

# **Outer Hebrides Inshore Fisheries Pilot**

**Year One report**

**May 2022**



**Scottish Government**  
Riaghaltas na h-Alba  
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# Outer Hebrides Inshore Fisheries Pilot



## Year One Report

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## 1. Summary

- The Outer Hebrides Inshore Fisheries Pilot (the Pilot) exemplifies one of the key functions of the [Regional Inshore Fisheries Group \(RIFG\)](#) network, highlighting how locally-led fisheries improvement projects can work in practice.
- The Pilot aligns with both the Scottish Government [Fisheries Management \(FFM\) Strategy](#) and the marine commitments within the [Bute House Agreement](#).
- The Pilot commenced on the 5<sup>th</sup> November 2020 and this report aims to provide an update on its various work streams and next steps.
- Fishers in the Outer Hebrides continue to express strong support for the Pilot and are reporting positive impacts on their fishing businesses.
- Marine Scotland have carried out work to characterise fishing activity within the Pilot area and to consider the relative merits of the available data.
- Baseline data identified that landings per unit effort (LPUE) of shellfish species (edible crab, European lobster, Norway lobster and velvet crab) decreased from 2017 to 2020.
- Compliance with the conditions of the Pilot has been good with no reports of breaches recorded in 2021.
- 40 fishing vessels working within the Pilot area were equipped with a Tracking Solution to consider the merits of its use in line with the Scottish Government Commitment to Modernisation of the Inshore Fleet.
- Track analyses are providing high resolution temporal and spatial data on fishing activity and estimated creel counts.
- Data collected during the Pilot will be used to improve automatically generated estimates of gear soak time for tracked vessels.
- A Catch App has been developed and made available for fishers to log daily catch in order to feed into highly spatially resolved assessment of LPUE, but also a method to support fishers promptly and accurately submitting landings data to Marine Scotland.
- A qualitative socio-economic assessment is planned to provide insights into the impact of the Pilot.

## 2. Introduction

Scotland's RIFG network consists of non-statutory bodies that aim to improve the management of our inshore fisheries. They enable fishers to work closely with their peers and the Scottish Government, as well as providing a strong voice in the wider marine planning context.

This aspiration, to enable locally-led management, was exemplified by the [2017 Inshore Fisheries Pilots Initiative](#) which signalled a commitment to enrich the evidence base on which fisheries management decisions are made, streamline governance and promote stakeholder involvement.

The FFM Strategy noted strong support for the RIFG network with the intention that it continue to evolve into Scotland's primary mechanism for delivering locally-led fisheries management initiatives.

### 2.1 Proposing an Inshore Fisheries Pilot

In November 2017 the Inshore Fisheries Pilots Initiative consulted on a number of stakeholder-proposed pilot projects. This included one from the [Outer Hebrides RIFG](#), which sought, primarily, to limit the number of creels that a commercial fishing vessel may deploy.

The proposal stated that creel numbers in the waters around the Outer Hebrides had been steadily rising for 20 years and had reached a point where catch rates were declining. This was of particular concern as the Hebrides remain heavily dependent on inshore fisheries and the health and status of the shellfish stocks are critical to supporting the local economy.

At consultation, stakeholder opinion on the proposal reflected a desire to challenge the *status quo*, where a commercial licence imposes few national restrictions on static gear fishing. Many stakeholders acknowledged the general trend towards increasing creel fishing effort leading to fishers setting gear out in order to 'ring fence' certain areas of sea bed, thus excluding competitors. This combined with a lack of output controls, such as quotas, for key shellfish species posed questions about the impact of fishing at current levels on stock health.

The consultation did highlight some potential challenges with implementing such a large scale pilot, including that the proposal did not differentiate different types of creel and therefore would not delineate the fishing pressures on respective shellfish species. In general, smaller vessels (up to approximately 8 metres) tend to target velvet crab and lobster on rocky seabed, down to 30 metres depth. Larger vessels tend to work deeper waters with a sandy bottom, targeting brown crab. Vessels of between 8 and 15 metres may also target *Nephrops* on muddy seabed at depths of 60 to 100 metres.

It was also highlighted that the Pilot only proposed management for static gear and that vessels trawl fishing for *Nephrops* were not considered or included.

Marine Scotland chose to progress the Pilot, acknowledging strong support expressed at consultation and also a well-defined, proactive group of active fishers keen to contribute to its development. It was considered that this group would be well placed to identify a level at which a profitable business could be run, while addressing the pressure to deploy ever more creels in order to combat declining catch rates.

### 2.2 Aims of the Pilot

- To address concerns that shellfish catch rates are declining.
- To enable the fishing fleet to work together, identifying an approach to static gear fishing that will limit the increase of fishing effort.
- To feed into the discussion on tracking solutions for the Scottish static gear fleet, under the wider Modernisation of the Inshore Fleet Programme.
- To test a locally-led approach to fisheries management.

### 2.3 Development and Implementation

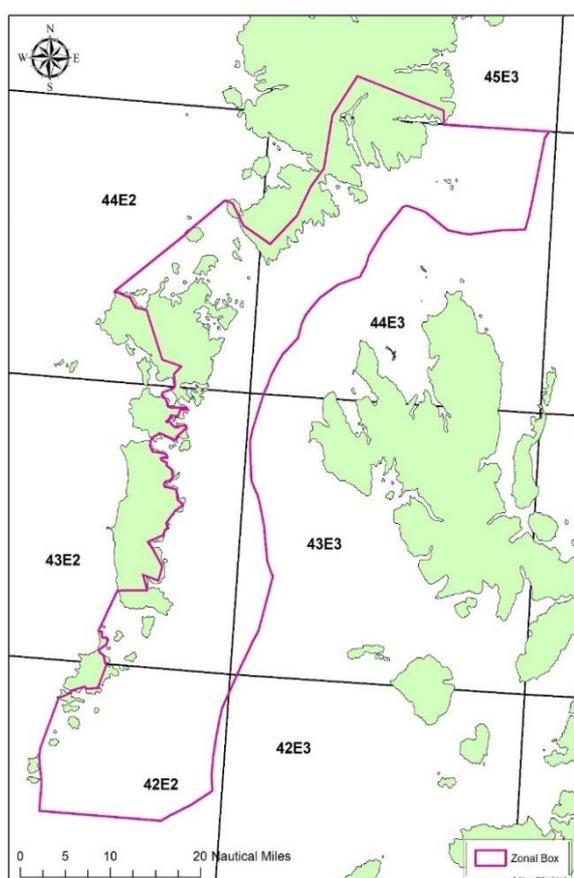
The Outer Hebrides RIFG established a Pilot sub group in 2018 that included active fishers, Marine Scotland, University of St. Andrews and Comhairle Nan Eilean Siar. Key areas for discussion included:

- The Pilot area.
- Basis on which to allocate creel limits.
- Permissible soak time.
- Monitoring and compliance.
- Legislative mechanism.

Following discussion led by active fishers, it was agreed that the Pilot area would be reduced from the extensive area detailed in the initial proposal to an area to the east of the Hebrides where anecdotal evidence suggested fishing was most intense (Figure 1). To address fishing effort, creel limits based on vessel length categories were agreed, along with a maximum soak time of two weeks (Table 1). The Pilot was also to be used as means to trial a vessel tracking solution. This would serve to enrich the available scientific evidence base as well as enable learning on how such a system might aid governance in the future.

**Table 1. Creel limits as a function of vessel length.**

Vessel Overall Length	Maximum No. of Creels
<8 meters	800
8-10 meters	1,200
10-12 meters	1,500
>12 meters	1,800



**Figure 1. The Pilot area, bounded by purple line.**

Vessels identified via analysis of their track record, as eligible to deploy creels in the Pilot area were issued derogation letters in October 2020. Applications were considered in line with policy designed to give fair consideration to new entrants, inactive fishers and nomadic vessels from other areas who fished within the Pilot area for part of their time. A total of 142 derogations have been issued to date.

The Pilot commenced on 5<sup>th</sup> November 2020, enabled by a licence condition prohibiting creel fishing - by those vessels not in possession of a derogation - within an area to the east of the Outer Hebrides. The licence condition also established conditions of access to the area, including the agreed creel limits, maximum soak time, and a provision that derogated vessels may be required by Marine Scotland to carry a vessel tracking solution.

## 2.4 Key Work Streams

### Outer Hebrides RIFG

The RIFG maintain a close dialogue with fishers across their network through regular committee meetings, taking note of both positive and negative observations of the Pilot. This information is shared with Marine Scotland on a regular basis (Section 3).

### **Marine Scotland Science**

In support of the Pilot, Marine Scotland Science carried out analyses of the best available data between 2017 and 2021, in order to consider its relative merits and assess fishing activity in and around the area (Section 4).

### **University of St Andrews**

Following on from the [Scottish Inshore Fisheries Integrated Data System \(SIFIDS\)](#) project led by the University of St Andrews, a tracking solution was fitted to 40 vessels participating in the Pilot (Section 5). Key objectives were:

- To inform possible future development of this data collection system and the functionality required for scientific evidence gathering and governance.
- To provide highly spatially and temporally resolved vessel track data for analysis.
- To combine that data with an algorithm that will infer where gear is being shot and hauled, in turn enabling estimation of soak time.
- To increase resolution of data by coupling it with the Catching App, enabling highly spatially and temporally resolved LPUE data for a section of the fleet, while supporting fishers promptly and accurately submitting landings data to Marine Scotland.
- To enable stakeholders to view their own data.

### **Marine Scotland Compliance**

To carry out routine monitoring of the Pilot area on a risk-assessed basis to detect and deter breaches of the licence condition (Section 6).

## **3. Outer Hebrides Regional Inshore Fisheries Group**

On 5<sup>th</sup> November 2021, as the Pilot entered its second year, the majority of fishers reported that the positive aspects outweighed the negative. These have included perceptions of improved fishing performance for less time spent at sea, reduced gear conflict and improved accessibility of seabed space. A negative aspect has been stakeholder concerns over breaches of soak time regulation, with fishers still using gear in order to ring fence fishing ground. However, no such activity has yet been reported to Marine Scotland.

