



Deliverable #5

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 04/2018-b) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 8).

**Final Report
07 February 2019**



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1. Executive Summary

An agreement between ICCAT and AquaBioTech Ltd based in Malta was set up in order to carry out sampling of Atlantic bluefin tuna (BFT) during harvesting of BFT caged in farms in Malta (600 fish in total).

This was carried out in the harvesting period of 2018, and a total of 1127 fish were sampled. BFT were sampled from cages containing the fish from the following areas:

- Western Mediterranean, the Tyrrhenian Sea (TY), and Central Mediterranean Sea, South of Malta (MA).

The BFT sampled varied in size from 125 to 277cm in length (SFL) although over 90% 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), first dorsal length (LD1) and whole weight (RWT)), 726 whole pair or single otoliths were extracted as well as 958 genetic samples (muscle).

2. The Agreement

As per the following Agreement between ICCAT and AquaBioTech Ltd:

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 04/2018-b) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 8).

AquaBioTech Ltd has the following address in Malta:

- AquaBioTech Ltd, referred to as ABT, whose registered office is at ‘Central Complex’, Triq in-Naggar, Mosta MST1761, 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) Length to the first dorsal (LD₁) in cm.
- iii) Total weight (round weight, RWT) in kg.
- iv) Sex identification.
- v) Otoliths sampling.
- vi) Tissue sampling 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 from the following selected areas:

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)
Number of fish	300	300

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.

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, CFL and LD1 of each fish were taken, 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

Samples were taken from fish caught in the Tyrrhenian Sea and Central Mediterranean Sea. Consequently, data and samples were collected from BFT caught during the purse seine fishing season in the following areas:

- Western Mediterranean, Tyrrhenian Sea (TY),
- Central Mediterranean Sea, South of Malta (MA),

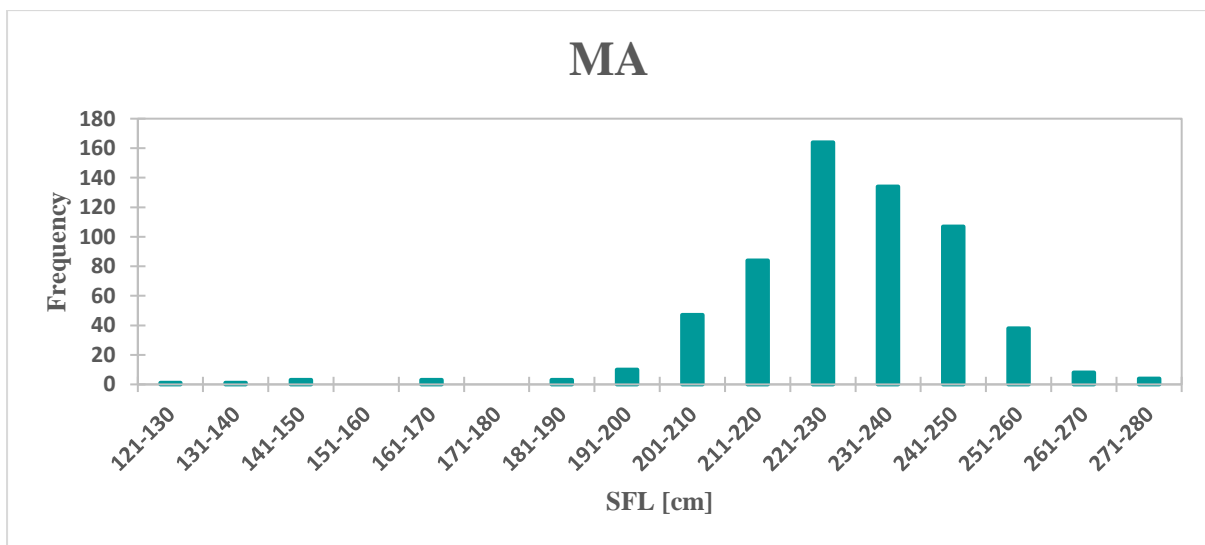
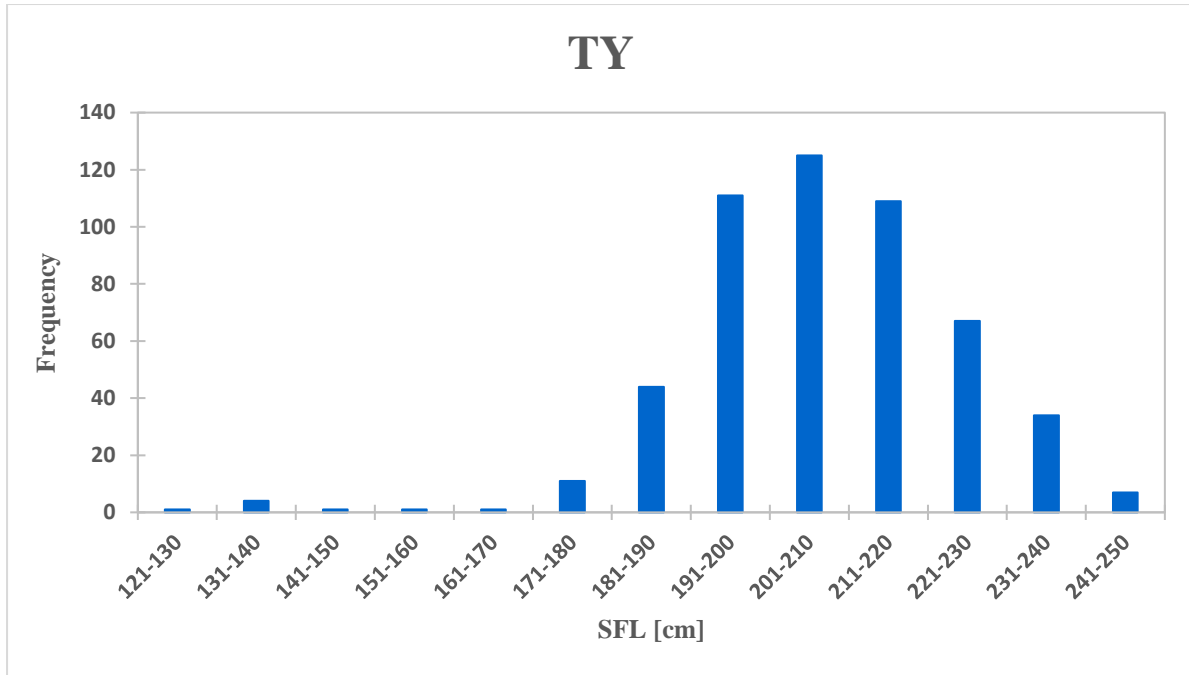
By the end of this period of collection, the following numbers of fish were sampled on board the processing vessel and heads collected for subsequent collection of otoliths/tissue samples for genetic analysis:

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)
Number of fish	516	611

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:

	Western Med Tyrrhenian Sea (TY)	Central Med Malta (MA)
SFL (cm)	Range: 136-260 Average: 217.3	Range: 125-277 Average: 229.4
RWT (kg)	Range: 59-405 Average: 218.4	Range: 65-470 Average: 257.8

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).



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)
SFL	516	607
CFL	516	608
LD₁	516	609
RWT	516	606
Sex	509	608
Otoliths (1 or 2)	369	357
Muscle	458	500



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