

ICCAT GBYP TAGGING PROGRAMME 2021

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

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



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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 the Swedish and Danish collaboration “Scandinavian Bluefin Marathon”, a variety of electronic and conventional tags on 133 ABFT (205 to 288 cm curved fork length (CFL)) in Skagerrak, Kattegat and Øresund during 15 tagging days between 21 August and 2 October 2021. All tagging fish were tagged with an acoustic tag and conventional tag and a subset was also tagged with PSAT (of which 9 PSAT were provided by ICCAT GBYP program under an ad hoc Memorandum of understanding) and accelerometer tags. Biological sampling was undertaken at the time of tagging through a fin clip for genetic analysis, 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 – 2020.

2. Introduction

ABFT have been a rare sight (if not completely absent) in waters of the Skagerrak/Kattegat since the 1960s. From 2014/15 onwards, sightings have been reported with increasing regularity (Aarestrup et al. in press).

In 2017, the first ABFT 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 the inception, the Scandinavian Bluefin Marathon (SBM), a collaboration between Technical University of Denmark (DTU) National Institute of Aquatic Sciences DTU Aqua, Denmark, SLU Aqua, Sweden and ICCAT have carried out four years (2017-2020) of ABFT tagging. Field operations take place between August and November – a period when ABFT return annually to feed on a diverse assemblage of forage fish. In 2021, an important part of this work has been carried out under a MOU with 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 baits 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 or Accelerometer tag. Here, to answer the request stated in the MoU signed with ICCAT GBYP, 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 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, 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. In order to achieve that ABFT were caught, tagged with PSATs, acoustic and conventional tags and sampled (e.g. fin, clip, muscle biopsy, blood sample).

3. Methods

Briefly:

- a) In Skagerrak and Kattegat, experienced Big Game anglers (In total 104 boats involving more than 1000 experienced anglers) fished for 15 days over the period from 21st August to 3rd October 2021. 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. All fish were revived from the capture experience by towing at 2-3 knots with the head forward prior to release both before and after the tagging procedure. All tags were deployed following ICCAT GBYP protocols.
- c) In total, 133 ABFT were tagged, sampled and released, all were tagged with a conventional tag from the ICCAT tagging series and most were also tagged with an acoustic tag. A subset of 57 ABFT were tagged with either a PSAT or an accelerometer tag. 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

Coordination of fishing and project operation: Kristi Källo

Onboard tagging operation: Kim Aarestrup, Kristi Källo.

Assistance in tagging operation: Brian MacKenzie, Hans Ole Olesen & Henrik Christensen, Anders Koed, Henrik Baktoft.

Data collection: Kristi Källo

3.2 Selection of anglers

All fishing operations were similar to the previous projects (Aarestrup et al. 2021, Birnie-Gauvin *et al.*, 2019; MacKenzie *et al.*, 2018), 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. As 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 ABFT. 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, 95 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

inspection 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 21 August 2020 and 3 October 2021. Due to the sensitivity of the tagging operation to weather conditions we had a total of 15 realized fishing days. The fishing area in the period from 23 August to 5 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 25 September – 3 October the tagging was performed in the South-western corner of Kattegat and Øresund (**Figure 1**), but this time with only one tagging boat.

