Annual Research Plan 2023-2024

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NORTHUMBERLAND INSHORE FISHERIES AND CONSERVATION AUTHORITY
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Contents

1. Introduction

The Northumberland Inshore Fisheries and Conservation Authority (NIFCA) is one of ten IFCAs in England created in April 2011 under Section 150 of the Marine and Coastal Access Act 2009 (MaCAA, 2009). The IFCAs aim to lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry.

The NIFCA district extends from a line drawn through the centre of the River Tyne to the Scottish border out to 6 nautical miles and up to the normal tidal limit of rivers and estuaries (Fig. 1). The NIFCA district neighbours the North Eastern IFCA district to the south and Scotland to the north.

Figure 1 Boundaries of the Northumberland Inshore Fisheries and Conservation Authority district.

This Annual Research Plan sets out NIFCA's work priorities and research plans between April 2023 and March 2024. The research plans outlined here are based on on-going priorities carried forward from NIFCA's 2022/23 Annual Plan as well as new research based on recent issues/knowledge gaps. Areas of research have been decided on and prioritised through revision of NIFCA's Strategic Environmental Assessment, and Environmental Risk Register, and cognizance of national priorities under the IFCA remit. Table 4 sets out the research and monitoring work that has been prioritised for 2023-24.

2. Personnel and Resources

Northumberland IFCA has 14 members of staff comprised of a Chief Officer, six enforcement officers, four environmental officers, and four financial and administrative staff. Enforcement officers and partner organisations assist the environment team with the collection of data (see Table 2).

The members of the Environmental team are:
Alex Aitken: alex.aitken@nifca.gov.uk
Andrew Boon: andrew.boon@nifca.gov.uk
Beth Harvey: beth.harvey@nifca.gov.uk
Katy Smart: katy.smart@nifca.gov.uk

Please see Appendix A for a detailed breakdown of all NIFCA survey resources.

3. Marine Protected Areas

NIFCA are responsible for monitoring and managing fishing activity within the network of marine protected areas in the district (Fig. 2). Sites are outlined in Table 1:

Table 1 Breakdown of Marine Protected Areas within Northumberland IFCA's jurisdiction.

Designation	Site name
Special Area of Conservation (SAC)	Berwickshire and North Northumberland Coast SAC
	Tweed Estuary SAC
Special Protection Area (SPA)	Lindisfarne SPA
	Farne Islands SPA
	Coquet Island SPA
	Northumbria Coast SPA

	Northumberland Marine SPA
Marine Conservation Zones (MCZ)	Coquet to St Mary's MCZ
	Aln Estuary MCZ
	Berwick to St Mary's MCZ

The sites outlined in Table 1 are in addition to several Sites of Special Scientific Interest (SSSIs), Ramsar Sites, the Lindisfarne National Nature Reserve (LNNR) and the Northumberland Area of Outstanding Natural Beauty (AONB).

