THE ATLANTIC OCEAN TUNA TAGGING PROGRAM (AOTTP) TASK FORCE WORK PLAN

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SUMMARY

The objective of this document is to establish the basis for the development of the proposal for a global Tagging Program on tropical tunas in the Atlantic. The document presents background information on tagging activities conducted in the past within ICCAT as well as information on similar experience carried out in other oceans. The document also includes a definition of the main objectives of the program and the main components to be developed in the proposal.

ÉSUMÉ

L'objectif du présent document est d'établir les bases de la formulation d'une proposition portant sur un programme de marquage mondial des thonidés tropicaux dans l'Atlantique. Le document présente des informations de référence sur les activités de marquage réalisées par le passé au sein de l'ICCAT ainsi que des informations sur des expériences similaires réalisées dans d'autres océans. Il inclut également une définition des principaux objectifs du programme et des principaux éléments à élaborer dans la proposition.

RESUMEN

El objetivo de este documento es establecer la base para el desarrollo de la propuesta para un programa mundial de marcado de túnidos tropicales en el Atlántico. En el documento se presenta información de referencia sobre actividades de marcado realizadas en el pasado en ICCAT, así como información sobre experiencias similares en otros océanos. El documento incluye también una definición de los principales objetivos del programa y de los principales elementos que se tienen que elaborar en la propuesta.

1 Context

1.1 Tropical tuna catches in the Atlantic

Since the beginning of the fishery in 1950 and until the early-90s, tropical tuna catches in the Atlantic ocean have rapidly increased to reach a peak in 1990, 1991 and 1994 respectively for yellowfin, skipjack and bigeye tuna (**Figure 1**). After these years, catches for all threes species decreased steadily as the stocks reached a level of full exploitation, management measures were introduced and a tuna fishery started in the Indian Ocean (Miyake et al., 2010). During recent years, catch of tropical tunas, and in particular of skipjack have shown an increasing trend, mainly due to the large catches of the purse seine EU-Spain fleet and the development of a purse seine fleet in Ghana.

Three main gears are catching the majority of the tropical tuna in the Atlantic ocean, baitboat, longline and purse seine, the latest being by far the most important as purse seine catches represent more than 50% of the total catch of tropical tuna in the Atlantic ocean since 1975 (**Figure 2**).

The large catches of tropical tunas in the Atlantic ocean, over 300 000 tons since the early 80s, are essential to the economies of some coastal countries of the Atlantic and of some distant water fishing nations and highlight the need for management to ensure the sustainable exploitation of the resources. With slightly less than 400 000 tons in 2011, the Atlantic tropical tuna fishery represents around 10% of the global tropical tuna catches, while the Pacific and the Indian oceans contribute respectively to 78% and 22%.

[1] SCRS Tropical Tuna Species Group, 25-27 September 2009, Madrid

1.2 Management of TT stocks in the Atlantic ocean

The International Commission for the Conservation of Atlantic Tunas (ICCAT) was created in 1966 and is the Regional Fisheries Management Organization (RFMO) responsible for the management of tropical tuna stock, among others, in the Atlantic Ocean and adjacent seas. The ICCAT currently counts 48 Contracting Parties.

As part of its management process, the ICCAT is undertaking regular stock assessments for the three tropical tuna species. The latest assessments were realized for yellowfin in 2011 (data up to 2010), for bigeye in 2010 data up to 2009) and for skipjack in 2008 (data up to 2006), and the stock status were as follow (ICCAT, 2012):

- yellowfin: stock is overfished
- bigeye: not overfished and overfishing is not occurring
- Eastern skipjack: not overfished and overfishing is not occurring.
- Western skipjack: not overfished and overfishing is not occurring

However, it is noted that uncertainty remains high for all three assessments, as some key-parameters of population dynamic, life history and biology, which would improve the results and robustness of the assessments are still missing or largely unknown (ICCAT, 2012, 2010). These include:

- stock structure
- natural mortality
- growth
- movements, *etc.*

These parameters are fishery independent and, as tropical tuna are pelagic species, the best way to estimate them is through the information obtain by tag-recapture experiments. In fact, tagging provide relevant data for stock assessment as well as for the evaluation of fisheries management measures, *e.g.* time-area closure, and has been conducted for many years in tuna fisheries.

1.3 History of tagging programmes under the ICCAT framework

Several tagging experiments have been conducted in the Atlantic Ocean since the mid-1950s, some of them having being implemented under the ICCAT framework. Tagging started in the Atlantic in 1956 with the first experiments being conducted by the USA and South Africa and since then, tropical tunas have been tagged almost every year in the region (Bard, 1989; ICCAT, 1991; Bard and Bannerman, 2002). These tagging experiments were a combination of dedicated projects, with dedicated tagging cruise, and opportunistic tagging activities implemented during commercial operation. Most of the experiments were implemented nationally and ran for short period of time. However, the number of releases and recoveries for each campaign was quite limited (**Figure 3**) and today the information has limited use in the stock assessment. In 2011, the ICCAT developed a central tagging database system (Palma and Kebe, 2009) to store the data that had been collected since the mid-50s. Today, this database contains information on 72012 releases of tagged tropical tuna and 11285 recoveries (**Table 1**).

