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AN OVERVIEW OF SCOTTISH FISHERIES PREPARED FOR THE FLOATING OFFSHORE WIND INDUSTRY

A REVIEW OF FISHING ACTIVITIES RELEVANT TO THE PLAN
OPTION AREAS OUTLINED IN THE SCOTTISH GOVERNMENT'S
SECTORAL MARINE PLAN FOR OFFSHORE WIND



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NOMENCLATURE

CFP	Common Fisheries Policy
EU	European Union
FOW	Floating Offshore Wind
FOW CoE	Floating Offshore Wind Centre of Excellence
kg	Kilograms
KIS-ORCA	Kingfisher Information Services – Offshore Renewable & Cable Awareness
kts	Knots
m	Metres
mm	Millimetres
nm	Nautical miles
ORE	Offshore Renewable Energy
PO	Plan Option
SFF	Scottish Fishermen’s Federation
SPFA	Scottish Pelagic Fishermen’s Association
SWFPA	Scottish White Fish Producers Association
VMS	Vessel Monitoring System

1 INTRODUCTION

This technical report provides a high-level overview of the Scottish commercial fisheries and is aimed at facilitating the identification of potential interactions between fishing activities and Floating Offshore Wind (FOW) in Scotland. This report was commissioned by the Floating Offshore Wind Centre of Excellence (FOW CoE) to guide and inform the collaborative stakeholder workshops undertaken during the course of the Floating Offshore Wind and Fishing Interaction Working Group and Roadmap project.

Where appropriate, this information has been presented with reference to the final Plan Option (PO) areas identified in the Scottish Government's Sectoral Marine Plan for Offshore Wind. These PO areas define the regions of Scotland's seabed that are available for offshore wind development through the ScotWind leasing process and, as such, are the areas that FOW development in Scotland is expected to be concentrated in the short-to-medium term. Despite this general focus on the ScotWind leasing zones, this report is not intended as a detailed baseline characterisation of fishing activities within the PO areas. Similarly, this document should not be regarded as a comprehensive overview of all fishing activities undertaken in Scotland.

A summary of feedback provided by fisheries stakeholders as part of the formal consultation process on the Sectoral Marine Plan is provided as an Appendix at the end of this document for reference (Appendix 1).

This resource has been developed to be read in conjunction with the Floating Offshore Wind Technology and Operations Review (prepared by the Offshore Renewable Energy [ORE] Catapult), and both documents address the same key themes across the two industries: Technology, Marine Operations, Geographical Distribution, Lifecycle, Port Requirements and Commercial Drivers. Both documents were produced to support the development of the project's final report, the Floating Offshore Wind and Fishing Interaction Roadmap, which has been published by the ORE Catapult on behalf of the FOW CoE. The roadmap identifies key risks and opportunities associated with FOW and fishing industry interactions in Scotland and is intended to provide a foundation for coordinating a programme of further activities to address these, and ultimately help to support collaborative relationships between the two industries over the course of the next decade and beyond.

2 COMMERCIAL FISHERIES OVERVIEW

The following sections provide a review of the principal fisheries in Scottish waters, with reference to those of relevance to the PO areas identified in the Sectoral Marine Plan. These are as follows:

- Demersal trawls and seines: whitefish, nephrops and squid fisheries;
- Pelagic trawls: pelagic fishery (herring and mackerel);
- Scallop dredges: scallop fishery; and
- Creels: shellfish (crustaceans) fishery.

Whilst other fishing methods may be used in Scottish waters (e.g. set gill nets, hand lining, and longlining) the above fisheries represent those most likely to be undertaken in the POs at the time of writing.

As specified by the Offshore Renewable Energy (ORE) Catapult, the following aspects have been covered under the review of commercial fisheries:

- Technology;
- Marine Operations;
- Geographical Distribution;
- Lifecycle;
- Port Requirements; and
- Commercial drivers.

3 TECHNOLOGY

The review of fisheries technology is provided separately by fishery and is focused on aspects of fishing gear and vessels which may be of relevance with regard to potential interactions between fishing activity and FOW, including:

- Dimensions and gear configurations;
- Target species;
- Manoeuvrability; and
- Gear penetration depths.

3.1 DEMERSAL WHITEFISH

The technical summary of the demersal whitefish fishery encompasses single vessel trawling, pair trawling and seine netting. A brief description of these methods is provided below and key parameters of relevance to potential interactions with FOW summarised in Table 1.

The Scottish whitefish fishery targets bottom-dwelling fish. This is primarily cod, haddock, whiting and saithe in the North Sea and west of Scotland and deeper water species in areas to the north and west of Scotland (Baxter et al., 2011).

3.1.1 DEMERSAL TRAWLING

Single vessel trawling

A vessel tows either one funnel shaped net over the seabed (single rig) or two nets (twin-rig), where the horizontal opening of the net is maintained by otter boards (doors), which are relatively heavy and often reinforced with a steel toe to ensure good contact with the bottom. Fish are herded between the boards and along the sweeps and into the mouth of the trawl where they then pass back through the net and are retained in the cod end (Figure 1). Twin-rig trawling, where one vessel tows two nets side by side with trawl doors attached to the outer wing ends of each net, and the inner wing ends of the net are attached to a central clump weight. The twin rig method can be altered and modified to target different fisheries such as flatfish, whitefish and nephrops (Section 3.3).

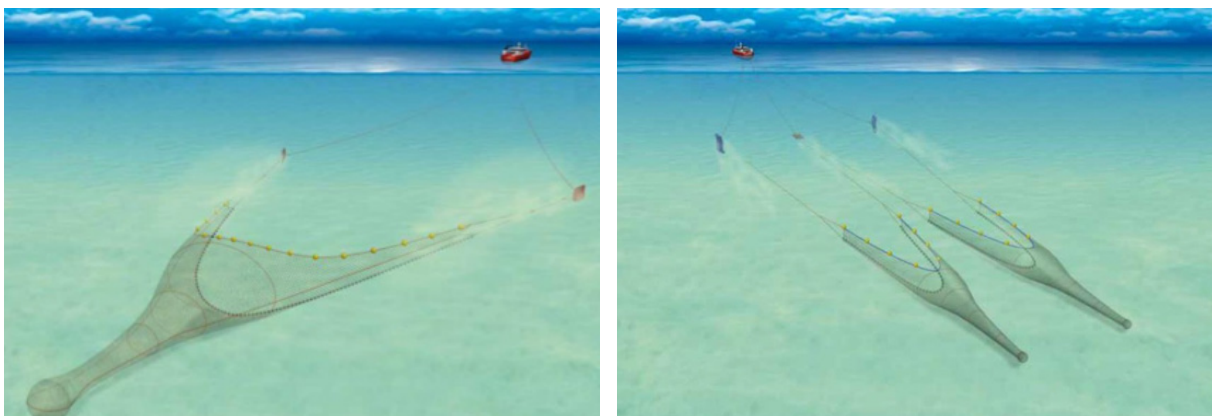


Figure 1: Single vessel trawling; single rigged and twin-rigged (Seafish, 2015)

Pair trawling

This method is where a single demersal trawl is towed by two vessels simultaneously, one towing each side of the trawl. Trawl doors are not used in this method, being replaced either by a clump weights or heavy trawl wires to assist in keeping the gear on the seabed.

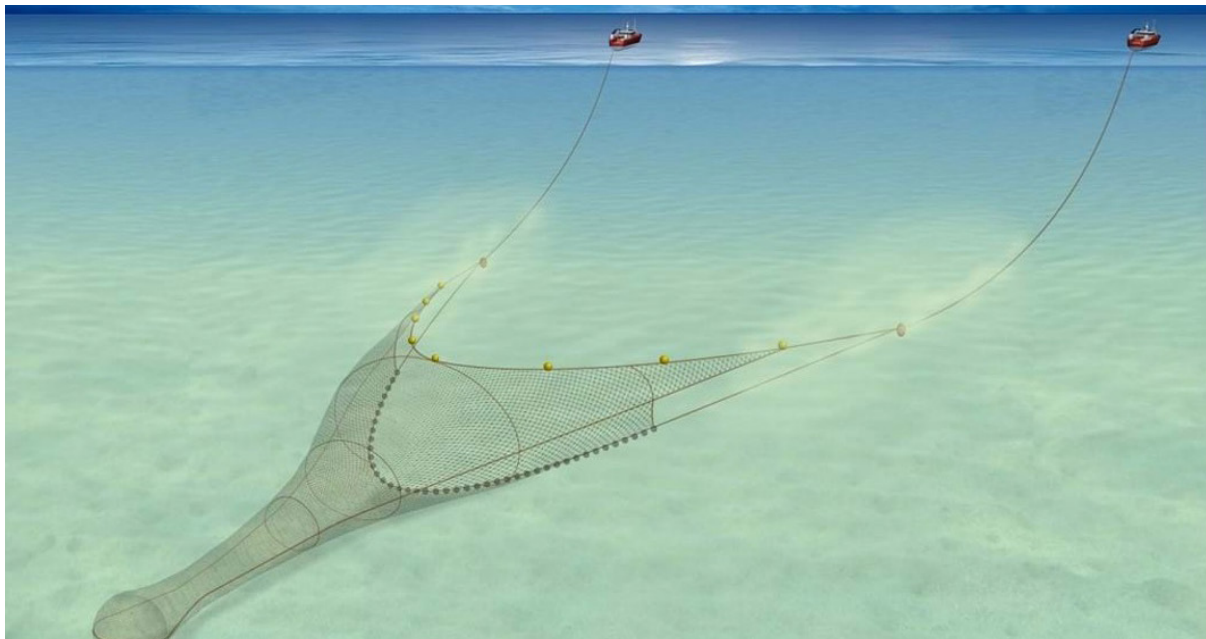


Figure 2: Pair trawling (Seafish, 2015)

3.1.2 SEINE NETTING

Seine netting uses a net similar in shape to a trawl net. The net is shot in the open sea over long ropes on the seabed in a triangular pattern (Figure 3). The net is gradually hauled in, closing the net as it does so, with the vessel maintaining position using its engine power. This exploits the reaction of the fish to swim away from the sediment cloud caused by the ropes moving over the seabed (Seafish, 2015).

