

ICCAT GBYP TAGGING PROGRAMME 2022

Atlantic-Wide Research Programme for Bluefin Tuna
(GBYP PHASE 12)

Tagging of Atlantic bluefin tuna with ICCAT tags in Skagerrak, Kattegat and Øresund



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1. Executive Summary

Atlantic bluefin tuna (ABFT) have recently returned to waters in the Skagerrak-Kattegat-Øresund area between Denmark and Sweden, where they have been nearly absent for almost six 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 the Swedish and Danish collaboration “Scandinavian Bluefin Marathon”, a variety of electronic and conventional tags on 174 ABFT (CFL ranging between 210 to 284 cm) in Skagerrak, Kattegat and Øresund over the course of 16 tagging days between 20 August and 2 October 2022. All tagged ABFT were tagged with a conventional tag (ICCAT tag series), and most (170 ABFT) were also tagged with an acoustic tag (Thelma Biotel). Thirty ABFT were also tagged with PSATs, of which 6 were provided by ICCAT GBYP program (under an ad hoc Memorandum of understanding), five were tagged with accelerometer tags and an additional eight were tagged with DST’s (Lotek Wireless). Biological sampling was undertaken during tagging: a fin clip was taken for genetic analysis and a muscle biopsy, blood sample and scales were collected to explore the physiological status (and other parameters) of each tagged individual. The tagging and sampling operations will extend the results already obtained from similar electronic tagging programs conducted between 2017 – 2021.

2. Introduction

ABFT have been a rare sight (if not completely absent) in waters of the Skagerrak/Kattegat/Øresund since the early 1960s. However, sightings have been reported with increasing regularity since 2015 (Aarestrup et al. 2022a).

In 2017, the first ABFTs were tagged with electronic tags in the Skagerrak. This was the first time ABFT 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). Since its inception, the Scandinavian Bluefin Marathon (SBM) – a collaboration between the Technical University of Denmark, National Institute of Aquatic Sciences (DTU Aqua), Denmark, and the Swedish University of Agricultural Sciences (SLU Aqua), Sweden –has carried out five years (2017-2021) of ABFT tagging. Field operations take place between August and October, a period when ABFT return annually to feed on a diverse assemblage of forage fish. In 2022, an important part of this work was carried out under a MOU with the GBYP ICCAT program, which provided conventional and pop-up satellite archival tags (PSATs). ABFT were caught by experienced big game anglers using established fishing methods (either using bait or by trolling surface lures). On-board the tagging boat, ABFT were measured, sampled and tagged with an acoustic tag and a conventional tag from the ICCAT series, while a subset was also equipped with a PSAT, accelerometer or DST tag. Here, as per the request stated in the MoU signed with ICCAT GBYP, we provide a brief summary of the project, including an overview of the planning process, 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 Skagerrak, Kattegat and Øresund to: 1) explore the detailed migration routes used by ABFT that undergo a feeding migration into Northern European seas, 2) identify the population of origin of the tagged ABFT, 3) explore relationships between a catch-and-release experience, migratory behaviour and physiological status, 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. To achieve the objectives, ABFT were caught, tagged with some combination of PSATs, acoustic, accelerometer and conventional tags and sampled (fin clip, muscle biopsy, blood sample, scales). For such ambitious goals, a multiyear effort is needed.

3. Methods

Briefly:

- a) In Skagerrak, Kattegat and Øresund, experienced big game anglers (a total of 102 boats involving more than 1000 experienced anglers) fished for 16 days between 20 August – 4 September and 24 September – 2 October, 2022. All the tunas were caught using rod and reel.
- b) All ABFT were brought on-board the tagging boat to be tagged and sampled. Whilst on-board, fish were measured, sampled and the hook was removed whenever possible. Once back in the water, fish were ventilated to aid in recovery from the capture and subsequent tagging procedure. To do so, fish were towed by rope at 2-4 knots with the head of the fish pointing forward until the fish was deemed fit for release (fin movements, colour, tailbeats and swimming). In most cases, this was less than 1 minute. All tags were deployed following ICCAT GBYP protocols.
- c) In total, 174 ABFT were tagged with a conventional ICCAT tag, with 170 of these also tagged with an acoustic tag, sampled and released. Thirty of these were tagged with PSATs, eight with DST's and five with accelerometer tags. Metrics of all tagged ABFT can be seen in Table 1.

3.1 Planning and organisation of tagging operations

Tagging coordination and planning: Kim Aarestrup, Kim Birnie-Gauvin

Coordination of fishing and project operation: Lene Klubben Sortland, Kristi Källo

Onboard tagging operation: Kim Aarestrup, Kristi Källo, Kim Birnie-Gauvin, Lene Klubben Sortland

Assistance in tagging operation: Hans Ole Olesen

Data collection: Kristi Källo, Kim Birnie-Gauvin

3.2 Selection of anglers

All fishing operations were similar to the previous projects (Aarestrup et al. 2022, Aarestrup et al. 2021, Birnie-Gauvin *et al.*, 2019), but with updates based on previous experience. In brief, together with our collaborators from SLU Aqua in Sweden, we reached out to sport fishing communities in Sweden, Denmark and nearby countries (e.g. Danish Angler Association (Dansk Sportsfiskerforbund) and Swedish Angler Association (Sportfiskarna)) as well as participants from previous years. To ensure that all fish that will be tagged and released are in good condition, very strict requirements were set 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 ABFT. We further requested a minimum of 1-week participation during the project. A meeting with the participants was held before the fishing to update them on animal welfare and legislation in relation to animal experimentation.

