

circnets

WP1 REPORT

D.1.1.1 REVIEW OF THE CURRENT COLLECTION RESPONSIBILITIES AND DISPOSAL PRACTICES IN NPA FISHING PORTS AND AQUACULTURE SECTOR

Interreg



Co-funded by
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CIRCNETS

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GLOSSARY

Fishing port. A port that is mainly used by fishing vessels, i.e. vessels that are used to catch fish or other living natural resources mainly commercially.

Ghost Nets. Ghost nets are runaway or abandoned nets, trolls or other scammers. They are part of the plastic garbage problem of the oceans. They cause harm to the fishing industry, the environment and shipping. In addition, they continue their task, i.e. fishing, for a long time after they have been abandoned. Fish, but also other animals, such birds and marine mammals, can get stuck in the nets. (Finnish Environment Institute, 2022)

Plastic containing fishing gear; “means any item or piece of equipment that is used in fishing or aquaculture to target, capture or rear marine biological resources or that is floating on the sea surface and is deployed with the objective of attracting and capturing or of rearing such marine biological resources”. (Directive (EU) 2019/904)

ACRONYMS AND ABBREVIATIONS

EEA	European Economic Area
EU	European Union
LUKE	Natural Resources Institute Finland
WFD	Waste Framework Directive (2008/98/EC)
SUP	Single-use plastics
SUPD	Single-use plastics directive (2019/904/EC)
EPR	Extended producer responsibility
NPA	Northern Periphery and Arctic
CIRCNETS	Blue Circular Nets project
EOL	End-of-life
MARPOL	International Convention for Prevention of Pollution from Ships
ALDFG	Abandoned, lost or discarded fishing gear



1 INTRODUCTION

Blue Circular Nets (CIRCNETS) is an INTERREG project funded by Northern Periphery and Arctic 2021–2027 (NPA) programme, which addresses marine litter issues. Single-use plastics and fishing gear are the most significant sources of marine plastic litter also in Europe, and the European Union has taken substantial steps in tackling these threats to the marine environment. Many single-use plastic (SUP) items have been banned and replaced with items made from more sustainable materials, but a similar approach is not yet possible with plastic containing fishing gear. Therefore, a different kind of approach has been taken. End-of-life (EOL) fishing gear, nets and other fishing equipment, which are approaching their best before date, should be collected separately and recycled in order to prevent them from ending in the waterways and contributing to the marine plastic pollution.

The more specific aim of CIRCNETS is to support the setting up of a collection system for EOL fishing gear in the NPA region. EU's SUP directive requires that producers and importers of plastic containing fishing gear in all EU member countries organise collection of EOL fishing gear based on the extended producer responsibility (EPR) principle. Finding out, how collection can be organised regionally in a most efficient and economical way, which also adheres to the "do no significant harm" principle, requires solutions to be looked at from other regions, which have already taken steps towards this. However, the collection of fishing gear opens a possibility to proceed towards a more circular economy, and find out ways, how the collected materials can be recycled regionally.

The aim of this deliverable report D.1.1.1 of CIRCNETS is to provide an overview of the current collection and disposal practices for EOL fishing gear in the NPA ports and aquaculture sector. The second chapter of the report shortly describes the fishing and aquaculture sector in the NPA countries, the differences and similarities between Finland, Iceland, Ireland, Norway and Sweden. The level of activity of this whole sector is a key factor, which affects the collection and recycling efforts in each country. Another key issue is the legislation related to this, which is studied in the next chapter. The EU legislation and national legislation regarding EOL fishing gear sets the requirements for collection activities, which must be adhered to. Finally, in chapter 4, existing EOL collection practices in individual countries are reviewed. The conclusions provide a short assessment of the differences between these existing systems, identifies good practices and highlights gaps that need to be addressed.

For more information about the project, visit the website of the project at <https://www.interreg-npa.eu/projects/CIRCNETS/home/>



2

FISHING AND AQUACULTURE SECTOR IN THE NPA COUNTRIES



2 FISHING AND AQUACULTURE SECTOR IN THE NPA COUNTRIES

The role and importance of the fishing and aquaculture sector for the NPA countries varies a lot from country to country. Therefore, the aim of this chapter is to take a closer look at these aspects and the differences between the countries. The economic value, production volumes & catches of the fishing and aquaculture sectors of the NPA countries are reviewed, as well as number of companies, fishing ports and professional fishers involved in these operations. Leisure fishing is also popular in the NPA countries, which is addressed as well.

2.1 Finland – fishing country of contradictions

Fishing and aquaculture sector play a small, but still a significant role in Finland. There are approximately 1800 companies in this field in the country and most of the companies carry out commercial fishing either in the sea or in the fresh waters. In terms of number of companies, the third largest branch of Finnish fisheries is aquaculture. However, in terms of economic value and employment, the most significant branches of Finnish fishing industry are fish processing and wholesale (Valve, Kaatrasalo and Setälä, 2023).

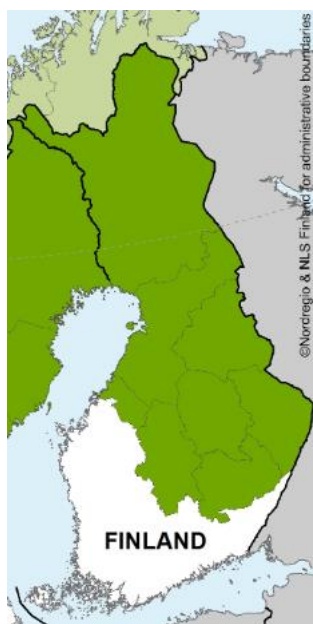


Figure 1. Map of Finland with the NPA Region area highlighted by green colour

Fishing is also a popular hobby in Finland. The number of leisure fishermen is estimated at 1.5 million – close to a third of the whole population. The catch of spare time fishermen is around 30 million kilos annually, which is about 30% of the commercial catch. Leisure fishing takes place mostly in the freshwaters (80% of the catch) and fishing with different types of rods is the most popular form of fishing: 700 000 to 800 000 fishers use rods and a half a million fishers

use ice fishing pole. A couple of hundred thousand of leisure fishers use traps and nets. (Natural Resources Institute Finland, 2023)

The NPA programme area covers the eight northernmost regions of the country. These are Central Finland, Southern Savonia, Northern Savonia, North Karelia, Kainuu, Central Ostrobothnia, Northern Ostrobothnia and Lapland. It is not possible to divide the spare time fishermen between those, who practice this hobby in the NPA region and outside of it, but fishing ports and companies carrying out fishing activities can be put on the map. It is worth noting that only three of the above-mentioned regions have access to the sea. The Finnish NPA area has only 300 km of shoreline by the Baltic Sea out of the total length of 1200 km in the whole country.

