ICCAT GBYP TAGGING PROGRAMME 2020

Atlantic-Wide Research Programme for Bluefin Tuna (GBYP PHASE 10)

Tagging of Atlantic bluefin tuna with ICCAT tags in Skagerrak, Kattegat and western English Channel in 2020



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FINAL REPORT

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1. Executive Summary

Atlantic bluefin tuna (ABFT) have recently returned to waters in the Skagerrak-Kattegat area between Denmark and Sweden and the western English Channel, where they have been rare for over five decades. To understand the factors that affect their distribution, ecology, population structure and survival, we conducted a tagging study to track their migratory behaviour. We deployed, within the framework of several national programs, a variety of electronic and conventional tags on 117 ABFT (222 to 274 cm curved fork length (CFL)) in Skagerrak and 21 ABFT in the English Channel (185 to 242 cm CFL, mean ± 1 S.D. $- 209 \pm 15$ cm) during August and September 2020. Among those, several electronic tags provided by ICCAT GBYP program under an ad hoc Memorandum of understanding signed to this end. Specifically, we deployed 15 pop-up satellite archival tags (PSATs; 3 in the English Channel and 12 in the Skagerrak) and five additional data storage tags (DST) in the Skagerrak provided by ICCAT. Additional PSAT tags and acoustic tags were deployed both in Skagerrak (funded by DTU & SLU) and in the English Channel (funded by the UK government). Biological sampling was undertaken at the time of tagging through a fin clip for genetic analysis and a muscle biopsy and blood sample to explore the physiological status of each tagged individual. These tagging and sampling operations will extend the results obtained from similar electronic tagging conducted in 2017 – 2019.

2. Introduction

ABFT have been a rare sight (if not completely absent) in waters of the Skagerrak/Kattegat and English Channel since at least the 1960s. From 2014 onwards, sightings have been reported with increasing regularity (Horton *et al.* In press).

In 2017 and 2018, the first ABFT were tagged with electronic tags in the Skagerrak and English Channel, respectively. This was the first time bluefin tuna were tagged in Scandinavian waters since the early 1960s, when ABFT were tagged with conventional tags in Norwegian waters (Hamre, 1963; Mather et al., 1995). Prior to recent efforts, ABFT have never been tracked from the English Channel. Since their inception, the Scandinavian Bluefin Marathon (SBM) and Thunnus UK (TUK) have carried out four (2017-2020) and three years (2018-2020) of ABFT tagging, respectively. Field operations take place between August and November for both programs – a period when ABFT return annually to both locales to feed on a diverse assemblage of forage fish. Part of this work has been carried out under a MOU with GBYP ICCAT program, which provided both conventional, internal archival and pop-up satellite archival tags (PSATs). ABFT were caught by experienced big game anglers using established fishing methods (either using baits or by trolling surface lures). Onboard, ABFT were measured, sampled and tagged with a PSAT, internal archival or an acoustic tag as well as a conventional tag from the ICCAT series. Here, we provide a brief summary of the project, including an overview of the planning, contact with anglers and the overall results of the tagging operation and related sampling.

2.1 Project objectives

The overall objective of the project was to tag and sample ABFT in the above areas are to: 1) explore the detailed migration routes used by bluefin tuna that undergo a feeding migration into Northern European seas, 2) identify the population of origin of the tagged bluefin tuna, 3) explore relationships between a catch-and-release experience, migratory behaviour and physiological status, and 4) investigate long-term and larger-scale movements, and how these might be affected by fishing and ecosystem conditions and 5) quantify and map mortality along the migration route. The method to obtain this information was to deploy several PSATs, acoustic tags, internal archival and conventional tags and to sample (e.g. fin clip, muscle biopsy and blood sample) ABFT in Skagerrak, Kattegat and western English Channel in 2020.