In total, 102 teams met the requirements and qualified to participate. During fishing each team was provided with a flag and unique number to be placed on the boat. A list of boats participating in the

project was handed to the fishing authorities to enable inspection of participating boats. Additionally, a small group of highly experienced anglers were selected to perform a 'gear check' on all new boats to ensure the quality and standards of the gear, as stipulated in the project description.

The fishing and tagging operations took place between 20 August and 4 September 2022 in Skagerrak, and 24 September and 2 October 2022 in Kattegat/Øresund. Due to the sensitivity of the tagging operation to weather conditions, we had 16 realized fishing days. The fishing area in the period from 20 August to 2 September spanned quite a large area of the Skagerrak, with water depth being 150-200 meters (**Figure 1**, top rectangle). Due to the large number of boats and the vast area of sea to cover, we collaborate with SLU Aqua, who also runs a similar tagging operation. This enabled us to have two separate tagging boats cooperating to perform tagging in the entire area. For the period from 24 September to 2 October the tagging was performed in the South-western corner of Kattegat and Øresund (**Figure 1**, bottom square), but this time with only one tagging boat and fewer fishing boats.

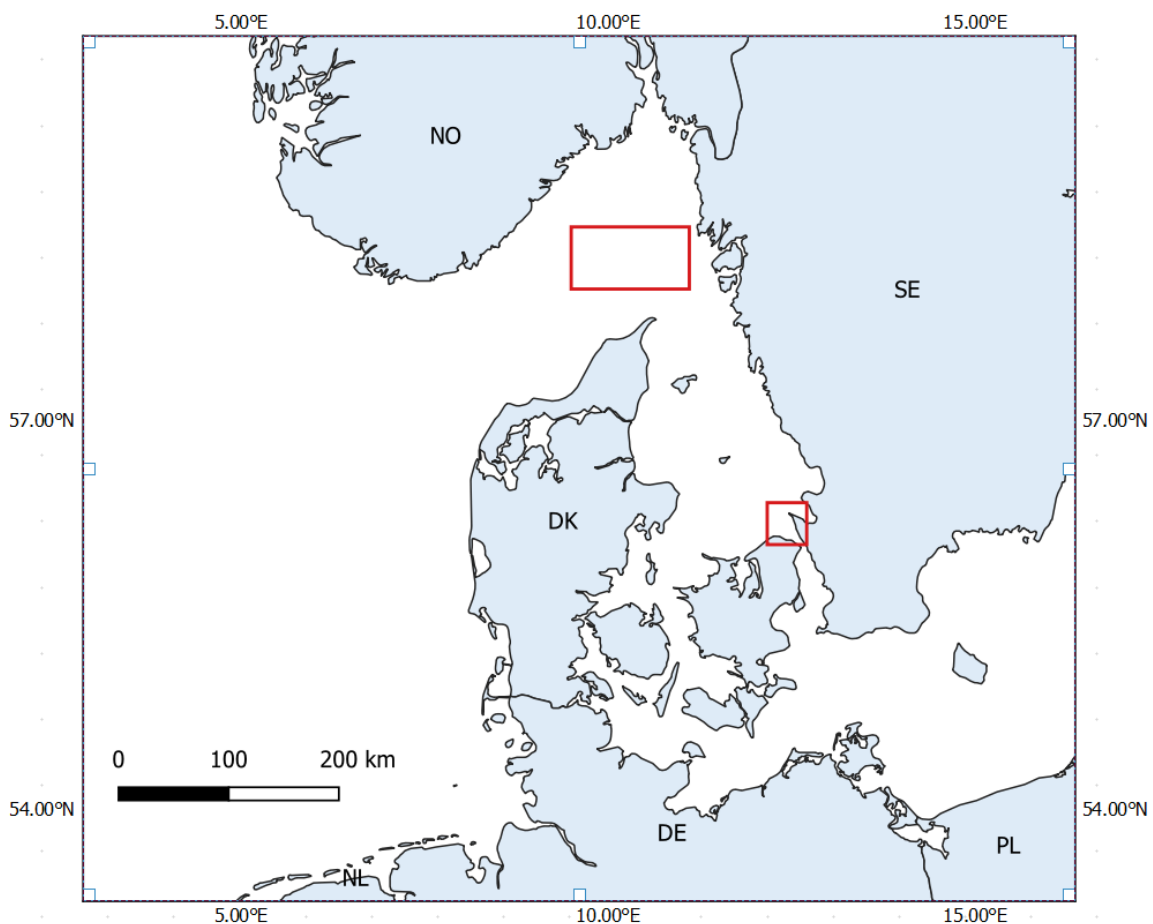


Figure 1. Location of fishing and tagging operations for the Scandinavian Bluefin Marathon (upper red rectangle representing the fishing location for 20 August to 4 September 2022; lower red square representing the fishing location for 24 September to 2 October 2022).

3.3 Fishing techniques

The fishing was done with rod and reel, typically using balloons and drifting. The main bait used by the

anglers was mackerel, with garfish and herring used to a lesser extent. Some teams opted to chum. Before the start of each fishing day, a fishing area of approximately eight nautical miles in radius was set from a predefined position where the tagging boat was placed (so the tagging boat could reach any fishing position within 20 minutes). Based on the fishing from the previous days or observational data, the fishing area moved slightly from day to day. Each boat had 2-10 crewmembers on board at any given moment. Subsequent to being caught, ABFT were gaffed by the anglers and towed 2-10m behind the boat at app. 2-4 knots to facilitate recovery. Fish were then transferred with a rope to the tagging boat where tagging and sampling was performed (Fig 2.).



