and offshore installations

The Common Fishery Policy in the Black Sea

EU is an important partner of the Black Sea Commission, and provides substantial contribution to the protection of Black Sea. In 2007 the EU adopted the "Black Sea Synergy" document, in which the accession of the European Union to the Bucharest Convention is stated as a priority.

With the accession of Bulgaria and Romania to the EU in 2007, the EU Common Fishery Policy (CFP) has been extended into the Black Sea. In 2008 for the first time EU TACs for sprat and turbot on Bulgarian and Romanian waters were set.
In December 2010, the Council of Fisheries Ministers reached political agreement on TACs and quotas for turbot and sprat fisheries in the Black Sea. Crucial to this result was an agreement supported by the Member States concerned on an allocation key derived from historical catches which fully recognizes the shared nature of the sprat stock. In the light of this important progress, and the commitment made by the Member States concerned to work closely with the Commission to improve monitoring and control in these fisheries, agreement was reached on a reduction of 10% in the TACs for each of the two stocks concerned. As a result, the total allowable catch for the EU in the Black Sea was set at 86.4 tons for turbot, and 11.475 tons for sprat. Following agreement of an allocation key for sprat, Bulgaria will receive 70% (8.032,5 tons) and Romania 30% (3.442,5 tons) of the TAC.
In January 2011 the European Parliament adopted a report[11] which also underlines the need for the application of multiannual management plans for fisheries, as well as the creation of a separate regional body for the management of Black Sea fisheries.

In Romania and Bulgaria the transfer to CFP has seemingly met with little problems: these countries have basically accepted and met all requirements for joining the CFP and are now eligible for support from the European Fisheries Fund (EFF). Although Turkey cannot take advantage of EFF support, EU twinning and technical assistance projects have addressed a range of important issues (Knudsen, 2008).:
- Training of fisheries staff
- Restructuring of administrative institutional composition
- Fisheries Information System and statistics (port offices, vessel monitoring system and information center)
- Legal issues – new fishery law
- Action plans for fisheries management
- Data collection implementation following the EU DCF (Data Collection Framework)
- Management advice in favour of TACs
- Vessel registration
- Subsidies and support

[11] European Parliament resolution of 20 January 2011 on an EU Strategy for the Black Sea (2010/2087(INI)).

- Producer organizations
- Common organisation of the market, market/quality standards

The process of aligning Turkish fisheries policies with the CFP is considerably delayed relative to benchmark dates set in twinning contracts, but is making some significant progress at the level of technical infrastructure (e.g. Port Offices, VMS). The most significant reduction in fishing capacity is expected to result from structural aid for decommissioning, which will most likely only be available with membership (Knudsen, 2008).

The UN and FAO approach to shared stocks

An important objective of GFCM is to contribute to the improved assessment and management of the so called shared stocks. Since fish move across national jurisdictions, stocks are often shared among countries and the activity of one fleet has a direct effect on the fishing opportunities of others exploiting the same fish stocks and the same ecosystem. Sustainable fisheries of shared stock must be based on international cooperation and on explicit recognition of the absolute need to limit access to resources, under the umbrella of RFMOs.

The term "shared fish stocks" is understood by FAO to include the following: (a) trans-boundary stocks: fish resources crossing the EEZ (Exclusive Economic Zones) boundary or national waters of one coastal State into the EEZ(s) or national waters of one, or more, other coastal States; (b) highly migratory fish stocks that can be found both within the coastal State's EEZ/national waters and the adjacent high seas; (c) straddling stocks: fish stocks (with the exception of anadromous/catadromous stocks) that are found both within the coastal State's EEZ/national waters and the adjacent high seas; (d) high seas fish stocks that can be found exclusively in the high seas.

The current FAO-GFCM definition of shared stock is the following:
"a group of exploitable organisms, distributed over, or migrating across, the maritime boundary between two or more national jurisdiction, or the maritime boundary of a national jurisdiction and the adjacent high seas, whose exploitation is carried out by more than one Country and which can only be managed effectively through cooperation between all concerned States"

The 1982 UN Convention on the Law of the Sea, which came into force in 1994, and the 1995 UN Fish Stocks Agreement, which came into force in 2001, are the basic legal framework for such regimes. The 1982 UN Convention calls upon States, be they coastal States or distant water fishing States to cooperate, or at the very least to negotiate, with respect to the management and conservation of all categories of shared stocks. In doing so, the 1982 UN Convention sets forth the basis upon which States are to negotiate or cooperate. Such negotiation and cooperation may be effected through bilateral or other agreements, or may be effected through appropriate sub-regional and regional organizations (see

Munro *et al.*, 2004). The United Nations Fish Stocks Agreement (UNFSA[12]) describes principles for the conservation and management of Straddling Fish Stocks and Highly Migratory Fish Stocks and establishes that such management must be based on the precautionary approach and the best available scientific information. The Agreement also describes the objective of such management and establishes that States should cooperate to ensure conservation and promote the objective of the optimum utilization of fisheries resources both within and beyond the EEZ.

Activities undertaken on the Black Sea within the GFCM framework

A. *Implementation of GFCM Recommendations by Black Sea members*

Reference of GFCM Measures	Purpose	Implementing policy, legal or institutional framework
REC-GFCM/29/2005/1	On the management of certain fisheries exploiting demersal and deepwater pelagic.	**Turkey:** The GFCM Recommendation 2005/1 has been reflected into current national legislation governing commercial fishing, i.e Notification 1/1 Regulating Commercial Fishing. • Article 4 (e) sets out provisions for a minimum bottom trawl mesh size of 44 mm for fishing on Aegean and Mediterranean Sea • Article 4 (f) sets out provisions for a minimum bottom trawl mesh size of 40 mm for fishing on Black Sea.
REC-GFCM/29/2005/2	Establishment of a GFCM record of vessels over 15 metres authorized to operate in the GFCM area.	**Turkey:** All the Turkish vessel > 15m integrated into GFCM Fleet over 15 m, which was sent on 6 December 2008, reflect white list.
REC-GFCM/30/2006/2	Establishment of a closed season for the dolphin fish fisheries using fishing ggregation devices (FADs).	**Turkey:** • Fishing of dolphin fish is banned from January 1 to August 14 in accordance with the Article 22 (4) of the Notification 2/1 Regulating Commercial Fishing.

[12] The Agreement was adopted in 1995, and came into force in 2001.[1]

REC-GFCM/31/2007/1	Mesh size of trawlnets exploiting demersal resources.	**Turkey:** • Article 10 (bans on deep trawl fishing) of Notification 2/1 Regulating Commercial Fishing. No derogation has been granted to demersal trawl fishing for the use of a minimum diamond or square mesh size of 40 mm for trawl fishing
REC-GFCM/2008/1	On a regional scheme on port state measures to combat illegal, unreported and unregulated fishing in the GFCM area	**Turkey:** The amendments include provisions on the IUU fishing. A technical, infrastructural and operational framework is being developed: Turkey has constructed 36 offices at ports for collection of data on landings. Provisions on the designation of ports for landings have been included into the amended Fisheries Law which requires approval from the Turkish parliament. The following landing ports have been designated for controlling of IUU fishing. 1. Silivri Landing Port, Istanbul 2. Yakakent landing Port, Samsun 3. Güzelbahçe Landing Port, Izmir 4. Iskenderun Landing Port, Hatay These are the fishing ports to which foreign vessels may be permitted access in accordance with the Regulation. • The amended Fisheries Law is expected to be approved by the Turkish Parliament within 2010.
REC-GFCM/2008/1	On a regional scheme on port state measures to combat illegal, unreported and unregulated fishing in the GFCM area	**Turkey:** The amendments include provisions on the IUU fishing. A technical, infrastructural and operational framework is being developed: Turkey has constructed 36 offices at ports for collection of data on landings. Provisions on the designation of ports for landings have been included into the amended Fisheries Law which requires approval from the Turkish parliament. The following landing ports have been designated for controlling of IUU fishing. 1. Silivri Landing Port, Istanbul 2. Yakakent landing Port, Samsun 3. Güzelbahçe Landing Port, Izmir 4. Iskenderun Landing Port, Hatay These are the fishing ports to which foreign vessels may be permitted access in accordance with the Regulation. • The amended Fisheries Law is expected to be approved by the Turkish Parliament within 2010.

REC-GFCM/33/2009/2	On a minimum mesh size in the codend of demersal trawl nets	**Turkey:** • Article 10 (2) of Notification 2/1 Regulating Commercial Fishing Use of a minimum size of 40 mm square mesh codend for trawl fishing is being implemented through legislative provisions. Works on bringing regulations on the use of a minimum legal diamond codend mesh size, in accordance with the Recommendation, is underway.
REC-GFCM/33/2009/4	On reporting of aquaculture data and information	**Turkey:** • Article 13 of Fisheries Law-1380. Turkish Statistical Institute is the main official competent authority for publishing all statistical data. The Ministry of Agriculture and Rural Affairs, the main competent body responsible for fisheries, circulates/reports official data and information on aquaculture to the relevant organisations, including FAO Fisheries and Aquaculture Department
REC-GFCM/33/2009/5	On the establishment of the GFCM Regional Fleet Register	**Turkey:** National fleet registry is being updated in real-time. Turkey is technically ready to submit the data required by the Recommendation
REC-GFCM/33/2009/6	Concerning the establishment of a GFCM record of vessels over 15 metres authorized to operate in the GFCM Area.	**Turkey:** Record of Turkish vessels over 15 metres authorized to operate in the GFCM Area is routinely submitted to the Secretariat
REF-GFCM/33/2009/7	Concerning minimum standards for the establishment of a vessel monitoring system in the GFCM Area	**Turkey:** • Ministerial Order on Bluefin Tuna Fishing. • Notification by Under secretariat for Maritime on the Equipment of Vessel with the Automatic Identification System Class-B CS Device and its Technical Specifications. (Date: 11th September, 2007; number:26640). A vessel monitoring system is being currently implemented for the vessel engaged in fishing for bluefin tuna. Vessels over 15 meters are under a legal obligation to have an Automatic Identification System since 1st January 2010. Turkey is technically ready to meet the requirements of that Recommendation.

B. Work Plans regarding the Black Sea Area

To date no specific work plan concerning the only Black Sea Area (GSA 29) have been proposed; however, the majority of the activities undertaken every year by the Programmes of work of the SAC for the intersessional periods do include the Black Sea area.

C. FAO/Governments Cooperative Programme: the Black Sea Project (BlackSeaFish)

In 2008, at its 32nd Session of the Commission, 4 documents elaborated by the GFCM Secretariat and two consultants (J. Caddy and S. Knudsen) were made available (GFCM/XXXII/2008/Dma.4). Those document were the first step towards the preparation of a Cooperation Project . The outlines of these documents are summarized here below.

Recent experience and future options for fisheries assessment and management in the Black Sea: A GFCM perspective
(J. Caddy)
The aim of this paper is to explore a way forward for managing shared and migratory resources of the Black Sea, and to consider how this can be tackled in the GFCM context. Achieving this will need to include a number of basic organizational requirements as well as several innovations, given the significant environmental interactions that have been documented to affect the marine ecosystem of the Black Sea in addition to fishing effort. This paper suggests how the GFCM subregional approach could be adapted to support a closed fisheries management cycle in the Black Sea within a management framework where all parties could participate within their respective mandates and capabilities. (This paper is based on a more extensive summary of historical and useful material resulting from earlier GFCM/FAO involvement in Black Sea Issues).

GFCM Black Sea programme, preliminary elements for a project framework
(S. Knudsen)
This short report presents a general review on the knowledge of the state of Black Sea fisheries resources and management and seeks to identify the priorities and essential elements to promote sustainable fisheries in the region. The state of the Black Sea environment and fish stocks have been comprehensively addressed in several recent reports (TDA 2007, Caddy 2008, SOEBS 2008[13]) and this report will therefore not dwell much on these issues beyond outlining the main conclusions of those reports. After a short survey of the current status of knowledge and regional cooperation, this report identifies challenges for cooperative responsible management of Black Sea fisheries. Following up on this survey, an outline of a possible GFCM Black Sea fisheries project in close cooperation with the BSC is outlined. The methodology used to produce this document includes, in addition to the author's own knowledge of the Black Sea fisheries, a thorough review of Caddy 2008, desk study of relevant scientific literature and reports, and consultation of project or institution web sites. Knowledge and perspectives were also gathered from some individuals involved in the sector, including the Executive Director of the BSC.

An outline of the series of objectives to be attained by the proposed project was also presented at the 32nd Session of the Commission in 2008(GFCM/XXXII/2008/Dma.4).

Objectives and components of a possible GFCM-executed project in the Black Sea
(GFCM Secretariat)
1. Foster cooperation among fishery scientists and stakeholders from Black Sea coastal states in the fields of fisheries science, socio-economics and management within the framework of an Ecosystem Approach to Fisheries.
2. Promote technology transfer among countries and support capacity building in, inter alia, monitoring and assessment of fisheries resources, bio-economic organizations, fishing gear

[13] *TDA 2007. 'Black Sea Transboundary Diagnostic Analysis'. Istanbul: UNDP/GEF Black Sea Economic Recovery Project.*
SOEBS 2008. 'State of the Environment Black Sea'. Istanbul: BSERP/BSC. Draft version.
Caddy, J. 2008. Recent experience and future options for fisheries assessment and management in the Black Sea: A GFCM perspective. GFCM internal report.

technology, catch assessment surveys and statistics and Information Technology tools for fisheries science.

