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MEDAC opinion on the management of coastal stocks- Focus on the main endangered inshore species in the Mediterranean Sea

The WG on Recreational Fisheries (WG4), composed by recreational and commercial representatives, as well as eNGOs, as a consequence of the work done in 2015/16 on the interactions between SSF and RF, which share coastal waters and resources, and taking into account that CFP demands the implementation of an ecosystem-based approach to fisheries management and understanding that current fisheries management is mainly focused on deep and/or pelagic waters, recognized the need of addressing inshore waters issues. Coastal waters and fish resources are of paramount interest, both for recreational and small-scale fisheries, as include most of their target species. These species aren't currently assessed, so there is a lack of knowledge about their status. Thus, WG4 agreed on identifying those species that, according to stakeholders' opinion, in addition of being of fishing interest, might be endangered. In addition, the WG4 for one year has tried to **fulfil ecosystem-based management approach**, by describing the ecology of these species (including both scientific and stakeholders' knowledge) and identifying some of their main threats, both linked and not linked to fisheries.

On October 2017, during the meeting held in Palma de Mallorca, the WG4 members agreed on the following list of species:

- *Sparus aurata*
- *Dicentrarchus labrax*
- *Dentex dentex*
- *Epinephelus marginatus*
- *Sciaena umbra*
- *Umbrina cirrosa*

For which:

the MEDAC[1] agrees and recommends to include in the framework of Mediterranean Multiannual plans, taking into account the ecology of each species and, at least, the threats described below.

[1] Oceana agrees and supports to include these 6 species into Mediterranean multiannual plans. However, rejects the description made for each species as it shows a biased analysis of their threats, almost obviating completely well documented fishing threats by scientist community, from both commercial and recreational fishing sectors. This analysis prevents to have a realistic picture of the situation and doesn't allows to identify possible fishing management measures to improve their threatened status.

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Note: *Information in italics obtained from scientific sources.* The remaining part is provided by stakeholders.

1. SPARUS AURATA

Found in seagrass beds and sandy bottoms as well as in the surf zone commonly to depths of about 30 m, but adults may occur to 150 m depth. A sedentary fish, either solitary or in small aggregations. In spring, they often occur in brackish water coastal lagoons and estuaries. Mainly carnivorous, accessorily herbivorous. Feed on shellfish, including mussels and oysters.

Males become females at about 3 years of age. Protandric hermaphrodite species, maturing first as male (during the first or second year of age) and after the second or third year of age, as female. Spawning happens generally from October to December, with sequenced spawning during the whole period. Incubation lasts about 2 days at 16-17°C. Larval stages last about 50 days at 17.5°C or about 43 days at 20°C. Egg size 0.9-1.1 mm, larval length at hatching 2.5-3.0 mm. Simultaneous hermaphroditism is suggested for this species.

During the spawning season (mainly October-November in Western Mediterranean) they gather in inshore waters (15-40m depth)) in big shoals of large individuals, around aisled structures (oceanic buoys, wrecks...) or on *Posidonia oceanica* grounds. After spawning, in late winter and early spring, they gather once again in shoals and, when high pressures occur, for unknown reasons come close to the shore and hide into caves. They are really skinny then, so an eventual reason could be for eating, but we're not sure about it. This is quite common in areas where the continental platform extends for many miles, with alternate of sandy bottoms, *Posidonia oceanica* and rocky reefs.

Big, protected, sandy bays, with very shallow water are perfect nursery habitats for this species. A paradigmatic example of that could be the Alfacs Bay, at the Ebro river mouth.

Threats external to fisheries

Disappearance of feeding resources may be significant for this species. Mussels are disappearing (depletion, pollution) and other potential sources of food in the sand may be affected by beach reconstructions (dredging).

Loss of brackish water habitats, reduced volume of fresh water into the sea and escapes from aquaculture (genetic impoverishment) are also other threats.

2. DICENTRARCHUS LABRAX

Adults manifest demersal behaviour, inhabit coastal waters down to about 100m depth but more common in shallow waters. Found in the littoral zone on various kinds of bottoms on estuaries, lagoons and occasionally rivers. [...] Young fish form school, but adults appear to be less gregarious. Feed chiefly on shrimps and molluscs, also on fishes. Juveniles feed on invertebrates, taking increasingly more fish with age. Adults are piscivorous. Spawn in batches [...]

Spawn in groups. Eggs are pelagic. In the Mediterranean, first sexual maturity occurs generally between 2 and 4 years of age [...]. Spawning in the Mediterranean seems to happen between

December and March, being the most common months January and February. Eggs have 1-2 fat drops that fuse about 12 hours after laying. Embryo development lasts about three days at 13-14°C and larval development about 40 days at 19°C. Egg size 1.1-1.5 mm, larval length at hatching 3 mm.

Eurythermal. Gregarious when young. Voracious predator. High tolerance to salinity changes. Adults migrate to the estuaries in summer where they spawn in January-June. Young inhabit waters of 0.24-0.37% salinity where they feed mainly on zooplankton. From 3.0 cm TL, diet changes to worms, crustaceans, fish larvae. Adults are strictly carnivorous surviving on small fish.

