THE ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA
(GBYP Phase 10)

COLLABORATIVE ELECTRONIC TAGGING IN 2020 OFF CANADA

Final Report

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Fisheries and Oceans Canada (DFO)

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REPORT ON COLLABORATIVE TAGGING ACTIVITIES IN 2020

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SUMMARY

The ICCAT GBYP accepted DFO's offer of collaboration and provided DFO with 5 Wildlife Computers MiniPAT Pop-up Satellite Archival Tags for deployment via a scientific fishing charter out of St. John's Newfoundland (between September and November 2020). The tags were to be deployed targeting as young as possible Atlantic Bluefin Tuna individuals present in the area (<85 inches straight fork length; ~ age 10) following the GBYP tagging protocols; in addition to the collection of a tissue sample (fin clip) for genetic analysis. Unfortunately, all fishing activities were unsuccessful at hooking a Bluefin Tuna in Newfoundland waters (Bluefin Tuna were present in the area). Respecting the conditions of the Memorandum of Understanding (MOU) between the ICCAT GBYP and DFO, it was determined that DFO would take the collaborative tags to Port Hood, Nova Scotia and work with the highly experience tagging team already funding a tagging operation there, led by Drs. Barbara Block (Stanford University) and Michael Stokesbury (Acadia University). DFO was able to join the Port Hood tagging effort for 4 days on the water: October 4th to 6th, and October 19th, 2020. The tagging team, using the "bring on board" method deployed the GBYP tags on October 4th (1; Drifting, Fresh Mackerel), October 5th (1; Drifting, Fresh Mackerel) and October 19th (3; Trolling, Squid Rig). The average curved fork length of the fish was 227 +/- 24 cm and all were released in good condition.

KEYWORDS

Bluefin tuna, etags, Atlantic Canada

1. Introduction

In June of 2020, Fisheries and Oceans Canada (DFO) responded to the call of the ICCAT Secretariat which was seeking national research teams that had experience in deploying electronic tags, particularly on Bluefin Tuna specimens, and who would be willing to collaborate with ICCAT in the 2020 GBYP electronic tagging program. The necessity for this call and the opportunity for this collaboration arose as a result of technical issues delaying the acquisition of new e-tags and more notably the coronavirus outbreak.

Since 2009, DFO has tagged 112 Atlantic Bluefin Tuna (ABFT) with external Pop-Up Satellite Archival (PSAT) Tags using both: Wildlife Computers' MK10 and miniPAT tags, and LOTEK's PSATGEO tags. Throughout the course of the tagging program, DFO has continually evolved and improved its methodology, and has used 3 different methodologies to date for the deployment of the tags: 1) Modified harpooning, 2) Catch and release over the side and 3) Catch and release bring the fish onboard. Additionally, in collaboration with the Canadian Bluefin Tuna Catch and Release fishery in the Gulf of St. Lawrence, DFO completed a 2 year study in 2018 of the short term survival and behaviour of ABFT caught and released using the "over the side" tagging methodology. 50 VEMCO Acoustic tags were deployed over the course of the study (39 in 2018 and 11 in 2017). Most tuna were tracked immediately after release and those followed recovered and swam away quickly with the exception of 1 known mortality. Thirty two of the tags applied in 2018 were subsequently detected by receivers in the Ocean Tracking Network (OTN). Of the 11 tuna tagged in 2017, 8 have subsequently been detected by receivers in the OTN in both 2017 and 2018.

The past two years (2018/2019), DFO has collaborated with Dr. Barbara Block and Dr. Michael Stokesbury's team in Port Hood, Nova Scotia, Canada for the deployment of 8 miniPAT tags using the "bring on board"

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method with a “tether plus loop” attachment. Between 2018 and 2019, 3 of the 8 tags deployed via this collaboration reached their scheduled release dates: 300, 323 and 353 days later; proving the viability of this methodology to obtain the long-term deployments necessary to study the annual migration of the ABFT.

The ICCAT GBYP accepted DFO’s offer of collaboration and provided DFO with 5 Wildlife Computers MiniPAT Pop-up Satellite Archival Tags for deployment via a scientific fishing charter out of St. John’s Newfoundland (between September and November 2020). The tags were to be deployed targeting as young as possible Atlantic Bluefin Tuna individuals present in the area (<85 inches straight fork length; ~ age 10) following the GBYP tagging protocols; in addition to the collection of a tissue sample (fin clip) for genetic analysis.