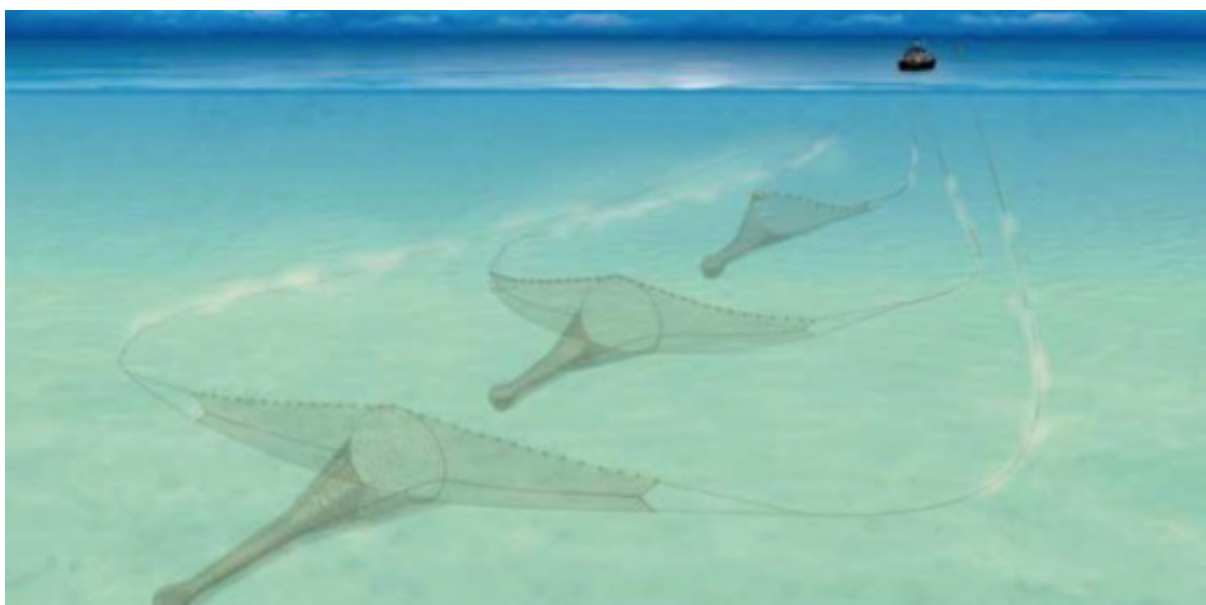


Figure 3: Seine netting (Seafish, 2015)

Parameter	Description
Vessel (size and configuration)	<p>Single and Pair trawling: Whether single or pair trawling methods are used is normally determined by vessel capabilities, with modern vessels towing larger heavier fishing gear and the older vessels pair trawling. However, over the last five years the Scottish fleet has seen a significant increase in new vessels reverting back to the pair trawl given the higher relative catching efficiency and reduced fuel and gear costs. The majority of whitefish trawlers range from 20-30 m in length.</p> <p>Seine Netting: There are only relatively few vessels using this method. At the time of writing, the Scottish Fishermen's Federation membership includes 13 seine net fishers. Seine net vessels generally range between 15-30 m in length.</p>
Target species	<p>Single vessel trawling: The modern more powerful trawlers with more bollard pull and horse power have the capabilities to tow a larger trawl net or nets to target fish such as cod, haddock and saithe. However, many of these trawlers are also targeting the higher value ground fish species such as monkfish, megrim, plaice and lemon sole.</p> <p>Pair Trawling: Pair trawlers normally fish in firmer rocky seabed, where the requirement for large rockhoppers on the net allow the net to bounce or hop over these boulder areas. The target species for a pair trawl vessel are haddock, cod, saithe and whiting. These species are usually captured in a shoal which can see some very large hauls of fish after only towing for a few hours.</p> <p>Seine Nets: This method targets small shoals of fish such as haddock, cod and whiting with towing times being very short.</p>
Gear (dimensions and configuration)	<p>Single vessel trawling: Trawl nets range in size to suit vessel's towing power. Modern trawlers can quite easily tow one very large single, or two slightly smaller twin trawls with trawl doors weighing 1,200 kg each and a centre clump weighing 2,000-2,500 kg at speeds of 3 kts when fishing. The effective gear width of demersal otter trawls is the distance between the trawl doors which can range from 25 m for smaller vessels and up to 65 m for larger vessels, for a single net, and up to 110 m if twin-rigging.</p> <p>Pair Trawling: The horizontal opening of the trawl is maintained by the distance between the two vessels as they tow the gear, approximately 300-400 m apart, depending on water depth and target species with a headline height of 6-10 m (Seafish, 2015).</p> <p>As there are no trawl doors, the overall drag of the gear is reduced, allowing the vessels to tow a slightly larger net without increasing their fuel consumption.</p> <p>Seine Netting: This method uses a significantly lighter net than those used for pair and twin trawling and therefore can only be operated on clean ground (sandy, muddy, mobile sediments) as the net will be easily damaged on harder, rockier ground (Seafish, 2015).</p>

Parameter	Description
Manoeuvrability	<p>Single and pair vessel trawling: These vessels tend to target areas of firmer rockier seabeds and will often tow along edges of firm ground or along the edges of banks or troughs, restricting their ability to alter course whilst trying to maximise fishing efficiency.</p> <p>Seine Netting: Once the net is deployed, any alteration of course other than the triangle shape deployment pattern would not be possible and it would take between 60-90 minutes from start of deployment to full recovery back to the vessels back deck. It is understood that the maximum lengths of ropes deployed each side of the net by the larger seine netters can be up to 3 km (Seafish, 2015).</p>
Gear penetration into seabed	<p>Single vessel and pair trawling: The ground contact fishing gear (e.g. trawl doors, clump weights, ground lines) will be in contact with the seabed, however, gear penetration is generally minimal and rarely exceeds a few centimetres.</p> <p>Seine Netting: No gear penetration of the seabed.</p>

Table 1: Technical summary of demersal whitefish fishery

3.2 PELAGIC

Currently, virtually all Scottish Pelagic trawling involves one vessel towing a single pelagic net. Pelagic trawl doors and sweep weights maintain the net opening, which typically have a significantly larger opening than demersal trawls (Figure 4). The key parameters of relevance to potential interactions with FOW are summarised in Table 2.

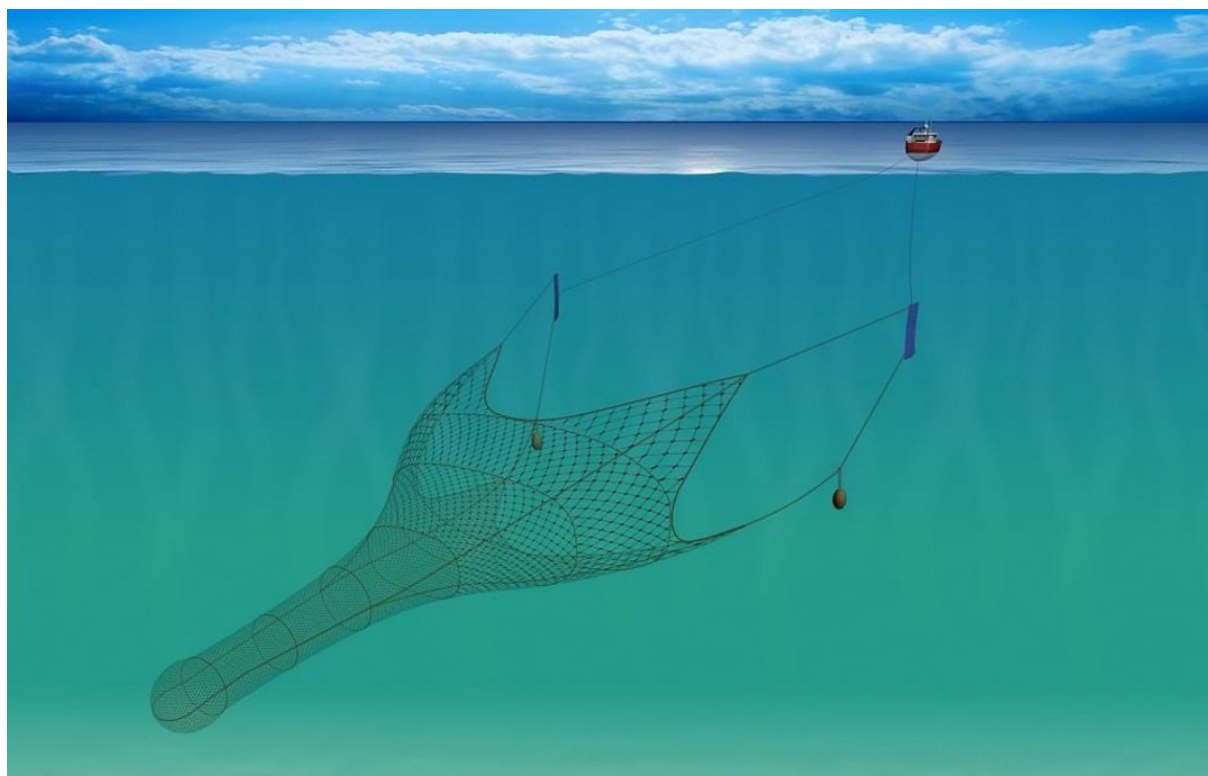


Figure 4: Pelagic trawling (Seafish, 2015)

Parameter	Description
Vessel (size and configuration)	At the time of writing, the Scottish pelagic fleet consists of 22 vessels primarily based in Fraserburgh, Peterhead and Shetland, plus five additional vessels that fish alongside the Scottish fleet but operate from other UK ports. The pelagic fleet vessels range from 40-86 m in length.
Target species	Scottish pelagic trawlers predominantly target shoals of herring and mackerel, fishing only for a few weeks each year and maximising returns with the demand in the market.
Gear (dimensions and configuration)	These vessels tow a very large net just off the seabed with an opening width at the mouth of the net from 100 m to a maximum of 200 m with headline heights ranging from 60-150 m. During fishing operations, the net can be up to 1 km behind the vessel's surface position. Trawl doors and sweep weights are required to ensure the net opening and height are in the correct location in the water column to capture as much of the shoal as needed. Pelagic trawl doors range in size from 6 m high by 2 m wide weighing up to 3,000 kg. The tow weights used to assist the vertical opening of the net generally weigh 250-500 kg.
Manoeuvrability	The vessel heading course is determined by the direction and course of the shoal of fish, therefore the vessels do have the ability to alter course as required when engaged in fishing. However, any course alteration, if not in line with the shoal of fish, could be very costly resulting in a reduced catch.
Gear penetration into seabed	None

Table 2: Technical summary of pelagic fishery

3.3 NEPHROPS

Twin-rig trawling is the most common fishing method used by vessels targeting nephrops in the central and northern North Sea. The vessel tows two nets using specially designed doors to give the nets spread and effective fishing width. A central clump weight is positioned between the two nets to ensure the gear stays tight to the seabed during fishing operations (Figure 5). The basic configuration of the fishing gear is as shown in Figure 1. Key parameters of relevance to potential interactions between twin-rig trawlers and FOW are summarised in Table 3.



