

Annual Research Report

2020-2021

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Summary

This report is intended to give an update on the outcomes and/or ongoing progress of Northumberland Inshore Fisheries and Conservation Authority's (IFCA) research plan. This report is an overview providing some key results, for more detailed information on each of the projects please refer to individual project reports.

Northumberland IFCA's Annual Research Plan¹ outlines the work priorities and survey plans for gathering evidence and data over a 12-month period (May – April). In the 2020-2021 plan the following areas were identified as priorities:

- assessment of shellfish stock status, with a focus on lobster, and sustainability of potting fishery within the district;
- intertidal fisheries monitoring, with a focus on periwinkle hand gathering and bait collection;
- continuation of annual survey work e.g. monitoring of mussel beds (Blyth & Fenham) and fish nursery areas (AIn estuary).
- assessment of fishing activities within Marine Protected Areas (including monitoring & control plans).

The tables below list the surveys and research conducted by NIFCA, external researchers and students, as identified in the Annual Research Plan 2020-2021. Outcomes of NIFCA actioned surveys are summarised from May 2020 to April 2021 in Table 1, and Table 2 lists all student research projects conducted relevant to NIFCA and their project status as of April 2021. A glossary of terms can be found in Appendix A.

Covid-19

This year's survey, research and monitoring priorities have been disrupted by restrictions due to the Covid-19 global pandemic. The Environmental Team have continued work where possible but unfortunately some of the planned work has been cancelled or postponed. This is reflected in Table 1.

¹ Latest Annual Research Plan (2020-21) available on the NIFCA website: https://www.nifca.gov.uk/wp-content/uploads/2020/04/2020-21_Annual-Research-Plan.pdf

Northumberland IFCA Research 2020-21

Table 1. NIFCA survey work 2019-2020 including a summary of the work and any outcomes/results generated. Colours separate the work areas through Annual Research Plans and Reports: Red: Crustacea, Grey: Mollusca, Purple: Finfish, Yellow: General, Green: Habitat.

Work area	Survey type	Research/Survey	Summary	Outcomes/Results	Priority objective
Crustacea	Stock Assessment	Lobster (<i>Homarus gammarus</i>) fishery ²	<p>Data collection throughout the year intended:</p> <ul style="list-style-type: none"> - Wholesaler surveys - Fleet and quayside sampling - Onboard observer surveys <p>However, sampling limited due to the pandemic, some sampling went ahead prior to March, and in some windows throughout the year when restrictions allowed.</p>	Any data collected will feed into the NIFCA stock assessment work, the results of which will be monitored over time. This forms part of our monitoring work on the health of the lobster fishery. Results will be documented through the NIFCA European Lobster Fisheries Management Plan.	Continue to seek further engagement to develop 'Fisheries Liaison Group' to discuss management options (difficult to put a timescale on due to meeting restrictions). Continue sampling and analysis in 2021/22.
	Fisheries Management Plans	Lobster Fishery	Document to outline all aspects of species-specific fishery containing research plans, data deficiencies and monitoring & control plans etc.	Document in draft and to be updated pending the analysis of the data collected during 2020.	Complete document draft and finalise (due Autumn 2021).
		Brown Crab Fishery	Documents to outline all aspects of species-specific fishery containing research plans, data deficiencies and monitoring & control plans etc.	First draft of document complete and in review. Document outlines all relevant information pertaining to the brown crab fishery and sets out a monitoring plan (due Autumn 2021).	Continue monitoring protocol as outlined in the plan.

² Report in final stages of publication and will be available on the NIFCA website

