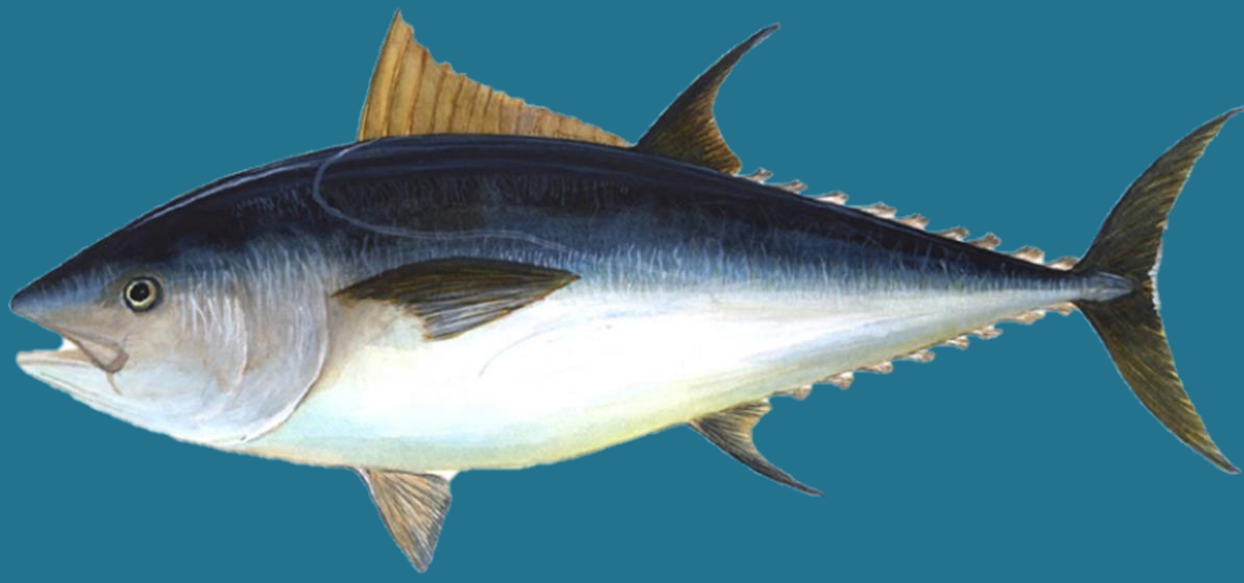
ATLANTIC BLUEFIN TUNA TAGGING PROGRAMME IN IRELAND 2017



Bluefin Tuna (*Thunnus thynnus*) Linnaeus 1758

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Marine Institute
Foras na Mara

QUEEN'S UNIVERSITY BELFAST
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1. Summary of tagging in 2017

Satellite tagging of Atlantic bluefin tuna was successfully carried out in 2017 with 9 individuals tagged and released with Wildlife Computers, pop-off satellite archival tags (Table 1). All tagging was carried out under a project licence from the HPRA with licenced and trained personnel. SFPA were made aware of the programme and identities of the vessels, skippers and scientific personnel and a derogation was obtained for scientific research fishing. A Research Mortality Allowance (RMA) (Appendix I) was obtained from ICCAT who also supplied ICCAT floy tags for identification of fish if recaptured at a later stage. All data derived from the tagging programme will be shared with ICCAT in due course.

The consortium was extended in 2017 to include Queens University Belfast who were contracted to carry out accelerometer studies to obtain real time information on the effects of angling capture on specimens to be tagged immediately post release. A further three fish were successfully tagged with accelerometer packages and data were retrieved from two of these (Table 2).

2. Introduction

Electronic tagging using archival tags by Block et al. (2005) highlighted the potential importance of the coast of Ireland and the UK as migratory routes for Atlantic bluefin tuna. A 191 cm fish tagged in waters off North Carolina showed trans-Atlantic migrations to the Mediterranean Sea and multi-annual site fidelity to waters off Ireland and the UK. This single track suggested that after a juvenile foraging period in the west, Atlantic bluefin foraged in the waters of the east Atlantic off Ireland and then undertook migrations to the Balearics and other known Mediterranean spawning areas. Many other western released fish have moved into these waters (Block et al. 2005). The only dedicated electronic tagging activity off Ireland was conducted in 2003 and 2004 by a scientific team from Stanford University and an Bord Iascaigh Mhara - Irish Sea Fisheries Board (Cosgrave et al, 2008; Stokesbury et al. 2007). Tagging of fish in Irish waters demonstrated that Atlantic Bluefin released in Irish waters travel between European foraging grounds, known eastern breeding regions (Mediterranean Sea; Malta) and western Atlantic waters. These data also highlighted a tentative link between bluefin caught off Ireland and western management regions. In addition, recent electronic tagging of ABFT off Scotland has shown local movements of Atlantic bluefin tuna around Scottish waters (Neat et al. 2014), to the north of Ireland, and further south. Given these insights it is important that stock origin, habitat utilisation and large-scale movement patterns of these Atlantic bluefin are characterised in more detail to ensure that the population models and concepts used in Atlantic bluefin tuna stock assessment and Management Strategy Evaluation (MSE) are parameterised as accurately as possible.

