October 2007

GENERAL FISHERIES COMMISSION
FOR THE MEDITERRANEAN
COMMISSION GÉNÉRALE DES PÊCHES
POUR LA MÉDITERRANÉE

GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN

SCIENTIFIC ADVISORY COMMITTEE

Tenth Session

Nicosia, Cyprus, 22-26 October 2007

ADRIAMED CONTRIBUTION NOTES:

Some considerations on the concept and definition of the "priority species" for the fishery assessment and management purposes in the GFCM area

Preliminary appraisal for the discussion on the criteria to update the SAC shared stocks lists

I. SOME CONSIDERATIONS ON THE CONCEPT AND DEFINITION OF "PRIORITY SPECIES" FOR FISHERY ASSESSMENT AND MANAGEMENT PURPOSES IN THE GFCM AREA*

1. Background

The concept of priority species represents a key factor for the management of fisheries resources. Priority species are very important for the main mission of the GFCM "*to promote the development, conservation and management of living marine resources and to formulate and recommend conservation measures*". Thus, the three issues of **development**, **conservation** and **management** should be taken into account when considering a list of priority species.

The scientific community, however, faces combined difficulties as the fishery resources in question do not generally fall at once within a discussion of all three issues mentioned above. Moreover,

* This paper should be cited as follows: AdriaMed. (2007) Some considerations on the concept and on criteria for defining "priority species" for fishery assessment and management purposes in the GFCM area. Paper presented at the GFCM-SAC Sub Committee on Stock Assessment (Kavala, 17-20 September 2007). FAO-AdriaMed Scientific Cooperation to Support Responsible Fisheries in the Adriatic Sea: 11 pp. This paper was prepared by N. Ungaro in cooperation with the scientists of the Adriatic research institutions collaborating with the FAO AdriaMed Project

there is a lack of clear criteria to be applied in the identification of the priority species in a given area.

The need for clarification of the concept was raised at the ninth session of the SAC (Rome, 2006) which specified in its SAC Preliminary Workplan for 2007, as follows: "***Priority species and shared stock lists****: - identify criteria to update the SAC priority species and shared stocks lists, for all GSAs, including for the Black Sea"*. At the moment no definition of priority species is included in the SAC – Glossary.

This paper aims at contributing to the discussion of the concept, analysing the available information and proposing some simple criteria.

2. Introduction

The concept of "priority species" is often related in general terms to conservation issues, as it is a universally accepted term in the compilation of the so-called "Red Lists" at local, national and international level.

According to the definition provided by the Washington Department of Fish and Wildlife (www.wdfw.wa.gov), for example, priority (fish) species are: *Fish and wildlife species requiring protective measures and/or management guidelines to ensure their perpetuation.* Moreover, *Priority species include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable*. The Washington Department indicates also some criteria (Table 1).

Table 1. Criteria proposed by the Washington Department of Fish and Wildlife for the inclusion in the Priority Species List.

Criterion 1	State Listed and Candidate Species. State listed species are those native fish and wildlife species legally designated as Endangered, Threatened, or Sensitive. State Candidate species are those fish and wildlife species that will be reviewed by the department for possible listing as Endangered, Threatened, or Sensitive according to the process and criteria defined in WAC-232-12-297.
Criterion 2	Vulnerable Aggregations. Vulnerable aggregations include those species or groups of animals susceptible to significant population declines, within a specific area or statewide, by virtue of their inclination to aggregate.
Criterion 3	Species of Recreational, Commercial, and/or Tribal Importance that are Vulnerable. Native and non-native fish and wildlife species of recreational or commercial importance, and recognized species used for tribal ceremonial and subsistence purposes, that are vulnerable to habitat loss or degradation.

Looking at a European example, Northern Ireland devised the scientific criteria reported below in order to identify which fish species qualify as a priority ones (Table 2: species which meet any one of the following seven criteria are considered to be Northern Ireland Priority Species; www.habitas.org.uk/priority/species.asp).

