



**ICCAT/GBYP 12/2022 TAGGING PROGRAMME**

**2022**

**ATLANTIC-WIDE RESEARCH PROGRAMME ON BLUEFIN TUNA (ICCAT  
GBYP – PHASE 12)**

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

**Final Report**

**Republic of Türkiye**

**Ministry of Agriculture and Forestry**

**General Directorate of Agricultural Research and Policies**

**Mediterranean Fisheries Research, Production and Training Institute (MEDFRI),**

**Antalya, Türkiye**

**Çukurova University, Fisheries Faculty (CUF)**

**Adana, Türkiye**

**August 2022**



This project is co-funded  
by the European Union

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

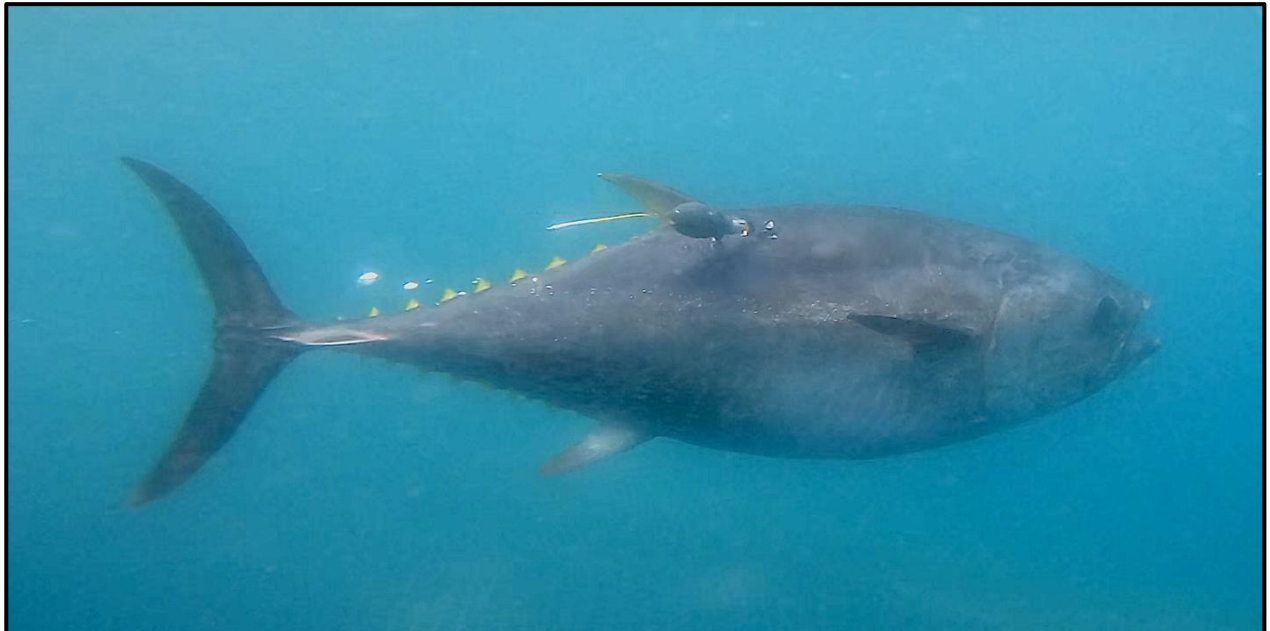
**Project Team:**

**Coordination** : F. Banu Yalım (MEDFRI), Sinan Mavruk (ÇUF), Serkan Erkan (MEDFRI), Francisco Alemany (ICCAT)

**Tagging** : Robert Joseph Schallert (Stanford University), Pablo Cermeño (Stanford University), Savaş Kılıç (MEDFRI)

**August 2022**

**Türkiye**



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## **1. Executive Summary**

The Northern Levant Sea is known as an important spawning area for Bluefin Tuna (BFT). Although there are previous efforts to understand the population structure and migration patterns of the BFT spawning in this area, a large knowledge gap still exists such as whether there is a connectivity to the other known spawning grounds and whether a resident population exists in the eastern Mediterranean. To contribute filling these gaps, conventional and satellite pop-up tags were deployed on BFT individuals as part of the research activities of the International Commission for the Conservation of Atlantic Tunas (ICCAT) Grand Bluefin Tuna Year Program (GBYP). For this study, BFT samples were collected using a commercial purse seine vessel and caged off Antalya-Kemer on the Eastern Mediterranean coasts of Turkey. The tagging operation took place on June 7, 2022, in accordance with ICCATs' protocols. ICCAT GBYP provided 20 satellite pop-up tags, 13 of which were successfully deployed on BFT individuals, size of which ranged between 120 and 140 in curved fork length. During tagging operations curved fork length and body width were measured and fin clips and tissue samples were taken for genetic analysis. Shortly after the operations, one of tags was detached within Antalya Bay where the tagging operations were carried out. Therefore, a total of 12 pop-up tags are still functioning at the sea and are expected to provide important information on BFT migration- and residency patterns.

## **2. Introduction**

Bluefin tuna (BFT) is a highly migratory pelagic species, distributed throughout the North Atlantic and adjacent seas including the Mediterranean Sea (Mather et al. 1995, Fromentin, 2005). Its stocks were managed using two-year quotas set by the International Commission for the Conservation of Atlantic Tunas (ICCAT) (ICCAT, 2006-2016). Türkiye has also been a member of ICCAT since 2003 and currently maintains the BFT fishery under ICCAT management guidelines (Karakulak and Yıldız, 2016). The Turkish BFT fishery is operated by licensed purse seiner vessels between May 15 and July 1 off the south coasts of Türkiye (Official Gazette, 2020). Caught fish are then transferred to capture-based aquaculture facilities for fattening (Karakulak and Yıldız, 2016).

