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ICCAT ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA (ICCAT GBYP) ACTIVITY REPORT FOR THE LAST PART OF PHASE 4 & THE FIRST PART OF PHASE 5 (2014-2015), INCLUDING A GENERAL OVERVIEW OF THE ACTIVITIES UP TO 2015

1. Introduction

The Atlantic-wide Research Programme for bluefin tuna was officially adopted by the SCRS and the ICCAT Commission in 2008, and it started officially at the end of 2009, with the objective to:

a) Improve basic data collection, including fishery independent data;
b) Improve understanding of key biological and ecological processes;
c) Improve assessment models and provision of scientific advice on stock status.

The total budget of the programme was estimated at about 19 million Euros for six years, and the European Union and some other Contracting Parties undertook to contribute to this programme in 2009 and in the following years; the budget officially approved by the ICCAT Commission in 2008 was 19,075,000 Euro for six years. The costs of the initial year were 653,874 Euros (against the original approved figure of 890,000 Euros), the costs of the second phase were 2,318,849 Euros (against the original figure of 3,390,000 Euros), while the costs of the third phase were 1,769,262 Euros (against the original approved figure of 5,845,000 Euros). The fourth phase had a total budget of 2,875,000 Euros (against the original approved figure of 5,195,000 Euros) and final costs were 2,819,557 Euros. The fifth phase has a total budget of 2,115,000 Euros (against the original approved figure of 3,345,000 Euros). The overall ICCAT GBYP operating budget for the first five phases, covering six years (a total of 9,676,548 Euros) is about 50.73% of what it was supposed to be (the 19,075,000 Euros approved by the Commission). Several private or public entities provided some additional funds or in kind support. These budget reductions have had an impact on all activities carried out so far.

The ICCAT GBYP funding is provided by voluntary contributions from the ICCAT Contracting Parties. The European Union has funded 80% of the budget for each Phase since the beginning of the programme. The remaining 20% has been provided by the CPCs having a bluefin tuna quota for the eastern stock and by other CPCs.

Taking into account that the funding of this programme is a serious constraint on its activities, the Steering Committee submitted a proposal for funding the ICCAT GBYP through an annual scientific quota. This proposal has been rejected by the Commission several times.

The Steering Committee has repeatedly stated that this programme is of great importance. For this reason, in 2014, the Steering Committee proposed to the Commission to extend the programme up to 2021, however funding is still an issue which needs to be solved.

The detailed ICCAT GBYP report is presented as document SCRS/2015/144.

2. Coordination activities

2.1 ICCAT GBYP coordination

The fourth phase of the ICCAT GBYP officially began on 6 March 2013, following the signature of the Grant agreement for the co-financing of ICCAT GBYP Phase 4 (SI2.643831) by the European

Commission. It was then extended for a total of about 23 months, ending on 23 February 2015. The partial results were presented to the SCRS and the Commission in 2013 and 2014 (documents SCRS/2013/144 and SCRS/2014/051) and they have been approved.

The fifth phase of the ICCAT GBYP officially started on 24 February 2015 following the signature of the Grant agreement for the co-financing of the ICCAT GBYP Phase 5 (SI2.702514) by the European Commission and will end on 23 February 2016.

In the second part of Phase 4 the staff was reduced, leaving only the Coordinator; the previous staffing level (an assistant and a data base specialist) was resumed from May 2015. The ICCAT Secretariat has always provided the support necessary for ICCAT GBYP activities.

A total of nine Calls for Tenders were issued in Phase 4 and a total of 25 contracts were awarded to various entities in Phase 4. Six additional Calls for Tenders have been announced to date in the first part of Phase 5 and a total of 15 contracts have been awarded to date to various entities in Phase 5.

A total of 88 contracts have been awarded under the ICCAT GBYP up to the first part of Phase 5 to 83 entities, located in 23 different countries; many hundreds of researchers and technicians have been involved to date in the various ICCAT GBYP activities. This extensive and open participation in ICCAT GBYP activities is considered to be one of the best results of this research programme.

A total of 45 reports were produced in the framework of Phase 4 of the ICCAT GBYP. Several additional documents and reports have also been issued by the ICCAT GBYP for the needs of Steering Committee meetings. A total of 58 scientific papers were produced in Phase 4, while others will be published later on. A total of 22 reports have been produced in the first part of Phase 5, along with 25 scientific papers.

2.2 Mid-term Review

The mid-term review of ICCAT GBYP was carried out in Phase 4 and the report, which was distributed to the Commission and the SCRS, is available at http://www.iccat.int/GBYP/Documents/RESEARCH/GBYP_Mid-Term_Review2013.pdf .

