NIFCA V-notching Report 2024

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Acknowledgements

Northumberland IFCA (NIFCA) is very grateful for everyone involved in this project, from wholesalers to fishers and would like to express their sincere thanks, in particular to Blyth Fish Ltd., D.R. Collin & Son and T.C. Fish who supplied the lobsters. We hope this scheme will continue to be supported by the industry going forward and further ensure its success.

Introduction

Northumberland's Lobster Fishery

The European lobster (*Homarus gammarus*) fishery of Northumberland is of significant cultural and economic importance for local fishers and is the most commercially important fishery for local inshore vessels, with 61 active potting vessels in 2024. All permitted vessels within the NIFCA district are required to submit monthly catch and effort returns. These returns provide information on the number of pots fished within the district, days fished, as well as the landed weight of key target species. From these returns, it is estimated that the value of lobster landed within the NIFCA district in 2023 was £4.7 million (Figure 1).

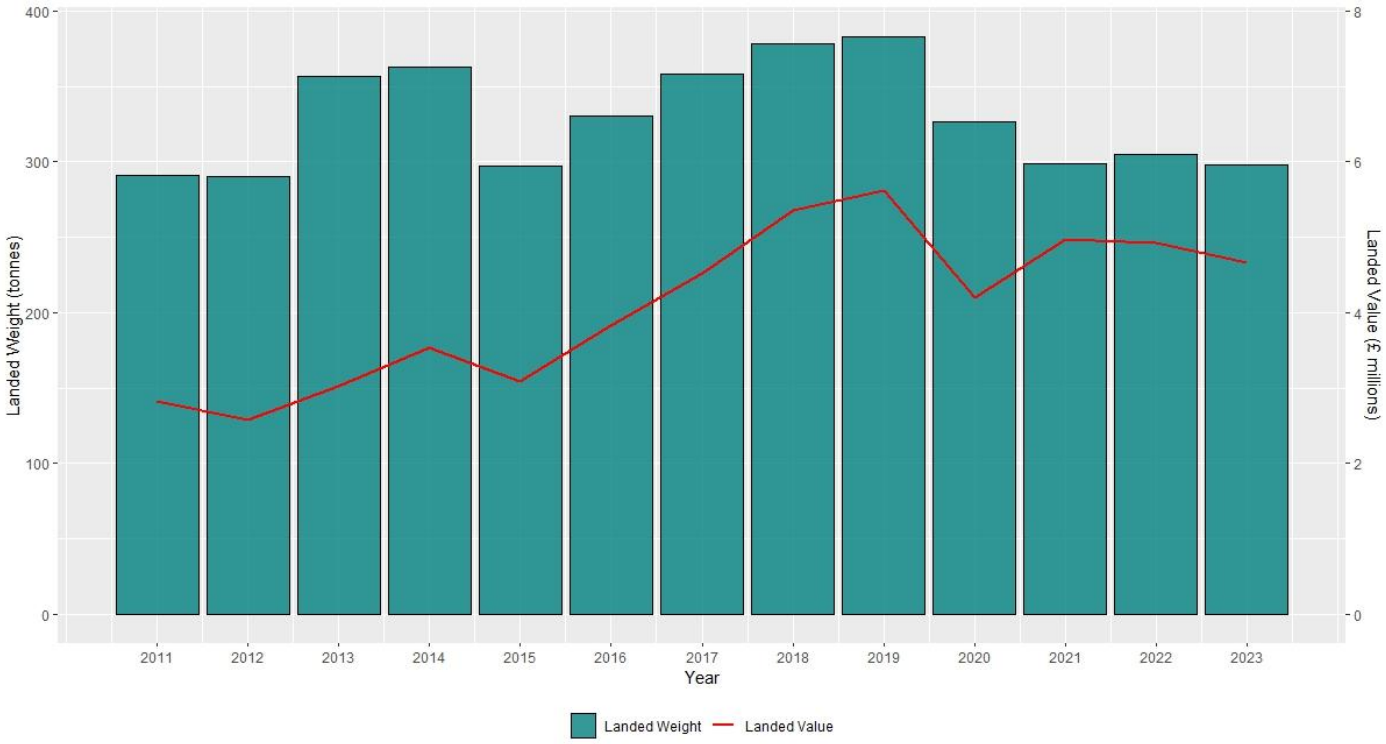

Figure 1: Landed weight and value for lobster caught within the NIFCA district, taken from NIFCA shellfish catch and effort returns.

