

November 2010



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



**GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN**

**SCIENTIFIC ADVISORY COMMITTEE (SAC)**

**Thirteenth Session**

**Marseille, France, 7-11 February 2011**

**REPORT OF THE TRANSVERSAL WORKSHOP ON SELECTIVITY  
IMPROVEMENT, BY-CATCH REDUCTION AND ALTERNATIVE  
GEARS**

**Alexandria, Egypt, 25-27 October 2010**

**OPENING, ARRANGEMENT OF THE MEETING AND ADOPTION OF THE  
AGENDA**

1. The transversal workshop on selectivity improvement, by-catch reduction and alternative gears was held at the Arab Academy for Science and Technology and Maritime Transport in Alexandria, Egypt, from the 25 to the 27 October 2010. The meeting was attended by 17 participants from 5 GFCM countries (Algeria, Egypt, France, Morocco and Turkey). The list of participants is provided in Appendix 2.
2. Prof. Mohamed F. Osman, Head of General Authority of Fisheries Resources Development welcomed the participants and thanked them for attending this meeting. He stressed the relevance of the GFCM as the appropriate regional body to present and discuss important issues related to the fisheries management in the Mediterranean and the Black Sea.

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3. Abdellah Srour, Acting Executive Secretary of the GFCM, welcomed the participants and thanked the Egyptian authorities, for their kindness in hosting and arranging the meeting. He introduced the GFCM and its functioning and recalled the frame of the meeting.
4. Jacques Sacchi thanked the participants for attending the meeting and presented the terms of reference of the workshop and the main objectives of the meeting.
5. The agenda was discussed and approved with several additions as presented in Appendix 1 and Vahdet. Ünal and Zafer Tosunoglu were appointed as rapporteurs of the meeting.

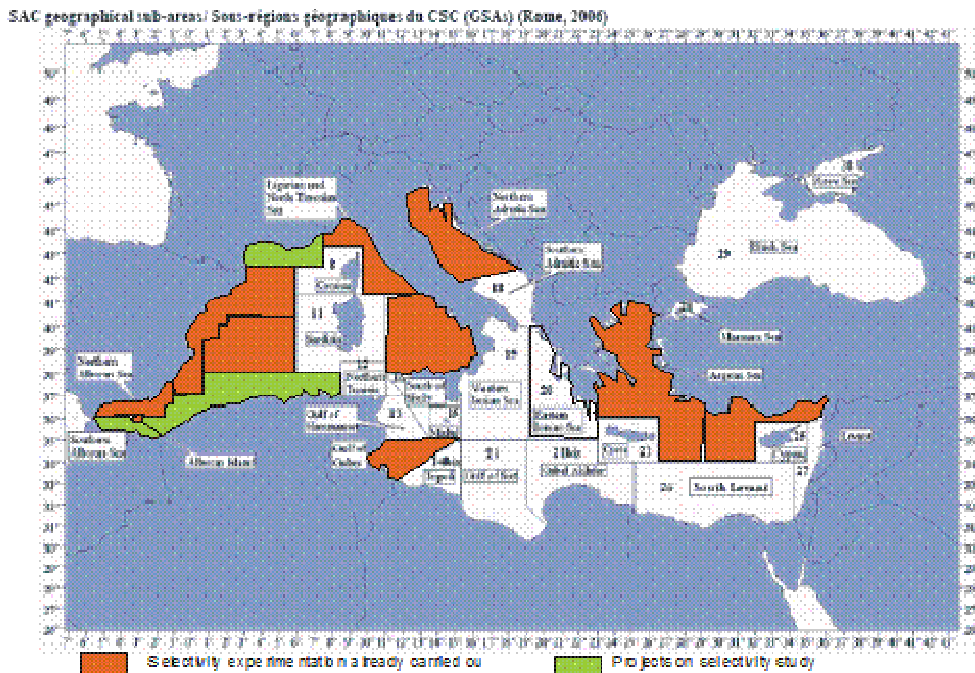
**DETERMINE THE CURRENT STATUS OF STUDIES ON THE EFFECT OF THE TRAWL 40 mm SQUARE MESH AND 50 mm DIAMOND MESH IN REDUCING BY-CATCHES AND DISCARD AND INCREASING THE SELECTIVITY OF THE TRAWL RELATED TO THE MEDITERRANEAN FISHERIES**

6. The session included 4 presentations; 3 from Algeria, Morocco, Turkey and 1 presentation from the technical moderator. Different case studies at the regional and national level were explained by participants and also a review of current selectivity studies in Mediterranean were presented by technical moderator (see abstracts below).
7. It was stressed that GFCM is willing to see the results of the studies pertaining to impacts of mesh size regulations on the trawl fishery. Therefore GFCM supports works on the implementation of 40 mm square mesh or 50 mm diamond mesh in Mediterranean fishery. Abdellah Srour also recalled the importance of the related studies and reminded participants that this issue will be take into consideration in the next month in Malta on the transversal session of sub-committee meetings and GFCM will review the progress on the implementation of the relevant recommendation on minimum mesh size.
8. In the first presentation of the day, Jacques Sacchi provided a regional overview on recent studies carried out in Mediterranean fisheries. Questions and contributions came out after his presentation were about difficulties of implementing grid system in trawl fishery, reasons for focusing only trawl selectivity in Mediterranean, importance of species selectivity together with the size selectivity and requirements of considering other management measures such as Fishery Restricted Areas, MPAs besides the selectivity measures. Jacques Sacchi stressed that the almost 80 percent of the total catch in Mediterranean comes from trawl fishery and therefore this fishing gear and its selectivity can not be neglected.