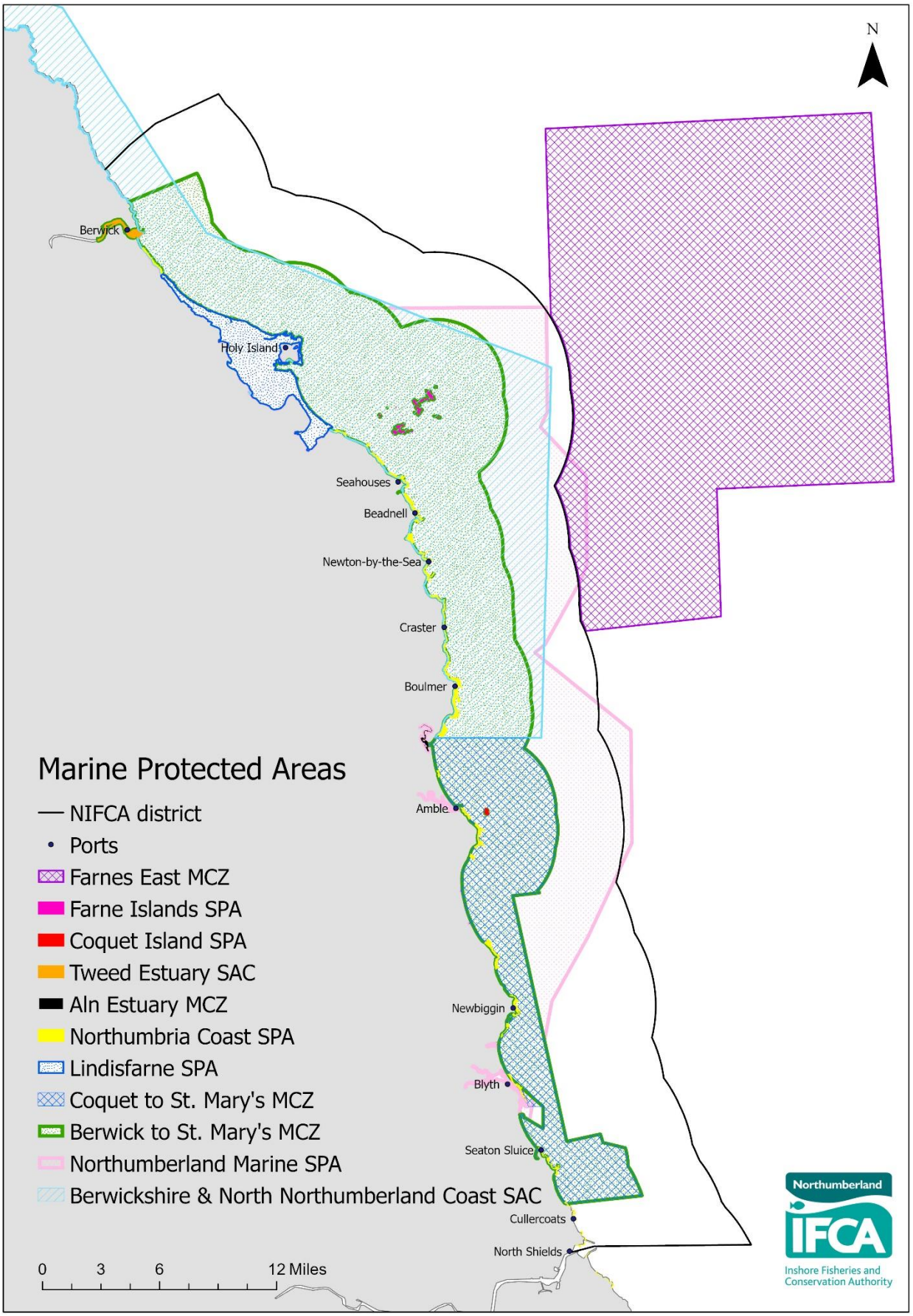


Figure 2 Map displaying Marine Protected Areas within and adjacent to the NIFCA district.

4. Marine Protected Area Assessments

Following Defra's revised approach to fisheries management in MPAs, IFCA's were tasked with carrying out assessments of fishing activity in MPAs within the area of their jurisdiction to bring them in line with other activities in the marine environment. NIFCA are continuing with this process into 2023-24, please see below for a breakdown of assessments that have been completed and those still in draft (Table 2). Defra have set a deadline for management measure in MPAs to be in place by the end of 2024, NIFCA continue to work with Natural England to agree assessment conclusions.

Table 2. NIFCAs outstanding interactions to assess. Interactions are grouped into assessments with 19 either in drafted and 'to be agreed with Natural England' or 'to be completed'. The status of each assessment is included in the table. NIFCA aim to have all outstanding assessments drafted by the end of March 2024.