Landings have fluctuated annually, however landings per unit effort (LPUE) calculated from the landed weight per 100 pots hauled has shown an increasing trend in recent years (Figure 2). LPUE is subject to significant seasonal variation, peaking between July and October where lobsters are more abundant closer inshore.

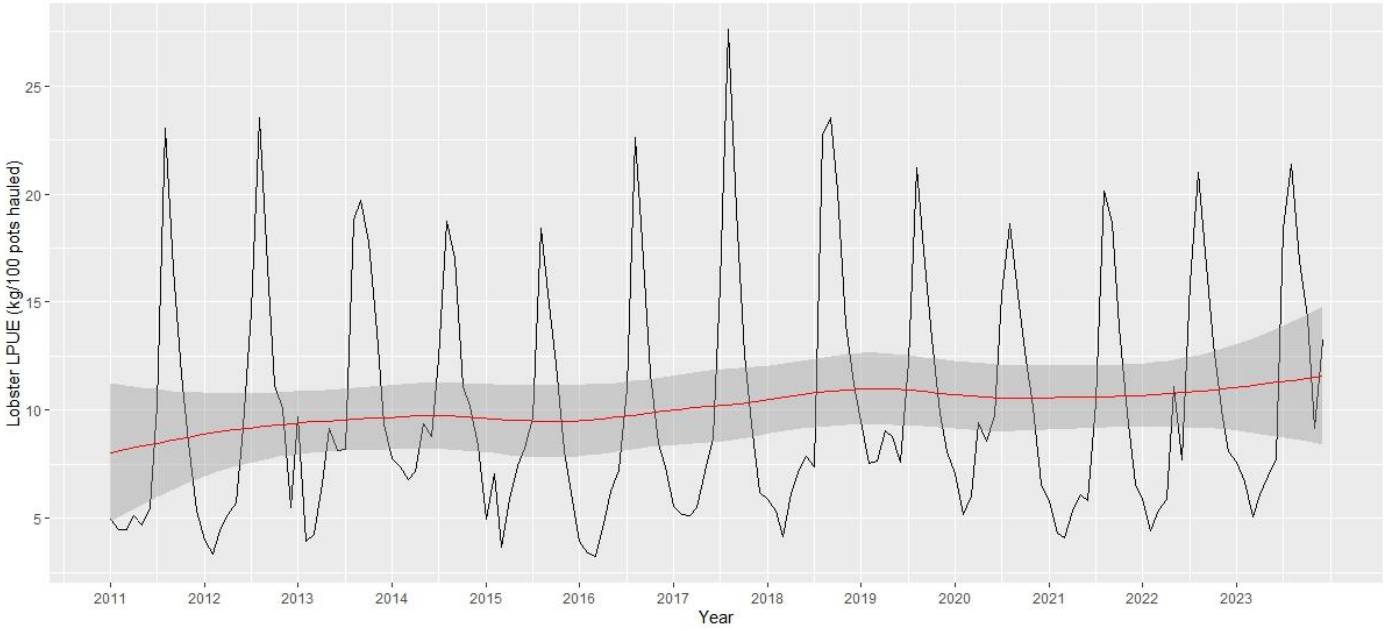

Figure 2: Landings per unit effort (black line) for activity within the NIFCA district, taken from NIFCA shellfish catch and effort returns. The red line shows the smoothed conditional mean, with the grey shading showing the 95% confidence level.

Current Fishery Management

The lobster fishery of Northumberland is subject to a suite of input and output controls to support the viability and sustainability of the fishery. These are established through regional (IFCA byelaws) and national legislation, covered in Table 1.

Table 1: Summary of the management measures applicable to commercial fishers within the NIFCA district.

Management Measure	Legislation	Management Output
Shellfish Permits	NIFCA Byelaw - Crustacea and Molluscs Permitting and Pot Limitation	Permit required to fish within NIFCA District
Minimum Conservation Reference Size (MCRS)	National - Regulation (EU) 2019/1241 of the European Parliament and of the Council	87mm
Pot Limitation	NIFCA Byelaw - Crustacea and Molluscs Permitting and Pot Limitation	800 pots per vessel
Maximum Vessel Size	NIFCA Byelaw - Crustacea and Molluscs Permitting and Pot Limitation	12m
Berried Lobsters	National - The Lobsters and Crawfish (Prohibition of Fishing and Landing) (Amendment) (England) Order 2017 NIFCA Byelaw - Crustacea and Molluscs Permitting and Pot Limitation	Unable to retain or land berried lobsters
Landing of Parts of Lobster	NIFCA Byelaw - Crustacea Conservation 2019	Unable to fish for, remove, take, land or offer for sale detached parts of a lobster.
Soft-shelled Lobster	NIFCA Byelaw - Crustacea Conservation 2019	Unable to fish for, remove, take, land or offer for sale a soft-shelled lobster