2.1.1 Fishing ports

There are around 260 fishing ports in Finland and 76% of them (197 ports) are located within the project area. These fishing ports are mostly publicly owned, but their services vary greatly. There are ports with ice flake stations, fish processing facilities and fish houses, but on the other hand there is also general ports, marinas, inland marinas and simple landing sites, which are used by both professional and leisure fishers. Only about a quarter of the ports located in the NPA area, 45 fishing ports out of 197, have specific facilities and buildings that can be used by the fishers. (Euroopan meri- ja kalatalousrahasto, 2023)

2.1.2 Commercial fishing and catches

There are about 1300 commercial fishing companies in Finland of which 1000 operate in sea areas and the remaining 20 % in freshwaters (Valve, Kaatrasalo and Setälä, 2023). Natural Resource Institute Finland maintains statistic about the number of professional fishermen in the Baltic Sea and freshwaters. In 2021 there were 4108 registered professional fishermen in Finland and 2757 of them were in the NPA area.

Table 1. The volume and value of catch and number of fishers divided between sea and freshwater and by whole of the country and NPA part of it in 2021

	Sea			Freshwater			Total		
	NPA	Whole of FIN	NPA %	NPA	Whole of FIN	NPA %	NPA	Whole of FIN	NPA %
Fishers	1430	2537	56%	1327	1751	76%	2757	4108	67%
Catch (M kg)	23	97	24%	4	5	80%	26	102	26%
Catch (MEUR)	5	28	18%	11	15	73%	15	43	35%

Source: Natural Resources Institute Finland, 2023

Even though over two thirds of the fishermen are found within the NPA region of Finland, the catch is not divided between NPA part of the country and the rest of the country along the same lines, as can be seen from table 1. In Finland, the total catch in 2021 was 102.4 million kilos, of which 27 million kilos originated from the NPA area. The NPA area fared better in terms of the value of that catch, which was 15 million euros out of 43.3 million euros. The NPA area is contributing significantly to the fresh water catch both in terms of fishermen, amount of catch and value of it. (Natural Resources Institute Finland, 2023)

To sum it up, the Finnish saltwater catch is over 10 times bigger in amount compared to the fresh water catch, and the most important fishing areas – in terms of volume of the catch - are located outside of the NPA region. On the other hand, 80 % of the freshwater catch originates from the NPA region, and the value of this catch is higher per unit when compared to fish caught at sea.

Natural Resources Institute Finland (LUKE) is the responsible body, who collects information for fishing statistics in Finland. LUKE also collects information about commercially used fishing gear in sea areas, which is presented as number of days per fishing gear type. Based on this information, nets (89%), fyke nets (7%) and lines (4%) are the most used fishing gear. Trawl nets are also used in both sea fishing and freshwater fishing, but their season is shorter. In addition to fyke nets, nets, trawl nets, seine nets are also used in commercial freshwater fishing. Based on catches, the use of all these methods is relatively even. (Natural Resources Institute Finland, 2023)

2.1.3 Aquaculture industry

In Finland fish farming is divided into food fish, fry and natural food pond farms. The first two are self-evident, but the third one is defined by the location of its operation: fry is produced in natural conditions and usually there is no need even for supplementary feeding. LUKE also maintains a database about the number of fish farming companies and their fish farming facilities, which totaled in 2021 237 and 363 respectively (table 2).

Table 2. Aquaculture in Finland. Number of aquaculture companies, fish farms and the value of their production divided by the different types of aquaculture operations in 2021

	Food fish		Fry		Natural food ponds		Total
	Sea	Freshwater	Sea	Freshwater	Sea	Freshwater	
Aquaculture companies	36	35	13	45	0	142	237
Fish farms	98	49	29	75	0	142	363
Production value, MEUR	73.3		24.6				97.9

Source: Natural Resources Institute Finland, 2023

Approximately 30% of the companies produce food fish, 25% are involved in fry production and about 60% are natural food pond farms. The numbers do not add up, as some companies are active in several branches of fish farming. (Natural Resources Institute Finland, 2023)

In 2021, there were about 118 sea-based fish farms and 245 freshwater fish farms. The majority of food fish production (66% of food fish farms) was located by the sea, whereas fry production was concentrated on fresh waters (72 % of fry farms). Additionally, there are natural food pond farmers in freshwater, but the value of their production is not included in the table above. In 2021, the value of food fish production was 73.3 million euros, and fry fish production was valued at 24.6 million euros. 60% of all fish farms are located in the NPA region – 58 food fish farms, 65 fry farms and 116 natural food pond farmers. This equals 40 % of all food fish farms in Finland, 63% of the country's fry farms, and 82% of natural food pond farmers. (Natural Resources Institute Finland, 2023)