The central tagging database of ICCAT, however, does not contain information on all tagging experiments conducted in the Atlantic so far, in particular before 1988. In fact, inventories of the annual number of releases in the Atlantic (Bard, 1989; ICCAT, 1991; Bard and Bannerman, 2002) until 1988 include a much large number of releases than currently included in the ICCAT tagging database

In fact, more tagging was undertaken however the data is not yet included in the ICCAT Secretariat, mainly because the recording and storing system were different. Recently, the USA and the Secretariat have worked towards improving tagging data exchanges (ICCAT, 2009).

The lack of a centralized tagging database containing all the relevant tagging data on tropical tuna, but also on other species under the management mandate of ICCAT, does not help to integrate tagging data to stock assessment.

1.3.1 International Skipjack Year Program - ISYP (1978-1982)

Following the large development of a purse seine fleet in the Atlantic Ocean, the ICCAT SCRS recommended in 1976 that a research program was developed to obtain necessary information for a skipjack stock assessment (ICCAT, 1986). This program, the International Skipjack Year Program (ISYP), was a four years program that started in 1978. Among other activities, the ISYP included tagging experiments to which 12 countries participated. In total 35 000 skipjack were tagged during the project (ICCAT, 1986), with more than 85% released in the eastern Atlantic ocean.

1.3.2 Yellowfin Year Program – YYP (1986-1987)

End of 1983 and during 1984, very low yellowfin catch rates were observed in the Atlantic which resulted in the departure of several purse seiners to the growing Indian Ocean fishery. The SCRS recommended to carry out extensive research in order to explain these low catches rates and the consequences on the stock of the reduction of effort that followed (ICCAT, 1991). The YYP included tagging activities in the Eastern Atlantic ocean, however the results were mitigated with only 3 026 fished tagged and released, and 138 recoveries reported to the Secretariat.

1.3.3 Bigeye Year Program – BETYP (1999-2003)

From 1999 to 2003, the ICCAT implemented a dedicated research program on bigeye tuna in order to clarify the stock structure of bigeye tuna and to study the impact of the fisheries on the stocks (Fisch, 2005). The BETYP included dedicated conventional tagging activities in Azores, Madeira, Canary Islands, Senegal, Ghana and São Tome and Principe during which 22 674 tunas were tagged (24.3% BET, 23.1% YFT and 52.6% SKJ). A total of 3 786 tagged fish were recaptured and reported with recovery rates being respectively for bigeye, yellowfin and skipjack of 31.3%, 7.74% and 13.88%. In addition, 42 electronic tags (23 pop-up and 19 archival) were deployed on bigeye tuna.

1.4 Other tagging activities in the Atlantic Ocean

Several other tagging initiatives have been implemented in the Atlantic ocean (ICCAT, 2008).

1.4.1Matte Associées aux Canneurs - MAC (1996-2000)

The Institut de Recherche pour le Développement had developed a four years project in to study the associated school fishing technique in the baitboat fishery based in Dakar, Senegal. Part of this project included tuna tagging during commercial operations onboard baitboat. The tagging effort was reinforce in 1999-2000 with funding from the BETYP project. In total 10 402 tuna were tagged during the MAC project (3 012 BET, 6 715 SKJ and 1 597 YFT), of which 3 181 were recovered and reported (Hallier et al., 2001; Hallier, 2005).

1.4.2 Southeast Fisheries Science Center's Cooperative Tagging Program (CTC)

The Cooperative Tagging Program (CTC) of the Southeast Fisheries Science Center's started in 1954 in the USA and has now tagged more than 200 000 tuna and billfish. The CTC is a program based on voluntary program from anglers and fishing operators.

1.4.3 The Billfish Foundation Tagging Program (TBF)

The Billfish Foundation (TBF) has developed a tagging program targeting billfish since 1990. The TBF is cooperating with the CTC.

1.4.4 National Programs

Some more tagging activities are also implemented at a national level by different institutions in Atlantic coastal countries. These projects are undertaken with dedicated experiments as well as with opportunistic tagging during commercial operations.

1.5 Other example of large-scale tuna tagging programme

Successful large-scale tuna tagging programs have been undertaken in the Pacific and in the Indian Ocean releasing hundreds of thousand of tagged tuna. All of these programs were very successful and have gathered a large amount of data which are now used routinely for stock assessments.

1.5.1Pacific Ocean

In the Pacific ocean, the first tagging project, the skipjack Survey and Assessment Programme (SSAP) was conducted from 1977 to 1981. 150 000 tuna were successfully tagged and release (95%) skipjack with a recapture rate of around 4%. As the purse seine fishery expanded quickly during the 80s, a second large-scale tagging program was conducted in the Pacific, the Regional Tuna Tagging Project (RTTP) which took place between 1989 and 1992. 146550 (67% SKJ, 27% YFT and 6% BET) tuna were tagged and released over a large area of the Pacific Ocean, and recovery rate was around 12.5%, with over 18 000 recoveries reported. In 2006, a new program was conducted under the WCPFC framework, the Pacific Tuna Tagging Programme (PTTP), which lasted 20 months and was prolonged by a second phase lasting 11 months. In 2011, the Papua New Guinea Tagging Project (PNG-TP) started and lasted 3 years, and the last cruise ended in March 2013.

In total, since 2006, almost 400 000 tunas have been tagged and released in the Pacific Ocean, with a recovery rate to date of over 16%.

