Scottish Government
Riaghaltas na h-Alba
gov.scot

Marine Scotland

Update: Electrofishing for razor clams trial (1 February 2020 – 31 January 2021)

Purpose

The third year of the Scottish trial of electrofishing for razor clams trial ran from 1 February 2020 and 31 January 2021. The information provided in this supplementary report builds on the material published in *'Update: Electrofishing for Razor Clams Trial 1 February 2018 - 31 January 2019*' and '*1 February 2019 - 31 January 2020*'.

Introduction

This trial year was like no other due to the global Covid-19 pandemic. No fishing activity was authorised under the trial between 2359 hrs on 31/03/20 – 0001 hrs on 23/06/20 due to the pandemic and initial lockdown. Despite the challenges presented, the trial's objectives continued to be progressed to inform future management options for this fishery.

Marine Scotland (Sea Fisheries Division, Compliance and Science) continued to work closely, yet remotely, with key public sector partners, including the Health and Safety Executive (HSE) and Food Standards Scotland (FSS), in particular to ensure that revised and appropriate Covid-19 related protocols were established prior to the trial recommencing in June, for example in relation to dive operations and FSS sampling. Communication was maintained with the fishers by online communication and via the Scottish Razor Clam Association (SRCA).

HSE's programme of ad hoc vessel inspections (on land and at sea) was unavoidably more limited during this reporting year. However, as restrictions eased HSE conducted random Covid-19 inspections onboard vessels. Furthermore, an additional layer of risk assessment is now expected to be carried out by the vessels taking part in the trial to deal with the risk of Covid-19. The safety of personnel who participate in the trial dive operations is paramount, HSE continued to regularly carry out checks on diving qualifications and diving medicals on additional divers who asked dive contractors to join the trial. This, as in previous years, was conducted to ensure all divers notified were suitably qualified and competent before being permitted to participate in the trial.

Covid-19, and the suspension of the trial, presented challenges for FSS harvesting protocols and sampling programmes. FSS developed a 'suspension protocol' to mitigate the risk posed and worked with individual fishers to ensure relevant classifications were in place as soon as possible after the trial recommenced.

In order to gather supplementary information from fishers on the specific impacts of the Covid-19 pandemic, a bespoke survey was conducted. The survey also sought to seek information regarding impacts on business related to the EU exit. This included establishing the impact on trade, markets, transport and freight services (see page 14).

Vessel activity, landings and employment

During the third year of the razor clam electrofishing trial 22, out of 27, eligible participants were actively participating in fishing , running from 1st of February 2020 to 31st of January 2021. Active vessels were estimated to have landed around 543 tonnes of razor clams, worth around £4.1 million.

Compared to the previous year of the trial, landings were reduced by more than a third - reflecting the effects of the Covid-19 pandemic. As seen on Figure 1 and 2. below, razor clam landings significantly dropped before the beginning of the third year of the trial, likely due to the Covid-19 restrictions limiting access to the Chinese markets.

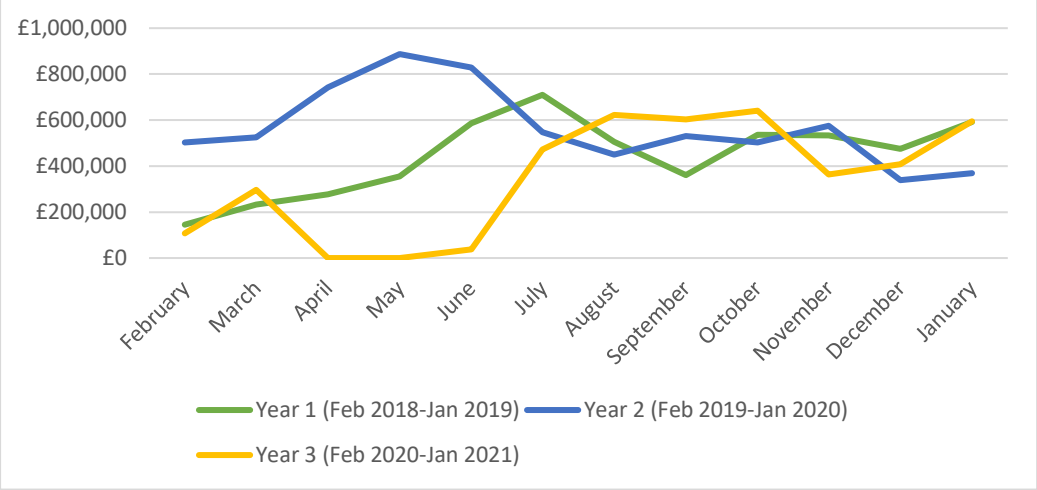

Figure 1: Monthly £ value of razor clams landed by trial vessels, February 2018 to January 2021.

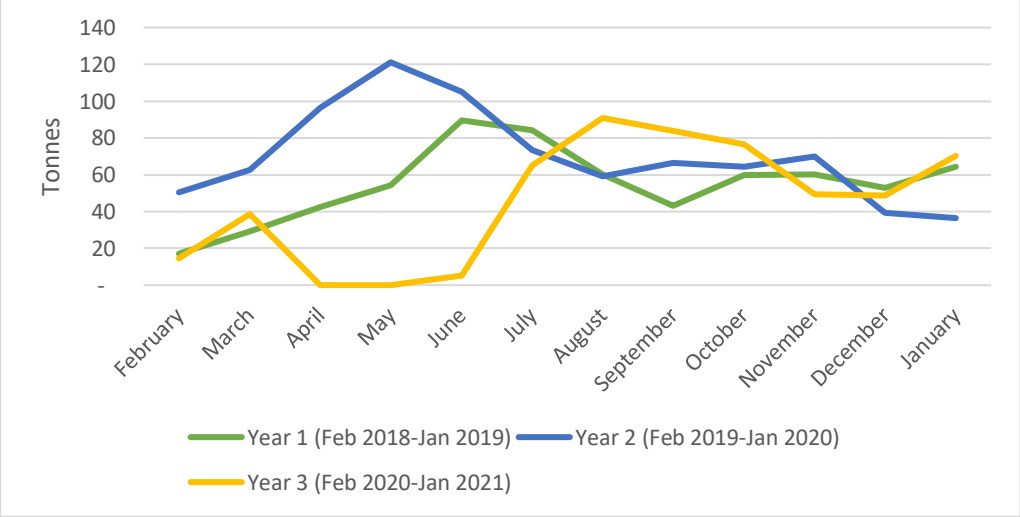

Figure 2: Monthly tonnage of razor clams landed by trial vessels, February 2018 to January 2021.

While prices fluctuate between vessels, buyers and months, the average price per kilogram (kg) achieved by the trial vessels during the third year of the trial was

estimated to be around £7.6 per kg (Figure 3.). This is the lowest average price per trial year yet. The lowest monthly average prices were seen after the first lockdown with the price in August being £6.8 per kilogram. The highest prices were generally seen at the end of the trial year, potentially due to the recovery of the market but also routinely coincides with Chinese new year markets.