In terms of general feedback, it has also been observed that the scale of the area may be causing fleet displacement both within and outside of the Pilot area. It is possible that this situation is being exacerbated because smaller vessels may not have sufficient range to access key grounds further from their home port in a single voyage. Introducing separate derogations for smaller, distinct areas is regarded as being a potential way of addressing this in the future.

The initial proposal for the Pilot included regulations on marking of gear and stakeholders continue to regard compliance with the subsequent 2020 Marking of Gear (Scotland) Order as being intrinsically linked to the Pilot and an important indicator of compliance with its rules.

Testing of the Tracking Solution on a significant portion of the fishing fleet has generated a positive response among stakeholders and the OHRIFG feel that valuable lessons have already been learned regarding the logistics of planning and implementing such devices. Unpredictability of fishing patterns as well as retaining a suitable marine engineer were the two main problems encountered.

### 3.1 Stakeholder Views

#### **Duncan MacInnes, Secretary, Western Isles Fisherman’s Association (WIFA)**

Duncan MacInnes reports that, following many years of uncontrolled creel fishing, the Pilot has brought a sense of stability to the fleet.

In the future, he is keen to see the extension of the requirement for local vessels to carry some form of vessel tracking solution. He says that this will not only provide a wealth of information on stock health and where the most productive grounds are located, but will also enable fishers to evidence their activity when decisions are being made about other commercial marine uses.

Encouraged by the initial success of the Pilot, Duncan reports that WIFA members would like to see its extension to cover a much larger swathe of the Western Isles. This would enable greater control to be exerted over the practice of leaving large amounts of gear unattended on key fishing grounds.

#### **Donald MacLennan, Skipper, Valhalla, Harris**



Donald MacLennan’s business has seen huge challenges as a result of dramatically increasing operating costs triggered by the pandemic, Brexit and now a dawning international energy crisis.

A fishing business like his might expect to replace 100 *Nephrops* creels and 50 crab creels each year. With the price of a 26 inch crab creel rising from approximately £65 in 2019 to approximately £85<sup>1</sup>

at the time of writing, he expects to incur an additional £5,000 annual cost between creels and rope.

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<sup>1</sup> Gael Force Marine Equipment

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In the case of fuel, Donald fears that recent price increases may equate to as much as an additional £7,000 this year and there are other expenses too. Operations central to his business model require frozen bait to be stored onshore and with his freezer in use constantly between May and December, will cost an additional £960.

In spite of these challenges, 2021 saw some of the best ever market prices for shellfish landed into Scotland and this gives Donald hope for the future of a business that sees him provide stable employment for four people, besides himself.

Donald supports the Outer Hebrides Pilot but would also be keen to see it rolled out throughout the Western Isles. He believes that the example it sets proves that with creel fishing, less can be more. Indeed, during the first year of the Pilot he has worked fewer creels and spent less time at sea for a significant improvement in his gross income.

Looking at the bigger picture, he believes that the answer for the Scottish fishing industry is more complex than the public perception that everyone should simply switch to static gear. The way he sees it, in order survive and thrive, the industry must seek ways to be efficient, while seeking opportunities for fisheries diversification.

### **Iain MacKenzie, Skipper, Restless Wave, South Uist**



Iain MacKenzie has seen a marked improvement in the quality of his catch since the Pilot began. The Restless Wave works in one of the most intensely fished areas around the Western Isles, which tends to be characterised by larger vessels who fish round the clock. This kind of approach to fishing makes competition for seabed space intense and gear conflict can quickly become a serious issue.

In the last 18 months, since the pressure has come off the grounds, it has been possible to adopt better fishing patterns that give the hardest fished areas a chance to rest. In short order, this has translated to more medium and large *Nephrops* being retained and, overall, some of the best returns Iain has seen since 2003. He typically experiences a spell of good fishing in the spring, but during 2021, that spell stretched out right through the summer.

Mutual agreement by the fleet to use less gear has had other positive effects too with the Restless Wave now fishing 600 creels a day, down from 1,080 in 2016 and 2017. Iain isn't sure whether the downturn in fishing has been due to the ground needing to be rested or to natural cycles but is encouraged that he now finds his business doing less work for a better income.

### **Angus Campbell, Manager, Kilbride Shellfish, South Uist**



Kilbride Shellfish Ltd was set up in 1985 to provide static gear vessels an improved marketing service where their catch was graded and weighed at a single despatch centre. This enables vivier lorries to be loaded quickly and efficiently, prior to departure for European markets. Kilbride Shellfish are heavily involved in stock enhancement measures, including lobster v-notching, supporting

the increase in shellfish minimum landing sizes and seasonal creel prohibition zones. Their overarching aim is to create a more flexible, diverse inshore fishing industry.

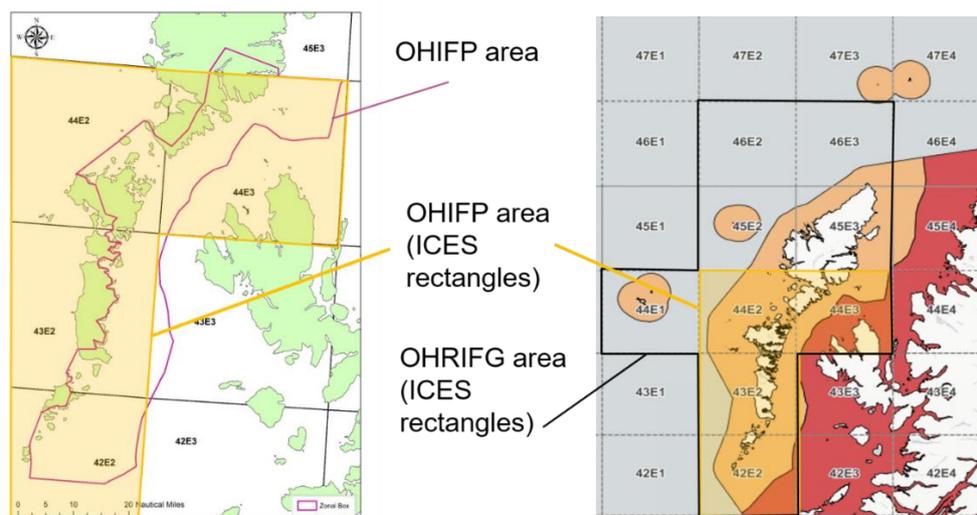
Kilbride Shellfish Manager, Angus Campbell reports seeing significant improvements since the start of the Pilot, with the fishing businesses with whom he deals hauling fewer creels and maintaining good catch rates. This has had a knock-on effect for his business, as shorter fishing trips means the catch is landed in better condition, leading to fewer mortalities during transportation.

## **4. Assessment of Available Data**

Marine Scotland Science analysed data that fishers statutorily provided between 2017 and 2021 (note that data for 2021 is provisional and incomplete) to advise on how the effects of measures introduced in the Pilot area could be evaluated. Available data included FISH1 forms for vessels of 10 metres and under, log sheets for vessels over 10 to 12 metres and electronic logbooks for vessels of over 12 metres in length. Analyses was carried out for:

- All vessels fishing in the Outer Hebrides Regional Inshore Fishery Group (OHRIFG) area (ICES statistical rectangles 42E2, 43E2, 44E1, 44E2, 44E3, 45E2, 45E3, 46E2 and 46E3).
- Vessels fishing in the four ICES rectangles most relevant to the Pilot area (44E2, 44E3, 43E2 and 42E2) (Figure 2).
- Vessels with trackers.

The analyses summarised the data (number of vessels and trips), evaluated the data quality, and reported landings and landings per unit effort (LPUE) for edible crab, European lobster, Norway lobster and velvet crab for those vessels derogated to fish in the Pilot area. The spatial distribution of vessels fitted with trackers was also explored.



**Figure 2. Map of the zonal box (purple outline), OHIFP area in terms of ICES statistical rectangles used in the analyses (coloured yellow) (left), OHRIFG area (coloured orange) and OHRIFG area in terms of ICES statistical rectangles used in the analyses (coloured black) (right).**

Marine Scotland Compliance Officers work tirelessly to ensure fishing returns are completed accurately and submitted timeously, but the self-certified nature of these returns mean there are weaknesses in the resultant data. These can stem from both inaccurate completion of FISH1 forms by the fisher, but also from operator error when they are entered onto the computer system used by Marine Scotland. Common issues include missing or unrealistic position reports and numbers of creels worked, gear types that are mismatched to the species caught and missing fishing trips. 7.6% of fishing trips featured extreme values for live weight, number of creels hauled and LPUE. Extreme values tended to be very low (zero or less than zero) or high enough that they could not realistically have been achieved on a single voyage.

#### 4.1 Breakdown by Gear, ICES Rectangle and Species

The most common gear reported in the OHRIFG and OHIFP areas are creels (Figure 3). The majority of trips for vessels smaller than 12 metres have creels as reported gear type. Vessels larger than 12 metres mainly use otter trawls, boat dredges and other gear types.

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**Figure 3. Trips broken down by gear used for both the wider OHRIFG and OHIFP areas. \*Data for 2021 are provisional.**

In the OHIFP area, the most commonly reported ICES rectangles fished are 44E3 and 43E2, followed by 44E2 and 42E2 (Figure 3). Vessels smaller than 12 metres mainly fish in the four ICES rectangles corresponding to the Pilot area, as well as 45E3. Vessels larger than 12 metres fish in the same rectangles and 46E2 and 46E3.

