# ICCAT ATLANTIC OCEAN TROPICAL TUNA TAGGING PROGRAMME (AOTTP)

## EVIDENCE BASED APPROACH FOR SUSTAINABLE MANAGEMENT OF TUNA RESOURCES IN THE ATLANTIC

*AOTTP Coordination Team*

*July 2019*

# CONTENTS

## LIST OF ACRONYMS USED IN THE REPORT

| | |
|---|---|
| AOTTP | Atlantic Ocean Tropical tuna Tagging Programme |
| AZTI | Centro Tecnologico Experto en Innovacion Marina y Alimentaria (Spain) |
| BET | Bigeye tuna (*Thunnus obesus*) |
| BOT | British Overseas Territory |
| CEFAS | Centre for Environment Fisheries and Aquaculture Science (UK) |
| CIPA | Centro de Investigacao Pesqueira Aplicada (Guinea-Bissau) |
| CISEF | Cap-Vert, Côte d'Ivoire, Senegal, Espagne (France) |
| CLPA | Commité Local de la Pêche Artisanale (Senegal) |
| CRO-CI | Centre Recherches Oceanologiques (Côte d'Ivoire) |
| CRODT | Centre Recherches Oceanologiques de Dakar-Thiaroye (Senegal) |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation (Australia) |
| DAFF | Department of Agriculture Forestry and Fisheries (South Africa) |
| DEPAq | Departamento de Pesca e Aquicultura (Brazil) |
| DG-DEVCO | Directorate General for International Cooperation and Development |
| DG-MARE | Directorate General for Maritime Affairs and Fisheries |
| DP-STP | Direcao das Pescas de São Tomé and Príncipe |
| EEZ | Exclusive Economic Zone |
| FADURPE | Fundação Apolônio Salles de Desenvolvimento Educacional (Brazil) |
| FM | Fausses marques |
| FSSD | Fisheries Scientific Survey Division (Ghana) |
| IATTC | Inter American Tropical Tuna Commission (USA) |
| ICCAT | International Commission for the Conservation of Atlantic Tunas |
| ICES | International Council for the Exploration of the Sea |
| IEO | Instituto Espanol de Oceanografia (Spain) |
| IFAN | Institute fondamental Afrique noire Cheikh Anto Diop (Senegal) |
| IMAR | Instituto do Mar (Portugal) |
| IMROP | Institute Mauritanien de Recherches Oceanographiques et des Peches |
| INDP | Instituto Nacional para Desenvolvimento das Pescas (Cabo Verde) |
| IOTC | Indian Ocean Tuna Commission |
| IRD | Institute de recherche pure le developpment (France) |
| ISRA | Institute Sénégalais de Recherches Agricoles (Senegal) |
| LATEP | Laboratorio de Tecnologia Pesqueira (Brazil) |
| LPRC | Large Pelagic Research Center (USA) |
| LTA | Little tunny (*Euthynnus alletteratus*) |
| MFRD | Marine Fisheries Research Division (Ghana) |

| | |
|---|---|
| MFV | Motor Fishing Vessel |
| MSE | Management Strategy Evaluation |
| NOAA | National Oceanic and Atmospheric Administration (USA) |
| NRIFSF | National Research Institute of Far Seas Fisheries (Japan) |
| PAD | Port Autonome de Dakar (Senegal) |
| PFRP | Pelagic Fisheries Research Program (USA) |
| PROBITEC | Proyectos Biologicos y Tecnicos (Spain) |
| RV | Research Vessel |
| SC | Steering Committee |
| SCRS | Standing Committee on Research and Statistics |
| SKJ | Skipjack tuna (*Katsuwonus pelamis*) |
| SPC | Pacific Community (New Caledonia) |
| tRFMO | Tuna Regional Fisheries Management Organizations |
| TRO | Tag Recovery Officer |
| UCT | University of Cape Town |
| UFERSA | Universidade Federal Rural de Semiarido (Brazil) |
| UFPRE | Universidade Federal de Pernambuco (Brazil) |
| UPV | Universidad Politecnica de Valencia (Spain) |
| VIMS | Virginia Institute of Marine Science (USA) |
| WAH | Wahoo (*Acanthocybium solandri*) |
| YFT | Yellowfin tuna (*Thunnus albacares*) |

## DESCRIPTION

### NAME OF COORDINATOR OF ICCAT CONTRACT

Douglas Beare (doug.beare@iccat.int).

### NAME AND TITLE OF CONTACT PERSON

Camille Jean Pierre Manel (camille.manel@iccat.int) Executive Secretary of ICCAT.

### NAME OF BENEFICIARY(IES) AND AFFILIATED ENTITY(IES) IN THE ACTIVITY

International Commission for the Conservation of Atlantic Tunas.

### TITLE OF THE ACTION

Evidence based approach for sustainable management of tuna resources in the Atlantic - Atlantic Ocean Tropical tuna Tagging Programme (AOTTP).

## CONTRACT NUMBER

DCI-FOOD/2015/361-161

## START DATE AND END DATE OF THE REPORTING PERIOD:

29 June 2018 to 28 June 2019.

## TARGET COUNTRY(IES) OR REGION(S):

Atlantic Ocean coastal states.

## FINAL BENEFICIARIES AND/OR TARGET GROUPS (IF DIFFERENT) (INCLUDING NUMBERS OF WOMEN AND MEN)

The final beneficiaries of the project are fishing communities and operators depending on the exploitation of tuna resources plus consumers of tuna fish.

## COUNTRY(IES) IN WHICH THE ACTIVITIES TAKE PLACE (IF DIFFERENT FROM 1.7):

They are not different.

# ASSESSMENT OF IMPLEMENTATION OF ACTION ACTIVITIES

## EXECUTIVE SUMMARY OF THE ACTION

ICCAT-AOTTP made substantial progress towards its targets during the fourth reporting period (June 2018 to June 2019). ICCAT-AOTTP evaluated and awarded seven contracts during this period (and 43 since the project began) with a total value of 10,911,434 €. Overall at least 1631 days at sea (time between first fish tagged and last on each trip) have been spent on 368 tagging cruises throughout the Atlantic. Tagging targets (120,000) should be met, within budget, by the end of the last quarter 2019. Currently *ca* 113,000 fish (94% of the target) have been tagged (R-1) with conventional tags in the EEZs of 28 different countries in addition to many tagged in the High Seas. 508 electronic tags (pop-ups and internals) have been deployed and are already providing new scientific information on tuna migrations. Scientists and technicians, including women, from developing countries have tagged over two-thirds of all the fish. Formal tag-recovery and awareness raising infrastructures are now in place in 13 countries, with less formal arrangements in another 5 locations, including Japan and the People's Republic of China. Around 14,500 tags have been recovered (overall recovery rate is 13%) for which rewards (t-shirts, caps, lottery entry, cash, and mobile phone top-ups) have been paid. Tag-seeding experiments are ongoing with our extensive network of observers throughout the Atlantic, and reporting rates for the most important purse-seine fleets are: 75.4%, 78.4%, and 66.4% for BET, SKJ, and YFT respectively. So far 19,907 have been double-tagged, allowing tag-shedding rates to be estimated, and 8628 chemically tagged which is improving our ability to age recaptured fish. ICCAT-AOTTP partners from Brazil and Senegal have created a pan-Atlantic Otolith Reference Set to standardize age-determination of tropical tunas and routine ageing has begun. Otolith ring deposition rate validation and training work is ongoing with contractors from Australia, Brazil, Côte d'Ivoire and Senegal. All AOTTP data continue to be uploaded rapidly into relational databases using smartphone applications and messaging applications, which are also used very effectively to maintain communication between AOTTP and the many field operatives around the Atlantic Ocean. Training in all aspects of tagging at sea, tag-recovery, and data transmission methodologies continued this year building

on the foundations already made. ICCAT-AOTTP organized 2 otolith-reading, capacity-building workshops during the current reporting period which were very successful. Two contracts for data analysis have been awarded: one to investigate mortality and movement/migration; and the other growth. The YFT tuna stock will be assessed this year by SCRS and age and mark-recapture data collected by AOTTP will have an important role.

## RESULTS AND ACTIVITIES

The AOTTP Programme is divided into the following five Phases: 1. Inception (6 months); 2. Tagging-Recovery 1 (18 months); 3. Tagging Recovery 2 (12 months); 4. Recovery and Analyses; and 5. Analyses and Symposium. AOTTP progress to date against Indicators described in the original Grant Contract is summarized below.

### EXPECTED RESULT 1 (ER1). TAG-RECAPTURE AND ASSOCIATED DATA FROM THE THREE MAIN TROPICAL TUNA AND ON NERITIC TUNA SPECIES IN THE ATLANTIC ARE STORED IN A DATABASE AT THE ICCAT SECRETARIAT

ER1 has the following objectively verifiable indicators:

- Number of tagged tunas: A minimum of 120,000 tunas are tagged (AOTTP & SCRS reports, ICCAT-AOTTP Databases)

- Reporting rates: A minimum reporting rate by gear within the range of those obtained in similar tuna tagging programmes in other oceans (e.g. purse seine fleets above 80%)

Tagging activity began at the end of June 2016 around the Azores (EU Portugal). Since then, together with its partners, ICCAT-AOTTP has tagged tuna: around the Canary Islands, around Madeira, off Senegal/Cabo Verde/Mauritania, in the Gulf of Guinea, in the territorial waters of the USA, off S. Africa, and off Brazil and Uruguay. Tagging has recently finished in the EEZ of Côte d'Ivoire, and is ongoing off northern Brazil, around the island of Saint Helena (BOT), and in the seas of the Caribbean/USA using sport fishers (**see Figure 1**).

A total of exactly 112,757 tropical tuna across species have now been tagged and released since the programme began (e.g. **Figure 1** and **Table 1**), and 14,285 of these tagged fish have been recovered. ICCAT-AOTTP has now achieved 94% of its overall tagging target. The distribution between the 3 main tropical species remains rather unbalanced: BET at *ca* 19%; SKJ at *ca* 41%; and YFT at *ca* 33%.

All the tagging release and recovery data are stored in a relational database at the ICCAT Secretariat, and up-dated weekly.

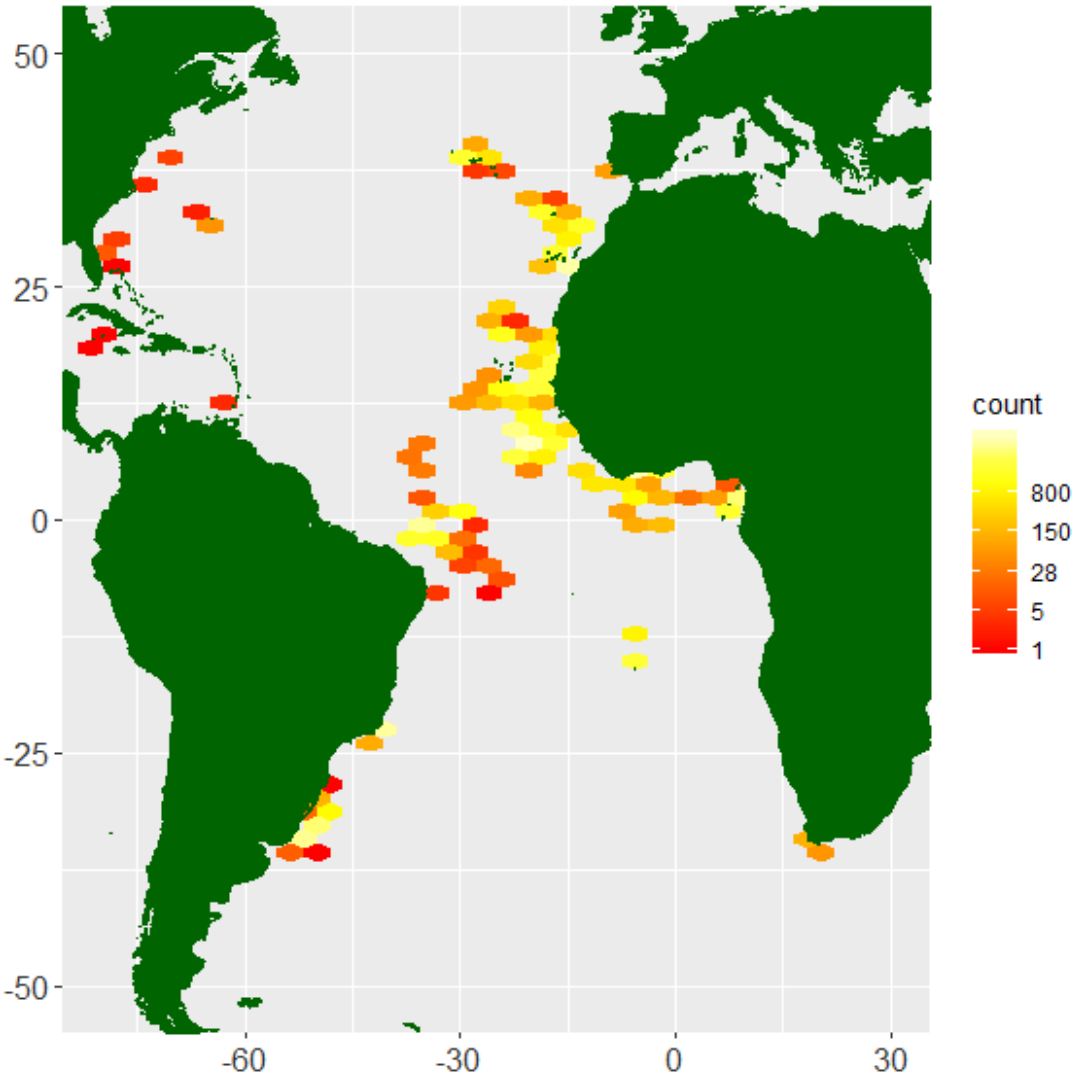


Figure 1. Spatial distribution of tropical tuna tagged and released (R-1 conventional tags only) by ICCAT-AOTTP between July 2016 and June 2019

**Table 1. ICCAT-AOTTP (R-1) tag releases by species**

| | Nos Released | Nos Recovered | Perc Rec |
|---|---|---|---|
| **BET** | 21920 | 4196 | 19.1% |
| **LTA** | 7679 | 552 | 7.2% |
| **SKJ** | 46085 | 2957 | 6.4% |
| **WAH** | 260 | 3 | 1.2% |
| **YFT** | 36813 | 6577 | 17.9% |
| **Total** | 112757 | 14285 | 12.7% |

**Table 2. Double-Tagged releases (R-1) by species**

| | BET | LTA | SKJ | WAH | YFT | Total |
|---|---|---|---|---|---|---|
| **Double_Totals** | 4272 | 1479 | 8638 | 22 | 5496 | 19907 |
| **Single_Totals** | 17648 | 6200 | 37447 | 238 | 31317 | 92850 |
| **Double_Tag_Perc** | 24% | 24% | 23% | 9% | 18% | 21% |

Twenty percent (24,000) of the 120,000 tuna targeted should also be double-tagged so that 'tag-shedding' rates can be estimated. So far 19,907 have been double-tagged, translating to 83% of the target (**Table 2**).

Two neritic species (LTA and WAH) are being targeted for tag and release by ICCAT-AOTTP after a recommendation from the SCRS Small Tunas Working Group. To date, 7,679 LTA and 260 WAH have been tagged against an overall combined target of 10,000. The target for LTA tagged was increased when it was realized that WAH were so difficult to catch.

**Table 3. Electronic tag releases by species**

| | BET | SKJ | YFT |
|---|---|---|---|
| **DS** | 22 | 0 | 7 |
| **LOTEK ARCGEO9** | 27 | 0 | 2 |
| **LOTEK LAT2810** | 121 | 9 | 212 |
| **Microwave Telemetry** | 5 | 0 | 2 |
| **WC** | 30 | 0 | 70 |
| **Total** | 205 | 9 | 293 |

ICCAT-AOTTP is using electronic tags to study the migrations of tropical tuna. Three different brands of pop-up type tag (Desert Star, Wildlife Computers and Microwave Telemetry) have been used by AOTTP; and two 'models' of internal archival tag from Lotek Wireless (Arcgeo9s and Lat2810s). To date, our partners have deployed 29 Desert Star, 100 Wildlife computers and 7 Microwave Telemetry pop-up tags. Similarly, 29 ArcGeo9 (Lotek), and 343 Lat2810 (Lotek) internal/archival tags have so far been deployed (**Table 3**).

**Table 4. Electronic tag mean retention times by species**

| | BET | YFT |
|---|---|---|
| **DS** | 52 | 36 |
| **LOTEK ARCGEO9** | 25 | NA |
| **LOTEK LAT2810** | 191 | 264 |
| **WC** | 71 | 23 |

**Table 5. Electronic maximum retention times by species**

| | BET | YFT |
|---|---|---|
| **DS** | 192 | 44 |
| **LOTEK ARCGEO9** | 35 | NA |
| **LOTEK LAT2810** | 341 | 556 |

| | | | |
|---|---|---|---|
| **WC** | | 151 | 91 |

Retention times of the pop-up tags have been disappointing with an average of 45 days (**Tables 4 and 5**). The maximum so far recorded for a Desert Star tag was 192 days (on a BET), and 151 days on a Wildlife Computers tag (also BET).

Pop-up tag retention rates achieved by teams working in the NW Atlantic and off S. Africa have, however, been relatively high, and new information showing the migration of both BET and YFT tuna is emerging (**see Figure 2**). Due to the generally poor performance of both Desert Star (limited data transmitted) and Wildlife Computers (e.g. pin breakages) satellite tags, ICCAT-AOTTP opted to purchase Microwave Telemetry tags for the second phase. Thirty tags were, therefore, ordered and are being deployed by tagging teams at various locations around the Atlantic.

Recovery rates of the internal/archival tags have been relatively low, with only 27 tags recovered so far. But a few have been recovered with long periods at liberty and hence very valuable information: one was returned in S. Africa with over 12 months of data, another released and returned in Brazil has over 18 months of data; while a third also released in Brazil was recently found by the Abidjan TROs in Côte d'Ivoire with over 21 months of data.