1.5.2 Indian Ocean

For more than 15 years, scientists have been calling for a large-scale tuna tagging project to be implemented in the Indian Ocean. In 2002, the Indian Ocean Tuna Tagging Programme (IOTTP) started under the supervision of the Indian Ocean Tuna Commission (IOTC). The programme was composed of a large-scale component, the Regional Tuna Tagging Project – Indian Ocean (RTTP-IO), and a suite of complementary small-scale projects, *i.e.* in India, Indonesia, Maldives, Mayotte, *etc.* In total, 201 425 tuna were tagged and released (RTTP-IO: 168 163 - 85%, SS: 33 262) in the Indian Ocean (**Figure 4**), and over 32 300 were recovered to date.

Releases took place mainly in the western Indian Ocean, where the main phase of the programme, the RTTP-IO, was based, however the recoveries were well spread with fish being recovered in the eastern Indian Ocean and even in the Atlantic ocean (**Figure 6)**.

The IOTTP generated an extensive datasets, and tagging data have been integrated in yellowfin stock assessment since 2008, in bigeye stock assessment since 2011 and in skipjack stock assessment since 2012.

2 Definition of AOTTP objectives

In order to fulfil its management mandate, the ICCAT needs reliable stock assessments. However, today, the uncertainty of these analyses remains high as some fishery independent key-parameters are still missing. A series of tagging projects have been implemented in the past, but most of them were small operations, *i.e.* not ocean scale, with limited results. Moreover, the tagging information available today for tropical tuna in the Atlantic is not centralized. As a result, most of the tagging data for tropical tuna are not included in the stock assessment or is not very informative.

In order to better reply to the Commission's requests and improve the stock assessments, the SCRS has been recommending for several years that a large-scale programme is implemented under the ICCAT framework in order to gather the necessary data to estimate the lacking information for future stock assessments (ICCAT, 2012, 2011, 2010). Such an experiment would be a project at the scale of the Atlantic Ocean, targeting the release and recovery of large number of fish from the three main tropical tuna species and coordinated under the ICCAT framework. ICCAT would also be the repository of the data gathered, which would be made available to undertake the necessary analyses. Ultimately the tagging data gathered would be integrated in the stock assessments in order to reduce their uncertainty.

The objectives of such a programme have to be well defined and precise in order to adapt the strategy and resources to fulfil them.

A Task Force, composed of the Chair of the SCRS, the Tropical Tuna coordinator and the Tropical Tunas rapporteurs and a consultant has been created to discuss and prepare the AOTTP. It is open to any interested scientist. The Task Force will be working on the definition of clear objectives, on the development of a detailed project proposal, on Terms of Reference for a Feasibility study and on the different funding opportunities for the AOTTP.

2.1 Overall objective

The overall objective of the Atlantic Ocean Tuna Tagging Programme (AOTTP) is ***to improve the sustainability of tropical tuna resources by providing the best science available to ICCAT***.

2.2 Specific objectives

In 2010, the SCRS defined some specific objectives for the project (ICCAT, 2010), which were later revised during the Inter-sessional meeting of the tropical tuna species group (ICCAT, 2013a):

1. Estimation of recent exploitation rates for tropical tunas
2. Integration of tagging information to spatialized stock assessment models and analyses of the effectiveness of management measures (e.g. time are closures, FAO management, *etc.*).

2.3Expected outputs

The specific outputs for the project:

a) Confirmation of the current stock structure for the three species of tropical tuna, and analysis of their movements across the Atlantic ocean,

b) Estimation of recent fishing mortality rates independently from CPUE,

c) Estimation of the level of interactions between surface and longline fisheries,

d) Estimation of age-area-sex specific growth rates,

e) Estimation age-specific natural mortality rates,

f) Estimation of tag-shedding and tag reporting rates by gear and flag.

g) Study the effect of *i)* drifting FADs on the movement patterns and biology of skipjack (at all stages) and of juveniles bigeye and yellowfin, *ii)* the associated school fishing technique in some baitboat fisheries as well as *iii)* the residence time of tunas around seamounts.

h) Study the link between environmental conditions and distributions and abundance of tropical tunas.

Furthermore, in 2013 the Tropical Tunas species group noted that the AOTTP would also be a good opportunity to contribute to the stock assessment of Atlantic bonito and Atlantic blackfin tuna (ICCAT, 2013a). Blackfin (*Thunnus atlanticus*) is an oceanic species occurring in the tropical western Atlantic and often mixing with skipjack and there could be tagging opportunities. However, Atlantic bonito (*Sarda sarda*) is a neritic tuna living along the tropical coasts of the Indian Ocean. Tagging such of neritic tuna might be difficult in the context of the AOTTP and should be considered with caution.

2.4 Development of a project proposal

Once the objectives are defined and agreed upon, the Task Force will work towards the development of a project outline. This will be use to define the approach, or the different possible approaches, for the AOTTP which could give a first indication f the budget required.

2.4.1 Tagging strategy

Unlike in the Indian Ocean, there are several baitboat fleets in the Atlantic and the knowledge of these fleets is a great opportunity to multiply simultaneous/successive releases operations in a wide area of the Atlantic. In 2011, 9 fleets have been reporting baitboat catches to the ICCAT for a total of 83 419 tons. Four main fleets, *i.e.* Brazil, EU-Spain, Ghana and EU-Portugal are catching 88% of the total. In addition the fishing grounds of those fleet are located in the different part of the Atlantic. Baitboat vessels could be chartered from these fleets for the purpose of the program.

The Program should be conducted over a period of around 5 years, including tagging activities over a period of at least 2.5 years. Recoveries activities should extend at least 2 years after the end of the tagging activities. This would ensure that:

- cohorts are tagged during several consecutive years
- a significant number of tags are releases in a large area and on different size classes
- the risk of tagging only during a period with abnormal climatic conditions that could influence the availability of tuna is avoided.
- estimate age specific parameters (*e.g.* growth, M, *etc*.)