**Review of recent studies carried out in Mediterranean sea ( Jacques SACCHI).**

Abstract : A working document was prepared by Jacques Sacchi on the base of a first analysis of 71 references published in the literature; this review was focused mainly on experiences 40 mm square mesh codend and or 50 mm diamond mesh codend and the effects of various technical parameters as material type. Today countries of 11 GSA have carried out selectivity experiments for 2 main area, coastal and continental shelf and slope and deep fishing grounds. These experiences allow in particular to complete progressively the data base on selectivity parameters for several a general conclusion show that there is notable improvement in gear selectivity with the use of square mesh codend nevertheless without reaching the biological objectives (e.g. minimum legal size) for the most part of species. On the other hand there is few references on sorting grids experience in Mediterranean sea as well for other selectivity devices as separator panels.

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**Figure 1** Repartition of GSA where studies on square mesh selectivity were carried out or are projected

**Selectivity of 44 mm diamond and square mesh PE codends in the deepwater trawl fishery of the Antalya Bay, eastern Mediterranean (M.Cengiz DEVAL, Gökçe ÖZGEN, İsmet SAYGU, Zafer TOSUNOĞLU).**

**Abstract:** Decapod crustaceans represent important commercial demersal resources of Mediterranean region. Giant red shrimp (*Aristaeomorpha foliacea*) and red shrimp (*Aristeus antennatus*) are the prime targets of deepwater bottom trawl fishing carried out in the Antalya Bay of the eastern Mediterranean. The commercial importance of these species, along with more than ten marketable by-catch species, including crustaceans (*Parapenaeus longirostris*, *Plesionika edwardsii*, *Plesionika martia*), fishes (*Helicolenus dactylopterus*, *Lepidorhombus whiffiagonis*) and several cephalopods makes the coastal resources of increasing interest.

Selectivity experiments were carried out on the R/V “Akdeniz Su” (26.3 m and 2x500 hp main engines) within the framework of a monthly sampling program of the trawling grounds of the Antalya Bay, eastern Mediterranean. Water depth of the fishing area varied between 400 and 650 m. The towing duration was 4-5 h for all the hauls and the average towing speed was 2.6 knots. In the experiments, 44 mm multi-monofilament polyethylene knotted diamond (DM44) and square (SM44) mesh codends were tested. The hooped covered codend method was used to collect escapements from the codends. The cover made of 24 mm mesh size knotted PA netting. The maximum likelihood of selectivity parameter for individual hauls and for pooled data was estimated using the software CC 2000.

Changing the mesh shape diamond to square increased the fifty percent retention lengths ( $L_{50S}$ ) of all seven studied species and decreased the selection ranges (SR) for only *Aristeus antennatus*, *Parapenaeus longirostris* and *Plesionika edwardsii*. For five shrimps species, Elasmobranchs species and all other catch increased the escape ratios, and the mean escape ratio changed from 3.8% to 39.5% by weight.

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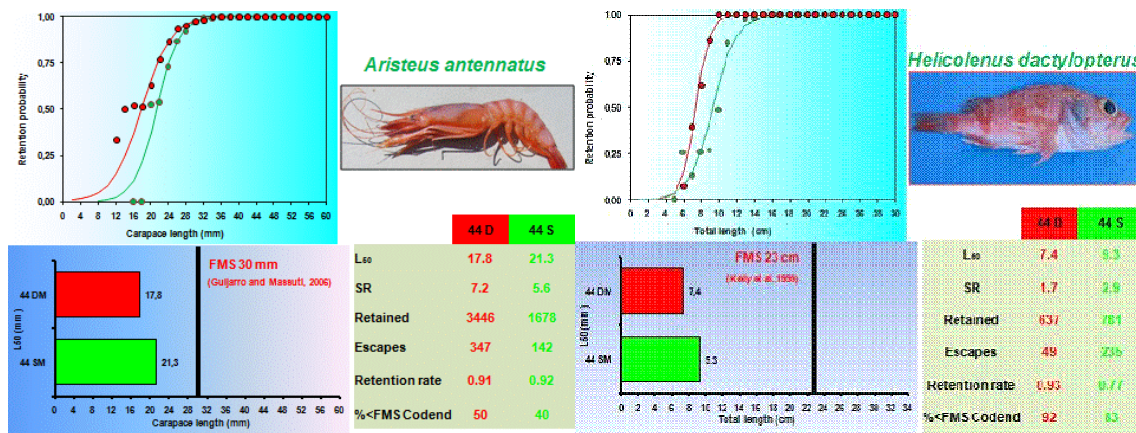


Figure 2 Results for *Aristeus antennatus* and *Helicolenus dactylopterus*

Results show that presently used commercial codend is rather unselective to release sufficient amount of juveniles whereas square mesh increased the selectivity of the most of the demersal species in the Mediterranean. However, it should be noted that the use of only the square mesh codend in demersal trawl fishery is not a suitable technical solution to decrease the capture of all immature individuals.