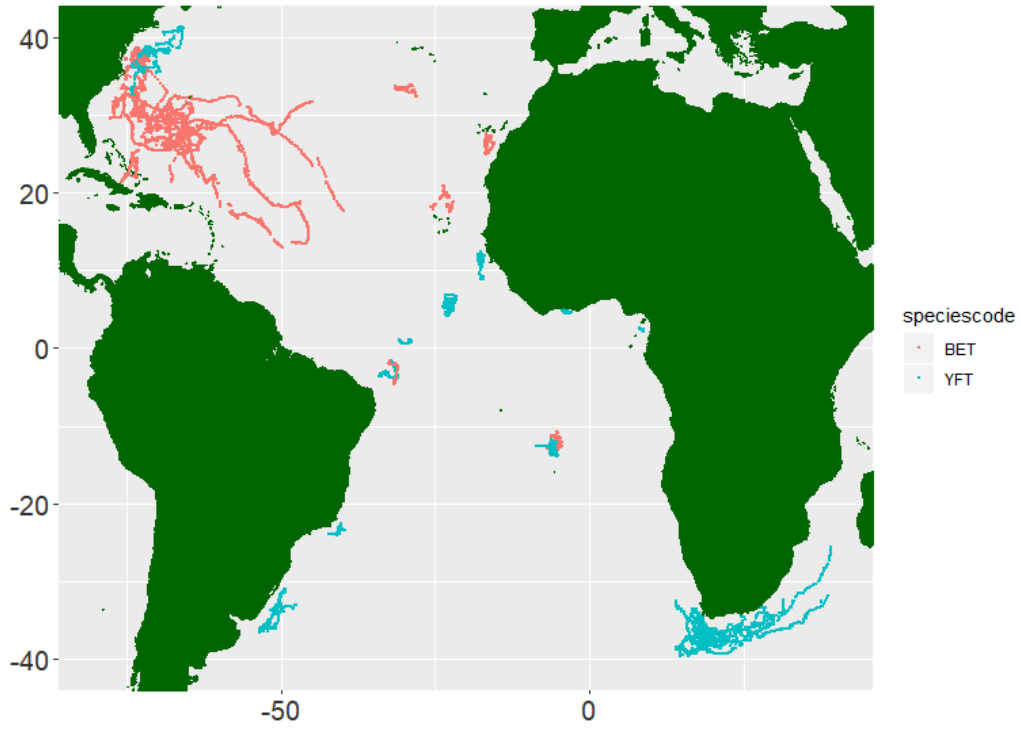


Figure 2. Migrations of PSAT tagged BET and YFT.

The ICCAT Secretariat has a well-developed database infrastructure for storing tagging data, which the AOTTP programme is exploiting and developing.

ICCAT-AOTTP is also estimating Tag Reporting Rates (an important parameter in population assessment from tagging data) by 'tag-seeding experiments'. The objective of this activity is to assess the efficacy of our awareness-raising activities in all geographic areas in which tagging is being conducted. A target Reporting Rate of 80% for the purse-seine fleet has been set. Reporting Rates are quantified by "tag-seeding experiments", whereby scientific observers, captains and crews of fishing vessels surreptitiously insert "false" tags into fish that have been caught, at all points along the value chain. The recovery of these "false" tags then allows Reporting Rates to be estimated for the project.

**Table 6. Tag-seeding 'releases' of false tags by species and gear/location (BB=baitboat, CACL=cannery, FISM=fish market, LL=long-liner, PS=purse-seiner, TRAN= transshipment)**

| Species | BB | CACL | FISM | LL | PS | TRAN |
|---|---|---|---|---|---|---|
| BET | 37 | 0 | 0 | 0 | 57 | 20 |
| LTA | 1 | 0 | 0 | 0 | 1 | 6 |
| SKJ | 151 | 3 | 6 | 0 | 176 | 69 |
| YFT | 66 | 2 | 6 | 1 | 113 | 104 |

So far 819 fish have been tagged with false tags in a range of different contexts including: on board fishing boats (baitboats, long-liners, and purse-seiners); during transhipment; at fish markets; and at canneries (**Table 6**). Out of those, 255 fish have been (false) tagged on baitboats (BB), 1 on a long-liner, and 347 on purse-seiners. The focus of the tag-seeding work is the purse-seine fleet which catches the majority of tropical tunas in the Atlantic. For purse-seiners ICCAT-AOTTP Reporting Rates for BET, SKJ, and YFT are 75.4%, 78.4%, and 66.4% respectively. The targets are clearly not being met, particularly for YFT, and AOTTP will continue to develop and improve awareness-raising activities until the end of the project. Note that both Recovery and Reporting Rates of tags are in a continual state of flux and there can be a considerable time-lag between deploying the tags, finding them, paying the reward and sending the data.

## ACTIVITY 1.1 (A1.1). TAGGING OF TROPICAL TUNAS

There are 3 Verifiable Indicators for Activity 1.1 and progress is summarized as follows (means of verification in parentheses).

- Fishing vessels will be hired for a total period of 1800 tagging days over 30 months (Number of tuna tagged & released, AOTTP reports)
- Tagging teams will be deployed on board the hired vessels (Number of tagging campaigns, Cruise reports)
- Tags (conventional, chemical, electronic, sonic) and tagging equipment will be procured.

Over 35 different boats have so far been used by ICCAT-AOTTP to tag fish in the Atlantic including El Grande Primero based in the Canary Islands (**Figure 3**).

Figure 3: El Grande Primero - baitboat chartered by ICCAT-AOTTP to tag in the Territorial waters the Canary Islands in late 2018

Between the start of the project and now, ICCAT-AOTTP and partners have completed 368 tagging trips and all corresponding cruise reports are available on request (**Table 7**). During this reporting period (June 2018 to June 2019) 229 tagging trips were done. The total time between the start and end of each tagging event, on each tagging trip, is 1631 days tagging.

**Table 7. Tagging trips by location since project start**

| Location | Number of trips |
|---|---|
| Azores | 16 |
| Bra-Uru | 50 |
| Canaries | 17 |
| G. of Guinea | 200 |
| Santa Elena | 58 |
| Senegal | 11 |
| S. Africa | 7 |
| USA | 9 |
| Total | 368 |

In summary, 16 tagging trips have been organized in the Azores/Madeira (**Figure 4**), 17 in the Canary Islands (**Figure 5**), 200 in the Gulf of Guinea region, 11 off Senegal, 7 off S. Africa,50 off Brazil/Uruguay, 58 around St. Helena, and 9 in the EEZ of the USA and Caribbean Sea.

Figure 4: Tagging Team on board Ponta Calhau, Madeira in July 2018


Figure 5: Tagging Team, featuring AOTTP Database Specialist Jesus Garcia on board El Grande Primero, Canary Islands, October 2018

All the conventional and electronic tags needed for the entire AOTTP Programme have now been sourced and procured (*ca* 150,000 tags) by ICCAT, including those needed for the tag-seeding experiments. Desert Star supplied AOTTP with 40 Seatag-3Ds, Wildlife Computers with 95 Mini PAT-348C pop-up tags, while Lotek Wireless provided 400 (LAT 2810) and 40 ARCGEO-9 internal archival tags. After reviewing the performance of all the electronic tags during the first phase (**Table 5**) it was decided to purchase 30 Microwave Telemetry pop-

up satellite tags for the second phase. Fifteen additional Mini PAT-348C pop-up tags (replacements for 'pin-breakages' and 'good will' tags) have been sent by Wildlife Computers, and have mostly been deployed, e.g. see **Figure 6**.

Figure 6: Pop up tagging of a yellowfin tuna off the island of São Tomé

## ACTIVITY 1.2 (A1.2). AWARENESS CAMPAIGNS AND RECOVERY SCHEMES

The AOTTP verifiable indicators for the awareness campaigns and recovery schemes are as follows:

- Awareness and publicity campaigns will be designed and implemented in Atlantic coastal States and Distant Water Fishing Nations (Number of countries with publicity campaigns, Reporting rates, AOTTP Reports)
- Awareness and publicity campaigns will target fishermen and crew, stevedores and other fishing fleet service providers, processors and workers, etc.
- Reward schemes will be designed and developed for the different target groups

Awareness and publicity campaigns are ongoing in the following thirteen countries: (1) Azores Islands (Portugal), (2) Madeira (Portugal); (3) Canary Islands (Spain); (4) Mauritania; (5) Senegal; (6) Cabo Verde; (7) Ghana; (8) Côte d'Ivoire; (9) São Tomé and Príncipe; (10) S. Africa; (11) Brazil; (12) Ghana; and (13) Uruguay, see **Figure 7**. Awareness raising has also started with sport and recreational fishers in the USA.

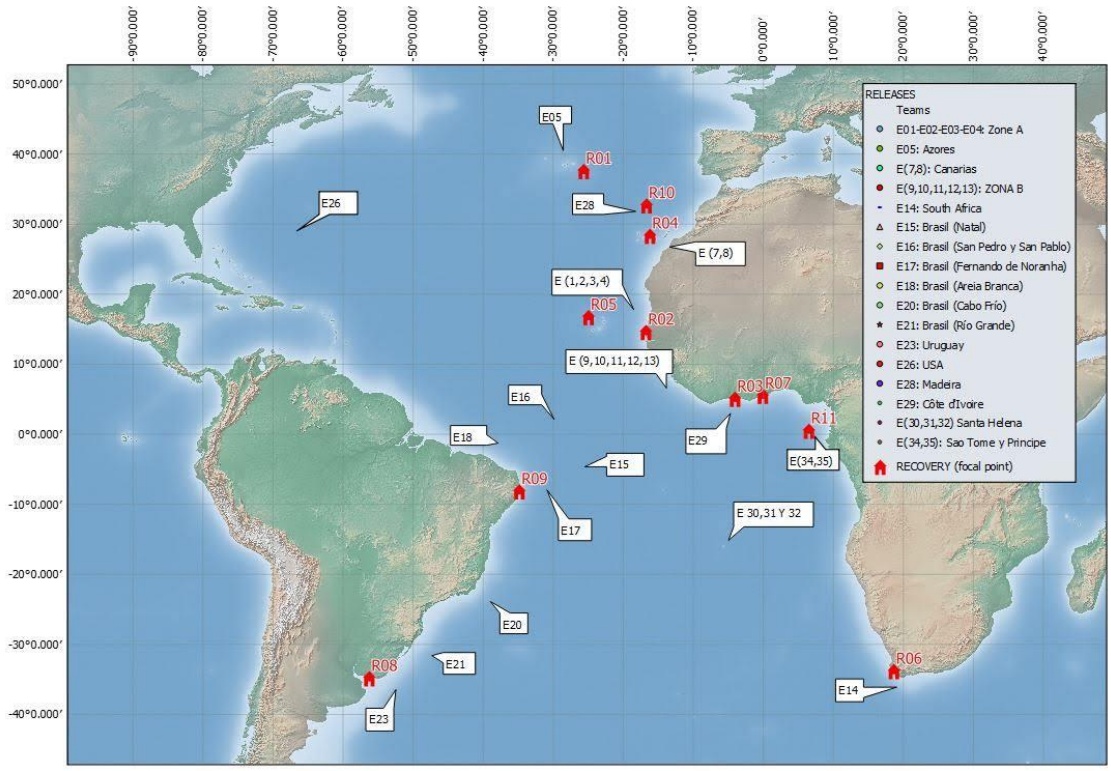


Figure 7: Distribution of ICCAT-AOTTP tag teams (E) and Recovery Teams (R) around the Atlantic Ocean

Specific officers and staff in each location are responsible for developing and implementing the activities (**Figure 8**). Each tag recovery team drafts a quarterly report summarizing awareness-raising activities and the numbers of tags recovered during that period (available on request to AOTTP Coordination). The tag recovery data themselves are being continuously sent to the Telegram Recovery group for upload to the ICCAT database via Telegram.


Figure 8: Awareness-Raising and tag-recovery among artisanal fishers in São Tomé and Príncipe

Awareness campaigns focus on those persons involved in different aspects of the fisheries sector, although some activities are directed at the general public. The design and production of the awareness material acknowledges the specific characteristics of those most directly involved, e.g. fishermen, stevedores, traders, and fish processors. Bright-colored t-shirts and caps with ICCAT and EU logos were designed in the official languages of each location during the first reporting period. Posters with clear messages highlighting the reward, the minimal required recovery information (e.g. fish length and capture location) and the mobile phone contact number, are continually being distributed and modified. Posters are water-proof and hard-wearing so they last when pinned up on fishing vessels, and around fish landing and auction facilities. Meetings and visits to artisanal fisheries communities, processing plants, landing areas are complemented by the distribution of this material.

The general public are also targeted by ICCAT-AOTTP. Standard press release templates have been distributed to every recovery office and have been adapted to the specific characteristics of the region. Many of the awareness-raising activities have also been recorded as videos on mobile phones and uploaded to **youtube channels**.

ICCAT-AOTTP reward schemes for tag and data recovery acknowledge: cultural nuances (e.g. English speaking Ghanaian fishing communities in Côte D'Ivoire); AOTTP budget constraints; and the incentives most valued in different countries by different sectors of the fishing business. In the third quarter of 2019, AOTTP adopted a

new preferential reward system to improve the completeness and quality of data being collected on recovered tags. Under this system, the reward depends on the completeness of the data reported. The standard practice of giving conventional tag-recoverers a cash (or phone credit) reward of 10€, and either a t-shirt or a cap, still stands for any tag recoverer who provides basic metadata on the tagged fish (at a minimum date and location fished), but we provide an additional 10€ bonus (in the form of cash or phone credit) to any recoverer who presents the actual tagged fish to an AOTTP TRO and allows the TRO to measure the fish precisely. If a tag is recovered and evidence of the tag is presented (either as the physical tag itself or a picture of the tag) but no metadata (at a minimum, location fished and date fished or size) are provided, then the AOTTP TRO will give out a t-shirt or cap, but no cash reward) to the tag-recoverer. This person is then informed of the preferential reward system so that larger rewards can be claimed in the future and more accurate data can be recorded. The use of phone credit as a reward is very popular and compensates tag-finders for the cost of phone calls to report the discovery of the tag and metadata. Note that for electronic tags, a reward of 500€ is paid (**Figure 9**). Lastly, all tag-recoverers are also entered into the ICCAT Annual Lottery (**Figure 9**) which offers substantial prizes.

Figure 9: ICCAT-AOTTP Rewards and Incentives. Top panel USA metal detectorist with PSAT found on Florida beach. Bottom panels ICCAT-AOTTP Lottery Presentation in Dakar in 2019

Staff involved in the recovery of tags also have continuous access to a simple website which tracks all the released tags enabling their status to be quickly ascertained. It is important, for example, that the TROs are able to tell the tag-recoverer where and when the fish was released which is often of great interest. Similarly, the TROs can verify the information provided by the tag-finders, avoiding duplications, and double payment of rewards.

## ACTIVITY 1.3 (A1.3). RECOVERY OF TAGS AND TRANSMISSION OF DATA TO ICCAT SECRETARIAT

TROs have been deployed in all strategic tuna landing ports of the Atlantic. The AOTTP verifiable indicators for this activity are as follows:

- Tag Recovery Officers (TRO) teams will be deployed in strategic ports to collect recovery data (Number of TROs deployed and counterparts, Number of recoveries, AOTTP reports, Tag seeding operations on PS fleets)
- A large network of counterparts will be developed to ensure recovery data collection and transmission to ICCAT
- Quality of the recovery data on board purse-seiners is assessed (Tag-seeding operations on purse-seine fleets)

The data collected so far attest to the efficacy of these activities (**Figure 10 and Appendix 2)**.