Investigation of the distribution and movements of Atlantic bluefin tuna in Irish waters is now a research priority for Ireland. The ocean waters off south Donegal are currently regarded by the International Commission for the Conservation of Atlantic Tuna (ICCAT) as an important area for Atlantic bluefin tuna and indications are that significant numbers arrive in the area over the period August to November each year. The Department of Agriculture Food and the Marine (DAFM) requested that the Marine Institute carry out a bluefin tagging programme in autumn 2016 to support

the International Commission for the Conservation of Atlantic Tuna (ICCAT) Grand Bluefin Year Programme (GBYP) Atlantic research programme for Bluefin tuna.

ICCAT is an inter-governmental fishery organization responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas. ICCAT compiles fishery statistics from its members and from all entities fishing for these species in the Atlantic Ocean, coordinates research, including stock assessment, on behalf of its members, develops scientific-based management advice, provides a mechanism for Contracting Parties to agree on management measures, and produces relevant publications. The Atlantic-wide research programme for Bluefin tuna was officially adopted by the ICCAT Commission in 2008 with a key priority being to improve understanding of key biological and ecological processes through electronic tagging experiments to determine habitat and migration routes. GBYP was adopted as official acronym of the research, which was initiated at the end of March 2010.
(ICCAT) manage Atlantic bluefin stocks under a two stock hypothesis for management and assessment i.e.

- Eastern Atlantic Ocean and Mediterranean Sea stock, that spawns in the Mediterranean Sea
- Western Atlantic Ocean stock, that spawns in the Gulf of Mexico,

with a boundary line dividing the stocks at 45 W longitude.

Results of Block et al. (2005) as well as tagging research by others including ICCAT and their collaborators indicates that movement across the currently assumed east-west boundary in the Atlantic, does occur. Scientists have used the spatial data to improve management models (Taylor et al. 2011, Kerr et al. 2016). ICCAT now recognises the need to develop quantitative knowledge of mixing rates and integrate this knowledge into the current assessments, as well as new models to improve the multiple stock evaluation processes.

The Mediterranean and Eastern Atlantic bluefin tuna (considered a single stock) is a highly regulated species with annual catch limits set by the International Commission for the Conservation of Atlantic Tunas (ICCAT) based on scientific advice.

The EC became a Contracting Party to ICCAT (the International Commission for the Conservation of Atlantic Tunas) in 1997. EU TACs and quotas for Bluefin Tuna were set by Council for the first time at the December, 1997 meeting in order to implement ICCAT catch limits/TACs for these species. Ireland did not have a track record of targeting bluefin tuna and does not have a quota. Ireland has access to a by-catch “others” quota for MSs without a quota share to cover by-catches of BFT in commercial fisheries subject to certain conditions. Ireland has no quota to cover recreational fishing for BFT and has had no such quota since 1997. This tagging programme has been developed to improve understanding of the stock and migratory patterns.

In 2016, the Marine Institute obtained expert guidance from Stanford University (USA), University of Acadia (Nova Scotia, Canada) to successfully tag and release 16 Atlantic bluefin tuna off the coast of Donegal with satellite tags to identify spawning stocks and the level of mixing of stocks in Irish waters. Training in application of satellite tags to bluefin was provided to staff of the Marine Institute by these international tagging experts as direct experience in handling and tagging these extremely large fish is essential for future Irish tuna research work. A consortium continued to tag Bluefin tuna off the

Donegal coast over the period September to October 2017 and was expanded to include Queens University, Belfast to investigate early behaviour and swim responses of bluefin tuna post capture and tagging. The consortium works closely with ICCAT.

