

**THE ATLANTIC-WIDE RESEARCH PROGRAMME FOR BLUEFIN TUNA  
(GBYP Phase 11)**

**Electronic Tagging of Juvenile Atlantic Bluefin Tuna  
in the NW Atlantic**

**Final Report**

**4 June 2023**

**Large Pelagics Research Center**

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This project is co-funded by  
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## **Final Report to ICCAT for GBYP electronic tagging of juvenile Atlantic bluefin tuna in the NW Atlantic.**

As completed under the Memorandum of Understanding (MoU), for ICCAT/GBYP or CSIC-ICCAT/GBYP and CSIC-ICCAT, to participate in GBYP Phase 11 e-tagging program. 4 June, 2023

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### **Executive Summary**

The ICCAT GBYP MOU goals were achieved with the deployment of all eight pop-up archival satellite (psat) tags (Wildlife Computers' Minipat model) provided by the SCRS and received by the participants in August, 2022 for deployment during the US bluefin fishing season. The electronic tagging campaign was organized and materials prepared by Lutcavage. Field work was initiated on 14 September, 2022, with travel by car and passenger ferry from Hyannis Port to Nantucket Island, Massachusetts. Shipped tags arrived just in time to allow Lutcavage to participate in the Nantucket Bluefin Blast tournament, at the invitation of Captain Eric Stewart, FV Drummer Hoff, a 33m Viking yacht, and the vessel's owner. All travel and logistic expenses associated with the tagging campaign were donated by Lutcavage (LPRC), and the charter days (2), crew and three nights lodging on Nantucket were donated by Capt. Stewart, Kate Weld, and the vessel's owner.

Captain Stewart and his crew had partnered with LPRC on the first psat tagging study of juvenile ABFT in the NW Atlantic, successfully deploying over 58 psat tags and many more conventional ID tags over subsequent years. Results provided the first ever year-long tracks indicating dispersals and annual migration paths (Galuardi and Lutcavage, 2012). Confidence in LPRC's successful tag and release methods was based on long tracks and data missions, and little to no indication of post release mortality. Psat tagging was accomplished with a single point dart attachment and silicone sleeve over monofilament tether. The tags provided by the SCRS had already been tethered and had additional external ID tags attached to the assembly. Based on experience and field trials, LPRC's tag tethering methods were preferred, which also allowed the external ID tag to be incorporated within the tether itself.

The vessel left at 04:00 hrs and fishing commenced before first light (sunrise), 16 September (the day preceding the Tournament) under nearly ideal fishing conditions- calm seas and light wind, with SST's of 19- 20 °C. Squid rigs of various colors were used as bait. The first bluefin was caught at 07:10 and the last (8<sup>th</sup> fish) released by 10:45 (Table 1), and at times, the crew successfully handled multiple bluefin hook-ups. All eight bluefin were caught within a mile or two of each other, where there was an extensive aggregation of surface and submerged schools.

Bluefin were brought aboard through the vessel's tuna door onto a padded, insulated vinyl mat wetted with seawater while its eyes were covered, examined closely for injuries, and the hook removed (see photo). As Lutcavage inserted the tag tether's dart into the pterygiophores below the

2<sup>nd</sup> dorsal fin, a crew member measured and recorded curved fork length while a fin clip was taken and stored in a 3.0 ml vial filled with 99% ethanol. Fish were on deck and released within 30-40 sec. Sizes of tagged bluefin were 114-133 cm CFL (mean + std, 122 ±9.1). LPRC considered the smallest fish (114 cm CFL) close to the minimum size suitable for release with current psats based on considerations of fish size vs drag and potential impacts of external attachments.

The team fished the first day of the tournament (17 September), releasing several more bluefin with conventional ID tags for LPRC's Tag a Tiny™ program, under more challenging fishing conditions- wind, current, a slow bite, and fish breaking off tackle. Indeed, the first mate lost his wedding ring as a fish hitting the rigging snapped it off his finger. The tagging team realized their luck with the previous day's superb fishing, and returned to the dock at 15:30, having safely deployed all eight tags for the GBYP 2022 program. Lutcavage returned via ferry to Hyannis, and a long drive home to Gloucester.

### **Evaluation and Recommendations for future work**

The best chance for a successful tagging program rely on good preparation: having tags and personnel and fishing arrangements in place well in advance of planned campaigns, and adequate financial support and time for the field work and participants. The record of failed tagging campaigns for tunas in the Atlantic is lengthy, despite the technology being in use since 1997, with little change in tag cost, tag hardware, mode of data transmission, or size of tags. Loss of science and data opportunity are rarely factored into project evaluation after campaigns end. It's well known among experienced tag teams that numbers matter: inherent tag and data transmission failures means that many more tags need to be deployed in order to recover a minimum of acceptable data records for scientific analysis, let alone population studies.