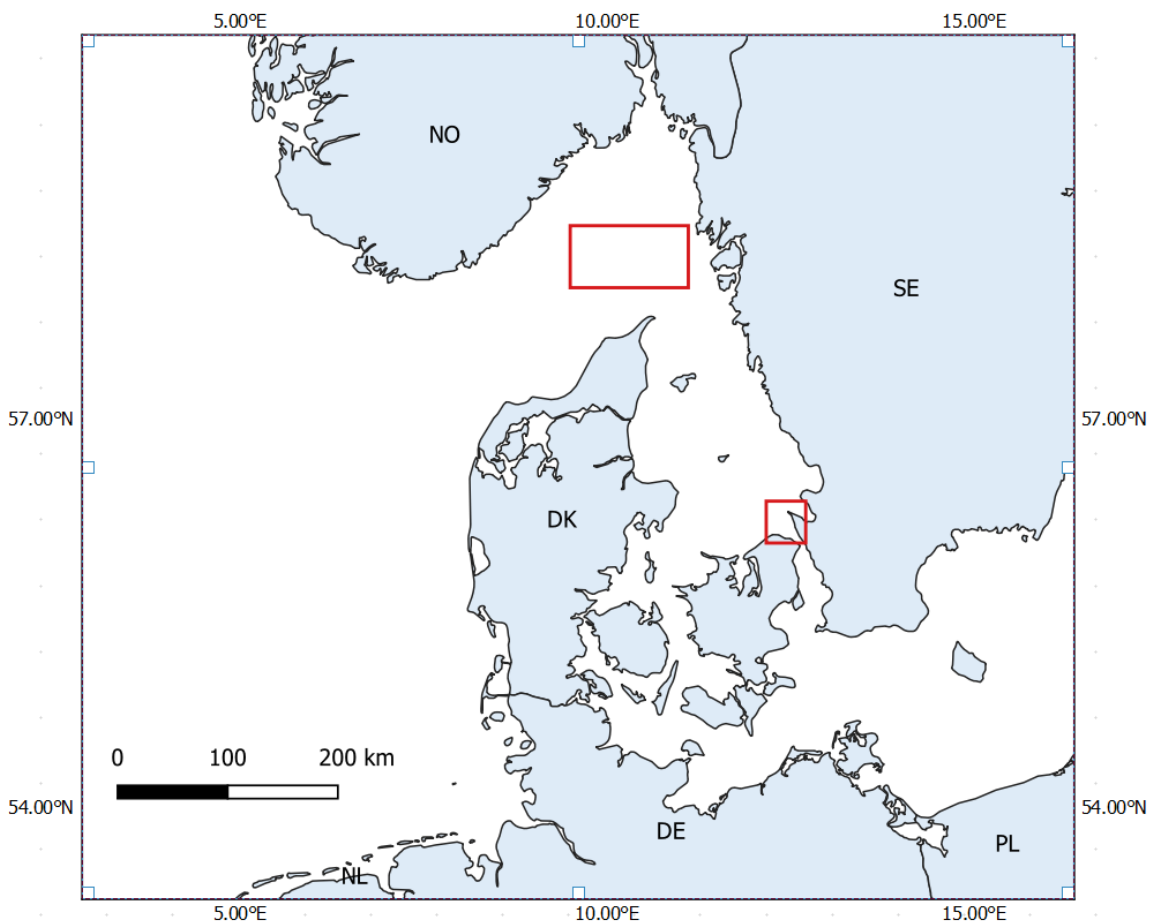


Figure 1. Location of fishing and tagging operations the Scandinavian Bluefin Marathon (red squares, Upper Square - 21 August to 5 September 2021, Lower square – 25 September – 2 October 2021).

3.3 Fishing techniques

The fishing was done with rod and reel, typically using balloons and drifting. Baits were largely mackerel with garfish to a lesser extent. 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 2-10 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.