The correct delimitation of management units, i.e. fish stocks or contingents, is crucial to advance successful management policies (Arrizabalaga et al., 2019). Currently, BFT stock management is being implemented in two units, spawning grounds of which are the Gulf of Mexico and the Mediterranean Sea (Arrizabalaga et al., 2019; ICCAT, 2016). However, the eastern stock primarily spawns in three locations in the Mediterranean; the Balearic Islands, Sicily and the North Levant Sea, its management is carried out as a single unit assuming the existence of a panmictic population. However, the relevance of this assumption is still unknown, and there are alternative hypotheses that anticipate the existence of distinct genetic subpopulations or migratory contingents (Arrizabalaga et al., 2019; J. M. Fromentin & Powers, 2005).

Several tagging experiments have been conducted over the past two decades to understand the migrations, population structure, and mixing of the eastern BFT management unit. Aranda et al. (2013) deployed tags on a western Mediterranean spawning aggregation and all individuals migrated to the Atlantic, after spawning. Abascal et al. (2016) deployed satellite pop-up tags on 13 adult BFT individuals in the Strait of Gibraltar during spawning migration to the Mediterranean Sea. All of these individuals spawned in the western Mediterranean and return to the Atlantic (Abascal et al., 2016). In contrast, the existence of yearlong resident individuals has been demonstrated in the western and central Mediterranean (Cermeño et al., 2015; J.-M. Fromentin & Lopuszanski, 2014). Before the quota application, the Turkish fleet traditionally fishing on bluefin tuna in the Aegean Sea and the Sea of Marmara during the winter and spring months (Oray & Karakulak, 2004). The surveys based on the fishers' ecological knowledge also confirm the existence of yearlong resident individuals along the Mediterranean and Aegean coasts of Turkiye (Unpublished Data).

Tagging experiments were also performed in the eastern Mediterranean to better understand the migratory and residency behavior of individuals spawning in this area. In context of a joint Turkish-Italian tagging campaign satellite pop-up tags were deployed to a total of 34 BFT individuals off the north coast of Cyprus and the Gulf of Antalya in the eastern Mediterranean. Almost all of these tags were prematurely detached from the fish around the deployment sites and only three fish were found to have entered the Aegean Sea (De Metrio et al., 2004). The second campaign was performed in Antalya Bay in 2015. In this study, 30 pop-up tags were deployed underwater with spearguns. Again, most of these tags prematurely detached from the fish within a

short time of use. On the other hand, some important results could also be acquired from these deployments. Two individuals moved to the Ionian Sea and the Libyan coast within a month, and two other individuals were spotted in the North Atlantic after 53 and 82 days (Di Natale, Tensek, & García, 2016).