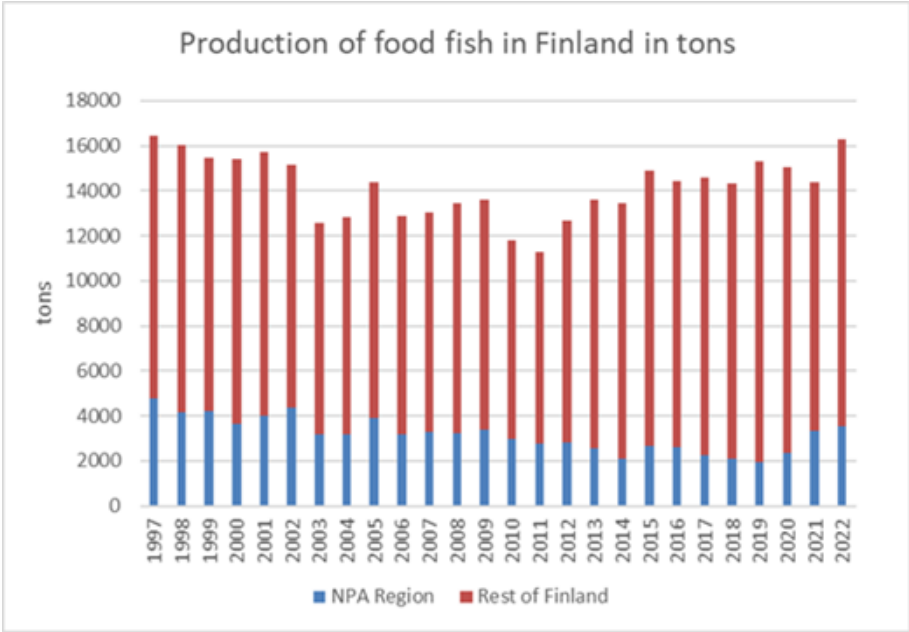


Figure 2. Production of food fish in Finland in tons, 1997–2022 (Natural Resources Institute Finland 2023)

The food fish production is the most important field of aquaculture in Finland and the production levels of food fish have remained rather stable in the past 25 years (Figure 2). In 2022 the production amounted to 16281 tons with an increase of 13 % from 2021. (Natural Resources Institute Finland, 2023)

2.2 Iceland – land of ice and fish

Iceland – being an island nation – is very much a seafaring and fishing nation. The country has almost 5000 km of coastline and the fishing grounds of the commercial fishing fleet stretch out far into the North Atlantic. The fishing industry currently accounts for 40% of the country's export value, more than 12% of the gross domestic product and provides employment for approximately 5% of the population. There is a strong focus on innovation and high utilization of the catch, which has given rise to various innovations and increased value. (radarinn.is,

2024) Spare time fishing is also a favourite pastime in the country. The whole country is included in the NPA programme region.

2.2.1 Fishing ports

There are 70 ports in Iceland that are member ports of the Ports Association of Iceland, but Icelandic ports are usually classified into the following categories: fishing port, large ship port, shipping port, boat port, small boat port, cargo port, ferry port, industrial port, pleasure boat port, etc.

Most towns and municipalities in Iceland are by the coast and were built up on grounds of fishing in the early 1900. Today, many of these small villages have developed different small scale industry related to fishing and tourism. These include for instance whale watching, zodiac tours and puffin watching. Some ports are also regularly visited by big cruise ships, so the ports still play an important role in the communities, even if the role of fishing has decreased throughout the past decades. Most of the ports serve both commercial and leisure fishing, but there is also ports, which service only fish farming companies.

2.2.2 Commercial fishing and catches

As in other NPA countries, the commercial fishing scene in Iceland is dominated by the big players, the major fishing companies, but there is also a significant amount of small scale commercial fishers in the country. The 20 biggest fishing companies in Iceland have been granted 70 % of the Icelandic fishing quote for the Atlantic, and the ten biggest ones deliver over half of the Icelandic catch, 57 % to be precise. Altogether there are 934 licenced commercial fishing companies, which have paid the fishing fee. Out of these there is 763 small boats with length of 12-15 meters and tonnage of 10. These vessels are usually operated just by one or two fishermen on board.

The Icelandic fish catch has changed significantly in the past four decades, as can be seen in figure 3. It peaked in late 90's and early 2000's in over 2 million tonnes but has since then decreased quite dramatically all the way down to just 1 million tonnes per year. The development of the catch has been quite volatile in the past 15 years, with sharp rises followed by equally sharp drops. Now the trend seems to be calming down a little, the catch in 2023 was 1,379 thousand tonnes, which is only 3% less than in 2022. The pelagic catch was 946 thousand tonnes, 1% less than in the previous year. Demersal catch was 403 thousand tonnes, 7% less than in 2022. Flatfish catch was 24 thousand tonnes, 10% more than in previous year and shellfish catch was 6 thousand tonnes, 6% less than in 2022.

Total catch of Icelandic vessels

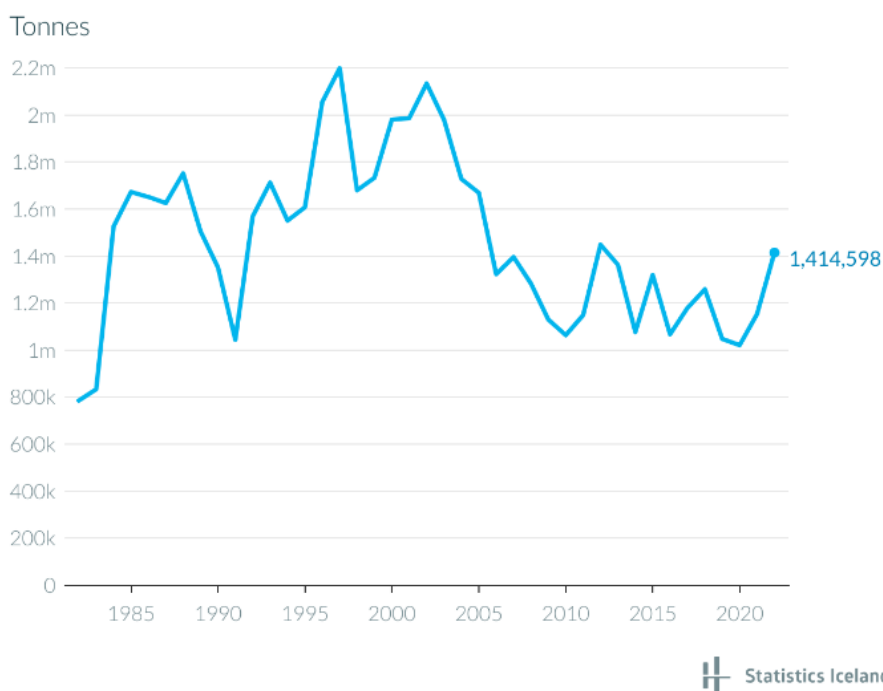


Figure 3. Annual catch in Iceland from 1980–2022

If we look at the catch by different fishing gear, which is recorded in Iceland, close to 90 percent of the fish is caught by using mid water trawl, bottom trawl and purse seine. Mid water trawl alone delivers over half of the annual catch based on the data from 2022.

