REPORT OF THE JOINT GFCM/ICCAT MEETING ON SMALL TUNAS FISHERIES IN THE MEDITERRANEAN

Malaga, Spain, May 5–9 2008

Opening and adoption of the agenda

1. The joint GFCM/ICCAT meeting on small tunas fisheries in the Mediterranean was held in Malaga, Spain, from 5 to 9 May 2008. It was attended by 29 participants (see list in Appendix 2).

2. Mr. Jorge Baro, Director of the "Instituto Espanol de Oceanografia" (IEO) in Malaga welcomed the participants and thanked them for attending this meeting.

3. Mr. Abdellah Srour, Deputy Executive Secretary of the General Fisheries Commission for the Mediterranean (GFCM), welcomed the participants and thanked the Sub-delegation of the Spanish Government in Malaga and the IEO for their kindness in hosting and arranging the meeting. Mr Srour also thanked the COPEMED II project for its support to this meeting and underlined the excellent cooperation between GFCM and ICCAT.

4. Mr. Driss Meski, ICCAT Executive Secretary, thanked the local hosts including the local authorities, in particular the Director of IEO in Málaga and the Subdelegado of the Spanish Government, for all the meeting logistical arrangements. He noted that small tunas in general were not assessed by the SCRS due the lack of reliable biological information and the scarcity of statistical data. He hoped that this meeting could help SCRS to give appropriate advice to ICCAT.

5. Mr. Hilario López Luna, Subdelegado of the Spanish Government in Malaga, welcomed the participants to the city and to the office of the Government Delegation. He highlighted the relevance of knowledge on the stock status of small tunas fisheries which account for an important source of income for many fishing communities. He drew attention to the fact that the conclusions obtained in the meeting will help the governments adopt the best management measures to maintain these valuable fisheries in the future.

6. The meeting appointed Mr. José María Ortiz de Urbina as Chairman and nominated the rapporteurs as follows:

Item	Rapporteur
1	P. Kebe and A. Srour
2	S. Karakulak
3	A. Di Natale, L. Orsi Relini, M. Idrissi and Malouli
4	M. Idrissi
5	A. Srour and A.Di Natale
6	J. Ortiz de Urbina
7	A. Srour and A. Di Natale
8	G. Scott

7. The meeting Agenda was adopted without any changes (Appendix 1). Appendix 3 lists the documents presented at the meeting.

Description of the fisheries

8. This section includes summarized descriptions of small tunas fisheries in the countries represented at the meeting.

Algeria

9. In Algeria, four small tuna species: *Euthynnus alletteratus, Auxis rochei, Katsuwonus pelamis* and *Sarda sarda* are caught together with large species like swordfish and bluefin tuna. Management measures are in force in the form of closed seasons for fishing and minimal size.

10. These species are not target fishes since they are caught by purse seines, small longliners and gillnes. This fishing fleet is composed of 836 purse seiners and 2731 artisanal boats. Catches are landed along the entire Algerian coast of 1200 km (18 fishing ports and 11 landing sides).

11. Statistical data of small tunas are not separated from the rest of the large pelagic species, but at present a breakdown of the data by species is being undertaken. However, no study will be conducted until support is received to carry out a scientific program in cooperation with scientists from the Mediterranean.

EC Italy

12. The fishery of small tuna species in Italy is a traditional activity since historical times. This is a fishery carried out either by the small-scale fleet or by larger vessels, including the recreational and sport fishery fleet in all Italian waters and in the open sea. The number of vessels engaged in these fisheries changes every year, according to the fishing opportunities and possibilities, but several thousand vessels are usually engaged, catching small tunas as a target fishery or as by-catch.

13. Several fishing gears are used in these fisheries: hand lines, troll lines, drifting longlines, pelagic trawls, surrounding nets, boat seines, beach seines, purse seines, lampara nets, gillnets and tuna traps.

14. The main species caught are Atlantic bonito (*Sarda sarda*), Atlantic black skipjack (*Euthynnus alletteratus*) and bullet tuna (*Auxis rochei*), and skipjack (*Katsuwonus pelamis*) catches are also reported in some years. Other species appear in the catches from time to time, including specimens of vagrant species and lessepsian migrants.

15. Declared landings for all small tuna species reached a total of about 3 477 tons in 2004, about 3 817 tons in 2005, about 2 482 tons in 2006, while partial data for the first eight months in 2007 are about 1 739 tons. Catches do not include the recreational and sport fisheries. Atlantic black skipjack was the most abundant species in 2004 and 2005, followed by Atlantic bonito; the situation was reversed in 2006 and 2007, while catches of bullet tuna were lower in the whole period and skipjack catches were reported only in 2004 and 2006.

16. The main catches over the period 2004-2007 were obtained by gillnets (50.8%), purse seines (33.3%), by unclassified gears (mostly pelagic trawlers) (10.1%), by longlines (5.6%) and finally by hand lines (0.1%), but this last gear category is mostly used by recreational and sport

fishermen and by a large part of the small-scale fleet.

EC Spain

17. Small tunas, mainly *Auxis rochei*, *Sarda sarda* and *Euthynnus alletteratus,* in the Spanish Mediterranean Sea are caught as by-catch of purse seiners targeting clupeoids, traps targeting bluefin tuna and surface longliners targeting albacore. In addition, there are several artisanal fisheries (fixed nets and small surface longlines) as well as some recreational fisheries (trolling lines) targeting these small tuna species.

18. Bullet tuna represent the highest fraction of the catch (800 t, on average for the last five years), followed by Atlantic bonito (400 t) and Atlantic black skipjack (200 t).

EC Malta

19. The small tunas fishery in Malta is relatively small. This small-scale fishery is artisanal and fairly typical of the fisheries found in many Mediterranean countries. The species of small tunas landed in Malta are: Atlantic bonito (*Sarda sarda*), bullet tuna (*Auxis rochei*) and the Atlantic black skipjack (*Euthynnus alletteratus*).

20. Bonito (*Sarda sarda*) are occasionally targeted by professional fishermen using gill nets. This species is more popular as a target species by part time fishermen where it is mainly caught by trolling lines and hand lines. Bonito~~s~~ caught by trolling and hand lines contribute to the majority of the landings of this species. Recent landing statistics of this species (from 2000 onwards) range from 0.5 to about 3 t per year. This species is also very popular with the recreational fishery sector. It should be noted that data from recreational fisheries are only available from 2005 onwards.

21. Bullet tuna (*Auxis rochei*) are mainly targeted by trolling lines used by professional and part time fishermen. Recent landing statistics (2000 onwards) are low and do not exceed 10 t, in contrast with landings from the 1950s to the 1990s when landings fluctuated from 10 to 30 t. This reflects the reduction in popularity of the Maltese coastal small tuna fishery, especially by professional fishermen who directed their attention to other resources.

22. *Sarda sarda* is also very popular with the recreational fishery sector, which may contribute to substantial catches.

23. As for the other two other small tunas landed in Malta, Atlantic black skipjack (*Euthynnus alletteratus*) is mainly targeted by the use of trolling lines by professional and part time fishermen. Recent landing statistics (2000 onwards) showed an upward trend reaching a maximum of 1.5 t. However this upward trend may be due to the possibility that landing statistics were unrecorded in the past years (pre 2000).