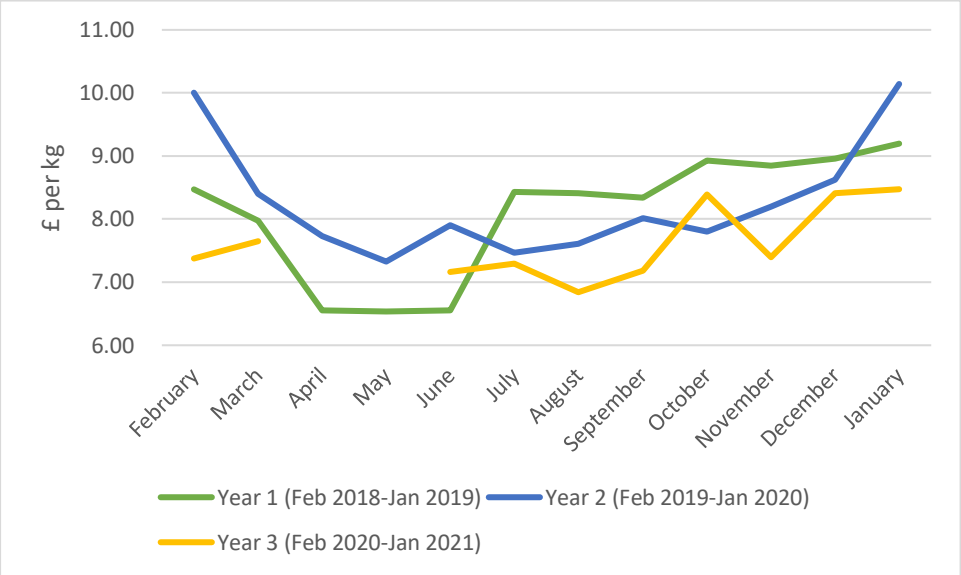

Figure 3: Monthly average £ per kilogram price received for razor clams landed by trial vessels, February 2018 to January 2021.

The trial also supports further economic activity and employment for people in the wider supply chain supporting participating vessels, and transportation of the product to market. Vessels active during the third year of the trial provided employment for around 105 people, of which around 95 were regularly employed

Marine Scotland (MS) Compliance : Inspections and Monitoring

MS Compliance continued to employ a risk based approach to the inspection of vessels participating in the trial and deployed land and sea based resources to monitor these vessels. During most of the 2020-2021 trial year, compliance officers were working within Covid-19 restrictions which reduced their operational capability.

Despite the restrictions in place 30 inspections were carried out both by inspectors on land and at sea where compliance was found to be good. In relation to daily landed catch limits, with a total of twenty weight checks undertaken at landing ports with no infringements found. Post landing checks by the FDF unit and coastal offices identified 25 minor breaches of terms and conditions of the trial and were dealt with by way of an advisory letter.

As per the trial terms and conditions, the owner of each vessel participating in the trial is entirely responsible for the purchase, installation and maintenance costs of all

fishing apparatus, generating gear, and monitoring equipment specified by Marine Scotland as necessary to participate in the trial. This includes a bespoke Remote Electronic Monitoring (REM) device which is proving a highly valuable tool for both scientific data collection purposes and compliance management.

From a compliance perspective, the REM data is received at MS's Fully Documented Fishery Unit, where it is analysed and verified for compliance. During 2020-2021 there were in excess of 1400 voyages analysed. Compliance with the requirements of the trial's Terms and Conditions was found to be high. All MS coastal offices and the Marine Protection Vessel fleet have access to live positional data of the vessels to aid inspections (subject to the 3G coverage in a vessel's area of operation).

The tracking equipment has shown to be extremely reliable. The inbuilt system tools ensure that time spent on analysis is efficient. The analysis software can incorporate layers which identify the delineated razor clam trial areas and also FSS classified waters, generating automatic alerts to compliance officers should fishing activity occur out with these areas. A robust reporting process now exists between FSS and MS Compliance to deal with any suspected incidences of fishing out with classified areas.

The technical realignment of FSS shapefiles that was created at the end of the last reporting period to take account of the mismatch has much reduced these referrals. Through discussions between FSS, MS, the REM providers and representatives of the SRCA a process has been established whereby these realigned shapefiles are now automatically uploaded onto the chosen REM platform of the fishermen, rather than requiring to be entered manually on the vessels' standalone fishing plotters.

MS Science

MS Science (MSS) are responsible for the science aspects of the razor clam trial. Live samples, provided by trial participants, are being used to derive length/weight relationships and information on size at maturity and spawning period of razor clams in the different trial areas. Participants are also providing measurements of the razor clams landed from different trial areas.

In addition, MSS is analysing REM data to study where catches are taken and combining fishing effort and reported landings data (where date of reported landings is consistent with detected fishing activity) to monitor landings per unit effort. MSS have also been involved in the design and commissioning of surveys. Progress and findings over the reporting period are summarised below.

1) Biological data

Samples of live razor clams were routinley sent to MSS by trial participants on an approximately monthly basis since August 2018 (Table 1). Sample numbers were low in 2018 as vessels gradually entered the fishery and improved after engagement with the fishers to remind them of the importance and protocols for submitting live samples. The number of samples is highest from the West Coast SW trial zone area and this is reflective of the higher number of vessels fishing in that area. As of January 2021, 51 samples had been received and 48 fully processed with over 5,100 razor clams weighed, measured and dissected. Three samples were not processed because of the poor condition of the razors due to delays in the delivery chain. Samples have been obtained from all four zones and eight of the trial areas. The samples consisted of, almost exclusively, the pod razor *Ensis siliqua*. A few specimens of the bendie razor, *E. magnus*, (previously known as *E. arcuatus*) were identified in samples from sites in the West coast SW zone. These were excluded from analyses. Due to the Covid-19 pandemic and working from home regulations, there were no live razor samples received from April 2020 to January 2021.

	Zone Area											
	Firth of Forth			Outer Hebrides			West Coast NW			West Coast SW		
	2018	2019	2020	2018	2019	2020	2018	2019	2020	2018	2019	2020
January		1	1								2*	1
February			1						1			
March		1	1*		1	1		1*			2	
April											1	
May		1									2	
June					1							
July		1			1							
August	1	1						1			3	
September	1				1		2	1		3	1	
October		1									3	
November	1			1						2	1	
December	1							1		3	1	
Grand total	**4**	**6**	**3**	**1**	**4**	**1**	**2**	**4**	**1**	**8**	**16**	**1**

Table 1. Number of razor clam live samples by year, month and trial zone area. * Indicates if samples were not processed. Live sampling was stopped in April 2020 due to Covid-19.

