Links for information in scope of the request that is already published

Commission Delegated Regulation (EU) 2019/2239 of 1 October 2019 specifying details of the landing obligation for certain demersal fisheries in North-Western waters for the period 2020-2021 (legislation.gov.uk)

Documents being released as part of the EIR request

001 - Marine Scotland and the levels of cod bycatch in the west of Scotland

"Any reports/written analysis carried out by Marine Scotland or commissioned by Marine Scotland into the levels of cod bycatch in the west of Scotland (VIa) trawl fisheries in each of the last 5 years (2018-2022)"

Response:

Estimates of bycatch are calculated annually from data collected through Marine Scotland's commercial vessel observer sampling programme which samples the Whitefish and *Nephrops* fleets.

No estimates of bycatch are yet available for 2022 as estimates will be generated in early 2023, following completion of the 2022 sampling cycle. Therefore, to be able to provide 5 years of data, 2017 has been included in this EIR response. The estimates are shown in Table 1.

Table 1. Total landed weight and estimated bycatch weight, in tonnes, of cod in ICES Division 27.6.a (West of Scotland) from the Whitefish and *Nephrops* fleets 2017-2021. Bycatch below MCRS is the estimated weight, in tonnes, of the cod bycatch that is comprised of fish below Minimum Conservation Reference Size (MCRS) for that species. The bycatch rate indicates the percentage of the total catch of cod classed as bycatch.

	Whitefish fleet				**Nephrops fleet**			
Year	**Landed weight (tonnes)**	**Estimated bycatch (tonnes)**	**Bycatch below MCRS (tonnes)**	**Bycatch rate**	**Landed weight (tonnes)**	**Estimated bycatch (tonnes)**	**Bycatch below MCRS (tonnes)**	**Bycatch rate**
2017	186	1,138	11	**86%**	9	234	49	**96%**
2018	209	588	4	**74%**	3	72	20	**96%**
2019	1,212	68	7	**5%**	1	88	44	**99%**
2020	693	117	11	**14%**	1	97	18	**99%**
2021	922	532	1	**37%**	3	*		
5-year average	644	489	7	**43%**	3	123	33	**97%**

* The observer sampling programme was not able to operate at full capacity in 2020 and 2021 due to Covid-19 restrictions. This resulted in no data collected in area 27.6.a from the TR2 fleet.

002 – Email on North Western Waters Bycatch Reduction Plan

From: [Name redacted] [Email redacted]
Sent: 14 May 2019 20:56
To: [Name redacted] [Email redacted]
Subject: FMAC - North Western Waters Bycatch Reduction Plan
Importance: High

Dear FMAC,

At our last meeting you will recall that we discussed the issue of the North Western Waters (NWW) Bycatch Reduction Plan (BCRP) which it was agreed at the last December Council would be developed by the NWW regional group for submission to the Commission at end April.

Clearly we've missed the end April deadline, in no small part to some challenges in discussing the BCRP with Other Member States as part of the NWW regional group. Notwithstanding this we're now at the point that we need to advise the regional group whether the UK can support the BCRP which has been drafted. Although discussions in the regional group haven't reached firm conclusions and the BCRP is still subject to change even at this late juncture, I am writing to let you know what is currently in the BCRP for the West of Scotland (and the position that we're taking in the group) and to ask for your views before seeking Ministerial signoff.

To complicate things further you will be aware that a trial has been undertaken under GITAG to test the proposed 300mm SMP. I have attached the report that the trial produced.

Key findings from the report are set out below.

The report is based on 7 paired hauls, with 2 out of the 7 showing an increase in overall Nephrops catches compared to the 200mm SMP, and the others showing a decrease in Nephrops catches specifically in relation to medium sized Nephrops. The overall decrease was relatively small.

Given the size of the trial, the number of tows, and the level of Nephrops and fish on the grounds, it is hard to draw firm scientific conclusions from the trial - we've had similar results for Nephrops from previous trials where limited numbers have been encountered we get haul-by-haul variability in catches between control and test nets.

Taking into account the conclusions that have been drawn and weighing these against the broader information we have about the success of SMP in reducing unwanted fish bycatch, the relatively simplicity of the SMPs (rather than using more complex gear such as Faithlie panels, Gamrie Flip-Flap and grids) and given the need to take action to reduce cod and whiting bycatch on the West Coast, on balance we think that the technical measures for the BCRP should be taken forward as drafted and as originally agreed at FMAC for putting forward to the regional group.