All size classes are not easily available to baitboat which catches in general small tuna, this is particularly true for yellowfin and bigeye. This should be kept in mind when designing the project and other platforms, or specific areas, should be consider in order to be able to tag larger fish of this two species

2.4.2 Structure of the AOTTP

For the Indian Ocean program, as well as for some programs in the Pacific programs, the tagging experiments are a combination of a large-scale project and some complementary smaller scale projects. These projects have in general particular objectives or particular area to be covered. In the Indian Ocean for example, the large-scale component, the RTTP-IO, was operated in the western part of the basin, from Madagascar to Oman. Small-scale operations were developed in order to tag and release fish in the central Indian Ocean, *i.e.* Maldives and Lakshadweep (India) and in the eastern Indian Ocean, *i.e.* Indonesia and Andaman Islands (India). In addition, one small-scale project was undertaken in Mayotte (France) in order to tag and release with handlines medium and large-scale yellowfin which are less catchable by baitboats.

However, small-scale operations needs to be carefully planned and are not always successful. During a large-scale project that last several years, the tagging teams and the vessel crew are well train and the quality of their tagging is high. During small-scale operation which are limited in time, the crew of the vessel and the local tagging team shave to be trained, the turnover is high and this can impact directly the results of the experiment by lowering the quality of the tagging, *i.e.* increasing shedding and post-tagging mortality.

Given the different objectives of the AOTTP, the area to be covered and the availability of baitboat vessels in the region, the Task Force should define the best structure for the AOTTP.

2.4.3 Areas to be covered

Defining the targeted area to tag and release fish is not an easy task, however, a much a possible tag should be releases in the largest area possible. This would allow to:

- estimate movements of tropical tuna in the Atlantic
- estimate interactions between surface and longline fisheries
- confirm the stock structure for 3 species
- estimate area specific parameters (*e.g.* growth, M, *etc*.)

Catches of tropical tunas in the Atlantic are well spread along the coast of Africa and along the equator, in the Gulf of Guinea, along the north and south American coasts, and in the Caribbean, however with some specificities depending on the species (**Figure 8).** Moreover, the logistic involved with the chartering of a fishing vessel, the bait availability, the rotation of crew and tagging teams bring heavy constraints that cannot be forgotten during the planning.

To take into account these different aspects and better plan and target the areas where the releases should be done in priority to reach the objectives of the of the program, computer simulations could be undertaken. They should include the different logistical aspects together with the bait and tuna availability.

2.4.4 Type of tags to be used

In order to tag fish, and in particular tuna, several types of tags can be used (**Figure 9**), and each of them can be used to reached different objectives.

- The most commonly used tag is the conventional "spaghetti" tags. These tags consist of a plastic streamer with a unique identification number and an address to return it and is inserted at the base of the second dorsal fin, through the pterygiophores.

- Archival tag and pop-up tags are electronic tags that record every few second a number of data such as the depth, the temperature (internal – external) and the light intensity. Pop-up tags have the advantages that the data is transmitted through satellite, and therefore they do not need to be recovered.
- Chemical tagging is done with oxytetracycline or strontium chloride, products that will leave a deposit in the otolith of the fish on the day of tagging. These are used for growth studies.
- The new generation RFID tags have not yet been used for tagging tropical tunas on a large-scale. This type of tags offers the possibility of being automatically detected with a reader.

The different tag types to be used for the AOTTP would depend on the objectives of the project, but in general most tagging programme included the releases of a very large-majority of conventional tags (more than 100 000) and a small proportion of electronic tag (less than 1000) due to their expensive prices.

2.5 Publicity and recovery campaign

Tagging is only the first step of such a large-scale programme, however, the real data comes after, from the recoveries of these tagged tuna. The development of publicity and recovery campaign is not as impressive as the deployment of fishing vessel going at sea to tag fish, and is to often underestimated. This was the case in the Indian Ocean, where the feasibility study, and therefore the final budget allocated, did not put enough emphasis on the important phase of the project ; the RTTP-IO was lacking funding but most importantly it was lacking staff with only one person dedicated to publicity and tag recovery campaign.

The publicity and tag recovery campaign should be planned well in advance of the start of the tagging activities. Even if there was no large-scale project in the Atlantic so far, tagging activities have been undertaken regularly since the mid-50s in the Atlantic. Fishermen, stevedores and other stakeholders might already be acquainted with the recovery of tagged tunas, and ICCAT has already contacts and counterparts in the different coastal countries. This would need to be reviewed and expanded to be able to involve the different participating countries, sensitize the different stakeholders of the project and work with them in defining adapted recovery strategies.

Recovery scheme should be developed in all costal countries of the Atlantic, as well as in Distant Water Fishing Nations catching or processing fish from the Atlantic. Rewards will be offered to the finder of the tags to motivate them to return the tags with the proper information to the program. The reward scheme should be *i)* adapted to the different countries (*e.g.* value of the reward, type of in kind reward), *ii)* should be fast process in order to give the reward immediate to the finder.

Additionally, recovery platforms should be prioritize in order to better allocate the resources of the program, and priority should be given to the platforms for which reporting rate can be estimated.

2. 6Auxiliary information needed to analyse tagging data

During a tagging experiment, factors can bias the number of tagged fish that are being recaptured, *i.e.* the shedding of the tags and the reporting rate of the recaptured tuna.