3. Methods

Briefly:

- a) In Skagerrak and Kattegat, experienced Big Game anglers (In total 126 boats involving more than 1000 experienced anglers) fished for up to 9 days over the period from 23rd August to 20th September. All the tunas were caught using rod and reel. In the western English Channel, two vessels were selected based on ability and experience. These vessels fished for 23 days between the 23rd of August and the 9th of October.
- **b)** All ABFT were brought on-board the tagging boat to be tagged and sampled. Whilst on-board, fish were also measured, sampled and the hook was removed whenever possible. All fish were revived from the capture experience by towing at 2-3 knots with the head forward prior to release, either before (SBM) or after (TUK) the tagging procedure. All tags were deployed following ICCAT GBYP protocols.
- c) In total, 138 ABFT were tagged and sampled, all were tagged with a conventional tag from the ICCAT tagging series and a subset of 20 were electronically tagged (Skagerrak 12 PSATs and 5 DST; English Channel 3 PSATs). Metrics of all tagged ABT can be seen in Table 1.

3.1 Planning and organisation of tagging operations

Tagging coordination and planning: Kim Aarestrup, David Righton, Andreas Sundelöf **Coordination of fishing and project operation**: Kim Birnie-Gauvin, Andreas Sundelöf, Tom Horton

Onboard tagging operation: Andreas Sundelöf, Gustav Hellström, Kim Aarestrup, Kim Birnie-Gauvin, Samantha Smith, Matt Witt, Owen Exeter and Tom Horton;
Assistance in tagging operation: Tomas Brodin, Brian MacKenzie Jan Rasmussen & Nils Wang;
Data collection: Gustav Hellström, Kim Birnie-Gauvin and Tom Horton.

3.2 Selection of anglers

SBM: All fishing operations were similar to the previous projects (Birnie-Gauvin *et al.*, 2019; MacKenzie *et al.*, 2018), but with updates based on previous experience. In brief, we reached out to sport fishing communities in Sweden and Denmark and nearby countries (e.g. Danish Angler Association (Dansk Sportsfiskerforbund) and Swedish Angler Association (Sportfiskarna)) as well as participants from previous years. Because all the fish that should be released for tagging studies must be captured, tagged and released in good condition, there were very strict requirements on experience to handle gear, boat and fish for inclusion of the teams in the fishing operation. To be selected, fishing teams had to have an appropriate boat (including VHF, AIS and safety equipment), powerful gear (minimum 80 lbs reels, 130 lbs main line, 180 lbs leader, circle hooks and a specified hook for gaffing the tuna), and documented experience with big game fishing of species similar to in mass and behaviour to bluefin tuna. We further requested a minimum of 1-week participation during the project. The Swedish fishing operation also requires all skippers to pass a course on animal welfare and legislation in relation to animal experimentation. This course was performed by SLU.

In total, 126 teams were found qualified to participate. Each team was provided with a flag and unique number to be placed on the boat. All the information was handed to the fishing authorities to enable control of participating boats. Additionally, a small group of highly experienced anglers were selected to perform a 'gear check' on all boats to ensure the quality and standards of the gear, as stipulated in the project description.

The fishing and tagging operations took place between 23 August 2020 and 20 September 2020. Due to the sensitivity of the tagging operation to weather conditions we had a total of 9 realized fishing days. The fishing area in the period from 23 August to 7 September spans quite a large area of the Skagerrak, following activity of fish around 150-200 meters water depth between Sweden and Denmark (Figure 1). Due to the large number of boats and the vast area of sea to cover, SBM used two separate tagging boats that cooperated to perform tagging in the entire area. For the period from 18 – 20 September the tagging was performed in the South-western corner of Kattegat (**Figure 1**).

TUK: Two vessels and crews were selected based on experience, capability, and safety equipment through a formal tendering and subsequent assessment process. Permission to fish was provided by the UK Marine Management Organisation, while tagging operations were licenced by the UK Home Office. Fishing and tagging operations took place between 23rd August 2020 and 9th October 2020. In total, 23 days were fished in the area broadly defined as Falmouth Bay (**Figure 1**).



Figure 1. Location of fishing and tagging operations the Scandinavian Bluefin Marathon (red squares, Upper Square - 23 August to 6 September 2020, Lower square – 18 - 20 September 2020) and Thunnus UK (blue square).

3.3 Fishing techniques

SBM: The fishing was done with rod and reel, typically using balloons and drifting. Baits were largely mackerel with some garfish. Some teams opted to chum in addition. The fishing area was restricted to app. 6 nautical miles from a predefined position where the tagging boat was placed (so the tagging boat could reach any fishing position within 20 minutes). Each boat had 2-6 crew members at any given moment. ABFT were gaffed by the anglers and revived 5-10m from the boat at app. 2 knots to facilitate recovery. Fish were then transferred with a rope to the tagging boat where tagging and sampling was performed.

