Centre for Environment Fisheries & Aquaculture Science

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World Class Science for the Marine and Freshwater Environment

Project UK Fisheries Improvement

Catch composition for King scallop dredges in ICES divisions 7d and 7e

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Executive Summary

Cefas was commissioned to contribute to the Seafish Project UK Fisheries Improvements PUKFI project. The project is led by Seafish and the MSC and aims to work towards an environmentally sustainable future for UK fisheries. Several fisheries were selected due to their importance for the UK market. One of which is the King Scallop dredge fishery in ICES divisions 7d and 7e.

The aim of the study was to compile a catch composition profile for scallop dredges in 2018 and 2019.

Reported landings by species were available from national statistics whilst estimates of discards were derived from the Cefas Observer programme.

Fishery observers do not weigh catches at sea, instead quantification was carried out by direct measurement to provide length distributions for each species. Estimation of discarded weights was achieved through application of species-specific length-weight coefficients derived from various Cefas surveys.

Of 8892 trips undertaken by dredgers targeting king scallop in the English Channel during 2018-19, 28 trips were sampled by Cefas Observers (<1%).

For each species where a threshold of 30 or more individuals were measured during 3 or more trips, annual discard and landed biomass, proportion and species category were tabulated. The quantity of discards for species that did not meet this threshold was not estimated due to concerns over statistical integrity, but a complete species list with reported landings was included.

For the two study years, king Scallop accounted for 14,456-15,627 t (96-97%) of the total catches and 2,703-3,044 t of the discarded catches by weight. The discard rate for scallops was 18.7-19.5%.

The remaining catch comprised mainly of a few non-target species. Spider crabs were observed in the catches in both sampled years (140 t and 238 t, 1% of the total catch in each year) but none were landed. Edible crab contributed 86 t to the discarded catch in 2018 and 52 t in 2019 but landings were <2 t in each year. The discard rate for edible crab was 97-98%. Some 88 t of cuttlefish were caught in 2019 of which 56 t (63.5%) were discarded. There was no discard estimates for cuttlefish in 2018 due to below threshold observation numbers, but 19 t were landed.

The Cefas observer programme is designed to quantify all fish and commercial crustacean and mollusc species taken in the catch. Non-commercial invertebrate species are not included in this report.

Table of Contents

Tables

Figures

1 Introduction

Cefas was commissioned to contribute to the Seafish Project UK Fisheries Improvements (PUKFI[1]). This initiative is a multi-stakeholder engagement process working towards achieving an environmentally sustainable future for UK fisheries. The project is led by Seafish and the Marine Stewardship Council (MSC) and aims to determine the environmental performance of key commercial fisheries, demonstrate how sustainability can be enhanced through Fishery Improvement Projects (FIPs) and ultimately achieve MSC certification where possible. Several fisheries were selected due to their importance for the UK market (and UK supermarket chains). The aim of this study was to compile and provide a catch composition profile for scallop dredgers operating in the English Channel.

This report relates to the Scallop dredge fishery in ICES divisions 7d and 7e.

2 Material and Methods

2.1 Data sources

The catch profile was developed using the official national landings database (IFISH) and discards data collected by the Cefas Observer programme in 2018 and 2019, in ICES divisions 7d and 7e.

2.1.1 Cefas Observer programme

The offshore programme is randomly stratified by region (landing port location i.e. northeast, east, northwest, south), predominant fishing gear (nets, lines, scallop dredges, beam trawls, otter trawls) and vessel length (7-10 m, ≥10 m) (Table 2.1). Within each stratum, vessels are randomly selected using a vessel draw list.

Table 2.1. Stratification of the current Cefas Observer programme (offshore).