In order to collect data on the movement patterns of BFT individuals spawning in the Eastern Mediterranean, the GBYP Steering Committee decided to conduct a new electronic tagging campaign in the eastern Mediterranean in 2020, but unfortunately this campaign had to be canceled due to the COVID-19 pandemic and financial constraints in 2020 and 2021. In June 2022, the Mediterranean Fisheries Research, Production & Training Institute (MEDFRI) and Çukurova University, Fisheries Faculty (ÇUF) planned electronic tagging experiments in the Mediterranean coasts of Türkiye with financial and technical support from ICCAT.

### **3. Objectives**

The tagging experiments were conducted to improve scientific knowledge on the movement patterns of BFT individuals spawning in the eastern Mediterranean. By collecting data on the horizontal and vertical distribution of tagged BFT individuals, the following questions are investigated;

1. Are there resident individuals among the spawners?
2. Spawners visit different spawning areas in the same year or in consecutive years? If so, what is the mixing rate between spawning grounds?
3. What is the success of deployments of the method used?

In addition, biological data was also collected from the fish taken on board for tagging purposes. In this context, information about the genetic structure and trophic relationships will be obtained. In addition, the length and width of the samples were measured, and this data can contribute to derive estimates of growth and condition if the deployed tags can be recovered.

## **4. Material and Methods**

### **4.1. Planning and Organization**

The tagging campaign was carried out with the financial support of ICCAT GBYP as part of research Phase 12. ICCAT GBYP provided a total of 20 satellite pop-up tags and technical support for the deployment. The fishing and tagging operations were organized by MEDFRI and CUF. Turkish fishing company Akua Group Su Ürünleri A.Ş. donated all logistics costs including purse seine operations, transportation and caging of captured BFT individuals, transportation scientist team to the fish cages with an auxiliary vessel and scuba diving and deck operations.

The necessary permits to conduct the study were obtained from the General Directorate of Fisheries and Aquaculture of the Ministry of Agriculture and Forestry of the Republic of Türkiye. The local fishery control authorities were also informed about the study. A total of five fish died during the tagging operations. These fish were reported under ICCAT GBYP Research Mortality Allowance rules.

### **4.2. Fishing and Tagging Operations**

On June 1, 2022, after the Akua Group fishing fleet completed their own BFT catch quota for the 2022 fishing season, a large school of BFT with an estimated size of 665 individuals was caught by Bedevi Reis purse seine boat in Antalya Bay at approximately the following coordinates; 36.34° N, 31.01° E. The fish were kept in Garipçeli 1 towing cages in the offshore waters of Antalya-Kemer (36.65° N, 30.60° E) until tagging (Figure 1).

On June 7, 2022, the tagging operations were carried out on board an auxiliary vessel named Koroğlu. Two types of tags were deployed on each BFT. One was Wildlife Computers' MiniPAT satellite pop-up tag and the second was a conventional spaghetti tag (Figure 2). All tagging operations were conducted according to the procedures outlined in the ICCAT Tagging Manual (Cort et. al., 2010). The fish were caught individually by a diving team and brought on board in a wet stretcher (Figure 3). During operation, a wet dark cloth was used to cover the fish's head and eyes. Sea water was constantly fed into the fish's mouth with a hose. The pop-up tags were deployed with an intramuscular tag applicator by attaching them with two titanium intramuscular attachments. Then conventional spaghetti tags were deployed with a smaller intramuscular tag

applicator. A total of 16 fish were brought on board during the operation, but one of the fish died before the tag was deployed. A total of 15 fish were tagged and released back into the cage. According to ICCAT sampling protocol, curved fork length and body width were measured and fin clip samples were collected for genetic analysis. The procedures on board took about 3 to 5 minutes.