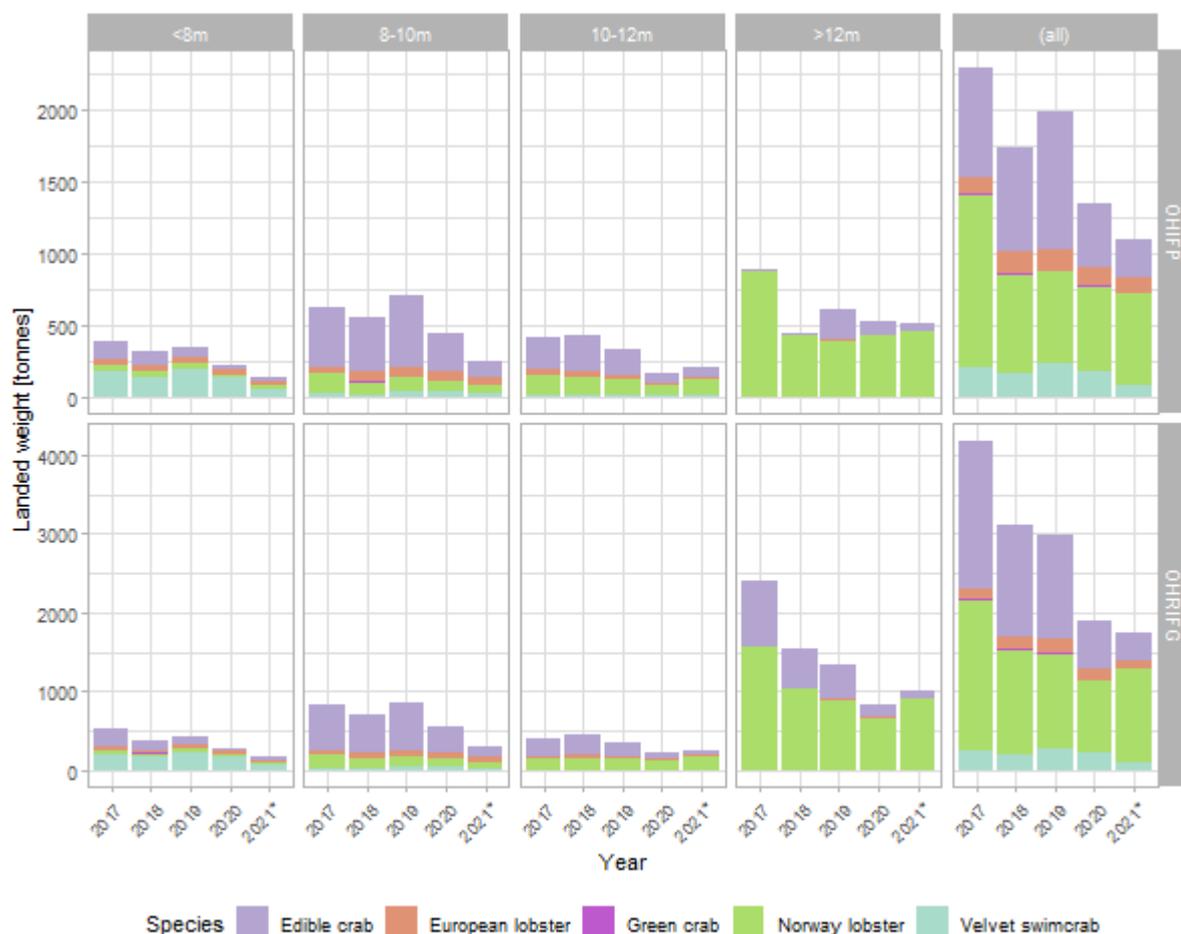
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**Figure 4. Trips broken down by ICES rectangle for both the wider OHRIFG and OHIFP areas, including all vessels (all gear types). \*Data for 2021 are provisional.**

The highest recorded landed shellfish species by weight are edible crab and Norway lobster in both areas (Figure 5). The total landed weight of edible crab has decreased over the years from 2017 to 2020 (note that 2021 is based on provisional and incomplete data).

Vessels smaller than 8 metres in length mainly land velvet crab and edible crab, vessels between 8 and 10 metres, edible crab vessels 10 to 12 metres edible crab and Norway lobster (2020) and vessels larger than 12 metres typically land Norway lobster and edible crab.



**Figure 5. Landed weight of shellfish species per year, per vessel length category and per area. \*Data for 2021 are provisional.**

#### 4.2 Landings Per Unit Effort (LPUE)

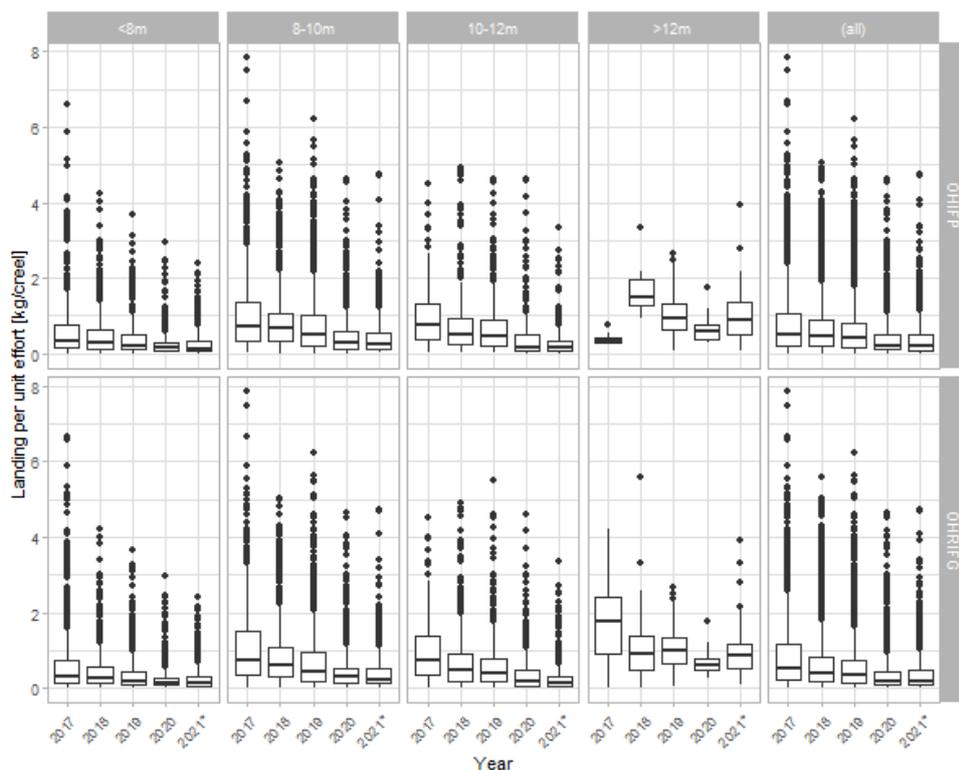
The LPUE was calculated as the ratio of the live weight and the number of creels hauled for each entry (row) in the dataset. The LPUE broken down by year and vessel length category for edible crab (Figure 6), European lobster (Figure 7), Norway lobster (Figure 8) and velvet crab (Figure 9) are shown below.

Edible crab has the highest LPUE among all five shellfish species (up to 8 kg/creel). The LPUE of edible crab has decreased over the years from a median of 0.54 kg/creel across all vessel length categories in 2017 to 0.21 kg/creel in 2020.

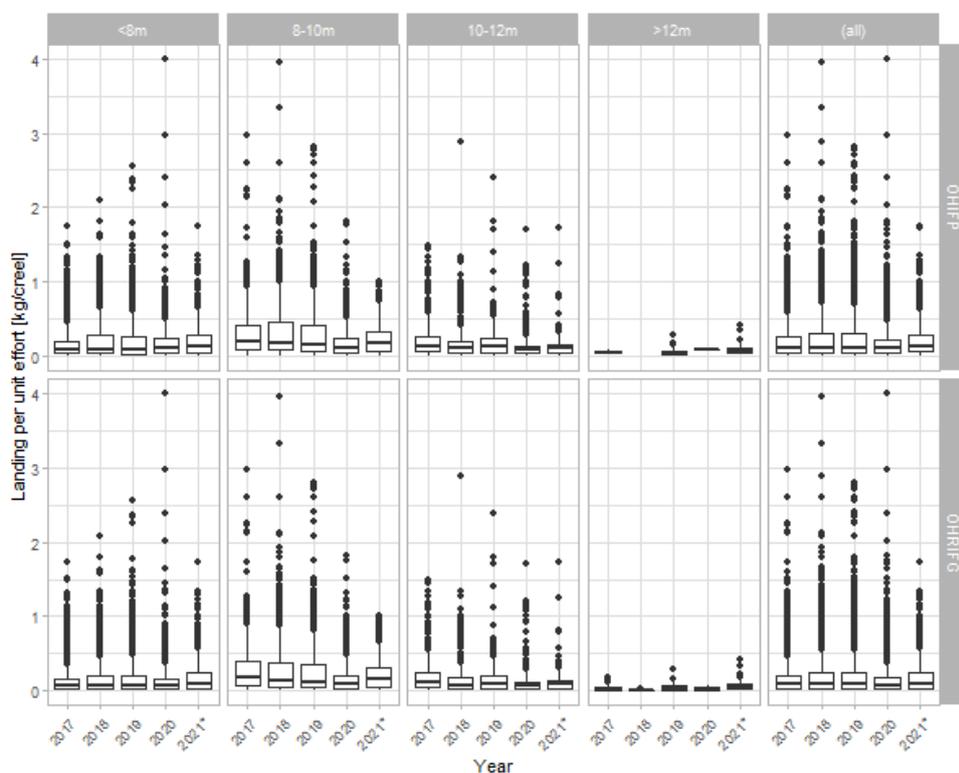
The LPUEs of European lobster and Norway lobster have also decreased slightly from 0.1 kg/creel in 2017 to 0.08 kg/creel for both species in 2020.

The LPUE of velvet crab has decreased from a median of 0.3 kg/creel in 2017 to 0.28 kg/creel in 2020.