Figure 5: Chain link clump weight and roller ball clump weights (Source: John Watt, 2020)

Parameter	Description
Vessel (size and configuration)	Twin rig trawling is the most common fishing method used by vessels targeting nephrops with approximately 225 vessels, predominantly ranging from 12-27 m in length, fishing in the North Sea and West of Scotland areas (Seafish, 2020).
Target species	A vessel targeting nephrops can catch other species as a by-catch due to the small cod-end mesh size utilised (80 mm). Species such as angler, haddock, lemon sole, plaice, witch and whiting are all commonly landed by nephrops trawlers.
Gear (dimensions and configuration)	<p>The nets used for targeting nephrops normally have an 80-100 mm cod-end mesh size and are designed with a very low headline height of around 0.5 m. These low fishing nets are known as scraper trawls. These nets sit tight on the seabed to capture mainly ground fish and nephrops, with the low design helping to avoid white fish species which swim slightly higher in the water column.</p> <p>The trawl nets, trawl doors and centre clump weights range in size to suit each vessel's engine horsepower. A standard set up commonly used is a single trawl door weighing 400-600 kg with a centre clump weighing 600-1,000 kg (this can be a combination of heavy chain links or a purpose made roller ball, depending on vessel suitability).</p> <p>Once the trawls are deployed to the seabed, the distance or spread between the trawl doors would commonly range from 100-150 m in water depths of 100-200 m. Again, the net spread is dependent on the length of combination sweep line ropes used for the connection between the doors and the net.</p>
Manoeuvrability	<p>During fishing operations, a twin rig trawler would commonly make large alterations of course up to 45° to avoid oncoming vessels or to avoid a potential subsea snagging hazard.</p> <p>There are times during fishing over restrictive areas or to maximise catch by staying on a smaller area of ground, when a trawler will turn 180° around. A severe alteration like this has to be well planned and done over a period of 30-45 minutes. These slow, timely course alterations are to avoid entanglement of the fishing gear on the seabed and to continue fishing as the vessel manoeuvres. A 180° turn would normally require a space of around one mile to complete.</p>
Gear penetration into seabed	Given nephrops are found in soft muddy substrate, a degree of gear penetration into the seabed by the trawl doors is possible and could be up to 100 mm for heavy gears in soft substrates. Higher penetration depths would also occur during a severe alteration of course causing a trawl door to change angle and penetrate farther than normal into the seabed.

Table 3: Technical summary of nephrops fishery

3.4 SCALLOP DREDGING

Scallop vessels generally tow between one and two beams onto which a number of dredges are attached, depending upon vessel size, engine power and winch capacity (Figure 6). The scallops are raked from the seabed by steel teeth that are attached along the leading edge of the dredges (Figure 7).

The key parameters of relevance to potential interactions with FOW are summarised in Table 4.

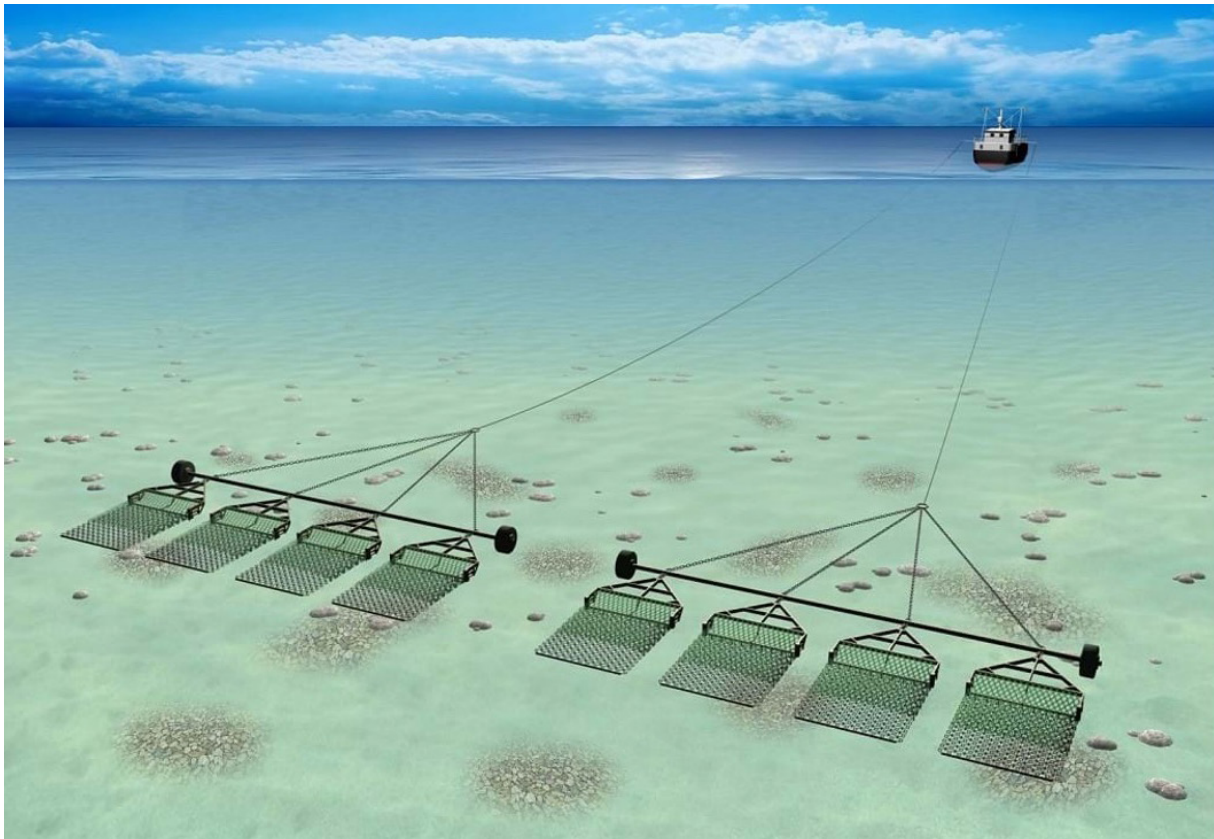


Figure 6: Scallop dredging (Seafish, 2015)



Figure 7: Scallop dredge teeth (Source: John Watt, 2020)

Parameter	Description
Vessel (size and configuration)	<p>Scallopers ('clammers') that target Scottish waters range from the small inshore vessel (less than 10 m) towing three or four two-foot dredges up to the large 30 m vessels equipped with outrigger booms which can handle up to 28 dredges, 14 on each bar. The 2019 UK fleet is reported as consisting of 259 scallop dredgers, with 185 vessels under 10 m and 74 over 10 m (Seafish, 2020). The number of dredges deployed varies with the size of the vessel, and the distance from land that the vessel fishes.</p> <p>The larger, +10 m vessels that predominantly comprise the north east fleet are more likely to target the further-from-shore areas included within the PO areas outlined in the SMP. These larger vessels are also generally nomadic in their fishing patterns, spending significant periods working outside of Scottish waters (see Section 4.4).</p>
Target species	Scallopers target king and queen scallops.
Gear (dimensions and configuration)	<p>A number of dredges are attached to a bar fitted with bridles, which are towed using a single warp. The dredges are usually deployed from outrigger booms. Each dredge consists of a ruggedly constructed triangular steel frame and a sprung tooth bar, behind which a mat of linked steel rings is secured. Heavy netting is laced into the frame to form a bag into which the catch is retained. As scallops usually lie recessed in sand and fine gravel, they are raked out by the teeth and swept into the bag (Seafish, 2015).</p> <p>The total gear width, which is indicative of the working area required for scallop dredging, can range from 9.2 m for an 11 m vessel to 16.5 m for a 30 m vessel.</p>
Manoeuvrability	Vessels normally fish within a very small area repeatedly turning 180° several times during a 90 minute tow.
Gear penetration into seabed	<p>Scallop dredges are fitted with a teeth bar designed to penetrate the seabed up to a depth of 20 cm. A standard teeth bar would have teeth 150 mm in length, which will wear down during fishing operations. Once 40% wear is observed, these are replaced to ensure effective fishing.</p> <p>Scallop dredging would be the greatest concern to any shallow buried assets given they tend to make multiple passes over a small area.</p>

Table 4: Technical summary of scallop dredge fishery

3.5 SQUID

Demersal trawling using a single trawl net is the key method used to target squid. The basic configuration of the fishing gear is as shown in Figure 1 in Section 3.1.1 and the key parameters of relevance to potential interactions with FOW are summarised in Table 5.

Parameter	Description
Vessel (size and configuration)	Vessels targeting squid range from 10-30 m in length.
Target species	Squid have a short lifespan and stock levels depend on the survival success rates of individual breeding seasons. Squid is an important alternative to whitefish for the demersal trawler fleet.
Gear (dimensions and configuration)	A single trawl net with a 40 mm cod-end mesh size, set up with large rockhoppers (e.g. 18" on a 20 m line) on the ground gear to minimise damage to the nets. The vessel would deploy trawl doors to give the net width and spread on the seabed, with a headline height ranging from 5-6 m.
Manoeuvrability	During fishing operations, squid trawlers commonly make large alterations of course up to 45° to avoid oncoming vessels or to avoid potential subsea snagging hazards. There are times during fishing, when, due to seabed factors or to maximise catch by staying in a smaller area of ground, a trawler will turn 180°. A severe alteration has to be well planned and done over a period of 20-30 minutes. These gradual course alterations are to avoid entanglement of the fishing gear on the seabed and to continue fishing as the vessel manoeuvres. A 180° turn would normally require a space of around 0.5 mile to complete. The squid gear configuration gives more manoeuvrability than a twin rig trawl configuration, as there is no centre clump weight.
Gear penetration into seabed	The ground contact fishing gear (e.g. trawl doors, clump weights, ground lines) will be in contact with the seabed. Given the seabed conditions of areas that squid are generally targeted are on rocky or uneven ground, however, there should be minimal gear penetration.

Table 5: Technical summary of squid fishery

3.6 CREELS

Creels (pots) are essentially traps baited to catch mobile shellfish such as lobster and crab. A number of creels are set on a main line marked with a buoy or a 'dhan' (flag and buff) at either end (Figure 8 and Figure 9). These are deployed on the seabed for an average soak time of three days, before the creels are hauled and emptied. Creels are fished on a continuous cycle to maintain cover of the ground.

The key parameters of relevance to potential interactions with FOW are summarised in Table 6.

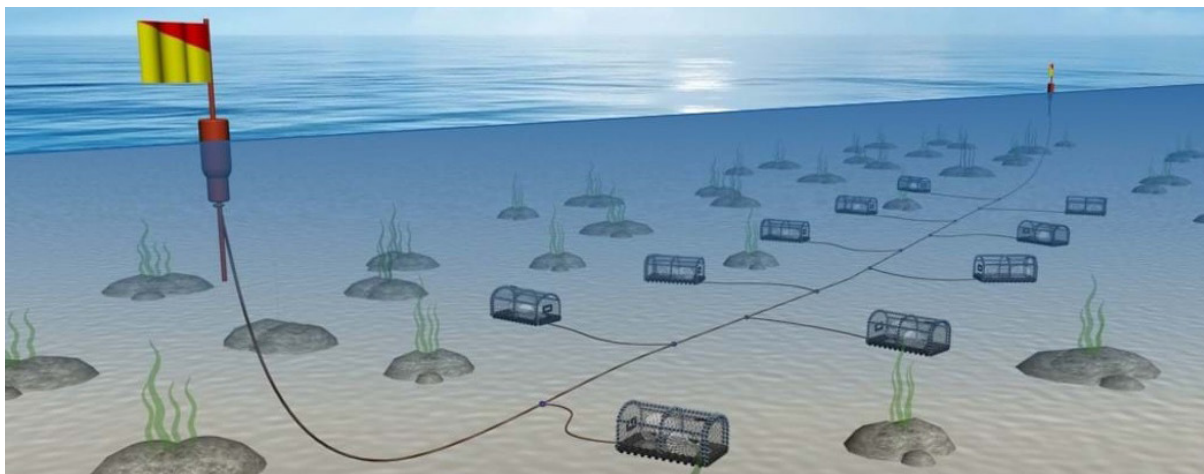


Figure 8: Creeling (Seafish, 2015)



Figure 9: Parlour creels (Source: BMM, 2016)

Parameter	Description
Vessel (size and configuration)	Historically, creeling was predominantly a small vessel nearshore fishery, however there are now increasing numbers of vessels over 20 m targeting crabs and lobsters as far offshore as 120 miles. The larger vessels will store their catch in vivier tanks to keep them alive onboard.
Target species	Creels are the principal method used to target active scavenging crustaceans such as brown crab, velvet crab, lobster, and whelk.
Gear (dimensions and configuration)	The majority of vessels fish with parlour creels, which can range in size from 34" to 48" in length. Vessels working in offshore areas generally work between 1,500-5,000 creels in fleets of up to 100 creels. Smaller vessels working closer to shore would generally fish 500-1,500 creels in fleets of up to 50 creels.
Manoeuvrability	Creel vessels will have limited manoeuvrability during deployment and recovery procedures, however, they are far more manoeuvrable than any vessel engaged in trawling.
Gear penetration into seabed	Initial seabed penetration is limited to the anchors deployed when setting the fleets of creels, which are used to limit creel movements while fishing. However, when the creels are hauled (retrieved), there will be a certain amount of dragging across the seabed before they are lifted to the vessel.