Morocco

24. In Morocco, harvesting for small tunas mainly takes place along the Atlantic coast. In the Mediterranean, however, there have been some catches of two small tunas species, mainly bullet tuna and Atlantic bonito. The average quantities landed during the time period 1996-2006, are 400 t and 70 t, respectively. Atlantic black skipjack are caught by the small-scale fishery.

25. In terms of price, bullet tuna showed a smooth upward trend during the last ten years, with an average of 0.8 US $/kg, whereas that of Atlantic bonito did not change turning around an average price of 1.2 US $/kg.

26. Along the Mediterranean coast of Morocco small tunas are mainly targeted by a small-scale fishery of more than 1 000 canoes plus 100 longliners which operate seasonally; the fishing season lasts between 3 and 6 months a year.

27. These fishing activities offer part-time employment for a about 4 000 fishermen.

28. The majority of the small tunas landed in Morocco goes to the canning industry on a local scale, providing raw products for factories based in the main coastal cities.

29. It is important, however, to emphasize that small tunas are not yet sufficiently valued, which explains their low market value in comparison with other similar species. These species may be used as bait by fishing activities using hooks.

Tunisia

30. Small tunas species are fished throughout the year, with peak landings during the warm weather months (March to October). All these species are preferential for Tunisian consumers. Pain bonito and Atlantic bonito are most required. Their commercial value is up to three times that of bullet tuna and Atlantic black skipjack. They all constitute either target or accessory species of all the fishing gears used in Tunisia (purse seine, light fishing, gill nets, pelagic trawl, longline, etc).

31. In Tunisia, the fishing gears used to catch these species are mainly purse seine (52) surface longline (5) and hand line. Small tunas can be taken as accessory catch with nets, lights and by pelagic trawl. The traps, which constituted the major gear for catching small tunas, have been relegated to last place, and have been abandoned since 2003.

32. In Tunisia, purse seiners target mainly bluefin tuna, whereas small tunas which have become secondary targets for the purse seiners, are also caught all along the Tunisian coast. In effect, vessels operate from October to March off the Tunisian coast, mainly along the Gulf of Gabes and close to the Tunisian-Libyan border. They are then active from May until the end of June following the movement of the spawners when they realize the highest catches. As concerns swordfish, longline fishing for this species continues to be carried out all along the Tunisian coast.

33. Atlantic bonito, bullet tuna and Atlantic black skipjack are the major targeted species of Tunisian purse seiners and artisanal fisheries in Mediterranean Sea waters. Tunisian landings varied from 970 to 4 500 tons between 1996 to 2007. They constitute 1 to 5% of the national landings of sea resources in the study zone and represent a proportion varying from 2,6 to 17,8% of the total Mediterranean and Black Sea landings.

34. The major small tuna species caught by Tunisian fishers are Atlantic black skipjack (*Euthynnus alletteratus*), bullet tuna (*Auxis rochei*), Atlantic bonito (*Sarda sarda*) and plain bonito (*Orcynopsis unicolor*).

35. The sizes vary from 25 to 108 cm-length; the class [56-60 cm] is represented for - *Euthynnus alletteratus.* Size varies from 20 to 46 cm in the case of *Auxis rochei*. The most

represented classes range between 33 and 41 cm, representing more than 90% of the sampled fish. The sizes of *Sarda sarda* vary from 15 to 50 cm, but the modal class ranges between 36 and 38 cm, and represent 40.1% of the total number sampled. Finally, the size of *Orcynopsis unicolor* varies from 31.5 cm to 79 cm. The modal size is represented by the 41-45 cm class, which represents 20% of the total number of sampled fish.

36. Besides the main large pelagic species, such as bluefin tuna and swordfish targeted by the Tunisian professionals, several small tunas are associated with these fisheries. The catches by trap nets were composed of about 80% of bluefin tuna, whereas species such as bullet tuna, bonito, Atlantic black skipjack, and plain bonito constitute the remainder of the catch. During 2000-2003, trap net catches consisted of less than 6% of bluefin tuna, whereas the small tunas species constituted the remaining 94%. For purse seine, the most abundantly captured species is the Atlantic black skipjack, with proportions varying from 21 to 27%. Incidental catches of Atlantic bonito, bullet tuna and plain bonito are taken, but their percentage is weak.

Turkey

37. Bonitos play a major role in the Turkish fishery. These species migrate for reproduction and feeding from the end of April to August from the Aegean Sea to the Sea of Marmara and the Black Sea. They migrate back from September to December through the Bosphorus and Marmara Seas to the Aegean Sea. Bonito fishing is intensively carried out in the Black Sea, Marmara Sea and the northern Aegean Sea using purse seine, gillnets, encircling nets and hand lines. Fishing starts in September and ends in December. During some months the fishery goes on until January. According to the years, the catch figures show fluctuations. The total catch in 2004 was 5 701 t. There has been a decrease in catches since 2002. However, in 2005 there was a considerable increase in bonito fishing (70 797 t). For 2006, the amount of *Sarda sarda* catch decreased to 29 690 t.

38. Three hundred and four (304) bonito individuals have been sampled in the eastern and central Black Sea during 2006. The average length of the sampled fish was 31.42 cm, the size range was between 21.9 and 44.0 cm. The average weight was 339.33 g with a weight distribution between 89.52 and 940.70 g.

39. Bullet tuna fisheries are carried out in the Aegean Sea and the eastern Mediterranean using purse seines, gill nets and encircling gillnets. The fishing season is generally between February and June. In April and May, fishing is carried out intensively. The catch quantities of bullet tuna were not recorded for a long time. The catch quantities of these species have been specifically recorded since 2004. In 2006, the total catch of Atlantic black skipjack was 1 230 t and the total catch of bullet tuna was 1 031 t.

Review of data and information available

40. The Coordinator of the study team on small tuna species set up by the GFCM, and on the behalf of the colleagues involved in this team (Srour, Di Natale, Hattour, Keskin, Idrissi and Orsi Relini), presented a preliminary overview of the main goals and the results obtained so far, which focused on the complete review of information on biology, fishing activities, legislation and socio-economic aspects of the small tuna species and their fisheries in the Mediterranean and Black Sea. It was pointed out the relevance of this fishery segment, either in terms of total catches or incomes, and the general underestimation of these figures by common perception. It is expected that the final version of the report will be ready quite soon, incorporating the new information presented at the current meeting. The report will be published by GFCM in a short

time, providing a reference point for future activities on small tuna species.

41. The meeting expressed its appreciation for the efforts made by GFCM in this field and for providing the financial support.

Review of biological and ecological knowledge

42. Ten documents dealing with biology and fishery of small tunas were presented to the meeting.

43. This point of the agenda was introduced by a general presentation about the species reported in the Mediterranean and the Black Seas, according to the GFCM regional study on small tunas.