V-notched and Mutilated Tails	National - The Lobsters and Crawfish (Prohibition of Fishing and Landing) Order 2000	Prohibits the landing of lobsters bearing a v-notch or those who have been mutilated in such a manner as to obscure a v-notch

V-notching as a Conservation and Management Tool

V-notching as a method of conserving the reproductive capability of lobster populations has a long history of implementation globally and is a widely recognised fishery management tool by both scientific (Gunning, 2012) and fishing communities (Acheson *et al.,* 2010) The objective is to maintain a healthy reproductive population in order to provide continual recruitment of lobsters to the stock with the aim of creating an ecologically sustainable fishery.

The process of v-notching involves the removal of a V-shaped segment from the inner uropod (inner tail flap) of a lobster (Figure 3). Any lobster bearing a v-notch is effectively removed from the fishery and unable to be landed until that v-notch grows out, typically in around 2-3 years. These lobsters are protected from commercial fishers under the Lobsters and Crawfish (Prohibition of Fishing and Landing) (Amendment) (England) Order 2017 (previously the Lobsters and Crawfish (Prohibition of Fishing and Landing) Order 2000), with recreational fishers prohibited from retaining v-notched lobsters under NIFCA Byelaw: Crustacea Conservation 2019. The legislation defines a v-notched lobster as:

Figure 3: A lobster being v-notched.

> "A 'v' notched lobster' means a lobster with a notch in the shape of the letter 'v' with a depth of at least 5 mm in at least one of the inner flaps of the tail fan either side of the main tail flap, with the apex of the 'v' positioned inward from the edge of the flap. The depth of the 'v' notch is measured vertically from the distal edge of the flap (not including the setae) to the apex of the 'v'"

Lobster Biology

The fundamentals of v-notching work due to the biology and life cycle of the European lobster. Lobsters grow incrementally throughout their lives in a process known as ecdysis, where the harder exoskeleton is moulted to reveal a softer shell. This is then expanded before it hardens by the lobster absorbing water into its tissues to generate new tissue growth. This process can occur up to several times a year for juvenile lobsters, reducing to once every one or two years for larger, mature lobsters. Through this process, lobster carapace length can increase by around 7mm per moult (Agnalt *et al.,* 2007). This process means that a lobster will retain the v-notch in its tail for 2-

3 years depending on the size of the animal, allowing the lobster to complete at least one full breeding cycle.

Lobsters breed throughout the year, but this is dependent upon the moulting cycle of the female, as mating occurs between a hard-shelled male and a soft shelled (newly moulted) female. Once a female bears eggs she is unable to moult again until they have hatched (about nine months), as this would cause her to lose her eggs. Following fertilisation, the eggs are secreted onto the pleopods underneath the abdomen of the lobster, however they can be carried internally for 9 months before being extruded, typically around autumn (Nagaraju, 2011). The number of eggs carried by an egg-bearing, also known as berried, lobster varies significantly with animal size, with larger animals typically carrying significantly larger number of eggs (Figure 4). Animals with a carapace length of 87mm (MCRS) are estimated to carry around 7,000 eggs, with larger females around 150mm carrying around 37,000 eggs (Coleman *et al.*, 2019), highlighting the importance of protection for larger, more fecund females.

