INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS

COMMISSION INTERNATIONALE POUR LA CONSERVATION DES THONIDES DE L'ATLANTIQUE

COMISIÓN INTERNACIONAL PARA LA CONSERVACIÓN DEL ATÚN ATLÁNTICO

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ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA

(ICCAT- GBYP)

PHASE 3

EC GRANT AGREEMENT SI2.625691

ANNUAL REPORT

GBYP SCIENTIFIC AND TECHNICAL PRELIMINARY FINAL REPORT FOR PHASE 3 ACTIVITIES

March 6, 2013

ICCAT – Calle Corazón de Maria 8, 6° - 28002 Madrid – España

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Executive summary

Phase 3 of GBYP was completed on schedule, besides the budget constraints. The activities carried out in GBYP Phase 3 included coordination, data recovery and analyses, conventional and electronic tagging, tag awareness and recovery, biological and genetic sampling and analyses and various modeling approaches. Additional activities were carried out by the coordination staff. Almost all objectives have been fulfilled.

The data mining allowed a first exploratory investigation of the Ottoman and Turkish Naval archives and for the first time it is possible to better understands what are the information and data available among several million of documents. The GBYP, as requested by SCRS, carried out a complete quality control and analysis of all data (1512-2009) recovered since 2010 and now they are fully ready for the incorporation in the ICCAT data base. SST and wave data in 2012 were collected daily directly by the GBYP coordination staff.

Tagging activities were conducted on schedule, but in the Mediterranean it was impossible to reach the target, due to the almost complete absence of bluefin tuna of age 1 and 2 close to the surface. The objective was reached in the Bay of Biscay. Most of the electronic tags were implanted and 7 over 40 miniPATs had already a premature detachment, showing mostly a permanence of juvenile tunas in the Bay of Biscay. The electronic tagging activity carried out in a Moroccan trap confirmed various different behaviours in spawners and large-scale movements of adult bluefin tuna.

The biological and genetic sampling and analyses are now adding more consistency to the first data sets obtained in 2011, reaching the objective. The age/length analyses are now much more numerous, genetic analyses are providing further evidences of possible more complex subpopulation structures (at least W. Atlantic, Western/central Mediterranean and Eastern Mediterranean), with possible partial mixing and microchemistry analyses are giving further support to the homing behavior of spawners and the various sub-components of the bluefin tuna population. It is also clear that these sets of data need further years of studies before a more precise definition of the various sub-populations and the mixing rates, due to the complex population structure of bluefin tuna.

The modeling studies are going on, with an extended risk analyses and two additional studies which faced specific problems for various data sets used in the modeling. Furthermore, a fourth study concerned the use of aerial survey indices in operative models. The operative models will be more precisely defined in Phase 4.

1.0 Introduction

The Atlantic-wide research programme for bluefin tuna was officially adopted by SCRS and the ICCAT Commission in 2008, after a long process. In 2003, as an input of the Working Group established by Rec. 02-11, SCRS presented the Commission with a research plan to improve knowledge on bluefin tuna, with a special focus on mixing between the two stocks (ICCAT, 2004, Col. Vol. Sci. Pap. ICCAT, 56(3): 987-1003). The various research elements included in this first proposal are still pertinent today, even if some other activities have been included in the following years. During the Marrakech Commission meeting (2008), the SCRS chair met with all the scientists present at the meeting and a detailed proposal was forwarded to the Commission. The proposal was adopted by the Commission in plenary (ICCAT Report 2008-2009 (I), 1: 40) and resulted in a first official document, Res.08-06, which covered only the 2004 SCRS proposal but under a broader title. At the same time, the Commission approved the STACFAD Report (ICCAT Report 2008-2009 (I), 1: 42), which included the agreement to endorse the Atlantic-wide research programme (ICCAT Report 2008-2009, (I), 1, Appendix 10 to Annex 9: 284-287), establishing three priorities in 2009 (Coordinator, data mining and Aerial surveys), other action to be further discussed by SCRS in 2009 and the provision for the programme to be adjusted in the following years taking into account the evolution of its implementation and research needs. The total budget of the programme was estimated at about 19 million Euros in 6 years. The same document reports the engagement of the European Community and some other Contracting Parties to contribute to this programme in 2009 and in the following years.

The SCRS, in 2009, reviewed the updated research proposal submitted by SCRS chair, as it was discussed and presented to the Commission at its meeting in 2008 (ICCAT Report 2008-2009 (II), 1: 224 and ICCAT Report 2008-2009 (II), 2: 223-224). The SCRS indicated the priorities identified in the 2008 document, as follows:

a) Improve basic data collection through mining (including information from traps, observers, and VMS), developing methods to estimate sizes of fish caged, elaborating accurate CPUE indices for Mediterranean purse seine fleets, development of fisheries-independent information surveys and implementing a large scale well planned conventional and genetic tagging experiment;

b) Improve understanding of key biological and ecological processes through electronic tagging experiments to determine habitat and migration routes, broad scale biological sampling of live fish to be tagged and dead fish landed (e.g. gonads, liver, otoliths, spines, etc.), histological analyses to determine bluefin tuna reproductive state and potential, and biological and genetics analyses to investigate mixing and population structure; ecological processes, including predator-prey relationships;

c) Improve assessment models and provision of scientific advice on stock status trough improved modelling of key biological processes (including growth and stock-recruitment), further developing stock assessment models including mixing between various areas, and developing and use of biologically realistic operating models for more rigorous management option testing.

A number of Contracting Parties expressed a willingness to make extra-budgetary contributions to such a programme with a view towards initiation of activities in 2009; the Commission, in 2009, set a very clear list of priorities for the GBYP: **programme coordination, data mining, aerial surveys**, and tagging design studies, with **additional** research activities to be undertaken in the following years.

The first phase costs were set at 750,000 Euro and voluntary contributions sufficient to initiate the year 1 activities were jointly committed by the European Community, United States, Japan, Canada, Norway, Croatia, Turkey and Chinese Taipei, while Morocco indicated its interest in future

contributions. The provision to accept additional contributions from various entities and private institutions or companies was also agreed. In the same document, it was recommended to form a Steering Committee comprised by the SCRS Chair, the ICCAT Executive Secretary or his/her Assistant, bluefin tuna rapporteurs, and an outside expert with substantial experience in similar research undertakings for other tuna RFMOs, to guide and refine the Programme as necessary.

The first phase, officially initiated on October 22, 2009 for 12 months, had a prorogation of 2 months for completing the works already planned. The prorogation of the EC Grant agreement SI2.542789 was provided after a specific request by the GBYP Steering Committee thought an amendment to the agreement provided by the European Commission on October 10, 2010; the termination of GBYP-Phase 1 was set on December 12, 2010.

Originally, the costs of GBYP Phase 2 were 3,390,000 Euro (ICCAT Commission, 2008), then 5,845,000 euro (ICCAT Commission and STACFAD, 2009) and finally 3,476,075 Euro (GBYP Steering Committee, 2010). The final budget reduction, due to the availability of funding by the various CPCs, induced the cancellation of some research activities (i.e.: eggs and larval survey) and the limitation of other research activities (i.e.: tagging and biological sampling). Several ICCAT CPCs confirmed their engagement for funding the GBYP, either with financial contributions or in-kind, but the SCRS recommendation to provide a dedicated quota for improving the financing of the programme was set aside, because it was not studied enough to be adopted by Panel 2 (ICCAT Report 2010-2011, vol. 1, page 267). The costs of the second Phase were then finally set at 2,502,000 Euro.

The second phase (12 months) officially initiated on December 22, 2010, after the signature of the Grant agreement for co-financing the GBYP Phase 2 (SI2.585616) by the European Commission. Phase 2 had two prorogations, the first up to April 22, 2012, and the second up to May 22, 2012. The co-funding for GBYP Phase 2 was committed by United States, Turkey, Libya, Japan, Morocco, Canada, Norway, Croatia, Chinese Taipei and the ICCAT Secretariat. The provision to accept additional contributions from various entities and private institutions or companies was also confirmed and additional funds were provided[1], mostly in kind or specifically devoted to individual activities.

The budget for GBYP Phase 3 in the original research plan approved by the Commission in 2008 (confirmed also by ICCAT Commission and STACFAD in 2009) was set at 5,845,000 Euro, then increased at 6,183,776 Euro by the GBYP Steering Committee in 2010 and revised at 4,417,980 Euro by the SCRS in 2011. Again, all tentative for putting in place a different and more stable funding structure for the programme were unsuccessful and finally the available budget for GBYP Phase 3 was set at 1,925,000 Euro (**Annex I**), with a serious reduction of the field activities and the suspension of some of them.

Due to the extension of Phase 2, the third phase (7 months) officially initiated on June 20, 2012, after the signature of the Grant agreement for co-financing the GBYP Phase 3 (SI2.625691) by the European Commission. The proposal to extend Phase 3 by 1-month for operative needs was not endorsed by the GBYP Steering Committee and then Phase 3 officially ended on January 19, 2013. In addition to the EU Contribution, the co-funding for GBYP Phase 3 was committed by United States, Turkey, Libya, Japan, Morocco, Canada, Norway, Croatia, Chinese Taipei and the ICCAT Secretariat. The provision to accept additional contributions from various entities and private institutions or companies was also confirmed[2].

[1] Additional financial contributions to GBYP were provided by Asociación de Pesca, Comercio y Consumo Responsable de Atún Rojo (SP) and by Grupo Ricardo Fuentes e Hijos s.a. (SP) and, in kind, by Balfegó Grup (SP), IEO–Fuengirola (SP); INRH –Tangier (MO), Maromadraba SARL and Es Sahel (Fuentes Group)(MO), Roberto Mielgo Bregazzi (SP) and WWF Mediterranean Programme.

[2] Additional contributions in kind to GBYP were provided by INRH –Tangier (MO), Maromadraba SARL and Es Sahel (Fuentes Group)(MO), Roberto Mielgo Bregazzi (SP), WWF Mediterranean Programme and by Dr. Antonio Di Natale.

The contents of the report up to September 2012 were presented to SCRS and then updated to November 2012 were presented the ICCAT Commission and they have been approved, while the contents up to December 2012 were presented to the GBYP Steering Committee and they have been approved.

2.0 Coordination activities

The GBYP Phase 3 officially started on 20 June 2012, with the signature of the agreement between the European Community and the ICCAT Secretariat.

Phase 3 was necessarily anticipated by paperwork which made possible the development of all activities on time, without affecting the budget. The very first period of this third phase, was devoted to setting-up a detailed weekly work-plan up to January 2019 and for preparing the necessary Calls for Tenders.

The coordination activities were mostly devoted to organise all the preliminary work for releasing the various Call for tenders in agreement with the ICCAT Secretariat, organising the various *ad hoc* Evaluation Committees after revising the various proposals in terms of fulfilling the requirements, and ensuring the follow-up activities (communication, contracting, monitoring, administrative controls, etc.). The coordination included also the continuous contact with the ICCAT Executive Secretary, the ICCAT Administration and the GBYP Steering Committee, organising all the necessary meetings and providing constant information about all the programme activities. The ICCAT Secretariat confirmed Dr. Laurence Kell as internal focal point for the GBYP activities.

An intense activity was devoted to the tag awareness campaign, continuing the efforts made in Phase 2 and taking advantage of the availability of awareness material. Travels abroad and participation to meetings organised by stakeholders were cancelled by the Secretariat, due to the relevant workload imposed by the large amount of activities to be organised and by the need to monitor them. 7 scientific meetings have been attended in Phase 3 (see **annex II**).

A constant duty of GBYP is also to provide a scientific support (on request) to the various national initiatives which are potentially able to increase the effectiveness of the GBYP and its objectives. For this reason, the Coordinator joined again the Steering Committee for the bluefin tuna programmes of the NOAA, together with other members of the GBYP Steering Committee; in this function he participated to the evaluation session of the US-GBYP domestic research programmes for bluefin tuna.

The coordination staff included the GBYP Coordinator, Dr. Antonio Di Natale and the GBYP Assistant Coordinator, Dr. M'Hamed Idrissi, assisted by a data analyst on temporary contract, Dr. Ana Justel Rubio.

The coordination activity required a continuous and constant contact with many institutions and people; this resulted in a considerable amount of e-mails and letters. Several reports were provided to the GBYP Steering Committee and the SCRS (the full detailed list of the internal deliverables and scientific papers is attached as **Annex III**). A total of 7 contracts were delivered, concerning 40 entities (27 contractors and 13 sub-contractors) belonging to 13 different Countries (the full list of contracts is attached as **Annex IV**). The administrative activity was very intense and heavy, including strict scientific, formal and administrative controls at each stage, with continuous and constructive contacts with the ICCAT Administrative Department, which had to face an important additional workload caused by GBYP activities.

For the first time, the GBYP used the provisions of Rec.11-06 concerning the Research Mortality Allowance (RMA). This RMA was essential for carrying out both tagging and biological sampling activities. In total, only 5,039.5 kg of BFT were used (equal to 662 BFT individuals) over a total of a maximum of 20,000 kg (**Deliverable A**). The RMA was followed in real time by the GBYP staff and all forms were closely checked and immediately registered.

In conformity with the Atlantic-Wide Bluefin Research Programme (GBYP) adopted by the SCRS and the Commission for Phase 3, the following research initiatives have been conducted or initiated.

3.0 Data mining and data recovery

Bluefin tuna data used in the assessment were officially classified as "unreliable" by the SCRS in most of the reports over the last decade and, for this reason, data mining and data recovery was set by the Commission as one among the first priorities of this programme.

As usual, the first preliminary activity was conducted at the ICCAT Secretariat. An updated analysis of the ICCAT data base on bluefin tuna was carried out, with the purpose to identify the most relevant gaps in the data series which are potentially useful for the stock assessment, taking into account the data already collected under GBYP Phase 1; this gap analysis was provided by GBYP to the SCRS Scientists and National statistical correspondents to help them in detecting the lacking data.

3.1 Objectives of the data mining and data recovery

The objective of data recovery and data mining activities is to fill the many gaps existing in several data series currently present in the ICCAT data base, concerning both recent and historical data, which causes a large amount of substitutions in the assessment process, increasing uncertainties. At the same time, data mining activities should provide reliable data series, longer that those currently available, recovering data from many sources, including archives having difficulties for the access. This activity will allow for a better understanding of the long-time catch series by gear, improving the data available for the assessment and possibly for replacing substitutions used for data gaps.

For Phase 3, the GBYP Steering Committee limited the data mining only to an exploratory work to be done for the Ottoman archives and, if this will not be possible, to a further data recovery for historical trap data. The GBYP Steering Committee excluded again any possibility for recovering more recent data from other fisheries and then the Call for tenders 05/2012 was limited to the two items included in the GBYP Steering Committee recommendations.

The objectives sets for data recovery and data mining in Phase 3 have been largely accomplished.

3.2 Data recovered in Phase 1, 2 and 3

In total, ICCAT-GBYP issued only 1 Calls for Tender under this activity in Phase 3, releasing one contract a total of 10 contracts. Considering also the previous activities, the total of Phase 1, Phase 2 and Phase 3 is 11 Calls for Tenders and 18 contracts.

The data recovery and data mining contracted activities in Phase 3 are described in detail on **Deliverable B.1a** (issued on January 8, 2013) and summarised on **table 1**. This first exploratory work carried out in various archives concerning the Ottoman period provided for the first time an in-depth overview of the data and information included in many million documents, which have never been

previously studied in correlation with the bluefin tuna fishery. It is possible that additional work will be necessary in future GBYP Phases for trying to have more data from all these archives, but this will be decided in Phase 4, after a direct discussion with the Turkish specialist.

