ICCAT GBYP 11/2021
TAGGING PROGRAMME 2021

Atlantic-Wide Research Programme for Bluefin Tuna
(GBYP PHASE 11)

Electronic tagging of Atlantic bluefin tuna in the Channel in 2021

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FINAL REPORT
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1. Executive Summary

Atlantic bluefin tuna (ABT) have recently returned to waters in the western English Channel (hereafter "the Channel"), where they have been rare or infrequent for over five decades. To understand the factors that affect their distribution and ecology, we conducted an electronic tagging study with the aim to gain a better understanding of their migratory behaviour. As part of the Thunnus UK and FISH-INTEL projects, we deployed 51 electronic tags in 2021 on ABT (125 to 243 cm curved fork length, CFL; mean ± 1 S.D. = 191 ± 26 cm) off southwest England (n=44) and the Channel Islands (n=7). Of these, six pop-up satellite archival tags (MiniPATs) were provided by ICCAT. Biological sampling was undertaken at the time of tagging in the form of a fin clip for genetic analysis and a muscle biopsy. These tagging and sampling operations will extend the results obtained from similar electronic tagging conducted between 2018 – 2020, including ICCAT tag deployments off southwest England in 2020.

2. Introduction

Atlantic bluefin tuna (ABT) were absent, or present in low numbers, in the Channel since at least the 1960s. From 2014 onwards, sightings have been reported with increasing regularity (Horton et al. 2021). In 2018, the first ABT were tagged with electronic tags (e-tagging) in the Channel. Prior to these efforts, ABT have not been tracked electronically to or from the area. Since its inception, Thunnus UK (TUK) has carried out four years (2018-2021) of ABT e-tagging. Field operations take place between August and November each year - a period when ABT return annually to feed on a diverse assemblage of forage fish. Part of this research has been carried out under a MOU with GBYP ICCAT program, who provided conventional and electronic tags. This MOU was agreed following the submission of a proposal for collaboration with GBYP in response to ICCAT CIRCULAR # 0471/2020 (published by the ICCAT Secretariat). The MOU awarded 9 MiniPATs to Thunnus UK for deployment in 2021.

