

ARCHIVAL TAGGING OF ALBACORE TUNA (*THUNNUS ALALUNGA*) IN THE NORTH ATLANTIC, A PILOT STUDY

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SUMMARY

This paper describes the methods employed in a pilot archival tagging study on albacore tuna onboard an Irish trolling vessel in North Bay of Biscay during July 2005. The study aims to obtain an estimate of recovery rates for fish tagged with 'dummy' archival tags in order to assess the feasibility of conducting an archival tagging study for albacore tuna in the North Atlantic. A total of 199 fish were tagged and released during the first phase of this study.

RÉSUMÉ

Le présent document décrit les méthodes employées dans une campagne pilote de marquage du germon, avec des marques-archives, réalisée à bord d'un ligneur irlandais opérant au nord du Golfe de Gascogne au mois de juillet 2005. La campagne a pour objectif d'obtenir une estimation des taux de récupération pour les poissons marqués avec des « marques-archives factices » en vue d'évaluer la faisabilité de réaliser une campagne de marquage avec des marques-archives pour le germon de l'Atlantique nord. Au total, 199 poissons ont été marqués et remis à l'eau au cours de la première phase de la campagne.

RESUMEN

Este documento describe los métodos empleados en un estudio piloto de marcado de atún blanco con marcas archivo desde un curricanero irlandés en el norte del Golfo de Vizcaya durante julio de 2005. El estudio tiene como objetivo obtener una estimación de las tasas de recuperación de ejemplares marcados con "marcas archivo facticias", para evaluar la viabilidad de realizar un estudio de marcado con marcas archivo para el atún blanco en el Atlántico norte. Durante la primera fase de este estudio se marcaron y liberaron 199 ejemplares.

KEYWORDS

Albacore. Tagging. Dummy. Archival. Bay of Biscay

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1 Introduction

A number of conventional tagging studies for albacore have been conducted in the North Atlantic and Mediterranean since the 1960s. These studies have been well described and summarised (Arrizabalaga *et al.*, 2002). Information was obtained on horizontal movements of albacore tuna from which it was possible to draw a number of conclusions; the hypotheses on two separate stocks existing in the North and South Atlantic was supported, long distance transoceanic movements were confirmed, and some mixing between the North Atlantic and Mediterranean was found to occur.

Archival tagging studies which provide detailed information on migratory paths, temperature and depth preferences, can lead to improved information on fish behaviour and physiological adaptations to oceanographic features. External pop-up archival tags (PAT tags), which transmit data via satellite systems and are therefore fishery independent, are used extensively in experiments on large pelagic species such as Atlantic bluefin tuna *Thunnus thynnus* (Block *et al.* 2001). However, currently available models are too large for tagging albacore tuna. Smaller, internally implantable archival tags can collect data for periods of up to 10 years and although fishery dependent, represent the best archival option at present.

Given a relatively high unit cost of archival tags, an estimated expected tag recovery rate should be determined in order to assess the number of tags and associated financial investment required to ensure sufficient recoveries from an archival tagging experiment. A number of uncertainties exist in the North Atlantic in this regard.

Although archival tags have been used extensively for other species of tuna their use with albacore is relatively new. An albacore archival tagging programme commenced on the west coast of the US as part of the Tagging of Pacific Pelagics Programme (TOPP) in 2001 and 16 archival tags have been recovered by US fishermen from 116 deployments (14% recovery rate) since 2003 (Childers, 2005). Also Uosaki (2003) reported preliminary results of one recapture from 40 albacore tuna tagged and released with archival tags near Japan in the Pacific. However an archival tagging programme for albacore tuna has yet to be carried in the North Atlantic. In addition the albacore fishery which is primarily conducted in the Bay of Biscay, is relatively complex. It is primarily exploited by 3 different nations with 3 different languages, employing a wide variety of fishing methods on a highly seasonal basis. Also this is the first occasion that a relatively high reward has been made available for the capture of tagged albacore in the area so it is not possible to draw direct comparisons with previous conventional tagging programmes when smaller incentives for the reporting of tag recaptures were available.

This study aims to obtain an estimate of recapture rates for fish tagged using 'dummy' archival tags in order to assess the feasibility of conducting an archival tagging programme for albacore tuna in the North Atlantic. No results of tag recaptures are available to date so this paper primarily focuses on the methods employed during this study.

2 Materials and Methods

2.1 Fishing Operations

Trolling gear was used for the experiment as Irish vessels have formerly successfully employed this method. It was intended to commence tagging operations early in the season in South Bay of Biscay in order to increase the likelihood of recaptures during year 1 as fish migrated north. However it was also planned, where possible, to operate in the same area as the Spanish trolling fleet in order to maximise tagging opportunities. The tagging vessel was 20 m long, constructed of wood, fitted out with steel outriggers and American hydraulic line winches, and fished 12 to 14 lines at a time. Large and small double barbless hooks were used to catch fish of a range of sizes. The vessel trolled at a speed of approximately 6 knots but slowed down when a fish was hooked to be taken aboard for tagging. Rubber bungees were present on all lines to absorb the tension of the fish bite.