3. Develop a multidisciplinary database and regional information system to act as a repository of all available data and information, as well as to serve as a tool to identify gaps in knowledge, perform analyses and produce outputs useful for scientists and managers alike.
4. Conduct joint data collection schemes including surveys to promote organizations and methodologies, complete information deficiencies and calibrate national systems, as appropriate.
5. Promote discussion among scientists, decision makers and stakeholders, through, inter alia, workshops and symposia, on strategy options for fisheries management in the region, in particular, on the integration of ecosystem considerations, bio-economic indicators and reference points, as well as on artisanal fisheries.
6. Cooperate with other initiatives of Black Sea scientific bodies, national entities and international projects, in order to achieve coordinated results and organise the benefits for the future of the Black Sea environment and sustainable exploitation of Black Sea living marine resources.
7. Support the attendance of Black Sea national scientists in international fisheries scientific fora, together with those of related disciplines, and encourage their effective participation in activities of the GFCM Scientific Advisory Committee and those of other regional scientific bodies.
8. Promote the presentation and publication of knowledge and results emanating from the Project's activities in international conferences, seminars, scientific meetings of the GFCM and other relevant meetings, contributing to the advisory processes required for the implementation of responsible fisheries management in the Black Sea.

In May 2010 a draft document on the upcoming Black Sea FAO Regional Project (BlackSeaFish) containing the main features and concepts was draft as a preparatory phase of the project. The overriding objective of the preparatory phase project is to prepare a Project Document for the full phase, based on the results of a formulation mission in the Black Sea countries to assess, in consultation with the relevant national authorities and other relevant stakeholders, the needs and expectations relative to fisheries management and research.

The main expected results of the full phase of the BlackSeaFish Project are:

- Identification of the main issues relevant for cooperation in fisheries research and management in the Black Sea;

- An improved network of Fisheries Research and Management institutions with mechanisms for dialogue and exchange among them;

- A document for a project in support of the countries in developing their capacity and the regional Scientific, Technical and Institutional cooperation and exchange necessary to support responsible fisheries in the Black Sea, in accordance with the FAO Code of Conduct for Responsible Fisheries and the Ecosystem Approach to Fisheries;

- Reinforced regional cooperation on Fisheries issues.

The proposed actions of the full phase project document will derive from a participatory process with country representatives and relevant stakeholders. Their involvement at the early stages of the formulation process is central for the success of the project.

D. Stock assessment and Task 1 – statistical bulletin submitted to the GFCM

Stock Assessment Forms (SAF)

In spite of the strong encouragement to scientists of the Black Sea area to actively participate in the subcommittees of GFCM, especially in stock assessments of small pelagic migratory species (see *GFCM:SAC9/2006/Inf.14*), to date no Stock Assessment Forms from the GSA 29 have been submitted to the GFCM Secretariat. Nevertheless, problems of data collection, as to gather consistent and reliability data on landings, fishing gears, vessels, efforts, etc. (particularly due to unreported illegal fishing) for the Black Sea countries have been already acknowledged (see *GFCM:SAC9/2006/Inf.14*).

Task 1 – Statistical bulletin

Updated (2008) information on fleet segment and stocks exploited within the GSA 29 (Black Sea) are available (see also Annex 1).

GSA 29

Black Sea

Reporting countries	Bulgaria BGR, Turkey TUR
Number of Vessels reported	7760
Number of Fleet Segment reported	11
Number of fishing Gear Classes reported	9
Number of Operational Units reported	54

GROUP OF TARGET SPECIES	*Tonnes*	*Countries*
SMALL GREGARIOUS PELAGIC SPECIES (e.g., anchovies, sardines, mackerel)	77 032	BGR+TUR
LARGE PELAGIC (e.g. tunas, amberjacks)	23.978	BGR
DEMERSAL SHELF SPECIES	16 108.72	BGR
DEMERSAL SLOPE SPECIES	25.57	BGR+TUR
SESSILE ORGANISMS (e.g., clams, mussels, warty venus)	35.11	BGR+TUR
MONOSPECIFIC (e.g., lobsters, red porgy)	513.46	BGR

E. Meeting documents (from 2007 to 2010)

GFCM/XXXII/2008/Dma.4

Strengthening Cooperation in the Black Sea (Caddy J. F.)

During its 31st Session, the Commission acknowledged efforts made to strengthen the cooperation with the Black Sea research institutions, particularly through convening the first meeting of the Permanent Working Group on Stock Assessment in collaboration with the Black Sea Economic Cooperation Organization. However, it further encouraged the Scientific Advisory Committee to increase its involvement in the Black Sea area and requested that the Secretariat should explore options for a cooperation project in support of fishery research and management for this sub-region. In response to this request, the Secretariat has attempted to address the issue, including through the assistance of consultants, and the following related draft documents, which have been produced over the course of the inter-sessional period, are attached for the Commission's perusal:

Recent experience and future options for fisheries assessment and management in the Black Sea: A GFCM perspective.

The aim of this paper is to explore a way forward for managing shared and migratory resources of the Black Sea, and to consider how this can be tackled in the GFCM context. Achieving this will need to include a number of basic organizational requirements as well as several innovations, given the significant environmental interactions that have been documented to affect the marine ecosystem of the Black Sea in addition to fishing effort. This paper suggests how the GFCM subregional approach could be adapted to support a closed fisheries management cycle in the Black Sea within a management framework where all parties could participate within their respective mandates and capabilities. (This paper is based on a more extensive summary of historical and useful material resulting from earlier GFCM/FAO involvement in Black Sea Issues).

List of supplementary relevant Black Sea-related documentation reviewed or compiled by the Secretariat

- *The Trans-Boundary Diagnostic Analysis (TBDA) for the Black Sea developed 1993-6;*
- *The 2006 revised TBDA*
- *The Strategic Action Plan for the Rehabilitation and Protection of the Black Sea.*
- *Excerpts from the draft Project Document for the second phase of the UNDPGEF Black Sea Ecosystems Recovery Project, October 2004 (BSERP).*
- *Other projects and funded activities in the Black Sea.*
- *The Advisory Group on Fisheries and Other Marine Living Resources (AG FOMLR).*
- *Structure and functions of the GFCM and its relevance to Black Sea fisheries management*
- *Proposals relevant to fisheries considered in Phase 2 of the BSERP*
- *A summary of key points in Anon (1996): 'Strategic Action Plan for the Rehabilitation and Protection of the Black Sea'.*
- *Impacts of the transition from planned economies on national activities in support of fisheries.*
- *The closed fisheries management 'cycle': its purpose and components.*
- *Agreements reached within the BSERP on actions that need to be taken in developing indicators for selected commercial species and habitat/environmental indicators.*
- *Establishing a logical framework for using indicators for fishery monitoring and management.*
- *Summary of conclusions from a joint meeting between assessment scientists of the Mediterranean and Black Seas; Istanbul, 14-18 Nov, 2005.*
- *Decisions made at the Thirteenth Meeting of the Commission on the Protection of the Black Sea Against Pollution.*
- *Potential use of a Fisheries Control Law.*
- *Conservation of sturgeons and marine mammal populations.*

GFCM Black Sea programme: preliminary elements for a project framework *(S. Knudsen)*

The dissolution of the Soviet Union made it possible to establish an environmental convention signed by all Black Sea countries (Bucharest Convention) and establish a Commission (Black Sea Commission - BSC) to address the urgent environmental problems of the Black Sea.

Although fisheries has been on the agenda from the beginning and a legally binding document concerning regional cooperation about fisheries management has been negotiated for a decade, no binding agreement has been reached. With the accession of Bulgaria and Romania to EU in January 2007, new dimensions and dynamics have been incorporated into the process. The Black Sea waters of these countries have become EU waters and the EC is seeking institutional mechanisms for wielding EU policies in the region. In this context, the General Fisheries Commission for the Mediterranean (GFCM), with the Black Sea as part of its Convention Waters, naturally assumes its responsibility in facilitating the process of fostering scientific, human capital and international cooperation that will be necessary to develop responsible fishery management in the Black Sea. This short report presents a general review on the knowledge of the state of Black Sea fisheries resources and management and seeks to identify the priorities and essential elements to promote sustainable fisheries in the region. The state of the Black Sea environment and fish stocks have been comprehensively addressed in several recent reports (TDA 2007, Caddy 2008, SOEBS 2008) and this report will therefore not dwell much on these issues beyond outlining the main conclusions of those reports. After a short survey of the current status of knowledge and regional cooperation, this report identifies challenges for cooperative responsible management of Black Sea fisheries. Following up on this survey, an outline of a possible GFCM Black Sea fisheries project in close cooperation with the BSC is outlined. The methodology used to produce this document includes, in addition to the author's own knowledge of the Black Sea fisheries, a thorough review of Caddy 2008, desk study of relevant scientific literature and reports, and consultation of project or institution web sites. Knowledge and perspectives were also gathered from some individuals involved in the sector, including from the Executive Director of the BSC.

F. Studies and Reviews

GFCM Studies and Reviews No. 85. Rome, FAO. 2009

- **Regional study on small tunas in the Mediterranean including the Black Sea**
  (Di Natale, A.; Srour, A.; Hattour, A.; Keskin, Ç.; Idrissi, M.; Orsi Relini, L.)
  This study, undertaken upon request by the General Fisheries Commission for the Mediteranean (GFCM), summarizes the available information about the small tuna species in the Mediterranean Sea and the Black Sea. It provides data on their biology and ecology, their exploitation, including the fishery statistics by species, and the socio-economic aspects of these fisheries. The study reverses the widespread perception that these fishing activities were almost irrelevant either in terms of catches or revenues. Indeed it was commonly believed that these fisheries were mostly subsistence activities. On the contrary, important production levels can be achieved. The fleet catching small tunas is scarcely defined or not identified in most of the countries studied, but it is generally known that thousands of small- and medium-sized vessels, engaged in small-scale, artisanal or recreational fisheries, are carrying out activities that also target small tuna species. In addition, catches are also obtained as a bycatch in other fisheries. Many Mediterranean and Black Sea countries are not reporting any catches, or, in the case of a few countries, only a small number of landings are declared. Nevertheless, fishery production data related to the small tuna species show a total official reported landing of 83 386 tonnes in 2005. The underreporting is believed to be significant because landing sites are scattered all along the coastline and the islands – where many thousands of small and medium-sized vessels operate – and the catches are often directly marketed. Moreover, catches from recreational fishery in many countries are seldomly reported. Under such circumstances, the total landings could possibly be estimated at a minimum of about 150 000 tonnes. Considering only the total official production for the four most relevant species, it is likely that the estimation of the real production might reach about 300 millions euros in the best years. A specific problem can be noted in relation

to the small tuna species fishery in the Marmara Sea and in the Black Sea. Apart from Turkey, no recent data are present in any of the databases used for this study. The level of catches reported by Turkey in that area is, however, important. A secondary difficulty is the lack of data on fleet segmentation targeting these species, on catch per unit effort (CPUE) and on socio-economic parameters.

GFCM Studies and Reviews No. 87. Rome, FAO. 2010

- **Status of alien species in the Mediterranean and in the Black Sea**
  (Ozturk B.)
  Biota of the Black and Mediterranean Seas have started to change with the introduction of alien species in the last few decades due to Lessepsian migration, Atlantic influx, intentionally or unintentionally introduction and climate change. Dispersion of alien species is a dynamic process showing a sign of increasing and likely to continue for the future. This phenomenon causes severe ecological, socio-economical, and human health problems in the entire basin.

G. Studies submitted to Workshops and Working Groups (from 2006 to 2011)

GFCM-BSC – Joint meeting on Stock Assessment Methodology and Workshop on Black Sea Assessments of Pelagic and Demersal Fish Stocks, Istanbul, Turkey, 8-10 March 2006

- **Some Key issues when advising on the status of resources in the Mediterranean and Black Sea**(J. Caddy)
  The potential use of indicators and reference points in management of Black Sea fisheries is reviewed, and fisheries management rules using RPs and indicators are discussed, including their use in stock recovery plans. A review of possible approaches to setting RPs and indicators for Black Sea fisheries emphasizes the dynamic nature of recent ecosystem change. This means that models using steady state assumptions may not be appropriate, and an empirical approach to defining indicators is explored. Indicators of ecosystem instability and risk are also proposed based on rates of decline and extent of decline of commercial species characteristic of different habitats. The traffic light approach is illustrated as a means of following dynamic changes and gaining a broad perspective on events at the ecosystem level.

- **Convention on the protection of the Black Sea against pollution**(O. Tarasova)

- **Analysis of stock assessment methodologies for pelagic stocks including proposal on standard report forms for assessment components** (V. Shliakhov)

- **Analysis of stock assessment methodologies for demersal stocks including proposal on standard report forms for assessment components** (M. Zengin)

- **Indicators Recommended for assessment of the Black Sea Fisheries by Black Sea Commission Advisory Group** (Dr. S. Nicolaev)

SCSA – Working Group on Demersals, Athens, Greece, 10-12 September, 2007

- **Experimental Studies on the Restocking of the Turbot *Psetta maxima* Populations in the Eastern Black Sea Coast (GSA 29)**
  (Zengin M, Polat H., Kutlu S. and Gümüs A.)