TUK: All fishing operations were conducted by trolling surface lures. Fish were either tagged onboard the capture vessel or transferred from between vessels by transferred using a spare rod and a weighted ball. ABFT were revived in-water post tagging.

3.4 Tagging and sampling operations

Once a fish was transferred to the tagging boat, the operations went as follows:

SBM

- 1) ABFT were 'swum' behind the boat and their conditions were evaluated by the tagging team (movement, fins, colors, ventilation, tail beats and swimming);
- 2) ABFT were boarded onto a wet PVC mat specifically for the tagging of large pelagic fish;
- 3) On deck, fish were continuously ventilated with fresh seawater and the available eye was covered with a wet dark microfibertowel;
- 4) In no specific order, fish were measured (CFL, curved fork length), tagged, sampled (fin clip, blood sample and muscle biopsy) and the hook was removed (**Figure 2**). Generally, all tagging, sampling and return to water was done within 2 to 4 minutes.

TUK

- 1) ABFT were boarded onto a wet PVC mat specifically for the tagging of large pelagic fish and their condition was evaluated by the tagging team (movement, colours, ventilation etc.);
- 2) Once passing the evaluation, fish were maintained on deck and continuously ventilated with fresh seawater and their eyes were covered with a wet dark microfibertowel;
- 3) In no specific order, fish were measured (CFL, curved fork length), tagged, sampled (fin clip and muscle biopsy) and the hook was removed (**Figure 2**).
- 4) After tagging, ABFT were 'swum' behind the boat and their fitness for release was evaluated by the tagging team (movement, ventilation, tail beats etc.). Generally, all tagging, sampling and return to water was done within 2 to 4 minutes.



Figure 2. Example methods. A) ABFT passed from the anglers' boat to the tagging boat is being swum to evaluate its condition. B) bluefin tuna onboard the tagging boat is tagged with a PSAT tag and a conventional ICCAT tag. C) Bluefin tuna onboard the tagging boat is measured. D) Working on bluefin tuna on the aft deck of Swedish tagging boat. Photos: Kim Birnie-Gauvin © and Andreas Sundelöf.

2. Results

2.1 Numbers and sizes of tunas caught and tagged

A total of 138 ABFT were tagged with conventional ICCAT tags (TUK, n=21; SBM, n=117). Of those fish, a total of 15 were tagged with ICCAT-provided Wildlife Computers miniPAT tags (TUK, n=3; SBM, n=12). Furthermore, the five Lotek DST was coupled a Wildlife Computer mrPAT tags in a floating package produced at DTU (Figure 3). The idea is to test if PSAT's can be used in combination with DST to facilitate more recoveries. All PSAT tags were set to pop after a 12-month deployment and mrPAT tags to pop after 24 months. In addition, 78 fish were tagged with acoustic tags, provided by national

funding. All tags were mounted externally.



Figure 3. Adapted package consisting on a Pop up satellite tags (mrPAT) and DST (Lotek 2310) deployed on ABT in Skagerrak 2020 similar to standard PSAT attachment. Photos: Kim Aarestrup ©.

Tagged ABT ranged from 185 to 274 cm in length (CFL, **Figure 4**). The 117 SBM-tagged ABT ranged from 222 - 274 cm (mean ± 1 S.D. -254 ± 10 cm) with the ICCAT tagged fish (12 PSAT and 5 internal archival) ranged from 236 to 269 cm CFL and the 21 TUK-tagged ABT in the English Channel ranged from 185 to 242 cm CFL (mean ± 1 S.D. -209 ± 15 cm).



Figure 4. Length-frequency distribution for 138 Atlantic bluefin tunas measured by the Scandinavian Bluefin Marathon and Thunnus UK during field operations in 2020.

2.2 Samples collected

Fin clips (< 0.5 cm in size) were taken from all 138 tagged tunas for genetic assignment to population of origin. In addition, muscle biopsies (< 0.5 cm in size) and blood samples (<1mL) were obtained from most tagged tunas.