#### Scientific monitoring of trawlers by-catch in the Bay of Bou-Ismaïl (Mohamed BOUAICHA)

Abstract: Bottom trawl catch a wide variety of target species and other by-catch species. These are discarded for various reasons (Low market value, juveniles, protected species etc.). This study is a pioneer in the Bay of Bou Ismaïl, is carried out by an observer on board a commercial trawler to monitor marine resource and to estimate percentage of by-catch (with the determination of the cause) by species. This work provides new information relating to the actual quantity of by-catch according to the gear and the fishing operation (trawling speed and time), allowed to locate the trawling activity in Algeria and at the same time try to minimize waste caused by this type of capture.

#### Diagnostic of the situation (technical characteristics of Moroccan trawl) (Mohamed BENYACINE)

Abstract: Moroccan Mediterranean demersal trawl fisheries traditionally operate using small diamond-shape meshes in the codend, which tend to retain almost all animals. The diagnostic of the situation (technical characteristics of Moroccan trawler and gear used in the Mediterranean sea is presented. Almost 91 unit, 32% of traditional trawler and 68% of stern trawl, are working in this area. The average of characteristics of this fleet were 302 HP, 42,8 Tx several species commonly captured in the Mediterranean sea the main species caught were *Merluccius merluccius*, *Mullus barbatus*, *Pagellus acarne*, *Parapenaeus longirostris* and *Octopus vulgaris*. There are four type of trawl used in this area the cod end is almost the same diamond mesh of 50mm.

#### SOCIO-ECONOMIC IMPACT OF THE NEW MEASURES ON TRAWL ON FISHERIES

- There was only one but an interesting presentation in this session and Mr V. Ünal and Z. Tosunoglu presented preliminary results of the work on comparative study of economic impacts of the implementing the 40 mm square and 44 mm diamond mesh shape in trawl codend in Turkey. Results of the study indicates that there is no any statistically significantly differences on the catch amount and the catch value of both trawl nets considering 10 hauls by the same fishing vessel, the same skipper, crews and the fishing areas. On the other hand the statistically

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significantly differences were found escapes of European hake and squid as well as total amount of the discard in this experimental case study from Turkey.

10. It was suggested the increase the number of hauls and consider also costs of each operations for the future studies on the economic impacts of the implementing the 40 mm square or 50 mm diamond mesh shape in trawl codend which are recommended to be used by GFCM for the Mediterranean trawl fishery. However Mr. V. Ünal said that changes of mesh shape does not requires any additional costs for fishers and operational costs also does not indicate any differences for the both shape of codends.

**Economic impacts of implementing the 40 mm square mesh codend in trawl fishery: experimental case study from Turkey (Vahdet UNAL & Zafer TOSUNOGLU).**

Abstract : Comparative study was carried out in the Sığacık and Kusadası Bays in the Aegean Sea, Turkey in 2007. A commercial trawl vessel with 550 HP and 23 m LOA was hired to compare catch amount, catch value, escape and discard amount of 40 mm square mesh and 44 mm diamond mesh codends with modified bottom trawl net. It was performed 10 hauls for each of the codends. Results indicate that there is no statistically a (Mann-Whitney U test) a significant difference between the two mesh shapes. Presently used commercial codend is rather unselective to release sufficient amount of juveniles. The use of square mesh codend as a technical measure was strongly supported the size selectivity. Furthermore does not cause any decrease on either catch amount and catch value. In addition to these positive results there was also found statistically significant differences on the favor of escaped fish such as hake ( $p < 0.05$ ) and broadtail shortfin squid ( $p < 0.05$ ) and discard ( $p < 0.05$ ). As a result, preliminary outcomes of the experimental study shows that recommendations of GFCM on the changes of mesh shape in Mediterranean trawl fishery seems to be acceptable by the fishers. However these results have to be taken with care due to the limited number of hauls (10 for each) and lack of operational cost data.

**METHODS FOR REDUCING THE BYCATCH AND THE IMPACT OF TRAWL FISHERIES ON THE SEABED**

**The Copemed II project on the implementation of 400 mm square mesh codend in Mediterranean sea (Jacques SACCHI, Juan Antonio CAMINAS, Jorge BARO).**

Abstract : Two pilot projects on implementation of square mesh codend are planned for the next year In Algeria and in Morocco. These projects are funded by FAO-COPEMED II and by Fisheries Ministry of the countries. The preparation of these projects needs to clarify more details of organization which were deposited in particular into 2 documents describing experiment device and protocol on board. The results of this experimentation should be present at the next SCEEM meeting in 2011.