Turbot *Psetta maxima* is one of the most important commercial species among demersal fishes inhabiting Turkish Black Sea Coasts. Unfortunately, the turbot stocks declined because of the over fishing, fishing fleet pressure and faulty fisheries management since the last of 1980s (Figure 1). However, turbot have always been a primary target for marine stock enhancement. The first study for the turbot restocking have been started in the Turkish Black Sea coast in 1999, with collaboration of CFRI (Trabzon Central Fisheries Research Institute) and JICA (Japan International Cooperation Agency). During 1999-2002, around 30.000 hatched and reared fish of 0-age group fish 13.9 (6.5-20.7) cm were released regularly from 11 different locations between Georgian Board and Sinop Cape. All individuals were tagged externally, numbered with Tbar tags having ten different colours. The material of the tag is composed of polyethylene. The tags were placed intramuscularly nearly between 10th and 15th rays of the dorsal fin. After releasing, we carried out a recapture programme up to the end of 2005. For the collection of samples, cooperation was conducted with coastal fishermen offering little rewards such as money, t-shirt, cap, some fishing equipment and posters. In a period of 7 years after releasing 2.2% of the turbot were recaptured, by gill-net and bottom trawl fisheries mostly in winter, spring and early summer. Recaptures were made at the coastal sites within a range of about 60 km from the release locations. Maximum vertical migrations reached to the limits of 110 m in direction of the littoral zone from releasing area. Population migrates and concentrated in depths 30-40 m as the spawning occurred. There was a linear relation between vertical/horizontal migrations and age-size groups. The recapture rate appeared to be positively correlated with size of fish (age).

SCMEE – Meeting of By ACCOBAMS project (jointly with ACCOBAMS) Rome, Italy, 17-18 September 2008

- **Cetacean-Fisheries conflicts in the Black Sea Region.** (Birkun A.)

- **Turbot fisheries and its impact on dolphin by-catch in the Black Sea. (**Öztürk B. and Tonay A. M.)

SAC-SCESS-SCSA – Transversal Workshop on the Monitoring of Recreational Fisheries in the GFCM Area, Palma de Mallorca, Spain, 20-22 October 2010

- **Characteristics of Marine Recreational Fishery Focusing on Spearfishing in Turkey**(Ünal V. and Özgül A.)
  With the income per capita increasing in Turkey in recent years, there is a growing tendency of people sparing more money and time for outdoor and leisure activities, foremost among which is recreational fishing. Undoubtedly, this fact largely owes to the beauty of the Turkish coasts and their convenience for such activities. Presently a substantial percentage of the Turkish coastal population regularly enjoys fishing for pleasure and personal consumption along almost 8,800 kilometres of coastline in the Mediterranean, Aegean, Marmara and Black Seas. In the present study we review the current regulations of marine recreational fishery with a special emphasis on spearfishing in Turkey. The government agency responsible for regulations and management of this activity is the Ministry of Agriculture and Rural Affairs.

SCMEE – Workshop on Algal and Jellyfish Blooms in the Mediterranean and Black Sea, Istanbul, Turkey 6-8 October 2010

- **Gelatinous macro zooplankton composition and seasonal distribution in Sinop peninsula of the central Black Sea of Turkey between 2002 and 2006**

(Bırıncı Özdemır Z., Bat L., Sezgin M., Satilmis H. H., Sahin F. and Üstün F.)
Seasonal distribution, biomass and abundance of Aurelia aurita, Pleurobrachia pileus, *Mnemiopsis leidyi* and *Beroe ovata* at the central southern Black Sea (Sinop Peninsula) were studied using vertical tows from stations at biweekly or monthly intervals between January 2002 and November 2006. In study period, the most abundant and biomass of gelatinous macro zooplankton were obtained 120 $n.m^{-2}$ on May 2005 and 1073.5 $g.m^{-2}$ on March 2003, respectively. The maximum abundance values of gelatinous macro zooplankton were determined 42.5 $n.m^{-2}$ on September 2002, 91.25 $n.m^{-2}$ on July 2003, 108.33 $n.m^{-2}$ on July 2004 and 95 $n.m^{-2}$ on May 2006. High biomass values were achieved 230 $g.m^{-2}$ on May 2002, 111.3 $g.m^{-2}$ on March 2004, 447.75 $g.m^{-2}$ on May 2005 and 393.33 $g.m^{-2}$ on July 2006, respectively. Minimum abundance and biomass of macro zooplankton amounts were found in winter sampling periods in all years. In terms of annual abundance, *A. aurita* was the dominant group in 2002, whereas *P. pileus* was the highest abundance group in 2004, 2005 and 2006. Moreover, *B. ovata* was found very low density, except 2002. Percentage of *M. leidyi* was showed decreasing from 2002 to 2006.

- **Basin-Wide Black Sea *Mnemiopsis leidyi* Database (MLDB)**
(Myroshnychenko V. and Kideys A. E.)
The database was created in 2008 in framework of the FP6 Black Sea SCENE project and further supported by the Permanent Secretariat of the Black Sea Commission. A team of scientists studying the *M. leidyi* in the Black Sea organized a consortium on a voluntary basis with purpose to maintain the database and provide their data and metadata on jellyfish in the Black Sea to common use. At the moment database contains ML metadata and data covering all the Black Sea for period 1989-2009.

- **Decreasing methods of jellyfish by catch on the trawl fishery**
(Özdemır S.)
Fishery by-catch and discards are old issues in fishing history but have become one of the most significant problems currently encountered by many fisheries. Large quantities of jellyfish are discarded in the anchovy, horse mackerel, bluefish and bonito fisheries in Turkish waters. The devices varied depending on the need of the particular fisherman. Some fishermen developed grids to exclude turtles, rays, sponges, and jellyfish, because these animals were caught frequently or because the value of their target catch could be increased markedly. Several fishermen took an interest in developing devices to reduce fishery by-catch in Black Sea. Grids are used to expel sea turtles and jellyfish. Grid practice could be preventing to catch of these species, on trawl fisheries in Black Sea. Additional, it is possible more quality of target species and selectivity by grid systems in trawl net.

- **The effect of jellyfish on the small scale fishery in the Black Sea**
(Özdemır S., Erdem E. and Bırıncı Özdemır Z.)
By-catch in fisheries has been considered a serious problem. Horse mackerel is a most of the economic fish in the Turkey small scale pelagic trawl fishery. Jellyfish are important by-catch pelagic trawl fisheries in the Black Sea coast of Turkey such as inedible, damage to target species, decreasing catch amount and mean length of fish. The experiments were carried out Black Sea coast (Sinop-Samsun) in October 2008; total 11 night and 11 daytime pelagic trawls were towed. Horse mackerel (*Trachurusmediterraneus*) and moon jellyfish (*Aurelia aurita*) were caught by pelagic trawl in the study 19540 kg and 8220 kg respectively. In the present study the effect of moon jellyfish (*Aurelia aurita*) on the catch efficiency and length composition of horse mackerel caught by the midwater trawl were established. The results showed that moon jellyfish catch amount increased, horse mackerel catch amount decreased

in pelagic trawl fishery in the fishing region at night on the other hand jelly fish ineffective on horse mackerel catch and size composition at daytime. Differences between mean length of horse mackerel in the hauls are significant ($p<0.05$).

SCMEE 2nd Transversal Working Group on By-catch (in collaboration with ACCOBAMS) 7-9 December 2011, Antalya, Turkey

- **Development of national network for monitoring the Black Sea cetacean in Romania and identification of relevant measures for mitigation the adverse impact of fisheries.** (Nicolaev S. and Radu G).
- **Estimates of Cetacean Bycatch in the Turbot Fishery on the Turkish Western Black Sea Coast in 2007 and 2008** (Tonay A.M.)
- **Cetacean bycatches in turbot fisheries on the central coast of the Bulgarian Black Sea** (Mihaylov K.)
- **Cetacean by-catch levels in the northern Black Sea: results of onboard monitoring programme** (Birkun A. Jr. and Krivokhizhin S.)

SCSA Workshop on Stock Assessment of Selected Species of Elasmobranchs in the GFCM area. Brussels (Belgium), 12 -16 December 2011

- **Age determination of Spiny Dogfish (Squalus acanthias L. 1758) in the Black Sea waters** (Polat N.)
- **Squalus acanthias L. and Raja clavata L., Length-Weight composition from scientific surveys in Bulgarian Black Sea waters** (Raykov V.)
- **Research on the status of dogfish (Squalus acanthias) populations in the Romanian marine area. Summary data on dogfish at Black Sea level.** (Radu G.)

FISHERIES RESEARCH

Research programs running on the Black Sea marine ecosystem

The Cooperative Marine Science Programme for the Black Sea (CoMSBlack)

Supporter: *Intergovernmental Oceanographic Commission (IOC)*

Mission: *The primary purpose of CoMSBlack, the establishment of a scientific basis for the effective and integrated management of the Black Sea, including environmental preservation, protection and optimum utilization, will be achieved by: clarifying the fundamental oceanographic processes and rates contributing to the environmental quality, including variability in space and time; assessing the role of*

anthropogenic inputs, and long-term climatic variability on the changing ecosystem; developing realistic ecological models coupled with general and regional circulation dynamics in a form usable for management; and establishing a long-term database of fluxes of water and biogeochemical active materials that affect the environment of the Black Sea.

Black Sea Region: *Whole Black Sea Region*

Starting Date: *April 1991*

Ending Date: *Ongoing*

Web-site: *n/a*

Institutions/ Organizations: *Major Black Sea Environmental Institutions*

Upgrade Black Sea SCENE

Supporter: *European Commission FP7 (Seventh Framework Program)*

Mission: *The project established a Black Sea Scientific Network of leading environmental and socio economic research institutes, universities and NGO's from the countries around Black Sea and developed an initial virtual data and information infrastructure populated and maintained by these organizations.*

Black Sea Region: *Whole Black Sea Region*

Starting Date: *2009*

Ending Date: *2011*

Web-site: *www.blackseascene.net*

Institutions/ Organizations: *Marine Information Service (NL), International Bureau of Environmental Studies (BE), Institute of Meteorology and Water Management (PL), Norwegian Institute of Water Research (NO), Netherlands Organization for Applied Scientific Research (NL), Fieldware International Ecological Development plc. (UK), Ukrainian Scientific Centre of the Ecology of Sea (UA), Marine Hydro-physical Institute of Ukrainian National Academy of Science (UA), Ukrainian Scientific and Research Institute of Ecological Problems (UA), Odessa National University (UA), Moscow State University (RU), State Oceanographic Institute (RU), Shirshov Institute of Oceanology (RU), Institute of Limnology and Space Research Institute, Russian Academy of Science (RU), All Russian Research Institute of Hydrometeorological Information – World Data Centre (RU), Middle East Technical University, Institute of Marine Sciences (TR), Sinop Fisheries Faculty of Ondokuz Mayis University (TR), Black Sea Technical University of Marine Sciences (TR), Institute of Oceanology Bulgarian Academy of*

Science (BG), Institute of Fisheries and Aquaculture (BG), National Institute for Marine Research and Development (RO), Tbilisi State University (GE), Institute of Geophysics Georgian Academy of Science (GE), Ministry of Environmental Protection and Natural Resources (GE), Georgian Coastal Protection Scientific-Industrial Center of Research and Governance of Coastal Formation Processes (GE), Black Sea NGO Network (BG), Institute of Biology of the Southern Seas (UA), Hellenic National Oceanographic Data Centre (EL)

SESAME

Supporter: *European Commission FP6 (Sixth Framework Program)*

Mission: *Aims to evaluate and predict changes in the Mediterranean and Black Seas ecosystems and in their ability to provide key goods and services.*

Black Sea Region: *North Western and North Eastern Black Sea*

Starting Date: *2006*

Ending Date: *Ongoing*

Web-site: *www.sesame-ip.eu*

Institutions/ Organizations: *Hellenic Centre for Marine Research, Centre National de la Recherche Scientifique, P.P.Shirshov Institute of Oceanology, Russian Academy of Sciences, ORTA DOGU TEKNIK UNIVERSITESI Institute of Marine Sciences, Middle East Technical University, University of Liege, MARE Interfacultary Research Centre, UNIVERSITE DE LIEGE, Consejo Superior de Investigaciones Cientificas, Consorzio Nazionale Interuniversitario per le Scienze de Mare, Panepistimion Aigaiou, Institute of Oceanology, Bulgarian Academy of Sciences, Israel Oceanographic & Limnological Research Limited, Athens University of Economics and Business - Research Center, Bogazici Universitesi, National Council for scientific research, Consiglio Nazionale delle Ricerche, Sofiiski Universitet "Sveti Kliment Ohridski", Department of Meteorology and Geophysics, University of Sofia, Ente per le Nuove Tecnologie, l'Energia e l'Ambiente, Fondazione Eni Enrico Mattei, National Institute of Marine Geology and Geo-Ecology, Institut Français de Recherche pour l'Exploration de la Mer, Institute of Biology of Southern Seas A.O.Kovalevsky Institute of Biology of the Southern Seas, Institute of Oceanography and Fisheries Institut za Oceanografiju I ribarstvo, Istituto Centrale per la Ricerca scientifica e tecnologica Applicata al Mare, ICRAM, Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, Fondazione IMC-Centro Marino Internazional-ONLUS, Commission of the European Communities, Directorate General Joint Research Centre, Institut National des Sciences et Techniques de la mer, Marine Hydrophysical Institute Ukrainian National Academy of Science, National Institute for Marine Research and Development "Grigore Antipa" Institutul National de Cercetare-Dezvoltare Marina, National Institute of Biology, Marine Biology Station Nacionalni Institutza Biologijo, National Institute of*

Geophysics and Volcanology, Climate Dynamics Istituto Nazionale di Geofisica e Vulcanologia, The National Institute of Oceanography and Fisheries, Panepistimio Kyprou, South Scientific Centre of Russian Academy of Sciences, Stazione Zoologica 'Anton Dohrn', Tbilisi State University Ivane Javakhishvili Tbilisi State University, Universitat de Barcelona, Universitat de Huelva, Universitaet Bremen, University of Crete, Physical Oceanography Unit, University of Malta, Polytechnic University of Marche Universita Politecnica delle Marche, Université du Littoral Côte d'Opale, University of Oldenburg, Institute for Chemistry and Biology of the Marine Environment Carl von Ossietzky Universitaet olden burg, University of Plymouth, Cyprus International Institute of Management, CLU srl, SOPAB BREST SA.