Length / weight relationships

Data has been analysed to derive length / weight relationships for the four trial zones (Figure 4). Length / weight relationships are required to convert survey estimates (sizes of razor clams and numeric density) into biomass density (weights) in the surveyed areas. They are also used in the process of checking the raised sampling length frequency distributions to landed weights.

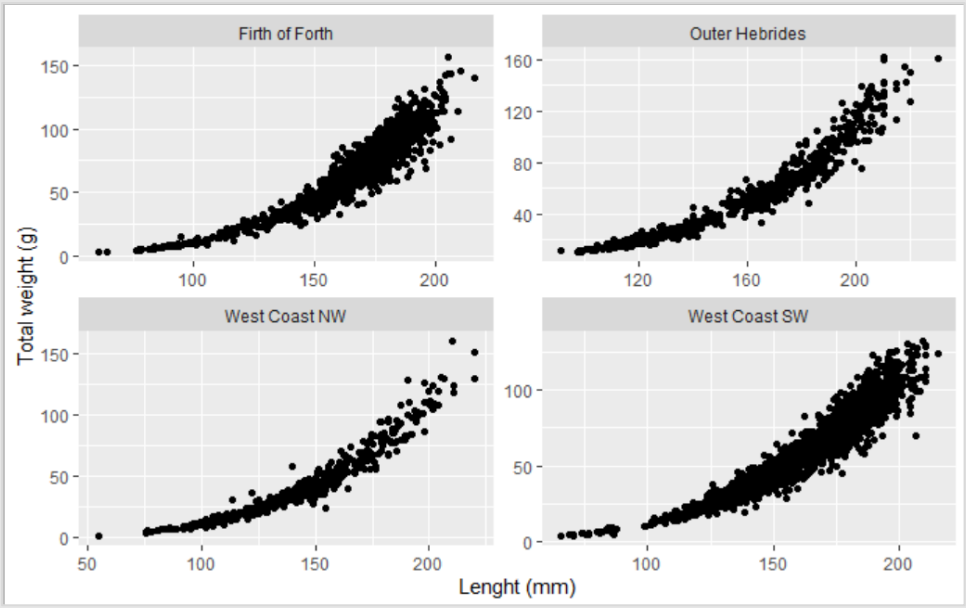

Figure 4: Length/weight relationships for the four razor clam trial zone areas (data collected up to 31 January 2021).

Further analyses will include examining differences between trial zones, areas, months and years but these are more difficult to interpret because of the paucity of samples from some of the trial areas. Increased communication with stakeholders and the introduction of a monthly schedule has improved the coordination of samples but unfortunately sampling was stopped in April 2020 because of the Covid-19 pandemic.

Razor shells have been sent to the Scottish Association for Marine Science (SAMS) for age determination. This is being done with a view to deriving estimates of area specific growth parameters for use in length based stock assessments.

Reproductive development

The biological analyses have been limited over the last year because sampling of live razors was stopped due to the Covid-19 pandemic. No further work was conducted on sexing of razors or the size of maturity but we provide below an update on histology samples analysed (up to February 2020) to investigate time of spawning.

Sections of razor tissue were examined microscopically to determine the stage of gonadal development and staged according to the six stages of the gametogenic cycle of *E. siliqua* published by Darriba *et al*., 2005. The observed seasonality of stages, for the sexes combined, is shown Figure 5. We were unable to identify all of the stages of the reproductive cycle and appear to have missed animals at the critical stage IIIA, the condition when the gonads are ripe. Samples collected in May

2019 were starting to spawn (IIIB) or in the stage of exhaustion (IV). In July, the majority of samples were exhausted (IV) or at rest (Stage 0). The early stage of gametogenesis, stages I and II, were evident in samples taken in August and October 2019 respectively, with more animals in stage II from October through to February 2020.

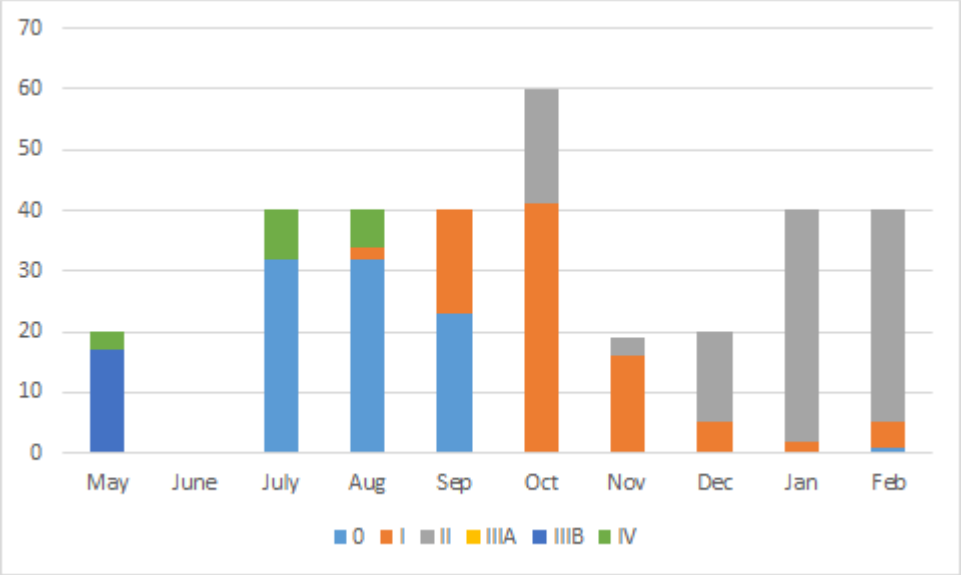

Figure 5. Numbers of razor clams at gonadal developmental stage (0; rest to IV exhaustion) from May 2019 to Feb 2020. Data for males and females combined.

On the basis of the work done to date, it seems likely that spawning occurs in March and or April. However, further sampling is required to confirm this. This would also be the best time of year to obtain samples which include better representation of smaller size classes to derive estimates of size at maturity.

Razor clam landings length measurements

Figure 6. Fishers measuring razor clams at sea. Photographs courtesy of Terry Shields.

Trial participants and associated processors, have provided measurements of the lengths of razor clams (Figure 6) landed from each of the four trial zones and eight trial areas. As of the end January 2021, a total of 189 length samples were submitted to MSS (Table 2) from 23 different vessels. Collectively, a total of 43,011 razors have been measured by trial participants. Sample numbers were low in 2018 as vessels gradually entered the fishery, and improved in 2019 after engagement with the fishers to remind them of the requirements and protocols for submitting measurement samples of landings. No samples were received in the months of April, May and June in 2020 because of the Covid-19 pandemic. Sampling resumed in July 2020 and the importance of this sampling was reemphasised. As a result, 102 length samples (from 18 different vessels) were received from July 2020 to January 2021.