44. Document GFCM-ICCAT_ST_001 provided a summary of this study. Three species are common to almost all countries in this area:Atlantic bonito *Sarda sarda* (BON), bullet tuna *Auxis rochei* (BLT)[1] and little tunny *Euthynnus alletteratus* (LTA). Three other species are more or less regularly present in the area: skipjack *Katsuwonus pelamis* (SKJ) in seven countries; plain bonito *Orcynopsis unicolor* (BOP) in the Mediterranean Morocco, Algeria, Tunisia, Libya and Portugal; narrow-barred Spanish mackerel *Scomberomorus commerson* (COM), a lessepsian migrant, in the Levant Sea countries, namely Egypt, Israel, Lebanon, but specimens have also been found in other countries. Three species, wahoo (*Acanthocybium solandri)* (WAH), West African Spanish mackerel (*Scomberomorus tritor)* (MAW), and Indian mackerel *(Rastrelliger kanagurta)* (RAG) are rarely reported in Mediterranean and Black Sea catches. Other species, like black skipjack (*Euthynnus lineatus*) (BKJ), dogtooth tuna (*Gymnosarda unicolor*) (DOT) and king mackerel (KGM) (*Scomberomorus cavalla*) have been mentioned in some fishery statistics in the area, possibly due to a misidentification.

45. Document GFCM-ICCAT_ST_006 provided a general overview of the distribution and abundance of bullet tuna larvae in the Balearic Sea, which is characterized by the confluence of Atlantic and Mediterranean water masses. Consequently, the water masses' convergence imparts in the area an intense geostrophic circulation of water masses and hydrographic processes, particularly suitable for the spawning of a number of tuna species, among which bullet tuna (*Auxis rochei*) is most abundant. The tuna larval surveys undertaken in the framework of the "TUNIBAL Project", allowed acquiring information on small tuna species during the 2003-2005 spawning seasons and on the inter-annual variability of bullet tuna larval abundance and on their distribution pattern observed throughout these years. Overall, the 2003 Mediterranean heat wave appears to have affected the strong inter-annual differences observed of bullet tuna larval abundance. Although their larvae are widely spread over the area, major concentrations tend to be closer to the coast than the other tuna species spawning in the area, particularly bluefin (*Thunnus thynnus*) and albacore (*Thunnus alalunga*). Main larval concentrations of bullet larvae were located between the islands of Mallorca and Menorca shelf and slope regions.

46. The following discussion provided evidence of spawning occurring in the Balearic Sea from June to September and confirmed the fact that larvae of *Auxis* are usually the most abundant among tunas in several surveys in the Mediterranean Sea.

[1] According to the present report, the catches of *Auxis thazard* (FRI) reported in several statistics have been considered as a mis-identification of the species. The problem is more extensively examined in the document GFCM-ICCAT_ST_003.

47. Document GFCM-ICCAT_ST_004 provided some fishing and population parameters of little tunny (*Euthynnus alletteratus*) caught by purse seines in the northeastern Mediterranean (Iskenderun Bay) during the pelagic fishing season 1998-1999. Catch-per-unit-effort for this species caught by sardine purse seines between October and May was estimated in 0.2 kg/HP/day. During the fishing season, the highest value of catch amount per month was estimated in 19.0 kg/HP/month in spring (April) and 4.6 kg/HP/month in autumn (November). The most profitable fishery is usually carried out by small scale vessels, while the little tunny catches obtained by medium and large vessels provide poor incomes. The length distribution of the little tunny population showed a single mode in autumn and two modes in spring. The cohort in autumn (October-November) was at 35-40 cm TL. The two cohorts in spring (March-April-May) were young specimens of 35-40 cm and mature specimen of 60-65 cm TL. The length-weight correlation was also provided.

48. Document GFCM-ICCAT_ST_005 provided a comprehensive overview of the Turkish small tunas fisheries in 2006. The report provided a detailed description of the various fleets engaged in several fisheries, the fishing areas, and the fishery production. A detailed report on the landings of Atlantic bonito in the various areas exploited by the Turkish fleet in the Mediterranean and in the Black Sea over the last 20 years was also provided.

49. The following discussion pointed out the necessity to understand the factors which caused the relevant increase of the Turkish catches of Atlantic bonito in 2005, which are the highest in the entire basin since statistical data are reported (68 years).

50. Document GFCM-ICCAT_ST_009 provided biological data and growth parameters on Atlantic bonito in the Black Sea and in the Marmara Sea for the period 2003-2005. The size of first sexual maturation was detected at 36.9 cm. The spawning season occurs from May to July, with a peak in June, and fertilized eggs were found either in the Black Sea or in the Marmara Sea. Young specimens usually migrate to the Marmara Sea in summer. Length-weight correlation by sex and the von Bertalanffy growth parameter were also provided. It was recalled that, according to various authors, it is possible to find slow-growth individuals up to 9 years and fast-growth individual up to only 4 years in this area; only fast growth individual were detected during the study. It was pointed out that the current minimum size regulation in Turkey is not properly based on the scientific evidence to protect the first spawners and that more studies are needed to understand the migrations.

51. The following discussion was mostly focused on the fact that there is a lack of evidence of migration between the Mediterranean and the Black Sea in the last 30 years, caused by a lack of research in the area, while information on this important aspect of the distribution of Atlantic bonito is needed, to better understand the recent evolution of the population dynamics in the Black Sea.

52. Document GFCM-ICCAT_ST_003 provided an in-depth analysis of the systematic situation of the genus *Auxis* in the Mediterranean Sea. Systematic studies (Collette et Aadland, 1996) have assigned the Mediterranean tuna of genus *Auxis* to the subspecies *Auxis rochei rochei*, but the diagnostic characters proposed for this taxon fit only partially the Mediterranean samples. The study presented the result of new research to verify the situation, carried out both on morphological characteristics and genetic diversity of *Auxis* obtained both in the Mediterranean and in the adjacent Atlantic. From the Atlantic side of Morocco to the central Mediterranean only one species was found; its main morphological characteristics are: peculiar color patterns, a large corselet evident in adult but not in young fish, low mean number of gillrakers on first arch (41.8) and some anatomical internal characteristics close to those of *A. thazard*. The peculiarities of

Mediterranean *Auxis* deserve appreciation on a taxonomical basis but, in the case of introduction of a new subspecies, the Mediterranean fish will maintain the name *Auxis rochei* established by Risso. In conclusion, the dismissal of the name *A. thazard* for Mediterranean fish is strongly supported.

53. The following discussion pointed out that this is an important point to be taken into account to homogenize the statistics for the Mediterranean and the Black Sea, which are actually reporting catches of genus *Auxis* under several different names or codes. According to the information available, only two specimens of *Auxis thazard* have been reported so far from the eastern part of the Mediterranean Sea.

54. Document GFCM-ICCAT_ST_007 provided a genetic overview of the situation for two of the most important species of small tunas in the Mediterranean fisheries, Atlantic bonito and the little tunny. Based on distribution of spawning grounds and migratory movements, the Atlantic bonito was thought to be structured in two isolated populations within this sea. However, recent genetic studies revealed that Atlantic bonito presented a population structure corresponding to isolation by distance mechanism. Furthermore, the North Atlantic population is genetically isolated from the Mediterranean. Little tunny (*Euthynnus alletteratus*) was originally described as a single species distributed on both sides of Atlantic Ocean including the Mediterranean Sea. However, a recent genetic analysis was able to identify cryptic species between east and west North Atlantic populations. In summary, genetic studies revealed hidden population structure in several small tuna species, indicating that small tunas species have a great susceptibility to establish genetically differentiation in relatively small areas. Therefore, population genetic studies in small tuna species have an extremely importance for both proper fishery management and species identification.

