

**GENERAL FISHERIES COMMISSION FOR THE MEDITERRANEAN  
INTERNATIONAL COMMISSION FOR THE CONSERVATION OF  
ATLANTIC TUNAS**

**Report of the**

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**THIRD MEETING OF THE AD HOC GFCM/ICCAT WORKING GROUP  
ON SUSTAINABLE BLUEFIN TUNA FARMING/FATTENING  
PRACTICES IN THE MEDITERRANEAN**

**Rome, 16–18 March 2005**



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## **PREPARATION OF THIS DOCUMENT**

This document is the final report approved by the participants of the third meeting of the Ad Hoc GFCM/ICCAT Working Group on Sustainable Bluefin Tuna Farming/Fattening Practices in the Mediterranean held in Rome, Italy, from 16 to 18 March 2005. The document also contains the reports of the first and second meetings of the Working Group held in Rome (12–14 May 2003) and Izmir, Turkey (15–17 December 2003), respectively.

The “Guidelines on Sustainable Bluefin Tuna Farming Practices in the Mediterranean” prepared and adopted by the Working Group are included in Annex 1 (Annex 2 in French and Annex 3 in Spanish) to the report.

### **Distribution:**

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GFCM mailing list  
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FAO/General Fisheries Commission for the Mediterranean/International Commission for the Conservation of Atlantic Tunas.

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### **ABSTRACT**

The Ad Hoc GFCM/ICCAT Working Group on Sustainable Bluefin Tuna Farming/Fattening Practices in the Mediterranean was set-up following a 2002 decision by the General Fisheries Commission for the Mediterranean (GFCM) which, in view of the expansion of bluefin tuna farming in the Mediterranean, decided that practical guidelines to ensure the sustainability of this activity were required. The work plan of the Working Group (WG) was discussed and proposed by a Coordinating Committee which met in January 2003 (Madrid, Spain) as agreed during the twenty-seventh session of the GFCM. At its first meeting (Rome, Italy, 12–14 May 2003) the WG produced a survey form that would enable to produce a summary of the current situation of bluefin tuna farming in the Mediterranean, identify problem areas with respect to the issues to be addressed, and propose solutions. During the second meeting (Izmir, Turkey, 15–17 December 2003) the WG finalized a first snapshot on the current situation of bluefin tuna farming based on the information made available in the survey forms and progressed with the drafting of the guidelines. The summary snapshot consisted in three documents covering capture fisheries, farming and marketing/trade of bluefin tuna in the Mediterranean. The WG held its third and final meeting in Rome, Italy, from 16 to 18 March 2005. The meeting was attended by 19 experts representing 10 Mediterranean countries, Japan and the European Commission, and representatives from the Secretariats of the GFCM and the International Commission for the Conservation of Atlantic Tunas (ICCAT). The WG completed its mandate and finalized and adopted the “Guidelines on Sustainable Bluefin Tuna Farming Practices in the Mediterranean”. Furthermore updated summaries on capture fisheries, farming and marketing/trade of bluefin tuna in the Mediterranean were also prepared by selected participants of the WG.

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## **OPENING OF THE MEETING**

1. The Ad Hoc GFCM/ICCAT Working Group on Sustainable Bluefin Tuna Farming/Fattening Practices in the Mediterranean held its Third Meeting in Rome from 16 to 18 March 2005.

2. The Meeting was attended by 19 experts representing 10 Mediterranean countries, Japan and the European Commission, as well as representatives from the Secretariats of the International Commission for the Conservation of Atlantic Tunas (ICCAT) and of the General Fisheries Commission for the Mediterranean (GFCM), FAO Officers and Observers. The list of participants is given in Appendix B to this report.

3. Mr Victor Restrepo, Assistant Executive Secretary of ICCAT and Chairperson of the Working Group welcomed the participants and expressed, on behalf of ICCAT and GFCM, appreciation for their presence at this Meeting. The Working Group congratulated Mr Alain Bonzon on his election as the GFCM Executive Secretary.

## **ARRANGEMENTS**

4. The Chairperson suggested that the first two days of the Meeting be devoted to discussion, revision and adoption of the Guidelines. It was agreed that the Guidelines would be finalized and adopted on the second day of the Meeting and that the third day would be reserved to discuss any other matters, including the updating of the national surveys reports, and adoption of the Meeting report.

5. Mr Alessandro Lovatelli, Technical Secretary of the GFCM Committee on Aquaculture (CAQ), was designed as rapporteur.

## **ADOPTION OF THE AGENDA**

6. The Working Group agreed to insert in its Agenda a new sub-item 7.5 under Agenda Item 7 (“Discussion of Guidelines”) in order to properly address statistical issues, while avoiding as much as possible repetitions in the final text of the Guidelines.

7. The Agenda attached as Appendix A to this report was adopted.

## **REVIEW OF THE WORKING GROUP MANDATE AND OBJECTIVES OF THE GUIDELINES**

8. The Chairperson highlighted the importance of this Meeting indicating that the main objective was to finalize the advisory guidelines on sustainable bluefin tuna (BFT) farming. The Guidelines aimed at addressing known problems and identifying major research items needed in order to investigate and resolve potential problems. The full mandate of the Working Group is reproduced in Appendix D.

## **REVIEW OF AVAILABLE MEETING DOCUMENTS**

9. The documents which were before the Meeting are listed in Appendix C.

10. The Chairperson informed that Document 6 (“Towards draft guidelines on sustainable bluefin tuna farming practices in the Mediterranean – Elements for discussion”), prepared by the FAO/GFCM Secretariat, was made available as a basic document to ease discussions. He invited the Working Group to finalize the Guidelines on this basis. It was further recalled that Document 6 had been distributed to participants two months in advance of the Meeting. The Working Group agreed to use the same structure of the Draft Document for its Guidelines.

11. The participants were reminded by the GFCM Executive Secretary that when the Working Group was formed, the 2003 and 2004 ICCAT recommendations relevant to bluefin tuna farming were not available. Since then the GFCM, at its twenty-ninth session (Rome, Italy, 21–25 February 2005), has adopted most of these recommendations on bluefin tuna, as binding for all of its Members. He therefore called participants to take due considerations to the ICCAT/GFCM recommendations.

## **DISCUSSION OF DRAFT GUIDELINES**

### **Guidelines introduction**

12. The participants agreed that the introduction section of the Guidelines should be shortened acknowledging nevertheless that the drafted text provided useful background material but lengthened the document unnecessarily. It was agreed that the text for the “Introduction” and the “Nature and scope” sections of the Guidelines be replaced with the summarized text proposed by the Chairperson in Document 9.

13. It was agreed that the introduction should refer to bluefin tuna farming as a “capture-based aquaculture” practice and that this revised definition for “tuna farming” should be included in the text.

### **Capture fisheries**

14. The participants agreed that the ICCAT Recommendation (04-06)<sup>1</sup> properly addressed the need to record catch and transfer data. The minimum catch size issue was debated, with some experts expressing that the minimum size set by ICCAT was purely a management measure considering that first spawning takes place mostly around 20–25 kg.

15. With the understanding that the scope of the Guidelines should be limited to present concerns resulting from bluefin tuna farming, it was acknowledged that questioning the recommendations adopted by the management bodies was not in the mandate of the Working Group. Any proposal to modify existing recommendations should be taken up by interested parties directly with the Commissions.

16. The current difficulty regarding the biomass estimation of tuna transferred to farming cages was highlighted. There was general consent that the use of killed specimens would not adequately represent the size-frequency of the captured fish and, therefore, more research was required in this respect.

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<sup>1</sup> Recommendation GFCM/2005/2/F.

17. It was agreed to remove from the Guidelines the section on the interactions with other marine organisms as incidental catches in the Mediterranean are not intrinsically related to farming.

### **Transport**

18. The availability of fish specimens accidentally killed during fishing, cage transfers and transportation provides an opportunity for the collection of scientific data for research purposes and studies including those on evolutionary genetics. Although it was generally agreed that dead fish could only be used for gathering certain information, continuous cooperation from the industry in this regard should be encouraged. It was suggested that the biomass of dead fish should be among the reported data.

19. It was also noted that, in the future, issues such as the transfer of diseases, if any, should be taken into account bearing in mind that fish are moved from one site to another.

### **Farming**

20. The participants acknowledged that fishing licences and quotas have been used to combat overfishing and regulate fishing capacity with a view to stabilize resource extraction, supplies and demand in the markets and to improve on product traceability. However, farming quotas for BFT aquaculture operations were not considered neither a realistic nor a feasible measure for improved regulation of the sector. Furthermore some disagreement was expressed within the Working Group on whether limits to the growth of the bluefin tuna farming sector could be set by taking into account the magnitude of the total allowable catch (TAC) established for this species in the region.

21. With regards to the licence issue, it was generally felt that a standardized system for adoption by all Mediterranean countries engaged in tuna farming would be difficult to achieve. It was nevertheless proposed that certain minimum requirements for issuing of licences should be adopted generally by these countries and their sectors, such as the obligation of conducting regular environmental impact assessment studies.

22. It was acknowledged that a farm registry was already in place with the ICCAT list of national approved farms. However, a more comprehensive system of such positive lists could be developed to control illegal, unreported and unregulated (IUU) farming or encourage that countries and their private sector representatives engaged in this industry continue to improve the exchange of information aimed at minimizing problems.

23. Socio-economic appraisals linked to the establishment of any bluefin tuna operations were discussed, particularly with respect to the avoidance of conflicts with other resource users including neighbouring fish farms. Furthermore, the Working Group deemed important that the public image of the industry would be raised if local fishing communities could be engaged to some extent. The issue of job opportunities and baitfish supply from local fishermen was raised as some of the possible arrangements.

24. The Working Group discussed the need for models in environmental impact assessment (EIA) and monitoring of the environmental effects of bluefin farms. Some countries apparently require EIA studies to include predictions of volumes of the release of faecal and excretory matters, while there is a lack of models which are specifically applicable

to bluefin farming operations. The Working Group felt that field-testing of the applicability of dispersion and deposition models developed for seabream/seabass and salmon cage farming operations might generate the prediction tools needed. The BFT farming industry in the Mediterranean region could work together and promote the testing and adaptation of such models, where needed.

25. The Working Group discussed how, and by whom, a standardized EIA and environmental monitoring programme should be developed. Such agreed standardized environmental monitoring programmes could indeed be very useful at local, provincial, national and regional levels. The Working Group suggested that GFCM/CAQ consider developing advisory guidelines on environmental monitoring procedures that would include the minimum standards to be applied for bluefin tuna farming.

26. It was also suggested that related scientific contributions and on-farm experience from environmental monitoring at Spanish bluefin farming operations could be very useful for identifying and developing relevant and practical standards and procedures. At the same time, EIA and monitoring procedures and requirements for bluefin farming should be comparable with those for other Mediterranean cage farming operations, and should not impose additional burdens onto bluefin farmers.

27. The Working Group further recognized the need for specialized competence and recognized expertise in EIA and the monitoring of cage aquaculture operations. It was felt necessary to assure the competence of the institution or company carrying out such EIA and/or environmental monitoring activities.

28. Furthermore, the Working Group agreed that there should be a high level of accountability and transparency in the procedures and requirements for EIA and monitoring programmes. EIA and monitoring reports should be made available to the public. Reference was made to presently strong trends in other regions for development and implementation of private sector driven and auto-regulated environmental management systems in aquaculture, such as eco-management and audit schemes (EMAS), International Standardization Organization (ISO) environmental standards and Best Management Practices (BMPs). The Working Group recognized that trends of environmental certification and related accreditation needs are becoming important for the aquaculture sector.

29. The Working Group briefly discussed the issue of financing the development of standardized quality control systems to be developed to ensure the quality of baitfish (i.e. heavy metals, polychlorinated biphenyls, dioxin) and to ensure the absence of potential pathogens. Clearly, there is opportunity for the industry to work together throughout the Mediterranean region, as well as to seek collaboration with concerned regulatory authorities and interested scientific research institutions.

30. The importance of scientific research was debated at length. In general it was agreed that the tuna farm operators have been collaborating with the scientific community, however such collaboration should be encouraged and further reinforced. The issue of “information confidentiality” was also discussed.

31. There was some discussion concerning whether the point in the draft Guidelines on harvesting procedures (with revised wording) needed to be included, as it is in the economic best interest of the farmer to follow best procedures to ensure marketability. The Working

Group kept the point based on the goal of documenting good practices that should be followed.

### **Harvesting and marketing**

32. There was extensive discussion concerning the provision of “round weight” (live weight) data. It was noted that there are different practices in the countries of the region, but that often individual fish are not weighed.

33. Concerns were raised with regards to the adequacy of available conversion factors considering the different circumstances and stages of tuna farming. It was agreed that provisions would be included in the Guidelines for addressing the need for developing better conversion factors for farmed specimens.

34. It was noted that the measurement of weight at harvest provides the means to separate the capture fisheries and aquaculture components. The total production from the cages is important for the statistical interests of GFCM and FAO for determining the aquaculture component of the total bluefin tuna production. Some concerns were expressed that provision of these statistics was not clearly requested in ICCAT recommendation [04-06]. The portion of the recommendation (i.e. section 5) regarding quantities caged and quantities marketed was noted. This partially alleviated the concerns but there remained a question as to whether the marketed quantity was an appropriate surrogate for the total production.

35. The Working Group noted that it would be difficult to “ensure” the traceability of all traded tuna, but possible to “improve” the traceability. It was further agreed to add provisions to the Guidelines concerning the difficulties of traceability for the live fish trade, and relative to the ICCAT statistical documents.

### **Statistical issues**

36. Although some statistical issues had already been mentioned in the specific chapters of the draft Guidelines, the Working Group decided to keep a chapter summarizing statistical issues, in order to reinforce the importance of collection and availability of data related to the various phases of bluefin tuna farming.

37. The Working Group discussed the problems related to different types of measurements. It was recalled that round (live) weight and fork length should be the standard measurements, although difficulties in accurately measuring live weight were reported and, for this reason, an improvement in conversion factors was suggested.

### **ADOPTION OF THE GUIDELINES**

38. The Guidelines were adopted on Thursday 17 March 2005.

### **OTHER MATTERS**

39. Five presentations from the experts were delivered on topics of interest to the bluefin tuna sector.

40. The first presentation, by Mr Takayuki Matsumoto from Japan, covered tuna import statistics, pointing out that currently 80 percent of imports consist of farmed products. He also touched upon a number of issues affecting the accuracy of the statistics collected. Mr Peter Miyake complemented the presentation indicating that the Mediterranean is currently supplying 50 percent of the bluefin tuna imports.

41. Mr Gregorio De Metrio and his colleagues presented the results of tuna tagging programmes in the Mediterranean indicating that an excellent collaboration has been established between the research institutions involved and a number of commercial farms. Furthermore the Turkish BFT Farmers' Association invited the relevant scientific institutions to carry out the second pop-up tagging campaign in Eastern Mediterranean and donated 50 BFT specimens for this purpose. Mr Isik Oray from Istanbul University summarised the results of a first bluefin tuna larval survey conducted in the Eastern Mediterranean basin and announced that a second survey may be carried out in the near future. Mr Antonio García Gómez of the Spanish Institute of Oceanography gave a presentation on the progress of the EU-funded REPRODOTT Project.

42. The participants welcomed the efforts of the GFCM Secretariat to update the bluefin tuna capture fisheries, aquaculture and marketing summaries presented at the Second Meeting of the Working Group. It was agreed that the missing national survey from Libya and the updates from the other countries would be forwarded to Rome within two weeks following this Meeting. The GFCM Secretariat would compile for publication and distribution a report containing such summaries along with the guidelines of the Working Group and the reports of its three meetings.

43. The Chairperson informed the participants that the Guidelines prepared by the Working Group would be available before the Third Meeting of the ICCAT Working Group to Develop Integrated and Coordinated Atlantic Bluefin Tuna Management Strategies (Fukuoka, Japan, 20–23 April 2005).

#### **ADOPTION OF THE REPORT**

44. The Report was adopted on Friday 18 March 2005. The Chairman thanked all participants for their hard work in finalizing the objectives of the Working Group and adjourned the meeting.

## Agenda

1. Opening of the Meeting
2. Arrangements
3. Adoption of the agenda
4. Review of the Working Group mandate and objective of the Guidelines
5. Review of available meeting documents
6. Discussion of draft Guidelines
  - 6.1 Capture fisheries
  - 6.2 Transport
  - 6.3 Farming
  - 6.4 Harvesting and marketing
  - 6.5 Statistics
  - 6.5 Other issues
7. Adoption of the Guidelines
8. Other matters
9. Adoption of the Report

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**List of documents****Meeting documents**

- Doc 1** - Draft Agenda
- Doc 2** - Mandate of the Working Group
- Doc 3** - List of Documents
- Doc 4** - List of Participants
- Doc 5** - Annex 8 of the Report of the Second Working Group Meeting (Izmir, Turkey)
- Doc 6** - Towards draft guidelines on sustainable bluefin tuna farming practices in the Mediterranean – Elements for discussion (FAO)
- Doc 7** - Miscellaneous ICCAT Recommendations and Resolutions
- Doc 8** - Working Group Chairperson's Comments on Doc. 6 (Chair)
- Doc 9** - Draft Introduction (Chair)

**National survey reports – Updates**

Croatia  
Cyprus  
Japan  
Turkey

**National survey reports – New**

Morocco

### Mandate of the Working Group

The rapid recent development of tuna farming (tuna "fattening") practices in the Mediterranean has been accompanied by a series of concerns about the sustainability of this important industry and about its impacts. The mandate of the Working Group (WG) is to develop practical guidelines to address known problems and propose research needed in order to investigate potential problems. Emphasis of known problems should be given towards the solution of those issues related to the collection of fishery and farming statistics. The report of the WG should also contain a snapshot of current bluefin farming practices in the Mediterranean. Geographical scope should be limited to the Mediterranean; however, the WG may wish to consult outside experts about their experience elsewhere.

#### List of issues to be addressed:

##### *Statistical issues:*

- Accurate estimation of total weight of the catch from the wild
- Accurate estimation of the biological characteristics of the catch from the wild (e.g. size composition)
- Accurate statistics on the origins of the catch (flag, area, season, transfer and destination)
- Accurate statistics on purse seine fishing operations (e.g. fishing effort and fishing strategy)
- Accurate estimates of growth and conversion rates in cages

##### *Biological issues:*

- Availability of biological samples to perform scientific studies (e.g. fecundity, reproduction and growth)

##### *Management issues:*

- Monitoring of compliance with current regulations (e.g. TACs and size limits)
- Gear conflicts (e.g. between towed cages and long lines)
- Shifts in the spatial-temporal distribution of fishing efforts
- Pressure (current and potential) to increase fishing efforts and targeting of small to medium-size bluefin tuna
- Potential impacts of re-stocking with hatchery-raised tuna

##### *Potential environment issues:*

- Impact on wild marine populations used as bait
- Pollution, contamination and possible alteration of local environments
- Contamination of farmed tunas by chemicals, metals, drugs, etc.