**Species selectivity on demersal trawl in the black sea: square mesh panel position and swimming behaviour of fishes (Süleyman ÖZDEMİR and Yakup ERDEM).**

Abstract : Many species having different morphology and behavior together was fishery on bottom trawl to supply its species and size selectivity is getting quietly complex. The present study was carried out the Samsun coasts of Black Sea between October and November 2005. Square mesh panel having different positions and 2.8x1.5 m measure on trawl cod-end used on species selectivity and behavior of species that into trawl was determined.

The six different combinations, 36 mm mesh size, formed from right, left and middle panel testing in position experiment of study used small mesh cod-end. Showed different swimming and turned behavior of whiting, red mullet, horse mackerel, bluefish and goby its Black Sea bottom trawl fishery caught and as economical utilized was determined in experiments.

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Although turn upwards and semi-pelagic characteristic of whiting showed from target species on bottom trawl, side and turn down red mullet because it is having demersal characteristic showed to was established. Horse mackerel, as other catch into trawl having pelagic characteristic and turn upwards, goby is disorganized turn behavior. Bluefish beforehand was decided towards behavior mesh square panel having more swimming than other species.

**Prevent of incidental catch and endangered species captured by trawls in the black sea: sturgeons (Acipenseridae) (Süleyman ÖZDEMİR)**

Abstract: In the present study, it was reviewed on endangered species (sturgeons) captured by the trawls and prevent of incidental catch in the Black Sea. Sturgeon is a fish that fishery has been forbidden in the Black Sea since 1999. Unfortunately sturgeons are captured as incidental catch by set nets, purse-seine and trawls in the Black Sea. Sturgeons are entering Kızırırmak and Yeşilirmak rivers for spawning. These areas are free for trawl fishing in the region. Therefore, sturgeon fishes are caught incidentally on trawl nets in these fields.

Square mesh panel and sorting grids used in many fishing gear mainly trawls for improving size and species selectivity are called special selective devices. Size and species of selectivity on the trawl can be achieved, using this system in the Black Sea. Grid systems, particularly the endangered sturgeon fishes to be a live on the trawl are assumed to be effective for the removal of fish. A detailed research should be done about it.

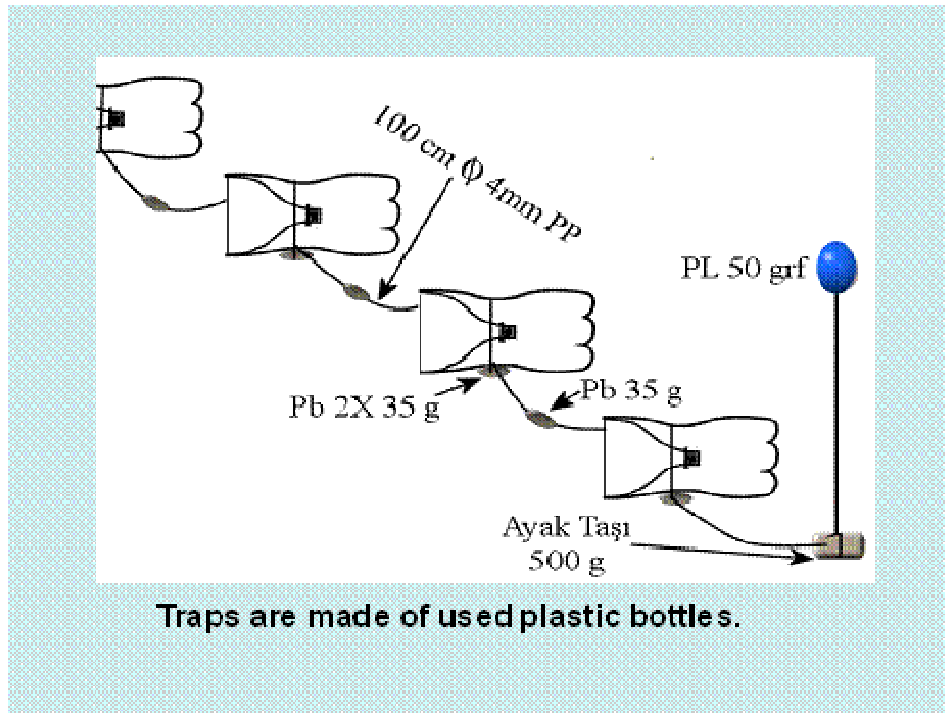
Grid system fishery may not be adversely affected to the Black Sea trawling. However there are a lot of examples and studies that the different modifications of the grid system are achieved.

**A preliminary investigation on feasibility in Black sea of baited shrimp traps (Süleyman ÖZDEMİR, Yakup ERDEM, Çetin SÜMER)**

Abstract: In this study were investigated species composition, catch efficiency of fishing gear and feasible of small dimension baited traps on shrimp fishery. Traps baited by mussel were soaked times 4, 18, 24, 48 and 72 h, forming priority shrimp species, *Palaemon elegans* and *Palaemon adspersus* with fish species, *Salaria pavo*, *Gobius sp.* and *Labrus sp.* in total 10 experiments were caught 375 individuals. Point of view soak time of traps could be most catch efficiency to 72 h but enter rate of none target species into traps were gradually raised at times more 18 h.