3. Overall summary and conclusions

The project successfully engaged the Nordic big game fishing community to participate in a tagging operation for bluefin tuna in Skagerrak and Kattegat, and the SW UK. The operations in the Scandinavian Bluefin Marathon 2020 and in Thunnus UK successfully deployed 4 types of tags (PSAT, internal archival, acoustic and conventional tags), and the results of these tagging's in the next 10 years will contribute to new knowledge on bluefin migratory behaviour (both short and long-term).

4. Acknowledgements

This work has been carried out under the ICCAT Atlantic-Wide Research Programme for Bluefin Tuna (GBYP), which is funded by the European Union, several ICCAT CPCs, the ICCAT Secretariat, and other entities (see https://www.iccat.int/gbyp/en/overview.asp). We wish to thank our skippers, Claus Møller Sørensen, Jan Rasmussen, Nicklas Sandberg and Thomas Kjelleberg for their time and dedication to the project. We also wish to thank all the volunteer anglers, without whom this project would not have been possible. The content of this paper does not necessarily reflect ICCAT's point of view or that of any of the other sponsors, who carry no responsibility. In addition, it does not indicate the Commission's future policy in this area."

5. References

- Birnie-Gauvin, K., MacKenzie, B. R., and Aarestrup, K. 2018. Electronic tagging of bluefin tunas in Scandinavian waters 2018. ICCAT Coll.Vol.Sci.Papers SCRS/2018/178, xx: 6 pp.
- Cort, J. L. 1991. Age and growth of the bluefin tuna (Thunnus thynnus thynnus) of the Northeast Atlantic. Col.Vol.Sci.Pap.ICCAT, 35: 213–230.
- Hamre, J. 1963. Tuna tagging experiments in Norwegian waters (Experience Paper No. 3). Proc. World Sci. Meeting on the Biology of Tunas and Related Species, La Jolla, California, USA, 2-14 July 1962.
 FAO, Rome. 1125–1132 pp.
- Horton, T. W. *et al.* (2021) Evidence of increased occurrence of Atlantic bluefin tuna in territorial waters of the UK and Ireland. ICES J. Mar. Sci. <u>https://doi.org/10.1093/icesjms/fsab039</u>
- ICCAT. 2017. Report of the 2017 ICCAT bluefin stock assessment meeting (Madrid, Spain 20-28 July, 2017). Madrid, Spain. 1–106 pp.
- MacKenzie, B. R., Aarestrup, K., Birnie-Gauvin, K., Cardinale, M., Casini, M., Harkes, I., Onandia, I., *et al.* 2018. Electronic tagging of adult bluefin tunas by sport fishery in the Skagerrak, 2017. ICCAT Coll.Vol.Sci.Papers SCRS/P/2018/164, x: 18 pp.
- Mather, F. J., Mason, J. M., and Jones, A. C. 1995. Historical document: life history and fisheries of Atlantic bluefin tuna. NOAA Technical Memorandum NMFS-SEFSC, 370: 1–165. US Department of Commerce, NOAA, NMFS, Southeast Fisheries Science Center.
- Parrack, M. L., Brunenmeister, S. L., and Nichols, S. 1979. An analysis of Atlantic bluefin tuna catches, 1960-76. Col.Vol.Sci.Pap.ICCAT, 8: 391–420.
- Rodriguez-Marin, E., Ortiz, M., Ortiz de Urbina, J. M., Quelle, P., Walter, J., Abid, N., Addis, P., et al.

2015. Atlantic bluefin tuna (Thunnus thynnus) biometrics and condition. PLOS ONE, 10: e0141478. https://dx.plos.org/10.1371/journal.pone.0141478 (Accessed 4 October 2019).