##### *Potential social and economical issues:*

- Interactions with other coastal activities (e.g. tourism and small-scale fisheries) from an economic point of view
- Other gear and fishing operation conflicts
- Interactions between aquaculture operations (competition for bait)

##### *Other issues:*

- As deemed necessary by the Working Group

## **GUIDELINES ON SUSTAINABLE BLUEFIN TUNA FARMING PRACTICES IN THE MEDITERRANEAN**

**Prepared by the Ad Hoc GFCM/ICCAT Working Group on  
Sustainable Bluefin Tuna Farming/Fattening Practices in the Mediterranean**

### **PART 1 – INTRODUCTION**

1. The development of bluefin tuna (BFT) farming<sup>1</sup> practices in the Mediterranean since the mid-1990s has been accompanied by a series of concerns about the sustainability of this important industry and about its impacts. The price of bluefin destined for sashimi, coupled with the ability to rapidly increase the weight of wild-caught bluefin in farms, has created more demand for bluefin captured at sea and, consequently, placed greater pressure on the stock.
2. In 2002, the General Fisheries Commission for the Mediterranean (GFCM) called for the establishment of a Working Group, to be convened jointly with the International Commission for the Conservation of Atlantic Tunas (ICCAT), with a mandate to develop practical guidelines to address known problems, with emphasis on fishing and farming statistics, and to propose research needed in order to investigate potential problems.
3. The Working Group met three times between 2003 and 2005 to develop the Guidelines that are presented in this document.

### **PART 2 – NATURE AND SCOPE**

4. The farming of Atlantic bluefin in the Mediterranean Sea should be considered an activity clearly overlapping between capture fisheries and aquaculture. The potential of bluefin farming, all the perceived risks associated with it, and all matters relevant to the sustainability of this recent commercial activity, clearly encompass issues specific to both the fisheries and aquaculture sectors.
5. In the long-term, the potential sustainability of BFT farming is linked also to the research advances in the successful “domestication” of the species. Although considerable progress has been made in this regard, the economically feasible “closed-cycle” production of BFT has not been achieved yet. The Guidelines have thus been prepared based on BFT farming as currently practiced in the Mediterranean.
6. The Guidelines encompass a series of statistical, socioeconomic, biological, environmental and management issues. They have been limited to only those issues

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<sup>1</sup> Tuna farming in the Mediterranean is currently practiced as capture-based aquaculture. It involves the collection of wild fish, ranging from small to large specimens, and their rearing in floating cages for periods spanning from a few months up to 1 to 2 years. Fish weight increment or change in the fat content of the flesh is obtained through standard fish farming practices. Confinement of captured fish during short periods of time (2–6 months) aimed mostly at increasing the fat content of the flesh, which strongly influences the prices of the tuna meat in the Japanese sashimi market, can also be referred to as “tuna fattening”.

arising, or potentially arising, because of BFT farming. In other words, the Guidelines do not address the sustainability issues that could exist even without farming. The Guidelines were written by a group of experts – primarily scientists – in these disciplines.

7. The Guidelines are advisory in nature. They are intended to reinforce the basis for the regulations<sup>2</sup> that have already been introduced by GFCM and ICCAT for bluefin tuna in the Mediterranean, primarily for the capture fisheries component. The Guidelines could also serve as a basis for a broader management framework that takes into consideration other aspects related to the sustainability of the farming industry.

## **PART 3 – GUIDELINES**

### **3.1 Capture fisheries**

8. Farmed bluefin tuna comes from capture fisheries. The expansion of tuna farming activities in the Mediterranean has generated a growing demand of wild fish specimens. Hence, one of the main concerns about this demand is the current and potential pressure to increase fishing effort. A main step towards responsible and sustainable fishing is to enforce the conservation and management measures of the regional fisheries management organizations, particularly ICCAT and GFCM (e.g. Rec. [02-08]).
9. *Catches.* In order to ensure that the potential pressure to increase fishing effort due to farming is not realized, it is necessary to ensure compliance with the quotas established for the conservation of the stock. In addition, under a number of international instruments, flag States of the fishing vessels have responsibilities to collect and report catch data, irrespective of whether the fish are destined for either the market or farming.
10. *Illegal, unreported and unregulated (IUU) fishing.* Every effort should be made to combat and eliminate IUU fishing and farming, including through the development of a responsible trading system among countries, in order to ensure that only fish caught and farmed in accordance with agreed conservation and management rules is allowed to enter into international trade. In particular, the recommendation that ICCAT and GFCM members prohibit landings from fishing vessels, placing in cages for farming and/or the trans-shipment within their jurisdiction of tunas or tuna-like species caught by IUU fishing activities, should be enforced ([Rec. 03-16]).
11. *Other information.* The Recommendation on BFT farming ([Rec. 04-06]) specifies types of data that flag States of fishing or transfer vessels should collect and maintain (vessel logs, quantities, time and place of catch, vessel lists, etc.). In addition to these requirements, research should be conducted on methodologies to obtain accurate estimates of the size composition of the catch; such methodologies should be adopted for the collection and reporting of size composition data.

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<sup>2</sup> Available from [www.iccat.es](http://www.iccat.es) and [www.faogfcm.org](http://www.faogfcm.org). Specific regulations cited in the text are listed at the end for ease of reference.

### **3.2 Transport and transfer**

12. A critical point of this phase is the control of the amount (quantitatively and qualitatively) of fish that are transferred from the fishing gear to the transport and/or farming cages.
13. *Fish transfers.* The traceability of the transfer of live fish into cages should be ensured, particularly when different countries are involved. The ICCAT Bluefin Tuna Statistical Document Program ([Res. 94-5], [Rec. 97-04], [Rec. 03-19]) set the modality of collecting trade data but does not cover live fish transfers. The ICCAT Recommendation [03-16] prohibits the transshipment of fish caught by IUU activities. The ICCAT Recommendation [04-06] regulates the statistical data to be taken by tugs or fishing vessels and farms.
14. Research should be promoted to further develop the methods and techniques presently available for quantifying live fish (e.g. underwater video cameras or acoustic methods); standards should be agreed to and adopted as soon as possible, also to allow for fair transactions thus avoiding conflicts between vessel and farm operators.
15. *Scientific research.* The provision of fish specimens to the research community, if required, will ensure the collection of valuable scientific information on the wild BFT population that may benefit both the fishery and farming sectors. Therefore, the industry should be encouraged to facilitate the provision to the research community of specimens accidentally killed during fishing, transfer or transport, as they represent a significant biological sample from the wild stock. Furthermore, specimens collected at the beginning of the farming process will provide 'point zero' information required to properly evaluate the performance of the farming activity at the end of the production cycle. Areas of research could include, among others: reproduction biology, growth, mortality, genealogy, stock structure and behaviour.

### **3.3 Farming**

16. This section refers to the BFT production phase itself. The culture technique follows in some ways the traditional offshore cage system, with similar rearing structures and technical constraints. On the other hand, farming of this pelagic species raises a series of distinct issues that require particular attention.

#### **3.3.1 Registration**

17. Licences/registration. It is essential to adopt a system to license or register farming facilities in order to comply with the requirements for listing authorized facilities in the ICCAT Recommendation [04-06], which should help prevent IUU farming. In addition, if excess farming capacity is deemed undesirable, due consideration should be given to the magnitude of the total allowable catch established for this species in the region.

### 3.3.2 *Socio-economic issues*

18. *Socio-economic issues.* A preliminary socio-economic appraisal to evaluate the context in which farming takes place appears to be an important requisite. Activities linked to BFT farming should be addressed particularly in view of job opportunities.
19. Studies for integrated coastal zone management should be carried out to avoid the possibility of conflicts between the BFT farmers and other resource users including those from the tourism, other aquaculture activities, and small-scale fisheries sectors. During the site selection process in particular, it would be advisable to give considerable attention to avoidance of conflicts with other sea users; consideration should be given to making arrangements for the involvement and participation by local fishermen, e.g. in the supply of baitfish.
20. *Subsidies.* Currently, BFT farming is unquestionably tied up to the availability and exploitation of natural resources (both seed and baitfish) and the practice of subsidizing activities that utilize limited natural resources is not generally in line with sustainable management policies. In some Mediterranean countries, subsidies for aquaculture development exist including funds for BFT farming. However, it remains unclear whether these will have a positive or negative impact on the development and sustainability of the BFT industry. This important issue certainly requires further monitoring and analysis.
21. The industry, in collaboration with public authorities, should develop, apply and monitor procedures and standards which aim to guarantee appropriate labour and safety conditions in BFT farming operations.
22. The Mediterranean aquaculture sector, including BFT farming, will benefit significantly from human resource development efforts, including capacity-building and promotion of skills on good farm management, as well as training of farm technicians and other farm workers.

### 3.3.3 *Environmental issues*

23. *Feeding.* In the absence of a formulated feed, the current practice is to feed the BFT using frozen baitfish from wild stocks of different geographical origins. The main risks resulting from the use of this kind of feed could be:
  - The possible overexploitation of wild stocks of small pelagic baitfish;
  - The involuntary introduction of pathogens. Frozen allochthonous species can be vectors to pathogenic organisms as well as potential aetiological disease agents of autochthonous wild populations.
24. The use of baitfish from local fisheries could represent a solution to the risk of introducing new pathogens. However, stock assessment and monitoring of local baitfish populations would be required to prevent the overfishing of these resources and, in the cases in which vessels are providing the baitfish directly to the farm without landing it, the quantities caught should be collected and reported by the flag State in order to be included in the national capture production statistics.



25. A standardized quality-control system should be developed to ensure the quality of baitfish [i.e. screened for heavy metals, polychlorinated biphenyls (PCBs), dioxin, etc.] and to ensure the absence of potential pathogens.
26. Furthermore, it appears essential that research on the nutritional requirements of BFT be promoted with the aim to develop an artificial feed capable of guaranteeing acceptable meat quality standards as required by the market.
27. In order to minimize the amount of baitfish used, and to avoid the polluting effect of uneaten food, improvement of feeding management practices is advisable.
28. *Site selection, Environmental impact Assessment (EIA) and farm design.* The steps of selecting an area where the farms will be located, a specific site within that area, and the evaluation of any potential environmental impacts are closely related. In addition, farm design considerations are important. Once an area is chosen, site selection should be preceded by an EIA. Factors that should be taken into account include, but are not limited to:
  - avoiding sensitive ecological areas;
  - ensuring the presence of an adequate water current pattern to properly/effectively disperse settling/floating particles/substances/debris and sediments;
  - maintaining a safe distance from potential sources of pollution (e.g. industrial parks, urban areas) to prevent contamination of the farmed fish;
  - ensuring a safe distance between farms and river beds, in order to avoid potential problems associated with floods;
  - ensuring the development and effective implementation of site rehabilitation plans, as appropriate;
  - ensuring a minimum and safe distance between farms, as well as a minimum distance between individual cages;
  - ensuring a sufficient minimum distance between the cage bottom and the sea bed in order to allow for adequate water circulation;
  - minimizing both visual and environmental impacts through farm design;
  - avoiding the use of copper- and zinc-based antifouling on nets and mooring systems.
29. *Environmental monitoring.* Approval of farming concessions and licenses should be, for all intents and purposes, linked to the submission of environmental monitoring plans. While all countries involved in BFT farming in the Mediterranean have requirements for EIA and environmental monitoring of aquaculture sites, it would be useful to develop minimum standards to be applied for bluefin at a regional or national level. The Committee on Aquaculture (CAQ) of GFCM should consider the feasibility of developing such standardized guidelines. Standard analysis of the main water and sediment's physical, chemical and biological parameters at agreed distances from the farm site should be the norm, at an agreed-upon frequency. As with other aquaculture activities, the results of monitoring procedures should be transparent and available to the public. The frequency of monitoring should be controlled and closely planned with the competent local environmental authorities, and could be conducted with the assistance of accredited independent environmental monitoring and certification services.

30. Environmental monitoring might, when and as appropriate, include the monitoring of ecological effects on (i) the benthos, including changes in biodiversity parameters, and deposition; (ii) the water column and water surface; (iii) interactions with attracted species and populations.
31. Environmental monitoring guidelines may include reference to the need/opportunity for regular assessment, including meaningful quantitative and interpretative analysis of environmental impact status and trends, as well as regular updates on the use of the information thus generated. This includes information on improved management (especially production practice and farm operation; waste reduction/reuse) and contingency planning efforts.

#### **3.3.4 Data and research**

32. *Farm data and records.* Information concerning farming operations and environmental parameters (fish movements between cages, stocking densities at any possible given/possible time, feed application/use, effective feed consumption, temperature, dissolved oxygen, etc.) should be properly collected, recorded and made available for monitoring purposes. Respecting confidentiality requirements, this information should also be made available for research purposes.
33. *Scientific research.* The farming activity presents a valuable opportunity for cooperative research between the industry and the scientific community, and such collaboration should be encouraged. Furthermore, collaborative efforts should be aimed at designing experiments on live fish during farming, especially on captive behaviour, reproductive physiology, growth performance, nutritional demand and feed conversion rates. The non-marketable parts of fish that die incidentally during recruitment and/or farming should be considered as potentially suitable samples for research.

#### **3.3.5 Animal welfare**

34. *Animal welfare.* The welfare status of captive livestock is an important determinant of society's overall acceptance of farming technology. In general terms, the following would be advisable:
  - During all phases of the production cycle, due care should be taken to avoid inflicting unnecessary stress to farmed fish. Handling of the fish should be reduced to a minimum during both fishing and transfer of the BFT into the transport or final cages.
  - Setting an upper limit to the density of the cultured fish in the cages (kg/m<sup>3</sup>). This parameter is closely related to the overall well-being of the fish in terms of its likely correlation with the incidence of pathogens, as well as with stressful conditions at high densities.
  - Adequate and standard harvesting procedures should be followed to minimize the suffering of the fish, and to guarantee quality standards of the final product required by the market.

### 3.4 Harvesting and marketing

35. The harvesting process is the production phase in which the data that can be collected and reported for biological and statistical purposes are measurements that are not as affected by estimation error as in the capture/transfer phase. These data, along with the farming reports, can be cross-checked with the estimates of inputs, as a means for validating the initial amount of farmed fish. It is essential that the concerned local authorities survey the correct application of the ICCAT/GFCM recommendations to ensure the accuracy of reported harvest and trade data.
36. *Biological samples and research.* In the input phase, accidentally-killed fish represent valuable specimens for scientific purposes. However, the data on input biomass are estimates. On the other hand, during the harvesting phase, all fish are physically available, such that accurate data and biological samples can be collected from a significant number of fish. The availability of specimens for sampling and data collection would facilitate the implementation of research activities.
37. *Waste management.* During harvesting and processing of the fish for the market, a large amount of biological waste is produced. Unless used for research purposes, this waste should be properly stored, treated, landed and disposed of. Licensed farms should have approved waste-disposal plans, including plans for farm material subjected to renewal (e.g. nets, ropes).
38. *Farm harvest data.* The output data of the harvesting activity should be recorded and reported.
- For stock assessment purposes, it is important to obtain the size composition of the captured fish. Since there currently are technological difficulties for measuring the fish at the time of capture with the desired degree of accuracy and precision, it is necessary to record and report the size composition at the time of harvesting, as specified in the ICCAT recommendation [04-06, par. 2]. Estimates of the round weight of harvested fish should also be obtained, as these data would be useful for monitoring regional farming activity and for cross-checking inputs and outputs.
  - Summary information on annual inputs and outputs to farming operations should also be reported in accordance with the ICCAT Recommendation [04-06, par. 5]. This information should be made available in round weight so that it can be analysed with respect to catch and aquaculture statistics.
39. *Trade.* The traceability of all internationally-traded tuna can be accomplished with instruments such as the ICCAT Bluefin Tuna Statistical Document Program [Rec. 03-19]. However, the usefulness of this Program should be improved by amending its coverage to include international transfers of live fish, and by ensuring that all ICCAT and GFCM members submit bi-annual summaries of their imports, as required by the Program. The data collected by the Program will also provide information useful for validation and estimating unreported catches.

### 3.5 Summary of statistical issues

40. From the point of view of the sustainability of the bluefin resource, it is clear that a number of statistics have to be collected, reported and analysed at the regional level, so

that the stock can be assessed and managed properly. Such requirements for data collection and reporting in capture fisheries directed at BFT existed well before the practice of farming begun (e.g. in the ICCAT Convention, in various ICCAT recommendations and resolutions, in the 1995 UN Fish Stocks Agreement, in the FAO Code of Conduct for Responsible Fisheries). It is important to obtain the following:

- accurate estimation of total weight of the catch from the wild;
  - accurate estimation of the biological characteristics of the catch (e.g. size composition);
  - accurate statistics on the origins of the catch (flag, area, season, transfer and destination);
  - accurate statistics on purse seine fishing operations (e.g. fishing effort and fishing strategy);
  - accurate estimates of input to and output from the cages, growth and conversion rates, and a brief description of the method used to measure the input;
  - information on authorized farming facilities.
41. The framework for the separation of the capture and aquaculture components of tuna farming was established by the Coordinating Working Party on Fishery Statistics (CWP). The CWP noted that *“the problem was to ensure that the weight of the captured organisms is recorded as capture fishery production and that subsequent incremental growth in captivity is recorded as aquaculture, so as to avoid partial or total double counting”*.
  42. The data specifically requested on the aquaculture and fisheries components should be reported by members to FAO, GFCM and ICCAT in accordance with the formats established by these organizations. It is important to stress that flag states have the responsibility to collect and report catch data for vessels flying their flag, irrespective of whether the fish are destined for canneries or farms.
  43. However, the separate account of the capture and aquaculture components is often difficult to implement. The key point in the collection of statistics from tuna farming remains the measurement/estimation of the number and weight of the fish introduced in the cages.
  44. When such techniques are not yet well or completely developed, and considering the uncertainties associated with quantifying fast-moving fish, it would be practical to consider additional sources of information that can be used to complement or cross-check such data. For example, the outputs from farms can be estimated quite accurately and, with a good estimate of growth rates, the initial input into the farms can be back-calculated. Similarly, trade data can be used to validate or complement output reports, although at the current time not all ICCAT Contracting Parties that import bluefin tuna (or its products) provide summaries of the Bluefin Statistical Documents to ICCAT. Thus, full implementation of the Statistical Document Program (which has been recently amended to include information on farming) will strengthen its ability to serve as a validation tool.
  45. It is also necessary to ensure that standard types of measurements are used when reporting data, in order to ensure consistent interpretation and comparisons. In general, all fish measurements of weight should be reported in round weight (live weight) and

all measurements of size should be reported in fork length in accordance with the ICCAT Field Manual. Although conversion factors and length-weight relationships are available for wild bluefin, these do not necessarily apply to farmed bluefin. Furthermore, the relationships and conversion factors may change depending on the duration of the farming operations, the feed used, and other factors. It is recommended that accurate conversion factors and relationships between measurement types be developed for the different types of farming operations.