The reviewers provided an extensive analysis of the work carried out from 2010 to 2014 and an extensive range of proposals for improving the research in the following years.

The reviewers recognized the important improvements in scientific knowledge obtained by the ICCAT GBYP in the first parts of the programme. Specifically, the reviewers pointed out that “on the whole, the ICCAT GBYP did yield an impressive increase in scientific investigations into Atlantic bluefin tuna, delivering much of the background scientific evidence crucial to conducting and improving stock assessments and ultimately management advice” and that “the investment in coordination of the programme through ICCAT is another shining example of good practice”.

3. Steering Committee

The ICCAT GBYP Steering Committee is currently composed by the SCRS Chair, the West bluefin tuna Rapporteur, the East bluefin tuna Rapporteur, the ICCAT Executive Secretary and one contracted external expert.

The activity of the Steering Committee included regular correspondence by e-mail with the ICCAT GBYP coordination, which provided the necessary information, as well as a monthly report. In Phase 4, the Steering Committee held three meetings (28-29 September 2013, 22-26 September 2014

and 10-12 February 2015), discussing various aspects of the programme, and providing guidance and opinions. All finalised reports of the Steering Committee are available at http://www.iccat.int/GBYP/en/scommittee.htm.

4. Data mining and data recovery

The total budget for data mining and data recovery activities over three years was 600,000 Euros; so far, the total expenditure for six years of activities has been 395,462.06 Euros (65.91% of the original budget), and much more data has been recovered than initially planned. Several SCRS meetings and workshops have been held on bluefin tuna data, including the Symposium on Bluefin tuna traps. To date, the ICCAT GBYP objectives set for data recovery and data mining in these first Phases have been largely accomplished.

The data mining and data recovery activity continued according to the objectives recommended by the Steering Committee. A complete and detailed overview of the data recovered in this last period is available (see documents SCRS/2013/073, SCRS/2013/169, SCRS/2014/042, SCRS/2014/049 and SCRS/2015/148). Most of the market and auction data provided to the ICCAT GBYP as a donation in kind were initially validated (SCRS/2014/042) and were finally endorsed by the SCRS. Task II data collected by the ICCAT GBYP are currently incorporated in the ICCAT bluefin tuna database. All the historical trap data received as a donation in kind in Phase 4 were checked against the ICCAT GBYP trap database and the results are provided in document SCRS/2015/148.

Furthermore, a specific activity for recovering genetic data from ancient bluefin tuna samples was carried out in the last part of Phase 4 and in the first part of Phase 5. An initial report (SCRS/2014/147) was presented to the SCRS, while a second comprehensive report (with genetic data from the 2nd century B.C. to the early 1900s) will be available at the end of Phase 5.

5. Aerial survey

The ICCAT GBYP Aerial Survey on bluefin spawning aggregations was initially identified by the Commission as one of the three main research objectives of this programme, in order to provide fishery-independent trends and estimates on the minimum SSB. The original programme included a total of three surveys over a maximum of three areas, but this was later modified by the Steering Committee, and a first power analysis revealed that under the best possible conditions a minimum of six/seven surveys will be necessary for detecting a trend. The total original budget set for three surveys in three areas was 1,200,000 Euros; the cost of carrying out four surveys in many more areas (four main “internal” areas and seven “external” areas) is approximately 1,619,624.24 Euros (134.97% of the original budget, but with more than twice the activities). So far, the ICCAT GBYP objectives initially set for the aerial survey on spawning aggregations in these first Phases have been largely accomplished.

The aerial survey design was revised again in 2015, according to the specific request of the Steering Committee. It included four “internal” areas and seven “external” areas, covering more than 60% of the Mediterranean Sea. Furthermore, ICCAT GBYP set an improved protocol for the aerial survey. A SWOT analysis for assessing the possibility of a calibration exercise was carried out by the ICCAT GBYP coordination and presented to the Steering Committee; it is now available in document SCRS/2015/143. ICCAT GBYP issued a Call for Tenders and four contracts were awarded in 2015. A training course for pilots, professional spotters and scientific observers was held at the Secretariat on 26 May 2015. The survey was conducted in most of the Mediterranean areas thanks to the cooperation of various ICCAT CPCs, but permits were not available for some southern and eastern air spaces. In spite of many operational and logistical difficulties or constraints and thanks to the strong cooperation of some CPCs as well as the four companies in charge of the survey, it was possible to carry out the survey and to obtain all the final reports.