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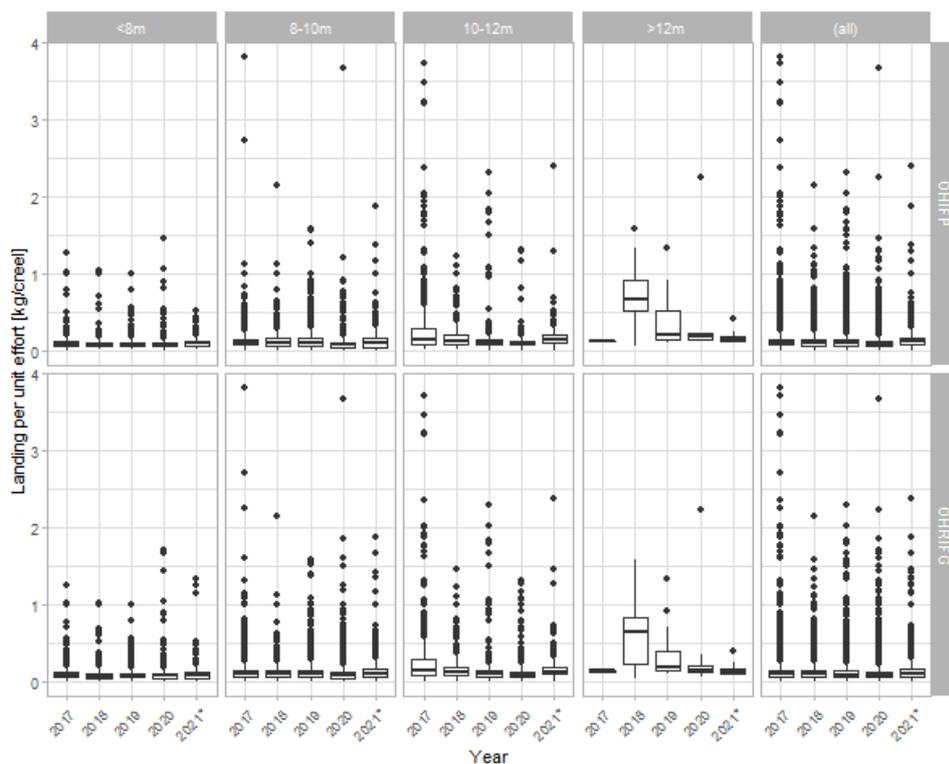


**Figure 6. LPUE of edible crab broken down by vessel length category and year. \*Data for 2021 are provisional.**

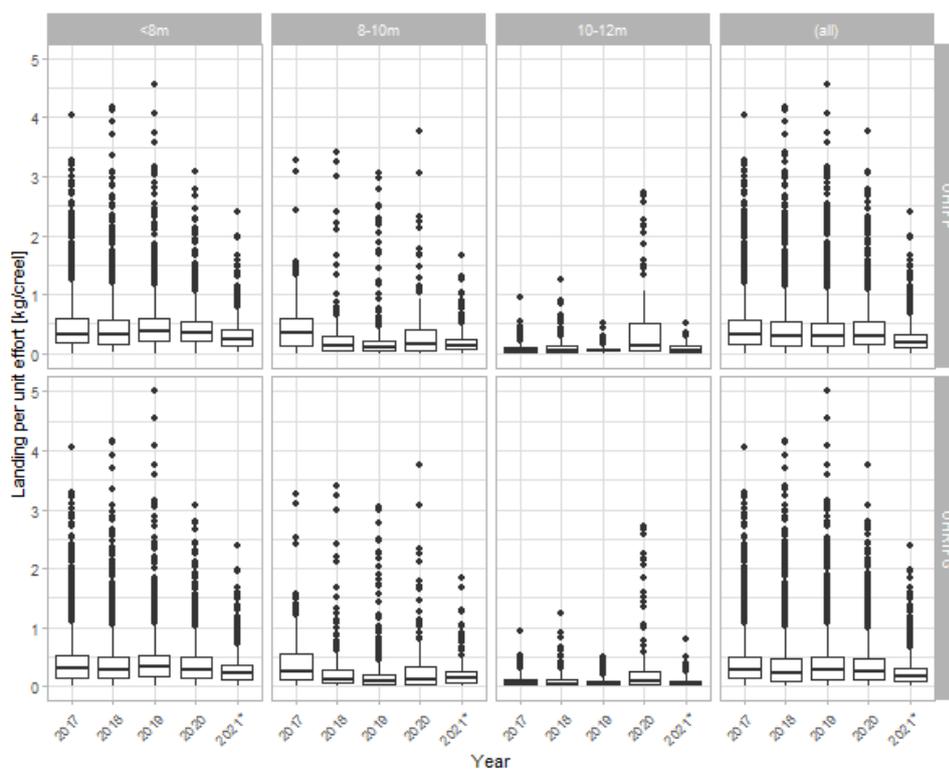


**Figure 7. LPUE for European lobster broken down by vessel length category and year. \*Data for 2021 are provisional.**

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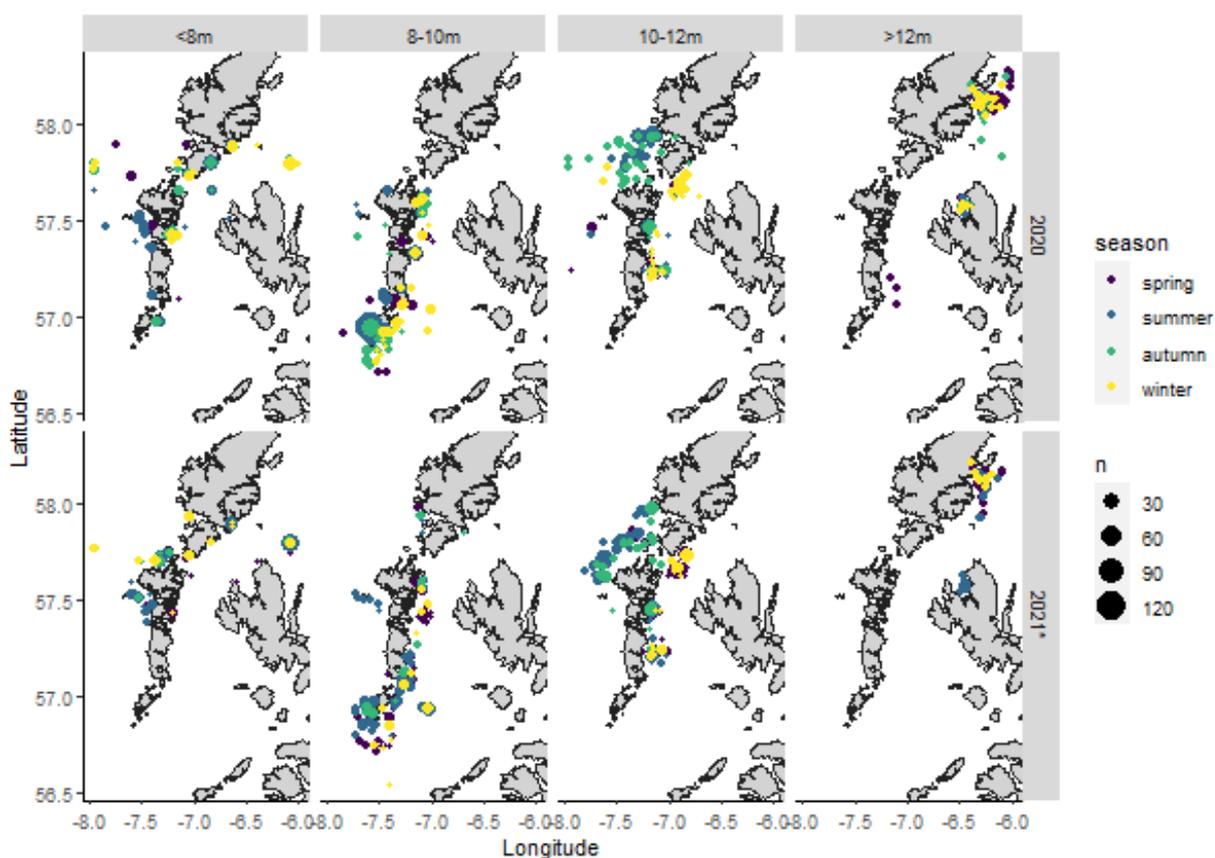
**Figure 8. LPUE for Norway lobster broken down by vessel length category and year. \*Data for 2021 are provisional.**



**Figure 9. LPUE for velvet crab broken down by vessel length category and year. \*Data for 2021 are provisional.**

### 4.3 Vessels with Trackers

Figure 10 shows the spatial coordinates (as reported on FISH1 forms) of vessels fitted with trackers in 2020 and 2021 (spatial data for years 2017-2019 not available). Note that the coordinates for 2021 are provisional and incomplete. It is evident that each vessel length category uses distinctive fishing grounds. Vessels smaller than 8 metres fish close to land and mainly around North and South Uist. Vessels 8 to 10 metres are concentrated east and south of North and South Uist. Vessels 10 to 12 metres fish further from land in the area between North Uist and Harris. There is also fishing activity in the east of the islands in the winter and spring months and west of the islands in the summer and autumn months. Vessels larger than 12 metres in length tend to fish east of Lewis and west of Skye.



**Figure 10. Latitudes and longitudes of fishing trips of vessels fitted with trackers. Spring months are March-May, summer months are June-August, autumn months September-November and winter months are December-February. \*Spatial coordinates for 2021 are provisional.**

## 4.4 Notes

### Number of creels hauled and total number of creels deployed/fishing

For most of the entries, the number of creels hauled should be a subset of the total number deployed/fishing. In certain circumstances, the number hauled might be higher than the total number deployed. This would typically be if they are hauled, baited and shot more than once in a day. Such situations might include the summer fishery where *Nephrops* enter the creels at a much quicker rate and also fishing businesses that do not have the resources to invest in more creels and so work the gear they do have more intensively.

### Date of landing

Fishers might always land on a certain day of the week and this could potentially explain a gap between the voyage end date and date of landing. This is typical behaviour for shellfish operations as the catch can easily be retained alive and then landed in bulk.