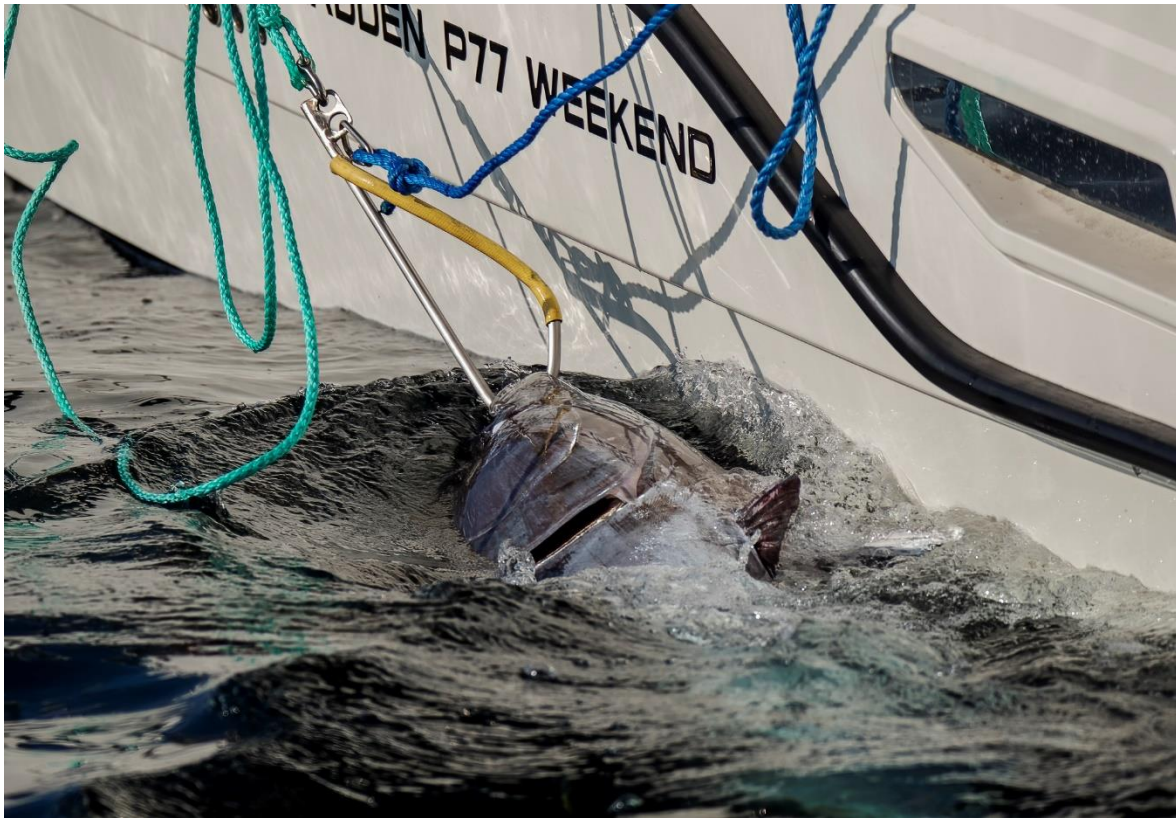


Figure 2. ABFT just after being gaffed in the outer jaw. The two ropes, attached to the gaff, are used to transfer the ABFT to the tagging boat, by throwing one end over and releasing the other once fish are secured behind the tagging boat.

3.4 Tagging and sampling operations

Once a fish was transferred to the tagging boat, the handling protocol was the following:

- 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 designed 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 microfiber towel;
- 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 3 to 5 minutes.

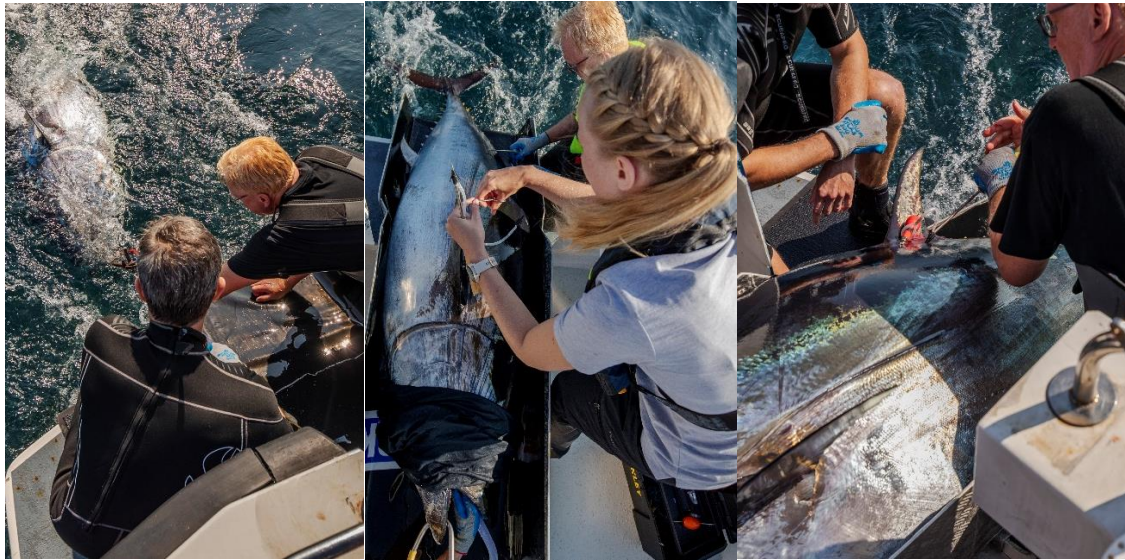


Figure 2. Example methods. A) ABFT was swum behind the boat to evaluate its condition. B) ABFT onboard the tagging boat on a wet PVC mat specifically designed for the tagging of large pelagic fish with the eyes covered and continually ventilated with fresh saltwater. C) ABFT being tagged with a PSAT tag and a conventional ICCAT tag. Photos: Lars Mikkelsen ©.

