



**ICCAT/GBYP 08/06/2024 TAGGING
PROGRAMME 2024**

**ATLANTIC-WIDE RESEARCH PROGRAMME ON
BLUEFIN TUNA (ICCAT GBYP)**

THE INTERIM TECHNICAL SHORT REPORT

**Electronic Tagging of Adult Bluefin Tunas Captured in the Eastern Mediterranean
(Turkish Levantine Coast) - 2024**

**Mediterranean Fisheries Research, Production and Training Institute (MEDFRI),
General Directorate of Agricultural Research and Policies, Republic of Türkiye, Ministry of
Agriculture and Forestry**

Hopkins Marine Station of Stanford University

**General Directorate of Fisheries and Aquaculture, Republic of Türkiye, Ministry of Agriculture
and Forestry (GDFA)**

Akua Group Fisheries Company

Fisheries Faculty, Cukurova University

June 2024



**Co-funded by the
European Union**

1. Introduction

The Northern Levantine Sea (NLS) is recognized as an important spawning area for Atlantic bluefin tuna (ABT; Karakulak et al., 2004; Oray & Karakulak, 2005). However, significant knowledge gaps remain concerning habitat connectivity with other ABT spawning grounds and the existence of a resident population within the Mediterranean Sea (Arrizabalaga et al., 2019). To address these issues, conventional and satellite pop-up tags have been deployed on ABT individuals primarily in the western and central Mediterranean Sea as part of the Grand Bluefin Tuna Year Program (GBYP) of the International Commission for the Conservation of Atlantic Tunas (ICCAT; ICCAT, 2016). However, there was little support for a coordinated effort in the eastern Mediterranean region.

The GBYP supported the deployment of 20 pop-up tags in the NLS in 2020, although this survey was cancelled due to COVID-19 mobility restrictions. A new campaign was then conducted in Turkish seas in June 2022, in collaboration with Turkish research team (MEDFRI and Cukurova University), Stanford University, ICCAT/GBYP, the Akua Group Fisheries Company, and the General Directorate of Fisheries and Aquaculture of Türkiye (GDFFA). Although 13 pop-up tags were successfully deployed, data could not be retrieved due to battery malfunctions, preventing the campaign's scientific aims from being fully met. On July 14, 2023, the ICCAT Executive Secretary issued a new GBYP Circular (G-00869-23), inviting expressions of interest to engage with the GBYP Phase 13 e-tagging program. The GBYP Steering Committee accepted a proposal submitted by MEDFRI to provide logistical support for a 2024 e-tagging campaign in the NLS. Additionally, Stanford University, whose e-tagging experts were contracted by GBYP in 2022 to assist in tag deployment, expressed interest in actively participating in this campaign and providing expertise and additional e-tags for deployment. This joint effort facilitated the successful deployment of tags on June 8, 2024. This document describes the field activities and technical information on the deployed instruments.

2. Objectives

The immediate goals of this new study are to improve our knowledge of the movement ecology and potential spawning behaviours of ABT in the eastern Mediterranean's NLS. For this purpose, the objectives of the tagging operation are to:

1. Deploy electronic and conventional tags on ABT to track their movements, diving and ecological behaviours.
2. Collect biological samples for further genetic and stable isotope analysis.

These tagging experiments aim to improve scientific knowledge on the spatiotemporal distribution of ABT individuals spawning in the eastern Mediterranean. By collecting data on the horizontal and vertical migrations of tagged ABT individuals, the following questions are investigated:

- What are the movements within the year of tracking of eastern Mediterranean tagged bluefin tuna?
- Do bluefin display residential behaviours remaining in the eastern Mediterranean?
- Do tagged bluefin visit known spawning areas in the same year?
- What genetic signature does the tagged bluefin have and what oceanic areas does it use?
- What is the success rate of the deployment methods used?

Team Members:

- MEDFRI: Serkan Erkan, Dr. F. Banu Yalım, Dr. Savaş Kılıç, Çağdaş Can Cengiz, Ayşegül Tuğçe Han, and Meryem Cansu Yeşiltaş.
- Stanford University: Prof. Barbara Block, Dr Eyal Bigal, and Robert Joseph Schallert.
- T.R. GDFFA: Melih Er.

- Akua Group Fisheries: Cenk Yurttaş, SCUBA divers and technical staff of F/V Aqua Group 2.
- Çukurova University: Dr Sinan Mavruk.
- ICCAT, GBYP: Dr Francisco Alemany.