2.2 Fish Handling

Fish were landed in a scoop landing net with nylon knotless netting onto a carpet on the deck at the stern of the vessel. Only fish in good condition, hooked through the lower lip were selected for tagging. Two 1m stainless steel V-shaped tagging cradles were specially constructed for this study, and were lashed to rails at the side of the vessel for the duration of the experiment. The cradles were also fitted with built in measuring rulers and plastic containers at the top end for storing tags and related equipment in betadine antiseptic solution during

surgery. A hose containing a clean flow of pumped seawater was inserted through a gap at the top of the cradle in order to irrigate the gills during tagging. Fish were blindfolded with a light sheet of back PVC during tagging.

2.3 Tagging

Dummy tags were based on Lotek LTD2410 archival tags which are the smallest full featured geolocator and temperature depth recorders currently available. The dummies were constructed in plastic moulds from epoxy resin with lead shot and protruding fishing gut to emulate the light sensor stalk, and had the exact same dimensions as the genuine archival tag, 37mm length x 11mm diameter and 6.2g in weight. A label with a contact number for recaptures was also embedded in the tags. A target of 200 fish was set for this experiment.

An incision was made with a scalpel posterior to the pelvic fins and a finger was used to penetrate the peritoneum. The tag was inserted in the peritoneal cavity and a single surgeon's flat knot was used to seal the wound. Next, a small amount of Betamox (1 – 2 ml) was injected into the wound from a syringe without a needle. In addition, depending on the size of the fish 1 – 3ml of 20% Oxytetracycline solution was injected into the dorsal musculature of the fish to facilitate age validation studies where whole fish are retained when recaptured (McFarlane and Beamish, 1987). A conventional floy tag with contact details was also inserted at the base of the second dorsal fin. Following completion of these procedures the fish was checked to ensure it was still in good condition and released over the side of the vessel. Tag numbers, geographic position, date, operating time, fish condition and time of release were recorded for all tagged and released fish.

2.4 Reward and Publicity

A reward of €200 is available to fishermen who recapture a fish with a dummy archival tag. This sum is consistent with the reward provided by AZTI in a juvenile bluefin tuna tagging programme in the Bay of Biscay which deploys both dummy and authentic archival tags, and will remain the same if/when an authentic archival tagging programme for albacore tuna occurs. The reward and the study have been advertised through the distribution of posters to relevant research institutions, fishermen's organizations and fishermen operating in the Atlantic.

3 Results and Discussion

Fishing and tagging operations were conducted within a relatively small geographical area in North Bay of Biscay (**Figure 1**) alongside a fleet of Spanish trolling vessels from the 15th to the 22nd July. A total of 547 fish were landed during 8 days fishing of which 199 (40%) were tagged and released with dummy tags. Fish that were not tagged were rejected due to poor condition or preoccupation with tagging a different fish. The system of tagging worked best with two people managing the operation, one holding the fish steady and keeping the hose in the mouth and the other conducting surgery. Almost all fish were calm and still once placed upside down in the tagging cradle, blindfolded and the gills well irrigated. Some fish, which continued to thrash about during the operation, were rejected and on several occasions tags were removed, as it was not possible to stitch the wound to a satisfactory level. The v-shaped cradle worked well but the angle of the side of the table could be increased from 30° to 45° or more to assist in holding the fish steady. Also a small smooth surfaced padded stretcher could be used to transport the fish from the stern, and placed with the fish into the cradle to ensure a soft point of contact.

Trolling generally catches juvenile albacore tuna which are prevalent close to the sea surface and this was found to be the case during the tagging experiment. The average size of tagged fish was 63 cm FL and the observed size frequency outlined in **Figure 2** corresponds primarily to age 1 and 2 fish. Tagging operations from time of fish landing to fish release took an average of 3 minutes and 3 seconds and fish were generally very lively at the point of release.

It is intended to continue this study with a similar experiment in 2006 when it is planned to deploy a similar number of dummy tags using the same basic methods described above. No tag recoveries have occurred to date but BIM and AZTI will continue to maintain contact with other research institutions and monitor fishing activities for tagged fish recaptures. It is hoped that sufficient recovery rates of dummy tags will occur from this study to warrant further investigation into a large-scale authentic archival tagging programme, and that links can be forged with other institutions interested in sharing this goal.