55. The following discussion was based mostly on the location of spawning areas of Atlantic bonito in the Mediterranean and the Black Seas. According to several scientific papers in the last century, there is evidence of spawning in most of the Mediterranean areas. However, this reinforces the idea of isolation by distance genetic population structure found in the Mediterranean, since multiple spawning areas are needed to explain isolation by distance population structure. The relevance of genetic studies for fishery management was also confirmed. The fact that genetic studies should be carried out also in areas of the southern Mediterranean was also discussed, with the purpose to get a more detailed figure.

56. Document GFCM-ICCAT_ST_008 provided an updated overview about the biology and fishery of small tunas in Tunisia and nalittle tunny, 33-41 cm in Bullet tuna, 36-38 cm in Atlantic bonito and 41-45 cm in plain bonito. No sexual dimorphism was detected in all species. The length-weight correlation was also provided for all species. The first sexual maturity was detected at 43 cm (age 2) in little tunny, at 32.6 cm (age 2+) in bullet tuna, at 36.5 cm (age 1) in Atlantic bonito, and at 44.5 cm (age 2) in plain bonito. The sexual cycle was studied through the gonadosomatic and hepatosomatic indexes. The spawning season occurs in June-August for little tunny, in May-September for bullet tuna and plain bonito, in May-August for Atlantic bonito. Growth parameters according to the Ford Walford equation are also provided for all species. The feeding habits of small tunas were also identified: the main preys are mostly small pelagic species like sardine species and anchovies.

57. Document GFCM-ICCAT_ST_010 provided information about biological parameters of bullet tuna in the Ligurian Sea and particularly on aspects scarcely studied in Italian waters. On the basis of gonadosomatic index, the spawning season was detected in May-September, with a peak in July for females and July-August for males. The minimum spawning size was at 32.5 cm

(FL) in females and 33.5 cm (FL) in males. The length-weight correlations were provided by sex, but no sexual dimorphisms was noticed. The age was detected up to year 7 and von Bertalanffy growth parameters were given. The diet was mostly based on Euphausid crustaceans and fish, both including pelagic and mesopelagic species. Important affinities of these biological characteristics with those evidenced by studies carried out in Spanish waters, are underlined.

58. Document GFCM-ICCAT_ST_002 provided an overview of the catch composition of Atlantic bonito in the southern Tyrrhenian Sea (GSA 10) and in the Strait of Sicily (GSA 16). The length-weight correlations and the size-at-age table were provided for the two areas for the period 2002-2007. The size distribution at landing in the two areas in the period 1994-2007 showed similar structures, with remarkable differences for the years after 2003, when hot temperatures affected the Mediterranean Sea for several months, with probable effects on the reproductive biology of Atlantic bonito (among many other species) in that year. The monthly analysis of size distribution in 1999 (the only year when a massive sampling was available) in the southern Tyrrhenian Sea shows the evidence of a passage zone for a large part of the year, while it seems that young Atlantic bonito (age 0 and the beginning of age 1 group) can stay for several months in the same area for wintering.

59. The following discussion pointed out the fact that monthly analysis should be available for more years, in order to better define the movements of Atlantic bonito in the central Mediterranean, a key area to understand the intra-Mediterranean movements of the species.

Review of statistics

60. In order to provide an overview of the small tunas statistics, a comparison among the various catch/landing databases (FAO-GFCM, ICCAT and EUROSTAT) was presented. While FAO-GFCM and ICCAT databases are quite comparable, except for the early years and a few points in some recent years, the comparison between the ICCAT with EUROSTAT showed remarkable discrepancies, only partially due to the different number of countries reporting data. The discrepancies are particularly difficult to explain when catches from EC countries only are higher in EUROSTAT than those reported by all countries combined to ICCAT. According to the GFCM regional study report, 38% of the countries have problems in reporting catch data on small tunas and 17% of countries never reported any data to ICCAT or FAO.

61. It was noted that the good concordance between the FAO-GFCM and ICCAT databases was the result of the coordination work conducted since 2004 to homogenize their databases. As concerns the discrepancies in early years (1950 to 1965), in several cases was not possible to disentangle catches reported by some countries as unidentified tunas or small tunas combined and then, for such cases only, it was decided top keep the original data in the two data bases as they were originally. The few discrepancies found in very recent years need to be investigated and clarified.

62. After a broad discussion, it was accepted to use FAO-GFCM and ICCAT databases for total catch figures, the ICCAT database for detailed catch/effort and size data as basic information for stock analysis and the EUROSTAT database for prices data.

63. Multidisciplinary data regarding stock analyses, collected and being completed by GFCM, will be also considered for future researches.

64. The meeting also pointed out that possible harmonization of the resolution of the ICCAT reporting area (5°x5° or, in the best case 1°x1°) and of the GFCM Statistical Areas (GSA) should

be discussed during the next CWP meeting.

65. The catalog of catch/effort and size data reported to ICCAT for the three main species of small tunas (namely Atlantic bonito, little tunny and bullet tuna) for the various countries, showed remarkable gaps in data availability and in time series. Several countries are not reporting size data of small tunas to ICCAT and almost all countries do not report them on a regular basis. Available size data for small tunas in ICCAT databases are shown in Table 2.

66. The group pointed out the considerable quantity of catch of mixed tuna species reported to ICCAT and further investigation was recommended to try to attribute those catches to species.

67. The available ICCAT nominal catch data were examined to get an overview of the reporting of Task I. Figure 1 and Table 1 summarize the Task II available information in comparison to the reported catch of small tunas. It is obvious that the available catch-effort data are extremely limited and of questionable use in analyzing stock status. It is recommended that data mining activities be undertaken to recover, to the degree possible, catch-per-effort information for the species of concern. There are only very few Task II data and data on effort or CPUE are non-existent. This situation requires considerable improvement and specific effort.

Review of socio-economic data

68. This point was introduced with a summary presentation of the work carried out within the GFCM regional study[2] on small tuna fishery. A comprehensive overview of the economic data available in eight countries only was presented, showing the time series of average prices for the five most important species and the annual revenue for each country concerned. The relevance of the small tuna fisheries from an economic point of view is quite clear, for all the countries concerned.

69. In the discussion, it was pointed out that the economic relevance of these fisheries is certainly much higher than the figure presented, because the price was provided at the first level of the market chain and for the clear underreporting of landings in many countries, while some countries are not reporting catches even if there is a reported price on their markets for small tuna species at the first level.

70. The social importance of these fisheries is supposed to be very high, because of the small-scale and artisanal characteristics of the activities, which concern a large number of fishermen in local communities all around the Mediterranean and the Black Seas. The combination of the economic and social relevance of these fisheries shows in a clear way the importance of the small tuna fisheries at the regional level and in total values.