### **Recommendations cited**

- [Res. 94-05] *Resolution by ICCAT Concerning the Effective implementation of the ICCAT Bluefin Tuna Statistical Document Program.*
- [Rec. 97-04] *Recommendation by ICCAT Concerning the Implementation of the ICCAT Bluefin Tuna Statistical Document Program on Re-export.*
- [Rec. 02-08] *Recommendation by ICCAT Concerning a Multi-year Conservation and Management Plan for Bluefin Tuna in the East Atlantic and Mediterranean.*
- [Rec. 03-16] *Recommendation by ICCAT to Adopt Additional Measures Against Illegal, Unreported and Unregulated (IUU) Fishing.*
- [Rec. 03-19] *Recommendation by ICCAT Concerning the Amendment of the Forms of the ICCAT Bluefin/Bigeye/Swordfish Statistical Documents.*
- [Rec. 04-06] *Recommendation by ICCAT on Bluefin Tuna Farming.*

## **DIRECTIVES CONCERNANT LES PRATIQUES DURABLES D'ÉLEVAGE DU THON ROUGE DANS LA MÉDITERRANÉE**

**Préparé par le Groupe de travail *ad hoc* CGPM/CICTA sur les pratiques durables  
d'élevage/engraissement du thon rouge en Méditerranée**

### **PREMIÈRE PARTIE – INTRODUCTION**

1. Depuis la moitié des années 90, le développement des pratiques durables d'élevage<sup>1</sup> du thon rouge en méditerranée, a fait naître toute une série de préoccupations quant à la viabilité de cette industrie, d'importance non négligeable, et de ses impacts. Le prix du thon rouge destiné au sashimi, associé au fait que, dans des fermes d'élevage, il peut rapidement atteindre un poids supérieur à celui enregistré lors de sa capture à l'état naturel, a provoqué un accroissement de la demande pour les captures en mer de cette espèce et par conséquent, a provoqué une plus grande pression sur le stock.
2. En 2002, la Commission générale des pêches pour la Méditerranée (CGPM) a suggéré qu'un groupe de travail conjoint soit établi avec la Commission internationale pour la conservation des thonidés de l'Atlantique (CICTA), avec pour mandat de développer des directives pratiques pour aborder les problèmes connus, en mettant l'accent sur les statistiques de pêche et d'élevage, et de proposer des thèmes de recherche nécessaires pour étudier les éventuels problèmes.
3. le groupe de travail s'est réuni à trois reprises entre 2003 et 2005 pour développer les directives qui sont présentées dans ce document.

### **DEUXIÈME PARTIE – NATURE ET PORTÉE**

4. L'élevage du thon rouge de l'Atlantique dans la Méditerranée devrait être considéré comme une activité qui couvre à la fois les pêches de capture et l'aquaculture. Le potentiel de l'élevage de thon rouge, tous les risques pressentis qui lui sont associés, et toutes les questions pertinentes à la durabilité de cette activité commerciale toute récente, englobent sans ambiguïté des questions spécifiques tant au secteur des pêches qu'à celui de l'aquaculture.
5. A plus long terme, l'éventuelle viabilité de l'élevage du thon rouge est également liée aux progrès accomplis dans le domaine de la recherche pour parvenir à «domestiquer» cette espèce. Bien que des progrès considérables aient été accomplis dans ce domaine, la faisabilité d'un «cycle fermé» de la production aquacole de thon rouge, économiquement viable, n'a pas encore été atteinte. Les directives ont par conséquent

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<sup>1</sup> L'élevage du thon dans la Méditerranée, peut actuellement être considéré comme une forme d'aquaculture basée sur les pêches de capture. Il implique la récolte de poissons à l'état naturel, comprenant des spécimens de toutes tailles, et leur élevage en cages flottantes pendant des périodes allant de quelques mois à 1 ou 2 ans. Les pratiques d'élevage standards sont utilisées pour augmenter le poids du poisson ou la teneur en graisse de sa chair. La détention du poisson capturé pendant de courtes périodes (de 2 à 6 mois) vise surtout à augmenter la teneur en graisse en vue de l'effet induit sur le prix du produit sur le marché du sashimi japonais. On peut également définir cette pratique d'élevage comme d'«engraissement du poisson».

été préparées sur la base des pratiques d'élevage du thon rouge telles que pratiquées actuellement dans la Méditerranée.

6. Les directives couvrent toute une série de questions d'ordre statistiques, socioéconomiques, biologiques, environnementales ainsi que relatives à l'aménagement. Elles ont toutefois été limitées aux questions qui résultent, ou pourraient découler de l'élevage du thon. En d'autres termes, les directives n'abordent pas les questions de viabilité qui pourraient exister hors du cadre de l'élevage. Les directives ont été rédigées par un groupe d'experts – pour la plupart des scientifiques – dans ces disciplines.
7. Les directives sont applicables sur une base volontaire. Elles ont été préparées avec l'intention de renforcer les fondements des règlements<sup>2</sup> qui ont déjà été introduits par la CGPM et la CICTA pour le thon rouge de la Méditerranée, principalement dans le cas de la composante pêches de capture. Les directives pourraient également servir de base pour un cadre de gestion de plus vaste portée qui tienne compte des autres aspects relatifs à la viabilité de l'industrie de l'élevage.

## TROISIÈME PARTIE – DIRECTIVES

### 3.1 Pêches de capture

8. Le thon rouge élevé provient des pêches de capture. Le développement des activités de l'élevage du thon dans la Méditerranée a été à l'origine d'une demande croissante de spécimens à l'état naturel. En conséquence, une des principales préoccupations qu'a fait naître cette demande concerne la pression déjà exercée ou potentielle en termes d'augmentation de l'effort de pêche. Une des principales démarches qui a été entreprise pour qu'une pêche responsable et durable soit pratiquée est le renforcement des mesures de conservation et d'aménagement par les organisations régionales de gestion des pêches, plus particulièrement la CICTA et la CGPM (par exemple la Recommandation [02-08]).
9. *Captures.* Afin que l'élevage ne soit pas à l'origine d'un éventuel accroissement de l'effort de pêche, il est nécessaire de respecter les quotas établis pour la conservation du stock. De surcroît, dans le cadre de documents officiels internationaux, les Etats dont les bateaux battent leur pavillon doivent recueillir et communiquer leurs données de capture, que le poisson pêché soit destiné au marché ou à l'élevage.
10. *Pêche illicite, non déclarée et non réglementée.* Tout ce qui est possible devrait être fait afin d'éliminer la pêche et l'élevage illicites, non déclarés et non réglementés, y compris en développant un système de commercialisation responsable entre les pays afin de s'assurer que seul des poissons capturés et élevés en conformité avec la réglementation relative à la conservation et à l'aménagement des pêcheries soient autorisés à entrer dans leur circuit de commercialisation internationale. En particulier, les recommandations émises par les membres de la CICTA et de la CGPM selon lesquelles les débarquements de thon ou d'espèces apparentées par des bateaux de pêche, leur mise en cages et/ou leur transbordement dans les eaux sous leur juridiction

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<sup>2</sup> Disponibles sur le site [www.iccat.es](http://www.iccat.es) et [www.faogfcm.org](http://www.faogfcm.org). Les règlements spécifiques cités dans le texte sont énumérés à la fin du document pour que le lecteur puisse s'y référer plus facilement.

nationale et faisant l'objet d'une pêche illicite, non déclarée et non réglementée sont interdits, devraient être dument appliquées ([Rec. 03-16]).

11. *Autres informations.* La Recommandation sur l'élevage du thon rouge ([Rec. 04-06]) spécifie les types de données que l'Etat du pavillon, pour les bateaux de pêche ou les bateaux effectuant des transferts de poisson, devraient recueillir et conserver (registres de bord, quantités, moment et lieu de la capture, bordereaux, etc.). En plus de ces exigences, les méthodes employées pour obtenir des estimations fiables sur les tailles des captures doivent faire l'objet d'une recherche. Elles devraient être adoptées pour la collecte et la diffusion de données sur la composition des tailles.

### **3.2 Transport et transfert**

12. Un point critique de cette phase est le contrôle du chiffre total (quantitativement et qualitativement) des poissons transférés des engins de pêche sur les installations qui serviront à leur transport et/ou placés dans des cages d'élevage.
13. *Transferts de poisson.* La traçabilité du transfert de poissons vivants dans des cages devrait être assurée, plus particulièrement lorsque plusieurs pays sont impliqués. La CICTA, dans son Programme pour le développement de documents statistiques sur le thon rouge (BFTSD) ([Rés. 94-5], [Rec. 97-04], [Rec. 03-19]) établit les modalités de collecte des données concernant les transactions mais ne couvre pas les transferts de poissons vivants. La Recommandation [03-16] de la CICTA interdit le transbordement de poissons fruit d'une pêche illicite, non déclarée et non réglementée. La Recommandation de la CICTA [04-06] réglemente les données statistiques devront être fournies par les remorqueurs, les bateaux de pêche ou les fermes.
14. La recherche devrait être encouragée afin de développer les méthodes et techniques actuellement disponibles servant à quantifier le poisson vivant (par exemple les vidéo caméras sous-marines ou les méthodes acoustiques); des modèles standardisés devraient être convenus et adoptés le plus tôt possible, également pour consentir des transactions équitables ce qui éviterait des risques de conflits entre les bateaux et les éleveurs.
15. *Recherche scientifique.* La fourniture de spécimens de poissons à la communauté scientifique, si nécessaire, assurera la collecte d'informations scientifiques précieuses sur la population naturelle de thon rouge qui peut être de grande utilité tant au secteur de la capture qu'à celui de l'élevage. Par conséquent, l'industrie devrait être encouragée à mettre à la disposition des scientifiques des spécimens tués accidentellement au cours des opérations de pêche, de transbordement ou de transport car ils représentent des échantillons biologiques révélateurs du stock à l'état naturel. En plus, les spécimens recueillis au début du processus d'élevage représenteront l'information «point zéro» nécessaire à l'évaluation correcte de la performance de l'activité d'élevage à la fin du cycle de production. La recherche pourrait approfondir, entre autres, des domaines tel s que la reproduction biologique, la croissance, la mortalité, la généalogie, la structure et le comportement du stock.

### **3.3 L'élevage**

16. Cette section se réfère à la phase de production du thon rouge proprement dite. Le procédé d'élevage peut être assimilée au système traditionnel de l'élevage en cage en



pleine mer, avec des structures et des contraintes techniques d'élevage similaires. D'autre part, l'élevage de cette espèce pélagique soulève une série de questions précises qui demandent une attention particulière.

### 3.3.1 *Enregistrement*

17. Licences/enregistrement. Il est essentiel qu'un système approprié de délivrance de licences ou d'enregistrement des installations destinées à l'élevage soit adopté afin d'inventorier les installations autorisées, conformément à la Recommandation [04-06] de la CICTA, ce qui devrait aider à prévenir l'élevage illicite, non déclaré et non réglementé. En plus, si une plus grande capacité d'élevage n'est pas jugée opportune, il faut tenir compte de l'importance du total admissible de capture établi pour cette espèce dans la région.

### 3.3.2 *Questions d'ordre socioéconomique*

18. *Questions d'ordre socioéconomique.* Une estimation socioéconomique préalable permettant d'évaluer le contexte dans lequel l'élevage est pratiqué, est un préalable important. Les activités liées à l'élevage du thon rouge devraient être abordées surtout en vue des possibilités d'emploi qu'elles offrent.
19. Des études pour la gestion intégrée des zones côtières devraient être entreprises pour éviter tout risque de conflits entre les éleveurs de thon rouge et les autres utilisateurs des ressources, y compris le tourisme, les autres activités aquacoles et la pêche côtière ou artisanale. Plus particulièrement, lorsqu'il s'agira de sélectionner les emplacements, il serait prudent d'éviter d'entrer en conflit avec d'autres usagers de la mer; il serait bon de prendre des dispositions pour que les pêcheurs soient impliqués et participent, par exemple, dans la fourniture des poissons pour l'alimentation des thons.
20. *Subventions.* A l'heure actuelle, l'élevage du thon rouge est sans aucun doute lié à la disponibilité et l'exploitation des ressources naturelles (à la fois les individus recherchés et les poissons pour l'alimentation des thons) et la pratique d'activités subventionnée qui utilisent une quantité limitée de ressources naturelles n'est généralement pas en accord avec les politiques de gestion durable. Dans certains pays méditerranéens, des subventions pour le développement de l'aquaculture sont allouées, y compris des incitations pour l'élevage du thon rouge. Toutefois, il reste encore à clarifier si elles ont un impact positif ou négatif sur le développement et la durabilité de l'industrie du thon rouge. Cette question importante nécessite un contrôle et une analyse plus approfondis.
21. L'industrie, en collaboration avec les autorités publiques, devrait développer, appliquer et contrôler des procédures et modèles standardisés qui visent à garantir une main-d'œuvre et des conditions de sécurité appropriées dans les activités d'élevage du thon rouge.
22. Le secteur aquacole méditerranéen, y compris l'élevage du thon rouge, tirera profit de manière significative des efforts de développement des ressources humaines, y compris le renforcement de la capacité et la mise en valeur des compétences en matière de bonne gestion de l'élevage ainsi que de formation de techniciens et autre personnel du secteur de l'élevage.

### 3.3.3 Questions liées à l'environnement

23. *Alimentation.* En l'absence d'aliments fabriqués, la pratique la plus couramment employée est de nourrir le thon rouge avec des poissons surgelés provenant de stocks naturels et de différentes origines géographiques. Les principaux risques résultant de l'utilisation de ce type d'aliment pourraient être:
- L'éventuelle surexploitation des stocks de petits pélagiques utilisés comme aliment;
  - L'introduction involontaire d'agents pathogènes. Des espèces allochtones surgelées peuvent être des vecteurs d'organismes pathogènes de même que d'éventuels agents étiologiques des populations autochtones à l'état naturel.
24. L'utilisation de poissons d'aliments provenant des pêcheries locales pourrait représenter une solution au risque d'introduction de nouveaux agents pathogènes. Toutefois, l'évaluation des stocks et la surveillance des populations locales de poissons pour l'alimentation du thon seront nécessaires pour prévenir la surpêche de ces ressources et, dans les cas où les bateaux fournissent directement les poissons appâts aux élevages sans les débarquer, les quantités capturées devraient être relevées et communiquées par l'Etat du pavillon afin qu'elles soient prises en considération dans la production des statistiques nationales.
25. Un système uniformisé de contrôle de la qualité devrait être développé afin de garantir la qualité des poissons comme aliment [c'est-à-dire filtrage pour détecter la présence de métal lourd, de diphenyle polychlore (PCBs), de dioxine, etc.] et pour s'assurer qu'il n'y a pas d'éventuels agents pathogènes.
26. En outre, il semble primordial que la recherche sur les exigences nutritionnelles du thon rouge soit encouragée dans le but de développer un aliment artificiel qui garantisse les standards de qualité de la chair, exigés par le marché.
27. De manière à minimiser la quantité de poissons utilisés comme aliment, et afin d'éviter que les aliments non consommés ne polluent le milieu, il est souhaitable d'améliorer les pratiques de gestion de l'alimentation.
28. *Choix des emplacements, Enquêtes d'impact environnemental (EIE) et conception des fermes.* Les mesures s'appliquant à la sélection de la zone où sera située la ferme, à des emplacements spécifiques dans une zone déterminée et à l'évaluation d'éventuels impacts sur l'environnement sont étroitement liées. De surcroît, une attention particulière doit être accordée à la conception même des fermes d'élevage. Lorsque la zone a été choisie, une enquête d'impact environnemental devrait être faite avant de procéder à la sélection de l'emplacement. Parmi les facteurs à prendre en considération (mais qui ne sont pas les seuls), on notera qu'il serait souhaitable:
- d'éviter les zones écologiquement sensibles;
  - de s'assurer de l'existence de courants et systèmes de circulation de l'eau afin que les particules déposées/flottantes, les substances, les débris et les sédiments soient dispersés convenablement;
  - de se maintenir à une distance raisonnable de toute source de pollution (par exemple: parcs industriels, zones urbaines) pour éviter que les poissons d'élevage ne soient contaminés;

- de respecter une distance de sécurité entre les élevages et le lit des rivières afin d'éviter les problèmes liés aux inondations;
  - d'assurer le développement et la mise en œuvre concrète de plans de réhabilitation du milieu et remise en état des emplacements, comme de besoin;
  - de laisser une distance suffisante entre les élevages de même qu'une distance minimale entre les cages individuelles;
  - d'assurer un espace minimum suffisant entre le fond des cages et le fond marin de façon à permettre à l'eau de circuler correctement;
  - de minimiser les impacts tant visuels qu'environnementaux que peut avoir le type d'élevage envisagé;
  - d'éviter l'application de produits anti-encrassement à base de cuivre et de zinc sur les filets et les systèmes d'amarrage.
29. *Surveillance de l'environnement.* Dans tous les cas, l'octroi de concessions et licences d'élevage devrait être assujéti à la soumission de plans de surveillance de l'environnement. Alors que tous les pays impliqués dans l'élevage du thon rouge dans la Méditerranée ont exprimé la nécessité de procéder à des évaluations de l'impact sur l'environnement et à la surveillance des conditions ambiantes des zones destinées aux activités aquacoles, il serait utile de développer des standards minimaux applicables au thon rouge aux niveaux national et régional. Le Comité de l'aquaculture (CAQ) de la CGPM devrait prendre en considération la possibilité de formuler de telles directives standardisées. Des analyses standards portant sur le principal courant marin ainsi que sur les paramètres physiques, chimiques et biologiques des sédiments, à une certaine distance du lieu où est pratiqué l'élevage, devraient être faites régulièrement, selon une fréquence acceptée d'un commun accord. Comme dans le cas d'autres activités aquacoles, les résultats des méthodes de surveillance devraient être transparentes et mis à la disposition du public. La fréquence des activités de surveillance doit être contrôlée et planifiée en étroite collaboration avec les autorités locales chargées de la conservation de l'environnement et pourrait être effectuée avec le concours de services assermentés et indépendants, et spécialisés dans le domaine de la surveillance et de la certification.
30. La surveillance de l'environnement, lorsque et quand jugé approprié, pourrait comprendre le contrôle des effets qu'exerce le milieu sur i) le benthos, y compris les variations des paramètres de la biodiversité et des dépôts ; ii) la colonne d'eau et la surface de l'eau ; iii) les interactions avec les espèces et peuplements attirés.
31. Les directives pour la surveillance de l'environnement devraient faire référence au besoin/à l'opportunité de procéder à des évaluations régulières comprenant des analyses quantitatives et interprétatives appropriées relatives à l'importance qu'assume l'impact sur l'environnement et ses tendances, et faire état des mises à jour régulières sur l'utilisation des informations ainsi générées. Cela comprend des informations sur de meilleures pratiques de gestion (plus particulièrement sur les pratiques de production et les modes de fonctionnement des fermes; la réduction et la réutilisation des déchets) et les éventuels efforts de planification.

### 3.3.4 Données et recherche

32. *Données sur l'élevage et documents y relatifs.* Les informations concernant les activités d'élevage et les paramètres environnementaux (mouvement des poissons entre les cages, densité des stocks à tout moment donné ou possible, la distribution d'aliments/la bonne assimilation de la nourriture, la température, l'oxygène dissous, etc.) devront être recueillies, enregistrées correctement et mises à disposition à des fins de suivi et contrôle. Ces informations devraient également pouvoir être utilisées pour faire avancer la recherche, tout en respectant les exigences de confidentialité.
33. *Recherche scientifique.* L'élevage représente une aubaine pour la recherche fondée sur la coopération entre l'industrie et la communauté scientifique, et une telle collaboration devrait être encouragée. En outre, les efforts de collaboration devraient viser à préparer des tests sur les poissons vivants durant leur élevage, portant plus particulièrement sur leur comportement en captivité, la physiologie reproductive, les performances de développement, les exigences nutritionnelles et les taux de conversion des aliments. Les quantités de poissons non commercialisables qui meurent accidentellement lors des opérations de capture et/ou en cours d'élevage devraient être considérées comme des échantillons utiles pour effectuer des recherches.