The hope of this tagging effort was to tag eastern Bluefin Tuna. Although, none of the DFO’s PSATs have entered the Mediterranean to date. There is an abundance of evidence that Eastern spawned ABFT are found in Canadian waters. 1) 8 DFO PSAT tagged fish have crossed beyond the meridian 30° west of Greenwich into the eastern Atlantic Ocean. 2) 2 conventional GBYP tags deployed by the Canadian Bluefin Tuna Catch and Release fishery in the Gulf of St. Lawrence have been recovered by Spanish purse seine vessels in the Mediterranean, and 3) Stock of origin assignment using Single Nucleotide Polymorphisms (SNPs) on Canada’s landed ABFT from 2013 to 2018 has found ~50% of the fish aged 9 to 14 in the Gulf of St. Lawrence are to be of eastern origin.

2. Methods/Results

Fisheries and Oceans Canada undertook a four day scientific fishing charter, September 29th to October 2nd, 2020, aboard the FV “Viking” (a 46 foot sport fishing vessel), leaving from the marina at Long Pond, Conception Bay South, Newfoundland. The first two days of the fishing charter, the vessel fished the southern portion of Conception Bay working from Long Pond, NFLD down and around to Harbour Grace, NFLD. The third day of the fishing charter, the vessel fished the north-eastern shore of Conception Bay, from Long Pond, NFLD to Bauline, NFLD (inside of Bell Island). On the fourth day of the fishing charter the vessel again fished the north-eastern shore of Conception Bay, from Bauline, NFLD out of Conception Bay to Pouch Cove, NFLD. The majority of the time was spent trolling at 7 knots, fishing a pair of J-Hook, plastic squid rigs off 9 foot 130 class bent butt rods (with reels), off out-riggers. The plastic squid rigs were also replaced with frozen mackerel or frozen squid daisy chains for trolling, approximately 25% of the time. On the second day of the fishing charter, the vessel also drift fished and chummed frozen mackerel and herring, 1.5 km west of Indian Pond in southern Conception Bay for 3 hours with live fresh caught Atlantic Cod on the two rod and reel set-ups. On the fourth day of the fishing charter, the vessel also drift fished and chummed frozen mackerel and herring 2.5 km east of Biscayan Cove outside of Conception Bay for 3 hours with live fresh caught Atlantic Cod on the two rod and reel set-ups. Unfortunately, all fishing activities were unsuccessful in hooking a Bluefin Tuna. Bluefin Tuna were in the area however; as there were landings in Bonavista Bay on September 30th and October 1st, Trinity Bay on October 2nd and Petty Harbour (south of St. John’s, NFLD) on October 2nd.

As DFO’s Newfoundland Bluefin Tuna Pop-up Satellite Archival Tagging scientific charter came to a conclusion, DFO reached out to the ICCAT GBYP programme to determine the next steps for the 5 MiniPAT tags that were provided for this collaborative tagging effort. Respecting the conditions of the Memorandum of Understanding (MOU) between the ICCAT GBYP and DFO, it was determined that DFO would take the collaborative tags to Port Hood, Nova Scotia and work with the highly experience tagging team already funding a tagging operation there, led by Drs. Barbara Block (Stanford University) and Michael Stokesbury (Acadia University). DFO was able to join the Port Hood tagging effort for 4 days on the water: October 4th to 6th, and October 19th, 2020. The Port Hood tagging operation had two vessels fishing for Bluefin Tuna: the 38 foot FV “Bay Queen IV” and the 37 foot FV “Nicole Brandy”; however only one of the vessels the “Bay Queen” had the stern door necessary to undertake the “bring-on board” Bluefin Tuna tagging. Therefore, the “Nicole Brandy” would hook and fight fish until the fish was under control, at which point the rod and reel set-up would be passed to the “Bay Queen” to complete the fight and undertake the tagging activity. All fishing effort took place within a 15 km radius of Port Hood, Nova Scotia. The first three days, DFO was out fishing with the Port Hood tagging team, the vessels’ fished two or three rod and reel set-ups with live mackerel on barbed circle hook. The lines were predominantly set-up with a balloon to take the bait away from the vessel and also keep the live bait in the top 10 meters of the water column. Occasionally, a kite rig was used for surface fishing, a weight was used for fishing deeper depths and/or chumming was undertaken with fresh mackerel and frozen herring when marks

occurred on the sounder. Fishing on October 19th was done exclusively via trolling a pair of squid rigs (J-hooks) behind the vessel at 4 to 7 knots. The tagging team deployed the GBYP tags on October 4th (1; Drifting, Fresh Mackerel), October 5th (1; Drifting, Fresh Mackerel) and October 19th (3; Trolling, Squid Rig). The five tags were deployed within an 4 KM radius circle of each other (Table 1; Figure 1).