	Zone Area															
	Firth of Forth				Outer Hebrides				West Coast NW				West Coast SW			
	2018	2019	2020	2021	2018	2019	2020	2021	2018	2019	2020	2021	2018	2019	2020	2021
January				1				1		1				3	4	9
February						2				1	3			5	2	
March						2				1	1			4	3	
April										2				2		
May										2				3		
June										2				1		
July		1	3				1			1	1			6	8	
August			3				1			1	1			3	19	
September	1		2			1	1			1	1		1	3	18	
October		1	2							1	1		1	5	9	
November	1		1							1	1		4	6	10	
December			4										1	3	4	
Grand total	**2**	**2**	**15**	**1**	**0**	**5**	**3**	**1**	**0**	**14**	**9**	**0**	**7**	**44**	**77**	**9**

Table 2. Number of razor clam length frequency distribution samples by year, month and trial zone area.

Landings from the West coast NW and West coast SW trial zones have been sampled on a regular basis, i.e. in most months of the year for 2019 and 2020 (Table 2). The number of samples is highest from the West Coast SW trial zone area and this is reflective of the higher number of vessels fishing in that area. Coverage of other zones, where there are fewer vessels authorised to participate in the trial, was sporadic and less satisfactory but there have been improvements in the number of samples from the Firth of Forth since July 2020.

The length frequency distributions (the representation of different sizes classes) for the four trial zones are shown in Figure 7. In the short term, any marked changes in the length frequency distribution of razors landed from particular grounds could be indicative of changes in the health of the stocks. In the longer term, this type of data combined with information on quantities landed and growth parameters can be used in stock assessments to indicate whether fishing mortality F is above or below an estimate of F_{MSY}.

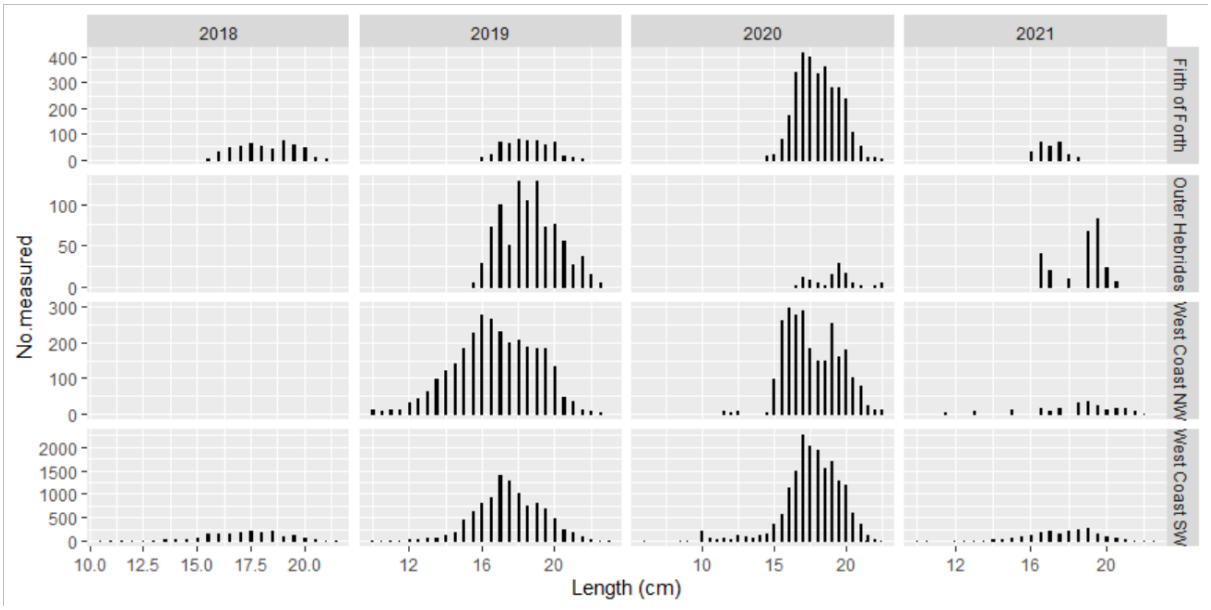

Figure 7. Length frequency plots of samples of razor clam landings from the four trial zones, in 2018, 2019, 2020 and up to January 2021.

The average length of razor clams in the landings sampled (all years and zones) was 176mm, above the minimum landing size of 100 mm, which is understood to reflect the size preference of the market. Initial examination of the length frequency data (Figure 7) suggests some variation in the sizes of razor clams landed from the different trial zones which may reflect differences in the size structure of stocks. Smaller razors were evident in 2019 for the West Coast NW but are not present in 2020 because one vessel fishing in a particular area is no longer targeting those grounds. That reduced the number of samples from that area and there is an observed change in the length frequency distribution from a normal curve to more bimodal shape. This is reflective of the different size categories landed by the different vessels. There are no obvious shifts for the other zones and the presence of very small razors in the West Coast SW was investigated and found to be a fisher who was measuring the catch and not landings. This was resolved and the protocol further clarified.

The length frequency data will be further analysed at the finer spatial resolution of trial area to assess for any obvious shifts to smaller size categories at a localised level. Analyses which involve raising measurements to landed weights, to determine the proportions of different size classes harvested are ongoing. A time series of four to five years of data is generally required for length-based stock assessments and work has started to progress assessments for trial areas where sufficient data are available.

2) Remote Electronic Monitoring (REM)

Summary of fishery

MSS is analysing the data from REM devices to build up a precise footprint of the fishery and to study fishing behaviour. Some vessels move between areas within their allocated zone and fish in a number of production areas (areas classified by FSS for shellfish harvesting) whereas others tend to fish more locally in only one or two production areas. Most fishing takes place at depths of less than 10 metres and over limited extents of the various production areas. The data are being analysed to map electro-fishing effort.

The number of vessels fishing throughout 2020 was fairly stable (Figure 8) excluding February where vessel numbers were lower, and April – June when the fishery was paused due to Covid-19. Fishing effort was highest during the summer months, July – September (Figure 8). It is possible that Covid-19 affected the temporal distribution of fishing effort throughout the year, although with the short time-series of the trial any consistent seasonal trend in effort is not yet discernible.