Table 6: Technical summary of creel fishery

4 MARINE OPERATIONS

The following section provides a summary of marine operations associated with fishing. This is provided separately by fishery (Table 7 to Table 12). The summaries are focused on aspects of fishing operating practices which may be of relevance with regard to potential interactions between fishing activity and FOW, including:

- Operational range;
- Towing practice;
- Seasonality; and
- Seabed constraints and availability of grounds.

4.1 DEMERSAL WHITEFISH

Parameter	Description
Operational range	<p>Single vessel trawling: Trips range between 6-10 days dependent on transit time to fishing grounds. Vessels have the ability to fish up 400 miles from home ports, targeting areas such as the northern North Sea, West of Shetland, Norwegian sector, Rockall bank, and if quota is available, in Faroese waters.</p> <p>Pair trawling: Trips typically range between 5-8 days with vessels mainly targeting the northern North Sea, Norwegian sector, and West of Shetland.</p> <p>Seine netting: Trips range between 3-7 days and are typically in the central and northern North Sea.</p>
Towing practice	<p>Single vessel and pair Trawling: The boats will tow for up to four or five hours at 2.3-3.5 kts.</p> <p>Seine netting: Scottish seine is a very skilful operation requiring extensive knowledge in locating fish within the grounds, accurate rigging of the gear, and consideration of tidal streams in relation to the gear throughout the shooting, towing and hauling operation (Seafish, 2015).</p>
Seasonality	<p>Single vessel and pair trawling: All year round, however, grounds and areas change seasonally.</p> <p>Seine netting: All year round, however, grounds and areas change seasonally</p>
Seabed constraints and availability of grounds	<p>Single vessel and pair trawling: These vessels are targeting the firmer, rockier seabeds and will often tow along edges of firm ground restricting their ability to alter course while trying to maximise fishing capabilities. When utilising large rockhoppers on the net these vessels can tow in most seabed conditions as it enables the net to pass over boulder areas and rocky seabed. Fishing grounds are targeted based on experience and historical information of good fishing in certain areas.</p> <p>Seine netting: This method requires clean ground as the nets are lighter and more easily damaged by seabed obstacles.</p>

Table 7: Marine operations summary for demersal whitefish fishery

4.2 PELAGIC

Parameter	Description
Operational range	Pelagic trawlers have an extensive operational range, fishing from inshore waters to several hundred kilometres offshore. Vessels follow the herring and mackerel shoals across key areas within their distribution range (i.e. migratory routes, spawning grounds).
Towing practice	<p>These vessels can catch a whole shoal of fish in short tows of 30-60 minutes; whereas the amount of time spent identifying the shoals can be significantly higher than other fishing methods, such as demersal trawling.</p> <p>Catches between 500-1,000 tonnes from a single tow are not uncommon. Once the net is retrieved alongside the vessel, a vacuum pump is attached to the back end of the net and the fish are pumped into refrigerated water tanks. These vessels can hold up to 3,000 tonnes of fish before having to return to port to offload. Normally a catch of 500-1,000 tonnes would be sufficient to return to port, as fish quality is of primary importance to achieving the maximum price on the market.</p>
Seasonality	A normal fishing season for a pelagic vessel would generally last 12-14 weeks in total. Typically, a mackerel fishing season runs over January-February and November-December whilst herring are generally targeted between June and August.
Seabed constraints and availability of grounds	Shoals of mackerel and herring tend to follow the same migratory patterns each year. However, vessels are equipped with state-of-the-art electronics to find and track the shoals of pelagic fish, should the pattern alter.

Table 8: Marine operations summary for pelagic fishery

4.3 NEPHROPS

Parameter	Description
Operational range	While the nature of nephrops fishing activity varies somewhat between Scotland’s different coastal regions, for the vessels of Scotland’s north east fleet (being those most likely to target the regions in and around the PO areas), trips typically range between 5-8 days dependent on transit time to fishing grounds. The vessels have the ability to fish up to 400 miles from home ports out to the Norwegian and Danish sector lines in the central and northern North Sea.
Towing practice	During fishing operations, the vessel will tow at a speed of 2.4-3 kts for a period of five hours, covering a distance of up to 15 nm on one tow. A single tow can consist of going in a single direction, include 180° turns or include multiple 180° turns if targeting a specific area where ground conditions or seabed hazards restrict fishing, like wrecks, boulders or historical snag areas. When fishing in 150 m water depth a vessel would pay out 450 m or three times the water depth from the vessel’s winches, with fishing gear extending 300-400 m behind the vessel position on the seabed.
Seasonality	The larger nephrops trawlers operate over a wide area during the 12-month fishing season, as noted in the operational range section. Local inshore vessels are less mobile and tend to fish the same local inshore grounds all year round.
Seabed constraints and availability of grounds	The nephrops fishery is constrained by the sediment preferences of the target species; nephrops are normally fished in areas of soft muddy seabed where they create burrows into the seabed.

Table 9: Marine operations summary for nephrops fishery

4.4 SCALLOP DREDGING

Parameter	Description
Operational range	Vessels normally operate in shallower banks closer to shore within 40 miles (with some exceptions, including the areas around Guernsey).
Towing practice	Vessels normally fish within a very small area repeatedly turning several times during a 90 minute tow.
Seasonality	Vessels are predominantly nomadic, operating all around the UK coast depending on season.
Seabed constraints and availability of grounds	Dredging is constrained by the seabed preferences of the target species. Scallops are found on sandy or shelly seabed where they bury into the seabed substrate, whereas rocky and muddy substrates in particular are less suitable for scallops .

Table 10: Marine operations summary for scallop dredge fishery

4.5 SQUID

Parameter	Description
Operational range	The main squid fishing areas can change annually. Currently the most activity is reported off Wick to Helmsdale, Lossiemouth to Roseharty and Stonehaven to Arbroath (though squid is also fished further south than Arbroath). As the fishing season progresses towards autumn, the squid and thereby the fishery, moves to deeper waters up to 20 miles offshore.
Towing practice	Vessels normally tow in areas targeting a water depth or seabed type, during hours of daylight, when the squid are concentrated near the seabed (Hastie et al. 2009). If a good catch is recovered, the vessel will focus on this small area until catch rates decline.
Seasonality	A typical squid season ranges from July to October/November. The timing of the fishery, however, is dependent upon the arrival of the species to the area, which is believed to be linked to environmental factors such as water temperature and day length (Hastie et al., 2009).
Seabed constraints and availability of grounds	The squid fishery may also be somewhat constrained by the seabed preferences of the target species. It is generally thought that squid need hard substrate for spawning, and they are known to migrate offshore as they grow bigger (Hastie et al., 2009).

Table 11: Marine operations summary for squid fishery

4.6 CREELS

Parameter	Description
Operational range	Vessels over 15 m are now targeting crabs and lobsters as far as 120 miles offshore, spending up to 5 days offshore.
Creeling practice	The largest creel vessels fishing offshore can deploy up to 220 creels per fleet, with fleet lengths of up to 3 km. The mid-range vessels will set fleets of approximately 50-100 creels per fleet, with the smaller nearshore vessels setting fleets of 5-50 creels. Creel vessels are not able to transport all active fleets in one trip therefore multiple trips are required to shift working areas. Smaller vessels, while less relevant to the majority of the POs, will also be more weather sensitive. Anchors are utilised to limit the movement of the creels once they are set on the seabed. The dynamic nature of the deployment and recovery processes means that some dragging of the creels on the seabed may occur during these short operational windows.
Seasonality	Fishing effort inshore follows a seasonal pattern with activity varying to shelter from adverse weather conditions, react to seasonal changes and exploit target species. The larger vessels working farther offshore tend to fish all year round.
Seabed constraints and availability of grounds	The creel fishery is constrained by the sediment preference of their target species. Creels targeting crab are normally deployed in areas of shallower water with sand and shell sediment seabed. These substrates are also targeted by scallop dredgers. The two fishing methods, scalloping and static gear, cannot coexist; this has caused some challenges to the scallop industry as the creel numbers increase and subsequently cover more ground and move farther offshore.

Table 12: Marine operations summary for creel fishery

5 GEOGRAPHICAL DISTRIBUTION

An indication of the geographical distribution of fishing activity by UK vessels around Scotland is given in Figure 10 to Figure 13 based on Vessel Monitoring System (VMS) data combined with information on landings values from logbook data. It should be noted that this data only includes information for vessels over 15 metres in length and therefore is not representative of activity by vessels in the under 15 metre category.

It was judged from the outset of the study that the use of VMS and logbook data would be sufficiently representative of the fishing activities typically conducted within the vicinity of the PO areas identified in the Sectoral Marine Plan. This decision was driven principally by the assumption that the further-from-shore fishing grounds included within and around these PO areas would primarily be targeted by the larger, +15 metre vessels that constitute the VMS datasets. By contrast, due to their distance from shore, the PO areas were considered to generally lie outside of the range of the smaller vessels not covered by the VMS data. It is understood and acknowledged that vessels under 15 metres account for a significant proportion of the fishing effort conducted in Scotland's waters, but for the reasons outlined, this under 15 metre vessel activity is not expected to significantly overlap with Scotland's FOW development areas in the short-to-medium term, and has therefore not been explored here in detail.

Further, while the focus of this report is on Scottish fisheries, and the data utilised concerns the activity of UK fishing vessels in Scotland, it should be noted that fishing fleets from a number of additional European nations (including Norway, Ireland, Denmark and the Netherlands) also operate in Scotland's waters.

Data is provided separately for the following key fishing methods:

- Demersal trawls/seines (Figure 10);
- Scallop dredges (Figure 11);
- Pelagic trawls (Figure 12); and
- Creels (Figure 13).

