SUMMARY OF THE 2021 PILOT YEAR CATCH AND RELEASE TAGGING (CHART) PROGRAMME IN SOUTHWEST ENGLAND

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SUMMARY

A Catch and Release Tag (CHART) recreational sports fishery for Atlantic Bluefin Tuna (BFT) was delivered in the western English Channel in 2021. The programme was co-designed with industry representatives and facilitated the collection of important scientific data in a cost-effective manner. The project design emphasised good handling practices, animal welfare and ensuring that any adverse impacts were minimised through a combination of technical measures (e.g., gear selections), monitoring (10% observer coverage and camera monitoring) and on-going evaluation (through data and video analyses). Over a 13-week fishing season, 421 trips were made by 15 vessels using predominantly trolled surface lures, and more than 1,000 paying anglers were involved. Over 900 bluefin tunas were hooked up; 704 (78%) were tagged with a large ICCAT floy tag, another 23 (2.6%) were measured but not tagged, 174 (19%) escaped from the hook and 10 fish died during the capture process. The nominal Catch Per Unit Effort (CPUE) averaged 1.74 BFT per day while the size range of captured BFT was between 100 to 288 cm straight fork length (SFL).

RÉSUMÉ

Une pêche sportive récréative de capture et de remise à l'eau (CHART) du thon rouge de l'Atlantique (BFT) a été mise en place dans l'ouest de la Manche en 2021. Le programme a été conçu conjointement avec des représentants de l'industrie et a facilité la collecte de données scientifiques importantes de manière rentable. La conception du projet mettait l'accent sur les bonnes pratiques de manipulation, le bien-être des animaux et l'assurance que tout impact négatif était minimisé grâce à une combinaison de mesures techniques (par exemple, le choix des engins), de surveillance (couverture par des observateurs à hauteur de 10 % et surveillance par caméra) et d'évaluation continue (par des analyses de données et de vidéos). Au cours d'une saison de pêche de 13 semaines, 421 sorties ont été effectuées par 15 navires utilisant principalement des leurres de surface à la traîne, et plus de 1.000 pêcheurs rémunérés ont été impliqués. Plus de 900 thons rouges ont été accrochés à l'hameçon ; 704 (78%) ont été marqués à l'aide d'une grande marque flottante ICCAT, 23 autres (2,6%) ont été mesurés mais non marqués, 174 (19%) se sont échappés de l'hameçon et 10 poissons sont morts au cours du processus de capture. La capture nominale par unité d'effort (CPUE) était en moyenne de 1,74 thon rouge par jour, tandis que la fourchette de taille des thons rouges capturés était comprise entre 100 et 288 cm de longueur à la fourche (SFL).

RESUMEN

En 2021 se llevó a cabo una pesquería deportiva de captura y liberación (CHART) para el atún rojo del Atlántico (BFT) en el oeste del Canal de la Mancha. El programa se diseñó junto con

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representantes de la industria y facilitó la recopilación de importantes datos científicos de una forma eficaz a nivel de costes. El diseño del proyecto hizo hincapié en las buenas prácticas de manipulación, el bienestar de los animales y la garantía de que cualquier impacto adverso se redujera al mínimo mediante una combinación de medidas técnicas (por ejemplo, la selección de los artes de pesca), la supervisión (cobertura de observadores del 10 % y seguimiento con cámaras) y la evaluación continua (mediante análisis de datos y vídeos). A lo largo de una temporada de pesca de 13 semanas, se realizaron 421 mareas con 15 buques que utilizaron predominantemente señuelos de superficie al curricán, y participaron más de 1.000 pescadores de pago. Se engancharon más de 900 atunes rojos; 704 (78 %) fueron marcados con una gran marca de aleta de ICCAT, otros 23 (2,6 %) fueron medidos, pero no marcados, 174 (19 %) se escaparon del anzuelo y 10 peces murieron durante el proceso de captura. La captura nominal por unidad de esfuerzo (CPUE) se situó en una media de 1,74 atunes rojos por día, mientras que el rango de tallas de los atunes rojos capturados se situó entre 100 y 288 cm de longitud recta a la horquilla (SFL).