<table>
<tr><td></td><td colspan="4">7-10 m</td><td colspan="4">≥10 m</td></tr>
<tr><td></td><td>Beam</td><td>Scallop</td><td>Net</td><td>Trawl</td><td>Beam</td><td>Scallop</td><td>Net</td><td>Trawl</td></tr>
<tr><td>Northeast – ICES 4</td><td colspan="4">All gears</td><td rowspan="4">Beam (Shrimp as subset)</td><td rowspan="4">Scallop</td><td colspan="2">Net, Trawl & Lines</td></tr>
<tr><td>East – ICES 4 and 7d</td><td colspan="4">All gears</td><td colspan="2">Net, Trawl & Lines</td></tr>
<tr><td>West – ICES 7e-k</td><td colspan="4">All gears</td><td>Net</td><td>Trawl</td></tr>
<tr><td>Northwest – ICES 7a</td><td colspan="4">All gears</td><td colspan="2">Net Trawl & Lines</td></tr>
</table>

For each stratum, a target number of trips is defined quarterly. The sampling effort allocation to each stratum is based on a number of information sources from the previous year of fishing, distributed in a statistically-sound manner. Information on catch (landings and discards) and effort (number and length of fishing trips and number of vessels) are used as equal weights to split the number of sampling days between strata. The current stratification of the observer programme includes several fleets and

[1] http://www.seafish.org/industry-support/fishing/project-uk

fisheries within each stratum, and which are highly variable in terms of gear, mesh size, trip duration, and catch composition. This report relates to king scallop fisheries targeted by scallop dredges.

The catch sampling scheme on each trip is a multi-stage process; discards are recorded for the haul or estimated from a fraction of a haul. Typically, >60% of the hauls are sampled during a specific trip. In each sampled haul, length measurements are recorded for fish, commercial crustaceans, and cephalopod species. When it is not possible to sample the whole haul catch (because of large amounts caught), the observer estimates a raising factor (volume measured relative to the total catch) which will be applied to the sub-sample taken and used to estimate the total catch of the haul. For each sampled haul, the following information is also collected: gear type and mesh size, tow duration, shot and haul positions, species catch composition and the following catch components: 1) *landings*, for the fraction that is landed, 2) *discards*, for the fraction that is returned back to sea; 3) *landings below minimum size (BMS)*, the fraction below minimum conservation size and 4) *landings used as bait*.

2.1.2 Official Landings (*IFISH database)*

Landings and effort data are derived from official national fisheries statistics, recorded under the control regulation (Council regulation 1224/2009). This information is obtained from official logbooks, for vessels ≥ 10 metres, and/or sales slips for vessels under 10 metres.

Landings and effort (number of trips) by rectangle for UK registered vessels are presented in Section 3.1. For the catch profile, only landings from English and Welsh vessels landing in England or Wales were included because only these are included in the Cefas Observer programme.

2.2 Estimation of discards

Discard estimates were derived from the Cefas Observer programme, for scallop dredgers operating in 27.7.e and 27.7.d, in 2018 and 2019 (Table 2.2.)

For each trip, numbers-at-length were raised first to the haul, based on an estimated proportion of the total catch volume sampled and then to the trip, based on the proportion of sampled hauls and fished hauls.

Trip-raised estimates summed for sampled vessels in each stratum (Year x Gear type x ICES area) were then raised to the total fleet using a ratio (RF) between the reported total fleet landings of a species and the estimated landings of that species by the sampled vessels:

$$RF = \frac{Total\ landings\ spp\ in\ stratum}{Estimated\ landings\ of\ spp\ sampled\ trips\ in\ stratum}$$

For species where landings were not reported, effort (number of days at sea in stratum) was used to raise the discard data:

$$RF_{effort} = \frac{Total\ number\ days\ at\ sea\ in\ stratum}{Number\ days\ at\ sea\ of\ sampled\ trips\ in\ stratum}$$

The ratio factors for each stratum were applied to the number of fish measured at length to estimate the raised number at length.

To overcome the low coverage of the programme and ensure quality of data provided, thresholds were applied, i.e. only discard estimates were provided where 30 or more fish (discarded and retained) were measured and 3 or more trips were sampled in each stratum (Year x Gear type x ICES area).

The length-based data were converted to biomass, using length-weight relationships for each species collected during various scientific surveys (Cefas, unpubl. data).