Once an Atlantic Bluefin Tuna was hooked, the fish was fought on the rod and reel set-up from the rear rod holder. The fish was fought until it was deemed suitably tired, that is to prevent a fish that was too feisty being brought on board, and potentially injuring itself or the crew. When the suitably tired fish reached the side of the vessel, the Captain would grab the leader line (extending to the hook and the fish) and maneuver the fish towards the stern door of the vessel. At the stern door, a member of the crew would insert the "lip hook" under the tongue of the fish and behind the jaw. With the "lip hook" inserted, tension on the attached rope could be taken up and the fish could be physically pulled on-board the vessel. The stern door had a built-in ram which sat below the water line making boarding relatively easy. A padded mat (wetted with water) was place on the deck of the vessel and the fish was pulled onto the mat. Once on board, the fish's eye was covered with a wet-cloth and a hose pumping salt water was inserted into the fish's mouth to ventilate the gills. With the fish successfully on board, the PSAT tag's tether was inserted into the dorsal musculature of the fish below the 2nd dorsal fin (~ 2 to 3 inches). The tether was insert parallel to the dorsal fin, at approximately a 45 degree angle (depending on the body condition of the fish; fatter fish permitting a slightly deeper angle). The tether was inserted to approximately 1 inch from the head of the PSAT tag. The second loop tether, which wrapped around the body of the tag, was insert parallel to the dorsal fin, similarly at approximately a 45 degree angle, with the goal of holding the tag relatively stable and in place. Next, the ICCAT conventional tag was inserted into the dorsal musculature approximately 4 to 5 inches anterior to the satellite tag. The fin clip was collected with a pair of scissors and locking tweezers from the pectoral fin. The fin clip was placed in a labelled vial of 95% ethanol. The curved fork length was measured from the tip of the tuna's snout to the fork of the fish's tail in centimeters (in line with the pectoral fins), using a soft measuring tape which could follow the curvature of the fish's body. The half girth length was also measure in centimeters, with a soft measuring tape, from the insertion of the 1st dorsal fin to ventral mid-line. With all the tags applied and the fin clip was collected, the salt water hose was removed from the fish's mouth, the cloth was removed from its eye and the mat on which the fish lay was spun 180 degree such that the fish could be pushed off the vessel head first.

The average measured curved fork length of the fish was 227 +/- 24 cm and the average estimated round weight was 461.8 +/- 148 lbs. All fish were released in good condition; one fish however did bleed a little more than optimal from where the "lip hook" was inserted (Table 1).

3. Recommendations

Fisheries and Oceans Canada has full intentions of continuing its Atlantic Bluefin Tuna Satellite tagging program activities again next year in Newfoundland waters. However, the intention would be to focus the fishing effort on the north-western shore waters of Conception Bay and the north eastern shore waters of Trinity Bay, earlier in the month of September. Canada is seeing a significant increase of fish and fishing activity in these areas, which has been historically noted in the past but of which has been relatively non-existent in more recent times. In 2020, 29 Bluefin Tuna were landed in Bay de Verde, NFLD and 23 were landed in Old Pelican, with the majority caught between September 1st and 16th; which represented over 60% of the landings on Newfoundland this fishing year.

DFO would recommend the usage of longer conventional tags accompanying the PSAT tags. It is highly likely that a percentage of the applied conventional tags are being shed from the Tuna's body due to the relatively shallow nature with which these tags are inserted.

4. 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

Table 1. Deployment location of ICCAT GBYP Pop-up Satellite Archival (PSAT) Tags (and conventional tags), near Port Hood, Nova Scotia October 2020, by Fisheries and Oceans Canada (DFO) working with tagging operation led by Drs. Barbara Block (Stanford University) and Michael Stokesbury (Acadia University). PTT Argos ID, Wildlife Computers MiniPAT serial number, GBYP Conventional Tag, Date of Deployment, Time of Deployment, Latitude, Longitude, Curved Fork Length in Centimeters, and estimated Round Weight in pounds.