The Steering Committee requested a complex and comprehensive analysis, providing an external contract and an extremely preliminary report (SCRS/2015/147). For the first time, it was also possible to use the data obtained from a selection of miniPATs for studying the additional variance associated with the bluefin tuna behaviour during the spawning season in the survey area (SCRS/2015/146). The data collected in Phases 4 and 5 confirmed the validity of the approach adopted in Phases 1 and 2, but at the same time confirmed the need for conducting several surveys before detecting any trend for a minimum SSB, due to the high variability of the oceanography in the Mediterranean Sea and adaptive behaviour of bluefin tuna.

6. Tagging

The initial, short-term ICCAT GBYP objective approved by the Commission in 2008 was to implant 30,000 conventional tags and 300 electronic tags in three years in the eastern Atlantic and Mediterranean, with a total budget of 9,765,000 Euros; the mandatory tag awareness and reward campaigns, as well as the tagging design study and protocol, were not included. So far, with only 37.65% of the funding (a total of 3,767,593 Euros, including the budget amount set for Phase 5, equal to 431,758 Euros), the ICCAT GBYP has deployed 81.05% of the conventional tags (24,314) and 79.33% of the electronic tags (238; 180 mini PATs, 50 internal archival tags and 8 acoustic tags). Furthermore, the tagging design and protocols, the awareness and reward campaigns have been included in the activity carried out to date. It is very clear that the general objectives set for the tagging activities in these first Phases have been largely accomplished so far in terms of the total number of tags to be deployed, taking into account the proportion of the available budget.

6.1 Conventional and electronic tagging activity

The tagging activities carried out in Phase 4 were reported to the SCRS (SCRS/2014/048 and SCRS/2014/184).

In September 2014, the Steering Committee adopted a different tagging strategy for Phase 5, maintaining the conventional baitboat tagging only in the Bay of Biscay and in the Strait of Gibraltar, while electronic tagging activities were planned in traps for adults (both in Morocco and Sardinia); experimental tagging with miniPATs was planned in the eastern Mediterranean and by purse seine for adults in the Turkish area. In February 2015, the Steering Committee considered that it was impossible to deploy the tags in all the areas as planned at the beginning due to various logistical and security issues, that was not possible to carry out any PIT tagging, that the scientific tag recovery activity was not possible for some changes in the fisheries and that this would be anyway limited to one or two areas, that the tag reporting rate for conventional tags was too low and recommended revising the plan for Phase 5, by cancelling the conventional tagging, and directing all activity only at electronic tagging in the three areas previously identified.

ICCAT GBYP issued a Call for Tenders and three contracts were awarded in 2015. 20 miniPATs were deployed in a Moroccan trap (Larache), 30 (of a total of 40) miniPATs were implanted in tunas caught by a purse-seiner in the Turkish area and 28 (of a total of 30, because the tags that were not used in Turkey were moved there) miniPATs were deployed in a Sardinian trap (Isola Piana). Furthermore, a complimentary tagging activity was carried out on tunas kept in an Italian cage (Marina di Camerota) that were released at sea and five miniPATs were implanted. Most of these tags had a premature release, suspected to be mostly due to fishing operations, however some tags provided extremely important results. The detailed report is provided in SCRS/2015/149.

As a matter of fact, five of the tags deployed in Turkey went to other Mediterranean areas (one off Libya, two in the Ionian Sea). One fish was off the Galician coast and another one as far as the North East Atlantic, off the Faroe Islands. The results from these tags, together with the recapture in 2015 in Turkey of two tunas tagged in the Strait of Gibraltar and in the Adriatic Sea, can finally support the

results of the ICCAT GBYP genetic studies, which showed full mixing in all bluefin tunas sampled in the Mediterranean Sea. At the same time, any different hypothesis made up to 2014 about a possible isolation of the bluefin tunas in the Levantine Sea seems unsustainable.

The results from the tags deployed in Morocco in 2015 show that most of the tunas entered into the Mediterranean Sea, possibly for spawning. Even here, a re-analysis of the full data sets from the tags deployed in Morocco since the beginning of the ICCAT GBYP, along with the data concerning the fish natal origin obtained by the ICCAT GBYP micro-chemistry analyses, might have detected a possible solution for explaining why several tunas did not enter in the Mediterranean for spawning during those years. It seems that the highly variable percentage of western Atlantic-origin fish in the Moroccan traps could be a major motivation, although not the only one. The bluefin tuna tagged with both miniPAT and conventional tags in Morocco in cooperation with the University of Stanford in 2014, which went close to Greenland in the same year, was recently fished in the Strait of Gibraltar, providing another important piece of our knowledge.