Table 2.2 Observer programme sampling levels for scallop dredgers in the English Channel 2018-2019

Year	Number of trips sampled by Observer	Total number of fishing trips (DRB targeting King scallops)
2018	16	4690
2019	12	4202

2.2.1 Catch profiles

To produce the catch profiles for these fisheries the official landings from English and Welsh vessels and the respective discards estimates were used, using the method described above. Total annual dredge landings and discards estimates for 2018 and 2019 by species in ICES divisions 7d and 7e are presented.

Each species was categorised according to the MSC fisheries standard in Principle 2: Primary (PI 2.1.1-2.1.3), Secondary (2.2.1 – 2.2.3), Endangered, Threatened or Protected species (ETP) and "out-of-scope" species. The rationale to define a species as **Primary species** within Principle 2 as those where an analytical stock assessment is available, that have management measures and tools in place intended to achieve stock management objectives reflected in either limit or target reference points. If a species is a data limited stock (DLS), management limits or reference points are not in place then the species is classified as a **Secondary species** (unless it is classified as Endangered, Threatened or Protected). **ETP species** were classified according with the IUCN red list (https://www.iucnredlist.org/) and **"out-of-scope"** species include amphibians, reptiles, birds and mammals that are that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

3 Results

3.1 Landings and Effort

Figure 3.1 shows total landings and number of trips per rectangle, by UK registered dredgers. Most effort in terms of trip numbers is confined close to shore, while most of the landings are derived from ICES rectangle 29F0.