KEYWORDS

Bluefin tuna, size distribution, sport fishing, tagging, temporal distribution, trolling, tuna fisheries

1. Introduction

In recent years there have been an increasing number of sightings of Atlantic Bluefin tuna *Thunnus thynnus* (BFT) in UK waters (Horton *et al*., 2021), and BFT is being increasingly encountered by fishers. This has led to a growing interest in the species from government, the scientific community, the recreational fishing community, and the commercial fishing sector. However, knowledge of the extent of presence/absence of this species, the demographic exploiting English waters, the spatial dynamics and relative abundance of these fish whilst in UK waters, is still relatively unknown. The CHART 2021 programme was developed in England in response to a proposal from the recreational fishing sector, who highlighted that anglers and charter boat operators were increasingly encountering BFT and that there was scope for a science-led, angler driven recreational fishing programme.

Scoping work stemming from this proposal concluded that a small-scale programme run by the Department for Environment, Food and Rural Affairs (Defra) and the Centre for Environment, Fisheries and Aquaculture Science (Cefas), working collaboratively with charter boat skippers trained in conventional floy tagging, could deliver valuable research while giving the highest consideration for the welfare and conservation of BFT. Such a citizen science data collection approach provides a cost-effective means to collect a large volume of data on BFT, with the benefits of co-design and stakeholder input. The involvement of charter boats and paying anglers enables skill and knowledge transfer, while also providing valuable scientific data.

2. Methods

2.1. Project structure

CHART is a science-led data collection programme designed to maximise the opportunity to contribute to the ICCAT Grand Bluefin Year Programme (GBYP) and ensuring that valuable data would be collected was at the forefront of the design criteria. Regular meetings and correspondence with industry stakeholders (**Figure 1**) enabled a shared understanding of each partners goals which fed into the design of formal documents in the vessel application and programme delivery phase. The design principles of CHART were guided by the UK Fishing Plan to ICCAT (e.g. camera monitoring and observer coverage) and the desire for valuable and robust data.

Throughout the programme design and delivery, the CHART project operated under the oversight and auspices of a project Steering Group (SG). This group consisted of representation from governmental organisations, stakeholder representation, as well as representation from the UK Devolved Administrations (Northern Ireland, Wales and Scotland). SG members were consulted and informed on the design and delivery of CHART throughout the year and were there to monitor progress, and to provide feedback/ideas/recommendations on programme design.

2.2. Pre-season design

In the 2021 pilot year, registered charter fishing vessels were invited to apply for one of the 15 fishing licences available within the CHART project. Application criteria were co-designed with stakeholders and potential applicants were informed of the terms and conditions that they would need to adhere to e.g. the types of fishing gear was restricted to minimise the risk of BFT mortality and any other potential welfare impacts (e.g. no treble hooks, and minimum line, rod and reel standards) and an angler code of conduct which provided procedure in the event of extended fight times. Applicants were screened to ensure they met the minimum criteria and those passing the criteria were then evaluated and scored against each of the selection criteria, with all applicants then ranked according to score. The fifteen successful applicants were then invited to attend (with their primary crew) one of two mandatory two-day training workshops to ensure that they had the required skills and knowledge to participate in fishing and tagging activities.

Cefas, as the research institute running the CHART project, was responsible for delivery of this training so as to ensure that all tagging was undertaken by trained personnel (**Figure 2**), as mandated in Paragraph 44 of ICCAT regulation 21-08 and laid out in the approved/endorsed UK Fishing Plan to ICCAT. In line with the co-design principles of CHART, this training was delivered as a collaborative approach with some parts of the day delivered by Cefas staff and the other led by the industry experts and key stakeholders. Additional presentations were given by Cefas' named vet (as part of the Animal Welfare and Ethical Review Body – AWERB, which has oversight of the ethical and welfare aspects of all Cefas' science) and the Marine Management Organisation (MMO, which is responsible for the licensing of fishing activity in England).