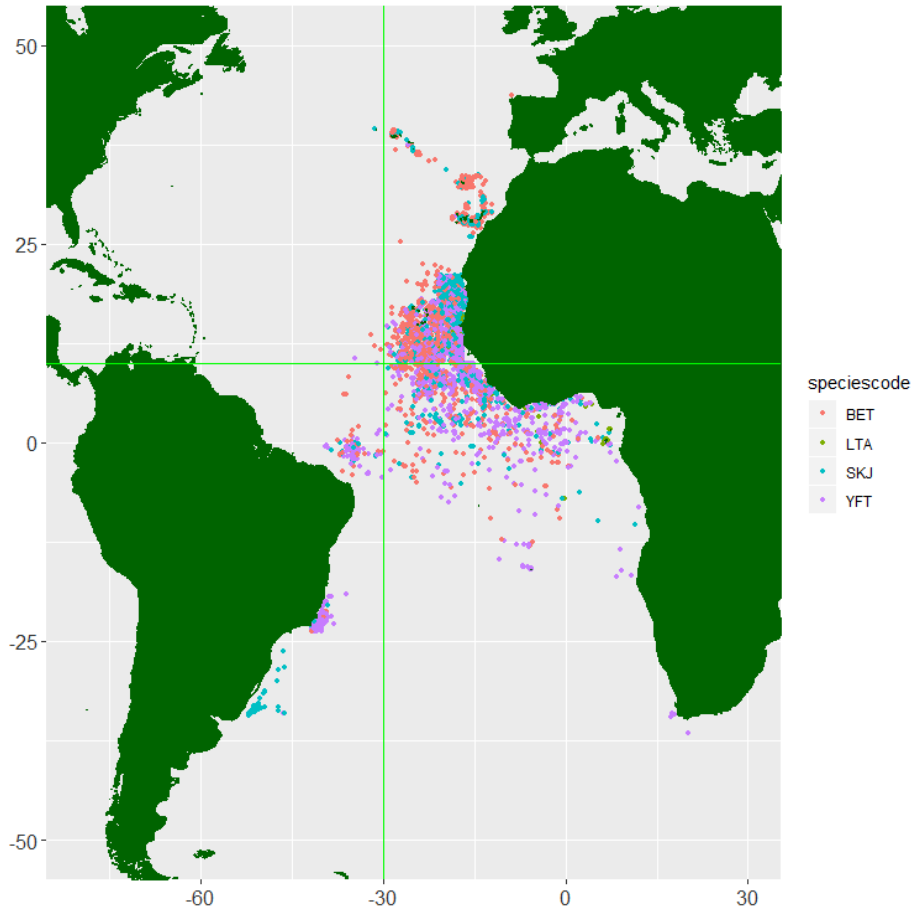


Figure 10: Spatial distribution of conventional tag recoveries June 2016 to June 2019 by species

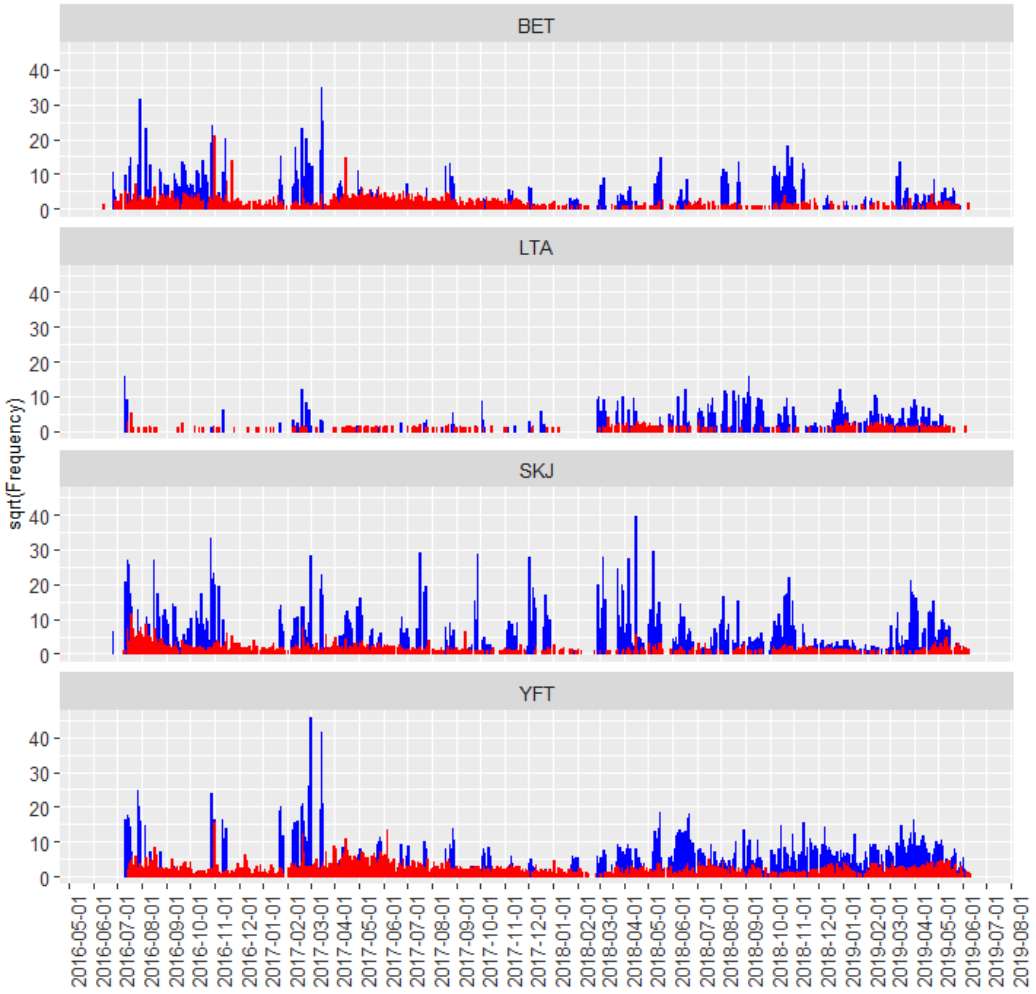


Figure 11: Total ICCAT-AOTTP releases (green) and recoveries (red) over time by species (BET=bigeye, LTA=little tunny, SKJ=skipjack, YFT=yellowfin). The numbers have been square-root transformed so they can be seen on the same axes

The number of valid tag recoveries is now (June 2019) 14285 (see **Figures 10 & 11**) translating to an overall recovery rate of 12.7% which is more than the rate originally predicted (10%). Of special importance is the fact that the recovery rates for BET and YFT are both each above 17%.

**Table 8. Chemically tagged totals by species**

| | BET | LTA | SKJ | WAH | YFT |
|---|---|---|---|---|---|
| **Number Released** | 1901 | 340 | 3484 | 20 | 2883 |
| **Number Recovered** | 332 | 3 | 183 | 0 | 428 |
| **Percentage** | 17.5% | 0.9% | 5.3% | 0 | 14.8% |

Out of those, 1901 BET, 3484 YFT, and 2883 YFT have been tagged chemically (**Table 8**). The total number of fish tagged chemically by ICCAT-AOTTP partners is 8628, or 86.28% of the 10,000 target set at the start of the project. Recovery rates of the chemically tagged BET and YFT are 14.8% and 17.5% respectively (**Table 8**)

Our network of counterparts is maintained using the Telegram Application which allows continuous communication and exchange of information between AOTTP Coordination and both tagging and tag-recovery teams. An "AOTTP Tag Recovery Group" (35 Members) was created which the tag-recovery personnel around the Atlantic use to upload data to ICCAT. The system facilitates the rapid correction of data and helps avoid coding mistakes. It also allows immediate feedback between AOTTP Coordination and the recovery officers.

Tag seeding experiments to estimate the Reporting rates have been implemented by observers organized by tagging and tag recovery teams in Senegal, Côte d'Ivoire, Ghana, S. Africa, and Brazil. So far 819 fish have been tagged with false tags throughout the tropical Atlantic.

Several improvements were made to the tag recovery template in the third quarter of 2018. The data entry program now requires input on the quality of the length reported (measurement vs. estimate), the quality of the date and location information (exact vs. approximate), the physical state in which the fish was when measurements were taken (fresh, frozen or thawed). In addition, new codes were added to the ICCAT database structure such as the boat-associated bait fishing technique used by some of our contractors. In addition, teams are instructed to collect logbook information for tags recovered on purse seine vessels so that a more precise estimate of the date of capture can be calculated in cases where that date is not known exactly. All of these changes contribute to improving the quality of the data stored by ICCAT-AOTTP, ultimately improving the types of analyses that make use of the data.

## REVISED LOG-FRAME

The log-frame was revised last year and no further revisions are needed.

## CONTRACTS (>60000€) AWARDED BY ICCAT DURING REPORTING PERIOD 4

ICCAT-AOTTP has now awarded 43 with a total value of 10,911,434.00€ since the project started. During this reporting period 8 were awarded with 4 above 60,000€ (**Table 9**).

**Table 9. List of contracts (>60000€) awarded by ICCAT during Reporting Period 4**

| Date | Supplier | Award procedure | Objective | Value (euros) |
|---|---|---|---|---|
| 2018-07-03 | UNIVERSITY OF MAINE | International Call For Tender | Tagging activities in North -West Atlantic | 349,680 |
| 2018-08-21 | AZTI CONSORTIUM 2nd PHASE | International Call For Tender 21 | Tagging activities in the East Atlantic | 661,820 |
| 2019-03-27 | CISEF CONSORTIUM | International Call For Tender 22 | Tagging Data Analysis and training in data analysis: mortality & movement | 268,882 |
| 2019-06-11 | VIMS CONSORTIUM | International Call For Tender 23 | Tagging Data Analysis and training in data analysis: tropical tuna growth | 122,070 |

## EXPECTED RESULT 2 (ER2). KEY PARAMETERS SUPPORTING STOCK ASSESSMENTS ARE ESTIMATED ON THE BASIS OF DATA COLLECTED THROUGH THE PROGRAMME AND INTEGRATED IN STOCK ASSESSMENTS

The new scientific information represented by the tag-recapture data collected by the ICCAT-AOTTP project will be used to support the population assessments of BET, SKJ, and YFT. The verifiable indicators for this 'Expected Result 2' are as follows:

- Biological parameters are made available to the SCRS by the end of the programme, and integrated stock assessments are undertaken for the three species of tropical tunas (Analyses, reports and publications, SCRS Documents and reports, Publications in Peer-reviewed scientific journals, AOTTP reports)
- Indicators are developed for neritic tunas (stock structure, growth, migrations)

ICCAT-AOTTP now has a rich dataset which can be used to estimate growth rates, mortality (including gear selectivity), and migration rates. Basic statistics and observations (e.g. number of releases, numbers of recoveries) were presented at the SCRS Species Group Meetings in September 2017 (Beare et al. 2017; Guemes, Garcia, and Beare 2017; Goñi et al. 2017; Onandia et al. 2017) and September 2018 (Ailloud and Beare 2018; Ailloud et al. 2018; Arregui et al. 2018; Gaertner, Goñi, et al. 2018; Gaertner, Pascual Alayon, et al. 2018); and again at the SCRS Plenary in early October 2017 (AOTTP Coordination Team 2017) and October 2018 (AOTTP Coordination Team 2018). Preliminary observations on little tunny were presented at the 2017 Small Tunas Intersessional Meeting by the ICCAT Secretariat in Miami in April 2017 (Neves dos Santos 2017) and at the Small Tunas Intersessional Meeting in June 2019 by Dr. Fambaye Ngom in Olhao, Portugal.

During ICCAT-AOTTP Workshop 2 in Abidjan in January 2018 our invited experts (Daniel Gaertner and Lisa Ailloud) successfully demonstrated how change in size can be estimated with non-linear models and how natural mortality ($M$) can be estimated using Brownie models.

ICCAT-AOTTP activities continue to stimulate the production of scientific reports and peer-reviewed manuscripts. In particular, the capacity building workshops allowed CPC scientists to familiarize themselves with the ICCAT-AOTTP tag-recapture data. At the subsequent BET data preparation meeting in April 2017 in Madrid AOTTP tag-recapture data for BET were first summarized (Beare 2018) and then various participants of the capacity building workshops presented their analyses on: BET growth (Arregui et al. 2018); BET gear selectivity (Gaertner, Goñi, et al. 2018); and BET tag-shedding rates (Gaertner, Pascual Alayon, et al. 2018).

More in-depth analyses were presented at the 2019 YFT data preparatory meeting concerning tag shedding rates (Gaertner et al. 2019), the FAD moratorium (Deledda-Tramoni and Gaertner 2019), tag reporting rates (Akia, Amandé, and Gaertner 2019) and progress on the otolith growth rate validation work (Ailloud et al. 2019).

The YFT assessment is scheduled for July 2019. AOTTP is formatting the tagging data for inclusion in the integrated assessment model, Stock Synthesis. In addition, AOTTP and contractors are providing tag shedding (Gaertner et al. 2019) and tag reporting rates (Akia, Amandé, and Gaertner 2019) estimated from the AOTTP double-tagging work and tag-seeding experiments, respectively. These parameters will prove crucial to improving mortality and movement parameter estimates that will be estimated internally within the integrated model. AOTTP Coordination has also provided the group with the daily YFT ages from the reference collection. These data will be used as input to the base case scenario of the assessment. They will form the basis for estimating growth rates of age zero fish.

Preliminary results from the analysis of OTC marked fish (see A2.1) were also influential for the 2019 YFT assessment with results indicating that age estimates based on micro-increment counts likely results in

underestimating age in larger fish, while age estimates based on reading alternating opaque and translucid growth zones appear to be unbiased. This new information was used as a basis for accepting the US YFT age data collection of *circa* 3000 samples, which is based on reading alternating opaque and translucid growth zones, as "best available" data and include it in the assessment this year. Accepting these data also resulted in a decision to raise the assumed maximum age of YFT from 11 years to 18 years. This information is important to consider as the assumed lifespan of a fish can substantially impact estimates of mortality and productivity of the stock in the assessment.

At the 2016 Small Tunas Species Group meeting it was agreed that AOTTP should focus on only two species: WAH (*Acanthocybium solandri*) and LTA (*Euthynnus aletteratus*). In this way ICCAT-AOTTP will (at least) ensure that plausible indicators are developed for two neritic species without effort being spread to thinly. As of writing 7679 LTA, and 260 WAH have been tagged with 552 and 3 recoveries recorded respectively (**Table 1**). WAH has proved difficult to catch, tag and release so AOTTP Coordination has focused on LTA and exceeding the initial target of 5000. The data for WAH are still too few but those for LTA, are now yielding new scientific information on growth rates and movement of the species around the coast of West Africa.

## A2.1. READING OF HARD PARTS

Relevant Verifiable Indicators for this activity are:

- Hard parts (otolith, vertebrae, spines) will be sampled on recovered tunas (Number of readings of hard parts, AOTTP reports)
- Reading of the hard parts will be undertaken by specialists

During the AOTTP programme 10,000 fish are being targeted for 'chemical tags', i.e. they will be injected with a chemical marker that allows their otoliths (or other hard parts) to be 'read', and aged more easily. Chemically tagged fish always have a red spaghetti tag, marked with 'KEEP WHOLE FISH'. When a fish with a red tag is found and reported (**Figure 12**), tag recovery teams arrange to buy the fish, pay any reward etc. take, store and process the biological samples, and ultimately determine the age of the fish from the hard-parts.

Figure 12: Chemically (red) tagged LTA caught by a fisher in São Tomé

**Table 10. Biological samples collected**

| | Female | Male | Unidentified |
|---|---|---|---|
| **BET** | 116 | 117 | 19 |
| **LTA** | 1 | 1 | 0 |
| **SKJ** | 62 | 72 | 2 |
| **YFT** | 132 | 204 | 4 |
| **Total** | 311 | 394 | 25 |

Thus far ICCAT-AOTTP has purchased and taken biological samples from 730 chemically marked fish (red tags) representing all size classes, 3 species, and both sexes (**Table 10**). Other biological information like body-weight, state of sexual maturity, and stomach contents has also been collected to complement eventual analyses.

An Otoliths Expert Group with specialists from Senegal, Côte d'Ivoire, France, Spain, USA, Australia and S. Africa was set up by ICCAT-AOTTP during the last reporting period with SCRS approval. The aim was to establish the procedures and protocols for the collection, preservation and reading of otoliths.

The Otolith Expert Group recommended creating a Reference Collection of otoliths for calibrating the age-readings. A Call for Tender to create the Reference Collection was thus launched on 22 June 2017 and five proposals were received and two contracts awarded: one to FADURPE (Brazil, West Atlantic); and the other to IFAN (Senegal, East Atlantic). The coordination between IFAN, FADURPE, AOTTP Coordination, and the Expert Group is contributing to the capacity building objectives of AOTTP.

Twenty-five pairs, by length categories, of otoliths (also other hard parts) for BET, SKJ and YFT are being collected in Brazil and another 25 pairs in West Africa. Note that recent progress reports from each side of the Atlantic are available on request to AOTTP Coordination. Images/photos of the hard parts are being circulated (digitally) among the Expert Group who will read and calibrate them.

ICCAT-AOTTP has been working in partnership with scientists in Senegal, Ivory Coast, Brazil and Australia to analyze OTC marked otoliths from fish marked and recaptured within the AOTTP framework. The ultimate objective is to test the frequency of deposition of micro-increments and examine both the frequency of deposition and the seasonality of assumed annual opaque and translucent zones across a wide range of sizes and as long a time of liberty as the project will allow. Results are being used to improve age reading protocols and provide guidance as to the utility of daily and annual increment counts for future age and growth parameter estimation. Preliminary results were presented at the 2019 YFT data preparatory meeting (Ailloud et al. 2019). These results indicate that YFT in the Atlantic appear to deposit a single opaque and translucent zone each year. But, for daily micro-increment counts, preliminary results indicate that counting micro-increments may lead to underestimating age for fish larger than 55cm FL. The AOTTP is continuing its efforts to analyze hard parts from OTC marked fish. As the program continues, more valuable and informative samples will become available (larger fish and longer times at liberty), helping solidify our results and recommendations for ageing tropical tunas.

Two laboratory technicians were hired by ICCAT-AOTTP partners in January 2019: one at the CRO in Abidjan; and one at the CRODT in Dakar. Dr. Khady Diouf from the IFAN provided these trainees with an intensive week of targeted training in otolith preparation for daily ageing in February 2019, see **Figure 13**. These new hires also attended the March 2019 Otolith Workshop where they learned more advanced techniques in otolith preparation, growth ring interpretation, and calculation of bias and precision in age readings. They are

scheduled to undergo one more week of training in July/August 2019, which will be focused on the preparation and interpretation of otoliths for annual ageing (as opposed to daily ageing), and on the use of the fluorescent microscope to validate the deposition rate of otolith rings in OTC marked fish.

Figure 13. Sadio N'fally and Venance Ngouan being trained by Dr. Khady Diouf in February 2019 in Dakar, Senegal

## ACTIVITY 2.2 (A2.2). TAGGING DATA ANALYSES AND ACTIVITY 3.3 (A3.3). TRAINING IN DATA ANALYSES.

Note that the original Activities A2.2 and A3.3 were merged to integrate the formal scientific research activities with the training and capacity building. A2.2 was originally envisaged with the analytical work (parameters for inclusion in the stock assessment) being done by trained and experiences scientists, while A3.3 (see below) would provide training and capacity development in this area. At the September 2018 meeting with Ms. Viallon it was agreed, however, that it made more sense to merge these two activities so that data analysis and research could be done simultaneously with training.

The relevant Verifiable Indicators for Activities 2.2 and 3.3 are:

- Tag-recovery data collected during the AOTTP will be analyzed by scientific consultants before the end of the programme to estimate missing key parameters for stock assessments (Number of analyses undertaken, reports from consultants, scientific publications, AOTTP reports)
- Dedicated workshops will be organized to reinforce the capacity of ICCAT developing member States in data analyses, interpretation of the scientific results and development of the scientific advice.

ICCAT-AOTTP has generated a large and important dataset including: (i) mark-recapture data from spaghetti/conventional tags; (ii) tag-seeding data; (iii) data from electronic tags; and (iv) biological samples such as otoliths and spines.

In the last reporting period BET data were made available to both the personnel attending the Capacity Building Workshops discussed below, and to the BET Stock Assessment.