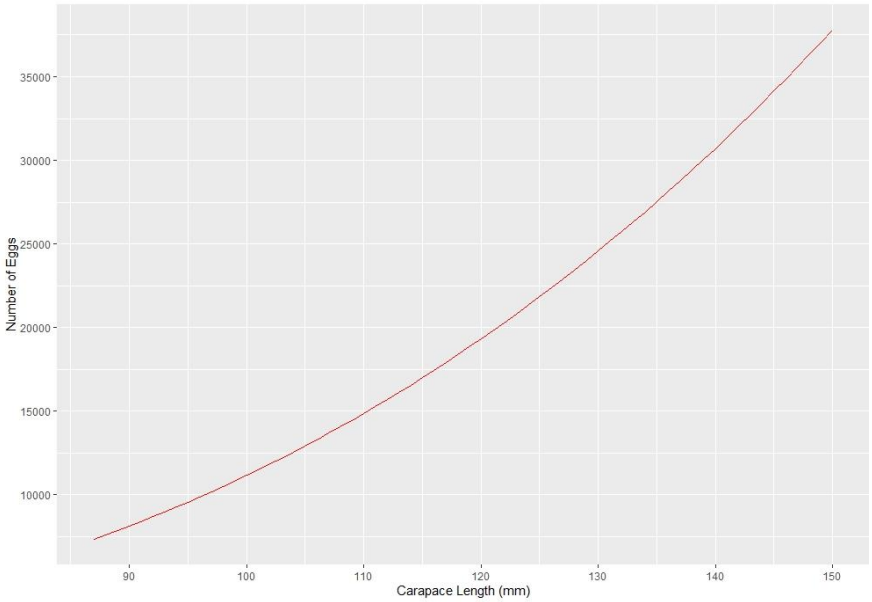

Figure 4: Fecundity estimates for female European lobsters (Coleman *et al.*, 2019).

History of V-notching in the NIFCA District

NIFCA previously ran a successful v-notching scheme from 2000-2017, v-notching and releasing over 20,000 lobsters during this time, typically focusing on larger, egg-bearing females. These lobsters were purchased from local wholesalers and released from NIFCA vessels. The Authority received widespread support from the industry, with many fishers donating money towards the scheme totalling £22,361 between 2000 and 2017. Many fishers attributed the v-notching scheme to observing increasing number of juvenile lobsters throughout the district and believed it contributed to the overall sustainability of the local fishery (Duffill-Telsnig, 2014). The scheme was paused in 2017 after the implementation of the Lobsters and Crawfish (Prohibition of Fishing and Landing) (Amendment) (England) Order 2017 which prohibited the landing of egg-bearing lobsters. This decision was made due to feedback from fishers expressing concern over duplicate protective measures for female lobsters, as well as the difficulties and practicality of sourcing berried lobsters for the scheme as it was done in previous years.

Despite the NIFCA-led scheme being paused, throughout the duration of the scheme and post-2017, fishers have voluntarily v-notched larger lobsters. As part of the catch and effort returns submitted to NIFCA, fishers are asked to report any v-notched lobsters they observe at sea. This provides a rough estimate of the numbers of lobsters that are being v-notched in the district. Information from the returns indicates that whilst the number of v-notched lobsters reported was higher during the NIFCA-led scheme (12,129 in 2014), there is still a significant number of v-notched lobsters reported in catch and effort returns 6 years after the last years of the NIFCA v-notching scheme (5,627 in 2023) (Figure 5), suggesting lobsters are being voluntarily v-notched by fishers, highlighting the support from the industry. Although it should be noted that there may be a significant amount of duplication in the reporting given that each lobster will bear a v-notch for several years.

The 2024 V-notching Scheme

Rationale

Following engagement with fishers throughout the district during patrols or through our Fisher Forums (dedicated meetings in ports to discuss issues and share information between fishers and NIFCA), there has been an increasing support for the v-notching scheme to resume. Following the implementation of the prohibition on the landing of berried hens, some fishers have expressed concerns around the enforceability of the legislation, with some suggesting that v-notching provides an increased level of protection to the lobster and safeguards it from being removed from the fishery. This is one of the reasons why voluntary v-notching by fishers has continued in the region, despite no formal v-notching scheme in place. Based on this feedback from the industry, the decision was made to resume the NIFCA-led v-notching scheme in 2024, with a hope to continue this for future years should the industry remain in support.