Date	Tag ID	Tag type	Conventional	Latitude	Longitude	Length	Vial	Tagger
27-08-2020	20P1131	ICCAT	ICCAT 80020		010.46.179	265	T52	KA/SBM
27-08-2020	20P1132	ICCAT	CAT 80025		010.49.290	248	T53	KA/SBM
27-08-2020	20P1133	ICCAT	79991	57.58.659	010.48.300	258	T54	KA/SBM
27-08-2020	20P1408	Wildlife	79992	57.59.084	010.55.904	251	T55	KA/SBM
27-08-2020	20P1507	Wildlife	79957	57.57.403	010.55.190	265	T56	KA/SBM
27-08-2020	20P1428	Wildlife	79994	57.54.989	010.52.927	222	T57	KA/SBM
27-08-2020	20P1499	Wildlife	79989	58.01.000	010.49.000	251	T58	KA/SBM
27-08-2020	20P1500	Wildlife	80024	57.59.000	010.51.000	265	T59	KA/SBM
27-08-2020	20P1506	Wildlife	80011	57.58.904	010.57.437	270	Т60	KA/SBM
27-08-2020	20P1503	Wildlife	80008	57.56.900	011.02.300	260	T61	KA/SBM
28-08-2020	20P1504	Wildlife	79951	57.59.189	010.46.606	263	T62	KA/SBM
28-08-2020	20P1501	Wildlife	79977	58.05.818	010.55.282	255	T63	KA/SBM
28-08-2020	2033-0209	Acoustic	79999	58.05.458	010.55.110	265	T64	KA/SBM
30-08-2020	2033-0211	Acoustic	76779	58.00.000	010.54.000	236	T68	KA/SBM
30-08-2020	19U3733+A17 246	Acc/Spot	79978	58.00.543	010.52.664	253	T65	KA/SBM
30-08-2020	19U3739+A17 243	Acc/Spot	76780	58.00.000	010.55.000	256	Т66	KA/SBM
30-08-2020	19U3488+A17 244	Acc/Spot	77628	58.00.267	010.55.410	244	Т67	KA/SBM
30-08-2020	2033-0203	Acoustic	79956	58.01.000	010.54.000	244		KA/SBM
30-08-2020	2033-0197	Acoustic	79995	58.01.000	010.53.000	257	T70	KA/SBM
30-08-2020	2033-0205	Acoustic	79983	58.02.000	010.53.000	235	T71	KA/SBM
30-08-2020	2033-0201	Acoustic	79986	58.02.000	010.58.000	237	T72	KA/SBM
30-08-2020	2033-0198	Acoustic	79973	58.02.000	010.55.000	259	T73	KA/SBM
30-08-2020	2033-0200	Acoustic	79971	58.02.522	010.54.446	244	T74	KA/SBM
30-08-2020	2033-0202	Acoustic	80003	58.04.941	011.03.540	249	T75	KA/SBM
30-08-2020	2033-0199	Acoustic	79974	58.01.000	011.05.000	260	T76	KA/SBM
30-08-2020	2033-0206	Acoustic	79993	58.00.513	011.01.562	254	T77	KA/SBM
30-08-2020	2033-0204	Acoustic	77991	58.02.000	011.03.000	231	T78	KA/SBM
30-08-2020	2033-0207	Acoustic	79997	58.00.000	010.57.000	244	T79	KA/SBM
01-09-2020	2033-0215	Acoustic	79952	57.58.000	010.48.000	258	Т80	KA/SBM
01-09-2020	2033-0208	Acoustic	79960	57.58.000	010.48.000	236	T81	KA/SBM
01-09-2020	20P1505	Wildlife	79980	57.59.000	010.51.000	250	T82	KA/SBM
01-09-2020	2033-0214	Acoustic	80005	57.59.397	010.50.503	264	Т83	KA/SBM
01-09-2020	2033-0210	Acoustic	79963	58.02.000	010.55.000	262	T84	KA/SBM
01-09-2020	2033-0216	Acoustic	79958	58.00.057	011.06.383	244	T85	KA/SBM
01-09-2020	2033-0213	Acoustic	79954	58.00.537	011.07.869	263	T86	KA/SBM
02-09-2020	20U0307	mrPAT/int ernal	79964	58.10.000	010.16.000	268	Т87	KA/SBM
02-09-2020	20U0317	mrPAT/int ernal	79955	58.12.00	010.12.000	265	Т88	KA/SBM
02-09-2020	20U0291	mrPAT/int ernal	80004	58-11-00	010.12.000	253	Т89	KA/SBM

Table 1. ABFT tagged in 2020 by the consortium with information on date, type of tag, tag ID's, release site, person and group.