2.6.1 Tag shedding

In order to estimate tag shedding, *i.e.* the proportion of the tags that will fall from the fish before its recapture, some double tagging should be realized. During double tagging, two tags are placed independently on the fish, on each side of its second dorsal. Double tagging should be undertaken regularly during the program, by all taggers in all conditions, and should reach between 15% and 20% of the total number of releases. At recovery, the number of double tagged fish recovered with only one tag and with the two tags will be analyzed to estimate the tag shedding rate.

2.6.2 Tag reporting

Unfortunately, not all the recovered tagged fish are reported to the program. This can be due to several reason: *i.* the tag finder is not aware of the recovery procedure, *ii.* The tag finder has lost the tag before reporting it, *iii*. the reward scheme is not attractive enough for the tag finder to report it, *etc.*

It is therefore necessary to be able to estimate the proportion of the recaptured tagged fish that are not reported as such to the program. Tag reporting rates can be estimated through *i)* a tag seeding experiment, consisting of

placing tagged fish directly inside the catch a fishing vessel and monitoring their return, or *ii)* by comparing the return rates from the fishery with those from a control group, *e.g*. high-value rewards, observed fishing trips, surveyed anglers, *etc*. (Hampton, 1997; Cadigan and Brattey, 2003; Dicken et al., 2006; Polacheck et al., 2006).

Tag seeding was conducted in the Pacific and in the Indian Ocean in order to test the reporting rate of stevedores for the purse seine fishery. In fact, this fishery is catching tuna in large quantities, and in the Indian Ocean, from this fleet, around 80% of the recoveries where reported by stevedores (recoveries at unloading/transhippping), with the remaining 20% being reported by fishers (recoveries during fishing).

In Seychelles during the IOTTP, around 3000 tags were seeded onboard the European purse seine fleet between 2004 and 2009. The results showed a rapid increase of the reporting rates for all three species after the start of the tagging activities from the RTTP-IO. Tag reporting rates increased from around 50% to over 95% after two quarters of tagging (22 000 releases).

2.7 Cooperation

For such a program to be successful, in addition to funding, tagging vessels, equipment and personnel, it needs the full cooperation all coastal countries and other members of ICCAT. This is very important in order to secure access to EEZ, for both continental (for bait) and deep waters (tunas), to ports and also to ensure the participation of some of their staff to the program, in particular for the recovery process.

This should be secure in advance at the level in order to avoid delays when the activities will start, in particular as access can be quite long to obtain in some countries.

2.8 Funding opportunities

Large-scale tagging projects are the best tool to gather necessary fishery independent key-parameters and have been implemented in the past in the Pacific and Indian oceans with great success. However, such projects need important funding and resources and a lot of planning.

In the Indian Ocean, all the funds for the large-scale program came from the EU DG-Development (14 millions €), however they usually do not fund 100%. Additional funding was provided by Japan and the DG-Mare for the small-scale projects. The situation was very different in the Pacific, where they had for their different programs a wide range of contributors, CPCs of WCPFC and IGOs (New Zealand, EU, Australia, GEF, Korea, France, China, PNG).

In the Atlantic, some important players in the tropical tuna fisheries are developed countries which are potential contributors (EU, USA, Japan, Canada, Korea, China, France, *etc.*), and they could be contacted in order to seek their support, monetary or in kind, for the AOTTP. A multi-donors program allows more flexibility in the way the activities are run. In fact, some donors have specific rules on how the money is spent (*e.g.* the EU), and have different sources of funding will eliminate some of these constraints. IGOs, NGOs and private companies could also provide support to the program.

3 Conclusion

A large-scale tagging program is needed in the Atlantic ocean, and the AOTTP would be an ambitious program to gather the information needed to improve stock assessment in order to ensure the sustainable management of the tropical tuna resources. Such a program always include a large amount of risk, and therefore the AOTTP should be carefully designed and planned in order to meet its different objectives.

It is proposed that the Task Force will work towards the development of a comprehensive proposal for the AOTTP, including:

- detailed objectives
- tagging strategy
- indicative budget
- contact with potential donors and contributors

This would allow writing specific terms of reference for a comprehensive feasibility study to be undertaken for the planning of the activities of the AOTTP.

The AOTTP should follow the implementation of the five other successful large-scale projects that took place in the Pacific and Indian Oceans, as these programs have many similarities with what is expected from the AOTTP, in terms of objectives and logistical requirements.

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Table 1. Number of releases and recoveries of tagged fish in the ICCAT database.

	Releases	*Recoveries*
BET	11198	2877
SKJ	42635	6849
YFT	18179	1559

Table 2. Comparison of the number of releases of tropical tuna per species between inventories in the literature and the ICCAT database from 1956 to 1988.

	Inventories	*ICCAT db*
YFT	21 555	4 526
SKJ	36 654	20 052
BET	7 183	2 236
TOTAL	**65 392**	**26 814**

Table 3. Number of tagged tuna released in the Pacific ocean from 2006 to 2013 (source: www.spc.int).