Table 1. Numerical data recovered

2012-05

Summary table - Data Recovery Plan

Source	*Fishing zone*	*# traps*	*Flag*	*Gear Type*	*Start-Date*	*End-Date*	*# Records*
Prof. ALI FUAT ÖRENÇ	Istanbul	UND	TUR	TP	01/03/1921	28/02/1924	**34**

BFT (# and/or kg)	
Number	*Catch*
-	238,623

Additional historical trap data from 1512 to 1916 were provided, as a donation in kind, by the GBYP Coordinator.

The amount of data recovered by GBYP in Phase 1, Phase 2 and Phase 3 is very relevant and the following **table 2** shows the results for the major components.

Table 2. Total data recovered by GBYP in Phase 1, Phase 2 and Phase 3.

TOTAL PHASE 1 + PHASE 2		Total	Total OG+TP
# Records	**OG**	87,834	118,757
	TP	30,923	
BFT (n)	**OG**	34,753	23,282,419
	TP	23,247,666	
BFT (t)	**OG**	119,227	738,752
	TP	619,525	
# Fish Sampled	**OG**	94,932	102,542
	TP	7,610	

In terms of number of records and number of fish sampled (Task II), most of the data are originating from various gears (BB, LL, HP, HL), while in terms of number of tunas and total bluefin tuna weight in the catches, the large majority of the data are from tuna traps.

These data are clearly showing the enormous improvement provided by GBYP to the ICCAT bluefin tuna data base in the first two years and it is the clear demonstration that the data recovery activity is able to find data sets which are sitting in various archives.

This third round of data mining and data recovery brings the full total to **23,282,419** tunas and **118,757** fishing operations, which constitutes a considerable improvement of the data available for scientific uses in the ICCAT data base. Even this data recovery and data mining was possible thanks to the passion, the dedication and the availability of several scientists, who worked well over the scheduled amount of workload established by the contracts.

In particular, it was extremely remarkable the amount of additional reliable data series provided for tuna traps, which currently start from the year 1512. This fact labels the ICCAT bluefin tuna data base as the longest among those hold by all others RFMOs and possibly as the most extended among all fishery data series.

The above reported data do not include a considerable amount (130,169 records of market data and 129,839 records of auction data, for a total of 260,008 records) of bluefin commercial data, provided as a donation in kind by Mr. Roberto Mialgo Bregazzi; these data will be checked and analysed under a specific contract in Phase 4.

3.3 Bluefin tuna fishery data analyses

For the first time, it was possible to in-depth analyse all bluefin tuna data existing in the ICCAT data base and the results of this exercise were provided to SCRS (see the document SCRS/2012/116, attached among the scientific production of GBYP Phase 3).

The analyses of data recovered in Phase 1 and Phase 2 were the main goal for Phase 3; for this reason, a first set of basic analyses were provided to the BFT Species Group and the SCRS. The detailed information is provided by the document SCRS/2012/141, included among the scientific documents produced by GBYP in Phase 3.

The GBYP data were not used during the last updating of the bluefin tuna assessment, because the two rapporteurs and the working group limited the assessment to a simple updating, using the same data sets used before and the new official data sets provided by ICCAT CPCs.

The first part of the work concerned the fine quality control for incorporating the data in the ICCAT data base and this was done by individually cross-checking all data, at first against the existing data sets in the ICCAT bluefin tuna data base, for confirming that there was not any potential duplication, and then by an in-depth control. This first part of the work is essential for going on with the regular ICCAT data process, which requires steps by the SCRS Bluefin Tuna Species Group and Subcomstat. A special intersessional meeting will further examine these data in Phase 4.

Immediately after the first essential quality control, which required a lot of time and several internal meetings, because it was necessary to individually check a total of 118,757 records and many correlated data, it was decided to initiate a series of basic analyses in strict cooperation with the ICCAT Statistical Department for providing a detailed overview of all data recovered and some very preliminary elaborations (length-weight correlations, length frequencies, etc.).

A particular attention was devoted to trap data sets (see the following **Table 3**), both for the specificity of this gear type and for the extremely long data series, and for these reasons the analyses were conducted separately. The list of 188 traps from which data series have been recovered is shown on **table 4**.

The analytical work is essential for including all data recovered so far and those that will be collected in the future in the bluefin tuna stock assessment process.

The updated scientific reports about the full analyses on the bluefin tuna data recovered by GBYP in the first three years of activities will be officially presented to SCRS intersessional meeting in 2013.

Table 3. Details of the data recovered from tuna traps by GBYP in Phase 1, Phase 2 and Phase 3.

GBYP DATA RECOVERY AND DATA MINING: TUNA TRAPS					
Reference: EXTRA					
Country	**1st year**	**last year**	**no. of Traps**	**no. of matanzas**	**no. of BFT**
Turkey	1909	1916	1	18	-
Italy	1862	1911	3	65	10.342
Spain	1512	1516	1	71	46.224
Total EXTRA Traps	**1512**	**1916**	**5**	**154**	**56.566**
Reference: Call 05/2012 (Phase3)					
Country	**1st year**	**last year**	**no. of Traps**	**no. of matanzas**	**no. of BFT**
Turkey	1921	1924	1	34	-
Total PH3 Traps	**1921**	**1924**	**1**	**34**	**-**
Reference: Calls for Tenders 01/2011, 02/2011, 11/2011 (Phase 2)					
Country	**1st year**	**last year**	**no. of Traps**	**no. of matanzas**	**no. of BFT**
Italy	1708	1935	73	10.003	3.427.076
Libya	1915	1942	18	1.203	339.509
Morocco	1927	2007	13	1.080	399.538
Portugal	1837	1972	23	10.029	5.404.873
Spain	1525	2009	51	7.190	12.581.269
Tunisia	1863	1932	8	1.174	1.035.940
Total Phase 2 Traps	**1525**	**2009**	**186**	**30.679**	**23.188.205**
Reference: Calls for Tenders 02/2010 (Phase 1)					
Country	**1st year**	**last year**	**no. of Traps**	**no. of matanzas**	**no. of BFT**
Italy	1994	2008	6	56	2.895
Total PH2 Traps	**1994**	**2008**	**6**	**56**	**2.895**
Total bluefin tuna trap fishery data recovered by GBYP in Phase 1 and Phase 2					
	1st year	**last year**	**no. of Traps**	**no. of matanzas**	**no. of BFT**
TOTAL	**1525**	**2009**	**187**	**30.735**	**23.191.100**
TOTAL PHASE 1 + 2 +3 + extra					
	1st year	**last year**	**no. of Traps**	**no. of matanzas**	**no. of BFT**
TOTAL	**1512**	**2009**	**188**	**30.923**	**23.247.666**

Note : "EXTRA" means data recovered by donations in kind and not through a Call for tenders.

Table 4. List of tuna traps concerned by the data mining and data recovery work.

GBYP DATA MINING - LIST OF TUNA TRAPS FROM WHERE DATA HAVE BEEN RECOVERED IN PHASE 1, 2 AND 3

FlagTrap		TrapName
LYB	1	Marsa Marrecan
LYB	2	Marsa Zuaga
LYB	3	Marsa Sabratha
LYB	4	Marsa Soman
LYB	5	Marsa Dila
LYB	6	Gebbana Sidi Mahfud o Sidi Bilal
LYB	7	Sidi Abdul Gelil o Zanzur
LYB	8	Ras Lahmar o Gargaresch
LYB	9	Mellaha Ras Tagiura o Sidi Azus
LYB	10	Sidi Sbeh Lahman
LYB	11	Marsa al Hamra o Marsa Beltan
LYB	12	Punta Lebdi
LYB	13	Zliten o Sidi Burgheira
LYB	14	Ras Urih
LYB	15	Sidi Bu Mefta o Sidi Bu Fatma
LYB	16	Dzeira
LYB	17	Ras el Msel o Ras el Mouen
LYB	18	Mongar el Chebir - Cirenaica
MOR	1	Cap Spartel
MOR	2	Garifa
MOR	3	Cuevas
MOR	4	Cenizosos
MOR	5	Es Sahel
MOR	6	Punta Negra
MOR	7	Jolot
MOR	8	Kenitra 1
MOR	9	Kenitra 2
MOR	10	Kenitra 3
MOR	11	Capo negro
MOR	12	Tahadart
MOR	13	Principe
TUN	1	Sidi Daoud
TUN	2	Ras el Ahmar
TUN	3	El Aouaria
TUN	4	Cap Zebib
TUN	5	Bordj Kadidja
TUN	6	Conigliera
TUN	7	Monastir
TUN	8	Kuriat
FlagTrap		**TrapName**
UE.PRT	1	Vau
UE.PRT	2	Torre da Barra
UE.PRT	3	Torre Altinha
UE.PRT	4	Torre Alta
UE.PRT	5	Sul do Cabo Carvoeiro
UE.PRT	6	Sul da Ponta do Zavial
UE.PRT	7	Sul da Ponta Baleeira
UE.PRT	8	Senhora da Rocha
UE.PRT	9	Pedra da Galé
UE.PRT	10	Olhos d'Água
UE.PRT	11	Medo das Cascas
UE.PRT	12	Medo Branco (Ramalhete)
UE.PRT	13	Srª do Livramento
UE.PRT	14	Forte Novo
UE.PRT	15	Farol
UE.PRT	16	Cabo de Santa Maria
UE.PRT	17	Cabeço
UE.PRT	18	Burgau
UE.PRT	19	Bias

UE.ESP	1	Reina Regente
UE.ESP	2	Las Cabezas
UE.ESP	3	Punta Umbria
UE.ESP	4	El terron
UE.ESP	5	Nuestra Senora de la Cinta
UE.ESP	6	Las Torres
UE.ESP	7	La Higuera
UE.ESP	8	Arroyo Hondo
UE.ESP	9	Rota
UE.ESP	10	Torre Gorda
UE.ESP	11	Punta de la Isla
UE.ESP	12	Torre del Puerco
UE.ESP	13	Torre Atalaya
UE.ESP	14	Conil de la Frontera (up tp 1914)
UE.ESP	15	Barbate
UE.ESP	16	Zahara
UE.ESP	17	Lances de Tarifa
UE.ESP	18	Carbonera
UE.ESP	19	La Barrosa
UE.ESP	20	La Tuta
UE.ESP	21	Conilejo
UE.ESP	22	San Sebastian
UE.ESP	23	La Mojarra
UE.ESP	24	El Portil
UE.ESP	25	Lentiscar
UE.ESP	26	Aguas de Ceuta
UE.ESP	27	La Atunara/ La Linea
UE.ESP	28	Estepona
UE.ESP	29	San Miguel
UE.ESP	30	Ancon de Cabo de Gata
UE.ESP	31	Agua Amarga
UE.ESP	32	La Azohia
UE.ESP	33	Calabardina de Cope
UE.ESP	34	Escombreras
UE.ESP	35	Isla de Tabarca
UE.ESP	36	Cala Punta
UE.ESP	37	Cala del Charco
UE.ESP	38	Rio Torres
UE.ESP	39	Benidorm
UE.ESP	40	La Caleta
UE.ESP	41	Calpe
UE.ESP	42	Moraira
UE.ESP	43	Granadella
UE.ESP	44	Nuestra Señora del Carmen
UE.ESP	45	Formentera
UE.ESP	46	Suratlantica
UE.ESP	47	Surmediterránea
UE.ESP	47	Levante
UE.ESP	49	Tramontana
UE.ESP	50	Baleares
UE.ESP	51	La Espada
UE.ITA	1	Capo Altano
UE.ITA	2	Camogli
UE.ITA	3	Bagno di Marciana
UE.ITA	4	Enfola (Capo d'Enfola)
UE.ITA	5	Bivona
UE.ITA	6	Langhione
UE.ITA	7	Angitola (from 1924 Mezzapraia)
UE.ITA	8	Pizzo
UE.ITA	9	Torre di Pizzo

UE.ITA	14	Porto Paglia
UE.ITA	15	Porto Scuso
UE.ITA	16	Isola Piana
UE.ITA	17	Saline
UE.ITA	18	Trabucato
UE.ITA	19	del Tono
UE.ITA	20	S. Giorgio
UE.ITA	21	Oliveri
UE.ITA	22	Salicà
UE.ITA	23	S. Antonino
UE.ITA	24	La Punta
UE.ITA	25	Brucoli
UE.ITA	26	S. Panagia
UE.ITA	27	Terrauzza
UE.ITA	28	Fontane Bianche
UE.ITA	29	Avola
UE.ITA	30	Fiume di Noto
UE.ITA	31	Bafuto o Vindicari
UE.ITA	32	Marzamemi
UE.ITA	33	Capo Passero grande
UE.ITA	34	Capo Passero piccolo
UE.ITA	35	S. Giuseppe
UE.ITA	36	Portopalo
UE.ITA	37	Pozzallo
UE.ITA	38	Palma di Montechiaro
UE.ITA	39	Sciacca - Lo Tono
UE.ITA	40	Siculiana
UE.ITA	41	del Pepe o Capo Bianco
UE.ITA	42	Capo Feto
UE.ITA	43	S. Giuliano
UE.ITA	44	Asinelli(S. Cusumano)
UE.ITA	45	Bonagia
UE.ITA	46	Curto
UE.ITA	47	S. Vito lo Capo / Capo S. Vito
UE.ITA	48	Secco (Monte S. Giuliano)
UE.ITA	49	Sibiliana
UE.ITA	50	Magazzinazzi
UE.ITA	51	Scopello
UE.ITA	52	Castellammare del Golfo
UE.ITA	53	Cala Pozzillo
UE.ITA	54	Isola delle Femmine
UE.ITA	55	Vergine Maria
UE.ITA	56	Arenella
UE.ITA	57	S. Elia
UE.ITA	58	Solanto
UE.ITA	59	S. Nicolò o Nicola
UE.ITA	60	Trabia
UE.ITA	61	Cefalù
UE.ITA	62	Torre Caldura
UE.ITA	63	Detta
UE.ITA	64	Dell'Orsa
UE.ITA	65	Santa Lucia
UE.ITA	66	Puntanera
UE.ITA	67	Vaccarella
UE.ITA	68	Calavinagra
UE.ITA	69	Columbargia
UE.ITA	70	Flumentorgiu
UE.ITA	71	Peloso
UE.ITA	72	Mondello
UE.ITA	73	Favignana

3.4 Limits and opportunities for GBYP data mining and data recovery

With the purpose of better understanding where it will be necessary to focus the data recovery activities in future years and for getting a independent opinion "*pro-veritate*" about the interpretation of the various ICCAT rules and provisions concerning Task II data obligations, the GBYP

coordination decided to propose a questionnaire to 20 persons among managers (senior members of various CPCs delegations to ICCAT Commission) and senior tuna scientists who were participating to the ICCAT Commission meeting in Agadir (November 2012), considering that all these experts have a long experience in ICCAT and so they can provide a better interpretation of ICCAT rules on this issue. This was considered necessary after the various discussions in several meetings of the GBYP Steering Committee, which resulted in limiting the data recovery exercise only to historical data and avoiding collect more recent data, changing the policy adopted in Phase 1 following the opinion of the first GBYP Steering Committee.

The results of this exercise, which was carried out in a very discrete manner, keeping confidential all the experts names (the original questionnaires are kept in the GBYP files), are very interesting, because they show a partly different opinion about obligations for providing data to ICCAT between scientists and managers, while several questionnaires have many notes about the different situations in various CPCs concerning the ownership of data not collected using public money or outside the official statistical framework.