Furthermore, as reported in item 5, the data sets obtained from miniPATs implanted in tunas that entered the Mediterranean Sea during the spawning season and coincided with the aerial survey, were used for the first time for preliminary assessment of an additional variance for the ICCAT GBYP aerial survey (SCRS/2015/146).

Additional complimentary tagging activities with conventional tags are or have already been carried out in Phase 5 in Italy, Morocco, Spain and Portugal. The full data will be available at the end of Phase 5.

In total, up to 1 September 2015, the total number of bluefin tunas tagged in all Phases of ICCAT GBYP is 16,883, and a total of 24,560 tags of various types have been implanted, mostly in juvenile bluefin tunas. Among these, 7,878 bluefin tunas were double tagged, amounting to 46.6% of the fish, a percentage which is well over the target (set at 40%).

These last activities show how important tagging activity is and how essential it is to continuously refine objectives and comprehensive analyses, taking into account the many ICCAT GBYP (and other) research projects and the extremely complex and adaptive behaviour of bluefin tuna. These results clearly show the great interest of ICCAT GBYP tagging activities in the future Phases of the ICCAT GBYP, providing inputs for more realistic management of the bluefin tuna stocks and populations.

6.2 Tag awareness and tag reporting campaign

According to the recommendations provided by the Steering Committee in all meetings, the ICCAT GBYP continued the tag awareness campaign, for the purpose of improving the tag recovery and reporting rates. Further, thousands of awareness material in 12 languages (posters and stickers) were produced and distributed in all Phases. Details are available at: http://www.iccat.int/GBYP/en/AwCamp.asp. The tagging awareness campaign is coupled with a tag reward campaign which is strongly recommended by the Steering Committee, and includes substantial rewards, special T-shirts and increased annual lottery prizes. The ICCAT GBYP also provides immediate feedback to the tagging teams and the tag recovery persons, informing them about the history of each tag. A field tag awareness programme was developed in 2014 in which several countries have been visited, and contact made directly with local authorities, fisher organizations, tuna factories, tuna traps, observers and sport fishers: (http://www.iccat.int/GBYP/Documents/TAGGING/PHASE%204/_Tag_Awareness_Report_2014.pdf). Specific training was provided yearly to ICCAT ROPs, requesting that they pay maximum attention to tags (including natural marks) when observing harvesting in cages or any fishing activity at sea.

To improve information and tagging programme awareness, ICCAT GBYP is developing contacts with various stakeholder organizations and journalists. Information on the ICCAT GBYP is now present on various websites, while some articles have been published in local newspapers.

A total of 341 tags (311 conventional tags, 19 mini-PATs, 7 archival tags and 4 commercial tags) from bluefin tunas have been reported to ICCAT GBYP up to 4 September 2015, showing a very substantial improvement in the total number of reported tags (see details in documents SCRS/2014/048, SCRS/2014/051, SCRS/2015/144 and SCRS/2015/149). Even if the tag reporting rate is still very low (0.91% of the deployed tags), comparing the mean annual bluefin tuna tag reporting rate to ICCAT for the eight years (2002-2009) prior to ICCAT GBYP (0.77 tags/year) and the current reporting rate for the full period of the ICCAT GBYP up to 1 September 2015 (60.14 tags/year), the increase is about 7810%.

Furthermore, the double tagging activity planned for studying the shedding rate of the different types of spaghetti tags and the specific recoveries reported so far (from 90 fish, with a reporting rate of 1.14%) showed that the results between single-barb spaghetti and double-barb spaghetti are quite comparable, because the double-barb ones were still on the fish in 92.2% of the cases, compared to 90% of the single-barb ones.

7. Biological studies

The initial, short-term ICCAT GBYP objective approved by the Commission in 2008 was to collect samples from 12,000 fish (including western Atlantic and the Japanese catches and markets) and carry out ageing and genetic studies, and micro-constituent analyses in three years in the eastern Atlantic and Mediterranean, with a total budget of 4,350,000 Euros. So far, with only 34.04% of funding (a total of 1,480,787 Euros, including the budget amount set for Phase 5, equal to 342,496 Euros), the ICCAT GBYP collected samples from 9217 fish (76.8% of the target) and carried out ageing, genetic and micro-constituent analyses; furthermore, the sampling design and protocols, and the otolith shape analyses were included in the activity carried out so far. It is very clear that the general objectives sets for the biological studies in these first Phases were largely accomplished so far, taking into account the proportion of the available budget.