### 3.3.5 Protection des animaux

34. *Protection des animaux.* Les conditions de vie des stocks d'animaux en captivité sont un facteur déterminant pour faire accepter la technologie d'élevage à la société dans son ensemble. De manière générale, il est opportun de:
- Faire en sorte que, durant toutes les phases du cycle de production, le poisson d'élevage ne soit pas soumis à un stress inutile. La manipulation des poissons devrait être réduite au minimum tant au cours des opérations de pêche que durant le transfert du thon rouge lors du transport ou dans les cages.
  - La densité des poissons dans les cages ne devra pas dépasser une certaine limite ( $\text{kg/m}^3$ ) à établir préalablement. Ce paramètre est étroitement lié au respect de la bonne santé du poisson notamment en termes d'incidence et risques pathogènes et risques de stress indésirable liés à des densités supérieures à celle recommandées.
  - Des méthodes de collecte des poissons, appropriées et standardisées, devraient être suivies pour que le poisson souffre le moins possible et pour garantir une qualité acceptable au produit final exigé par le marché.

## 3.4 Récolte et commercialisation

35. Le processus de récolte est la phase de production durant laquelle les données recueillies et enregistrées à des fins biologiques et statistiques sont des mesures qui ne peuvent être faussées par des erreurs d'estimation comme ce peut-être le cas dans la phase de capture/transfert. Ces données, tout comme les rapports concernant l'élevage, peuvent être contre-vérifiées avec les estimations des apports, et être utilisées pour valider la quantité initiale de poisson destinée à l'élevage. Il est essentiel que les autorités locales concernées s'assurent que les recommandations de CICTA/CGPM soient correctement suivies afin que les données relatives à la récolte et à la commercialisation soient aussi exactes que possible.

36. *Echantillons biologiques et recherche.* Durant la phase d'introduction, les poissons tués accidentellement constituent des échantillons de valeur considérable pour la recherche scientifique. Toutefois, les données sur la composition de la biomasse ne sont que des estimations. D'autre part, durant la phase de récolte, tous les poissons sont physiquement utilisables, de sorte que des données fiables et des échantillons biologiques peuvent être prélevés sur un nombre significatif de poissons. La disponibilité des spécimens pour le prélèvement d'échantillons et la collecte de données faciliteront la mise en œuvre des activités de recherche.
37. *Gestion des résidus.* Une grande quantité de résidus biologiques est produite au cours des opérations de récolte et de traitement du poisson destiné au marché. A moins que ces débris ne soient utilisés à des fins de recherche, ils devraient être correctement emmagasinés, traités, débarqués et détruits. Les élevages autorisés doivent avoir des aménagements pour l'évacuation des déchets ainsi que pour le matériel d'exploitation sujet à remplacement (par ex. les filets, les cordages).
38. *Données sur les activités de récolte.* Les données sur les produits des activités de récolte doivent être enregistrées et communiquées.
- Pour les besoins d'évaluation du stock, il est important d'obtenir la composition des tailles des poissons capturés. Vu qu'actuellement, en raison de certaines difficultés techniques, il n'est pas facile de déterminer avec exactitude et précision la taille du poisson au moment de sa capture, il est indispensable d'enregistrer et de communiquer la composition des tailles au moment de la récolte, comme spécifié dans la recommandation de la CICTA [04-06, par. 2]. Des estimations du poids vif du poisson capturé sont également nécessaires car ces données s'avéreront utiles pour contrôler et pour contre-vérifier les inputs et outputs des activités d'élevage.
  - Des informations succinctes portant sur les inputs et les outputs annuels relatifs aux opérations d'élevage devraient également être fournies en accord avec la recommandation [04-06, par. 5] de la CICTA. Cette information devrait communiquer le poids vif et être mise à disposition de manière à ce qu'elle puisse être analysée en ce qui concerne les statistiques des captures et de l'aquaculture.
39. *Commerce.* On peut arriver à assurer la traçabilité du thon commercialisé à l'échelon international au moyen d'instruments tels que le Programme pour le développement des documents statistiques sur le thon rouge de la CICTA (*BFTSD*) [Rec. 03-19]. Toutefois ce programme pourrait être rendu encore plus utile si l'on modifiait son champ d'application de façon à ce qu'il tienne aussi compte des transferts internationaux de poissons vivants, et si on prenait des mesures pour que tous les membres de la CICTA et de la CGPM soumettent deux fois par an des relevés sommaires de leurs importations, comme l'exige le Programme. Les données recueillies par le Programme fourniront aussi des informations utiles pour la validation et l'estimation des captures non déclarées.

### **3.5 Résumé des questions statistiques**

40. Du point de vue de la durabilité des ressources en thon rouge, il est évident qu'un certain nombre de données statistiques doivent encore être recueillies, communiquées et analysées au niveau régional de manière à ce que le stock puisse être évalué et géré correctement. Le besoin de telles informations au niveau de la collecte des données et

de la déclaration des pêches de capture visant le thon rouge s'est fait sentir bien avant que les pratiques d'élevage ne débutent (par ex. comme le font ressortir la Convention de la CICTA, diverses recommandations et résolutions de la CICTA, l'Accord des Nations Unies de 1995 sur les stocks chevauchants et les grand migrateurs, le Code de conduite pour une pêche responsable de la FAO). Il est donc important d'obtenir:

- une estimation correcte du poids des captures de poissons à l'état naturel;
  - une estimation correcte des caractéristiques biologiques des captures (par ex. la composition des tailles);
  - des statistiques correctes sur les origines des captures (pavillon, zone, saison, transfert et destination);
  - des statistiques correctes sur les opérations de pêche à la senne tournante (par ex. effort de pêche et stratégie de pêche);
  - des estimations correctes des inputs pour les cages et des outputs des cages, des taux de croissance et de conversion, et une brève description de la méthode utilisée pour mesurer les inputs;
  - des informations sur les dispositifs et aménagements autorisés pour les fermes.
41. Dans le cadre de l'élevage du thon, la séparation des composantes captures et aquaculture a été établie par le Groupe de travail chargé de coordonner les statistiques des pêches (CWP). Le CWP a noté que *«le problème était de s'assurer que le poids des organismes capturés figure sous la rubrique production de la pêche de capture et que l'augmentation de poids ultérieure en captivité figure sous la rubrique aquaculture, de manière à éviter une double prise en compte, qu'elle soit totale ou partielle.»*
42. Les données spécifiquement demandées au sujet des composantes de aquaculture et pêches de capture dans le domaine de l'élevage du thon rouge doivent être adressées par les membres à la FAO, à la CGPM et à la CICTA, conformément aux formats propres à ces organisations. Il est important de signaler que les Etats du pavillon sont responsables de la collecte et de la déclaration des données de capture pour les bateaux battant leur pavillon, que le poisson soit destiné aux conserveries ou à l'élevage.
43. Cependant, il est souvent difficile de tenir des comptes séparés pour les deux composantes. Le point clé pour le recueil des statistiques en matière d'élevage reste le calcul/estimation du nombre et du poids des poissons introduits dans les cages.
44. Lorsque de telles techniques ne sont pas très bien ou pas complètement développées, et tenant compte des incertitudes quant à la quantification des poissons qui n'est pas aisée vu la rapidité à laquelle ils se déplacent, il serait judicieux de considérer d'autres sources d'information qui pourraient servir à compléter ou contre-vérifier de telles données. Par exemple, les produits de l'élevage peuvent être estimés avec un bon degré de précision et, si les taux de croissance sont correctement estimés, les inputs tout au début du processus d'élevage peuvent être calculés rétroactivement. De même, les données relatives au commerce peuvent être utilisées pour valider ou compléter les rapports des outputs de l'élevage bien qu'à l'heure actuelle, toutes les Parties contractantes de la CICTA qui importent du thon rouge (ou des produits dérivés) ne fournissent pas les résumés requis par les formulaires des Documents statistiques pour le thon rouge, de la CICTA. Par conséquent, la mise en œuvre du Programme pour le développement des documents statistiques dans son ensemble (qui a récemment été

modifié afin de faire figurer les informations concernant l'élevage) s'affirmera comme un outil de validation.

45. Chaque fois que des données sont communiquées, il est également nécessaire de veiller à ce que des méthodes standardisées soient employées de façon à assurer une interprétation et des comparaisons cohérentes. De manière générale, toutes les estimations de poids des poissons devraient se référer au poids vif et toutes les mesures de la taille à la longueur à la fourche caudale en accord avec le manuel de terrain de la CICTA. Bien que des facteurs de conversion et des relations longueur-poids soient disponibles pour le thon rouge à l'état naturel, ils ne s'appliquent pas nécessairement au thon rouge d'élevage. En outre les facteurs de conversion et les relations existantes peuvent varier selon la durée des opérations d'élevage, le type d'alimentation employé et d'autres facteurs. Il est recommandé que des facteurs de conversion corrects et des relations entre les différents types de mesure soient développés pour les différents types d'activités d'élevage.

### **Recommandations citées**

- [Rés. 94-05] *Résolution de la CICTA concernant la mise en œuvre de son Programme pour le développement de documents statistiques sur le thon rouge (BFTSD).*
- [Rec. 97.04] *Recommandation de la CICTA concernant la mise en œuvre de son Programme pour le développement de documents statistiques pour la réexportation du thon rouge.*
- [Rec. 02-08] *Recommandation de la CICTA relative à un programme pluri-annuel de gestion et de conservation du thon rouge de l'Atlantique Est et de la Méditerranée.*
- [Rec. 03.16] *Recommandation de la CICTA relative à l'adoption de mesures additionnelles contre la pêche illicite, non déclarée et non réglementée (IUU).*
- [Rec. 03-19] *Recommandation de la CICTA concernant la modification de la forme des documents statistiques relatifs au thon rouge/au thon obèse/à l'espadon.*
- [Rec. 04-06] *Recommandation de la CICTA relative à l'élevage du thon rouge.*

## **DIRECTRICES SOBRE PRÁCTICAS SOSTENIBLES DE CRÍA DE ATÚN ROJO EN EL MEDITERRÁNEO**

**Preparado por el Grupo de Trabajo especial conjunto CGPM/ICCAT  
sobre prácticas sostenibles de cría/engorde de atún en el Mediterráneo**

### **PARTE 1 – INTRODUCCIÓN**

1. Desde mediados de los noventa, el desarrollo de las prácticas de cría de atún rojo (BFT)<sup>1</sup> en el Mediterráneo ha ido acompañado por una serie de preocupaciones sobre la sostenibilidad de esta importante industria y sobre su impacto. El precio del atún rojo destinado a sashimi, junto con la capacidad de incrementar rápidamente en las granjas el peso del atún rojo capturado en estado salvaje, ha creado más demanda de atún rojo capturado en el mar y, por consiguiente, ha incrementado la presión ejercida sobre el stock.
2. En 2002, la Comisión General de Pesca del Mediterráneo (CGPM) pidió que se estableciera un Grupo de Trabajo, convocado conjuntamente con la Comisión Internacional para la Conservación del Atún Atlántico (ICCAT), con el mandato de desarrollar directrices prácticas para abordar problemas conocidos, centrándose en las estadísticas de cría y pesca, y de proponer el trabajo de investigación necesario para analizar los problemas potenciales.
3. El Grupo de Trabajo se ha reunido en tres ocasiones entre 2003 y 2005 para desarrollar las directrices que se presentan en este documento.

### **PARTE 2 – NATURALEZA Y ALCANCE**

4. La cría de atún rojo en el mar Mediterráneo debe considerarse una actividad claramente a caballo entre las pesquerías de captura y la acuicultura. El potencial de la cría de atún rojo, todos los riesgos detectados en relación con ella y todas las cuestiones referentes a la sostenibilidad de esta actividad comercial reciente abarcan claramente cuestiones específicas tanto del sector pesquero como del sector de acuicultura.
5. A largo plazo, la sostenibilidad potencial de la cría de atún rojo está vinculada también con los avances de la investigación sobre la «domesticación» de esa especie. Aunque se han realizado considerables progresos en este sentido, no se ha conseguido todavía llegar a una producción económicamente viable del «ciclo cerrado» del atún rojo. Por consiguiente, estas directrices se han preparado basándose en la cría de atún rojo tal y como se practica actualmente en el Mediterráneo.

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<sup>1</sup> Actualmente, la cría de atún rojo en el Mediterráneo se practica como acuicultura basada en la captura. Implica la recogida de peces en estado salvaje, con especímenes cuyo tamaño oscila entre pequeño y grande, y su cría en jaulas flotantes para períodos que abarcan desde unos pocos meses hasta 1-2 años. El incremento de peso de los peces o el cambio en el contenido graso en carne se obtiene mediante prácticas estándar de cría de peces. El confinamiento de los peces capturados durante cortos períodos de tiempo (2-6 meses), que tiene como principal finalidad el incremento del contenido graso en carne, que influye en gran medida en el precio de la carne de atún en el mercado de sashimi japonés, puede denominarse también “engorde de atún”.



6. Las Directrices abarcan una serie de cuestiones estadísticas, socioeconómicas, biológicas, medioambientales y de ordenación. Se han limitado únicamente a las cuestiones suscitadas, o potencialmente suscitadas, por la cría de atún rojo. Dicho de otro modo, las directrices no abordan cuestiones de sostenibilidad que podrían plantearse incluso sin operaciones de cría. Las directrices fueron redactadas por un grupo de expertos – principalmente científicos – en estas disciplinas.
7. Las Directrices tienen un carácter consultivo. Su finalidad es reforzar la base de las regulaciones<sup>2</sup> que ya han sido introducidas por CGPM e ICCAT para el atún rojo en el Mediterráneo, sobre todo para el componente de las pesquerías de captura. Las directrices también pueden servir de base para un marco de ordenación más amplio que tenga en cuenta otros aspectos relacionados con la sostenibilidad de la industria de cría.

## PARTE 3 – DIRECTRICES

### 3.1 Pesquerías de captura

8. El atún rojo de granja proviene de las pesquerías de captura. La expansión de las actividades de cría de atún en el Mediterráneo ha generado una demanda creciente de peces en estado salvaje. Así pues, una de las principales preocupaciones en relación con esta demanda es la presión actual y potencial para el incremento del esfuerzo pesquero. Un paso importante para la pesca sostenible y responsable es implementar las medidas de conservación y ordenación de las organizaciones regionales de ordenación pesquera, sobre todo de ICCAT y de CGPM (por ejemplo, la Recomendación 02-08).
9. *Capturas.* Con el fin de garantizar que no se genera una presión potencial para incrementar el esfuerzo pesquero debida a la cría, es necesario garantizar el cumplimiento de las cuotas establecidas para la conservación del stock. Además, con arreglo a varios instrumentos internacionales, los Estados abanderantes de los buques pesqueros tienen la responsabilidad de recopilar y comunicar los datos de captura, con independencia de si el pescado se destina al mercado o a la cría.
10. *Pesca ilegal, no declarada y no reglamentada.* Debe hacerse todo lo posible para combatir y eliminar las actividades de pesca y cría ilegales, no declaradas y no reglamentadas (IUU), lo que incluye el desarrollo de un sistema de comercio responsable entre los países, con el fin de garantizar que sólo se permita entrar en el mercado internacional al pescado capturado y criado de conformidad con las normas de conservación y ordenación acordadas. En particular, se debe hacer cumplir la recomendación de que los miembros de ICCAT y CGPM prohíban los desembarques de buques de pesca, la transferencia a jaulas para su cría y/o el transbordo dentro de su jurisdicción de túnidos y especies afines capturados mediante actividades de pesca IUU ([Rec. 03-16]).
11. *Otra información.* La *Recomendación de ICCAT sobre cría de atún rojo* [Rec. 04-06] especifica los tipos de datos que deben recopilar y mantener los Estados abanderantes de los buques pesqueros o que realizan la transferencia (cuadernos de pesca de los buques, cantidades, momento y lugar de la captura, listas de buques, etc.). Además de

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<sup>2</sup> Disponibles en [www.iccat.es](http://www.iccat.es) y [www.fao-gfm.org](http://www.fao-gfm.org). Las regulaciones específicas mencionadas en el texto se enumeran al final del mismo para facilitar su consulta.

estos requisitos, deben llevarse a cabo trabajos de investigación sobre las metodologías para obtener estimaciones exactas sobre composición por tallas de la captura; dichas metodologías deberían adoptarse para la recopilación y comunicación de datos de composición por tallas.

### **3.2 Transporte y transferencia**

12. Un punto crítico de esta fase es el control (cuantitativo y cualitativo) de la cantidad de peces que se transfiere desde un arte de pesca al transporte y/o a las jaulas de cría.
13. *Transferencia de peces.* Debe garantizarse la trazabilidad de la transferencia de los peces vivos a las jaulas, sobre todo cuando hay varios países implicados. El Programa de ICCAT de Documento Estadístico para el Atún Rojo ([Res. 94-05], [Rec. 97-04] y [Rec. 03-19]) establece la modalidad de recopilación de datos comerciales pero no cubre las transferencias de peces vivos. La Recomendación 03-16 de ICCAT prohíbe el transbordo de peces capturados mediante actividades IUU. La Recomendación 04-06 de ICCAT regula los datos estadísticos que deben recopilar los buques pesqueros o los buques de remolque y las granjas.
14. Debe fomentarse la investigación para desarrollar los métodos y técnicas actualmente disponibles para cuantificar los peces vivos (por ejemplo, cámaras de video submarinas o métodos acústicos); deben acordarse y adoptarse normas lo antes posible, para permitir también transacciones justas evitando así los conflictos entre los buques y los operadores de las granjas.
15. *Investigación científica.* El suministro de especímenes de peces a la comunidad científica, cuando se requiera, garantizará la recopilación de información científica valiosa sobre la población de atún rojo en estado salvaje, que puede beneficiar tanto al sector pesquero como al de cría. Por tanto, debería instarse a la industria a que facilite a la comunidad científica los especímenes que mueran accidentalmente durante la pesca, transferencia o transporte, ya que representan una muestra biológica importante del stock en estado salvaje. Además, los especímenes recogidos al comienzo del proceso de cría proporcionarán información sobre el «punto cero», información necesaria para evaluar adecuadamente el rendimiento de la actividad de cría al final del ciclo de producción. Los campos de investigación deberían incluir, entre otros: biología reproductiva, crecimiento, mortalidad, genealogía, estructura del stock y conducta.

### **3.3 Cría**

16. Esta sección se centra en la fase de producción de atún rojo propiamente dicha. La técnica de cría sigue en cierto modo el sistema tradicional de jaulas en alta mar, con estructuras de cría y limitaciones técnicas similares. Por otro lado, la cría de estas especies pelágicas plantea una serie de cuestiones diferentes que requieren una atención particular.

#### **3.3.1 Registro**

17. *Licencias/Registro.* Es esencial adoptar un sistema de concesión de licencias o de registro de instalaciones de cría para cumplir con los requisitos de inclusión en listas de las instalaciones autorizadas contemplados en la Recomendación 04-06 de ICCAT, lo

que ayudaría a evitar la cría IUU. Además, si se estima que un exceso de capacidad de cría no es adecuado, debería considerarse adecuadamente la magnitud del total admitido de capturas establecido para esta especie en la región.