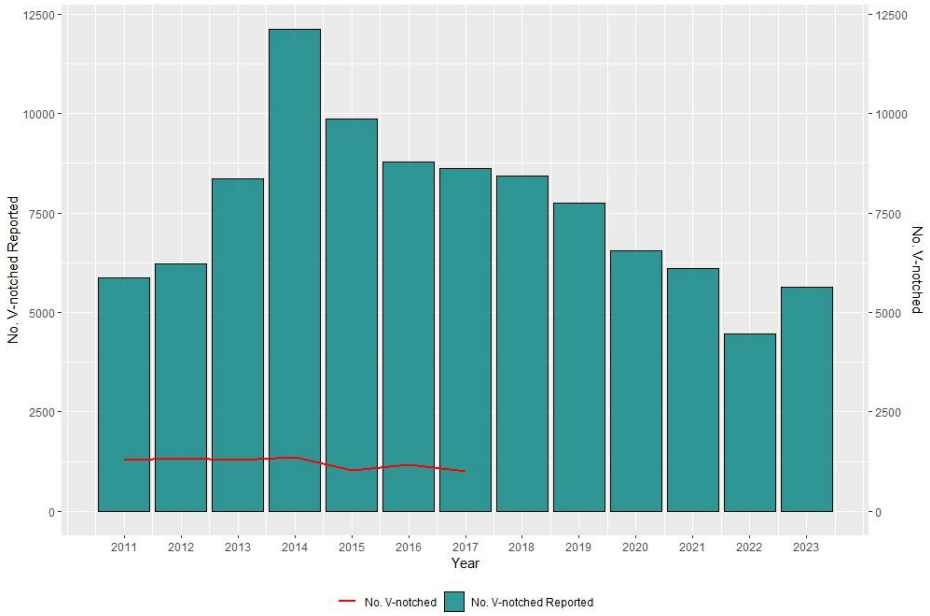

Figure 5: The number of lobsters v-notched by NIFCA during the v-notching scheme compared to the numbers reported from monthly permit returns.

Methodology

Due to the prohibition on the landing of berried hens, berried females were not available from wholesalers, therefore non-berried female lobsters of a range of sizes, and a small number of males were purchased. V-notching males (at a ratio of 1:10-20 male to female) ensures that larger v-notched females had larger males to breed with, as female lobsters have been shown to display a preference to breed with animals of similar or larger sizes (Sørdalen *et al.*, 2018). The scheme ran over the summer months where lobsters were more abundant, and the price was at its lowest to ensure that more lobsters could be purchased with the funds available. All lobsters were purchased from local wholesalers (Blyth Fish Ltd., D.R. Collin & Son and T.C. Fish), measured to gather individual biometric data (carapace length and abdomen width), v-notched and released across five sectors in the district to ensure that each area received a similar quantity of lobsters. All lobsters were released over areas of hard ground, the preferred habitat of lobsters, identified using European Nature Information System (EUNIS) level 3 seabed habitat maps. All releases were carried out from the NIFCA vessels (Figure 6).

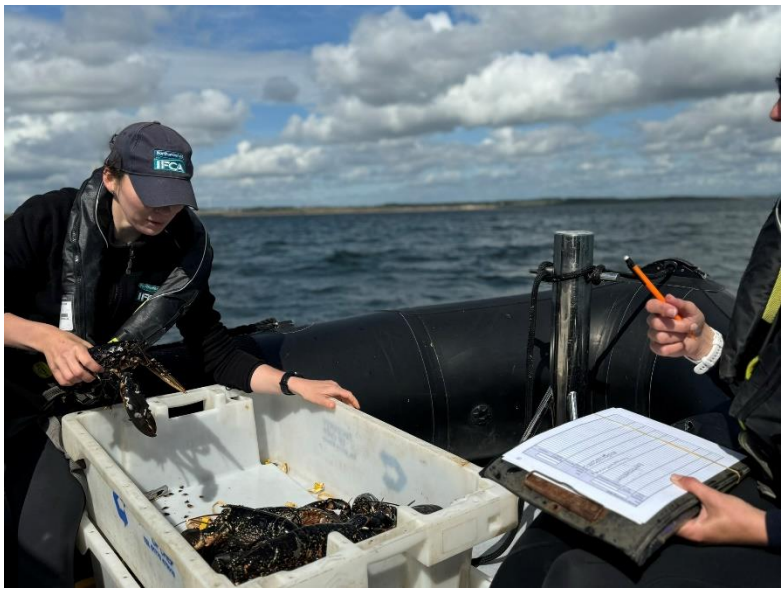

Figure 6: Officers v-notching and recording biometric data during a release.

Results

In 2024, the v-notching scheme ran from 12th July-23rd September, with 1,474 lobsters v-notched and released across the 13 releases. In total, 809.5kg of lobsters were purchased, costing £13,694. A breakdown of the key statistics from the scheme can be seen in Table 2.

Table 2: A breakdown of the 2024 v-notching scheme.