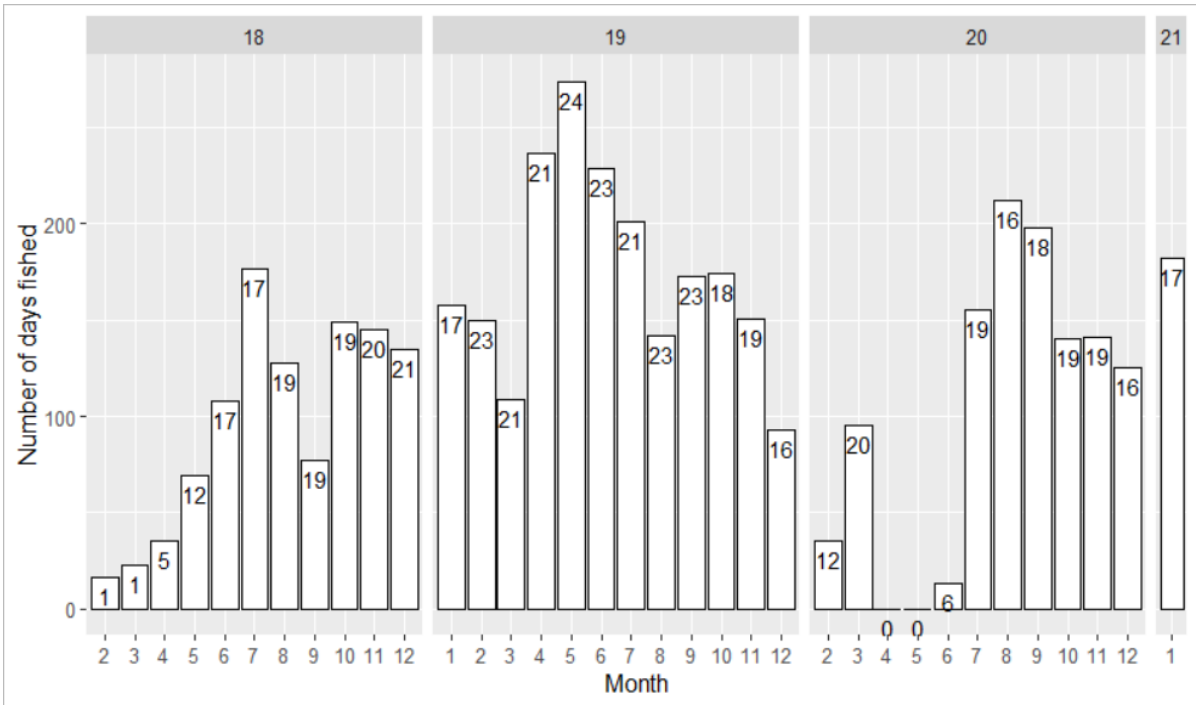

Figure 8. Number of days (aggregated for all vessels) detected (by REM) on which electro-fishing gear was deployed by month. The numbers displayed on the bars indicate the number of unique vessels electro-fishing in the given month.

Fishermen record landings on a tow-by-tow basis (as opposed to a daily) to enable MSS to refine spatial mapping of landings per unit effort (LPUE) and monitor trends during the trial. MSS has developed data checking procedures which identify instances of apparent mismatches between reported landings and fishing activity identified from REM sensor data. These are not uncommon in REM trials: however, it can take time to put processes in place to minimise occurrences to an acceptable level. Given the inconsistency in the temporal resolution of reported landings (tow-by-tow or daily) and the challenges in matching effort and landings data, electro-fishing activity and Fish1 reported landings have been matched on a daily basis to allow investigations of LPUE (kg/hour).

The distribution of reported landings across trial areas indicates that Firth of Clyde and Firth of Forth are the most harvested trial areas and are harvested across all months along with Colonsay (Figure 9). The remaining trial areas were not fished in all months.

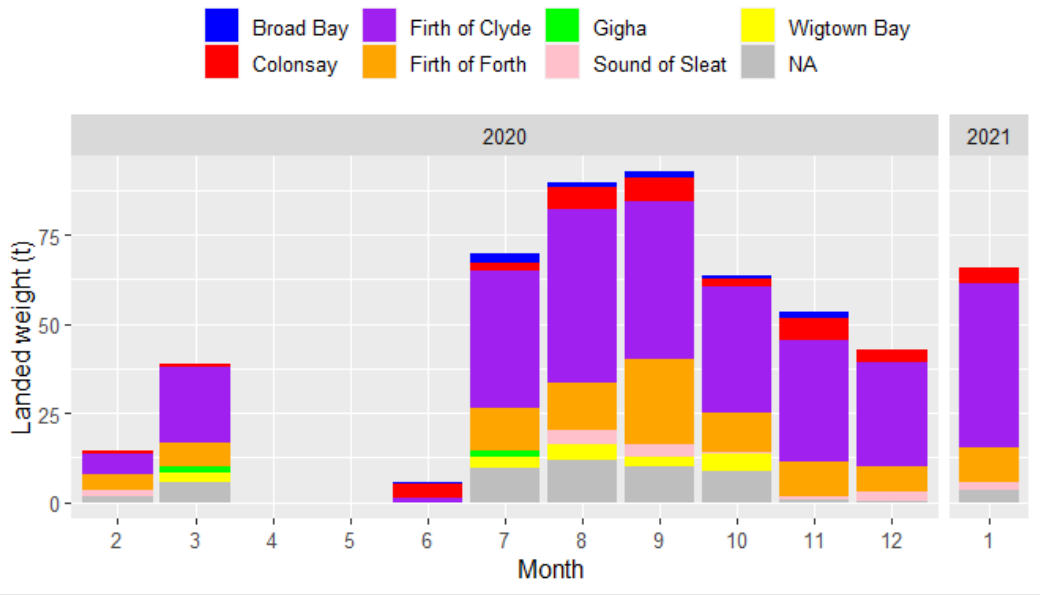

Figure 9. Total landings for the fleet by month and Trial area. NA represents reported landings where there was no corresponding REM sensor data from which to ascertain a Trial area location.

Evaluation of integrating REM derived effort and reported landings data

As part of the scientific reporting on the Scottish razor clam scientific trial, a data pipeline is in development as part of the Scottish Government Data Science Accelerator Programme. The project will develop a documented process to integrate fishers' weekly Fish1 landings declaration forms with fishing activity identified from remote electronic monitoring systems on board vessels as a proof of concept for future REM implementation. For the 2020 trial year, the fishery recorded 1435 days-

at-sea, of these 19% were missing either reported landings or REM detected fishing activity. This means that scientific evidence and analysis of trends is based on approximately 81% of the likely fishing activity of the trial fleet.

For 8% of days-at-sea vessels reported landings but no electro-fishing activity was identified by their on-board REM systems (Appendix 1; Figure 1). This occurred for just over half of participating vessels (59%) but for most the number of days affected was <5%. The most common cause for lack of corresponding REM fishing activity was a non-operational sensor attached to the generator monitoring electrical activity (66% of cases) (Appendix 1; Figure 2). Days where there was no indication of any vessel use whatsoever from on-board REM systems, which could be indicative of landings being reported incorrectly to a date other than the date in which fishing activity actually occurred accounted for only 1% of days-at-sea. Following the evaluation of data integration, the vessels where reported landings were missing REM electro-fishing effort were flagged to MS Compliance who reported already having notified the affected vessels and attempted to remedy the issue with either the REM system or suspected non-compliant behaviour.

For 11% of days-at-sea, on-board REM systems detected electro-fishing activity but vessels had no corresponding reported landings. This does not necessarily infer non-compliance but may be indicative of the poor data quality of weekly submitted log books. Approximately 10% of these cases were instances where the detected electro-fishing activity was for less than 1 hour which could indicate the generator was used for a non-fishing activity or for some reason electro-fishing was halted for the day after only a very brief operation (Appendix 1; Figure 3).