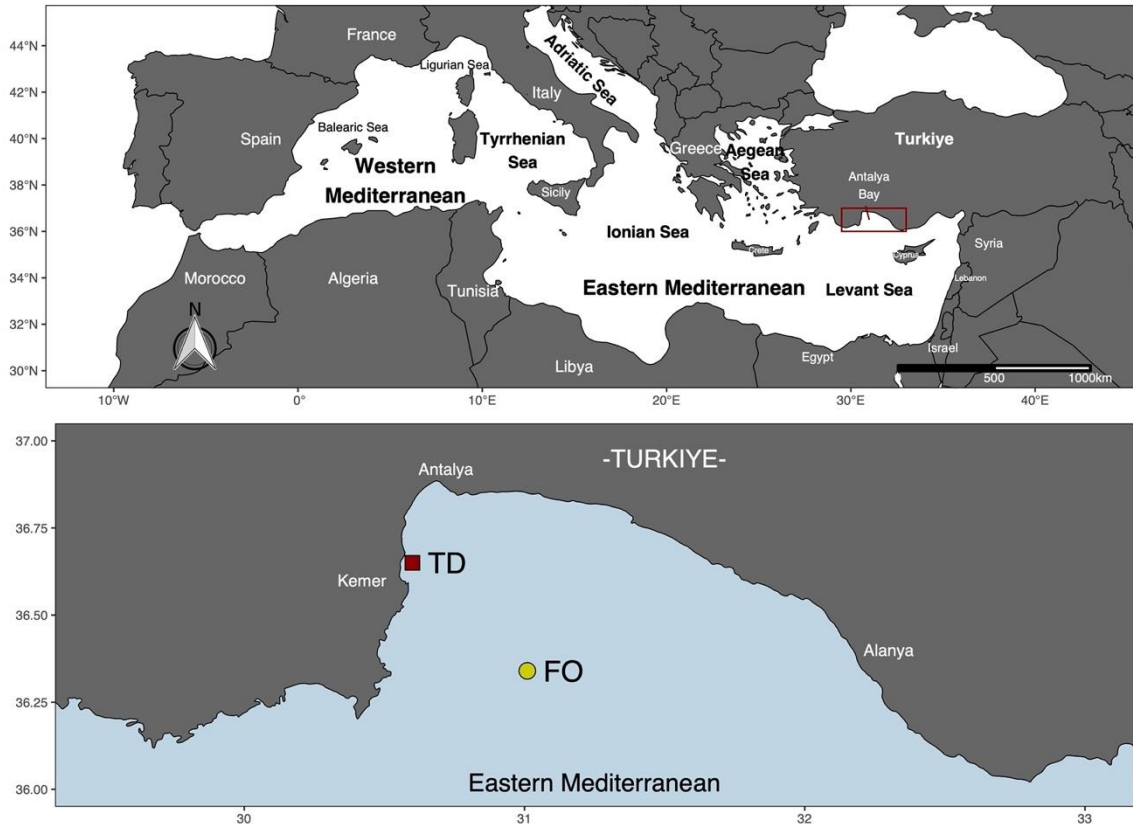


Figure 1. Locations of fishing (FO; 36.34°N, 31.01°E) and tagging operations (TD; 36.65°N, 30.60°E).

After tagging, the behavior of the fish was observed by divers in the cage. Two more of the tagged fish were found to have died underwater. These fish were brought on deck and their tags removed. Thus, a total of five BFT individuals died in the tagging operations and were assigned the GBYP Research Mortality Allowance (Rec. 11-06) (Appendix I). All fish were then released into the sea at the end of the operation and the ICCAT Release Report was prepared (Appendix II).



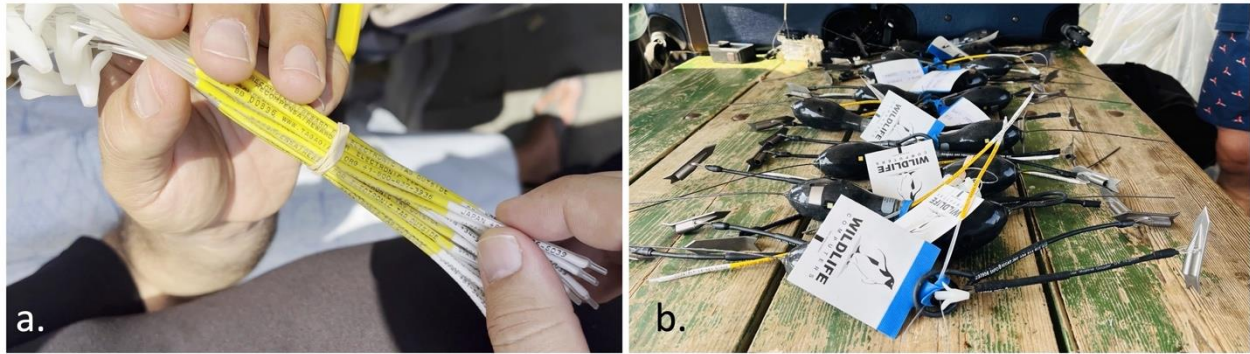


Figure 2. Deployed conventional spaghetti tags (a) and Wildlife Computers MiniPat pop-up tags (b)