The final opinion, which was the main objective of this survey, clearly indicated that a large majority (70.6%) believes that GBYP data recovery should have no limitations and shall work for recovering all available data sets, fully in agreement with the original ICCAT Commission's decision; 23.5% of the opinions indicate that GBYP should concentrate the efforts for recovering only recent data sets, while only 5.9% of the opinions restricted the GBYP recovery activities to ancient data sets. The powerpoint presentation with the synthesis of the results of the survey and the questionnaire are attached as ***Deliverable B.2a***.

The results of the survey were presented to the GBYP Steering Committee in December 2012 (and the presentation is listed on the list of documents), but no mention was included in the text of the last GBYP Steering Committee report and the decision was to continue only by recovering ancient data sets in Phase 4.

3.5 Sea-Surface Temperature (SST) data and environmental data

The GBYP Steering Committee decided to suspend in Phase 3 the acquisition of detailed SST data initiated in previous Phases, which covered the period 2010 to 2011. These data have been used for elaborating the spatial model of the aerial survey data and can be used for adding reliable environmental data to advanced models in future assessments.

For overcoming the problems caused by this decision, the GBYP Coordination decided to independently collect free data sets, concerning daily SST maps and daily wave maps (**Figure 1**), but no numerical data sets are available. These images were collected daily directly by the GBYP Coordination staff from two very reliable sites (the Mediterranean Ocean Forecasting System and the Mediterranean Wave Forecast), without any impact on the budget. The full collection is available on the GBYP data files.

These data sets are essential for understanding the fishing possibilities for some gears and for confirming the field observations about the presence of spawning tunas in some areas.

3.6 Elaboration of VMS data

The analyses of VMS data was among the objectives of GBYP data recovery activities. A very preliminary tentative of analysing VMS data was carried out in 2012 and the documents SCRS/2012/125 in included among the scientific documents of GBYP Phase 3.

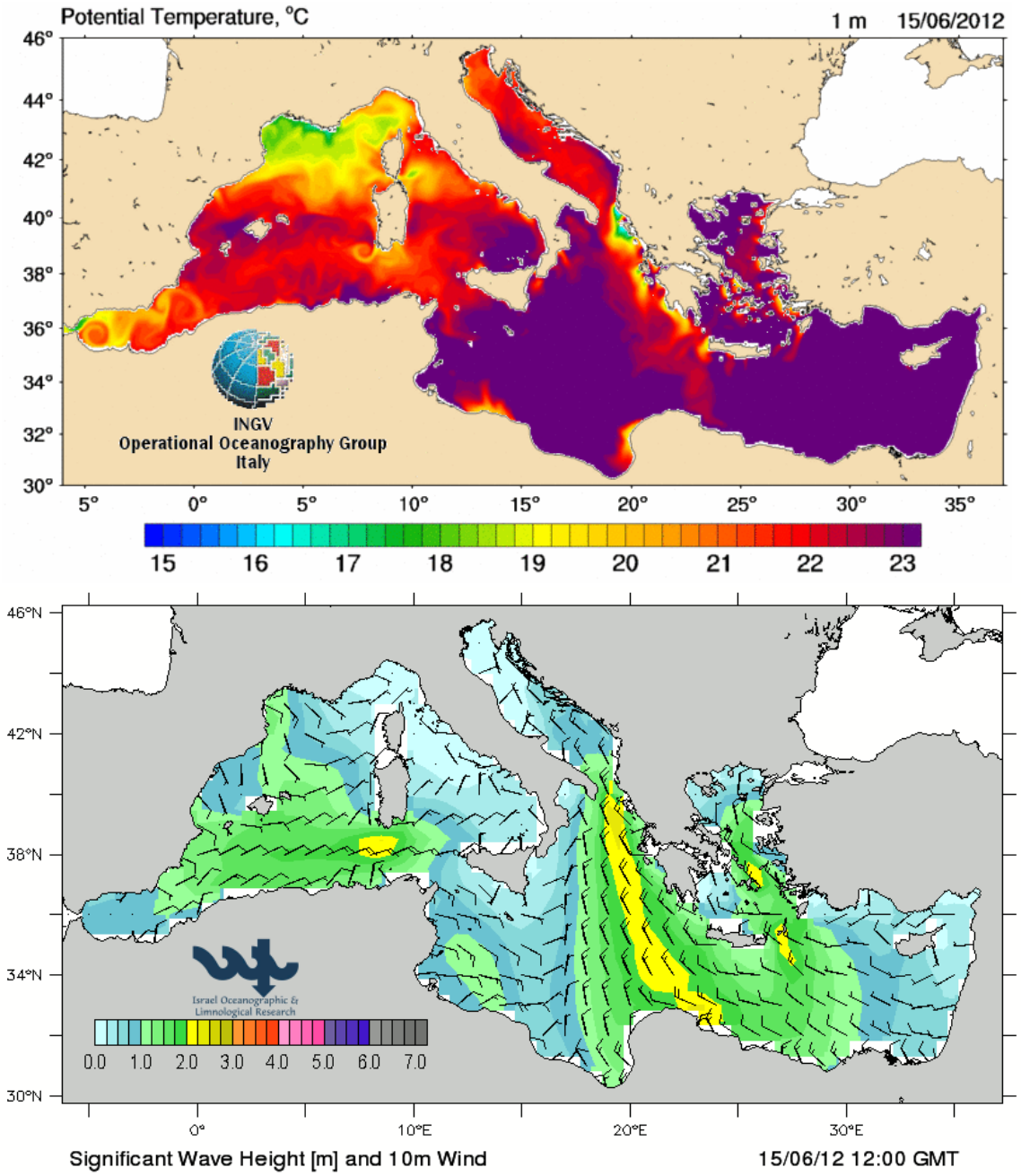


Figure 1 – An example of the daily maps for sea surface temperatures (left) and waves (right) daily collected by GBYP in 2012.

4.0 Aerial survey on bluefin tuna spawning aggregations

The aerial survey on bluefin tuna spawning aggregation was suspended by the GBYP Steering Committee in Phase 3.

A SWOT analyses was carried out by the GBYP Coordination for assessing two alternatives (aerial survey on juveniles versus spawners), because a study was recommended by the GBYP Steering Committee for Phase 3, but there was no budget availability. The results were presented to the SCRS in 2012 (SCRS/2012/140). The analyses resulted in higher opportunities and strengths for the aerial survey on spawners, confirming the motivation of the choice made by both the SCRS and the ICCAT Commission when the GBYP was adopted.

A further study concerning the aerial survey was carried out at the end of Phase 3 under the Modelling approaches (see paragraph 6.2.4).

5.0 Tagging activities

According to the general programme, it was planned to continue the tagging activity in GBYP Phase 3, including a preliminary operational meeting and then a field activity with conventional tags and a limited activity with electronic tags. It was possible to organize a second operational meeting during the extension period of Phase 2, in order to allow Phase 3 tagging activities to start on schedule.

5.1 Objectives

The specific objectives of the GBYP tagging activity on the medium term (according to the GBYP Tagging Design) are:

a) Validation of the current stock status definitions for populations of bluefin tuna in the Atlantic and Mediterranean Sea. If the hypothesis of two stock units (eastern and western stocks) holds, the tags should provide estimates of mixing rates between stock units by area and time strata (ICCAT main area definitions and quarter at least). It is also important to consider possible sub-stock units and their mixing or population biomass exchange, particularly in the Mediterranean Sea[3].

b) Estimate the natural mortality rates (M) of bluefin tuna populations by age or age-groups and/or total mortality (Z).

c) Estimate tagging reporting rates for conventional tags, by major fishery and area, also using the observer programs currently deployed in the Mediterranean fisheries (ICCAT ROP-BFT).

d) Evaluate habitat utilization and large-scale movement patterns (spatio-temporal) of both the juveniles and the spawners.

e) Estimate the retention rate of various tag types, due to contrasting experiences in various oceans.

A well-designed tagging programme, developed over several years schedule and with a progressive methodological approach, will therefore be important in improving our understanding of bluefin tuna ecology and ethology and for developing better stock assessment methods.

Electronic Pop-up tags should provide data over a short time frame, while conventional tags, internal archival tags and PIT tags should provide data over a longer period of time, always depending on the reporting rate.

The objectives set for Phase 3 have been mostly accomplished, taking into account all the various changes, the constraints the GBYP had to face and the peculiar lack of bluefin tuna of age 1 and 2 aggregations in most of the Mediterranean areas. In particular, the synthesis for each item is the following:

- ✓ Operational meetings: fully accomplished, but hold taking advantage of Phase 2 extension;
- ✓ Tagging material: fully accomplished and additional material is already available for allowing Phase 4 activities beginning without delay;
- ✓ Conventional tagging: mostly accomplished, except for “force majeure” operational problems in most of the Mediterranean areas;

[3] Additional elements will be provided by the GBYP biological and genetic sampling and analayses.

- ✓ Mini-PATs electronic tagging: not originally included, was carried out also in the extension period obtaining very useful results.
- ✓ Tag reward policy: fully accomplished, with the new improved system officially in place.
- ✓ Tag awareness campaign: partly accomplished; the materials were refurnished and distributed, but external contacts on site were cancelled.

All activities concerning tagging and related issues are reported in details on the ***Deliverable C.1a***.

5.2 Tags and correlate equipments

ICCAT-GBYP, in Phase 3, acquired the following tagging material, to be used in Phase 2 and following Phases of GBYP; this material is in addition of the tags and applicators already acquired in Phase 2:

Conventional spaghetti tags:

a) 4,973 applicators for small-head double-barb FIM-96
b) 4,972 applicators for big-head double-barb BIM-96

Internal archival tags:

a) 50 internal archival tags TDR-Mk9

Any remaining tagging material will be used in the following GBYP Phases.

5.3 Conventional and electronic tagging

All details about the conventional tagging and electronic tagging activities carried out under the GBYP contract in Phase 3 are included in **Deliverable C.1a1** (issued on January 6, 2013). The tagging was carried out following the GBYP Tagging Design and Protocols, focusing the activity on juvenile bluefin tunas. This decision implies that tags will be possibly mostly recaptured in future years, over a longer period.

The activity was carried out by a Consortium, which provided various interim reports. The Consortium encountered several problems for tagging, particularly in the western and central Mediterranean Sea, mostly due to causes of "*force majeure*" (bad weather conditions, fishery technical accidents and absence of juvenile tunas of age 1 and 2 at the surface when the vessels where on site). This fact is partly related with the well-known attitude of age 1 and 2 bluefin tuna to only occasionally aggregate at the surface in the Mediterranean Sea, but also to very peculiar conditions, which induced those tunas to go deeper. This last issue was particularly important, because real-time information, provided by local fishermen and scientists confirmed the presence in upper strata just before the vessel reached the area in the southern Tyrrhenian Sea and in the southern Adriatic Sea, but then they went deeper together with other accompanying species (like dolphin fish, albacore and little tunny). Even the permits for accessing some areas were not easy to get due to domestic procedures and delays, while the access in some Italian harbours presented unexpected difficulties. All these problems combined resulted in lower percentage of tagged fish in the Mediterranean areas, beside considerable searching efforts. There was a continuous discussion with the contractor and it was possible to reach an agreement for extending the tagging in the area of Gibraltar, for better balancing the number of tagged fish against the target. The decision to have a tagging coordinator in charge of managing the field situations was a good experience and resulted in a real-time updating of the situation and in quickly finding solutions to various operational problems.

The tunas tagged in each area are as follows: 3437 in the Bay of Biscay (41.03% double tagged fish, plus 14 miniPATs and 13 internal archival tags), 1512 in the area of the Strait of Gibraltar (84.38%

double tagged, plus 21 miniPATs and 25 internal archival tags); 302 in the Western Mediterranean Sea (34.34% double tagged, plus 5 miniPATs), including the opportunistic tagging by sport fishers (6.25% double tagging), and 97 in the central Mediterranean Sea (see **Table 5**). It total, **5348 bluefin tunas were tagged**, 5270 with conventional tags (44.85% of the objective), 2738 tunas were double tagged (58.26% of the objective, but the percentage of double tagged fish was higher than the planned, 51.95% *versus* the objective of 40%), while all 40 miniPATs were implanted (100% of the objective) and 38 internal archival tags were implanted as well (76% of the objective). Taking into account the allowed 10% contingency and considering all the history of this second tentative effort for contemporary tagging bluefin tunas in several area and the "*force majeure*" events, the final result can be considered justified and mostly acceptable. The very strong efforts made at sea, particularly in the Mediterranean, for trying to reach the objective besides the lack of juvenile bluefin tunas close to the surface need appreciation. In any case, this tagging trial provided additional elements for better planning future activities.

As previously mentioned, the conventional tagging activity on juveniles will provide results in the following years, depending on the reporting rate that will be reached and the success of the tag awareness activities.

Table 5. Details of the ICCAT-GBYP conventional and electronic tagging activities in Phase 3.

ICCAT GBYP 01/2012 A : TAGGING PROGRAMME 2012

Areas & Vessels	Spaghetti Tags	MiniPATs	Internal Archival Tags	Total	double tagging
Bay of Biscay (F/V Attalaya Berria)	3410	14	13	3437	1399
Bay of Biscay	**3410**	**14**	**13**	**3437**	**1399**
Central Mediterranean (F/V Tuku Tuku)	97	0	0	97	0
Sub-Total Central Mediterranean	**97**	**0**	**0**	**97**	**0**
Gulf of Lion (F/V Arcangel San Rafael)	17	5	0	22	15
Gulf of Lion (F/V Yalobey Primero)	88	0	0	88	75
Balearic Sea - Sport Fishery (CEPRR)	192	0	0	192	12
Sub-Total Gulf of Lion	**297**	**5**	**0**	**302**	**102**
Strait of Gibraltar (F/V Fernandez y Moreno)	299	8	5	312	235
Strait of Gibraltar (F/V Union Vazquez Blanco)	186	6	7	199	113
Strait of Gibraltar (F/V Nuevo Adrian)	276	2	1	279	273
Strait of Gibraltar (F/V Arcangel San Rafael)	316	3	6	325	297
Strait of Gibraltar (F/V Yalobey Primero)	373	2	6	381	319
Strait of Gibraltar - Sport Fishery (CEPRR)	16	0	0	16	0
Sub-Total Strait of Gibraltar	**1466**	**21**	**25**	**1512**	**1237**
Total	**5270**	**40**	**38**	**5348**	**2738**
					52%
OBJECTIVES					
Bay of Biscay	**3350**	**10**	**13**	**3373**	**1340**
Central Mediterranean	**2000**	**10**	**12**	**2022**	**800**
Gulf of Lion	**3200**	**10**	**12**	**3222**	**1280**
Strait of Gibraltar	**3200**	**10**	**13**	**3223**	**1280**
ICCAT-GBYP 01/2012 A Contract	**11750**	**40**	**50**	**11840**	**4700**
ACHIEVEMENTS					
Bay of Biscay	**102%**	**140%**	**100%**	**102%**	**104,40**
Central Mediterranean	**5%**	**0%**	**0%**	**5%**	**0,00**
Gulf of Lion	**9%**	**50%**	**0%**	**9%**	**7,97**
Strait of Gibraltar	**46%**	**210%**	**192%**	**47%**	**96,64**
achievement on ICCAT-GBYP 01/2012A objectives	**45%**	**100%**	**76%**	**45%**	**58%**

Note: the percentage of double tagged tunas was higher than the planned one, reaching about 52% against a target of 40%.