Summary of catch by fishing gear 2022

Botnvarpa	Bottom trawl	Magn (tonn)	286.530
Dragnót	Danish seine	Magn (tonn)	31.025
Flotvarpa	Mid-water trawl	Magn (tonn)	755.384
Handfæri	Line	Magn (tonn)	18.532
Hörpudiskplógur	Scallop dredge	Magn (tonn)	2.880
Humarvarpa	Prawn trawl	Magn (tonn)	35
Kúfiskplógur		Magn (tonn)	..
Lína	Long line	Magn (tonn)	87.368
Net	Netting	Magn (tonn)	25.345
Nót	Purse seine	Magn (tonn)	201.118
Rækjuvarpa	Shrimp trawl	Magn (tonn)	3.104
Önnur veiðarfæri	Others	Magn (tonn)	3.276

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Table 3. Summary of catch by fishing gear 2022 in Iceland.

2.2.3 Aquaculture industry

First Icelandic aquaculture experiments with salmon date back to 1950s, but the revival of salmon production in the country started less than a decade ago. It has increased continuously since 2016 and this has benefitted greatly the Icelandic society by generating increased export value for the economy and creating new jobs in the more sparsely populated areas. Fish farming in Iceland currently accounts for approximately 5% of Iceland’s export value for goods. A total of 51,350 tons of fish were produced by aquaculture companies in 2022.

This remarkable growth is partly due to the circumstances, which have attracted a lot of foreign investments to this sector. Companies don’t have to pay as high facility fees as they pay in Norway, so many Norwegian companies have expanded their operations to Iceland. In fact, they possess 14 out of 16 licenses currently granted for fish farming. Six companies operating in open sea are the most important players in the sector, but there is also some smaller companies involved in this business as well. Fish farming on land is increasing rapidly due to environmental requirements and this is expected to increase significantly in the near future. Another factor that is contributing to this is the easy access to fresh ground water. Sea-based salmon farming takes places in the Westfjords and the eastern part of Iceland. Rainbow trout is also farmed at sea and is once more a growing industry. Thanks to the use of geothermal water, Iceland is a worldwide leader when it comes to the farming of Arctic char, as well as Senegal flounder. There are now plans to increase Iceland’s land-based production of salmon. Currently only one producer uses land-based facilities to produce salmon and has been the single biggest producer until now.

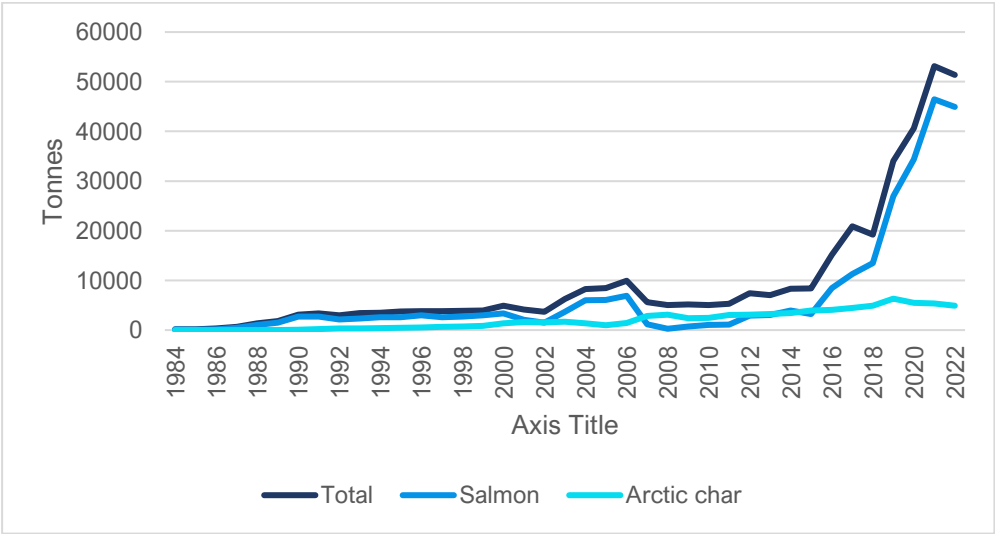


Figure 4. Fish farming in Iceland in 1985-2022 by species (Hagstofan.is)

This fast-growing industry has created side effects. Fish farming has suffered from sea lice and thousands of salmon have escaped into open sea due to damaged nets and polluted the fjords. The government of Iceland is responding to growing criticism on the environmental effects of this industry and implementing stronger laws and regulation on fish farming. This could mean that the peak of production has been reached, but on the other hand the drop in production in 2022 might be temporary. Still, it is very unlikely that the industry will record as high annual growth rates as it has done in the past decade.