Figure 2. ABFT are gaffed at the front of the mouth and towed after the fishing boat for recovery. A rope, attached to the gaff, are used to transfer the ABFT to the tagging boat, by throwing one end over and releasing the other once the fish is secured behind the tagging boat. Photo: Kristi Källo©

3.4 Tagging and sampling operations

Once a fish was transferred to the tagging boat (**Figure 3**), the handling protocol was the following:

- 1) ABFT were 'swum' behind the boat and their conditions were evaluated by the tagging team (movement, fins, colours, ventilation, tail beats and swimming);
- 2) ABFT were brought onboard using a winch system by sliding onto a wet aluminium platform fully spray painted with multiple layers of rubber, specifically designed for the tagging of large pelagic fish;
- 3) Fish were continuously ventilated with fresh seawater from the moment they were lifted out

of water until they were returned to water following tagging and sampling. In addition, 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, muscle biopsy and scales) and the hook was removed. Generally, all tagging, sampling and return to water was done within 2 to 4 minutes.





Figure 3. Example methods. Upper picture: ABFT was swum behind the boat to evaluate its condition. Lower picture: ABFT onboard the rubber covered ramp of tagging boat specifically designed for the tagging of large pelagic fish. The fish has eyes covered and is continually ventilated with fresh saltwater while tagging. Photos: Kristi Källo©

4. Results

4.1 Numbers and sizes of tunas caught and tagged

A total of 174 ABFT were tagged with conventional ICCAT tags, with the majority (170) also tagged with an acoustic tag (Thelma Biotel ID-HP16). Of those fish, a total of six were tagged with ICCAT-provided Wildlife Computers miniPAT tags, and another 24 with PSAT tag from Wildlife Computers, Microwave Telemetry and Lotek Wireless and eight with floating DST tags from Lotek Wireless. Five of these PSATs were programmed to surface after 24 months, while the remaining 19 were programmed to surface after 12 months. Furthermore, five accelerometer DST + Camera were coupled to Wildlife Computer mrPAT tags (programmed to release after 1-5 days to facilitate recovery) (Figure 4). All tags were mounted externally.

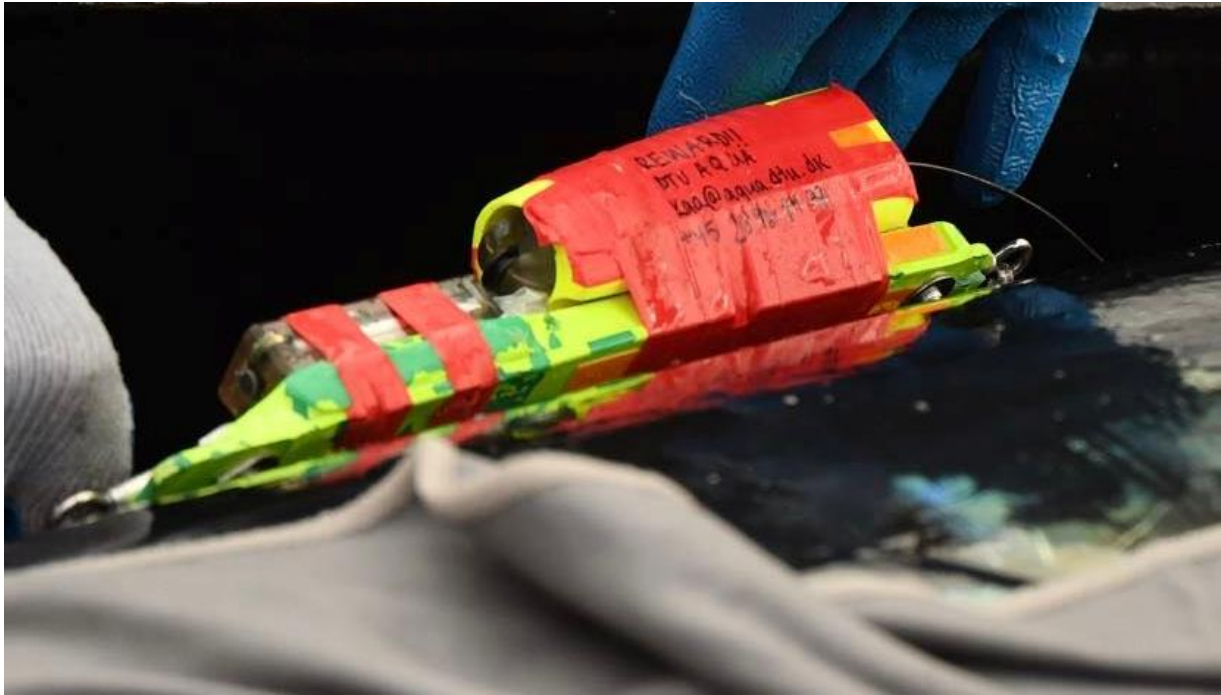


Figure 4. Package consisting of a Pop up satellite tags, DST and Camera deployed on ABFT in Skagerrak 2022. Attachment anchors (not shown) are similar to standard PSAT attachment. Photos: Kim Birnie-Gauvin ©.