The first day of the training covered: The science behind CHART (e.g. GBYP and the ICCAT regulations), the theory of tagging fish, how to assess the vitality of BFT (Cefas' named vet), the recovery and release of BFT after tagging and licensing/licence conditions. Afterwards, with the foundations in place, a series of practical sessions took place to train participants in measuring techniques for BFT, tagging technique and data collection. The second day covered presentations from industry experts on the fishing process, which covered a broad range of topics including: welfare and capture, preparation and mindset, recreational gear selection, how to find BFT and how to bring it all together, complemented by practical break-out session trialling and discussing stand up techniques, rods, reels, harnesses and connections.

All skippers and their primary crew were mandated to attend one of the training workshops for their fishing licence to be issued.

2.3. Management of Operations

During the fishing season there were seven Cefas observers and the operations manager, involved with the observing requirements of CHART. The aim in the pilot year was to provide 10% observer coverage across the trips. All observers attended at least one of the two-day workshops to ensure they were trained to at least the same standard as the skippers and crews in the principals behind CHART, legal requirements and were familiar with the information and protocols in which the skippers and crews were trained in. Therefore, confirming that the training provided at the workshops was translated into the field to ensure that fish welfare was given the highest possible consideration and data were robust.

Remote Electronic Monitoring (REM) camera systems were fitted to all vessels for the programme duration. The cameras were programmed to start recording the moment the vessel left its home port and stop recording once the vessel was back on its mooring. The hard drives were sent to the Cefas Laboratory where 100% of received footage was analysed for protocol adherence and any breaches to the fishing/tagging protocol, cross-referencing of time/date stamps and catch details with the data forms, and to inform on any recommendations regarding refinement of protocols which may have a beneficial impact on fish condition.

3. Results

The CHART fishing season was open for a period of 13-weeks (91 days), from 16th August to 14th November 2021. The final project tallied results are presented in an infographic (**Figure 3**). An infographic of this nature was produced each week and put on the project website (https://www.cefas.co.uk/impact/programmes/chart/) and Twitter so as to share the ongoing results of the project with stakeholders and the general public.

All vessels adopted trolling surface lures as their preferred method of fishing as opposed to drift fishing of deadbaits, the two permitted fishing methods (the use of livebaits was not permitted in this programme). The total number of fishing trips undertaken by the CHART fleet was 421 on 74 different fishing days (no fishing activity occurred on 17 days). Effort was largely dictated by weather, existing bookings, prior work commitments, vessel failure and in the case of the most geographically isolated vessel, a lack of tuna sightings. The active fishing time per fishing trip (the soak time of the fishing gear) averaged 6.9 hours and totalled 2881 hours of fishing effort across the season. The average number of anglers across the season per trip was 2.6 (range 0 – 6) with a total of 1,069 anglers participated in CHART 2021.

A total of 901 BFT were hooked-up for more than 30 seconds. Of these, 733 were successfully angled to the side of the vessel, equating to an overall 81% conversion rate for the programme. The nominal Catch Per Unit Effort (CPUE; number of BFT angled to point of restraint at the side of vessel divided by days fishing) for the programme was therefore 1.74 fish per day (**Figure 4**). Weeks 1 and 2 saw the lowest CPUE at 0.6 and 0.5 fish per day respectively. The highest CPUE was in the final week, when it rose to 3.5 fish per day. The mean fight time was 18-minutes and increased with fish size. Only five fish (0.7%) had a fight time in excess of 1 hour and 74% of fish were restrained within 25-mins.

Fish successfully angled to the side of the vessel were not permitted to be brought onboard and were restrained on a lip hook or lip grip at the side of the vessel with the boat in gear to facilitate recovery at an early stage. Of the 733 BFT brought to the side of the boat, 727 were measured (straight fork length, SFL). These ranged from 100 – 288 cm SFL, with the average size of 182 cm (mode of 165 cm SFL; **Figure 5**), equating to an estimated age of 7 years old (calculated from Rodriguez-Marin *et al*., 2016). The size range encountered has estimated ages of between 3 – 12 years old exploiting English waters.

In total 704 BFT were tagged over the side of the vessel with a large double barb anchor floy tag provided by ICCAT (**Figure 6**). No recaptures were reported during the season.