An SCRS meeting was organized in May 2013 in Tenerife for reviewing the bluefin tuna biological parameters and the report is available on http://www.iccat.int/Documents/Meetings/Docs/2013-BFT_BIO_ENG.pdf. The results are also on documents SCRS/2013/074, SCRS/2013/080, SCRS/2013/089, SCRS/2013/94, all presented at the Tenerife meeting. The latest data are in SCRS/2014/051 and SCRS/2015/144. The details of the areas were revised jointly by the ICCAT GBYP coordination and the Steering Committee prior to the field activities in 2015 and now there are 12 areas, 38 strata and 79 substrata, allowing for detailed analyses.

Following two Calls for Tenders in Phase 5, two contracts were awarded. One of the contracts was awarded to a large Consortium of 14 entities and 7 sub-contracted entities, belonging to 11 countries, and is in charge of both sampling and analyses. Unfortunately, it was not possible to contract out the ageing calibration in 2015, due to the unacceptable quality of bids received in Phase 5.

In total, 9,217 bluefin tunas have been sampled up to September 1, 2015 and about 40% have already been analysed. At the moment, there are 6,795 muscle/fins, 4,447 otoliths, 3,493 spines and 688 gonads already stocked in the ICCAT GBYP tissue bank, currently maintained by AZTI; an additional 735 fish were sampled in 2015, but sampling is going on in many areas.

The first results, which can still be considered preliminary, are extremely interesting and very promising:

- Genetic analyses show that there is a genetic difference between western Atlantic bluefin tuna and eastern Atlantic bluefin tuna, and a certain mixing is present in almost all areas; at the same time, for the eastern Atlantic stock, it is difficult at the moment to discriminate among the many Mediterranean areas because there is significant mixing. Results need to be confirmed by a larger number of samples, further extending the sampling to areas which have not yet been sampled.
- Microchemistry analyses showed that current stock components are well identified; mixing in the Mediterranean Sea is minimal, but the presence of important percentages of bluefin tuna from different areas in central-North Atlantic and in Atlantic Ibero-Moroccan area needs to be much more investigated and checked before having more solid results, but it seems that the two stocks can be present there, with a very high interannual variability; it is possible that intra-Mediterranean components can be further discriminated.
- Otolith shape has provided the first, very preliminary results and even here it seems that bluefin fin tuna population components show some differences, but many other analyses are needed to better study the differences.
- A first ageing calibration was carried out in 2014, with broad participation from scientific institutions and scientists belonging to several CPCs; the initial results show good improvements and similar exercises for smoothing the biases, which are essential for more accurate ageing of bluefin tuna, must be continued.

8. Modelling approaches

The initial, short-term ICCAT GBYP objective which was approved by the Commission in 2008 was to carry out operating modelling studies from year 4, with a total budget of 600,000 Euros. So far, with only 62.98% of the funds (a total of 377,895 Euros, including the budget amount set for Phase 5, equal to 194,670 Euros), the ICCAT GBYP carried out many modelling activities from Phase 2, following the recommendations of the Steering Committee and the SCRS. It is very clear that the general objectives set for the modelling studies in these first Phases were largely accomplished so far, taking into account the proportion of the available budget. Furthermore, the modelling plan was fully revised and now it has been extended up to 2021, as it was endorsed by the Commission.

In Phase 4, two meetings were held on modeling: a first one in May 2013 in Tenerife (EU-ESP) for preparing a first discussion draft document (see: http://www.iccat.int/GBYP/Documents/MODELLING/PHASE%204/tenerife_Modelling.pdf, and http://www.iccat.int/GBYP/Documents/MODELLING/PHASE%204/Tenerife_gbyp-modelling_draft_proposal.pdf) and a second was held in July in Gloucester (USA), where a detailed planning of bluefin tuna modeling activities have been agreed for the submission to SCRS (http://iccat.int/Documents/Meetings/Docs/2013_BFT_METHODS_REP_ENG.pdf). Another meeting was held in Phase 5, during the SCRS Bbluefin tuna data preparatory meeting in March 2015 (http://iccat.int/Documents/Meetings/Docs/BFT_DATA_PREP_2015_eng.pdf).

A modeling coordinator and a modeling technical assistant were contracted in Phase 4, following two Calls for Tenders, according to the decision taken by the bluefin tuna species group, the ICCAT GBYP Steering Committee and the SCRS. An ICCAT GBYP Modelling Steering Group was also established. The modelling coordinator was replaced in Phase 5, based on a recommendation of the Steering Committee. There were changes in the membership of the ICCAT GBYP Modelling-MSE Steering Group in Phase 5, taking into account the new BFT rapporteurs and SCRS Chair. The data obtained from the electronic tagging activities have been included in the trials. The work necessary for developing new modeling approaches will take several years.