Opinions about how to conduct electronic tagging of valuable species of tunas and billfish are highly subjective, but should be based on record and performance, and especially, potential impact on the welfare of the animal itself. We note that our previous studies delivering full year tracks for juvenile and giant bluefin tuna using single point attachment confirms that the 2 anchors attachment adopted by the SCRS is unnecessary when tag hardware is reliable. Two point dart attachment seems to have been adopted largely to mitigate nosecone breakage in a particular tag model deployed on tunas- a hardware issue that the company has been trying to resolve for some years. In our experience, two anchors should be avoided especially in the case of smaller tuna- where a 2<sup>nd</sup> flesh wound could result in predation soon after release.

Electronic tags, especially psats, remain costly (@~\$4,000 USD) and have unreliable performance records, just considering hardware and software of the tags themselves, let alone attachment materials and fishing (e.g. Lutcavage et al., 2015). A second consideration is that bluefin selected for release with an external electronic tag must be carefully evaluated for appropriate size and health condition. Against all of these challenges, it's clear that the tagging team needs to have extensive experience with all aspects of the fishing and tagging protocols, led and trained by individuals and crews that have that expertise.

In the Nantucket campaign, data returned by reporting tags did not indicate post release mortality. However, tag technical performance was dismal. All reporting tags released early, with broken

nosecones (3 tags), non-reporting (1 tag), no useable data except release location (2 tags). This meant that 6 out of 8 tags (75%) malfunctioned. The two longest monitoring durations were ~ 3 and 6 months, far less than desired, and insufficient to identify longer dispersal routes and mixing of juvenile bluefin. In our previous study (Galuardi and Lutcavage, 2012), the smallest fish we released with a different tag model (Xtag, MWT) was 117 cm CFL, which we considered the smallest body size that might reasonably be expected to retain an external tag for long duration. In the Nantucket campaign, we would have preferred fish of at least that size, but the window for fishing and tagging was very short on account of late receipt of the psats (earlier in the summer is preferred), our own research schedule and that of the vessel and crew. As far as the GBYP science program, assuming well trained participants, the largest issue may be tag reliability and data return. In the future, there should be full consideration of expectations of tag performance and data return records, as well as the realistic evaluations of budget and time needed for electronic tagging programs to deliver useable, reliable information of sufficient temporal-spatial scales on dispersals, behavior and mixing.

### **Literature Cited**

Galuardi, B. and M. Lutcavage. 2012. Dispersal routes and habitat utilization of juvenile Atlantic bluefin tuna, *Thunnus thynnus*, tracked with mini PSAT and archival tags. PLoS One. 7(5), e37829:1-11.

Lutcavage, M.E., Lam, C.H., and Galuardi, B. 2015. Seventeen years and \$3 million dollars later: Performance of PSAT tags deployed on Atlantic bluefin and bigeye tunas. SCRS/2014/178.

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Table 1. Tag deployment information for Atlantic bluefin tuna tagging, Nantucket Island, MA, USA.

PTT-ID	Serial	Tether ID	Date mm/dd/yr	Lat deg	Lat min	Long deg (-W)	Long min	CFL (cm)	Time	SST °C
233992	22P0027	000999	09/10/2022	41	32.2	69	23.4	114	7:10	20.1
233990	22P0025	000994	09/10/2022	41	32.2	69	23.4	114	7:25	20.1
233996	22P0032	001000	09/10/2022	41	32.2	69	23.4	133	7:40	20.1
220547	21P0347	000996	09/10/2022	41	32.2	69	23.4	119	7:45	20.1
220565	21P0409	000998	09/10/2022	41	32.2	69	23.4	114	7:50	20.1
220589	21P0477	000993	09/10/2022	41	32.2	69	23.4	140	8:00	20.1
233991	22P0026	000995	09/10/2022	41	32.2	69	23.4	119	9:20	20.1
233995	22P0031	000997	09/10/2022	41	32.2	69	23.4	119	9:30	20.1



Figure 1. Squid rigs glow before the dawn, as the crew begins fishing preparations.



Figure 2. Lines out, as Capt. Stewart and crew make adjustments to rods and rigging.



Figure 3. Lutcavage, (about to insert tether dart), and Mate Cory Stewart conduct tagging and sampling. Bluefin were slid and released back out of the tuna door within 30-40 sec.



Figure 4 Crew of FV Drummer Hoff back at the dock after a successful tagging day off Nantucket Island, September, 2022. All photos courtesy of Large Pelagics Research Center.