PTT ID	PSAT Serial #	Conventional Tag	Date Fished	Time Released	Lat	Long	CFL	eRWD
204874	20P1140	BYP079153	10/4/2020	10:54	45.99	-61.70	229	464.72
204876	20P1152	BYP079154	10/5/2020	15:19	45.99	-61.74	215	389.25
204877	20P1154	BYP078682	10/19/2020	10:52	46.03	-61.74	216	394.35
204864	20P1165	BYP078683	10/19/2020	11:32	46.01	-61.74	267	715.34
204875	20P1151	BYP078684	10/19/2020	12:27	46.00	-61.79	206	345.18

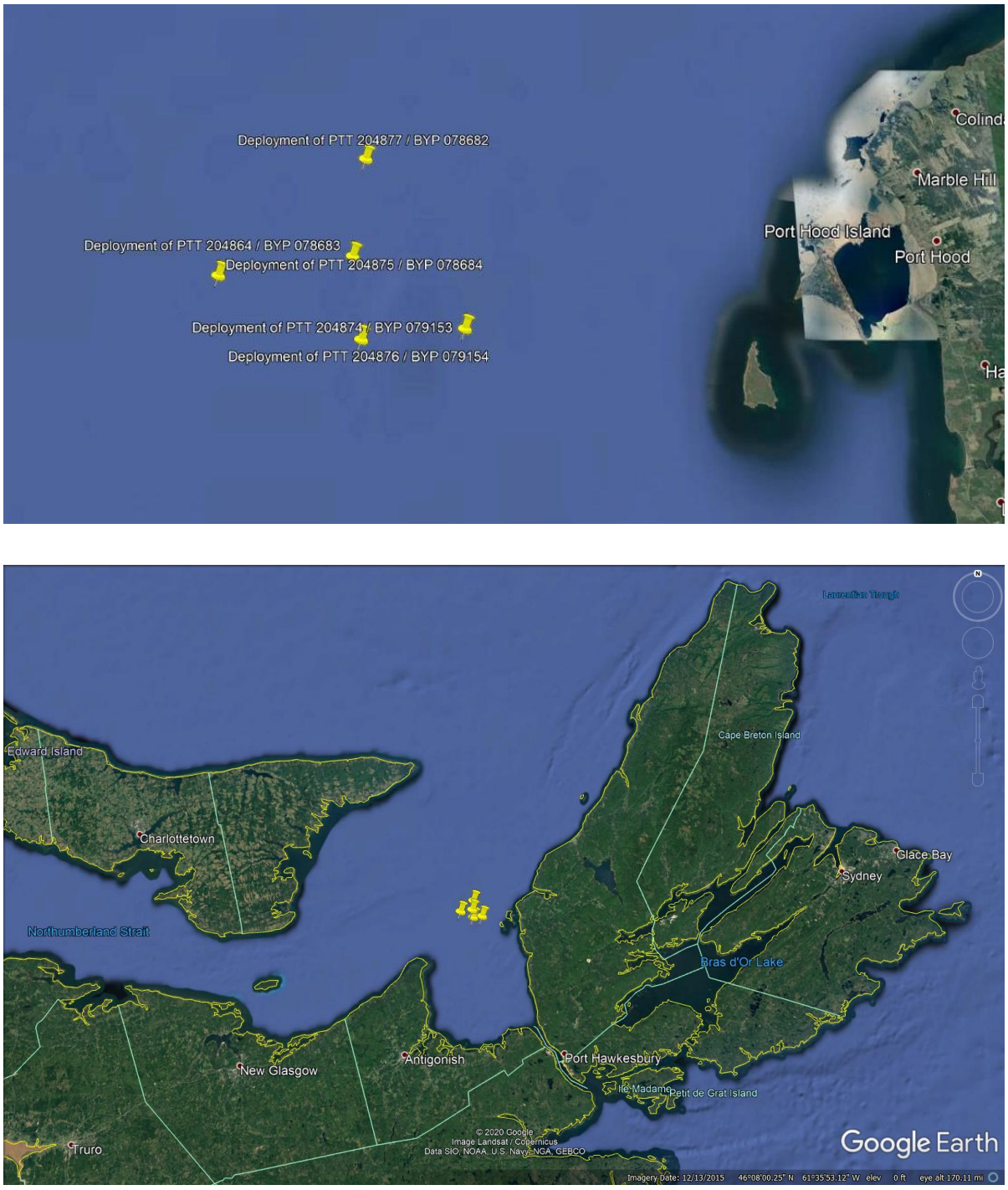

Figure 1: Deployment location of ICCAT GBYP Pop-up Satellite Archival (PSAT) tags (and conventional tags), near Port Hood, Nova Scotia October 2020, by Fisheries and Oceans Canada (DFO), working with the highly experience tagging team already funding a tagging operation there, led by Drs. Barbara Block (Stanford University) and Michael Stokesbury (Acadia University). A) Zoomed in Google Earth Map. B) Zoomed out Google Earth Map.