Between catch proportion and soak time found strong relationship  $y = 33.766 \ln(x) - 7.769$  ( $R = 0.97$ ). Otherwise catch per unit of effort (CPUE) quickly increasing at first 4 h, at subsequent 4 h slowly down and after 8<sup>th</sup> h gradually decreasing determined as to soak time. Line of thought profitable of fishery soak time should limited 24 h and as alternative fishery methods to damage nature as dredge was concluded further protective fishery feasibility with using of specials arranged more great traps at commercial fishery of same economical species

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**Figure 3 plastic bottle baited traps used for *Palaemon sp.***

**Pelagic longline fishery for Albacore, *Thunnus alalunga* in the Mediterranean sea, Egypt (Mohamed GABR & Alaa Eldin EL-HAWEET).**

**Abstract:** This study described a developing pelagic longline fishery targeting Albacore tuna in the Egyptian coast at the Eastern Mediterranean Sea. By-catch and discards were recorded and evaluated. Length frequency, length-weight relationship and catch per unit of effort “CPUE” were assessed for Albacore, the target species. Moreover, some initial observation on the spawning time of this species was recorded. Albacore catch represented about 93.5 % of the landed catch (expressed in numbers). The major by-catch species were swordfish *Xiphias gladius* (2.5 %) and the Little tunny *Euthynnus alletteratus* (2.4 %). The skipjack *Katsuwonus pelamis*, the dolphinfish *Coryphaena hippurus*, the pelagic thresher *Alopias superciliosus*, and the oilfish *Ruvettus pretiosus* represented collectively, 1.5 % of the landed catch. The fork length of albacore ranged from 54 to 138cm, with a mean selection length “L50” estimated graphically to be 80cm. The length-weight relationship was determined to be  $W = 5.26 \times 10^{-5} L^{2.75}$  (W in kg, and L in cm). The CPUE for albacore ranged from 0.7 to 2.2 fish / 100 hooks for the different fishing boats, with an overall CPUE of 1.1 fish / 100 hooks. Nearly all fish dissected during the fishing trips were having full ripe gonads in June, while those dissected in July were having “running” stage of gonads. Regional research program should be carried out to study distribution, spawning behavior, age and growth, and fishing status of this important species for the stock assessment, rational exploitation and management purposes in the eastern part of the Mediterranean Sea.

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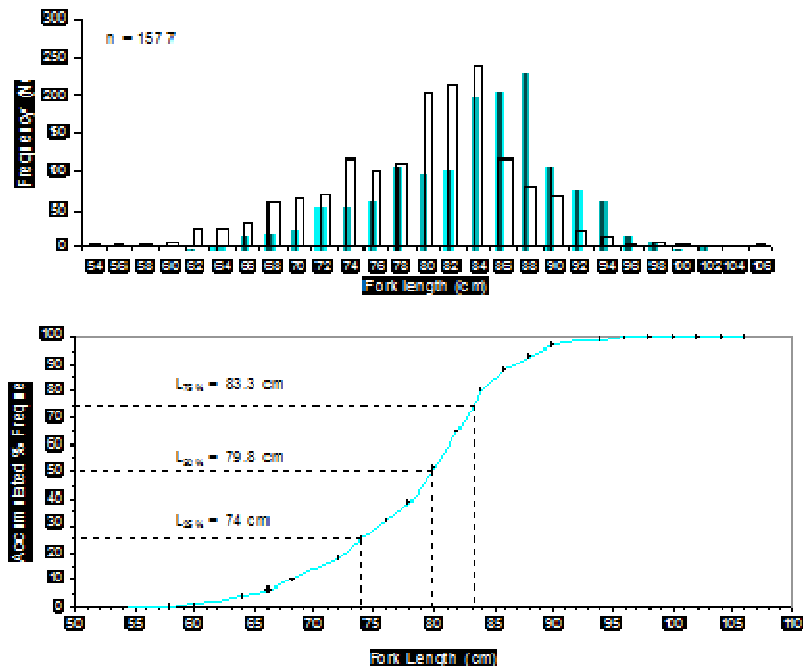


Figure 4 selectivity of *Thunnus alalunga* longline

### Mediterranean fishery profile of Egypt (Alaa Eldin EL HAWYET)

Alaa El-Hawyet described the fisheries with the special emphasizing trawl fishery in Egypt and he stressed on the high percentage of juvenile fish among the total catch composition. He pointed out the requirements of shifting some percentage of trawl vessels from shore to the offshore.

**Abstract:** The main fishing ground in the Egyptian Mediterranean water is the continental shelf in front of the Nile Delta. Inshore fisheries widely exist with artisanal fishermen along the coast. Fishing fleet is consisted from 3129 boats from them 1095 boat are trawlers varies in length from 15 to 28m and in engine power from 50 to 850hp. Italian type bottom trawl net is common with cod end mesh size about 2cm, they targeting shrimp, cuttlefish, red mullet and different bream species. The continental shelf is generally fairly heavily exploited, trawl catch target small size fishes that requested by the market. Discards and by-catch species are the majority of the catch. Managements measurements are necessary include increasing mesh size and modify of net design for conservation of the Egyptian fish stocks

At the end of the second day, Zafer Tosunoglu and Vahdet Ünal introduced a book which is going to be published within the next month in Turkey. The book describe different dimensions of the fishery such as existing fishing gears and their technical plans prepared according to the FAO manners, socio-economic and demographic characteristics of fishers, problems of fishers and fishery cooperatives etc. along the Turkish Aegean sea costs. They suggested to working group to put similar work into next year working plan and prepare a similar book for the Mediterranean or at least for the Eastern Mediterranean during the East-Med Project.