EnviroGRIDS @ Black Sea Catchment

Supporter: *European Commission FP7*

Mission: *EnviroGRIDS aims at building capacities in the Black Sea region to use new international standards to gather, store, distribute, analyze, visualize and disseminate crucial information on past, present and future states of this region, in order to assess its sustainability and vulnerability. To achieve its objectives, EnviroGRIDS will build a Grid-enabled Spatial Data Infrastructure (GSDI) becoming one of the integral systems in the Global Earth Observation System of Systems (GEOSS), and compatible with the new EU directive on Infrastructure for Spatial Information in the European Union (INSPIRE), as well as UNSDI developments.*

The scientific aim of the EnviroGRIDS @ Black Sea Catchment project is to start building an Observation System that will address several GEO Societal Benefit Areas within a changing climate framework. This system will incorporate a shared information system that operates on the boundary of scientific/technical partners, stakeholders and the public. It will contain an early warning system able to inform in advance decision-makers and the public about risks to human health, biodiversity and ecosystems integrity, agriculture production or energy supply caused by climatic, demographic and land cover changes on a 50-year time horizon.

Black Sea Region: *Whole Black Sea Region*

Starting Date: *April 2009*

Ending Date: *March 2013*

Web-site: *www.envirogrids.net*

Institutions/ Organizations: *UNIGE/GRID-Europe, UNIGE/enviroSPACE, arx iT, AZBOS, CCSS, CERN, EAWAG, GeoGraphic, UNESCO/IHE, UAB, USRIEP, SPSU, ITU, BSERC, DDNI, DHMO. IDSS, IHAR, INHGA, ONU, UTC, VITUKI, BSC PS, CRS4, ICPDR, NIMH, TNU, MEF, UMA.*

PEGASO (People for Ecosystem-based Governance in Assessing Sustainable development of Ocean and coast)

Supporter: *European Commission FP7*

Mission: *The main objective of PEGASO is to build on existing capacities and develop common novel approaches to support integrated policies for the coastal, marine and maritime realms of the Mediterranean and Black Sea Basins in ways that are consistent with and relevant to the implementation of the ICZM Protocol for the Mediterranean.*

Black Sea Region: *Whole Black Sea Region*

Starting Date: *January 2010*

Ending Date: *December 2013*

Web-site: *www.pegasoproject.eu*

Institutions/ Organizations: *Universitat Autònoma de Barcelona UAB, Universidad Pablo Olavide UPO, Plan Bleu pour l'Environnement et le Developpement en Méditerrannee Plan Bleu, Institut Français de Recherche pour l'exploitation de la Mer IFREMER, ACRI Etudes et Conseil ACRI-EC, Priority Action Programme/Regional Activity Centre PAP-RAC, Union Internacional para la Conservación de la Naturaleza IUCN, The University of Nottingham UNOTT, Vlaams Instituut Voor De Zee Vzw VLIZ, Universita Ca'Foscari Di Venezia Univ Ca´ Foscari, Commission of the European Communities – Directorate General Joint Research Centre JRC, Université de Genève UNIGE UNEP, Hellenic Centre for Marine Research HCMR, Mediterranean Coastal Foundation MEDCOAST, Institutul National de Cercetare Dezvoltare Delta Dunarii DDNI, Université Mohammed V-Agdal UM5a, Association de Réflexion, d'Échanges et d'actions pour l'Environnement et le Développement AREA-ED, National Institute of Oceanography and Fisheries NIOF, University of Balamand UOB, Marine Hidrophysical Institute-Ukrainian National Academy of Sciencies MHI, Fondation Tour du Valat TdV, National Authority for Remote Sensing and Space Sciences NARSS, Permanent Secretariat of the Commission on the Protection of the Black Sea against Pollution PSBSC, Intergovernmental Oceanographic Commission.*

KnowSeas

Supporter: *European Commission FP7*

Mission: *The overall objective of the project is to provide a comprehensive scientific knowledge base and practical guidance for the application of the Ecosystem Approach to the sustainable development of Europe's regional seas. This will increase the evidence base available for decision makers and facilitate the practical implementation of the Ecosystem*

Approach, currently seen by some stakeholders as confusing and nebulous. It will be delivered through a series of specific sub-objectives that lead to a scientifically based suite of tools to assist policy makers and regulators with the practical application of the Ecosystem Approach. It is also expected to deliver high quality scientific outputs that advance our understanding of coupled social and ecological systems.

Black Sea Region: *Whole Black Sea Region*

Starting Date: *April 2009*

Ending Date: *April 2013*

Web-site: *www.knowseas.com*

Institutions/ Organizations: *Scottish Association for Marine Science (SAMS), Alfred Wegener Institute for Polar and Marine Research (AWI), Baltic Nest Institute, Stockholm University (BNI), The Centre for Environment, Fisheries & Aquaculture Science (Cefas), CNR - Institute of Atmospheric Pollution Research (CNR-IIA), Consejo Superior de Investigaciones Científicas (CSIC), Deltares, ENVISION Management Ltd., EUCC - Coastal and Marine Union, Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH (HZG), Institute for European Environmental Policy (IEEP), Instituto do Mar (IMAR), Institute of Oceanology, Bulgarian Academy of Sciences (IOBAS), Netherlands Institute of Ecology (KNAW), Environmental Systems Analysis Lab, University of Padua (LASA), Megapesca Lda, Middle Eastern Technical University (METU), Norwegian Institute for Air Research (NILU), Sir Alister Hardy Foundation for Ocean Science (SAHFOS), University of Plymouth - Marine Institute (UoP-MI), Southern Denmark University (SDU), Sea Fisheries Institute (SFI), The Finnish Environment Institute (SYKE), University de Bretagne Occidentale (UBO), Coastal & Marine Resources Centre, University College Cork (UCC), University of East Anglia (UEA), University of Bergen (UiB), University of Venice, Department of Economics (UNIVE), University of Bath (UoB), VU University Amsterdam, Institute for Environmental Studies, Universidad de Sevilla (USE).*

Hypox

Supporter: *GEO (Group on Earth Observations)/European Commission FP7*

Mission: *HYPOX is a EU funded project involving 16 partner institutions located in 11 countries in and around Europe. HYPOX is focusing on a better understanding of the occurrence of hypoxia (low oxygen conditions) in aquatic systems and the influence of anthropogenic impacts on the responsible processes.*
The scientific work focuses on capacity building for improved oxygen monitoring (continuously at high temporal resolution) at a number of target sites as well as on modeling and prediction of hypoxia and ecosystem consequences.

Black Sea related work is focusing on three sites: Istanbul Strait, Crimean Shelf and Romanian Shelf.

Black Sea Region: *Whole Black Sea Region*

Starting Date: *April 2009*

Ending Date: *April 2013*

Web-site: *www.hypox.net*

Institutions/ Organizations: *Max Planck Society for the Advancement of Science / Max Planck Institute for Marine Microbiology, AVVI, eawag, IBSS, IFM-GEOMAR, Ifremer, INGV, IOW, Technical University of Istanbul ITU, Universitaet Bremen Uni-HB, SAMS, Goeteborgs Universitet UGOT, University of Patras UPAT, GKSS, GeoEcoMar, NIOO, Koninklijke Nederlandse Akademie van Wetenschappen KNAW KNAW).*

MEECE (Marine Ecosystem Evolution in a Changing Environment)

Supporter: *European Commission FP7*

Mission: *MEECE is a European FP7 Integrated Project which aims to increase ecosystem modelling predictive capacities. Both natural and human-induced climate pressures have an impact on the structure and function of marine ecosystems. Using a combination of data synthesis, numerical simulation and targeted experiments MEECE intends to boost our knowledge and develop the predictive capabilities needed to learn about the response of marine ecosystems.*
MEECE will also develop methods to integrate the dynamic response of marine ecosystems to the combined effects of various anthropogenic and natural drivers in order to provide decision making tools to support the EC Marine Strategy, EC Maritime Policy and the EC Common Fisheries Policy.

Black Sea Region: *Whole Black Sea Region*

Starting Date: *September 2008*

Ending Date: *September 2012*

Web-site: *www.meece.eu*

Institutions/ Organizations: *PML, Universitet i Bergen, UHH, AZTI, Universitá di Bologna, Wageninen University, CEFAS, Natural Environment Research Council, IRD, Technical University of Denmark Danish Institute for Fisheries Research, Havforsking Instituttet, Institute of Marine Sciences Middle East Technical University, Hellenic Centre for Marine Research, CNRS, SAHFOS, Università del Piemonte Orientale "Amedeo Avogadro" , Bolding & Burchard, Instituto Español de Oceanografía, CEA, Syddansk Universitet, University of Cape Town.*

ODEMM (Options for Delivering Ecosystem-Based Marine Management)

Supporter: *European Commission FP7*

Mission: *The overall aim of the ODEMM project is to develop a set of fully-costed ecosystem management options that would deliver the objectives of the Marine Strategy Framework Directive, the Habitats Directive, the European Commission Blue Book and the Guidelines for the Integrated Approach to Maritime Policy. The key objective is to produce scientifically-based operational procedures that allow for a step by step transition from the current fragmented system to fully integrated management.*

Black Sea Region: *Whole Black Sea Region*

Starting Date: *March 2010*

Ending Date: *October 2013*

Web-site: *www.liv.ac.uk/ODEMM*

Institutions/ Organizations: *University of Liverpool, Hellenic Centre for Marine Research, Institute of Biology of Southern Seas, IFM, Institute of Marine Sciences Middle East Technical University, SAC, INCDM, Wageningen Institute for Marine Resources and Ecosystem Studies, National Institute of Oceanography, Israel Oceanographic & Limnological Researcher, MIR Sea Fisheries Institute, University of Thessaly, CEFAS, MLOPRS LTD, Wageningen University, Institute of Oceanology - Bulgarian Academy of Sciences, SKYE, Department of Zoology, Tel Aviv University.*

CREAM (Coordinating research in support to application of Ecosystem Approach to Fisheries (EAF) and management advice in the Mediterranean and Black Seas)

Supporter: *European Commission FP7*

Mission: *CREAM will establish an effective collaboration network among key role players in Mediterranean and Black Sea fisheries research and management. The participants in the project include national research institutes from Mediterranean and Black Sea countries with a long history and active participation in fisheries research and assessment, who provide advice to national, regional and international fisheries management organisms.*

The project will seek the active collaboration of regional and international fisheries management organisms as external participants in the project, in order to identify the gaps (in terms of data, knowledge, training, coordination) which hamper at present the full application of the Ecosystem Approach in the management of Mediterranean and Black Sea fisheries.

The project will have a strong training and capacity building component in order to help harmonize data collection and methodologies used in fisheries assessment and management in the

	Mediterranean and Black Sea. The project will serve to establish the guidelines for the application of the Ecosystem Approach to Fisheries in the Mediterranean and Black Sea, both in EU member states and third countries
Black Sea Region:	*Whole Black Sea Region*
Starting Date:	*May 2011*
Ending Date:	*May 2014*
Web-site:	http://www.cream-fp7.eu/
Institutions/ Organizations:	*Mediterranean Agronomic Institute of Zaragoza, IAMZCIHEAM (Spain), Consejo Superior de Investigaciones Científicas, CSIC (Spain), Hellenic Centre for Marine Research, HCMR (Greece), Consorzio per il Centro Interuniversitario di Biologia Marina ed Ecologia Applicata "G. Bacci", CIBM (Italy), University of Rome "La Sapienza" (Italy), Institut Français de Recherche et Exploitation de la Mer, IFREMER (France), Institut de Recherche pour le Développement, IRD (France), Instituto Español de Oceanografía, IEO (Spain), National Research Council – Institute for Coastal Marine Environment, CNR-IAMC (Italy), Institut National de Recherche Halieutique, INRH (Morocco), National Institute for Marine Sciences and Technologies, INSTM (Tunisia), Ege University Fisheries Faculty (Turkey), National Institute for Marine Research and Development "Grigore Antipa", NIMRD (Romania), Institute of Oceanology – BulgarianAcademy of Sciences, IO-BAS (Bulgaria), Federal Research Institute of Fisheries and Oceanography, VNIRO (Russian Federation), Southern Scientific Research Institute of Marine Fisheries and Oceanography, YugNIRO (Ukraine), Alexandria University (Egypt) Institute of Oceanography and Fisheries, IOR (Croatia), American University of Beirut (Lebanon), Ministry for Resources and Rural Affairs (Malta), Ministry of Agriculture, Natural Resources and Environment of Cyprus (Cyprus)*

CONCLUSIONS AND RECOMMENDATIONS

In preparing this short note on the status of the Black Sea in terms of fishery data and fishery management, a large amount of reports and documentation has been consulted. Clearly, in the Region much intellectual and practical energy is dedicated to the Sea and its situation, resources, environment, ecosystem, etc. Also, a high number of projects, commissions and other initiatives that have been, and still are, operating in the area have been examined. Although there is a long-standing dialogue between the GFCM and the Black Sea Institutions (national and international) that has never been interrupted, this has not yet produced those outcomes in the fishery domains that have often been discussed in joint meetings and agreed to in principle. It would be too long and repetitive to report here the many issues that were discussed and from which lists of priorities were produced where

most of these discussions are listed in chronological order. We are concentrating here (Annex 2) only on the recommendations issued in relation to fishery domains during the last 10 years and not only those devoted to the relationship between the GFCM and the Black Sea discussed and reported at the various session of the Scientific Advisory Committee of the GFCM and in other occasions. Special mention should also be given to the report and its recommendations drawn up by Dr. J. Caddy on 2008[14]. In Annex 2 all the recommendations drawn by different project or working groups have been included to be summarized and ranked for importance during the meeting.