Whilst not ideal, in terms of the results of the trial and the variability within it, we, along with our scientific advisors, judge that the BCRP proposals would be positive in terms of reducing unwanted bycatch and not meaningfully detrimental to overall Nephrops catches. The priority here is to get a sensible measure which critically using this path through the regional groups applies to all vessels regardless of nationality. This was one of, if not the, key criteria you sought of us at the last FMAC.

For information the current drafting within the BCRP is set out below (although, as said, this is subject to further discussion and amendments at the regional groups next week, particularly around the size/measurement of the SMPs):

> From 1 July 2020, fishing vessels operating with bottom trawls or seines in ICES divisions 6a and 5b (within EU waters, east of 12°W) shall comply with the technical measures set out below:
>
> a) For vessels deploying a cod-end mesh size <100mm, mandatory use of a squared mesh panel (positioning retained) of at least 280mm (as measured with an Omega gauge, 300mm SMP if measured knot to knot);
>
> b) In relation to (a), for vessels with engine power of 112kw or less the overall length may be 2m and the panel may be 180mm (as measured with an Omega gauge, 200mm SMP if measured knot to knot).
>
> c) For vessels deploying a cod-end mesh size of 100-119mm, mandatory use of a squared mesh panel (positioning retained) of at least 160mm.

In addition to the above technical requirements the regional group has also discussed introducing a voluntary move on rule should bycatches of cod/whiting breach a particular level. Given this is voluntary we are minded to accept the introduction of this measure but do let me know if you have any comments. We can also discuss at FMAC.

We will discuss the technical measures at FMAC next week and will seek to draw conclusions at that meeting. If anyone can't make FMAC and would like to submit views then please do this in advance of the meeting – by next Monday. Obviously our hope is that we can proceed as planned, although we will welcome discussion with you on this.

If you have any questions or would like more detail then please don't hesitate to get in touch.

Kind regards

[Name Redacted]

[Name Redacted]

[Information redacted]

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003 – Attachment to the email on North Western Waters Bycatch Reduction Plan

GITAG
Gear Innovation and Technology Advisory Group

Development trial of a 300 mm square mesh panel for bycatch reduction in the West of Scotland *Nephrops* fishery

Shaun Fraser, Chevonne Angus, Davie Riley

2019

In partnership with:

NAFC Marine Centre
University of the Highlands and Islands

SCOTTISH FISHERMEN'S FEDERATION

seafish

marinescotland

SAFPO
Scottish Association of Fish Producers' Organisations

Development trial of a 300 mm square mesh panel for bycatch reduction in the West of Scotland *Nephrops* fishery

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Suggested citation: Fraser, S., Angus, C.H., and Riley, D., 2019. Development trial of a 300 mm square mesh panel for bycatch reduction in the West of Scotland *Nephrops* fishery. *NAFC Marine Centre report for the Gear Innovation and Technology Advisory Group (GITAG)*. pp 6.

1 Introduction

As part of the work being undertaken to look at issues of stocks and quota for the West of Scotland, Marine Scotland have suggested to industry that a 300 mm square mesh panel could be a solution which they would favour. In response, the fishing industry have asked for the opportunity to look at any potential impact which using the above panel may have particularly on a smaller class of vessel. Particular concerns were expressed in relation to the practicality of the above-mentioned measure for smaller West Coast boats, the risk being a potential loss of target species which would hinder the viability of the fishing activity.

A short development trial of a 300 mm (measured knot centre to knot centre) square mesh panel was undertaken by the Gear Innovation and Technology Advisory Group (GITAG). This trial used a small commercial vessel (< 15 m) targeting *Nephrops* in the West of Scotland fishery, normally fitted with a 200 mm square mesh panel. Data analysis and reporting was undertaken at NAFC Marine Centre. The effects of the increased mesh size were interpreted by comparison of catch results between a test net (fitted with the 300 mm square mesh panel) and a control net (using the standard 200 mm square panel).

This report summarises the results of the seven valid hauls conducted during this limited development trial. The overall objective of this work is to present the data to Marine Scotland Policy to inform their decisions with regard to technical measures for the West of Scotland in the context of discard reduction.