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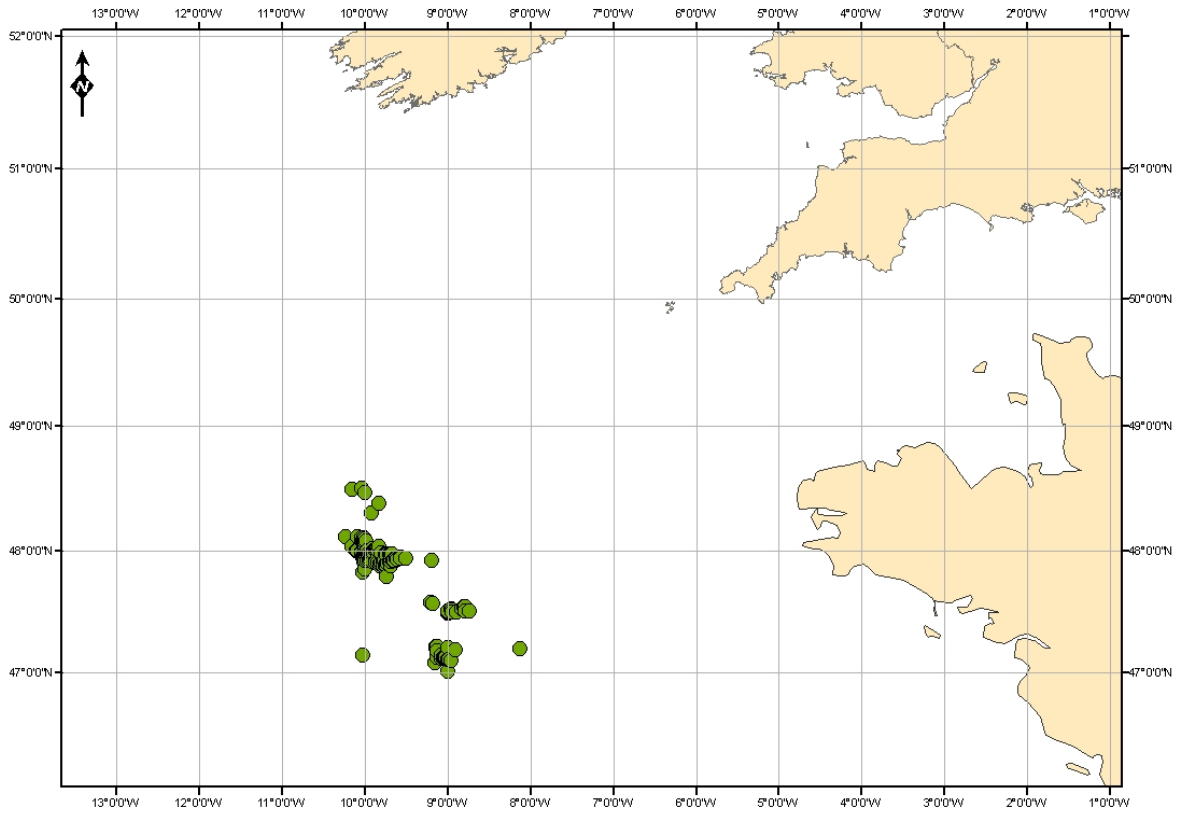


Figure 1. Release locations of 199 albacore tuna tagged with dummy archival tags in North Bay of Biscay July 2005

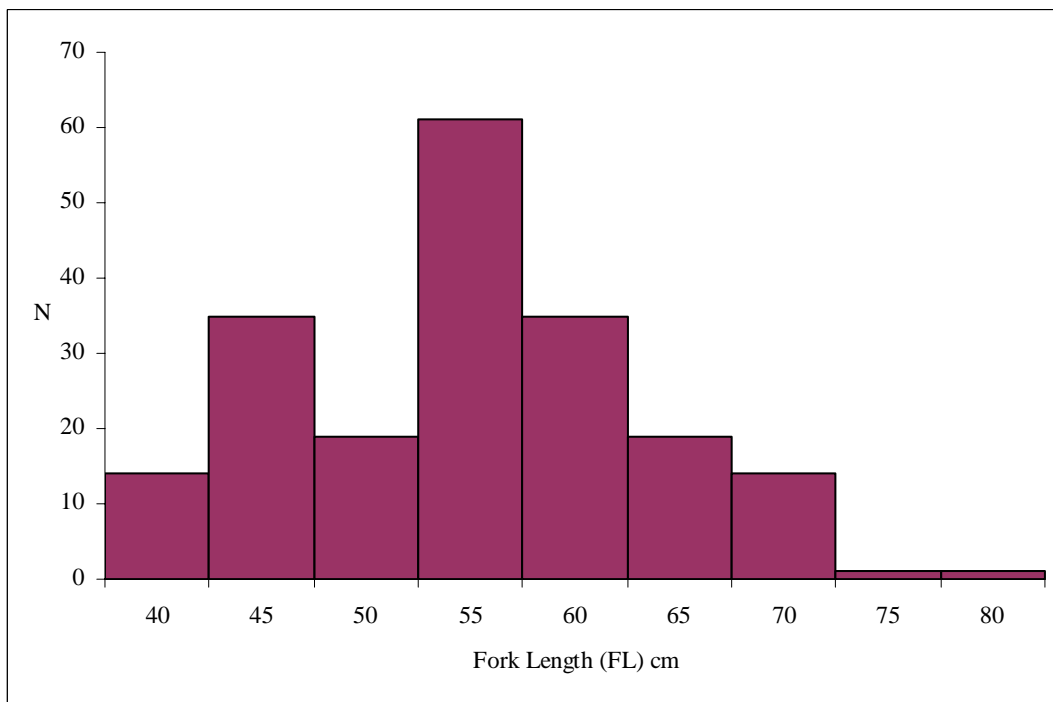


Figure 2. Size frequency of dummy archival tagged albacore tuna