71. The SCRS Chairperson stressed the importance of incorporating socio-economic information into the advice provided to the Commission. Furthermore, it was recommended that methods for incorporating socio-economic data into the ICCAT database should be considered.

Discussion about possible indicators of stocks' status

72. The meeting noted the lack of basic data necessary to obtain fishery indicators such as catch, CPUE or mean weight trends. Hence, important improvement should be made, mainly with respect to collecting basic elements, to provide scientific advice on small tunas stock status.

[2] Economic data can be found in the GFCM regional study on small tunas (in press).

73. The need was underlined to (i) reconstruct how catches' patterns look like over time; (ii) get **catch-at-age data**, and (iii) rebuild **catch-per-unit effort** time series. Some ways were indicated to address such issues~~;~~ through trap catches, as records on time series production on small tunas, purse seiners (Turkey) and gillnets which make considerable catches.

74. In terms of biological information, there is a need to seek the necessary stock status indicators, such as (i) growth (mean length and weight), (ii) reproductive and fecundity characteristics, (iii) catch at age and catch at size (back over time when possible), and (iv) to keep in mind the necessity to carry out some assessment work (Y/R and SPR, for instance)

75. The group emphasized the importance of data to be recovered from traps of the Mediterranean and CPUE, and from purse seiners and longliners as well.

76. The meeting underlined the need to carry out standardization of fishing effort units~~;~~ among the different fishing techniques and fishing segments exploiting small tunas.

77. After discussion, a list of priority species was set by the Group:

1. Atlantic bonito (*Sarda sarda*)
2. Bullet tuna (*Auxis rochei*)
3. Little tunny (*Euthynnus alletteratus*)
4. Plain bonito (*Orcynopsis unicolor*)
5. Skipjack (*Katsowunus pelamis*), this last species is being considered as a major species for the ICCAT

78. The group emphasized the need to promote the use of socio-economic indicators (as a good start) and then extend them to other tuna species and tuna-like species (even major ones) and develop data collection through pilot studies for specific areas.

Considerations regarding the management of small tunas fisheries

79. So far, no specific international regulation with regard to small tunas fisheries is in force in the Mediterranean except for the technical measure regulating the use of driftnet, implemented by GFCM (Resolution 97/1 and Recommendation GFCM/2005/03) and ICCAT Recommendation [03-04]"). Other technical measures are implemented at the national level as shown in Table 3.

Outline of a joint GFCM- ICCAT workplan for small tuna

80. During the current meeting, the proposal of a research project on small tunas submitted during the 2004 GFCM-ICCAT joint meeting was considered. After discussions, the Group considered the proposal as a good starting point to improve the current knowledge on these species and recommended that ICCAT and GFCM support the goal of this project. The Working Group noted that the regional study launched by GFCM in 2007 has foreseen to address several aspects suggested by this project. The final report of this study will be ready shortly.

81. During the discussion the Group recognized that, in spite of the effort some countries might have made to improve the statistics on small tunas, the current situation of ICCAT's Task I and Task II databases still needs ~~a~~ substantial improvement.

82. The meeting acknowledged the beneficial effect (although limited to the duration of the

project) that projects such as COPEMED (phase I: 1996- 2005), in collaboration with GFCM, have had on the improvement of ICCAT's database.

83. Furthermore, data mining should be undertaken in order to identify and recover existing historical records of catches and effort (such as trap and other gears) which could be used as stock status indicators.

84. The Group agreed on five general items regarding a joint GFCM-ICCAT work plan for small tunas.

- Improvement of statistics on catch and fishing effort:

  - Formal request from both ICCAT and GFCM Secretariats to Mediterranean fishing countries not reporting the above-mentioned statistics;
  - Collection of existing historical records on catch and fishing effort;
  - In case the aforementioned records do not exist, establishing of a specific sampling programme to allow a backward estimation of missing data.

- Improvement of the knowledge on biology, stock structure and other biological parameters:

  - Length distributions of catches by species, gear and area and time strata;
  - Biometric relations between length-weight per species and area and time strata;
  - Sex-ratio per length class, species, gear and area and time strata;
  - Growth studies: growth equation; direct determination of age;
  - Collection and analysis of gonadosomatic indices (GI) and their evolution over area and time;
  - Larval distribution;
  - Spawning area and season;
  - Spawning characteristics: histological analysis of gonads;
  - Estimation of maturity and fecundity ogives;
  - Genetic analysis of samples (eggs, larvae, juveniles) obtained in the different sub-areas of study;
  - Tagging programs.

- Improvement of fisheries indicators and promotion of socio- economic indicators for management purposes:

  - Catch and catch per unit effort, mean weight, mean age, mean length, size and condition of individuals, percentage of mature specimens in the catch, sex ratio, percentage of fish caught at optimum length, percentage of large fish in the catch, etc.;
  - Economic productivity, capital invested, costs, revenues, prices, indicators related to employment and direct added values, etc.

- Development of standardized abundance indices by species, gear and selected sub-areas to be used in stock assessment.

- Description and analysis of the relation between environmental factors and spawning and recruitment areas; analysis of environmental factors which can influence the fishing yields.

85. While some of the research outlined in this plan is already underway and should continue at national levels, much of what has been identified will require supplemental support since it exceeds the current capacity for conducting this research at national levels for some of the countries involved in the Mediterranean small tuna fisheries.

86. The Group agreed that, as part of the above-mentioned workplan for small tunas, another meeting of the joint GFCM/ICCAT Working Group should be held in 2010/2011 to assess the progress made in relation to the objectives of the workplan. Both GFCM and ICCAT Secretariats should be in contact in order to make the necessary arrangements.

Other matters

87. The meeting was informed about an upcoming meeting addressing Climate Change in the Black Sea. The meeting is being jointly organized by the Commission on the Protection of the Black Sea against Pollution and Black Sea Scene – EC 6th Framework Project, and will be held in Sofia, Bulgaria, from 6-9 October 2008. At this meeting, discussion about possible underlying reasons for increased productivity of some Black Sea fishery resources will be held. This discussion may provide an explanation notably for the large levels of bonito production in recent years from the Black Sea. It was recommended that ICCAT and GFCM consider attending the meeting to gain insight into the recent change in productivity of tunas and other species in the region.

Conclusions and recommendations

88. The status of small tuna stocks in the Mediterranean is generally unknown, although it is apparent that a large number of fishers depend on catches of these species for their livelihoods and that the economic value of the catches is high. Fishery statistics which can provide a basis for evaluating fishery impacts on stock status and the prospects for improving long-term sustainable catches and benefits to society are generally unavailable for these species. The Recommendations which follow address the information needs for conducting such evaluations and advising the respective RFMOs on fishery resource status and trends and likely impacts of the fisheries on small tunas in the Mediterranean.

89. All countries should make an effort to improve statistics on small tuna ~~statistics~~ as well as the current knowledge on the biology, stock structure and other relevant aspects of these species. COPEMED II has just been initiated, which along with the other sub-regional projects in the Mediterranean, should result in future improvements.