As said above, many documents from other Black Sea nations and non-FAO regional institutions have been examined where several other (in many cases similar) recommendations were reported although for different situations and circumstances, especially those contemplated by the Black Sea Commission, the STEF for the Black Sea, UNEP, ICCAT, GEF, and many others, all targeting the analyses and the assessment for the improvement of the knowledge and management of the Black Sea.

In addition, it seems to us that Fishery data and applications for the Black Sea are not easily available mainly because of the absence of a regional database, structured according to certain rules. This prevents national and international experts from systematically studying phenomena in space and time essential for national and regional fishery management planning.

Another problem is that some Black Sea countries belong to international conventions with specific requirements from which they cannot derogate.

We hope that this document will stimulate a discussion of the problem and result in a concrete proposal aimed at resolving it. This could envisage an inventory of the main areas of investigation needed for a regional data collection system to enable countries to set up common management plans prepared with the collaboration of all parties concerned. In this exercise we may be assisted by the results from ranking the importance (frequency and objectives).

The ways and means of implementing the above could be through a restricted joint meeting (or by some other practical way) where the objectives would be clearly identified with all the components (definition, timetable, budget, area of investigation, etc.), in other words, a clear step-wise road map as a start up of a joint development plan. This operation will also help GFCM and countries to clear identify area of cooperation and technical assistance.

[14] Caddy J. 2008. Recent experience and future options for fisheries assessment and management in the Black Sea: A GFCM perspective. *GFCM Meeting document* GFCM/XXXII/2008/Dma.4

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ANNEX 1 – GFCM STATISTICAL BULLETIN
BULGARIA

GFCM Task 1 Matrix

Country: Bulgaria
Year: 2008
Reporting Authority: National Agency of Fisheries and Aquaculture

GSA 29: Black Sea

Number of Vessels: 656
Number of Operational Units: 43
Number of Fleet Segments: 7
Number of Fishing Gear Classes: 7

	Number of Vessels	01 Surrounding Nets	02 Seine Nets	03 Trawls	04 Dredges	05 Lift Nets	06 Falling Gear	07 Gillnets and Entangling Nets	08 Traps	09 Hooks and Lines	10 Grappling and Wounding	11 Harvesting Machines	20 Miscellaneous Gear	25 Recreational Fishing Gear	98 Other Gear	99 Gear Not Known or Not Specified	Number of OUs per Fleet Segment ▼
Polyvalent small-scale vessels without engine (<12 metres)	69		9					101	7	2							10
Polyvalent small-scale vessels with engine (<6 metres)	167		11					331		23							10
Polyvalent small-scale vessels with engine (6-12 metres)	294							489	56						1		9
Trawlers (<12 metres)																	
Trawlers (12 - 24 metres)																	
Trawlers (> 24 metres)																	
Purse Seiners (6-12 metres)	5		8														3
Purse Seiners (>12 metres)																	
Long liners (> 6 metres)	24									25							3
Pelagic Trawlers (> 6 metres)	51			56													3
Tuna Seiners (> 12 metres)																	
Dredgers (> 6 metres)																	
Polyvalent vessels (> 12 metres)	46							44					36				5
Number of OUs per Gear Class ►			8	3				16	6	8			1			1	

NB: The value in each red cell is the cumulative number of vessels of each Operational Unit pertaining to the same gear class and fleet segment (individual vessels may be included in more than one Operational Unit). Vessels within the same segment may also use more than one Gear Class.

Report generated on: 05/10/2011

GFCM statistical bulletin

TURKEY

GFCM Task 1 Matrix

Country: Turkey
Year: 2008
Reporting Authority: Ministry of Agriculture and Rural Affairs

GSA 29: Black Sea

Number of Vessels: 7104
Number of Operational Units: 11
Number of Fleet Segments: 7
Number of Fishing Gear Classes: 5

	Number of Vessels	01 Surrounding Nets	02 Seine Nets	03 Trawls	04 Dredges	05 Lift Nets	06 Falling Gear	07 Gillnets and Entangling Nets	08 Traps	09 Hooks and Lines	10 Grappling and Wounding	11 Harvesting Machines	20 Miscellaneous Gear	25 Recreational Fishing Gear	98 Other Gear	99 Gear Not Known or Not Specified	Number of OUs per Fleet Segment ▼
Polyvalent small-scale vessels without engine (<12 metres)																	
Polyvalent small-scale vessels with engine (<6 metres)	2181									2181							1
Polyvalent small-scale vessels with engine (6-12 metres)	2500							2500		2500							2
Trawlers (<12 metres)																	
Trawlers (12 - 24 metres)	330			330													1
Trawlers (> 24 metres)	130			130													1
Purse Seiners (6-12 metres)																	
Purse Seiners (>12 metres)	500	500															1
Long liners (> 6 metres)																	
Pelagic Trawlers (> 6 metres)																	
Tuna Seiners (> 12 metres)																	
Dredgers (> 6 metres)	1240				1240												1
Polyvalent vessels (> 12 metres)	223	50		250	100												4
Number of OUs per Gear Class ►		2		4	2			1		2							

NB: The value in each red cell is the cumulative number of vessels of each Operational Unit pertaining to the same gear class and fleet segment (individual vessels may be included in more than one Operational Unit). Vessels within the same segment may also use more than one Gear Class.

Report generated on: 05/10/2011

ANNEX 2 – KNOWLEDGE GAPS IDENTIFIED ON BLACK SEA FISHERIES AND RECOMMENDATIONS FROM DIFFERENT PROJECTS AND WORKING GROUPS

A) Summary of the main issues of Black Sea fisheries identified by Black Sea Transboundary Diagnostic Analysis (TDA, Black Sea Environmental Programme, (TDA 2007)

Knowledge Gaps

• Regional fish stock data is missing entirely, due to a Regional assessment methodology, and the data gathering to support this, not yet having been agreed upon.
• Fisheries statistics (landings, fishing fleet statistics, etc) and monitoring activities are fragmented and irregular at national levels. At a regional level the type and quality of data make inter-country comparisons farcical.
• There is no common regional view on criteria and methodologies for evaluation of marine habitats of importance for marine living resources or for the establishment of transboundary fishing-free zones.
• National reporting on fisheries statistics to the Black Sea Commission Permanent Secretariat is very incomplete
• No quantitative or semi-quantitative estimates are known to have been made of the contribution of illegal fishing activities to actual, rather than reported, landings.

Summary and preliminary recommendations

● Marine living resources, although renewable, are not infinite and their exploitation needs to be properly managed.
• The majority of fish species with commercial value are shared or migratory species.• Mortalities of demersal species due to eutrophication-linked hypoxic events still occur in the North West Black Sea
• The restructuring of fishing fleets as response to changing of fish stocks state, is very slow with very limited aid from governments.
• Fisheries management is applied individually by each coastal country. İn the case of shared and migratory species, no regionally agreed system exısts to match fishıng effort to stocks.
• Fisheries statistics, fish stock assessment and monitoring activities are fragmented and irregular at national level; some data and methodologies used at national level are not compatible for regional purposes.
• National fishing zones are not yet established between all coastal Black Sea countries.
• The use of non-sustainable fishing technologies (notably dregging and bottom trawling) contributes directly to the deterioration of seabed biocenoses.
• The extensive use of non-selective fishing gear (small mesh size trawls and pound nets) increases by-catches of threatened species, such as sturgeon, bluefish and turbot.
• An important threat to marine mammals in the Black Sea (notably the harbor porpoise) is by the extensive use of gill nets for catching turbot.
• Ilegal fishing practicies increase the effect of inadequate fisheries management, because they are focused on high value species, increasing existing pressure.
• Some alien species (notably Mnemiopsis leidyi) act at the food chain level and can cause a dramatic effect on the marine living resources.
• Black Sea mariculture is currently poor developed but of increasing in importance

• Spawning/nursery habitats for anadromous species have been drastically reducedby the damming of rivers, land drainage, sand extraction and maintenance ofshipping channels.
• Many lagoon and liman habitats have been physically separated from the Sea. Thequality of sediments in lagoon/liman habitats has worsened as a result ofeutrophication or toxic pollution from land based sources.
• Shelf habitats are damaged by siltation from the building of ports/harbours and coastal defence works, dragging and bottom trawling. Dumping of polluted sediments dredged from ports and microbiological pollution of shallow waters is also likely to impact coastal fisheries.

B) Recommendations and conclusion on the suitability of BSIS (Black Sea information System) data for calculation of fisheries indicators used by the Black Sea Commission to monitor Black Sea fisheries (from Raykov, 2010)

- **Indicator: Fishing fleet capacity /fishing effort (P)**

Proposed methods for fisheries fleet monitoring and control improvement
The most important role here belongs to the control bodies, and the control on IUU (Illegal,Unregulated and Unreported catches) is of major significance.
Survey of the presently used methods for fisheries monitoring, control and surveillance in theBlack Sea countries needs to be undertaken.
Analysis of these methods compared to what should be needed for optimal / sufficient input tofisheries management. Identify gaps and propose solutions in the form of deployment ofsurveillance tools.
Assess the feasibility of regional data access and exchange system for fishing vessel positionsand efforts, from technical, administrative, legal and political points of view. Issues includedata exchange formats, confidentiality, commercial sensitivity, aggregation level, and more.
Conclusions, recommendations:
One of the most important issues in the proper fishing management is the fishing effortestimation. Difficulties come from:
- some of the vessels operate seasonally (part of the time they are used only for tourism)and as a result there are significant differences between fishing days of the vessels from onesegment;
- Some fishermen use the vessels for fishing when possible – outside of their mainjob/occupation.
VMS is a cost-effective technology, but needs to be backed up by other surveillance means todetect purposeful IUU (Illegal, Unreported and Unregulated) fishing effort. On the regionallevel several control, surveillance and monitoring tools can be used together with the VMS:patrols and inspection vessels or aircraft, satellite imaging etc. VMS also extends only to thelarge fishing vessels, in many cases covering a major part of the catch but disregarding themajority of the fleet. Fishing vessel surveillance is in most cases implemented based onnational law and carried out country-wise by national authorities – needs harmonization at theregional level.

- **Indicator: Catches by major species and areas**

Due to an identified misreporting and the lack of data on IUU catch and landings the total catch amount in the Black Sea might be highly underestimated.

Recommendations
Reporting on catches needs improvement. Illegal fishery should be assessed as well.

- **Fish Stocks indicators**

  Commercial Fish Stocks (Subindicators: Number of commercial stocks; Number of assessed stocks; Number of non-assessed stocks; Percentage of non assessed / stocks of economic importance; Percentage of overfished / stocks of economic importance; Percentage of safe / stocks of economic importance; State of SSB, State of recruitment; State of exploitation, Trophic level)

  Bottlenecks/Gaps/misreporting:
  There is no Legally Binding Document on fisheries/management in force for the Black Sea. Most of the stocks are not assessed (only for sprat and turbot assessments are available for the whole Black Sea), or just separate assessments (not in a harmonised manner) exist in some countries.
  No common fishery regulation (base for fisheries management) exists in the Black Sea region.

  Recommendations:
  Dedicated surveys for stock assessments need to be carried out.

C) Recommendations of the STECF sub-group for the Black Sea

The ad-hoc Working Group on Sustainable Exploitation of Sprat and Turbot in the Black Sea, chaired by Dr. Georgi M. Daskalov met in Constanta, Romania 10-14 September, 2007 agreed on the following recommendations to be implemented in a medium term period (EC, 2007).

• To strengthen of the operational capacity of national scientific research units through improvement of methodologies and equipment, development of information systems, training and mobility of personnel.

• To procure adequate funding and support of scientific research and fisheries related monitoring programs for performing reliable stock assessment and provision of scientific advice to fisheries managers and governments.

• To agree at national and regional level of a comprehensive list of indicators for marine living resources, habitats, key species and fisheries activities; establishing of corresponding parameters to be collected by fisheries monitoring systems.

• To develop a fisheries information system through compilation of historical and present data information, and establish a system for facilitating access to the publications at the national level.

• To develop a regional network of research and information centers of fisheries and aquaculture, marine living resources habitats and biodiversity.

• To evaluate the scientific and technical implications in the Black Sea area of the EU Common Fishery Policy and European marine strategy; development of a common platform for cooperation with GFCM, ICES, ACCOBAMS, etc.

• To create an inventory of habitats and sites with national and regional importance for the Black Sea living resources and marine mammals.

The STECF EWG 11-16 recommended inter alia:

- The establishment of fishery independent scientific surveys to monitor the living resources across all national waters of the Black Sea be established including Bulgaria, Romania, Georgia, Russia, Turkey and Ukraine.

ANNEX 3 – COMPILED QUESTIONNAIRES ON BIOLOGICAL DATA COLLECTION AND ONGOING SCIENTIFIC ACTIVITIES

A) Ongoing research activities on fisheries science

Name of the project / research activity /working group	**Biological and population parameters of commercially important fish and non-fish resources in the Bulgarian Black Sea in relation to environmental conditions**
Research institutes involved	Institute of Fish Resources
Countries	Bulgaria
Coordinator name	Dr Konstantin Mihaylov
Funding Institution	Agricultural Academy, Sofia
Starting date	2008
Duration	current
Overall objective	Long-term monitoring of the biological and exploitation parameters of the main commercial fish and non-fish species and the environmental factors for their sustainable utilization and management.
Specific objectives	Determining the structure, state, biomass and distribution of basic living organisms of ecological and commercial importance: hydrochemistry, phyto-, zooplankton, macropytes, zoobenthos, fish, small cetaceans.