2 Materials and methods

The development trial was conducted between 4th and 7th January 2019 by GITAG-contracted observers onboard the MFV *Eilidh* (BRD 149), an 11.9 m twin-rig trawler fishing under normal conditions with 5' Dunbar standard doors and 43 m long sweeps. Two nets were used during this trial, a "control" and "test" net which towed were together in a twin-rig system. Each net had a fishing circle of 300 meshes, 20 m of grass rope ground gear, and a headline length of 18 m. The control net was fitted with the vessel's standard 3 m x 200 mm square mesh panel, which was replaced in the test net by a 3 m x 300 mm square mesh panel. Note that the 300 mm here refers to the industry standard of knot centre to knot centre measurement for large mesh sizes, with is equivalent to an approximate 270 mm inside mesh measurement.

The trial took place during daylight conditions at *Nephrops* fishing grounds off the Scottish West Coast (Figure 1). A total of eight tows were conducted, of which one (tow 7) was invalid due to operational issues. The remaining seven valid tows (Table 1) were in depths ranging from 125 - 140 m, and with tow durations ranging from 3 - 4.5 h, and average tow speeds ranging from 2.1 - 2.3 knots (3.9 - 4.3 km h^{-1}). The test and control nets were switched between port and starboard sides to reduce any potential effects related to position, and the vessel's orientation with the tide direction was alternated to account for any tidal effects on the gear performance.

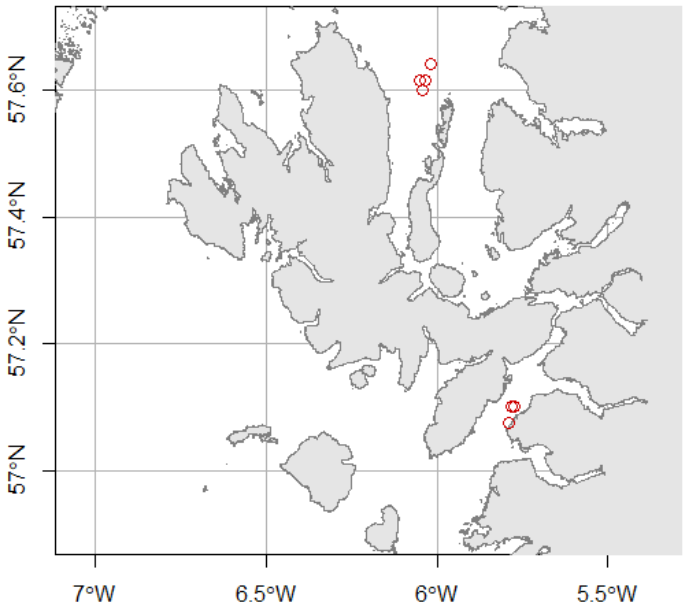

Figure 1. Development trial tow positions by the MFV *Eilidh* off the Scottish West Coast. Each location (red circle) represents the approximate mid-point of each valid tow.

Table 1. Summary of operational information for valid tows.

Tow	Date	Depth (m)	Tide direction	Trial net position	Tow duration (h)	Tow speed (knots)
1	04/01/2019	125	With	Starboard	4.5	2.2
2	04/01/2019	130	Against	Starboard	4.5	2.2
3	05/01/2019	132	With	Starboard	4.5	2.3
4	05/01/2019	140	Against	Starboard	4.5	2.2
5	06/01/2019	132	With	Port	4.5	2.3
6	06/01/2019	140	Against	Port	4	2.2
8	07/01/2019	134	Against	Port	3	2.1

A split hopper system was used to ensure that the catches from the control and test nets were kept separate at all times. The catch from each haul was first sorted by species. The target species (*Nephrops*) was further sorted by size category. The sorted catch from each net was weighed to give the whole weights for each category.

All data visualisation and statistical analyses was carried out using R (version 3.4.0, R Core Team, 2017). To account for the variability in tow duration between hauls, catch weight results were compared by considering the catch per unit effort (*CPUE*), i.e. catch weight divided by towing time (units kg h^{-1}). Differences in mean *CPUE* results between the test and control nets were analysed using the non-parametric Wilcoxon signed rank test for matched pairs.

The main bycatch species, haddock (*Melanogrammus aeglefinus*) and whiting (*Merlangius merlangus*), together with cod (*Gadus morhua*), monkfish (*Lophius* spp.), megrim (*Lepidorhombus whiffiagonis*), witch (*Glyptocephalus cynoglossus*) and lemon sole (*Microstomus kitt*), were measured by length (cm below). For the larger catch of haddock from the third tow, length measurements were taken from a random representative subsample with the sampling factor

calculated by weight. Length distributions were corrected for subsampling before inspection and then statistically compared using the non-parametric two-sample Kolmogorov-Smirnov test.

