

**MANAGEMENT PLAN FOR ARTISANAL FISHING WITH
BOAT SEINES (SONSERAS) OF CATALONIA (SPAIN)
(MPBS) (October 18th, 2013)**

With the following additions:

- **CORRIGENDUM I (October 21th, 2013) (in this document: page 26, and in Annex II)**
- **CORRIGENDUM II (Enero 15th, 2014) (in this document: pages 6 and 35)**
- **Stricter management measures for fisheries gobies** (Amendment of Article 5 of Order laying down the Management Plan, Annex I of this MPBS) **(in Annex I)**

1. Background	4
2. Management plan objectives	6
3. The target species of fishing with sonseras	8
3.1. Sand eel (<i>Gymnammodytes cicereus</i> and <i>G. semisquamatus</i>)	8
3.1.1. <i>Gymnammodytes cicereus</i> Rafinesque-Schmaltz, 1810	8
3.1.2. <i>Gymnammodytes semisquamatus</i> Jourdain, 1879	9
3.2. Goby (<i>Aphia minuta</i>, <i>Crystallogobius linearis</i>)	9
3.2.1. <i>Aphia minuta</i> (Risso, 1810)	9
3.2.2. <i>Crystallogobius linearis</i> (Düben, 1845)	10
3.2.3. <i>Pseudophya ferreri</i> (O. de Buen & Fage, 1908)	11
4. Fishing with sonseras (boat seines)	12
4.1. Fishing of sand eel and similar species with sonseras in Catalonia	12
4.1.1. Description of the <i>sonsera</i>	12
4.1.2. Fishing operations with <i>sonsera</i>	13
4.2. Location of the fishing activity	15
4.3. Classification of the <i>sonsera</i> gear	16
4.4. Catch composition	17
4.5. Regulations	19
5. Request for exceptions to the Mediterranean Regulation (EC 1967/2006) Fishing for fishing with sonseras	20
5.1. Request for an exception to the minimum mesh size	20
5.1.1. <i>The fishing activity must be highly selective</i>	20
5.1.2. <i>The fishing activity shall not have a significant impact on the marine environment</i>	20
5.1.3. <i>The fishing activity shall not affect the provisions of Article 4, Section 5 of the Mediterranean Regulation</i>	21
5.2. Request for an exception to the minimum distance to the coast	21
5.2.1. <i>The fishing activity has no significant impact on the marine environment</i>	21
5.2.2. <i>The fishing activity affects a limited number of boats</i>	21
5.2.3. <i>The fishing activity cannot be carried out with any other gear</i>	21
5.2.4. <i>The fishing activity shall be included in a management plan</i>	21
5.2.5. <i>It should be an activity already authorised prior to the entry into force of the Regulation</i>	22
5.2.6. <i>Authorised boats must show a log comprised of more than five years of catches</i>	22
5.2.7. <i>The fishing activity shall not involve any future increase in fishing effort</i>	23
5.2.8. <i>Other conditions laid down in Article 9</i>	23
6. Scientific basis of the management plan	24
6.1. Summary of the scientific study	24

6.1.1.	<i>Impact on the marine environment.....</i>	24
6.1.2.	<i>Assessment of sand eel.....</i>	24
6.1.3.	<i>Assessment of transparent gobies.....</i>	26
6.2.	Advice and technical measures	26
6.2.1.	<i>Catch limitations.....</i>	26
6.2.2.	<i>Establishing Benchmarks.....</i>	27
6.2.3.	<i>Reduction of the fishing effort through the withdrawal of licences</i>	27
6.2.4.	<i>Limitation on the number of authorised boats.....</i>	31
6.2.5.	<i>Limitation on the type of authorised boats</i>	31
6.2.6.	<i>Structure and dimensions of the 'sonsera'</i>	32
6.2.7.	<i>Establishment of a close season for fishing for the species CSIC.....</i>	33
6.2.8.	<i>Establishment of schedule-limiting measures.....</i>	33
7.	Order laying down the Management Plan	34
8.	Calendar for the implementation of the Management Plan	35
9.	Plan for monitoring the populations and to control of the activity	36
9.1.	<i>The Co-management Committee of the sonsera.....</i>	36
9.2.	<i>Monitoring and control of the landing.....</i>	37
9.3.	<i>Monitoring and control of daily quotas: excess compensation.....</i>	37
9.4.	<i>Monitoring the documents recording the daily catches.....</i>	38
9.5.	<i>Inspection of the fishing activity at the sea, port and fish auction market</i>	38
9.6.	<i>Sampling in the sea and port.....</i>	38
10.	Evaluation of the socio-economic impact.....	40
10.1.	The fisheries sector in Catalonia.....	40
10.1.1.	<i>Macroeconomic analysis.....</i>	40
10.1.2.	<i>Analysis of the fisheries sector.....</i>	40
10.2.	Socio-economic analysis of sonsera fishery in Catalonia.....	42
10.3.	A change of model: co-management of the fishery	45
10.3.1.	<i>Economic Impact.....</i>	45
10.3.2.	<i>Social Impact</i>	47
10.4.	Socio-economic impact of the ban on the sonsera fishery	48
10.5.	The socio-economic perspective of the MPBS	50
11.	Annex I. Order laying down the Management Plan	
12.	Annex II. Scientific report supporting the MPBS from Marine Sciences Institute of Barcelona (ICM) of the Spanish National Research Council (CSIC))	
13.	Annex III. Register of boats dedicated to artisanal fishing with sonseras	
14.	Annex IV. Regional regulations in force	
15.	Annex IV. Minutes recording the incorporation of the incorporation of the Co-management Committee of the Artisanal Sonsera Fishery	

1. Background

The Regulation (EC) No 1967/2006, of 21 December 2006, concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean Sea, amending Regulation (EEC) No 2847/93 and repealing Regulation EC No 1626/94, from now onwards called the Mediterranean Regulation, lays down in the Section 19 that the Members States shall adopt management plans for several fishing practices, including the fisheries conducted by shore seines, in Catalonia (Spain) called locally as *sonsera* fishing

The fishing technique of *sonsera* is carried out exclusively by artisan small-scale vessels. Due to the singularity of this fishing technique, and with the intention to preserve it, it is necessary to pass a management plan which should include two exceptions of what it is established in Sections 9 and 13 of the Mediterranean Regulation, regarding the minimum authorized mesh size, and minimum distances and depths for the use of fishing gears. The justification of the need to make flexible those minimum requirements of the Regulation is incorporated in this document.

On 11 May 2010 a first draft of the Management Plan for Artisanal Fishing with Boat Seines or *Sonsera*, locally called *Pla de Gestió de la Sonsera* and from now onwards MPBS, was submitted to the *Dirección General de Recursos Pesqueros y Acuicultura* of the *Ministerio de Medio Ambiente, Medio Rural y Marino* of the Spanish Government, to be delivered to the European Commission. The European Commission answered the MPBS by submitting a document dated on 22 June 2010 with the comments for the making of a management plan according to the criteria laid down by the Mediterranean Regulation. Following the instructions of the document of the Commission and those set at the meeting held in Brussels on 27 May 2011, another document of the MPBS was drafted and submitted to the European Commission by the Spanish government on 30 June 2011. This latter document of the MPBS was amended with a brief *Corrigendum* submitted on 20 July of 2011.

After assessing the MPBS and the subsequent *Corrigendum*, the European Commission responded to the project of MPBS with the document MARE D2/BF/ D(2011) 78111, 24 January 2012, based on the requirements of the Scientific Technical and Economic Committee for the Fisheries (from now onwards CCTEP) and requested to complete it with scientific information.

The Co-Management Committee of the Artisanal *Sonsera* (CCMS) was established on 26 April 2012 at the headquarters of the Fisheries Administration of the Autonomous Government of Catalonia to optimize management based on scientific recommendations and in turn to respond to the request for additional information by the European Commission contained in document MARE D2/BF / D (2011) 78111 of 24 January 24 2012. The CCMS is composed of representatives of the fishing sector, scientists from the of the Institute of Marine Sciences (*Instituto de Ciencias del Mar*, ICM) of the Spanish National Research Council (*Consejo Superior de Investigaciones Científicas*, CSIC), representatives of non-governmental environmental organizations namely World Wide Fund for Nature (WWF) and Greenpeace as well as members of the Fisheries Administration of the Catalan Autonomous Government and of the Government of Spain. Among the main functions of CCMS is to manage the fishing activity with the criteria in the proposed MPBS, to propose and to coordinate scientific studies, to monitor the compliance of the activity with the management measures envisaged and to propose appropriate measures in case of his noncompliance. It is also among the functions of CCMS to make proposals and to report to the EC, through the competent authority, on any aspects related to the MPBS as well as on any improvements.

On 18 June 2012, based on the provisions of Section 7 of Regulation (EC) No 1224/2009 of 20 November 2009 establishing a community control system for ensuring compliance with the rules of the common fisheries policy of Section 1.2 of Regulation (EC) No 1967/2006, of 21 December 2006, concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean, the Fishing Administration of the Autonomous Government authorized to fish under daily basis with artisanal *sonsera* to 10 of the total 25 boats proposed in the MPBS, in order to obtain necessary data required for scientific study. The CCMS through its Permanent Committee consisting of two representatives of each of its pillars, agreed in a series of technical measures of management and a calendar for the vessels that should govern during the development of scientific study conducted by the ICM-CSIC and funded by the fishing sector of the *sonsera*, and set out in the Order of the Director General of Fisheries and Maritime Affairs of the Autonomous Government on 19 November 2012. The Standing Committee meets monthly in the so-called control sessions to assess the details of catches, review the landing quotas and manage the fishing activity.

On 12 February 2013 a double session of the plenary and the Permanent Committee of the CCMS was held in Barcelona that was attended by two observers from EC DG MARE. The main purpose of this special meeting of the CCMS was to make a presentation on the functioning of the committee to DG MARE staff attending the meeting as guests. During the conference the different members of the Permanent Committee of CCMS exposed aspects related to the Co-Management Committee, the scientific studies linked to the Management Plan and the Management Plan itself.

The Permanent Committee of CCMS, based on the results of a specific scientific study and the experience gained during the months of functioning of the CCMS, has prepared this Plan of Management artisanal *sonsera* that is submitted to the European Commission in order to comply with the Section 19 of the Mediterranean Regulation and to justify the granting by the European body of an exception from paragraph 1 of Section 13 of this Regulation.

The management measures in the project drafted by the CCMS have the approval of the fisheries administration of the Spanish Government including the granting of the exception to the minimum mesh size in the codend of the *sonsera* as provided in paragraph 7 Section 9 of the Mediterranean Regulation.

Regarding the functioning and the role of the CCMS and its Standing Committee, it has to be reported to the European Commission that its work has been recognized with the 2013 award of the World Wildlife Fund (WWF) of Conservation of Merit in recognition of his pioneering work in the field of sustainable fishing. According to WWF, it is a revolutionary step towards rational management of fisheries in the Mediterranean which has led result in a significant change in the attitude of fishermen and brought together all stakeholders in the goal of a sustainable management of the natural resource.

2. Management plan objectives

The main objective of the management plan (MPBS) is to regulate the artisanal fishing practice of *sonsera*.

This Management Plan for Artisanal Fishing with Boat Seines (MPBS) is a unique management plan in Catalonia with regard to management plans related to fishing with boat seines. Therefore, this MPBS includes in a single management plan both measures for the fisheries of sand eel as well as those for gobies with boat seines as provided in the normative project in Section 11. Annex I of the MPBS "Order laying down the Management Plan."

The fish species targeted by the fishing practice *sonsera* are: the sand eel (*Gymnammodytes cicerelus*, *G. semisquamatus*), locally called "sonso", and the gobies (*Aphia minuta*, *Crystallogobius linearis*), locally called "llengüeta".

Given the need to increase scientific sampling in order to evaluate the current population status of a third species of gobies -Ferrer's goby (*Pseudaphya ferreri*), locally called "morulla", a species traditionally fished in small amounts by boats of *sonsera*- fishing of *Pseudaphya ferreri* has been prohibited. Depending on the results of the scientific monitoring of the MPBS, and in accordance with the state of its population, the CCMS may propose incorporating *Pseudaphya ferreri* as a target species in the future.

The fishing activity regulated by this MPBS is limited to a Catalan coastal line extending from the coast of Barcelona to the northern Gulf of Roses.

The fishing gear of *sonsera* should be classified according to Mediterranean Regulation (Regulation (EC) No 1967/2006 regarding Fisheries in the Mediterranean) as a boat seine fishery.

Fishing with *sonsera* in Catalonia has been authorized since 1987 and in the past it was carried out complementing other small scale fishing methods. This MPBS lays down the incompatibility of fishing with *sonsera* and simultaneously fishing with other forms artisanal fishing gears during the term of the special permit for fishing with *sonsera*, thereby establishing a new reduction of the fishing effort under the artisanal category along the Catalan coast.

Following the recommendations of international fisheries management bodies and international agreements, the "sonso" as a natural resource should be managed under an ecosystem approach and, within this framework, the goal to bring the fishery around the maximum sustainable yield shall be pursued.

In relation to the ecosystem approach, control and monitoring of the seabed shall be performed, avoiding seagrass beds and rocky areas, as well as a strict control of non-target species.

The scientific assessment confirms the perception by stakeholders regarding a healthy status of the sandeel stock in 2013. Therefore, there is no reason for immediate alarm and it is proposed to maintain the management measures of the last period, in particular the annual quota of 819 tonnes for the sandeel. For the gobies it is proposed to establish quotas based on the average historical catch for the

2001-2013 period which would provide values of 1.8 tons of *Aphia minuta* and 3.8 tons of *Crystallogobius linearis*.

The technical measures set out in the MPBS, which have been adopted in response to scientific advice, are based on an adaptive management approach being applied by the Co-Management Committee of the *sonsera* (CCMS), established on 26 April 2012 and composed of representatives of the fishing industry, scientists, representatives of social organizations and competent fisheries administrations.

For the artisanal *sonso* fleet that is active in coastal waters of Catalonia (Spain) it is requested to the European Commission the publication of an implementing Regulation providing for the exemption under Article 13, paragraph 1, of Regulation (EC) No 1967/2006. This is based on the management plan for artisanal fishing with boat seines (MPBS), considering that conditions laid down in Article 13.5 are fully met.

We justify the conditions governing the grant of exemption from the minimum size of the mesh laid down in Article 9 of Regulation (EC) No 1967/2006 (as amended by Regulation (EU) No 1343/2011), for boat seines. This exemption shall apply to the artisanal fleet fishing with boat seines that is active in the coastal waters of Catalonia (Spain), according to the management plan for artisanal fishing with boat seines (*sonseras*). According to the Article 9, paragraph 7 of the Regulation (EC) No 1967/2006 it is on the concerned Member State to approve such exemption.

3. The target species of fishing with sonseras

3.1. Sand eel (*Gymnammodytes cicerelus* and *G. semisquamatus*)

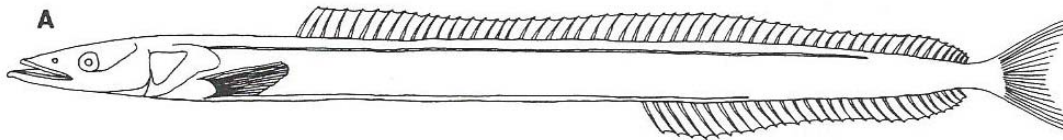
3.1.1. *Gymnammodytes cicerelus* Rafinesque-Schmaltz, 1810

Diagnosis: ventro-lateral skin-folds extending well beyond pectoral fins to anus. Dorsal rays 56-59; anal rays 27-31; pectoral fin ray 12-15. Lateral line branched. Vertebrae 66-67 (mode 66). Colour: iridescent silver, while the back is bluish-grey and the flanks and belly whitish. In this species it is possible to observe a strip of quit marked dark pigmentation along the top part of the flanks and over the head. Size: to 17 cm SL.