Name of the project / research activity /working group	**Establishment of a network on cetacean strandings monitoring and on bycatch assessment in Bulgaria (2 projects interlinked**
Research institutes involved	IFR, Varna and
Countries	Bulgaria (1st project), Bulgaria, Romania (2nd Project)
Coordinator name	Dr Konstantin Mihaylov
Funding Institution	quarters II and III (summer)
Starting date	2008-2009, 2010-2011

Duration	4 years (2 years each)
Overall objective	Research and conservation of cetaceans
Specific objectives	Strengthening the stranding and bycatch network; Organise onboard monitoring of cetacean bycatch; Collect tissue samples from freshly dead cetaceans; Raising the awareness of fishermen and general public about the need of joint activities on protecting the cetaceans; define most hazardous marine areas in relation to increased cetacean mortality events.

Name of the project / research activity /working group	**Strengthening the regional capacity to support the sustainable management of the Black Sea Fisheries (SRCSSMBSF)**
Research institutes involved	National Institute for Marine Research and Development "Grigore Antipa" Constanta, Romania (NIMRD), Institute of Fishing Resources, Varna, Bulgaria (IFR), Institute of Oceanography of the Bulgarian Academy of Science, Varna (IOBAS), Southern Research Institute of Sea Fisheries and Oceanography (YugNIRO), Kerch, Ukraine, Central Fisheries Research Institute, Trabzon (CFRI), Black Sea Technical University, Marine Science Faculty, Trabzon (KTU-MSF)
Countries	Romania, Bulgaria, Ukraine and Turkey
Coordinator name	Dr Gheorge Radu
Funding Institution	Joint Managing Authority of the Joint Operational Programme "BLACK SEA 2007-2013" European Union
Starting date	2011
Duration	2 years
Overall objective	The major task is to develop methods for joint-regional stock assessment for the Black Sea that that will ultimately enable researchers to determine the condition of stocks and advice on management strategies.
Specific objectives	Harmonization of methods and tools to assess the present state of fish stocks by scientific surveys, holistic models; - Alignment of the common methods for sampling, processing and interpretation data from fisheries and stock assessment using analytic models; - Awareness of the fishery organizations and decision–makers from national fisheries regarding the need to use in the management strategies of the advice from research and joint – regional stock assessment.

Name of the project / research activity /working group	**National Program for Fisheries Data Collection**

Research institutes involved	National Institute for Marine Research and Development "Grigore Antipa"Constanta
Countries	Romania
Coordinator name	Dr. Gheorghe RADU
Funding Institution	EC/Romanian NAFA
Starting date	2011
Duration	3 years
Overall objective	Collection, management and use of data in the fisheries sector, support for scientific advice regarding the Common Fisheries Policy.
Specific objectives	In the NDPC 2011-2013, NIMRD Constanta, will be involved in the following activities: - evaluation of the fishing sector - data collection and processing on economic variables; - data collection and processing on biological metier related variables; - data collection and processing on recreational fisheries; - data collection and processing on biological stock – related variables; - data collection and processing on transversal variables; - research surveys at sea; - evaluation of effects of the fishing sector on the marine ecosystem; - management and use of data; - participation with specialists in the co-ordination meetings

Name of the project / research activity /working group	**Strengthening the regional capacity to support the sustainable management of the Black Sea Fisheries (SRCSSMBSF)**
Research institutes involved	National Institute for Marine Research and Development "Grigore Antipa"Constanta;Institute of Fishing Resources, Varna, Bulgaria (IFR) ; Institute of Oceanography of the Bulgarian Academy of Science, Varna (IOBAS); Southern Research Institute of Sea Fisheries and Oceanography (YugNIRO), Kerch, Ukraine Central Fisheries Research Institute, Trabzon (CFRI), Black Sea Technical University, Marine Science Faculty, Trabzon (KTU-MSF);
Countries	Romania, Bulgaria, Ukraine, Turkey
Coordinator name	Dr. Gheorghe RADU
Funding Institution	EU - JOP Black Sea
Starting date	2011
Duration	2 years
Overall objective	Cooperation between the Black Sea riparian countries for knowing and rationally managing the marine ecosystem and its resources, carrying out diagnostics of fish stocks status as well as advice on management strategies. The major task is to develop methods for joint-regional stock assessment for the Black Sea that will ultimately enable researchers to determine the condition of stocks and advice on management strategies.

Specific objectives	Harmonization of methods and tools to assess the present state of fish stocks by scientific surveys, holistic models;- Alignment of the common methods for sampling, processing and interpretation data from fisheries and stock assessment using analytic models;- Awareness of the fishery organizations and decision–makers from national fisheries regarding the need to use in the management strategies of the advice from research and joint – regional stock assessment. C12

Name of the project / research activity /working group	Coordinating research in support to application of Ecosystem Approach to Fisheries (EAF) and management advice in the Mediterranean and Black Seas - CREAM
Research institutes involved	Mediterranean Agronomic Institute of Zaragoza, IAMZ CIHEAM (Spain). Coordinator 21 institutes/ NIMRD Constanta (partner) -Dr. Eugen ANTON
Countries	15 countries
Coordinator name	J. Lleonart (Institut de Ciències del Mar, Barcelona)
Funding Institution	EU - FP7
Starting date	2011
Duration	4 years
Overall objective	To set up the basis for a future network of research organisations to coordinate fisheries research for the effective application of the eaf in Mediterranean and Black Seas
Specific objectives	1. Harmonizing data collection and data exploitation 2. Harmonizing assessment methodologies 3. Dialog scientists / international bodies 4. Developing recommendations to improve cooperation 5. Dissemination

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Name of the project / research activity /working group	**Inventory of species using the scientific fishing and establishing of the populations dynamic using the tagging**
Research institutes involved	National Institute for Marine Research and Development "Grigore Antipa"Constanta
Countries	Romania
Coordinator name	dr. Valodia Maximov
Funding Institution	European funds - POS -Environment
Starting date	2011
Duration	1 year
Overall objective	Inventory of species using the scientific fishing in ROSCI0066 - Danube Delta marine zone and establishing of the populations dynamic using the tagging
Specific objectives	1. Scientific fishing; 2. Establising the presence of Natura 2000 species; 3. Capture of Natura 2000 species, tagging and re-capture; 4. Establishing the dynamic of Natura 2000 fish population

Name of the project / research activity /working group	**Optimization of accounting fishing systems with practical application to estimate the abundance of commercial fish species of the Black Sea and development of the methods for the determination of coefficients of catchability accounting fishing gear used in the coastal waters of the Black Sea**
Research institutes involved	Russian Federal Research Institute of Fisheries and Oceanography (VNIRO).
Countries	Russia
Coordinator name	Elena N. Kuznetsova, Principal Scientist, Laboratory of fish ecology, Department of industrial fishing
Funding Institution	Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Starting date	2010
Duration	2 years
Overall objective	Optimization of accounting fishing systems with practical application to estimate the abundance of fishing and the development of the methods for the determination of coefficients of catchability accounting gear
Specific objectives	Optimization of accounting fishing systems to estimate the abundance of commercial fish species, assessment of the impact of active fishing gear on benthic biocenoses, the development of the methods for the determination of coefficients of catchability accounting gear

Name of the project / research activity /working group	**The study and monitoring of the status of aquatic biological resources and coastal ecosystems of the Black Sea in areas exposed to the most intense anthropogenic impact and proposals development for the conservation of aquatic biological resources and the improvement of coastal ecosystems state of in these waters**
Research institutes involved	Krasnodar branch of Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Countries	Russia
Coordinator name	Ludmila G. Bondarenko. The Director of the Krasnodar branch of Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Funding Institution	Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Starting date	01.01.2010 - 31.12.2011
Duration	Permanent (seasonal observation)
Overall objective	Assessment of food reserve and its trends changes in the Russian area of the Black Sea, including the estuaries
Specific objectives	Evaluation of the Black Sea valuable fish species' juveniles food supply

Name of the project / research activity /working group	**Monitoring of abiotic factors of the environment of aquatic bioresources in the Russian area of the Black Sea**
Research institutes involved	Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Countries	Russia
Coordinator name	Mikhail I. Kumantsov, th Deputy of the Director
Funding Institution	Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Starting date	01.01.2010-31.12.2012
Duration	Permanent (seasonal observation)
Overall objective	Assessment of nutrients content and its trends changes as the basis of bioproductivity in the Russian area of the Black Sea
Specific objectives	Zoning and allocation of coastal areas, the most favourable for the development of mariculture

Name of the project / research activity /working group	**Monitoring of the commercial, non-traditional and potentially commercial invertebrates, algae and sea grasses stocks status in the Russian area of the Black Sea**
Research institutes involved	Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Countries	Russia
Coordinator name	Mikhail V. Pereladov. Head of Laboratory of coastal research, Department of the fish hydrobiology
Funding Institution	Russian Federal Research Institute of Fisheries and Oceanography (VNIRO)
Starting date	01.01.2010-31.12.2012
Duration	Permanent (seasonal observation)
Overall objective	Evaluation the current status of stocks dynamics of aquatic bioresources of the Russian part of the Black Sea, including the Black Sea estuaries, regularities of their reproduction and multiyear tendencies of their changes
Specific objectives	Delivering recommendations on harmonious exploitation of invertebrates, algae and sea grasses taking into account the role in the rehabilitation of aquatic biological resources of the Black Sea

Name of the project / research activity /working group	**Turbot Fisheries and Cetacean Bycatch in the Turkish part of the Black Sea**
Research institutes involved	Turkish Marine Reserach Foundation is an NGO and involve several marine conservation project
Countries	Turkey
Coordinator name	Bayram ÖZTÜRK- Arda TONAY

Funding Institution	Turkish Marine Research Foundation
Starting date	2009
Duration	3 years
Overall objective	To protect marine mammals and marine biodiversity
Specific objectives	To reduce and minimize cetaceans bycatch in the region

Name of the project / research activity /working group	**BlackSea Anchovy**
Research institutes involved	Middle East Technical University Institute of Marine Sciences + Ministry of Food, Agriculture and Livestock Centeral Institute of Fisheries Reserach
Countries	Turkey
Coordinator name	Ali Cemal Gucu
Funding Institution	TUBITAK
Starting date	40801
Duration	4 Years
Overall objective	To asses anchovy stocks in the Black Sea
Specific objectives	Determine overwintering behavior of anchovy and optimize acoustic surveys accordingly

Name of the project / research activity /working group	**TCP/TUR/3202 (D)-Recovery of Sturgeon Population in Turkey: Habitat Assesment and Restocking**
Research institutes involved	Whole Black Sea Countries and related Scientific and Public Organization and Marine Faculties
Countries	Turkey
Coordinator name	Dr. Hayri Deniz, Dr. Atilla ÖZDEMİR
Funding Institution	FAO
Starting date	January, September and October, 2011
Duration	three 2 days
Overall objective	"REGIONAL WORKSHOP ON THE TURKISH ACTION PLAN FOR REHABILITATION OF NEAR EXTINCT STURGEONS AND DEVELOPMENT OF A BLACK SEA PERSPECTIVE".
Specific objectives	

Name of the project / research activity /working group	**Determination of Bycatch rates**

Research institutes involved	KTU Faculty of Marine Science
Countries	Turkey
Coordinator name	Prof. Dr. Ertug DUZGUNES
Funding Institution	University Research Fund
Starting date	2000
Duration	3 yrs
Overall objective	decrease bycatch rates
Specific objectives	produce scientific advice to the Ministry

Name of the project / research activity /working group	**Stock assessment of Rapana**
Research institutes involved	KTU Faculty of Marine Science
Countries	Turkey
Coordinator name	Prof. Dr. Ertug DUZGUNES
Funding Institution	University Research Fund
Starting date	2011
Duration	2 yrs
Overall objective	estimating stock size on regional basis
Specific objectives	compile data for STECF workshops, scientific advice to the Ministry

Name of the project / research activity /working group	**Biological data collection**
Research institutes involved	KTU Faculty of Marine Science
Countries	Turkey
Coordinator name	Prof. Dr. Ertug DUZGUNES
Funding Institution	University Research Fund

Starting date	1995-…
Duration	ongoing
Overall objective	
Specific objectives	compile data for STECF workshops, scientific advice to the Ministry

B) Biological data collection

Length/age composition of landings																		
Country	**Anchovy**		**Sprat**		**Horse mackerel**		**Turbot**		**Red mullet**		**Whiting**		**Bonito**		**Piked dogfish**		**Rapa whelk**	
	Starting date	Fleet segment*	Starting	Fleet segm.	Starting date	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.
Romania	1980	PT	1980	PT	1980	PT	2003	FN	2008	PT	1990	PT			2008	PT		
Romania	1980	FPN	1980	FPN	1980	FPN			2008	FPN	1990	FPN						
Bulgaria	1950s, 1978- more detailed data	PT, FPN	1950s	PT	1950s	PT, FPN	2010-2011	FN			1970s	PT					1990s	OTB, Dredge
Eastern Black Sea of Turkey	2005	PS	2008	PT	1990	PS, OTB, FN	1990	OTB, FN	1990	OTB, FN	1990	OTB, FN	2000	PS, FN			2000	BT (Beam
South-Eastern Black Sea[1]	1990	PS			1995	PS			1995	FN	1995	FN					1990	OTB(dredge)
Discards data	**Anchovy**		**Sprat**		**Horse mackerel**		**Turbot**		**Red mullet**		**Whiting**		**Bonito**		**Piked dogfish**		**Rapa whelk**	
	Starting date	Fleet segm.	Starting	Fleet segm.	Starting date	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.	Starting	Fleet segm.
Romania											2008	PT						
Romania											2008	FPN						
Eastern Black Sea of Turkey	2005	PS							2005	OTB	2005	OTB						
Southern Black Sea coasts[1]	2000	PS			2000	PS			2000	OTB, FN	2000	OTB, FN						