90. Statistics on small tunas should be considered important in the Mediterranean as a whole (including the Black Sea). In particular, these species should be taken into account in the MedFiSis project, specifically dealing with the improvement of fishery statistics.

91. The Working Group underlined the need that the four main small tuna species (*Auxis rochei, Sarda sarda, Euthynnus alletteratus, Orcynopsis unicolor*) as well as skipjack (*Katsuwonus pelamis*) be added to the GFCM priority species list as these species already exist on the ICCAT list, in order to improve the current status of data collection, including socio-economic aspects.

92. Due to the large amount of catches reported and entered as unclassified tuna species or mixed tuna species in the ICCAT database, the Group recommended that scientific experts from

both ICCAT and GFCM Contracting Parties review their catches and try to classify them by species.

93. The Group appreciated the support provided by COPEMED II for experts to participate in this meeting and expressed the desire that the project continues its support. Other sub-regional projects are also invited to ~~also~~ support, as appropriate, research activities on tuna and tuna-like species.

94. Ten documents were presented dealing with biological and fisheries on small tunas from different areas: 2 regional, 2 from Italy, 1 from Tunisia, 1 from Spain and 3 from Turkey (including the Black Sea). Recognizing that scientists from eight countries participated in this meeting, which represents about half of the flags reporting catches of small tunas in the Mediterranean, it was recommended that countries catching tuna and tuna- like species in the Mediterranean should be involved in future meetings of the joint GFCM- ICCAT Working Group depending on the topics to be discussed.

95. The meeting considered that further analysis and discussion will be needed to provide the respective Commissions with the best scientific advice on the status, trends and indicators on small tunas.

96. The meeting agreed that, as part of the above-mentioned work plan for small tunas, another meeting of the joint GFCM/ICCAT Working Group should be held in 2010/2011 to assess the progress made in relation to the objectives of the work plan. Both GFCM and ICCAT Secretariats should be in contact in order to make the necessary arrangements.

97. The meeting took note of the invitation made by Turkey to host the next meeting of the joint GFCM/ICCAT Working Group.

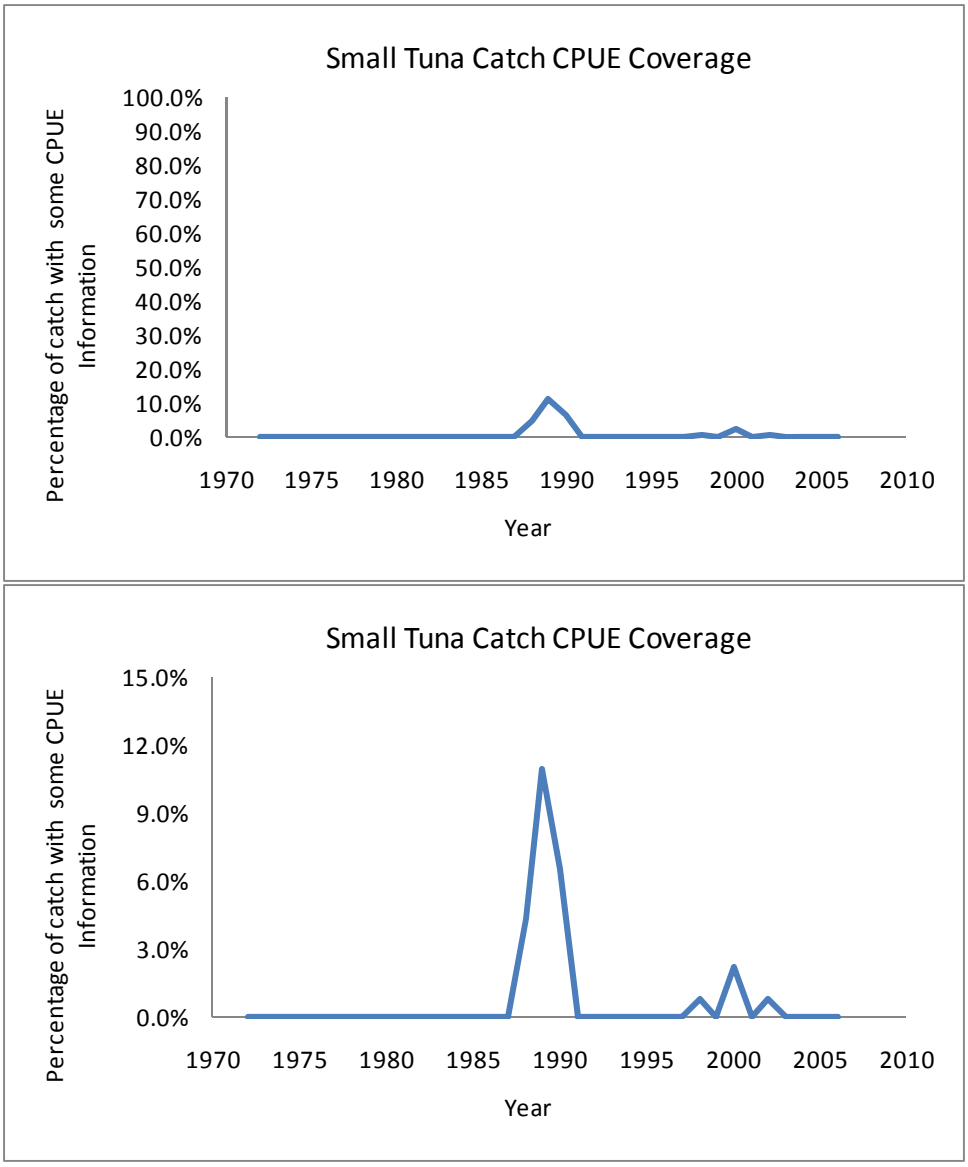


Figure 1. Percentage of the reported catch of small tunas for which some catch per effort is also reported in the Task II data.

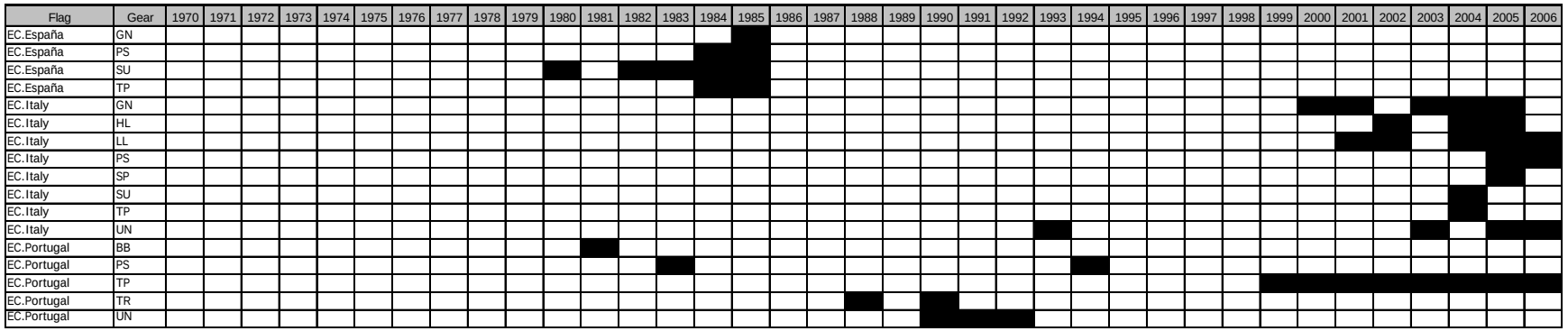
Table 1. Small tunas reported catch and available catch per effort available in the ICCAT database. Positive catch per effort is indicated in green[1]. ([1] Information from France, Spain and Portugal may include data from Atlantic area)

