Northumberland IFCA
Inshore Fisheries and Conservation Authority

Annual Research Report
2021-2022

NORTHUMBERLAND INSHORE FISHERIES AND CONSERVATION AUTHORITY
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Contents

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 Plan[1] outlines the work priorities and survey plans for gathering evidence and data over a 12-month period (April-March). In the 2021-2022 plan the following areas were identified as priorities:

- assessment of shellfish stock status and sustainability of potting fishery within the district;
- intertidal fisheries monitoring, with a focus on periwinkle hand gathering and bait collection;
- increased stakeholder engagement, with a focus on commercial industry and angling sectors, including bait collection and hand gathering;
- continuation and development of annual monitoring plans including Fisheries Management Plans and Marine Protected Area (MPA) Monitoring and Control Plans.
- continuation of annual survey work e.g. monitoring of mussel beds (Blyth & Fenham) and fish nursery areas (Aln 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 2021-2022. Outcomes of NIFCA actioned surveys are summarised from May 2021 to April 2022 in Table 1, and Table 2 lists all student research projects conducted relevant to NIFCA and their project status as of April 2022. A glossary of terms can be found in Appendix A.

[1] Latest Annual Research Plan (2020-21) available on the NIFCA website: https://nifca.gov.uk/wp-content/uploads/2022/02/2021-22-Annual-Research-Plan-V0.2-compressed.pdf

Northumberland IFCA Research 2021-22

Table 1. NIFCA survey work 2021-2022 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, Blue: Angling and Bait collection, Purple: Finfish, Green: Habitat.

Work area	Survey type	Research/Survey	Summary	Outcomes/Results	Priority objective
Crustacea	Stock Assessment	Lobster (*Homarus gammarus*) Fishery	Data collection throughout the year: - Wholesaler surveys - Fleet and quayside sampling - Onboard observer surveys Sampling at the end of 2021 and the start of 2022 were still disrupted due to Covid.	The data collected forms part of the annual monitoring of trends in this fishery. Any data collected will feed into the NIFCA stock assessment work, the results of which will be monitored over time. Results will be documented through the NIFCA European Lobster Fisheries Management Plan.	Continue to seek further engagement to develop 'Fisher Forums'. Continue sampling and analysis in 2022/23.
		Brown Crab (*Cancer pagurus*) Fishery	Data collection throughout the year: - Wholesaler surveys - Fleet and quayside sampling - Onboard observer surveys Sampling at the end of 2021 and the start of 2022 were still disrupted due to Covid.	The data collected forms part of the annual monitoring of trends in this fishery. Any data collected will feed into the NIFCA stock assessment work, the results of which will be monitored over time. Results will be documented through the NIFCA Brown Crab Fisheries Management Plan.	Continue to seek further engagement to develop 'Fisher Forums'. Continue sampling and analysis in 2022/23. Tie in the finalised brown crab maturity study outcomes into the stock assessment process.
	Fisheries Management Plans	Lobster Fishery	Document to outline all aspects of species-specific fishery containing research plans, data deficiencies and monitoring & control plans etc.	First iteration of this document completed after internal review. Document outlines all relevant information pertaining to the lobster fishery and sets out a monitoring	Publish FMP onto the NIFCA website. Continue monitoring protocol as outlined in the plan.

				plan. Future FMPs will be based off this document and the relevant information updated and emerging issues/considerations added.	
		Brown Crab Fishery	Documents to outline all aspects of species-specific fishery containing research plans, data deficiencies and monitoring & control plans etc.	First iteration of this document completed after internal review. Document outlines all relevant information pertaining to the brown crab fishery and sets out a monitoring plan. Future FMPs will be based off this document and the relevant information updated and emerging issues/considerations added.	Publish FMP onto the NIFCA website. Continue monitoring protocol as outlined in the plan.
	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.	Sampling completed in Spring 2021, with 769 samples collected in total from Northumberland and Berwickshire. Research paper in the process of being reviewed by partner organisations. The outcome of this research will inform the suitability of the current MCRS of brown crab within the NIFCA district.	Final amendments to be made to research paper before submission for publication.
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	NIFCA will continue to monitor periwinkle collection in the district.