3. Methods and Procedures

The Akua Group Fisheries Company captured ABT during five purse seine operations conducted between June 2nd and 4th in Antalya Bay, Türkiye. Following each operation, the fish were transferred into tow pens. The tagging procedure was conducted inside one of the pens, before being towed for harvest, in the offshore waters of Alanya-Antalya (Figure 1) on June 8, 2024. After tagging, the fish were released back into the open sea at a depth of 1,000 meters. Table 1 lists the sites and conditions in which the fishing and tagging operations were performed.

Table 1. Location, date and time of fishing and tagging operations. Water temperature at sea surface and 5m-depth were extracted from the Mediterranean Sea Physics Analysis and Forecast model of the Copernicus Marine Environment Monitoring Service (CMEMS) following Clementi et al. (2021).

Operation	Latitude (°N)	Longitude (°E)	Date	Time	Temp. Surf. (°C)	Temp. 5m (°C)
Fishing	36.31	31.31	02/06/2024	23:35	23.13	22.08
Fishing	36.3	31.32	03/06/2024	04:04	22.92	22.17
Fishing	36.27	31.31	03/06/2024	05:35	22.7	22.27
Fishing	36.22	31.28	04/06/2024	04:56	23.34	22.39
Fishing	36.38	31.25	04/06/2024	22:12	24.26	22.35
Tagging	36.49	31.80	08/06/2024	09:01	24.08	23.04

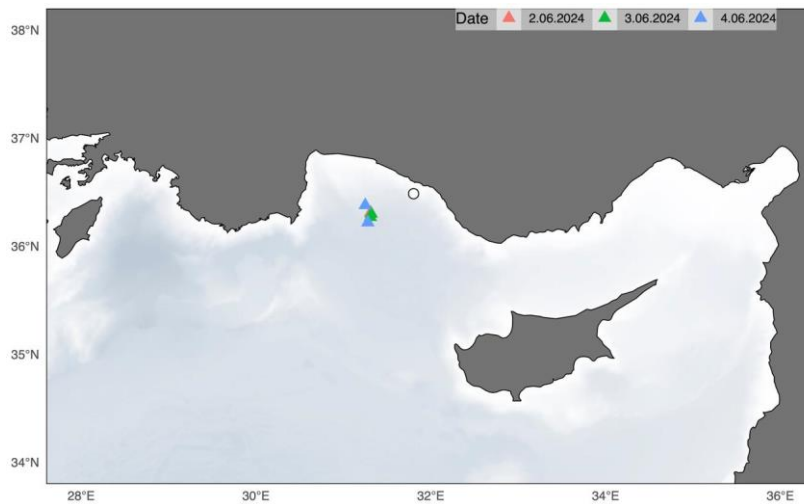


Figure 1. Location of bluefin tuna fishing (triangles) and tagging (circle) operations in the offshore waters of Alanya-Antalya, Türkiye.

Captured ABTs were fitted with conventional tags (FLOY Tag & Mfg. Inc, WA, USA), pop-up satellite tags (PSATs; MiniPAT-348, Wildlife Computers, Inc., WA, USA), and/or external acoustic tags (V16-6H and V16-4H, Innovasea, Canada). The PSATs were programmed to release 180-375 days following deployment (Appendix I). Premature release was set to activate if the tag was below 1,700 meters, at the surface, or at any constant depth for longer than three days. All acoustic tags had a transmission interval of 30-90 seconds and an estimated battery life span of 1,415 and 2,479 days (V16-6H and V16-4H, respectively).

Fish were held inside a tow pen and were individually captured by SCUBA divers, by hand, and once captured, eased onto a mat on a floating tagging platform. A saltwater hose was then inserted into the mouth of the fish to oxygenate the gills, and a wet cloth was placed over its eye to reduce stress. Tags were positioned next to the second dorsal fin and secured at two attachment points with a second tether called a loop. A fin clip and muscle tissue sample were obtained from each fish while its precaudal length and half girth were measured. Tagged fish were then released outside the pen within a 30-90 second handling time (Figure 2). The release of tagged fish was documented above and below the water from the surface-level perspective using a video camera (Figure 3).

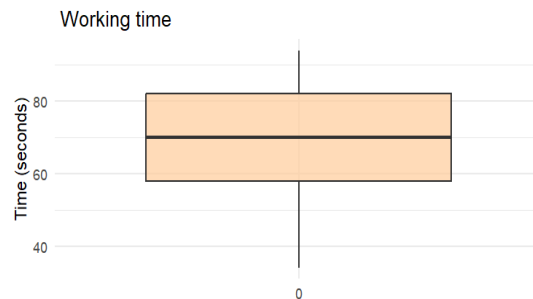


Figure 2. Handling time of ABT during the 2024 tagging operation (n = 32).