The 174 SBM-tagged ABFT ranged from 210 to 284 cm (CFL; mean \pm S.D. – 252 ± 16 cm), with the individuals tagged with ICCAT tags ranging from 220 to 264 cm (CFL) (Figure 4).

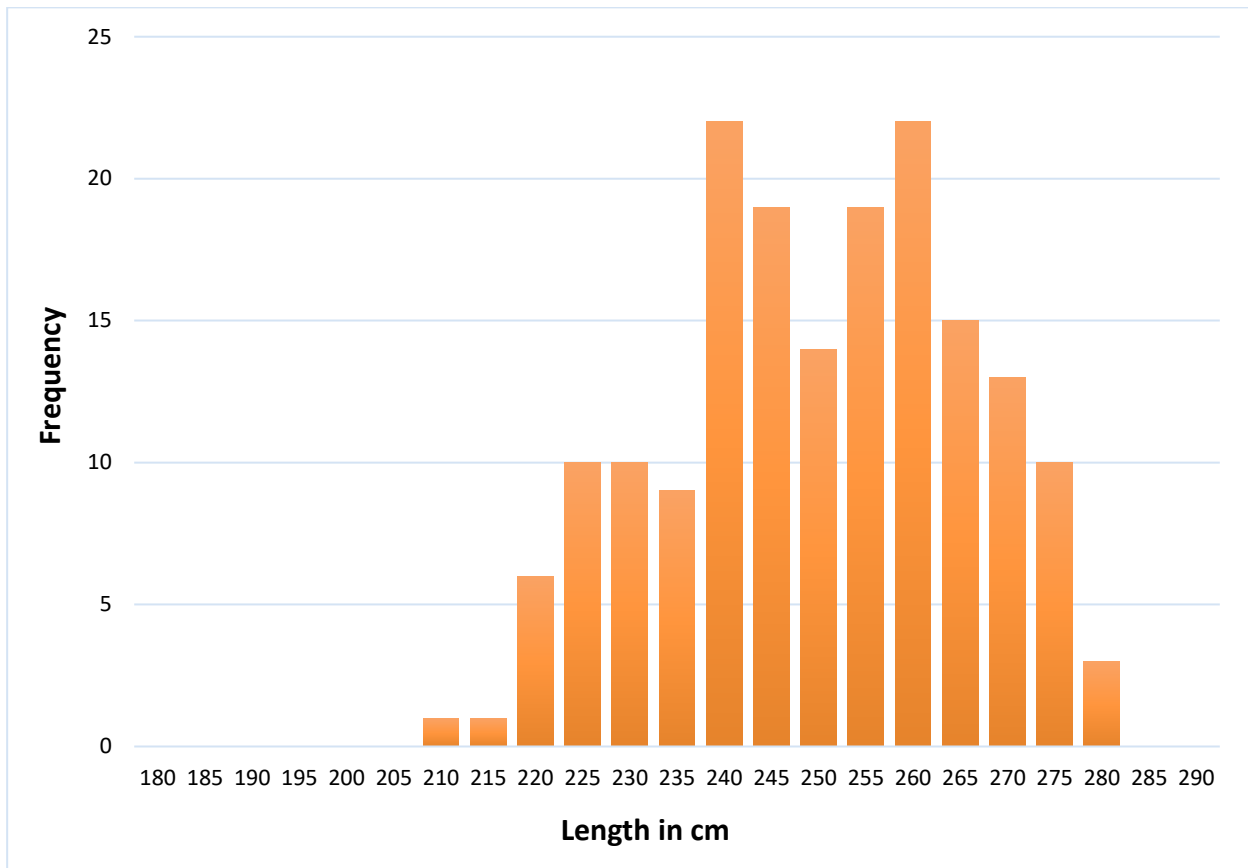


Figure 4. Length-frequency distribution for 174 Atlantic bluefin tunas measured by the Danish Scandinavian Bluefin Marathon during field operations in 2022.

4.2 Samples collected

Fin clips (< 0.5 cm in size) were taken from all 174 tagged tunas for genetic assignment to determine population of origin (western vs eastern Atlantic). In addition, scales, muscle biopsies (< 0.5 cm in size) and blood samples (<1mL) were obtained from most tagged tunas.

5. Overall summary and conclusions

The project successfully engaged the Nordic big game fishing community to participate in a tagging operation for ABFT in Skagerrak and Øresund. The operations in the Scandinavian Bluefin Marathon 2022 successfully deployed four types of tags (PSAT, Acoustic, DST, Accelerometer, and conventional tags), and the results of these tagging operations will, in the coming years, contribute significantly to new knowledge generated on ABFT migratory behaviour (both short and long-term).

6. 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 skipper, Hans Ole Olesen for his time and dedication to the project. We also wish to thank all the volunteer anglers,

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7. References

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Table 1. ABFT tagged in 2022 by the consortium with information on date, Acoustic tag ID, PSAT ID, PSAT owner (ICCAT (International Commission Conservation of Atlantic Tunas), DTU (Technical University of Denmark)), type of PSAT (MT = Microwave Telemetry X-tag, WC = Wildlife Computer miniPAT, WCA = Wildlife Computer mrPAT + CTL accelerometer tag, LW = Lotek Wireless PSATFLEX), tag ID's, release site and person tagging.