Habitat: inshore to 15 m depth. Food: probably plankton. Reproduction: winter spawner.

Distribution: Mediterranean (northern coasts only) and Black Sea, overlapping with *G. semisquamatus* in the western Mediterranean.

Larvae: Sabates et al (2003) working on the North of the study area found larvae of *G. cicerelus* in winter (January-March).



Adult of *Gymnammodytes cicerelus* from the Catalan coast (from Sabates et al, 1990)



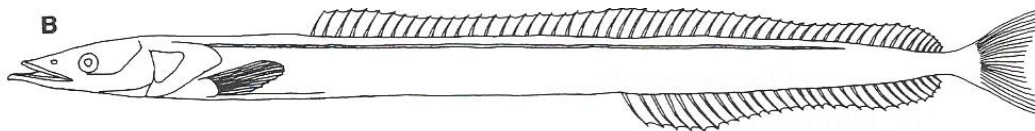
3.1.2. *Gymnammodytes semisquamatus* Jourdain, 1879

Diagnosis: ventro-lateral skin folds extends from the base of the pectoral fin to just beyond the rear end of the fin. Dorsal rays 53-59; anal rays 26-32; pectoral fin ray 12-15. Lateral line branched. Vertebrae 64-72. Colour: Body silver, while the back is dark brown and the flanks and belly whitish. The strip of pigmentation on the flanks is brownish and barely appreciable, though it does exist. Size: to 28 cm SL.

Habitat: typically offshore over shell-gravel, also inshore where shellgravel beaches occur. Food: plankton. Reproduction: summer batch spawner, ripe fish occurring from March to September in North Atlantic, but probably with more restricted spawning periods for each population, and possibly a winter/spring spawner in the Mediterranean.

Distribution: eastern North Atlantic from the southern coast of Norway and the Shetlands (61° N) to Spain (36° N) including all coasts of the British Isles and the North Sea, but not the Baltic, and extending along northern Mediterranean coasts to at least 3° E.

Larvae: Sabates et al (2003) working on the North of the study area found larvae of *G. cicereus* in winter (January-March) and few specimens in a 24-h sampling cycle carried out in July.



Adult of *Gymnammodytes semisquamatus* from the Catalan coast (from Sabates et al, 1990)



3.2. Goby (*Aphia minuta*, *Crystallogobius linearis*)

3.2.1. *Aphia minuta* (Risso, 1810)

Diagnosis: Dorsal spines (total): 4 - 6; Dorsal soft rays (total): 113; Anal spines: 1; Anal soft rays: 11 - 15. Vertebrae 26-28 (Whitehead et al , 1986.). *Aphia minuta* is a small species no

more than 6 cm long (Tortonese, 1975) with a short lifecycle and rapid maturation of the gonads. The specimens present a long body flattened laterally. The scales are cycloid and easily lost. There are no scales on the nape of the neck or the first dorsal fin. The swimbladder is evident and persistent and the food canal is straight and short. The adults are white, yellowish or pink; the body is transparent with a few black chromatophores. In proximity to the opercules a red spot can be observed due to the blood of the gills, visible because of the animal's transparency. This species presents sexual dimorphism: the males have a larger head, uneven teeth, a higher caudal peduncle and the fins are more developed, especially the ventral ones.

Distribution: *Aphia minuta* is spread throughout the Atlantic Ocean from Gibraltar to the Norwegian coasts, the North Sea and the western Baltic Sea. It is also present all over the Mediterranean basin including the Black Sea and the Azov Sea.

Biology: It is a coastal species, pelagic in the larval and young stage. During sexual maturity the organisms acquire demersal-benthic habits.



3.2.2. *Crystallogobius linearis* (Düben, 1845)

Diagnosis: Dorsal spines (total): 2 - 3; Dorsal soft rays (total): 18-20; Anal spines: 1; Anal soft rays: 20 - 21. Patterns of sensory papillae require detailed description. Pronounced sexual dimorphism. Anterior nostril a short tube. Pectoral fin uppermost rays within membrane. Males: with prominent front canine teeth; pelvic disc complete and deep; 1st dorsal with only 2 with rays. Females: pelvic disc reduced or lacking; 1st dorsal absent or rudimentary. Vertebrae 30(29-31).

Distribution: Eastern Atlantic: Lofotens, Norway, to Gibraltar. Also known from the Mediterranean Sea. Eastern Central Atlantic: Madeira Island (Wirtz et al., 2008).

Biology: This occasionally territorial species occurs in coastal waters, over shell, sand, or mud bottoms; males bottom-living during breeding season. Feed on zooplankton (Wheeler, 1992). Spawning takes place when 1 year old. Adults die afterwards. Eggs are laid in the

empty tube-worms and are guarded by the male (Muus and Nielsen, 1999). Eggs are pear-shaped (Miller, 1986).



3.2.3. *Pseudaphya ferreri* (O. de Buen & Fage, 1908)

Description: Teeth size does not differ markedly between sexes. DI V, D2 I + 7-10, A I + 9-10, P 15-16. Scales in lateral series 25-30. Vertebrae 30. Colour: body transparent, with rosy stippling on sides, head and bases of median fins; caudal fin base with large triangular dark spot.

Size: to 3.5 cm.

Distribution: It is found in the Mediterranean Sea in the western basin and the Adriatic Sea.
Habitat: nektonic, over sandy beaches.

Reproduction: The females mature to 26-27 mm. Reproduction in June.

4. Fishing with *sonseras* (boat seines)

4.1. Fishing of sand eel and similar species with *sonseras* in Catalonia

Sand eel has a restricted distribution in the sea and located only in sandy coastal habitats of the Catalan coast, between the ports of Barcelona and L'Estartit. It is fished usually at depths between 6 and 16 meters with a maximum authorized depth that may not exceed 30 meters.

The sandy bottoms of northern area of the distribution of the sand eel, from Blanes to L'Estartit, are located in rocky shores where a depth of 10-14 meters is found at a distance of less than 400 meters from the coast. In the south area of its distribution, between Barcelona and Blanes the shape of the seashore is different and at 600 meters away from the coast the average depth is just 7 meters.

This essential habitat of the sand eel, so close to the coast, it is the reason why this fishing activity can only be performed in a nearshore and shallow fishing ground. In order to protect the marine environment, sand eel fishing must be regulated to environmentally friendly and, therefore, it must be carried out exclusively over sandy bottoms and, therefore fishing over sea grass (phanerogam meadows) or rocky bottoms must be banned.

For both species of gobies, the distribution is located in muddy bottoms or habitats with mud and sand. *Aphia minuta* can be fished in depths between 7 and 12 meters in the south fishing grounds of the coast near the port of Barcelona, while *Crystallogobius linearis* has a deeper bathymetric range with fishing depths generally between 30 and 50 meters deep and is distributed mainly in the fisheries of the north, between Blanes and L'Estartit. Obviously, in this case it must also be banned fishing over sea grass meadows and rocky bottoms.

Based on the characteristics of their essential habitats, we conclude that the geographic distributions of gobies do not overlap with those of sand eel.

4.1.1. Description of the *sonsera*

Sonsera is a fishing gear of the group of boat seines. It must be clarified it is not fishing by trawls.

The *sonsera* is the only fishing gear that, by their shape, is able to fish sand eel (*Gymnammodites cicerelus* and *G. semisquamatus*) and small gobies locally and generically called llengüeta (*Aphyia minuta*, *Cristalogobius linearis*) and it is used exclusively for this purpose.

Based on the analysis during the scientific evaluation campaign of the measurements of the *sonsera* used by fishermen, the standardized features to be met have been set for the fishing gears of the boats included in the management MPBS.

The *sonsera* is a fish net gear whose structure is based on two sidebands called locally "alas" (wings) and a centre bag or codend between them called locally "copo" whose overall dimensions are as follows.

- The maximum length of the band is 125 meters.
- The maximum height of the band is 35 meters.
- The maximum length of the codend 30 meters.

Each one of the edges of the bands is fixed out to a rope whose length cannot exceed 100 meters.

These dimensions of the *sonsera* are general proposals for both fishing sand eel and small gobies. However, given the different geographical and bathymetric range of the target species and the different depth of their fishing grounds, when accessing the fishing grounds located above the north of the port of Blanes it may be considered the following variation in the dimensions of the *sonsera*:

- To catch sand eel a maximum height of the bands of 60 meters and a length of the rope attached to the edges of the bands of up to 200 meters shall be accepted. In this area the catches are made usually in a depth between 13 and 16 meters, usually not exceeding 30 meters.
- To capture small gobies it is only allowed to increased the size of the rope attached to the edges of the bands up to a maximum length of 200 meters.

In the fishing grounds located below the south of the port of Blanes the *sonsera* dimensions allowed will be only the general dimensions given at the beginning of this section, either to catch sand eel or small gobies.

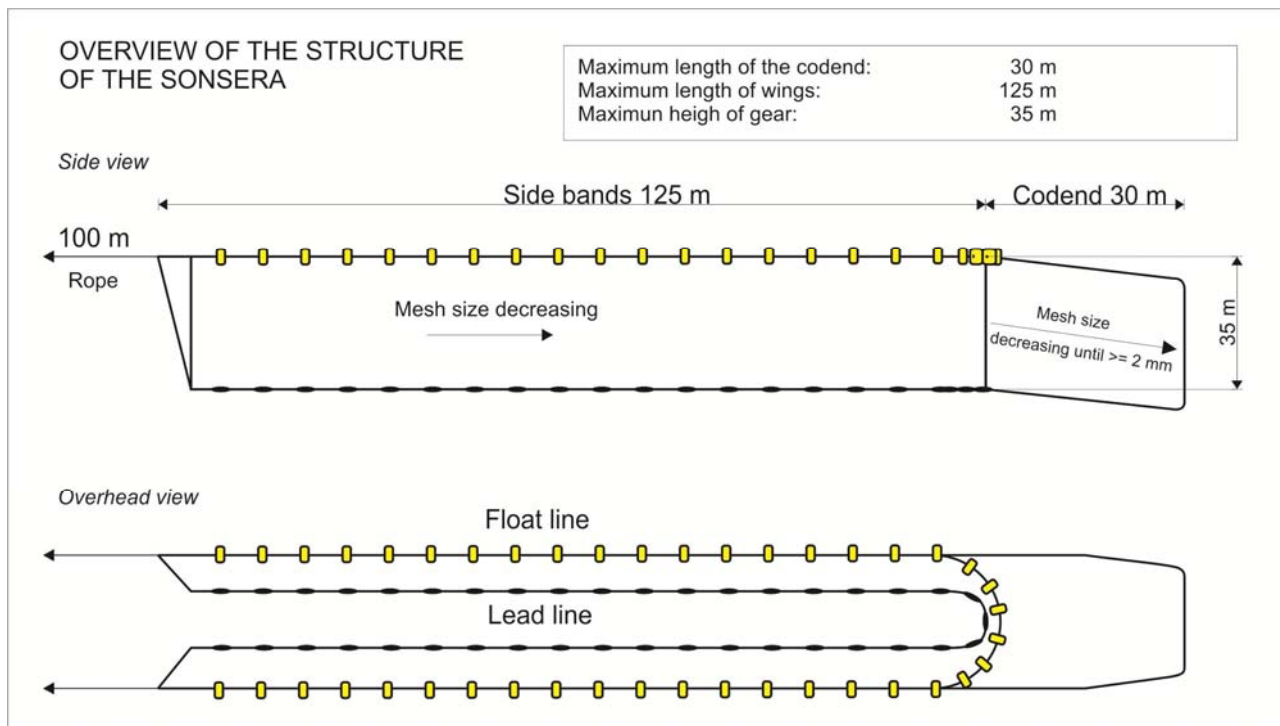


Diagram of *sonsera* (fishing gear) features

4.1.2. Fishing operations with *sonsera*

Shipments in fishing boats that use *sonsera* completed during the scientific study, provided an excellent opportunity to know how was the fishing operation and to estimate the impact of this activity on the marine environment.



The fishing operation begins with the location and identification of the target species by the fish finding sonar. This identification allows both assessing the size of the target bank and to recognize any presence of non-target species. At this very moment of the fishing operation is when it should be assured the selective catch of the gear by controlling the possible presence of non-target species.

Then the net shall be deployed surrounding the shoal, releasing rapidly the rope, a band, the codend, the other band and the other rope. It is quite important to monitor the effect of the marine current in order not to miss the operation of surrounding the school of fish with the net. During the operation of enclosing the shoal, a buoy shall be set as a reference to the same position that helps the operation of deploying the net properly. This buoy stalls once the target shoal has been identified .

After the deployment of the fishing gear, the net bands shall be left with the two ends of the rope tight up on board. By traction and recovery of the two ends, the net is properly positioned resting on the bottom so as to prevent fish to escape. This operation should not be performed with much traction since it may cause the lifting of the gear and it could shut it out of control with the subsequent failure of the fishing operation. Then the anchor is thrown overboard from the bow to keep the boat in a stable position.

A winch is used to retrieve the fishnet, lifting the different sections of the net from the sea slowly and continuously, retrieving the two ends of the rope parallel and the two bands up to the codend. To keep the boat in a fixed position the boat engine is used to help in balancing the force of the moving the gear.

All these fishing operations are done from astern, although some boats carried by the side of the vessel.



Finally codend is recovered manually and its content is being pulled by the cylindrical extension of the codend and it is being deposited in containers.

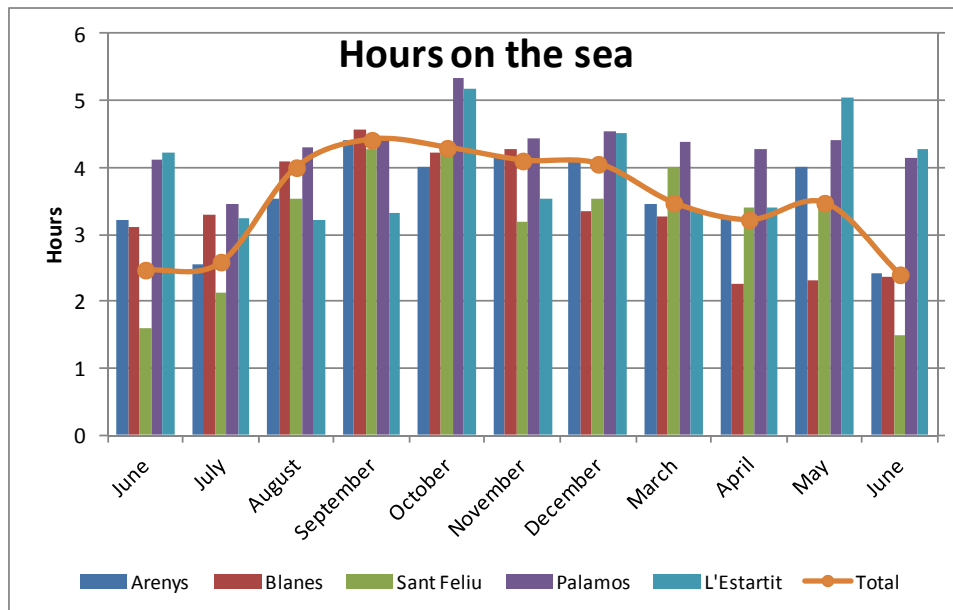
During this activity, the non-target species catches shall be released and returned alive to the sea. The most common process for releasing these species is manually extracting them from the containers while they are dumped in. Sieves that allow passing the target species through can also be used so that non-target species can easily be handled.