## 5. Results

On the first tagging attempt, divers narrowed the cage net and trapped a group of 7 large fish in the shallower part of the net. Divers caught the fish by hand and carried it upside-down to the wet stretcher. Then the first fish was brought on board, but died during the tagging procedure, probably due to excessive time in the hands of the divers in the inverted position before hauling onboard. Then it was decided to release this group fish and trap a new group of smaller ones which are much easier and quicker to handle by the divers.

On the second try another group of about 20 smaller fish was caught. A total of 18 of them were taken on board. Only a conventional spaghetti tag was deployed to the first fish. Two fish from this group died during operations on board due to excessively long hauling times. After all, onboard tagging procedures were successfully completed for a total of 15 individuals. These fish were released back into the cage and observed by divers. Two more of them also died in the cage and were brought onboard to recover their tags.



Figure 3. Photos taken during hauling and tagging works.

After the operations were completed, a total of 13 individuals were released back into the sea. The size of the tagged fish, the codes of electronic and conventional tags and their functional duration are given in Table 1. The size distributions of the tagged individuals are given in Figure 4.

On 10-Jun-2022 13:00:00 (UTC), a tag (serial number: 21P1998) prematurely detached in Antalya Bay three days and 5 hours after deployment (Figure 5). The tag was found by a fisher and delivered to MEDFRI on June 17<sup>th</sup>.. At the time of writing this report (July 30), 12 of the 13 markers deployed on BFT individuals were still functional (Table 1).

**Table 1.** Details of the 13 deployed tags on June 7, 2022 in Antalya Bay, Eastern Mediterranean Sea (36.65° N, 30.60° E).

Fish Number	Conventional Tag	PTT	Serial	Duration <sup>a</sup>	CFL <sup>b</sup>	HG <sup>c</sup>
1	BB00875	233955	21P2004	365	120	38
2	BB00872	233964	21P2019	365	149	50
3	BB00859	233947	21P1994	180	138	43
4 <sup>d</sup>	BB00853	233951	21P1998	360	135	47
5	BB00857	233963	21P2017	365	148	49
6	BB00851	233965	21P2020	365	128	42
7	BB00891	233948	21P1995	300	134	46
8	BB00858	233959	21P2009	365	133	46
9	BB00886	233949	21P1996	300	129	42
10	BB00861	233952	21P1999	300	131	47
11	BB00868	233953	21P2000	330	131	44
12	BB00860	233961	21P2013	365	134	43
13	BB00862	233954	21P2001	330	123	40

<sup>a</sup>: deployment duration in days, <sup>b</sup>: Curved Fork Length in cm, <sup>c</sup>: Half girth in cm, <sup>d</sup>: The pop-up tag prematurely detached from the fish 10-Jun-2022 13:00:00 (UTC), three days after deployment. The tag was recovered by local fishers.