Sector Number	No. releases	Total Released	No. Females	No. Males	Max Carapace Length (mm)	Mean Carapace Length (mm)	Cost
1	6	265	256	9	115	91.1	-
2	2	320	289	31	112	91.3	-
3	1	331	316	15	126	91.7	-
4	2	280	238	42	128	94.7	-
5	2	278	235	43	123	94.7	-
Combined	**13**	**1,474**	**1,334**	**140**	**128**	**92.6**	**£13,694**

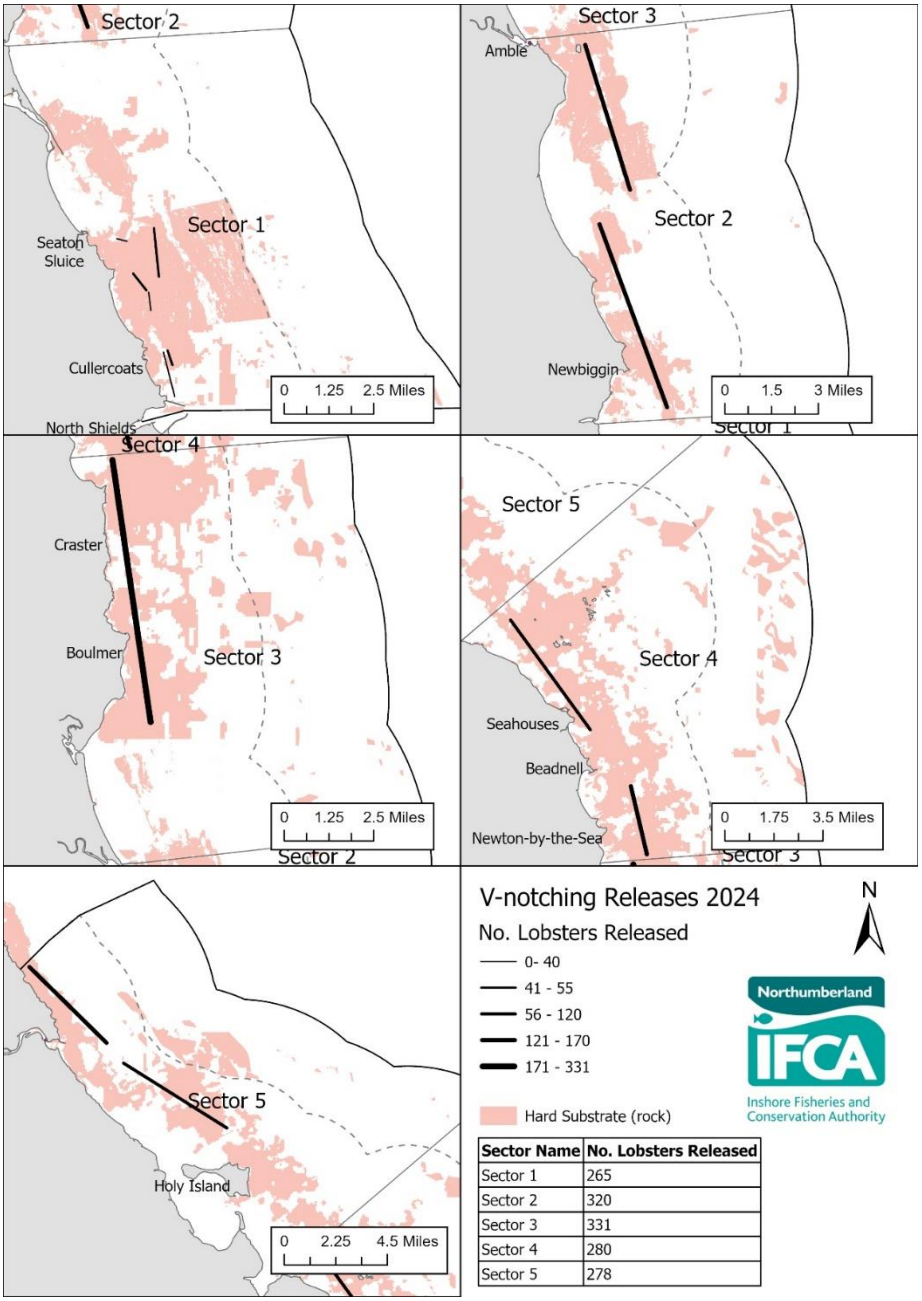

Figure 7: Distribution and scale of releases throughout each individual sector for the 2024 v-notching scheme.

As part of the scheme and for ease of distributing the lobsters as evenly as possible throughout the district, the district was divided into five sectors, with separate releases in each (Figure 7). In total, the releases covered 35 nautical miles of the NIFCA district. Every effort was made to release the lobsters evenly throughout the district; however, this was difficult due to wholesaler supply and lobster size varying the amount in each box purchased.