The principle aim of Thunnus UK is to provide a baseline understanding of the spatial ecology of ABT present in aggregations off the United Kingdom. One objective of the project is the electronic tagging programme (**Figure 1**), which seeks to 1) explore the migration routes used by ABT that migrate into the Channel, 2) identify the population of origin of the tagged ABT, 3) explore relationships between a catch-and-release experience and behaviour, and 4) investigate long-term and larger-scale movements, and how these might be affected by fishing and ecosystem conditions.
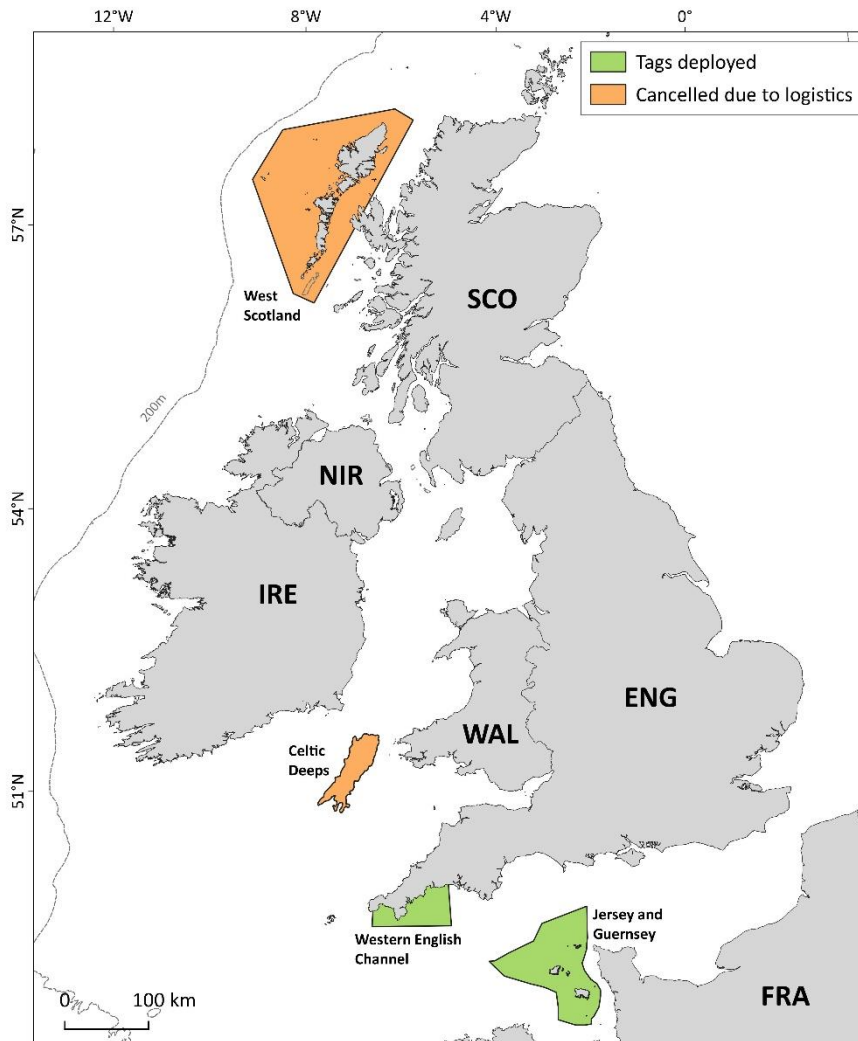
Figure 1: Map of the British Isles showing proposed Thunnus UK, FISH-INTEL and Jersey Government e-tagging sites in 2021.

The e-tagging programme has deployed a combination of pup-up archival transmitting tags (PATs), acoustic tags, accelerometers, and conventional identification tags ("Floy tag") to sample ABT from aggregations around the United Kingdom. Planned work areas in 2021 included the western Channel (including the Crown Dependencies of Jersey and Guernsey), the Celtic Deeps to the southwest of Wales and the waters off the Outer Hebrides, Scotland (**Figure 1**). These areas are of particular interest because, to date, tuna tagged in these areas are found to be relatively young and are like to either be maturing or have recently matured. Due to unforeseen logistical challenges e-tagging on the Celtic Deeps and the Outer Hebrides was postponed to 2022.

3. Methods

Vessels were selected based on experience, capability, and meeting safety standards and contracted through an open tendering process. Permission to fish in English and Jersey waters was provided via a dispensation issued by the Marine Management Organisation and by Jersey Government respectively. Tagging operations on Atlantic bluefin tuna in English waters were further licenced by the UK Home Office in concordance with the Animals (Scientific Procedures) Act 1986. The two vessels fished for 31 days between the 1st of August and the 15th of November 2021 from Falmouth (England) and an additional vessel fished for 7 days from Jersey in the Channel Islands (**Figure 1**). ABT were caught by experienced anglers by trolling surface lures and brought to the tagging vessel as quickly as possible to avoid harm. ICCAT PATs were deployed for 365-day durations following ICCAT GBYP protocols.

Once a fish was supplied to the tagging team, the operations were as follows:

1) ABT were boarded onto a wet mat specifically used for the tagging of large pelagic fish and health their condition was evaluated (e.g. considering movement, colours, ventilation etc.).
2) If fish passed the health evaluation they were maintained on deck and continuously ventilated with fresh seawater and their eyes were covered with a wet dark coloured microfiber towel.
3) Fish were measured (curved fork length, CFL and half girth), fitted with an electronic tag, tissue sampled (fin clip and muscle biopsy) and the hook was removed. Generally, all tagging, sampling and return to water was done within 2 to 3 minutes.
4) To revive ABT and assess fitness after tagging, ABT were towed behind the boat and their fitness for release was evaluated by the tagging team (movement, ventilation, tail beats etc.).