Date	Acoustic ID	PSAT ID	Owner	Tag type	Conventional	Latitude	Longitude	Length	Vial	Tagger
22-08-2022	2128-2909	236239	DTU	MT	BYP083977	56,1458	12,4086	244	T_267	CAA
22-08-2022	2128-2912	233972	ICCAT	WC	BYP083993	56,1562	12,4462	262	T_269	CAA
22-08-2022	NA	236629	DTU	WC	BYP083992	56,1278	12,4610	257	T_268	CAA
22-08-2022	2128-2930	236243	DTU	MT	BYP083997	56,1451	12,4646	261	T_270	CAA
22-08-2022	2128-2908	233970	ICCAT	WC	BYP083985	56,1641	12,3863	260	T_271	CAA
22-08-2022	2128-2935	236238	DTU	MT	BYP083979	56,1900	12,3574	252	T_272	CAA
22-08-2022	2128-2905	233987	ICCAT	MT	BYP083999	56,1927	12,4115	264	T_273	CAA
22-08-2022	2128-2927	NA	NA	NA	BYP083976	56,1203	12,4889	245	T_274	CAA
22-08-2022	2128-2897	NA	NA	NA	BYP083990	56,1737	12,3296	231	T_275	CAA
22-08-2022	2128-2928	NA	NA	NA	BYP083982	56,1440	12,4610	267	T_276	CAA
22-08-2022	2128-2926	NA	NA	NA	BYP083989	56,1717	12,3908	259	T_277	CAA
22-08-2022	2128-2934	NA	NA	NA	BYP083978	56,1790	12,4162	232	T_278	CAA
23-08-2022	2128-2916	236256	DTU	LW	BYP083998	56,2019	12,3448	255	T_279	CAA
23-08-2022	2128-2902	236251	DTU	LW	BYP083984	56,1785	12,3274	243	T_280	CAA
23-08-2022	2128-2881	236255	DTU	LW	BYP083994	56,2018	12,3917	226	T_281	CAA
23-08-2022	2128-2883	236245	DTU	MT	BYP083981	56,1564	12,4244	247	T_282	CAA
24-08-2022	2128-2887	233975	ICCAT	WC	BYP083983	56,1560	12,4101	220	T_283	CAA
24-08-2022	2128-2888	NA	NA	NA	BYP083987	56,1376	12,4055	222	T_285	CAA
24-08-2022	2128-2789	236244	DTU	MT	BYP083996	56,1538	12,3535	235	T_286	CAA
24-08-2022	2128-2880	236257	DTU	LW	BYP083991	56,2986	12,2974	263	T_287	CAA
24-08-2022	2128-2889	233983	ICCAT	NA	BYP083980	56,1255	12,4875	260	T_288	CAA
24-08-2022	NA	NA	NA	NA	BYP083986	56,1372	12,4713	224	NA	CAA
24-08-2022	2128-2784	236241	DTU	MT	BYP084000	56,1640	12,4062	262	T_290	CAA
24-08-2022	2128-2882	236253	DTU	LW	BYP083988	56,1272	12,4239	226	T_291	CAA
24-08-2022	2128-2924	233978	ICCAT	WC	BYP083995	56,1223	12,4650	262	T_292	CAA
24-08-2022	2128-2788	236240	DTU	MT	BYP083870	56,1125	12,4435	241	T_293	CAA
24-08-2022	2128-2903	236254	DTU	LW	BYP083864	56,1744	12,3333	229	T_294	CAA
24-08-2022	2231-6545	236628	DTU	WC	BYP083859	56,1403	12,4235	255	T_295	CAA
24-08-2022	2128-2952	NA	NA	NA	BYP083873	56,1647	12,3948	242	T_296	CAA
24-08-2022	2128-3024	NA	NA	NA	BYP083868	56,1540	12,3697	238	T_297	CAA
24-08-2022	2128-3023	NA	NA	NA	BYP083871	56,1832	12,6063	235	T_298	CAA
24-08-2022	2128-3018	NA	NA	NA	BYP083857	56,1955	12,3453	262	T_299	CAA
24-08-2022	2128-3016	NA	NA	NA	BYP083861	56,1818	12,3273	261	T_300	CAA
24-08-2022	2128-3017	236248	DTU	LW	BYP083853	56,1596	12,4603	246	T_301	CAA
24-08-2022	2128-3019	NA	NA	NA	BYP083855	56,1588	12,4468	245	T_302	CAA
24-08-2022	2128-2954	NA	NA	NA	BYP083867	56,1300	12,4425	241	T_303	CAA
24-08-2022	2128-2948	NA	NA	NA	BYP083866	56,1461	12,4435	276	T_304	CAA
24-08-2022	2128-2953	NA	NA	NA	BYP083862	56,1422	12,4114	265	T_305	CAA
25-08-2022	2128-3025	236625	DTU	WC	BYP083856	56,1412	12,4453	249	T_306	CAA

