AquaBioTech Group

Deliverable #5

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 12/2019-B) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 9).

Final Report

20 December 2019

This project is co-funded by the European Union

Contents

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 has been carried out in the harvesting period of 2019, and a total of 1087 fish have been sampled so far. BFT were sampled from cages containing the fish from the following areas:

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

The BFT sampled varied in size from 135 to 295 cm 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), 822 whole pair or single otoliths were extracted as well as 982 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 12/2019-B) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 9).

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 (LD_1) 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 July 2018)".

The table below indicates the target number of BFT which were required by the Agreement and subsequent communications 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	200	400

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 is carried out on board the processing vessels working in conjunction with the harvesting activies 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 is carried out before the fish heads were cut off. The SFL, CFL and LD1 of each fish are 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 are then separated from untagged heads and collected in large bags which are also labelled individually.

The large bags containing the sampled heads are then taken by the farm operators and stored in designated -20^{o}C reefers.

5. Data and samples collected

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

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

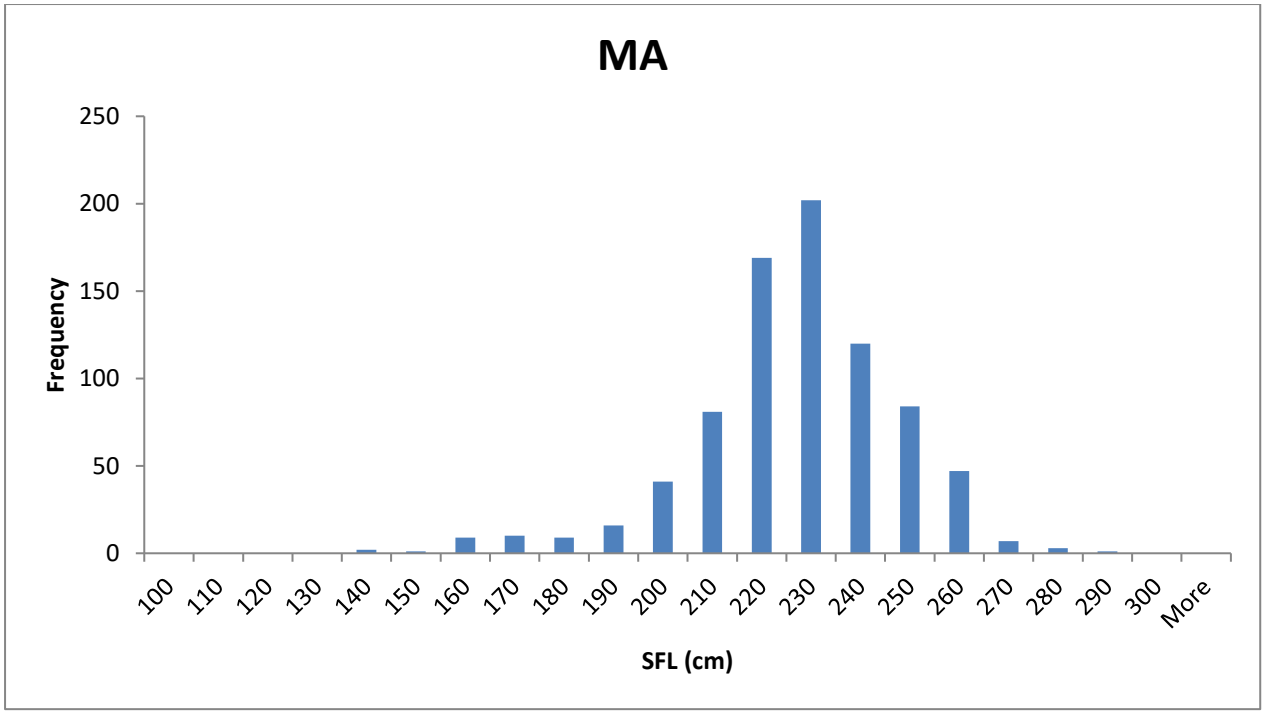
The following numbers of fish have been sampled on board the processing vessel and heads collected for subsequent collection of otoliths/tissue samples for genetic analysis:

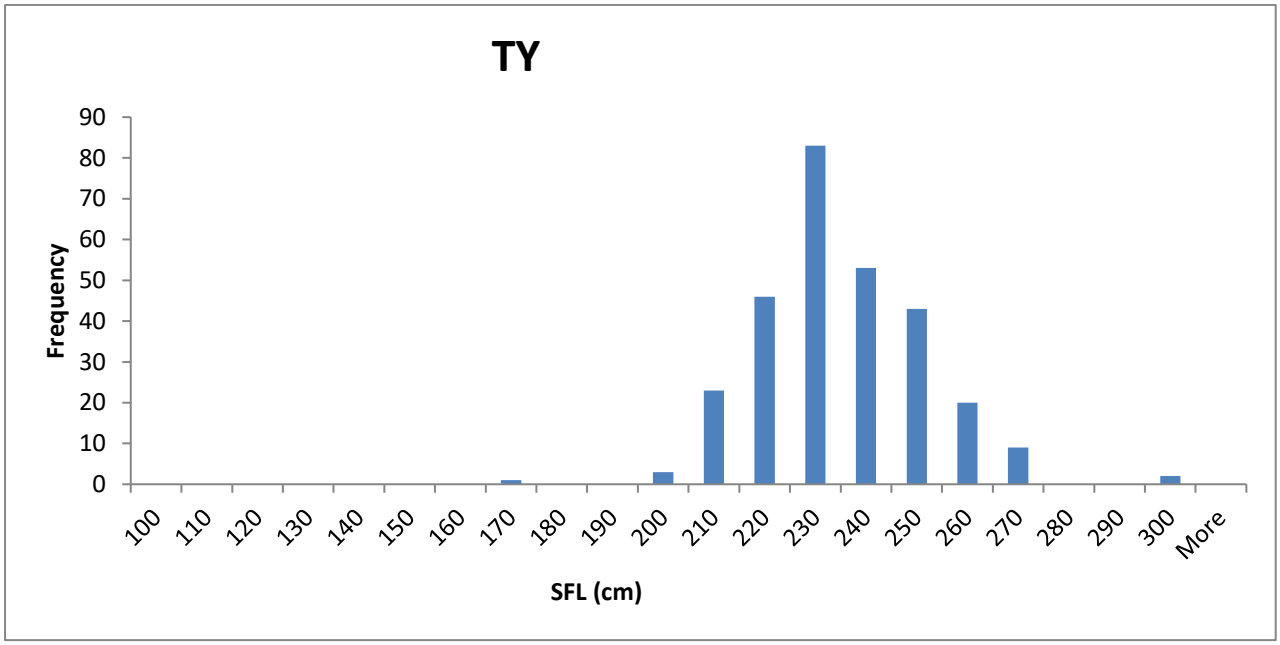
	Western Med Tyrrhenian Sea (TY)	**Central Med Malta (MA)**
Number of fish	283	804

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: 169-295 Average: 230.1	Range: 135-290 Average: 222.7
RWT (kg)	Range: 97-470 Average: 258.7	Range:65-605 Average: 251

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	283	802
CFL	283	802
LD_1	283	802
RWT	283	803
Sex	283	791
Otoliths (1 or 2)	213	609
Muscle	256	726

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