### 3.3.2 *Cuestiones socioeconómicas*

18. *Cuestiones socioeconómicas.* Realizar una valoración socioeconómica preliminar para evaluar el contexto en que tiene lugar la cría sería un requisito importante. Las actividades vinculadas con la cría de atún rojo deben abordarse considerando especialmente las oportunidades de empleo.
19. Deberían llevarse a cabo estudios de ordenación integrada de la zona costera para evitar posibles conflictos entre los propietarios de las granjas de atún rojo y otros sectores que utilizan el recurso, lo que incluye el turismo, otras actividades de acuicultura y pesquerías de pequeña escala. Concretamente, durante el proceso de selección del emplazamiento, sería aconsejable prestar especial atención a evitar los conflictos con otros sectores que utilizan el mar, debe considerarse la posibilidad de tomar disposiciones que conlleven la implicación y participación de los pescadores locales, por ejemplo, mediante el abastecimiento de peces para carnada.
20. *Subvenciones.* Actualmente la cría de atún rojo está incuestionablemente ligada a la disponibilidad y explotación de recursos naturales (semillas y peces para carnada); y la práctica de subvencionar actividades que utilizan recursos naturales limitados no suele estar en línea con las políticas de ordenación sostenibles. En algunos países mediterráneos existen subvenciones para el desarrollo de la acuicultura, que incluyen fondos para la cría de atún rojo. Sin embargo, no está claro si éstos tienen un impacto positivo o negativo en el desarrollo y sostenibilidad de la industria de atún rojo. Indudablemente, esta importante cuestión ha de ser objeto de seguimiento y de nuevos análisis.
21. La industria, en colaboración con las autoridades públicas, debería desarrollar, aplicar y realizar un seguimiento de los procedimientos y normas encaminados a garantizar unas condiciones adecuadas de trabajo y de seguridad en las operaciones de cría de atún rojo.
22. El sector de acuicultura del Mediterráneo, que incluye la cría de atún rojo, se beneficiará significativamente de los esfuerzos de desarrollo de los recursos humanos, lo que incluye la creación de capacidad y la promoción de conocimientos sobre una ordenación adecuada de la cría, así como la formación de técnicos en cría y de otros trabajadores de las granjas.

### 3.3.3 *Cuestiones medioambientales*

23. *Alimentación.* Ante la ausencia de alimentos formulados, la práctica actual es alimentar al atún rojo utilizando como carnada peces congelados de stocks en estado salvaje de diversas procedencias geográficas. Los principales riesgos resultantes de la utilización de este tipo de alimentación podrían ser:
  - La posible sobreexplotación de los stocks en estado salvaje de pequeños pelágicos utilizados como carnada.

- La introducción involuntaria de patógenos. Las especies congeladas alóctonas pueden ser vectores de organismos patógenos así como potenciales agentes etiológicos de enfermedades de poblaciones autóctonas en estado salvaje.
24. La utilización de carnada compuesta por peces provenientes de las pesquerías locales podría ser una solución para el riesgo de introducción de nuevos patógenos. Sin embargo, es necesario llevar a cabo una evaluación de stock y realizar un seguimiento de las poblaciones locales de peces utilizados como carnada para evitar la sobrepesca de estos recursos y, en los casos en los que los buques suministren la carnada directamente a la granja sin desembarcarla, las cantidades capturadas deberían ser registradas y comunicadas por el Estado abanderante para su inclusión en las estadísticas nacionales de producción nacional de capturas.
  25. Debería desarrollarse un sistema estandarizado de control de calidad para garantizar la calidad del pescado utilizado como carnada [por ejemplo, examinar contenidos en metales pesados, bifenilo policlorinado (BPC), dioxina, etc.] y la ausencia de patógenos potenciales.
  26. Además, resulta esencial que se impulse la investigación sobre los requisitos nutricionales del atún rojo, con el objetivo de desarrollar una alimentación artificial que garantice unos niveles de calidad de la carne aceptables como los requeridos por el mercado.
  27. Para minimizar la cantidad de pescado utilizado como carnada y para evitar el efecto contaminador del alimento no ingerido, se aconseja mejorar las prácticas de ordenación de alimentación.
  28. *Selección del emplazamiento, Evaluación del Impacto Medioambiental (EIM) y diseño de la granja.* Los pasos para seleccionar una zona en la que situar las granjas, el emplazamiento específico dentro de esta zona y para llevar a cabo la evaluación de cualquier potencial impacto medioambiental están estrechamente relacionados. Además, son importantes las consideraciones acerca del diseño de la granja. Una vez elegida una zona, la elección del emplazamiento debe ir precedida de una EIM. Los factores que deben tenerse en cuenta incluyen, entre otros:
    - evitar zonas ecológicas sensibles;
    - garantizar la presencia de un patrón adecuado de corrientes de agua para dispersar adecuada/eficazmente las partículas, sustancias o restos flotantes o en proceso de sedimentación y los sedimentos;
    - mantener una distancia segura respecto a fuentes potenciales de contaminación (por ejemplo, zonas industriales, áreas urbanas) para evitar la contaminación de los peces de la granja;
    - garantizar una distancia segura entre las granjas y los lechos de los ríos, para evitar problemas potenciales asociados con los desbordamientos;
    - garantizar el desarrollo e implementación efectiva de los planes de rehabilitación del emplazamiento, según proceda;
    - garantizar una distancia mínima y segura entre las granjas, así como una distancia mínima entre las jaulas individuales;
    - garantizar una distancia mínima suficiente entre el fondo de las jaulas y el fondo del mar para permitir una adecuada circulación del agua;

- minimizar los impactos tanto visuales como medioambientales mediante un buen diseño de las granjas;
  - evitar el uso de antiincrustantes a base de zinc y cobre en las redes y sistemas de amarre.
29. *Seguimiento medioambiental.* La aprobación de concesiones y licencias de granjas debería estar, a todos los efectos, vinculada con la presentación de planes de seguimiento medioambiental. Aunque todos los países implicados en la cría de atún rojo en el Mediterráneo tienen requisitos para la EIM y el seguimiento medioambiental de las instalaciones de acuicultura, sería útil desarrollar unas normas mínimas aplicables al atún rojo a nivel regional o nacional. El Comité de Acuicultura de la CGPM debería considerar la viabilidad de desarrollar dichas directrices estandarizadas. Debería establecerse una norma para realizar, con una frecuencia previamente acordada, análisis estandarizados del agua principal y de los parámetros físicos, químicos y biológicos de los sedimentos a distancias acordadas de la granja. Al igual que ocurre con otras actividades acuícolas, los resultados de los procedimientos de seguimiento deben ser transparentes y estar disponibles para el público. La frecuencia del seguimiento debe ser controlada y planeada detalladamente con las autoridades medioambientales locales competentes, y podría llevarse a cabo con la ayuda de servicios de seguimiento y certificación medioambientales independientes y acreditados.
30. El seguimiento medioambiental podría, como y cuando proceda, incluir el seguimiento de los efectos ecológicos en (i) el bentos, incluyendo cambios en los parámetros de biodiversidad, y la deposición, (ii) la columna de agua y la superficie del agua, (iii) las interacciones con especies y poblaciones atraídas.
31. Las directrices de seguimiento medioambiental podrían incluir una referencia a la necesidad/oportunidad de una evaluación regular, incluyendo análisis interpretativos y cuantitativos profundos de la situación y las tendencias del impacto medioambiental, así como una actualización regular del uso de la información así generada. Esto incluye información sobre una ordenación mejorada (especialmente prácticas de producción y operación de las granjas; reducción/reutilización de residuos) y esfuerzos de planificación de contingencias.

#### **3.3.4 Datos e investigación**

32. *Datos y registros de las granjas.* La información referente a las operaciones de cría y a los parámetros medioambientales (movimiento de los peces entre las jaulas, densidades de almacenamiento en cualquier momento posible/determinado, uso/aplicación de la alimentación, consumo efectivo de alimentos, temperatura, oxígeno disuelto, etc.) debería ser recopilada y consignada adecuadamente, y estar accesible para su seguimiento. Respetando los requisitos de confidencialidad, esta información debería también estar disponible a efectos de investigación.
33. *Investigación científica.* La actividad de cría presenta una oportunidad valiosa de investigación cooperativa entre la industria y la comunidad científica, y debe fomentarse tal colaboración. Además, los esfuerzos de colaboración deben estar destinados a realizar experimentos con peces vivos durante la cría, centrados especialmente en la conducta en cautividad, fisiología reproductiva, resultados del

crecimiento, demandas nutricionales y tasas de conversión de alimentación. Las partes no comercializables del pez que muere incidentalmente durante el reclutamiento y/o la cría deberían considerarse muestras potencialmente adecuadas para la investigación.

### 3.3.5 *Bienestar animal*

34. *Bienestar animal.* El bienestar de los animales estabulados y en cautividad es un factor determinante de la aceptación general de la tecnología de las granjas por parte de la sociedad. En términos generales, sería aconsejable:
- Poner especial atención, durante las fases del ciclo de producción, en evitar provocar un estrés innecesario a los peces de las granjas. La manipulación debería reducirse al mínimo, tanto durante la captura como durante la transferencia del atún rojo a las jaulas de transporte o a las jaulas finales.
  - Establecer un límite máximo para la densidad de los peces en las jaulas ( $\text{kg/m}^3$ ). Este parámetro está estrechamente relacionado con el bienestar general de los peces en términos de su probable correlación con la incidencia de patógenos, así como con las condiciones de estrés que se producen en altas densidades.
  - Seguir procedimientos de sacrificio adecuados y normalizados para minimizar el sufrimiento de los peces y garantizar las normas de calidad del producto final que requiere el mercado.

### 3.4 *Sacrificio y comercialización*

35. El proceso de sacrificio es la fase de producción en la que los datos que pueden recopilarse y comunicarse para fines estadísticos y biológicos son mediciones que no están tan afectadas por el error de estimación como en la fase de captura/transferencia. Estos datos, junto con los informes sobre cría, pueden cotejarse con las estimaciones de los datos de entrada, como medio para validar la cantidad inicial de peces en la granja. Es esencial que las autoridades locales afectadas controlen la correcta aplicación de las recomendaciones ICCAT/CGPM para garantizar la veracidad de los datos de comercio y sacrificio comunicados.
36. *Muestras biológicas e investigación.* En la fase de entrada, los peces que mueren de forma accidental son especímenes valiosos para fines científicos. Sin embargo, los datos sobre biomasa de entrada son estimaciones. Por otro lado, durante la fase de sacrificio, todos los peces están físicamente disponibles, de tal modo que se pueden recoger muestras biológicas y datos precisos de un número significativo de peces. La disponibilidad de especímenes para el muestreo y la recopilación de datos facilitaría la implementación de actividades de investigación.
37. *Gestión de residuos.* Durante la captura y transformación de los peces para el mercado, se produce una gran cantidad de residuos biológicos. A menos que éstos se usen para fines científicos, los residuos deben almacenarse, tratarse, desembarcarse y eliminarse adecuadamente. Las granjas con licencia deberían contar con planes de eliminación de residuos, que incluyan planes para el material de la granja que ha de renovarse (por ejemplo, redes, cuerdas).
38. *Datos de sacrificio de las granjas.* Los datos de salida de las actividades de sacrificio deben registrarse y comunicarse:

- Para fines de evaluación de stock es importante obtener la composición por tallas de los peces capturados. Como actualmente existen dificultades técnicas para medir los peces en el momento de la captura con el nivel deseado de exactitud y precisión, es necesario registrar y comunicar la composición por tallas en el momento del sacrificio, tal y como se especifica en la Recomendación de ICCAT 04-06, párrafo 2. Deben obtenerse también las estimaciones del peso en vivo de los peces sacrificados, ya que estos datos podrían ser útiles para realizar un seguimiento de la actividad regional de cría y para cotejar los datos de entrada y salida.
- De conformidad con la Recomendación de ICCAT 04-06, párrafo 5, debería también comunicarse la información resumida sobre los datos de entrada y salida de las operaciones de cría. Esta información debe comunicarse en peso en vivo, para que pueda analizarse en relación con las estadísticas de captura y acuicultura.

39. *Comercio.* La trazabilidad de todos los tónidos comercializados a nivel internacional puede conseguirse mediante instrumentos como el Programa de Documento Estadístico para el atún rojo ([Rec. 03-19]). Sin embargo, la utilidad de este programa debería mejorarse enmendando su cobertura para incluir la transferencia internacional de peces vivos y garantizando que todos los miembros de ICCAT y de CGPM presenten los informes semestrales sobre sus importaciones, tal y como requiere dicho Programa. Los datos recopilados por el programa también proporcionarán información útil para la validación y estimación de las capturas no comunicadas.

### 3.5 Resumen de las cuestiones estadísticas

40. Desde el punto de vista de sostenibilidad de los recursos de atún rojo, está claro que es necesario recopilar, comunicar y analizar una serie de estadísticas a nivel regional para que el stock pueda evaluarse y gestionarse adecuadamente. Dichos requisitos de recopilación y comunicación en las pesquerías de captura dirigidas al atún rojo existían mucho antes de que se iniciase la práctica de cría (por ejemplo, en el Convenio de ICCAT, en varias recomendaciones y resoluciones de ICCAT, en el Acuerdo de Stocks de Peces de las Naciones Unidas de 1995, en el Código de Conducta de la FAO para la pesca responsable, etc.) Es importante obtener lo siguiente:

- una estimación precisa del peso total de la captura de los stocks en estado salvaje;
- una estimación precisa de las características biológicas de la captura (por ejemplo, composición por tallas);
- estadísticas precisas sobre el origen de la captura (bandera, zona, temporada, transferencia y destino);
- estadísticas precisas sobre las operaciones de pesca al cerco (por ejemplo, esfuerzo pesquero y estrategia de pesca);
- estimaciones precisas de datos de entrada y salida de las jaulas, tasas de crecimiento y de conversión, y una breve descripción del método utilizado para medir las entradas;
- información sobre las instalaciones de cría autorizadas.

41. El marco para la separación de los componentes de la captura y de la acuicultura en la cría de atún fue establecido por el Grupo Coordinador de Trabajo sobre Estadísticas de Pesca (acrónimo inglés CWP). El CWP indicó que «el problema consistía en garantizar que el peso de los organismos capturados se consignase como producción de la

pesquería de captura y que el posterior crecimiento incremental en cautividad se consignase como acuicultura, para evitar una contabilización parcial o duplicada».

42. Los datos requeridos específicamente sobre los componentes de las pesquerías y de la acuicultura deben ser comunicados por los miembros de la FAO, CGPM e ICCAT, de conformidad con los formatos establecidos por estas organizaciones. Es importante recalcar que los Estados abanderantes tienen la responsabilidad de recopilar y comunicar los datos de captura de los buques que enarbolan su bandera, al margen de que los peces se destinen a las conserveras o a las granjas.
43. Sin embargo, la contabilización separada de los componentes de la acuicultura y la captura resulta a menudo difícil de implementar. El punto clave en la recopilación de estadísticas de la cría de atún sigue siendo la estimación/medición del número y peso de los peces introducidos en jaulas.
44. Dado que dichas técnicas no se han desarrollado bien o completamente, y considerando las incertidumbres asociadas con la cuantificación de los peces que se mueven con rapidez, resultaría práctico considerar fuentes adicionales de información que puedan utilizarse para complementar o cotejar dichos datos. Por ejemplo, los datos de salida de las granjas pueden estimarse con bastante exactitud y, con una buena estimación de las tasas de crecimiento, se pueden retrocalcular los datos de entrada a las granjas en el momento inicial. Asimismo, se pueden utilizar los datos comerciales para validar o complementar los informes de salida, aunque actualmente no todas las Partes contratantes de ICCAT que importan atún rojo (o sus productos) presentan resúmenes de los documentos estadísticos de atún rojo a ICCAT. La plena implementación del Programa de Documento Estadístico (que fue enmendado recientemente para incluir información sobre cría) reforzará su utilidad como instrumento de validación.
45. También es necesario cerciorarse de que se utilizan tipos de mediciones estándar al comunicar los datos, para garantizar interpretaciones y comparaciones coherentes. En general, todas las mediciones de peso de los peces deben comunicarse en peso en vivo y todas las mediciones de talla en longitud a horquilla, de conformidad con el *Manual de operaciones de ICCAT*. Aunque se dispone de factores de conversión y de relaciones talla-peso para el atún rojo salvaje, éstos no se aplican necesariamente al atún de granja. Además, las relaciones y factores de conversión pueden cambiar en función de la duración de las operaciones de cría, del alimento utilizado y de otros factores. Se recomienda que se desarrollen factores de conversión y relaciones entre tipos de mediciones precisos para los diferentes tipos de operaciones de cría.

### **Recomendaciones citadas**

- [Res. 94-05] *Resolución de ICCAT sobre la implementación efectiva del Programa ICCAT de Documento Estadístico para el atún rojo (DEAR)*
- [Rec. 97-04] *Recomendación de ICCAT respecto a la implementación del Programa de Documento Estadístico ICCAT para reexportación de atún rojo*
- [Rec. 02-08] *Recomendación de ICCAT respecto a un plan plurianual de ordenación y de conservación del atún rojo en el Atlántico este y Mediterráneo*
- [Rec. 03-16] *Recomendación de ICCAT para adoptar medidas adicionales contra la pesca ilegal, no declarada y no reglamentada (IUU)*



- [Rec. 03-19] *Recomendación de ICCAT sobre la enmienda de los formularios de los documentos estadísticos de ICCAT del atún rojo/patudo/pez espada)*
- [Rec.04-06] *Recomendación de ICCAT sobre cría de atún rojo*

**REPORT OF THE FIRST MEETING OF THE AD HOC GFCM/ICCAT WORKING  
GROUP ON SUSTAINABLE BLUEFIN TUNA FARMING/FATTENING  
PRACTICES IN THE MEDITERRANEAN**

**Rome, Italy, 12–14 May 2003**

### **OPENING OF THE MEETING**

1. The meeting was held at FAO headquarters. Mr Alain Bonzon, Secretary of the General Fisheries Commission for the Mediterranean (GFCM), opened the meeting and welcomed participants (Appendix 1)<sup>1</sup>. Mr Bonzon explained that the Tuna Fattening/Farming Working Group (WG) had been set-up following a 2002 decision by GFCM which, in view of the recent expansion of tuna farming in the Mediterranean, decided that it needed practical guidelines to ensure the sustainability of this activity.

### **ARRANGEMENTS**

2. Mr Bonzon explained that a Coordinating Committee had been created to facilitate the work of the WG. That Committee met on January 24, 2003, to set up a proposed work plan for the WG to consider. Part of the plan included a draft survey outline to determine the current situation of bluefin farming practices in the Mediterranean, which was previously distributed to potential WG participants. Appendix 2 provides a list of documents distributed at the meeting, including the draft survey outline.

### **ELECTION OF THE CHAIRMAN AND APPOINTMENT OF RAPPORTEURS**

3. Mr Victor Restrepo, Assistant Executive Secretary of the International Commission for the Conservation of Atlantic Tunas (ICCAT), who had served as Chairman of the Coordinating Committee, was elected as Chairman of the First WG Meeting. Mr Alessandro Lovatelli, Technical Secretary of GFCM Committee on Aquaculture (CAQ), and the Chairman were asked to share responsibilities for drafting the report.