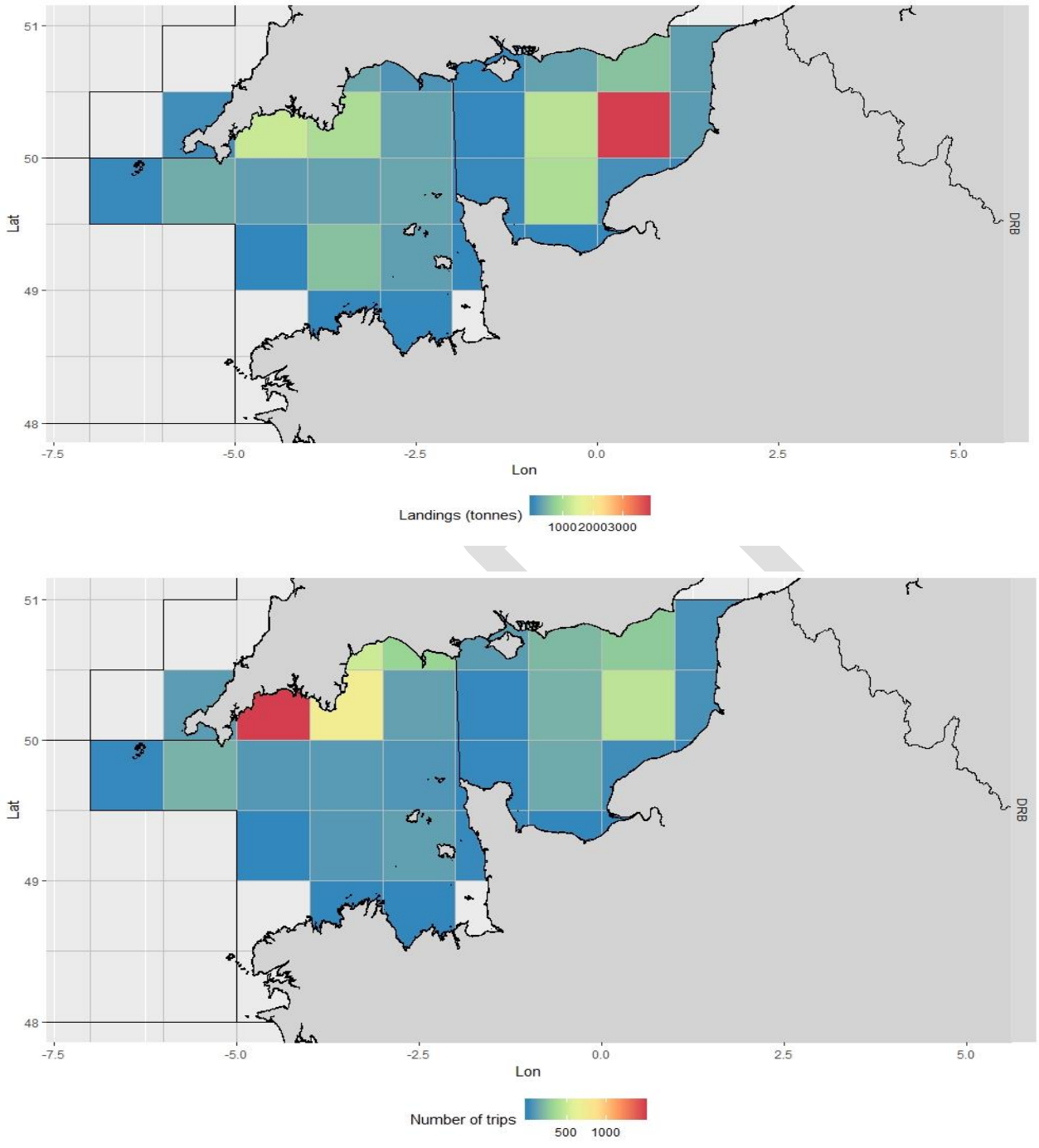

Figure 3.1 Mean Landings and number of trips by UK registered vessels – King scallop Dredges in ICES divisions 7d and 7e, between 2018 and 2019 (Data source: UK Official landings).

3.2 Catch profile

A summary of the landings, discards, proportion of each species for scallop dredgers operating in ICES divisions in 7d and 7e are presented in Table 3.1.

Dredger catch profiles were dominated by king Scallop, providing 14,455.9 t and 15,627 t (96-97%) of the 14,833.9 t and 16,297 t total catches in the two study years. This species accounted for 2,707.3-3,043.8 t of the discards by weight. The discard rate for scallops was 18.7% in 2018 and 19.5% in 2019. The remaining catch comprised mainly of a few non-target species. Spider crabs were observed in the catches in both sampled years (139.9 t and 237.9 t, 1% of the total catch in each year) but none were landed. Edible crab contributed 85.6 t to the discarded catch in 2018 and 52.4 t in 2019. The discard rate for edible crab was very high at 97-98% and reported landings were <2 t in each of the two years. Some 87.7 t of cuttlefish were caught in 2019 of which 55.7 t (63.5%) were discarded. There was no discard estimate for cuttlefish in 2018 due to below threshold observation numbers, but 19.1 t were landed. Discards for anglerfish, sole, plaice, manilla clam and whelks were very low (<10 t). For other species the quantity of discards was not estimated because there were <30 animals per stratum.

No information was available on the condition of discarded animals.

Table 3.1 Dredges Catch profile in ICES division 7d and 7e – Annual discards estimates, reported landings and numbers of observer trips and fish measured for dredges, in 2018 and 2019, sorted by total catch in each year. Data sources: Cefas Observer Programme and official landings database. NA indicates no discard data available. * Indicates below threshold numbers of trips or fish for biomass estimation.

Year	Species common name	Scientific name	Discards (tonnes)	Observer trips/fish (N)	Landings (tonnes)	Catch (proportion)	Category (1;primary 2;secondary/ ETP)
2018	Great Atlantic scallop	*Pecten maximus*	2707.3	16/9064	11748.6	0.97	2
	Spinous spider crab	*Maja squinado*	139.9	14/141	0.0	0.01	2
	Edible crab	*Cancer pagurus*	85.6	14/95	1.9	0.01	2
	Anglerfishes	Lophiidae	9.4	13/54	44.4	0.00	2
	Turbot	*Psetta maxima*	*	2/2	33.3		2
	Common sole	*Solea solea*	0.6	12/85	21.0	0.00	2
	Cuttlefish	Sepiidae	*	5/11	19.1		2
	Plaice	*Pleuronectes platessa*	3.7	8/32	6.9	0.00	2
	Brill	*Scophthalmus rhombus*	*	2/5	8.1		2
	Lemon sole	*Microstomus kitt*	*	6/11	2.4		2
	Thornback ray	*Raja clavata*	*	3/10	0.7		2
	Spotted ray	*Raja montagui*	*	2/7	0.2		2
	Megrims	*Lepidorhombus spp*	*	2/6	0.2		2
	Common octopus	*Octopus vulgaris*	NA		0.2		2
	Blonde ray	*Raja brachyura*	*	1/1	0.1		2
	Cuckoo ray	*Raja naevus*	*	1/1	0.1		2
	John dory	*Zeus faber*	*	1/1	0.1		2