Table 2. Criteria proposed by the Northern Ireland Assembly for inclusion in the Priority Species List.

Criteria
1. Listed as a UK Priority Species
2. Rapid decline (2% per year)
3. Decline (1% year) with Northern Ireland being a stronghold (S) consisting of either >50% Irish population or >20% UK population/range, or with the Irish or UK population restricted (R) to Northern Ireland i.e. Decline + S or R
4. Rare - confined to a small population of one or two sites in Northern Ireland with Northern Ireland being a stronghold (S) consisting of either >50% Irish population or >20% UK population/range, or with the Irish or UK population restricted (R) to Northern Ireland i.e. Rare + S or R
5. At least 20% of international population of species or well-recognised subspecies occurring in Northern Ireland
6. Irish Red Data Book (RDB) species classed as critically endangered (CR), endangered (EN) or vulnerable (VU)
7. Red-listed species in either Ireland or the UK Birds of Conservation Concern (BOCC) lists

In the Mediterranean and Black Sea, the report of the ninth session of SAC includes the list of the "priority species" for assessment and management purposes as reported in Annex I of this paper. The list includes vertebrates and invertebrates, pelagics and demersals, shallow and deep water species, massive and protected/threatened species, etc.

3. The Approach

Based on the above background, the three mentioned aspects (development, conservation and management) could be simplified as follows:

i) Conservation Criteria
ii) Management (including Development) Criteria

Up to now, a species is generally defined as "priority" when it is relevant for fishery exploitation or for conservation purposes (Barcelona Convention, 1995; Berna Convention, 1979; EU Habitat Directive, 1992, CITES Agreement, IUCN Red Lists). However the relative weight of the "conservation" status or the "fishery" importance for some species might be difficult to identify.

According to the proposed criteria, the current SAC list could therefore be split into two different lists, the first consistent with the species' conservation status and the second in relation to its importance for fisheries exploitation.

With regard to the operative, administrative and geographic scenario to be taken into account, the current list refers to the species' relative importance at different levels. In addition, SAC request specified that the list of priority species has to be updated considering the GSA level as the minimum. Three lists could therefore be proposed: a) one list for each country; b) one list for each GSA; c) one list for the GFCM area as a whole.

4. The proposed lists

According to the selected criteria (conservation and management) two lists could be compiled using the 42 species included in the current SAC list of priority species.

Conservation Criteria

Eleven species, of the 42 listed, are considered to be regulated by international protection and conservation regimes and they are included in special lists (Barcelona Convention, Berna Convention, EU Habitat Directive, CITES – Convention on International Trade in Endangered Species -Lists, IUCN – International Union for the Conservation of Nature - Red Lists) (Table 3):

Table 3. Species proposed as "priority" by the GFCM (2006) and included in the International Lists for the Environmental Conservation.

Species	Special list
Acipenser gueldenstaedtii	Barcelona, annex 2; Berna, annex 2; Habitat, annex 2-4; CITES; IUCN Red List, endangered.
Acipenser stellatus	Barcelona, annex 2; Berna, annex 2; Habitat, annex 2-4; CITES; IUCN Red List, endangered.
Acipenser sturio	Barcelona, annex 2; Berna, annex 2; Habitat, annex 2-4; CITES; IUCN Red List, endangered.
Anguilla anguilla	Barcelona, annex 3; CITES, proposed.
Huso huso	Barcelona, annex 2; Berna, annex 3; Habitat, annex 5; CITES; IUCN Red List, endangered.
Isurus oxyrhinchus	Barcelona, annex 3; Berna, annex 3; IUCN Red List, vulnerable.
Lamna nasus	Barcelona, annex 3; Berna, annex 3; CITES, proposed; IUCN Red List, vulnerable.
Palinurus elephas	Barcelona, annex 3; Berna, annex 3.
Prionace glauca	Barcelona, annex 3; Berna, annex 3; IUCN Red List, least concern.
Thunnus thynnus	Barcelona, annex 3.
Xiphias gladius	Barcelona, annex 3.