1. Results

1.1 Numbers and sizes of tunas caught and tagged

A total of 133 ABFT were tagged with acoustic tags (Thelma Biotel ID-HP16) and conventional ICCAT tags. Of those fish, a total of 9 were tagged with ICCAT-provided Wildlife Computers miniPAT tags. Furthermore, five floating G7 CTL accelerometer DST were coupled to Wildlife Computer mrPAT tags (programmed to release after 1-5 days to facilitate recovery) (Figure 3). All other PSAT tags were set to pop after a 12-month deployment. All tags were mounted externally.



Figure 3. Package consisting of a Pop up satellite tags (mrPAT) and floating DST (CTL G7) deployed on ABFT in Skagerrak 2021 after retrieval. Attachment anchors (not shown) are similar to standard PSAT attachment. Photos: Kim Aarestrup ©.

The 133 SBM-tagged ABT ranged from 209 – 288 cm (mean \pm 1 S.D. – 255 \pm 10 cm) with the ICCAT tagged fish ranged from 230 to 275 cm CFL (Figure 4).

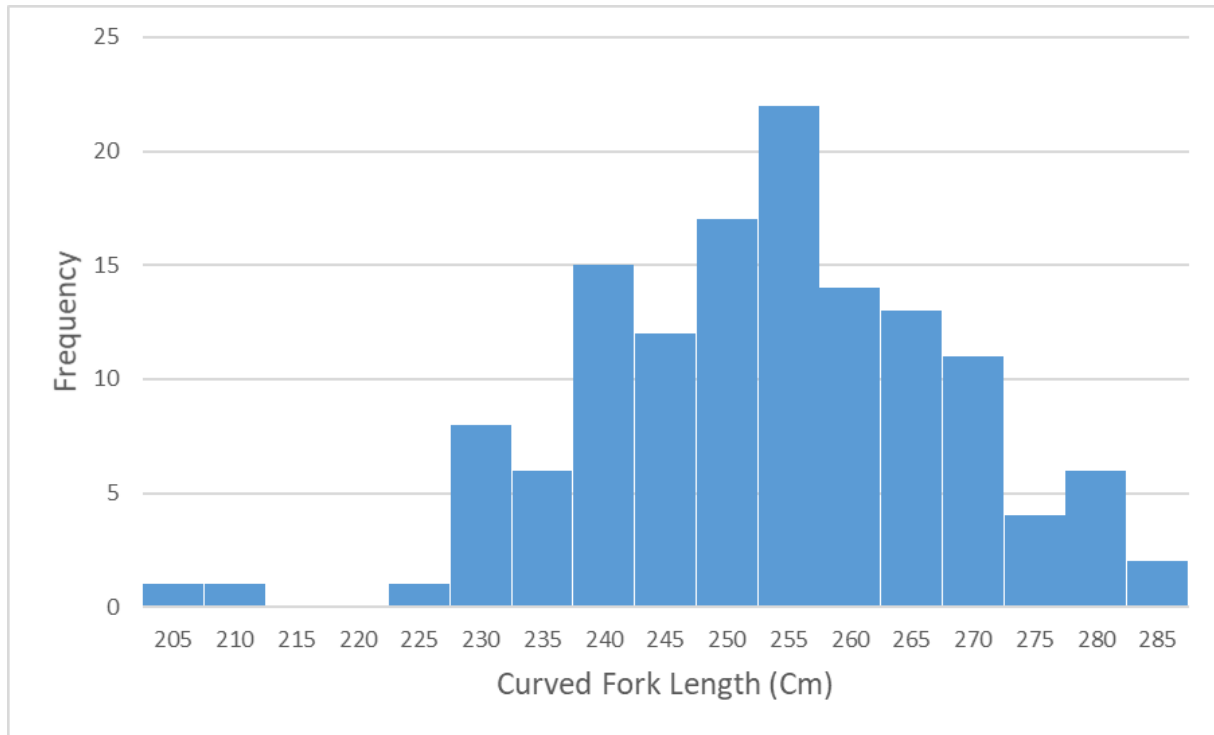


Figure 4. Length-frequency distribution for 133 Atlantic bluefin tunas measured by the Danish Scandinavian Bluefin Marathon during field operations in 2021.