Year	Species common name	Scientific name	Discards (tonnes)	Observer trips/fish (N)	Landings (tonnes)	Catch (proportion)	Category (1;primary 2;secondary/ ETP)
	European lobster	*Homarus gammarus*	NA		0.1		2
	Gurnards	Triglidae	NA		>0.0		2
	Atlantic cod	*Gadus morhua*	NA		>0.0		1
	Whelk	*Buccinum undatum*	NA		>0.0		2
	Undulate ray	*Raja undulata*	*	1/1	>0.0		ETP
	Queen scallop	*Aequipecten opercularis*	NA		>0.0		2
	Octopuses	Octopodidae	NA		>0.0		2
	Common squids	*Loligo spp*	NA		>0.0		2
	European seabass	*Dicentrarchus labrax*	NA		>0.0		2
	Pouting	*Trisopterus luscus*	*	2/3	>0.0		2
	Starry ray	*Raja radiata*	NA		>0.0		ETP
	Hake	*Merluccius merluccius*	NA		>0.0		1
	Haddock	*Melanogrammus aeglefinus*	NA		>0.0		1
	Sand sole	*Solea lascaris*	NA		>0.0		2
	Pollack	*Pollachius pollachius*	NA		>0.0		2
	European flounder	*Platichthys flesus*	NA		>0.0		2
	Surmullet	*Mullus surmuletus*	NA		>0.0		2
	Whiting	*Merlangius merlangus*	*	1/1	>0.0		1
	Common dab	*Limanda limanda*	NA		>0.0		2
	Butterfly blenny	*Blennius ocellaris*	*	1/1	0		2
	Black Seabream	*Spondyliosoma cantharus*	*	1/1	0		2
	Ballan wrasse	*Labrus bergylta*	*	1/1	0		2
	Blennies	*Blenniiformes*	*	1/1	0		2
	Common dragonet	*Callionymus lyra*	*	5/8	0		2
	Crawfish	*Palinurus elephas*	*	4/4	0		ETP
	Small-spotted catshark	*Scyliorhinus canicula*	*	3/5	0		2
	Norwegian topknot	*Phrynorhombus norvegicus*	*	1/1	0		2

Year	Species common name	Scientific name	Discards (tonnes)	Observer trips/fish (N)	Landings (tonnes)	Catch (proportion)	Category (1;primary 2;secondary/ ETP)
	Poor cod	*Trisopterus minutus*	*	1/4	0		2
	Scald fish	*Arnoglossus laterna*	*	3/6	0		2
	Solenette	*Buglossidium luteum*	*	1/5	0		2
	Thickback sole	*Microchirus variegatus*	*	6/11	0		2
2019	Great Atlantic scallop	*Pecten maximus*	3043.8	12/6975	12583.2	0.96	2
	Spinous spider crab	*Maja squinado*	237.9	11/163	0	0.01	2
	Anglerfishes nei	Lophiidae	2.6	10/216	128.6	0.01	2
	Cuttlefish	bobtail squids nei	55.7	7/140	32.0	0.01	2
	Edible crab	*Cancer pagurus*	52.4	9/46	1.8	0.00	2
	Common sole	*Solea solea*	0.0	10/81	46.1	0.00	2
	European plaice	*Pleuronectes platessa*	2.5	8/66	43.1	0.00	2
	Turbot	*Psetta maxima*	*	3/5	44.3		2
	Brill	*Scophthalmus rhombus*	*	2/2	12.1		2
	Lemon sole	*Microstomus kitt*	*	6/20	4.4		2
	Thornback ray	*Raja clavata*	*	1/1	2.3		2
	Megrims	*Lepidorhombus spp*	*	1/1	1.7		2
	Spotted ray	*Raja montagui*	*	2/15	0.4		2
	Queen scallop	*Aequipecten opercularis*	NA		0.3		2
	Blonde ray	*Raja brachyura*	*	1/1	0.3		2
	Atlantic mackerel	*Scomber scombrus*	NA		0.2		1
	European flounder	*Platichthys flesus*	NA		0.1		2
	John dory	*Zeus faber*	*	2/2	0.1		2
	Common squids nei	*Loligo spp*	NA		0.1		2
	Gurnards	Triglidae	*	1/1	0.1		2
	Cuckoo ray	*Raja naevus*	*	1/1	0.1		2
	Small-spotted catshark	*Scyliorhinus canicula*	*	3/3	0.1		2
	Undulate ray	*Raja undulata*	*	1/3	0.1		ETP