3 Results

3.1 Catch weight

The target species, *Nephrops*, was the main catch component with 482.50 kg caught over the seven valid hauls corresponding to 53% of the total catch weight. A total *Nephrops* catch of 225.25 kg was from the test net and 257.25 kg was from the control net, with a similar pattern observed in all marketable *Nephrops* size categories (Table 2).

Table 2. Catch weight results for *Nephrops* over all valid hauls, with size categories increasing from "tails" to "large".

Nephrops	Catch weight (kg)		
category	Control net	Test net	Combined
"Tails"	20.00	15.50	35.50
"Small"	50.00	45.50	95.50
"Medium"	70.00	56.50	126.50
"Large"	93.00	84.00	177.00
Dead	12.25	12.75	25.00
Discard	12.00	11.00	23.00
Total	257.25	225.25	482.50

A total of 424.36 kg of fish bycatch (Table 3) was caught over the seven valid hauls, of which the main component (34%) was lesser spotted dogfish (*Scyliorhinus canicula*). Haddock was the next largest bycatch species by weight, with 72.00 kg observed over both nets corresponding to 17% of fish bycatch. Overall, bycatch weight in the test net was 191.30 kg and in the control net was 233.06 kg in the test net. However, this pattern was not found to be consistent, particularly for some commercially important species (notably haddock, cod and lemon sole).

Table 3. Catch weights of fish species observed during the trial. Numbers measured are also given for the commercial bycatch species that were sampled.

		Catch weight (kg)			Number measured		
Common name	Scientific name	Control net	Test net	Combined	Control net	Test net	Combined
Lesser spotted dogfish	*Scyliorhinus canicula*	82.00	64.00	146.00	0	0	0
Haddock	*Melanogrammus aeglefinus*	33.25	38.75	72.00	377	424	801
Thornback ray	*Raja clavata*	35.50	28.00	63.50	0	0	0
Monkfish	*Lophius* spp.	27.00	10.40	37.40	7	10	17
Common skate	*Dipturus* spp.	18.50	14.00	32.50	0	0	0
Whiting	*Merlangius merlangus*	9.00	7.95	16.95	195	161	356
Starry ray	*Amblyraja radiata*	7.00	6.00	13.00	0	0	0
Herring	*Clupea harengus*	5.00	2.50	7.50	0	0	0
Cod	*Gadus morhua*	1.10	6.00	7.10	7	9	16
Megrim	*Lepidorhombus whiffiagonis*	5.20	1.10	6.30	5	1	6
Horse mackerel	*Trachurus trachurus*	3.30	1.70	5.00	0	0	0
Plaice	*Pleuronectes platessa*	1.21	1.55	2.76	0	0	0
Long rough dab	*Hipploglossoides platessoides*	1.15	1.30	2.45	0	0	0
Cuckoo ray	*Raja naevus*	0.75	1.50	2.25	0	0	0
Witch	*Glyptocephalus cynoglossus*	0.70	1.50	2.20	1	4	5
Mackerel	*Scomber scombrus*	1.20	0.70	1.90	0	0	0
Lemon Sole	*Microstomus kitt*	0.20	1.55	1.75	6	20	26
Bluemouth	*Helicolenus dactylotperus*	0.00	1.00	1.00	0	0	0
Spotted ray	*Raja montagui*	0.00	1.00	1.00	0	0	0
John Dory	*Zeus faber*	0.60	0.20	0.80	0	0	0
Norway pout	*Trispoterus esmarkii*	0.30	0.40	0.70	0	0	0
Grey gurnard	*Eutrigla gurnardus*	0.10	0.20	0.30	0	0	0
Total	---	233.06	191.30	424.36	598	629	1227

To account for variations in towing duration and sampling effort, catch weight data were considered in more detail in terms of *CPUE* (Figure 2). The combined *Nephrops* catch rate over all categories was 8.54 kg h^{-1} in the control net and 7.31 kg h^{-1} in the test net; however, this difference was not found to be statistically significant overall ($p > 0.05$). When comparing *Nephrops* categories the proportions retained in the test compared to those in the control net appeared to be similar among marketable categories. Only in the case of "medium" *Nephrops*, was there evidence of a statistically significant ($p = 0.04$) effect of the test net linked to a 21% reduction in catch rate over the seven hauls. For all individual bycatch species, no statistically significant changes in catch rate were observed ($p < 0.05$) when comparing the control and test nets. However, for most bycatch species the results provide some indications of a reduced catch rate in the test net (e.g., a 26% decrease in lesser spotted dogfish catch rate, although not significant) with some commercially important exceptions (e.g., a 19% increase in haddock catch rate, although not significant).