In addition, a summary of feedback provided by fisheries stakeholders as part of the formal consultation process on the Sectoral Marine Plan, including information on fishing activities which take place within specific POs in Scottish waters, is included for reference in Appendix 1.

5.1 DEMERSAL TRAWLS/SEINES

The distribution of fishing activity by demersal trawls/seines is illustrated in Figure 10 based on VMS data by value (annual average 2014-2018). This includes activity by vessels engaged in the nephrops, squid and whitefish fisheries.

The activity recorded in inshore grounds corresponds predominantly with the nephrops fishery. Key nephrops grounds are however also found in offshore areas particularly off the east coast.

Whitefish are predominantly targeted in areas off the north of Scotland as well as offshore grounds off the east coast.

Squid grounds are predominantly found off the north coast as well as in the Moray Firth and off the east coast around the Firth of Forth area. Grounds around the Moray Firth and the Firth of Forth area are understood to have been of increasing importance to the squid fishery in recent years.

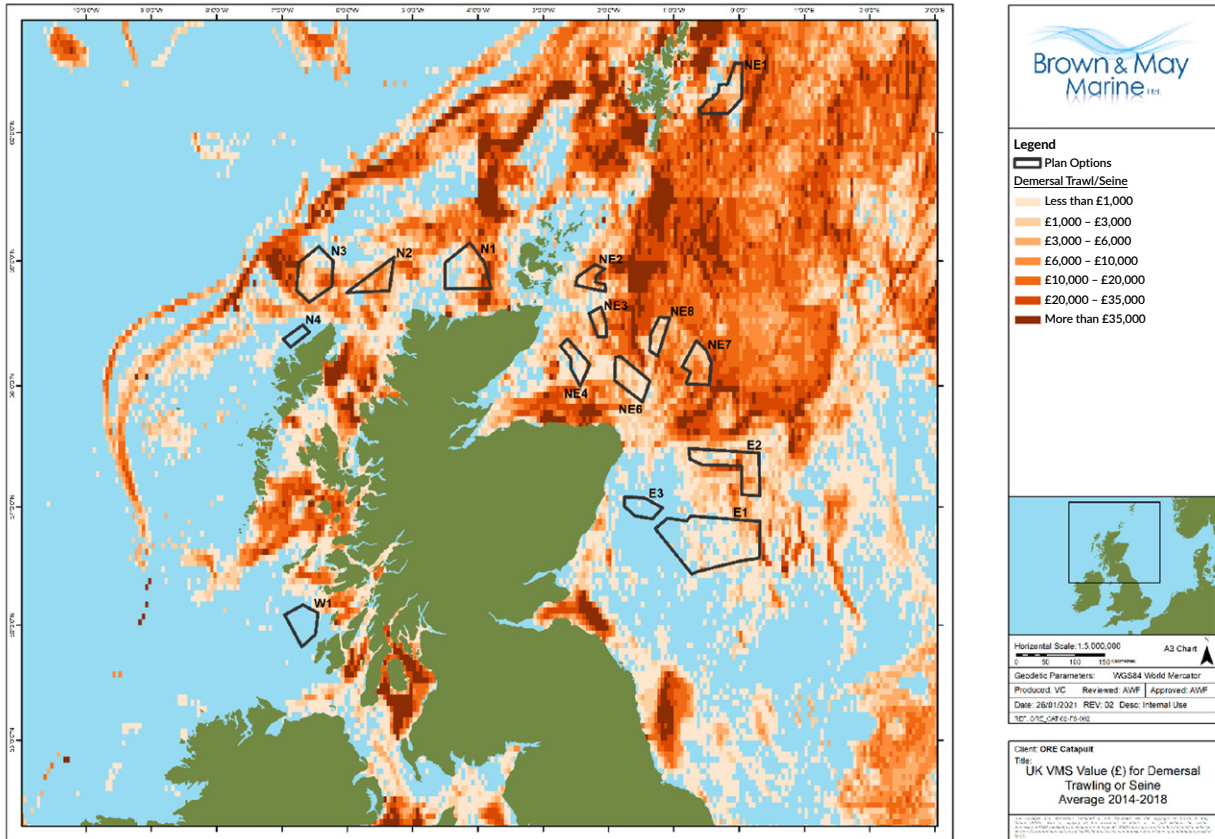


Figure 10: Demersal trawls/seines VMS data by value (£) (annual average 2014 -2018) (Source: MMO)

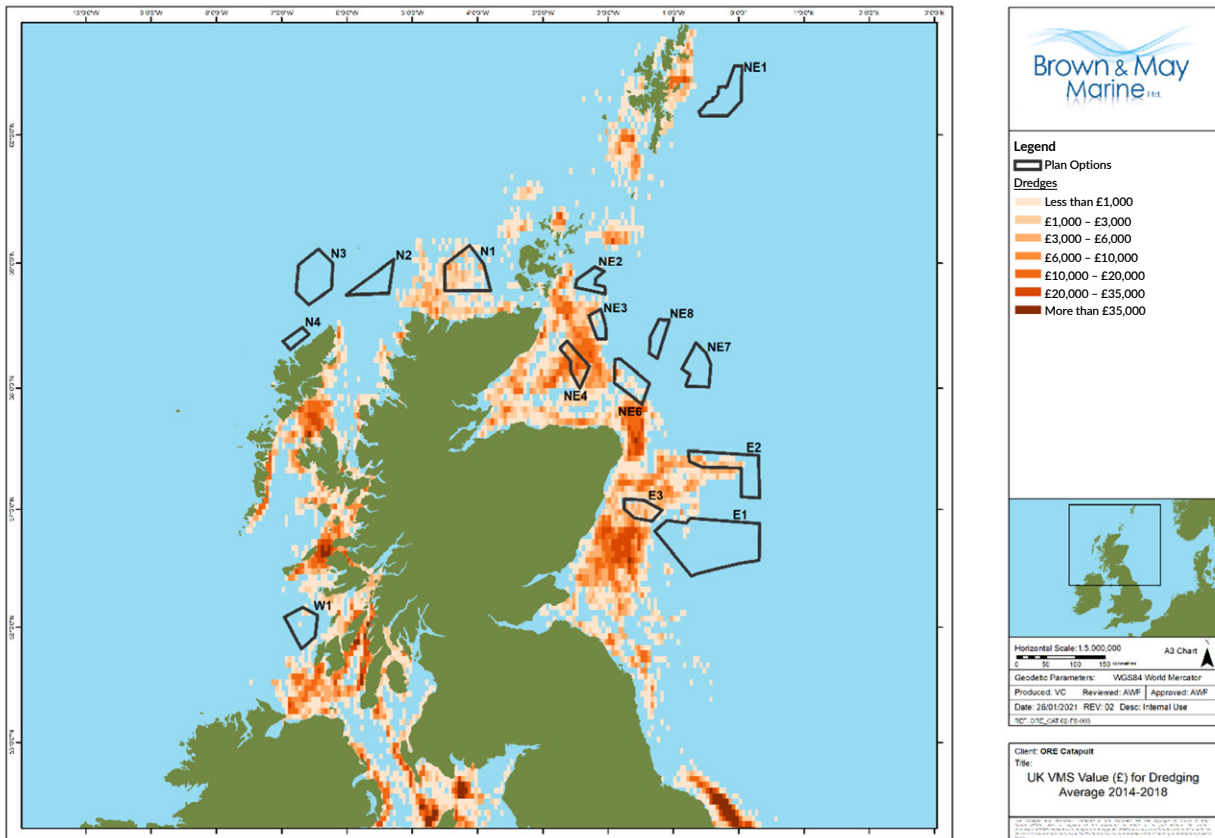


Figure 11: Scallop dredge VMS data by value (£) (annual average 2014 -2018) (Source: MMO)

5.2 SCALLOP DREDGING

The distribution of fishing activity by vessels engaged in scallop dredging is illustrated in Figure 11 based on VMS data by value (annual average 2014-2018). As shown, scallop dredging is undertaken around Scotland over discrete grounds. As noted in Table 10, some of the scallop dredgers active in Scottish waters are part of the nomadic scallop dredge fleet that target grounds around the UK.

5.3 PELAGIC

The distribution of fishing activity by pelagic trawls is illustrated in Figure 12 based on VMS data by value (annual average 2014-2018). This includes activity by vessels predominantly targeting mackerel and herring. As it is apparent from Figure 12, pelagic trawling is primarily undertaken in grounds off the north coast of Scotland, including significant activity around Shetland as well as in offshore areas off the north east and north west coast.

5.4 CREELING

The distribution of fishing activity by vessels using creels is illustrated in Figure 13 based on VMS data by value (annual average 2014-2018). It should be noted that as this data does not include vessels under 15 metres in length, it is not representative of the geographical distribution of the activity of many of the Scottish vessels which operate (generally under 10 m in length). There is spatial data available for under 15 metres creel vessel activity, however the four study areas were focussed on nearshore activity, with limited relevance to the PO areas (Kafas et al., 2014)¹.

As outlined at the beginning of Section 5, it was judged from the outset of the project that VMS data would be sufficiently representative of the fishing activities typically conducted within the vicinity of the Sectoral Marine Plan's PO areas. VMS data suggests that areas off the north and north west coast of Scotland as well as discrete smaller areas off the east and the south west coast support the greatest level of activity by over 15 m creelers. Smaller creelers normally concentrate their activity in inshore areas closer to shore and would be expected to be active at varying degrees across the majority of the Scottish coast.