Management Criteria

The other species (31) included in the current SAC "priority" list came from the indications made by the countries concerned. According to the second criteria (management) the abundance values could be used to compile a list.

Considering the whole GFCM area and the landing statistics from GFCM data-sources (year 2004) (FAO, 2006) the following list of forty-two species could be obtained, according to the decreasing abundance values (Table 4):

Tab. 4. The most abundant species in the GFCM area (year 2004).

Species landings in the GFCM area (2004, most abundant species in decreasing order)	
European anchovy	X
European pilchard	X
Round sardinella	X
Striped venus	
European sprat	X
Mediterranean mussel	
Red mullets nei	X
Bogue	X
Chub mackerel	
Atlantic bluefin tuna	X
European hake	X
Mediterranean horse mackerel	X
Bluefish	X
Common octopus	
Azov sea sprat	
Swordfish	X
Atlantic mackerel	X
Atlantic bonito	
Common cuttlefish	X
Atlantic horse mackerel	X
Blue whiting	X
Whiting	X

Deepwater rose shrimp	X
Gilthead seabream	
Spottail mantis squillid	
Caramote prawn	
Common pandora	X
Common sole	X
European seabass	
Albacore	X
So-iuy mullet	
Angler(=Monk)	X
Norway lobster	X
Flathead grey mullet	
Meagre	
Speckled shrimp	
Frigate and bullet tunas	
Red porgy	
Horned and musky octopuses	X
Blue and red shrimp	X
European squid	X
Common dolphinfish	X

X common species with respect to the current SAC list.

Therefore should the list be compiled, for example, on the basis of the landing biomass in the whole GFCM area (excluding taxa under "conservation" regimes), the following species would be deleted from the current list: Giant red shrimp, Turbot, Blackspot seabream, Pink spiny lobster.

Some species can be very important not only for their abundance but also for the price and/or the market demand (mostly at local level). Thus the market/price variables should be included when considering the management criteria in order to decide what species have to be effectively included or not in the list.

Hence, a ranking procedure could be useful for the correct classification of the landings data, as has already been done by other authors (Barone *et al*, 2006). A ranking approach according to the following variables could be used:

- 1) Species landings (abundance);
- 2) Average market price of landings (estimation of the commercial value of the single species).

Otherwise, only one variable related to the commercial value of the total landing by species (in $ or €) can be used. In this case some information could be missed out (the species is abundant or high priced? Or both?).

Each value of the variables could be grouped according to six chosen categories (ranks). The attribution to a single rank should be defined: Poor (rank = 0); Very Low (rank = 1); Low (rank = 2); Medium (rank = 3); High (rank = 4) and Very High (rank = 5).

The total list of abundance values by single species or fishery resource, as well as the average prices can be then ordered from the minimum to the maximum and equally divided into the six categories. Thus, all the species entering in one of the six groups can be marked with the same rank value (0, 1, 2, 3, 4 or 5).

To summarise, to establish the list, according to the management measures, the first step is to choose the operative, administrative and geographic scenario. In this case the full GFCM area is taken into consideration as it is easy to retrieve common statistics on landings (GFCM data source). Then the yearly (2004) total landings (variable 1) can be ranked, according to 136 single species included in the GFCM landings statistics. The same list can be also ranked referring to the other variable (e.g. average estimated price according to the market statistics).
The sum of the two ranking values for each species could be used for the classification in the proposed SAC "priority (target)" list for the Management and Development of the fisheries (Table 5).

Table 5. Classification of the fishery species in the Mediterranean and Black Sea area on the basis of the landing importance (abundance and average price, year 2004).