Stock	Flag	GearGrp	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
MED	Algerie	GN C																				129	210	286	237	244	184	285	255	329	241	238	414		226	315	69
		GN C/E																																			
		HL C																																	39	69	15
		HL C/E																																			
		LL C																																	252	285	478
		LL C/E																																			
		PS C																				689	838	904	869	908	762	741	886	860	845	727	746		553	569	895
		PS C/E																																			
		TL C																						25													
		TL C/E																																			
		TP C	222	343	183	140	143	206	196	515	640	740	860	867	874	880	459	203	625	1,528	1,307	130	139	144	123	121	154	106	98	139	116	102	112				
		TP C/E																																			
		UN C																				96	118	153	107	107	88	76	83	98	57	65	82		88		
		UN C/E																																			
	Croatia	PS C																				75	152	60	107	43	26	26	51	146							
		PS C/E																																			
	EC.Bulgaria	UN C					40	44	11	1	13	191	4	24	1	1		13			17	17	20	8		25	33	16	51	20	35	35	35				
		UN C/E																																			
	EC.Cyprus	GN C																													14		10	10			
		GN C/E																																			
		TN C																																	6	4	
		TN C/E																																			
		UN C	6	6	5	7	7	18	11	17	17	22	33	17	31	32	13	25	41	20	23	25	21	11	23	10	19	19	19	16	19	19	19				3
		UN C/E																																			
	EC.España	GN C														272	247																				
		GN C/E																																			
		LL C																														0	1	0	0	1	3
		LL C/E																																			
		PS C												2,598	2,247	2,009	1,727																			0	
		PS C/E																																			
		SU C	1,838	2,429	2,780	2,290	2,915	2,389	3,084	3,160	3,280	2,160	3,240	44	144	53	6		2,220	956	1,527	1,527	787	693	1,043	1,871	2,650	1,033	545	946	741	1,092	794	1,040	1,322	1,066	1,487
		SU C/E																																			
		TP C	338	273	533	160	251	464	495	317	120	256	390	718	926	770	309	682	1,416	2,234	2,170	1,385	650	155	425	248	354	208	290	156	633	200	192			255	156
		TP C/E																																			
		UN C																					1														
		UN C/E																																			
	EC.France	PS C																	10		1	18	9	6		1											
		PS C/E																																			
		UN C												33	16																		27				
		UN C/E																																			
	EC.Greece	PS C											1,405	1,367	1,732	1,321	1,027	1,848	1,254	2,534	2,534	2,690	2,690	2,690	1,581	2,116	1,778	1,585	945	2,135	2,110	1,675	1,672	1,784	1,547	1,682	1,188
		PS C/E																																			
		UN C	600	500	487	658	511	550	610	712	809	1,767	2,192	1,887	2,060	1,419	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400									
		UN C/E																																			
	EC.Italy	HL C																															124	463	481	217	
		HL C/E																																			
		LL C																																1,005	887	541	
		LL C/E																																			
		SP C																																55	52	41	
		SP C/E																																			
		UN C	2,665	1,915	2,060	1,898	1,867	2,680	2,555	2,745	2,556	2,289	2,401	3,300	4,387	2,781	2,781	3,054	2,851	1,878	1,738	1,519	1,593	1,617	2,359	2,043	2,462	2,462	2,462	4,621	4,621	4,621	6,923	2,055	2,446	1,457	
		UN C/E																																			
	EC.Malta	TR C																				20	11	10	1	2	3	6	6	3	1						
		TR C/E																																			
		UN C			9	23	16	11	35	12	19	4	9	12	4	1	13	5	8	18	21	8	1	8	8	8	5	10	2	2	1						
		UN C/E																																			
	EC.Portugal	LL C																																		1	
		LL C/E																																			
	Egypt	PS C																								697	985	725	724	1,442	1,442						
		PS C/E																																			
		UN C			10	3		1	17	10	3	2	23	14	48	62	68	35	17	358	598	574	518	640	648						1,128	1,128				
		UN C/E																																			
	Libya	PS C																					80	80				24	32								
		PS C/E																																			
		TP C																					31	30				21	20		5	4	4				
		TP C/E																																			
	Maroc	GN C											77	57	52	48	150	151	811	1,107	2,162	949	1,189	84	1,637	626	1,753	599	682	527	546	241	630	255	100	20	1
		GN C/E																																			
		HL C																																	80	15	27
		HL C/E																																			
		LL C																																	97	31	242
		LL C/E																																			
		PS C																											33	9			64	97	134	32	18
		PS C/E																																			
		SU C	113	609	159	198	758	695	350	262	72	384	83	92	76	66	48	148	127	35						1		1									
		SU C/E																																			
		TP C	145	164	391		233	134									29	32	1	70	412	423	487	125	205	55		11	480	275	342	29					
		TP C/E																																			
	Syrian Arab Republic	UN C					102	105	109	89	80	73	90	80	96	95	73	121	99	121	127	110	156	161	156	155	270	350	417	390	370	370	330				
		UN C/E																																			
	Tunisie	PS C						98	194	1,115	1,352	883	1,167	1,013	963	1,258	1,094	1,609	1,639	943	102	102	4														
		PS C/E																																			
		SP C																														1,183					
		SP C/E																																			
		TP C	32	29	77	82	126	100	200	179	61	145	28	29	39	44	50	140	197	155	202	94	47														
		TP C/E																																			
		UN C	570	573	1,065	993	1,325	2,390	1,969	1,659	1,468	839	1,400	1,004	1,116	988	1,488	1,160	1,260	1,550	3,282	2,437	1,291	1,054	522	1,123	1,397	976	2,061	2,147	2,996	3,336	3,004	1,508	3,645		
		UN C/E																																			
	Turkey	PS C									14,292	23,174	23,397	29,034	7,220	12,281	10,756	16,793	17,613	4,667	14,737	19,151	8,863	19,548	10,093	8,944	10,284	7,810	24,500	18,650	12,750	14,210	6,286	6,000	5,922	71,304	29,690
		PS C/E																																			
		UN C	13,905	3,901	5,324	3,371	3,178	4,503	5,536	9,082																							750				
		UN C/E																																			
	Albania	UN																								1	2										
	Israel	UN	100	100	242	200	300	300	200	170	105	35	110	35	60	259	284	273	135	124	129	108	126	119	119	215	119	119	119	119	119	119	119				
	NEI-2	UN									295	274	476	652	894	559	559	737	761	542	511	511	511	500	500	500	500	275	200	200							
	Palestinian Territory	UN																									90	59	61	60	60	60	129				
	Rumania	UN					2																														
	Serbia & Montenegr	PS																				63	1	31	23	43	38	36	38	39	41	41					
	Yugoslavia Fed.	PS	46	25	36	45	43	54	62	46	91	53	75	50	59	49	71	78	82	144	111																
	Total		20,580	10,867	13,361	10,068	11,817	14,742	15,634	20,091	25,273	33,291	37,460	42,927	23,045	25,248	22,652	28,507	32,567	20,384	33,111	34,250	21,944	30,542	22,186	21,507	25,355	18,979	35,060	33,329	28,104	29,495	23,595	14,272	17,877	77,905	34,271

Table

Table 2 – Catalog of the existing information on size on the three main species of small tunas in ICCAT database for the Mediterranean and the Black Seas.