4.2. Location of the fishing activity

Fishing activity has been monitored through log books, from June 2012 to June 2013. Information is available, on a daily basis and by vessel and fishing operation, on the target species catches, coordinates and depth of the fishing ground, time at sea, and by-catch species (Annex IV). The analysis of these data allowed evaluating the fishing effort, in terms of fishing days, number of hauls, hours at sea, and fishing ground.

Data of the fishing activity are available on a total of 1906 daily trips and 3038 hauls, carried out by the boat seine "sonsera" fleet with base in the fishing ports of Arenys de Mar, Blanes, Sant Feliu de Guixols, Palamos, L'Estartit during 10.5 months (from 16 December to 1 March fishing closure was applied).

Fishing hours at sea showed an increasing trend from June 2012 (2.47 hours) to September. From September onwards, until the end of the fishing season in December, the time spent at sea was >4 hours. When season started in March 2013, the hours at the sea were 3.47, decreasing until June 2013 to 2.4, the same value as in the previous season.



Some differences between ports could be observed. In general fishermen worked in the area nearby the base port of the fishing boat and moved further seeking for the target species as the season advanced.

See sections Part I-4.3 and Part II 2.3 of the scientific study (Annex II), where the maps with the position of the hauls and presence of phanerogams meadows are presented.

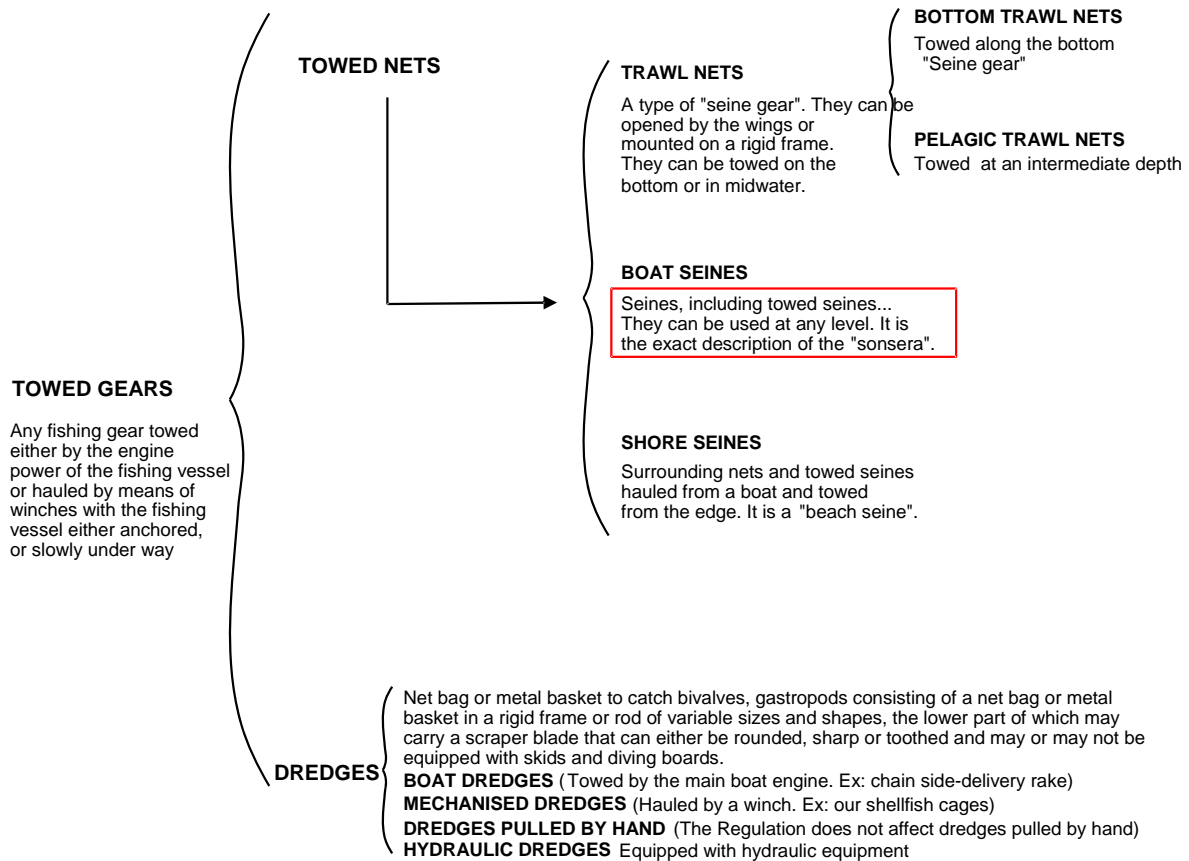
The maps show the position of the hauls during the studied period. Even when the fishing took place in the area corresponding to base port of the fishing boats, the fleet of Arenys overlapped their fishing ground with the Blanes fleet on the northern area. Boats from Sant Feliu de Guixols, Palamos and L'Estartit are those that displayed highest mobility. The depths where the fishing operations took place ranged from 4 m to 15 m for the fleet of Arenys and Blanes, and from 5.5 m to 30 m for the boats of Sant Feliu de Guixols, Palamos and L'Estartit.

As shown by the maps, the "sonsera" is not used on sea bottoms characterized by the presence of sea grass meadows, in particular *Posidonia oceanica*.

4.3. Classification of the *sonsera* gear

The gear used for fishing sand eel is known in Catalonia as "*sonsera*". It is a small boat seine that is used from a boat that is no longer than 10 m (LBP). The gear is comprised of two wings no longer than 125 metres, at the end of which is a cod-end that is a maximum of 30 metres long. Handling the gear is quite simple: after a shoal is located, it is encircled with the net. Then the two ropes of the wings are pulled so that the fish collect inside the cod-end.

The diagram in Figure 1 is based on the definitions of Article 2 of Regulation 1967/2006 on Mediterranean Fishing. In accordance with this diagram, the *sonsera* is classified as a "boat seine".



Classification of towed gears according to Regulation 1967/2006

4.4. Catch composition

The analysis of the catches made by the scientific study has brought the result that the *sonsera* is a selective fishing gear since there is a previous detection of presence and identification of the species of the school of fish with the sonar and, therefore it can be proceeded to perform a fishing operation clean of non-target species.

The percentage by weight of non-target species in relation to sand eel catches recorded during the study period was very low, between 2% and 3%. It has to be noted that these non-target catches have been released alive into the sea. During the scientific study the selling of all non-target species has been banned.

The data analyzed to evaluate the selectivity of fishing has two sources: the data collected during the scientific sampling trips and the data recorded in the fishermen log-books.

Two scenarios have been analyzed with the information gathered from sampling trips. A first scenario considered all non-target species retained by the gear without being released. The results showed percentages that did not exceed 2%. The second scenario considered that the non-target species should be released and it was recorded two data, firstly, the percentage of retained target species that were later released and, secondly, the species that could not be released and were landed dead. The percentages obtained were <1% and <0.5% respectively.

The data recorded by fishermen referred to non-target species retained and released. In this case the weight percentage was also very low, ranging from <0.5 to <1 %.

Among the non-target species that were found in the catches of the study, 16 have been considered as the most frequent and abundant for the whole period. The species that appeared in all fishing days analyzed have been common are: pandora or *Pagellus erythrinus* ("pagel"), razorfish or *Xyrichtys novacula* ("lorito"), flounder or *Bothus podas* ("podas"), greater weever or *Trachinus draco* ("araña") and blue stripe lizardfish *Synodus saurus* ("lagarto").

Among the five top most frequently found species, only *Pagellus erythrinus* is regulated through a minimum landing size, which is set at 12 cm. The survey of the weight of *Pagellus erythrinus* compared to the catches of sand eel, delivered that the maximum non-target catches were recorded in November (0.11%), in May (0.12%) and in June (0.15%), with individuals sized over 12 cm. The other months of the year recorded *Pagellus erythrinus* with percentages of the total catches ranging from 0.01 % to 0.05 %. In the month of October individuals with length < 12 cm were recorded, but with a percentage of 0.02 % of the total catch.

Other two non-target species regulated through minimum landing sizes are horse mackerel *Trachurus spp. (jurel)*, with size set at 12 cm, and Spanish mackerel *Scomber japonicus (estornino)*, with size set at 18 cm. Average percentage of horse mackerel catches in weight for the whole study period was 0.02 %. These individuals were larger than the regulated minimum catch size (all were above 23 cm) and only 11 individuals caught in the month of September were smaller than 12 cm.



A) *Gymnamodytes cicereus*

B) *Gymnamodytes semisquamatus*

Photographs showing the two separated species with their characteristic shades

For both species of goby the study of the selectivity of the fishery was also based on the non-target species retained by the net during the scientific fishing trips and analyzed in the laboratory. These specimens belonging to non-target species were released as in all the other fishing operations. The sale of non-target species was prohibited during the scientific study.

In the case of the two species of goby, the weight ratio between them and the non-target species is quite dissimilar from the case found with sand eel due to the low individual weight of gobies.

The results for the fishing of *Aphia minuta*, are such that the percentage of non-target species accounts for 38%, with a ratio of 61 kg of goby vs. 23 kg of non-target species. There are more than 20 species that were caught out regularly and although their number is low always a high percentage of weight was found. For example: red mullet (locally called "salmonete"), or *Mullus barbatus* by 3.2 %, red sea-bream (locally called "pagel") 1.5 %, horse mackerel (locally called "jurel") 2.6 %, with 60, 11 and 49 individuals respectively. Juveniles of small pelagic such as european sardine *Sardina pilchardus* were present of 1.64% only in two hauls (one in March and another in April) over the complete study period. However, it should be pointed out that in all fishing days and for all species, individuals retained in the net were released alive into the sea if it had not been studied.

Crystallogobius linearis study case is similar to the former, with a large number of non-target species due to its heavier weight with high in weight percentages of the catch. The percentage in weight of red mullet, *Mullus barbatus*, common Pandora, *Pagellus erythrinus* and annular sea-bream was 11.7%, 35.3% and 21.8% respectively, and 488, 963 and 21 individuals respectively. Pelagic species both adults and juveniles are practically absent over the complete study period (*Spratus spratus*, *Alosa fallax* and *Sardina pilchardus* of 0%; *Sardinella aurita* of 27.4% and 12 individuals). As in the case of *Aphia minuta* should be pointed that all those individuals were released alive at sea if it had not been studied.

The conclusion of the study conducted is that the actions carried out with the control of banning the sale of non-target species is an achievement in the ability of *sonsera* fishing selectivity and accomplishment in the liberation and survival of non-target species. The scientific study recommends limiting the presence of non-target species in the catch in weight percent maximum of 1% of the total catch or a total weight less than 5 kg. The prohibition must be kept also along the marketing chain of the product.

4.5. Regulations

This fishing activity was legally governed by regulations of the Autonomous Community of Catalonia, implemented by Orders of the Ministry of Agriculture, Livestock, Fisheries, Food and the Environment, published in the Official Journal of the Generalitat of Catalonia.

The regulation of this type of fishing dates back to the year 1987 when, by means of the Order of 15 January 1987, which governs the fishing of sand eel, *Gymnammodytes cicerellus* Rafinesque, 1810, along the Catalan coast, the foundations were laid for an activity that, with slight modifications, has been evolving up to the present. In this regard, the Order of 19 August 1997 was published to complement the previous Order (15 January 1987), amending the regulations for the fishing of Mediterranean sand eel along the Catalan coast.

The regulations have been attached to this management plan.

5. Request for exceptions to the Mediterranean Regulation (EC 1967/2006) Fishing for fishing with *sonseras*

As previously stated, the Mediterranean Regulation, in accordance with article 2, classifies the *sonsera* as a boat seine, in accordance with Article 2. This circumstance requires, in accordance with Mediterranean Regulation provisions, the granting of two exceptions to allow this type of artisanal fishing to continue operating.

Specifically, a request is made for an exception to the minimum mesh size set forth in Article 9 and to the minimum distance to the coast set forth in Article 13.

5.1. Request for an exception to the minimum mesh size

Since the *sonsera* is included in the group of "towed nets", it is subject to the provisions of Article 9, "Minimum mesh size", specifically those of Article 9.3. Thus, the same minimum mesh size must be observed for bottom trawling, despite the fact that the *sonsera* gear has been authorised, since the entry into force of the Order of 15 January 1987, to use a minimum mesh size at the end of the cod-end that makes it possible to retain catches of species that in their adult phase do not exceed a cylindrical section of a few centimeters. The justification of this mesh with a small diameter is simple: the target species of the *sonsera* is small in size and the catches are always single-species, as indicated in Section 1.

As required by the Mediterranean Regulation, fishing with *sonseras* complies with the following requirements:

5.1.1. The fishing activity must be highly selective

Depending on the season, the *sonsera* is aimed at two different sets of species. During most of the year, fishing activities target exclusively sand eel (*Gymnammodytes cicerellus*, Rafinesque 1810 and *Gymnammodytes semisquamatus*). During the closed season for sand eel fishing (from 16 December to 1 March) and also in April the boats can direct their activity towards the two species of *llengüeta* (goby): *Aphia minuta* and *Crystallogobius linearis*.

Fishing operations are straightforward: once the shoal has been detected, it is encircled with the gear's wings, which are then slowly dragged so that the fish collect in the cod-end, which is hauled on board with the assistance of a small engine.

The analysis of the catches made during the scientific study (see section 4.2) has shown that the *sonsera* is a selective fishing gear since the occurrence of non-target species is detectable by the sonar which allows performing fishing operations free of non-target species. As a conclusion of the scientific study, the success of control measures preventing the sale of non-target species (1), the good selectivity of the *sonsera* gear (2) and the success in the release alive and posterior survival of non-target fish (3) support the recommendation to limit the occurrence of non-target species to less than 1 % of the total catch in weight, or to a total weight of less than 5 kg. This measure has been integrated in the Management Plan (see Annex I).

5.1.2. The fishing activity shall not have a significant impact on the marine environment

Once the fish have been encircled, the gear is momentarily dragged. The regulatory draft lays down that this handling should be carried out exclusively over sandy bottoms. The

activity is strictly prohibited over seagrass and rocky sea bottoms. Results of the scientific study and field observations confirm that fishing operations are not performed on phanerogam meadows (See 4.2 and results of the scientific study in Part I-4.3 and Part II of Annex II).

5.1.3. The fishing activity shall not affect the provisions of Article 4, Section 5 of the Mediterranean Regulation

The type of fishing with *sonseras* is carried out by using a boat seine over sandy bottoms. For this reason, it does not affect the provisions of Article 4.5 related to small seine boats that fish over marine phanerogam meadows.

5.2. Request for an exception to the minimum distance to the coast

Both the sand eel and the rest of the target species of the *sonsera* are generally caught at very shallow depths, with just a few centimetres of water below the keel of boats with an average length of 10 metres and just one metre of draught.

Since the *sonsera* is classified as a "boat seine", a sub-class of "towed nets" and in turn of "towed gear", it must comply with Point 1 of Article 13, minimum distances and depths for the use of fishing gear, which prohibits fishing with "towed gear" less than 3 miles off the coast or at least in waters that are 50 metres deep if a lesser distance is reached. Compliance with this provision is completely incompatible with fishing with *sonseras* and makes it totally unfeasible.