4. Results

ICCAT-funded MiniPATs were deployed on six ABT, four off England and two off Jersey (mean curved fork length ± 1 S.D. = 189 ± 24 cm, range = 154 to 212 cm; **Figure 2**). Three GBYP funded MiniPATs could not be deployed as fish catches rates declined towards the end of the main ABT residency period in the Channel region. A further 41 Atlantic bluefin tuna were tagged with either single or double electronic tags. Of these, 26 were fitted with a single acoustic tag (Model HP-16; Thelma Biotel), 4 were fitted with an acoustic tag (HP-16) and a 2-year duration MiniPAT, 3 were fitted with 1-year duration MiniPATs and 7 were fitted with 2-year MiniPATs. A single bluefin tuna was fitted with a 4-day accelerometer (this tag was subsequently retrieved). The size range of ABT caught during fishing operations in 2022 was greater than in previous years; five ABT below 150 cm were caught, including one ABT of 125 cm (this animal was marked with an ICCAT Floy tag but was not electronically tagged).
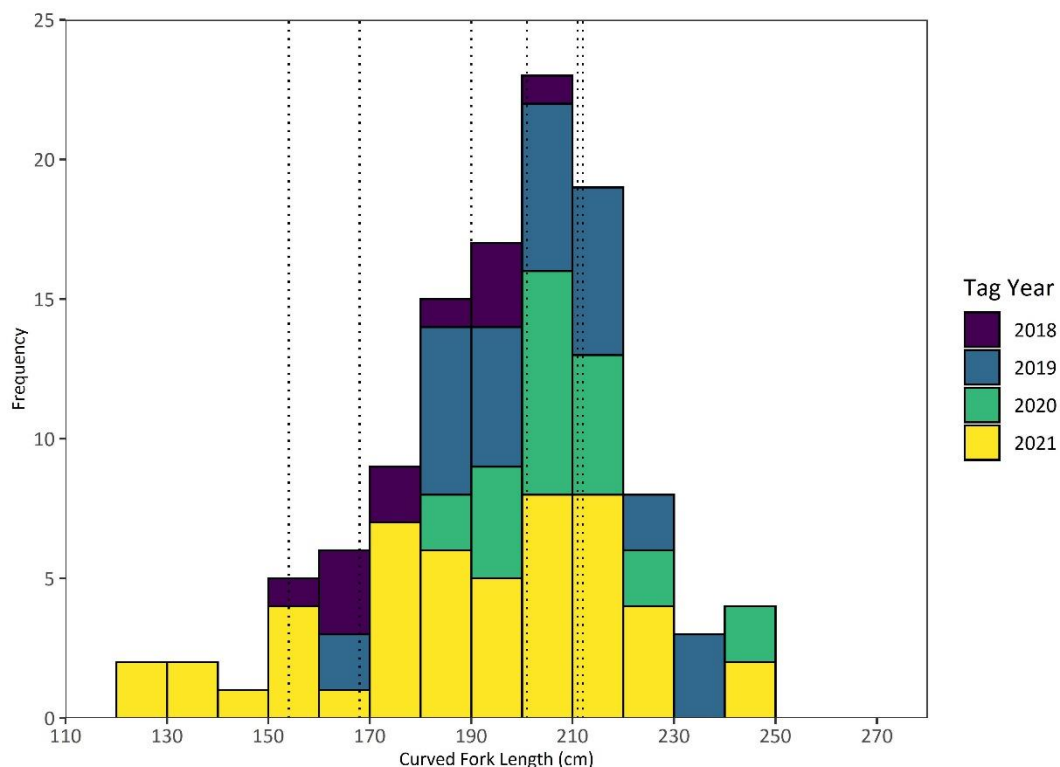
Figure 2. Length-frequency distribution for all Atlantic bluefin tunas measured by Thunnus UK during e-tagging field operations between 2018 and 2021. Vertical dotted lines denote sizes of the ABT tagged with ICCAT funded PATs deployed on in 2021.