2.1 Legislative/formal preparation:

Registration was required with the Irish Animal Welfare Authorities (HPRA) for licencing of the project under EU Directive 2010/63 and S.I. No. 543 of 2012 e.g. application for and receipt of short term Animal Welfare Licences for individuals from USA, Canada and the UK.

An amendment was made to an existing Health Products Regulatory Authority (HPRA) project licence to include Blue Fin Tuna in telemetry studies.

Formal letters of invitation to US/Canadian collaborators were issued by the Marine Institute to participate in international research programme in Irish waters.

Acknowledgement of programme from ICCAT was sought and specific inclusion of the Marine Institute in the International Research Mortality Allocation (RMA) was received (Appendix I).

Derogation of fishing for Bluefin Tuna fishing for the purposes of research was reviewed and granted from the Irish Sea Fisheries Protection Authority (Appendix II).

2.3 Financial preparation:

The Marine Institute supported a research budget to cover technical equipment (10 satellite tags), vessel charter, technical support of Marine Institute staff, fees for HPRA Animal Welfare licences and costs to allow experts from the USA and Canada travel to Ireland to assist with a) establishing the project, b) training of technical and scientific staff and c) tagging operations on board the charter vessel.

An Official call and open tender (ETender) process for Vessel Charter and formal evaluation of tenders was implemented.

Ordering and purchase of ten satellite tags to arrive in time for the charter period.

Establishment of new telemetry platforms with the ARGOS Satellite service group (CLS) for each tag under Marine Institute account.

3. Tagging Locations and Methods

All fish were tagged off the Donegal coast often within close proximity to the shore (Figure 1).

Pop-up Satellite Archival Transmitting Tags (PSATs) are designed to track the large scale movements and behaviour of pelagic fish and other animals. Depth, temperature and light-level data are used to estimate location. At a user-specified date and time, a pin is corroded, releasing the PSAT to float to the surface and transmit summarised information via the Argos satellite system. Daily longitude of the migration track, is calculated onboard the PSAT using geo-location by light level techniques. Daily latitude can be calculated from transmitted light level curves using software provided by the tag manufacturer. The results provide the migration path and depth and temperature preferences of the study animal, as well as oceanographic data, in the form of depth-temperature profiles.

Accelerometer tags measure acceleration in three spatial axes and when attached to an animal, provide very high resolution measurements of relative activity levels and behaviour of the tagged animal. For fishes, accelerometers can provide powerful measurements of swimming effort including tail-beat frequency and amplitude, and can identify burst events associated with predation attempts. Since they index gravity, accelerometers can also reveal orientation of the animal in space (e.g. pitch and roll angles); important information for identifying abnormal swimming behaviour. The accelerometer devices are typically coupled with additional sensors including swim speed, water depth, and water temperature.

Two vessels were deployed over the period i.e. the Leah C and the Evie Rose. Both are equipped with transom doors to bring fish on board with specialized gear, fighting chairs to land the fish. All fish were captured using angling methods and squid spreader bar lure setups with up to 11 separate plastic squid lures per rig. Only the last in the train bears a hook. Once the lure is taken the fish are played to the boat as quickly as possible and landed through the ransom door of the vessel using a lip hook technique developed by the Block lab (Block et al. 2001). Once on board the team performs individual tasks e.g. placing of damp cloth over the eyes of the fish to keep the fish calm, constant irrigation of the gills using fresh saltwater, insertion of the PSAT or accelerometer tag into the dorsal musculature using a titanium tag dart. Two other numbered marker tags are also applied to aid in recovering information form tagged fish. Small samples of tissue are removed for genetic analyses. As quickly as possible the fish are then released back into the water. The onboard procedure takes approximately 3 to 5 minutes. A length and girth are recorded as well as comments on the fish appearance in general, the landing, tagging and release condition of the fish upon release. The position of hook-up and release is noted and recorded. Details of tagging for satellite tags and accelerometer tags are given in Table 1 and 2.

No significant problems were encountered during tagging operations and no modifications were made to the tagging protocols as outlined in the HPRA project licence. All fish were released alive with satellite tags and conventional tags attached (Table 1 and 2). Some minor modifications to on board procedures have been noted for future tagging activity to improve efficiency. ICCAT data sheets have been prepared for each tagged fish containing details and have been sent to ICCAT.

4. Results

The results of the tagging programme are currently being prepared for scientific publication by the consortium and will be the subject of an extended report subsequently.

