



Deliverable #5

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 07/2016-2) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 6 - 2016).

**Final Report
02 March 2017**



Contents

Title Page	1
Contents	2
1. Executive Summary	3
2. Composition of the Consortium.....	4
3. Aim of the work	5
4. Sampling on board the processing vessels.....	6
5. Data and samples collected	7

1. Executive Summary

An agreement between ICCAT and a Consortium based in Malta was set up in order to carry out sampling of Atlantic bluefin tuna (BFT) during harvesting of BFT caged and grown in the three farms forming part of the Consortium (600 fish in total).

This was carried out in the harvesting period of 2016, and a total of 1098 fish were sampled. BFT were sampled from cages containing the fish from the following areas: Western Mediterranean, the Tyrrhenian Sea (TY), Central Mediterranean Sea, south of Malta (MA), Central Mediterranean Sea, the Gulf of Gabes (TU). The BFT sampled varied in size from 114 to 274cm in length although over 87% were above 200cm in length.

However, there were significant issues with the collection of otoliths. This was related to the actual harvesting process and the fish processing operations on board the processing vessels, specifically the position where the shot hits the fish in the head and the position of the cut applied to remove the head at the beginning of the processing. This issue had been known about before the start of the work, and a number of fish more than had been requested in the Agreement were sampled on board the processing vessels.

Apart from the biometric data (which includes straight fork length (SFL), curved fork length (CFL) and whole weight (RWT), otoliths (pair or single, whole or broken) were extracted from 723 of the heads sampled as well as 906 genetic samples (muscle).

2. Composition of the Consortium

As per the following Agreement between ICCAT and the Consortium:

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 07/2016-2) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 6 - 2016).

The Consortium was formed by the following entities operating in Malta:

- AquaBioTech Ltd, referred to as ABT, whose registered office is at ‘Central Complex’, Triq in-Naggar, Mosta MST1761, Malta (Coordinator)
- Mare Blu Tuna Farm Ltd, referred to as MB whose registered office is at 74, Liesse Hill, Valletta VLT1940, Malta,
- Fish & Fish Ltd, referred to as F&F whose registered office is at Tarxien Road, Ghaxaq, GXQ2901, Malta,
- MFF Ltd, referred to as MFF whose registered office is at ‘Hangar’, Triq it-Trunciera, Marsaxlokk MXK1522, Malta,

3. Aim of the work

The objective of the Agreement was to obtain adult Atlantic bluefin tuna, *Thunnus thynnus* (BFT) biometric data and samples as follows:

- i) Straight fork length (SFL) in cm.
- ii) Total weight (round weight, RWT) in kg.
- iii) Sex.
- iv) Otoliths.
- v) Tissue for genetic analysis.

The procedures which were followed during the sampling on board the processing vessel and subsequently on the heads were those indicated in the “Appendix 2: SAMPLING PROTOCOLS FOR THE GBYP BIOLOGICAL SAMPLING (Last revised: 18 October 2016)”.

The table below indicates the target number of BFT which were required by the Agreement to be sampled during harvesting from each of the farms from fish caught (and subsequently caged at the respective farms) from the following selected areas:

Farm	Tyrrhenian Sea	Central/Southern Med Sea
MB	300	100
F&F		100
MFF		100

Full cooperation was provided by the farms and their operators during the sampling of BFT and subsequent storage and handling.

4. Sampling on board the processing vessels

Biometries of BFT and collection of BFT heads was carried out on board the processing vessels working in conjunction with the harvesting activities being carried out by each of the BFT farms forming part of the Consortium.

The actual process of harvesting starts when the BFT are first shot in the cages, lifted out of the water and taken to the processing vessel in groups (not individually) whereby they are subsequently processed by the crew.

The first step on board the processing vessel normally involves weighing of the fish, followed by cutting off of the head and tail followed by further cutting into loins or fillets after which they are then frozen.

Biometries and tagging of heads was carried out before the fish heads were cut off. The SFL and curved fork length (CFL) of each fish were taken with calipers and measuring tape respectively, each head tagged individually and the weight of each fish recorded prior to the whole fish moving on to the next part of the processing (which involved cutting off of the head and tail). Tagged heads were then separated from untagged heads and collected in large bags which were also labelled individually.

The large bags containing the sampled heads were then taken by the farm operators and stored in designated -20°C reefers.