9. Legal framework

ICCAT adopted the Rec. 11-06 in its meeting in Istanbul in November 2011, which allows for a "research mortality allowance" of 20 t of bluefin tuna per year for the ICCAT GBYP and for the use of any fishing gear in any month of the year in the ICCAT Convention area for ICCAT GBYP research purposes. To implement the recommendation, the ICCAT Secretariat issues a circular in each year of ICCAT GBYP activity.

A total of 171 ICCAT GBYP RMA certificates have been issued up to September 14, 2015 in respect of a total of 10,539.892 kg of bluefin tuna; 6 RMA certificates, concerning 33 tunas for a total of 219.862 kg have been issued so far in Phase 5, but the sampling activity is ongoing. The details are reported in SCRS/2015/145.

10. Cooperation with ROP

The ICCAT GBYP coordination, together with the ICCAT Secretariat, is maintaining and improving the contacts with the ROP observers, for strengthening the cooperation and providing opportunities. The ROPs observers are engaged in checking directly bluefin tuna at harvest for improving tag recovery and reporting. The observers are also requested to report any natural mark and a specific form was provided by the ICCAT GBYP to ROPs. The ICCAT GBYP Coordinator provided yearly a specific training to the ROPs.

11. ICCAT GBYP Web page

The ICCAT GBYP web page, which was created in the last part of Phase 1, is usually updated regularly with all documents produced by the ICCAT GBYP; in some cases, due to the huge workload, some sets of documents are posted all together. The updating also includes the budget page, where all contributions (monetary or in kind) are regularly listed, to ensure full transparency. The ICCAT GBYP web pages have recently been fully revised and improved.

12. Following activities

The ICCAT GBYP Steering Committee, the mid-term review and the various ICCAT GBYP meetings provided a list of recommendations on various issues; several of them are essential for fulfilling the duties. A summary of the point of view of the Steering Committee after its last meeting is provided in **Annex 1**. A document on ICCAT GBYP activities presented by the Steering Committee is also provided in **Annex 2**. Further recommendations will be provided this year by the SCRS and will then be forward to the Commission.

In addition, the ICCAT GBYP considers it essential to better define the following points:

a) *Evolution of the Atlantic-Wide Research Programme for Bluefin Tuna*: According to the current situation, it has been fully demonstrated that it is impossible to reach the level of funding approved by the ICCAT Commission for the first six years of the ICCAT GBYP and, as a consequence, to carry out the various activities as originally planned. The extension of the programme up to 2021 was discussed and considered by the Commission in 2014. However, the ICCAT GBYP funding system should be revised and better defined, stabilised and improved, in order to ensure the regular development of the activities. Regardless of the type of system envisaged, the budget by Phase or year, subject to the Commission's approval, must be ensured. A second external review should provide an independent overview of the work carried out so far and possible proposals for the following extension.

b) *Data recovery and data mining*: Task II data have finally been included in the ICCAT bluefin tuna database; several data conflicts were resolved, but some others must be revised as soon as possible by the CPCs and national scientists concerned. The many sets of market and auction data which were validated will be included in a specific ICCAT database and made available to scientists as soon as possible. If additional reliable data about LL BFT fisheries in the Mediterranean in the last decade or other additional data sets, not already included in official Task II data, are detected, then these data should be recovered and used for improving our understanding of these fisheries.
c) *Aerial survey*: It is considered essential to continue the survey on spawning aggregations in selected areas, for providing a trend to be used in advanced models; a minimum of 6/7 years of survey is needed; the prediction model using the SST data should be further developed and improved; the additional variance estimated thanks to the electronic tags will possibly improve the assessment. An enhanced power analysis will provide the necessary data for informing any further decision about this activity.
d) *Tagging*: Electronic tagging should be strongly improved, while conventional tagging should be carried out capitalising on the experiences in the first part of the ICCAT GBYP. In particular, electronic tagging should be carried out in the eastern Mediterranean, improving the logistical component. Tag awareness activity will be consistently continued, strongly improving media communication.
e) *Biological and genetic sampling and analyses*: Sampling should be continued, covering the less sampled areas or areas where mixing problems have recently been detected; the analyses of the available samples should be improved; age analyses should be cross checked for validation (repeating the calibration). The recovery of old ICCAT BYP samples should be defined.
f) *Modelling*: New additional efforts should be devoted for finding the best approaches for using fishery independent data and innovative approaches for better quantifying uncertainties. The dialogue with stakeholders should be activated and possibly improved. The revised plan should be enforced as soon as possible.