### Parlour creels

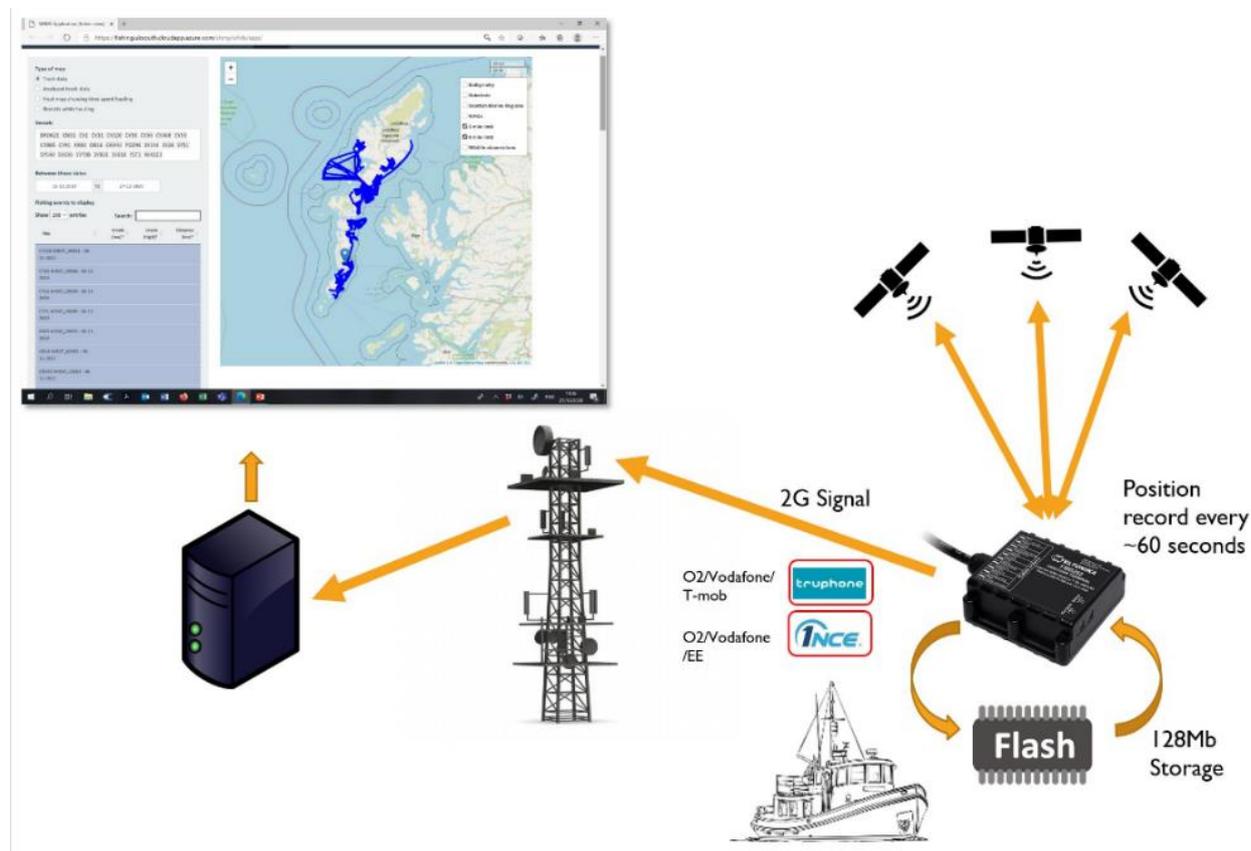
Some vessels use parlour creels, which can hold a higher catch than the traditional creels used in the OHRIFG area. Fishers use fewer creels and report a higher catch (higher LPUE) when using parlour creels. This distinction in type of creel used only became clear at the OHRIFG meeting on 3 December 2021. There is no field in the FISH1 form to make a distinction between the type of pot used. Consequently, no distinction between traditional and parlour creels has been made in the analyses of this report. This may mean that the LPUE presented here is skewed. Based on the number of trips with less than 40 creels reported, we suspect that ~4.6% of trips per year with gear type stated as “creels”, may actually be parlour creels. However, these numbers have not been confirmed to date.

## 5. Tracking and Monitoring

### 5.1 The Vessel Tracking Solution

As part of the work stream led by University of St Andrews, 40 vessels participating in the Pilot were fitted with a tracking solution. This solution utilised the Teltonika FMB204 tracker, which is widely used in the logistics sector (Figure 11). The device is fully configurable and, based on SIFIDS research, is set to capture vessel position, direction and speed of travel every 30 seconds. At the time of writing the unit cost of this device is £75, but it is likely that bulk purchase from the manufacturer might drive the cost lower.

Data captured by the device are transmitted via the mobile phone network to a secure Microsoft Azure cloud server. Data costs associated with this SIM card-based system were approximately £25 per unit annually. The data is stored in a relational database and automatically analysed to infer where fishing is taking place and to provide estimates of the number of creels being deployed.



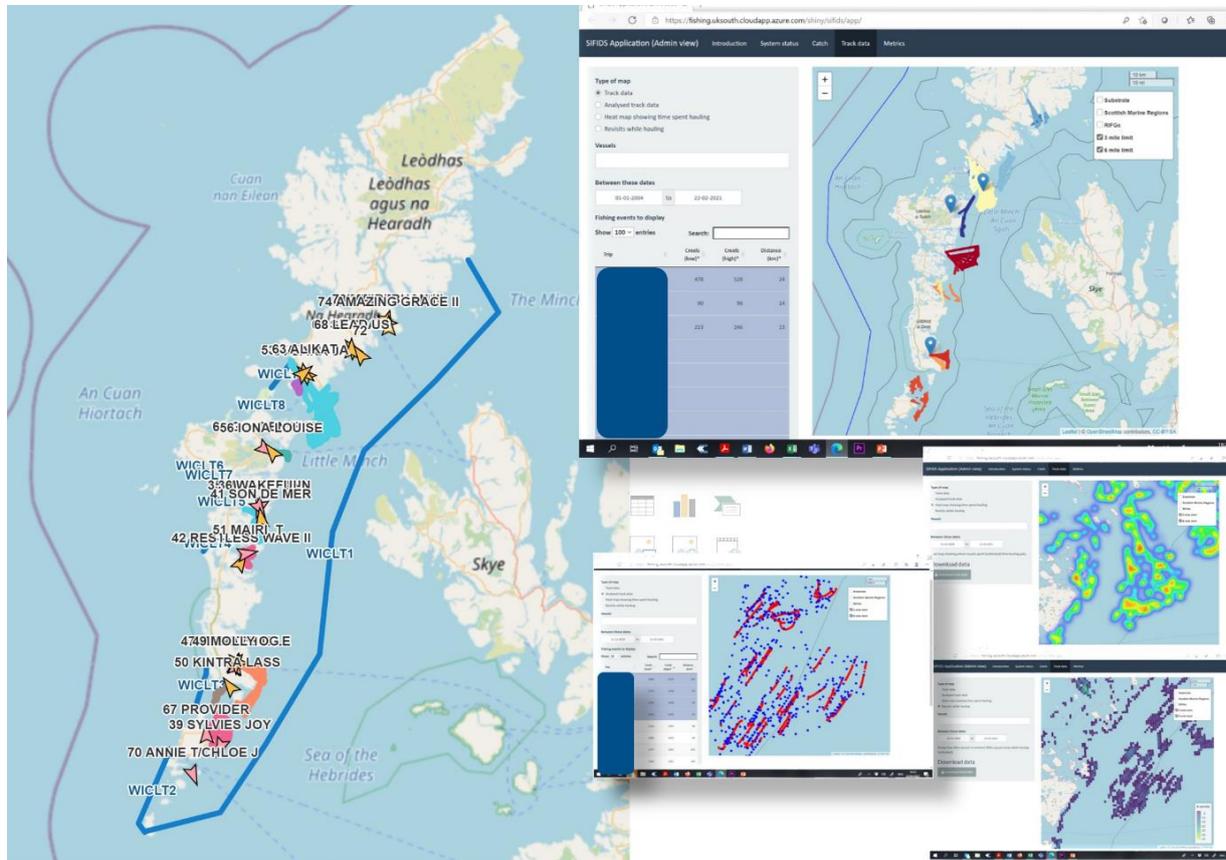
**Figure 11. Schematic showing the Teltonika FMB204 tracker and the flow of data.**

Fishers taking part in the Pilot, who had trackers fitted aboard their vessels were required to sign a data consent form and provide access to an engineer to enable installation. The majority of vessels (33) were fitted by the time the Pilot trial formally started on 5<sup>th</sup> November 2020.

The trackers are equipped with multi-network SIM cards for mobile communication of data. Five vessels operating to the south of Barra appeared to have network connection problems and a subset of these vessels were re-equipped with alternative SIMs with a view to resolving these issues. Whilst this does appear to have worked for some, there are still anomalies with the connections of at least two vessels that will require further investigation.

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All fishers who have had trackers fitted to their vessels and provided a signed consent form have been issued with login credentials to allow them access to the online portal, where they can see their own track data. Marine Scotland Compliance Officers also have access to the tracks for all participant vessels (Figure 12.).



**Figure 12. Images taken from the SIFIDS tracking portal showing examples of some of the automated analysis of vessel tracks.**

### 5.2 The Catching App

Marine Scotland are currently working on developing an online portal whereby fishers can submit FISH1 returns directly. However, as an interim measure to support collection of best quality data for the Pilot, the SIFIDS Catching App was redesigned for the Pilot. The App (Figure 13 A, B) was tested and released to participants in June 2021 with the approval of Marine Scotland and forms part of consideration of approaches to encouraging modernisation of the inshore fleet. The App is available for both Android and iOS mobile devices (phones) and is designed to capture data on catch and landings. The App has been introduced to the Pilot to provide an option to assist fishers in their statutory requirement to submit a weekly FISH1 form. While it remains the responsibility of the fisher to submit this information to their local Fishery Office as required, the app is able to record catch data in the required format, that can then be printed or emailed to the Fishery Office.