Taking into account this circumstance, a request is made for an exception to the compliance with a minimum distance to the coast and a minimum depth, given that fishing with *sonseras* complies with Points 5 and 9 of Article 13 of the Regulation, as detailed hereunder.

Point 5 of the same Article 13 mentions this possibility for certain cases. With regard to the *sonsera*, for the possibilities listed in this point, the exception is justified for the following reasons:

5.2.1. The fishing activity has no significant impact on the marine environment

This matter was justified in the previous section 5.1.2.

5.2.2. The fishing activity affects a limited number of boats

The management plan sets forth the reduction of licences to a register comprised of a maximum number of 26 boats. The register's details are covered in the relevant section.

5.2.3. The fishing activity cannot be carried out with any other gear

In the Spanish Mediterranean Sea, there is no other regulated gear that, due to its structure, technical characteristics and the type of mesh used, can capture species of a size as small as that of the target species of the *sonsera*. See 4.1.

5.2.4. The fishing activity shall be included in a management plan

This document is the proposed Management Plan for Boat Seines (MPBS).

The possibility of an exception, in accordance with the stipulated management plan, also complies with the three mandatory conditions set forth in Point 9 of the same Article 13:

5.2.5. It should be an activity already authorised prior to the entry into force of the Regulation

The activity has been regulated in Catalonia since 1987 by the Order of 15 January 1987, which rules the fishing of sand eel *Gymnammodytes cicereillus* Rafinesque, 1810, along the Catalan coast, and thus, it fully meets the established condition.

5.2.6. Authorised boats must show a log comprised of more than five years of catches

The boats that are used for fishing with *sonseras* are boats registered as small-scale fishing boats of the Statistical Register of Spanish Fishing Vessels. Council Regulation (EEC) No. 2847/93 of 12 October 1993, which establishes a control system applicable to the common fishing policy, sets forth for the first time the mandatory nature of the issuance of first-sale notes in relation to fishing products. Despite the fact that this Regulation set forth that the Commission may exempt boats of a length of less than 10 metres from presenting the first-sale notes, in Catalonia it has always been believed that these small boats must comply with the same requirements as the rest of the fishing boats. Nevertheless, during the procedure that automates the fish markets and issuance of sale notes, certain omissions were made when the data was entered that have made it advisable to incorporate delivery notes and invoices into the valid documentation as proof of the catches made. Hence, for the calculation of historic catches required by the Regulation, delivery notes and invoices have been used for the period ranging from 2000 to 2010.

As a result, the Management Plan sets forth the reduction of licences to a register comprised of 26 boats, which show proof of their catches in accordance with the Regulations' requirements.

ASSOCIATION	NAME	REGISTRATION NO.	FOLIO NO.	LENGTH BETWEEN PERPEN.	POWER (hp)	POWER (kw ⁽¹⁾)
CP ARENYS DE MAR	CRIS-U	BA-3	'2-92'	6.67	27	20,13
	ESPARTA	BA-3	4-02	7.5	50	37,28
	LLAMANTO U	BA-3	'1-96'	6.67	32	23,86
	MONTSERRAT	BA-3	'2103'	5.75	30	22,37
	PAT I AINA	BA-3	'2-96'	8.25	45	33,56
	MARIA	BA-1	'1232'	6.1	50	37,28
	JUAN BAUTISTA	BA-3	'1817'	5.98	27	20,13
CP BADALONA	NURIA	BA-2	'3064'	6	30	22,37
CP BARCELONA	TRASMALLERO	BA-1	'2-05'	7.64	58	43,25
CP CALELLA	NEUS II	BA-1	'1227'	8.05	56	41,76
CP BLANES	MARLU	BA-4	'1-93'	7.42	60	44,74
	HERMANOS CAYUELA DOS	BA-5	'1-91'	9.8	48	35,79
	NOVA SANT JOAN	BA-4	'1-00'	9.5	91	67,86
	PARE TRIAS	BA-4	'3-01'	9.3	74.5	55,55
	ROSA DOS	TA-1	'1349'	9.64	50	37,28
	REFI	BA-4	'1499'	7.46	50	37,28

¹ In the Register of the fishing fleet operating the engine power is indicated in horses (Hp), for conversion to kw the following formula has been used: P (kW) = 0.7457 * P (Hp)

	SANT JOAN TERCERA ⁽²⁾	BA-4	'1-11'	10.0	100	74,57
CP L'ESTARTIT	ELISA	BA-2	'3754'	5.5	27	20,13
	EL BOLERICO	CP-1	'1-96'	8.06	18	13,42
	FERMA	BA-4	'2-93'	7.42	50	37,28
CP PALAMÓS	MARTÍ I PEP	BA-5	'1-99'	5.7	40	29,83
	FOQUE UNO	BA-2	'3990'	10.76	75	55,93
	NINU SEGON	BA-5	'1-96'	11.98	100	74,57
CP SANT FELIU DE GUÍXOLS	AVI TONI	BA-4	'2-01'	9.28	74	55,18
	CONSTANT	BA-2	'1-91'	8.8	126	93,96
CP TOSSA DE MAR	GERMANS REFÍ	BA-4	'1-07'	9.96	95.2	70,99

More information in this regard is included in the appendix "Register of boats dedicated to artisanal fishing with *sonseras*".

5.2.7. The fishing activity shall not involve any future increase in fishing effort

In case a registration actualization is required, the MPBS provides for a closed number of vessels and the impossibility of merging registrations and their corresponding engine powers which would be translated into new constructions with greater capacity. The MPBS also indicates a maximum quota per fishing season which, if exceeded, will imply the immediate closure of the fishery.. As will be seen hereunder, there is also a provision stating that for future incorporations replacing boats of the register presented in this MPBS, the maximum length, currently limited to 10 metres between perpendiculars, shall not be greater than 10 metres in total length. Additionally, the power of the boat engine shall not be above 75 kw.

5.2.8. Other conditions laid down in Article 9

In addition, this type of fishing complies, as also required in Article 13, with Article 4 of the Mediterranean Regulation (protected habitats), Article 8.1.h (mesh smaller than 40 mm for bottom trawling), Article 9.3.2 (on the replacement of the 40 mm square mesh), given that the exception has also been justifiably requested in the previous point, and Article 23.

Control of the fishing activities through fishing inspections, which will be increased with the application of this MPBS, will ensure that catches of species listed in Appendix III of the Mediterranean Regulation are minimal and do not target cephalopods.

Lastly, due to the nature and size of the target species, this type of fishing does not compete with any other type, as there is no other gear that can capture them.

² This vessel was not included in the management plan submitted on 30 June 2011. The revision conducted in 2012 as a result of administrative proceedings initiated by the ship owner detected an error in the calculation of historic catch that has been corrected in this management plan.

6. Scientific basis of the management plan

6.1. Summary of the scientific study

In accordance with Article 6 of Regulation 2371/2002, the management plans shall include conservation reference points, such as objectives in relation to which the maintenance of the populations within these limits shall be assessed. Letters a) to d) of Section 2 of Article 5 shall apply.

The scientific study is presented in Annex II.

6.1.1. Impact on the marine environment

The sand eel is distributed in shallow waters of the Catalan coast only in coastal habitats of sandy bottoms at depth mainly between 5 and 25 m never at more than 30 m.

This sandy coastal essential habitat of the sand eel is the reason by which the *sonsera* fishing activity must be made in very coastal and shallow fishing grounds. For this reason the fishing activity is strictly controlled and developed exclusively in sandy bottoms and being prohibited on phanerogam meadows or in rocky bottoms. Results of the scientific study and field observations confirm that fishing operations are not performed on phanerogam meadows.

The boat seine named *sonsera* is the only gear targeting sand eel and at the same time the sand eel can be only exploited with the *sonsera*.

The scientific study pointed out that this gear can be considered highly selective because the target species can be identified at sea by the echo sounder that can be used to evaluate both, size of schools and presence of other species. Moreover, the few individuals caught as by-catch are returned alive to the sea.

The observation of the fishing procedure on board of different boats showed that in all cases the fishing techniques are appropriate to avoid the catch of non-target species and to return the individuals from by-catch alive into the sea.

The results from the study demonstrated that the percentage in weight of non-target species was less than 3% of the total catch when all the retained species were analyzed. In parallel, separate analyses of species retained and liberated alive and species retained and non-liberated which arrived dead at port were developed. The percentages were respectively <1% and < 0.5%.

Of the total by-catch, 16 species were the most frequent and abundant for the period of study, being *Pagellus erythrinus*, *Xyrichtys novacula*, *Bothus podas*, *Trachinus draco* and *Synodus saurus* those that appeared in all the analysed hauls. Of these 5 most frequent species only *Pagellus erythrinus* has a regulated minimum landing size at 12 cm.

6.1.2. Assessment of sand eel

Gymnammodytes cicereus accounts for 98% of total catch in weight, while *Gymnammodytes semisquamatus* represents only 2%. Therefore, the present management plan was based on the results obtained for the former species. *G. cicereus* is a short lived species, which can be considered annual (94% of the caught individuals belong to the first annual class (aged 0 to 1), only 6% are more than one year old).

The assessment has been carried out from the analysis of the historical series and from the length frequency distributions of the samples taken during the period August 2012 to July 2013 (including during the closed season).

There are no parameters and assessments for this species in the bibliography, only from the lesser sand eel *Ammodytes marinus*, in the North Sea. However, due to very different environmental conditions these parameters are hardly applicable to *G. cicerelus*.

From sampling a reliable length-weight relationship was obtained. Unfortunately the von Bertalanffy growth parameters are not so easy to estimate. Several methods were applied to the length frequency distributions with not very reliable results. Natural mortality is also a parameter difficult to estimate. Several sets of growth and natural mortality parameters were retained to define assessment scenarios.

As sand eel is a short lived species, the age of the population at sea is below 1 year, being 99% in number of individuals and 96% in biomass. This characteristic has several consequences regarding the stock assessment: (i) the stock is highly dependent on the recruitment, 26% of the individuals at sea belong to the smaller size, first class (3.5-4.4 cm length), and (ii) mortalities are very high. By the end of the fishing season in December, catches consist of individuals that have reached the size-at-first-maturity and the population is spawning. Most of the recruitment arrives to the ground in February, and therefore, at the beginning of the fishing season in March catches are made up of recruits. A direct relationship has been observed between yield at the end of the fishing season in December and yield at the beginning of the following March.

From the results of the Leslie depletion method (2000-2013), sand eel biomass at the beginning of the fishing season in March has been estimated to be highest in the most recent years, in the period 2010-2013.

Given the characteristics of the data available, i.e. one season of monthly catches and length frequency distributions, the assessment method applicable was length cohort analysis (LCA). Age distribution is not possible due to the short lifespan of sand eel, generating only two or three age classes with the first class containing more than 90% of individuals. From LCA, under different parameter scenarios, the yield per recruit (Y/R) analysis was also performed.

The stock assessment models that can be used with the actual data available are highly sensitive to the biological parameters, in particular growth and natural mortality.

The terminal fishing mortality has no significant effect on number and biomass estimations. The effect on the fishing mortality (F) vector is visible but low and only in the two last classes.

The growth parameters have a heavy effect on the results of LCA. Although both, L_{∞} and K, affect the assessment, K appears to have more impact and LCA results are very sensitive to it. In general a high K produces a shape of a small population heavily exploited, while a low K does the opposite. For this reason, it is highly recommended to refine in the future the estimates of the von Bertalanffy growth parameters, ideally analysing the daily otolith increments.

Natural mortality has an opposite effect to K. Low natural mortality values (M) contribute to give an image of small populations heavily exploited. So, effort to progress in M estimates is highly recommended.

According to the assessment scenarios considered, it appears that the sand eel fishery of the two half periods (2012-2013) is quite healthy. In the worst parameter combination a slight

growth overfishing could appear. However, no traces of recruitment overfishing have been detected.

After considering the available information, it can be concluded that the stock seems to be in good shape. Therefore, and waiting for further data and better parameter estimations, it is advisable to maintain the fishing limitations implemented during the performance of the scientific study, for which an effort reduction by half and a TAC has been established. Furthermore, it is highly recommended to keep the fishery under continuous observation and to adjust management measures according to the established harvest control rules.

6.1.3. Assessment of transparent gobies

Transparent goby (*Aphia minuta*) and crystal goby (*Crystallogobius linearis*) landings over the fishing seasons (from November to May) 2001-2003 to 2012-2013 displayed marked fluctuations. In addition, the landing pattern within each fishing season was also very variable, and the landing peak in each season may occur at different months. The increasing and decreasing trends of monthly landings and CPUE in some of the fishing seasons suggest the incorporation of new individuals once the fishing season has started, which prevents the use of depletion methods.

As for the structure of the exploited population of the two gobid species, the only data available are the monthly size distributions from December 2012 to February 2013, which correspond to a period shorter than the usual November to May (i.e. not fully representative for a whole fishing season).

Historically, a very limited number of boats targeted gobids (four to six). Since, from now on, all **boat seiners** might go fishing gobids (although unlikely to happen during the sonso fishing season since fishing for sonso and gobids won't be allowed during the same day), the use of a reference CPUE (daily catch per boat) threshold for the fishing season based on the activity of a very limited number of vessels would be meaningless. For this reason, 2001-2013 historical average catch is proposed as TAC, which provides an estimate of 1.8 tons of *Aphia minuta* and 3.8 tons of *Crystallogobius linearis*.

In any case, it is the sand eel that drives the boat seine activity; both landings and fishing days resulting from targeting gobids are very low compared to those of sand eel.

6.2. **Advice and technical measures**

Following the recommendations of the international fisheries management bodies and their related international agreements, the natural resource of the sonso will be managed based on the ecosystem approach and, within this framework, the goal will be to that of placing the fishery around the maximum sustainable yield.

Regarding the ecosystem approach, the exploitation of the sea bottom will be controlled and monitored, avoiding fishing operations over sea grass beds (phanerogam meadows) and rocky areas, as well as strictly controlling non-target species.

6.2.1. Catch limitations

The only species authorised for fishing with *sonseras* are the sand eel (*Gymnamodytes cicerellus* Rafinesque, 1810 and *Gymnamodytes semisquamatus*), transparent goby

(*Aphia minuta*), and crystal goby (*Crystallogobius linearis*). The *sonsera* must be used exclusively for catching these species.

Catches of Ferrer's goby (*Pseudaphya ferreri*) shall not be authorized until the scientific monitoring provides conclusive biological conclusions regarding the status of the populations.

After considering the available information, it can be concluded that the stock seems to be in good shape. In that case, and waiting for further data and better parameter estimates, it is advisable to maintain the fishing limitations implemented during the performance of the scientific study, for which an effort reduction by half and a TAC has been established. Furthermore, it is highly recommended to keep the fishery under continuous observation and to adjust management measures according to the established harvest control rules.

The scientific assessment confirms the perception by stakeholders regarding a healthy status of the sandeel stock in 2013. Therefore, there is no reason for immediate alarm and it is proposed to maintain the management measures of the last period, in particular the annual quota of 819 tons for the sandeel. For the gobies, it is proposed to establish quotas based on the average historical catch for the 2001-2013 period, which would provide values of 1.8 tons of *Aphia minuta* and 3.8 tons of *Crystallogobius linearis*.

6.2.2. Establishing Benchmarks

It is recommended to monitor several biological reference points following an adaptive management prospect.

After each fishing season the Co-management Committee will undertake appropriate assessments for both groups, sand eel and transparent gobies, providing biomass or population size, fishing mortality and assessment relative to maximum yield per recruit (proxy for maximum sustainable yield, or MSY). Depending on the results obtained a total allowable catch, or TAC, shall be fixed for the next season in monthly installments, according to the biology of the species.