Landings per unit effort (LPUE) trends for fleet

Landings per unit effort (LPUE) is typically variable, among vessels and over time, which makes it difficult to reliably discern trends which might be related to stock abundance. Although, there is some suggestion of declines in catch rates in some trial areas and production areas over the reporting period relatively high catch rates have been maintained in others. LPUE can also be influenced by individual vessel fishing patterns, vessels moving between grounds etc. MSS continues to monitor LPUE in trial and production areas and is considering whether LPUE data in combination with changes in the length distributions of landings could be used as indicators of changes in stocks.

The LPUE has been fairly stable for the length of the trial for the West coast SW and Outer Hebrides zones (Figure 10). For the West coast NW zone the LPUE has increased over the duration of the trial: however, this appears to be attributable to three production areas with markedly different LPUE values having been fished at different periods of the trial. For the Firth of Forth trial area there is an indication that the LPUE has reduced over the timespan of the trial. This trial area was further

investigated with a camera survey completed in 2020 to better understand the razor stocks in this area (https://doi.org/10.7489/12381-1).

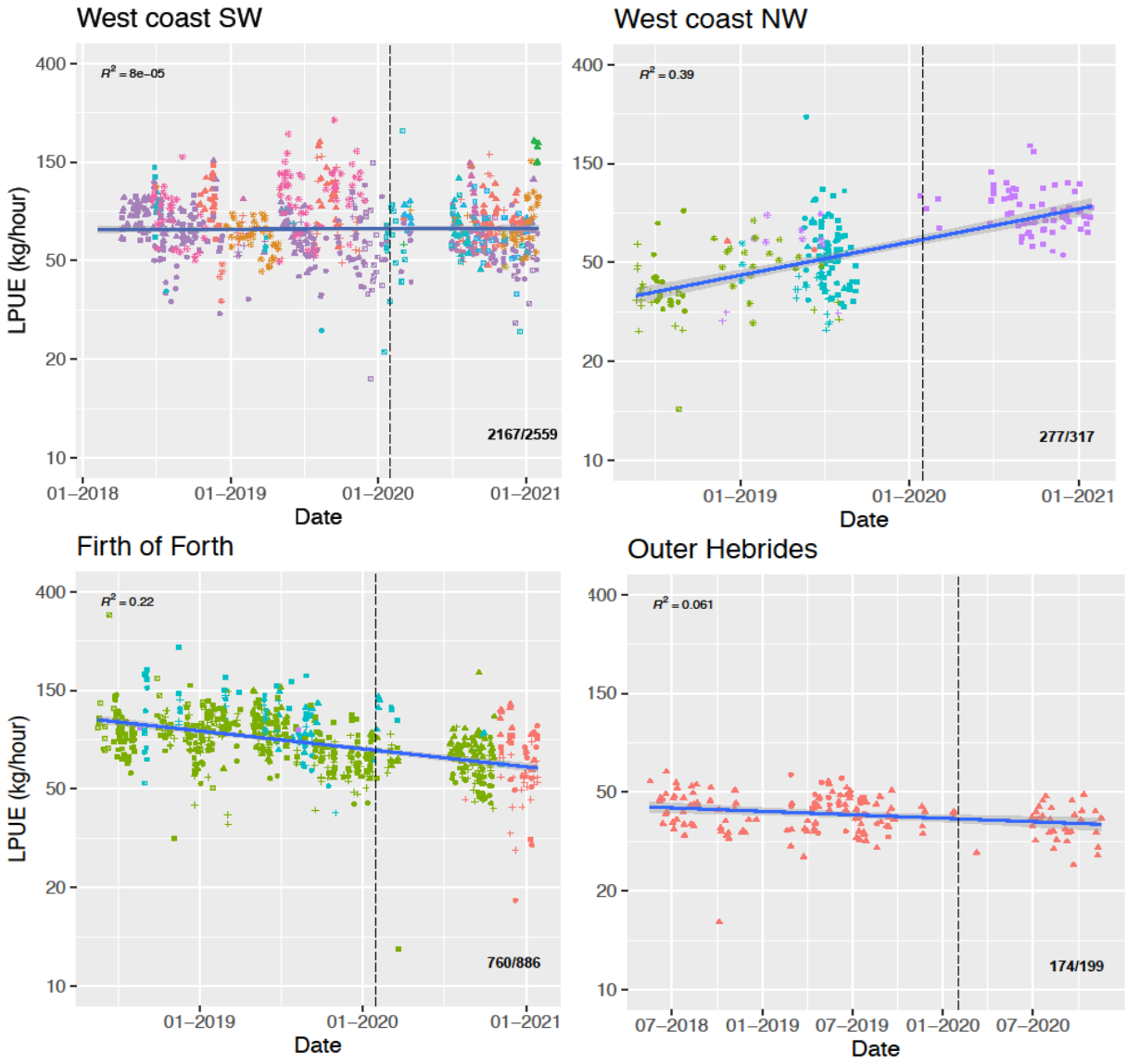

Figure 10. Daily LPUE (kg/hour) by Zone. Point colours indicate production area within zone and point shapes indicate anonymised vessel within zone. The dashed vertical line indicates the start of the current trial year. The text in the top left indicates the strength of the linear regression relationship between LPUE and time, shown as a blue line. The text in the bottom right indicates the number of 'useable' LPUE data points out of the total number of days with either reported landings or REM electro-fishing effort.

Analysis of Covid-19 and EU Exit impacts' survey responses

Marine Scotland carried out a survey exploring the impacts of the Covid-19 pandemic and EU Exit on businesses participating in the electrofishing for razor clams trial. The response rate was high and covered more than two thirds of the vessels participating in Year 3 of the trial.

Survey results show that the majority of businesses were negatively affected by the Covid-19 pandemic, with over half of the respondents saying their business was affected very negatively. The razor clam trial was suspended over the period: 2359 hrs on 31st March 0001 hrs on 23rd June 2020, however vessel owners noted negative impacts on their business throughout the whole Year 3 of the trial. When comparing to the previous trial year's turnover, half of the respondents experienced a decrease between 20% to 50%, whilst a sixth of the respondents saw their turnover fall by more than 50%. Over 90% of the respondents linked this decrease to the Covid-19 pandemic.

All respondents applied for at least one government support scheme.

As seen in Figure 11, the second most reported negative impact of Covid-19, besides the pause in the trial, was a drop in demand from international markets. Over 90% of the respondents marked Asia as their business primary sales market for razor clams. Owing to the pandemic, businesses sought out new markets with around a third of the respondents claiming to supply razor clams to a mix of new and old markets. It was noted though that the price received at the new markets was lower. Half of the respondents said that by the end of Year 3, trade had recovered only partially when comparing to pre-pandemic conditions.