Currently ICCAT-AOTTP mark-recapture data are being, and will be, used in a variety of important scientific analyses resulting in improved (more accurate) stock assessments, and peer-reviewed scientific papers. This work will be coordinated by the Chair of the SCRS (Dr Gary Melvin), the ICCAT Secretariat, and the associated SCRS scientific community. YFT data were made available to participants of the YFT Data Preparation meeting in April 2019 and will be made available to participants of the YFT stock assessment meeting in July 2019. LTA and WAH data are being made available to participants of the Small Tunas Intersessional Meeting being held in Olhao, Portugal at the end of June 2019. Partners for the data analysis and capacity building work (merging of activities A2.2 and A3.2) were contracted during the current reporting period, after two competitive Calls for Tender: one for mortality and movement/migration work; and one focusing on the growth of tropical tuna (from hard parts, length frequencies and tag-recapture data). Both Calls for Tender contain the following text (Section 3.4) in their terms of reference: *"AOTTP has a strong commitment to capacity development among relevant stakeholder groups from developing countries around the tropical Atlantic Ocean. Proposals must therefore include evidence of strong involvement from developing countries fisheries institutions, public bodies and/or scientists. The scoring process for proposals will be heavily weighted in favor of proposals that demonstrate a commitment to high quality capacity building. Proposals that do not demonstrate a commitment to capacity building, mentoring of junior/early career scientific staff, and training will not be considered."* Two proposals were funded (see **Table 9**). All of the data analytical work funded by AOTTP will thus involve training, and capacity development. The mortality and movement work started in February 2019 and the growth analyses in June 2019. All the results will be presented at the Final Symposium in June 2020 and written-up for peer-reviewed publication. Note that the Terms of Reference for the scientific aspects of the work were discussed and approved at the SCRS Species Group meeting in autumn 2018.

Three workshops were organized during the last reporting period to promote the involvement of the ICCAT SCRS scientific community in the analysis, and scientific interpretation of AOTTP tag-recapture data. Please see the following links for detailed Agendas and Syllabuses: Workshop 1; Workshop 2; and Workshop 3. Outcomes included: improved understanding of relational databases; increased capacity to work with ICCAT-AOTTP in the development of the mark-recapture databases; increased ability to connect with the remote databases using plotting and statistical software (R, QGIS, Excel); increased confidence to work with AOTTP data to develop and submit scientific articles to SCRS and peer-reviewed literature; and increased involvement in SCRS Working groups, particularly in relation to population assessment.

AOTTP held two age reading workshops during this reporting period. The first took place in Dakar from October 29th to November 2nd, 2018 (**Figures 13, 14 & 15**). The aim of this first workshop was to ensure the otoliths and other hard-parts collected from AOTTP of chemically and non-chemically tagged fish get properly read, validated and calibrated. Fourteen participants were in attendance, including the two contractors leading the development of the reference set, and an external expert from the United States of America who shared with the group his yellowfin otolith age training set so that workshop participants could practice the techniques learned. The workshop was successful, and a hard-part reading plan was developed to define objectives and deadlines to come.

Figure 14: Participants at the otolith workshop held in Dakar in October 2018

The second took place in Dakar from March 18-22 (**Figure 13**) and was attended by 13 participants from Senegal, Côte d'Ivoire, Brazil, Spain and Australia. Participants were trained in data analysis, calculating bias and precision metrics for age readings and then applying these skills to the reference set developed by Brazil and Senegal. The remainder of the meeting was spent modifying the otolith age reading protocol to decrease bias and increase precision in the final ages recorded. An expert from Australia was in attendance to help guide the process.

Figure 15: Yacine Ndiour counting daily rings on an otolith prepared slide at the otolith workshop held in Dakar, Senegal in early 2019

*Note:* Access to ICCAT-AOTTP data ICCAT-AOTTP conventional tag data (checked and validated to the extent possible) are now publicly available at six monthly intervals – organized by species - from the **ICCAT website**. Data (less well checked) are distributed at monthly intervals to partners more specifically involved in the

project (e.g. participants at capacity building workshops, SCRS meeting participants, and other contractors), e.g. **AOTTP Data**. Electronic tag data are available on request to AOTTP Coordination.

## ACTIVITY 2.3 (A2.3). INFORMATION FROM STAKEHOLDERS

- An International Symposium will be organized towards the end of AOTTP in order to present and publicize the results of the AOTTP and the analyses of the tagging data (Number of participants and presentations to the Symposium, AOTTP reports)

This activity relates to the organization of the Symposium planned for the final months of the AOTTP. The ICCAT Executive Secretary (Jean Pierre Camille Manel) travelled to Dakar, Senegal, with AOTTP Coordinator and Administrative and Financial Officer to formally inform the relevant Senegalese Authorities on the planning of the final Symposium in their country (**Figure 16**). During this 3-day trip, the group visited the Senegalese Fisheries Ministry and Minister (Mme Aminata Mbengue Ndiaye) and explored possible venues for the AOTTP Final Symposium. The meeting went well, and the Director of the Senegal Fisheries Department has offered to act as a Focal Point for the organization of the Symposium. Note that the International Seafood Sustainability Foundation (ISSF) have offered to support travel and subsistence for two early career scientists to attend the AOTTP Final Symposium to present their work. Similarly **ARGOS-CLS** with whom we work closely in the context of electronic tag data have been approached by the AOTTP Coordinator and may also sponsor some activities.

Figure 16. ICCAT Executive Secretary and AOTTP Coordination visit to the Fisheries Ministry in Dakar, Senegal

Additional activities in support of A2.3 this year include:

• AOTTP Coordination (Dr Beare) described AOTTP experiences with pop-up tags at the European Users Conference on Argos Wildlife held in Toulouse, France, 21-22 November 2018.

• AOTTP Coordination went to St Helena in January 2019 (**Figure 17**) to meet key personnel, support tagging activities there and raise awareness among the fishing community. The project was presented to stakeholders in a public house, and two radio interviews were done about the project.


Figure 17. AOTTP Coordination visit to St Helena. Tagging Activity, Visiting the Governor (top left), Blue Belt Programme Coordinator (bottom left), Cold Storage (middle-top), Fisheries Department (center), and article in local newspaper.

• AOTTP (Dr. Ailloud) attended a workshop organized by IATTC in La Jolla, California in January 2019 (**Figure 18**). The IATTC has recently raised the funds to initiate an extensive multi-year tagging program of tropical tuna in the eastern Pacific Ocean. To get started, they planned a workshop to discuss the design of the tagging experiment and seek advice and recommendations from scientists from across tuna RFMOs, including AOTTP. The discussions were focused on the design and coordination of such programs (in particular, the experimental design and logistic elements), with time allocated to discussing tagging data analysis and application to stock assessments. Representatives from the following organizations were present: SPC, IOTC, NRIFSF, PFRP and AZTI (**Figure 16**). This gave AOTTP a platform to reach other scientists involved in tuna tagging campaigns.

Figure 18. Dr Ailloud at the IATTC Workshop in La Jolla, California.

• AOTTP Coordination traveled to Grenada (Caribbean) in March 2019 to support tagging activities there organized by the University of Maine and raise awareness among the sport fishing stakeholders (**Figure 19**).

• Dr Ailloud was asked (and supported by ICCAT-AOTTP) by ICES to review the Benchmark Assessment of Atlantic Mackerel in March 2019. In particular, ICES wanted Dr Ailloud's expertise in the role of tag-recapture data in fish population assessments.

Figure 19. University of Maine tagging team on board Exile in Grenada.

• AOTTP Coordination (Drs. Ailloud and Beare) attended the Annual **European Tuna Conference** in Brussels on 6 May 2019. This conference presented a good opportunity to promote awareness of the AOTTP project among a diverse group of tuna stakeholders including food processors, scientists and NGOS. AOTTP Coordination set up an Exhibition Stand with brochures, tags, posters and videos (**Figure 20**), and met and discussed all aspects of the project with diverse and interested stakeholders, including representatives of World Wildlife Fund, the Marine Stewardship Council, the Fishery & Aquaculture Unit of the Maruha Corporation in Japan, and the Global Seafood Manager of Food Service Line in France. This awareness-raising work provided AOTTP with many useful contacts, particularly for organizing the AOTTP Final Symposium, but also for promoting tag recovery worldwide.


Figure 20. Dr Ailloud at the AOTTP Exhibition Stand, European Tuna Conference, Brussels, May 2019.

• AOTTP attended the **70th Tuna Conference** in California, USA between 21 and 23 May 2019. Drs. Beare and Ailloud each gave talks during the Tagging Data session. This meeting allowed AOTTP to advertise the project to yet another diverse group of tuna stakeholders including scientists, fish tag developers (Biologgers, Lotek, Wildlife Computers) and NGOs (The Pew Charitable Trust, The Nature Conservancy).

## EXPECTED RESULT 3 (R3). SCIENTISTS FROM DEVELOPING COUNTRY CONTRACTING PARTIES OF ICCAT ARE TRAINED IN TAGGING, DATA COLLECTION, AND TAGGING DATA/STOCK ASSESSMENT ANALYSIS (EXPECTED RESULT 3)

The indicators relevant to this result are as follows:

- Tagging techniques: 20 scientists/technicians from developing ICCAT States are trained on board the tagging vessels (Number of scientists/technicians trained on board the tagging vessels, number of fish tagged by scientists/technicians from developing ICCAT Member States, AOTTP reports)
- Data collection and sampling at recovery: 30 scientists/technicians from developing coastal States trained in data collection and sampling at recovery
- Tagging data analysis and interpretation: 80 participants from developing coastal States to workshops

To date, substantially more than 20 scientists/technicians from developing countries have already been trained in tagging techniques at sea, including two from Cabo Verde, seven from Côte d'Ivoire, seven from Ghana, five from Senegal, eight from Brazil, two from Uruguay, and five from São Tomé and Príncipe. Many more than 30 technicians have also been trained in data collection and sampling at recovery. For example up to June 2019, at least 50 scientists/technicians have received training in tag recovery in: Azores Islands (Portugal), Madrid (Spain), Dakar (Senegal), Abidjan (Côte d'Ivoire), Tema (Ghana), Mindelo (Cabo Verde), Brazil, Uruguay, Cape Town (S. Africa) and São Tomé and Príncipe.

### ACTIVITY 3.1 (A3.1). TRAINING IN TAGGING TECHNIQUES AND DATA COLLECTION

Progress in this activity has been continuous and substantial. There is one indicator below:

- Scientists from developing ICCAT CPCs will be invited and trained to participate to tagging activities on board the tagging vessels (Number of scientists/technicians trained on board the tagging vessels, number of fish tagged by scientists/technicians from developing ICCAT Member States)

During Phase 1, at least 46 individuals (from Senegal, Cabo Verde, Côte d'Ivoire, Hawaii, EU-Spain, EU-France, EU-Portugal, São Tomé and Príncipe, and Ghana) attended training courses run by AZTI in conventional, chemical and electronic tagging, and associated data collection. Having scientists on board was a condition for gaining access to the territorial waters of Mauritania, Guinea Bissau, and São Tomé and Príncipe.

Similarly, other AOTTP-ICCAT Contractors organized training in Cape Town (S. Africa) between 23 and 27 January 2017, while in Brazil initial tagger training sessions for 8 people were held between the 2nd and 4th of April 2017 and have since been ongoing.

During Phase 2, AOTTP Coordination organized tagger training in Madrid with CEFAS (contracted to tag 5600 fish around St. Helena) on 16 April 2018, and with Ilair Concepçao (Tagging Coordinator responsible for tagging 6000 fish around São Tomé and Príncipe) between 24 and 25 May 2018. The ICCAT Assistant Executive Secretary and Science Coordinator Dr Miguel Neves Santos also visited The Fisheries Directorate in São Tomé and Príncipe in August 2018 to deliver tags, provide training in internal tag deployment, and discuss tag-seeding protocols (**Figure 21**).

Figure 21: ICCAT Assistant Executive Secretary demonstrating AOTTP tagging protocols in August 2018 in São Tomé and Príncipe

Our colleague Iñigo Onandia, an expert who tagged with AZTI under the first phase, visited Madeira between 11 and 20 June 2018 to demonstrate electronic tagging protocols and procedures (fish care etc.) to the team there.

During AZTI's Phase 2 tagging activities off West Africa and the Canary Islands the following nine other organizations were involved:

1. Centro de Investigação Pesqueira Aplicada, Guinea-Bissau (CIPA)
2. Centre de Recherches Océanologiques de Côte d'Ivoire (CRO-CI)
3. Centre de Recherches Océanographiques Dakar Thiaroye (CRODT)
4. Direção das Pescas de São Tomé e Príncipe (DP-STP)
5. Direction Générale des Pêches et de l'Aquaculture, Gabon (DGPA-G)
6. Fisheries Scientific Survey Division, Ghana (FSSD)
7. Instituto Español de Oceanografía (IEO)
8. Institut Mauritanien de Recherches Océanographiques et des Pêches (IMROP)
9. Instituto Nacional de Desenvolvimento das Pescas, Cabo Verde (INDP)

AZTI also provided training in tagging and AOTTP protocols to the following seven individuals from developing countries:

1. Ahmed Diagne (IMROP, Mauritania)

2. Mario Nbunde (CIPA, Guinea-Bissau)
3. Jeremias Intchama (CIPA Guinea-Bissau)
4. Jean-Bernard Mougoussi (DGPA-G Gabon)
5. Djimera Lassana (IMROP, Mauritania)
6. Davy Angueko (DGPA-G, Gabon)
7. Loïs Allela (DGPA-G Gabon)

AZTI has, together with AOTTP Coordination, also continued to develop training material, e.g.:

- **AOTTP tagging protocols**
- **Video tutorials for using the Memento software**
- **Exercises for Data Registration using Memento**

This indicator has been satisfied. What is particularly encouraging is that colleagues who worked on the first phase tagging, and attended training courses, are now teaching tagging during the second phase. For example, our colleague Guelson da Silva ran tagging cruises off Northern Brazil in 2017 as part of the FADURPE Consortium and has now organized and taught tagger training in São Tomé and Príncipe. Similarly, Dr Justin Monin Amande (after receiving training in tagging from AZTI in May 2016) won a contract on behalf of CRO-CI (AOTTP second phase) to tag 11,000 fish in the EEZ of Côte d'Ivoire during 2018 and 2019, for which he has now trained his own staff.

**Table 11. Numbers of fish tagged by nationality of tagger**

| Country | Number |
|---|---|
| Brazil | 30399 |
| Cape Verde | 1260 |
| Côte d'Ivoire | 16010 |
| EC Spain | 21572 |
| EC France | 21 |
| EC Portugal | 6476 |
| EC United Kingdom | 327 |
| Ghana | 9085 |
| São Tomé and Príncipe | 6548 |
| Senegal | 10526 |
| S. Africa | 195 |
| U.S.A. | 102 |
| UK Saint Helena | 3052 |
| Uruguay | 15 |
| **Total** | **105588** |

The numbers of fish tagged during the AOTTP programme by scientists from all countries is summarized in **Table 11**. It shows that over two-thirds have been tagged by scientists/technicians from developing countries, and it is thus clear that AOTTP has satisfied these indicators.

### ACTIVITY 3.2 (A3.2). DATA COLLECTION AND SAMPLING AT RECOVERY

The verifiable indicator is as follows:

- TRO teams and other counterparts will be trained in recovery data collection and sampling protocols to ensure the good quality of the data (Number of TROs and counterparts trained, AOTTP reports)

All TROs and their supporting teams have received training in the ICCAT-AOTTP protocols for collecting tag-recovery information. This includes procedures for introducing data into the recovery template of the AOTTP smartphone application, the subsequent submission of data to ICCAT-AOTTP, and the resolution of any problems via the AOTTP recovery Telegram group. Training sessions were done in the facilities of each counterpart. The sessions were complemented with visits to key recovery locations like, landing sites, tuna vessels, processing plants, artisanal fisheries communities.

When red tagged fish are recovered, each fish is dissected and biological parts (otoliths, spines, vertebrae, muscle tissue, stomach content) are stored on site. A biological database structure and an ageing database structure were created for data collected on these fish and other fish sampled for hard parts as part of the Otolith Reference Collection. All teams were consulted individually and trained in data entry for the new database format.

### ACTIVITY 3.3 (A3.3). TRAINING IN DATA ANALYSIS

This activity has been merged with A2.3 where it is discussed.

## BENEFICIARIES/AFFILIATED ENTITIES AND OTHER COOPERATION

### HOW WOULD YOU ASSESS THE RELATIONSHIP BETWEEN YOUR ORGANIZATION AND STATE AUTHORITIES IN THE ACTION COUNTRIES. HOW HAS THIS RELATIONSHIP AFFECTED THE ACTION ?

The AOTTP Action, together with the ICCAT Secretariat, maintains good relationships with the State Authorities in the target countries. AOTTP is working directly with State Authorities in Spain (Canary Islands), Portugal (Azores, Madeira), Côte d'Ivoire, Mauritania, Senegal, Brazil, USA, Ghana, Uruguay, São Tomé and Príncipe, Cabo Verde, UK (CEFAS, British Overseas Territories of St Helena and Ascension Island) and S. Africa. Many of AOTTP contractors/partners (e.g. CRODT, CEFAS & CRO-CI) are state authorities themselves.

ICCAT CPCs and Cooperators have also contributed funds to the AOTTP programme, including the People's Republic of China, USA, Canada, and Chinese Taipei. The Uruguayan Research Vessel has also been made available to AOTTP, without cost, to tag tuna. IRD staff contribute their time without cost to analyzing AOTTP data.

### WHERE APPLICABLE, DESCRIBE YOUR RELATIONSHIP WITH ANY OTHER ORGANIZATIONS INVOLVED IN IMPLEMENTING THE TAGGING ACTIVITIES.

AOTTP maintains good working relationships with all its Contractors: communication with tagging teams and TROs around the world being done using a range of modern media, including WhatsApp, Telegram and E-mail.