25-08-2022	2128-2947	236246	DTU	MT	BYP083860	56,1331	12,4492	254	T_307	CAA
25-08-2022	2128-2950	236252	DTU	LW	BYP083863	56,1634	12,4429	260	T_308	CAA
25-08-2022	2128-2940	236627	DTU	WC	BYP083875	56,2186	12,3997	269	T_309	CAA
25-08-2022	2128-2936	236242	DTU	MT	BYP083872	56,1458	12,4086	239	T_310	CAA
25-08-2022	2128-2943	236249	DTU	LW	BYP083869	56,1562	12,4462	236	T_311	CAA
25-08-2022	2128-2942	NA	NA	NA	BYP083826	56,1278	12,4610	257	T_312	CAA
25-08-2022	2128-2937	NA	NA	NA	BYP083852	56,1451	12,4646	235	T_313	CAA
25-08-2022	2128-2941	NA	NA	NA	BYP083874	56,1641	12,3863	277	T_314	CAA
25-08-2022	2128-2945	NA	NA	NA	BYP083854	56,1900	12,3574	261	T_315	CAA
25-08-2022	2128-2939	NA	NA	NA	BYP083865	56,1927	12,4115	275	T_316	CAA
25-08-2022	2128-2955	NA	NA	NA	BYP083858	56,1203	12,4889	263	T_317	CAA
25-08-2022	2128-2944	NA	NA	NA	BYP083851	56,1737	12,3296	250	T_318	CAA
25-08-2022	2128-2931	NA	NA	NA	BYP083919	56,1440	12,4610	271	T_319	CAA
25-08-2022	2128-2946	NA	NA	NA	BYP083911	56,1717	12,3908	272	T_320	CAA
25-08-2022	2128-2938	NA	NA	NA	BYP083906	56,1790	12,4162	259	T_321	CAA
25-08-2022	2231-6590	NA	NA	NA	BYP083924	56,2019	12,3448	267	T_322	CAA
25-08-2022	2231-6583	NA	NA	NA	BYP083909	56,1785	12,3274	273	T_323	CAA
25-08-2022	2231-6573	NA	NA	NA	BYP083916	56,2018	12,3917	223	T_324	CAA
25-08-2022	2231-6578	NA	NA	NA	BYP083923	56,1564	12,4244	261	T_325	CAA
25-08-2022	2231-6586	NA	NA	NA	BYP083908	56,1560	12,4101	231	T_326	CAA
26-08-2022	2231-6581	236633	DTU	WC	BYP083914	56,1376	12,4055	275	T_327	CAA
26-08-2022	2231-6582	NA	NA	NA	BYP083920	56,1538	12,3535	222	T_328	CAA
26-08-2022	2231-6587	236247	DTU	MT	BYP083903	56,2986	12,2974	243	T_329	CAA
26-08-2022	2231-6544	NA	NA	NA	BYP083913	56,1255	12,4875	228	T_330	CAA
26-08-2022	2231-6576	236630	DTU	WC	BYP083901	56,1372	12,4713	240	T_331	CAA
26-08-2022	2231-6585	236250	DTU	LW	BYP083912	56,1640	12,4062	243	T_332	CAA
27-08-2022	2231-6589	NA	NA	NA	BYP083905	56,1272	12,4239	258	T_333	CAA
27-08-2022	2231-6588	NA	NA	NA	BYP083921	56,1223	12,4650	241	T_334	CAA
27-08-2022	2231-6538	236626	DTU	WC	BYP083922	56,1125	12,4435	226	T_335	CAA
27-08-2022	2128-2949	NA	NA	NA	BYP083925	56,1744	12,3333	215	T_336	CAA
27-08-2022	2231-6543	NA	NA	NA	BYP083904	56,1403	12,4235	252	T_337	CAA
27-08-2022	2231-6580	NA	NA	NA	BYP083910	56,1647	12,3948	251	T_338	CAA
27-08-2022	2231-6575	NA	NA	NA	BYP083907	56,1540	12,3697	257	T_339	CAA
27-08-2022	2231-6579	NA	NA	NA	BYP083915	56,1832	12,6063	272	T_340	CAA
27-08-2022	2231-6577	NA	NA	NA	BYP083902	56,1955	12,3453	248	T_341	CAA
27-08-2022	2128-2951	NA	NA	NA	BYP083917	56,1818	12,3273	251	T_342	CAA
27-08-2022	2231-6551	NA	NA	NA	BYP083879	56,1596	12,4603	238	T_343	CAA
27-08-2022	2231-6549	NA	NA	NA	BYP083889	56,1588	12,4468	275	T_344	CAA
27-08-2022	2231-6550	NA	NA	NA	BYP083885	56,1300	12,4425	247	T_345	CAA
27-08-2022	2231-6536	NA	NA	NA	BYP083899	56,1461	12,4435	262	T_346	CAA
27-08-2022	2231-6534	NA	NA	NA	BYP083880	56,1422	12,4114	225	T_347	CAA
27-08-2022	2231-6537	NA	NA	NA	BYP083897	56,1412	12,4453	266	T_348	CAA
30-08-2022	2128-2869	NA	NA	NA	BYP083891	56,1331	12,4492	240	T_349	CAA
30-08-2022	2128-2871	NA	NA	NA	BYP083890	56,1634	12,4429	266	T_350	CAA