1.2 Samples collected

Fin clips (< 0.5 cm in size) were taken from all 133 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.

2. Overall summary and conclusions

The project successfully engaged the Nordic big game fishing community to participate in a tagging operation for ABFT in Skagerrak, Kattegat and Øresund. The operations in the Scandinavian Bluefin Marathon 2021 successfully deployed 4 types of tags (PSAT, Accelerometer, Acoustic and conventional tags), and the results of these tagging's in the coming years will contribute to new knowledge on ABFT migratory behaviour (both short and long-term).

3. 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, Hans Ole Olesen and Henrik Christensen 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.

4. References

- Aarestrup, K., Birnie-Gauvin, K., Baktoft, H., MacKenzie, B. R., Righton, D., Witt, M., Hawkes, L., Horton, T., Hellström, G., Sundelöf, A. & Brodin, T. 2021. Tagging of Atlantic bluefin tuna with ICCAT tags in Skagerrak, Kattegat and western English Channel in 2020. ICCAT Atlantic-Wide Research Programme for Bluefin Tuna (GBYP PHASE 10) tagging report, 13pp.
- 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. <https://doi.org/10.1093/icesjms/fsab039>
- 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).

Table 1. ABFT tagged in 2021 by the consortium with information on date, Acoustic tag ID, PSAT ID, 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
21-08-2021	2128-2836	175144	DTU	MT	29559	57.989533	10.793	249	T_135	CAA
21-08-2021	2128-2837	220580	ICCAT	WC	29597	57.994833	10.799517	230	T_136	CAA
21-08-2021	2128-2838	221965	DTU	LW	29667	57.988843	10.787715	258	T_137	CAA
21-08-2021	2128-2839	221935	DTU	MT	29660	58.002017	10.73	260	T_138	CAA
21-08-2021	2128-2841	220581	ICCAT	WC	29658	58.0472	10.39933	253	T_139	CAA
21-08-2021	2128-2840	221966	DTU	LW	29686	58.00135	10.76196	251	T_140	CAA
21-08-2021	2128-2843	221936	DTU	MT	29590	58.060417	10.78555	266	T_141	CAA
21-08-2021	2128-2842	220582	ICCAT	WC	29664	58.77916	10.78891	266	T_142	CAA
21-08-2021	2128-2844	221968	DTU	LW	29674	58.110733	10.757617	274	T_143	CAA
22-08-2021	2128-2845	221937	DTU	MT	29577	58.1021	10.209667	257	T_144	CAA
22-08-2021	2128-2846	220583	ICCAT	WC	29656	58.1214	10.112317	262	T_145	CAA
22-08-2021	2128-2847	221967	DTU	LW	29671	58.101867	10.191467	256	T_146	CAA
22-08-2021	2128-2848	221938	DTU	MT	29697	58.1091	10.258483	284	T_147	CAA
22-08-2021	2128-2849	220584	ICCAT	WC	29654	57.987633	10.958333	251	T_148	CAA
22-08-2021	2128-2850	221969	DTU	LW	29691	58.03679	10.34608	246	T_149	CAA
22-08-2021	2128-2851	221939	DTU	MT	29549	58.05053	10.11164	226	T_150	CAA
22-08-2021	2128-2852	220585	ICCAT	WC	29578	58.121867	10.214917	260	T_151	CAA
22-08-2021	2128-2853	221970	DTU	LW	29677	57.130267	10.1418	242	T_152	CAA
22-08-2021	2128-2854	NA	NA	NA	29683	58.12295	10.15535	241	T_153	CAA
22-08-2021	2128-2855	NA	NA	NA	29588	58.1021	10.209667	251	T_154	AK/CAA
22-08-2021	NA	NA	NA	NA	29592	58.112267	10.3304	263	T_155	AK/CAA
23-08-2021	2128-2816	221940	DTU	MT	29653	58.00033	10.81617	240	T_156	CAA
23-08-2021	2128-2817	220586	ICCAT	WC	29665	58.006883	10.704583	250	T_157	CAA
23-08-2021	2128-2818	221971	DTU	LW	29669	57.98905	10.820517	243	T_158	CAA
23-08-2021	2128-2819	221942	DTU	MT	29663	57.985583	10.816633	275	T_159	CAA/HR H
23-08-2021	2128-2830	220587	ICCAT	WC	29657	58.03765	10.68615	275	T_160	CAA/HR H
23-08-2021	2128-2831	221972	DTU	LW	29668	57.984117	10.728367	259	T_161	CAA
23-08-2021	2128-2832	221947	DTU	MT	29589	58.0399	10.6671	265	T_162	CAA
23-08-2021	2129-2833	220588	ICCAT	WC	29579	58.041517	10.85835	262	T_163	CAA
24-08-2021	2128-2834	221973	DTU	LW	29581	57.986983	10.934117	246	T_164	CAA
24-08-2021	2128-2835	221948	DTU	MT	29586	58.040117	10.963183	255	T_165	CAA
24-08-2021	2128-2777	221950	DTU	WC	29580	58.039317	10.9922	271	T_166	CAA
24-08-2021	2128-2778	221974	DTU	LW	29593	58.025267	10.960317	253	T_167	CAA
24-08-2021	2128-2779	221941	DTU	MT	29600	58.025233	10.9601	266	T_168	CAA
24-08-2021	2128-2790	221951	DTU	WC	29582	58.0162	10.933533	241	T_169	CAA
24-08-2021	2128-2791	221952	DTU	WC	29576	58.019433	10.937917	242	T_170	CAA
24-08-2021	2128-2792	221953	DTU	WC	29599	57.98555	10.947433	243	T_171	CAA
24-08-2021	2821-2793	NA	NA	NA	29583	58.015267	11.02385	268	T_172	CAA