Species	Abundance Rank	Price Rank	*Tot. Rank*
Swordfish	X	X	***X***
Blue and red shrimp	X	X	***X***
n species.....	X	X	***X***

5. Conclusions

According to the two criteria identified, conservation and management, two separate lists could be compiled, the first list according to the "conservation status" of the species (e.g. inclusion in the National or International protection regulations), the other list according to the landings (quantity and economic value) at different aggregation levels (country, GSA or GFCM level).
Some species can be included in both the lists (e.g. *Palinurus elephas*, *Thunnus thynnus*, *Xiphias gladius*), making them "sensitive" for management purposes.
The advantages of the proposed concept and method for the definition of the GFCM "priority" species are mostly related to the following characteristics:

- objectivity
- flexibility
- adaptability

The criteria defined use easily available data even if there is still the need to discuss the methods and the number of the categories to be identified, in order to obtain objective ranking values.

Moreover, the landing-based compilation can change according to the operative scenario considered (country level, GSA level, country area inside the GSA), thus allowing the method to be adapted to any situation. Taking into account some "local" peculiarities, the information at lower levels (country area inside the GSA or single country) can be transposed at higher level (GSA or GFCM area) using correction factors; e.g., the relative importance of the fishery fleet or the extension of the coast line.

6. References

Barone, M., De Rossi, F., Mannini, P., Marttin, F. 2006. GFCM priority species: a simple information tool for the visualization of the open access capture fisheries landing data. Paper presented at the GFCM-SAC Sub-Committee on Fishery Statistics and Information (Rome, 11th-14th September 2006). Mediterranean Fishery Statistics and Information System. GCP/INT/918/EC-TD-9, MedFisis Technical Document, 9: 20 pp.

FAO Fishery Information, Data and Statistics Unit. 2006. GFCM capture production 1970-2004. FISHSTAT Plus - Universal software for fishery statistical time series [online or CDROM]. Food and Agriculture Organization of the United Nations (available at: http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp.).

General Fisheries Commission for the Mediterranean. 2003. Revision of the priority species list. List adopted in 2003 by GFCM (available at: ftp://cucafera.icm.csic.es/pub/scsa/).

General Fisheries Commission for the Mediterranean/Commission générale des pêches pour la Méditerranée. 2006. *Report of the ninth session of the Scientific Advisory Committee. Rome, 24–27 October 2006/Rapport de la neuvième session du Comité scientifique consultatif. Rome, 24-27 octobre 2006.* FAO Fisheries Report/FAO Rapport sur les pêches. No. 814. Rome, FAO. 106p.

ANNEX I

SAC Priority species list / Liste des espèces prioritaires du CSC (Rome, 2006)

English common name	Scientific name
Danube sturgeon	*Acipenser gueldenstaedtii*
Starry sturgeon	*Acipenser stellatus*
Sturgeon	*Acipenser sturio*
European eel	*Anguilla anguilla*
Giant red shrimp	*Aristaeomorpha foliacea*
Blue and red shrimp	*Aristeus antennatus*
Bogue	*Boops boops*
Common dolphinfish	*Coryphaena hippurus*
Homed octopus	*Eledone cirrosa*
Musky octopus	*Eledone moschata*
Anchovy	*Engraulis encrasicolus*
Beluga	*Huso huso*
Shortfin mako	*Isurus oxyrhinchus*
Porbeagle	*Lamna nasus*
European squid	*Loligo vulgaris*
Blackbellied angler	*Lophius budegassa*
Monkfish or angler	*Lophius piscatorius*
Whiting	*Merlangius merlangus*
Hake	*Merluccius merluccius*
Blue whiting	*Micromesistius poutassou*
Red mullet	*Mullus barbatus*
Striped red mullet	*Mullus surmuletus*
Norway lobster	*Nephrops norvegicus*
Black spot seabream	*Pagellus bogaraveo*
Common pandora	*Pagellus erythrinus*
Common spiny lobster	*Palinurus elephas*
Pink spiny lobster	*Palinurus mauritanicus*
Deepwater rose shrimp	*Parapenaeus longirostris*
Bluefish	*Pomatomus saltatrix*
Blue shark	*Prionace glauca*
Turbot	*Psetta maxima*
Sardine	*Sardina pilchardus*
Round sardinella	*Sardinella aurita*
Atlantic mackerel	*Scomber scomber*
Common cuttlefish	*Sepia officinalis*
Common sole	*Solea vulgaris*
Sprat	*Sprattus sprattus*
Albacore	*Thunnus alalunga*
Bluefin tuna	*Thunnus thynnus*
Mediterranean horse mackerel	*Trachurus mediterraneus*
Atlantic horse mackerel	*Trachurus trachurus*
Swordfish	*Xiphias gladius*