5.3.1 Electronic tagging in Phase 3

The electronic tagging carried out by the Consortium is progressively providing results; much more informative data are expected from all remaining 33 tags, which were set for many hundred days. The first seven tags implanted in the Bay of Biscay show limited displacements of these juvenile bluefin tunas (**figure 2**), while only one specimen left the Bay of Biscay, reaching the Channel and then going back to the Bay. The time at sea of these prematurely detached tags was between 11 to 63 days while other 7 tags implanted in the Bay of Biscay are still attached on the tunas. So far, no one of the 21 miniPATs implanted in the Strait of Gibraltar and the 5 implanted in the Western Mediterranean had any premature detachment.

The 38 internal archival tags implanted in the Bay of Biscay (13) and in the Strait of Gibraltar (25) would be possibly recovered in future years.

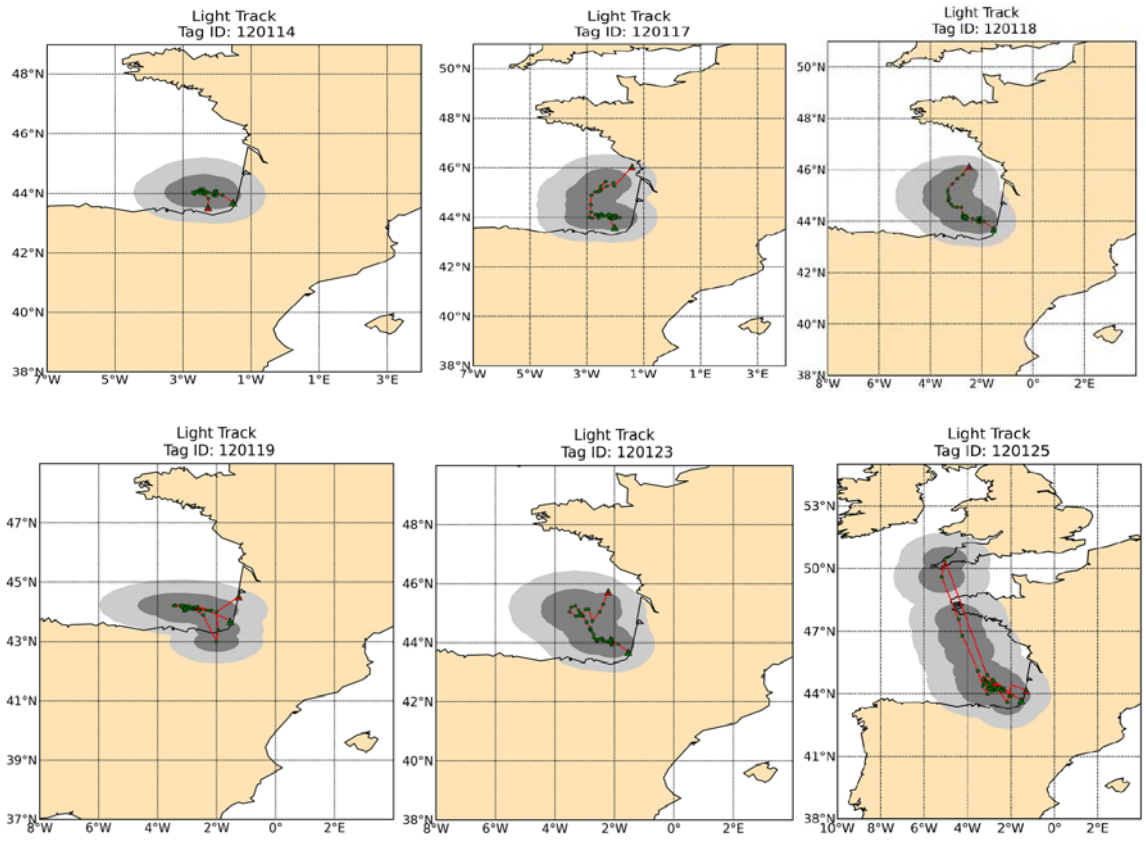


Figure 2. Tracks of the 6 over 7 premature detached miniPATs implanted in the Bay of Biscay in Phase 3. The gas remained on the bluefin tuna respectively (from left to right) 33, 53, 38, 55, 45 and 63 days. The 7th tag remained at sea only 11 days and was always in the inner part of the Bay of Biscay.

The electronic tagging with mini-PATs on bluefin tuna pre-spawners in a Moroccan trap in 2012, carried out by several institutions (WWF-MedPO, INRH, the Moroccan Tuna Trap Association and GBYP staff, with the fundamental support of the Moroccan Fishery Authority) was described and included in GBYP Phase 2 report, because it was carried out during the extension period. Anyway, at the moment all miniPAT tags except two had already popped-off and the full data analyses will be presented to the SCRS-GBYP Meeting in May 2013. According to the first incomplete information, it is confirmed that 38% of the total tagged fish never entered into the Mediterranean for spawning and went directly towards some Atlantic sites (Azores, Madeira) where some old studies suspected

the presence of additional spawning areas. 54% of the tagged tunas regularly entered into the Mediterranean Sea, going to well-known spawning areas and some of them went back to the Atlantic, exploring also some northern areas. Additional electronic tagging activity was carried out by WWF-MedPO under the GBYP umbrella in various areas of the Mediterranean Sea, using opportunistic platforms (sport fishermen); in total, 15 miniPATs were implanted so far and 7 had already prematurely popped-off, without going outside the Mediterranean Sea. Full details of all electronic tagging activities outside those of the Consortium are included in **deliverable C.1a2**.

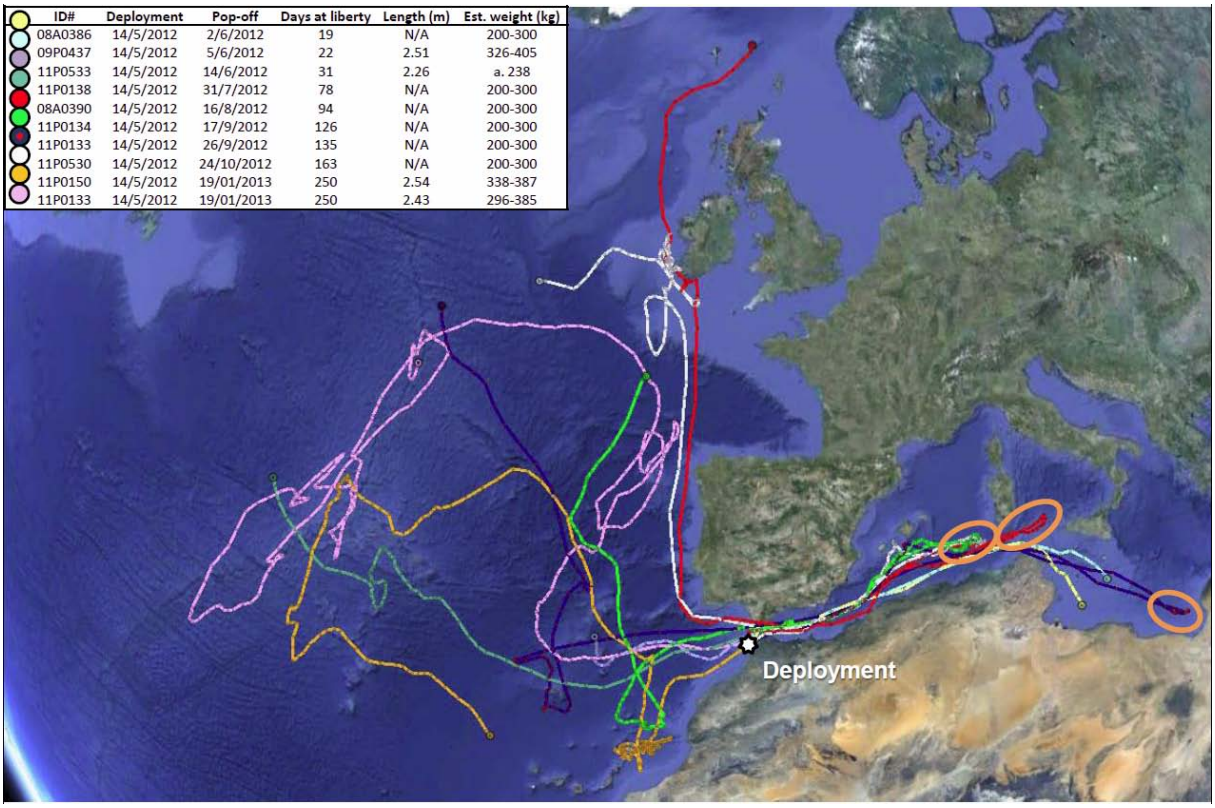


Figure 3 – Preliminary overview of the location where the miniPATs implanted by WWF-Med-PO in the tuna trap of El Sahel (Morocco) on 14 and 16 May 2012 popped-off or where fish were captured (10 out of 14 tags).

5.4 Discussion about the use of miniPATs and the preliminary results.

Tagging pre-spawners in Morocco, originally planned for calibrating the results of GBYP aerial survey, revealed the high scientific importance of better understanding the behavior of the bluefin tunas coming northward along the West African coast. The hypothesis made by the GBYP Steering Committee and endorsed by SCRS thaqt bluefin tuna spawners behavior might be biased by tagging the fish outside the water is now not confirmed, after the trials made in Phase 3. For sure, it seems confirmed that more than **50% of these fish enters in the Mediterranean Sea for spawning**, reaching at least the Western and Central Mediterranean. At the same time, it seems confirmed that an **important percentage of these fish does not enter in the Mediterranean Sea**, but go to Atlantic areas where, in the past, some authors (De Buen, 1926; Matters III, 1995) **hypothesized the presence of additional and maybe not-constant spawning areas**. Even if bluefin tuna larvae were never found during the few larval campaigns carried out in those areas, the temperature at sea and the general oceanographic conditions where these recent tags popped-off were potentially suitable for spawning. **This fact is particularly interesting from a scientific point of view and needs further investigations,** due to the potential implications in terms of stock structure and in our current understanding of bluefin tuna populations**.**

The preliminary data obtained by tagging in Moroccan traps were presented and discussed at the SCRS in 2012. These data are considered extremely interesting, because the hypothesis that the bluefin tuna spawners did not entered into the Mediterranean Sea in 2011 because they were tagged outside the water is not confirmed by the 2012 data and it seems that individual spawners may have completely different behaviours. This fact provides new and important working hypotheses for the next Phases of GBYP and suggests deeper investigations, because if there are possible concentrations of bluefin tuna spawners outside the Mediterranean Sea, in the Eastern Atlantic, then this might have serious impacts in our current understanding of bluefin tuna populations. Furthermore, it is clear that, working in cooperation with the tag producer, it will be necessary to improve the tag anchors, for increasing the days of retention and decrease the premature release possibilities.

At the same time, it is equally important to investigate the behavior and the origin of the fish going to Moroccan traps before getting there and particularly in the last part of winter and the first part of spring. Anecdotic but confirmed information collected by GBYP indicates that bluefin tuna is still currently distributed in several parts of the southern Atlantic Ocean, but scientific data are missing for various reasons.

The use of miniPATs, as showed by the tagging carried out by WWF-MedPO in the Mediterranean Sea and by other projects, is also **very important for better understanding the behavior of bluefin tunas juveniles, while also the behavior of pre-spawners in all the Mediterranean Sea and particularly in the eastern basin should be further investigated**.

Long-time setting for more tags is very useful, but a further improvement of the anchoring system should be tested, possibly discussing again this issue with the US scientific team having the largest experience in this field and with the tag producer. Continuous contacts with the US and EU scientists carrying out electronic tagging on bluefin tuna will be continued in Phase 4.

5.5 Tag awareness campaign, tag recovery and tag reporting activities

These activities, initiated in Phase 2, are considered essential for improving the very low tag reporting rate existing so far in the Eastern Atlantic (max about 5%) and the Mediterranean Sea (max about 1%). The first and basic part of the tag awareness campaign was carried out in Phase 2 and the activities have been included in the previous report.

5.5.1 Production and distribution of tag awareness tools

The tag awareness tools produced by GBYP were continuously refurnished during Phase 3 and several additional sets of posters and stickers were provided directly to tuna scientists or local organizations of fishermen (either commercial or sport). Several web-pages now contain also the ICCAT-GBYP posters. The ICCAT-GBYP web page has the full list of contacts http://www.iccat.int/GBYP/en/AwCamp.asp .

Posters are now present in most of the ports where bluefin tuna are usually or potentially landed, in tuna farms, tuna traps, industries, sport fishers clubs, fishers associations, bars where fishers are usually going, local port authorities and on many fishing vessels.

The SCRS and the ICCAT Commission were detailed informed about the campaign, while direct information was also provided to the World Congress of Sport Fishing Federations in 2012.

Meetings with ICCAT ROPs were also organised, for informing them about the ICCAT-GBYP tag recovery activity and for asking them to pay the maximum attention to tags when observing harvesting in cages or any fishing activity at sea. They have been requested also to inform about natural marks caused by cookiecutter sharks.

5.5.2 Tag reward policy

Following the recommendations made by SCRS and the GBYP Steering Committee, the ICCAT-GBYP tag reward policy was considerably improved, with the purpose to increase the tag recovery rate which is currently extremely and unacceptably low (according to the last available data, only five bluefin tags were reported to ICCAT in 2011). The new strategy includes the following rewards: spaghetti tag 50€/ or a T-shirt; electronic tag 1000 €; annual ICCAT-GBYP lottery (September): 1000 € for the first tag drawn and 500 € each for the 2nd and 3rd tag drawn. A press release for the tag lottery was issued by ICCAT and distributed to all ICCAT scientists and several press agencies.

In addition to the three prizes distributed during the ICCAT Tag lottery in September 2012, for a total of 2,000 euro, in Phase 3 a total of only 6 rewards have been provided, 2 for conventional tags and 4 for electronic tags; in some cases the reward was not requested or the tag reporting person did not provide the necessary data. Furthermore, several T-shirts were distributed to taggers or to journalists who helped ICCAT-GBYP in diffusing the information about the programme.

5.5.3 Tag recovery

For the first year, it was possible to have the first results of the tag awareness activities carried out by GBYP, which are having positive effects on the general tag recovery activity carried out by the ICCAT Secretariat, independently from the origin of the tags.

As a matter of fact, the number of bluefin tuna tags reported to ICCAT in the last year went from a previous value of 11 tags (reported in 2011) to the current amount of **63 tags, showing an increasing of 464% over the previous year**, which is clearly related to the GBYP tag awareness activities (**table 6** and **Deliverable C.3)**). Besides this good result, we need many efforts for substantially increasing the reporting rate of bluefin tuna tags. As a matter of fact, we are still aware of several tags which have been recovered by fishers and never reported to ICCAT, for various reasons which are sometimes difficult to understand.

Among the reported tags, there are 57 conventional tags of various types, 4 pop-up tags, 1 internal archival tag and even 1 Japanese commercial tag; in 8 cases it was possible to recover even the double tag implanted on the fish. In some cases, the full data are still to be obtained and GBYP is continuously working for solving the issue of missing data. All tag recapture data, with the related tag release data will be made available for the SCRS-GBYP Meeting in May 2013.

Recovered and reported tags are showing also some interesting behaviours: two of the tags implanted on juvenile bluefin tunas by GBYP in the Bay of Biscay in 2011 were recovered in summer 2012 along the Eastern US coast, showing a trans-Atlantic migration also of juveniles. The commercial tag was found stranded on a beach in Norway and it was possibly lost by a fishing vessel operating in Icelandic waters in 2011. Each recovery has a different story and only a very few tags have the necessary information.