24-08-2021	2128-2794	221959	DTU	WC	29585	58.1046	11.149	282	T_173	CAA
24-08-2021	2128-2795	NA	NA	NA	29595	58.032067	11.03505	262	T_174	CAA
24-08-2021	2128-2776	NA	NA	NA	29684	58.015283	11.0096	240	T_175	CAA
30-08-2021	2128-2820	221975	DTU	LW	29655	57.97605	10.811533	251	T_176	CAA
30-08-2021	2128-2821	221958	DTU	WC	29534	57.975633	10.818967	212	T_177	CAA
30-08-2021	2128-2822	221943	DTU	MT	29569	57.976183	10.8038	243	T_178	CAA
30-08-2021	2128-2823	221976	DTU	LW	29564	57.976217	10.8212	232	T_179	CAA
30-08-2021	NA	NA	NA	NA	29555	57.985367	10.860367	263	T_180	CAA
30-08-2021	2128-2824	221955	DTU	WC	29570	57.976717	10.86855	249	T_182	AK/CAA
30-08-2021	2128-2825	221944	DTU	MT	29558	57.98	10.88755	249	T_181	AK/CAA
30-08-2021	NA	NA	NA	NA	29568	57.9991	10.892283	270	T_183	AK/CAA
30-08-2021	2128-2827	221956	DTU	WC	29567	57.999533	10.901383	253	T_184	AK/CAA
30-08-2021	2128-2828	221945	DTU	MT	29552	57.98975	10.8915	262	T_185	AK/CAA
30-08-2021	2128-2829	221978	DTU	LW	29557	57.9717	10.868367	262	T_186	AK/CAA
30-08-2021	2128-2891	NA	NA	NA	29556	57.97455	10.868467	233	T_188	AK/CAA
30-08-2021	2128-2892	NA	NA	NA	29562	57.972667	10.87965	234	T_189	AK/CAA
30-08-2021	2128-2893	NA	NA	NA	29571	57.936083	10.815433	234	T_190	AK/CAA
31-08-2021	2128-2894	221979	DTU	LW	29560	57.9122	10.8669	246	T_191	CAA
31-08-2021	2128-2895	221946	DTU	MT	29608	57.971583	10.894733	261	T_192	CAA
31-08-2021	2128-2876	221954	DTU	WC	29624	58.026833	10.995333	270	T_193	CAA
31-08-2021	2128-2877	221980	DTU	LW	29616	58.0093	10.969483	262	T_194	CAA
31-08-2021	2128-2878	221949	DTU	MT	29621	57.99235	10.997417	251	T_195	CAA
31-08-2021	2128-2879	221957	DTU	WC	29553	57.9636	10.97315	257	T_196	CAA
31-08-2021	2128-2800	NA	NA	NA	29528	57.980983	10.848583	256	T_197	CAA
31-08-2021	2128-2801	NA	NA	NA	29609	57.963983	10.9052	259	T_198	CAA
31-08-2021	2128-2802	NA	NA	NA	29615	57.903033	10.850433	255	T_199	CAA
31-08-2021	2128-2803	NA	NA	NA	29713	57.947967	10.86965	209	T_200	CAA
31-08-2021	2128-2804	NA	NA	NA	29696	57.887967	10.82585	241	T_201	CAA
01-09-2021	2128-2805	NA	NA	NA	29676	57.954983	10.76705	233	T_202	AK
01-09-2021	2128-2806	NA	NA	NA	29720	57.959667	10.780567	238	T_203	CAA
01-09-2021	2128-2807	NA	NA	NA	29602	57.917833	10.727367	258	T_204	CAA
01-09-2021	2128-2808	NA	NA	NA	29611	57.978233	10.7358	235	T_205	AK
01-09-2021	2128-2809	NA	NA	NA	29605	57.978233	10.7358	239	T_206	AK
01-09-2021	2128-2810	NA	NA	NA	29623	57.950567	10.733817	267	T_207	AK
01-09-2021	2128-2811	NA	NA	NA	29610	57.929933	10.875617	268	T_208	AK
01-09-2021	2128-2812	NA	NA	NA	29606	57.94575	10.910617	238	T_209	AK
01-09-2021	2128-2813	NA	NA	NA	29604	57.954017	10.73795	249	T_210	AK
02-09-2021	2128-2814	NA	NA	NA	29617	57.9448	10.803467	242	T_211	CAA
04-09-2021	2128-2815	221981	DTU	LW	29666	57.920583	10.821267	234	T_212	CAA
04-09-2021	2128-2796	NA	NA	NA	29572	57.9966	10.845983	254	T_213	CAA
04-09-2021	2128-2977	NA	NA	NA	29661	57.968133	10.754233	241	T_214	CAA
04-09-2021	2128-2978	NA	NA	NA	29694	57.949483	10.820267	242	T_215	CAA
04-09-2021	2128-2979	NA	NA	NA	29596	58.021783	10.796917	235	T_216	CAA
04-09-2021	2128-2796	NA	NA	NA	29651	57.984667	10.749383	246	T_217	CAA