Year	Species common name	Scientific name	Discards (tonnes)	Observer trips/fish (N)	Landings (tonnes)	Catch (proportion)	Category (1;primary 2;secondary/ ETP)
	Whelk	*Buccinum undatum*	NA		0.1		2
	Common dab	*Limanda limanda*	*	1/1	0.1		2
	Sand sole	*Solea lascaris*	NA		0.1		2
	Pouting	*Trisopterus luscus*	*	2/7	>0.0		2
	European lobster	*Homarus gammarus*	NA		>0.0		2
	Small-eyed ray	*Raja microocellata*	NA		>0.0		2
	European conger	*Conger conger*	NA		>0.0		2
	Manila clam	*Corbicula manilensis*	NA		>0.0		2
	Whiting	*Merlangius merlangus*	*	1/1	>0.0		1
	Smooth-hound	*Mustelus mustelus*	NA		>0.0		2
	Octopuses	*Octopodidae*	NA		>0.0		2
	Haddock	*Melanogrammus aeglefinus*	NA		>0.0		1
	Ling	*Molva molva*	NA		>0.0		2
	European seabass	*Dicentrarchus labrax*	NA		>0.0		2
	Surmullet	*Mullus surmuletus*	NA		>0.0		2
	Witch flounder	*Glyptocephalus cynoglossus*	*	1/2	>0.0		2
	Atlantic cod	*Gadus morhua*	NA		>0.0	0.00	1
	Northern quahog	*Mercenaria mercenaria*	NA		>0.0	0.00	2
	European hake	*Merluccius merluccius*	NA		>0.0	0.00	1
	Pollack	*Pollachius pollachius*	NA		>0.0	0.00	2
	Mullets	*Mugilidae*	NA		>0.0	0.00	2
	Butterfly blenny	*Blennius ocellaris*	*	1/1	0		2
	Common dragonet	*Callionymus lyra*	*	3/5	0		2
	Crawfish	*Palinurus elephas*	*	1/1	0		ETP
	Nurse hound	*Scyliorhinus stellaris*	*	1/1	0		2
	Marbled electric ray	*Torpedo marmorata*	*	1/1	0		2
	Norwegian topknot	*Phrynorhombus norvegicus*	*	1/1	0		2

Year	Species common name	Scientific name	Discards (tonnes)	Observer trips/fish (N)	Landings (tonnes)	Catch (proportion)	Category (1;primary 2;secondary/ ETP)
	Common flat oyster	*Ostrea edulis*	*	1/48	0		2
	Poor cod	*Trisopterus minutus*	*	2/7	0		2
	Scald fish	*Arnoglossus laterna*	*	1/1	0		2
	Spotted dragonet	*Callionymus maculatus*	*	1/2	0		2
	Thickback sole	*Microchirus variegatus*	*	7/14	0		2
	Tompot blenny	*Parablennius gattorugine*	*	2/2	0		2
	Sandeel	*Ammodytidae*	*	1/1	0		2

Centre for Environment Fisheries & Aquaculture Science

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