Table 1. Details of bluefin tuna PSAT deployments in October 2017 in Irish water

PSAT Tag Code	1st Floy Tag No	2nd Floy Tag No	Tagging Date	Latitude	Longitude	Length cm	Half Girth cm	Estimated Wt kg	Handling Time	Name of Boat	Type of Bait/Lure
16P1978	BYP027580	BYP077526	21/09/2017	54.59407°N	8.7499°W	229	77	180kg	5 mins	Evie Rose	Plastic Squid
16P1601	BYP027582	BYP077530	24/09/2017	54.5905°N	8.6768°W	176	62	75kg	3 mins	Leah C	Plastic Squid
16P2000	BYP027583	BYP077527	25/09/2017	55.04437°N	8.66778°W	227	70	130kg	3 mins	Leah C	Plastic Squid
16P1988	BYP027581	BYP077529	25/09/2017	55.04833°N	8.65585°W	184	65	90kg	3 min	Leah C	Plastic Squid
16P1984	BYP027584	BYP077528	26/09/2017	54.56175°N	8.59512°W	218	74	170kg	3 mins	Leah C	Plastic Squid
17P0217	BYP027586	BYP077556	27/10/2017	54.90227°N	8.69095°W	217	78	N/A	2.5 mins	Evie Rose	Plastic Squid
17P0218	BYP027625	BYP077559	27/10/2017	54.91888°N	8.69743°W	228	82	N/A	2.5 mins	Evie Rose	Plastic Squid
17P0219	BYP027616	BYP077551	30/10/2017	54.80157°N	8.63785°W	234	85	N/A	4 mins	Evie Rose	Plastic Squid
17P0246	BYP027602	BYP077568	30/10/2017	54.79198°N	8.64245°W	235	82	N/A	4 mins	Evie Rose	Plastic Squid

Table 2. Details of bluefin tuna accelerometer deployments in October 2017 in irish waters

Accelerometer reference	Tagging Date	Latitude	Longitude	Length cm	Fish release time	Fish release date	Logging duration (hours)	Name of Boat
1a	18/10/2017	54°46'22.80"N	8°42'54.00"W	200	11:40:00	18/10/2017	10h05	Leah C
2a	29/10/2017	54°54'4.93"N	8°41'36.60"W	235	13:56:00	29/10/2017	7h45	Evie Rose
3a	02/11/2017	54°53'31.27"N	8°38'58.78"W	200	14:40:00	02/11/2017	17h30	Evie Rose