In most of the cases, each reported tag implies many exchanges of e-mails, sometimes for months, trying to recover all necessary data. It is also clear that the current system existing in ICCAT, which is based mostly on the good-will of the scientists, needs improvements and possibly some basic rules: as a matter of fact, at the moment, if ICCAT provides tags to a scientist or any institution, then there is no formal obligation for them to provide tag release data to the ICCAT tag data base. This means that if one of these tags is reported to ICCAT Secretariat, then it is necessary to start a real investigation for discovering the release data and sometimes even the entity which implanted the tag. Maybe an ICCAT resolution may help in smoothing the problems and set more strict rules.

Under GBYP tagging contracts, there is a very clear obligation to provide a table with all tag release data at the end of each year activity, but even in this case the data quality controls require a huge, detailed and long work by the GBYP Coordination staff, before incorporating these data in the ICCAT tag data base.

Table 6 – Complete list of bluefin tuna tags reported to ICCAT in the last year.

	TAG CODE		TAG TYPE		RELEASE								RECAPTURE							
Row	tag1	tag2	type1	type2	Set Single or/and double	Date (dd/mm/yyyy)	Length (cm)	Weight (kg)	Lat	Lon	Area	Fishery	Date (dd/mm/yyyy)	Length (cm)	Weight (kg)	Lat	Lon	Area	Fishery	CPC reporting
L1	BYP001272		conv		single	11/08/2011	79,00		42,42	3,63	Gulf of Lions	PS	26/10/2012	96,00		35,98	-5,48	Strait of Gibraltar	BB	ES
L2	BYP005081	BYP051561	conv	conv	double	05/02/2012	104,00		35,93	-5,66	Strait of Gibraltar	BB	26/10/2012	119,00		35,93	-5,55	Strait of Gibraltar	BB	ES
L3	BYP007209		conv		single	18/07/2012	59,00		43,63	-1,83	Bay of Biscay	BB	29/07/2012	61,00		43,72	-1,83	Bay of Biscay	TROL	ES
L4	BYP007352	BYP053652	conv	conv	double	18/07/2012	63,00		43,63	-1,83	Bay of Biscay	BB	12/09/2012		6,50	43,39	-2,03	Bay of Biscay	TN	ES
L5	BYP009318		conv		single	27/07/2012	81,00		43,60	-1,82	Bay of Biscay	BB	22/09/2012	87,00	12,30	43,39	-1,97	Bay of Biscay	TROL	ES
L6	BYP009420	BYP053220	conv	conv	double	19/07/2012	60,00		43,68	-1,95	Bay of Biscay	BB	31/10/2012	67,50	6,93	43,75	-1,58	Bay of Biscay	PS	ES
L7	BYP009696		conv		single	22/07/2012	62,00		43,67	-1,92	Bay of Biscay	BB	29/10/2012	89,00	7,50	43,66	-1,85	Bay of Biscay	LL	ES
L8	BYP000865	BYP050265	conv	conv	double	12/08/2011	61,00	4,66	43,58	-1,80	Bay of Biscay	BB	14/08/2012	86,50		43,63	-1,67	Bay of Biscay	BB	ES
L9	BYP000386		conv		single	06/08/2011	84,00	11,46	43,58	-2,73	Bay of Biscay	BB	16/07/2012	105,00	22,00	43,38	-2,37	Bay of Biscay	BB	ES
L10	BYP001235		conv		single	12/08/2011	88,00	13,06	43,56	-1,81	Bay of Biscay	BB	21/08/2011		11,00	43,52	-1,72	Bay of Biscay	BB	ES
L11	HES011574		conv		single	09/09/2009	165,00		42,33	3,33	Gulf of Lions	UNCL	02/09/2011	185,00		42,33	3,33	Gulf of Lions	UNCL	ES
L12	HTN008779		conv		single	20/09/2008	148,00		42,33	3,33	Gulf of Lions	UNCL	20/08/2011	155,00		42,33	3,33	Gulf of Lions	UNCL	ES
L13	HCT015320		conv		single	26/08/2011	170,00		42,33	3,33	Gulf of Lions	UNCL	04/09/2011	170,00		42,33	3,33	Gulf of Lions	UNCL	ES
L14	HFF001729		conv		single	29/07/2007		4,50	43,15	7,37	Nice	UNCL	30/08/2011	108,00	24,00	35,93	-5,50	Strait of Gibraltar	UNCL	ES
L15	AAAA02632		conv		single	13/06/2009	88,00		39,37	1,23	Balearic Sea	UNCL	12/05/2011	102,80	22,10	40,97	1,35	Balearic Sea	UNCL	ES
L16	AAAA01705		conv		single	31/08/2008	108,00		42,15	3,62	Gulf of Lions	UNCL	12/05/2011	126,00		40,97	1,35	Balearic Sea	UNCL	ES
L17	HES000772		conv		single	28/07/2006	54,00		40,10	2,80	Balearic Sea	UNCL	05/09/2008	91,00		44,03	-2,85	Bay of Biscay	UNCL	ES
L18	HCT015449		conv		single	02/13/2006	70,00		39,13	5,50	Western Med	LLHB	16/08/2010	135,00				South France	UNCL	FS
L19	HTN008908		conv		single	01/12/2007	95,00			2,28	MED	UNCL	02/08/2010	125,00				South Balearic	UNCL	ES
L20	AAAA03331		conv		single	03/10/2009	93,00				North Mallorca	UNCL	27/07/2010	93,00				South Mallorca	UNCL	ES
L21	HT3000659		conv		single	30/08/2008	73,00		42,15	3,68	Gulf of Lions	UNCL	26/09/2009	93,40		41,02	2,75	Balearic Sea	UNCL	ES
L22	SEC001276		conv		single	04/09/2010	97,00		41,86	3,77	Gulf of Lions	TROL	21/05/2011		17,00	43,94	8,48	ligurian Sea	LLSWO	ES
L23	HBE023170		conv		single							UNCL	26/06/2012	146,00	36,00	38,87	0,72	Balearic Sea	SPOR	ES
L24	AAAA03777		conv		single							UNCL	28/06/2012	140,00	28,00	38,30	8,53	South Sardinia	UNCL	IT
L25	BYP000219		conv		single	04/08/2011	60,00	4,44	43,83	-2,73	Bay of Biscay	BB	08/07/2012	81,28	11,61	39,67	-73,47	ATW near NJersey	JGL	US
L27	BYP000728		conv		single	09/08/2011	60,00	4,44	43,60	-1,78	Bay of Biscay	BB	03/07/2012	78,74		40,47	-72,87	Shinnecock Inlet	UNCL	US
L28	16PD648		POP-UP		single							UNCL	06/11/2012	NA	35,00	43,28	16,51	between villages Milna and	NA	HR
L29	HBE023171		conv		single	15/05/2012	156,00	80,00	40,87	0,85	L'Ametlla de Mar	Farm	16/09/2012	NA	NA	40,86	0,85	L'Ametlla de Mar	Farm surroundings	ES
L30	BYP005673		conv		single	14/07/2012	160,00	NA			Balearic Sea	RR	06/09/2012	160	NA	40,86	0,85	L'Ametlla de Mar	Farm surroundings	ES
L31	AAAA03240		conv										23/09/2012	NA	NA	40,86	0,85	L'Ametlla de Mar	Farm surroundings	ES
L32	HBE023174		conv		single	15/05/2012	151,00	70,00	40,87	0,85	L'Ametlla de Mar	Farm	05/08/2012	150	NA	40,86	0,85	L'Ametlla de Mar	Farm surroundings	ES
L33	HBE023159		conv		single	15/05/2012	156,00	80,00	40,87	0,85	L'Ametlla de Mar	Farm	09/09/2012	NA	NA	40,86	0,85	L'Ametlla de Mar	Farm surroundings	ES
L34	BYP005818		conv		single	15/07/2012	160,00				Balearic Sea	RR	23/09/2012	NA	NA	40,86	0,85	L'Ametlla de Mar	Farm surroundings	ES
L35	16A6880		PAT			16/06/2011		165,00			Balearic Sea	UNCL	finales julio 2012	NA	NA				NA	FR
L36	11PD588	BYP008636	POP-UP	conv	double	18/08/2012	105,00		43,68	-1,53	Bay of Biscay	BB	17/10/2012	NA	NA	46,03	-1,40 s	Huttes, Ile d'Oléron, France	NA	DE
L37	11PD550	BYP008633	POP-UP	conv	double	18/08/2012	105,00		43,68	-1,53	Bay of Biscay	BB	20/10/2012	NA	NA	44,45	-1,25	France	NA	ES
L38	BYP016683		conv		single	30/10/2013	38,00		38,67	16,06	Tyrrhenian Sea	BB	29/10/2012		1,20	38,22	15,58	Strait of Messina	SPOR	IT
L39	BYP008571	BYP053571	conv	conv	double	08/08/2012	67,00		43,52	-1,68	Bay of Biscay	BB	16/10/2012		7,00	44,07	-1,60	Bay of Biscay	BB	ES
L40	AA8001460		conv		single	06/08/2010	120,00	35,00	45,09	13,01	ic (punta della maes	NA	27/07/2012	150,00	40,00	43,98	13,20	North Adriatic	SPOR	IT
L41	70068	NJ0476	INT-ARC	conv	double	18/08/2007	70,00		43,61	-2,85	Bay of Biscay	BB	07/11/2012	157,00	73,00	55,33	-25,13	North Atlantic	LL	JP
L42	HHV023110		conv		single	09/01/2000	155,00		34,51	-76,26	North Carolina	UNCL	18/06/2006	264,00	186,00	32,83	20,17	Libya		LY
L43	LTO2310/A2198		INT-ARC			17/01/2004	211,00	161,00	34,44	-75,83	North Carolina	UNCL	15/03/2006		194,00			ATW near Florida	NA	LY
L44	BYP001440	BYP050551	conv	conv	double	09/09/2011	120,00		42,87	6,65	Ligurian Sea	PS	17/12/2012	137,00	50,00	35,83	14,57	Malta	Farm	ROP
L45	BYP003825		conv		single	07/12/2011	118,00		35,95	-5,53	Strait of Gibraltar	BB	18/12/2012	146,00	75,00	35,83	14,57	Malta	Farm	ROP
L46	BYP003826		conv		single	07/12/2011	116,00		35,95	-5,53	Strait of Gibraltar	BB	01/12/2012	144,00	65,00	35,83	14,57	Malta	Farm	ROP
L47	BE023157		conv		single	15/05/2012	156,00	80,00	40,87	0,85	L'Ametlla de Mar	Farm	11/02/2013	143		40,86	0,85	L'Ametlla de Mar	UNCL	ES
L48	SEC003401		conv		single	21/02/2012	150,00				Cartagena	Farm	20/11/2012	161,00	75,00	35,93	-5,55	Strait of Gibraltar	BB	ES
L49	BYP009092		conv		single	19/07/2012	60,00		43,68	-1,95	Bay of Biscay	BB	16/12/2012		6,00	44,00	-1,58	Bay of Biscay	BB	ES
L50	BYP008521	BYP053621	conv	conv	double	21/11/2012	117,00		35,93	-5,47	Strait of Gibraltar	BB	05/02/2013	119,00	25,00	35,95	-5,48	Strait of Gibraltar	BB	ES
L51	AAAA02087		conv			30/06/2012	64				Bay of Biscay		17/07/2012	63,8				Bay of Biscay		ES
L52	AZ 00145		conv			07/08/2010	72				Bay of Biscay		30/07/2012	106,3				Bay of Biscay		ES
L53	FY2009 / JQKC-0511		Commercial								Iceland area?		07/10/2012			66,06	12,37	West Norway		Norway

6.0 Biological and Genetic Sampling and Analyses

According to the general programme, it was planned to continue and possibly improve the biological and genetic sampling and analyses activity in GBYP Phase 3. The second GBYP Operational Meeting was held during the extension period of Phase 2 and included in the previous report.

6.1 Objective

The main objective of this task was to improve understanding of key biological and ecological processes through broad scale biological sampling of live fish to be tagged and dead fish landed (e.g. gonads, muscles, otoliths, spines, etc.), histological analyses to determine bluefin tuna reproductive state and potential, and biological and genetics and micro-chemical analyses to investigate mixing and population structure. In particular, Phase 3 objective was initiating the work to better define the population structure of Atlantic Bluefin Tuna (*Thunnus thynnus*), with a particular attention to the age structure and sub-populations identification.

The objective is set for at least three years of the programme and this second year activity was clearly able to accomplish its objective. Of course, the activities in following Phases of GBYP are set for completing and improving the results obtained in the first two years and for better defining some

issues, such as the sub-population hypothesis, which requires several years of data, samples and many analyses, depending on the available budget.

Detailed information is available in detail on **Deliverable D** (issued on February 17, 2013).

6.2 Biological Sampling Scheme

The GBYP biological sampling design was the one provided by a team of scientists under the coordination of the Institut National de Recherche Haulieutique (INRH - Morocco) (annex to Deliverable E2 in Phase 2) and approved on March 14, 2011, then enforcing it in GBYP Phase 2 and Phase 3. The final version is also available on the ICCAT-GBYP web site (http://www.iccat.int/GBYP/Documents/Biological_Sampling_Plan_GBYP_2011.pdf).

6.3 Biological and Genetic Sampling and Analyses activities

The biological and genetic sampling and analyses in Phase 3 was carried out by an international Consortium, which included 12 institutions and 5 subcontractors. At the beginning of the activity it was necessary to delay the signature of the contract because some institutions, belonging to North African Countries, had difficulty for signing the Consortium agreement and finally they withdrawn their participation. This fact created some geographical holes in the scheme, but fortunately, thanks to the good will of the Libyan scientists, several samples were already collected and they will become available for the analyses in Phase 4. The preliminary interim report (on 26 September 2012) and the second interim report (on 6 November 2012) have been provided on schedule and, due to the time necessary for having the analyses done, it was agreed to have the final draft report by February 17, 2013. The preliminary results were officially presented to the SCRS Plenary and to the ICCAT Commission in 2012.

Table 7. Samples collected and analyses carried out by the Consortium in GBYP Phase 2 (including the extension period), with the target and percentages of achievement.

item	*Target no.*	*Achievement no.*	*% of achievement*	*% considering 10% tolerance*
bluefin tunas to be sampled	1750	2813	160.74	n.a.
genetic samples	1550	2733	176.32	n.a.
otoliths	1450	1759	121.31	n.a.
spines	1250	1413	113.04	n.a.
gonads	250	351	140.4	n.a.
Genetic analyses	1000	1152	115.2	n.a.
microchemical analyses	400	811	204.78	n.a.
age readings (otoliths)	130	157	120.77	n.a.
age readings (spines)	120	158	131.67	n.a.
histological analyses	60	158	263.33	n.a.
TOTAL	**6210**	**8692**	**139.97**	n.a.
Total sampling	4500	6296	139.91	n.a.
Total analyses	1710	2436	142.46	n.a.

The total number of samples was higher than the target (141%)[4], also thanks to the ICCAT Rec.11-06, which allowed for collecting samples even outside the fishing season. The late beginning of the activity had particularly affected the gonads sampling of mature gonads, because the spawning period was already initiated when the activity was conducted. Additional technical and logistic problems were noticed by the Consortium, particularly for sampling juveniles in Malta and for exporting the samples from Turkey. The targets and the final achievements, in terms of total number of samples and analyses are showed on **Table 7**.