Assessment reference	Pressure	Features	Status
BNNCSAC-tLSE 021	Digging with forks	Mussel beds on mixed and sandy sediments	With NE
BNNCSAC-tLSE 021	Digging with forks	Intertidal mud	With NE
BNNCSAC-tLSE 021	Digging with forks	Intertidal mud and sand	With NE
BNNCSAC-tLSE 021	Digging with forks	Intertidal Gravel and sand	With NE
BNNCSAC-tLSE 022	Handwork (access from land)	Mussel beds on mixed and sandy sediments	With NE
BNNCSAC-tLSE 022	Handwork (access from land)	Intertidal bedrock reef	With NE
BNNCSAC-tLSE 022	Handwork (access from land)	Intertidal boulder and cobble reef	With NE
BNNCSAC-AA 004	Handwork (access from land)	Intertidal bedrock reef	In draft
BNNCSAC-AA 004	Handwork (access from land)	Intertidal boulder and cobble reef	In draft
NCSPA-tLSE 037	Digging with forks	Estuarine birds	With NE
NCSPA-tLSE 037	Digging with forks	Intertidal sand	With NE
NCSPA-tLSE 038	Handwork (access from land)	Estuarine birds	With NE
NCSPA-tLSE 038	Handwork (access from land)	Intertidal bedrock reef	With NE
NCSPA-tLSE 038	Handwork (access from land)	Intertidal boulder and cobble reef	With NE
AlnMCZ-SRA 016	Crab tiling	Intertidal Mud	In draft
CSMMCZ FA 005	Heavy otter trawl	Subtidal Sand	In draft
CSMMCZ FA 005	Heavy otter trawl	Subtidal Mud	In draft
CSMMCZ FA 005	Heavy otter trawl	Subtidal Mixed Sediments	In draft
CSMMCZ FA 005	Heavy otter trawl	Subtidal Coarse Sediment	In draft
CSMMCZ FA 005	Light otter trawl	Subtidal Sand	In draft
CSMMCZ FA 005	Light otter trawl	Subtidal Mud	In draft
CSMMCZ FA 005	Light otter trawl	Subtidal Mixed Sediments	In draft
CSMMCZ FA 005	Light otter trawl	Subtidal Coarse Sediment	In draft
CSMMCZ FA 005	Scallops	Subtidal Sand	In draft
CSMMCZ FA 005	Scallops	Subtidal Mud	In draft
CSMMCZ FA 005	Scallops	Subtidal Mixed Sediments	In draft
CSMMCZ FA 005	Scallops	Subtidal Coarse Sediment	In draft
CSMMCZ FA 002	Hand work (access from land)	Low Energy Intertidal Rock	With NE
CSMMCZ FA 002	Hand work (access from land)	Moderate Energy Intertidal Rock	With NE
CSMMCZ FA 002	Hand work (access from land)	High Energy Intertidal Rock	With NE
CSMMCZ FA 002	Hand work (access from land)	Intertidal Underboulder Communities	With NE
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Subtidal Sand	In draft

CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Subtidal Mud	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Intertidal Mud	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Intertidal Sand & Muddy Sand	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Intertidal Mixed Sediments	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Subtidal Mixed Sediments	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Subtidal Coarse Sediment	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Low Energy Intertidal Rock	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Moderate Energy Intertidal Rock	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	High Energy Intertidal Rock	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Intertidal Underboulder Communities	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	High energy infralittoral rock	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	Moderate energy Infralittoral Reef	In draft
CSMMCZ FA 005	Pots/creels (crustacea/gastropods)	High energy circalittoral rock	In draft
CSMMCZ FA 006	Gill nets	Subtidal Sand	To do
CSMMCZ FA 006	Gill nets	Subtidal Mud	To do
CSMMCZ FA 006	Gill nets	Subtidal Mixed Sediments	To do
CSMMCZ FA 006	Gill nets	Subtidal Coarse Sediment	To do
CSMMCZ FA 006	Gill nets	High energy infralittoral rock	To do
CSMMCZ FA 006	Gill nets	Moderate energy Infralittoral Reef	To do
CSMMCZ FA 006	Gill nets	High energy circalittoral rock	To do
CSMMCZ FA 006	Trammels	Subtidal Sand	To do
CSMMCZ FA 006	Trammels	Subtidal Mud	To do
CSMMCZ FA 006	Trammels	Subtidal Mixed Sediments	To do
CSMMCZ FA 006	Trammels	Subtidal Coarse Sediment	To do
CSMMCZ FA 006	Trammels	High energy infralittoral rock	To do
CSMMCZ FA 006	Trammels	Moderate energy Infralittoral Reef	To do
CSMMCZ FA 006	Trammels	High energy circalittoral rock	To do
CSMMCZ FA 006	Entangling	Subtidal Sand	To do
CSMMCZ FA 006	Entangling	Subtidal Mud	To do
CSMMCZ FA 006	Entangling	Subtidal Mixed Sediments	To do
CSMMCZ FA 006	Entangling	Subtidal Coarse Sediment	To do
CSMMCZ FA 006	Entangling	High energy infralittoral rock	To do
CSMMCZ FA 006	Entangling	Moderate energy Infralittoral Reef	To do
CSMMCZ FA 006	Entangling	High energy circalittoral rock	To do
CSMMCZ FA 003	Digging with forks	Intertidal Sand & Muddy Sand	With NE
CSMMCZ FA 003	Digging with forks	Intertidal Mixed Sediments	With NE
NMSPA-tLSE 006	Light otter trawl	Pursuit and plunge diving birds	To do
NMSPA-tLSE 006	Light otter trawl	Benthic feeding seabirds	To do
NMSPA-tLSE 006	Light otter trawl	Water column	To do
NMSPA-tLSE 014	Scallops	Benthic feeding seabirds	To do
NMSPA-tLSE 014	Scallops	Water column	To do
NMSPA-tLSE 020	Hand work (access from land)	Benthic feeding seabirds	To do
NMSPA-tLSE 020	Hand work (access from land)	Water column	To do
NMSPA-tLSE 021	Pots/creels (crustacea/gastropods)	Water column	To do
NMSPA-tLSE 024	Gill nets	Pursuit and plunge diving birds	To do
NMSPA-tLSE 024	Gill nets	Benthic feeding seabirds	To do
NMSPA-tLSE 024	Gill nets	Water column	To do
NMSPA-tLSE 025	Trammels	Surface feeding birds	To do
NMSPA-tLSE 025	Trammels	Pursuit and plunge diving birds	To do
NMSPA-tLSE 025	Trammels	Benthic feeding seabirds	To do
NMSPA-tLSE 025	Trammels	Water column	To do
NMSPA-tLSE 026	Entangling	Surface feeding birds	To do
NMSPA-tLSE 026	Entangling	Pursuit and plunge diving birds	To do