During this reporting period ICCAT-AOTTP worked with a Consortium, led by AZTI (Spain), to tag tuna in the Azores, the Canary Islands, and West Africa. This Consortium involved CRO-CI, CRODT, FSSD, IEO, IMAR, and MFRD/FSSD. More recently, and in other areas of the Atlantic we are working, or have worked, with: the

FADURPE Consortium (Brazil), CEFAS (UK), LPRC (USA), University of Maine (USA), NOAA (USA), Directorate of Fisheries (São Tomé and Príncipe), and Capmarine (S. Africa) to tag fish at sea. In awareness-raising and tag-recovery activities AOTTP is also working directly, and successfully, with many of the same organizations (e.g. CRO-CI, CRODT, MFRD/FSSD, IEO, and IMAR) but also with Capmarine and INDP (Cabo Verde).

AOTTP has also recently started working with the Saint Helena Government (BOT).

In the USA, LPRC wrote in their Final Report that, *"Our relationship with commercial fishermen tagging partners, all US Atlantic longliners, has been strengthened by this partnership, and the vessel crews have gained additional tagging and research experience and remain excited about future research opportunities"*.

AOTTP partners at the University of Maine and **NOAA** are working *voluntarily* with a large range USA sport fishing associations and organizations including: the **South Shore Marlin and Tuna Club**, **Sail World**, **Virginia Saltwater Fishing**, the **Billfish Foundation**, the **Fort Walton Beach Sailfish Club**, the **Billfish Rundown**, **Grenada Fishing Charters**, **The Anderson Cabot Center for Ocean Life**, and **ROFFS**. These relationships are beginning to become productive and a number fish have now been tagged and recovered by volunteers in the NW Atlantic.

AOTTP has worked with **ARGOS-CLS** who run the satellites that collect the data from the pop-up electronic tags and the AOTTP Coordinator was invited to present AOTTP to the **European Users Conference on ARGOS Wildlife** in late 2018.

AOTTP has so far worked with the skippers and crews of more than 25 commercial fishing vessels (Appendix 1) and feedback with respect to the relationships between the scientific and technical teams and the fishing crews has been routinely positive, according to both verbal and cruise reports from our Contractors. Tishers are usually extremely engaged, enthusiastic about the tagging work, and delighted to help in all possible ways.

AOTTP has an agreement with IATTC to pay rewards on its behalf and collect metadata from tags where possible.

The TROs in Abidjan work closely with personnel from IRD and IEO to gain access to log-book data, essential for ascertaining where and when a tagged tuna was actually caught.

The AOTTP SC is also regularly consulted on AOTTP progress and plans, and members have been involved in evaluating contracts. Members of the ICCAT SCRS are also enthusiastic about AOTTP and are looking forward to undertaking research with the data.

## FINAL BENEFICIARIES AND TARGET GROUPS

The 'Final Beneficiaries' of the Action are: (i) Fishing communities and operators depending on the exploitation of tuna resources; and (ii) Consumers (of tuna).

The Action has already had an impact on the 'Final Beneficiaries'. AOTTP TROs have now recovered over 14,000 tags. Both Recovery Rates and Reporting Rates are good compared with similar oceanic tagging campaigns. These statistics indicate strong 'buy-in' to the project from fishers, dockers, stevedores and the tuna canning industry. More than 100 scientists and technicians from developing countries have benefited directly from the employment AOTTP is generating, and less directly from the training and capacity building activities they have received. Thousands of euros of cash rewards, substantial lottery prizes, and t-shirts have also been distributed to many diverse fishery stakeholders.

The Target Groups are: (i) Scientists of the developing coastal states, and scientist members of the ICCAT SCRS; (ii) Fisheries authorities in the different Member States of ICCAT; and (iii) the ICCAT Secretariat.

The SCRS and its scientists benefited substantially from the training, coaching, and mentoring provided by AOTTP and the ICCAT Secretariat during the capacity building workshops. They have also benefited from access to the AOTTP data, which helps improve the scientific knowledge and leads to the publication of reports and peer-reviewed papers, boosting careers. The fisheries authorities in many ICCAT CPCs are aware of the project and many of their staff have benefited from training aboard the tagging vessels. Indeed, scientists from Côte d'Ivoire (CRO-CI) and São Tomé and Príncipe have now gone on to win and manage tagging contracts of their own. Two of the tagging contracts, recently awarded by ICCAT-AOTTP (one to tag 11,000 fish of Côte d'Ivoire and the other to tag 6000 fish around São Tomé and Príncipe) are being managed by African nationals who received training in phase 1 within the AZTI Consortium.

The ICCAT Secretariat itself is also benefiting from the publicity and goodwill the AOTTP project is generating. Its scientist will, in the future, have a highly useful dataset for informing policy, and ascertaining the efficacy of management measures (e.g. spatial closures) which will result in better management of the tropical tuna fisheries in ICCAT's mandate.

## OTHER THIRD PARTIES INVOLVED (INCLUDING OTHER DONORS, OTHER GOVERNMENT AGENCIES OR LOCAL GOVERNMENT UNITS, NGOS)

The FADURPE Consortium in Brazil is organizing tagging at sea and awareness-raising and tag-recovery activities. It comprises a large network of organizations and NGOs including; DEPAq, LATEP, UFPRE, and UFERSA. In Cabo Frio an NGO called **Projeto Albatroz** is working closely with AOTTP tagging and tag-recovery teams, providing logistical support.

AOTTP also works extensively with the Observer Programs in the target countries.

In Abidjan, Dakar, and Tema the TROs must liaise daily with the Port Authorities to gain access to harbors and fishing vessels. They have also done awareness-raising activities at the tuna canning factories building relationships with their staff.

AOTTP has carried out exchanges of samples with CISEF and the University of Cape Town (UCT), mutually benefiting all parties. Members of CISEF and UCT have sent whole otoliths from very large BET and YFT to AOTTP for ageing, AOTTP will share the resulting data and return the prepared slides when done. In addition, AOTTP has sent CISEF 30 YFT otolith samples from very young fish/short term recaptures caught in the Gulf of Guinea to be analyzed for isotopic signatures and determine natal origin. Results will improve our understanding of stock structure of YFT in the Atlantic, thus benefiting the stock assessment process.

## WHERE APPLICABLE, OUTLINE ANY LINKS AND SYNERGIES YOU HAVE DEVELOPED WITH OTHER PROJECTS, ESPECIALLY THOSE FUNDED BY THE EUROPEAN UNION.

In January 2019, AOTTP was invited by IATTC to attend a meeting to discuss implementation of large-scale tuna tagging programs. IATTC benefitted from hearing about the AOTTP experience as AOTTP provided expert advice and guidance on what mistakes to avoid. AOTTP also benefitted from the presence of other tuna RFMOs and national agencies (e.g. NRIFSF). In addition, Dan Fuller from the IATTC volunteered to age an OTC-marked AOTTP sample as a long-time expert in daily ageing of tropical tunas. His results helped advance the validation work being conducted by AOTTP.

In September 2018, AOTTP met with the vice-president of ISSF, an NGO self-described as serving as a "global bridge among industry, environmental stakeholders, scientists, and RFMOs and their members." ISSF provided AOTTP advice on how to reach the industry community and expressed interest in sponsoring the participation

of early career scientists at the AOTTP Final Symposium. AOTTP also provided ISSF (Jefferson Morhua) with a some maps and data summarizing the AOTTP project for regular presentation at the **ISSF Skippers Workshops** which reached 700 participants in 2018.

AOTTP is working productively with the **Blue Belt** in the BOTs of Ascension and St Helena. The Blue Belt programme has tagged fish in both these locations. When Blue Belt tags are found by AOTTP TROs the rewards are paid and (release and recovery) data shared.

In March 2019 AOTTP was approached by José L Varela from Cadiz University offering to tag SKJ in the Gulf of Cadiz using sport and recreational fishers. The offer was accepted and AOTTP sent tags and applicators. Similarly, during the SCRS Species Group meeting in September we were approached by Dr Karina Ramírez López from Instituto Nacional de Pesca y Acuacultura in Mexico who offered to do some tag-seeding experiments for AOTTP in the Gulf of Mexico which was also accepted. AOTTP Coordination (Jesus Garcia) prepared some tags for her and provided her with training in data submission.

**Dr Barbara Block** from Monterey Aquarium in the USA visited AOTTP partners in St Helena and joined them in some tagging activities, particularly in relation to pop-up tagging. The team there was grateful for the input and advice.

## IF YOUR ORGANISATION HAS RECEIVED PREVIOUS EU GRANTS IN VIEW OF STRENGTHENING THE SAME TARGET GROUP, IN HOW FAR HAS THIS ACTION BEEN ABLE TO BUILD UPON/COMPLEMENT THE PREVIOUS ONE(S) ? (LIST ALL PREVIOUS EU GRANTS).

ICCAT receives funding for GBYP from the European Union, and there are synergies in view of strengthening the same target groups. ICCAT, AOTTP, SCRS and GBYP Coordination collaborate to coordinate effort and activities where possible.

## VISIBILITY

The EU logo and funding statement are always clearly visible on all AOTTP communication materials including websites, flyers, pamphlets, posters, reports, newsletters, t-shirts, and caps. The materials can be seen at harbours, at fishing beaches, and on-board fishing and recreational vessels throughout AOTTP target countries.

AOTTP, together with the ICCAT Secretariat, has developed a **website** packed with regularly updated information about the project.

AOTTP Coordination publishes **quarterly newsletters** about the project which, in addition to being available on the website , are also sent by email to all our partners working on the project.

The AOTTP final symposium will provide visibility and has been announced at various platforms, including: the European Tuna Conference, the IATTC meeting, the Tuna Conference and ICCAT SCRS meetings. A webpage is in development and will be distributed widely to increase visibility.

AOTTP has been formally presented at many different fora around the Atlantic Coastal States, including:

- ICCAT WG on Tropical Tunas Species Group (Doug Beare, Lisa Ailloud, Madrid, September 2018)
- ICCAT SCRS Plenary (Doug Beare, Madrid, September 2018)
- ICCAT Commission meeting (David Die, Dubrovnik, November 2018)
- European User Conference on Argos Wildlife - AOTTP summary presentation (Doug Beare, Toulouse, 22 November 2019)

- IATTC tuna tagging program - four presentations on AOTTP (Lisa Ailloud, San Diego, January 2019)
- Public presentation of AOTTP (Doug Beare, Serena Wright, St Helena, January 2019)
- ICCAT YFT data preparatory meeting - AOTTP summary presentation (Doug Beare, Madrid, April 2019)
- ICCAT YFT data preparatory meeting - tag shedding and mortality estimation (Lisa Ailloud, Madrid, April 2019)
- AOTTP Exhibition Stand at the European Tuna Conference (Doug Beare, Lisa Ailloud, Brussels, May 2019)
- The Tuna Conference – AOTTP summary presentation (Doug Beare, California, May 2019)
- ICCAT Intersessional meeting on Small Tunas (Fambaye Ngom, Portugal, June 2019)

ICCAT-AOTTP is directing its communication activities/materials/products at the following three main target groups or audiences:

- Direct stakeholders who actually work in the commercial fishing, recreational fishing, and fish-processing industries. This group depends most directly on tuna resources in the Atlantic and is most likely to actually find and report the discovery of a tagged fish
- Marine/fisheries scientists (includes ICCAT CPC representatives at the SCRS, and AOTTP Steering Committee) who will analyze and interpret the AOTTP tagging data, using them to make improved estimates of stock abundance.
- Policy/decision-makers concerned with the actual management (population assessment, quota-setting etc.) of tropical tuna fisheries.
- NGOs, donors, and the general public primarily concerned with sustainable exploitation, socio-economic issues and conservation.

Each of these four audiences is clearly very distinct from the other, and each will require different communication and messaging strategies. These are outlined in detail in the Communication Plan available on request.

AOTTP has already been published widely on the internet, e.g.:

- **Safari News**
- **ARGOS-CLS**
- **Sail World**
- **NOAA**
- **Saving Seafood**
- **Skiboat**
- **St Helena**
- **Terramar Project**

Many of our partners have made videos and uploaded them to YouTube, eg. :

- **Senegal (AZTI)**;
- **Northern Brazil (FADURPE)**;
- **Central Brazil (FADURPE)**;

- Senegal (CRODT);

AOTTP video Training Tutorials etc. can be found here:

- https://www.youtube.com/watch?v=BKEZKf4Vya0
- https://www.youtube.com/watch?v=EXx5Yf0NHBI&t=70s
- https://www.youtube.com/watch?v=8UF2Vp-XFKw&t=21s

## PROPOSED AOTTP WORKPLAN 2019 – 2020 BY ACTIVITY

### NO-COST 5 MONTH EXTENSION OF AOTTP

The AOTTP was originally conceived as a 5-year duration project beginning at the end of June 2015. Due to an administrative delay, however, AOTTP activities did not start until 23 November 2015, cutting the project short by 5 months, and potentially compromising its results of the project. Tagged fish are continually being recovered, and in other large oceanic tagging campaigns conventionally tagged tropical tuna have been recovered over 10 years or more at sea. Such recoveries are often the most scientifically valuable. Long-term recoveries of chemically tagged fish are particularly important and if budget is sufficient AOTTP Coordination recommends paying the salaries of the otolith readers that have been hired by the TROs in Dakar and Abidjan for a further five months corresponding to the duration of the AOTTP no-cost extension that has been confirmed.

Another particularly important part of the project will be its formal scientific output, ie. peer-reviewed papers. AOTTP is organizing a large (150 participants) Final Symposium in Dakar, Senegal in June 2020. The date for the Consortium had to be pushed forward as much as possible in order to analyze the results from the programme and prepare presentations and manuscripts. The work presented at the AOTTP Symposium will be combined into a Special Volume of Fisheries Research containing at least 20 scientific manuscripts for peer-review. They will require organizing, reviewing, editing, translating, and AOTTP Coordination will have a vitally important role. If AOTTP ended at the end of June 2020 there would have been insufficient time remaining to do this effectively. The finalization of pending invoices that are outstanding was also an important point to consider.

AOTTP Coordination, therefore, met with the Project Officer (Isabelle Viallon) and other EU officials at a coordination meeting in September 2018 where progress on the project was discussed, together with the necessary procedures required to formally apply for a 5 months no-cost extension. At the same time some changes to the budget lines were requested by AOTTP Coordination (i.e., a budget amendment). Ultimately, in early 2019, the EU agreed to allow a budget amendment and extend the duration of the AOTTP Project (at no extra cost) so that it formally now finishes on 30 November 2020 giving the project a full 60 months duration.

The principal two objectives of this extension are: (a) to provide 'parachute' payments (until additional funding can be secured) to the Tag Recovery Offices around the Atlantic so that tag-recoveries continue to be made, rewards continue to be distributed, and metadata continue to flow into the ICCAT database; and (b) to ensure that all the results of the project presented at the AOTTP Final Symposium are published properly in the peer-reviewed scientific literature.

### A1.1-TAGGING OF TUNAS (2019-2020)

AOTTP has now tagged *ca* 113000 tropical tuna across the Atlantic Ocean, and the overall objective of 120,000 fish tagged should be achieved by the end of 2019. In USA and Caribbean tagging activity (target = 5000) has

been very slow and will continue probably until first quarter 2020. *Budget*. Since the approval of the budget amendment, 150,000€ was made available to fund additional tagging of 2500 tuna, north of Brazil between 5 and 10° N. This work was targeted to fill in specific gaps deemed important by the Steering Committee.

### A1.2-AWARENESS CAMPAIGNS AND RECOVERY SCHEMES (2019-2020)

Activity A1.2 will continue as normal to the end of the project, but the most important (numbers of tag-recoveries) TRO/Focal Point contracts will be extended corresponding to the duration of the extension (5 months). Reward payments will continue to be refunded, for a further 5 months, and t-shirts/caps will be distributed. *Budget*. The necessary funds have been reallocated from other budget lines (e.g. Travel & Human resources).

### A1.3-TAG RECOVERY AND TRANSMISSION TO ICCAT SECRETARIAT (2019-2020)

The TROs and Focal points around the Atlantic Coastal states send tag recovery data to AOTTP Coordination regularly in a standard template via the smartphone application Telegram. Activity A1.3 will also continue as normal, and at the most important TRO offices for a further 5 months, i.e. data will continue to be sent to AOTTP Coordination. AOTTP-ICCAT will also organize, together with GBYP, for a specialist consultant to help us organize an Atlantic wide electronic tag database for all of ICCAT´s tags. *Budget*. Necessary funds have been reallocated from other budget lines (e.g. Travel & Human resources) to finance these extensions.

### A2.1-READING OF HARD PARTS (2019-2020)

8628 fish have been chemically tagged, and 946 recovered. Otolith reference collections (containing both physical and digital records) have been created for all 3 tropical tuna species in Brazil and Senegal. Hard part analysis meetings have been held in Dakar in November 2018 and in March 2019.