### FOLLOW UP OF TECHNOMED NETWORKS TASKS

**MEDTRAWL database on main Mediterranean bottom trawl characteristics** (Jacques SACCHI).

**Abstract:** Three databases have been built in excel format during the last intersession and will be



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now available on the GFCM website; the first one is on the collection of selectivity parameters of several species measured in different selectivity experiments in Mediterranean sea and Black sea and provided by the literature or their authors; the 2nd one is dealing on main technical characteristics of bottom trawls in Mediterranean sea the 3rd give comprehensive information on national and regional legislation on fisheries and technical characteristics.

## CONCLUSIONS AND RECOMMENDATIONS

11. The meeting made the following main conclusions:

- (i) Literature and recent experiments show that there is notable improvement in gear selectivity with the use of square mesh codend nevertheless without reaching the conservation objectives (e.g. minimum legal size) for most of commercial species.
- (ii) There is few studies in Mediterranean sea of experimentation on sorting grids as well for other selectivity devices as separator panels.
- (iii) A case study from Turkey supports the implementation of GFCM recommendation on new mesh regulations in trawl codend in Mediterranean from the economic point of view.
- (iv) According several analysis and recent studies on Algeria and Egypt fisheries, the catch of the most part of Mediterranean coastal fisheries are composed of discards but also of several species of commercial interest as a satisfying selectivity by the use only of selective devices can be obtained only with an important loss of income at a high social and economic costs .
- (v) This conclusion plaids for the development of more pilot case studies on the effects of the implementation of 40 mm square mesh or 50 mm diamond mesh as it was recommended by GFCM.
- (vi) Whereas the workshop focused on technical aspects of selectivity, GFCM has already carried out management measures, such as the creation of a fishing restricted area in Gulf of Lions which can be considered as an efficient to improve selectivity.
- (vii) In some case as crustacean fishery, the use of passive gears (e.g. longlines and traps) can be consider as also alternative technical solutions to reduce impacts of bottom trawling on juveniles and vulnerable species under the condition to improve our knowledge on their selectivity characteristics and limited the risks of ghost fishing.

12. The workshop formulated the following recommendations:

- (i) The working group of transversal workshop on selectivity improvement, by-catch reduction and alternative gears agreed for the proposition of the following recommendations and actions:
- (ii) Encourage scientists to continue to make selectivity experiments on the base of the standardized methodology adopted in GFCM-ATSELMED 1 (Sète, 2005); these experiments should be carried out in their fishing area in prior on biological and socio-economical effects of 40mm square mesh and 50mm diamond mesh at least for the most important species in Mediterranean sea with the aim to get a maximum of information for the maximum GSA number.
- (iii) Encourage scientists to carry out experiments on most important technical parameters as twine diameters, twine thickness circumference ratio, mesh shape, and other factors as trawl design which may affect selectivity in trawl fishery or fishing performance on species.
- (iv) Encourage scientists to carry out experiments on alternative or complementary technical devices (e.g. grids, separator panels, square mesh windows,) in all GFCM areas in order to improve the overall selectivity of trawls, including effects on vulnerable species as marine mammals, turtles and elasmobranchs.
- (v) Encourage other scientific team from other Mediterranean countries to carry out such like

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- pilot project on the base of the same experiment protocol used for the Algerian and Moroccan case studies including socio-economical analysis.
- (vi) Suggest to TECHNOMED network to prepare a new version of this protocol as a standard document which could be available for any Mediterranean case study as standard and with the help of SCSE including socio-economical indicators to collect. The standardized methodology of the statistical analysis should be improved and completed (as minimum number of hauls) to make more reliable the conclusions on the catch and economical losses of the implementation of a selectivity device.
  - (vii) Case studies on socio-economic impacts of selectivity improvement in trawl fishery should be going on taking account both on consequences on the whole net design and on fishing strategy but also on the market demand and food loss for behavior of consumers.
  - (viii) Considering ecosystem approach, it is recommended in a general way to encourage using pots and traps instead of towed gears (dredges or trawls) for the fishing of some species as sea snail (*Rapana venosa*) fishery, norwegian lobster (*Nephrops norvegicus*), cuttlefish (*Sepia officinalis*). Estimation of time, economic and social effects and costs taking for the replacement of the new gears, should be evaluated.
  - (ix) It is recommended to encourage studies on management measures and regulatory systems which can complete the improvement of the trawl selectivity by the use of the technical devices.
  - (x) On a general it is strongly recommended to associate more closely fishermen to all studies and outcome by regular presentation of results to fishermen organization and organization of specific workshop.
  - (xi) The MEDSELECTIVITY database should be completed as long goes along the experiments will be made or according the fisheries evolution. They should be presented by GSA with references to the authors. This database should be available for all the scientists community and fishermen organization.
  - (xii) The MEDLEGISLATION database should be completed by members of TECHNOMED network by all information related to technical measures taken by each Mediterranean countries on their fisheries legislation.
  - (xiii) On the base of the material collected for the MEDTRAWL database the realization it is requested to TECHNOMED network to draw up an Atlas for the different Mediterranean trawl by countries and GSA with reference on main target species and available selectivity parameters.