				activity on protected features within the NIFCA district. Full results can be found at https://nifca.gov.uk/wp-content/uploads/2022/02/Periwinkle-Surveys-Report-2021-V1.0.pdf	
	Impact Assessment	Scallop dredging impacts in Northumberland – recovery inside the Berwickshire and North Northumberland Coast SAC (BNNC SAC).	The study compared areas that were subject to historic dredge pressure (2010-2013) with areas that have been more recently dredged (2016-2019). The areas were categorised into high, moderate, low, and no dredging pressure. Subtidal imagery was taken in each of these areas and analysed to compare indicators such as species richness, diversity, and abundance between historic and recently fished sites. Scallop size and abundance were also compared. Recovery was inferred where results were most similar between 'Historic' dredged sites and sites with no recorded dredging events.	Results suggest some signs of recovery within the BNNC SAC. Cover taxa such as dead man's fingers showed some signs of recovery, with faunal turfs showing resilience to dredging pressure. Other more mobile species such as those in the family Paguroidea showed no signs of recovery. This may be due to the short time between the implementation of the mobile gear ban within the BNNC SAC with six years between closure of the site to mobile gear and the sampling work. There was no difference in scallop abundance between historic and recent sites but there were significantly smaller scallops within the BNNC SAC which may suggest some signs of recruitment. Full results can be read in two Newcastle University student reports which will be made available on the website.	No further monitoring work is currently planned, however further subtidal camera sampling could happen in the future to continue to monitor recovery.

	Stock Assessment	Fenham Flats mussel survey	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 17.4%. Percentage cover is showing a decreasing trend since surveys began in 2006, but has remained relatively stable since 2019, however percentage cover has decreased significantly since a value of 43.5% in 2021. The estimated values obtained for density increased since 2021, 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 (47.4mm) with a mean length of 47.4 mm in 2022. The 2022 report can be found at https://nifca.gov.uk/wp-content/uploads/2022/02/Fenham-Flats-report-2021-V1.2.pdf	Liaise with Natural England and continue monitoring survey in 2022-23.
		Holy Island mussel survey	Part of NIFCA's annual monitoring programme. Mussel surveys at Holy Island have been carried out since 2018 to determine bed area, mussel number and density, length frequency and percentage cover.	The mussel bed on Holy Island Sands in 2021 covered an area of 3.41ha with a percentage cover of 70%. The estimated values obtained for density, biomass and total number of mussels have decreased compared to the 2021 survey. Mean length of mussels sampled in 2022	Continue monitoring survey in 2022-23.

				increased by 2mm compared to 2021 (40mm in 2021, 42mm in 2022). The 2022 report can be found at https://nifca.gov.uk/wp-content/uploads/2022/02/Holy-Island-Report-2021-V1.0.pdf	
		Blyth Estuary mussel survey	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.	Though mussel bed area has varied over time since 2015, there is no overall trend. This year had lower proportions of spat (<5mm mussels) than in 2021, though 24% of mussels were still juveniles under 25mm in length. While density varies across the mussel bed, it is consistently low in all sectors. Overall density was the lowest in 2022 since surveys began, following two years of low density in 2020 and 2021. Overall density has decreased over fourfold since 2015 which is a cause for concern. Compared to 2021 (the previous lowest year) percentage cover was much lower throughout the mussel bed with an overall decline from 24% to 17% cover. The 2022 report can be found here https://nifca.gov.uk/wp-content/uploads/2022/02/Blyth-mussel-survey-2021-report-V1.0.pdf	Continue monitoring survey in 2022-23.