02-09-2020	20U0308	mrPAT/int ernal	79961	58.07.000	010.12.000	269	Т90	KA/SBM
02-09-2020	20U0282	mrPAT/int ernal	79984	58.06.000	010.11.000	256	T91	KA/SBM
02-09-2020	2033-0212	Acoustic	79970	58.11.000	010.07.000	252	T92	KA/SBM
02-09-2020	2033-0177	Acoustic	79968	58.12.000	010.15.000	268	Т93	KA/SBM
02-09-2020	2033-0181	Acoustic	79965	58.12.000	010.14.000	245	T94	KA/SBM
02-09-2020	2033-0218	Acoustic	79969	53.08.000	010.14.000	242	T95	KA/SBM
02-09-2020	2033-0222	Acoustic	79995	58.07.000	010.12.000	249	Т96	KA/SBM
02-09-2020	2033-0184	Acoustic	79959	58.07.000	010.09.000	252	T97	KA/SBM
02-09-2020	2033-0182	Acoustic	79998	58.09.000	010.10.000	254	T98	KA/SBM
02-09-2020	2033-0183	Acoustic	79982	58.11.000	010.11.000	251	Т99	KA/SBM
02-09-2020	2033-0179	Acoustic	79953	58.07.000	010.13.000	256	T100	KA/SBM
02-09-2020	2033-0226	Acoustic	79972	58.06.000	010.22.000	249	T101	KA/SBM
02-09-2020	2033-0125	Acoustic	79967	58.08.000	010.26.000	258	T102	KA/SBM
02-09-2020	2033-0180	Acoustic	79966	58.08.000	010.25.000	249	T103	KA/SBM
02-09-2020			79962	58.09.000	010.22.000	243	T104	KA/SBM
02-09-2020			29680	58.11.000	010.22.000	252	T105	KA/SBM
03-09-2020	2033-0195	Acoustic	29538	58.09.881	010.11.671	256	T106	KA/SBM
03-09-2020	2033-0191	Acoustic	29545	58.10.420	010.19.267	245	T107	KA/SBM
03-09-2020	2033-0187	Acoustic	29541	58.07.423	010.16.217	250	T108	KA/SBM
03-09-2020	2033-0192	Acoustic	29587	58.08.101	010.10.104	249	T109	KA/SBM
03-09-2020	2033-0188	Acoustic		58.12.632	010.09.309	264	T110	KA/SBM
03-09-2020	2033-0190	Acoustic	29594	58.12.392	010.15.817	254	T111	KA/SBM
03-09-2020	2033-0189	Acoustic	29591	58.12.500	010.17.100	243	T112	KA/SBM
03-09-2020	2033-0196	Acoustic	29693	58.12.500	010.17.100	252	T113	KA/SBM
03-09-2020	2033-0194	Acoustic	29531	58.12.400	010.14.700	249	T114	KA/SBM
03-09-2020	2033-0193	Acoustic	29536	58.08.600	010.18.300	226	T115	KA/SBM
03-09-2020			29687	58.07.771	010.18.722	238	T116	KA/SBM
18-09-2020	20P1127	ICCAT	29539	56.07.000	012.30.000	250	T117	KA/SBM
18-09-2020	2033-0232	Acoustic		56.08.000	012.29.000	265	T118	KA/SBM
19-09-2020	20P1128	ICCAT	29548	56.08.000	012.32.000	258	T119	KA/SBM
19-09-2020	20P1129	ICCAT	29543	56.14.000	012.26.000	269	T120	KA/SBM
19-09-2020	2033-0233	Acoustic	29544	56.15.000	012.26.000	265	T121	KA/SBM
19-09-2020			29527	56.14.000	012.26.000	249	T122	KA/SBM
19-09-2020	2033-0231	Acoustic	29550	56.17.000	012.28.000	248	T123	KA/SBM
19-09-2020			29526	56.15.000	012.28.000	274	T124	KA/SBM
19-09-2020			29540	56.16.000	012.25.000	257	T125	KA/SBM
19-09-2020			29547	56.17.000	012.29.000	270	T126	KA/SBM
19-09-2020			29535	56.18.000	012.24.000	242	T127	KA/SBM
20-09-2020			29542	56.15.000	012.28.000	243	T128	KA/SBM
20-09-2020			29529	56.15.000	012.28.000	251	T129	KA/SBM
20-09-2020			29533	56.14.000	012.27.000	264	T130	KA/SBM
20-09-2020			29537	56.13.000	012.29.000	256	T131	KA/SBM
20-09-2020			29532	56.18.000	012.27.000	246	T132	KA/SBM