Skippers and crew were trained to assess the condition of the fish upon arrival at the side of the vessel (pre-tagging) and again post-tagging prior to release. Overall condition was determined by 'injuries' 'bleeding' and 'activity and movement' metrics. Of the 733 BFT brought to the side of the boat, 97% of them displayed no injuries, with <2% exhibiting moderate or major injuries. Similarly, 99% of fish had no visible bleeding when they arrived to the side of the boat which did not change post-tagging. Most fish (96%) were classed as alert on arrival and 3% lethargic. Post-tagging, this increased to 98% classed as alert following a recovery period. The recovery periods ranged from one to 53 minutes with a mean of 7.5 minutes. The position of hooking was recorded for each fish to ensure that foul hooking was not a regular occurrence and to ensure that the gear specifications were facilitating hooking in the scissors of the BFT most of the time. This was the case, with >99% of fish hooked in the scissors, mouth or jaw, and <1% of BFT foul or deep hooked.

There were ten BFT mortalities across the season, giving an incidental mortality of 1.4% (of fish brought to the side of the vessel). Initial feedback and data suggested that five mortalities were due to foul/deep hooking, two reported heavy bleeding from the gills and two from damage associated with restraint on the lip hook, and one unknown. All fish were brought ashore and retained for scientific analysis and autopsy at a later date, with cadavers also being used for further training purposes.

4. Discussion

The pilot year of the CHART programme has provided a good baseline to inform our of knowledge of BFT and their interaction with recreational fisheries in the Southwest English waters. Their presence between August and November in good numbers which seemed to increase throughout the season has been confirmed. Despite the large size range encountered most fish caught in the programme would have been mature (L_{50} and L_{100} at three and five years old respectively; Mather *et al*., 1995). It is therefore anticipated that following their residency in these waters

until at least mid-November, they would move out to migrate to winter feeding areas or spring/summer spawning area in the Mediterranean. With no tag returns reported during the 2021 fishing season, it is hoped that any inter-annual site fidelity will be able to be determined during the 2022 fishing season or further in the future.

The fishing method of trolled surface lures proved to be effective in catching BFT recreationally in these waters during daylight (fishing during the hours of darkness was not permitted) and the CPUE increased throughout the season. The impacts of the programme which could be quantified (e.g. at-vessel mortality) and visually assessed (e.g. fish condition, hooking position) proved to be minimal. Practices were in place (such as the skipper/trained crew taking over the angling if there was a lack of progress or strictly after 60 minutes) to try to constrain excessive fight times and the mean fight time experienced in CHART (18-minutes) was lower than that reported in other programmes (e.g. mean of 33 minutes in Stokesbury *et al*., 2011). This was augmented by a minimum recovery period of five-minute post-tagging (exceptions apply in case of risk of damage to fish). This recovery period increased the post-tagging vitality, with 98% classified as alert, thus evidencing the importance of the recovery period in the process. The low levels of foul or deep hooked BFT (<1%) demonstrated the effectiveness of the recommended and restricted gear lists in limiting such occurrences.

The success of the pilot year in terms of valuable scientific data collected, minimal adverse outcomes and socio-economic benefits were testament to the lengthy scoping and co-design process, with researched protocols, robust training courses and in-season support and monitoring to promote best practice. These measures were adopted by participants who showed dedication to the programme and a good team-working ethos of sharing knowledge and experiences. As a result, CHART has been continued into 2022 with 25 vessels participating in England and a season extension to better understand the temporal trends in occurrence. Furthermore, the sharing of knowledge, training and protocols with Devolved Administrations in Wales and Northern Ireland has led to their own programmes being implemented in 2022, with data being collected in harmony to provide a collaborative UK approach.

5. References

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Acknowledgements

This work was funded by Defra under the remit of the Recreational fishing, Aquaculture, Migratory & Freshwater fisheries team, led by Ruth Allin and supported by Grant Horsburgh and Alex Maydew. We would like to thank all the skippers, crew and anglers who participated in this programme and facilitated the collection of these data. We would also like to thank all of those staff involved in helping to shape the programme design from other similar research programmes who invested time in feeding back their experiences (specifically William Roche, Ciara Wogerbauer and Kim Aarestrup). Thanks too for the input of all project Steering Group members who assisted in the decision making and direction of this programme. This programme involved a lot of other staff to which we owe our thanks, including observers (Ruth Hicks, Samuel Roslyn, Matthew Eade, Mark Ives, Spike Searle and Ramon Benedet) and video specialists and analysts (Lauren Popham and Rebecca Skirrow). The contents of this paper do not necessarily reflect the points of view of the funders, nor anticipate future policy.