### **ADOPTION OF THE AGENDA**

4. The Agenda (Appendix 3) was adopted with a change of a word from “aquaculture” to “farming”. The Chairman noted that Item 6 referred to the survey form from which information would be collected, while Item 7 referred to the information itself.

### **REVIEW OF THE WORKING GROUP MANDATE**

5. The Chairman referred to a document that reflected the WG’s mandate as envisioned by GFCM and slightly modified by the Coordinating Committee (Appendix 4). The Chairman proposed that the WG participants concentrate on producing practical guidelines that are more technical than legal in nature. He also expressed his view that WG members should be represented primarily in their personal capacities in a multi-disciplinary group, rather than as

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<sup>1</sup> Only Appendixes 1 (List of participants), 3 (Agenda) and 5 (Final National Survey Form) of the report of the first meeting of the Working Group are attached to the present document as Annexes 4B, 4A and 6, respectively.

government representatives. After some discussion, WG members agreed with the mandate presented in Appendix 4 and with the Chairman's proposition. Further discussion led the WG to conclude that it needed to:

- (A) Summarize the current situation of bluefin tuna farming in the Mediterranean;
- (B) Analyze (A) to identify problem areas with respect to the issues to be addressed;
- (C) Propose solutions to (B).

6. It was noted that scientists from some of the countries that either fish for farming or that conduct farming operations in the region were absent. Several WG members stated that it would be useful to get them involved at a later stage so as to obtain a more complete product.

7. The issue of definitions was discussed at different times during the meeting. The WG agreed to use the GFCM Scientific Advisory Committee (SAC) definition of "farming" with a slight modification (below) in a broad sense. To many participants, both "farming" and "fattening" are part of a continuum in a special case of "aquaculture" (capture-based aquaculture). It was agreed that the important thing was not so much to develop a precise definition, but rather to make sure all WG participants had the same process in mind when considering the process of Mediterranean Bluefin Tuna Farming.

*"Tuna Farming. Tuna farming currently involves the collection of wild fish, ranging from small to large specimens, and their rearing in floating cages for periods spanning from a few months up to a few years. Fish weight increment and change in the fat content of the flesh is obtained through standard fish farming practices. Confinement of captured fish during short periods of time (2-6 months) aimed mostly at increasing the fat content of the flesh, which strongly influences the prices of the tuna meat on the Japanese sashimi market, can also be referred to as 'Tuna fattening'. Future tuna farming practices may evolve to encompass a closed life cycle, i.e. the rearing of larvae in laboratory conditions."* (SAC, 2002)

## **DEVELOPMENT OF A SURVEY ON THE CURRENT SITUATION**

8. It was noted that the draft survey outline to which this Agenda Item refers had been drafted by the Coordinating Committee and that it had been circulated to many potential WG members well in advance of the meeting for their comments. Nevertheless, the Chairman stated that it would be useful to review the contents of the survey point by point as a group.

9. The WG spent considerable time reviewing the draft document and made multiple changes to it. The final version agreed to by the WG is given in Appendix 5.

## **REVIEW OF AVAILABLE INFORMATION TO-DATE**

10. Several participants had prepared summaries of the bluefin tuna farming situation in their countries which were presented during the meeting and are briefly summarized below. It was noted that in most cases the information presented was only partial with regards to the survey outline developed under Agenda Item 6. Thus, the individual country reports were treated as being preliminary and are not attached to this report.

### ***Croatia***

11. The farming of bluefin tuna (BFT) in Croatia has developed rapidly since 1996. Initially, purse seine-caught BFT were fattened over a period of 4–6 months before being

harvested and exported to the Japanese market. Recently, an entirely new concept has developed: Small- to medium-sized fish are being fattened for over 2 or even 3 years, before being shipped. This practice is aimed at improving the limited fishing quota, by increasing the BFT products biomass without increase of fishing mortality, and at raising the value of the product, thus obtaining a better market price.

12. Based on the draft WG survey questionnaire, some preliminary information was collected from five out of six Croatian BFT farmers, and reported to the WG. Regarding the capture fisheries data collection, the main constraints focused on the accuracy of catch estimations and size-composition data, thus affecting the accuracy of cage input data.

13. A study is being carried out currently within the framework of BYP on the growth rate of small bluefin tuna when reared in grow-out floating cages. This should include a study on equations concerning conversion of the tuna products weight (originating from cages) into the round weight of the fish. It was also suggested to start research activities on acoustic aimed at arriving refining data collection on catch and size-composition.

### *Greece*

14. Greece had reported prior to the meeting that it currently had no bluefin farming activities nor was it fishing bluefin destined for farming.

### *Italy*

15. Italy reported that some farming activity has been taking place recently in Sicily but that relevant data, if any, are under the jurisdiction of regional authorities.

### *Japan*

16. Japan has no activities in bluefin tuna fishing for farming or farming itself. However, the majority of farmed tuna from the Mediterranean is exported to Japan. The quantity of the various farmed bluefin tuna products imported into Japan was reported to the WG. This amount has increased sharply since 1996 (261 tonnes) to 2002 (13 153 tonnes – round weight basis). Major export countries in recent years include Spain, Croatia, Malta and Italy. Japan provides detailed statistics of farmed bluefin import by country of origin, type of product and by year of import.

17. It was pointed out that the place of the first shipment is well documented, but the origin of fish (i.e. the flag of fishing vessels) is not always available. It was felt that in some cases there may be a possibility of the same fish being exported into more than one product and hence reported twice. It was confirmed that the “round” product means fish handed to a Japanese factory ship directly from the farmers. It was hoped that in the future bluefin statistical documentation identifies separately those volumes of fish which are farmed.

### *Malta*

18. Tuna farming started in the year 2000. The number of licensed farms is five but not more than three have been operational up to now. Live tuna stocking in the cages for fattening originates from neighbouring countries purse seining fleets. Malta is at present developing a pilot purse seine fishery but is largely involved in longlining.

19. The fattened fish is sold fresh and frozen to Asian markets mainly Japan. Inputs into cages need to be covered by ICCAT statistical documents and re-export documents are issued on harvest. Over and underestimates into ICCAT statistical documents have both been experienced in the past years.

20. The volume of production has grown from around 300 to 2 000 tonnes in 2002. The collective capacity of the farms is 3 225 tonnes and all are situated offshore outside bays in waters that are 50 m deep or more. Environmental impact studies prior to commencement and continuous monitoring during and after the farming activity are carried out.

### *Morocco*

21. Morocco reported that it had no bluefin farming activity for purse-seine caught fish. However, some amount of fish caught in traps is kept for fattening.

### *Spain*

22. With regards to capture fisheries, a purse-seiner fleet composed of 6 vessels operates in the Levante area from April to October with towing operations occurring in May-July and lasting up to 20 days (1 knot speed). BFT catches in 1996–2001 averaged annually 1 500 tonnes with a fish-size range of 10–200 kg (mean weight: 25 kg). The percentage of BFT catch destined to farming has progressively increased from 40 to 70 percent. Towing usually causes less than 10 percent of mortality.

23. BFT farming started in 1985 in the south of Spain. Up to 1996 only two farms (Barbate and Ceuta) were transferring post-spawning BFT caught in traps (Almadraba) to cages for fattening. Since then, nine new farms have been established in the Murcia Region (South-East Spain). New installations will be probably placed in Cataluña and the Canary and Balearic Islands.

24. BFT farms usually employ circular ring-type cages of 50–90 metres in diameter. Seed fish come from Spanish and French fleets and recently also from Italian, Tunisian and Croatian fleets. Fattening lasts 4–6 months. Production in 2002 reached over 47 000 tonnes. Mortality was less than 10 percent caused by problems when transferring the fish from the towing cage or by occasional bad sea conditions (e.g. turbidity). Growth varies from 10 to 40 percent depending on the initial fish size (better in smaller fish). Food consists mainly of mackerel, sardine and eventually squid or other locally fished species. Conversion rate was 13–20:1. Over 95 percent of production is exported to Japan either fresh or frozen, whole or in loins.

25. To obtain a license (10 to 20 years) from national and regional administrations an Environmental Impact Assessment and yearly survey of its impact on the location is required. Farm capacity is limited, normally around 1 000 tonnes. There has been some conflict with fishermen and “green forces”, but also some positive effects on employment at a local level and on the regional economy.

26. Several research activities have been carried out in the last five years by public research centres in close collaboration with the industry, mostly on reproduction (supported by European Union funds), nutrition, environmental studies, food processing (slaughtering methods, flesh quality control). It was pointed out that the DOTT Conference held in February 2002 and the EU-REPRODOTT project which started last January aim at

controlling BFT reproduction in captivity. The latter DOTT initiative is the submission of proposal to the EU 6 Research Framework Program (FP6) regarding a feasibility study to create a BFT European Centre for basic and applied research.

### ***Turkey***

27. Turkey has been involved in BFT capture since 1985, possessing a remarkable fishing fleet consisting of over 100 purse seiners. BFT farming started in 2002 with 28 purse seiners situated in three farm sites (two in the Mediterranean and one in the Aegean Sea). By the end of 2002, Turkish farms were producing 1 960 tonnes of farmed BFT. Although a new activity in the country, BFT farming is having an important socio-economic impact.

28. Turkish BFT farmers are eager to contribute to scientific studies and research activities aimed at achieving a sustainable farming activity. In this respect, the Turkish BFT Farmers' Association has recently donated 30 BFT specimens for a tagging project to be jointly conducted between the University of Bari (Faculty of Veterinary Medicine) in Italy and the University of Istanbul (Faculty of Fisheries) in Turkey. The Association will also cover food and accommodation expenses for both research teams. Furthermore, an additional project aimed at investigating the Environmental Impacts of Tuna Farming is now being studied by the University of Aegean and funded by one of the private BFT farming companies in Turkey.

29. A Workshop on Farming, Management and Conservation of BFT in the Eastern Mediterranean Sea was organized by the Turkish Marine Research Foundation (TUDAV) from 5 to 7 April 2003 in Istanbul, Turkey. The aim of this Workshop was to focus interest on BFT in the Eastern Mediterranean Sea. The proceedings of the Workshop are available from [tudav@superonline.com](mailto:tudav@superonline.com).

### ***Others***

30. After the presentations, WG participants noted that other countries were also (or could become) important either in the capturing or the farming of bluefin in the Mediterranean, such as: France, Tunisia, Libya, Algeria, Cyprus, Syria, Israel and Lebanon. The WG stressed that it was very important to make every attempt so that these countries would provide the necessary information for the WG to carry out its job. To this end, it was agreed that the following contacts should be established: Mr Isik Oray with eastern Mediterranean countries; Mr A. Bonzon with all GFCM Member countries; COPEMED Project Coordinator, with COPEMED participants.

### ***Summary***

31. Although some of the national reports presented were still incomplete, the WG noted that some common problems were evident from the presentations, such as:

- difficulties in estimating total biomass and size composition of bluefin in the purse seines and in the pens and cages;
- incomplete knowledge about gains in weight/size during the farming period as a function of various factors (initial size, time kept, diet, etc.);
- incomplete knowledge about conversion rates during farming;
- incomplete knowledge about the relationship between diet and final product quality;
- lack of information about quality control mechanisms in place during farming;

- difficulties in determining the origin of fish based on the current ICCAT catch documentation scheme.

## **FUTURE WORKPLAN FOR THE WORKING GROUP**

32. The WG discussed at length its future workplan and what it should achieve. It was agreed that the WG's final product (Guidelines) should be finalized by spring, 2004. With this target in mind, it was discussed whether it would be useful to hold a large workshop during the intervening period and, if so, what were the goals of the workshop, who would participate in it, and what would be the necessary logistical arrangements. In the end, the WG decided that instead of holding a large and potentially expensive workshop, it would be more cost-effective to have more meetings of the WG itself, although with the possibility of enlarging the WG by inviting experts in various fields.

33. The WG asked the GFCM Secretariat to contact those members, who had previously expressed interest in hosting a meeting of the WG to consider hosting a second WG meeting in December, 2003. ADRIAMED and COPEMED were also invited to support financially, if possible, the participation of key experts from the region who might not be able to participate otherwise.

34. The WG agreed that considerable work would need to be done before its next meeting to prepare national reports, to summarize them, to analyze them, and to identify key problems and offer potential solutions. The preparation of the "national reports" should be done by WG members following the outline developed under Item 6 (Appendix 5). The WG recommended that the summary/analysis of these reports and other preparatory work be completed before the next meeting to be carried out under the following leadership (who could solicit help from others, as necessary):

Ms Andreina Fenech-Farrugia:	Capture Fisheries component
Mr Alessandro Lovatelli:	Farming component
Mr Peter Miyake:	Market and Trade component

35. The workplan agreed-to by the WG is as follows:

<b>Dates</b>	<b>Action</b>	<b>Description</b>
July 14, 2003	Completion of National Reports	By WG members in every country involved in BFT farming. Reports should be sent electronically to Victor Restrepo
July to September, 2003	Summary and analysis of National Reports	By Fenech-Farrugia, Lovatelli and Miyake. The analysis should lead to the grouping of issues/themes, the identification of problems, and the drafting of possible solutions.
September 29, 2003	Distribution of analyses and summaries	Analyses in previous step to be sent to all WG members (routed by Victor Restrepo)
Early October, 2003	Progress reports to GFCM and ICCAT	By Victor Restrepo. Prepare brief summary to inform the two Commissions about what the WG is doing (GFCM will meet 14–17 October; ICCAT will meet 17–24 November)
December 15–17, 2003	Second WG Meeting	Venue to be sought by Alain Bonzon upon consultation with potential hosts. The main goal will be to produce a first complete draft of the guidelines.
January-March, 2004	Updating of National Reports	By WG members, primarily for the purpose of completing information on the 2003 fishing/fattening season.
3 days, March-May, 2004	Third WG Meeting	Venue to be sought by Alain Bonzon upon consultation with potential hosts. The main goal will be to finalize the guidelines.

36. In terms of composition, it was agreed that it would be more efficient for the WG not to grow too much. It was recommended that the next WG meeting be composed by this meeting's participants, other intended participants to this meeting who were unable to make it, and some outside experts, for example a scientist familiar with Australia's experience in Southern Bluefin Tuna (SBT) farming, a person expert in the Spanish farming activities, a person expert in purse seining activities, and experts in other pertinent fields such as acoustic and visual sampling techniques.

#### **OTHER MATTERS**

37. No other matters were discussed.

#### **PREPARATION OF THE REPORT**

38. Most of the report was prepared and adopted during the meeting. Country summaries (Item 7) were prepared by presenters and circulated by correspondence after the meeting.

#### **ENDORSEMENT OF THE CONCLUSIONS AND RECOMMENDATIONS**

39. There was complete agreement on all decisions made by the WG. The meeting was adjourned.



**FIRST MEETING OF THE AD HOC GFCM/ICCAT WORKING GROUP ON  
SUSTAINABLE BLUEFIN TUNA FARMING/FATTENING PRACTICES IN THE  
MEDITERRANEAN**

**Rome, Italy, 12–14 May 2003**

**Agenda**

1. Opening of the Meeting
2. Arrangements for the Meeting
3. Election of the Chairman/Appointment of Rapporteur(s)
4. Adoption of the agenda
5. Review of the Working Group mandate
6. Development of survey on current situation
  - 6.1 Capture fisheries component
  - 6.2 Farming component
  - 6.3 Market-side component
7. Review of available information to-date
  - 7.1 Statistical issues
  - 7.2 Biological issues
  - 7.3 Management issues
  - 7.4 Potential environmental issues
  - 7.5 Potential social/economical issues
  - 7.6 Other issues
8. Future workplan for the Working Group
9. Other matters
10. Preparation of the Report
11. Endorsement of conclusions and recommendations

**FIRST MEETING OF THE AD HOC GFCM/ICCAT WORKING GROUP ON  
SUSTAINABLE BLUEFIN TUNA FARMING/FATTENING PRACTICES IN THE  
MEDITERRANEAN**

**Rome, Italy, 12–14 May 2003**

**List of participants**

Nedim ANBAR	Turkish BFT Farmers' Association	Turkey
Juan A. CAMIÑAS	Centro Oceanográfico de Málaga	Spain
Stefano CATAUDELLA	University of Rome "Tor Vergata"	Italy
José Miguel DE LA SERNA ERNST	Centro Oceanográfico de Málaga	Spain
Gregorio DE METRIO	Università di Bari	Italy
Antonio DI NATALE	Aquastudio	Italy
Vlasta FRANIČEVIĆ (Ms)	Directorate of Fisheries	Croatia
Antonio GARCÍA GÓMEZ	Instituto Español de Oceanografía	Spain
Anthony GRUPPETTA	Malta Centre for Fisheries Sciences	Malta
Susana JUNQUERA (Ms)	European Commission	Belgium
Makoto Peter MIYAKE	Japan Tuna	Japan
Koichi MIZUTANI	Fisheries Research Agency	Japan
Pere OLIVER	Instituto Español de Oceanografía	Spain
Isik ORAY	University of Istanbul	Turkey
Francesca OTTOLENGHI (Ms)	Consorzio Mediterraneo	Italy
Riccardo RIGILLO	Ministry of Agriculture & Forestry Policies	Italy
François SIMARD	World Conservation Union	Spain
Abdellah SROUR	Institut National de Recherche Halieutique	Morocco
Ziro SUZUKI	Fisheries Research Agency	Japan
Vjekoslav TIČINA	Institute of Oceanography and Fisheries	Croatia
Sergi TUDELA	World Wildlife Fund	Spain

**INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS**

Victor R. RESTREPO

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**

Luca GARIBALDI  
Alan LOWTHER  
Jordi LLEONART  
Jacek MAJKOWSKI

**GFCM SECRETARIAT**

Alain BONZON  
Alessandro LOVATELLI  
Mairi PAGE (Ms)

**REPORT OF THE SECOND MEETING OF THE AD HOC GFCM/ICCAT  
WORKING GROUP ON SUSTAINABLE BLUEFIN TUNA FARMING/FATTENING  
PRACTICES IN THE MEDITERRANEAN**

**Izmir, Turkey, 15–17 December 2003**

### **OPENING OF THE MEETING**

1. The meeting was held at the Crowne Plaza Hotel in Izmir. Mr Victor Restrepo, Working Group (WG) Chairman, opened the meeting and welcomed the participants (Appendix 1)<sup>1</sup>. The Chairman expressed the WG's appreciation to the Turkish Ministry of Agriculture and Rural Affairs (MARA) and to the Turkish Association of Bluefin Tuna Farmers (OYID) for hosting the meeting and for taking care of all the logistical arrangements, including a field tour to visit a bluefin tuna farm.

2. The Chairman explained that one of the main objectives of the second meeting was to finalize the snapshot of the current situation of bluefin tuna (BFT) farming in the Mediterranean as reflected by the “national reports” which had been started at the first meeting of the WG. The other major objective was to make good progress on the drafting of the guidelines in the WG mandate (Appendix 2).

### **ARRANGEMENTS**

3. The Chairman proposed that the first day should be devoted largely to presentations, while the second and third days are devoted largely to drafting and discussions, in smaller groups if necessary. Appendix 3 provides a list of documents distributed at the meeting.