Species	*Releases*	*Recoveries*	*%*
Albacore	2877	19	0.66
Bigeye	40770	10288	25.23
Skipjack	246717	37914	15.37
Yellowfin	106085	15889	14.98
Total	**396449**	**64110**	**16.17**

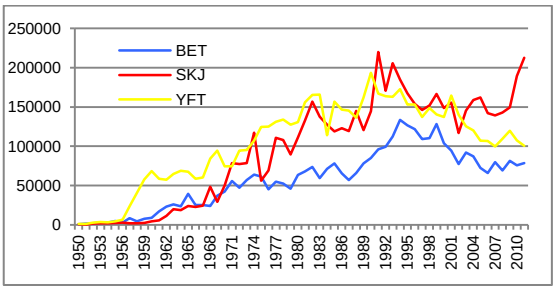

Figure 1. Nominal catches of tropical tunas in the Atlantic ocean from 1950 to 2011 (source: ICCAT)

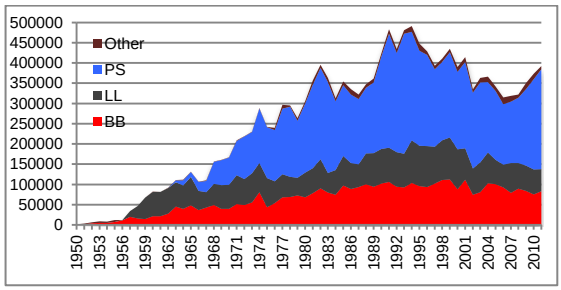

Figure 2. Nominal catch of tropical tunas in the Atlantic ocean by gear from 1950 to 2011. (source: ICCAT)

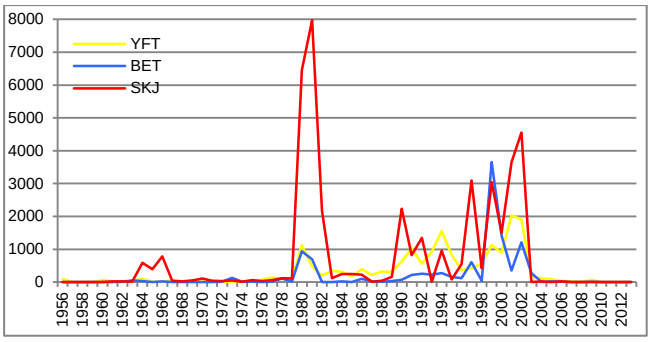

Figure 3. Releases of tagged fish per species recorded in the ICCAT database

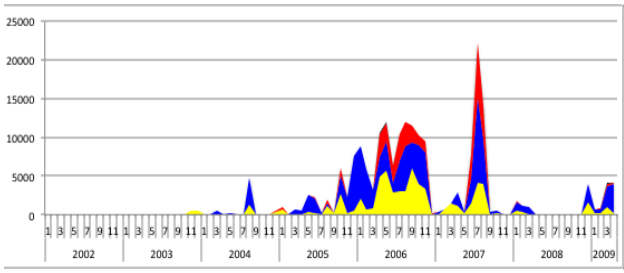

Figure 4. Monthly releases of tagged tuna per species in the Indian Ocean between 2002 and 2009.

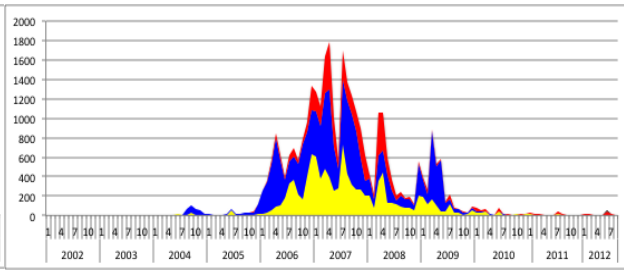

Figure 5. Number of recoveries of tagged tuna per species in the Indian Ocean between 2002 and 2009.