Vessel owners also reported significant transport issues as a result of the Covid-19 pandemic, with the main influencing factor being lack of suitable air freight. Lack of flights, and reduced flight routes pushed up the cost of air freight. On top of that, it was noted that often the product had to be transported to a more distant large airport, such as Manchester or Heathrow, further increasing the costs for the businesses. This also meant that due to time delays goods arrived at the destination market in poor condition. Many respondents emphasised that previously razor clams could be flown out of Scotland with next day arrival in the destination market and that the aforementioned transport issues resulted in lower quality product reaching the final market, further reducing demand.

Several vessel owners flagged issues with work force - a lack of suitably qualified divers and employees not being able to work due to issues related to Covid-19.

Around a quarter of the respondents said their businesses experienced issues due to the EU Exit transition period and EU Exit. The most common impact was an increase in costs that incurred to get razor clams to the destination market. Other impacts were delays at the border due to new paperwork or queues, transport problems on land for exporting to the EU and decrease in EU workers.

Half of the respondents are in the process of planning, or have already made plans anticipating future sudden fluctuations similar to those caused by the Covid-19 pandemic and EU Exit. The measures mentioned by vessel owners include adapting their business models and diversifying revenue streams.

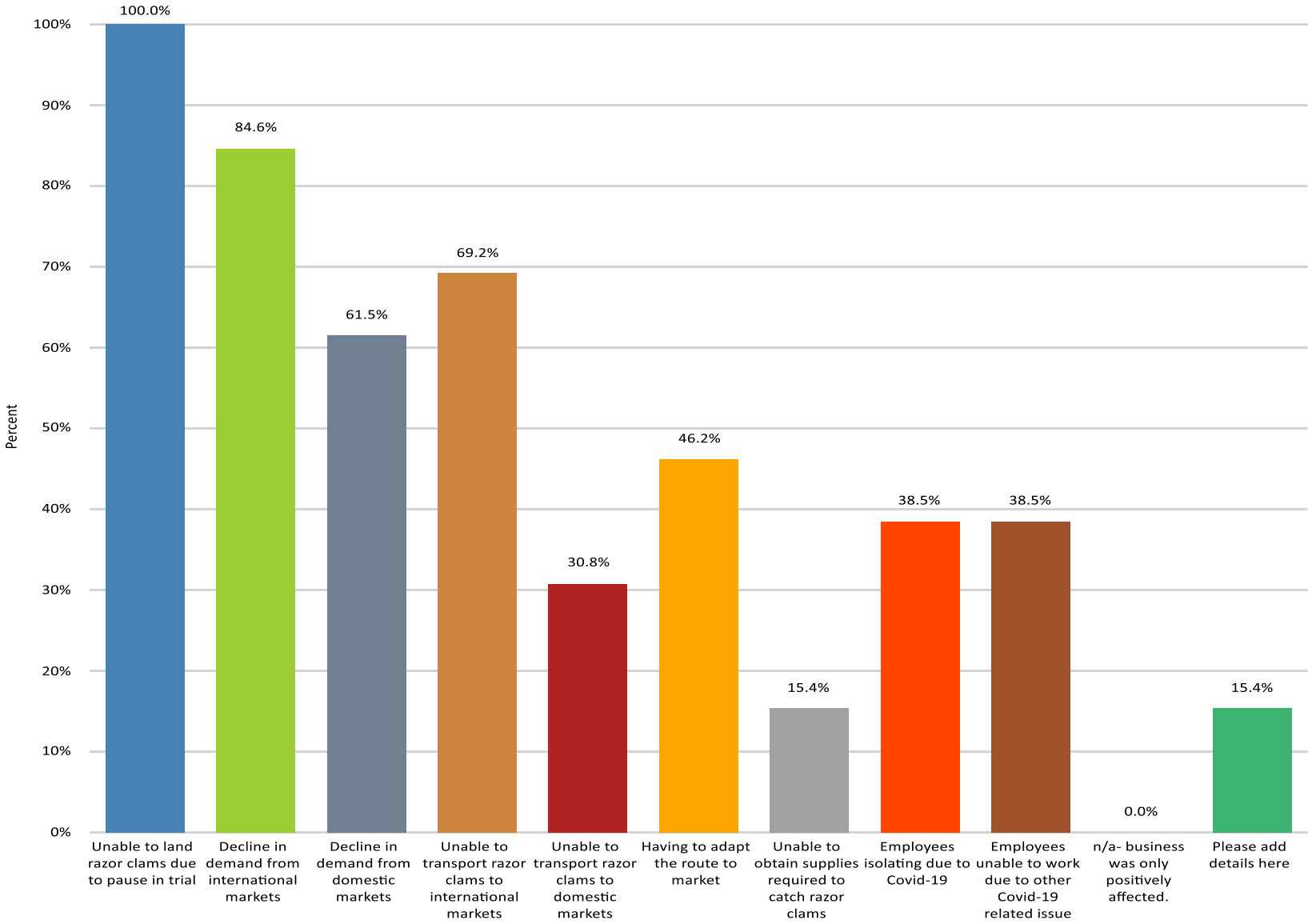

Figure 11. Proportion of businesses affected negatively by the Covid-19 pandemic

Other work Streams

Prior to this trial commencing, HSE carried out a literature research project into the safety of divers when using the electrofishing technique. HSE now have additional information about the generating equipment and power output being used to energise the electrodes on the seabed. Due to this, an application for further research to be carried out by HSE has been approved and will be completed in due course. Those taking part in the trial will be advised of the research and the possibility of their voluntary involvement in the project and the result of this research will be shared with all partners. HSE are also currently reviewing guidance around diving for shellfish and two periods of consultation have been completed with comments and views from those involved in this sector have been considered. A new revision will be in publication in due course.

Survey work in the Firth of Forth was conducted in March 2020 but was only partially completed because of the Covid-19 pandemic. Our intention is therefore to conclude this survey when an opportunity arises in order to deliver a robust stock assessment from the required data gathered to inform biological and fisheries data on this species. The report is available; https://doi.org/10.7489/12381-1 and MS's intention is to conclude the survey when there is an opportunity. A paper on the survey methodology developed by SAMS and MS Science was previously accepted for publication in the Journal Fisheries Research (Fox *et al.* 2019).

SAMS, with support from MSS, have been successful in securing Natural Environment Research Council funding for a PhD studentship to study the organism and ecological impacts of electrofishing in Scottish shallow coastal habitats. The student started in October 2020 and has been undertaking a literature review. Next steps are to estimate the growth rates (by aging razor shells) and set up tank experiments to investigate the long-term impacts of exposure to electrical fishing apparatus on razors, as well as other benthic species. This work was delayed because of the Covid-19 pandemic and working from home regulations.

MSS have previously provided razor clam tissue samples for genomic analysis in a study of population connectivity. This is part of a PhD project at the University of the Highlands and Islands which aims to elucidate relationships between razor clam stocks and determine source, sink and self-recruiting populations.