20-09-2020			29546	56.17.000	012.29.000	250	T133	KA/SBM
20-09-2020		29530		56.14.000	012.28.000	270	T134	KA/SBM
27-08-2020	20P1134	ICCAT	CAT 29551		11,03928	267	1D	AS/SBM
27-08-2020	20P1135 + 9076	ICCAT	29650	57,97833	10,90833	265	2D	GH/SBM
27-08-2020	20P1138 + 6204	ICCAT	29561	58,02500	10,78333	236	3D	AS/SBM
27-08-2020	20P1508 + 9084	Wildlife	29566	57,99500	10,98333	270	4D	GH/SBM
27-08-2020	20P1403 + 6203	Wildlife	29575	58,04333	11,02500	255	5D	AS/SBM
27-08-2020	90-6205	Acoustic	29632	58,03833	10,96333	257	6D	GH/SBM
27-08-2020	90-6202	Acoustic	29633	58,01667	10,89667	243	7D	AS/SBM
27-08-2020	90-6195	Acoustic	29634	58,16667	11,02667	258	8D	GH/SBM
28-08-2020	90-6206	Acoustic	29635	58,10500	11,06833	256	9D	AS/SBM
28-08-2020	90-6207	Acoustic	29637	58,17000	11,06500	262	11D	AS/SBM
28-08-2020	90-6196	Acoustic	29638	58,20000	11,08167	257	12D	GH/SBM
28-08-2020	90-6194	Acoustic	29636	58,12833	11,11833	262	10D	GH/SBM
30-08-2020			29647	58,10500	10,99833	264	19D	GH/SBM
30-08-2020	90-6197	Acoustic	29649	58,08167	11,09667	265	15D	GH/SBM
30-08-2020	90-6199	Acoustic	29647	58,09667	11,02167	231	18D	AS/SBM
30-08-2020	90-6200	Acoustic	29640	58,08333	11,10000	240	16D	AS/SBM
30-08-2020	90-6201	Acoustic	29641	58,11167	11,02833	261	17D	GH/SBM
30-08-2020	2033-186	Acoustic	32150	58,12333	11,10167	250	20D	GH/SBM
30-08-2020	2033-221	Acoustic	29643	58,10167	11,15667	258	21D	AS/SBM
30-08-2020	90-6198	Acoustic	29639	58,05167	11,03333	249	14D	AS/SBM
01-09-2020	2033-217	Acoustic	29644	58,09500	10,96500	254	22D	GH/SBM
01-09-2020	2033-234	Acoustic	29645	58,16500	10,95000	270	23D	AS/SBM
01-09-2020	2033-223	Acoustic	29648	58,10333	11,12500	248	25D	GH/SBM
01-09-2020	2033-225	Acoustic	29646	58,08667	11,11167	265	24D	GH/SBM
01-09-2020	2033-224	Acoustic	32126	57,98833	11,13500	262	26D	AS/SBM
01-09-2020	2033-220	Acoustic	32127	58,01333	10,90167	253	27D	AS/SBM
02-09-2020	2033-178	Acoustic	32129	58,06833	11,12500	258	29D	GH/SBM
02-09-2020	2033-219	Acoustic	32130	58,10500	11,02833	249	30D	AS/SBM
02-09-2020	2033-227	Acoustic	32131	58,19833	10,98167	267	31D	GH/SBM
03-09-2020	2033-236	Acoustic	32132	58,02167	11,17333	263	33D	AS/SBM
03-09-2020	2033-235	Acoustic	32133	58,02667	11,15167	269	34D	GH/SBM
03-09-2020	2033-230	Acoustic	32135	58,10167	11,13167	244	36D	GH/SBM
03-09-2020	2033-228	Acoustic	32136	58,09833	11,15833	260	37D	GH/SBM
03-09-2020	2033-229	Acoustic	32137	58,12500	11,20333	259	38D	AS/SBM
09/09/2020	A17247	Acc/Spot	BYP077617	50.1060	-4.8727	205	A17247	SS/TUK
09/09/2020	A17240	Acc/Spot	BYP076776	50.0892	-4.8890	196	A17240	SS/TUK
11/09/2020	A17890	Acc/Spot	BYP076792	50.0703	-4.9256	212	A17890	SS/TUK
13/09/2020	A17893	Acc/Spot	BYP076789	50.0910	-4.9882	207	A17893	SS/TUK
08/09/2020	20P0085	Wildlife	BYP077611	50.1116	-4.8530	214	20P0085	SS/TUK
09/09/2020	20P0086	Wildlife	BYP077658	50.1017	-4.8797	204	20P0086	SS/TUK