2.3 Ireland – blue economy of “the Emerald Isle”

Ireland is surrounded by the most productive seas and richest biological areas of European waters. With a 7,500 km of coastline, the clean and natural waters provide the country with an excellent source of seafood. As an island nation, fishing has always been an important economic and social activity in Ireland. About 500 fishing vessels operate daily in Irish waters, resulting in 1.8 million fishing hours per year. Overall, Irish fisheries are highly diverse due to spatial patterns in the distribution of target species (Department of Agriculture, Food and the Marine, 2020). With regard to the aquaculture industry, since the 1970s, aquaculture in Ireland has developed into a thriving seafood industry with 315 production units up to date (BIM, 2022; NESCI, 2016). The Irish aquaculture sector is mainly focused on the production of molluscs (i.e. oysters and mussels) and finfish (i.e., salmon and trout) along the Atlantic coast and in freshwater sites to a lesser extent (NESCI, 2016). Bord Iascaigh Mhara (BIM) is a government agency of the Irish state responsible for developing the Irish Seafood Industry by providing technical expertise, business support, funding, training and promoting responsible environmental practice.

Recreational fishing has also become very popular in Ireland, not only among the local residents, but also among tourists. Ireland presents 77,000 kilometres of freshwater rivers and streams and a quarter of a million hectares of lakes, as well as sea-angling resources within the national 12 nautical mile limit. It is estimated that recreational angling contributes over €800 million to Ireland’s rural and regional economy (Department of environment, Climate and Communications, 2020). Iascaigh Intíre Éireann – Inland Fisheries Ireland (IFI) – is the state agency responsible for the protection, management and conservation of the Ireland’s inland fisheries and sea angling resources. In 2013, a socio-economic study developed by IFI and Tourism Development international reported the participation of 406,000 individuals in recreation angling in Ireland, 62% of them being domestic anglers, and 38% tourist anglers (IFI, 2013).

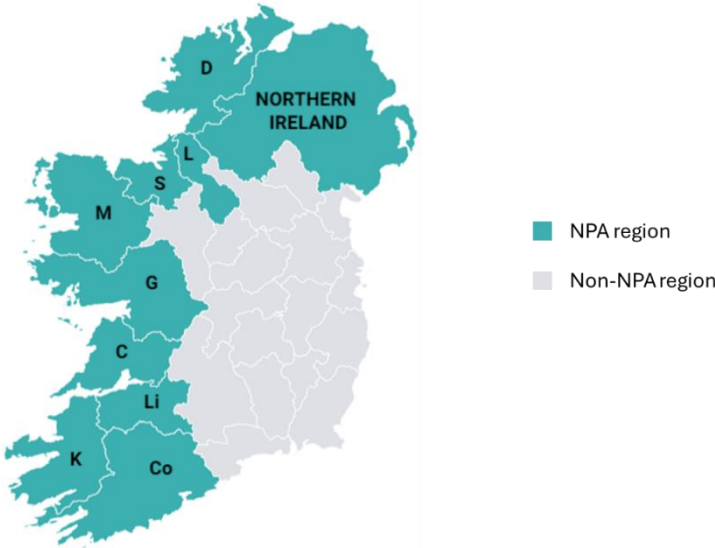


Figure 5: Map of Ireland showing the counties within the NPA region. C: Clare; Co: Cork; D: Donegal; G: Galway; K: Kerry; L: Leitrim; Li: Limerick; M: Mayo; S: Sligo

The NPA area in Ireland (excluding Northern Ireland) covers the border, midland and western regions of the country. These regions include the following counties: County Clare, County Cork, County Donegal, County Galway, County Kerry, County Leitrim, County Limerick, County Mayo and County Sligo (Figure 5). These counties encompass 5,454 km of sea coastline and estuarine or tidal coastline, accounting for 73% of the total coastline (Neilson and Costello, 1999; Collins, 1996).

2.3.1 Fishing industry

Fish are landed into numerous ports around the Irish coast. Ireland has a total of 124 fishing ports, 77% (i.e., 95 ports) falling within the NPA region (SFPA, 2023). Geographically, the fishing industry is primarily focused on the western shoreline and in the port towns of the southern and eastern coastal areas. The more relevant fishing ports falling in the NPA region are the following: Greencastle, Killybegs, Ros a Mhil, Dingle, Castletownbere and Union Hall. In Ireland, a fishing port is defined as a harbour that provides facilities to handle the coming and going of both large (>15m) and small (<15m) trawler vessels which carry seafood to shore for market (MaREI, 2023). The Irish fishing fleet is divided into 5 fishing fleet segments (Table 4).

Table 4: Segmentation of the Irish fishing fleet and characteristics

Fishing fleet segment	Vessel characteristics	Cached species	Fishing gear used
Refrigerated Seawater (RSW) Pelagic Segment	Vessels' characteristics in this segment are: Length: 23.96m to 64.91m Gross tonnage (GT): 325GT to 1,988GT Engine power: 522kW to 3,460kW	<i>Pelagic species:</i> mackerel, herring, horse mackerel, blue whiting, and boarfish	Pelagic trawl gear
Beam Trawler Segment	Vessels' characteristics in this segment are: Length: 23m to 28.05m Gross tonnage: 83GT to 196GT Engine power: 221kW to 474kW	Flatfish species: sole, turbot, megrim, plaice, monkfish, and rays	Beam trawl gear
Polyvalent Segment	Covers the vast majority of the fleet. These vessels are multipurpose including: <ul style="list-style-type: none"> • Inshore vessels: netters and potters • Medium and large trawlers • Gillnetters Overall, vessels' characteristics in this segment are: Length: 3.06m to 38m Gross tonnage: 0.19GT to 469GT Engine power: 0kW to 1,119kW	Wide range of species on a seasonal basis: whitefish (e.g., haddock, hake, monkfish, whiting). Prawns and pelagic fish (e.g., mackerel, herring, and albacore tuna)	Static nets, trawl nets and pots

Specific Segment	Including vessels permitted to fish for bivalve molluscs and aquaculture species only. There are two sub-segments: <ul style="list-style-type: none"> • Scallop sub-segment: vessels equal to or over 10m in length with qualifying track record in the scallop fishery • Specific general sub-segment: vessels in this segment range from: Length: 5.35m to 35.59m Gross tonnage: 0.66GT to 135GT Engine power: 3.7kW to 560kW 	Mollusks and aquaculture species	Creels and aquaculture specific gear
Aquaculture Segment	Vessels used exclusively for the management, development, and servicing of aquaculture areas. Vessels' characteristics in this segment are: Length: 4.38m to 49.07m Gross tonnage: 0.57GT to 561GT Engine power: 7.30kW to 748kW	N.a.	N.a.