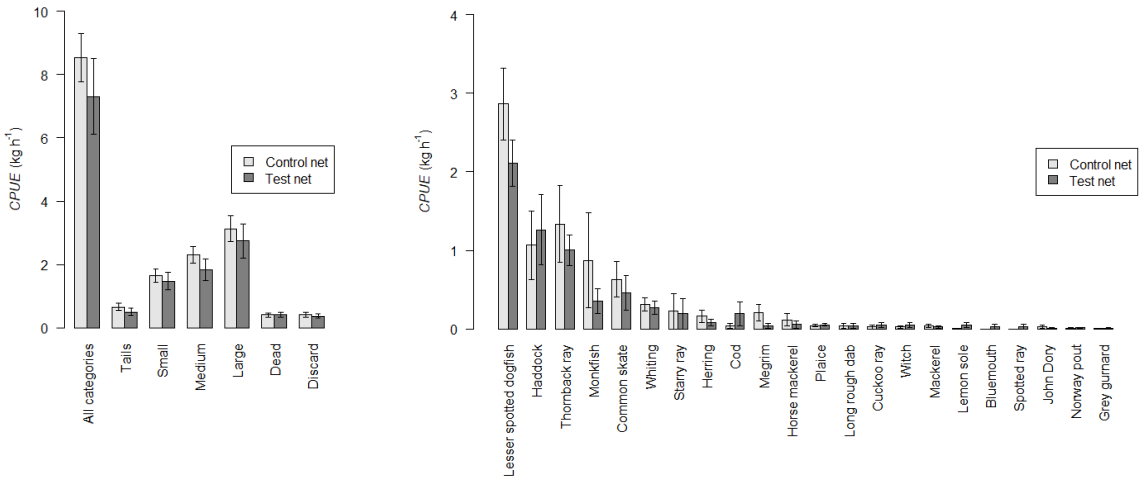

Figure 2. Mean catch per unit effort (*CPUE*) results with standard errors. Left: results for *Nephrops* categories. Right: results for the fish bycatch species.

Length distribution results are presented for the commercial bycatch species caught in highest abundances, haddock and whiting, alongside the other measured species for completeness (Figure 3). Haddock and whiting catches were almost entirely composed of unmarketable undersize fish, with control and test net results spanning very similar length ranges. Only in the case of haddock was a significant difference ($p < 0.001$) between the control and test net numbers at length observed. However, this difference in haddock results was dominated by the effects of the subsampled third haul. With the data from the third haul excluded then the difference between haddock results was visibly reduced but still statistically significant ($p = 0.02$). The third haul was also largely responsible for the higher numbers of lemon sole observed in the test net.