04-09-2021	2128-2797	NA	NA	NA	29598	57.983267	10.72015	269	T_218	CAA
04-09-2021	2128-2798	NA	NA	NA	29698	57.985967	10.804217	237	T_219	CAA
04-09-2021	2128-2799	NA	NA	NA	29584	58.0461	10.78355	259	T_220	CAA
04-09-2021	2128-2985	221982	DTU	LW	29679	58.059883	10.8326	259	T_221	CAA
04-09-2021	2128-2986	NA	NA	NA	29685	58.052867	10.81465	273	T_222	CAA
04-09-2021	2128-2987	NA	NA	NA	29672	57.98605	10.850633	258	T_223	CAA
04-09-2021	2128-2988	NA	NA	NA	29682	57.986067	10.8137	257	T_224	CAA
04-09-2021	2128-2989	NA	NA	NA	29681	57.98385	10.805383	275	T_225	CAA
04-09-2021	2128-2890	NA	NA	NA	29700	57.991483	10.7873	249	T_226	CAA
04-09-2021	2128-2826	NA	NA	NA	29695	57.994317	10.739433	255	T_227	CAA
04-09-2021	NA	NA	NA	NA	29692	57.988567	10.731967	252	NA	CAA
26-09-2021	2128-2980	NA	NA	NA	29690	56.1519	12.545633	268	T_228	CAA
26-09-2021	2128-2981	NA	NA	NA	29673	56.11805	12.567833	269	T_229	CAA
26-09-2021	2128-2982	NA	NA	NA	29652	56.202817	12.44065	270	T_230	CAA
26-09-2021	2128-2983	NA	NA	NA	29689	56.202417	12.2065	258	T_231	CAA
26-09-2021	2128-2984	NA	NA	NA	29699	56.224833	12.4319	231	T_232	CAA
26-09-2021	2128-2990	NA	NA	NA	29688	56.212817	12.492367	281	T_233	CAA
26-09-2021	2128-2991	NA	NA	NA	83814	56.17265	12.50485	264	T_234	CAA
26-09-2021	2128-2992	MA	NA	NA	83824	56.186633	12.2885	250	T_235	CAA
26-09-2021	2128-2993	NA	NA	NA	83820	56.182567	12.313133	275	T_236	CAA
26-09-2021	2128-2994	NA	NA	NA	83804	56.18295	12.118883	254	T_237	CAA
27-09-2021	2128-2995	NA	NA	NA	83809	56.122717	12.4479	249	T_238	CAA
27-09-2021	2128-2998	NA	NA	NA	83819	56.166517	12.381967	271	T_239	CAA
27-09-2021	2128-2900	NA	NA	NA	83815	56.164417	12.3301	241	T_240	CAA
28-09-2021	2128-2911	NA	NA	NA	83808	56.13165	12.341433	265	T_241	CAA
28-09-2021	2128-2918	NA	NA	NA	83805	56.1588	12.350417	268	T_242	CAA
28-09-2021	2128-2919	NA	NA	NA	83813	56.135183	12.35555	288	T_243	CAA
28-09-2021	2128-2906	NA	NA	NA	83801	56.10975	12.42625	257	T_244	HBA
28-09-2021	2128-2907	NA	NA	NA	83802	56.139567	12.31975	249	T_245	HBA
28-09-2021	2128-2899	NA	NA	NA	83821	56.158717	12.3363	257	T_246	CAA
28-09-2021	NA	20U17 20	DTU	WCA	83812	56.099817	12.470267	258	T_247	CAA
28-09-2021	NA	20U17 22	DTU	WCA	83806	56.155167	12.38045	254	T_248	CAA
28-09-2021	2128-2920	NA	NA	NA	83817	56.173933	12.37605	286	T_249	CAA
28-09-2021	2128-2921	NA	NA	NA	83803	56.185367	12.358633	253	T_250	CAA
28-09-2021	NA	20U17 38	DTU	WCA	83825	56.137517	12.38175	251	T_252	CAA
29-09-2021	2128-2922	NA	NA	NA	83846	56.202	12.30345	259	T_253	CAA
29-09-2021	2128-2925	NA	NA	NA	83830	56.214733	12.355433	248	T_254	CAA
29-09-2021	2128-2913	NA	NA	NA	83833	56.1744	12.277617	281	T_255	CAA
29-09-2021	2128-2915	NA	NA	NA	83850	56.20035	12.383717	256	T_256	CAA
29-09-2021	2128-2923	NA	NA	NA	83827	56.215183	12.342833	272	T_257	CAA
29-09-2021	2128-2933	NA	NA	NA	83832	56.145783	12.436383	253	T_258	CAA
29-09-2021	2128-2896	NA	NA	NA	83847	56.152167	12.364	244	T_259	CAA
29-09-2021	2128-2910	NA	NA	NA	83918	56.130317	12.440817	261	T_260	CAA