Several harvest control rules will be specified for both, sand eels and transparent gobies. The total TAC agreed for the season will be divided into monthly installments. In the case of sand eel, these monthly quotas won't be equally distributed along the season, being smaller at the beginning of the season when individuals are young, and increasing afterwards towards the end of the season, never exceeding the TAC.

Yield will be monitored monthly as catch per unit effort (CPUE). Harvest control rules will be based on the following principles: (i) target reference point, the expected monthly CPUE, according to the daily catch quotas established by boat; (ii) warning, 75% of the expected CPUE; (iii) limit reference point, 50% of the expected CPUE. At the warning limit (75% share), the quota will be halved for the following month. If not reached the limit reference point of 50% CPUE, the fishery will be closed the following month, keeping a scientific experimental observation of CPUE.

6.2.3. Reduction of the fishing effort through the withdrawal of licences

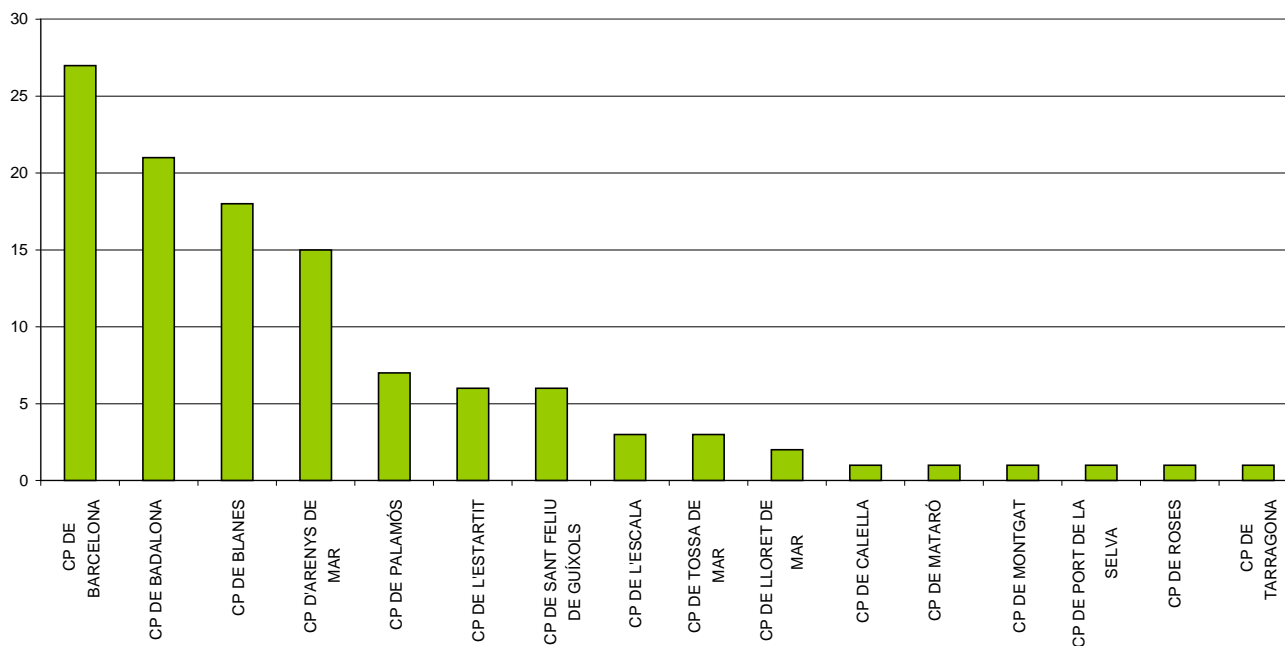
The traditional type of fishing with *sonseras*, used for fishing sand eel, has been carried out in recent decades at the ports of the regions of Barcelonès, Maresme, La Selva and El Baix Empordà.

As described in the report presented by Catalonia in Publication No. 98 of the Technical Reports of the Spanish Institute of Oceanography, in 1987 (year in which the regulations on fishing sand eel in Catalonia were passed) an initial register of 30 boats was created, compared to the 4000 fishing boats that operated in Catalonia. This initial register gradually grew and as a result, from 1987 to the present, 114 boats have dedicated themselves to this type of fishing.

In general, we can say that the activity of fishing sand eel and goby with *sonseras* was characterized in the beginning by being based on a relatively large fleet of boats of very small dimensions (7-8 meters in length and 40-70 HP of power) that obtained very small catches. Currently, the number of boats has dropped to the 26 set forth in the management plan. These boats, of dimensions that are only slightly larger than the initial dimensions, nevertheless have a higher potential for catches.

ASSOCIATION	RECORD OF LICENCES
CP D'ARENYS DE MAR	15
CP DE BADALONA	21
CP DE BARCELONA	27
CP DE BLANES	18
CP DE CALELLA	1
CP DE L'ESCALA	3
CP DE L'ESTARTIT	6
CP DE LLORET DE MAR	2
CP DE MATARÓ	1
CP DE MONTGAT	1
CP DE PALAMÓS	7
CP DE PORT DE LA SELVA	1
CP DE ROSES	1
CP DE SANT FELIU DE GUÍXOLS	6
CP DE TARRAGONA	1
CP DE TOSSA DE MAR	3
Total	114

Record of licences for fishing with *sonseras* by Fishermen's Association



Prior to the drawing up of this MPBS, 72 boats have been de-registered from the register of fishing with *sonseras* upon having transferred the license or appearing as withdrawn from the fishing activity or de-registered from the Statistical Register of Fishing Vessels. These de-registrations signify a reduction in the fishing effort related to this type of fishing in terms of 2,937 HP of power and 63.16% of the fishing units or licenses. These boats measured between 3 and 13 meters.

Name	Registration No.	Folio No.	Reason for de-registration
MARIA	BA-3	2533'	SCRAPPED 22/4/2004
VICTORIA	AM-1	936	TRANSFERRED
ÀNGEL DE LA GUARDA	BA-3	1967'	WITHDRAWAL FROM FISHING ACTIVITY 10/06/2002
ELVIRA	BA-1	816'	SCRAPPED 2/4/1996
MARIA MAGDALENA	VA-3	1606'	SINKING AS SUBSTITUTE FOR SCRAPPING 21/12/1994
MESTRAL	BA-6	1887'	SINKING AS SUBSTITUTE FOR SCRAPPING 15/11/1995
SILVIA	BA-2	3779	DE-REGISTRATION FOR UNKNOWN REASON 14/11/2003
TRINI	BA-3	2307	WITHDRAWAL FROM FISHING ACTIVITY 13/3/2001
CARMEN	BA-2	1977'	SCRAPPED 25/11/2005
DOS HERMANOS	BA-2	2312'	WITHDRAWAL FROM FISHING ACTIVITY 13/03/2001
JOSE RAMON	BA-1	1062'	SCRAPPED 16/8/2005
MANUEL JOSÉ	BA-2	3450'	SINKING AS SUBSTITUTE FOR SCRAPPING 7/2/1997
MARIA	BA-2	3650'	WITHDRAWAL FROM FISHING ACTIVITY 10/6/2002
MARIA MARTÍNEZ	BA-2	3504'	SCRAPPED 25/10/2005
ROSITA	BA-2	2472'	WITHDRAWAL FROM FISHING ACTIVITY 13/3/2001
SAN ANTONIO	BA-2	1236	TRANSFERRED, WITHDRAWAL FROM FISHING ACTIVITY 13/3/2001
CAPRI	TA-1	1203'	SCRAPPED 17/08/2005
CAROLINA	BA-4	1413'	SCRAPPED 14/3/1195
JOAN I LAURA	BA-4	1463'	PROVISIONAL DE-REGISTRATION 22/12/2010
MAGÍ	BA-2	3939'	TRANSFERRED, SCRAPPED 6/8/2004
MARTA	BA-4	1435'	SCRAPPED 4/2/1993
MERCÉ	BA-4	1467'	DE-REGISTRATION DUE TO NEW CONSTRUCTION 6/9/2004
PARELL	BA-4	1472'	DE-REGISTRATION DUE TO NEW CONSTRUCTION 6/9/2004
QUIMA II	BA-4	1402'	SCRAPPED 31/12/1989
SAN JUAN	TA-2	1054	SCRAPPED 21/7/2000
SURCOUF	BA-5	1371	DE-REGISTRATION DUE TO NEW CONSTRUCTION 1/6/2004
CRISTINA	BA-3	2560'	SCRAPPED 11/11/1992
MARGARITA	BA-3	2520'	SCRAPPED 20/5/1997

MARIA	BA-4	'1069'	RETIRADA DE LA ACTIVIDAD PESQUERA 24/11/1992
NINU	BA-4	1477'	SCRAPPED 12/03/1999
GAVINA	BA-6	'1751'	SCRAPPED 17/4/2003 MARITIME ACCIDENT
MIJURO	BA-6	2055'	SCRAPPED 19/3/2001
CARMEN	TA-1	'787'	WITHDRAWAL FROM FISHING ACTIVITY 4/6/2008
CRIOLLA	BA-4	1496'	
EL PERDIGAL	BA-3	2579	SCRAPPED 12/12/2008
IMPOSIBLE	BA-3	'2634'	TRANSFERRED
ANTONIA	TA-3	2610'	SCRAPPED 11/04/2007
EMILIO	BA-3	'2410'	WITHDRAWAL FROM FISHING ACTIVITY 1/2/2010
LA VIEIRA	TA-3	'2149'	WITHDRAWAL FROM FISHING ACTIVITY 25/01/2010
MARIA DEL CARMEN	BA-3	'2416'	WITHDRAWAL FROM FISHING ACTIVITY 25/01/2010
MARIA JESUS	BA-2	'3947'	PROVISIONAL DE-REGISTRATION 25/01/2010
MERCEDES	BA-2	'3379'	PROVISIONAL DE-REGISTRATION 10/02/2011
ROSA MARIA	BA-3	'2490'	PROVISIONAL DE-REGISTRATION 25/01/2010
ANA MARIA	BA-2	3766'	SCRAPPED 30/01/2008
ANDRES	BA-1	7-64'	SCRAPPED 16/01/2008
ANGEL ALBERTO	BA-4	1466'	SCRAPPED 27/12/2007
ANTONIO	BA-2	3608'	SCRAPPED 08/01/2008
BARLOVENT U	BA-2	1-93'	SCRAPPED 08/01/2008
EN MARTIN	BA-2	3948'	SCRAPPED 30/1/2008
ESTEL	BA-1	1261'	SCRAPPED 16/1/2008
EVA SALOMÉ	TA-1	1281	SCRAPPED 27/12/2007
FRANCISCO Y MARIN	BA-2	3866'	SCRAPPED 5/1/2008
HERMANOS RUSO	BA-2	3929'	SCRAPPED 8/1/2008
LEVIATAN	BA-2	3923	SCRAPPED 8/1/2008
MARIA QUILLIS	BA-2	3512'	WITHDRAWAL FROM FISHING ACTIVITY 28/3/2007
MEY DOS	BA-2	2-93'	SCRAPPED 8/1/2008
MONICA	BA-2	3906	SCRAPPED 8/1/2008
NOELIA TRES	BA-2	6-93'	SCRAPPED 8/1/2008
REMEI	BA-3	2593'	SCRAPPED 27/12/2007
SARDINETA	BA-2	3952	SCRAPPED 8/1/2008
SIMON UNO	BA-2	1-96'	SCRAPPED 8/1/2008
ALBERT*	BA-6	'2293'	PROVISIONAL DE-REGISTRATION 10/02/2011
EVA*	CO-3	'1296'	PROVISIONAL DE-REGISTRATION 22/12/2010
LOJU	BA-4	'1498'	DE-REGISTRATION DUE TO NEW CONSTRUCTION 26/3/2009
XALOC	BA-5	'1424'	LIST CHANGE 27/11/2008
ANITA	BA-4	'974'	PROVISIONAL DE-REGISTRATION 10/02/2011
JORDI I NURIA	TA-3	2507'	TRANSFERRED
PALAMOSINA	BA-5	1434	TRANSFERRED
GERMANS MARQUEZ	BA-4	'3-00'	EXPIRED
POZ GARRI	BA-4	'1469'	PROVISIONAL DE-REGISTRATION 11/01/2011
SERAFINA	BA-4	'1342'	PROVISIONAL DE-REGISTRATION 11/01/2011

In addition, there has been an even greater reduction in the fishing effort for this type of fishing as the following 18 boats in the Management Plan Register have not been incorporated, since they cannot show proof of sufficient catches (in accordance with the requirements set forth in the Mediterranean Regulation (EC 1967/2006). This de-registration signifies a reduction in terms of 793 HP of power and 15.79% of the fishing units or licenses.

ASSOCIATION	BOAT	YEARS 2010-2000
ARENYS DE MAR	LOLI MAR (3)	4
ARENYS DE MAR	TRIAS	3
BADALONA	CIUTAT DE BADALONA	0
BADALONA	GUILOVA- ANTONIA	2
BADALONA	IFACH	2
BADALONA	IGUALDAD	0
BADALONA	J.CURRITO	4
BADALONA	MARINA	0
BADALONA	XUPLINA	0

BLANES	CRIOLLA	2
BLANES	MARIA DEL PILAR ⁽³⁾	4
L'ESCALA	CRUYFF	0
L'ESCALA	GLORIA	0
LLORET DE MAR	ELS BESSONS	0
MATARÓ	SANTA MONICA	0
PALAMÓS	MARI MONTSE	3
PORT DE LA SELVA	MARINA LA GRANDE	0
ROSES	XICU CALO	1

Number of years with catches of *sonsera* species during the period 2000-2010

Therefore, in total, this MPBS signifies a reduction in the fishing effort in terms of 3,730 HP of power and 78.95% of the fishing units or licenses.

6.2.4. Limitation on the number of authorised boats

A register is established of 26 boats authorized for fishing with *sonseras*, comprised of the following boats. These boats represent a power of 1,384 HP. The lengths are between 5.5 meters (least) and 11.98 meters (greatest).

The maximum number of registered boats authorized for fishing with *sonseras* may not increase while this management plan is in force.

6.2.5. Limitation on the type of authorised boats

Access to the register for fishing with *sonseras* is limited to boats that are registered with the Statistical Register of Fishing Vessels as small-scale fishing boats, the base port of which is between the border with France and the Sènia River at the far south of Catalonia.

In the event that a boat with a license de-registers from the Statistical Register of Fishing Vessels, this license may only be transferred, at the request of the boat owner, to a boat of which the same boat owner is the registered owner. The boat receiving the license may not exceed 75 kw of power or have a total length of greater than 10 meters. In the event that the boat owner does not request a license transfer, the General Directorate for Fisheries and Maritime Affairs may add a new boat to the register to replace the one that has been de-registered, with the same limitations of 75 kw of power and a total length of 10 meters.

If the owner of a boat that has a license requests the transfer of this license to another boat, this transfer may only be granted if the same conditions set forth in the previous point regarding ownership and the boat's technical characteristics are met.