Conclusion

The collaborative nature of the trial, involving the key regulators of inshore shellfish harvesting, scientists and industry, helped to ensure that its objectives were progressed during a particularly challenging year due to the pandemic. The regulators of inshore shellfish harvesting continue to report high levels of compliance with the rules and regulations.

A significant amount of biological, sampling and fisheries data has been collected which continues to be collated and analysed, there has also been an encouraging increase in the self-sampling from fishers and processers. Work on age determination and deriving area specific growth parameters for razor clams and investigating length based stock assessment methods is underway and monitoring of the volume and size distribution of landings, fishing effort and the footprint of the fishery continues. Collectively, this work will improve the evidence base and enable MSS to evaluate possible approaches to stock assessment and appropriate management of any future fishery. MS Science have a data pipeline in development as part of the Scottish Government Data Science Accelerator Programme to improve matching of REM data with landings data, a challenge encountered on other REM projects.

All the findings from the trial will be considered before any decision is made about the future approach to electrofishing for razor clams in Scotland.

References

Darriba, S., Fuencisla, S.J. and Guerra, A. 2005. Gametogenic cycle of *Ensis siliqua* in the Ria de Corcubion Northwestern Spain. *Journal of Molluscan Studies* 71:47-51

Fox, C.J., McLay, A and Dickens, S. 2019. Development and application of electrofishing with towed video as a new survey method for razor clams (Ensis spp.). *Journal of Fisheries Research* 214: 76-84.

(*Marine Scotland, 2019*) Marine Scotland, Update: Electrofishing for razor clams trial (1 February 2018- 31 January 2019) 00548864.pdf (nrscotland.gov.uk)

(*Marine Scotland, 2020*) Marine Scotland, Update: Electrofishing for razor clams trial (1 February 2019- 31 January 2020) Update+-+electrofishing+for+razor+clams+trial+-+1+Feb+2019+-+31+Jan+2020.pdf (www.gov.scot)

Appendix 1. Example screenshots from Anchorlab system

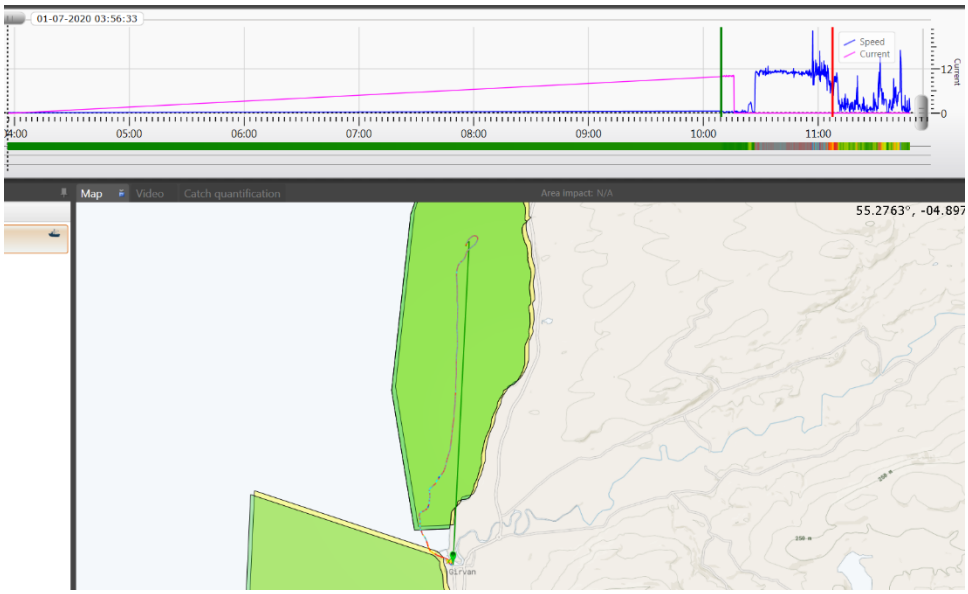

Figure 1. Anchorlab Black Box software visualisation tool example of table 4 classification 'B. Example of a System failure/interruption'

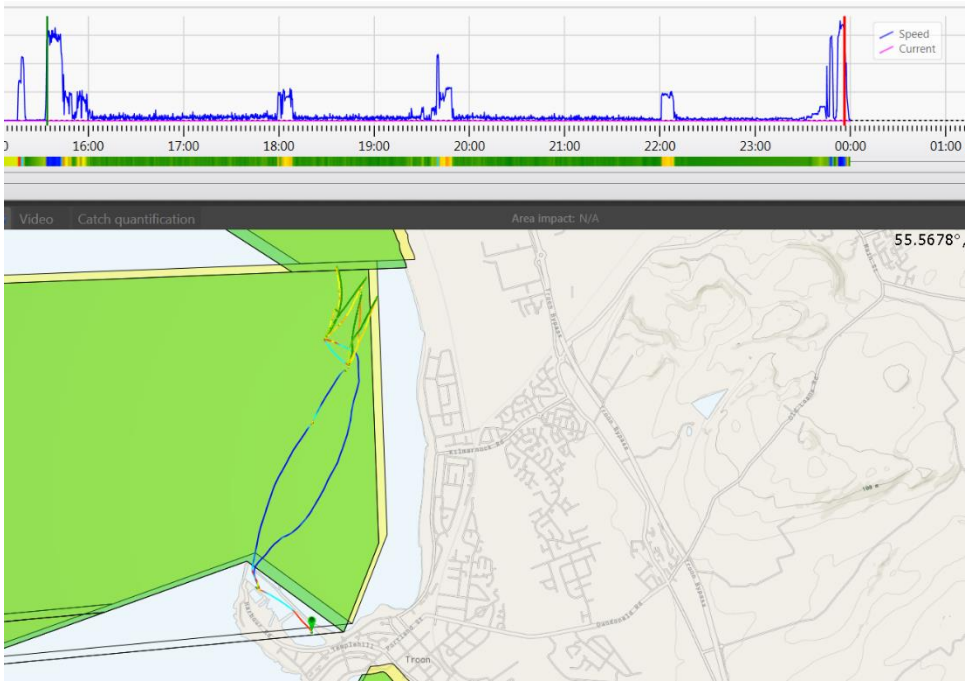

Figure 2. Anchorlab Black Box software visualisation tool example of table 4 classification 'C. No current (Amps) sensor reading'

Figure 3. Anchorlab Black Box software visualisation tool example of detected fishing activity <60mins with no corresponding reported landing.

This publication is available at **www.gov.scot**

Any enquiries regarding this publication should be sent to us at

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

ISBN: 978-1-80201-638-3 (web only)

Published by The Scottish Government, November 2021

Produced for The Scottish Government by APS Group Scotland, 21 Tennant Street, Edinburgh EH6 5NA
PPDAS975766 (11/21)