Figure 3. Photos captured during the planning, tagging and release procedures.

3. Results

A total of 32 fish were caught and released in the 2024 Campaign. Of these, 17 with a pop-up tag only, 13 were tagged with an acoustic tag only, and two were double tagged (Figure 4). One fish died during the operation and was assigned the GBYP Research Mortality Allowance (Rec. 11-06; Appendix II).

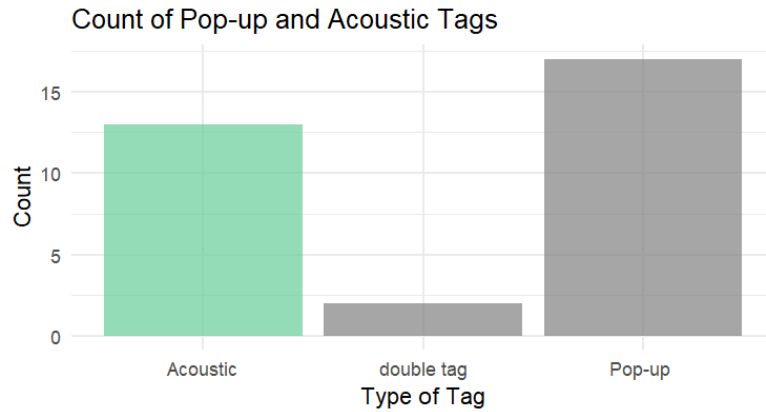


Figure 4. Total number of pop-up and acoustic tags deployed in the 2024 Eastern Mediterranean Campaign.

The CFL of ABT individuals ranged from 120 to 273 cm with a mean of 176.3 ± 41.2 cm (\pm SD) while the HG ranged from 41 to 86 cm with a mean of 58.5 ± 12.3 cm (\pm SD; Figure 5).

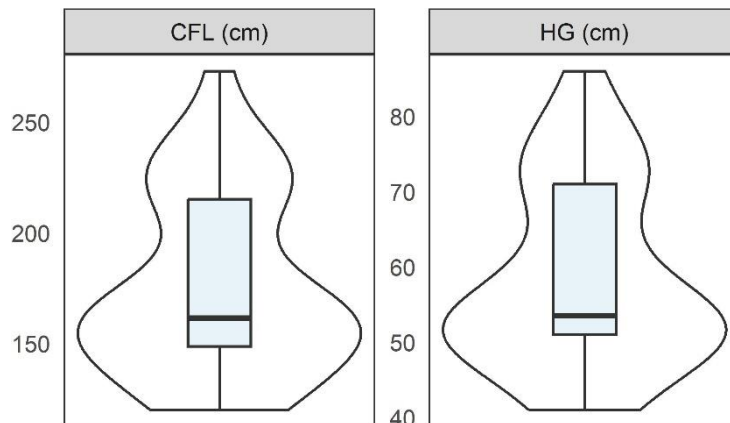


Figure 5. Curved fork length (CFL; left) and half girth (HG; right) distribution of tagged individuals. The median is indicated by the marker on the boxplot, while the kernel density estimates of the size frequency distribution are shown by the violin plot around the boxes. CFL: Curved Fork Length, HG: Half Girth.

6. Conclusion

The Bluefin Tuna tagging operation conducted on June 8, 2024, marked a significant step towards cooperative tagging operations were working together a successful tagging and release was conducted. The objective is to increase our understanding the migration and spatial patterns of Atlantic bluefin tuna (ABT) in the eastern Mediterranean. This collaborative effort, involving MEDFRI, Cukurova University, Stanford University, ICCAT, the Akua Group Fisheries, and GDFA, and successfully deployed tags and collected biological samples. Despite the challenges faced, including the incidental mortality of one fish, the data collected will contribute to ongoing research and conservation efforts.

7. Acknowledgements

This work was carried out under the provision of the ICCAT. The contents of this document do not necessarily reflect the point of view of ICCAT, which has no responsibility over them, and in no ways anticipate the Commission's future policy in this area. This work was conducted within the ICCAT GBYP Phase 13 and partially funded by the European Union through the EU Grant Agreement No. 101133291.