Fleet segment*: Bottom trawl (OTB), Pelagic trawl (PT), Purse seine (PS); Gillnets and Trammel nets (FN); Longlines (LL); Pound nets (FPN)

[1] Prof. E. Duzgunes KTU Faculty of Marine Science

C) Surveys

Country	**Bulgaria**	**Bulgaria**	**Bulgaria, Romania**	**Bulgaria**
Area	Bulgarian Black Sea	Bulgarian Black Sea	Bulgarian Black Sea	Bulgarian Black Sea area - northern and southern regions
Survey name	Ichthyoplankton survey for determining recruitment and spawning stock biomass	Stock assessment of pelagic fishes	Establishment of a network on cetacean strandings monitoring and on bycatch assessment in Bulgaria	Assessment of environmental impact resulting from rapa whelk (R. venosa) harvesting by beam trawling in definite zones of the Bulgarian Black Sea
Type, e.g. acoustic, pelagic, trawl, other (specify)	Ichthyoplankton survey applying Daily Egg Production Method (DEPM) developed by California (USA) scientific team in 1980s	Acoustic survey	Cetacean Stranding Network and Onboard Observer Programme	Beam trawl
Quarter of the year	quarters II and III (summer)	quarters II, III and IV (summer, autumn)	quarters II and III (summer)	3rd quarter (summer months)
Years	1989-1991	1984-1992	2008-2009, 2010-2011	1999
Target species	Anchovy, Horse mackerel, Red mullet	sprat, whiting, anchovy, horse mackerel	Cetaceans, Turbot	Rapa whelk (R. venosa), Blue mussel (M.
Institutes involved	IFR, Varna	IFR, Varna	IFR, Varna, NIMRD "Grigore Antipa", Constanta	National Agency of Fishery and Aquaculture, Institute of Fish Resources; Private Company
General features (add a short description of the sampling design, sampling gear, n. of transects, n. of stations, etc.)	The ichthyoplankton survey aimed at determining adult fish reproductive parametres: batch fecundity, spawning frequency, sex ratio as well as ichthyoplankton data - egg production, larvae and juvenile abundance during peak summer spawning season of warm-water species. The above biological information was included in the analyses to finally obtain estimate of the spawning stock biomass and juvenile abundance. The sampling was carried out by Bogno paired net, pelagic trawl and small pelagic trawl hauls. The survey encompassed the waters of Bulgaria up to 100 nmi from coastline. The assessment of egg and juvenile abundance was conducted through swept area method including stratification of the sea area. The number of ichtioplankton and oceanographic stations were about 60 per year, 20 pelagic trawl hauls and 10 hydrobiological samplings.	The main goal of the hydroacoustic survey was to define the biomass of sprat, whiting, anchovy, horse mackerel and distribution of their feeding schools in the Bulgarian Black Sea area through 22 pelagic trawl hauls, 32 hydrobiological and hydrological stations. The surveys were carried in different months during the period to test the species seasonal distribution variations, schooling pattern and opportunities different seasons give for biomass assessment. The stock biomass assessment was conducted through stratification of the sea area. While conducting the echometric survey by means of a transect scheme designed beforehand the results of the echointegrator were recorded in every mile passed through.	The research is aiming at cetacean research and conservation. The sampling design includes development and maintenance of cetacean stranding network together with organising and onboard monitoring of cetacean bycatch off the Bulgarian Black Sea coast. The observer study was the fisrst organized one in Bulgaria, the trips sampled were carried out off the central coast of the Bulgarian Black Sea area, the boats accompanied operated in rather offshore waters, applying comparatively higher fishing effort.	The survey in 1999 included research of impact on bottom communities while beam trawling in predefined sectors. The number of zones was 4 encompassing 25 stations. The objectives of the surveys was to define the impact of rapa whelk on the blue mussel; assessment of rapa whelk and blue mussel stocks; effect of trawling and dredging on benthic communities; conclusions for bottom trawling with regard to protecting benthic organisms together with utilisation of rapa whelk. The last rank second by capture production after the sprat captures during recent years.

C)Surveys (continued)

Country	**Bulgaria**	**Romania**	**Romania**	**Romania**	**Romania**
Area	Bulgarian Black Sea area - northern and southern regions	Romanian Black Sea	Romanian Black Sea	Romanian Black Sea	Romanian Black Sea
Survey name	Estimate of Blue mussel (M. galloprovincialis) and rapa whelk (R. venosa) and bottom dredges' impact on benthic communities in the northern and southern	Bottom trawl survey	Pelagic trawl survey	juveniles survey	ichtioplancton survey
Type, e.g. acoustic, pelagic, trawl, other (specify)	Bottom dredges	Bottom	Pelagic	pelagic	
Quarter of the year	3rd quarter (summer months)	2and 4	2and 4	2 and 3	2 and 3
Years	2005	2003-2011	2003-2011	1995-2008	1995-2008
Target species	Rapa whelk (R. venosa), Blue mussel (M.	turbot, whiting, dogfish	sprat	sprat, whiting, anchovy, horse mackerel	sprat, whiting, anchovy, horse mackerel
Institutes involved	National Agency of Fishery and Aquaculture, Institute of Fish Resources; Private Company	NIMRD "Grigore Antipa" Constanta	NIMRD "Grigore Antipa" Constanta	NIMRD "Grigore Antipa" Constanta	NIMRD "Grigore Antipa" Constanta
General features (add a short description of the sampling design, sampling gear, n. of transects, n. of stations, etc.)	The survey in 2005 included research of impact on bottom communities while bottom dredging in predefined sectors and to compare these results with previous ones. The numbe of fields was 6 with overall 70 stations. The objectives of the surveys was to define the impact of rapa whelk on the blue mussel; assessment of rapa whelk and blue mussel stocks; effect of trawling and dredging on benthic communities; conclusions for bottom trawling with regard to protecting benthic organisms together with utilisation of rapa whelk. The last rank second by capture production after the sprat captures during recent years.	35-40 trawlings	35-40 trawlings	15 stations	15 stations

C)Surveys (continued)

Country	**Turkey**	**Turkey**	**Turkey**	**Turkey**	**Turkey**
Area	Eastren Black Sea	Eastren Black Sea	Westrn Black Sea	Westrn Black Sea	Eastren Black Sea
Survey name	Monitoring of trawl fisheries in the Black Sea	Monitoring of purse seiner vessels fisheries in the Black Sea	Stock assessmant of demersal fish species	The Western Black Sea (*Sinop -Cide)* distributed on the Striped Venus Estimated stocks on the A Preliminary Study	From Eggs to Adults of Horse Mackeral Populations in the Trabzon Coasts: Age, Growth, Mortality and Reproduction
Type, e.g. acoustic, pelagic, trawl, other (specify)	Experimantal bottom trawl and fisherman bottom trawl	with purse seine net from landing	Experimantal bottom trawl	hydraulics dredge and mechanics	Plankton nets and landing surveys for purse-seine
Quarter of the year	7	7	3	2	2
Years	2005-2011	2005-2011	2011-2013	2011-2012	2011-2012
Target species	whiting, red mullet, turbot, bluefish, horse mackeral, sprat	anchovy, horse mackeral, bonito	whiting, red mullet, turbot, sprat	Striped Venus (*Chamelea gallina)*	Horse mackeral
Institutes involved	CFRI and 19 May University, Biology Department	CFRI	CFRI, İstanbul Un. Marine Faculty	CFRI	CFRI
General features (add a short description of the sampling design, sampling gear, n. of transects, n. of stations, etc.)	Two years expremantal seasonally, sub region and vertically survey and each trawl fishing season with fishermans boat monthly surveyin the sub fishing areas.	Weekly sampling in the port and port office whole Small pelajic fishing season	Field studies will be carried out in 2011, 2012 and 2013. Two trips will be launched to the study area. Taking into account the migration and bioecological properties of these target commercial fish species, the most appropriate sampling period has been determined for spring period (15 April-15 May): *the period of reproductive stocks migrate to the nearest coastal waters* and for autumn period (late September-October): *the recruitment period*. This research project will be conducted in the Black Sea; within the fishery sub regions K1-K3-K5-K7: the area between İğneada and K. Ereğlisi "*Classified sampling procedure"* (stratified sub regions) which is applied by EU States to estimate fish stocks will be used. In addition to experimental surveys; monthly sampling studies will be carried out to determine catch effort and amount of landed fish regarding the commercial turbot fishery in the same region.	The research area will be separated five main regions (Sinop-İnceburun, Sinop-Ayancık, Kastamonu-İnebolu, Kastamonu-Doğanyurt ve Kastamonu-Cide). Studies in each region will be carried out in 0-20 m depth and this depth will be broken down into bottom layer in "0-5 m, 5-10 m, 10-15 m and 15-20 m". Within a year; in the seasonal studies 20- shot and in the summer studies for the stock detection 100-shot totally 140- shot are considered.	The metodologiies have two surveys which one is spawning period, the second is around whole year especially spring, winter and automn. For egss and larva are used plankton nets and the sampling forom May to September each 15 days vertical and horizantal hauls. For adults an juvenile surveys used fisherman purse seine which is landing each week all yaers.

C)Surveys (continued)

Country	**Turkey**	**Turkey**	**Turkey**	**Turkey**	**Turkey**	**Turkey**
Area	South of the Turkish Black Sea Coasts	Middle of the Turkish Black Sea Coasts (Samsun)	Eastren Black Sea	South of the Turkish Black Sea Coasts	Eastren Black Sea	South Black Sea (east and west)
Survey name	Stock Assessment of Black Sea Anchovy Using Acoustic Method and Establishing a Monitoring Model for National Fisheries Data Collection Program	European Lifestyle and Marine Ecosystems (ELME), Work Package 5: Unsustainable Extraction of Living Resources. Case study 2: Trawl and Sea Snail Fisheries in Samsun, Black Sea Coast of Turkey.	An Investigation on Recruitment of Hatchery-Reared Black Sea Turbot Juveniles to Natural Stocks and Its Bioecological Characteristics		Using of the alternative gear against to beam trawl for rapa whelk fisheries	BlackSea Anchovy
Type, e.g. acoustic, pelagic, trawl, other (specify)	Acoustic and landing surveys	Depend on the fisheries surveys bottom and beam trawl and field of questionnaire surveys	Recaptured using different types of commercial fish nets (bottom trawls, gill-nets and purse-seine) and by the research vessel of CFRI (bottom trawl).	Recaptured using different types of commercial fish nets (bottom and pelagic trawls, gill-nets and purse-seine)	Three diffrent pot desing	Acoustic and pelagic trawl
Quarter of the year	4	2	6	7	2	4 (Nov-Dec) and 1 (Jan - Feb)
Years	2011-2014	2004-2006	1999-2005	2006-2013	2006-2007	2011 -
Target species	Anchovy	whiting, red mullet, turbot and sea snail (rapa whelk)	turbot	Acipenser sp (*A. gueldenstaedtii, A. stellatus, Huso huso*)	Rapa whelk (*Rapana thomasiana*)	Anchovy, horse mackerel,sprat
Institutes involved	CFRI and Erdemli Institute of Marine Sciences METU	EU Sixth Scientific Framework Programme, No: 505576 and CFRI	CFRI and JICA	CFRI, FAO/TCP	CFRI and Fisheries Cooperatives	Middle East Technical University Institute of Marine Sciences + Ministry of Food, Agriculture and Livestock Centeral Institute of Fisheries Reserach
General features (add a short description of the sampling design, sampling gear, n. of transects, n. of stations, etc.)	Biological requirements of the anchovie undergoes seasonal migrations and aggregates on the southeast Black Sea in winter. Almost 90% of the stock is accumulated within an area not larger than 1% of surface area of the Black Sea. One of the goals of the project is to set the borders of the over-wintering area and to determine the environmental overwintering conditions. The next goal is to assess the size of the over wintering stock using hidro-acoustic techniques and landing surveys in the fishing season. The results are planned to incorporate in a stock assessment model tested and modified for the Black Sea anchovy.	Data sources: Turkish public statistics, reports and articles (mainly in	Totally 28176 tagged juveniles were released from 15 different stations to the coastal area through Rize-Pazar and Sinop-Akliman, at 20 different periods between March 1999 and December 2002. The tags used in fish tagging were in 10 different colors, made up of plastic (polyethylene) and having special marks. All juveniles were produced in hatchery unit of Trabzon Central Fishery Research Institute using matures collected from eastern Black Sea. The mean length and weight of tagged juveniles before releasing was 13.9 (6.5-25.7) cm and 59.8(4.6-257.1) g respectively. The theoretical hatching date for individuals of 0+ age group was accepted as May 15.	In this study, as regional sturgeon stocks were weakened severely, direct and planned sea/field surveys could not be done for sample collection. A strategy to provide a strong organization and to implement good information flow is used for sample collection. A work-flow chart about sample collection (Communication network and Data flow Diagram): According to this plan; (1) Direct collaboration is made with professional fishermen and 'Fishing Cooperatives' operating in important fishing localities along the Black Sea coast. This *information network* was especially used for reporting the information about the sturgeons which accidentally enter the nets of small coastal fishermen and trawlers. (2) 'Local Liaison Team' was established for the project with the staff working in fisheries activities at Provincial and District Directorates of Agriculture (*Rize, Giresun, Ordu, Çarşamba, Samsun, Bafra, Karasu*) at localities where these fish are historically the most common along the Black Sea coast. Thanks to this teamis most effective in catching whelks than other pot types. ht in fishing areas and being sold illegally as well as the live or dead fish material provided directly by the fishermen. (3) Project researchers planned direct field observation studies in order to obtain information on adult fish population during spawning migration (in spring) especially on the Yeşilırmak, Kızılırmak, and Sakarya rivers, and on juvenile individuals in post-spawning period (in Autumn). And also hatchery rearing juvenile are released to the main three rivers and recapture coastal fishermen nets. Also It carried out rivers habitat surveys.	The study was conducted monthly in Trabzon, seasonally in Samsun and summer in Ordu From April 2006 to February 2007 as using 465 pots in three difrent pot desing. It's tested whether there was a difference in CPUE between depths (5-10m, 15-20m and 25-30m) and between soak times (1 day, 3 days and 6 days) in each three different pot designs in catching whelk in the Black Sea of Turkey. In whelk pot type 2, it's assessed catch per unit effort (CPUE, expressed as kg or individual per pot) on bait types (whiting+ mussel, ray etc.) and pot colors (black, white, blue and green). Also it's studied prey-predator relationships and socio-economic structure of rapa whelk fisheries. Total average CPUE (kg and indv. per pot) was 0.57 kg and 19 indv. for pot type 1; 0.31kg and 10 indv. for pot type 2 and 0.31kg and 11 indv. for pot type 3 pot/a day in Trabzon along the year. In summer, it was 1.02 kg and 39 indv. for pot type 1; 0.56 kg and 24 indv. for pot type 2 and 0.56 kg and 29 indv. for pot type 3. Whelk pot type 1 is most effective in catching whelks than other pot types.	Transects perpendicular to the coast with 8 n.miles intervals in the west and 4 n.miles in the east covering entire continental shelf (20-200m) from Igneada to Hopa