At the first of these meetings (Dakar, November 2018) all the practical details of age-determination were discussed and a detailed workplan was articulated (**Table 12.**)

**Table 12. A2.1 plan articulated in Dakar, November 2018**

| Theme | When | Activity | Status |
|---|---|---|---|
| Validation | Q4 2018 | Work up all samples (All where red-tagged fish have been bought). Jesus/Lisa to distribute email/tutorials etc. to help with data upload to biological database. TROs to update Biological Database (red tagged fish). | Done. |
| Validation | Q4 2018 | Explore Biological Database and communicate back to TROs which samples (red tagged, 100 per species) should be sent to Fish Ageing Services (FAS), cleaned and in phials. Samples must be representative. ICCAT/AOTTP will refund the cost of courier. | Done. |
| Validation | Q1 2019 | FASs send data and return prepared microscope slides and digital records to ICCAT HQ. YFT will be prioritized but BET & SKJ also sent. | Done. |
| Validation/Reference Set | Q1-Q2 2019 | 2nd AOTTP hard part coordination meeting Dakar. Analyses of validation results, shared via correspondence before workshop. Draft document with recommendations resulting from analysis | Done. |

| | | | |
|---|---|---|---|
| | | of validated parts. Finalize Reference Sets. Draft and agree upon reading/interpretation protocol. | |
| Reference set | Q4 2018 | AOTTP to create ageing database and share with Khady and Guelson for data upload. | Done. |
| Reference set | Q3 2018 | Priority YFT but goal is to have 1 reference set per species. Procure 6 > 140cm FL fish (Abidjan/Dakar)? Standard biological sampling of all fish. Note, Brazil has some large ones (frozen) yet to work up. | Done. |
| Reference set | Q3 2018 | Procure < 40 cm FL fish. Dakar has circa 5 <40cm YFT. AZTI to freeze any <40cm YFT/BET, bring them ashore, and give to Khady (or extract otoliths directly and send to Khady). | Done. |
| Reference set | Q3 2018 | Exchange most up to date subset of reference set (prepared slides) between Senegal and Brazil. Prioritize YFT for blind (annual and daily, where applicable) reading. ICCAT to refund/pay postage costs. 3 large/old (>100cm FL) individuals for each species from each reference set read annually and daily. | Done. |
| Reference set | Q1 -Q2 2019 | Reference sets completed and prepared slides sent for cross readings between Senegal and Brazil. | Done. |
| Reference set | Q1 - Q2 2019 | Third (or fourth) person to read hard parts, providing feedback. | Ongoing. |
| Reference set | Q1 2019 | Two teams (and experts) bring data and remaining slides to the meeting. | Ongoing. |
| Routine-Ageing | Q4 2018 | Procure equipment (microscopes, saws, etc.) for Abidjan/Dakar. | Done. |
| Routine-Ageing | Q4 2018 | Recruit a dedicated sampler and hard-part reader in Dakar and Abidjan. | Done. |
| Routine-Ageing | Q1 - Q2 2020 | Train hard-part readers (new hires in Dakar and Abidjan). Note: New hires to attend Workshop in Dakar in March. | Ongoing |
| Routine-Ageing | Q1 - Q4 2019 | Read representative sample of fish. | Ongoing |
| Routine-Ageing | Q1 - Q4 2019 | Shipping otoliths from other locations to Dakar and Abidjan for reading. | Ongoing |
| Reference set | Q1 2019 - Q4 2020 | Spines, vertebrae etc. for SKJ? Note: this can only be resolved in the future as spine markings are annual. Not yet many OTC marked SKJ at liberty > 1 yr. | Ongoing |

Ultimately age-data for all three tropical tuna species will be available for incorporation into the stock assessment process by the end of the project. AOTTP Coordination is focusing on the priority species for each assessment (e.g. currently YFT). These data will be continually updated as chemically tagged fish with progressively longer times at liberty are caught. The 5 month no-cost extension can only help in this process. *Budget*. Necessary funds have been reallocated from other budget lines (e.g. Travel & Human resources).

## A2.2 AND A3.3 - TAGGING DATA ANALYSES AND TRAINING IN DATA ANALYSIS (2019-2020)

The work will be planned to fit around all the stock assessments scheduled for tropical tunas during 2019 and 2020 (**Table 13, 14 & 15**). *Budget*. The costs for this work (considered particularly important by the Steering Committee) were higher than originally estimated. Hence, we requested that funds be re-allocated from other budget lines.

**Table 13. Activity chronogram: Mortality and Movement Analyses (CISEF Consortium)**

| | | **2019** | | | | | | | | | **2020** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WP | Activities | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S |
| | Kick-off Meeting | | | | | | | | | | | | | | | | | | |
| 1.1 | Estimating M & associated factors | | | | | | | | | | | | | | | | | | |
| 1.2 | Evaluating impact of FADs | | | | | | | | | | | | | | | | | | |
| 1.3 | Evaluating impact of FAD moratorium | | | | | | | | | | | | | | | | | | |
| 2.1 | Exploratory data analyses | | | | | | | | | | | | | | | | | | |
| 2.2 | Modeling | | | | | | | | | | | | | | | | | | |
| 3 | Estimating abundance | | | | | | | | | | | | | | | | | | |
| 4 | Capacity building | | | | | | | | | | | | | | | | | | |

**Table 14. Reporting chronogram: Mortality and Movement Analyses (CISEF Consortium)**

| | 2019 | | | | | | | | 2020 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reporting | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S |
| Inception Report | | | | | | | | | | | | | | | | | | |
| Docs & ppts for data prep meetings | | | | | | | | | | | | | | | | | | |
| Docs & ppts for SCRS 2019 | | | | | | | | | | | | | | | | | | |
| Docs & ppts for AOTTP Symposium 2020 | | | | | | | | | | | | | | | | | | |
| Executive Summary & draft Final Report | | | | | | | | | | | | | | | | | | |

**Table 15. Chronogram: Growth Analyses (VIMS)**

| | 2019 | | | | | | | | 2020 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Task | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J |
| Data processing | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Prepare workshop schedule | ■ | ■ | | | | | | | | | | | | | |
| Develop workshop materials | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | |
| Develop R package | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Conduct 2 workshops (1 in West Africa, 1 in South America) | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Kick off meeting (video-conference) | | ■ | | | | | | | | | | | | | |
| Inception Report (#1) | | ■ | | | | | | | | | | | | | |
| Prepare and present SCRS documents for the Species Group meeting (#2) | | ■ | ■ | ■ | ■ | | | | | | | | | | |
| Prepare and present SCRS documents for the SKJ Data Prep meeting (#3) | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | |
| Submit draft manuscripts for Final Symposium (#4) | | | | | | | | | | | | ■ | | | |
| Travel to Final Symposium to present results (#5) | | | | | | | | | | | | | | ■ | |
| Revise manuscripts for publication | | | | | | | | | | | | | ■ | ■ | ■ |
| Draft Executive Summary (#6) | | | | | | | | | | | | | | | ■ |

## A2.3-INFORMATION OF STAKEHOLDERS (2019-2020)

This relates to the AOTTP Final Symposium which will be held in Dakar, Senegal, 16-18 June 2020. The event will gather scientists and other concerned stakeholders. An Event Manager and Venue will be sought by competitive tender, a 'call' has been drafted, and will be published in July 2019. This Activity has also been supported by the activities described in the main A2.3 section of the current report. Between now and the end of the project A2.3 will also be supported by the following activities:

- AOTTP (Dr Ailloud) will attend the YFT Stock Assessment in Abidjan in July 2020.
- Drs Ailloud and Beare will attend and present AOTTP at the FAO International Symposium on Fisheries Sustainability in Italy in November 2019.
- Dr Beare will attend the ICCAT Commission meeting in Spain in November 2019.
- Drs Ailloud and Beare will attend and present AOTTP at both the SCRS Species Group and Plenary meetings in Madrid in September and October 2019 and 2020.
- Drs Ailloud and Beare will attend both the SKJ Data Preparatory and Stock Assessment meetings in 2020 (probably both in Madrid).
- Mr. J Garcia will travel to TRO offices to resolve outstanding data issues in late 2019 or early 2020.
- The AOTTP Team (Ailloud, Beare, Garcia, Kebe and Pastor) will attend the AOTTP Final Symposium in Dakar in June 2020. Note that AOTTP will also support travel to the Symposium of 5 representatives from the ICCAT Secretariat and the AOTTP Steering Committee.

- The next FAO Committee on Fisheries (COFI) meeting in Rome scheduled for 9-13 July 2020 (COFI 2020).
- AOTTP is preparing a proposal for a Theme Session on Large-scale Oceanic Tagging Programmes for the 2020 ICES Annual Science Conference in Copenhagen. In the case that we are successful the Session will be chaired by AOTTP Coordination and partners and be another opportunity to disseminate the project, see ICES ASC 2020.

## AOTTP TRAVEL PLAN (2019-2020)

**Table 16. AOTTP Travel Plan 2019-2020**

| Motivation | Location | Year |
|---|---|---|
| YFT stock assessment | Ivory Coast | 2019 |
| Training workshop VIMS | S. Africa | 2019 |
| Training workshop VIMS | Mauritania | 2019 |
| Training workshop VIMS | Senegal | 2019 |
| Training workshop VIMS | Côte d'Ivoire | 2019 |
| FAO International Symposium on Fisheries Sustainability | Italy | 2019 |
| ICCAT Commission meeting | Spain | 2019 |
| Electronic Tag Database (consultant travel to Madrid) | Spain | 2019 |
| Training workshop VIMS | Uruguay or Brazil? | 2020 |
| Skipjack data prep | Madrid | 2020 |
| Tuna conference | California | 2020 |
| Final Symposium AOTTP staff | Senegal | 2020 |
| Final Symposium ICCAT staff | Senegal | 2020 |
| Final Symposium AOTTP Steering-Committee | Senegal | 2020 |
| Travel to TRO to resolve outstanding data issues | Dakar | 2020 |
| Travel to TRO to resolve outstanding data issues | Abidjan | 2020 |
| Travel to TRO to resolve outstanding data issues | Tema | 2020 |
| Skipjack stock assessment | Madrid | 2020 |
| FAO Committee on Fisheries (COFI) meeting | Italy | 2020 |
| ICES annual science meeting | Europe | 2020 |

## A3.1-TRAINING IN TAGGING TECHNIQUES AND DATA COLLECTION (2019-2020)

This work is largely complete.

## A3.2-DATA COLLECTION AND SAMPLING AT RECOVERY (2019-2020)

This work is ongoing and will continue until the end of the programme.

### A3.3-TRAINING IN DATA ANALYSIS (2019-2020)

This Activity has been merged with Activity A2.2 see above.

## EXIT STRATEGY

All the data collected will continue to be stored as a component of the ICCAT Secretariat databases and made public. Core AOTTP activities, requiring funding, that would secure the key elements of the AOTTP project are activities A1.2, A1.3, A2.1 and A3.2, see below.

*A1.2-Awareness campaigns & recovery schemes & A1.3-Tag recovery and transmission to ICCAT Secretariat* AOTTP has a number of Tag Recovery Offices (TROs) and Focal Points (FPs) in coastal states around the Atlantic. TROs and FPs collect metadata from tags and send them (using smartphones) regularly to ICCAT. Additionally, TROs organize regular awareness campaigns (e.g. trips to ports/fishing vessels, distributing posters, radio adverts, etc.) and distribute incentives such as cash prizes, t-shirts, caps and mobile phone top-ups. Maintaining these activities would require no more than two persons at ICCAT to scrutinize reports, check tag numbers, verify the data and upload them to the ICCAT database.

*A2.1-Reading of hard parts and A3.2-Data collection and sampling at recovery* AOTTP is currently collecting and analyzing hard parts to provide age-data for the three tropical tuna species. Such data are vital for our understanding of growth and age composition and are currently lacking. AOTTP's plans for these activities are described in detail below. The key consideration for the Exit Strategy revolves around the two new hires in Abidjan and Dakar who are being trained in all aspects of tropical tuna ageing. They are now doing this on a routine basis, working with an experienced network of readers (e.g. Fish Ageing Services), and sending the data regularly to ICCAT in stock assessments. ICCAT-AOTTP is paying their salary for one year at a cost of 7,000€ each. These trained otolith readers will be extremely valuable in future, and their work (and salaries) should be maintained for as long as possible. It would not necessarily depend on any future tagging activity. A large number of chemically tagged fish will have been released by the end of the project. Recovering and dissecting these fish will be crucial in helping validate ageing methods. Expansion of the routine ageing into other countries should also be considered. A Final Evaluation of the programme, by independent experts, is scheduled for the end of 2019 and their report will be useful for crystallizing the Exit Strategy. Along with determining how much funding will be needed to sustain these activities, ICCAT-AOTTP will help identify the key people and institutions who have been particularly successful in their involvement with the AOTTP and whose participation will be crucial in the planning and realization of core activities into the future. Last, lessons learned from the programme will be disseminated at the Final Symposium and ultimately in the form of peer-reviewed publications.

The various tag recovery activities could be achieved for 3 years for less than 112,00€ per annum. AOTTP Coordination has drafted a budget for this activity, based on generous tag-recovery assumptions, which will be presented at the ICCAT Commission Meeing in November 2019.

## ACKNOWLEDGEMENTS

An ocean-wide mark-recapture programme such as AOTTP depends on the hard work and dedication of fishing skippers and crews, financial administration officers, and tagging and tag-recovery teams around the Atlantic. We therefore thank the ICCAT Secretariat (particularly Camille Jean Pierre Manel, Driss Meski, Juan-Antonio Moreno, Miguel Neves dos Santos, Mauricio Ortiz and Paul de Bruyn) for overseeing the administration of the project, the skippers, owners and crews of Acoriana, Aita Fraxku, Albacore, Aldebaran I, Babalou, Back Pearl, Boy, Canyon Runner, Conched Out, Eagle Eye II, El Classico, El Grande Primero, El Macizo, Estrella Dalva, Exile,

Fv Amalia, Fv Extractor, Fv Helena Dorothy, Fv John Melliss, Fv Ocean Wave, Hit N Run, In Gods Hands, Katsushio Maru 8, Kerry-D, Nuevo Batabano I, Ouled Si Mohand, Ponta Calhau, Sinuelo, Slack'd Up, Tarrynamy, Thavisson III, Transmar I, Tuburao Tigre, and Txilamon Ni Son for their work in finding fish, catching bait and the cheerful help given to the tagging teams on board.

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## APPENDICES

### APPENDIX 1

**Appendix 1. AOTTP Tagging Cruises since tagging activity began on Acoriana on 26th June 2016**

| Gearcode | Start time | End time | Vessel name | Zone name | N days |
|---|---|---|---|---|---|
| BB | 2016-06-26 10:40:00 | 2016-06-29 13:27:00 | ACORIANA | Azores | 4 |
| BB | 2016-07-11 07:56:00 | 2016-07-19 11:37:30 | AITA FRAXKU | Senegal | 9 |
| BB | 2016-07-12 14:30:00 | 2016-07-20 10:03:00 | ACORIANA | Azores | 8 |
| BB | 2016-07-23 20:54:00 | 2016-07-27 11:03:00 | ACORIANA | Azores | 4 |
| BB | 2016-07-27 08:00:00 | 2016-07-31 15:02:11 | AITA FRAXKU | Senegal | 5 |
| BB | 2016-08-05 15:02:00 | 2016-08-12 16:56:00 | AITA FRAXKU | Senegal | 8 |

| | | | | | |
|---|---|---|---|---|---|
| BB | 2016-08-12 16:47:00 | 2016-08-12 17:07:00 | ACORIANA | Azores | 1 |
| BB | 2016-08-16 14:14:00 | 2016-08-27 13:02:00 | ACORIANA | Azores | 11 |
| BB | 2016-08-24 12:03:00 | 2016-08-26 09:29:00 | AITA FRAXKU | Senegal | 2 |
| BB | 2016-08-26 15:03:00 | 2016-09-04 09:40:00 | EL GRANDE PRIMERO | Canaries | 9 |
| BB | 2016-08-30 19:24:00 | 2016-08-31 12:28:00 | ACORIANA | Azores | 1 |
| BB | 2016-09-09 11:12:00 | 2016-09-19 12:50:00 | ACORIANA | Azores | 11 |
| BB | 2016-09-11 19:08:00 | 2016-09-18 23:06:00 | EL GRANDE PRIMERO | Canaries | 8 |
| BB | 2016-09-20 00:09:00 | 2016-09-26 14:46:00 | EL MACIZO | Canaries | 7 |
| BB | 2016-09-24 12:29:00 | 2016-09-30 14:08:00 | ACORIANA | Azores | 7 |
| BB | 2016-09-25 07:20:00 | 2016-10-02 10:26:00 | EL GRANDE PRIMERO | Canaries | 8 |
| BB | 2016-10-04 01:00:00 | 2016-10-12 01:00:00 | EL MACIZO | Canaries | 8 |
| BB | 2016-10-09 09:38:00 | 2016-10-16 15:29:00 | EL GRANDE PRIMERO | Canaries | 8 |
| BB | 2016-10-16 01:00:00 | 2016-10-23 01:00:00 | EL MACIZO | Canaries | 7 |
| BB | 2016-10-23 09:05:00 | 2016-10-30 10:20:00 | EL GRANDE PRIMERO | Canaries | 8 |
| BB | 2016-10-27 01:00:00 | 2016-11-01 01:00:00 | EL MACIZO | Canaries | 6 |
| BB | 2016-10-27 08:07:00 | 2017-03-04 15:31:00 | AITA FRAXKU | G. of Guinea | 129 |
| BB | 2016-11-05 12:50:00 | 2016-11-06 19:25:00 | EL GRANDE PRIMERO | Canaries | 2 |
| BB | 2016-11-05 12:55:00 | 2016-11-05 12:55:00 | EL MACIZO | Canaries | 1 |
| BB | 2016-11-11 08:50:00 | 2016-11-16 10:34:00 | AITA FRAXKU | G. of Guinea | 6 |
| BB | 2017-02-05 08:14:00 | 2017-02-08 20:53:00 | TARRYNAMY | S. Africa | 4 |
| BB | 2017-02-15 20:13:00 | 2017-02-17 19:01:00 | TARRYNAMY | S. Africa | 2 |
| BB | 2017-03-01 08:33:00 | 2017-03-04 14:34:00 | TARRYNAMY | S. Africa | 4 |
| BB | 2017-03-15 13:32:00 | 2017-03-17 13:13:00 | TARRYNAMY | S. Africa | 2 |
| BB | 2017-03-15 16:13:00 | 2017-03-18 17:04:00 | AITA FRAXKU | G. of Guinea | 4 |
| SPOR | 2017-03-16 12:47:00 | 2017-03-16 12:47:00 | AITA FRAXKU | G. of Guinea | 1 |
| BB | 2017-03-21 14:51:00 | 2017-03-30 18:35:00 | TARRYNAMY | S. Africa | 10 |
| BB | 2017-04-02 08:08:00 | 2017-04-04 19:39:00 | TARRYNAMY | S. Africa | 3 |
| BB | 2017-04-06 01:00:00 | 2017-04-12 01:00:00 | ESTRELLA DALVA | Bra-Uru | 6 |
| BB | 2017-04-10 12:28:00 | 2017-04-12 08:21:00 | TARRYNAMY | S. Africa | 2 |
| RR | 2017-04-10 13:07:00 | 2017-05-15 15:38:00 | TUBURAO_TIGRE | Bra-Uru | 36 |
| HL | 2017-04-10 22:00:00 | 2017-04-23 07:00:00 | THAVISSON III | Bra-Uru | 13 |
| HL | 2017-04-12 09:16:00 | 2017-06-06 08:26:00 | TRAMSMAR I | Bra-Uru | 55 |
| BB | 2017-04-18 16:45:00 | 2017-05-05 18:45:00 | KATSUSHIO MARU 8 | Bra-Uru | 18 |
| BB | 2017-04-29 01:00:00 | 2017-05-04 01:00:00 | ESTRELLA DALVA | Bra-Uru | 5 |
| HL | 2017-05-16 12:55:00 | 2017-05-20 06:55:00 | THAVISSON III | Bra-Uru | 4 |
| BB | 2017-05-24 01:00:00 | 2017-05-29 01:00:00 | ESTRELLA DALVA | Bra-Uru | 5 |
| LL | 2017-06-07 14:49:00 | 2017-06-14 16:00:00 | ALDEBARAN_1 | Bra-Uru | 8 |
| RR | 2017-06-09 01:10:00 | 2017-06-20 16:09:00 | TUBURAO_TIGRE | Bra-Uru | 12 |
| BB | 2017-06-22 01:00:00 | 2017-06-25 01:00:00 | ESTRELLA DALVA | Bra-Uru | 3 |