<https://apps.apple.com/gb/app/wieat-app-for-fishers/id1562352967>  
<https://play.google.com/store/apps/details?id=uk.ac.standrews.fishing>



WIEAT Fishers App  
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Free Download

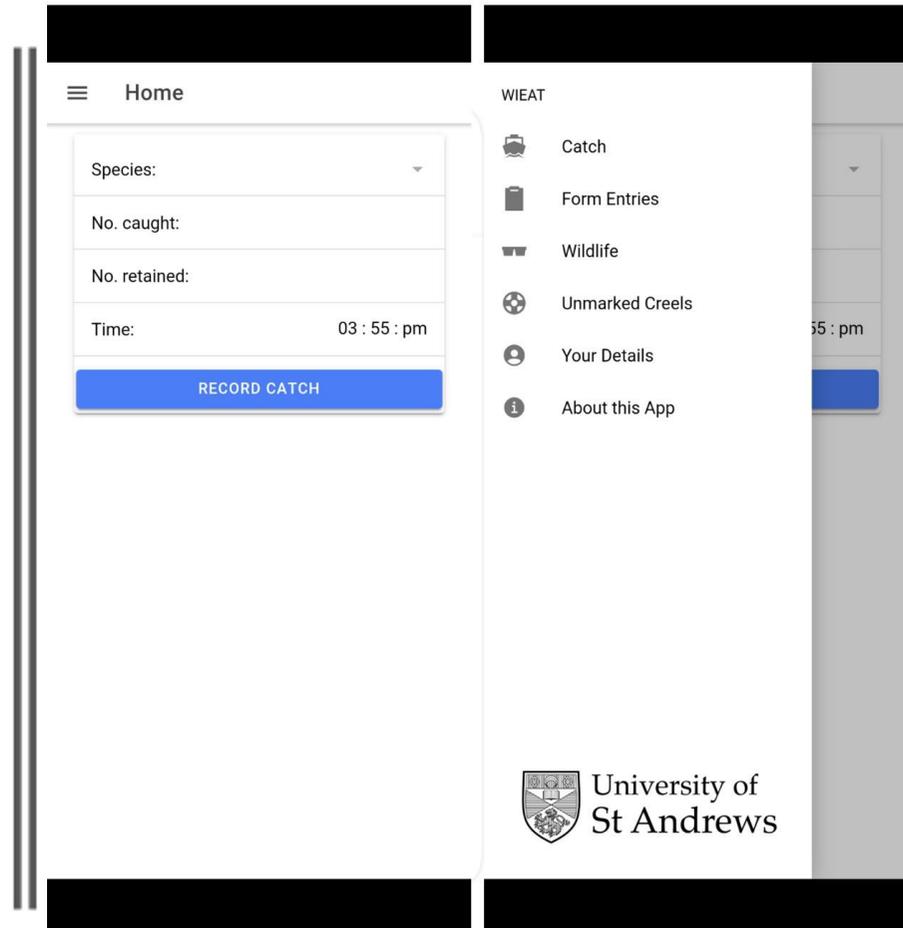


Figure 13A. Catch App download details

### Form Entries

**Form Entry**

Fishing Activity Date: 03 Jun 2021

Location: 57° 19' N, 5° 53' W

ICES Rectangle: 43E4

**Form Entry**

Gear:

Mesh Size:

Species:

Presentation:

Weight (kg):

DIS?

No. Pots Hauled:

Landing or Discard Date:

Buyer, Transporter/Reg. or Landed to Keeps:

**Spreadsheet Generator**

Fisheries Office:

Marine Office, Estates Office, Scorrybreac, PORTREE, Isle of Skye, IV51 9DH Tel: 0300 244 8778

Email:

PLN:

Port of Departure:

Port of Landing:

Vessel Name:

Owner/Ma MacLennan

Signed:

Total Pots: 450

PLN: BBD 123

Vessel Name:

Owner/Ma MacLennan

Address:

Port of Departure: Broadford

Port of Landing: Broadford

Total Pots Fishing: 500

Week Starting: Sun, 30 May 2021

Fishing Activity Date	Lat	Lon	Stat	Rect	Gear	Mesh Size	Species	State	Presentation	Weight	DIS	BMS	Number of Date	Landing or Discard	Reg. or Landed to Keeps
Mon, 31 May 2021	57	16	5	52	W	43E4	Pots/traps FPO	Nephrops	Live	Whole	15	FALSE	200 Thu, 1 Jul 2021	Landed, Keltic	Buyer, Transporter
Tue, 1 Jun 2021	57	15	5	52	W	43E4	Pots/traps FPO	Nephrops	Live	Whole	20	FALSE	250 Tue, 1 Jun 2021	Landed, Keltic	Buyer, Transporter
Thu, 3 Jun 2021	57	15	5	53	W	43E4	Pots/traps FPO	Nephrops	Live	Whole	5	FALSE	150 Thu, 3 Jun 2021	Landed, Keltic	Buyer, Transporter



### Wildlife Observations

**New Observation**

Animal:

Location:

Time:

Behaviour:

Approaching the vessel

Feeding

Interacting with fishing gear

Behaviour or other notes:

Record Observation

**Animal List:**

- Seal
- Porpoise
- Dolphin
- Whale
- Shark
- Minke Whale
- Humpback Whale
- Sperm Whale
- Fin Whale
- Sail Whale



### Lost and unmarked gear

**Record Gear**

What happened:

Type of gear:

Number of creels:

Location:

Other:

**Record Creel**

Location:

Notes:



Figure 13B. Illustration of main Catch App data entry screens and FISH1 equivalent output

Data from the App is transmitted to the Azure cloud server database and combined with the relevant track data for each vessel. By combining track, catch and landings data, it should be possible to generate accurate metrics of fishing effort and catch (CPUE) and LPUE. The priority is to ensure that fishers with trackers fitted to their vessels use the App as soon as possible. To this end, the App was promoted by a demonstrative YouTube video as well as WIFA meetings with fishers in Barra, Benbecula and Tarbert in August 2021 and a further visit in November 2021 in association with WIFA training meetings.

Feedback thus far suggests that some fishers rely upon the return of catch weights from their buyer before they populate their FISH1 forms and so are reluctant to populate the App with estimates of weight on a daily basis. Providing estimates of daily catch was also considered by some respondents to represent additional work. Unfortunately, it is difficult to reconcile catch and landings data with track data unless fishers are willing to use the App to provide contemporary catch and landings data on at least a daily basis. During the second year of the trial the St Andrews team will continue to promote the App and analyse the data from registered users. Direct experience of observing fishers at sea, is that many manually record the number of lobsters and crabs that they retain per creel fleet.

### **5.3 Fitting of Trackers**

The process of fitting vessels remotely using subcontractors has been extremely challenging, and a firm recommendation for any such roll-out in the future is that a dedicated team of fitters be contracted to manage both the logistics of fitting the vessels and the physical work. Further, that they are obliged to provide all necessary details of the process to the tracker database administrator at the time of fitting each vessel and that they undertake the necessary diagnostic tests to ensure that the tracker is functioning and reporting correctly. In addition, the engineer and the skipper of the vessel should undertake to provide the necessary consent as part of an online transaction prior to the tracker being fitted. Delays in communicating this information, together with poor documentation of the fitting process resulted in significant delays and additional staff resource requirements. In principle, this should be a straightforward process. Personal experience of the St Andrews team in fitting the Teltonika trackers to vessels is that this process usually takes less than one hour per vessel. Registering the skipper, vessel and tracker details on the database can be achieved in less than 30 minutes. Some of the steps required to register the tracker on the SIFIDS system need to be streamlined and automated checks implemented to prevent duplication or errors in data entry.

Throughout the course of the trial, it is of note that some vessels have either not gone to sea or have been laid up for extended periods due to ill-health, mechanical failure, or vessel owners having other employment preventing them from fishing. In addition, a number of vessels originally identified to be fitted with trackers have been

sold or replaced during the course of the pilot. Keeping abreast of changes in the status of vessels could potentially represent a significant administrative challenge and any large scale roll out of tracking will need to put in place the necessary processes to screen for such changes in vessel status.

#### 5.4 Tracker Performance

Trackers that have been correctly fitted have proved to be extremely reliable. Whilst there are clearly some areas of poor mobile network signal, the majority of vessels appear to be reporting track data in near real time when there is sufficient signal to both send a signal and forward any stored track data.

There do not appear to have been any tracker malfunctions, but there are at the time of reporting ~5 trackers that have not reported for extended periods where it does appear that some fishing has occurred. These trackers will be investigated as part of ongoing work.

As part of the Pilot, SIM data use has also been monitored. The multi-network SIM cards used in the trackers are data only and have a limit of 400 Mb per SIM per month. The total data allocation across all SIMS can be balanced to maximise the efficiency of data use. Figure 14 shows SIM data use per month for all vessels tracked showing that no vessels exceed the monthly data limit and data use clearly mirrors fishing activity as illustrated in Figure 14. Monthly SIM Data use per vessel averages less than 6 Mb and the maximum recorded was 27 Mb SIMs cost ~£20 per year per vessel.

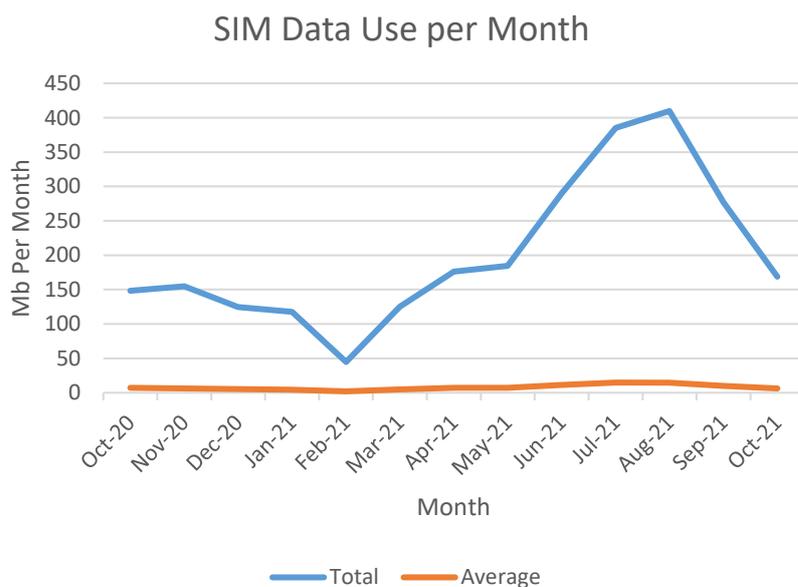


Figure 14. Tracker SIM card data use for all vessels tracked Oct 20 – Oct 21.