The average size of the lobsters did not vary significantly between sectors, with lobster supplied for the northernmost sectors typically larger, which is expected for this area and corroborated through NIFCA biometric data suggesting that larger lobsters are more common in the North of the district. Animals across a broad range of sizes were released as part of this scheme, with wholesalers asked for animals of all sizes to ensure a varied brood stock was available (Figure 8).

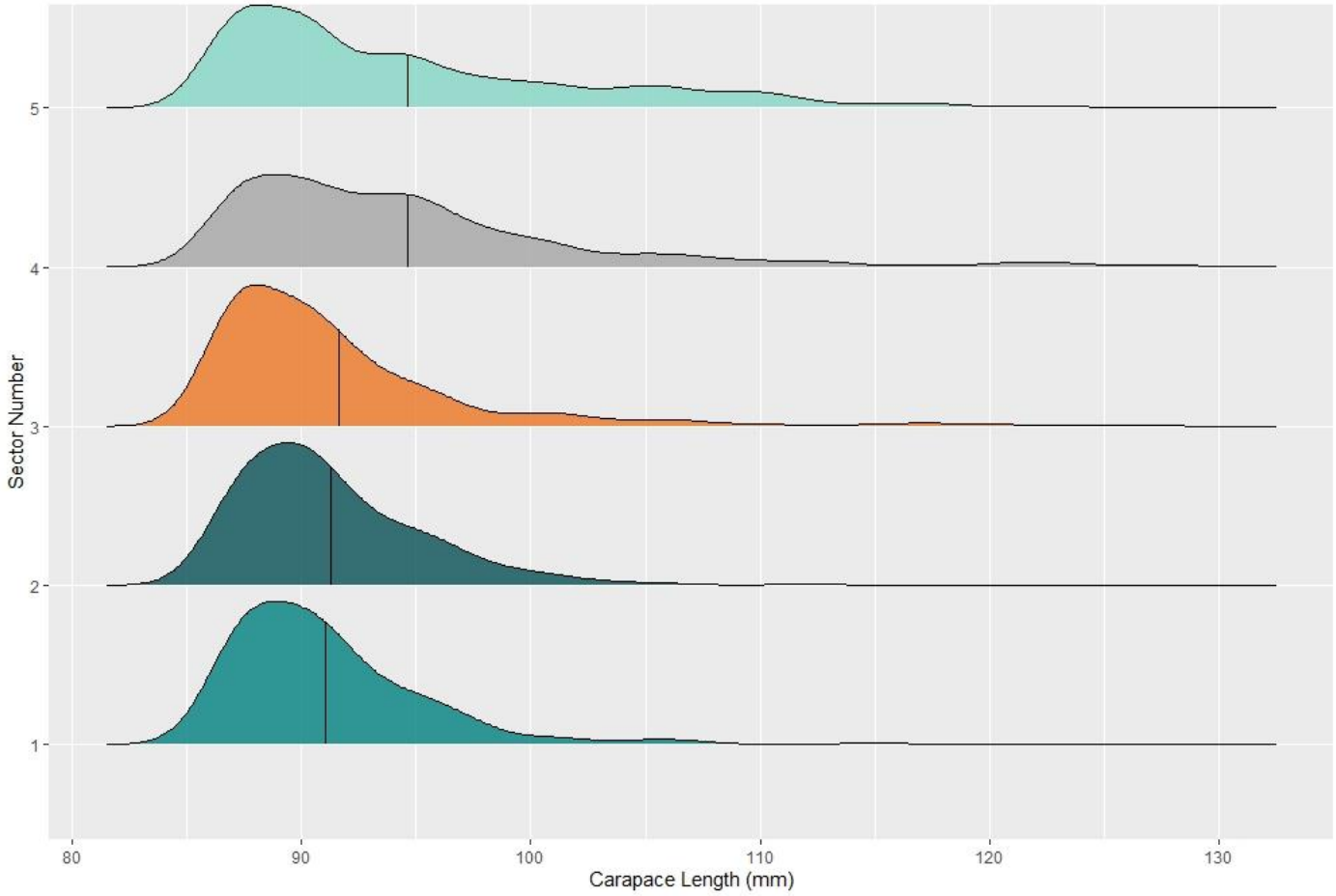

Figure 8: Density plots for lobster carapace lengths for each release sector, as well as an indication of the mean animal size (black line).

Survivability of lobsters purchased during the scheme in 2024 was monitored during all releases, with only 2 instances of mortality recorded, representing 0.1% of the lobsters purchased. Survivability post-release is also expected to be high, with care taken during the v-notching and release to minimise stress, handling time and exposure to any detrimental environmental conditions.