NMSPA-tLSE 026	Entangling	Benthic feeding seabirds	To do
NMSPA-tLSE 026	Entangling	Water column	To do
NMSPA-tLSE 036	Crab tiling	Benthic feeding seabirds	To do
NMSPA-tLSE 037	Crab tiling	Water column	To do
NMSPA-tLSE 037	Digging wth forks	Benthic feeding seabirds	To do
NMSPA-tLSE 037	Digging wth forks	Water column	To do

The majority of the assessment process has been completed to date. Assessments for Berwick to St Mary's MCZ also remain outstanding for which conservation advice is pending.

Following the assessment process, IFCAs were advised to complete monitoring and control plans which keep fishing activity assessments up to date. The plans have thresholds built into them which if reached, triggers a reassessment of the fishery and any protected features it interacts with. Monitoring and Control plan reviews are completed annually at the end of the research year (Feb/Mar).

5. Partner Organisations and Working Groups

The Research and Environmental Projects (section 6) outline the key workstreams that will be carried out by NIFCA this year. Partnership working is vital to ensure this work is carried out and disseminated effectively.

Key partner organisations for the NIFCA's research and environment team include:

- Northumberland County Council (funding authority)
- North Tyneside County Council (funding authority)
- The Marine Management Organisation (MMO)
- Natural England
- The Environment Agency (EA)
- Newcastle University
- The Centre for Environment, Fisheries and Aquaculture Science (Cefas)
- MARINElife/North East Cetacean Project
- Northumberland Rivers Trust
- Wildlife NGOs including the Royal Society for the Protection of Birds and the Wildlife Trusts
- Blue Marine Foundation / Berwickshire Marine Reserve / St Abbs Marine Station

In addition, the NIFCA benefits from collaborating with other relevant authorities on the management groups for the Berwickshire and Northumberland Marine Partnership.

The environmental team sits on a variety of focus and working groups relevant to NIFCA's work which involve key partners listed above (Table 3).

Table 3 Focus and working groups attended by environmental officers

Group	Area	Other members	Frequency
IFCA Technical Advisory Group	National	IFCAs	Quarterly
Northumberland Rivers Catchment Partnership	Northumberland	NRCP; Northumberland Wildlife Trust; Environment Agency; Port of Blyth; Tyne Rivers Trust; Natural England; Northumberland Coast AONB; Berwickshire and Northumberland Marine Nature Partnership	Quarterly
Joint Working Arrangement	Northumberland	MMO; Natural England; Environment Agency	Annually
Berwickshire and Northumberland Marine Nature Partnership steering group	Northumberland	Natural England; MMO; Northumberland Wildlife Trust; Berwick Harbour Commission; Eyemouth Harbour Trust; Scottish Natural Heritage; Scottish Borders Council; Environment Agency	Quarterly
Berwickshire and Northumberland Marine Nature Partnership research group	Northumberland	Natural England; Environment Agency; Newcastle University; Berwickshire Marine Reserve; Scottish Natural Heritage	Ad-hoc
North East Marine Monitoring Group	North East	Natural England; Environment Agency	Ad hoc
Lindisfarne Joint Advisory Committee	Lindisfarne	Natural England; Berwickshire and Northumberland Marine Nature Partnership; British Association for Shooting and Conservation; Royal Yachting Association; RSPB, Environment Agency	Biannual
Cullercoats Harbour Working Group	Cullercoats	North Tyneside Council: local fishermen	Quarterly (postponed due to Covid restrictions)