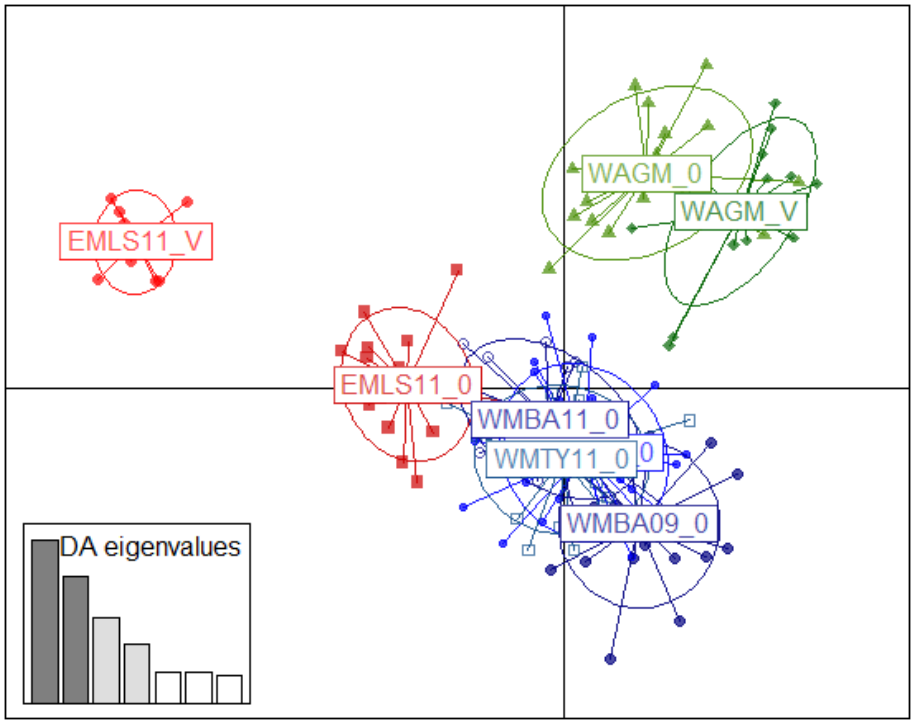


Figure 8: *Clustering analysis using DAPC based on the eight reference samples and a restricted subpanel of 96 SNP. Three clusters can be seen, roughly coinciding with the expected spawning groups, with an improved separation of the Eastern Mediterranean Age-0 sample from the Western Mediterranean reference samples, even if yet not clustering with the Eastern Mediterranean Larvae sample.*

Among the most relevant results, the **genetic analyses** are clearly showing and confirming the genetic characteristics and difference between the specimens from the Western Atlantic and the Eastern Atlantic. After the studies carried out in 2011, the additional results obtained in 2012 seems able to better identify at least **two sub-populations** inside the Mediterranean: one temporarily called "Western Mediterranean" (which includes tunas from the western and central Mediterranean, including the Adriatic Sea) and the other temporarily called "Eastern Mediterranean" (which is possibly generated by the ancient sub-population of bluefin tuna which inhabited the Black Sea and the Marmara Sea up to the '70s and which possibly displaced in the Eastern Mediterranean after the ecological crisis of the Black Sea). The analyses showed a problem among age 0 fish from the Eastern Mediterranean, because there was a Western Mediterranean component, which created a discrepancy with the full Eastern Mediterranean identification of the bluefin tuna larvae.

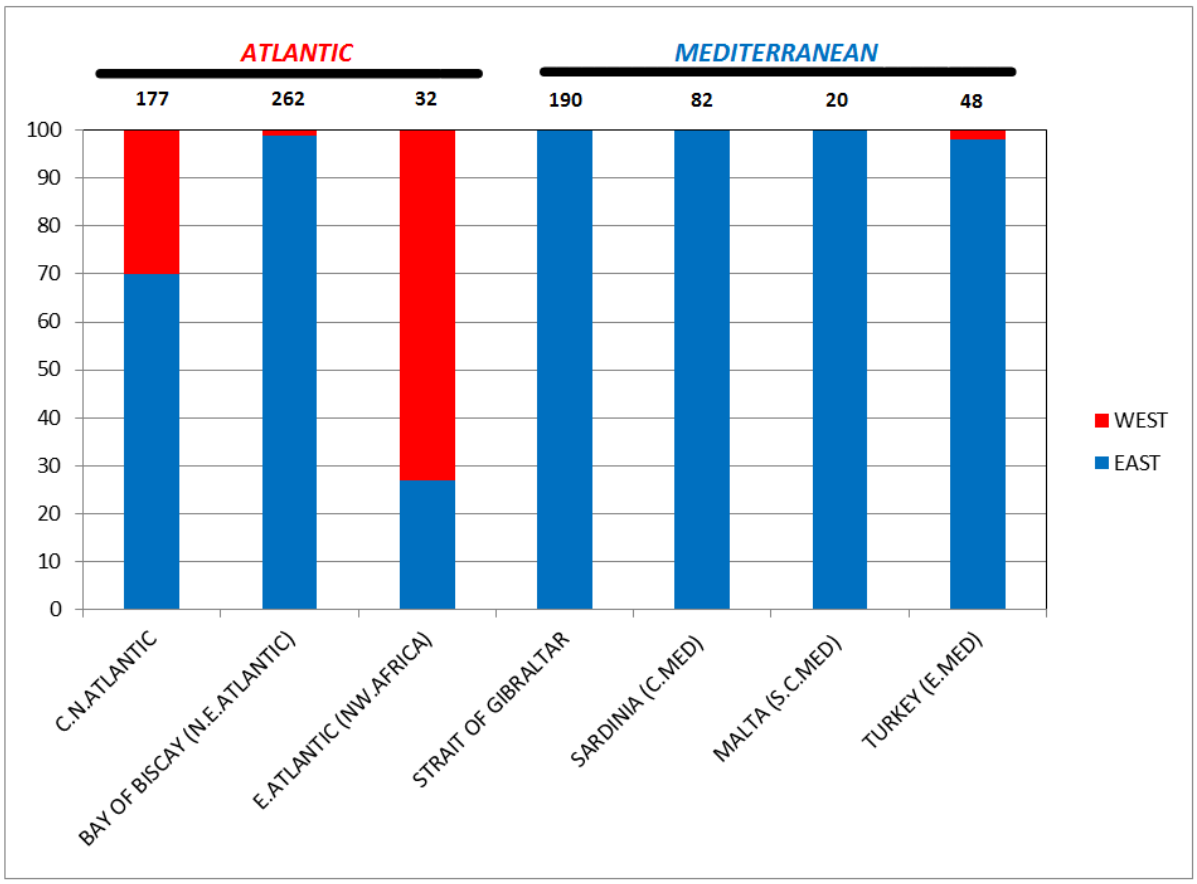
[4] Additional 150 biological samples collected by the Libyan scientists are not included in the official report provided by the contractor. GBYP was informed by one member of the Consortium that these Libyan samples were moved to Malta and stocked there in the last part of 2012. They will become available for the analyses in Phase 4 and officially included in the biological data base.

In this case, the broader view of GBYP is able to provide a possible justification, thanks to the aerial survey carried out in 2011 and the environmental data collected daily in the same period. According to these field observations, an anomalous oceanographic condition, coupled with strong winds south of Malta, caused the presence of a large area of stable hot waters in the western part of the Eastern Mediterranean, between Cirenaica and the southern part of Italy and the western part of Greece. In this area, the stable conditions of hot surface waters allowed for a deep surface thermocline; this fact induced a considerable number of bluefin tuna spawners, which were usually spawning in the central Mediterranean, to move eastward and possibly spawn in this large area north of Cirenaica. This opportunity possibly caused the presence of some "western Mediterranean" age 0 fish in 2012 in areas where "Eastern Mediterranean" tunas were usually distributed (the right food chain is anyway available for juvenile bluefin tuna even in that area, where there is traditionally a high availability of small pelagic species).

Even if further analyses are necessary for confirming and more precisely the various sub-populations, it is clear that the availability of information from many different sources (aerial survey, environmental data, genetics, microchemistry, etc.) may sometimes contribute in increasing our understanding of the results of sophisticated analyses.

The **microchemistry analyses**, carried out on 811 otoliths (about twice the target), also provided again very useful and interesting results, further discriminating the two main bluefin tuna populations according to the individual origin of each fish (western and eastern Atlantic Ocean). Estimates are given as percentages (**figure 9**).

Figure 9. Summary of predicted origin of medium (25-100 kg) and large (>100 kg) bluefin tuna from the Atlantic Ocean and Mediterranean Sea in 2012. Sample size is provided for each area.



It is very interesting to further define the results according to the scientific knowledge on the distribution, biology and ethology of Atlantic bluefin tuna. As a matter of fact, the results from the Central-North Atlantic confirm the current knowledge, which shows a partial mixing of the Western and Eastern bluefin tuna. The data of the Bay of Biscay show an almost total presence of juveniles from the Eastern Atlantic stock, with very marginal components of Western Atlantic migrants. The samples collected in Moroccan traps (East Atlantic-West African coast) are extremely interesting, because they show a major Western Atlantic component which is not well known in term of migration; adding to these data the results of the electronic tagging and the doubts about the bluefin tuna living in South Atlantic, it is very clear that that area needs much more attention in future years and the sampling should be strongly improved, for increasing our understanding of the various components. The results from the various areas of the Mediterranean Sea show a total component of East Atlantic bluefin tuna, except, in 2012, for a marginal component of Western Atlantic tuna in the inner part of the Mediterranean, the Turkish area. Even if it is difficult to clearly identify the reason for this presence, looking at the historical distribution of the tuna traps, it is evident that, at the beginning of the XX century, there were some traps in East Libya and in Egypt fishing for bluefin tuna coming at least from the Western Mediterranean and these tunas, in the traps of Tripolitania, had also an undefined component coming from the Atlantic through the Strait of Gibraltar. Then, it is not impossible that a tuna from the Western Atlantic may reach from time to time even the extreme Eastern Mediterranean. Of course, it will be necessary in next years to increase both sampling and tagging, for better defining also this situation and the possible mixing rate.

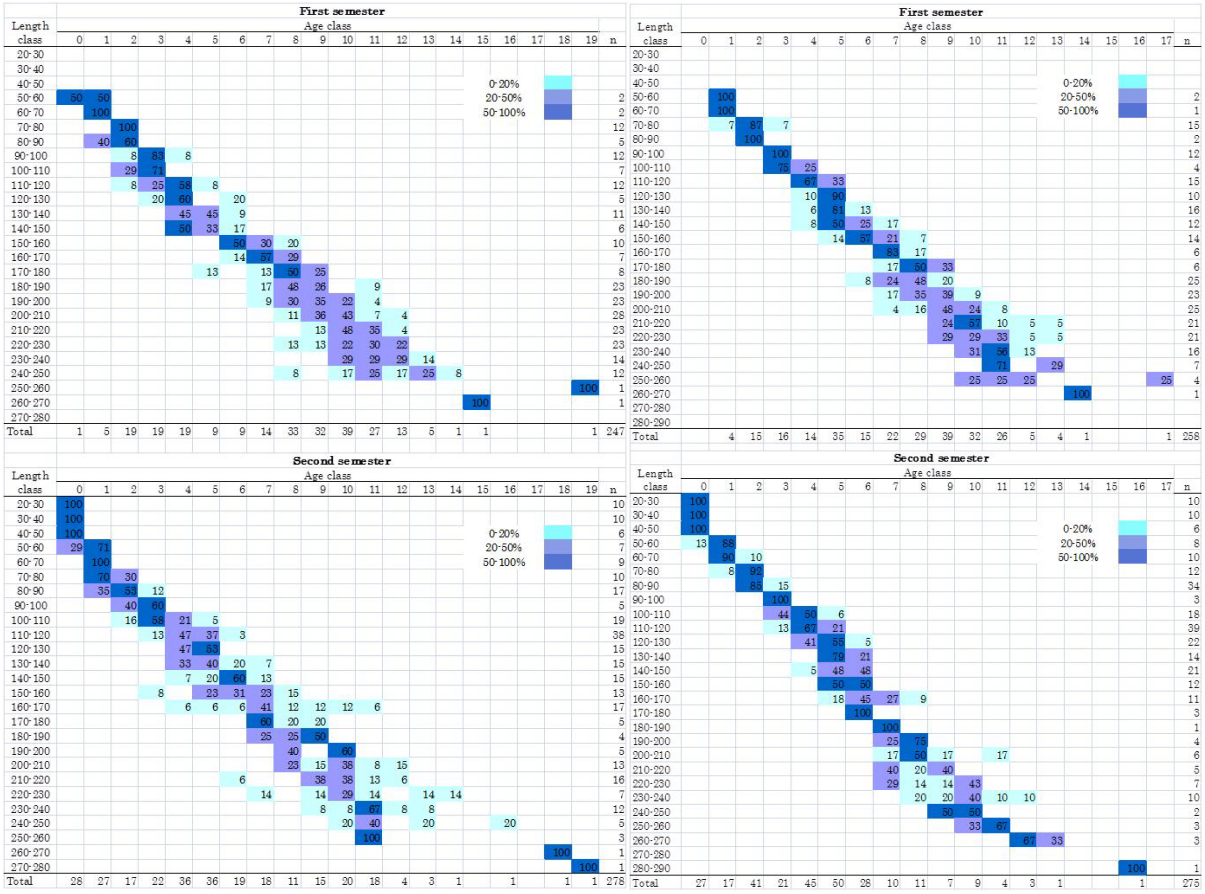


Figure 10. Age-length key based in age interpretation from Atlantic bluefin tuna otoliths (**10a, left**) and spines (**10b, right**) sections, by semester, in 2012. Numbers represent percent by number by length class (SFL, cm).

The **ageing analyses** provided a second GBYP data set for age-length key (ALK), in addition to the set obtained in 2011, which can be used in future assessments, together with all other available ALK data. The ageing analysis in 2012 was carried out on 315 samples (more than the target of 250): 157

age determinations were carried out by using otoliths and 158 by using spines. Many additional samples (a total of 1759 otoliths and 1413 spines) have been collected and those not used for the analyses in 2012 were stocked together with previous samples collected in 2011 for future analyses. The target objective for sampling 10 specimens by 10 cm length range was nearly achieved, but not for all age classes. **Figure 10a** shows the ALK obtained from otoliths, while **Figure 10b** shows the ALK from spines. **Figure 11** provides the comparison between ALK from otoliths and spines.

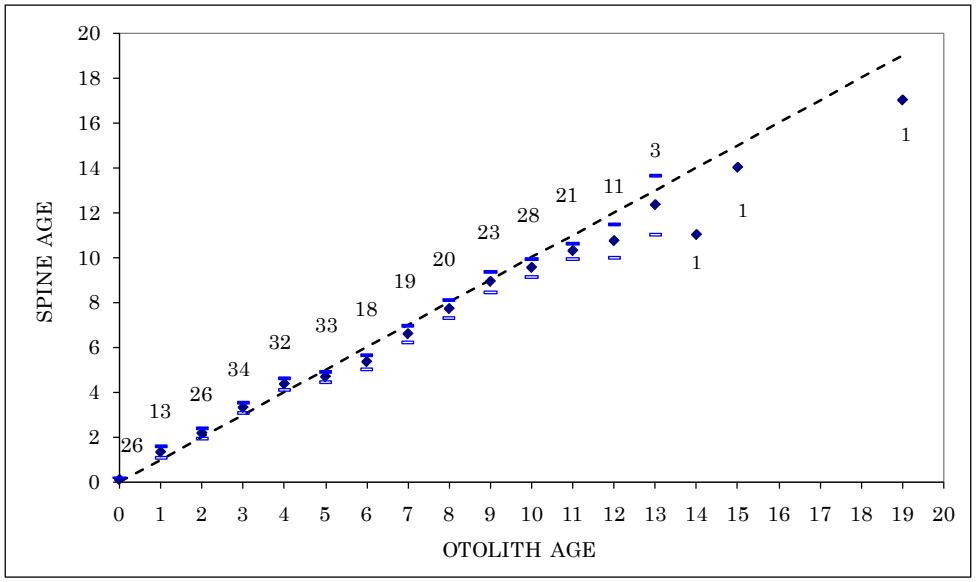


Figure 11. Bias comparison between spines and otoliths age readings in 2012. Spines age readings are presented as the mean age and 95% confidence interval corresponding to otolith age readings (numbers above values represent number of calcified structures used; total number of paired structures: 310).