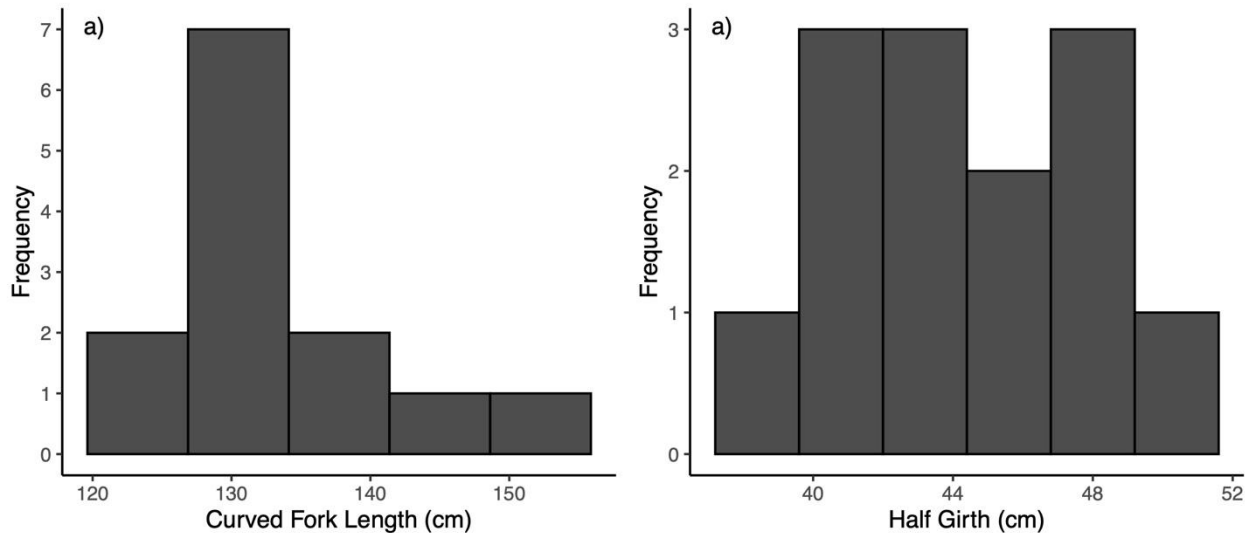


Figure 4. Length (a) and girth (b) distributions of the tagged BFT specimens.

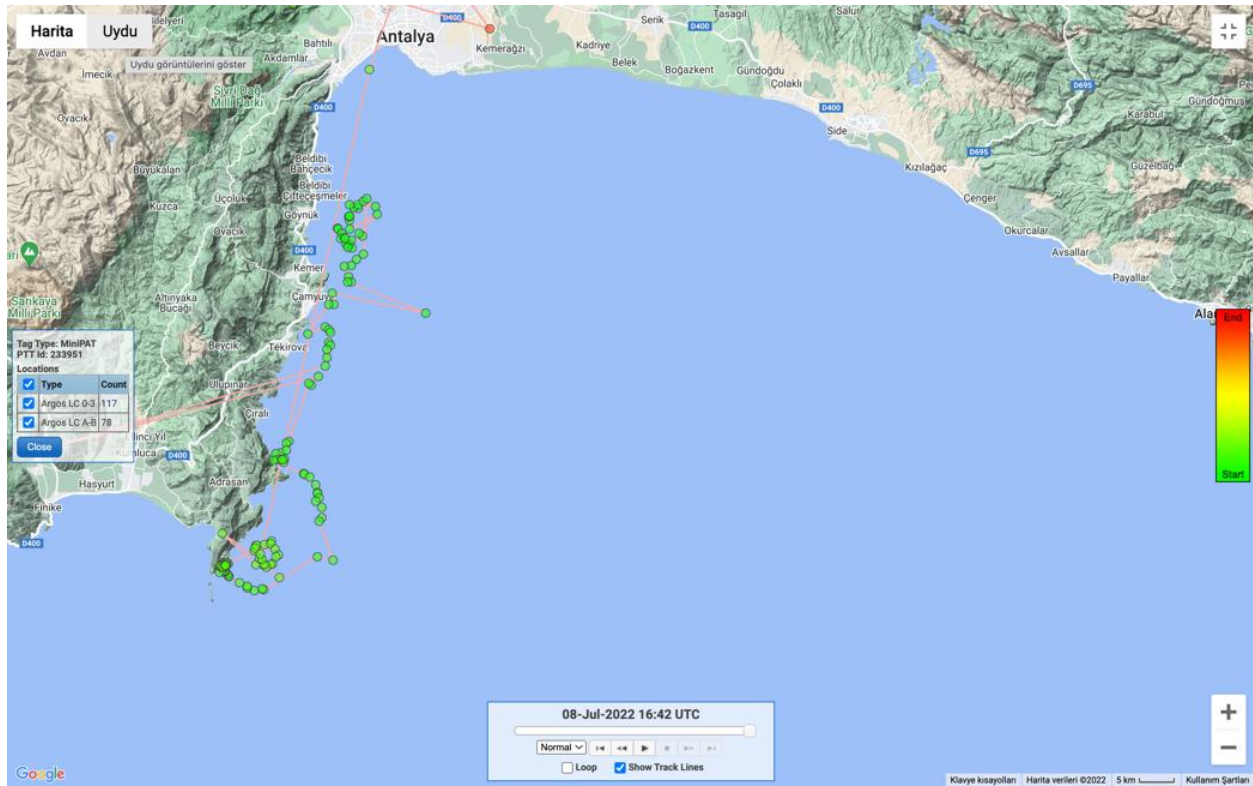


Figure 5. Trace of prematurely detached tag 21P1998 until recovery.