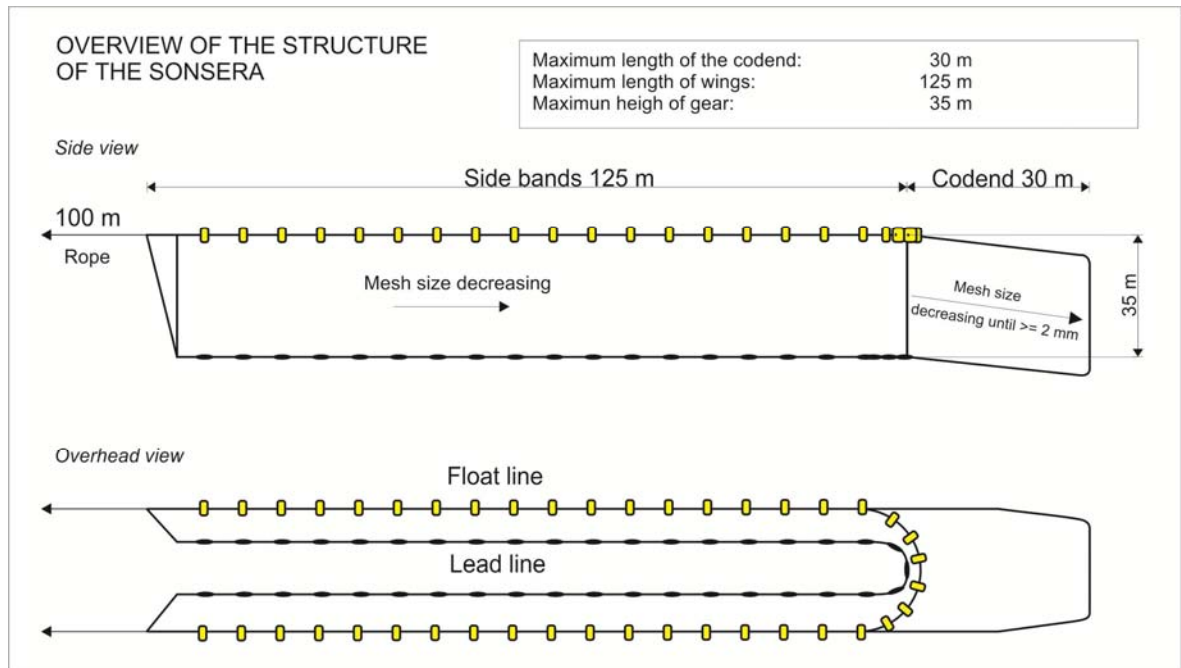
This technical measure aims, during the life of this MPBS, to standardize the technical characteristics of the boats registered with the register. Thus, the boats that currently have a total length of less than 10 meters can, in the case of replacement, reach this limit and those that currently exceed this length shall be replaced in the future by others that do not exceed

³ As specified in section 5.2.6. finally has joined the boat register Sant Joan Tercera contribution from the removal to the boat for Loli i Mar (Arenys de Mar) and Maria del Pilar (Blanes).

this limit. This measure ensures that the fishing effort does not increase with regard to the limitation on the registration of the boats.

6.2.6. Structure and dimensions of the 'sonsera'

As justified in section 4.1.1. and based on measurements made to *sonsera* gear used during the scientific evaluation campaign, the features to be met by the gears authorized to the boats of the MPBS been have determined according to the following diagram:



The sonsera is a fishing gear whose structure is made of two long sidebands called wings and a centre bag in between called codend. The size limitations are as follows:

- The maximum length of the band is 125 meters .
- The maximum height of the bands is 35 meters.
- The maximum length of the codend is 30 meters .

Each one of the edges of the bands is fixed out to a rope whose length can not exceed 100 meters.

The above dimension of the *sonsera* gear is the general proposal for both fishing sand eel and small gobies. However, given the different geographical and bathymetric range of the target species and the depth of their fishing grounds, when accessing the fishing grounds located northern of the port of Blanes it shall be consider the following variation in the general dimensions of the sonsera given formerly:

- A height of the bands up to 60 meters and a length of the rope attached to the edges of the bands of up to 200 meters are accepted to catch sand eel. In this area, the catches frequently are made in depths between 13 and 16 meters and, usually not under 30 meters.
- An increased length of the rope attached to the edges of the bands up to 200 meters is accepted to capture small gobies.

In the fishing grounds located southern to port of Blanes only shall be used *sonseras* with general dimensions defined at the beginning of this section, either to catch sand eel or small gobies.

6.2.7. Establishment of a close season for fishing for the species CSIC

A biological closed season is established for the two species of sand eel, which is not subsidized. This period runs from 16 December to 28 February (29 February on leap years), both inclusive. The scientific study revealed a peak of spawning females of *G. cicereus* and *G. semisquamatus* in January and February, respectively. This fact reinforces the need for a closed season during the reproduction period.

In addition, a biological closed season is established for the three species of goby, which is also not subsidized. This period runs from 1 May to 15 December (both inclusive). According to the existing literature, the period of reproduction of *Aphia minuta* is from May to August, nevertheless, this season may come up with annual and regional variations.

6.2.8. Establishment of schedule-limiting measures

Due to the proximity to the fishing grounds, and the technical characteristics of the boats included in the current register for fishing with *sonseras*, it is advisable to reduce the excessive fishing effort with schedule-limiting measures. Therefore, the following schedule for leaving and returning to the port is established:

- From 1 May to 30 September (both inclusive), boats authorized for fishing with *sonseras*, shall not leave the port prior to 6:00 a.m. During the rest of the year, these boats may not leave the port before 7:00 a.m.
- The boats must return to the operating port before 2:00 p.m.

The fishing administration shall draw up the list of operating ports, which must observe the times for leaving and returning to the ports.

The operating ports for fishing with *sonseras* are as follows:

- Arenys de mar
- Badalona
- Barcelona
- Calella
- Blanes
- L'Estartit
- Palamós
- Sant Feliu de Guíxols
- Tossa de mar.

7. Order laying down the Management Plan

Once approved this MPBS, the Catalan fisheries administration shall publish the Order needed to incorporate the legal precepts laid down in that management plan.

According to the current MPBS the body of the Order is attached in Annex II.

8. Calendar for the implementation of the Management Plan

The draft of the Order to regulate the management plan proposes a term of five years from the date of publication in the official gazettes. As it has been mentioned throughout this document the MPBS will be implemented through an adaptive process agreed by the CCMS, based on the scientific and technical follow-ups and the results obtained through the control and the inspection measures. The adaptive measures of the management plan that in the future may be implemented shall be communicated to the European Commission through the officially established channels.

In addition to the provisions of Article 19.3 of Regulation (EC) 1967/2006 , upon completion of the third year of the Management Plan for Artisanal Fishing with Boat Seines (MPBS) an evaluation of the results of the effectiveness of the measures applied in the management plan will be reported, with a special mention about the stocks situation and the viability of the fishery based on the results of the scientific monitoring.

9. Plan for monitoring the populations and to control of the activity

9.1. The Co-management Committee of the sonsera

The scientific monitoring of the situation of the target and non-target species population, as well as the monitoring of compliance with established MPBS measures will be developed based on an adaptive management model by the Co-management Committee of the *Sonsera* (CCMS) formed on 26 April 2012.

The CCMS is composed of the following representatives of the administrations, associations and organizations:

- Directorate General for Fisheries and Maritime Affairs (*Direcció General de Pesca i Afers Marítims*) of the *Departament d'Agricultura, Ramaderia, Pesca, Alimentació i Medi Natural* of the *Generalitat de Catalunya* (Catalan regional government).
- Directorate General of Fisheries and Aquaculture (*Dirección General de Recursos Pesqueros y Acuicultura*) of the *Secretaria General del Mar* of the *Ministerio de Agricultura, Alimentación y Medio Ambiente* (Spanish Central Government).
- Fishermen associations authorized to use *sonsera* fishing gear and its federations:
 - *Cofradía de Pescadores de Arenys de Mar*
 - *Cofradía de Pescadores de Badalona*
 - *Cofradía de Pescadores de Barcelona*
 - *Cofradía de Pescadores de Calella*
 - *Cofradía de Pescadores de Blanes*
 - *Cofradía de Pescadores del Estartit*
 - *Cofradía de Pescadores de Palamos*
 - *Cofradía de Pescadores de Sant Feliu de Guixols*
 - *Cofradía de Pescadores de Tossa de Mar*
 - *Federación Territorial de Cofradías de Pescadores de Barcelona*
 - *Federación Territorial de Cofradías de Pescadores de Girona*
 - *Federación Nacional Catalana de Cofradías de Pescadores*
- Mediterranean Platform of Artisanal Fishers (*Plataforma de Pescadores Artesanales del Mediterraneo*)
- Barcelona Institute of Marine Sciences ((*Instituto de Ciencias del Mar*, ICM) of the Spanish National Research Council (*Consejo Superior de Investigaciones Científicas*, CSIC)
- Non-Government Organizations:
 - World Wide Fund for Nature (WWF)
 - Greenpeace

CCMS functions include, among others, the following:

- To manage the fishery with the criteria set in the MPBS.
- To propose and coordinate scientific monitoring required for assessing and preserving the marine target population, evaluating the impact of the activity over other species and their habitat.
- To participate in the evaluation and control of compliance with the measures envisaged in the MPBS and propose appropriate punitive measures in case of non-compliance.
- To propose and report to the European Commission through the appropriate official channels, on issues related to the development of the activity and execution of MPBS, as well as any proposed improvements.

The CCMS plenary shall meet only exceptionally, so that the functions provided in the previous section will be generally undertaken by the Permanent Commission (PC) which will be responsible for convening the plenary of the CCMS when required by two or more members.

The Permanent Commission of CCMS main function is to follow up on the decisions taken by the CCMS and act as decision-maker body about any technical issues related to the development and performance of *sonsera* fishery, as well as any others that may be assigned by the CCMS.

The Permanent Commission is composed of ten members: two members from the Directorate General for Fisheries and Maritime Affairs, two members from the Directorate General of Fisheries and Aquaculture, two members from ICM, two members of environmental NGOs and two members from the *sonsera* fishery. Each member has one vote.

The resolutions of the Permanent Commission shall be taken, whenever is possible, by consensus, but in case that consensus could not be achieved it shall be required a minimum of seven votes to pass a proposal.

In exceptional circumstances, as in the case of purely technical decisions and like decision on coefficients, values or parameters to apply or to consider, if that results in a draw, the vote of two senior representatives of the fisheries administrations would have consideration of deciding votes.

The plan for monitoring and control the activity shall consist of implementation of the described below points, which generally shall be checked during the monthly meeting of the Permanent Commission of the CCMS.

9.2. Monitoring and control of the landing

- Qualified fish inspectors will carry out the effective control of the activity at sea, during the landing and during the sale at the auction market. Each month, a written report shall be prepared with the controls carried out in respect of which a copy shall be sent to the Permanent Committee for its evaluation in a control session.
- All boats must unload the full quota at its home port which can only be one of the following: Barcelona, Badalona, Mataró, Blanes, Palamós and Sant Feliu de Guíxols and l'Estartit.
- On board the sand eel catches may be stowed in the container that the employer considers appropriate: drums, buckets or other.
- Once landed sand eel catches shall be immediately decanted into buckets (standard blue bucket) and weighted by the auction market of the association of fishermen of their home port. It is strictly forbidden to weight directly sand eel from the drums or to leave the auction premises without weighing the merchandise.

9.3. Monitoring and control of daily quotas: excess compensation

- The daily weight quota shall be set monthly per boat and day.
- Up to a 10% excess of the quota shall be allowed during the five days of the week.
- On Friday, the quota of each vessel is set for the rest of the day but balanced with the excess of quota accumulated during the week if any (quota may be reduced). On Friday it is also allowed an excess of up to 10% of the reduced quota, but if it occurred it should

account for the coming Friday in addition with the excess that may be on next week Monday, Tuesday, Wednesday and Thursday.

- In case of exceeding the 10% excess of the daily quota or of reduced quota on Friday, this extra surplus will have the following effects:
 - A sale is made and the amount collected will go to charity of the Fishermen's association of the auction market.
 - The extra excess kg accrues monthly and shall be compensated by deducting the quota of the first Monday of the second month following the excess. If the excess extra is larger than the Monday quota, the quota shall be balanced reducing the equivalent weight into working fishing days ⁽⁴⁾
- Weekly, authorized vessels and Fishermen's associations shall conduct a follow-up of first sale delivery notes, to determine the appropriate quota recoveries to potential daily excesses.
- Monthly, the Permanent Commission of CCMS, from of first sale delivery notes shall control catches per boat and day, calculating the potential excess compensation in accordance with the provisions of the protocol of measures Annex V of the normative project attached to this Management Plan.
- Fish catches data detailed at the first sale delivery notes shall be crosschecked with daily catch documents filled up by fishermen and reports of inspections performed by fish inspectors.

9.4. Monitoring the documents recording the daily catches

- The documents filled up daily by fishermen standardized in the annex IV of the draft regulation related to this management plan will be used to complement the scientific monitoring plan scheduled in a way to contrast the data obtained by sampling.
- Such information, similarly to the scientific study conducted during 2012-2013 to adopt management measures of the management, plan shall be used to a greater knowledge of the following parameters:
 - Location and sonar of the usual fishing grounds
 - Number of sets per day
 - volume of the catch by set
 - non-target species

9.5. Inspection of the fishing activity at the sea, port and fish auction market

Periodical control of the sea activity shall be incorporated into a fish inspection program that shall monitor the following points: check up of catches, position of the fishing gear set, estimated volume of catch of target and non-target species. These inspections shall generate the proceeding disciplinary action in case of detection of a breach in the compliance to the regulatory management plan and a monthly report to assess the control during the meeting of the Permanent Commission of the CCMS.

9.6. Sampling in the sea and port

⁴ Example: If a boat that accumulates monthly excess 1,753kg and that has a daily quota of 500kg, it will be docked three days without fish and the fourth day only captures 247 kg (500 kg-253 kg).



Monthly samplings will be conducted, at least in two ports (one in the southern and the other one in the northern areas) where the boat seining fleet operates, the sampling shall be collected on board the authorized boat seiners and upon its arrival to port. Data about the catch (target and by-catch species) and related to the fishing operations (location, depth, time, duration) will be recorded and biological samples will be examined at the laboratory.

The objective of the monthly samplings will be to know the geographical distribution and size distributions of the target species; the specific composition of by-catch and corresponding sizes; updating of the target species biometric data and of the data on the species reproduction and spawning.

Funds provided by the industry under the regulation arbitrated by the CCMS shall finance the expenses of the monitoring.

10. Evaluation of the socio-economic impact

10.1. The fisheries sector in Catalonia

10.1.1. Macroeconomic analysis

Catalonia is an autonomous community belonging to the Kingdom of Spain, a Member State of the European Union. Located northeast of the Iberian Peninsula, covers an area of about 32,000 square kilometers, with a coast line of about 580 km.

Currently, in Catalonia has 7.5 million inhabitants living in a total of 946 municipalities, of which just 63 exceed 20,000 inhabitants (with 70% of the Catalan population). Two-thirds of its citizens live in the metropolitan area of Barcelona.

Catalonia is a dense regional territory highly industrialized and its economy is the largest among the Spanish autonomous communities. The Catalan economy represents 18.7 % of the Spanish gross domestic product (GDP), with a contribution of 200,111 million euros. Among all Spanish Regions, Catalonia by the side of the Madrid Community is the larger contributors to the Spanish GDP.

Following the macroeconomic pattern of other industrialized European economies, Catalan economy has the usual parameters. Regarding the Catalan GDP, the primary sector just accounts for approximately its 3%, and this percentage includes those activities related to agriculture, livestock and fisheries.

Employment in the primary sector in Catalonia is around 62,000 direct jobs. In the particular case of the Catalan economy, the fisheries sector contributes around 17% of GDP of the primary sector which, overall, represents 0.5 % of Catalan GDP.

From an employment perspective, the fisheries sector accounts for about 4,000 direct jobs, representing 7% of total employment in the primary sector Catalan.