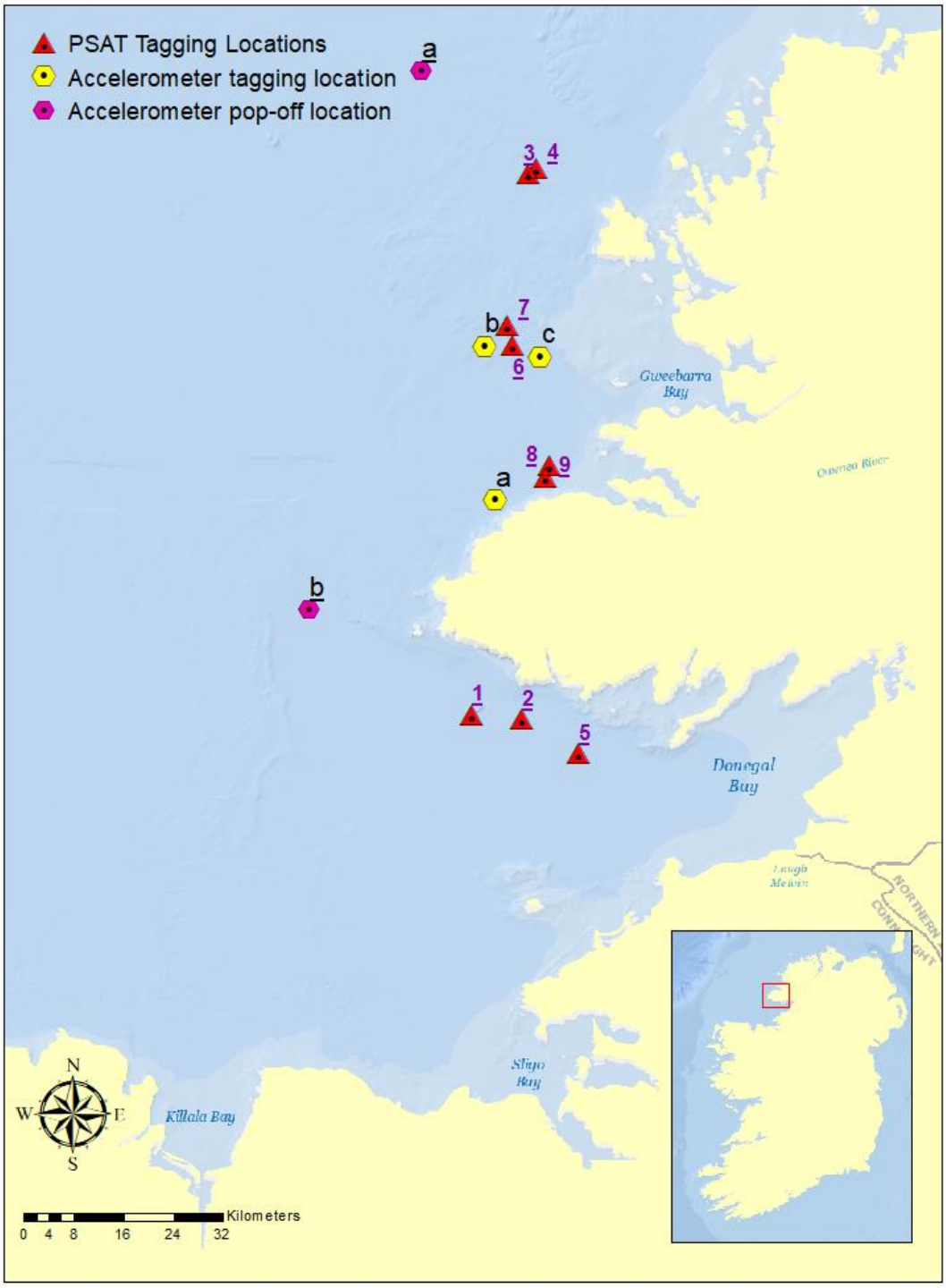

Figure 1. Location of capture of bluefin tuna during 2017 tagging programme – Triangles are PSAT tag locations. Circles are accelerometer tag release (yellow) and detachment (red) locations.

Figure 2. Squid spreader bar being fished with up to four sets operating close to the surface – note proximity to land during some fishing operations in 2017.

Figure 3. Bluefin tuna being played into the boat quickly using the rod rest to avoid stress; tagging procedure on board. Note constant irrigation of gills with fresh seawater during tagging and subsequent sampling of tissues for genetic stock identification. (Figure not to be reproduced without permission)

5. References

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6. Acknowledgements

Particular thanks go to Adrian Molloy and Michael Callaghan who skippered the vessels and to a number of anglers who caught fish for the project. Leonie O'Dowd (MI) provided assistance with tendering and procurement.

7. Appendix I Research Mortality Allowance ICCAT

INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS
COMMISSION INTERNATIONALE POUR LA CONSERVATION DES THONIDES DE L'ATLANTIQUE
ICCAT CICTA CICAA
COMISIÓN INTERNACIONAL PARA LA CONSERVACIÓN DEL ATÚN ATLÁNTICO

Madrid – 12 September 2017

ICCAT GBYP CIRCULAR #1386 / 2017

SUBJECT: BFT RESEARCH MORTALITY ALLOWANCE (RMA)

I have the honor to transmit to you the attached updated information on the ***"Bluefin Research Mortality Allowance for the ICCAT Atlantic-wide Research Programme for Bluefin Tuna (ICCAT Rec. 11-06) - Special Documents and Procedures"***, which includes the rules established regarding the RMA, current list of participating entities in ICCAT GBYP tagging activities and biological studies in 2017, as well as the GBYP Logbook for RMA.

Please accept the assurances of my highest consideration.

COMISION INTERNACIONAL ICCAT Conservación AT. ATL.

