Estimating absolute abundance of anglerfish from multiple trawl surveys

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Tweetable abstract:
The absolute abundance of anglerfish may be estimated from multiple trawl surveys. This is able to provide more complete survey coverage for the stock area. #MASTSasm2021

Anglerfish (Lophius spp.) occur throughout the world and represent a number of important fisheries. The Northern shelf anglerfish stock (L. piscatorius and L. budegassa) is monitored by the Scottish-Irish anglerfish and megrim industry-science survey (SIAMISS). This stock is considered as covering the International Council for the Exploration of the Sea subareas 4 and 6, and division 3.a (North Sea, Rockall and West of Scotland, Skagerrak and Kattegat), however, the survey only fully covers subarea 6 and partially covers subarea 4. The International Bottom Trawl Survey in the North Sea (NS-IBTS) covers this section of the anglerfish stock area that is not surveyed in division 4 by SIAMISS and overlaps with part of the area that it does cover. The catches of anglerfish at length of these two surveys were compared in an area of the North Sea where they overlap in coverage to explore the relationship between them. A correction factor was then created which accounts for the differences in the catchability of monkfish at length between the two surveys. This demonstrates the NS-IBTS survey as being largely less effective at catching anglerfish than the SIAMISS survey, except at very small fish lengths (< approx. 18cm). The correction factor is applied to the NS-IBTS data in the regions not covered by the SIAMISS survey and allows for it to be incorporated into the stock estimation alongside the SIAMISS data, increasing survey coverage. An updated time series of stock estimates for northern shelf anglerfish is then created that includes this corrected IBTS survey data as well as a recently updated gear selectivity model. This results in an increase in the absolute stock estimates for anglerfish across the time series.

Western Isles Early Adopters Trial (WIEAT) – Tracking Inshore Fishing Vessels and Creel Limitation

James, M. A.[1], Mendo, T. [1], Swift., R.[1], Crowe, S. [2], and McCann, P.[2]

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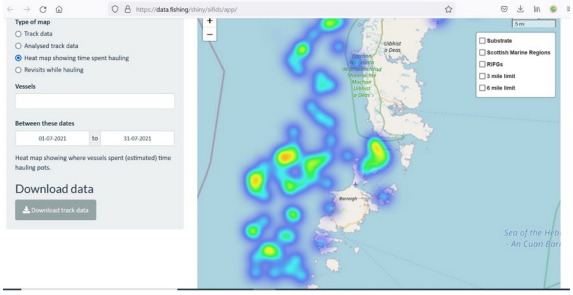
Abstract

The Western Isles Early Adopters and Creel Limitation Pilot Trials 2020-2022 assess the potential to deploy a low costs tracking system on 40 <10m fishing vessels and collecting data from >140 vessels in the first Scottish study of the impact of limiting the number of fishing creels in a designated area to the east of the islands.



Heat maps of creel hauling activity

In November 2021, Marine Scotland in collaboration with the Western Isles Fishermen's Association (WIFA), initiated the first pilot scale deployment of the vessel tracking systems developed by the University of St Andrews under the Scottish Inshore Fisheries Integrated Data System (SIFIDS) project. Tracking devices were fitted to 40 10m and under vessels operating within an area to the east of the Western Isles designated for a creel limitation trial. The purpose of the WIEAT trial is to assess the potential to deploy a low cost tracking system at scale, acquaint Marine Scotland staff and fishers with the operation of the system and seek feedback. In addition, the data being gathered during the trial will contribute to the evidence base to assess the impact of the creel limitation trial, both in terms of changes in fishig effort, compliance, and potentially observable changes in catch oer unit effort.

The presentation will cover the technical, policy and regulatory challenges of larger scale deployment of tracking technology and an associated Catch App on small scale vessels. The response of fishers to the use of this technology and access to related outputs through a dedicated web portal will be discussed.

Acknowledgements

The authors wish to thank Marine Scotland for funding this research and the Western Isles Fishermen's Association (WIFA) and its members for their participation in the pilot trial. Particular thanks is due to Duncan MacKinnnes of WIFA without who's support on the ground in the Western Isles, this project would not be possible. We are grateful for Selkie Marine Ltd for co-ordinating the fitting of trackers to fishing vessels during the challenges of COVID and related restrictions.