09/09/2020	20P0084	Wildlife	BYP077664	50.1112	-4.9453	229	20P0084	SS/TUK
09/09/2020	20P0060	Wildlife	BYP077612	50.1029	-4.9395	197	20P0060	SS/TUK
11/09/2020	A17889	Acc/Spot	BYP076782	50.0812	-4.8616	201	A17889	SS/TUK
12/09/2020	20P1136	ICCAT	BYP077655	50.1047	-4.9032	194	20P1136	SS/TUK
15/09/2020	A17891	Acc/Spot	BYP076799	50.0754	-4.9864	204	A17891	SS/TUK
15/09/2020	A17892	Acc/Spot	BYP076796	53.7850	-4.9337	214	A17892	SS/TUK
16/09/2020	20P1139	ICCAT	BYP077657	50.1267	-4.8489	222	20P1139	SS/TUK
16/09/2020	20P1137	ICCAT	BYP077654	50.1115	-4.8337	201	20P1137	SS/TUK
16/09/2020	20P0083	Wildlife	BYP077661	50.0787	-4.8636	185	20P0083	SS/TUK
22/09/2020	20P0055	Wildlife	BYP077602	50.1018	-4.9363	216	20P0055	SS/TUK
27/09/2020	20P0056	Wildlife	BYP077670	50.1520	-4.9133	241	20P0056	SS/TUK
21/09/2020	20P0094	Wildlife	BYP077635	50.1252	-4.8908	190	20P0094	тн/тик
27/09/2020	20P1100	Wildlife	BYP077608	50.1669	-4.8995	205	20P1100	SS/TUK
23/09/2020	20P0089	Wildlife	BYP077601	50.2207	-4.7364	220	20P0089	OE/TUK
23/09/2020	20P1175	Wildlife	BYP077631	50.2364	-4.7072	242	20P1175	OE/TUK

Table 2. Tags deployed within ICCAT GBYP Electronic tagging campaign 2020. IA = Internal Archival

Tag Serial No.	Argos No. decimal	Conventional Tag No.	Deployment Date	Deployment Latitude	Deployment Longitude	Specimen length CFL (cm)
20P1131	204865	80020	27-08-2020	58.00.442	010.46.179	265
20P1132	204866	80025	27-08-2020	57.58.280	010.49.290	248
20P1133	204867	79991	27-08-2020	57.58.659	010.48.300	258
IA 1047	205254	79964	02-09-2020	58.10.000	010.16.000	268
IA 1050	205256	79955	02-09-2020	58.12.00	010.12.000	265
IA 1049	205253	80004	02-09-2020	58.11.00	010.12.000	253
IA 1048	205255	79961	02-09-2020	58.07.000	010.12.000	269
IA 1046	205252	79984	02-09-2020	58.06.000	010.11.000	256
20P1127	205532	29539	18-09-2020	56.07.000	012.30.000	250
20P1128	205533	29548	19-09-2020	56.08.000	012.32.000	258
20P1129	205534	29543	19-09-2020	56.14.000	012.26.000	269
20P1134	204868	29551	27-08-2020	58,06312	11,039283	267
20P1135 + 9076	204869	29650	27-08-2020	57,97833	10,908333	265
20P1138 + 6204	204872	29561	27-08-2020	58,02500	10,783333	236
20P1136	204870	BYP077655	12-09-2020	50.1047	-4.9032	194
20P1139	204873	BYP077657	16-09-2020	50.1267	-4.8489	222
20P1137	204871	BYP077654	16-09-2020	50.1115	-4.8337	201