30-08-2022	2231-6591	NA	NA	NA	BYP083881	56,2186	12,3997	236	T_351	CAA
30-08-2022	2231-6547	NA	NA	NA	BYP083884	56,1458	12,4086	271	T_352	CAA
30-08-2022	2231-6548	NA	NA	NA	BYP083876	56,1562	12,4462	260	T_353	CAA
30-08-2022	2231-6572	NA	NA	NA	BYP083893	56,1278	12,4610	253	T_354	CAA
30-08-2022	2231-6584	NA	NA	NA	BYP083894	56,1451	12,4646	257	T_355	CAA
30-08-2022	2231-6540	NA	NA	NA	BYP083900	56,1641	12,3863	251	T_356	CAA
30-08-2022	2231-6546	NA	NA	NA	BYP083878	56,1900	12,3574	258	T_357	CAA
30-08-2022	2231-6541	NA	NA	NA	BYP083886	56,1927	12,4115	231	T_358	CAA
30-08-2022	2231-6542	NA	NA	NA	BYP083898	56,1203	12,4889	239	T_359	CAA
30-08-2022	2231-6574	NA	NA	NA	BYP083895	56,1737	12,3296	268	T_360	CAA
30-08-2022	2128-2862	NA	NA	NA	BYP083882	56,1440	12,4610	247	T_361	CAA
30-08-2022	2231-6535	NA	NA	NA	BYP083888	56,1717	12,3908	258	T_362	CAA
31-08-2022	2231-6539	NA	NA	NA	BYP083896	56,1790	12,4162	256	T_363	CAA
31-08-2022	2231-6532	NA	NA	NA	BYP083887	56,2019	12,3448	244	T_364	CAA
31-08-2022	2231-6533	NA	NA	NA	BYP083883	56,1785	12,3274	247	T_365	CAA
31-08-2022	2128-2864	NA	NA	NA	BYP083877	56,2018	12,3917	256	T_366	CAA
31-08-2022	2128-2861	NA	NA	NA	BYP083892	56,1564	12,4244	242	T_367	CAA
31-08-2022	2128-2858	NA	NA	NA	BYP083953	56,1560	12,4101	262	T_368	CAA
31-08-2022	2128-2857	NA	NA	NA	BYP083955	56,1376	12,4055	254	T_369	CAA
31-08-2022	2128-2860	NA	NA	NA	BYP083970	56,1538	12,3535	256	T_370	CAA
31-08-2022	2128-2868	NA	NA	NA	BYP083962	56,2986	12,2974	253	T_371	CAA
31-08-2022	2128-2863	NA	NA	NA	BYP083974	56,1255	12,4875	249	T_372	CAA
31-08-2022	2128-2856	NA	NA	NA	BYP083963	56,1372	12,4713	226	T_373	CAA
31-08-2022	2128-2872	NA	NA	NA	BYP083968	56,1640	12,4062	245	T_374	CAA
31-08-2022	2128-2875	NA	NA	NA	BYP083951	56,1272	12,4239	243	T_375	CAA
31-08-2022	2128-2870	NA	NA	NA	BYP083965	56,1223	12,4650	256	T_376	CAA
31-08-2022	2128-2874	NA	NA	NA	BYP083957	56,1125	12,4435	252	T_377	CAA
31-08-2022	2128-2867	NA	NA	NA	BYP083959	56,1744	12,3333	243	T_378	CAA
31-08-2022	2128-2859	NA	NA	NA	BYP083956	56,1403	12,4235	244	T_379	CAA
01-09-2022	2128-2866	NA	NA	NA	BYP083975	56,1647	12,3948	248	T_380	CAA
01-09-2022	2128-2873	NA	NA	NA	BYP083966	56,1540	12,3697	228	T_381	CAA
01-09-2022	2128-2865	NA	NA	NA	BYP083973	56,1832	12,6063	235	T_382	CAA
01-09-2022	2128-2968	NA	NA	NA	BYP083969	56,1955	12,3453	257	T_383	CAA
01-09-2022	2128-3007	NA	NA	NA	BYP083954	56,1818	12,3273	245	T_384	CAA
01-09-2022	2128-2964	NA	NA	NA	BYP083964	56,1596	12,4603	241	T_385	CAA
01-09-2022	2128-2975	NA	NA	NA	BYP083972	56,1588	12,4468	239	T_386	CAA
01-09-2022	2128-2957	NA	NA	NA	BYP083971	56,1300	12,4425	277	T_387	CAA
01-09-2022	2128-2960	NA	NA	NA	BYP083958	56,1461	12,4435	248	T_388	CAA
01-09-2022	2128-2974	NA	NA	NA	BYP083967	56,1422	12,4114	241	T_389	CAA
01-09-2022	2128-2961	NA	NA	NA	BYP083952	56,1412	12,4453	254	T_390	CAA
01-09-2022	2128-2966	NA	NA	NA	BYP083960	56,1331	12,4492	238	T_391	CAA
01-09-2022	2128-2973	NA	NA	NA	BYP083961	56,1634	12,4429	235	T_392	CAA
01-09-2022	2128-2965	NA	NA	NA	BYP080316	56,2186	12,3997	244	T_393	CAA
01-09-2022	2128-2963	NA	NA	NA	BYP080311	56,1458	12,4086	229	T_394	CAA