C)Surveys (continued)

Country	**Turkey**	**Turkey**	**Turkey**
Area	Southern Black Sea Coasts	Southern Black Sea Coasts	South-Eastern Black Sea coasts
Survey name	Determination of Bycatch rates	Stock assessment of Rapana	Biological data collection
Type, e.g. acoustic, pelagic, trawl, other (specify)	All types of fishing gear	dredge	OTB, FN,PS
Quarter of the year			
Years	2000-2013	2011-2013	ongoing
Target species	Anchovy, horse mackerel, whiting, rapa whelk, baby clam, mullets	Rapa whelk	Anchovy, horse mackerel, whiting, red mullet
Institutes involved	KTU Faculty of Marine Science	KTU Faculty of Marine Science	KTU Faculty of Marine Science
General features (add a short description of the sampling design, sampling gear, n. of transects, n. of stations, etc.)	Experiemental gears and commercial gears are used in open fishing sites	Swept area method is applied in certain grids, besides catch and effort data is collected with length, weight and frequency data, growth parameters are determined using length based models	Samlings are carried out from the fishing gear used in commercial vesels. Total regional catch data provided from National Satatistical Association. VPA is used for short and long term assessments under STECF working group activities annually

ANNEX 4 – SAMPLE OF COMPILED QUESTIONNAIRES ON STATISTICAL AND INFORMATION SYSTEMS FROM TURKEY

Questionnaire 1- Fishery Statistics and Information Systems

First meeting of the GFCM Working Group on the Black Sea

Assessment of the status and the potentialities of

Fishery Statistics and Information systems in the Black Sea Area

Country : Romania

Note: This Questionnaire is not meant to be filled in by the respondent (national officer) on his own, but is intended to be completed in collaboration with the GFCM Secretariat staff who will contact him/her via telephone, E_Mail or other means.

Section A

Part 1: The national fishery statistical structure and resources.

S1 - Institution officially responsible for the **overall** statistical functions in Romania: *(not limited to Fishery)*

S2 - Institution (s) officially responsible for National Fishery Statistics (hereafter called: “Statistical Office”):

S3 - Institutional level of the Statistical Office:

Department of:	
Service	
Office	
Other (specify)	

S4 – Organigramme of the Statistical Office (just list the positions):

Please attach a graphical organigramme if available.

S5- Full address of the Statistical Office including telephone and FAX numbers, E_Mail, Home page, etc.:

Comments:

Part 2 – Data collection and dissemination

S6 – Is your country a member (participating) of Regional or sub-Regional Programmes dealing with Fishery Statistics and Information systems?

If Yes, state which programme:

S7 – Is your country a member of any FAO/UN Projects operating in the region where Fishery Statistics and Information Systems are one of the main topics?

If Yes, state which project/programme

S8 – Does your Office regularly participate in meetings organized by:

FAO	GFCM	EC	ICCAT	GEF	UNEP	Other

S9 – Does your Office regularly report Fishery Statistics to FAO/GFCM ?

Yes	

S10 – Question: Does your Office regularly report Fishery Statistics to regional/international organizations other than FAO/GFCM ?

Yes	

Part 3 Human Resources

S10 – Number and qualifications of staff permanently employed in the Statistical Office:

Director		
Professional Statistician		
Professional Data processing/system analyst		
Other professional scientists		
Statistical clerks		
Field Recorders		
Data Clerks		
Drivers		
Administrative staff		
Other (Specify)		

S11- Does the Statistical Office have a dedicated data centre and adequate staff? (Y/N)

S12 – If yes, are the processing tools based on stand-alone personal computers or on a Client/Server environment?

S13 – Do all the workstations make full use of Internet connectivity ? (Y/N)

S14 – Do other institutions in the country collect data on fishery statistics? (Y/N)

S15 – Are training programmes regularly organised for the staff? (Y/N)

S16 – Are national fishery statistical databases or yearbooks produced regularly? (Y/N)

Name and position of the officer completing the Questionnaire.

Date:_____ Place:_____

Questionnaire 1- Fishery Statistics and Information Systems

First meeting of the GFCM Working Group on the Black Sea

Assessment of the status and the potentialities of

Fishery Statistics and Information Systems in the Black Sea Area

Country:

Note: This Questionnaire is not meant to be filled in by the respondent (national officer) on his own, but is intended to be completed in collaboration with the GFCM Secretariat staff who will contact him/her via telephone, E_Mail or other means

Section B: The National Fishery Statistical Survey System – Fleet Statistics.

S1 - Are there any fishery statistical survey programmes in place?

S2 – Please specify if Ongoing (O), Completed(C), Planned (P), and if the whole country is covered or just a part of it. Specify also the nature of the survey (s) i.e., main surveys or pilot survey(s).

1	Fishing Fleet Statistics Industrial/Commercial Fishery	
2	Fishing Fleet Statistics Artisanal/Small-scale Fishery	
3	Catch and effort Survey Industrial/Commercial Fishery	
4	Catch and Effort Survey Artisanal/Small-scale Fishery	
5	Cost and Earning Survey Industrial/Commercial Fishery	
6	Cost and Earning Survey Artisanal/Small Scale-Fishery	
7	Fishery Labour force/manpower	

8	Other/Specify	

S3 – Which Department/Institutions are responsible for implementing the Survey(s)?

1	
2	
3	
4	
5	
6	
7	
8	
Other	

S4 - Last Completed Fishery Census

Has a Census of **Industrial /Commercial** fishing vessels ever been conducted ?	If yes, when? No	
Has a Census of **Artisanal/Small-scale** vessels ever been conducted?)	If yes, when? No	
Was it (were they) organised in collaboration with the National Statistical Office and Research Institute?	yes, when? No	
Did any international expert/consultant participate in the exercise?	yes, when? No	

S5 - What are the main data elements (i.e., **Name of vessel, GT, Registration No,** etc.)? Enumerate below.

S6 – Is the Census data regularly updated ? How (put a cross):

Micro surveys	
Through the Catch and Effort Surveys	
Ad hoc checking (Coverage Check Survey)	
Fishermen reporting changes	
Other	

S7 - What has the Census produced (apart from listing, and other structural, administrative and operational data, etc)?:

Computerised Fishing Vessel Register	
Sampling Frame for Catch and Assessment Surveys	
Sampling Frame for other surveys	
Fishing Fleet National Yearbook	
Web Presentation of the National Fleet	
Data Dissemination to Regional and international entities	
Other:	

S8 – Is the entire fleet licensed (holding a Fishing License)?

Industrial/Commercial Fishery	
Artisanal/Small Scale Fishery	

S9 – In implementing the Census, has a **codification and data definition system** been developed ? (Y/N)

S10 – Is the codification and data definition system in line with the National Statistical Office? (Y/N)

S11 – Is the codification and data definition system compliant with FAO/GFCM/EU standards? (Y/N)

S12 –Has a National Statistical and Information Computerised system been developed or acquired?

S 13 - If Yes, please name it.

S14 – Are Census data used to design the Catch and Effort Survey?

If Yes, how?:

Further comments:

Name and position of the officer completing the Questionnaire.

Date:_____ Place:_____

Questionnaire 1- Fishery Statistics and Information Systems

First meeting of the GFCM Working Group on the Black Sea

Assessment of the status and the potentialities of

Fishery Statistics and Information Systems in the Black Sea Area

Country :

Note: This Questionnaire is not meant to be filled in by the respondent (national officer) on his own, but is intended to be completed in collaboration with the GFCM Secretariat staff who will contact him/her via telephone, E_Mail or other means

Section C: The National Fishery Statistical Survey System – Catch and Effort Survey (CAS)

S1 - Are there any Catch and Effort fishery statistical survey programmes in place?

S2 – Please specify also if Ongoing (O), Completed (C), Planned (P), and if the whole country is covered or just a part. Specify also the nature of the survey(s) i.e., main survey or pilot survey(s).

1	Catch and Effort Survey **Industrial/Commercial Fishery**	
2	Catch and Effort Survey **Artisanal/Small-scale Fishery**	
3	Catch Assessment survey at **Market place** for Industrial /Commercial Fishery	
4	Catch Assessment Survey for **standing /passive Gear**	
5	Marketing Survey	
6	Other/Specify	

S3 – Which Department/Institutions are responsible for implementing the survey (s)?

1	
2	

3	
4	
5	
6 Other	

S4 – Catch and Effort Survey (CAS) for <u>Industrial/Commercial Fishery</u>

S 5 - Has a CAS for Industrial/Commercial fishery ever been conducted in your country?

if yes, who carried out the last CAS exercise? (institution, service,...)	

If a CAS for Industrial/Commercial Fishery is being undertaken:

S 41 - Does it cover the whole fleet or part of it ? (W/P)

Does it cover the whole country or only part of it ? (W/P)

S 42 - Is a LogBook Census approach being applied? (Y/N)

Is a LogBook Sampling approach being applied? (Y/N)

S 43 - Data collection methods used:

1. The logbooks are compiled by recorders at the landing place
2. The logbooks are distributed to fishermen, compiled by them and handed to the office by the fishermen and checked by the recorders
3. The logbooks are distributed to fishermen and returned to the office by hand or mail without prior control by the recorders for consistency and contents.
4. The logbooks are given in bulk to the fishing company and collected on a monthly basis?

S 44 - Does the survey also include distant fishing activities (fishing trips of more than 2 days) ? (Y/N)

S 45 - Is an appropriate database for storing, processing and presenting the results in place? (Y/N)

S 46 - Is any additional technical assistance being provided for this exercise? (Y/N)

S 47 - Is it conducted throughout the year ? (Y/N)

S 48 - Specify the survey timeframe (logbooks collected on a monthly basis or other).

S 49 - What are the main data elements (i.e., Vessel Name, Species caught, Gear used, etc.)? Enumerate below. (Add a page if needed)

S8 – Catch and Effort Survey (CAS) for <u>Artisanal/Small-scale Fishery</u>

Has a CAS for **Artisanal /Small-scale** fishery ever been conducted in your country?

if yes, who carried out the last CAS exercise? (institution, service,...)	

If a CAS for Artisanal/Small-scale Fishery is being undertaken:

S 81 - Does it cover the whole fleet or part of it? (W/P)

Does it cover the whole country or only part of it? (W/P)

S 82 - Is a Census approach being applied? (Y/N)

Is a Sampling approach being applied? (Y/N)

Is other methodology being applied? (specify)

S 83 - Data collection methods used:

- The CAS Questionnaires are compiled by recorders at the landing place by interviewing the fishermen. (Y/N)
- The CAS Questionnaires are distributed to fishermen, compiled by them and handed to the office by the fishermen and checked by the recorders.
- The CAS Questionnaires are not compiled by recorders at the landing place.
- Are the fishing cooperatives/associations collecting data for this exercise?

S 84 - Is an appropriate database for storing, processing and presenting the results in place ? (Y/N)

S 85 - Is any additional technical assistance being provided for this exercise ? (Y/N)

S 86 - Is the survey being conducted throughout the year ? (Y/N)

S 87 - What is the Sampling Ratio in terms of number of vessels sampled over the total?

S 88 - How many days per month is a fishing village visited? ( )

S 89 - What are the main data elements (Number of vessels fishing, Species caught, etc.)? Enumerate below. (Add a page if needed)

S - 9 Expected Outputs

Yearbook of Fishery Statistics – Production and Effort
National Database for Industrial/Commercial Fleet Production and Effort
Monthly Catch and Effort Statistics
National Fishery Production on the Web

Regional/International Reporting System
Other results/outputs

S 10 - Is the Catch and Effort Survey a sustainable task over time? (Y/N)

Further comments:

Name and position of the officer completing the Questionnaire.