The total budget necessary for Phase 6 is provisionally set once again at €2,125,000.

The ICCAT GBYP will continue encouraging and supporting additional research activities carried out by the various CPCs.

Annex 1

ICCAT GBYP Steering Committee
Summary of meeting held in Madrid (*27 September2015*)

During this meeting the Steering Committee (SC) of the ICCAT GBYP reviewed all documents provided by the ICCAT GBYP Coordinator including SCRS/2015/143, SCRS/2015/144, SCRS/2015/145 SCRS/2015/146, SCRS/2015/149, SCRS/2015/147, SCRS/2015/208 and SCI-039/2015 and adopted the proposed Agenda.

The SC commends the ICCAT GBYP team on the progress achieved during Phase 5, and recognizes the positive effects that the hiring of the two new staff has had on the productivity of the programme. The ICCAT GBYP Coordinator attempted to implement all the recommendations that the SC made for Phase 5, including changes in the research programme aimed at enhancing the ability of the programme to reach its original objectives.

Great difficulties continued to be found in the implementation of the aerial survey caused by logistically issues related to the political situation in the Mediterranean and the complicated legal environment within which the project needs to implement aerial flights. The information gathered during the 2015 survey adds to that collected in earlier surveys, however, it is unclear to the SC whether the data collected so far indicates whether aerial surveys of adult fish are a viable alternative for a fishery independent index of abundance. The ICCAT GBYP has completed a preliminary analysis of the data collected in the "core areas" of the survey to start answering this question. The SC, however, believes a definite answer will not be reached until a more thorough power analysis of the current aerial surveys (as constrained by logistics) is completed. The SC recommends setting aside resources to implement such a power analysis as soon as possible.

Biological data collection is progressing and has started producing the kind of data that will be usable in the next stock assessment of bluefin tuna. The ICCAT GBYP has put in place modifications to this component that will speed up the processing of biological data that has been accumulating, so that it will be available for the next assessment. The SC places high priority in this processing of biological data (especially the one related to age-length keys) in a format that can be used by the SCRS.

The SC appreciates the efforts made by the ICCAT GBYP team in implementing a more ambitious set of satellite tagging experiments which, in spite of some difficulties, have already yielded very valuable information regarding the structure of the stock within the Mediterranean and its relation to the rest of the Atlantic. This information will also be very valuable in interpreting the probability of detection of tuna by aircrafts, because it contains information on the distribution of fish at depth during the time that aerial surveys are being conducted. Although the release of tuna marked with conventional tags has more or less halted, the SC urges the ICCAT GBYP to continue to invest heavily on tag awareness campaigns in the expectation that tuna released with conventional tags in the past will have grown to sizes that are more likely to be caught by the current fishery. The SC supports the idea of seeking new media and strategies to make this campaign more effective.

The SC will help the ICCAT GBYP at identifying new candidates to implement the feasibility study of close kin and genetic tagging as soon as possible, because this technology has the potential to be an alternative to others attempted so far to develop fishery independent abundance indices.

The data recovery projects have been providing useful information and the SC supports its continuation, at the same level of funding as before, as long as these projects continue to produce data that are clearly useful to the assessment of bluefin tuna.

Progress on the modelling intending to advance the development of an MSE framework for bluefin tuna have been delayed by the change in composition of the modeling group but the SC has confidence that the new team will progress better and faster towards its objectives. The SC stresses the long term support for this activity because it feels it is an essential tool to evaluate not only management strategies but also the value of data for the assessment including the ICCAT GBYP data. The SC therefore commits to continue to fund this activity as long as the ICCAT GBYP continues. The SC supports the proposal to hold the next meeting of this Group in Monterey in January 2016.

The SC supports the continuation of MSE modelling, biological sampling, electronic tagging and data recovery for Phase 6 of the programme. The SC, however, is not convinced that the aerial surveys should be conducted in phase 6. The SC will not support such implementation unless the proposed power analysis is completed prior to February 2016 and provides clear evidence that an aerial survey based on the core areas can produce indices of abundance that are useful in the assessment. If this evidence is not forthcoming the ICCAT GBYP should not implement such a survey in 2016.