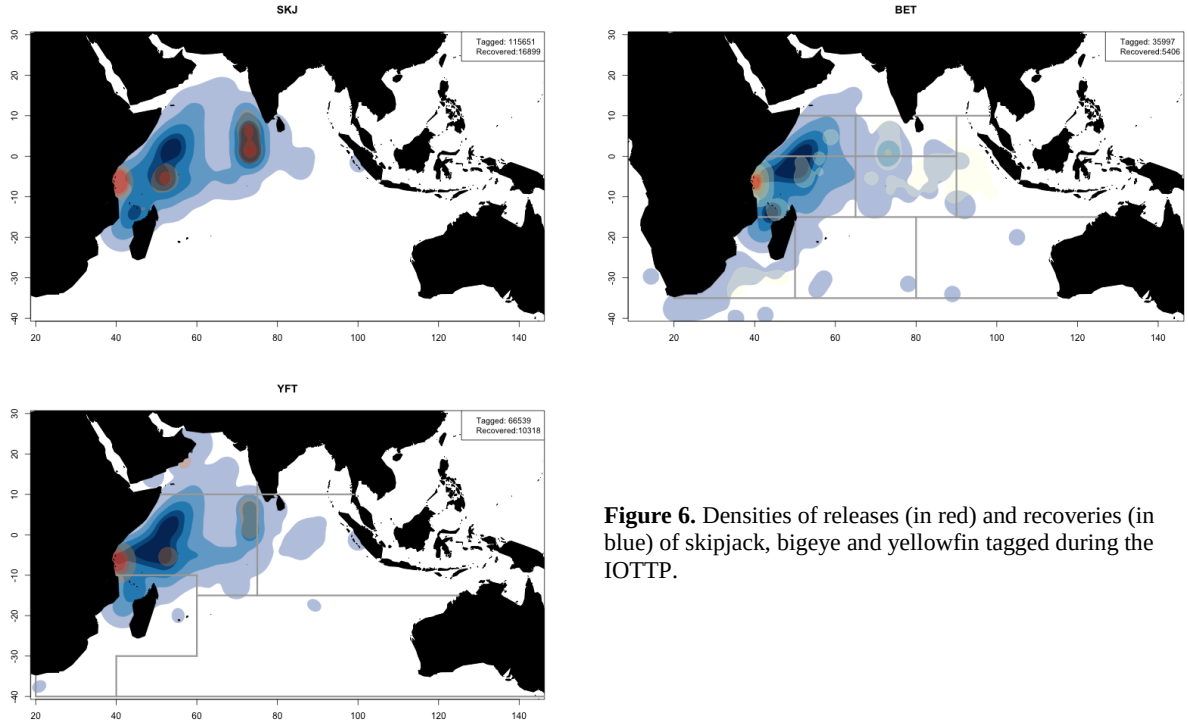

Figure 6. Densities of releases (in red) and recoveries (in blue) of skipjack, bigeye and yellowfin tagged during the IOTTP.

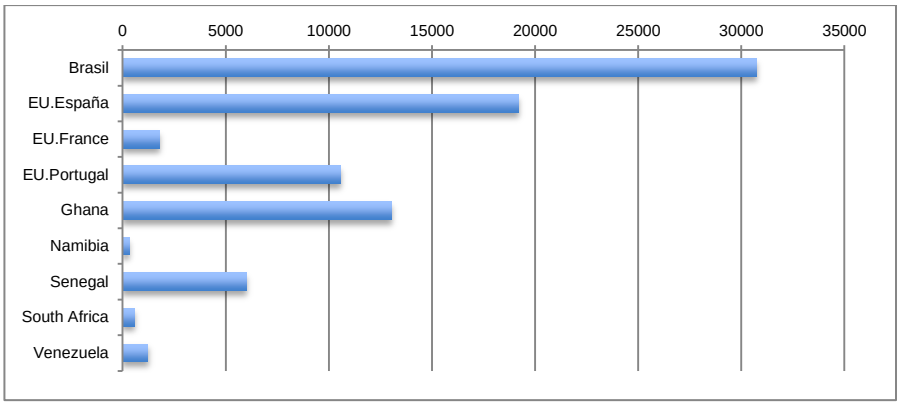

Figure 7. Baitboat catches (in tons) of tropical tunas (BET, SKJ and YFT) in 2011 per fleet.

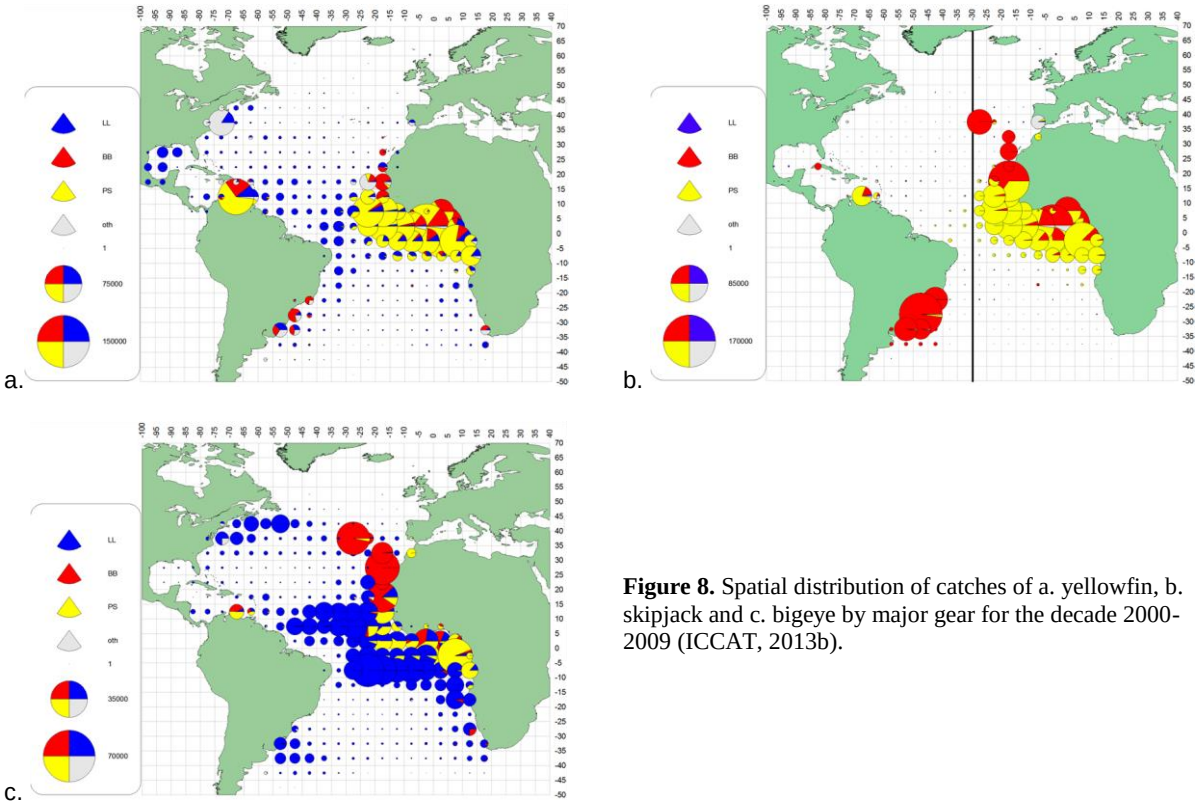

Figure 8. Spatial distribution of catches of a. yellowfin, b. skipjack and c. bigeye by major gear for the decade 2000-2009 (ICCAT, 2013b).