Whelk Working Group	National	IFCAs, Cefas, MMO, Seafish, Universities/Research Institutes and fisheries management organisations	Quarterly
Bait Collection and Hand Gathering Working Group	North East	NE, EA, National Trust Harbour Authorities, Local Authorities, AONB, Marine Nature Partnership, Northumbria Police, Tweed Commission	Ad hoc
IFCA and MMO Licensing Engagement	National	IFCAs; MMO	Quarterly
Berwickshire Shellfish Working Group	North East	TBC	TBC

6. Research Plan

The research plan is detailed in Table 4. The table is broken down into work areas with individual research projects/survey work that feed into the work area. There is also information on objectives, a brief description of methods, rationales, and timescales included in the table. It also sets out a timeframe for each piece of work. This is a loose timeframe set out to guide the work throughout the year however work may fall outside of the timescale specified in the table.

Areas of work have been prioritised based of NIFCA's current research priorities. Officers aim to carry out all work with a priority of 1. Unconfirmed work has been included in the table but may not be carried out due to time or resource constraints.

All data collected through research and monitoring work is shared to the ERIC NE records centre where it can be accessed by other organisations or individuals for future use.

Table 4 Northumberland IFCA Annual Research Plan

Northumberland IFCA Annual Research Plan 2021-2022																								
									Time frame															
Work-stream	Survey	Project	Objective	Method	Rationale	Timescale	Partners	Lead contact	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Priority
Crustacea	Stock Assessment	Lobster	Assess lobster stock status and exploitation levels based on size distribution and sex ratio of lobster catches	Measure lobster carapace length and record biometric data through offshore, wholesaler and quayside surveys.	To build dataset for stock assessment work.	Regular	Fishing industry	Andrew Boon													1
	Stock Assessment	Brown crab	Assess brown crab stock status and exploitation levels based on size distribution and sex ratio of brown crab catches	Measure brown crab carapace width and record biometric data through offshore, wholesaler and quayside surveys.	To build dataset for stock assessment work	Regular	Fishing industry	Andrew Boon													1
	Fisheries Management Plans	Lobster	Outline key parameters of the NIFCA lobster fishery, as well as highlight management strategies.	Analysis of NIFCA permit returns data.	To provide a comprehensive overview of the NIFCA lobster fishery.	Annually	-	Andrew Boon													1
		Brown crab	Outline key parameters of the NIFCA brown crab fishery, as well as highlight management strategies.	Analysis of NIFCA permit returns data.	To provide a comprehensive overview of the NIFCA brown crab fishery.	Annually	-	Andrew Boon													1
	Temperature loggers on pots	Lobster and brown crab	To collect temperature at depth data and relate this to catch.	Work with fishers to put temperature loggers on pots.	Start a long-term temperature at depth monitoring programme to understand more about how temperature affects catchability of pots.	Regular	Fishing industry	Andrew Boon Alex Aitken													2
	Nephrops monitoring surveys	Nephrops	To understand Nephrops abundance inside the NIFCA distrct.	Liaise with Cefas to understand whether an extension of their survey is possible.	Abundance of Nephrops in the NIFCA district unknown.	TBC	Cefas	Alex Aitken													2
Mollusca	Impact Assessment	Periwinkles	To monitor the impacts of periwinkle collection on both in situ populations and communities.	Quadrat surveys, timed searches and shore patrol observations	To understand the impacts of this activity based on current levels and monitor over time.	Regular	-	Alex Aitken Beth Harvey													2