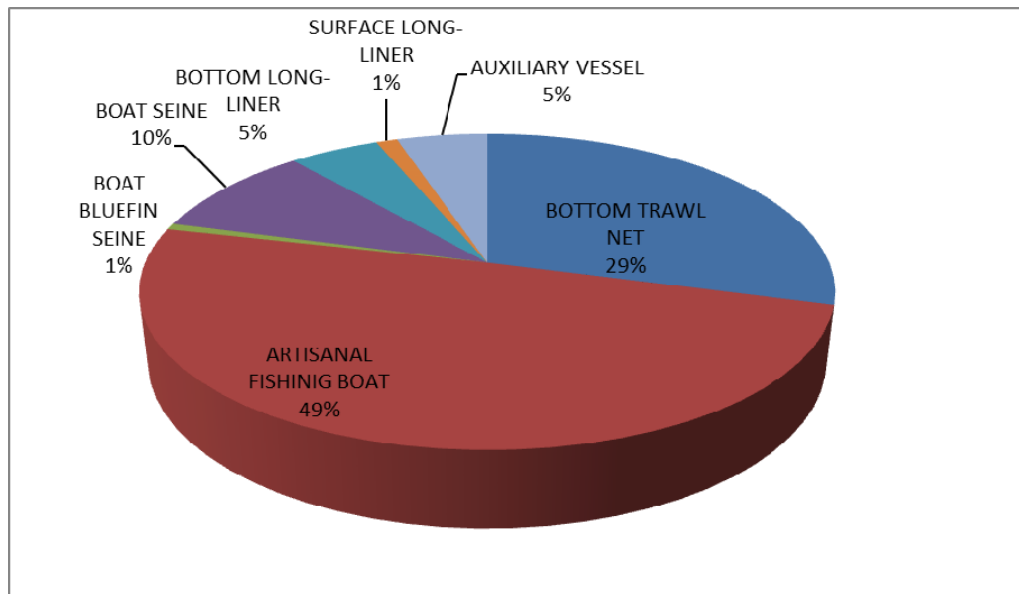
10.1.2. Analysis of the fisheries sector

The Catalan fishery sector consists mainly of a coastal fleet which currently has 921 fish vessels and of 6 vessels engaged in fishing seine bluefin tuna. 49% of the fleet corresponds to small-scale artisanal vessels.

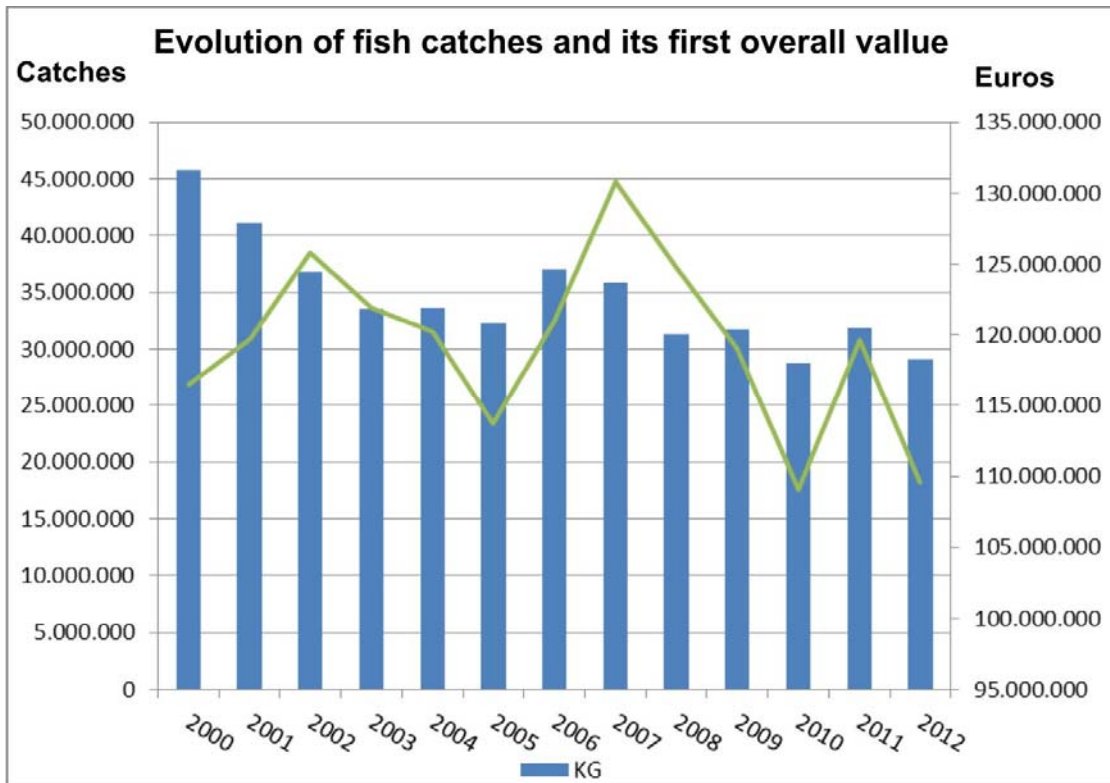
Catches of Catalan coastal fleet during the 2012 amounted to 29,149,084.49 kg that represented first-sale revenues at the auction market of 109,569,169.02 euros with an average selling price of fish items of 3.76 €/ kg. Average price has behaved fairly stable for the last four years.

TYPE OF FISHERY	NO OF VESSELS
BOTTOM TRAWL NET	271
ARTISANAL FISHING BOAT	458
BOAT BLUEFIN SEINE	6
BOAT SEINE	88
BOTTOM LONG-LINER	46
SURFACE LONG-LINER	11
AUXILIARY VESSEL	47
TOTAL	927

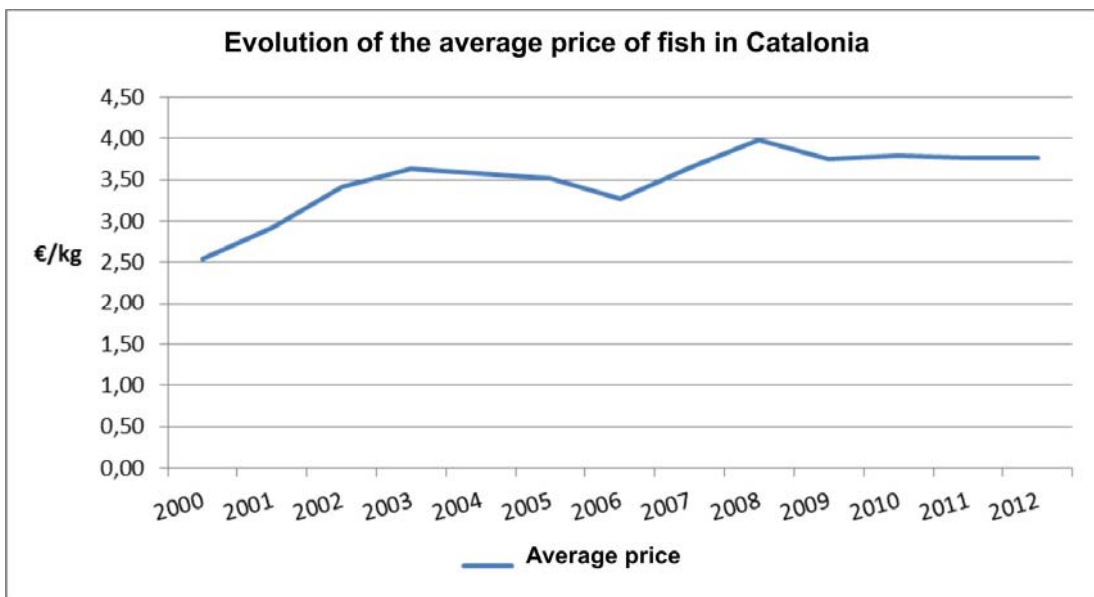
Register of the Catalan fleet by type of fishery



Catalan fleet distribution by type of fishery



Evolution of fish catches and value of first sale



Evolution of the price of first sale fishery products

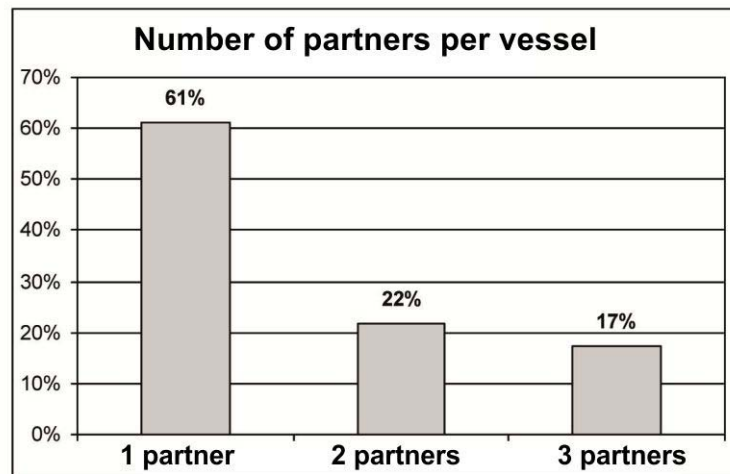
10.2. Socio-economic analysis of *sonsera* fishery in Catalonia

In this section, from a microeconomic perspective this primary productive sector is analyzed from a business and management point of view will be analyzed.

In order to understand the socio-economics of this fishery, two surveys to fishermen have been conducted. During 2010, a brief test was carried out focusing on 13 questions

addressed to the *sonsera* fleet in order to note social aspects of the activity. Additionally, in 2013 a new survey was conducted to determine other economic aspects of this activity.

Most of the owners are self-regarded as fishermen or self-employed but not as entrepreneurs. 48 % of respondents perceived their identity as businessman and only 22% recognize themselves exclusively as businessman. The shareholder structure of the companies is as shown in table below with single ownership in the vast majority of vessels:

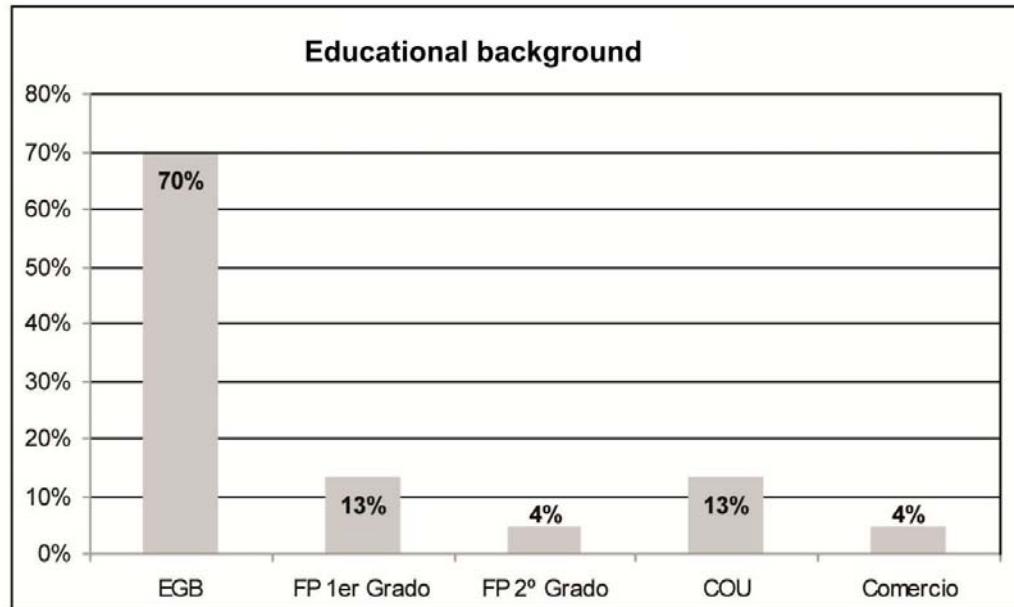


The average age of the owner is around 44 years old, with an average experience in the profession of 22 years and an average of 10 years of continuous activity in the registered *sonsera* vessel.

Concerning occupation, 82 % of the vessels have a crew on board made up of 3 people and 18% of vessels a crew team of 2 members. Seamen employed on board have an average professional experience of 13 years and permanence in the registered *sonsera* boat for the last 9 years.

In 87 % of the cases they live with a life partner and only 39 % have another source of family income. Children circumstances do not follow a regular pattern over the ages, ranging from 3 years old to 34 and there is not a standard number of children status. The most relevant figures are that 83 % of employers have at least one child and in half of the cases the family number of children is 2.

The level of education is mostly primary school, in 70% of cases, vocational education of grade 1 or 2 in 17% of cases, higher formal education in 13% and in some isolated cases specific education in business.



Regarding continuous training 70% of respondents acknowledged conducting mandatory training only from Harbour Master's Office and always related to operational aspects of fishing, though approximately half of respondents believed that it would be constructive to receive further training.

A characteristic of artisanal *sonsera* in Catalonia is that the fishery is performed locally, and therefore it does matter to the cluster of involved fishermen and fishermen's associations (*Cofrarias de Pescadores*). In the year 2012 the catches of *sonsera* target-species accounted for 2.43 % catches and 1.41 % on the income from the auction market sale out of all the catches of the whole Catalan fleet. The ratio in 2012 of the *sonsera* target-species within the small-scale artisanal fisheries sector accounted for 30.86% of the catches and 11.64 % on the generated income at the auctions market.

Noteworthy, this fish is caught for fresh human consumption. This fact corresponds to the characteristics of a small scale type of business with good returns associated to product based on proximity.

The average age of the vessels engaged in *sonsera* activity is 21 years. 14% of the surveyed owners estimated the current market value of their boat below 60,000 euros, 57% estimated it between 100,000-160,000 euros and 29% between 200,000-250,000 euros.

82% of the surveyed owners claimed that they have made investments in their vessel during the last five years, with an average investment amount of 20,351 euros, of which only 2 % have received subsidy from the public administrations.

35% of owners reported to have debts for an average amount of 18,853 euros.

76% of owners said that the cost associated with the crew represents around 50-60% of cost of the operational expenses.

10.3. A change of model: co-management of the fishery

It is important to note that in 2012 and in the framework of the implementation of the scientific study of the *sonsera* activity, the change in the management of the fishery had a significant and immediate impact in socio-economic aspects of this fishery compared to the economic analysis presented before. This socio-economic study focuses on the assessment of new management measures incorporated in the management plan.

The main issues that have influenced the change in socio-economic analysis are:

- Constitution of the CCMS.
- Limitation of the fishing activities of the vessels of the *sonsera* register, reducing the fish effort of other species targeted by the rest of the artisanal small-scale fisheries.
- Establishment of a limitation in the fishing schedule with a weekly and reduction to half of the vessels and therefore decreasing the fishing effort.
- Setting an annual quota according to the estimated situation of the fish population and that cannot be trespassed.
- Setting a daily catch quota per boat.
- Establishment of control protocol about the compliance of the daily quota of the boats and a system for clearing and/or sanctioning the breach.
- Concentration, in the authorized auctions markets of the MPBS, of the entire marketing of the target species of the *sonsera* activity.
- Establishing a morning auction for marketing catches of the *sonsera* boats.
- Intensification of a specific control of the *sonsera* activity under a fish inspection program
- Increase of the principle of responsibility for both the *sonsera* vessels owners as well as the Fishermen's associations linked to the plan.
- Collaboration of wholesale markets to control the marketing of the target species of the *sonsera* fishery.

The socio-economic impact of the implementation of the measures provided in this MPBS focuses on the following issues, which directly affect the vessels register of the *sonsera* and indirectly the whole Catalan fishing sector, especially the rest of the artisanal small-scale sector.