## 6. Conclusions

So far, the total number of tags deployed in the eastern Mediterranean is notably lower compared to other spawning areas of the eastern stock (De Metrio et al., 2004; Di Natale et al., 2016, present study) and the migratory-residency patterns of BFT spawning in the eastern Mediterranean are still poorly understood. Therefore, future tagging efforts are required to fill such data gaps and develop a more reliable management strategy for this internationally shared stock.

The majority of tags were detached prematurely and the tracked times at liberty were quite short in the previous tagging campaigns conducted in the Eastern Mediterranean. Although 34 tags were deployed in 2004, useful data could only be acquired from 3 and most tags detached within a month (De Metrio et al., 2004). Similar problems were also encountered in the tagging experiments conducted in 2015 (Di Natale et al., 2016). In this study, 12 out of 13 pop-up tags in the sea are still functional. Therefore, the success of this tagging campaign has surpassed previous ones in the eastern Mediterranean, but more time at liberty is needed to reach conclusive results.

Tag recovery rates are extremely low in the Mediterranean countries. GBYP has initiated a reward program to improve this situation by rewarding 50 € for recovering a conventional tag and 1000 € for an electronic tag (Di Natale et al., 2016). Apparently, this strategy was useful for the detached tag which are found by local fishers and brought to MEDFRI for transfer to ICCAT.

## **7. 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>). 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. Financial support was also provided by Republic of Türkiye, Ministry of Agriculture and Forestry, General Directorate of Agricultural Research and Policies, in context of the project "Investigation of Reproductive and Migration Behaviors of Atlantic Tunas (*Thunnus thynnus*) that Breeding in the Eastern Mediterranean" (TAGEM/HAYSUD/B/19/A6/P1/01). We are grateful to Akua Group Su Ürünleri A.Ş., who donated the fish and all logistical support for the tagging operation, including fishing and auxiliary boats, fishing crew and divers for the tagging operations. We are also thankful to Dr. M. Altuğ ATALAY (General Director of Fisheries and Aquaculture Ministry of Agriculture and Forestry), Turgay TÜRKYILMAZ (General Deputy Director of Fisheries and Aquaculture), Melih ER (Head of Hunting and Control Department) and Dr. Hasan Alper ELEKON who gave us crucial support in organizing legal steps.

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# Appendix I - Research Mortality Allowance (RMA)

INTERNATIONAL COMMISSION FOR THE  
CONSERVATION OF ATLANTIC TUNAS



COMMISSION INTERNATIONALE POUR LA  
CONSERVATION DES THONIDES DE L'ATLANTIQUE

COMISION INTERNACIONAL PARA LA  
CONSERVACION DEL ATUN ATLANTICO

Annex 1

## ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA (ICCAT-GBYP)

### REPORT FOR GBYP RESEARCH MORTALITY ALLOWANCE (Rec. 11-06)

#### GBYP LOGBOOK - RMA

1. Date: 07/06/2022	2. Document number: (allocated by ICCAT-GBYP) TUR-REL-REC/2022/AKVA/001	
3. Entity in charge of the research activity: ICCAT GBYP, TAGEM, AKSAM	4. Research activity: GBYP Bypass Survey	
Address: Akdeniz Mah. Vali Kazim DINK Cad. NO:32 K:4 O:42 KONAK IZMIR	Telephone No. (including that of the scientist responsible for the activity): cankyurttas@akva-grup.com	
Country: TURKEY	E-mail: +305337428706	
Vessel or trap name: Garpagali 1	Flag: Turkish	Vessel or trap ID number: A1000TUR00140 - 34A2250