1 <https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=1568>

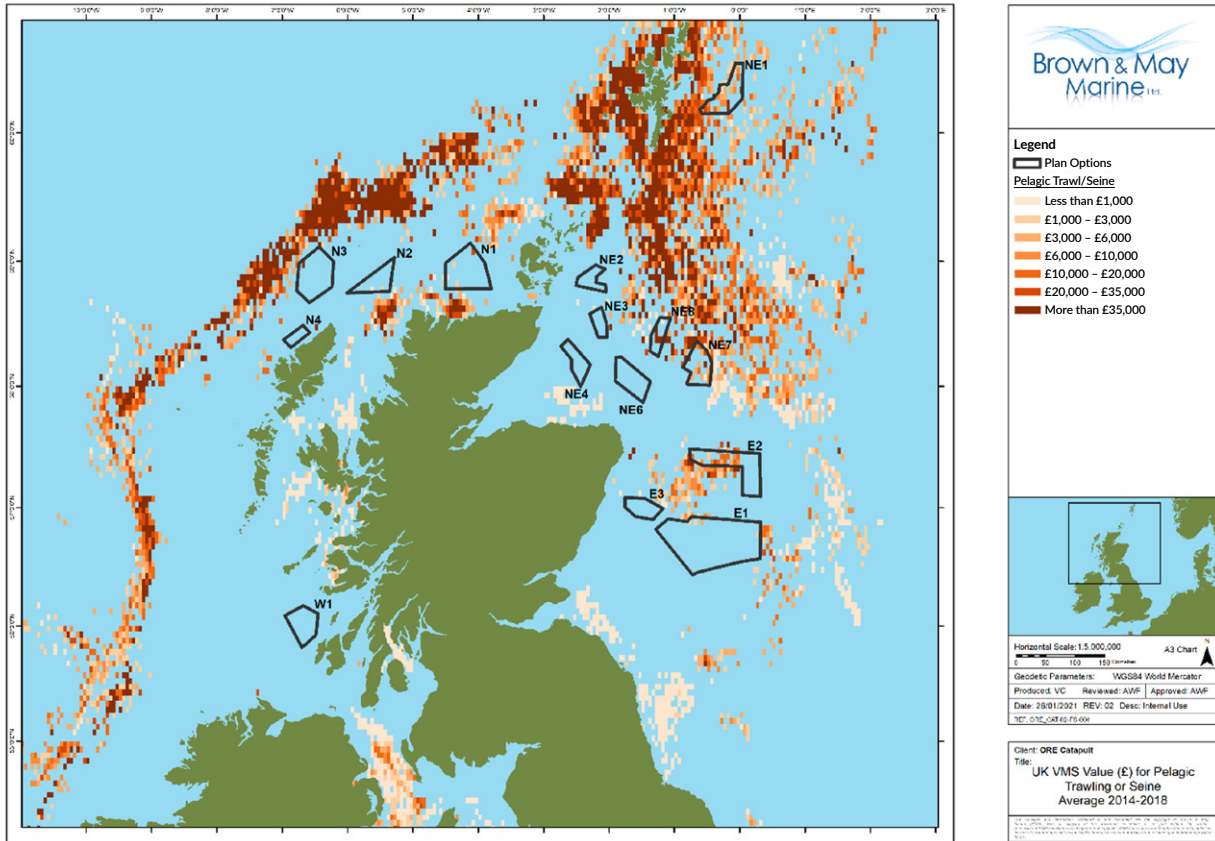


Figure 12: Pelagic trawls VMS data by value (£) (annual average 2014 -2018) (Source: MMO)

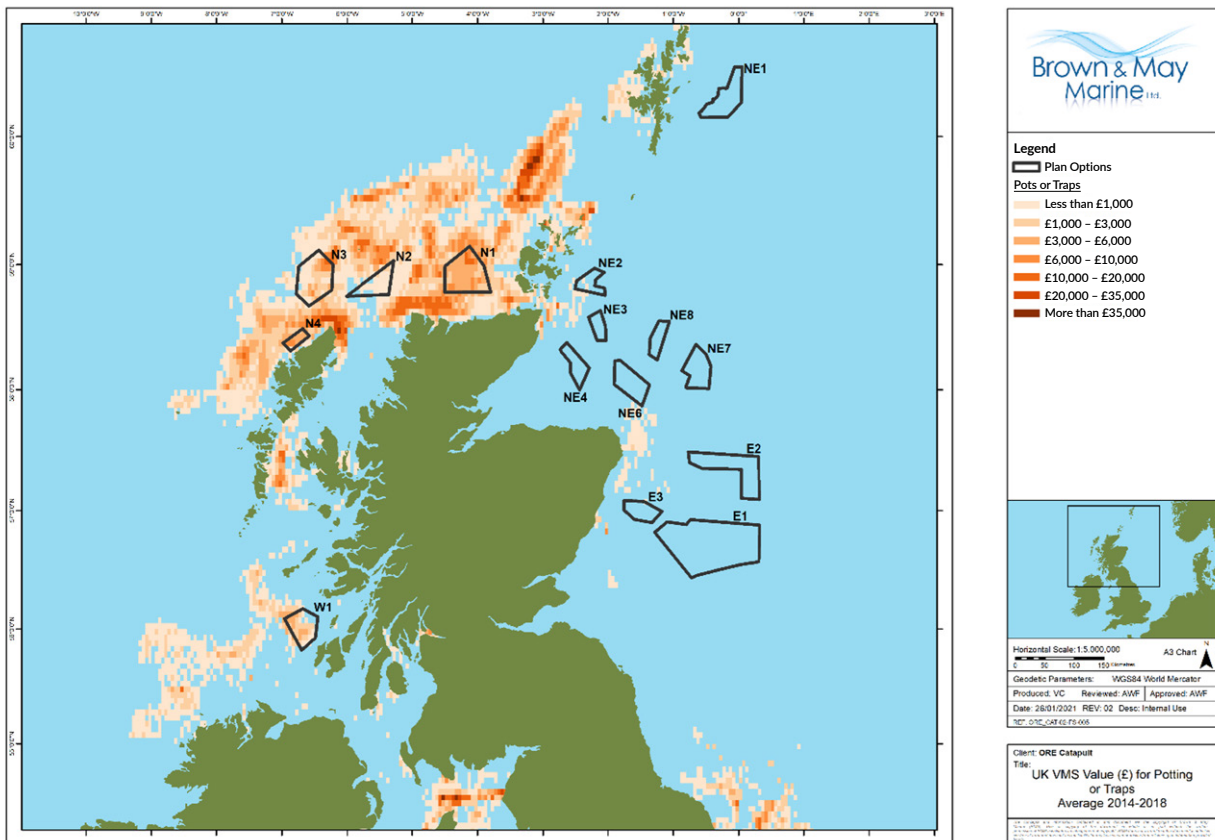


Figure 13: Pots/Traps VMS data by value (£) (annual average 2014 -2018) (Source: MMO)

6 LIFECYCLE

The fishing industry is subject to continuous change as a consequence of the range of often inter-related factors which affect fishing activities. Changes in national and international controls and regulations, status of stocks, technological developments, economics and market trends, amongst other factors, play an important role in determining the level and nature of fishing activity that a given area may support at a given time.

The past patterns of the Scottish pelagic, demersal and shellfish fisheries provide some insight into the changes that might occur in the future.

6.1 DEMERSAL FISHERY

The trend within the Scottish demersal fleet has seen some amalgamation of licences and quotas with a progressive reduction in the number of vessels but with an increase in the size and catching efficiency of the vessels.

In addition to on-going generic factors such as fisheries controls and economics, during the past 60 years, three distinct factors are generally considered to have had a significant effect in determining the recent cycles of Scottish demersal fishing, namely:

- The effects of the so called “Icelandic Cod Wars” and the subsequent implementation of 200-mile fisheries limits;
- The implementation of the EU Common Fisheries Policy (CFP); and
- UK fishing vessel decommissioning schemes.

The system of pressure stock quotas and vessels licences – with association vessel capacity units forming the basis of the EU’s CFP, along with other EU and national legislation – has had the effect of limiting the sizes of the Scottish fishing fleet, as well as its catching capacity. In addition, a number of vessel decommissioning schemes in the late 1990s and early 2000s effectively reduced the size of the Scottish demersal fleet. In 1975 there were in the order of 850 registered Scottish demersal fishing vessels of over 15 metres in length, reducing to 755 in 1985 and subsequently to 330 in 2019 (Marine Scotland, 2020).

Up until the mid-to-late 1990s, a significant number of Scottish fishing vessels were engaged in single boat seine netting (also known as “flydragging”). In recent years however there has been notable decline in its use, with the majority of demersal vessels either engaged in single boat or pair trawling or seining.

6.2 PELAGIC FISHERY

The most significant change to-date of the Scottish pelagic fishery has been the switch from herring to mackerel as the key target species and a dramatic reduction in the number of vessels as a consequence of technological developments and the economies of scale associated with ever larger vessels. Herring however remains an important target species for the pelagic sector, in most instances being the second most important in monetary terms.

In the early 1960s, adopting Norwegian developments, the Scottish pelagic fishery changed from drift netting to purse seining and pair trawling, an important factor being the development of sophisticated sonars with the capacity to locate herring shoals. Unfortunately, the efficiency of the Scottish and other

European and Scandinavian fleets resulted in an over-exploitation of the North Sea herring stocks, peaking in 1972 followed by a total ban on North Sea herring fishing in 1977 which lasted for four years.

A consequence of the ban was that the Scottish pelagic fleet had to find alternative species to fish, the main one selected being mackerel, which previously Scottish vessels landed in comparatively small quantities. For example, only 18,620 tonnes of mackerel were landed by Scottish vessels in 1972 (Marine Scotland, 1973). Whilst Scottish vessels resumed herring fishing following the lifting of the ban, catches since have not been at the levels prior to its implementation, being in 2019, for example, at 49,433 tonnes (Marine Scotland, 2020). By 1987, there were 100-140 Scottish vessels engaged in the fishery with recorded mackerel landings of 170,350 tonnes (Marine Scotland, 1988).

From the mid 1990s purse seining began to be progressively replaced by pelagic trawling, in part due to changes in the migration behaviour of mackerel as well as the higher catch rates that could be achieved (Pers. comm vessel owners, 2021). A notable feature of the of the pelagic sector from 2000 onwards, and in the last five years in particular, has been the amalgamation of vessel licences and quotas into fewer and larger more sophisticated vessels. Subsequently the main Scottish pelagic fleet now comprises of only 22 vessels of lengths primarily between 64 and 86 metres (plus a further five vessels operating from other UK ports, which fish alongside the Scottish fleet). The largest of these vessels has the capacity to keep 3,000 tonnes of fish in its refrigerated seawater tanks and averages catches of 800 tonnes with each haul of its net. Between 2015 and 2019, annual landings by the Scottish pelagic fleet have ranged from 234,457 to 301,394 tonnes (Marine Scotland, 2020).

6.3 SHELLFISH FISHERY

Creeling, with the exception of a limited number of larger vessels, is generally undertaken by under-10 metre vessels, and has remained relatively stable, in terms of the numbers of vessels. At present the under-10 metre fleet comprises 1,559 vessels, an increase of 5% over the past 10 years (Marine Scotland, 2020). (While it is recognised that most accurate measure of creel fishing effort is the soak time (the time that the creels spend in the water between deployment and recovery), rather than the number of creel vessels operating, and that there is not necessarily a linear relationship between the two measures, the number of creel vessels operating is used here as a guide for the purposes of this report. This is primarily due to public data being more readily available for the number of vessels operating, compared to the same for creel soak time, or the number of creels deployed.)

It is understood that currently within the Scottish fleet there are 90 vessels with scallop fishing entitlements. Of those with scallop fishing entitlements, between 75-80 % of the vessels are actively engaged in scallop fishing, almost all of which use dredges to do so. The dredging of specific scallop grounds is highly cyclical, whereby an area is heavily fished over a short period. The timeline required for an area to fully recover following a period of heavy scallop fishing is approximately 7-10 years, although vessels may revisit an area sooner (i.e. 3-7 years) in order to attempt a dredge. The overall levels of scallop dredging in Scottish waters is also cyclical, as a significant proportion of the Scottish scallop dredge fleet is nomadic, fishing grounds all around the UK and particularly in the English Channel. In 2019, approximately two thirds of the landing of scallops by Scottish vessels were of scallops caught in English and French waters, whereas in previous years the opposite has been the case (Marine Scotland, 2020).

Another recent cycle has been the growth of the nephrops trawl fishery, particularly its growth in the North Sea. Up until the mid-1980s, the Scottish nephrops fishery was comparatively small (although it was a significant fishery on the west coast during that period). However, as a consequence of a number of legislative and economic constraints on vessel targeting fin fish species, nephrops is now the second most valuable species of the Scottish fishing industry, with an estimated 60% of the demersal fleet targeting it (Marine Scotland, 2020a).