	Stock Assessment	Fenham Flats mussel survey	Monitor size distribution, density and spatial extent of mussels.	Defra 'Walker and Nicholson'	Annual survey to assess mussel stocks within Lindisfarne protected areas to ensure enough food resources for birds.	1 day	NE	Alex Aitken														2
	Stock Assessment	Holy Island mussel survey	Monitor size distribution, density and spatial extent of mussels.	Defra 'Walker and Nicholson'	Annual survey to assess mussel stocks within Lindisfarne protected areas to ensure enough food resources for birds.	1 day	NE	Alex Aitken														2
	Stock Assessment	Blyth Estuary mussel survey	Monitor size distribution, density and spatial extent of mussels.	Dutch wand	Annual survey to assess mussel stocks within Northumberland Marine SPA to ensure enough food resources for birds.	1 day	NE	Alex Aitken														2
	Impact Assessment	Investigating declines in mussel bed density	NE project to investigate documented declines in Northumberland mussel beds incorporating wide range of potential factors		To build on a 2021 Masters project to understand causes of decline and potentially address them in the future.	Unknown (awaiting funding to develop a bid)	NE project	Alex Aitken Beth Harvey Catherine Scott Clare Fitzsimmons														2 Not confirmed
	Monitoring management	Monitoring of NIFCA Periwinkle Code of Conduct and Blyth Estaury Bait Collection Code of Conduct	To document whether Codes of Conduct are being adhered to as per statutory guidance.	Frequent patrols throughout the district.	To understand effectiveness of current codes of conduct to understand where further management may be required.	Regular	-	Alex Aitken Beth Harvey														1
Angling, Bait collection and hand gathering	Fishing activity	Aln estuary UAV survey of bait collection devices (tyres); possible surveys in other estuaries	Monitor number of tyres in the estuary to compare to 2022.	UAV survey as in 2022.	Monitor if any changes since HRA completed on the activity	Summer survey	-	Alex Aitken Beth Harvey														2
	Fishing activity	Monitoring intertidal digging/pumping for bait, bait collection and hand gathering	Monitor intertidal activity throughout the district.	Shore patrol observations	Monitoring of all activities to track patterns in collection activity. Monitor areas that have fewer patrols to better understand extent of activity.	Regular	-	Alex Aitken Beth Harvey Katy Smart														1

	Impact assessment	Bait digging impacts	Understand impacts to intertidal sediment in relation to pressures of MPA features.	Lugworm density surveys continued from 2022.	To fill knowledge gaps identified through the MPA assessment process.	3-4 months	Natural England	Beth Harvey Katy Smart															1
	Stakeholder engagement	Continue to work within existing Recreational Sea Angling (RSA) Strategy. Aim to expand on current strategy.	To develop engagement with this sector to understand where we can work with anglers to increase knowledge and build better relationships. To run public facing event during the summer months.	Public engagement / RSA group / stakeholder meetings. Monthly RSA focused patrols.	Continue working to the strategy with the aim of increasing engagement with the Angling sector in the NIFCA district.	Regular / ongoing	Angling sector	Katy Smart															1
General	Fishing Activity	Vessel Sighting Data / iVMS	Record the location of fishing vessels observed throughout the district during sea patrols. To build on current understanding of the uses of iVMS data to identify fishing footprint from trawling, potting and netting activities.	Sea patrol observations Data sharing with MMO.	Monitoring will continue to build a detailed picture of different fishing activities occurring throughout the district which can be used to inform MPA assessments. Understand how iVMS data can best be used, particularly in outstanding MPA assessments. .	Regular	-	Alex Aitken Beth Harvey Andrew Boon Mark Southerton															1
	Stakeholder engagement	Develop communications with the fishing industry – Fisher Forums	To build better relationships with local fishers and understand where we can work together to improve management and work towards sustainable fishing.	Working groups / stakeholder meetings	Increase engagement and develop relationship.	Quarterly	Fishing industry	Alex Aitken Mark Southerton															1
	National Fisheries Management Plans	To keep up to date with national FMPs, specifically the crab and lobster plan.	Review draft plans, respond to consultations, share updates with key stakeholders and send feedback to Defra.	n/a	NIFCA are a key stakeholder in the development of the plans.	Regular / ongoing	-	Alex Aitken															1

Finfish	Habitat use/fish habitat	Aln Estuary Fish Survey	Collect and analyse size and species composition of fish communities.	EA TRaC survey method.	To understand Aln Estuary MCZ habitats importance for juvenile fish species.	4 days	EA, volunteers	Alex Aitken Andrew Boon														2
	Catch data analysis	Recreational angling catch data analysis	To understand changes in recreational catches over time.	Compare regional club competition catch data over time.	To corroborate anecdotal evidence from anglers of changes in catch	1 week	Newcastle University RSA clubs	Katy Smart														2
Habitat	Habitat mapping	Ground truthing Coquet to St Mary's MCZ habitat map	Collect further information on the extent of rock habitat in the northern section of the MCZ.	Drop down camera / grab samples	To confirm presence of coal in the northern section of the MCZ.	TBC	-	Alex Aitken														Not confirmed 2
	Habitat mapping	OLEX data collection	Collect high resolution seabed habitat maps focusing on the northern area of the Berwickshire and North Northumberland Coast SAC.	Operating WASSP multibeam sonar during routine patrols with some targeted area.	To better understand to spatial extent of protected features in relation to fishing activity.	TBC	NE?	Mark Southerton, Alex Aitken														Not confirmed 3
	Habitat mapping	Ground truthing OLEX	Collect high resolution seabed habitat maps focussing on the northern area of the Berwickshire and North Northumberland Coast SAC.	Drop down camera and grab samples to confirm habitat (preferably to EUNIS level 3)	To better understand to spatial extent of protected features in relation to fishing activity.	TBC	NE?	Mark Southerton, Alex Aitken														Not confirmed 3