5. Data and samples collected

Data and samples were collected from BFT caught during the purse seine fishing season in the following areas:

- Western Mediterranean, the Tyrrhenian Sea (TY),
- Central Mediterranean Sea, south of Malta (MA),
- Central Mediterranean Sea, the Gulf of Gabes (TU).

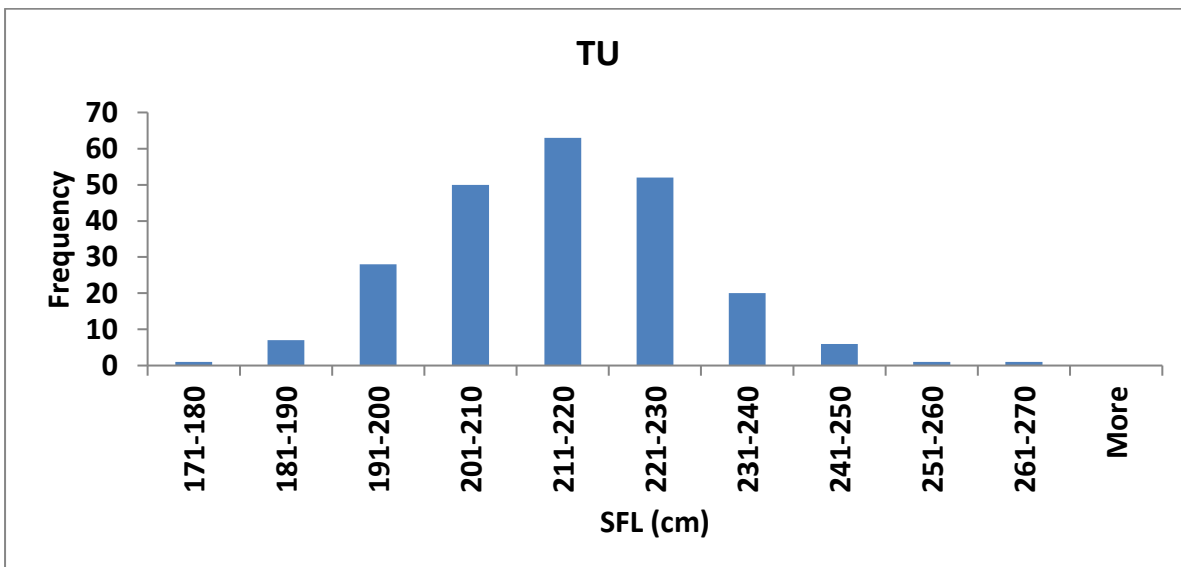
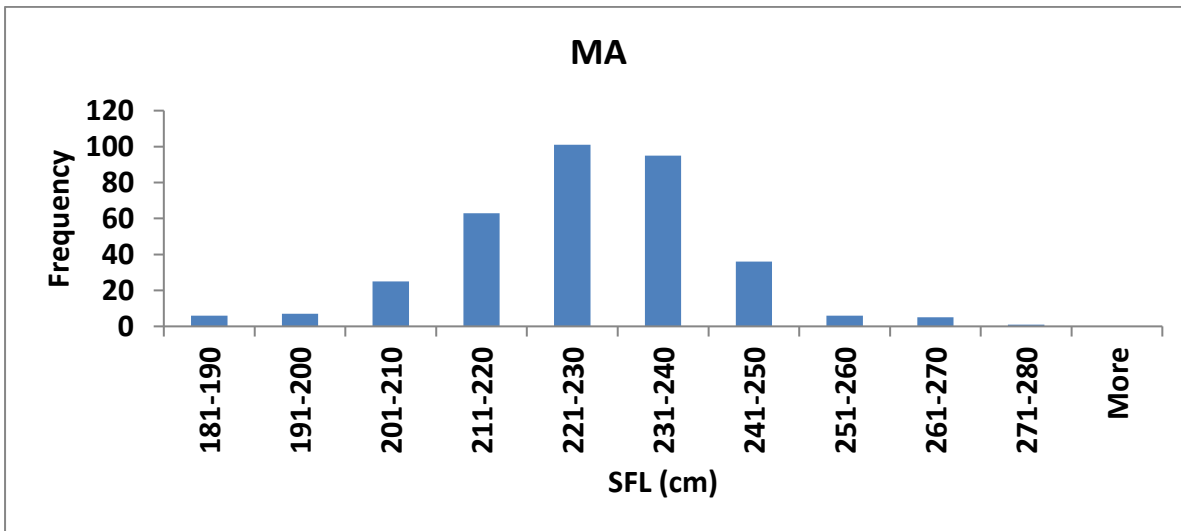
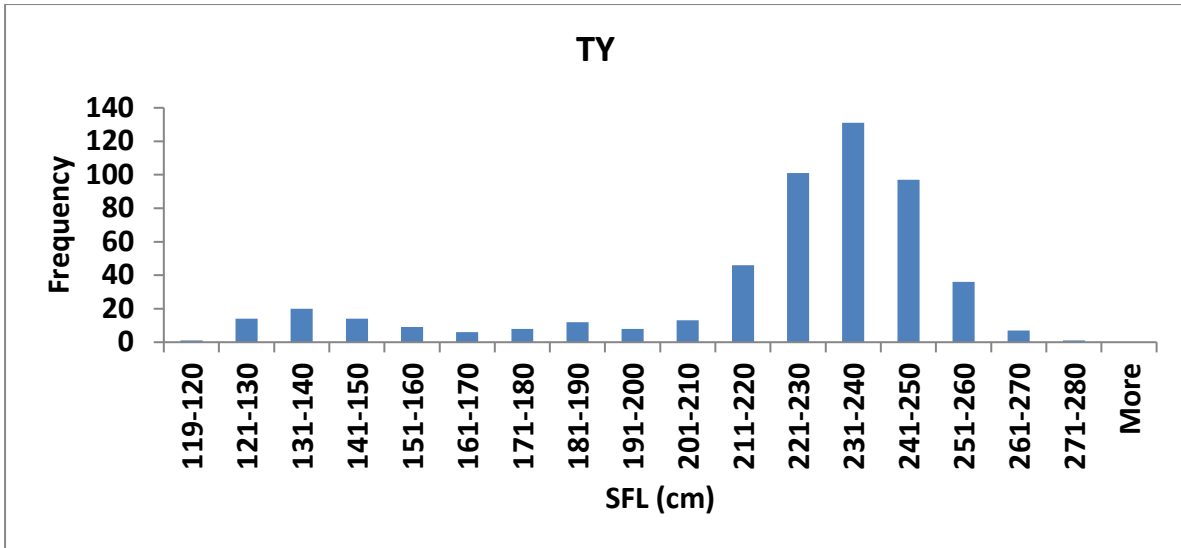
By the end of this period of collection, the following numbers of fish were sampled on board the processing vessel and heads collected for subsequent collection of otoliths/tissue samples for genetic analysis:

Farm	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)	Central Med Gulf of Gabes (TU)
MB	524	176	
F&F		169	
MFF Ltd			229

The Table below summarises the ranges of SFLs and RWTs of the BFT sampled on board the processing vessels, providing the range of each and the average for the whole sampling group:

Farm	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)	Central Med Gulf of Gabes (TU)
SFL (cm)	Range: 114-271 Average: 220.4	Range: 181-274 Average: 226.9	Range: 180-262 Average: 215.4
RWT (kg)	Range: 40-460 Average: 245.5	Range: 131-448 Average: 257.8	Range: 145-440 Average: 235.9

The Figures below summarise the size distribution (SFL) in 10cm length classes of the BFT sampled from each of the areas (Tyrrhenian Sea, TY; south of Malta, MA; the Gulf of Gabes, TU).



Heads were subsequently defrosted and cut open to enable extraction of otoliths and sampling of muscle for the purpose of genetic analysis.

Collection of otolith/s (pair, single) were problematic in a significant number of heads collected from the farms during the processing of the harvested BFT.

This was due to two reasons: firstly, the central position of the shot in the head which stuns the fish prior to removal from the cage, and secondly, the cut carried out during the processing (carried out by staff during the processing on board the processing boat) at the point where the head is removed (after weighing of the fish). In many cases, the otolith/s were broken or completely missing.

The Table below summarises the collection of data and samples collected:

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)	Central Med Gulf of Gabes (TU)
SFL	524	345	229
CFL	524	345	229
RWT	524	345	229
Sex	522	343	225
Otoliths (1 or 2)	293	209	133
Muscle	443	259	203