II. PRELIMINARY APPRAISAL FOR THE DISCUSSION ON THE CRITERIA TO UPDATE THE SAC SHARED STOCKS LISTS [1]

1. Background

The management of shared fishery resources is considered one of the great challenges towards the achievement of long-term sustainable fisheries. These resources account for as much as one third of world marine capture fishery harvests (Munro et al., 2004) and this is considered one of the main issues for the sustainable management of fisheries (Gulland 1980, FAO 1995, FAO, 2003).

In the Mediterranean, despite the fact that the relevance of shared fishery resources is widely recognised, the list of priority shared fishery stocks would require a more deeper reading both in terms of consistency and homogeneity, as was discussed at length during the 31st session of the GFCM. The list of shared stocks is usually updated during each session of SAC, the last being that of October 2006 (GFCM, 2006).

According to the SAC Glossary the "shared stocks" are the "*Stocks fished by two or more countries"*. The need to identify and harmonize the criteria for the identification of shared stocks was underlined during the ninth session of SAC (GFCM, 2006), during which the following was recommended for the SAC 2007 Preliminary Workplan: "***Priority species and shared stock lists****: - to identify criteria to update the SAC priority species and shared stocks lists, for all GSAs, including for the Black Sea"*.

The main task of these short notes is to contribute to the discussion on this issue, proposing a table reviewing the criteria used and the tools to verify these criteria.

2. Notes

The definition of "shared stock" is generally used in many topics related to the assessment and management of fishery resources. Keen (1988) defined as "shared" the "*Stocks of fish that migrate across international boundaries or, in the case of the United States, across the boundaries between states or Fishery Management Council areas of control*". Christy (1997) gives the following definition of shared stock: "*Stocks of fish that migrate across the EEZs boundary of adjacent or opposite coastal states"*. Caddy's (1997) definition of "shared stock" is: "*a group of commercially 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 can only be managed effectively by cooperation between the States concerned"*.

The international context considers as "shared fish stocks", the resources entering in the following categories (FAO, 2003; Munro *et al*., 2004):

a) fish resources crossing the EEZ boundary of one coastal State into EEZ(s) of one, or more, other coastal States – transboundary stocks;

[1] This paper should be cited as follows: AdriaMed. (2007) Some notes for the discussion on the criteria to update the GFCM-SAC shared stocks list. (Rome, September 2007). FAO-AdriaMed Scientific Cooperation to Support Responsible Fisheries in the Adriatic Sea: 4 pp. This paper was prepared by N. Ungaro and the Project Staff in cooperation with the scientists of the Adriatic research institutions collaborating with the FAO AdriaMed Project

b) *highly migratory species, as set forth in Annex 1 of the 1982 UN Convention on the Law of the Sea (UN, 1982), consisting, primarily, of the major tuna species (being highly migratory in nature, the resources are to be found, both within the coastal State EEZ, and the adjacent high seas);*
c) *all other fish stocks (with the exception of anadromous/catadromous stocks) that are to be found, both within the coastal State EEZ and the adjacent high seas – straddling stocks;*
d) *fish stocks to be found exclusively in the high seas – discrete high seas fish stocks.*

On the basis of these definitions the following table is an attempt to list reliable criteria and the scientific tools useful for the identification of shared stocks in the GFCM area.

Some criteria and tools are listed in the table below. The criteria represent a series of conditions for which the definition of shared stocks is valid. The tools represent instrument that aims to check if most of the conditions (criteria) are verified; the table should be considered as methodological contribution to the establishment of the list of criteria for the identification of shared stocks. The approach and the content of the table is not considered exhaustive but it is intended to provide a useful checklist for further development.