Establishing the relationship between fish size and nutritional composition in catch seasons of Atlantic mackerel (*Scomber scombrus*) and its implications.

Anneli Lofstedt[1], Baukje de Roos[2] and Paul Fernandes[1]

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Please also provide a tweetable abstract first (max. 280 characters) to assist online promotion, along with ONE complementary image to go alongside the social media text (study species, map of location, photograph of your team, image of equipment etc.
If possible, please include #MASTSasm2021.

@Anneli_Lof01 explores effect of season on nutritional composition in #mackerel. Is it time to optimize fisheries for nutrients instead of biomass?

If you are on twitter please provide your twitter handle @someone (or an appropriate account to tag). Don't worry if you are not on twitter as you will still be named.

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The full abstract should be submitted to masts@st-andrews.ac.uk, in an editable format, by 16:00 Monday 23rd August 2021.

Abstract:

Fish and fisheries products play a vital role in global food security and in the provision of several essential amino acids, micronutrients, trace elements and fatty acids, particularly omega-3, for human health. Fisheries management relies on assessments of the biomass of fish to determine exploitation rates that are consistent with maximum sustainable yield. However, literature suggests that the nutrient composition of fish varies between species, size and season. So here we explore an alternative optimisation: rather than total yield (biomass), we consider the nutrient content. We examined the relationship between size and the concentration of amino acids, micronutrients, trace elements and fatty acids in the different catch seasons of Atlantic mackerel. In total, 60 samples were obtained in October 2018 and January 2019. Mass spectrometry and proximate analysis were completed. Our results indicate that bioavailable micronutrient significantly differ between seasons. The relationship between fatty acid composition and size was also examined. Our analyses suggest that nutritional content is optimised at a particular size and season. A management strategy evaluation (MSE) was used to determine whether mackerel could be sustainably harvested at this "ideal" size. An alternative harvest control rule, optimising for nutritional content is explored, which we propose as the maximum sustainable nutritional yield. At a time of concerns in food security, assessing the nutritional content of fish at different sizes and subsequently carrying out an MSE, could enlist for alternative fishing strategies for a healthier global population and a more sustainable produce in the future.

Acknowledgements

We would like to thank Denholm Seafoods for providing the mackerel and Sharon Wood for technical support.

References

NA

Impacts of COVID-19 on the value chain of the hake small scale fishery in Peru

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Supply chains have been severely affected around the globe. Peru is one of the worst affected countries, as it relies heavily on its artisanal fisheries for food security. One of the most important resources which is affordable for local and regional consumption is hake (*Merluccius gayi peruanus*). This study is a first attempt to describe the small-scale hake fishery value chain and to quantify the impact of COVID-19 from March to August 2020 in two fishing communities in northern Peru. We also analyze the different autonomous responses that each community undertook to face the pandemic and the limitations in governmental support. The levels of fishing and primary buying were the most affected, and we estimate that ~23,000 fishing trips were not conducted, ~1680 t of hake was not landed (83% decrease), and 620 jobs were negatively impacted during this period. The gross income of vessel owners and primary buyers decreased by nearly 1 million US dollars. Marked differences were observed in the way each community responded to the pandemic and in their resilience to cope with COVID-19, despite being located less than 10 km away from each other. In El Ñuro, which relied more heavily on the international market for hake trade, the value chain was affected for longer, while in Los Órganos, which supplied national markets, the chain was restored after an initial period of adjustment. Fishing communities developed autonomous measures to mitigate the spread of the virus and cope with the economic impacts, making decisions at community level. These measures were not developed in collaboration with, nor did they receive, any assistance from fisheries authorities. Our study suggests that government efforts should focus on developing indicators to monitor the resumption of activities, facilitating a formalisation process in all levels of the chain, and the inclusion of a value chain approach to fisheries management.

Acknowledgements

The authors want to thank the operators and other members of both El Ñuro and Los Órganos fishing communities that voluntary accepted to participate in the interviews. The supply chain mapping and analysis of secondary sources was supported by The Walton Family Foundation (Grant 2019-319) and the estimation of COVID-19 impacts by a 2019-20 SFC-ODA GCRF (University of St. Andrews) Grant.