MEDAC considers that sea bass from the Mediterranean has a considerably different behaviour than populations from the Atlantic. In addition, the fact that the main studies about this species have been carried out with Atlantic populations, makes the results with a certain degree of bias at least when applicable to our sea. This stakeholder opinion, could be in some way backed by recent research [2].

Spawning takes place usually between one big female and several smaller males. It is common to see them in really shallow water (less than 10m depth) and/or inside big caves, but also can happen within bigger shoals in deeper water (20 - 30m) and sandy bottoms. What definitely does not seem to occur are the offshore huge spawning shoals so common in the Atlantic.

Regarding the Mediterranean, MEDAC does not agree with fish base's suggestion that adults are not gregarious. Indeed, MEDAC usually finds important shoals of big adults around aisled structures during summer (buoys, wrecks, artificial reefs...), probably for feeding.

Regarding euryhaline behaviour, MEDAC suggests that although some individuals may surely come in and leave the rivers, in the Mediterranean, an important amount of sea bass that live in rivers do it permanently.

Excellent nursery habitats for Mediterranean sea bass are really shallow waters in sandy beaches and rocky bottoms, where they can usually be found in schools of several individuals swimming at less than 1m depth from May to late August.

Although adults are mainly piscivorous, MEDAC members informed that they have found large individuals feeding voraciously on sandy crabs during end of winter and early spring.

Threats external to fisheries

Estuarine and coastal antropization, as well as loss of brackish water habitats, reduced volume of fresh water into the sea and escapes from aquaculture (genetic impoverishment) are some threats.

[2] Mbaye Tine et al. (2014), **European sea bass genome and its variation provide insights into adaptation to euryhalinity and speciation**, Nature Communications

Occasional stormy episodes may destroy some spawning habitats. Climate change might end up producing population moves and epigenetic modifications[3].

3. DENTEX DENTEX

Inhabit hard bottoms (rock or rubble) down to 200 m depth. Usually found in shallow water less than 50 m deep. Adults solitary; young gregarious. [...] Feed on fish, molluscs and cephalopods. [...]

Gonochoric, but some specimens are hermaphroditic. Species of separated sexes (although some individuals may be hermaphrodite in young stages). In the Mediterranean, reproduction takes place between March and May, in areas near the coast. Embryo development lasts about 3 days at 17°C.

Adults are solitary only some months of the year, usually autumn and winter. During the spawning months they gather in big shoals and during late spring and summer they keep living in smaller shoals, probably to be more effective hunting.

During late spring and summer they usually move with the thermocline, although some of them don't seem to fulfil always this behaviour[4]. Although they usually like some locations, their movements may be directly linked to those of their preys, too.

In late autumn and winter, adults are usually found alone or in small groups in rocky shallow waters (less than 10m). Those same areas will become excellent nursery habitats in summer, together with *Posidonia oceanica* bottoms.

4. EPINEPHELUS MARGINATUS

Juveniles are found close to the shore or in rocky tidal pools. Adults prefer rocky bottoms at littoral and circalittoral area. They are mainly solitary and territorial, although they form spawning aggregations, that occurs mainly between June and August.

Their migrations are between demersal, benthic and littoral habitats between 1 and 120m depth, mainly linked to those of their preys, for spawning and also to temperature (thermocline).

Threats external to fisheries

Virus.

***5.* SCIAENA UMBRA**

Its main habitat are rocky and Posidonia oceanica bottoms. Juveniles live very close to the shore. This seems to be a sedentary species with strong side-fidelity and low levels of mobility and their breeding season is from May to July.

[3] Anastasiadi, D., Díaz N., Piferrer F., (2017), **Small ocean temperature increases elicit stage-dependent changes in DNA methylation and gene expression in a fish, the European sea bass**. Nature Scientific Reports.

[4] Aspillaga Eneko et al., 2017, **Thermal stratification drives movement of a coastal apex predator**, Scientific reports, 7:526.

Some scientific sources of information relate the species with estuarine environments, but MEDAC members consider that there can be a confusion with some similar species (*Umbrina cirrosa* or *Argyrosomus regius*), as they have never interacted with this species in estuarine environments. MEDAC suggests that these sources of information are reviewed thoroughly.

Threats external to fisheries

Loss of seagrass habitats and antropization.

6. UMBRINA CIRROSA

Juveniles are gregarious and can be found in coastal sandy bottoms. They can enter estuaries. Adults are solitary or in small groups, living in different littoral sea bottoms, but preferring sandy ones. Their migrations are demersal, benthic and littoral, from 0 to 100m depth. Spawning happens during spring and summer.

Threats external to fisheries

Habitats antropization (estuaries, ports and beaches).

THREATS RELATED TO FISHERIES FOR ALL THE SPECIES

Overfishing seems to be significant for the six species mentioned and special attention should be put in those gears targeting aggregations. For hermaphrodite species, targeting only a segment of the population may end up seriously affecting the reproductive capacity of the species. In addition, some of them lack of MLS, or the one that have is significantly below first sexual maturity.

MEDAC understands that those fisheries impacts are broad and affect both commercial and recreational. Thus, MEDAC will identify and treat them in detail when discussing specific MAPs.