5. Catch area (geographical description): Eastern Mediterranean	6. Location (latitude-longitude): 36.35 N lat. 30.36 E long
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7. DESCRIPTION OF THE MORTALITY INDUCED				
Gear	Number of fish	Length (cm)	Round weight (kg)	Final destination*
Purseine	1	210cm	153kg	fish for scientific purposes
Purseine	2	181cm	128kg	fish for scientific purposes
Purseine	3	123cm	32kg	fish for scientific purposes
Purseine	4	164cm	80kg	for crew's personal consumption
Purseine	5	127cm	35kg	for crew's personal consumption
TOTAL				

Name and position of the scientist on board: Assoc Prof. Dr. Sinan Mavrid	Signature: 
--	----------------

Name of Captain of the vessel/trap: Yakup Astor	Signature: 
--	----------------

The form MUST be delivered to ICCAT by e-mail (gbyp@iccat.int) or fax (+34 91 415 2612) within a maximum of 24 hours of the research mortality event

\* Dead bluefin tuna derived from a GBYP research activity cannot be sold on the market or traded under any circumstances. The mortality report shall distinguish between dead fish discarded at sea, fish for crew's personal consumption and fish for scientific purposes.

Corazón de María, 8 - 28002 MADRID - Spain, Espagne, España - Tel: +34 91 416 5600 - Fax: +34 91 415 2612 - www.iccat.int - info@iccat.int

R. Cant Yurtlar  
AKVA GRUPLU SU ÜRÜNLERİ  
ANONİM ŞİRKETİ  
AKDENİZ MAHALLESİ VALİ KAZIM  
DINK CAD. NO:32 K:4 O:42  
KONAK IZMIR  
TEL (232) 446 33 66 07 FAX: (232) 446 84 99  
ZİNCİRLİKUYU V.D. 043 036 7876

MUSTAFA YASATIR  
20-TR-129

Dr. F. BAY YALIM  
AKSAM



## Appendix II - Release Report

ICCAT Release Report	Document No: TUR-REL-REF 12022 / AKUA 1001
<b>1 - CATCHING/CAGING DETAILS</b>	
Farm/catching vessel/trap/towing vessel carrying out the release: <i>Bedevi Reis 34 A 2643</i>	
ICCAT Register number: <i>A1000TUR0011</i>	
Release order reference: <i>TUR-REL-REF 12022 / AKUA 1001</i>	
Catching vessel(s)/trap (1): <i>Bedevi Reis</i>	
JFO number: <i>2022-010</i>	
Caging authorisation(s) number (1): <i>N/A</i>	
Release cage(s) number: <i>TUR-AKU-2022-005</i>	
eBCD(s) reference(s) <i>-</i>	
Release authorization number: <i>TUR-REL-AUT 12022 / AKUA 1001</i>	
<b>2 - DETAILS OF THE RELEASE OPERATION</b>	
Type of release (3): <i>Release from towing cage (G8YP Tagg'ng Survey)</i>	
Date of the operation: <i>07/06/2022</i>	
Towing vessel name: <i>Ganipgeh 1</i>	
ICCAT Register number: <i>A1000TUR00140</i>	
Flag: <i>TURKISH</i>	
Segregation of fish prior to the release operation: <i>N/A</i>	
Verification cage number: <i>TUR-AKU-2022-005</i>	
Release cage number: <i>TUR-AKU-2022-005</i>	
Number of BFT individuals released: <i>660</i>	
Weight of BFT released (kg): <i>44.571 kg</i>	
Operator name, date and signature (2): <i>Yakup Aslan</i>	Observer Name, ICCAT No, date and signature: <i>Mustafa YASATIR</i> <i>20-TR-129</i>

- (1) Only for releases from farms
- (2) Signature of the farm operator for releases from farms, or of the fishing vessel master for releases ordered to catching vessels or towing vessels
- (3) Release after completion of caging reports (Annex 9, paragraph 4); BFT remaining after harvesting that is not covered by an eBCD; excess of BFT found following a control transfer or carry-over assessment.

*R. Cenk Yurtkıs*  
**AKUA GROUP SU ÜRÜNLERİ**  
**ANONİM ŞİRKETİ**  
 AKDENİZ İHTİŞAT VE TİCARET ODASI CAD.  
 NO: 22/1-2/2002 BEKONAK 2. KAT  
 TEL: (32) 446 44 66 07 FAX: (232) 446 88 09  
 ZİNCİRLİKUYU V.D. 01 036 7876

*Dr. F. Banu YALIM*  
**AKSAM**  
*Ban*