## **OTHER MATTERS**

- 13. The workshop thanked the hosting authorities (Arab Academy for Science and Technology and Maritime Transport) for their excellent hospitality and organization
- 14. The meeting also thanked the rapporteurs for the excellent work.

## **ADOPTION OF THE REPORT**

- 15. The conclusions and recommendations were adopted on October 27, 2010. The whole report was adopted by e-mail on 15 November 2010.

**Appendix 1****Agenda**

- 1. Opening, arrangement of the meeting and adoption of the agenda**
- 2. Determine the current status of studies on the effect of the trawl 40 mm square mesh and 50 mm diamond mesh in reducing by-catches and discard and increasing the selectivity of the trawl related to the Mediterranean fisheries.**
- 3. Socio-economic impact of the new measures on trawl on fisheries.**
- 4. Methods for reducing the bycatch and the impact of trawl fisheries on the seabed:**
- 5. Follow up of Technomed network tasks**
- 6. Conclusions and recommendations**
- 7. Others matters**
- 8. Adoption of the report**

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## APPENDIX 2

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**Registered presentation not presented****By-Catch and Discarding of Trawl Fisheries at the Mediterranean Coast of Egypt. A. Alsayes, Sh. Fattouh and S. Abu- Enin. National Institute of Oceanography and Fisheries, Egypt**

Abstract: Trawling remains a controversial method of fishing due to the poor selectivity of trawl net and the resultant catch of huge amount of non target species. This work aimed to throw light on quantitative data of the catch composition, by- catch levels and discard estimates of bottom trawling along the Mediterranean coasts of Egypt. Experimental fishing operations using the Italian trawl net during 2008 pointed out the following: The non target catch comprised 51.07 and 37.04% of the total catch of trawl net during spring and summer seasons, respectively. A category of the non target catch comprising 21.52 and 7.86% of the total catch were discarded during spring and summer seasons, respectively. The by-catch taken through the period of study embodied 13 commercial fish species, the average length of which was 4.7 to 10.9 cm attaining average weight of 1.1 to 21.2 g. Furthermore most of the target fish species were retained in the cod end with small sizes before reaching the length at first maturity. In conclusion, to conserve the fish stocks of demersal species, it is strongly recommended to increase the mesh size of trawl nets used on commercial scale along the Egyptian coast of the Mediterranean.

**Development of Trawl and Shrimp Fisheries at the Egyptian Mediterranean Area. A. Alsayes, Sh. Fattouh, S. Abu Enin and T. Soliman. National Institute of Oceanography and Fisheries, Alexandria, Egypt**

Abstract: Trawling is the most important fishing method for catching demersal fish and shrimp along the Mediterranean coast of Egypt. The landed catch of trawling comprise 43.6% by weight of the total yearly landed catch. Experimental fishing operations were carried out in the present study using the Italian trawl net at the area off the Nile delta during Spring and Summer, 2008. This study indicated that shrimp comprised 49.52% of the trawl catch. *Pagellus erythrinus*, *Merluccius merluccius* and *Siganus rivulatus* comprised high percentages in that catch. Most of the commercial fish species are caught with average sizes below 15.0 cm., therefore they are mostly caught before attaining their first sexual maturity. Fisheries management and fish stock conservation for sustainable fish and shrimp production is strongly recommended in the study area. This can be achieved through the application of minimum landing size of fish, trawl net cod-end mesh regulation and closed season for all fishing activities.

**Selectivity improvement in the gulf of Gabes (southern Tunisian water) : BDIQUI Marouene and M'RABET Ridha (Institut National Des Sciences et Technologies de la Mer (Tunisia))**

Abstract: This study investigates the differences in the selectivities of 40mm mesh size diamond mesh and 40mm mesh size square mesh codend. The comparisons were carried out in the gulf of Gabes southern of Tunisian water in October 2010. A conventional, 600 meshes around mouth, commercially used shrimp bottom trawl was operated. Selectivity data were collected in 14 hauls with 40mm square mesh codend and 17 hauls with 40mm diamond codend, for red mullet (*Mullus barbatus*), Speckled shrimp (*Metapenaeus monoceros*), and common pandora (*Pagellus erythrinus*). The hooped covered codend method was used for data collection. The selectivity parameters were obtained using a logistic equation with CC2000 software.