5. Overall summary and conclusions

The operations of Thunnus UK & FISH-INTEL resulted in the successful deployment of four tag types (PAT, accelerometer, acoustic and conventional tags) including six ICCAT funded PATs and will contribute to new knowledge on ABT migratory behaviour (both short and long-term). Should future deployments of GBYP funded tags be possible we recommend them to be distributed earlier in the year so that they are available from the beginning of the core residency period in the Channel region (July onwards). Thunnus UK institutions (University of Exeter and Cefas) can now both deploy at least two electronic tags on each ABT caught (e.g. Acoustic tags and MiniPATs, which was previously limited to Cefas). As such, greater use can now be made of each animal caught, which will ensure all tags received can be deployed and will provide greater opportunities for leveraging novel data to support GBYP in its strategic aims.

6. Acknowledgements

7. References

Horton, T.W., Block, B.A., Davies, R., Hawkes, L.A., Jones, D., Jones, H., Leeves, K., Maoiléidigh, N.Ó., Righton, D., van der Kooij, J. and Wall, D., 2021. Evidence of increased occurrence of Atlantic bluefin tuna in territorial waters of the United Kingdom and Ireland. ICES Journal of Marine Science, 78(5), pp.1672-1683.http://dx.doi.org/10.1093/icesjms/fsab039

Table 1. ABT tagged in 2021 by Thunnus UK, FISH-INTEL and Jersey Government with information on date, type of tag, tag ID, release location and funder. Greyed out rows with emboldened text denote tags deployed on ICCATs behalf. 1Y (1-year deployment duration), 2Y (2-year deployment duration), JG (Jersey Government) and AT (Acoustic tag).