Notes: N.a.: not applicable. Based on Perry et al., (2023) and SFPA, (2023)

The total landings received in Irish ports in 2022 were 260,400 tonnes (174,600 from Irish fleets and 85,800 from non-Irish fleets) with a total economic value of €507 million to the fishing industry (€336 million from Irish fleets and €171 million from non-Irish fleets). It is important to note that majority of the fishing activity happens within the NPA region, covering the 78% of landings (204,400 tonnes) and 65% of economic value (€332 million) to the Irish fishing industry in 2022 (Table 5).

Table 5: Commercial fishing, landing values and employment from the fishing industry in Ireland.

Commercial fishing and landing values in Ireland*						
	Volume of Landings (Tonnes)			Value of landings (€ million)		
	Irish	Non-Irish	Total	Irish	Non-Irish	Total
NPA ports	122,500	82,000	204,400	180	153	332
Total Ireland	174,600	85,800	260,400	336	171	507
NPA %			78%			65%

Fishing industry employment in Ireland**	
Employment Ireland	Employment NPA-Ireland
2,776	1,083***

Notes: *Figures based on BIM, (2022). ** Figures based on Perry et al., (2023). *** Estimated figure considering the 39% employment share in NPA-Ireland region to overall seafood sector BIM, (2022).

Of the 95 fishing ports within the NPA region, Killybegs, Co. Donegal is the largest one in terms of volume and value of landings (160.8 kt and €135million in 2022). Castletownbere, Co. Cork is the second largest port in both terms (29 kt and €129 million), followed by Dingle, Co. Kerry (7.1 kt and €23 million). Greencastle, Co. Donegal (3.7 kt and €12 million), Ros a Mhil, Co. Galway (2.1 kt and €22 million) and Union Hall, Co. Cork (1.7 kt and €11 million) are other major ports. In addition to the major ports mentioned above, there are many medium-sized ports throughout the Irish NPA region, receiving a mix of pelagic, demersal and shellfish species (Gerritsen and Lordan, 2014; BIM, 2022). As can be seen from the table 4, most of the catch – both in terms of volume and value – is landed in the Irish NPA region.

With regard to employment, the Irish fishing activity supported 2,776 jobs in 2021 (Perry et al., 2023). Within the NPA region, 1,083 jobs were estimated considering the 39% share of employment in the NPA region for the overall seafood sector (BIM, 2022).

2.3.2 Aquaculture industry

In Ireland, aquaculture activities take place along the coast, with particular focus on counties Donegal, Galway, Kerry, Waterford, Wexford and Cork (Figure 6). In 2022, 292 aquaculture production units were registered, of which 201 operate in the Irish NPA region, accounting for 69% of national employment in the aquaculture sector (Table 6).

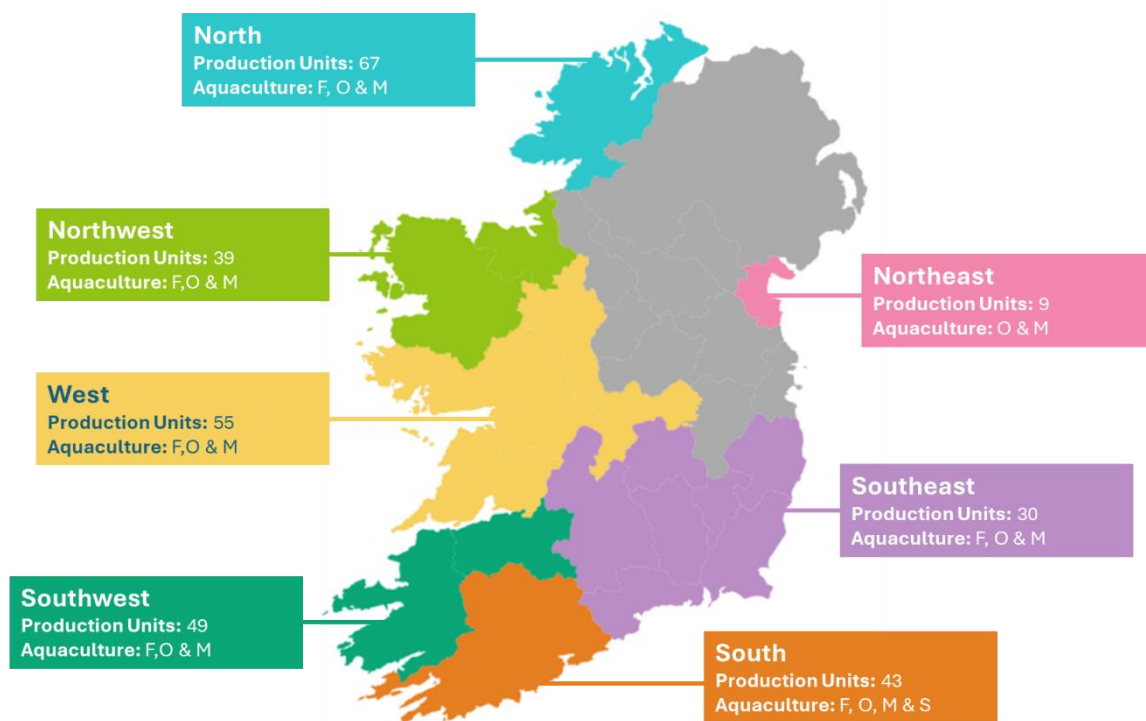


Figure 6: Map of production units’ distribution and aquaculture industry in Ireland, 2022. F: finfish; M: mussels; O: oysters; S: seaweed. Based on Dennis et al., (2023).