Based on fecundity estimates for the animals released, and assuming each animal only completed one full breeding cycle whilst bearing a v-notch, the scheme will allow for almost 12,000,000 eggs to be produced and provide additional recruitment to the fishery. Estimates of survivability of lobster larvae varies significantly (Vives i Batlle *et al.,* 2010) and a full review is required to determine the larval survival rate to maturity and therefore the future recruitment to the breeding population.

Funding

The 2024 V-notching scheme was funded by NIFCA with the total costs for the purchase of lobsters £13,694 (Table 3). The cost of the scheme from 2000-2017 varied significantly, based on the number of lobsters purchased and average price per kilo, with the lowest cost in 2000 of £5,003. The high costs in 2024 are due to the higher number of lobsters purchased, and a higher

prices per kg than in any previous year. With other vessel commitments and working around suitable weather windows, the scheme ran slightly longer than initially planned, which resulted in a higher price per kilo in the final release (Table 3).

Table 3: A financial breakdown of the 2024 v-notching scheme.

Date	Wholesaler	Number of Lobsters	Weight (kg)	£/kg	Cost
12/07/2024	T.C. Fish	79	41.5	£16	£664
12/07/2024	Blyth Fish Ltd.	92	47	£16	£752
26/07/2024	Blyth Fish Ltd.	320	166	£16	£2,656
16/08/2024	Blyth Fish Ltd.	491	258	£15	£3,870
20/08/2024	T.C. Fish	94	47	£16	£752
23/09/2024	D.R. Colin & Son	398	250	£20	£5,000
				Total	**£13,694**

Monitoring

Previous work into recapture rates of v-notched lobsters has helped to provide an understanding of the success of the scheme's success (Skerritt, 2014). NIFCA receives regular reports from fishers regarding the number of v-notched lobster observed at sea through its permit return system (Figure 5). Caution must be applied when viewing these results, as these numbers do not represent individual lobsters, as a re-captured lobster can be caught multiple times. In addition to this, officers also conduct offshore observer surveys on commercial fishing vessels, as well as at-sea fleet surveys, during which the number of v-notched lobsters are recorded. We will continue to monitor records of v-notched lobsters through both data sources.

A full analysis of the levels of fishing effort relating to the capture rates of v-notched lobsters is planned for 2025 when a complete picture of the catch and effort returns for 2024 are available. Based on returns up to September 2024, there has been a noticeable increase in the number of reported v-notched lobsters compared to 2023, with 5,856 reported since the start of the year (3,672 between July and September). This information can help infer the success of the scheme, as well as the survivability of the lobsters after their release.

The overall health of the local stock will be monitored through ongoing data collection and analysis through offshore observer trips and shore-based sampling, in addition to the Cefas stock assessment programme to which NIFCA contributes data. The most recent assessments for the Northumberland and Durham stock unit indicate that the exploitation rate of the stock is high, and fishing mortality is above the limit reference point for males and between the limit and target for females (Cefas, 2024). Whilst it will take time to see possible benefits of the scheme reflected in these assessments, they are a useful monitoring tool.

If the scheme continues, further workstreams will be developed to monitor v-notched lobsters after their release. This could include mark-recapture work to understand the movements of lobsters post-release.

Communication and Outreach

In 2024 NIFCA commissioned a video to be made to promote the current v-notching scheme and explain its importance to the local fishery. This has been a key component of the communication and outreach work done as part of the scheme and has been showcased at events that NIFCA has attended, namely the International Council for the Exploration of the Sea (ICES) Annual Science Conference held in September 2024. The video was viewed by attendees from all over the world and served as an excellent opportunity to promote the work of the scheme and increase our engagement with fishers and the scientific community. We have also continued to update fishers of the progress of the scheme through regular updates and also during our Fisher Forums up and down the coast. Communication of the scheme is vital to its success and through these channels, we have been able to receive feedback and updates from fishers which will feed into how the scheme is run going forward.

Future of the Scheme

NIFCA aims to continue the v-notching in future years, after a well-supported and commended re-introduction in 2024. This is provided there is the continued support from the local industry. NIFCA has recently made available a number of v-notching pliers to its commercial shellfish permit holders to increase the number of instances of voluntary v-notching across the district. Over the coming months, we will continue to engage with local fishers to gauge the support for the scheme and identify any areas that it could be improved upon. Efforts will also be made to identify any possible external funding sources to support the scheme in future years and to help develop any additional monitoring projects.

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