The 40mm square mesh codend had higher  $L_{50}$  values than the diamond codend.  $L_{50}$ 's 40mm square mesh codend and 40mm diamond codend were 11.9269 and 6.5814 cm, respectively for red mullet; 8.3613 and 8.1150 cm for Speckled shrimp; and 10.1258 and 6.5861 cm for common pandora. The results confirm that the use of square mesh codend impedes the escapements of

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significant proportions of immature species.

**An update of the review on selectivity studies on the effect of different codend mesh configuration and mesh opening will be provided in order to open a discussion. Alessandro Lucchetti and Antonello Sala.**

Abstract: Italian demersal trawl fisheries traditionally operate using small diamond-shape meshes in the codend, which tend to retain almost all animals. Italian research investigated the effect of mesh configuration on the size selectivity of several commercial species.

Data on selectivity are available for the following species commonly captured in the Italian demersal trawls: the scadfish *Arnoglossus laterna*, the broad-tail shortfin squid *Illex coindettii*, the European hake *Merluccius merluccius*, the red mullet *Mullus barbatus*, the Norway lobster *Nephrops norvegicus*, the common pandora *Pagellus erythrinus*, the deepwater rose shrimp *Parapenaeus longirostris*, deep water red shrimp *Aristaeomorpha foliacea*, the Mediterranean horse mackerel *Trachurus mediterraneus*, the blue whiting *Micromesistius poutassou* and the poor-cod *Trisopterus minutus capelanus*. The studies were carried out in different areas in order to evaluate the efficacy of mesh configuration (square and diamond) on the selectivity performance of bottom trawl. The codend mesh openings used in the different studies were always around 40 mm; the mesh opening reported in the studies was not a nominal measure but it was measured with official mesh gauges. Selectivity was always measured using the covered codend technique, the cover being supported by circular hoops. The results were analysed taking into account the between-haul variation in selectivity. All studies demonstrated a substantial improvement in selectivity with square-mesh. The selectivity of 40 mm diamond-mesh codend has been reported to be rather poor because a large proportion of the codend catch is immature and smaller than the minimum landing size (MLS) or first maturity size. With the exception of the flatfish (*A. laterna*), the effect of a change of mesh configuration from diamond- to square-mesh on size selectivity positively affected the retention length at 50% (L50). Thus, square-meshes were found to be unsuitable for flat and/or deep-bodied fish as these escape more readily from diamond-meshes. The Council Regulation (EC) No. 1967/2006, concerning management measures for the sustainable exploitation of fishery resources in the Mediterranean, establishes the MLS of marine organisms. However, the increase in L50 with square-mesh would not avoid some of the existing contradictions in allowing the use of codend mesh which leads to lower L50 than the MLS. Some studies were carried out in the Pomo pit area, which is both the main Adriatic nursery area for European hake and Norway lobster and an important trawling ground for the Adriatic trawl fleet. In Sala e Lucchetti, 2010 in addition to mesh configuration the number of meshes around the codend was considered. Results seem to suggest that for the main target species, Norway lobster, square-mesh codend would protect specimens under the 20 mm of MLS (carapace length). Square-mesh also improves the L50 of European hake, but it seems not to be sufficient to avoid the catch of specimens under MLS of 20 cm as fixed by the EC Reg. Nr. 1967/2006. The influence of codend circumference on diamond-mesh selectivity was less evident and there was no evidence of a coherent effect on selectivity parameters. Lucchetti 2008 investigated both size selectivity of European hake (*Merluccius merluccius*) and the reduction of the discards in a demersal multi-species trawl fishery, giving a simple evaluation of the economic loss, based on market prizes. The catch was sorted as target species and bycatch and the selectivity with respect to European hake was investigated using covered-codend method. The square mesh codend allowed a reduction of about 37% of the fraction discarded at sea. The mean catch obtained with experimental codend was lower than that observed for the traditional codend (about 14 kg per haul) but the short term economic losses was low (~12%). In conclusion, enforcement of installation of square-mesh codends in Mediterranean trawl fishery can be a suitable alternative to decrease the capture of individuals, especially from particular nursery areas.

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**Efficiency and catch yields of traps, fyke nets and trammel net for cuttlefish. Fabio Grati, Gianna Fabi, Giuseppe Scarcella, Paolo Sartor, Mario Sbrana**

Abstract: In the present paper the main results of the study “*Sepia officinalis*: impact of three set gear fishing techniques in the Adriatic and Ligurian Sea” funded by EU (Study Contract No 98/069) are reported. Along the Adriatic coast the most used gears for the exploitation of this species are trammel nets and specific pots. Recently, fishermen have started to utilise also fyke nets which are going to substitute the traditional pots for cuttlefish because of their efficiency, handiness and low cost. The aim of the present study was to investigate the impact of these fishing techniques in the two coastal areas. Investigations were carried out on an experimental basis and concerned comparisons of the efficiency and catch yields of the three gears in terms of total catch, target species and bycatch (fraction of the catch non belonging to the target species). This last fraction was divided in “kept bycatch” (portion of the catch marketable together with the target species) and “discard” (individuals caught but not retained). Demography, sex ratio and reproductive biology of the specimens of *S. officinalis* in the catches were also investigated. Moreover, considerations on the costs/benefits related to the fishing activity carried out with the different gears were performed.