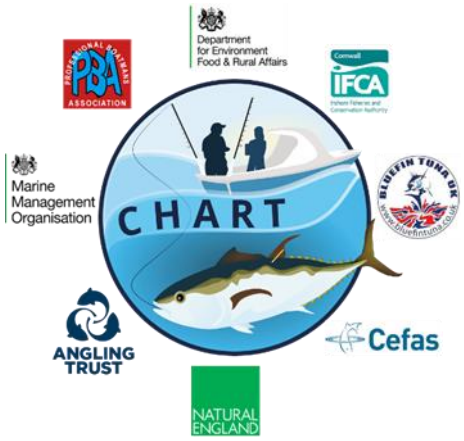

Figure 1. Infographic of the organisations involved in the co-design of CHART.

Figure 2. Photos from the Weymouth workshop of tagging demonstration (left) and stand-up trials (right).

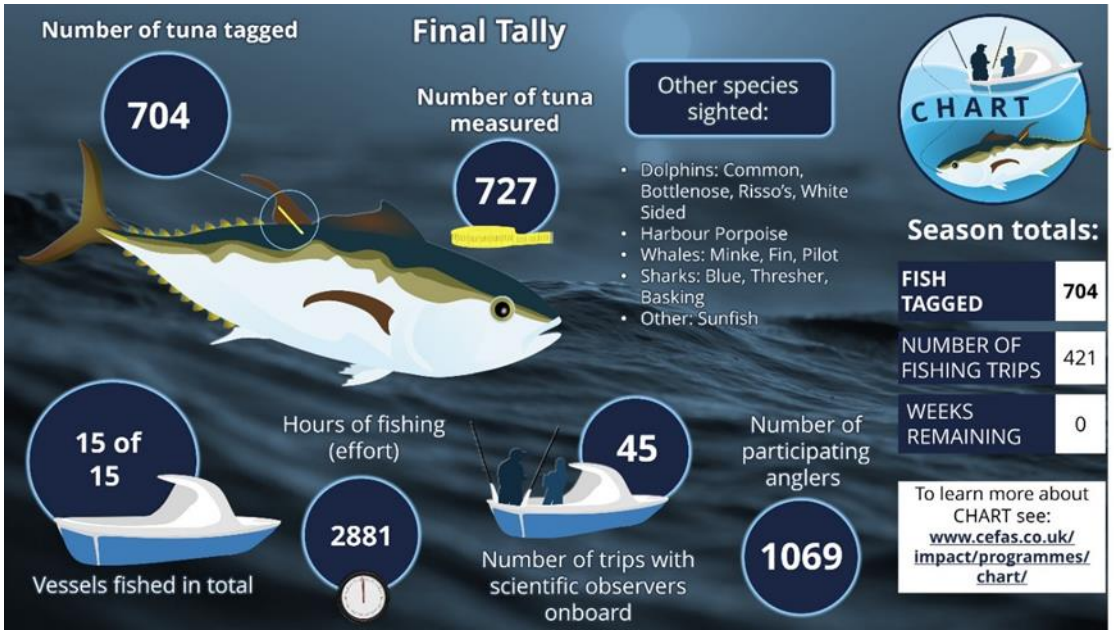

Figure 3. Project infographic displaying the end of season statistics.

