Deliverable #5

ICCAT short-term contract for biological studies - sampling for adults - (ICCAT GBYP 06/2021-B) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 11).

Final Report

04 February 2022

This project is co-funded by the European Union

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 year has been problematic due to COVID restrictions on board a number of the harvesting vessels. The intial intention had been to obtain samples from fish harvested from two of the farms situated in the SE aquaculture zone of Malta. Unfortunately, when the harvesting period approached, we were informed that the captains of the vessels on which the sampling was going to be taken would not give permission for our personnel to be on board.

After we were informed of this decision, we contacted the other two farms in Malta and obtained permission (with the requirement to be fully vaccinated and have PCR results prior to boarding) to sample fish on board the harvesting vessels operating with these two farms. However, in the case of one of the farms which had TY fish, we were only able to sample for two days before the cage was finished. Sampling continued on the other farm with MA fish (no TY fish), but there have also been delays related to the harvesting programme of that particular farm; we were in continuous contact with the farm to continue sampling of MA fish in January. However, the COVID restriction with the processing vessel continued, and the full sampling programme could not be achieved.

A total of **394 fish** were sampled. 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 117 to 268 cm in length (SFL) although over 74% were above 200cm in length.

As the case for other sampling years, 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 have been planned to sample on board the processing vessels.

The samples collected are 257 with a full set of samples with Biometric data (SFL, CFL and LD1) and biological data (Otolith/s (1or 2), spine and muscle). For TY fish there are 31 full sets of samples and MA fish are 226 full sets of samples.

Apart from the biometric data (which includes straight fork length (SFL), curved fork length (CFL), first dorsal length (LD1) and whole weight (RWT), 289 whole pair or single otoliths were extracted as well as 363 genetic samples (muscle) and 358 spines.

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 12/2021-B) of the ICCAT Atlantic-wide research programme on Bluefin tuna (ICCAT GBYP Phase 11).

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) Curved fork length (CFL) in cm.
iii) Length to the first dorsal (LD_1) in cm.
iv) Total weight (round weight, RWT) in kg.
v) Sex identification.
vi) Otoliths sampling.
vii) Tissue sampling for genetic analysis.
viii) First spine of dorsal fin.

The procedures which were followed during the sampling on board the processing vessel 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	300	300

Full cooperation was provided by the farms and their operators during the actual sampling of BFT.

4. Sampling on board the processing vessels

Biometries of BFT 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 and spine 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), during which the sex of each tagged fish was identified. Tagged heads are then separated from untagged heads and moved to a dedicated area of the vessel where a field laboratory facility was set up to conduct otoliths extraction and cleaning, and muscle samples collection. Lastly, tagged spines are separated from untagged spines in the later parts of fish processing, collected and brought to a separate area where the first dorsal spine is extracted from the separated first dorsal fin.

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),

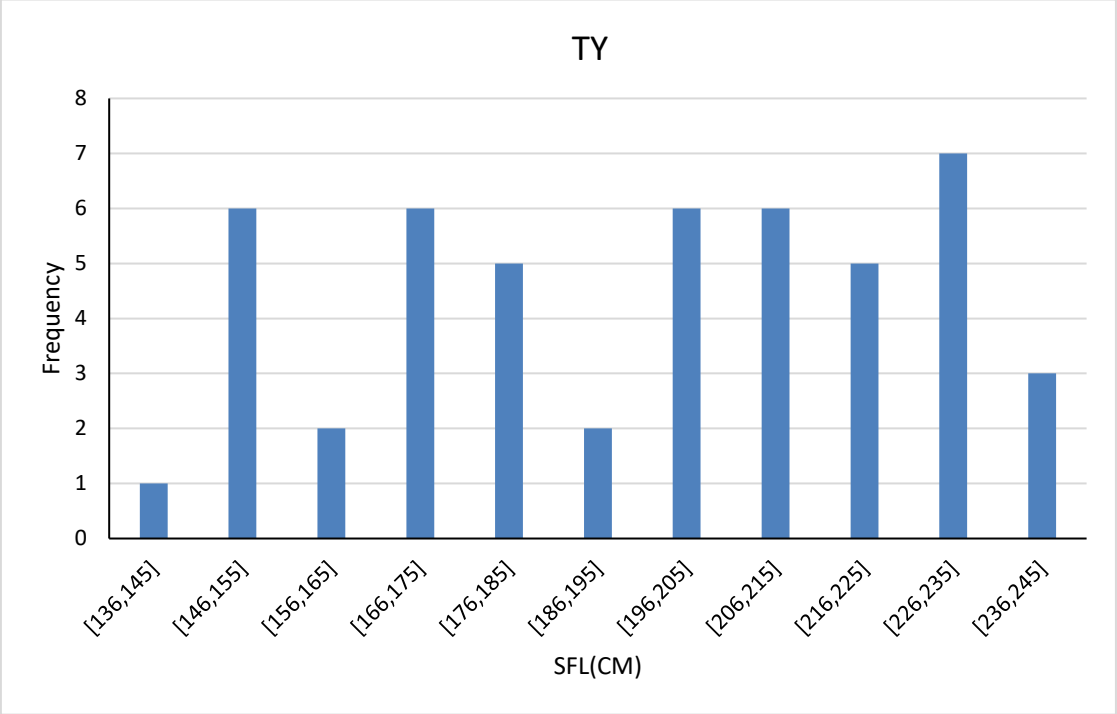
The following numbers of fish were sampled on board the processing vessels with collection of biometric data, otoliths, tissue and spine samples for analysis:

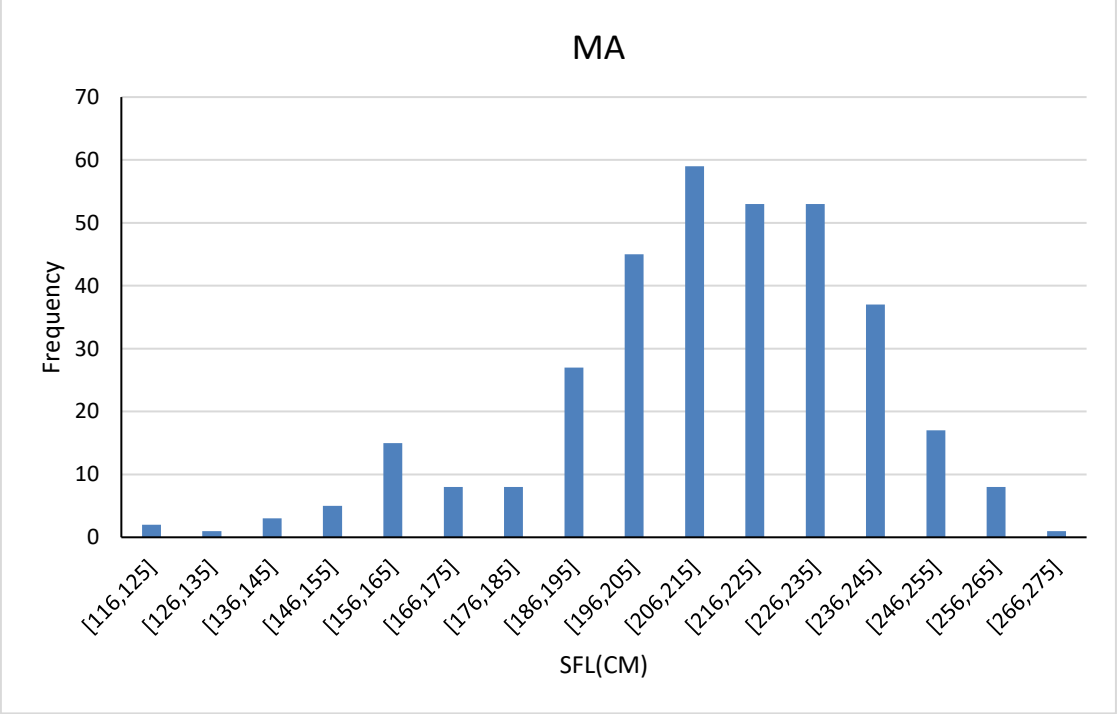
	Western Med Tyrrhenian Sea (TY)	**Central Med Malta (MA)**
Number of fish	51	343

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: 139 - 243 Average: 195.2	Range: 117 - 268 Average: 212.9
RWT (kg)	Range: 58 - 311 Average: 162.2	Range: 35 - 450 Average: 216.7

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





Heads were 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. 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	49	342
CFL	49	342
LD_1	48	341
RWT	51	343
Sex	50	340
Otoliths (1 or 2)	36	253
Muscle	42	321
Spine	50	308

6. Acknowledgements

This work has been carried out under the ICCAT Atlantic-Wide Research Programme for Bluefin Tuna (GBYP), which is funded by the European Union, several ICCAT CPCs, the ICCAT Secretariat, and other entities (see https://www.iccat.int/gbyp/en/overview.asp). The content of this paper does not necessarily reflect ICCAT's point of view or that of any of the other sponsors, who carry no responsibility. In addition, it does not indicate the Commission's future policy in this area.

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