The SC acknowledges that the ICCAT GBYP has only achieved some of the original objectives of the programme. Many of the delays and difficulties that have caused such objectives not being achieved are clearly outside the control of the ICCAT GBYP staff, including the logistic difficulties to implement the programme in the Mediterranean in the present time and the shortcoming in funds produced by adjustments made by the funding agency. The SC and the ICCAT GBYP staff have tried to remediate some of such shortcomings by adjusting work plans and experimental designs, however, some of such adjustments are yet to produce the desired effect.

The SC sees the ICCAT GBYP as a unique opportunity to advance science in support of the management of bluefin tuna and is committed to its continuation beyond Phase 6. The SC and the ICCAT GBYP therefore support the implementation of an external review of the programme that can help the ICCAT GBYP improve its work and, more importantly, to develop the proposal for next phases of the ICCAT GBYP that are planned for the period following the completion of Phase 6. This review should be completed and presented at the 2016 SCRS meeting with the view of providing information to evaluate the performance of the ICCAT GBYP and to adjust its plans for the future.

Annex 2

Document on ICCAT GBYP provided by the Steering Committee

The objectives of the ICCAT GBYP are to improve basic data collection, understanding of key biological and ecological processes, assessment models and the provision of scientific advice. There are five main areas of work, namely *Data Mining, Biological Sampling, the Aerial Survey, Tagging and Modelling*. A key measure of the success of the ICCAT GBYP is whether the data collected under the ICCAT GBYP is used by the bluefin tuna stock assessment working group to provide advice to the Commission.

The first steps in utilizing the information collected under the ICCAT GBYP were made during the 2014 update of the eastern bluefin assessment, whereas preliminary revision of the catch-at-age data incorporating historical information from the ICCAT GBYP data mining activities was used in a sensitivity analysis. Tagging data, biological information, age-length keys and aerial survey data from the ICCAT GBYP will be evaluated during the 2016 data preparatory workshop with the intention of being used in the next assessment. The main activity under the Modelling component of the ICCAT GBYP is to conduct Management Strategy Evaluation (MSE) in order to evaluate alternative management procedures and to the benefits and costs of different data collection schemes, assessment methods and management options. The operating model developed for the MSE may also be used as the basis for a new stock assessment method that can more effectively utilize the new information obtained through ICCAT GBYP and other programmes. To this end, the ICCAT GBYP contracted an MSE Coordinator and a Technical Assistant in 2014 and 2015 to lead this work.

In 2013 (under Phase 4) a mid-term review was held of the ICCAT GBYP, the review concluded:

The review team considers too that (i) a future ICCAT GBYP type project should be developed by ICCAT with a view to it commencing as the current ICCAT GBYP ends in 2015, and (ii) the SCRS and the ICCAT Commission be tasked now with investigating and promoting such an ambitious project as part of its long-term investigations into improved management of Atlantic bluefin tuna. The review team also recommends that any next generation of an ICCAT GBYP be fully justified and described by means of a full-scale research plan showing in detail the proposed content of the programme: research actions planned and their priorities, cost and time-scales, etc. Ideally, a small task force should be created to take cognizance of all ICCAT GBYP results to date in making their recommendations.

When evaluating programmes such as the ICCAT GBYP, key criteria are relevance, efficiency, effectiveness, impact and sustainability. For example the reviewers asked *"what is the most cost effective way to produce a useful long-term index from aerial surveys and how soon will the outputs feed, with some value, into the stock assessment process"*. The review also urged an immediate quantitative analysis of tag recovery rates.

MSE can be used to develop a management procedure (MP) like that used by the CCSBT, which sets management measures (e.g. a Total Allowable Catch) without direct input from the Commission. However, MSE can also be used to evaluate the costs and benefits of different data collection schemes and scientific studies. For example will the data from the tagging activities and aerial survey be able to provide cost effective advice. It could therefore be used to *justify the ICCAT GBYP research plan showing in detail the proposed content of the programme: research actions planned and their priorities, cost and time-scales, etc.* as proposed by the mid-term review.

As the programme, which was established in 2009, is nearing its end, it seems highly appropriate to objectively assess the progress to date and the most effective way to move forward. To this end, the ICCAT GBYP will be issuing calls for tender to fully evaluate the utility of the current aerial survey and tagging activities. It will also issue a call for tender to evaluate the feasibility of genetic tagging (including close-kin analyses such as have been conducted for southern bluefin tuna).

If the programme continues to use the same methods as those employed in the last six years, without evaluating how the data and knowledge gained will improve the scientific advice framework, the programme may fail to meet management objectives, To avoid this risk it is essential to conduct a cost/benefit analysis to help design a programme which will meet programme objectives in a cost effective way. This also requires a clear definition of objectives and milestones to monitor progress.