Driss Meski
Executive Secretary

DISTRIBUTION:

- **Commission Officers:**

Commission Chair:	M. Tsamenyi	**COC Chair:**	D. Campbell
First Vice-Chair:	S. Depypere	**PWG Chair**	F. Donatella
Second Vice Chair:	R. Delgado	**STACFAD Chair**	S. Lapointe
SCRS Chair:	D. Die		

- **Head Delegates**
- **Cooperating Parties, Entities, or Fishing Entities**

cc: Head Scientists

Attachments: Rules for RMA;
List of Participating Entities;
GBYP Logbook-RMA

Corazón de María, 8 – 28002 MADRID – Spain, Espagne, España – Tel: +34 91 416 5600 – Fax+34 91 415 2612 – *http://www.iccat.int- info@iccat.int*

BLUEFIN RESEARCH MORTALITY ALLOWANCE FOR THE ICCAT ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA (ICCAT REC. 11-06)

SPECIAL DOCUMENTS AND PROCEDURES

In accordance with ICCAT Rec. 11-06, Art. 3, "Scientific institutions and entities participating in the ICCAT GBYP research activities are exempt from the Commission's conservation measures on bluefin tuna for up to a maximum of an overall amount of 20 metric tons of bluefin tuna annually ("Research Mortality Allowance" or "RMA") taken or killed incidentally during the GBYP biological studies or the tagging activities, as approved by the SCRS and endorsed by the Commission. These tunas cannot be sold for commercial purposes and shall be reported in detail to ICCAT and SCRS at the end of each Phase of GBYP, according to specific rules that will be established by the ICCAT Secretariat and attached to the research contracts", the following rules are established:

1) Each entity engaged in any ICCAT GBYP activity for tagging or biological studies, that deliberately or incidentally killed any bluefin tuna has to complete the form "GBYP LOGBOOK – RMA" (attached as **Annex 1**). This form must be completed on board the vessel or trap, signed by the researcher on board, by the vessel or the trap master and then delivered to the ICCAT Secretariat, by e-mail or fax, within a maximum of 24 hours of the mortality event.

2) The ICCAT Secretariat is responsible for informing all entities concerned whenever the maximum of 20 tons of Research Mortality Allowance is reached. From this moment on no more mortality is allowed.

3) Any fish included in the ICCAT GBYP Research Mortality Allowance that is landed for research purposes, for the crew´s personal consumption, or for charitable purposes is exempted from the BCD in the ICCAT Rec. 11-20. A copy of the "GBYP LOGBOOK – RMA" must accompany any fish destined for the crew´s personal consumption or for charitable purposes.

4) Any bluefin tuna recorded as "Research Mortality Allowance" cannot be used for any commercial purposes. If any of these fish are found on the market, this will be considered as IUU catch.

5) Each year, the ICCAT GBYP will set-up a specific register, available on the ICCAT GBYP web-page, with a recapitulation of the information collected from the "GBYP LOGBOOK – RMA".

6) The current updated list of entities involved in ICCAT GBYP activities in 2017, either for tagging or biological studies, is provided in **Annex 2**.

Annex 1

ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA (ICCAT-GBYP)

REPORT FOR GBYP RESEARCH MORTALITY ALLOWANCE (Rec. 11-06)

GBYP LOGBOOK - RMA

1. Date:	2. Document number: (attributed by ICCAT-GBYP)

3. Entity in charge of the research activity:	4. Research activity:

Address:	Phone (including that of the scientific responsible for the activity):
Country:	E-mail:

Vessel or trap name:	Flag:	Vessel or trap ID number:

5. Area of catch (geographical description):	6. Location (latitude-longitude):

7. DESCRIPTION OF THE MORTALITY INDUCED

Gear	Number of fish	Length (cm)	Round weight (kg)	Final destination*
TOTAL				

Name of the scientist on board and title:	Signature:

Name of Captain of the vessel/trap:	Signature

The form MUST be delivered to ICCAT by e-mail (gbyp@iccat.int) or fax (+34 91 415 2612) within a maximum of 24 hours of the research mortality event

* Dead bluefin tuna derived from a GBYP research activity cannot be sold on the market or traded under any circumstances. The mortality report shall distinguish between dead fish discarded at sea, fish for crew's personal consumption and fish for scientific purposes.

