ROMANIA

REPORT ON THE IMPLEMENTATION OF THE MEMORANDUM OF UNDERSTANDING REGARDING THE CONSERVATION OF MIGRATORY SHARK SPINY DOGFISH IN THE BLACK SEA

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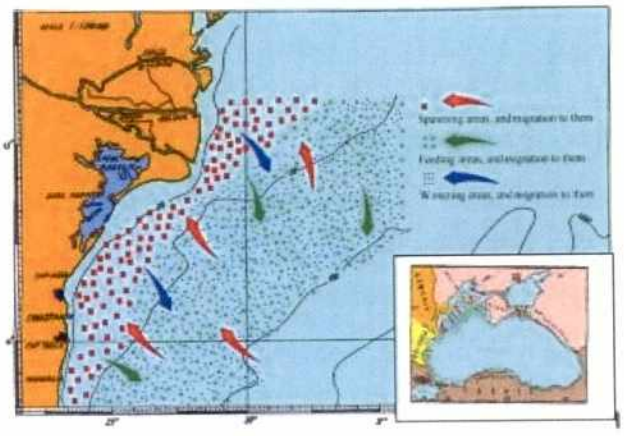
The designated authority for the Memorandum of Understanding on the conservation of migratory sharks is the National Institute for Marine Research and Development "Grigore Antipa (NIMRD)."

Spiny dogfish (*Squalus acanthias*), Family Squalidae, Order Squaliformes

inhabits the whole Black Sea shelf at the water temperature 6–15°C, Fig. 1 and Fig. 2.



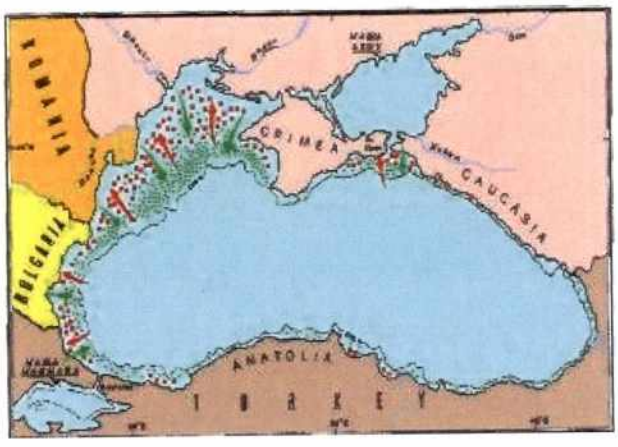


Fig. 1 Distribution and migration routes of the Spiny dogfish (*Squalus acanthias*) at Romanian littoral

Fig. 2 Distribution and migration routes of the Spiny dogfish (*Squalus acanthias*) at Black Sea level

It undertakes extensive migrations. In autumn feeding migrations are aimed at the grounds of the formation of the wintering concentrations of anchovy and horse mackerel in the vicinity of the Crimean, Caucasus and Anatolian coasts.

In the Black Sea Fishes list IUCN status presented on the Black Sea Commission website (www.blacksea-commission.org) is included and categorized *Squalus acanthias* as follows (Table 1).

The IUCN status of spiny dogfish in the Black Sea countries

Table 1

Country	BG	GE	RO	TU	RF	UKR
IUCN status	N/A	LC	NT	EN	N/A	NT

LC - Least Concerned

NT- Near Threatened

EN- Endangered

N/A – No Data

Historical analysis shows that the state of spiny dogfish stock has been influenced not only by fishing which was at quite high level due to the bigger number of trawlers and high levels of the spiny dogfish by-catch.

The state of the species has also been influenced by ecological changes due to eutrophication and *Mnemiopsis leiydi* invasion and outburst in Black Sea. Simultaneously, the small pelagic fishes are important trophic base for the dogfish in the Black Sea.

1. Scientific research and monitoring

Reproductive migrations of viviparous spiny dogfish (*Squalus acanthias*) take place towards the coastal shallows with two peaks of intensity – in spring and autumn. The autumn migration for reproduction covers more individuals usually.

Spiny dogfish (*Squalus acanthias*) belongs to long-living and viviparous fish, therefore reproduction process includes copulation and birth of fries. Near the coasts of Romania the intense spawning season is in March-May. Two peaks of birth of juveniles can be distinguished – spring period (April-May) and summer-autumn (August-September). To give birth of juveniles the females approach the coastal zone in depth 10–30 m.

At this time males keep separately from females in depth 30 – 50 m. The birth of spiny dogfish (*Squalus acanthias*) juveniles takes place at the temperature of water 12 – 18°C.