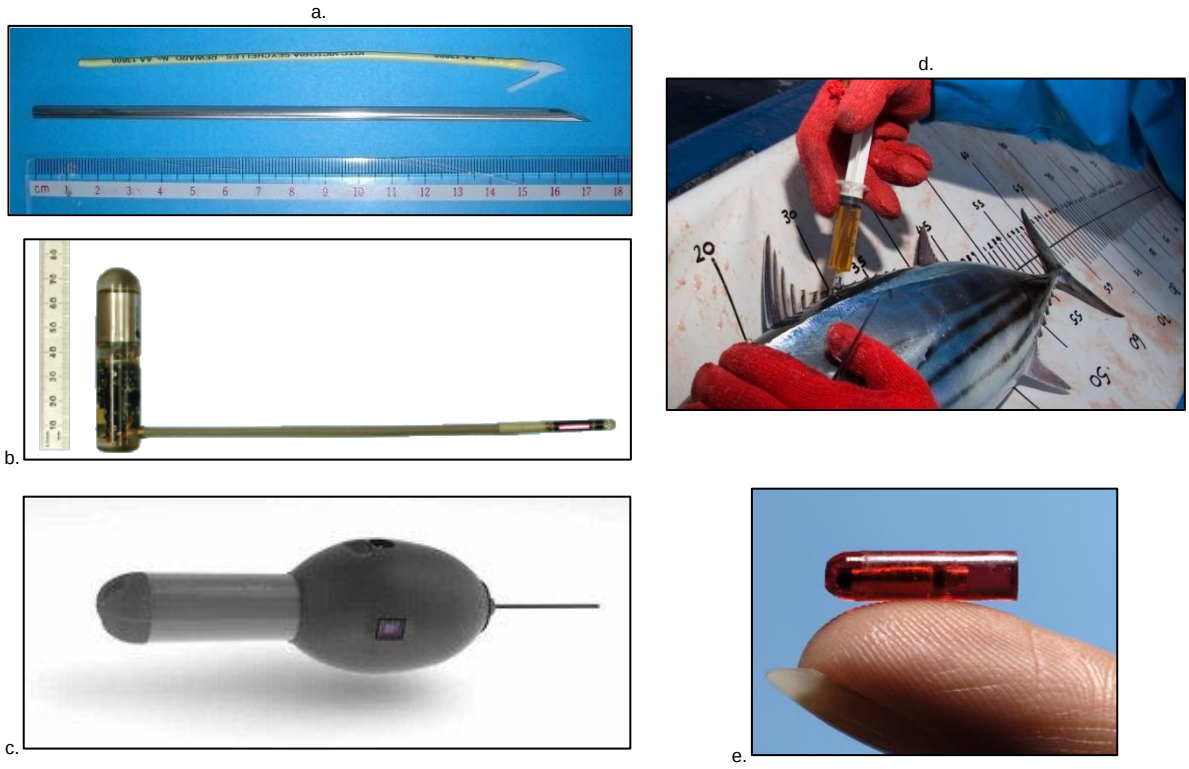

Figure 9. Different types of tags for different objectives, a. conventional spaghetti tag, b. archival tag, c. pop-up tag, d. chemical tagging, e. food safe RFID tag.

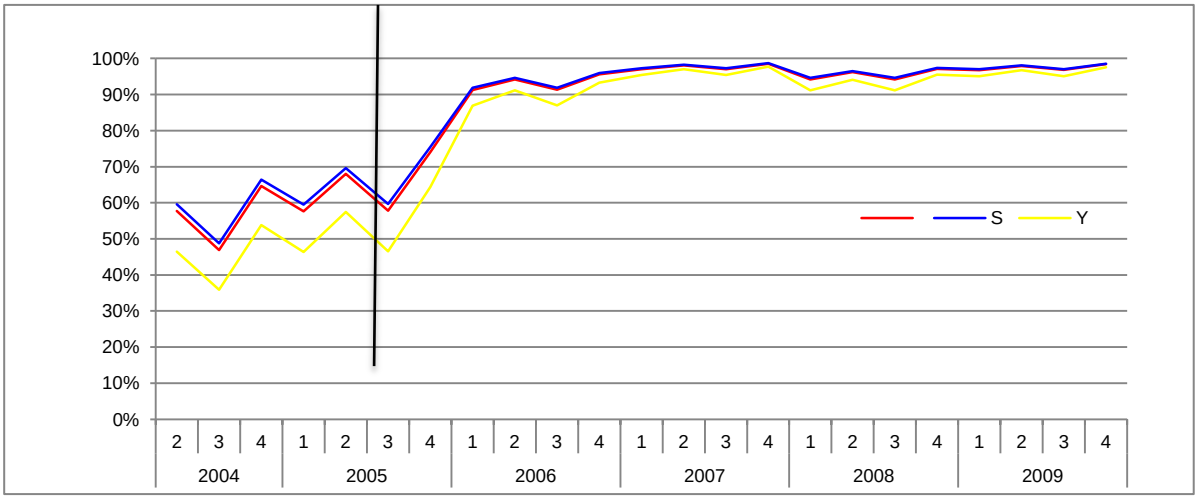

Figure 10. Reporting rates for the stevedores in Seychelles by species from 2004 to 2009.