The **gonads analyses** were carried out on 351 samples (more than the target and almost the double of the samples collected in 2011) but only a portion of these samples were collected just before, during or just after the usual spawning period. Sampling in some traps provided biased results, because the tunas were kept inside the trap for several weeks, due to quota issue. The results obtained in 2012 are confirming again most of the current knowledge about the spawning season of the eastern Atlantic stock. In future years, sampling well outside the usual spawning season should be avoided. A continuous sampling immediately before, during and after the main spawning season in various areas may confirm extended or non-typical spawning seasons in some years, when the oceanographic conditions show this possibility.

7.0 Modelling approaches

The ICCAT-GBYP activity on Modelling Approaches in Phase 3 strictly followed the course recommended by the GBYP Steering Committee, endorsed by ICCAT-SCRS and approved by the ICCAT Commission.

Three contracts were awarded under the Modelling Programme, I) Risk assessment, II) Statistical conversion of catch-at-size to catch-at-age and III) Statistical Procedures for raising reported catch data. In addition to these three contacts, a fourth contract was provided to an external expert after the GBYP Steering Committee meeting in December 2012. This last contract assessed the current limits and opportunities for the aerial survey on spawning aggregations in order to the possibility of using that data as fishery independent indices for operating models.

The reports are included in **Deliverables E.1** (presented to SCRS in 2012), **E.2** (received on January 8, 2013), **E.3** (received on January 21, 2013), **E.4** (received on January 18, 2013) and **E.5** (received on Janury 15, 2013).

7.1 Objectives

Under the GBYP the modelling programme is addressing objective 3, i.e:

- Improve assessment models and provision of scientific advice on stock status trough improved modelling of key biological processes (including growth and stock-recruitment), further developing stock assessment models including mixing between various areas, and developing and use of biologically realistic operating models for more rigorous management option testing.

In addition, in 2012 the Commission requested the SCRS (Doc. No. PA2-617A/2012 COM) to conduct a stock assessment in 2015 and to:

a) Develop a new assessment model allowing the inclusion of the last updated knowledge on the biology and ecology of bluefin tuna, in particular life-history parameters, migration patterns, and aiming at identifying and quantifying uncertainties and their consequences on the assessment results and projections.

b) Release a stock status advice and management recommendations, supported by a full stock assessment exercise, based on the new model, additional information and statistical protocols mentioned in points above and on which basis all actions may be adopted and updated by the Commission through the management plan to further support the recovery.

In further addition, the GBYP Steering Committee requested an external report in order to analyse the power to detect population trends that consider additional variance, to obtain data that could be used as fishery independent indices for operating models

The modelling work will be important for meeting these objectives.

This second set of trials made in Phase 3 was considered consistent with the objective set by the Steering Committee and the SCRS, even if additional work will be necessary in Phase 4 and in the following Phases of GBYP before reaching the final objective.

7.2 Phase 3 activities for modelling.

7.2.1 Risk analysis

The objectives of this work package are to identify the main sources of uncertainty related to stock assessment and management. The risk analysis conducted under Phase II identified the main sources of uncertainties of concern to members of the SCRS. Under Phase III this work was extended to managers.

This initial qualitative work will be used to develop a quantitative risk analysis to evaluate the relative importance of the different sources of uncertainty. In particular in helping to design scenarios used in the management strategy evaluation of the alternative management procedures with respect to meeting management objectives. The full report is available on **Deliverable E.2**.

7.2.2 Catch data

Three non-parametric stochastic imputation approaches that provide a means of imputing Atlantic bluefin tuna length frequency data are described and tested by cross-validation (**Deliverable E.3**).

The multivariate normal ‘distance’ model that randomly imputes data using a multinomial probability function, offered the best predictive capacity by some margin. All imputation methods operate most successfully when nearby (in time and space) length observations are imputed preferentially.

The multivariate normal imputation approach described here offers a basis for quantifying uncertainty from data processing by means of repeated-imputation inference (running multiple stock assessments from multiple imputed data sets).

By imputing data that are specific to time and region, the approach offers the basis for applying multiple growth curves (for cohort slicing for example) where applicable. Additionally, uncertainty from aging may be simultaneously incorporated into the same repeated-imputation inference framework. A number of patterns in the data provide evidence of possible errors in the Task II dataset for Atlantic bluefin tuna, for example, identical length samples replicated in adjacent areas and times.

While the imputation approach appears to perform reasonably well (assuming the data are reported correctly) future improvements could include the incorporation of greater variability among imputations and further optimization of code to improve computation time (by extending the code to be compatible with parallel processing packages, for example).

7.2.3 Conversion of size to age

This contract reviewed the available methods for estimating catch-at-age data from catch-at-size information. Two main groups of methods were considered, i.e. those based on the classic Age-Length Key (ALK) method, for which the ALKs produced can only be applied to the same population from which the catch-at-size samples were drawn, and those based on the inverse ALK method, which don't have this restriction.

A total of 7 methods were considered, and are described on the paper that accompanies the report (**Deliverable E.4**). The methods will be used during the next BFT SCRS data meeting in May 2013 to evaluate the benefits of different stock assessment methods and biological sampling programmes.

7.2.4 Use of aerial survey data for operating models

According to a specific request of the GBYP Steering Committee, this contract assessed the feasibility of a large-scale survey on bluefin tuna spawning aggregations in all the Mediterranean Sea for obtaining useful data for operating modeling purposes (**Deliverable E.5**).

A key assumption is the relationship between effort and CV. If there is no over-dispersion, CV = *sqrt(n)/n*, where *n* is proportional to effort. The study assumed that variance of *n* is *2 x n* to account for some overdispersion but this is simply a scalar here. Therefore, CV is proportional *sqrt(effort)/effort*. This relationship should be explored more fully and empirically using re-sampling methods by first combining the data from the original replicates and then re-calculating the variances.

There are factors that influence additional variance (e.g. due to variability in availability due to proportion of schools at the surface) and among them some will be related to environmental conditions and other factors that will vary spatially and temporally.

Another problem with the choice of scenario is that the analysis assumes that there is perfect knowledge already of the density outside the area. This is not the case. A better procedure would have been to calculate CVs for each survey design based on the different scenario, i.e. the CV that would be expected if the scenario on which that design was based was wrong but one of the other scenario was right, i.e. the risk of a specific design with the wrong scenario. This would result in a matrix of CV's (e.g. rows being survey design and columns being the actual population distributions).

This also means that using an adaptive survey design may be useful since after a few years the densities outside the areas will be better known, factors affecting the CVs due to school size and sighting should be better understood, and the population structure hypotheses developed. All of which will influence the optimal design.

Also for operational reasons the survey design is likely to change from that used in the report. While this would not be expected to change the general conclusions it will require the analysis to be re-conducted prior to a survey going ahead.

In this study it is assumed that the survey will be used as an index of abundance independently of a stock assessment model. However, the GBYP will hopefully develop new stock assessment methods which would use the index as an input in which case the power to detect trends may be improved.

The study provided the necessary inputs and scenarios to the GBYP Steering Committee (on the basis of the best available data and assumptions) for adopting the recommendation for Phase 4 activities.

7.3 Further actions on modeling

A outlining of future modelling activities is being developed (in the form of a EU FP7 Framework Project Document), in which objectives, milestones and deliverables are presented. In this document the work in subdivided into work packages with clear responsibilities for the GBYP, SCRS and the ICCAT Secretariat.

The main work to be done in Phase IV is to develop an Operating Model (OM) for use as part of Management Strategy Evaluation (MSE).

8.0 Legal framework

The rules set by ICCAT Rec. 11-06, which allows for a "research mortality allowance" (RMA) of 20 t for GBYP and for the use of any fishing gear in any month of the year within the ICCAT Convention area for GBYP research purposes and the further provisions set by the ICCAT Secretariat (Circular #2296 on May 22, 2012) are now helping the ICCAT-GBYP in a substantial manner.

9.0 Steering Committee activities

The GBYP Steering Committee is currently composed by the Chair of SCRS, Ph.D. Josu Santiago, the BFT-W Rapporteur, Ph.D. Clay Porch, the BFT-E Rapporteur, Ph.D. Jean-Marc Fromentin, the ICCAT Executive Secretary, Mr. Driss Meski, and an external expert, Ph.D. Tom Polacheck, who was contracted for this duty.

The Steering Committee members have been constantly informed by the GBYP about all the initiatives and consulted by e-mail on many issues.

The reports of all GBYP Steering Committee meetings held in Phase 3 are included in **Deliverable 13**.

10.0 Funding, donations and agreements.

The Atlantic-wide Research Programme for Bluefin Tuna, according to the Commission decision in 2009, is voluntary funded by several ICCAT CPCs. In Phase 3, the programme was funded by the following CPCs and entities (in order of contribution):

European Union (grant agreement)	Euro	1,140,000.00
United States of America (donation)	Euro	187.500.00
Kingdom of Morocco (donation)	Euro	64,732.08
Japan (donation)	Euro	43,704.08
Turkey (donation)	Euro	27,836.23
Canada (grant agreement)	Euro	22,000.00

Norway (donation)	Euro	20,000.00
Croatia (donation)	Euro	19,518.90
Algeria (donation)	Euro	7,177.05
Chinese Taipei (donation)	Euro	3,000.00
The following CPCs should still provide their contribution:		
Tunisia (donation)	Euro	50,239.38
Libya (donation)	Euro	46,952.68
Korea (donation)	Euro	4,024.52

For better defining the funding structure and following the SCRS recommendation in 2012, a draft recommendation concerning the adoption of a bluefin tuna scientific quota for specifically funding the GBYP activities was circulated among all CPCs participating to the Panel 2 during the ICCAT Commission Meeting in Agadir in 2012. After several discussions and alternative ideas, it was not possible to adopt any recommendation.

The Atlantic-wide Research Programme for Bluefin Tuna is a very complex programme and its activities concern all stakeholders. As a consequence, the GBYP needs not only a stable funding structure, but also the cooperation of all stakeholders and all countries to fulfil its duties in the best possible way. This need was perfectly identified by SCRS and the Commission during the preliminary evaluation of the Programme. Therefore, GBYP is managing to work with all stakeholders, making them aware of the programme and its activities and getting them directly involved when necessary. This approach is creating a favourable environment for GBYP, and one of the best proof was the tagging activity carried out in Morocco in Phase 2 and Phase 3, when it was possible to reach a very difficult but extremely productive agreement among State institutions, research Institutes, tuna industry and an NGO, who worked all together with the only and clear objective to get neutral fishery independent data on tuna behaviour. A formal agreement of collaboration for research activities to be developed under the GBYP and particularly on tagging was established with the WWF Mediterranean Programme (WWF-MedPO).

GBYP, in all Phases, continued to work constantly on this diffused network. This activity helped the Programme to get donations and practical supports, which sometimes were destined for a precise activity (see footnote in paragraph 1.0).

11.0 GBYP web page

The ICCAT-GBYP web page, which was created in the last part of Phase 1, is usually regularly updated with all documents produced by GBYP; in some cases, due to the huge workload, some set of documents are posted all together. Documents are posted only after their revision and final approval. The updating includes also the budget page, where all contributions (monetary of in kinds) are regularly listed, to ensure a full transparency.

12.0 Recommendations

The various GBYP operational meetings, GBYP Steering Committee and the SCRS the provided a list of recommendations on various issues; several of them are essential for fulfilling the duties.

In addition, GBYP considers essential better defining the following points:

a) Evolution of the Atlantic-Wide Research Programme for Bluefin Tuna: according to the current situation, which demonstrated the impossibility to reach the funding level approved by the ICCAT

Commission in 2009 for the various years of the GBYP and, as a consequence, the impossibility to carry out the various activities as originally planned, a programme revision is then necessary, finding the right balance among funding possibilities, research needs and duration. The funding system shall be better defined and improved.

b) Data recovery and data mining: it proved to be really effective and able to recover many data sets, but within the limits established by the GBYP Steering Committee; it should be extended to all available data sets not already included in the ICCAT data base or in previous ICCAT-GBYP data recovery, following the original Commission decision. The survey conducted in 2012 provides guidelines. Furthermore, data recovery (as originally planned) should include also historical biological data sets.

c) Aerial survey: the suspension caused by the impossibility for budget shortage to carry out this activity (but covering the full Mediterranean, as requested by the GBYP Steering Committee) contemporary with other activities in 2012, questioned also the objective, the strategy and the time frame; GBYP presented a SWOT analyses to the SCRS in 2012, but it had no follow-up; the study conducted in the last part of Phase 3 showed different possible scenarios. The Steering Committee is still requesting a Mediterranean comprehensive survey in 2013 and the final decision will be taken according to the availability of permits. The previously surveyed areas represent the zones where spawners mostly aggregate in the last decades and 12% of the total potential spawning area in the Mediterranean Sea.

d) Tagging: the first year (Phase 2) can be regarded as a complex large scale experiment; the strategy adopted for Phase 3 was used for testing a different strategy and approach, which resulted in a further revision of the field approaches. Tagging in Phase 4 will be conducted according to the recommendations provided by the GBYP Steering Committee, on fourth major issues. It would be necessary to possibly extend the tagging activities to other areas (such as the Eastern Mediterranean Sea), always considering the budget constraints and the permits issue. The electronic tag activities should be improved, particularly in Eastern Mediterranean, the Atlantic Moroccan coast and possibly even in South Atlantic). The tag awareness activity shall be firmly continued, improving media communication.

e) Biological and genetic sampling and analyses: according to the current situation, it is clear that it was impossible to analyse all samples which have been collected (due to budget limits), while it is also clear that it will be necessary to apply all possible efforts for getting samples from areas not sampled so far (mostly the North African Mediterranean area, the SE Mediterranean area and the Central-South Atlantic) even if not always easy. The number of analyses shall be strongly increased in Phase 4. A medium term strategy is needed.

f) Modelling: new additional efforts should be devoted for finding the best approaches for using fishery independent data and innovative approaches for better quantify uncertainties. The meeting in Phase 4 should possibly better define opportunities and limits.

13.0 Deliverables and scientific papers

The list of the internal deliverables and scientific papers produced in GBYP Phase 3 is provided in **Annex III**. The full documents are provided under separate covers.

14.0 Acknowledgments

The GBYP would like to warmly acknowledge the very supporting efforts made by all the colleagues of the ICCAT Secretariat staff for allowing the Atlantic-Wide Research Programme for Bluefin Tuna to stay on schedule, besides of the few time available for carrying out all the necessary duties, sometimes under a very short notice. In particular, the GBYP caused a considerable increase of workload to the ICCAT Administration and the translators and we would like to officially acknowledge the continuous, professional and generous support we are still having.