Shared stocks: Criteria	**Shared stocks: Tools to verify the criteria**
Group of individuals that belongs to the same population	The identification of "a population" is based on genetical, morphological and biological (growth rate, length and age at first reproduction, etc.) data and information from appropriate studies.
Group of individuals (stock) exploited by a fishery that reacts to the exploitation in a homogeneous way	The stock is characterised by the same exploitation rate, fishery mortality, trend in abundance, etc.
Group of individuals (stock) that inhabits a more or less defined geographical area(s) during the life cycle	The nurseries, spawning and distribution areas have quite clearly defined locations, to be identified and confirmed by means of data and information from *ad hoc* studies.
Group of individuals (stock) that is distributed during the life cycle over the maritime boundary between two or more national jurisdiction and international waters.	The nurseries, spawning and distribution areas are totally or partially common between two or more national jurisdiction and international waters.
Group of individuals (stock) that is fished by two or more national Countries in the respective national jurisdiction and international water.	The landing from fishery fleets of two or more national countries include catches from the same stock.

The listed criteria are not applicable to the highly migratory species (consisting primarily of the major large pelagic species, according to the FAO reported information – Munro et al., 2004). In fact, they have to be considered as "shared" among all the Mediterranean Countries due to their highly migratory behaviour in nature.

According to the reported criteria, the exploitation of the shared stock recalled the content of the statement included in *Art. 7.1.3.* of the Code of Conduct for Responsible Fisheries (FAO, 1995); "*For transboundary fish stocks, straddling fish stocks, highly migratory fish stocks and high seas fish stocks, where these are exploited by two or more States, the States concerned, including the relevant coastal States in the case of straddling and highly migratory stocks, should cooperate to ensure effective conservation and management of the resources. This should be achieved, where appropriate, through the establishment of a bilateral, subregional or regional fisheries organization or arrangement*".

However, for the best use of these criteria in deciding a list of shared stocks, it would be necessary first of all that the species be selected from the "list of priority species due to management reasons". Furthermore it would be useful to define an appropriate assessment and management zone of the fishery stocks in the relation of the fisheries activities within one or more Geographical Sub-Areas (GSA) as have been defined by GFCM.

3. References

CADDY, J.F. 1997. Establishing a Consultative Mechanism or Arrangement for Managing Shared Stocks Within the Jurisdiction of Contiguous States. In D. Hancock (ed), Taking Stock: Defining and Managing Shared Resources. Australian Society for Fish Biology and Aquatic Resource Management Association of Australasia Joint Workshop Proceedings, Darwin, NT, 15-16 June 1997, Sydney, Australian Society for Fish Biology: 81-123.

CHRISTY, F.T. 1997. The development and management of marine fisheries in Latin America and the Caribbean. Policy Research Paper. Inter-American Development Bank, Washington, D.C. No. ENV-110.

FAO. 1995. FAO Code of Conduct for Responsible Fisheries. 41 pp.

FAO. 2003. Papers Presented at the Norway-FAO Expert Consultation on the Management of Shared Fish Stocks, Bergen Norway, 7-10 October 2002. FAO Fish. Rep. N° 695, Rome.

GFCM (General Fisheries Council for the Mediterranean). 2006. Report of the ninth session of the SAC (Rome, 24-27 October 2006). FAO Fish. Rep., 814: 106 pp.

GULLAND, J.A. 1980. Some Problems of the Management of Shared Stocks, FAO Fisheries Technical Paper No. 206, Rome.

KEEN, ELMER A. (1988): Ownership and productivity of marine fishery resources: An essay on the resolution of conflict in the use of the ocean pastures. McDonald and Woodward Publishing Co., Virginia, USA.

MUNRO G., VAN HOUTTE A., WILLMANN R. 2004. The conservation and management of shared fish stocks: legal and economic aspects. FAO Fish. Tech. Pap. N° 465: 69 pp.