Tweetable abstract:
The COVID-19 pandemic has had severe impacts on supply chains and food security. Peruvian fishing communities took distinct, autonomous measures to mitigate against these impacts, with markedly different outcomes. We investigate these different approaches and discuss the lessons that can be learned. #mastsasm2021

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Sex and size influence the spatiotemporal distribution of white sharks, with implications for interactions with fisheries and spatial management in the southwest Indian Ocean

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Human activities in the oceans, specifically fisheries, increase the extinction risk of marine megafauna populations. Given that fisheries management measures and spatial zonation may be required to reduce the extinction risk of a species, we analysed the movement patterns of 33 white sharks (*Carcharodon carcharias*) satellite-tagged in South Africa. We investigated the influence of size, sex and season on movement patterns and the spatial and temporal overlap with longline and gillnet fisheries and marine protected areas (MPAs) between 2012 and 2015. A hidden Markov model identified two movement states ('resident' and 'transient') and investigated the effect of individual and temporal covariates on the transition probabilities between states. A model with sex, total length and a periodic function of day of the year (season) had the most support. All tagged white sharks were more likely to be in a resident state near the coast and a transient state away from the coast, while the probability of finding a shark in the transient state increased with size. White sharks overlapped with longline and gillnet fisheries within 25% of South Africa's Exclusive Economic Zone (EEZ) and spent 26% of their time exposed to these fisheries during the study period. The demersal shark longline fishery had the highest relative spatial and temporal overlap, followed by the pelagic longline fishery, and regional beach safety gear. The latter reported the highest white shark catches, emphasising the need to combine spatiotemporal shark movement and fishing effort with reliable catch records to assess risks to shark populations more accurately. White shark exposure to beach safety gear, corresponded with the catch composition of that fishery, providing support for a meaningful exposure risk estimate. White sharks spent significantly more time in MPAs than expected by chance, suggesting that MPAs can benefit large, mobile marine megafauna. Improved conservation and management of white sharks in South Africa could be achieved by finding alternative non-lethal solutions to beach safety, increasing the observer coverage in longline fisheries, a centralised database of white shark mortality and continued monitoring of movement patterns with existing and emerging threats.

Assessing bait use by static gear fishers of the Scottish Inshore fisheries: A preliminary study

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The economic and environmental implications of bait use in Scottish creel fisheries is unknown, despite approximately 70% of the Scottish fleet fishing in this manner (Marine Scotland, 2019). An online survey was distributed to Scottish creel fishers to investigate their preferred bait types, the mass of bait used in a creel, costs and bait discarding habits for used bait. Vessel tracking data from eight creeling boats around Scotland were analysed to identify the frequency of revisits to specific fishing locations. The maximum number of revisits was used to estimate the amount of bait that enters the water through creeling activity at frequently visited fishing grounds. On investigation, it was found that bait type preferences differed with geographic location around Scotland and at the time of surveying, cost the industry approximately £9.8 million annually (16.3% of the 2018 nominal shellfish landing value), equating to an average of 12p per creel. Our data suggests that approximately 13,500 metric tonnes of bait enters Scottish waters annually through highly localised 'hotspots'. This equated to approximately 75 kg ha^{-1} and 47 kg ha^{-1} of bait mass in the water for *Nephrops* creel fishers and crab/lobster creel fishers respectively per year. Data also suggested that most fishers discard used bait at the fishing grounds due to convenience. This preliminary study provides an understanding of bait usage and suggests that bait should be a consideration in the management of the Scottish creel fisheries.

Acknowledgements

Thanks to Ivar McBay, Duncan Macinnes and all those that helped proofread and distributing the survey. Thanks also to the SIFIDS project, funded by the European Maritime and Fisheries Fund for the use of their vessel GPS data. Lastly, thanks to all the creel fishers that completed the survey.

References

Marine Scotland (2019). Scottish Sea Fisheries Statistics 2018. The Scottish Government, Edinburgh. Page 109.

Tweetable Abstract

A preliminary study suggests the consideration of bait in the management of Scottish creel fisheries after estimating 13,500 metric tonnes enter Scottish waters annually in localised fishing 'hotspots', costing approximately £9.8 million with unknown implications. #MASTSasm2021

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