| | | | | | |
|---|---|---|---|---|---|
| HL | 2017-06-28 19:00:00 | 2017-07-04 09:50:00 | THAVISSON III | Bra-Uru | 6 |
| BB | 2017-07-14 09:10:00 | 2017-07-14 12:34:00 | PONTA CALHAU | Azores | 1 |
| BB | 2017-07-18 12:31:00 | 2017-07-19 09:47:00 | PONTA CALHAU | Azores | 1 |
| BB | 2017-07-23 01:00:00 | 2017-07-26 01:00:00 | ESTRELLA DALVA | Bra-Uru | 3 |
| BB | 2017-07-23 08:25:00 | 2017-07-26 10:11:00 | PONTA CALHAU | Azores | 4 |
| LL | 2017-08-02 06:27:00 | 2017-08-09 12:03:00 | OULED SI MOHAND | Bra-Uru | 8 |
| TROL | 2017-08-15 11:40:00 | 2017-08-15 11:40:00 | SINUELO | Bra-Uru | 1 |
| HL | 2017-08-17 08:25:00 | 2017-08-30 18:29:00 | THAVISSON III | Bra-Uru | 14 |
| BB | 2017-08-25 01:00:00 | 2017-08-29 01:00:00 | ESTRELLA DALVA | Bra-Uru | 4 |
| RR | 2017-09-16 10:08:00 | 2017-09-22 11:08:00 | TUBURAO_TIGRE | Bra-Uru | 7 |
| BB | 2017-09-25 01:00:00 | 2017-09-28 15:00:00 | PONTA CALHAU | Azores | 4 |
| TROL | 2017-09-26 01:00:00 | 2017-09-26 01:00:00 | SINUELO | Bra-Uru | 1 |
| LL | 2017-09-28 08:44:00 | 2017-10-11 11:39:00 | OULED SI MOHAND | Bra-Uru | 14 |
| BB | 2017-10-04 01:00:00 | 2017-10-07 01:00:00 | ESTRELLA DALVA | Bra-Uru | 3 |
| HL | 2017-10-06 09:00:00 | 2017-10-14 08:50:00 | TRAMSMAR I | Bra-Uru | 8 |
| BB | 2017-11-04 07:10:00 | 2017-11-17 18:15:00 | KATSUSHIO MARU 8 | Bra-Uru | 14 |
| HL | 2017-11-07 09:00:00 | 2017-11-11 16:16:00 | THAVISSON III | Bra-Uru | 5 |
| BB | 2017-11-30 01:00:00 | 2017-12-10 01:00:00 | KATSUSHIO MARU 8 | Bra-Uru | 10 |
| HL | 2017-12-02 15:55:00 | 2017-12-04 20:55:00 | THAVISSON III | Bra-Uru | 3 |
| LL | 2017-12-03 06:27:00 | 2017-12-11 09:03:00 | OULED SI MOHAND | Bra-Uru | 9 |
| BB | 2017-12-17 13:00:00 | 2017-12-28 14:50:00 | KATSUSHIO MARU 8 | Bra-Uru | 12 |
| RR | 2017-12-18 15:52:00 | 2017-12-21 17:44:00 | TUBURAO_TIGRE | Bra-Uru | 4 |
| HL | 2018-01-23 01:00:00 | 2018-02-03 16:09:00 | TRAMSMAR I | Bra-Uru | 12 |
| LL | 2018-01-25 06:55:00 | 2018-02-03 08:54:00 | OULED SI MOHAND | Bra-Uru | 10 |
| SPOR | 2018-02-26 18:08:00 | 2018-02-26 18:08:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-02-27 01:00:00 | 2018-03-08 01:00:00 | KATSUSHIO MARU 8 | Bra-Uru | 9 |
| LL | 2018-02-27 07:45:00 | 2018-03-08 07:00:00 | OULED SI MOHAND | Bra-Uru | 9 |
| SPOR | 2018-02-28 11:56:00 | 2018-02-28 13:37:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-03-01 16:30:00 | 2018-03-06 15:00:00 | ESTRELLA DALVA | Bra-Uru | 5 |
| SPOR | 2018-03-03 00:02:00 | 2018-03-03 23:59:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-03-06 10:39:00 | 2018-03-06 16:13:00 | LEVANA | G. of Guinea | 1 |
| BB | 2018-03-08 16:22:00 | 2018-03-08 17:22:00 | LEVANA | G. of Guinea | 1 |
| BB | 2018-03-09 17:23:00 | 2018-03-09 18:16:00 | LEVANA | G. of Guinea | 1 |
| BB | 2018-03-16 11:01:00 | 2018-03-16 20:22:00 | LEVANA | G. of Guinea | 1 |
| BB | 2018-03-22 23:00:00 | 2018-03-22 23:00:00 | ALBACORE | G. of Guinea | 1 |
| HL | 2018-03-24 01:00:00 | 2018-04-06 12:55:00 | THAVISSON III | Bra-Uru | 14 |
| BB | 2018-03-24 07:30:00 | 2018-04-16 17:20:00 | KATSUSHIO MARU 8 | Bra-Uru | 24 |
| BB | 2018-03-24 22:00:00 | 2018-03-24 22:00:00 | ALBACORE | G. of Guinea | 1 |
| LL | 2018-03-25 04:20:00 | 2018-04-02 10:12:00 | OULED SI MOHAND | Bra-Uru | 9 |

| | | | | | |
|---|---|---|---|---|---|
| BB | 2018-03-30 22:00:00 | 2018-03-30 22:00:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-03-31 22:00:00 | 2018-03-31 22:00:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-04-05 01:00:00 | 2018-04-10 01:00:00 | ESTRELLA DALVA | Bra-Uru | 5 |
| BB | 2018-04-07 21:12:00 | 2018-04-07 22:46:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-04-13 23:20:00 | 2018-04-13 23:20:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-04-14 23:00:00 | 2018-04-14 23:00:00 | ALBACORE | G. of Guinea | 1 |
| HL | 2018-04-16 10:30:00 | 2018-04-21 18:16:00 | THAVISSON III | Bra-Uru | 6 |
| BB | 2018-04-16 15:20:00 | 2018-04-16 15:20:00 | ALBACORE | G. of Guinea | 1 |
| HL | 2018-04-25 15:04:00 | 2018-05-15 15:49:00 | TRAMSMAR I | Bra-Uru | 21 |
| BB | 2018-05-01 15:00:00 | 2018-05-10 17:55:00 | KATSUSHIO MARU 8 | Bra-Uru | 10 |
| BB | 2018-05-03 20:09:00 | 2018-05-03 20:09:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-05-10 01:00:00 | 2018-05-16 01:00:00 | ESTRELLA DALVA | Bra-Uru | 6 |
| HL | 2018-05-12 19:16:00 | 2018-05-18 23:38:00 | THAVISSON III | Bra-Uru | 7 |
| BB | 2018-05-19 21:12:00 | 2018-05-19 21:21:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-05-28 23:00:00 | 2018-05-28 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-05-29 23:00:00 | 2018-05-29 23:00:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-05-30 23:00:00 | 2018-05-30 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-05-31 07:00:00 | 2018-05-31 11:46:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2018-05-31 23:00:00 | 2018-05-31 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-02 23:00:00 | 2018-06-02 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-04 23:00:00 | 2018-06-04 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-05 08:07:00 | 2018-06-08 09:26:00 | FV AMALIA | Santa Elena | 4 |
| BB | 2018-06-05 08:45:00 | 2018-06-05 14:10:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2018-06-05 21:00:00 | 2018-06-05 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-06 21:00:00 | 2018-06-06 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-07 07:00:00 | 2018-06-13 11:10:00 | FV EXTRACTOR | Santa Elena | 7 |
| BB | 2018-06-07 23:00:00 | 2018-06-07 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| TROL | 2018-06-08 08:58:00 | 2018-06-09 13:40:00 | TXILAMON NI SON | G. of Guinea | 2 |
| BB | 2018-06-09 22:00:00 | 2018-06-09 22:00:00 | EL CLASSICO | G. of Guinea | 1 |
| HL | 2018-06-10 00:05:00 | 2018-06-16 16:05:00 | THAVISSON III | Bra-Uru | 7 |
| BB | 2018-06-11 22:00:00 | 2018-06-11 22:00:00 | ALBACORE | G. of Guinea | 1 |
| BB | 2018-06-12 09:00:00 | 2018-06-12 13:40:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2018-06-13 22:00:00 | 2018-06-13 22:00:00 | ALBACORE | G. of Guinea | 1 |
| TROL | 2018-06-14 08:14:00 | 2018-06-14 14:54:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-06-15 07:20:00 | 2018-06-17 15:31:00 | TXILAMON NI SON | G. of Guinea | 3 |
| BB | 2018-06-15 08:30:00 | 2018-06-15 13:35:00 | FV JOHN MELLIS | Santa Elena | 1 |
| BB | 2018-06-15 23:00:00 | 2018-06-15 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-16 09:00:00 | 2018-06-23 17:23:00 | ESTRELLA DALVA | Bra-Uru | 8 |
| BB | 2018-06-16 23:00:00 | 2018-06-16 23:00:00 | EL CLASSICO | G. of Guinea | 1 |

| | | | | | |
|---|---|---|---|---|---|
| BB | 2018-06-17 22:06:00 | 2018-06-20 07:40:00 | PONTA CALHAU | Azores | 3 |
| BB | 2018-06-18 22:00:00 | 2018-06-18 22:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-20 23:00:00 | 2018-06-20 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-06-21 22:00:00 | 2018-06-21 22:00:00 | EL CLASSICO | G. of Guinea | 1 |
| TROL | 2018-06-26 09:52:00 | 2018-06-26 12:45:00 | BOY | G. of Guinea | 1 |
| BB | 2018-06-26 23:00:00 | 2018-06-26 23:00:00 | EL CLASSICO | G. of Guinea | 1 |
| TROL | 2018-06-27 05:00:00 | 2018-06-27 05:35:00 | BOY | G. of Guinea | 1 |
| BB | 2018-06-27 23:00:00 | 2018-07-03 23:00:00 | EL CLASSICO | G. of Guinea | 6 |
| BB | 2018-06-29 09:13:00 | 2018-06-29 11:05:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| TROL | 2018-07-03 14:14:00 | 2018-07-08 19:48:00 | TXILAMON NI SON | G. of Guinea | 6 |
| BB | 2018-07-03 19:00:00 | 2018-07-03 19:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-07-04 20:00:00 | 2018-07-04 20:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-07-05 20:00:00 | 2018-07-05 20:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-07-06 20:00:00 | 2018-07-06 20:00:00 | EL CLASSICO | G. of Guinea | 1 |
| TROL | 2018-07-09 07:58:00 | 2018-07-09 14:57:00 | BOY | G. of Guinea | 1 |
| BB | 2018-07-09 20:00:00 | 2018-07-09 20:00:00 | EL CLASSICO | G. of Guinea | 1 |
| HL | 2018-07-10 11:00:00 | 2018-09-06 10:20:00 | TRAMSMAR I | Bra-Uru | 58 |
| BB | 2018-07-10 21:00:00 | 2018-07-10 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-07-11 21:00:00 | 2018-07-11 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-07-16 09:00:00 | 2018-07-16 11:44:00 | FV CATFISH | Santa Elena | 1 |
| TROL | 2018-07-16 09:09:00 | 2018-07-16 12:18:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-07-17 10:00:00 | 2018-07-24 16:52:00 | TXILAMON NI SON | G. of Guinea | 8 |
| TROL | 2018-07-19 09:06:00 | 2018-07-19 17:40:00 | BOY | G. of Guinea | 1 |
| SPOR | 2018-07-23 00:30:00 | 2018-07-23 23:30:00 | CANYON RUNNER | USA | 1 |
| BB | 2018-07-23 11:01:00 | 2018-07-23 13:03:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2018-07-24 08:43:00 | 2018-07-24 10:28:00 | FV CATFISH | Santa Elena | 1 |
| TROL | 2018-07-24 09:32:00 | 2018-07-24 17:29:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-07-26 10:30:00 | 2018-07-26 12:10:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-07-27 10:01:00 | 2018-07-27 19:22:00 | BOY | G. of Guinea | 1 |
| BB | 2018-07-30 09:10:00 | 2018-07-30 09:42:00 | FV CATFISH | Santa Elena | 1 |
| TROL | 2018-07-30 12:01:00 | 2018-07-30 14:57:00 | BOY | G. of Guinea | 1 |
| BB | 2018-08-01 09:04:00 | 2018-08-05 07:55:00 | PONTA CALHAU | Azores | 4 |
| TROL | 2018-08-01 10:40:00 | 2018-08-01 17:11:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-08-01 12:08:00 | 2018-08-15 17:13:00 | TXILAMON NI SON | G. of Guinea | 15 |
| BB | 2018-08-02 01:00:00 | 2018-08-02 01:00:00 | FV SEAHORSE | Santa Elena | 1 |
| BB | 2018-08-03 01:00:00 | 2018-08-03 01:00:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| TROL | 2018-08-03 02:28:00 | 2018-08-03 16:11:00 | BOY | G. of Guinea | 1 |
| BB | 2018-08-03 03:36:00 | 2018-08-12 20:42:00 | FV AMALIA | Santa Elena | 10 |
| BB | 2018-08-08 09:00:00 | 2018-08-10 15:10:00 | PONTA CALHAU | Azores | 3 |

| | | | | | |
|---|---|---|---|---|---|
| TROL | 2018-08-20 11:20:00 | 2018-08-20 11:20:00 | TXILAMON NI SON | G. of Guinea | 1 |
| BB | 2018-08-22 16:10:00 | 2018-08-24 22:33:00 | PONTA CALHAU | Azores | 3 |
| TROL | 2018-08-23 08:04:00 | 2018-08-23 18:32:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-08-28 09:06:00 | 2018-09-10 11:17:00 | TXILAMON NI SON | G. of Guinea | 14 |
| TROL | 2018-09-10 13:49:00 | 2018-09-10 17:48:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-09-13 09:15:00 | 2018-09-13 17:25:00 | BOY | G. of Guinea | 1 |
| TROL | 2018-09-14 16:28:00 | 2018-10-01 17:33:00 | TXILAMON NI SON | G. of Guinea | 18 |
| BB | 2018-09-15 21:00:00 | 2018-09-15 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| TROL | 2018-09-16 12:05:00 | 2018-09-16 12:23:00 | BOY | G. of Guinea | 1 |
| BB | 2018-09-17 21:00:00 | 2018-09-17 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| TROL | 2018-09-19 15:35:00 | 2018-09-19 15:37:00 | BOY | G. of Guinea | 1 |
| HL | 2018-10-03 08:36:00 | 2018-10-22 15:40:00 | TRAMSMAR I | Bra-Uru | 20 |
| BB | 2018-10-05 09:45:00 | 2018-10-12 09:30:00 | FV AMALIA | Santa Elena | 7 |
| BB | 2018-10-05 17:31:00 | 2018-10-14 20:15:00 | AITA FRAXKU | Senegal | 10 |
| BB | 2018-10-07 08:29:00 | 2018-10-13 17:30:00 | NUEVO BATABANO I | Canaries | 7 |
| BB | 2018-10-09 21:00:00 | 2018-10-09 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| TROL | 2018-10-11 07:49:00 | 2018-10-23 11:14:00 | TXILAMON NI SON | G. of Guinea | 13 |
| BB | 2018-10-12 12:45:00 | 2018-10-13 09:12:00 | AITA FRAXKU | Senegal | 1 |
| BB | 2018-10-13 10:45:00 | 2018-10-20 20:55:00 | EL GRANDE PRIMERO | Canaries | 8 |
| TROL | 2018-10-14 15:50:00 | 2018-10-24 11:01:00 | TXILAMON NI SON | G. of Guinea | 10 |
| BB | 2018-10-15 21:00:00 | 2018-10-15 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-10-19 10:45:00 | 2018-10-27 21:00:00 | NUEVO BATABANO I | Canaries | 9 |
| BB | 2018-10-21 11:05:00 | 2018-10-30 10:16:00 | AITA FRAXKU | Senegal | 10 |
| TRAP | 2018-10-23 10:30:00 | 2018-10-23 11:00:00 | ARAGAO | Canaries | 1 |
| BB | 2018-10-26 11:43:00 | 2018-10-31 11:50:00 | FV AMALIA | Santa Elena | 6 |
| BB | 2018-10-26 12:50:00 | 2018-11-03 07:45:00 | EL GRANDE PRIMERO | Canaries | 8 |
| TROL | 2018-10-29 16:42:00 | 2018-11-07 17:24:00 | TXILAMON NI SON | G. of Guinea | 10 |
| BB | 2018-11-01 21:00:00 | 2018-11-01 21:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-05 08:41:00 | 2018-11-05 09:21:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2018-11-07 09:25:00 | 2018-11-13 07:45:00 | FV AMALIA | Santa Elena | 6 |
| BB | 2018-11-07 12:00:00 | 2018-11-07 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-11 08:30:00 | 2018-11-13 15:14:00 | AITA FRAXKU | Senegal | 3 |
| BB | 2018-11-13 12:00:00 | 2018-11-13 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-14 01:00:00 | 2018-11-14 08:15:00 | EL GRANDE PRIMERO | Canaries | 1 |
| BB | 2018-11-16 12:00:00 | 2018-11-16 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-18 10:12:00 | 2018-11-18 12:12:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2018-11-18 12:00:00 | 2018-11-18 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-21 07:23:00 | 2018-11-25 09:50:00 | FV AMALIA | Santa Elena | 5 |
| BB | 2018-11-21 12:00:00 | 2018-11-21 12:00:00 | EL CLASSICO | G. of Guinea | 1 |