## 5.5 Tracker Data Analysis

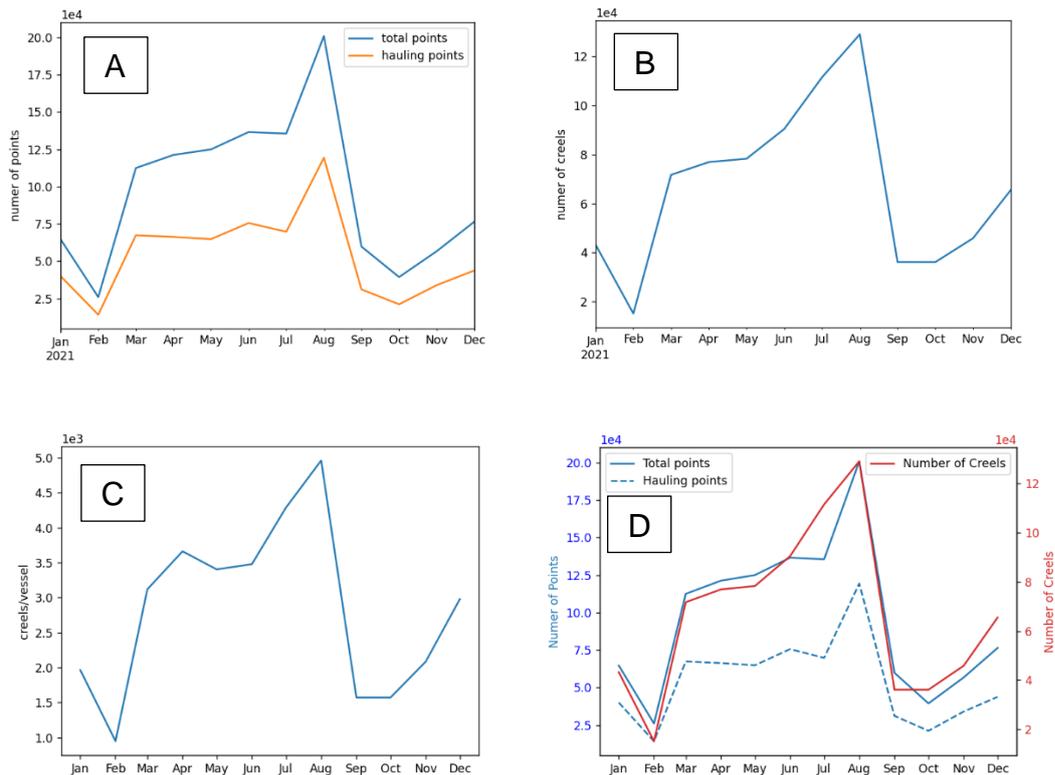
Between 1<sup>st</sup> January 2021 and 31<sup>st</sup> December 2021 a total of 1.15 million data points have been recorded. Analysis of these data is provided by month indicating the estimated number of creels deployed by the specified number of vessel for which track data is available for that month (See Table 2). The creel estimates remain to be verified, but the algorithm used to produce these estimates now automatically determines whether the vessel fished for *Nephrops* or crabs and lobsters and thus amends the creel separation per fleet/string accordingly.

**Table 2. Summary of data including creel number estimates for vessels producing track data.**

Month	Total No. Positional Records	Total No. of Positional Records for Hauling	Estimated Total No of Creels	Total Number of Vessels	Total No of Trips	Average Estimated No of Creels Hauled Per Trip Per Vessel
01/01/2021	64675	39994	43234	22	140	330
01/02/2021	26016	14201	15159	16	54	303
01/03/2021	112490	67453	71731	23	232	345
01/04/2021	121265	66336	76920	21	257	334
01/05/2021	125001	64871	78301	23	248	359
01/06/2021	136622	75652	90444	26	254	371
01/07/2021	135557	69790	111502	26	367	324
01/08/2021	200852	119358	129017	26	381	355
01/09/2021	59856	31155	36150	23	113	341
01/10/2021	39433	21173	36135	23	152	260
01/11/2021	56726	34005	45866	22	166	288
01/12/2021	76488	43823	65527	22	226	306

Figure 15 A-D illustrates the seasonal changes in creeling activity, with little fishing in January to February rising to a peak in July to August, dropping dramatically in September to October, before increasing steadily in the run up to Christmas.

## Outer Hebrides Inshore Fisheries Pilot – Year One Report



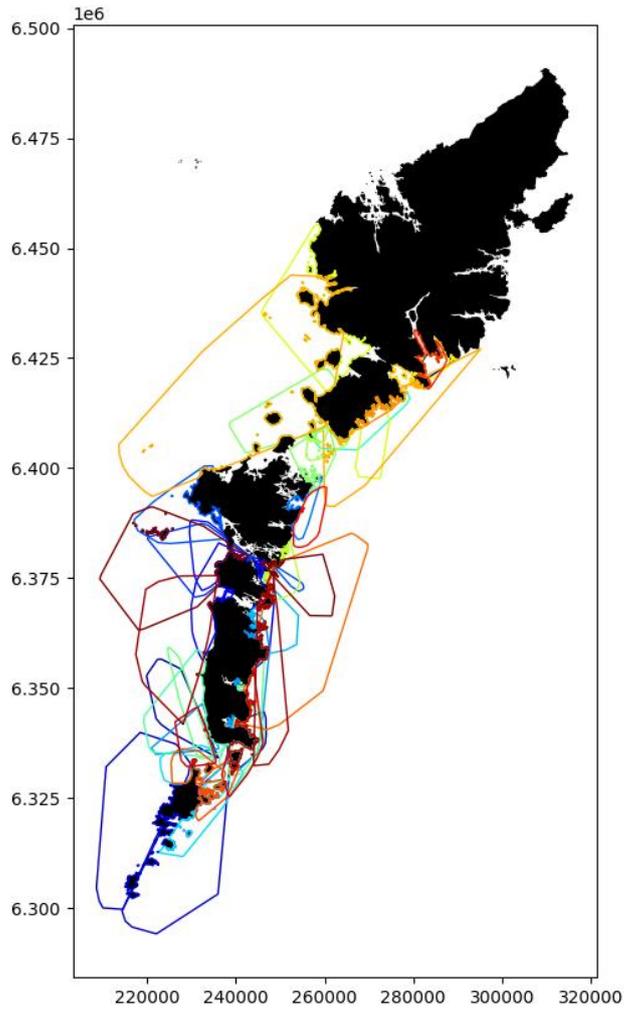
**Figure 15. Seasonal pattern in creeling activity 1/1/21 – 31/12/21 showing: A – total number of data points for hauling and steaming (10,000s); B – estimated number of creels (10,000s); C – estimated average number of creels deployed per vessel/month (1,000s); D – Number of data points and estimated creel counts combined (10,000s).**

The estimate of creel numbers is based on the estimated separation of creels used for *Nephrops* and crab and lobster coupled to the length of the fleet calculated from the length of the fleet hauled. Further refinement of this model is required to take into account those vessels that are using parlour creels.

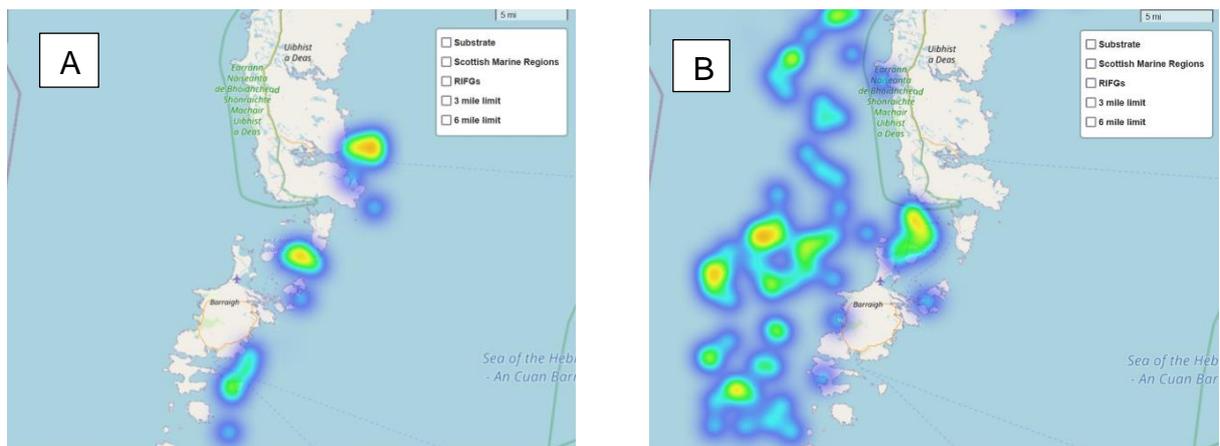
The ability to collect pilot scale data over an extended period has also enabled the necessary data cleaning steps to be automated updated to eliminate spurious data points that appear on land and interpolation errors that cause track lines to cross areas of land. Work to improve the prediction of the shooting of gear is ongoing but this will ultimately improve predictions of soak time – i.e. the difference between the time the gear is shot and hauled.

Vessel track data clearly shows that individual skippers tend to fish quite discrete areas that are, by and large, separate from other local fishers inferring some local agreement on the use of space and resource (Figure 16). In addition, there is a point at which fishers switch from fishing within the creel limitation area in the east, to fishing in the more open waters of the west (Figure 17 A, B).