The GBYP also acknowledges the strong collaboration of the GBYP Steering Committee, who responded very often in real time, particularly on very difficult scientific and practical issues.

ICCAT-GBYP PHASE 3 (2012-2013) - BUDGET				
ACTIONS		**ALLOCATION**	**budget**	
Phase 3	**Original**		**detail**	**total Phase 3**
A	**A**	**Coordination**		225.000,00 €
A.1	**A.1**	Coordinator's and supporting staff's (P3) salary and benefits	€ 150.000,00	
A.2	**A.2**	Travels and subsistence (including SC)	€ 45.000,00	
	A.3	Computer hardware and software		
A.3	**A.4**	Consumables and supplies	€ 5.000,00	
A.4	**A.5**	Contracts for external Steering Committee members	€ 15.000,00	
A.5	**A.6**	ICCAT Secretariat overhead	€ 10.000,00	
B	**B**	**Data mining, data retrieval and data elaboration (external contracts)**		€ 30.000,00
B.1	**B.1**	Data mining and data retrival exercise:		
	B.1a	Ottoman archives	€ 10.000,00	
	B.1b	Recent (2000-2011) data recovery	€ -	
	B.1c	Historical data gaps including environment	€ -	
	B.1d	model with thermocline data	€ -	
	B.1e	SST data 2012	€ -	
B.2	**B.2**	Data analyses activities:	€ -	
	B.2a	data standardisation and basic analyses	€ 20.000,00	
	B.2b	VMS Data Analysis	€ -	
	C	**Aerial surveys**	€ -	€ -
C	**D**	**Tagging**		€ 1.175.000,00
C.1	**D.1**	Conventional and electronic tagging and tag recapture trials (external contracts) including tagging expert coordinator, taggers and 6 month/vessel	€ 1.080.000,00	
	D.2	Electronic tagging (external contracts)	€ -	
C.2	**D.3**	electronic tags	€ 45.000,00	
	D.4	conventional tags and applicators	€ -	
C.3	**D.5**	Tag awareness and rewards campaign (partly external contracts)	€ 50.000,00	
	D	other costs	€ -	
D	**E**	**Biological sampling (external contracts)**		€ 430.000,00
D.1	**E.1**	Biological and genetic sampling;	€ 330.000,00	
	E.2	Sampling operational meeting	€ -	
D.2	**E.3**	Analysis of samples	€ 100.000,00	
	E	other costs	€ -	
E	**F**	**Modelling**		€ 65.000,00
E.1	**F.1**	Technical meetings on modelling	€ 10.000,00	
E.2	**F.2**	Risk analysis (external contract)+travels	€ 25.000,00	
	F.3	Historical data analysis (external contract)	€ -	
	F.4	Distribution analysis of areas where juveniles may concentrate	€ -	
E.3	**F.5**	Alternative management advice frameworks	€ 10.000,00	
E.4	**F.6**	Performing simulation trials (external contracts)	€ 20.000,00	
		Total revised reduced minimum budget		**€ 1.925.000,00**

Annex II: List of meetings and activities participated by the GBYP Coordination staff* in 2012 and 2013

date	place	Meeting or field activity	Motivation and participation
Meetings and activities included in GBYP Phase 2 extension			
17-19/01/2012	Paris (FR)	OSPAR 2nd Informal Meeting of Competent Authorities on the Management of Selected Areas in ABNJ in the North-East Atlantic	Presentation of ICCAT-GBYP activities (D. Meski, A. Di Natale*)
07-08/02/2012	Madrid (SP)	GBYP Steering Committee meeting	Review of GBYP activities and plans for Phase 3 (A. Di Natale*, M. Idrissi*)
20-21/03/2012	Madrid (SP)	GBYP Steering Committee meeting	Updated plans for Phase 3 (A. Di Natale*, M. Idrissi*)
29-31/03/2012	Melilla (SP)	World Congress of the International Federation of Sport Fishing	Presentation of the GBYP tag activities and tag awareness strategy (A. Di Natale*)
17-18/04/2012	Madrid (SP)	ICCAT-GBYP Operational Meeting on Tagging, Biological and Genetic Sampling and Analyses	Review of the improvements in knowledge from Phase 2 activities, and discussions about the best approaches in terms of practices, coverage, strategies and techniques for Phase 3 (A. Di Natale*, M. Idrissi*, A. Justel*, L. Kell).
9/05/2012	Genova (IT)	Cycle of conferences about scientists and field studies organized by Amici dell'Acquario di Genova	Presentation of "Seguire la rotta dei tonni dal cielo e del mare (e non solo!): La difficile sfida dell'Atlantic-wide research programme for bluefin tuna (ICCAT-GBYP) (A. Di Natale*, on personal costs)
13-17/05/2012	Larache (MO)	Electronic tagging in trap	Electronic tagging activity with INRH and WWF (A. Di Natale*, M. Idrissi*)
Meetings and activities included in GBYP Phase 3			
4-11/09/2012	Madrid (SP)	Atlantic Bluefin Tuna Stock Assessment Session	Coordination of the data preparatory work, including bluefin tuna data (A. Di Natale*, M. Idrissi*, A. Justel Rubio*)
7/09/2012	Madrid (SP)	Steering Committee Meeting	Discussion about Phase 3 activities (A. Di Natale*, M. Idrissi*)
24-25/09/2012	Madrid (SP)	SCRS Sub-Committee on Statistics	Overview of the GBYP data recovery (A. Di Natale*, M. Idrissi, A. Justel Rubio*)
1-5/10/2012	Madrid (SP)	SCRS Plenary	GBYP reporting and dedicated meetings (A. Di Natale*, M. Idrissi*)
28/10-4/11/2012	Grand Bay - Mauritius	IOTC Symposium on tuna tagging	Presentation of ICCAT-GBYP Tagging and tag awareness activities (A. Di Natale*)
10-20/11/2012	Agadir (MO)	ICCAT Commission Meeting	Presentation of GBYP activities in Phase 3 and plan / budget for Phase 4, plus Survey on Data Collection (A. Di Natale*, M. Idrissi*)
10-14/12/2012	Sete (FR)	Steering Committee Meeting	Presentation of Phase 3 activities report (A. Di Natale*, M. Idrissi*, L. Kell)

Annex III: List of deliverables and scientific papers produced by ICCAT-GBYP in Phase 3

List of internal deliverables:

1. A. Report on the use and enforcement of GBYP Research Mortality Allowance in Phase 3: 1-9.
2. B.1a Report on the ICCAT-GBYP Data Mining & Recovery Plan, Phase 3: Exploratory trials on Ottoman and other Turkish Archives (by A. F. Örenç, M. Ünver and L. Akgünlü, January 8, 2013) : 1- 15 + 1-25 (fig.).
3. B.2a Questionnaire and survey on GBYP data recovery perspectives: Independent Opinion *Pro-Veritate* (presented by GBYP Coordination to the GBYP Steering Committee on December 12, 2012): 1-12.
4. C.1a1 Report on the ICCAT-GBYP Phase 3 Tagging Programme (by the Consortium for Tagging, January 20, 2013): 1-34 + 1-16 (Annexes).
5. C.1a2 Summary of the electronic tagging activities carried out in cooperation with WWF-MedPO: 1-4.
6. C.3 Summary Table on the ICCAT-GBYP Tag Recovery Activity (February 20, 2013): 1.
7. D. Report on the GBYP Biological and Genetic Sampling and Analyses in 2012 (by the Consortium for Biogenetic Activities, February 5, 2013, and partly revised afterwards): 1-99 + 1-17 (Appendix).
8. E.1. Reports on ICCAT-GBYP Technical meeting on Modelling Approaches: 3 SCRS documents:
    1. SCRS/2012/029: A catch curve analysis for East Atlantic Mediterranean Bluefin Tuna: 1-8.
    2. SCRS/2012/030: A length-based indicator for East Atlantic Mediterranean Bluefin Tuna: 1-9.
    3. SCRS/2012/186: Projections for East Atlantic Mediterranean Bluefin Tuna: 1-10.
9. E.2. Report on the ICCAT-GBYP Modelling Approaches: Risk Assessment – Eliciting uncertainties in GBYP (by A.W. Leach, P. Levontin, J. Holt and J.D. Mumford, January 8, 2013): 1-24.
10. E.3. Report on the ICCAT-GBYP Modelling Approaches in Support to Bluefin tuna Stock Assessment: Non-parametric stochastic imputation of length composition data for Atlantic Bluefin tuna; Description and cross-validation of imputation methods (by T. Carruthers, January 21, 2013) : 1- 14.
11. E.4. Report on the ICCAT-GBYP Modelling Approaches in Support to Bluefin tuna Stock Assessment. ALKr: a R package of methods based on age-length keys to estimate the age structure of fish populations (by A.G. Murta, J.F. Loff, M. Neves and L. Wise, January 18, 2013): 1- 25.
12. E.5 Report on the ICCAT-GBYP Contract for assessing the feasibility of a large-scale aerial survey on bluefin tuna spawning aggregations in all the Mediterranean Sea for obtaining useful data for operating modeling purposes (by A. Cañadas and J.A. Vázquez, January 15, 2013): 1-18 + 5 tables.
13. ICCAT-GBYP Steering Committee Reports in Phase 3:
    - Report of the *Ad horas* meeting of the GBYP Steering Committee; Madrid - September 07, 2012: 1-3;
    - Report of the GBYP Steering Committee meeting; Sète – December 12-14, 2012: 1-24.

List of Scientific Papers – Phase 3

SCRS/2012/029 A catch curve analysis for East Atlantic Mediterranean Bluefin Tuna. Kell L.T., Bonhommeau S., Fromentin J.M., Ortiz M., 8 p.

SCRS/2012/030 A length-based indicator for East Atlantic Mediterranean Bluefin Tuna. Kell L.T., Bonhommeau S., Fromentin J.M., Palma C., 9 p.

SCRS/2012/116 Review and preliminary analysis of size frequency samples of bluefin tuna (*Thunnus thynnus*) 1952-2010. Justel Rubio A., Ortiz M., 22 p.

SCRS/2012/125 Preliminary analyses of the ICCAT VMS data 2010-2011. Justel Rubio A., Parrilla A., Ortiz M., 19 p.

SCRS/2012/139 ICCAT-GBYP Atlantic-wide Research Programme for Bluefin Tuna 2012. GBYP Coordination detailed activity report on Phase 2 (last part) and Phase 3 (first part). ICCAT Secretariat (Di Natale A., Idrissi M.), 54 p.

SCRS/2012/140 ICCAT-GBYP Aerial Survey: juveniles *versus* spawners. A SWOT analysis for both perspectives. ICCAT Secretariat (Di Natale A., Idrissi M.), 11 p.

SCRS/2012/141 BFT catch and size historical data recovered under the ICCAT Atlantic-wide Research Programme for Bluefin Tuna (Phases 1 and 2). ICCAT Secretariat (Di Natale A., Idrissi M., Justel Rubio A.), 34 p.

SCRS/2012/142 The mystery of Bluefin tuna (*Thunnus thynnus*) presence and behavior in the central southern Atlantic in recent years. Di Natale A., 12 p.

SCRS/2012/143 Preliminary information on GBYP pop-up tagging activities in Morocco in 2012. Quílez-Badia G., Cermeño P, Sainz Trápaga S., Tudela S., Di Natale A., Idrissi M., Abid N., 9 p.

SCRS/2012/149 Eastern Bluefin Tuna (*Thunnus thynnus*, L.): Reproduction and Reproductive Areas and Season. Piccinetti C., Di Natale A., Arena P., 20 p.

SCRS/2012/186 Projections for East Atlantic Mediterranean Bluefin Tuna. Kell L.T., Bonhommeau S., Fromentin J.M., Ortiz M., Walter J., 10 p.

SCI/2012/036 ICCAT-GBYP Operational Meeting on tagging, biological and genetic sampling and analyses (Madrid, April 17-18, 2012), 25 p.

In press: The ICCAT-GBYP Tagging Programme for Bluefin Tuna. Di Natale A., 35 p. (presented to the IOTC Indian Ocean Tagging Symposium and in press on: Fisheries Research):

Annex IV: Summary status of the various contracts included in GBYP Phase 3 activity

Item	Date of Call for Tenders	Award date or contract date	Deliverables, as scheduled in Contracts		
			Preliminary report	Draft final report	Final report
Tagging Programme (ICCAT-GBYP 01/2012 A) (1 contract – Consortium of 9 institutions led by AZTI-Foundation of Spain, 8 subcontracts)	26/03/2012 (extended on 03/05/2012 for 7 days)	21/06/2012	17/09/2012	27/11/2012	14/12/2012 (extended to 19/01/13 by Amendment)
Biological and Genetic Sampling and Analysis (ICCAT-GBYP 01/2012B) (1 contract – Consortium of 12 institutions led by AZTI-Foundation of Spain, 5 subcontracts)	26/03/2012 (extended on 03/05/2012 for 7 days)	awarded 07/06/2012 Contract on 20/09/2012	26/09/2012	08/01/2013	15/01/2013 (extended to 19/01/13 by Amendment)
Modelling Approaches: Risk Assessment (ICCAT-GBYP 02/2012) (1 contract – Imperial College Consultants Ltd. – London of UK)	06/09/2012	25/09/2012	04/01/2013	11/01/2013	11/01/2013
Modelling Approaches in Support to Bluefin tuna Stock Assessment: Non-parametric stochastic imputation of length composition data for Atlantic Bluefin Tuna (Statistical Conversion of Catch-At-Size to Catch-At-Age) (ICCAT-GBYP 03/2012a) (1 contract – Jointly by IPMA and JFL Consultoria Estatistica – Lisbon - Portugal)	06/09/2012	17/10/2012	04/01/2013	11/01/2013	11/01/2013
Modelling Approaches in Support to Bluefin tuna Stock Assessment: ALKr - an R package of methods based on age-length keys to estimate the age structure of fish populations (Data Imputation) (ICCAT-GBYP 03/2012b) (1 contract – Dr. Tom Carruthers – Vancouver - BC of Canada)	06/09/2012	17/10/2012	04/01/2013	11/01/2013	11/01/2013
Data Recovery Plan: Historical any data sets (Task 1 and/or Task 2), including those from Ottoman Archives, for BFT fishery in eastern Mediterranean and Black Sea (ICCAT-GBYP 05/2012) (1 contract – Dr. Ali Fuat Örenç – Istanbul - Turkey)	08/10/2012	24/10/2012	08/01/2013	14/01/2013	14/01/2013
Aerial Surveys (for Phase 4): Assessment of the feasibility of a large-scale aerial survey on bluefin tuna spawning aggregations in all the Mediterranean Sea for obtaining useful data for operating modelling purposes (ICCAT-GBYP Phase 3; December 2012) (1 contract – ALNILAM Investigación y Conservación S.L. – Madrid -- Spain)	20/12/2012	21/12/2012		15/01/2013	19/01/2013

Distribution of GBYP Phase 3 contracts and subcontracts by Country:

Contracts (27):

EU-Spain	:	13
EU-Italy	:	3
EU-Portugal	:	2
EU-France	:	1
EU-Malta	:	1
EU-United Kingdom	:	1
Canada	:	1
Croatia	:	1
Japan	:	1
Morocco	:	1
Turkey	:	1
USA	:	1

Subcontracts (13):

EU-Spain	:	6
Turkey	:	2
EU-Italy	:	2
EU-Portugal	:	1
EU-Belgium	:	1
Morocco	:	1