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|---|---|---|---|---|---|
| BB | 2018-11-22 12:00:00 | 2018-11-22 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| LL | 2018-11-26 10:38:00 | 2018-12-18 12:56:00 | ALDEBARAN_1 | Bra-Uru | 23 |
| BB | 2018-11-26 12:00:00 | 2018-11-26 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-27 12:00:00 | 2018-11-27 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-28 12:00:00 | 2018-11-28 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-29 12:00:00 | 2018-11-29 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-11-30 12:00:00 | 2018-11-30 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-01 12:00:00 | 2018-12-01 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-04 12:00:00 | 2018-12-04 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-05 12:00:00 | 2018-12-05 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-06 07:10:00 | 2018-12-06 11:30:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2018-12-06 12:00:00 | 2018-12-06 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-07 12:00:00 | 2018-12-07 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-08 12:00:00 | 2018-12-08 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-09 08:27:00 | 2018-12-16 12:13:00 | FV EXTRACTOR | Santa Elena | 8 |
| BB | 2018-12-09 08:30:00 | 2018-12-09 13:00:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2018-12-10 12:00:00 | 2018-12-10 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-12 12:00:00 | 2018-12-12 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-13 12:00:00 | 2018-12-13 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-14 12:00:00 | 2018-12-14 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-15 12:00:00 | 2018-12-15 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-16 07:27:00 | 2018-12-16 11:52:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2018-12-16 07:30:00 | 2018-12-16 11:15:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2018-12-17 12:00:00 | 2018-12-17 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-18 12:00:00 | 2018-12-18 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-19 12:00:00 | 2018-12-19 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-21 12:00:00 | 2018-12-21 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-22 12:00:00 | 2018-12-22 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-23 12:00:00 | 2018-12-23 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-23 13:15:00 | 2018-12-23 14:21:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2018-12-24 07:25:00 | 2019-01-14 14:50:00 | FV HELENA DOROTHY | Santa Elena | 22 |
| BB | 2018-12-25 12:00:00 | 2018-12-25 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-26 12:00:00 | 2018-12-26 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-27 12:00:00 | 2018-12-27 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-28 12:00:00 | 2018-12-28 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-29 12:00:00 | 2018-12-29 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-30 12:00:00 | 2018-12-30 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2018-12-31 12:00:00 | 2018-12-31 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-03 12:00:00 | 2019-01-03 12:00:00 | EL CLASSICO | G. of Guinea | 1 |

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|---|---|---|---|---|---|
| BB | 2019-01-04 12:00:00 | 2019-01-04 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-05 12:00:00 | 2019-01-05 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-06 11:01:00 | 2019-01-06 12:06:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2019-01-07 07:12:00 | 2019-01-07 11:40:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-01-07 12:00:00 | 2019-01-07 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-08 12:00:00 | 2019-01-08 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-09 07:36:00 | 2019-01-09 10:57:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-01-09 12:00:00 | 2019-01-09 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-11 08:05:00 | 2019-01-11 11:42:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-01-13 10:44:00 | 2019-01-13 13:27:00 | FV JOHN MELLIS | Santa Elena | 1 |
| BB | 2019-01-14 12:00:00 | 2019-01-14 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-15 08:15:00 | 2019-01-15 14:45:00 | FV JOHN MELLIS | Santa Elena | 1 |
| BB | 2019-01-15 12:00:00 | 2019-01-15 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| SPOR | 2019-05-16 01:00:00 | 2019-05-31 01:00:00 | KERRY-D | USA | 16 |
| BB | 2019-01-16 12:00:00 | 2019-01-16 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-17 12:00:00 | 2019-01-17 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-18 12:00:00 | 2019-01-18 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-21 09:17:00 | 2019-01-21 09:54:00 | FV JOHN MELLIS | Santa Elena | 1 |
| BB | 2019-01-21 12:00:00 | 2019-01-21 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-23 12:00:00 | 2019-01-23 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-24 12:00:00 | 2019-01-24 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-29 12:00:00 | 2019-01-29 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-01-30 12:00:00 | 2019-01-30 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-01 12:00:00 | 2019-02-01 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-02 12:00:00 | 2019-02-02 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-04 12:00:00 | 2019-02-04 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-05 12:00:00 | 2019-02-05 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-06 12:00:00 | 2019-02-06 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-07 12:00:00 | 2019-02-07 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-08 12:00:00 | 2019-02-08 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-09 12:00:00 | 2019-02-09 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-11 09:25:00 | 2019-02-11 12:32:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-02-11 12:00:00 | 2019-02-11 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-12 12:00:00 | 2019-02-12 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-13 12:00:00 | 2019-02-13 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-14 12:00:00 | 2019-02-14 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-15 12:00:00 | 2019-02-15 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-16 12:00:00 | 2019-02-16 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-18 12:00:00 | 2019-02-18 12:00:00 | EL CLASSICO | G. of Guinea | 1 |

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|---|---|---|---|---|---|
| BB | 2019-02-19 12:00:00 | 2019-02-19 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-19 12:00:00 | 2019-02-19 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-20 12:00:00 | 2019-02-20 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-25 12:00:00 | 2019-02-25 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-25 12:00:00 | 2019-02-25 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-26 12:00:00 | 2019-02-26 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-27 12:00:00 | 2019-02-27 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-02-28 12:00:00 | 2019-02-28 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-01 12:00:00 | 2019-03-01 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-02 12:00:00 | 2019-03-02 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-03 08:45:00 | 2019-03-03 11:52:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-03-04 12:00:00 | 2019-03-04 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-05 12:00:00 | 2019-03-05 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-06 12:00:00 | 2019-03-06 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-07 12:00:00 | 2019-03-07 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-10 07:26:00 | 2019-03-10 12:40:00 | FV JOHN MELLIS | Santa Elena | 1 |
| BB | 2019-03-11 12:00:00 | 2019-03-11 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-11 15:25:00 | 2019-03-24 21:50:00 | AITA FRAXKU | Senegal | 14 |
| BB | 2019-03-12 12:00:00 | 2019-03-12 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-13 12:00:00 | 2019-03-13 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-14 12:00:00 | 2019-03-14 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-16 07:00:00 | 2019-03-19 12:27:00 | FV AMALIA | Santa Elena | 4 |
| BB | 2019-03-17 01:00:00 | 2019-03-17 11:30:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2019-03-18 12:00:00 | 2019-03-18 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-19 08:52:00 | 2019-03-19 11:45:00 | FV Ocean Wave | Santa Elena | 1 |
| BB | 2019-03-19 12:00:00 | 2019-03-19 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-20 08:55:00 | 2019-03-20 11:18:00 | FV Ocean Wave | Santa Elena | 1 |
| BB | 2019-03-20 12:00:00 | 2019-03-20 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| SPOR | 2019-03-22 01:00:00 | 2019-03-22 01:00:00 | EXILE | USA | 1 |
| BB | 2019-03-25 12:00:00 | 2019-03-25 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| HL | 2019-03-25 17:26:00 | 2019-04-05 22:01:00 | THAVISSON III | Bra-Uru | 12 |
| BB | 2019-03-26 12:00:00 | 2019-03-26 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-27 12:00:00 | 2019-03-27 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-28 12:00:00 | 2019-03-28 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-29 12:00:00 | 2019-03-29 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-03-30 12:00:00 | 2019-03-30 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-01 04:22:00 | 2019-04-06 22:31:00 | AITA FRAXKU | Senegal | 6 |
| BB | 2019-04-01 07:53:00 | 2019-04-01 13:08:00 | FV JOHN MELLIS | Santa Elena | 1 |
| BB | 2019-04-01 12:00:00 | 2019-04-01 12:00:00 | EL CLASSICO | G. of Guinea | 1 |

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| BB | 2019-04-02 12:00:00 | 2019-04-02 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-03 12:00:00 | 2019-04-03 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-04 12:00:00 | 2019-04-04 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-05 07:10:00 | 2019-04-05 11:51:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-04-05 12:00:00 | 2019-04-05 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-06 12:00:00 | 2019-04-06 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| SPOR | 2019-04-07 01:00:00 | 2019-06-04 01:00:00 | SLACK'D UP | USA | 58 |
| BB | 2019-04-09 12:00:00 | 2019-04-09 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-10 01:17:00 | 2019-04-27 21:50:00 | AITA FRAXKU | Senegal | 18 |
| BB | 2019-04-10 12:00:00 | 2019-04-10 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-11 12:00:00 | 2019-04-11 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-12 07:54:00 | 2019-04-12 10:07:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-04-13 12:00:00 | 2019-04-13 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-16 12:00:00 | 2019-04-16 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-17 12:00:00 | 2019-04-17 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-18 12:00:00 | 2019-04-18 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-19 12:00:00 | 2019-04-19 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-20 12:00:00 | 2019-04-20 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| SPOR | 2019-04-25 01:00:00 | 2019-04-25 01:00:00 | N.D.N.S. | USA | 1 |
| BB | 2019-04-25 08:10:00 | 2019-04-25 10:04:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-04-25 12:00:00 | 2019-04-25 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-26 12:00:00 | 2019-04-26 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| SPOR | 2019-04-27 01:00:00 | 2019-04-27 01:00:00 | Hit n Run | USA | 1 |
| BB | 2019-04-27 12:00:00 | 2019-04-27 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-28 06:48:00 | 2019-04-29 12:24:00 | FV CATFISH | Santa Elena | 2 |
| BB | 2019-04-29 12:00:00 | 2019-04-29 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-04-30 12:00:00 | 2019-04-30 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-01 12:00:00 | 2019-05-01 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-02 12:00:00 | 2019-05-02 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-03 01:00:00 | 2019-05-03 11:15:00 | FV Ocean Wave | Santa Elena | 1 |
| BB | 2019-05-03 12:00:00 | 2019-05-03 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-04 12:00:00 | 2019-05-04 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-05 08:02:00 | 2019-05-05 11:49:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| HL | 2019-05-06 11:17:00 | 2019-05-24 05:48:00 | THAVISSON III | Bra-Uru | 18 |
| BB | 2019-05-06 12:00:00 | 2019-05-06 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-07 12:00:00 | 2019-05-07 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-08 12:00:00 | 2019-05-08 12:00:00 | EL CLASSICO | G. of Guinea | 1 |
| BB | 2019-05-09 09:45:00 | 2019-05-09 11:30:00 | FV CATFISH | Santa Elena | 1 |
| BB | 2019-05-09 11:15:00 | 2019-05-09 11:19:00 | FV HELENA DOROTHY | Santa Elena | 1 |

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| BB | 2019-05-12 08:34:00 | 2019-05-12 12:30:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| LL | 2019-05-14 01:00:00 | 2019-05-14 01:00:00 | Babalou | USA | 1 |
| SPOR | 2019-05-15 01:00:00 | 2019-05-15 01:00:00 | Conched Out | USA | 1 |
| SPOR | 2019-05-17 01:00:00 | 2019-05-17 01:00:00 | In Gods Hands | USA | 1 |
| BB | 2019-05-17 08:00:00 | 2019-05-17 12:00:00 | FV Ocean Wave | Santa Elena | 1 |
| BB | 2019-05-19 09:20:00 | 2019-05-19 12:20:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-05-23 09:55:00 | 2019-05-23 13:56:00 | FV Ocean Wave | Santa Elena | 1 |
| BB | 2019-05-28 09:36:00 | 2019-05-28 15:59:00 | FV Ocean Wave | Santa Elena | 1 |
| BB | 2019-05-30 05:42:00 | 2019-05-30 12:20:00 | FV HELENA DOROTHY | Santa Elena | 1 |
| BB | 2019-06-02 08:14:00 | 2019-06-02 14:50:00 | FV CATFISH | Santa Elena | 1 |

**Appendix 2. Fish tagged and released by AOTTP and partners by Exclusive Economic Zone**

| | BET | LTA | SKJ | WAH | YFT |
|---|---|---|---|---|---|
| **Bahamas EEZ** | 0 | 0 | 1 | 0 | 0 |
| **Bermudian EEZ** | 1 | 0 | 0 | 0 | 59 |
| **Brazilian EEZ** | 2607 | 309 | 15866 | 70 | 6756 |
| **Cameroonian EEZ** | 0 | 3 | 0 | 0 | 0 |
| **Cape Verdean EEZ** | 2628 | 4 | 1261 | 0 | 470 |
| **Cayman Islands EEZ** | 0 | 0 | 1 | 0 | 1 |
| **Disputed Western Sahara/Mauritania** | 1 | 0 | 10 | 0 | 0 |
| **Equatorial Guinean EEZ** | 0 | 334 | 55 | 6 | 455 |
| **Gabonese EEZ** | 0 | 94 | 3 | 0 | 6 |
| **Ghanaian EEZ** | 10 | 0 | 8 | 0 | 140 |
| **Grenadian EEZ** | 0 | 0 | 3 | 0 | 0 |
| **Guinea Bissau EEZ** | 162 | 62 | 78 | 0 | 590 |
| **Guinean EEZ** | 526 | 49 | 658 | 0 | 1081 |
| **Ivory Coast EEZ** | 445 | 3204 | 1322 | 67 | 7879 |
| **Liberian EEZ** | 178 | 0 | 112 | 0 | 335 |
| **Mauritanian EEZ** | 950 | 0 | 2966 | 0 | 1221 |
| **Nigerian EEZ** | 0 | 2 | 1 | 0 | 3 |
| **Portuguese EEZ** | 0 | 77 | 0 | 0 | 0 |
| **Portuguese EEZ (Azores)** | 175 | 1 | 2250 | 0 | 3 |
| **Portuguese EEZ (Madeira)** | 1141 | 0 | 2238 | 0 | 1 |
| **São Tomé and Príncipe EEZ** | 12 | 2916 | 791 | 95 | 2039 |
| **Senegalese EEZ** | 1601 | 356 | 1856 | 1 | 2217 |

| | | | | | |
|---|---|---|---|---|---|
| **Sierra Leonian EEZ** | 299 | 0 | 69 | 0 | 114 |
| **S. African EEZ** | 0 | 0 | 108 | 0 | 87 |
| **Spanish EEZ (Canary Islands)** | 4271 | 0 | 6932 | 0 | 66 |
| **St. Helena EEZ** | 104 | 0 | 571 | 21 | 2424 |
| **United States EEZ** | 0 | 0 | 6 | 0 | 19 |
| **Uruguayan EEZ** | 3 | 0 | 0 | 0 | 12 |
| **Western Saharan EEZ** | 38 | 0 | 20 | 0 | 1 |

**Appendix 3. Fish recovered by AOTTP and partners by Exclusive Economic Zone**

| | BET | LTA | SKJ | WAH | YFT |
|---|---|---|---|---|---|
| **Angolan EEZ** | 0 | 0 | 1 | 0 | 5 |
| **Ascension EEZ** | 2 | 0 | 0 | 0 | 0 |
| **Beninese EEZ** | 2 | 0 | 3 | 0 | 8 |
| **Brazilian EEZ** | 42 | 2 | 125 | 1 | 265 |
| **Cape Verdean EEZ** | 472 | 7 | 128 | 0 | 185 |
| **Equatorial Guinean EEZ** | 0 | 0 | 2 | 0 | 3 |
| **Gabonese EEZ** | 0 | 0 | 0 | 0 | 1 |
| **Gambian EEZ** | 20 | 3 | 9 | 0 | 30 |
| **Ghanaian EEZ** | 14 | 7 | 18 | 0 | 58 |
| **Guinea Bissau EEZ** | 42 | 14 | 31 | 0 | 152 |
| **Guinean EEZ** | 183 | 27 | 184 | 0 | 533 |
| **High Seas** | 1623 | 33 | 533 | 0 | 2370 |
| **Ivory Coast EEZ** | 16 | 289 | 57 | 2 | 1073 |
| **Liberian EEZ** | 33 | 1 | 25 | 0 | 76 |
| **Mauritanian EEZ** | 641 | 26 | 876 | 0 | 844 |
| **Moroccan EEZ** | 6 | 0 | 1 | 0 | 0 |
| **Nigeria - São Tomé and Príncipe Joint** | 0 | 0 | 1 | 0 | 0 |
| **Nigerian EEZ** | 1 | 3 | 0 | 0 | 4 |
| **Portuguese EEZ (Azores)** | 100 | 0 | 63 | 0 | 1 |
| **Portuguese EEZ (Madeira)** | 99 | 0 | 36 | 0 | 0 |
| **São Tomé and Príncipe EEZ** | 1 | 8 | 5 | 0 | 11 |
| **Senegalese EEZ** | 191 | 87 | 400 | 0 | 371 |
| **Sierra Leonian EEZ** | 126 | 14 | 66 | 0 | 295 |
| **S. African EEZ** | 0 | 0 | 0 | 0 | 4 |
| **Spanish EEZ** | 1 | 0 | 0 | 0 | 0 |
| **Spanish EEZ (Canary Islands)** | 472 | 0 | 270 | 0 | 7 |
| **St. Helena EEZ** | 1 | 0 | 1 | 0 | 94 |

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