7. Collaborative Research Projects

Collaborative research projects provide a number of benefits to Northumberland IFCA. NIFCA, Newcastle University and Natural England's Northumbria Team have had a joint research group since 2009. Each member can bring different elements to the group with mutual benefits (funding, equipment, expertise, research questions, time, data etc.). Combining each organisations' strengths and resources allows the group to overcome these challenges and together the group has developed and successfully funded several projects to address evidence gaps and benefit all partners. Recently completed, current, or soon to start projects are listed below.

Louis Desmet

Status: IMEC Masters student due to complete August 2023.

Study: Seal deterrents in the Northumberland net fishery, does this encourage diversification away from potting?

Emma Kearns

Status: IMEC Masters student due to complete August 2023.

Study: Cross-border lobster fecundity (partnered with Blue Marine Foundation and St Abbs Marine Station).

Adam Bassett

Status: IMEC Masters student due to complete August 2023.

Study: Project TBD

Annabel Duckett

Status: Second year undergraduate students due to complete April 2023.

Study: Changes in the size of berried lobster over time.

Molly Claason

Status: Second year undergraduate students due to complete April 2023.

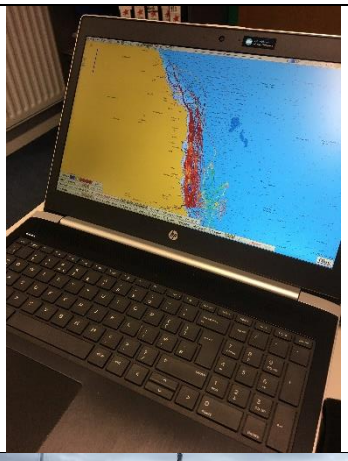
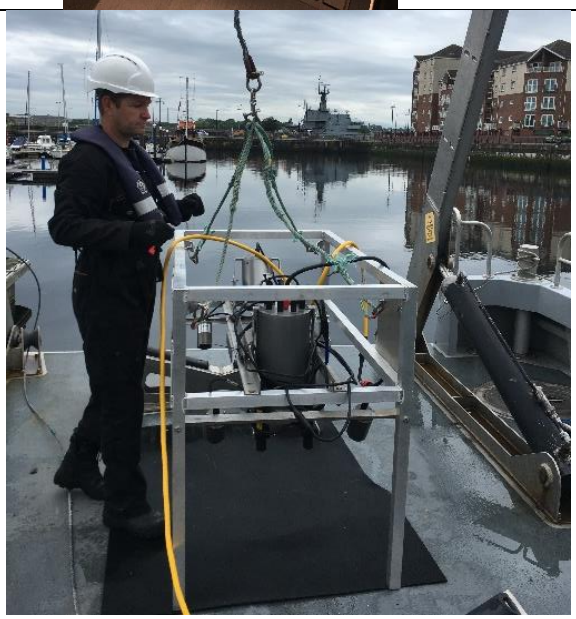
Study: Sea surface temperature in relation to landings and effort in the Northumberland lobster fishery.

Appendix A

Vessel	Description
Patrol Vessel St. Aidan 	- Built 2014/2015 at Goodchild Marine (Great Yarmouth) - 16metre GRP Catamaran, coded to MCA category 2 - Top Speed 23knts - Multi-Purpose Enforcement/Survey Vessel - Carries 5.3m RIB onboard (TT St. Aidan), deployed via A-frame on stern - Without RIB, 'A' frame can be used to carryout grab-sampling, trawling and towing of multi beam equipment. - 1 ton starboard pot hauler - 1 ton twin drum north sea winch - Electronics include: Olex navigation, WASSP Multi Beam echo sounder, Hemisphere VS330 GNSS receiver, GNNS Global Correction Service, SMC IMU motion sensor. Nav-net 3 in 1, Furuno Sat compass, GPS, Furuno radar and Furuno comms suite. 2x computer stations operating windows 10 desktop PC's
T.T. St. Aidan 	- Built 2014/2015 - On-board P.V. St. Aidan - 5.3metre Ribcraft - 90 HP Suzuki outboard engine - Multi-purpose RIB used primarily for enforcement boarding's but can also be used for close inshore survey work e.g. towing Starfish Side-scan Sonar. Garmin echomap 65 GPS plotter, iComm ICM 330 fixed V.H.F.
Robert Arckless MBE 	- Built 2018/2019 - 9.5 metre shore-based RIB (Ribcraft) coded MCA category 3 - Twin 250 HP Suzuki outboard engines - Used primarily for enforcement work -