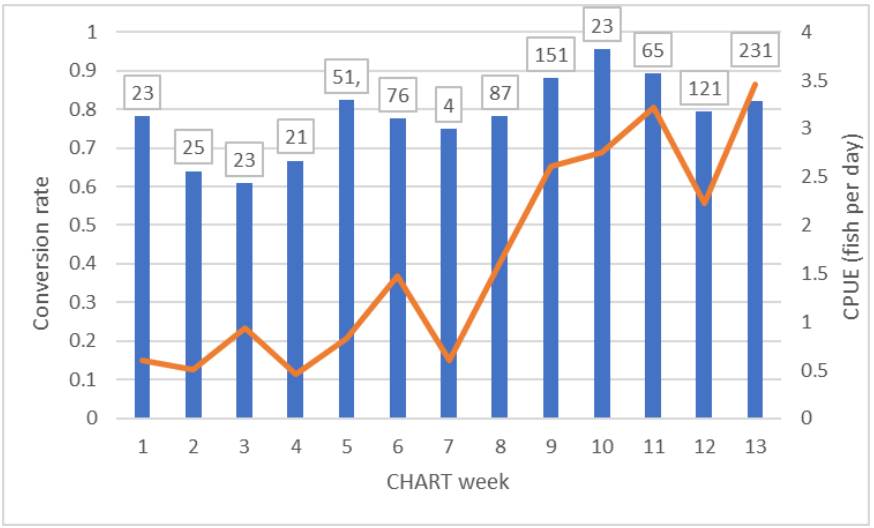

Figure 4. Mean conversion rate (hookup to boat-side restraint, blue bars) and CPUE by week (orange line). Numbers indicate the total number of hookups in that week.

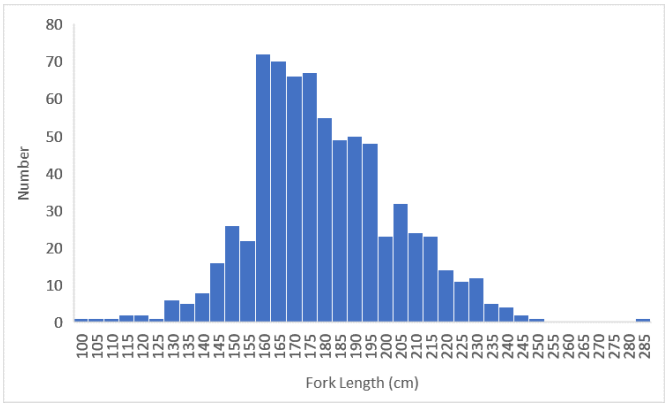

Figure 5. Length frequency (SFL) plot for captured fish

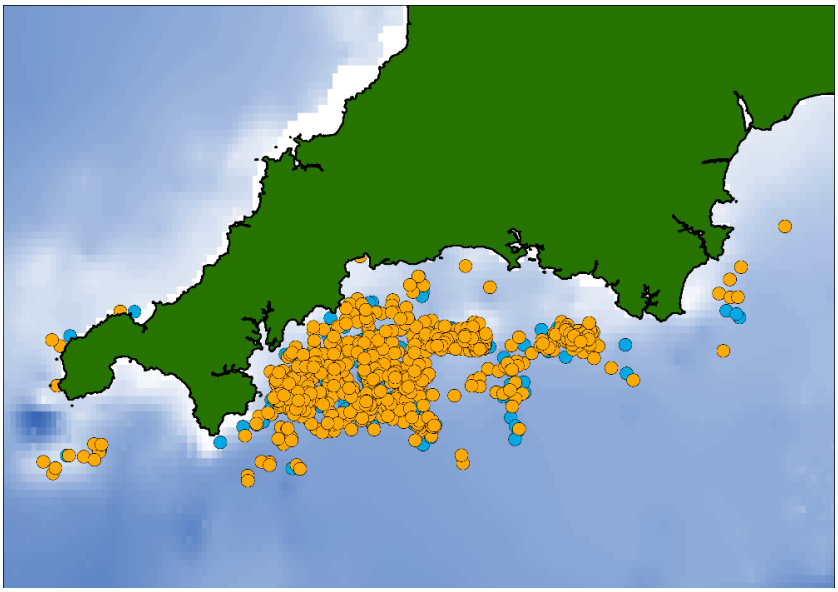

Figure 6. Map of locations of tagged (orange circles) and dropped (blue circles; where the BFT was hooked up for more than 30-seonds but was lost before restraint) BFT in Southwest England.