### **APPOINTMENT OF RAPORTEURS**

4. Mr Alessandro Lovatelli, Technical Secretary of General Fisheries Commission for the Mediterranean-Committee on Aquaculture (GFCM-CAQ), and the Chairman were asked to share responsibilities for drafting the report.

### **ADOPTION OF THE AGENDA**

5. The Agenda (Appendix 4) was adopted.

### **PRESENTATION OF “NATIONAL REPORTS”**

6. The WG, at its first meeting held in Rome, asked that knowledgeable scientists complete survey forms developed by the WG in order to obtain a picture of the current BFT farming situation (capture fisheries, aquaculture, and marketing) in the Mediterranean. The Chairman explained that for the purpose of facilitating discussions, these surveys are referred to “national reports”, but that WG participants should keep in mind that they did not represent official reports from any government agencies.

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<sup>1</sup> Only Appendixes 1 (List of participants) and 4 (Agenda) of the report of the second meeting of the Working Group are attached to the present document as Annex 5B and 5A, respectively.

7. “National reports” were received from Croatia, Cyprus, France, Greece, Italy, Japan, Malta, Spain and Turkey. Presentations for Croatia, Cyprus, Italy and Turkey were given during the meeting, in some cases as updates to the information that had already been presented following the first meeting in Rome. The WG agreed to give the authors until mid-January, 2004, to make any final updates or corrections to these reports (attached as Appendix 5).

8. The WG expressed its concern for the fact that, no reports were received from countries where either BFT farming, or catching of BFT destined for farming, is taking place (such as Libya or Tunisia). This situation makes it difficult for the WG to fulfil its mandate. The WG asked that the GFCM Secretary make new efforts to invite knowledgeable scientists from these countries to participate in the final meeting of the WG.

### **PRESENTATION OF SURVEY SUMMARY REPORTS**

9. The WG had previously asked three individuals to prepare summaries of the “national reports” in order to facilitate their analysis (Appendix 6):

- Capture fisheries (Ms Andreina Fenech-Farrugia)
- Aquaculture (Mr Alessandro Lovatelli)
- Marketing (Mr Peter Miyake)

10. The WG recognized that the reports received focused largely on the aquaculture component, hence it was difficult to form a comprehensive picture of the flow of bluefin from the capture side, to the farms, to the markets. Mr Jordi Lleonart was asked to lead an effort to obtain an approximate picture of this flow (Appendix 6.4).

### **PRESENTATION ON THE EUROPEAN TUNA RESEARCH CENTRE (EUTREC) DESIGN STUDY**

11. As it is known, some of the most important species to which the tuna fishery is addressed are the Atlantic, Pacific and Southern bluefin tunas. The catches of these species are mainly delivered to sashimi-sushi market and the Atlantic bluefin tuna is considered as the first-class species among them. Therefore, a powerful trend from capture fishery to catching and fattening integration has been developed during the last ten years in order to keep up with the tuna market demand.

12. But, as concerns the Atlantic bluefin tuna, since the catches of this species in the Mediterranean and eastern Atlantic are considered not to be sustainable, it is desirable that aquaculture activities are developed in the near future. A European Tuna Research Centre, as a land-based infrastructure, could be an opportunity for conducting academic and applied studies on Atlantic bluefin tuna, not only at European level. Such infrastructure could allow a larger range of experimental topics in a secured environment, with the aim to be able to control the whole life cycle of this species in captivity.

13. Of course, an infrastructure supporting European research in Atlantic bluefin tuna has to be previously defined in terms of European partnership, main scientific objectives, infrastructure design definition and costs, setting-up country and site, funding tools and scientific and administrative management. This is why it has been programmed to develop a first step, in the ambit of FP 2003, which allows for arguing the European added-value and

demonstrating the need for a feasibility study, explaining the conceptual foundations of a EuTReC and including the design, costs and operational limitations of land-based prototypes.

14. Then, a second step will be developed in the ambit of FP 2005 concerning the Prototypes setting-up and corresponding investigations, EuTReC architectural and operational design. Finally, a third step, which will be developed in the ambit of future FPs will be the EuTReC setting-up.

## **PRESENTATIONS ON HOW FARMING INDUSTRY CAN HELP BFT RESEARCH**

15. *Tuna farms as an opportunity for basic & applied research on *Thunnus thynnus*.* ICCAT recommends conducting research on stock identity and reproductive biology of the Atlantic bluefin tuna in order to better manage this resource. The tuna-farms could be a very good opportunity to carry out experiments aimed to solve many of the impasses concerning the problems evidenced during tagging campaigns. Moreover, a more in-depth knowledge of the bluefin tuna reproductive biology could be of great importance in order to develop a closed-cycle aquaculture farming technology. It is desirable, therefore, that all the Mediterranean tuna-farm owners collaborate with the researchers in order to acquire essential knowledge on various aspects of the bluefin tuna biology (behaviour, reproductive biology, growth rates, etc.). The expected cooperation represents the key for a new research strategy that will give advantages both to the scientific community and the tuna farm owners.

16. *Environmental effects of a tuna farm.* Environmental effects of the AKUA-DEM tuna fish farm located in the vicinity of Cesme (Izmir, Turkey) on the marine ecosystem have been monitored by the Fisheries Faculty of the Aegean University over a 1-year period. Seasonal sampling efforts were performed at three stations, one located under the netcages, and two control sites at a certain distance from the cages. In the study, water quality (temperature, dissolved oxygen, turbidity, pH, salinity, nitrite N, nitrate N, phosphate phosphorus, silica and chlorophyll a), sediment quality (% carbon), flammable substance (%), granulometric analysis) and biological components (phytoplankton, zooplankton, benthos and fish fauna) were investigated. The research findings indicate no discernable negative effect of the tuna farms on the marine environment.

## **OUTCOME OF THE EIGHTEENTH REGULAR MEETING OF ICCAT ON BFT FARMING**

17. The Chairman presented two Recommendations that were adopted by ICCAT at its last Commission meeting. Recommendation [03-19] (Appendix 7.1) is an amendment to the ICCAT Bluefin Tuna Statistical Document which requires as new information (a) the calendar year of capture, and (b) information about farming in case the BFT products are from farms. The WG noted that these changes would improve the tractability of BFT products; however, it was noted that it could be useful to amend the Statistical Document program in order to include the requirement that it be implemented for live fish that are traded for input into cages.

18. Recommendation [03-09] (Appendix 7.2) is intended to replace a 2002 Recommendation that specifies requirements for collecting data on inputs to and outputs from farming operations. The newer Recommendation contains several new features that the WG deemed to be useful, such as the establishment of a published record of BFT farms, and the specification of details on farming inputs to be reported at the regional level.

## **GUIDELINES ACCORDING TO THE WG MANDATE**

19. The following discussion leaders/rapporteurs were nominated for different topics: Mr Luca Garibaldi (statistical issues), Ms Francesca Ottolenghi (environmental and biological issues), Ms Vlasta Franičević (social and economic issues), and Mr Corrado Piccinetti, Mr L. Garibaldi and Mr A. Lovatelli (management issues). The WG was subdivided into smaller groups that developed ideas around the issues identified in the WG's mandate, including the listing of potential solutions or potential research. These issues were then discussed and altered during plenary sessions (Appendix 8 contains the results from this process). The WG considered that these should serve as the primary source for the ideas that will eventually become the WG's Guidelines.

## **FUTURE WORKPLAN FOR THE WORKING GROUP**

20. In terms of process, the WG agreed that the final Guidelines should be drafted and adopted during the third meeting, and that the mandate of the WG would then be completed. Mr V. Restrepo and Mr A. Lovatelli were asked to use the material in Appendix 8 and reshape it into the form of guidelines that could be used by the WG as the working draft at its third meeting; this draft should be circulated to participants two weeks before the meeting.

21. There was discussion about holding a Symposium immediately after the final WG meeting, with open participation by scientists, industry (fishermen and farmers), and government officials. However, it was not clear to the WG how such a Symposium could or should affect the WG's work, or the conclusions that GFCM or ICCAT might reach about it. Therefore, it was decided to put this idea on hold until after the Commissions reacted to the final Guidelines. If a Symposium is deemed as being useful then, it could be arranged.

22. The government observers from Turkey made a statement to the WG indicating that government officials from the fishing, environment and aquaculture branches should be allowed to participate either in the final WG meeting or in a Symposium, and that funds should be made available to promote participation by officials from developing countries. The Chairman replied that due consideration would be given to their first request, but that it was unlikely that any funds would be available from either GFCM or ICCAT for such purposes.

23. In terms of dates and venue, the GFCM-SAC Chairman noted that, at its last Session, GFCM had decided that the third meeting should take place in Italy, sometime between March and May, 2004. Mr Isik Oray indicated that the Turkish Marine Research Foundation would hold its Second Workshop on bluefin tuna farming, management and conservation, on 1–3 April, 2004, and suggested that the WG avoid meeting in the same dates, if possible. The WG agreed that the third meeting would last for 3 days and asked that the GFCM Secretary arranges for the dates as soon as possible in consultation with the Italian Government and with ICCAT.

## **OTHER MATTERS**

24. No other matters were discussed

**PREPARATION OF THE REPORT**

25. The report was prepared and adopted during the meeting. The Chairman noted that he would circulate the report to WG members who were unable to attend but that their comments, if any, would not alter this report, as these individuals could bring up their concerns during the final WG meeting.

**ENDORSEMENT OF CONCLUSIONS AND RECOMMENDATIONS**

26. Participants endorsed the Conclusions and Recommendations and the meeting was adjourned after the Chairman thanked participants for their constructive work and the Turkish hosts for their hospitality.

**SECOND MEETING OF THE AD HOC GFCM/ICCAT WORKING GROUP ON  
SUSTAINABLE BLUEFIN TUNA FARMING/FATTENING PRACTICES IN THE  
MEDITERRANEAN**

**Izmir, Turkey, 15–17 December 2003**

**Agenda**

1. Opening of the Meeting
2. Arrangements for the Meeting
3. Appointment of Rapporteurs
4. Adoption of the agenda
5. Presentation of “National Reports”
6. Presentation of Survey Summary Reports
7. Presentation on the European Tuna Research Centre (EuTReC) design study
8. Presentations on how farming industry can help BFT research
9. Outcome of the 18th Regular Meeting of ICCAT on BFT farming
10. Guidelines according to the Working Group mandate
11. Future workplan for the Working Group
12. Other matters
13. Preparation of the Report
14. Endorsement of conclusions and recommendations



**SECOND MEETING OF THE AD HOC GFCM/ICCAT WORKING GROUP ON  
SUSTAINABLE BLUEFIN TUNA FARMING/FATTENING PRACTICES IN THE  
MEDITERRANEAN**

**Izmir, Turkey, 15–17 December 2003**

**List of participants**

Nedim ANBAR	Turkish BFT Farmers' Association	Turkey
Vlasta FRANICEVIC (Ms)	Directorate of Fisheries	Croatia
Gregorio DE METRIO	Faculty of Veterinary Medicine	Italy
Susana JUNQUERA (Ms)	European Commission	Belgium
Işık ORAY	University of Istanbul	Turkey
Ziro SUZUKI	Fisheries Research Agency	Japan
Vjekoslav TICINA	Institute of Oceanography and Fisheries	Croatia
Michele DEFLORIO	Faculty of Veterinary Medicine	Italy
Makoto Peter MIYAKE	Japan Tuna	Japan
Francesca OTTOLENGHI (Ms)	Consorzio Mediterraneo	Italy
Saadet KARAKULAK (Ms)	Istanbul University	Turkey
Adriano MARIANI	Consorzio UNIMAR	Italy
Corrado PICCINETTI	Lab. of Marine Biology and Fisheries	Italy
George L. GEORGIU	Department of Fisheries	Cyprus
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Sergi TUDELA	World Wildlife Fund	Spain

**INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS**

Victor R. RESTREPO

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**

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**GFCM SECRETARIAT**

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**OBSERVERS (from Turkey)**

Hayri DENİZ

Hasan KILIÇ

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Huseyin KAPLAN

Haydar FERSON

Vahdettin KURUM

Erkan GOZGOZOGLU

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**FINAL NATIONAL SURVEY FORM**


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**AD HOC GFCM/ICCAT WORKING GROUP ON SUSTAINABLE BLUEFIN TUNA  
FARMING/FATTENING PRACTICES IN THE MEDITERRANEAN**
**National Reports Survey Form  
on current Bluefin Tuna Farming Practices  
in the Mediterranean**


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**Instruction for filling the survey form**

*The objective of this survey is to collect comprehensive and detailed data about the development of tuna farming practices in the Mediterranean, with special focus on the current situation. The survey is composed of three main sections: (1) Capture, (2) Farming and (3) Marketing. The persons working on the survey form should strive to complete the survey as much as possible, while respecting confidentiality requirements of individual companies. In some cases, it may be appropriate to provide several versions of a particular table so as not to aggregate too many pieces of information into a single entry.*

*Conversion values to estimate the whole weight of fish from various product types used in the ICCAT are listed for reference and use in case no specific values are available for some product types. If specific values are available at individual farms, those values have to be used. In such cases, specify the equation and also indicate the range of sizes used to derive the equation.*

*Even if confidentiality is required for data entered, an attempt should be made to fill all entries by using, for example, codes or aggregating data or simply noting "data is available, but confidential".*

*The National Survey Form is divided in three sections, (1) capture fisheries, (2) farming and (3) markets and trade. Countries should complete those sections when engaged in one or more of the activities described in the three sections. In fisheries capture section, however, point 1.4 describes the bluefin tuna transportation operation. If any given country is not engaged in capturing fish, but involved in transportation, please complete point 1.4.*

*Summary (maximum 2 pages) should be attached in the beginning of the National Survey describing general aspect of bluefin farming activities in the country including history, present status and future prospect, if any and possible.*

---

**Country:** \_\_\_\_\_

**Prepared by:** \_\_\_\_\_

**Affiliation:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Tel./Fax:** \_\_\_\_\_

**E-mail:** \_\_\_\_\_

## 1. CAPTURE FISHERIES

- A.1** Are vessels flying the flag of your country involved in the capture of bluefin destined for farming anywhere?  
YES \_\_\_\_\_ NO \_\_\_\_\_
- A.2** Are vessels flying the flag of other countries involved in the capture of bluefin destined for farming in your country?  
YES \_\_\_\_\_ NO \_\_\_\_\_
- B.1** Are vessels flying the flag of your country involved in the transport of bluefin destined for farming anywhere?  
YES \_\_\_\_\_ NO \_\_\_\_\_
- B.2** Are vessels flying the flag of other countries involved in the transport of bluefin destined for farming in your country?  
YES \_\_\_\_\_ NO \_\_\_\_\_

*If the answer to either A.1 or B.1 is YES, please complete the remainder of Section 1. If the answer is NO, please explain if there are currently any plans for vessels flying the flag of your country to get involved in the capture of bluefin tuna for farming in the Mediterranean.*

### 1.1 Description of Bluefin Fishing Fleet (and of tug boats, if applicable)

*Describe the fishing fleet, including:*

- Number and type of vessels
- Home ports
- Fishing (towing) gears
- Search strategy (aerial search; cooperation between boats, etc.)
- Areas of operation
- Season of operation
- Duration of towing operations
- Other relevant fleet information

**Note:** *Include a description of tuna traps if they are used for catching bluefin destined for farming.*

### 1.2 Catch and Effort of your Flag Vessels

*Provide as complete as possible the following statistics:*

Year	BFT catch (tonnes)	Effort (Specify units used)	Size range (kg)	Mean size (kg)	% of catch destined for farming	Country of destination	Comments
1996							
1997							
1998							
1999							
2000							
2001							
2002							
Etc.							

### 1.3 Description of Method to Estimate Magnitude and Characteristics of the Catch

- Explain how the overall catch (tons) is estimated (e.g. logbooks, observers)
- Explain how catch is sampled (for size composition, etc.)
- What are the main sources of uncertainty in estimating catches and size composition?

### 1.4 Estimates of Mortality

- What percentage of the fish dies during the fishing operation?



- 2.3** Description of Method to Estimate Magnitude and Characteristics of the Inputs
- Describe how the inputs (magnitude and size distribution) are estimated
  - Describe whether the same pen receives different inputs during a given fattening season
- 2.4** Outputs
- Describe the duration of the fattening/growing season (months, range and mean)
  - Describe the output (production) season (months, range and mean)

*Provide the following statistics on production:*

<b>Year</b>	<b>BFT produced (tonnes)</b>	<b>BFT size range (kg)</b>	<b>BFT mean size (kg)</b>	<b>Comments</b>
1996				
1997				
1998				
1999				
2000				
2001				
2002				
Etc.				

- 2.5** Mortality
- Farming season and duration
  - What percentage of the farmed tuna dies while in captivity?
  - Describe other relevant mortality information (incl. diseases)
  - Describe the fate of the dead fish
- 2.6** Growth
- What is the relationship between weight gain and explanatory variables, such as initial size, temperature, and time in captivity?
- 2.7** Other Data
- Describe other types of data collected by the farms (e.g. on reproduction, behaviour)
- 2.8** Feeding
- What are the tuna fed (incl. species composition; food supplements)?
  - What are the sources of fish used for feeding (comment on the sources of small pelagics and whether those stocks of small pelagics are assessed and managed by a relevant RFB or government)?
  - Describe feeding (quantity, frequency and quality)
  - Provide estimates of food conversion over fattening season (kg gained by BFT divided by kg of feed used; explain the basis for the calculation-dry or wet weight)
  - Provide information on monitoring of feeding with regards to food safety: are antibiotics, hormones or chemical additives used? Are chemical analyses of the food or of the bluefin conducted regularly? Are any such controls voluntary or mandated by legislation?
  - Other relevant feeding information
- 2.9** Commercialization
- To what countries are the products sold (provide quantities, if available)?

Provide the following information:

Year	Country of destination	Type of product (with conversion factor* to the whole fish)	Amount produced (tonnes)	Fresh (tonnes)	Frozen (tonnes)	Amount exported (tonnes)	Fresh (tonnes)	Frozen (tonnes)	Comments
1996									
1997									
1998									
1999									
2000									
2001									
2002									
Etc.									

\* If you have accurate conversion factors, please report them and apply them. Otherwise, the following conversion factors can be used to estimate round weight for various product types:

Belly meat x 10.28	= round weight	Gilled & Gutted weight x 1.16	= round weight
Dressed weight x 1.25	= round weight	Other products x 2.0	= round weight
Fillets x 1.67	= round weight		

- What types of products are obtained? (fresh; frozen; belly meat, loins, etc.)
- Provide available estimates between product type and whole fish weight

#### 2.10 Legal Framework

- Describe the legislation that regulates the issuance of permits for farms (i.e. the mechanisms in place – local or national – that govern the permitting process)
- Describe the specific requirements that are needed to obtain a license for a farm (e.g. distance from shore, distance from marine reserves, capacity)
- Describe what types of environmental impact studies are needed before permits are issued
- Describe what types of environmental impact studies are required for monitoring purposes while the farm is in operation

#### 2.11 Environmental Aspects

- Are there perceived/factual interactions with the environment (explain if studies have been conducted to test for the interactions, who made the study and what were the conclusions)?
- Are harmful metals or harmful chemicals or drugs in the fish measured before and after farming? If yes, specify them. Are there mechanisms in place to establish the traceability of the product for the purpose of ensuring food safety?