	Fisheries Assessment	Brown Crab cross-border size of maturity project	Gather contemporary, region-specific size of maturity data for brown crab in the NIFCA district in partnership with the Blue Marine Foundation and St Abbs Marine Station. Progress was delayed following the restrictions associated with the COVID-19 pandemic.	One final round of sampling will be completed in the spring of 2021, with a research paper to be completed for this project. All samples collected to date have been processed (~600 individuals from English and Scottish waters). The outcome of this research will inform the suitability of the current MCRS of brown crab within the NIFCA district.	Complete final batch of sampling and finalise the overarching research paper (due Autumn 2021).
Mollusca	Impact Assessment	Intertidal Rocky Shore Periwinkle Survey	To understand the impacts of periwinkle collection on both in situ populations and communities and find out more information on regional size of maturity (SOM).	At current levels periwinkle harvesting is not having a detectable impact on target species size, or wider rocky shore communities, however preliminary results indicate it may decrease periwinkle densities at the highest levels of collection pressure. Results from this research will feed into MPA assessments for this activity on protected features within the NIFCA district. Results will be written into a report which will be published on the NIFCA website.	NIFCA will continue to monitor periwinkle collection in the district and work with collectors and wholesalers to gather more information.
	Impact Assessment	Scallop dredging impacts in Northumberland	The study compared areas that have not been exposed to scallop dredging to other areas which were classified along a pressure gradient based on the amount of dredging activity from 2016-2019 (Areas classified as: None, Low, Moderate, and High). Subtidal imagery was taken in each of these areas and analysed to compare indicators such as	Initial results suggest scallop dredging from 2016-2019 has had an impact on seabed communities. Opportunistic species (fast growing) were more abundant in high pressure areas, with slow growing fragile species less abundant. Species diversity decreases with dredging pressure. Crustacea (squat lobsters, harbour crab, spider crab, hermit crab), Sea urchins,	Results are important in discussions about changes to scallop dredging management. Imagery will be compared to imagery taken inside an MPA where scallop dredging has been prohibited

			species richness, diversity, and abundance.	and Bivalve molluscs negatively impacted even at low dredging pressure. Fragile species such as hydroids negatively impacted even at low dredging pressure. No difference in scallop abundance across the pressure gradients.	since 2014 to see if any recovery can be detected.
Stock Assessment	Fenham Flats mussel survey ³	Part of NIFCA's annual monitoring programme. Mussel surveys at Fenham Flats have been carried out since 2006 to determine bed area, mussel number and density, length frequency and percentage cover.	The mussel bed on Fenham Flats in 2021 covered an area of 46.58ha with a percentage cover of 43.5%. Percentage cover is showing a decreasing trend since surveys began in 2006, but has remained relatively stable since 2019. The estimated values obtained for density increased since 2020, however have decreased significantly (97%) since surveys began. Biomass and total number of mussels have continued on a decreasing trend over recent survey years. Mean length of mussels sampled has remained relatively stable since 2013, however has decreased since the 2020 survey.	1. Liaise with Natural England and continue monitoring survey in 2021. 2. MSc student at Newcastle University investigating potential causes of decline.	
	Holy Island mussel survey ³	Part of NIFCA's annual monitoring programme. Mussel surveys at Holy Island have been carried out since 2018 to determine bed area, mussel number	The mussel bed on Holy Island Sands in 2021 covered an area of 3.59ha with a percentage cover of 59%. The estimated values obtained for density, biomass and total number of mussels have decreased	1. Continue monitoring survey in 2021. 2. MSc student at Newcastle University investigating	

³ Report available on the NIFCA website: <https://www.nifca.gov.uk/downloads/>

			and density, length frequency and percentage cover.	compared to the 2020 survey. Mean length of mussels sampled in 2021 decreased from those sampled in 2020. The length distribution was skewed towards a larger mussel size, with 58% of mussels being larger than the recommended minimum size of 45mm, and an increase in frequency of smaller sized mussels (<45mm) were recorded compared to previous years.	potential causes of decline.
		Blyth Estuary mussel survey ³	Part of NIFCA's annual monitoring programme. Mussel surveys at the Blyth Estuary have been carried out since 2015 to determine bed area, mussel number and density, length frequency and percentage cover.	<p>Though mussel bed area has varied over time since 2015, there is no overall trend. This year had high proportions of spat (juvenile mussel) with 25% of individuals <5mm in length.</p> <p>The largest measured mussel was 59mm which is the lowest of any surveyed year. This is because the density of mature mussels (>45mm) has decreased significantly (by almost tenfold) over time.</p> <p>Overall mussel density has varied but declined over time. It varies significantly across the mussel bed.</p> <p>Percentage cover has declined slightly over time with the lowest recorded cover overall (14%) in 2021. This is highly variable both over time and spatially.</p>	<ol style="list-style-type: none"> 1. Continue monitoring survey in 2021. 2. MSc student at Newcastle University investigating potential causes of decline.