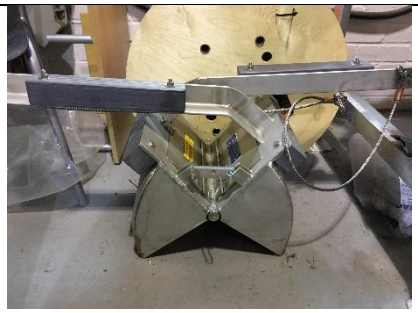
Inflatable dinghy 	- Flat bottomed Zodiac inflatable - 4 hp Suzuki outboard engine - Used for estuary surveys

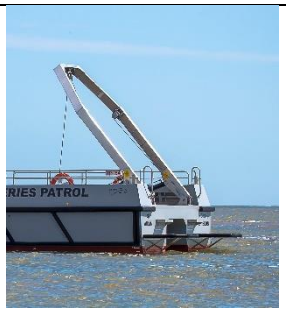
Equipment category	**Item description**	
Positional	Garmin etrex 20 handheld GPS x2 Garmin etrex 22 handheld GPS x1	
	Garmin map 60Cx handheld GPS	
Acoustic	Starfish Sidescan 452F Including 50metres of tow cable and software key for Sonar TRX mosaic program	

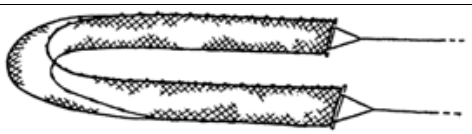
	Linux laptop running OLEX software and multibeam, hardness licence	
Video & stills	STR Seaspyder Camera with custom frame. Equipment consists of: - STR Seaspyder 18Mp U/W digital still camera (18 mega pixels) - STR Seaspyder High power U/W camera flash - 4 STR Seaspyder 20W High intensity LED light - 2 STR Seaspyder Subsea scaling laser (Red; 100mm spacing) (not 100mm spaced) - Seaspyder camera frame (Figure 6) - Recording Equipment - Seaspyder top side equipment (2 monitors and 2 PCs) running SeaSpyder software	
	Unmanned Aerial Vehicles (UAV) DJI Mavic 2 Pro + 3 batteries	

	FIFISH Remotely Operated Underwater Vehicle	
	Olympus Tough digital camera x3 2.1m shockproof, 15m waterproof	
	2 x GoPro 3+ black edition camera with accessories	
	Sony HDR 260 8.9 megapixel camera Seapro waterproof housing Colour filters, L.E.D. light rig and two laser scale pointers Aluminium ‘drift’ frame	
	Panasonic HC-X920 20 megapixel video camera Seapro waterproof housing Colour filters, L.E.D. light rig and two laser scale pointers	

	Aluminium ‘drop’ frame	
	Waterproof Seapro housing To install GoPro camera (for live surface feed)	
	60 metres umbilical cable	
	160 metres umbilical cable (with video amplifier)	
	Surface box: GPS and text overlay, Lyyn Hawk video enhancer, Pinnacle dazzle HD screen capture card, 7-inch LED screen, Getac fully rugged laptop including additional storage	

Seabed sampling	0.1m^2 offset Day grab and stand	
	0.1m^2 Van Veen grab	
	Grab table, damper and separator	 
	Wilson Auto-Siever	

Deploy & recovery	1000kg lift A-frame (St. Aidan)	
	1000kg Spencer Carter pot hauler	
	1000kg Spencer Carter trawl winch with 200 metres warp	
Fishing equipment	Assortment of lobster pots, ropes, anchors and buoys	
	Beam Trawl 1.6m mouth	
	Standard estuary survey seine net Estuary Survey Seine Net 43m x 4m deep – 210/12 6.5mm & 14mm	
	Sand eel seine net	

	Knotless netting, fully rigged, in 17mm, 10mm and 5mm in the centre. Five Panels per net, 25 yards x 6ft deep	
	2 x Standard fyke nets (including anchors and buoys) 7-hoop large double dee fyke net 10 & 14mm – 100cm x (2 x 5.3mtrs) – 32ft Leader	
	Fish storage buckets, air pumps, measuring boards and hand nets	
Intertidal survey	2 x 'Dutch wand'	
	2 x 6mm mesh aluminium sieve	
	2 x 1m^2 stainless steel quadrat