10.3.1. Economic Impact

As mentioned earlier, the establishment of the measures of this MPBS has generated a direct economic impact over the vessels of the register of the *sonsera* with an improvement in the profitability of the companies, mainly due to these two reasons:

- Increase the average selling price of the target species
- Reduction of operating costs

The prospect of the sale price of fish species is determined by different explanatory inputs: production generated, sale channel, auction used, seasonal demand, targeted market capacity, etc. The final price of the sale is made up of all those variables.

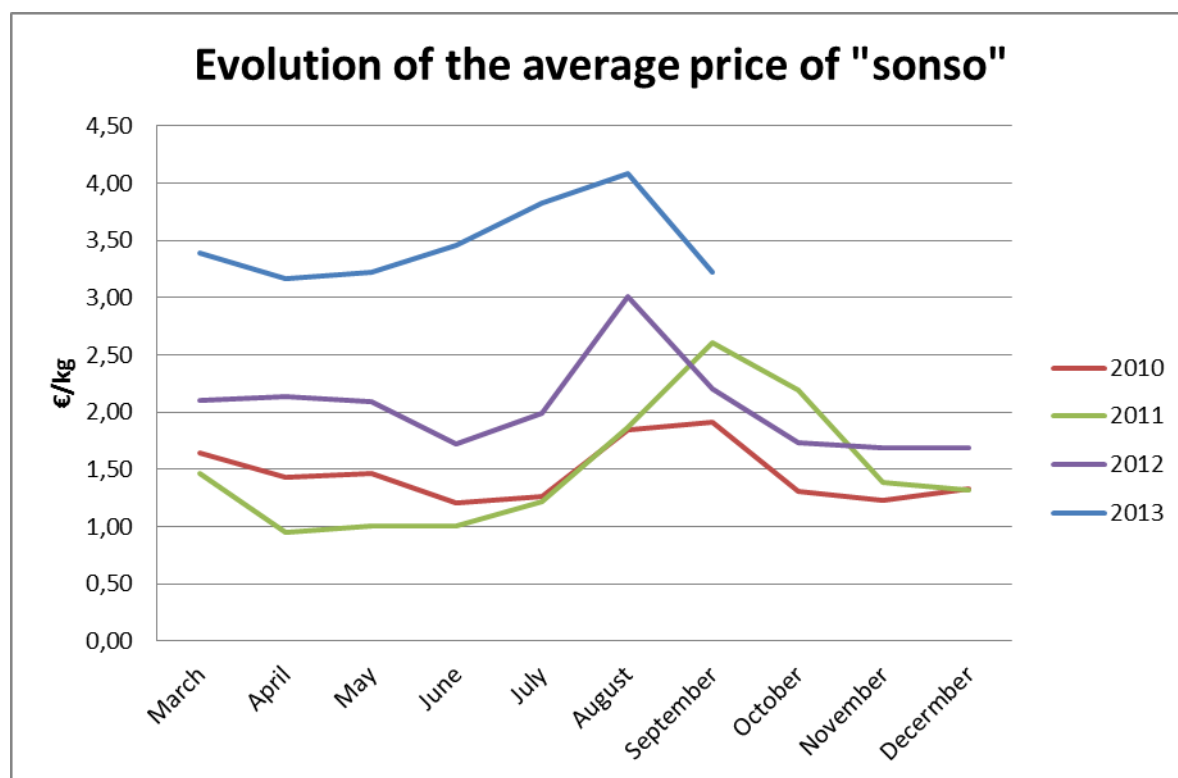
It can be concluded that the average selling price is the most decisive strategic factor, both for the sustainability of this fishery and to ensure greater transparency and business profitability.

For large part of the fishing industry and for the *sonsera* fishery in particular, the traditional expectation of profitability was perceived from the volume of the catch: "the more I fish, the more my income".

The new management model, defined in this MPBS, has demonstrated that planning the shrinking of daily catches according to the sea population status, together with the concentration of supply at authorized auctions and setting appropriate commercial mechanisms (in this case the morning auction), have shown as a result a hike of the average selling price and thus an increase in profitability of fishing as a business activity.

The graphic below displays the monthly price of target-species of *sonsera*. Analyzing the annual average for the last four years it is displayed how the implementation in 2012 of the measures incorporated in this MPBS for scientific study has shown a dramatic hike in the monthly average price of nearly 2 €/ kg

Year	2010	2011	2012	2013
Average price (€/kg)	1,46	1,50	2,04	3,48



With the strategy of the *sonsera* fishermen group focused in the profitability of the activity, the fishery ensures a constant volume of catches adjusted to the fish population in the sea, with more profitability, which means entering into a virtuous circle of business. Under this line of analysis it is perceived the potential sustainability and the goodness of the business under a proper operational management.

Additionally, the establishment of a daily reduction of the fishing effort in terms of number of vessels for the scientific study has shown a drop in the running expenses of the vessels.

Prior to the implementation of the measures set out in this MPBS, vessels incorporated at the register of *sonsera* fishery, all of them licensed under artisanal gears, were performing *sonsera* activity as a complement to other ways of authorized fishing activities. The limitations that are in place since the year 2012 for the *sonsera* fishery (and are expected to remain within the framework of this MPBS,) have generated an additional positive indirect

impact on the entire fishing industry, particularly on vessels other artisanal fisheries, as they represent a reduction of the fishing effort on the rest of fish species.

10.3.2. Social Impact

In the socio-economic analysis to the owners of *sonsera* fishing boats made in 2010, the following strengths and weaknesses were detected:

- Strengths:
 - Due to both their working age and their average of 22 years of experience in the fisheries sector, the interviewed appreciated the sustainability of this fishery as a source of stable income.
 - Direct occupation of owners and employed fishermen is around 67 stable jobs.
 - In their responses, the owners share the same view of focusing their concern to catch their quota and on improving the average price. Generally, they also agreed in appreciating the importance of MPBS as a regulatory tool.
 - It was perceived a commitment in the desire to preserve the population of the target-species of the *sonsera* fishery with all the required guaranties of sustainability.
 - The opportunity associated with all these strengths is the ability to improve the collectivity in terms of business and environmental responsibility.
- Weaknesses:
 - Master ships are not fully aware about themselves being businessmen.
 - A clear shortfall in business management skills was perceived, similarly to the rest of the fishing industry.
 - Master ships share the same analysis but they are not capable of walking in the same direction.
 - Despite being a small number, the group is not capable to coordinate its interests and members towards strategic common goals. Its strength as a group can only get focused in extreme situations.
 - It is a extremely suspicious group.
 - The major hazard, linked with these weaknesses, is the current inability to find a solution for the individualist background limiting their potential.

As mentioned earlier, the implementation of the measures established in the MPBS, and especially with the formation of CCMS, has generated a change in the collective performance of the group that can be summarized in the following points:

- A coordinated collective action in the management of the fishery, which contrasts with the traditionally individualistic behavior of the fisheries sector.
- A direct involvement of fishermen in the conditions, monitoring and control of management of the fishery.
- An acceptance of the responsibility of industry in the management of the fishing activity.
- A direct participation of the industry in monitoring the status of populations by both supplying their daily data and providing the financial support for the scientific study.
- Increasing the work force in number of jobs by raising the number sailors to 3 people in most of the vessels.
- The fishermen perception that the social importance of their activity has raised and is appreciated by the society.
- A strong commitment of the sector in preserving this type of fishing gear, with the MPBS as the instrument capable to ensure the sustainability and encouraging the business prospects.

Additionally the following indirect social impact has been detected:

- Launching new channels and forums for collaboration between the different pillars involved in the management (administration, scientific, social, industry)
- The keen interest of other collective and fisheries to implementing a similar management model, following the positive experience and taking *sonsera* fishery as a role model.
- A raise of local customer awareness about *sonsera* fishery and “sonso”.

10.4. Socio-economic impact of the ban on the *sonsera* fishery

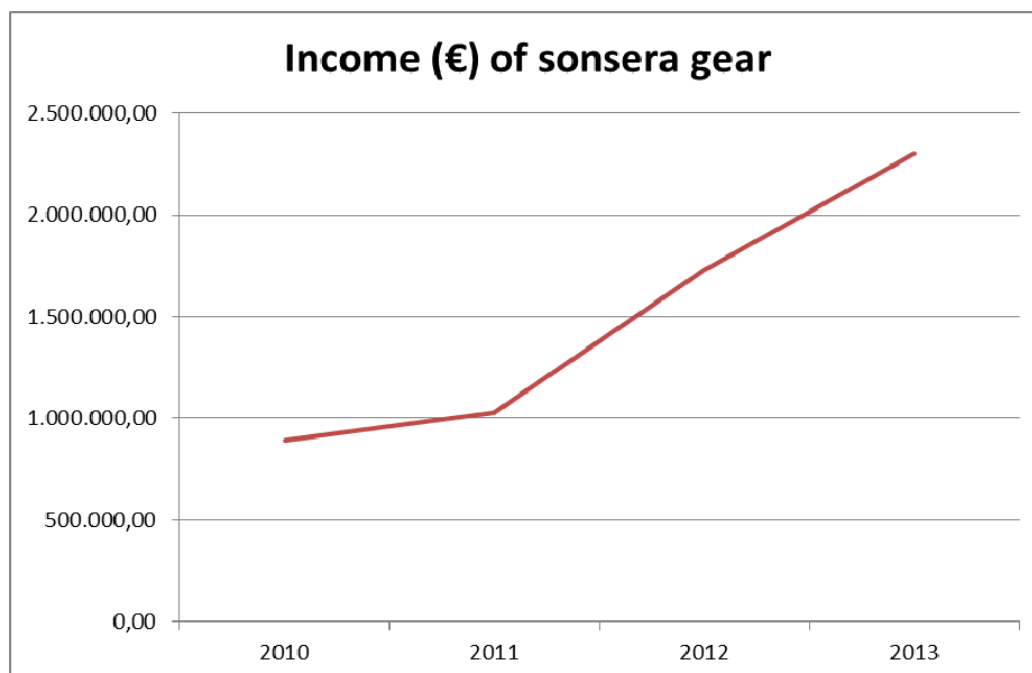
In pure macroeconomic logic the main consequences of the ban are obvious: destruction of direct jobs and a collateral impact on the small-scale artisanal fishing industry, harder under the current economic crisis of Spain and other countries of the EU.

There is a first result, at financial level, which relates the current level of income of each vessel. The following table shows the economic income of *sonsera* fishery for the last four years.

As it can be appreciated, income of the *sonsera* fishery has experienced a sharp growth since the implementation of the measures provided by this MPBS.

Year	€ Sand eel	€ Gobies	€ Total
2010	873.910,18	17.894,75	891.804,93
2011	948.545,37	79.315,76	1.027.861,13
2012	1.704.410,59	21.855,15	1.726.265,75
2013	2.268.131,08	34.502,79	2.302.633,88

It can be noticed that 97% of returns come from sandeel catches and just 3% from gobies.



Within the group of fishermen engaged in *sonsera* fishery, the ban would in some cases cause a shift to other artisanal fisheries. Another consequence is that it might even lead to the closure of business, with direct employment loss and other indirect impact as lesser fees collected by fishermen's association or service industry linked with the activity.

On the other hand, the selectivity of this fishing gear that targets sand eel and gobies plays a major role linked to the conservation of other marine species of commercial interest. Sand eel because of its small size is an excellent legally-permitted raw material for dishes demanded by the consumer that originally were made by young individuals of other species of fish. This role as a substitute of fish demanded at sizes below the regulatory established by the Regulation 1967/2006 makes sand eel an important element to tackle unauthorized fishing and marketing. Unfortunately, despite intense advertising campaigns and controls, some of these species such as sardines, anchovies and mackerel, they are still commonly consumed in parts of the Spanish Mediterranean coast, without complying with its regulatory size.

Therefore, the inability to catch sand eel and gobies could cause to increase illegal activity fishing by purse seine furtive of sardine, anchovy, horse mackerel, mackerel, Spanish sardine and similar species, well below the minimum size of sexual maturity and therefore with a negative impact on the ecology balance of its populations .

Shutting down the *sonsera* fishery would cause a third consequence not discussed so far. The *sonsera* fishery complies with another direct use related to other fisheries, especially those related to hook since supplies the fresh bait indispensable for the development of their activity.

Based on these different perspectives above, we can conclude that the ban on fishing with *sonsera* would cause a substantial price drop in other artisanal fisheries, with particular impact in ports Arenys de Mar, Blanes, l' Estartit , Palamós and Sant Feliu de Guíxols , due to the specific weight of the *sonsera* vessels, as well as an increased pressure on overexploited species and the loss fishing gears where sand eel is used as bait, causing a second wave of stress, both at the price level and at the level of fish catches.

From a systemic perspective, the main socio-economic impact is probably not any of the above mentioned. The main impact is the loss of a role model small group that has already set an example of good practices from an environmental standpoint as well as business point of view generating value.

The *sonsera* fishery success story can be a model of strategic management within the sector and can, why not, set an example for other similar groups.

The critical reflection should focus on what can be potentially lost more than in what we merely loose, since after intense evaluation it has been considered extremely important matter.

Good management in the artisanal *sonsera* fishery throughout its chain of value, from the catch till final consumption, ensuring the sustainability of the species, a fishing business oriented towards higher value-added levels, price stability and distribution in terms of market and appreciated by the final customer, with a double perspective of wealth creation and preservation of other species.

In this sense the MPBS should act as a regulatory tool and especially as a catalyst for a new better operation of the business.

Once again, it should be emphasized that this business is aimed at adding value to the product, not volume, as it is the case of sand eel fisheries in northern Europe. It is a fishery that aims final human consumption and not a fishery that supplies intermediate products.

To fix catch quotas limitation provides stability both to sand eel marine population and the market prices, which is one key of the business model.

10.5. The socio-economic perspective of the MPBS

As discussed in the previous section, the implementation of the measures proposed in this MPBS during the scientific study represented an improvement in socio-economic prospects of the fishery.

The consolidation of the MPBS, based on an adaptive co-management model will act as a roadmap to improve the business model of this fishery.

The key goal in this business has to be focused in:

- Ensuring sustainable fisheries directly affects in generating value.
- The use of the closure period as continuous improvement tool.
- The harmonization of fishing capacity in order to ensure a higher average price

The most decisive key factor have been to visualize catches as a regulatory tool of the average price and the shift away from the traditional view, where the regulatory power was in hands of distribution channel. The annual catches are regulated by quotas that are set at 819 tones. This annual figure along the potential final consumption of metropolitan and coastal area consumers, with a population above than five million people, represents a very low consumption per capita expectation. Hence, proximity to this type of market, i.e. catering and retail fish shops, means the prospective sale backed by quality of the product is far below its potential. From the perspective of the average price, to have a further second market, as in the case of export, it should not be causing an average price reduction and therefore margin.

The need to regulate *sonsera* fishery for environmental and economical reasons in Catalonia, has facilitated the ability to change the business model, and move to a better and more profitable economy based on business excellence, social responsibility and environmentally friendly.

The fish industry in general and the artisanal *sonsera* fishery in particular, cannot be oblivious to business innovation as a value generator. The principle of increasing profitability via price improvement and control of the supply of catches are the common goals that have united a group of 26 vessels and lead the fishery to a better situation.

A display by all social and economic pillars related to the MPBS, linked to this new orientation of the catches and latter sale has positioned this type of artisanal fishery in the focus of attention of other fish groups. Their success may be an example of good practice applicable to other types of fishing in Catalonia, or even exported to other regions of the Spanish State or Europe.