The Irish aquaculture industry encompasses the production of many different seafood products and species, such as finfish (e.g., Atlantic salmon, rainbow trout, Arctic char, European perch, and turbot), shellfish (e.g., blue mussel, Pacific oyster, flat oyster and to a lesser extent king scallop, clam, abalone and sea urchin) and seaweed (e.g., *Alaria esculenta*, *Laminaria digitata*, *Saccharina latissimi*, *Palmaria palmata* and *Asparagopsis armata*) (Seafood Technical Services-BIM, 2023; EC, 2013).

Salmon pen production operates in exposed sites along the west coast, from Donegal to Cork. Salmon hatcheries and land-based trout production units are located inland in counties Donegal, Galway, Cork, Carlow, Tipperary, Roscommon, Kilkenny, and Wicklow. Rope mussel production is centered in the deep sheltered bays of the South and Southwest, and in suitable bays in the West, Northwest, and North. In contrast, seabed cultured mussels are farmed in shallow estuarine bays and loughs of the Northeast, Southeast, and Southwest. Oyster farming operates in all coastal regions with specific requirements such as shallow bays and estuaries with moderate flow and suitable substratum. Native oysters can also be cultured and harvested in these regions. As for the farming and harvesting of seaweed, it occurs in the deep shelter bays of the South (Dennis et al., 2023).

In 2022, the Irish aquaculture sector contributed €208 million to the economy and produced a total of 44,623 tonnes of seafood products, generating sales of €186 million. Such production required the use of 554,000 culture structure (e.g. suspended heads, trestles, pens, tanks and ponds), covering more than 12,250 hectares of licensed land throughout the country. In terms of employment, the aquaculture sector in Ireland reached a total of 2,008 individuals in 2022 (including those employed in State-run farms) (Dennis et al., 2023).

Atlantic salmon farming is the largest contributor to national sales value, contributing €104 million in 2022, and whose production focuses in the NPA region (Table 6). The mussel and oyster farming segments lead the aquaculture industry in terms of production volumes and employment, generating 30,906 tonnes and 1,372 employment positions. 64% of oyster production and 7% of seabed mussel farming take place in the NPA region. Meanwhile, rope/suspended mussel farming is entirely focused in the NPA region. The salmon and shellfish sectors are followed by the land-based finfish sector, which involves the production of rainbow trout, salmon smolt, perch, and lumpfish, together generating €8.9 million in 2022. The remaining segments are the production of other bottom bivalve (i.e., native oyster, king scallops and clams) and seaweed farming. Production of native oysters (*Ostrea edulis*) and King scallops (*Pecten maximus*) is carried out in seabed culture. Small-scale clam cultivation (*Ruditapes philippinarium*) has been resumed in Ireland in specific sites along the west coast. In addition to these farming methods, in Ireland, shellfish are also reared in several land-based units. With regard to seaweed farming, production occurs on 343 longlines, covering 165 hectares of licensed sub-tidal coastal area. The main cultured species is *Alaria esculenta* (also known as winter weed). Other seaweed groups, such as *Laminaria* and *Saccarina*, are also cultured. The seaweed segment in Ireland has not yet reached profitability in 2022. It is under an investment phase to bring it to an economically sustainable scale (Dennis et al., 2023).

Table 6: Economic value, production and employment of the Irish aquaculture industry.

Aquaculture production and employment in Ireland									
	Production volume (Tonnes)			Production value (€ million)			Employment		
	National	NPA	NPA%	National	NPA	NPA%	National	NPA	NPA%
Products									
Farmed salmon	11,916	11,916	100%	104,259	104,259	100%	238	238	100%
Oysters	11,121	7,164.7	64%	54,609	34,844	64%	1,037	812	78%
Rope/suspended mussels	12,921	12,921	100%	9,671	9,671	100%	232	232	100%
Seabed mussels	6,864	503	7%	8,966	N.d.	N.d.	103	28	27%
Seaweed	493	493	100%	396	N.d.	N.d.	33	N.d.	N.d.
Land-based finfish	1,009	N.d.	N.d.	8,883	N.d.	N.d.	75	N.d.	N.d.
Other bottom bivalve*	399	N.d.	N.d.	2,358	N.d.	N.d.	290	N.d.	N.d.

Notes: Based on Dennis et al., (2023). * Other bottom bivalve: native oyster, king scallops and clams. N.d.: no data.

2.4 Norway – fishing and aquaculture nation

Norway is surrounded by water to the south (Skagerrak), to the west (the North Sea and to the Norwegian Sea), the north and north-east (the Barents Sea). With a coastline spanning over 25,000 km, Norway is a leader in both capture fishery and aquaculture in Europe (Lawson, 2015). The capture fishery sector has historically played a significant role in the country's social and economic development, providing employment, and supporting settlements along the entire Norwegian coast (FAO, 2013). The commercial capture fishery industry is divided into two segments: the coastal fishing fleet and the ocean fishing fleet. The coastal fleet consists of smaller vessels operated by 1-5 fishers, ranging from 10 to 20 meters in size. The ocean fleet, on the other hand, engages in deep-water fishing practices and operates larger vessels, generally over 28 meters in size, with crews of 20 or more individuals (FAO, 2013; Fiskeridirektoratet, 2017). As of 2016, Norway had a total of 5,946 registered fishing vessels, with approximately 90% being coastal vessels and the remaining being ocean fishing fleets (Fiskeridirektoratet, 2017).



Fig. 1. The fishing areas. (Credit: Norwegian Environmental Agency).

Figure 7: Norwegian fishing areas

The aquaculture industry in Norway is a modern and internationally competitive sector that produces high-quality food in an efficient manner. Aquaculture products make up almost half of the total fish exports from Norway in terms of value. Atlantic salmon and rainbow trout are the leading species in this industry, but many new species such as cod, halibut, wolf fish, and shellfish are being farmed. A license from the authorities is mandatory to farm fish and shellfish in Norway. Environmental considerations and efforts related to fish health and welfare are given the utmost priority in industry and public administration. These efforts will play a crucial role in the ability of the aquaculture industry to compete (OECD, 2021).