#### 2.12 Socio-Economic Aspects

*Provide the information on the following*

- Number of people employed in farming/processing operations; structure of employees in terms of skills; flow of workers from/to other activities
- Overall economic impact of farming, including profitability
- Any available economic information (e.g. subsidies)

#### 2.13 Research

- Describe past, present and planned studies carried out in the farms
- Are farming operations accessible to researchers (describe particular studies)?
- Do farming operations hire their own researchers? For what studies?

#### 2.14 Interactions

*Describe known interactions between farming and:*

- Other fishing activities
- Others

### 3. MARKETS AND TRADE

- A. Is your country involved in the buying of farmed Mediterranean bluefin products?  
 YES \_\_\_\_\_ NO \_\_\_\_\_

*If the answer is YES, please complete Section 3.*

#### 3.1 Statistics

*Provide statistics on purchased farmed Mediterranean bluefin products by year, country and product type:*

Year	Country of origin	Country of shipment	Type of product	Amount frozen products (tonnes)	Amount fresh products (tonnes)	Estimated whole fish weight (tonnes)*	Comments
1996							
1997							
1998							
1999							
2000							
2001							
2002							
Etc.							

\* Provide conversion factors used (see Table 2.9).

#### 3.2 Economic Data

- How are the products marketed?
- Provide available information on prices
- Other relevant economic information

## INTRODUCTION TO THE SUMMARY REPORTS BASED ON THE NATIONAL SURVEYS

The main objective of the survey was to collect comprehensive and detailed data on the development of bluefin tuna farming/fattening practices in the Mediterranean, with special focus on the current situation. The survey was composed of three main sections: (1) capture fisheries, (2) farming/fattening practices and (3) marketing.

A first set of survey reports were compiled and submitted by the following Mediterranean countries: Croatia, Cyprus, France, Greece, Italy, Malta, Spain and Turkey. Furthermore, some information on activities in Israel, Lebanon and Syria were unofficially provided by the University of Istanbul (Turkey). A report was also made available by Japan as a member of the General Fisheries Commission on the Mediterranean (GFCM) and due to the important role played by the country with regards to the imports and consumption of bluefin tuna.

The information provided in the attached capture fisheries, aquaculture and marketing summaries (Annexes 8–10) has been compiled from the first set and updated surveys<sup>1</sup> submitted to the Ad Hoc GFCM/ICCAT Working Group on Sustainable Bluefin Tuna Farming/Fattening Practices in the Mediterranean. In some sections additional information has also been extracted from other available official reports. The information source is indicated if extracted from reports other than the survey reports mentioned above

The summaries have been prepared by selected participants of the Working Group.

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<sup>1</sup> The following countries submitted new or updated survey forms at or short after the third meeting of the Working Group: Croatia, Cyprus, France, Greece, Japan, Libyan Arab Jamahiriya, Malta, Morocco, Spain and Turkey.



**SUMMARY REPORT ON BLUEFIN TUNA CAPTURE FISHING FOR  
FARMING/FATTENING IN THE MEDITERRANEAN**

Prepared by  
**Jordi Leonart and Jacek Majkowski**  
(FAO Fisheries Department, Rome)

This Summary is limited to the information provided in response to the national surveys submitted described in Annex 7; it is not supplemented by that from other sources as it was beyond its scope. Therefore, it refers only to the countries that provided information. The authors did not include information of no or marginal relevance to the questions posed in the Survey, eliminating, at least, some inconsistencies.

**BLUEFIN VESSELS AND THEIR OPERATIONS**

All the countries that provided information are involved in catching bluefin for farming with the exception of Cyprus, Japan and Morocco. All countries with farming activities receive bluefin caught by other countries. Several countries catching bluefin for farming are also involved in their transport (excluding Cyprus, France and Malta). Some farming countries (Croatia, Spain and Turkey) do not use foreign flag vessels for transport bluefin to their farms. The table below provides additional information on these operations.

	<i>Are vessels flying the flag of your country involved in the capture of bluefin destined for farming anywhere?</i>	<i>Are vessels flying the flag of other countries involved in the capture of bluefin destined for farming in your country?</i>	<i>Are vessels flying the flag of your country involved in the transport of bluefin destined for farming anywhere?</i>	<i>Are vessels flying the flag of other countries involved in the transport of bluefin destined for farming in your country?</i>
Croatia	Yes	Yes	Yes	No
Cyprus	No	Yes	No	Yes
France	Yes	No	No	No
Greece		Yes		Yes
Italy	Yes	Yes	Yes	Yes
Japan	No	No	No	No
Libya	Yes	Yes	Yes	Yes
Malta	Yes	Yes	No	Yes
Morocco	No	No	No	No
Spain	Yes	Yes	Yes	No
Turkey	Yes	Yes	Yes	No

According to the surveys received, there are about 235 purse seiners able to fish bluefin the Mediterranean (not necessarily all doing it). This number is underestimated because the Algerian and Tunisian vessels are not included. France, Italy, Croatia and Turkey have more than 20 vessels, each.

The table below provides information on vessels involved in fishing bluefin in the Mediterranean and their fishing operation. In this table, some countries did not include vessels other than purse seiners (used for fishing bluefin for farming). Vessels of most countries cooperate to find bluefin for fishing and France and Spain use aerial search. Usually the fishing season is from March/April to October.

<i>Country</i>	<i>Number and type of vessels</i>	<i>Home ports</i>	<i>Search strategy</i>	<i>Areas of operation</i>	<i>Season of operation</i>	<i>Duration of towing operations</i>
<b>Croatia</b>	63 purse seiners, not necessarily all active (29 in 2001 and 31 in 2002)		Cooperation among vessels and visual observations from the vessels	Adriatic Sea	March to October	3 to 20 days
<b>France</b>	38 purse seiners	Gulf of Lions	Aerial search and cooperation among vessels including Spanish ones	all Mediterranean areas	June to October	1 to 12 hrs
<b>Greece</b>	1 purse seiner authorized to fish for bluefin 1 fishing vessel authorized to transport bluefin 2 tug vessels authorized to transport bluefin	Neapoli, Veion and Pireaus				
<b>Italy</b>	87 purse seines (in 2001 and 2002)		No aerial search, but cooperation among vessels is possible, but not recorded.	Mediterranean	March to October	
<b>Libya</b>	5 purse seiners	Tripoli	Cooperation among vessels	Libyan waters	Summer	
<b>Malta</b>	Vessels used for the transport of bluefin include commercial tug vessels, fishing trawlers and multi-purpose fishing vessels	Valletta		Ionian Sea	27th April to 15th July	Usually a few days to about a week
<b>Morocco</b>	200 artisanal boats used for handling (also one trap in the Mediterranean and purse seiners are used)				<u>Handline</u> : June to September <u>Trap</u> : June to October.	
<b>Spain</b>	6 purse seiners (150 GRT, 1200 HP and 38 m in length)	L' Ametlla de Mar (Tarragona)	Aerial search and cooperation among vessels	Levante area of Spain (Balearic Island, Murcia and Tarragona): 37°-42° N/ Coast 0.4° E	April to October	Up to 20 days
<b>Turkey</b>	Over 100 purse seiners (28 in 2002 and 50 in 2003 which are over 32 meters)	Istanbul, Izmir, Trabzon, Bandırma and Canakkale	Fish finder, sonar, bird radar and cooperation among vessels	Mediterranean including the Aegean Sea	<u>Mediterranean</u> : 1 May to 15 July <u>Aegean Sea</u> : 16 Aug. to 1 May	3 days to 3 weeks

## CATCHES AND FISHING EFFORT

The table below provides estimates of annual catches by country and year. Large catches were reported by France, Italy, Morocco and Turkey.

	1996	1997	1998	1999	2000	2001	2002	2003	2004
France	9 680	8 470	7 713	6 741	7 321	6 748	5 870	6 443	7 028
Spain	1 657	1 172	1 573	1 504	1 676	1 453	1 686	2 521	
Italy	--	--	--	--	--	3 255	3 245	--	--
Greece	0	0	0	0	0	0	0	0	--
All EU Countries	11 337	9 642	9 286	8 245	8 997	11 456	10 801	8 964	7 028
Cyprus	0	0	0	0	0	0	0	0	--
Turkey	--	--	--	--	--	--	2 300	3 300	1 090
Croatia	--	1 105	906	970	930	903	977	--	--
Libya	--	--	--	--	--	--	200	905	--
Morocco	1 621	2 603	3 028	2 825	2 923	3 008	2 986	2 557	--
<b>Total</b>	<b>12 958</b>	<b>13 350</b>	<b>13 220</b>	<b>12 040</b>	<b>12 850</b>	<b>15 367</b>	<b>17 264</b>	<b>15 726</b>	<b>8 118</b>

The total catches reported in the surveys are smaller from those given in the FAO FISHSTAT+ database (updated to 2003). Even for 2002, which is the year with most complete data from the surveys, 17 000 tonnes reported in the surveys is much smaller than the estimate of total catch in 2002 from FISHTAT+ (22 400 tonnes) and the Total Allowable Catch (TAC) of 29 500. Data from FISHSTAT+ and the surveys also do not match for most individual countries.

With a fleet of 38 purse seiners and with an annual catch of more than 6 000 tonnes, France is the most important country fishing bluefin. Italy is the second one, with 86 purse seiners catching more than 3 000 tonnes of bluefin per year. Morocco is also important, but its catches are not used for farming. These countries reported catches quite below their ICCAT quotas. The catches reported by Spain include all fishing techniques (purse seine, longline and others).

There is no ICCAT quota specifically allocated to Turkey. The Turkish quota is a part of the quota for "other countries" which is around 1 000 tonnes by year. In response to the survey, Turkey reported a catch larger than the quota for all "other countries" (same as for FISHSTAT+) with 1 600 tonnes introduced to cages.

Regarding fishing effort, most of the data presented refers to the number of vessels. Only Morocco reported the number of days at sea, but this country is not involved in fishing for farming.

The table below provides information on the range of weights of bluefin caught (in kg). For all the countries, these ranges are very wide.

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Croatia	--	--	--	5-200	5-200	5-200	5-200	--	--
France	50-400	50-400	50-400	50-400	50-400	50-400	50-400	50-400	50-400
Italia	--	--	--	--	--	8-400	8-400	--	--
Libya	--	--	--	--	--	--	25-450	25-450	--
Morocco	--	--	--	55-385	45-385	80-385	85-365	65-365	--
Spain	10-200	10-200	10-200	10-200	10-200	10-200	10-200	10-200	--
Turkey	--	--	--	--	--	--	25-450	45-450	35-400

The table below provides information on the mean weight of bluefin caught (in kg). Bluefin catches of Libya and Morocco seem to be dominated by very large fish. Spain mentioned that the large tuna (100–200 kg) are caught in June/July while in August/September the individuals weight are 15 to 20 kg.

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Croatia	--	--	--	24.23	10.06	11.69	8.26	--	--
Italia	--	--	--	--	--	50	50	--	--
Libya	--	--	--	--	--	--	237.5	225	--
Morocco	--	--	--	173	150	195	182	151	--
Spain	20-25	20-25	20-25	20-25	20-25	20-25	20-25	20-25	--
Turkey	--	--	--	--	--	--	70	90	80

The table below provides percentages of catches that were used for farming. With the exception of Morocco, these percentages are generally above 50 percent and for Croatia and Turkey 100 percent or close to it. Since 1996, the percentages have increased continuously, so currently most of the bluefin catch in the Mediterranean is used for farming.

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Croatia	--	--	--	100	100	100	100	--	--
France	0	2	10	30	50-70	50-70	50-70	50-70	50-70
Italia	--	--	--	--	--	81	86	--	--
Libya	--	--	--	--	--	--	50	70	
Morocco	0	0	0	0	0	0	0	0	0
Spain	40	40	40	40	70	70	70	70	
Turkey	--	--	--	--	--	--	70	99	99

## COUNTRIES OF DESTINATION FOR FARMING

Data on relationships between fishing and farming countries are requested in several parts of the survey. In this chapter, all data were summarized in a single table below.

The table provides information in which country bluefin was farmed (country of destination) after catching them by the country specified in the first column (country of origin) of the table. Inside the cells, there are the names of the countries that provided the information. For example, according to France, bluefin caught by France was transported to Cyprus, Malta and Spain. Cyprus and Spain confirmed it, but not Malta. Furthermore, Croatia, Greece and Italy declared that they receive bluefin from France. In general, for the 27 cells filled in the table, in only four cases, both the “fishing” and “farming” countries involved provided consistent information. This refers to bluefin caught by France and transported for farming to Cyprus and Spain and to bluefin caught by Italy and transported for farming to Croatia and Malta. Spain and Turkey declared the import of bluefin from “other” countries. However, none of the countries declares exports to Turkey. Greece declared that it farmed bluefin caught by Greek vessels, but Greece did not report any bluefin catch.

		Country of destination for farming										
		Algeria	Croatia	Cyprus	France	Greece	Italy	Libya	Malta	Spain	Tunisia	Turkey
Country of origin	Algeria											
	Croatia		Croatia									
	Cyprus											
	France		Croatia	Cyprus France		Greece	Italy		France	France Spain		
	Greece					Greece						
	Italy		Croatia Italy				Italy		Italy Malta	Italy		
	Libya					Libya		Libya	Malta	Libya		Turkey
	Malta		Malta				Malta		Malta	Malta		
	Spain		Croatia				Italy			Spain		
	Tunisia		Croatia									Turkey
	Turkey											Turkey

According to Turkey, bluefin caught by South Korean vessels are farmed in Turkey. Spain also reported import and export from and to “other” non-specified countries. According to Libya, France is a destination of the bluefin caught by Libya. However, considering that France is not involved in farming, this information refers probably to transshipments.

## MAGNITUDE AND CHARACTERISTICS OF THE CATCH

Several methods are used to estimate the catches used for farming. Croatia and Turkey use underwater video recording. Estimates by other countries are from logbooks or by counting bluefin using some non-specified methods. Estimates of size composition are difficult to obtain during the fishing process and only Turkey seems to have such estimates from video recordings and from died specimens. Other countries obtain size estimates during the farming process. All reporting countries pointed out the uncertainties of these estimates.

	<i>Explain how the overall catch (tonnes) is estimated (logbooks, observers, etc.)</i>	<i>Explain how catch is sampled (for size composition, etc.)</i>	<i>What are the main sources of uncertainty in estimating catches and size composition?</i>
<b>Croatia</b>	Underwater video recording, camera counting during transfer, divers' estimates based on their experience	No sampling	Technical difficulties in estimation of live fish quantity and of size compositions
<b>France</b>	<u>Before 2000</u> : data from some seafood traders and some from vessels <u>From 2000</u> : from official logbooks	<u>Before the farming started</u> : data of seafood traders or vessel owners <u>After the farming started</u> : no or little information on the size composition <u>In 2003</u> : from observers on board	The characteristics of the fish in the cages very poorly known

	<i>Explain how the overall catch (tonnes) is estimated (logbooks, observers, etc.)</i>	<i>Explain how catch is sampled (for size composition, etc.)</i>	<i>What are the main sources of uncertainty in estimating catches and size composition?</i>
<b>Malta</b>	The catch transferred to the fattening cages is estimated during the transfer at the cage site. The data on the documentation (ICCAT stat doc or T2M) are normally based on the weights of bluefin died during capture and transport. The number of individuals in the cage is normally counted by both fishermen and farmers. The numbers are then confirmed and agreed upon at harvest	Sampling of the fattened fish done during harvest when fork length and body weight measured	Sampling on arrival cannot be carried out due to very high costs. This creates uncertainty between the sellers and the buyers
<b>Spain</b>	Official landing reports from each vessel	<u>Until five years ago</u> : on-board observers <u>Then</u> : observers at fish markets and bluefin processing plants	No observers/samplers onboard of fishing vessels and at farming facilities
<b>Turkey</b>	During the transfer from a purse seine to the cage, two divers record the transfer by video cameras. Then, bluefin are counted by the buyer and the skipper (in slow motion) and according to the experience of the skipper and some crew, an average weight is determined and multiplied by number of the fish	Some bluefin die during purse seining. After weighting the fish and watching the video recordings, an estimated size composition is determined by experienced persons	Video recordings are not always clear. The sudden flow of a group of fish from purse seine to cage hinders accurate counting. The size composition is not as precise as desired. Night time transfers always introduce additional uncertainty

## ESTIMATES OF MORTALITY

Estimates of bluefin mortality during purse seining and transport are very variable from one country to another. In the fishing process, values between 0.5 percent and 15 percent were reported. The mortality estimates in the transport cover also a wide range, but apparently are lower than those during fishing (except in the case of Turkey).

	<i>What percentage of the fish dies during the fishing operation?</i>	<i>What percentage of the fish dies during transport to farming?</i>
Croatia	0.5–10 %	0–5 %
Italia	1–2 %	No data
Libya	15 %	5 %
Spain	No data	Less than 10 %
Turkey	1 %	3 %

## TRADE

The trade of catches for farming among countries is quite complex, as it was shown before and the information provided seems to be incomplete (see following table).

	<i>To what countries does the catch destined for farming go?</i>	<i>Other relevant information on how the catches are traded</i>
France	Mainly Spain and from 2002 possibly to Malta. No cages in France in 2005	The part not used form farming is mainly sold for the European fresh or frozen market through seafood traders
Italia	Spain, Italy, Malta and Croatia	--
Libya	Libya , Spain and Greece	--
Malta	--	The catches are traded as fresh or frozen. Fresh is sent by air-freight. Bluefin are frozen on board at the farming site
Spain	Spain	Usually, arrangements are made between BFT farming companies and fishing vessels including price fixing. When transferring BFT to towing cages, both fishermen and farmers agree on the catch size composition and final price
Turkey	Turkey	In 2002 other than farming, 700 tonnes was destined to Japan (80%) and France (20%)

## SOCIO-ECONOMIC ASPECTS

The socio-economic issues seem to be quite variable among countries, but the responses to these questions are scarce. Subsidies exist in France for fleet renewal, but not in Croatia. However, no general conclusions can be obtained from the information provided.

	<i>Number of people employed in fishing operations</i>	<i>Describe flow of people employed from/to other activities: same vessels are fishing for small pelagic fish, towing boats are used for all other purposes</i>	<i>Any available economic information (e.g. subsidies)</i>
Croatia	226		No governmental incentives
France	Around 10 persons/vessel		Tuna vessels benefit from the national and European subsidies for fleet renewal
Libya	About 15 persons		
Morocco	200–250 persons/trap/season		
Malta	About 90 people in total, including divers, seamen and other boat personnel	Fishermen, divers and tug boat personnel	
Turkey	Approx. 2000 crew	No people employed from other activities. In addition to the crew employed on board the fishing and tug vessels, each farm employ 40–50 people (in total approx. 250 employee)	

## INTERACTIONS

Greece and Libya reported no interactions between tuna fishing for farming and other fishing activities. Malta communicated some conflicts between purse seining and longlining. In Croatia interactions with other fishing activities and minor conflicts with tourism occur. Turkey noted interactions between artisanal fisheries and tourism.