In recent years the squid fishery has become an important alternative to whitefish for the demersal trawler fleet particularly as the fishery is, at present, unregulated and ability to target the species relieves pressure on other restricted stocks such as whitefish and nephrops (Hastie et al., 2009). The squid fishery is usually of short duration although it has been reported to be lengthening (Young et al., 2006).

6.4 FUTURE LIFE CYCLES

With regards to the pelagic fishery, purely in terms of the age, value and profitability of the Scottish pelagic vessels, it would be expected to remain in a similar form to that which currently exists for at least the next 20 years. Similarly, the number and increased size of new build vessels entering the Scottish demersal fleet over the past 10 years suggests a fleet with a similarly stable structure. In the case of the creeling fleet, despite its past long-term resilience, continuing demand for its products, and comparatively lower investment and operating costs, the industry acknowledges that the current management approach needs to be reviewed to ensure the fishery's long-term sustainability (Marine Scotland, 2017). In the case of the Scottish scallop dredging fleet, whilst the age and structure of the fleet suggest a potentially stable future, as discussed below, other factors may adversely influence the life cycle of scallop dredging in its current form.

In comparison to assessing the operational longevity of the vessels and the structures of the fleets engaged in the fisheries discussed above, there is some uncertainty associated with predicting the future quantities of the various species they may catch, particularly with reference to the recent Brexit deal. A statement published by the Scottish Government concludes that "The Brexit fisheries deal negotiated by the UK Government will mean a fall in the quantity of key fishing stocks landed by the Scottish fleet", the key stocks being cod, haddock, saithe and whiting (Scottish Government, 2020). The statement does however accept that pelagic landings will see a modest gain.

As mentioned above, a significant proportion of Scottish scallop dredgers catches are taken from the English Channel, much of it in the Baie de Seine under previous EU CFP arrangements. This access has long been resented by French fishermen and has in recent years led to conflicts at sea. Understandably there is concern that after the initial five and a half years of the Agreement, the French Government will exert pressure for the access to be revoked. Should this access be lost, it is to be expected that there will be an increase in scallop dredging activity in Scottish waters.

Other factors likely to affect future fisheries in Scotland include the increasing implementation of fisheries management measures in Marine Protected Areas (MPAs) such as closed areas (particularly for demersal fisheries), the ability of the various fishing methods to co-exist with other offshore industries and the status of key stocks, whose distribution will be driven by factors such as climate change.

7 PORT REQUIREMENTS

An indication of the distribution of landings at the various Scottish port districts and of the relative importance of different species to each district is provided in Figure 14. This shows landings values by species type (shellfish, demersal and pelagic) as reported for the year 2019.

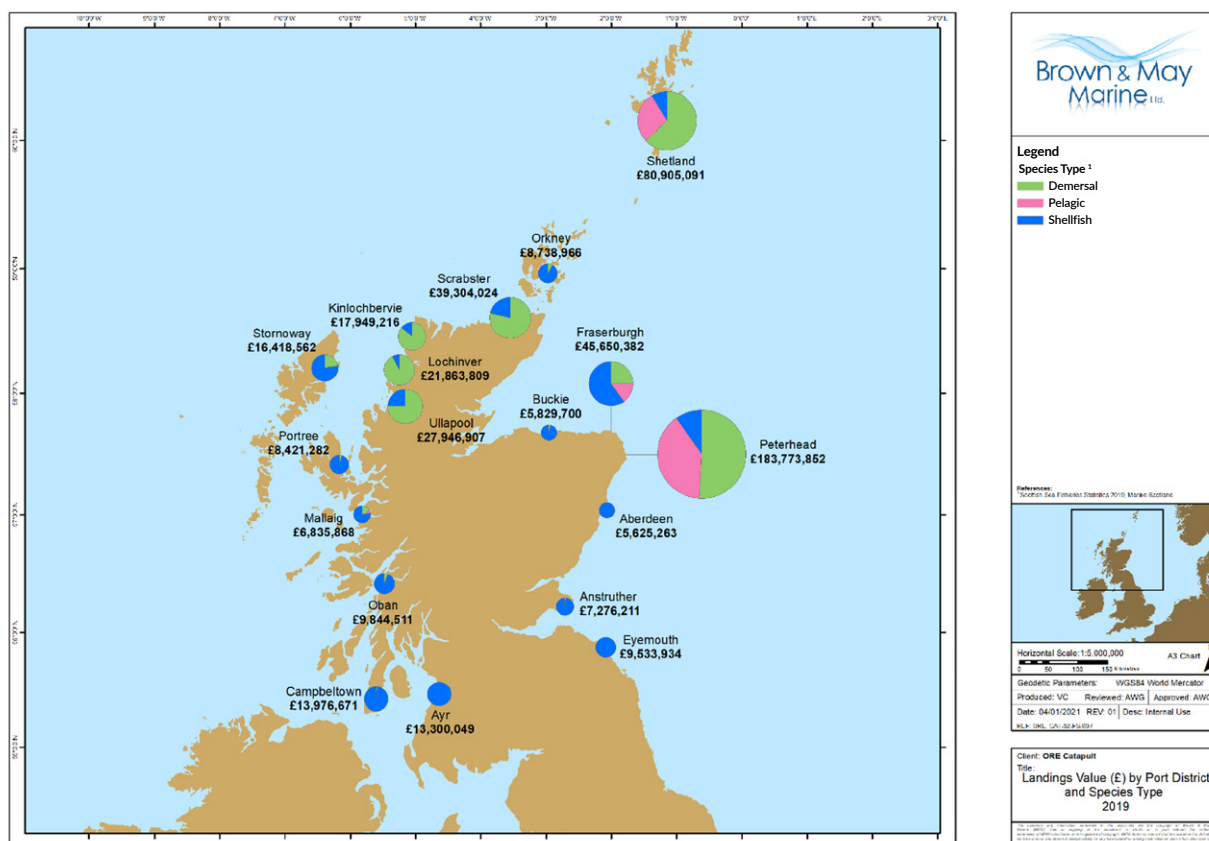


Figure 14: Value of landings (£) by Port District in 2019 (MSS, 2020)

A significant proportion of Scottish fishing vessels operate from ports located in the north east of Scotland, especially around Peterhead and Fraserburgh. This region has the greatest volume and value of landings, as well as a greater concentration of local fish processors and an important level of local economic dependence on fishing activity (Baxter et al., 2011; Marine Scotland, 2019). Shellfish, predominantly nephrops, account for a considerable proportion of the values of landings into Fraserburgh, whilst landings into Peterhead are predominantly of pelagic and demersal fish species, particularly mackerel, cod, haddock, saithe and whiting.

Shetland has a fishing sector on a similar scale to that of the north east and provides important landing facilities for many of Europe's pelagic fleets. Demersal species and shellfish also contribute significantly to the overall value of landings into Shetland. The north coast and Orkney support a small local industry and also have some busy fishing ports, notably Scrabster and Wick. Landings into the Scrabster district by value are predominantly of shellfish (lobster, crabs, scallops and squid) and demersal fish (cod, haddock, hake and monkfish). Landings into Orkney are primarily of shellfish, particularly lobster, crabs and scallops.

In the north west, Lochinver and Kinlochbervie are important ports for access to the fishing grounds to the north west of Scotland and often receive landings from fishing vessels from other EU countries that operate to the west of Scotland. Landings of demersal fish species (cod, hake, haddock and monkfish in particular) and shellfish (primarily squid in Kinlochbervie and nephrops in Lochinver) are both of importance in these two port districts (Marine Scotland, 2019).

The western coast still supports numerous small ports and harbours, the largest of which are Ullapool, Oban, Portree and Mallaig. Elsewhere, in the south-east and south-west, numerous small ports continue to support a small local industry based on small vessels fishing inshore grounds, mostly for shellfish. Most of the fishing industry in these areas is dependent on shellfish with nephrops, scallops, lobster and crabs all being species of key importance (Marine Scotland, 2019).

Port requirements may vary significantly depending on the type of vessels and species landed and associated market requirements. An outline of port facilities required by the various fisheries is provided in Table 13.

Port facilities	Whitefish	Pelagic	Scallops	Nephrops	Squid	Static gear
Replacement empty boxes facility	X			X	X	
Fuel & lube services	X	X	X	X	X	X
Food provisions (supermarkets etc)	X	X	X	X	X	
Ice factory	X		X	X	X	
Shore power connections	X	X	X	X	X	
Engineer, electrical maintenance services	X	X	X	X	X	X
Machinery spares	X	X	X	X	X	X
Refrigerated fish market	X			X	X	X
Slipway/dry dock	X	X	X	X	X	
Deep water basin facilities	X	X	X	X	X	
Suitable quay berthing	X	X	X	X	X	
Access to port at all times regardless of tidal state	X	X	X	X	X	
Processors, factory at quay side		X				
Net, gear manufactures for spares	X	X		X	X	
Chandlery shop for hardware supplies	X			X	X	X
Transport links	X		X	X	X	
Easy access in severe weather conditions	X	X	X	X	X	
Gear maintenance and storage area	X		X	X	X	X

Table 13: Port facility requirements by fishery

8 COMMERCIAL DRIVERS

Key commercial drivers associated with the operation of commercial fishing vessels include the following:

- Turnover, determined by the quantity of fish that can be caught and the market prices achieved;
- Catching efficiency;
- Control of overheads, and
- Depreciation/replacement costs.

To most fishermen targeting pressure stocks, which comprise the majority of the tonnage landed by Scottish vessels, quotas are a major, if not the major, factor determining the quantity of fish they can catch and therefore their turnover. As such, quotas are a tangible asset of significant value, which can be bought, sold or rented. In the most extreme cases, such as those for mackerel of large pelagic vessels, the quotas market values can run into tens of millions of pounds.

In order to fish a vessel must hold a valid licence, which determines the size and power of the vessel, as well as the types of gear it can deploy, where it can fish and the categories of fish and shellfish it can land. As is the case with quotas, licences also have a value, and, depending upon their type, can in effect be a financial driver.

Fish, and to a lesser extent shellfish, are one of the few remaining food commodities still sold by auction and, as such, are subject to significant dockside price fluctuations mainly due to variations in landing volumes and demand. Other factors such as currency fluctuations and direct and indirect export costs, such as those associated with Brexit, can also affect prices. For some species, such as nephrops and scallops, and some fin fish species, sales are against agreed contract prices rather than at dockside auctions.

Whilst short term fluctuations in dockside prices are a fact of life, over the longer term, the pattern is generally to a progressive increase in first sale prices. Given in Table 14 are the average prices for the years 1999 and 2019 for a selection of the main species landed into Scottish ports (Marine Scotland, 1990; 2019).

Species	1990 - £/tonne	2019 - £/tonne
Mackerel	209	1,239
Cod	1,353	2,802
Haddock	820	1,519
Nephrops	2,635	3,614
Lobster	10,497	14,282

Table 14: Averaged first sale prices (Marine Scotland, 1990; 2020)

The catching efficiency of fishing vessels, both in terms of catch per unit effort (i.e. the volume and value of catch per days at sea), and in terms of catch per cost unit are also important factors affecting profitability. The drive for increasing catching efficiency has led to a pattern within the Scottish industry over the last 10 years in particular, of the building of larger, more powerful vessels. The ability to achieve this has however often required the amalgamation or purchase of both quota and licences, thereby reducing the size of the fleet.