8. References

- ICCAT, 2016.. Tagging Programme 2016 - ICCAT/GBYP Phase 06 Call For Tenders 03/2016 - Objective A Electronic Tagging Of Adult Bluefin Tunas By Purse-Seiners In The Eastern Mediterranean 24 pp.
- Arrizabalaga, H., Arregui, L., Medina, A., Rodríguez-Ezpeleta, N., Fromentin, J.-M., & Fraile, L. (2019). Life History and Migrations of Mediterranean Bluefin Tuna. In *The Future of Bluefin Tunas. Ecology, Fisheries Management, and Conservation* (pp. 67–93). Maryland, USA: John Hopkins University Press.
- Clementi, E., Aydogdu, A., Goglio, A. C., Pistoia, J., Escudier, R., Drudi, M., Grandi, A., Mariani, A., Lyubartsev, V., Lecci, R., Cretí, S., Coppini, G., Masina, S., & Pinardi, N. (2021). Mediterranean Sea Physical Analysis and Forecast (CMEMS MED-Currents, EAS6 system) (Version 1) [Data set]. Copernicus Monitoring Environment Marine Service (CMEMS). https://doi.org/10.25423/CMCC/MEDSEA_ANALYSISFORECAST_PHY_006_013_EAS8
- Karakulak, B.S., Oray, I., Corriero, A., Deflorio, M., Santamaria, N., Desantis, S., Metrio, G. De. , 2004. Evidence of a spawning area for the bluefin tuna (*Thunnus thynnus* L.) in the eastern Mediterranean. *Journal of Applied Ichthyology*. 20:318–20
- Oray, I.K., Karakulak, F.S., 2005. Further evidence of spawning of bluefin tuna (*Thunnus thynnus* L., 1758) and the tuna species (*Auxis rochei* Ris., 1810, *Euthynnus alletteratus* Raf., 1810) in the eastern Mediterranean Sea: preliminary results of TUNALEV larval survey i. *Journal of Applied Ichthyology*. 21(3):236–40

Appendix I - Details of the tags deployed on 8 June 2024 in the eastern Mediterranean Sea.

Event_ ID	Curved fork length (cm)	Half girth (cm)	Handling time (mm:ss.dec)	Serial number	PTT	Days to release	Acoustic serial	Acoustic ID	Floy number
1	155	51.5	01:21.84	NA	NA	NA	1368481	64160	BYP064958
2	128	47	00:55.21	NA	NA	NA	1572257	50208	BYP064952
3	214	65	01:20.60	23P2678	244352	210	NA	NA	BYP089788
4	227	73	01:05.30	24P0058	265519	365	NA	NA	BYP089776
5	273	86	01:24.91	24P0111	265525	365	NA	NA	BYP089800
6	234	75	01:05.15	24P0113	265527	365	NA	NA	BYP089783
7	164	53	00:50.35	NA	NA	NA	1535200	55780	BYP064959
8	237	79	01:32.16	24P0065	265521	365	NA	NA	BYP089779
9	232	80	01:21.00	24P0110	265524	365	NA	NA	BYP089784
10	216	71	01:12.00	24P0064	265520	365	NA	NA	BYP089794
11	240	74	01:03.44	24P0114	265528	365	NA	NA	BYP089789
12	183	61	00:43.18	NA	NA	NA	1535201	55781	BYP064956
13	157	51	00:49.33	NA	NA	NA	1535197	55777	BYP064970
14	217	71.5	NA	24P0069	265522	365	1368473	64152	BYP089793
15	123	42	01:10.34	NA	NA	NA	1535222	55802	BYP064955
16	171	58	01:03.18	NA	NA	NA	1535193	55773	BYP064960
17	143	47	01:23.18	NA	NA	NA	1535199	55779	BYP064965
18	126	41	01:10.18	NA	NA	NA	1535196	55776	BYP064973
19	158	51	01:26.14	NA	NA	NA	1368468	64147	BYP064961
20	215	71	01:34.18	24P0115	265529	365	1368480	64159	BYP089780
21	180	61	01:10.18	23P2780	244357	375	NA	NA	BYP089777
22	170	56	01:01.18	23P2633	263024	300	NA	NA	BYP089792
23	158	54	01:02.14	24P0116	265530	365	NA	NA	BYP089781
24	130	50	01:28.94	NA	NA	NA	1368482	64161	BYP064975
25	138	48	01:14.35	NA	NA	NA	1572254	50205	BYP064954
26	150	51	00:34.13	23P0304	244341	365	NA	NA	BYP089782
27	120	41	01:29.18	NA	NA	NA	1535194	55774	BYP064974
28	158	52	00:52.14	23P0299	244337	360	NA	NA	BYP089790
29	162	52	00:55.18	23P2634	263025	180	NA	NA	BYP089797
30	155	52	00:52.18	24P0070	265523	365	NA	NA	BYP089786
31	161	54	01:26.14	23P2665	244350	275	NA	NA	BYP089785
32	145	52	01:14.00	24P0112	265526	365	NA	NA	BYP089798