In Romanian waters, structure analysis of length and mass classes of Spiny dogfish catches revealed the presence of large specimens, ranging from 90-130 cm length, with average mass values ranging from 3000-14950g, the dominant classes 109-121cm /5755-7990 g, the average length of the body was 114.91 cm and average weight of 7388 g.

Overall sex ratio of males was significantly positive with a rate of 84.29% compared to only 15.61%, as were females. Coefficients in length-weight relationship:

a = 0.0117; b = 2.76;

Natural mortality M = 0.258 – 0.31

During wintering the densest concentrations are observed where spiny dogfish feeds intensively.

In the northwestern Black Sea, in the waters of Romania, in depth from 70-80 m down to 100-120 m, abundant wintering concentrations of spiny dogfish (*Squalus acanthias*) are also observed where they are located on the grounds of whiting and sprat concentrations.

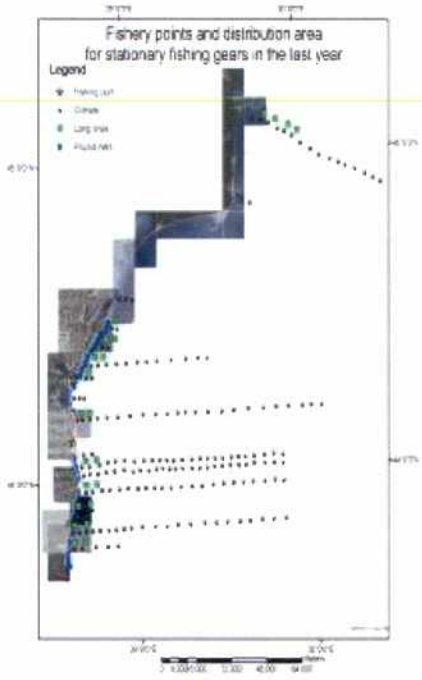
Spiny dogfish (*Squalus acanthias*) is a major demersal predator, reaching in the Black Sea the length of about 1.50 m.

The Romanian fishing area is comprised between Sulina and Vama-Veche; coastline extends for over 240 km, which can be divided into two main geographical and geomorphologic sectors:

- 1/ the northern sector (about 158 km in length) lies between the secondary delta of the Chilia branch and Constantza, constituted of alluvial sediments;
- 2/ the southern sector (about 85 km in length) lies between Constantza and Vama-Veche characterised by promontories with active, high cliffs, separated by large zones with accumulative beaches often protecting littoral lakes.

The distance from the sea shore to the shelf limits (200 m depth) varies from 100 to 200 km in the northern sector and to 50 km in the southern one.

The submarine slope of the shelf is very gentle in the north, while in the southern sector the slope increase very quickly (Fig. 3-5).



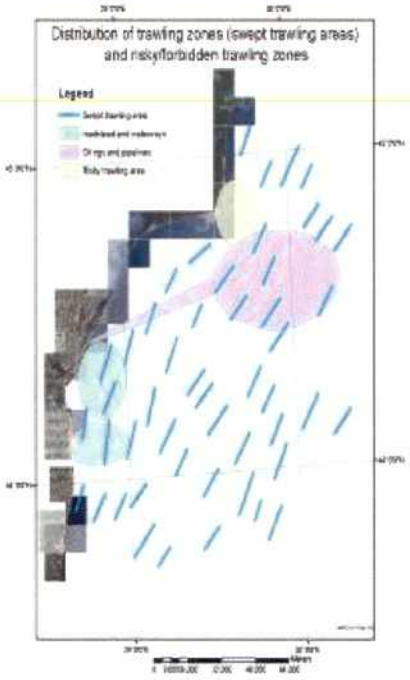


Fig. 3 Fishery points and distribution areas for stationary fishing gears at Romanian littoral

Fig. 4 Distribution of trawling zones

Fig. 5 Romanian protected areas

The shallow waters up to 20 m depth of the northern part are included in the "Danube Delta" Biosphere Reserve (declared through the Law no. 82/1993).

The marine zone of the "Danube Delta" - Biosphere Reserve constitutes a traditional zone for spawning and feeding for transboundary species as well as a passage route for anadromous species (sturgeons, Danube shad).

In the South part of littoral is situated also the Vama Veche - 2 Mai Reserve with the surface of 5,000 hectares.

The marine Reserve "2 Mai - Vama Veche" is an area with a high diversity of the biotopes and biocoenosis, being settled on the migration routes of the main pelagic and benthic fish and marine mammals.