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**Figure 16. Illustration of the areas bounding track data.**

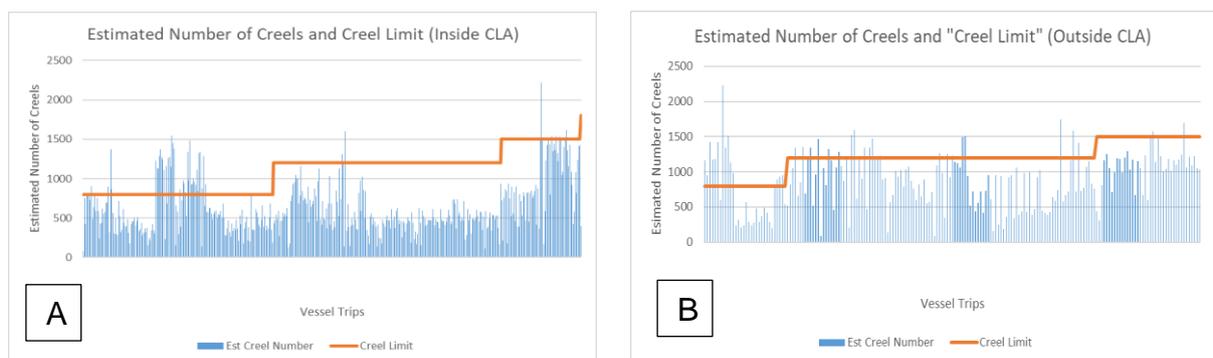


**Figure 17. Kernel density heat maps of fishing activity - A 1<sup>st</sup> – 31<sup>st</sup> March 2021 and B. 1<sup>st</sup> – 31<sup>st</sup> July 2021**

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If the average number of creels deployed per vessel is extrapolated to the total number of vessels participating in the creel limitation pilot (~140), it suggests that there have been in the order of 500,000 creels deployed in the 12 month period beginning 1<sup>st</sup> January 2021. Whilst this Figure is speculative it provides a measure of the level of creeling effort within the Pilot area and more broadly around the Outer Hebrides.

Analysis of individual vessel creel counts per day suggests that the vast majority of vessels are deploying fewer creels than their designated limit with only two vessels appearing to breach that limit (Figure 18A). Discussions with fishers involved in the trial suggests that this could be caused by “double hauling” which is when fishers deploy their creels and haul them more than once per day. The creel limitation rubric should preclude double hauling if the objective is to reduce creel effort. Based on some estimates of creel numbers deployed outside the Creel Limitation Pilot area to the west of the islands (Figure 8B) it is likely that similar creel limits would also not be exceeded.



**Figure 18 A. Estimated number of creels deployed per vessel per trip within and B out with the creel limitation area. Please note that these Figures are illustrative only and the estimated creel numbers require further validation.**

### 5.6 Next Steps

Vessel tracking will continue until October 2022. Improvements in track data analysis are ongoing and refining soak time estimates will be a priority. We will attempt to verify soak time using uniquely identified active RFID tags that we will deploy on selected vessels to detect when and where specific creels are deployed and recovered.

The St Andrews team will also continue to promote the use of the App to provide the data needed to calculate highly spatially resolved CPUE and LPUE.

## Evaluation and qualitative assessment of socio-economic implications

It is important to conduct monitoring and evaluation of the pilot and the key work streams in order to know how well they are working, identify any unintended impacts, and collect useful learning that may inform adaptations to the approach going forward. An evaluation and qualitative assessment of the pilot project will therefore be conducted during 2022. The main aims of the evaluation and qualitative assessment are therefore to:

- Broadly assess whether the Creel Limitation Pilot has achieved its objectives.
- Qualitatively assess experiences / perspectives of a some of those involved in the Pilot and the impact that it may have had on fishing practices.
- Qualitatively assess the impacts of the Pilot on fishers, covering both social and economic considerations.
- Provide insights and recommendations for future projects of this nature.

The findings will inform future management approaches, such as those proposed in the FFM Strategy and the marine outcomes of the Bute House Agreement.

## 6. Marine Scotland Compliance

**DO YOU FISH USING CREELS TO THE EAST OF THE OUTER HEBRIDES?**

The Outer Hebrides Inshore Fisheries Pilot will commence on 1st November 2020 and run until 1st November 2022

Your community has partnered with Marine Scotland to implement a pot limitation pilot under local management, aiming to reduce catch effort and gear conflict by prohibiting creel fishing within the denoted areas, except for vessels in possession of a derogation.

The maximum number of creels that can be deployed at any one time in the pilot area will be limited to:

<8 meters	800 pots
8-10 meters	1,200 pots
10-12 meters	1,500 pots
>12 meters	1,800 pots

Soak time of creels deployed by derogated vessels within the pilot area will be limited to 3 weeks.

Derogated vessels may be required to carry remote electronic monitoring (REM) equipment at the discretion of Marine Scotland when deploying creels within the pilot area.

**I fish in this area, what should I do?**  
If you have fished within the pilot area between 2017 and 2019 Marine Scotland will offer you a derogation allowing participation in the pilot before 1st October 2020. You should ensure you keep a paper or electronic copy of this document on board your vessel at all times when deploying creels within the pilot area.

If you do not receive a letter of eligibility by 1st October please contact your local fishery office or email: [inshore@gov.scot](mailto:inshore@gov.scot)

**I would like to be able to fish in this area, what should I do?**  
If you are a new entrant to the fishing industry and believe you might have legitimate cause to fish with creels in this area please contact your local fishery office who will supply you with an application form.

Marine Scotland Compliance continue to act upon any intelligence they receive, either direct to the Fishery Office or by way of the Reports of Suspicious Activity Form. There have been no reports of excess creels being deployed, excess soak times or non-derogated vessels operating within the area since November 2020.

Officers at Stornoway Fishery Office have heard anecdotal evidence of increased catch rates for *Nephrops*, though are mindful that it remains early in the Pilot life cycle to be seeing such pronounced improvements.

Marine assets have been deployed within the Pilot area in line with a risk-based approach to monitoring. This work has tended to involve checking that vessels operating within the area are in

possession of a derogation, as well as compliance with the Marking of Creels (Scotland) Order 2020. Boarding Officers have reported a number of instances

## Outer Hebrides Inshore Fisheries Pilot – Year One Report

where advice has been discharged to fishers, but on the whole compliance has been good.

A new iteration of the FISH1 form and associated guidance was issued to industry in August 2021 and aims at further improvements to the accuracy and consistency of data that Marine Scotland collects. The new FISH1 form highlights the correct procedure, that position reports should record where majority of catch was taken rather than where gear was first shot.

In addition to this it is expected that by quarter two of 2022, all 10 metre and under vessel owners will have the option to submit a record of their voyages directly to Marine Scotland via an online web portal, on a voluntary basis.

It is through developments such as these and the use of the Catching App that Marine Scotland are working towards modernisation of the inshore fleet that will yield benefits in the quality of the data captured – reducing duplication and operator error.

Marine Scotland have recently received intelligence suggesting that larger, faster vessels who fished within the Pilot area, have now relocated beyond its Northern extremities and the East side of the Minch in order to avoid gear limitation. The static fleet feel that this is causing even more competition for seabed space and has already impacted on their ability to move gear around as they would like.

The mobile sector is also reporting seeing more static gear on their tows and feel that this is due to vessels being displaced from within the Pilot area to new grounds.

While the resultant increase in creel numbers is not wholly down to vessels displaced from inside the Pilot area, in considering its usefulness, it is important to remain alert to the possibility of negative knock-on effects. In this case, where the original Pilot proposal covered a far bigger area, restricting it to the East side of the isles may progressively lead to the creation of other areas of intense fishing effort.

## 7. Conclusions

- The Pilot represents an ambitious stakeholder-led project, that has been developed and implemented collaboratively by the fishing industry, the scientific community and the Scottish Government. The Pilot is yielding valuable learning about approaches to effort management and the use of Tracking Solutions to improve our knowledge of a fishery.
- Marine Scotland will continue to work with OHRIFG to support the Pilot, including discussion with fishers on how to ensure continued buy-in and compliance. This will consider the efficiency of using a licence derogation, the efficacy of restricting fishing effort, and possible knock-on effects for neighbouring fishing grounds.
- Marine Scotland will continue to use the outputs of the Pilot to improve the information we hold about shellfish stocks around the Outer Hebrides to inform policy development.
- Analysis of the available data from 2017 – 2020 (data for 2021 is provisional and incomplete) highlighted a number of insufficiencies in the data collected. We are using this information to improve the quality of the data. This includes working with fishers to promote best practice, developing online submission of catch returns and promoting use of the Catching App.
- During 2021 some fishers reported better quality catches in the Pilot area, however the reasons for these observations are not understood at present. For example, fishers may be catching larger animals, but that may not necessarily mean abundance within the Pilot area has improved.
- Analysis of best available data corroborates stakeholder observations of diminishing LPUE. We are continuing to analyse the data we collect to further assess this. It should be noted that, while analysis shows diminishing LPUE year on year, that data does not make a clear distinction between inside and outwith the Pilot Area. Further work is required to assess LPUE within the Pilot area.
- Marine Scotland recognise the need to consider how best to account for the use of different types of creel being deployed when approaching the management of fishing effort.
- Though there are benefits to limiting creel numbers, there are also well understood challenges with such an approach. We will consider the merits of an input based approach to management that licensing and creel limits provides, alongside whether utilising an output system such as quota might be of value to Scottish shellfish fisheries (as signposted in our FFM Strategy).
- The delineations in area between the ground worked by vessels of different sizes represent opportunities to evolve the Pilot, taking into account relative fishing pressure on different shellfish species.
- Trialling of the Tracking Solution has highlighted the granularity of data this type of system can provide but also the challenges posed by logistics,

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communications, data management; and the level of user input required to attain optimum outputs.

- Trailing of the Tracking Solution will be continued, improving our evidence base and informing our commitments towards implementation of vessel monitoring and tracking.
- Overall, the pilot has established an important platform for the co-development of a management strategy which will inevitably evolve as we learn collectively from this experience. The continued co-operation and collaboration of the OHRIFG in this project is commendable



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