Catalog of size information of Atlantic Bonito (*Sarda sarda*) available in ICCAT Task-2 data base.



Flag	Gear	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
EC.España	GN																																					
EC.España	PS																																					
EC.España	SU																																					
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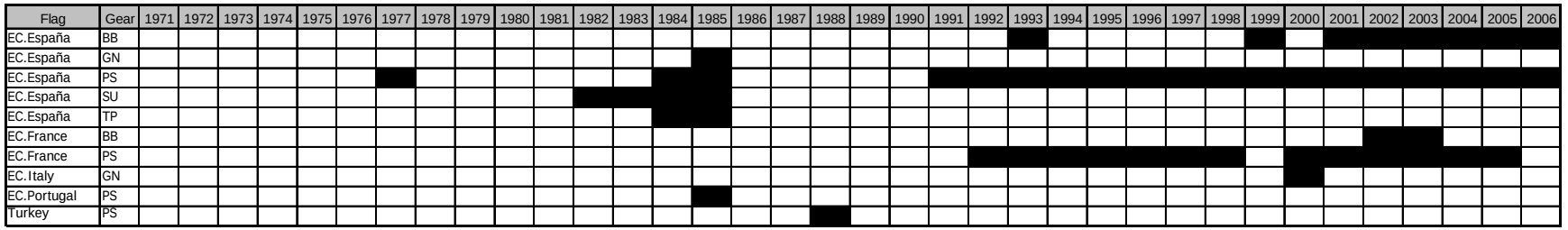
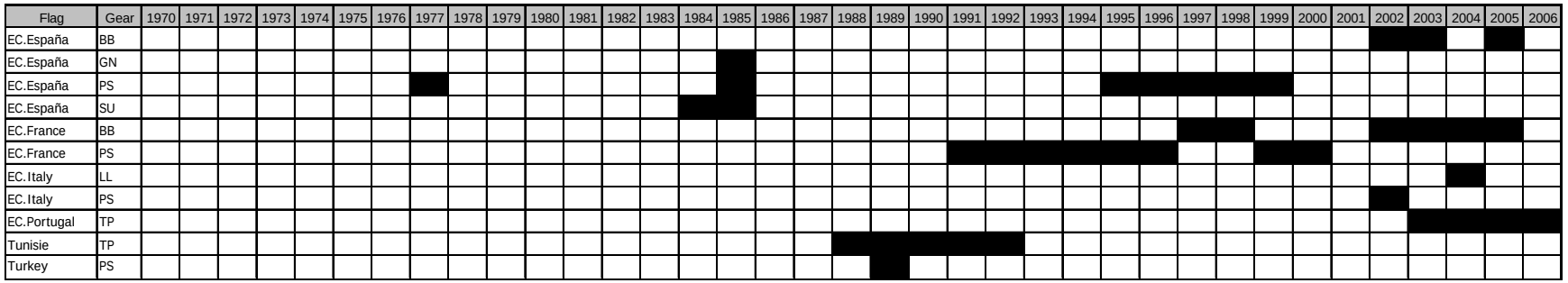
EC.Italy	TP																																					
EC.Italy	UN																																					
EC.Portugal	BB																																					
EC.Portugal	PS																																					
EC.Portugal	TP																																					
EC.Portugal	TR																																					
EC.Portugal	UN																																					

Catalog of size information of frigate (*Auxis rochei*) available in ICCAT Task-2 data base.



Flag	Gear	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
EC.España	BB																																				
EC.España	GN																																				
EC.España	PS																																				
EC.España	SU																																				
EC.España	TP																																				
EC.France	BB																																				
EC.France	PS																																				
EC.Italy	GN																																				
EC.Portugal	PS																																				
Turkey	PS																																				

Catalog of size data for Little Tunny (*Euthynnus alletteratus*) available in ICCAT data base



Flag	Gear	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
EC.España	BB																																				
EC.España	GN																																				
EC.España	PS																																				
EC.España	SU																																				
EC.France	BB																																				
EC.France	PS																																				
EC.Italy	LL																																				
EC.Italy	PS																																				
EC.Portugal	TP																																				
Tunisie	TP																																				
Turkey	PS																																				

Table 3 – Technical measures regarding small tunas implemented at national level.

Country\Type of measure	Minimum landing size	Seasonal closure	Spatial closure	Gears /Mesh size	Fishing effort control
Albania	X				
Algeria	X	X			
EC				X	
EC-Bulgaria	X				
EC-France				X	
EC-Italy	X			X	
EC-Malta	X			X	
EC-Spain		X	X	X	X
Israel				X	
Morocco				X	
Tunisia				X	
Turkey	X	X	X	X	

APPENDIX 1

Agenda

1. **Opening, adoption of agenda and meeting arrangements**

2. **Description of fisheries**

3. **Review of available data and information**
   - **3.1 Review of biological and ecological data**
   - **3.2 Review of statistics (catch, effort, size)**
   - **3.3 Review of socio-economical data**

4. **Discussion about possible indicators of stock's status**

5. **Considerations regarding the management of small tuna stocks**

6. **Outline of a joint GFCM-ICCAT workplan for small tunas**

7. **Other matters**

8. **Conclusions and recommendations**

9. **Report adoption and closure**

APPENDIX 2

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APPENDIX 3

List of documents

GFCM-ICCAT_ST_001 (SCRS/2008/056) Summary note on the GFCM regional study on small tunas in the Mediterranean including the Black Sea. Srour, A., A. Di Natale, A. Hattour, Ç. Keskin, M. Idrissi and L. Orsi Relini

GFCM-ICCAT_ST_002 (SCRS/2008/050) New data on catch composition of Atlantic bonito (SARDA SARDA, bloch, 1763) in the Tyrrhenian Sea and in the Strait of Sicily.Di Natale, A. and A. Mangano

GFCM-ICCAT_ST_003 (SCRS/2008/051) Between lumpers and splitters, which taxonomical approach to Mediterranean small tuna of genus Auxis? Orsi Relini L., G. Palandri, F. Garibaldi, L. Lanteri and F. Tinti

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GFCM-ICCAT_ST_006 (SCRS/2008/042) Distribution and abundance of frigate tuna larvae (*Auxis rochei*) off the Balearic Sea during the 2003-2005 spawning seasons. Garcia, A., Alemany, F., Rodríguez, J.M., Cortes, D., Corregidor, F., Ceballos, E., Quintanilla, L. and P.Velez-Belchí,

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