In the coastal zone of the Romanian marine sector with small depth, fishing with fixed gear is characterized by the concentration of activity mainly in the first three/four months of the season (April-July), when usually the turbot (the most important comercial fish) migrates to the coastal area for reproduction and other species migrate for feeding. In generally, total fishing season being of about eight months.

The capture level and the level of fishing productivity differs from one year to another, depending on the fishing effort (number of pound nets, number of gill nets and effective fishing days), and also depends on the evolution of hydro climatic conditions and at last but not least, the state of fish stocks.

The structure of the catches mirrored only partly the composition of Black Sea ichtyofauna from the Romanian sector, due to the type of gear conditions the ratio between the different fish species.

2. Education and public awarness

NIMRD organized a symposium where participated the government and local authorities, the research and development institutions and universities, scientific, professional and environmental NGOs, other organizations from Romania and abroad. The plenary lectures were the state of the marine and coastal environment development, the developing environment - friendly marine aquaculture for the blue economic, the analysis of public and stakeholder attitudes towards the aquaculture, the oceanography and coastal engineering, sustainable development tools and methods, Black Sea influence on the land surface temperature in the south Dobroudja plateau, the oceanographic and environmental data management in Romania, biodiversity conservation.

3. Capacity building

The main characteristics of Spiny dogfish (*Squalus acanthias*) stock in the Black Sea and peculiarities of the management at regional level:

❖ migratory specie has spawning, feeding and wintering habitats located in the economic exclusive zone of different states;

❖ there are strong technical interactions, being exploited by different types of fishing boats and gear and biological features, with complex predator-prey interactions involving most exploited species;

❖ due to their relatively low commercial interest and sometimes low number of specimens caught, Spiny dogfish (*Squalus acanthias*) are most of the times a component of the by-catch in fisheries targeting most commercially valuable species;

❖ in the Black Sea area is a common practice to don't report the catches and this situation may exceed the officially reported;

❖ presently there is no regional fishery management organization in the Black Sea area, the fisheries regulatory framework is promoted by each coastal country being not harmonized at regional level, even in the case of shared or migratory species;

❖ the lack of an adequate management in the Black Sea fisheries is also evidenced by the fact that in spite of decline of stocks, the fishing effort continued to increase;

❖ the fishing is carried out in a competitive framework without any agreement between the countries on limits to fishing;

❖ there are large differences in the economic and technical structure of the fleets exploiting the fishery resources of the Black Sea among the countries, making regional cooperation a more demanding exercise;

❖ the development of small-scale fisheries needs a new and transboundary approach by national authorities;

❖ fishery research in the Black Sea region remains sparsely equipped and funded.

Strengthening the regional capacity to support the sustainable management of the Black Sea fisheries is a project implemented during the period 2011-2012 by the NIMRD. The major task of the project 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.

The specific objectives are:

- 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.

Main activities

- Exchange of good practices in the fields of methods and tools to assess the present state of fish stocks by scientific surveys, holistic models;
- Strengthening the joint knowledge and information base needed to alignment of the common methods for sampling, processing and interpretation data from fisheries and stock assessment using analytic models;
- Promote of stronger integration and development of research, awareness and scientific partnerships in the fields of monitoring, control, protection and management of the Black Sea ecosystem and its living resources;
- Project information and communications activities;
- Project management and coordination activities.

Estimated outputs and results

- Meetings of specialists in assessment from the Black Sea coastal countries;
- Working visits and trainings of specialists;
- A best-practice guideline for stock assessment using scientific surveys realised in the national languages of partners and English (a guideline and standardized protocol which include the sampling gear (feature and handling), the design of the survey, the information collected, and the management of the data as far as the common standard analysis of the data);
- Manual of protocols on international methodology for sampling, samples processing, analyzing and discussions of data and results, fishery statistics, stocks assessment by analytical models;
- Report on state of the Black Sea Fisheries;
- Management Plan for Black Sea Fisheries;

- Inventories of the national authorities, focal points, scientists and non-governmental organizations concerned with fisheries;
- Awareness materials.

4. International cooperation

The NIMRD cooperates with the Regional Fisheries Management Organisations, the Institute of Fishing Resources, Varna, Bulgaria, the Institute of Oceanography of the Bulgarian Academy of Science, Varna, the Southern Research Institute of Sea Fisheries and Oceanography, Kerch, the Central Fisheries Research Institute, Trabzon, the Black Sea Technical University, Marine Science Faculty, Trabzon, China Agricultural University, Beijing, "Alexander" Technological Environmental Association, Thessaloniki, Greece and other international organizations.

Cooperation between the Black Sea riparian countries is 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.