Increased catching efficiency has also led to developments in both fishing gears and fishing electronics. An example of gear developments has been the conversion to twin-rigged trawls, whereby two trawl nets are towed side by side. This effectively doubles the width of the fishing gear thereby doubling the area of seabed fished. Similarly, there have been significant developments in fish finding and gear monitoring electronics, to the point that the costs of the electronic packages installed in some recently built pelagic vessels have been in the order of one million pounds sterling.

Loss of fishing time, and therefore fishing efficiency, can occur in instances where gears are caught fast on seabed obstructions such as rocks, boulders and even subsea infrastructure. In the case of the offshore oil and gas infrastructure, the cost and health and safety implications of such gear fastenings led to an industry sponsored drive to make fishermen aware for the presence of seabed infrastructure through the financing of the “Fishsafe” system and the KIS-ORCA initiative.

Maintaining fishing access to fishing grounds is also an important factor to ensure the economic viability of fisheries. Multiple fisheries are constrained by the substrate specificity of their target species, such as scallops and nephrops. A further consideration in respect of the driver to maintain access to known productive fishing grounds, particularly for trawling, is that not all of a given large sea area (such as the North Sea) can be fished by all vessels due to a number of considerations, for example: unsuitable seabed type, closed or restrictive conservation areas, or the predominance of a species for which the vessel does not have quota or a licence entitlement.

The control of fixed and variable costs is a fundamental driver for any commercial enterprise, including commercial fishing vessels. The largest variable overheads for a fishing vessel are normally fuel and repair and maintenance costs. Of repair costs, in addition to loss of fishing time, the costs of fishing gear repair or replacement due to fastenings can be significant.

Frequently, some of the highest fixed costs, particularly on recently built vessels, are the finance charges incurred for the building of a vessel, and in some cases, the costs associated with licences as well as additional quota purchases. From conversations with vessel owners, it is understood that the current price for a new larger class of pelagic vessel can be as much as £27,000,000 and up to between £3,000,000 and £9,000,000 for new demersal trawlers of 24-30 metres, indicating not only the scale of investment but also the potential finance costs and levels of depreciation.

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APPENDIX 1

As part of the Sectoral Marine Plan for Offshore Wind public consultation process, various Scottish fisheries organisations such as the Scottish Fishermen’s Federation (SFF), the Scottish White Fish Producers Association (SWFPA) and the Scottish Pelagic Fishermen’s Association (SPFA) provided detailed feedback with regard to the activity of their members within the proposed Plan Option (PO) areas and their concerns with respect of co-existence with offshore wind farm projects.

A summary of the feedback provided by these organisations is given in the Table 15. This included the identification of preferred areas for development within some POs by SFF/SWFPA. The location of these areas is illustrated in Figure 15.

Full consultation responses are available online at <https://consult.gov.scot/marine-scotland/draft-sectoral-marine-plan-for-offshore-wind/>.

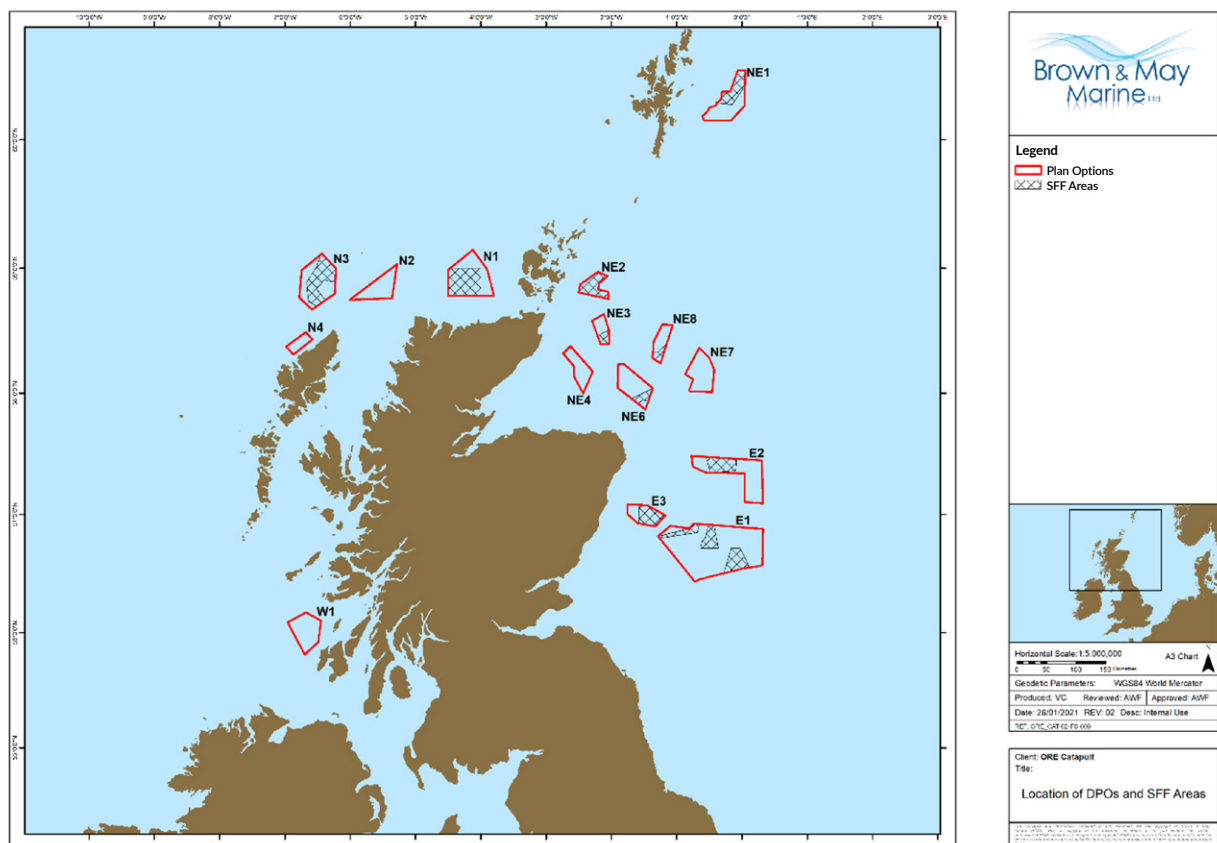


Figure 15: Location of POs and areas identified by the SFF/SWFPA

PO	Consultee	Strongly support	Somewhat support	Neither support or oppose	Somewhat oppose	Strongly Oppose	Additional feedback/comments
E1	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						SPFA note that this PO contain gravel substrate where herring spawn. There is also concern that this area is of importance as a sandeel area. Fishing activity for herring has been limited in recent years.
E2	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						SPFA note that this PO contain gravel substrate where herring spawn. There is also concern that this area is of importance as a sandeel area. Fishing activity for herring has been limited in recent years.
E3	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						There is a prolific herring spawning area within this PO at the Aberdeen Bank. Herring fishing has not taken place in this area for a number of years.
NE1	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						There are important mackerel and herring fisheries taking place within this PO. This is also an area where herring are known to overwinter. There will also be gravel substrate within this PO.

PO	Consultee	Strongly support	Somewhat support	Neither support or oppose	Somewhat oppose	Strongly Oppose	Additional feedback/comments
NE2	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						Herring fishing takes place in this area during the summer spawning season. There will be sensitive gravel substrate within this PO.
NE3	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						There is a limited amount of herring caught in this PO. There will be gravel substrate within this PO.
NE4	SFF/ SWFPA						Due to amount of inshore fishing by multiple fisheries in these areas and with the loss of fishing grounds already taken up by Beatrice, Moray East and Moray West OWF. SFF/SWFPA feel strongly that this area should be rejected.
	SPFA						There is no SPFA pelagic activity in this area. There would be concern there may well be gravel substrate in the PO. This area is known to be an overwintering area for juvenile herring.
NE5	SFF/ SWFPA						Due to amount of inshore fishing by multiple fisheries in these areas and with the loss of fishing grounds already taken up by Beatrice, Moray East and Moray West OWF. SFF/WFPA feel strongly that this area should be rejected.
	SPFA						There is no SPFA pelagic activity in this area. There would be concern there may well be gravel substrate in the PO. This area is known to be an overwintering area for juvenile herring.

PO	Consultee	Strongly support	Somewhat support	Neither support or oppose	Somewhat oppose	Strongly Oppose	Additional feedback/comments
NE6	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						There is mackerel fishing taking place in this PO during November/ December. However, this is very much dependent on mackerel migration. Summer herring are caught in these areas in the early part of the season. There will be significant areas of gravel substrate found within this PO.
NE7	SFF/ SWFPA						SFF/SWFPA note that due to the important fisheries involved in this area they must reject this PO.
	SPFA						There is mackerel fishing taking place in this PO during November/ December. However, this is very much dependent on mackerel migration. Summer herring are caught in these areas in the early part of the season. There will be significant areas of gravel substrate found within this PO.
NE8	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						There is mackerel fishing taking place in this PO during November/ December. However, this is very much dependent on mackerel migration. Summer herring are caught in these areas in the early part of the season. There will be significant areas of gravel substrate found within this PO.
N1	SFF/ SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						There is limited pelagic activity in this area but there are concerns that some gravel substrate may be found within this PO.

PO	Consultee	Strongly support	Somewhat support	Neither support or oppose	Somewhat oppose	Strongly Oppose	Additional feedback/comments
N2	SFF/SWFPA						SFF/SWFPA note that due to this area being a very important haddock/whiting area and fished all over its extension, they must reject this area.
	SPFA						This has been a traditional area where herring has been caught – although not so much in recent years due to the declining stock status.
N3	SFF/SWFPA						SFF/SWFPA noted that altering the boundaries of the PO to include only the areas identified in Figure 15, would allow fishing and OWFs to co-exist. Some fishing grounds would however still be lost.
	SPFA						This PO is the area where there is the most prolific pelagic activity and as such the SPFA would have serious concerns if this PO is selected for development. Mackerel migrate through this area on their way to their spawning grounds – this occurs in January/February.
N4	SFF/SWFPA						SFF/SWFPA suggest that local fisheries associations are contacted to gather information on the activities in this area.
	SPFA						There is limited pelagic activity in this area. SPFA concern is that a site would build on the current deep water transit route which could force vessels into more dangerous waters during bad weather.
W1	SFF/SWFPA						SFF/SWFPA suggest that local fisheries associations are contacted to gather information on the activities in this area.
	SPFA						There is no SPFA activity in this area.
SW1	SFF/SWFPA						SFF/SWFPA suggest that local fisheries associations are contacted to gather information on the activities in this area and note that this area is heavily fished by scallop fishermen.
	SPFA						There is no SPFA activity in this area.

Table 15: Summary of key fisheries organisations feedback to the draft Sectoral Marine Plan for Offshore Wind

Member of the
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