Annex 2

LIST OF PARTICIPANTS IN ICCAT GBYP TAGGING ACTIVITIES AND BIOLOGICAL STUDIES IN 2017
Second list

1. Alleanza Pescatori Ricreativi (APR), Genova, EU-Italy
2. AquaBioTech Ltd.– EU-Malta
3. Asociación Catalana per una Pesca Responsable (ACPR), Barcelona, EU-Spain
4. AZTI Fundazioa – Fundación AZTI –EU-Spain
5. Balfegó & Balfegó – EU-Spain
6. Carloforte Tonnare Piam s.r.l. – EU-Italy
7. Centro de Estudios Avanzados (CEAB-CSIC) – EU-Spain
8. Centro di Competenza sulla Biodiversità Marina (COM.BIO.MA.) – EU-Italy
9. Department of Aquatic Resources, Institute of Marine Research, Swedish University of Agricultural Sciences – EU-Sweden
10. FIPSAS-CIPS, Roma – EU-Italy
11. Fish Ageing Searvices Pty Ltd. - Australia
12. Fish & Fish Ltd. – EU-Malta
13. Galway-Mayo Institute of Technology – EU-Ireland
14. Great Tuna Race – EU-Spain
15. IFREMER – EU-France
16. Institute of Marine Research - Norway
17. Institut National de la Recherche Halieutique (INRH) – Kingdom of Morocco
18. Instituto Español de Oceanografía (IEO) – EU-Spain
19. Instituto Português do Mar e da Atmosfera (IPMA) - EU-Portugal
20. Kali Tuna d.o.o.– EU-Croatia
21. Large Pelagics Group, St.Andrews Biological Station (SABS) – Canada
22. Mare Blu Tuna Farm Ltd. – EU-Malta
23. The Marine Institute, EU-Ireland
24. MFF Ltd.– EU-Malta
25. MRAG Ltd – EU-United Kingdom (for ICCAT ROP)
26. National Institute for Aquatic Resources (DTU Aqua), Technical University of Denmark – EU-Denmark
27. National Institute of Fisheries Sciences – Republic of Korea
28. National Research Institute for Far Seas Fisheries (NRIFSF) – Japan
29. NECTON Marine Research Society – EU-Italy
30. Prof. Oray, Isik – Turkey
31. Ricerca Mare Pesca p.s.c.r.l. – EU-Italy
32. TAXON Estudios Ambientales S.L.– EU-Spain
33. Texas A&M University (TAMU) - USA
34. Tuna Graso S.A.U. – EU-Spain
35. Universidad de Cádiz, Departamento de Biología – EU-Spain
36. Università di Bologna (UNIBO) – EU-Italy
37. Università di Cagliari (UNICA) - EU-Italy
38. Università di Genova (UNIGE) – EU-Italy
39. University of Exeter – EU-United Kingdom
40. University of Istanbul, Department of Fisheries - Turkey
41. UNIMAR Soc. Coop. – EU-Italy
42. WWF European Policy Programme – EU-Italy
43. WWF-Netherlands, Oceans and Coasts Programme – EU-Netherlands

8. Appendix II derogation to conduct scientific research fishing 2017

AN t-ÚDARÁS UM CHOSAINT IASCAIGH MHARA | SEA-FISHERIES PROTECTION AUTHORITY
Headquarters, Park Road, Clogheen, Clonakilty, Co. Cork, Ireland
T +353 (0) 23 8859309
F +353 (0) 23 8858796
W www.sfpa.ie

20th September 2017
DSR 16/2017

Dr Niall Ó'Maoileidigh
Marine Institute
Ireland

DEROGATION TO CONDUCT FISHING FOR SCIENTIFIC RESEARCH

"LEAH C"

Dear Dr Ó'Maoileidigh

Please note that the Sea-Fisheries Protection Authority is pleased to agree to your request for a specific derogation to conduct fishing for scientific research subject to compliance with the terms outlined below:

Type of survey: A research consortium has been formed comprising the Marine Institute, Stanford University, United States and Queens University Belfast (QUB). This consortium will aim to tag between 8 and 16 adult Atlantic Bluefin tuna (ABFT) with electronic pop-up satellite archival tags (PSATs; supplied by the Marine Institute) in the coastal waters off the north west coast of Ireland during October 2016. The consortium will also undertake biological sampling of fin and muscle tissue.

Vessel Details: Name: **LEAH C (angling charter vessel)**

Area coverage: ICES VIa & VIIb; Donegal Bay.

Period: Between 21st September & 15th November 2017, approx. 20 days in total during this period.

Target Species: Bluefin Tuna (Thunnus thynnus)

Scientific Staff: Dr Niall Ó'Maoileidigh & Marine Institute staff along with colleagues from Stanford and Queens University Belfast (at least two on board at all times during trial)

Please be advised that a copy of this document should be retained onboard the vessel whilst engaged in the scientific work.

Finally I would like to wish you and your team every success with the project.

Christopher Nally
Sea-Fisheries Operations Manager
cc: [Naval Service, SFPA-SMT, SFPA-Senior Port Officers, European Commission]

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