5. Protection of migratory species, conservation measures

In the Romanian fisheries, Spiny dogfish (*Squalus acanthias*) was mainly as by-catch in the trawlers catches. When the number of trawlers has been high, also the dogfish catches were higher.

After 1989, the number of operational trawlers decreased and the Spiny dogfish catches have the same tendency.

In the last years, Spiny dogfish (*Squalus acanthias*) is a target species for dogfish gillnets. In the waters of Romania, most of Spiny dogfish is harvested in spring and autumn months.

The largest catches of Spiny dogfish are along the coasts of Turkey, although this fish is not a target species of fisheries, being harvested as by-catch in trawl and purse seine operations mainly in the wintering period.

In the last 20 years, the decrease of Spiny dogfish landing may be due to over-fishing. In Romania, the catches decreased very much because of decreasing of the trawling effort.

Scientific Surveys

In Romania, the swept area method is used for evaluation the Spiny dogfish fishing agglomerations biomass, based on the statistic processing of productivity data obtained in sampling trawling.

In Table 2 are given the values of spiny dogfish fishing agglomerations biomass at Romanian littoral.

The values of spiny dogfish fishing agglomerations biomass at Romanian littoral

Table 2

Year	2010	2011
Spiny dogfish biomass (t)	5.635 - 13.051	1.173 - 1.619

In Romanian waters the agglomerations are distributed on entire shelf, but especially at depth more than 20 m. Two peaks of intense spawning and of birth of juveniles are in spring and autumn period at Romanian littoral.

In front of Romanian littoral, the biomass of Spiny dogfish (*Squalus acanthias*) seems to increase in the last years.

Regarding Spiny dogfish (*Squalus acanthias*), for protecting the reproduction and rehabilitation of the stock were adopted the following measures:

- ✓ in the period April - June, 60 days, the fishing is prohibited;
- ✓ it is banned to use the trawl in marine zone under the 20 m depths;
- ✓ mesh size for dogfish gillnets: a = 100 mm, 2a = 200 mm;
- ✓ minimmum admissible length in catches is 120 cm.

6 Administrative, legislative, institutional measures

Romanian fisheries regulatory framework includes between others the following:

- ❖ Law No. 23/2008 on Fishing Fund, Fishery and Aquaculture;
- ❖ Annual Order on the Fishing Prohibition;
- ❖ Order No. 342/2008 on minimal size of the aquatic living resources;

❖ Order No. 449/2008 on technical characteristics and practice conditions for fishing gears used in the commercial fishing.

Conclusions

✓ The spiny dogfish (*Squalus acanthias*) inhabiting the Romanian marine waters is a migratory species, with long life cycle, whose stock is strong influenced by the environmental conditions and fishing effort size.

✓ The stock is common for the majority of Black Sea riparian states (shared stock); accordingly the management of stock has to be made at regional level, establishing the total admissible catch.

✓ The catches, both regionally and nationally level, are clearly decreasing, due to the over-exploitation and the use inappropriate fishing gear;

✓ In compliance with the IUCN criteria, the *Squalus acanthias* species is considered near threatened.

✓ State of spiny dogfish (*Squalus acanthias*) stock at the Romanian littoral and also at Black Sea level is on going to be re-evaluated, following that the necessary measures will be proposed.

✓ In order to protect and rehabilitate the population of this species at the whole Black Sea level and for a sustainable management, we consider opportune a commune assessment of the stock size at regional level, by all riparian countries and function by the conclusions we can propose more complex measures.

7. Activities planned for the next year

For the future management of this resource at regional level we shall take into consideration the following aspects:

- the improvement of catch statistics regarding *Squalus acanthias* in the Black Sea is needed;
- joint survey (6 Black Sea countries) are recommended to follow the distribution patterns, spawning areas, catch/effort unit, biomass estimations, diet, maturity indices etc.

- a better knowledge of the species (distribution, migration, reproduction, fecundity);
- catch information is vital for the successful management of this species;
- strengthening the regional legal framework for sustainable management;
- establishing a regional organization through negotiation on signing of legally binding documents for fisheries;
- common policy of Black Sea countries for development of small-scale fisheries sector including harmonized fisheries regulation measures;
- developing and implementing regionally agreed fish stock assessment methodologies;
- harmonizing the development strategies of the fishing sector with those of environmental protection, through implementing the concept regarding the fishing management based on the ecosystem approach and the FAO Code of Conduct for a responsible fishing;
- development of specific indicators for the Black Sea to monitor and assess the state of key resources/habitats;
- undertake concerted actions to combat illegal fishing and to establish regional consultation mechanisms between the Black Sea coastal states;
- designate the protected marine areas of regional significance and establish a network for the Black Sea.