01-09-2022	2128-2958	NA	NA	NA	BYP083937	56,1562	12,4462	241	T_395	CAA
01-09-2022	2128-2962	NA	NA	NA	BYP083823	56,1278	12,4610	224	T_396	CAA
01-09-2022	2128-2971	NA	NA	NA	BYP083843	56,1451	12,4646	270	T_397	CAA
02-09-2022	2128-2967	NA	NA	NA	BYP083842	56,1641	12,3863	232	NA	CAA
24-09-2022	2128-2970	NA	NA	NA	BYP083836	56,1900	12,3574	272	T_399	CAA
24-09-2022	2128-3012	NA	NA	NA	BYP083930	56,1927	12,4115	263	T_400	CAA
24-09-2022	2128-2997	NA	NA	NA	BYP083948	56,1203	12,4889	265	T_401	CAA
24-09-2022	2128-3002	NA	NA	NA	BYP083929	56,1737	12,3296	278	T_402	CAA
24-09-2022	2128-3001	NA	NA	NA	BYP083928	56,1440	12,4610	241	T_403	CAA
24-09-2022	2128-3011	NA	NA	NA	BYP083940	56,1717	12,3908	263	T_404	CAA
24-09-2022	2128-3009	NA	NA	NA	BYP083933	56,1790	12,4162	269	T_405	CAA
24-09-2022	2128-3014	NA	NA	NA	BYP083926	56,2019	12,3448	242	T_406	CAA
24-09-2022	2128-3000	NA	NA	NA	BYP079962	56,1785	12,3274	247	T_407	CAA
24-09-2022	2128-2959	NA	NA	NA	BYP083927	56,2018	12,3917	257	T_408	CAA
24-09-2022	2128-2956	NA	NA	NA	BYP083936	56,1564	12,4244	267	T_409	CAA
25-09-2022	2128-2996	NA	NA	NA	BYP083932	56,1560	12,4101	251	T_411	CAA
25-09-2022	2128-2972	NA	NA	NA	BYP083934	56,1376	12,4055	227	T_412	CAA
25-09-2022	2128-3008	NA	NA	NA	BYP083944	56,1538	12,3535	256	T_413	CAA
25-09-2022	2128-2999	NA	NA	NA	BYP080358	56,2986	12,2974	249	T_414	CAA
25-09-2022	2128-3003	NA	NA	NA	BYP083845	56,1255	12,4875	248	T_415	CAA
25-09-2022	2128-3010	NA	NA	NA	BYP083836	56,1372	12,4713	210	T_416	CAA
25-09-2022	2128-2998	NA	NA	NA	BYP083838	56,1640	12,4062	284	T_417	CAA
25-09-2022	2128-3006	NA	NA	NA	BYP083829	56,1272	12,4239	262	T_418	CAA
25-09-2022	2128-3004	NA	NA	NA	BYP083840	56,1223	12,4650	268	T_419	CAA
25-09-2022	2128-3015	NA	NA	NA	BYP083950	56,1125	12,4435	270	T_420	CAA
26-09-2022	2128-2969	NA	NA	NA	BYP083839	56,1744	12,3333	243	T_421	CAA
26-09-2022	2128-3013	NA	NA	NA	BYP083828	56,1403	12,4235	271	T_422	CAA
26-09-2022	2231-6595	NA	NA	NA	BYP083831	56,1647	12,3948	282	T_424	CAA
28-09-2022	2128-3005	NA	NA	NA	BYP083949	56,1540	12,3697	249	T_425	CAA
28-09-2022	2231-6594	NA	NA	NA	BYP083947	56,1832	12,6063	271	T_426	CAA
28-09-2022	2231-6611	NA	NA	NA	BYP083948	56,1955	12,3453	276	T_427	CAA
28-09-2022	2231-6600	NA	NA	NA	BYP083935	56,1818	12,3273	277	T_428	CAA
28-09-2022	2231-6601	NA	NA	NA	BYP083945	56,1596	12,4603	276	T_429	CAA
28-09-2022	2231-6602	NA	NA	NA	BYP083939	56,1588	12,4468	237	T_430	CAA
28-09-2022	2231-6593	NA	NA	NA	BYP083946	56,1300	12,4425	274	T_431	CAA
28-09-2022	2231-6608	NA	NA	NA	BYP083942	56,1461	12,4435	273	T_432	CAA
28-09-2022	2231-6598	NA	NA	NA	BYP083931	56,1422	12,4114	267	T_433	CAA
28-09-2022	NA	NA	NA	NA	BYP083928	56,1412	12,4453	264	NA	CAA
28-09-2022	2231-6605	NA	NA	NA	BYP083941	56,1331	12,4492	266	T_435	CAA
30-09-2022	2231-6604	236631	DTU	WC	BYP083943	56,1634	12,4429	272	T_436	CAA
30-09-2022	2231-6599	236632	DTU	WC	BYP080382	56,2186	12,3997	266	T_437	CAA
30-09-2022	2231-6596	NA	NA	NA	BYP080302	56,1458	12,4086	265	T_438	CAA
30-09-2022	2231-6610	NA	NA	NA	BYP080323	56,1562	12,4462	248	T_439	CAA
30-09-2022	2231-6597	NA	NA	NA	BYP080305	56,1278	12,4610	264	T_440	CAA

30-09-2022	2231-6592	NA	NA	NA	BYP080318	56,1451	12,4646	283	T_441	KAA
30-09-2022	2231-6603	NA	NA	NA	BYP080320	56,1641	12,3863	257	T_442	KAA
01-10-2022	2231-6609	NA	NA	NA	BYP080314	56,1900	12,3574	253	T_443	KAA

Table 2. Tags deployed within ICCAT GBYP Electronic tagging campaign 2021

Tag Serial No.	Argos No. decimal	Conventional Tag No.	Deployment Date	Deployment Latitude	Deployment Longitude	Specimen length CFL (cm)
21P2271	233972	29597	21-08-2021	58,0033	11,1522	262
21P2262	233970	29658	21-08-2021	58,0053	10,9717	260
21P2314	233987	29664	21-08-2021	55,9789	10,9122	264
21P2275	233975	29656	22-08-2021	58,1822	10,3428	220
21P2291	233983	29654	22-08-2021	58,1011	10,2605	260
21P2279	233978	29578	22-08-2021	58,0922	10,3015	262