Bait collection	Fishing Activity	Monitoring intertidal digging/pumping for bait	Bait collection activity has been recorded by officers on routine shore patrol to continue information gathering on the scale and extent of bait collection activity in the region.	Information collected shows patterns of collection, locations where bait collection occurs, and seasonal patterns in collection.	Results will inform MPA assessments of this activity.
Finfish	Small Fish Surveys	Aln Estuary Survey ³	Surveys cancelled due to Covid 19 restrictions. This survey usually forms part of NIFCA's annual monitoring programme. Fish surveys have been carried out on the Aln Estuary since 2012 as part of monitoring for the Marine Conservation Zone (MCZ). NIFCA share results with the Environment Agency to input into their monitoring work to determine the WFD status of the estuary (Classified as Good by latest EA report in 2016).	No results from 2020.	Continue monitoring survey in 2021 with particular focus on herring abundance.
Habitat	Broadscale habitat mapping	Collect high resolution seabed habitat maps within NIFCA district.	Operating WASSP multibeam sonar during routine patrols as well as targeting data collection in the northern part of the district.	During routine at sea patrols with St Aidan, areas with less detailed information on seabed habitat spatial extent was targeted. Seabed hardness information was generated from which habitat type can be inferred. OLEX data must be ground-truthed to fully determine habitat type.	Develop this objective in 2021 to target specific areas with the multibeam. Potential to develop a priority grid for this work. This is a lower priority for NIFCA and so will be carried out if time and resources allow.

	MSFD Project	Develop and test indicators for seabed habitat health for mud and reef features. Site selected so results can be compared along a fishing pressure gradient.	Partnership project between Newcastle University, Natural England and NIFCA. Rock and mud habitats were sampled in 2018 and 2019 and indicators (such as species diversity) will be analysed. Sample sites were selected based on fishing pressure gradients therefore results can be used to determine impact of trawling and potting pressure. Sample sites were also added to include dredged areas (cobble/gravel habitat).	Results area currently being analysed and written up into a report by a research associate at Newcastle University. This will be available on the NIFCA website when published.	The results will provide information that can be used to understand the impacts of current level of potting and trawling on target habitat health. The results will be used in MPA assessments and Monitoring and Control Plans in the future.
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Marine Protected Areas

Northumberland IFCA assessment of fishing activities in MPAs is ongoing with progress made on assessments throughout the year. Assessment work will continue through 2021 with thanks to Natural England for their helpful guidance and input. For a detailed breakdown of the progress made with assessments, outcomes of assessments, and a list of assessments to be completed, please contact the Environmental Team.

External Projects

External projects carried out by partner organisations or academia but relevant to NIFCA aims and priorities are detailed below. NIFCA may have input into projects by providing data, staff time or resources. For further information on the projects listed please contact the Environmental Team.

Table 2 Research projects carried out by external researchers.

Project title	Institute / Project type / Student or Researcher	Status
Comparison of trawl data and fishery food webs between present and 100 years ago in Northumberland.	Newcastle University / PhD / Georgina Hunt	Due: 2021
MSFD Subtidal Rock and Mud Indicators and Monitoring Protocols in the North Sea	Newcastle University partnered with Natural England / Post Doc / Dr Ashleigh Tinlin-McKenzie	Due: 2021
Changes to Northumberland lobster catches as a result of the national prohibition on landing berried hens	Newcastle University / BSc / Sophia Yakoob	Due: 2021

Appendix A – Glossary of Terms

FLAG – Fisheries Local Action Group. Provides grants for commercial fishermen, the fishing industry including aquaculture.

Ground-truth - The collection of ground-truth data enables the accuracy of remote- sensing data (such as underwater video footage) to be determined, aiding the interpretation and analysis of the remotely-sensed data.

Marine Conservation Zone (MCZ) - Marine areas in English waters designated under the Marine and Coastal Access Act 2009 to protect marine habitats and species typical of UK waters.

Marine Protected Areas (MPAs) - A marine area that is protected by statutory or voluntary measures to control human activity. The term is also used to describe Scotland’s national network of marine nature conservation sites.

Minimum Conservation Reference Size (MCRS) - The size for a given species below which the sale of catches shall be restricted to reduction to fish-meal, pet food or other non-human consumption products only.

Monitoring & Control Plans – outline the methods of monitoring fisheries to detect their impacts over time.

OLEX - a complete system for seabed mapping, plotting and navigation.

WASSP multibeam sonar - A multibeam echosounder is a type of sonar that is used to map the seabed.