	Impact Assessment	Potential causes of decline – mussels at Lindisfarne.	As a result of the continued declines an MSc student from Newcastle University investigated the potential causes of decline at the beds at Lindisfarne (Holy Island and Fenham Flats).	The study used water quality and biocontamination information from the Environment Agency with NIFCA mussel bed survey results to establish trends or links to the loss of percentage cover over the past 4-16 years. Results suggest a negative correlation between a banned flame retardant and banned pesticides. The study suggests these contaminants may be affecting mussel populations due to increase storm events. The study recommends monitoring of the levels of these contaminants given the rapid loss of the beds. The full report will be made available on the website.	Liaise with the Environment Agency and Natural England on the outcomes of this project.
Angling and 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 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 have fed into MPA assessments of this activity and has been used to identify area of higher collection in which to target impact surveys.

	Fishing activity	Lugworm abundance survey	Monitoring survey to assess the abundance of lugworm in more heavily collected areas.	The surveys started in July 2022 with the intention of carrying out the surveys three times per year (July, November and March) at Berwick, Newton and Boulmer. This survey is a repeat of surveys carried out as part of a PhD in 2014 (Tinlin-Mackenzie, 2018). Results will be compared to 2014 results for Boulmer and Newton (Berwick was not surveyed in 2014 but has been chosen to survey this year dues to the amount of activity here). The survey also tests the use of a UAV to survey however results were not accurate enough to continue with this method. A full report will be made available on the website.	Surveys will continue in 2022-23. Results in March will be compared to 2014 results. Results will also feed into MPA assessments.
	Fishing activity	Fisheries aggregation devices	Feasibility study to determine survey and analysis methodologies for the use of UAVs in NIFCA intertidal monitoring.	There were a total of 129 tyres estimated from UAV imagery within the Aln estuary, most in four discrete locations of lines of tyres. Tyres were able to be identified by eye from photos taken at all heights including 50m. A height of 40m is recommended for future surveys in the Aln estuary.	Continue to monitor tyres in the Aln Estuary and carry out surveys at other estuaries the district.

	Stakeholder engagement	Recreational Sea Angling Strategy	NIFCA have developed a Recreational Sea Angling Strategy with the aim of increasing engagement with this sector.	The strategy has been developed throughout 2021 with increased engagement with anglers on the shore and at sea, as well as with local tackle shops. NIFCA held a meeting in 2021 and aims to do the same in the near future.	Update the strategy.
Finfish	Small Fish Surveys	Aln Estuary Survey	This 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).	In 2021 all species, apart from greater sandeel, were under their size of maturity indicating the presence of juveniles and therefore the site is likely used as a nursery and/or spawning ground. Though abundance has varied over time since 2015, there is no overall trend between the years 2015-2021. An average of 15 fish species were recorded each year with herring, sprat and sandeel being most abundant.	Continue monitoring survey in 2022-23 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 to target specific areas and plan ground truthing surveys.

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 2022 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**
Dredging up the past – Assessing current scallop dredging impacts in Northumberland & tracking recovery from historic dredging efforts	Newcastle University / MSc / Imogen Dent	Complete. Full report will be made available on the website.
Dredging up the Past – Tracking Recovery of Non-Target Benthos from Historic Scallop Dredging Fishing Effort in Northumberland	Newcastle University / MSc / James Duffy	Complete. Full report will be made available on the website.
Drivers of *Mytilus edulis* decline in Northumberland Marine Special Protection Area (Lindisfarne)	Newcastle University / MSc / Sarah Richardson	Complete. Full report will be made available on the website

Practical applications of UAVs	Newcastle University / Post-doctoral research / Tom Chudley and Pippa Ward	Ongoing, research work and handbook produced with paper publication to follow.
Using GIS to illustrate seasonal changes in potting sightings across the Northumberland Coastline.	Sheffield Hallam University / BSc / Cadie Chandler	Complete.

Appendix A – Glossary of Terms

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.

UAV – Unmanned Aerial Vehicle or drone to capture aerial imagery.

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