30-09-2021	2128-2929	NA	NA	NA	83837	56.1268	12.427217	282	T_261	CAA
02-10-2021	2128-2932	NA	NA	NA	83834	56.17255	12.2512	273	T_262	CAA
02-10-2021	NA	20U17 32	DTU	WCA	83844	56.043017	12.2667	265	T_263	CAA
02-10-2021	NA	221977	DTU	LW	83811	56.190333	12.25765	257	NA	CAA
02-10-2021	2128-2914	NA	NA	NA	83818	56.173233	12.2811	282	T_264	KKAL
02-10-2021	2128-2901	NA	NA	NA	83807	56.166333	12.23405	272	T_265	KKAL
02-10-2021	2128-2904	NA	NA	NA	83822	56.201917	12.270583	262	T_265	HBA
02-10-2021	2128-2917	NA	NA	NA	83810	56.197317	12.226917	271	NA	CAA

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)
21P0434	220580	29597	21-08-2021	57.994833	10.799517	230
21P0435	220581	29658	21-08-2021	58.0472	10.39933	253
21P0456	220582	29664	21-08-2021	58.77916	10.78891	266
21P0457	220583	29656	22-08-2021	58.1214	10.112317	262
21P0458	220584	29654	22-08-2021	57.987633	10.958333	251
21P0459	220585	29578	22-08-2021	58.121867	10.214917	260
21P0471	220586	29665	23-08-2021	58.006883	10.704583	250
21P0472	220587	29657	23-08-2021	58.03765	10.68615	275
21P0473	220588	29579	23-08-2021	58.041517	10.85835	262