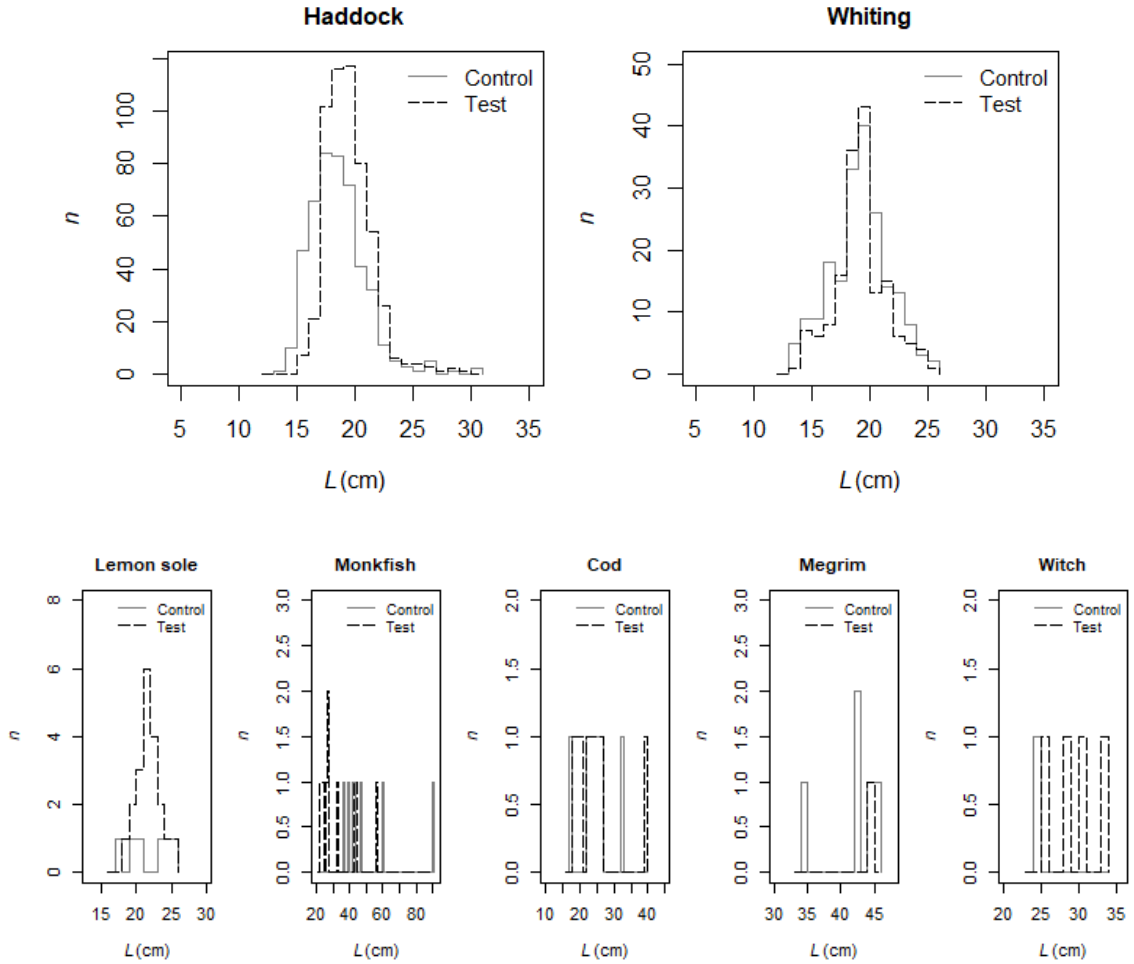

Figure 3. Length distribution results combined for all valid hauls for fish species measured during the trial. For each species, the raised (if subsampled) numbers (*n*) are plotted against length (*L*).

4 Discussion and conclusions

This development trial has investigated the effects of a 300 mm (measured knot to knot) square mesh panel on the catches by a commercial fishing vessel targeting *Nephrops* in the West of Scotland fishery (normally fitted with a 200 mm square mesh panel). With catch weight data from only seven valid hauls available, and relatively low numbers of fish measured, then the scope for analysis here was limited and the results of this trial should be considered preliminary. Nonetheless, the results presented here do provide some evidence of the effects of the 300 mm square mesh panel which may inform consideration of the viability of such technical measures.

The 300 mm square mesh panel led to a statistically significant (p = 0.04) decrease in “medium” *Nephrops* catches, related to a 21% catch rate reduction in that size class. However, it should be pointed out that some variability in *Nephrops* catches between hauls was observed and in two hauls (the first and third) there was overall increase in *Nephrops* catches in the test net. The low number of hauls combined with the variation in catches between hauls is likely to have contributed to some of the comparisons being found to be not statistically significantly different; however, there was some general indication that the test net was negatively affecting marketable *Nephrops* catches.

The fish bycatch data did not indicate a statistically significant reduction in catch rate for any specific species, but did suggest an overall 18% decrease in fish bycatch weight. This decrease was not found to be consistent among species, and in the case of haddock a 19% increase in catch rate was observed and found to be related to increased numbers of undersize fish.

While a more extensive trial is recommended to investigate these results further, the limited data here suggest that the implementation of a 300 mm square mesh panel in the West of Scotland *Nephrops* fishery could lead to a reduction in catches of the target species without clear benefits to bycatch reduction. For the smaller class of vessels considered here, these results have obvious implications for the commercial viability of the West Coast fishery.

5 Acknowledgements

The Gear Innovation and Technology Advisory Group (GITAG) seeks to build on the body of work around gear selectivity, catch and discards reducing devices. The Group was formed in 2015 when the Scottish Fishermen's Federation's wholly owned subsidiary company SFF Services had secured funding from the Scottish Government and European Maritime and Fisheries Fund (EMFF) to develop and trial innovative fishing gear exploring practical solutions aimed at reducing the amount of discards. The GITAG project partners include Marine Scotland Policy, Marine Scotland Science, Seafish and the West of Scotland Fish Producer Organisation. Particular thanks are due to the skipper and crew of MFV *Eilidh*.