Deploy date	Type	Tag ID	Floy	Lat	Lon	CFL (cm)	Location	Funder
17/08/2021	Acoustic	21272757	BYP076769	50.0030	-4.9848	220	England	FishIntel
17/08/2021	Acoustic	21272763	BYP077633	50.0061	-4.9399	187	England	FishIntel
18/08/2021	Acoustic	21272759	BYP077697	50.0451	-4.9993	228	England	FishIntel
20/08/2021	Acoustic	21272743	BYP077685	50.1291	-4.9417	211	England	FishIntel
21/08/2021	Acoustic	21272756	BYP077684	50.0914	-4.9294	160	England	FishIntel
27/08/2021	Acoustic	21272762	BYP077687	50.0372	-4.9958	177	England	FishIntel
27/08/2021	Acoustic	21272746	BYP077680	50.0536	-5.0108	213	England	FishIntel
27/08/2021	Acoustic	21272771	BYP076788	50.0424	-5.0023	205	England	FishIntel
28/08/2021	Acoustic	21272755	BYP077689	50.0524	-4.9418	213	England	FishIntel
28/08/2021	Acoustic	21272749	BYP077679	50.0394	-4.9909	243	England	FishIntel
29/08/2021	Acoustic	21272766	BYP077634	50.0582	-4.9437	201	England	FishIntel
29/08/2021	Acoustic	21272770	BYP077653	50.0282	-4.9851	207	England	FishIntel
29/08/2021	Acoustic	21272761	BYP077694	50.0098	-4.9628	208	England	FishIntel
29/08/2021	Acoustic	21272748	BYP077695	50.0670	-4.9851	197	England	FishIntel
04/09/2021	MiniPAT-1Y	21P0469	BYP077675	49.1045	-2.4450	154	Jersey	JG
04/09/2021	MiniPAT-1Y	21P0468	BYP077669	49.0775	-2.3354	153	Jersey	JG
05/09/2021	MiniPAT-1Y	21P0467	BYP077650	49.0692	-2.4013	179	Jersey	JG
06/09/2021	**MiniPAT-1Y**	**21P0466**	**BYP077652**	**49.0875**	**-2.3735**	**212**	**Jersey**	**ICCAT**
07/09/2021	**MiniPAT-1Y**	**21P0341**	**BYP077676**	**49.0500**	**-2.3297**	**154**	**Jersey**	**ICCAT**
08/09/2021	MiniPAT-2Y+AT	20P1145	NO FLOY	49.3245	-2.3432	179	Jersey	Defra
09/09/2021	Acoustic	21272750	BYP077681	50.1243	-4.7436	212	England	FishIntel
09/09/2021	MiniPAT-2Y+AT	20P1104	NO FLOY	49.3283	-2.3900	177	Jersey	Defra
11/09/2021	Acoustic	21272747	BYP077696	50.1072	-4.7190	228	England	FishIntel
11/09/2021	Acoustic	21272752	BYP077699	50.1034	-4.6932	218	England	FishIntel
12/09/2021	Acoustic	21272742	BYP077607	50.0975	-4.6967	226	England	FishIntel
13/09/2021	MiniPAT-2Y+AT	20P1062	NO FLOY	50.0874	-4.6960	229	England	Defra
14/09/2021	MiniPAT-2Y+AT	20P1178	NO FLOY	50.0299	-4.6379	207	England	Defra
15/09/2021	Acoustic	21272751	BYP077637	50.1235	-4.8968	195	England	FishIntel
15/09/2021	Acoustic	21272745	BYP077692	50.1105	-4.8855	206	England	FishIntel
15/09/2021	Acoustic	21272754	BYP077688	50.0929	-4.8911	208	England	FishIntel
15/09/2021	Acoustic	21272764	BYP077691	50.1205	-4.8814	200	England	FishIntel
22/09/2021	Acoustic	21272758	BYP077693	49.8811	-4.9302	150	England	FishIntel
23/09/2021	Acoustic	21272744	BYP077666	49.9663	-4.8780	136	England	FishIntel
23/09/2021	Acoustic	21272765	BYP077683	50.0219	-4.8787	136	England	FishIntel
12/10/2021	**MiniPAT-1Y**	**21P0399**	**BYP077686**	**50.0753**	**-4.8407**	**201**	**England**	**ICCAT**
12/10/2021	**MiniPAT-1Y**	**21P0337**	**BYP077627**	**50.0830**	**-4.8169**	**190**	**England**	**ICCAT**

Deploy date	Type	Tag ID	Floy	Lat	Lon	CFL (cm)	Location	Owner
12/10/2021	**MiniPAT-1Y**	**21P0342**	**BYP077629**	**50.0613**	**-4.7580**	**211**	**England**	**ICCAT**
12/10/2021	**MiniPAT-1Y**	**21P0397**	**BYP076755**	**50.0521**	**-4.7952**	**168**	**England**	**ICCAT**
12/10/2021	MiniPAT-2Y	20P1068	BYP077645	50.0480	-4.7113	191	England	Defra
13/10/2021	Acoustic	21272753	BYP077698	50.0904	-4.8106	188	England	FishIntel
13/10/2021	MiniPAT-2Y	20P0102	BYP077640	50.0714	-4.6942	178	England	Defra
13/10/2021	MiniPAT-2Y	20P1102	BYP077648	50.0487	-4.6813	185	England	Defra
14/10/2021	MiniPAT-2Y	20P1142	BYP076772	49.9998	-4.7603	174	England	Defra
14/10/2021	MiniPAT-2Y	20P0856	BYP077610	49.9870	-4.7647	241	England	Defra
14/10/2021	MiniPAT-2Y	20P0090	BYP077606	50.0421	-4.6723	184	England	Defra
14/10/2021	MiniPAT-2Y	20P0095	BYP076764	50.0811	-4.6604	175	England	Defra
15/11/2021	Accelerometer	A17939	BYP077649	49.9596	-5.0813	185	England	Defra