2.4.1. Fishing Ports

The Marine Resource Act that enforces the EU's port reception directive is implemented also in Norway. Norway has 4,443 registered ports, but only 1,514 out of 4,443 registered ports and landing sites in Norway has waste reception and handling plans. The Maritime Safety Act prohibits dumping of gear, moorings, and other objects that may harm marine life, hinder harvesting, or damage gear. It also requires fishers to report gear losses to authorities if they cannot retrieve them. The Waste Regulation Act provides guidelines for handling and managing waste in the region (Desphande, 2020).

2.4.2 Commercial Fishing and Catches

The Norwegian commercial catch in 2023 was over 2 million tons with a value of 28 billion NOK. The volume of the catch has stayed mostly between 2.5 – 2 million tons in the past 20 years or so, but the value of the catch has increased quite significantly at the same time as can be seen from the figure below (figure 8). The fishing industry in Norway contributed significantly to value creation, with a total direct value added of NOK 6.8 billion. The pelagic consumer industry accounted for the largest value creation, surpassing NOK 1.8 billion. In terms of employment, the seafood and fishing industry, along with related knock-on effects, provided jobs for approximately 13,900 individuals in 2021. These figures highlight the importance of the fishing industry in Norway's economy and its contribution to both value creation and employment opportunities.

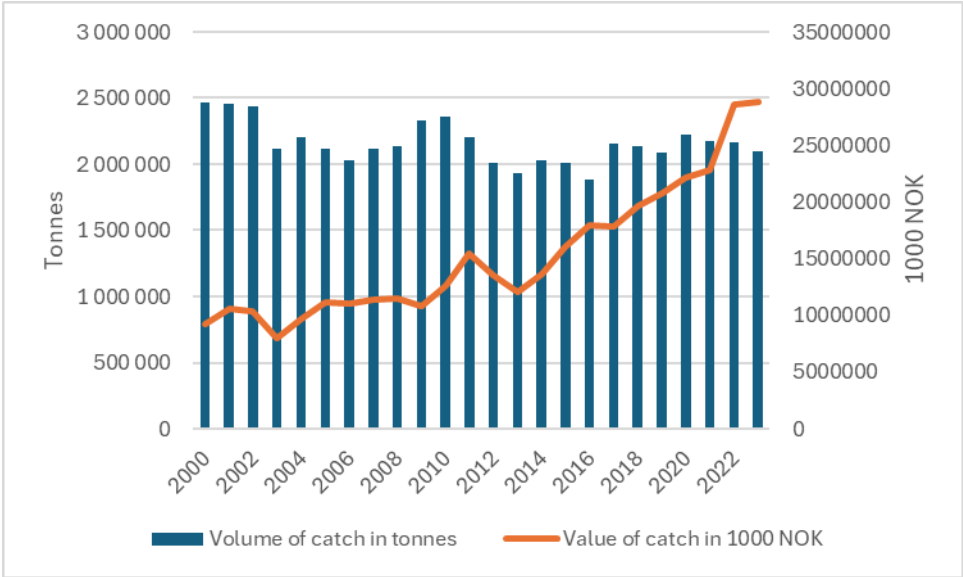


Figure 8. Volume and value of Norwegian fishing catch, 2000–2023 (Fiskeridirektoratet, 2024)

The role of fishing is particularly important for the NPA region of Norway, which covers the three northernmost regions in Norway – Trøndelag, Nordland and Finmark. Close to half of the catch in 2023 was landed in ports located in the Norwegian NPA area in these three counties. When measured by the value of the catch, the Norwegian NPA area contributed close to 60 % of the national catch. The Norwegian NPA area with its long coast is key area of commercial fishing activity. Over half of the professional fishers, and close to two thirds of commercial, licenced fishing vessels originate from the region, but there is also significant difference between the various fishing areas of Norway. As can be seen from table 7, which includes the volume of catch by fishing gear type, trawls are not as commonly used in the north as in the rest of the country. On the other hand, conventional fishing methods – different kinds of lines for instance, are more commonly used in the north. The explanation for this is that there is more coastal fishing in the north than in the more southern parts of the country, which utilize these conventional fishing methods and gears. Fishing by nets is also more common in the southern part of the country.

Table 7: Key indicators of commercial fishing in Norway and the NPA part of it in 2023

Volume of landings by fishing gear types (Tonnes) and total value of the catch (NOK 1000)						
	Net	Conventional	Trawl	Other	Total	Value
NPA ports	242,247	347,341	277,907	104,467	971,962	17,067,533
Total Norway	611,019	422,892	865,026	195,157	2,094,094	28,814,476
NPA %	40%	82%	32%	54%	46%	59%

Professional fishers and commercial fishing vessels in Norway	
Total professional fishers in Norway	Fishers in NPA-Norway
10,803	5,584
Total commercial fishing vessels in Norway	Commercial fishing vessels in NPA-Norway
4,722	3,056

Source: Fiskeridirektoratet, 2024

2.4.3 Fish farming companies

The Norwegian aquaculture industry has grown tremendously in the past 20 years, producing 1,650,000 tons of salmon and becoming a multi-billion-dollar industry. This growth has been rapid, the volume of sales has doubled in the 15 years while the value of these sales has multiplied in the same time, as can be seen in figure 9. This growth has been possible due to innovative companies investing heavily in research and development. Norway is now the world's leading producer of salmon and a hub for salmon aquaculture. However, as with any industry, growth poses challenges. The aquaculture industry has faced environmental and fish health issues, particularly sea-lice problems, which have limited growth since 2012. The production process includes breeding and fertilizing eggs, nurturing fry to smoltification, and finally growing them to harvest size (Norwegian Aquaculture industry, 2022).

This particular segment comprises of more than 200 companies, but most of the value creation comes from a small number of companies. In 2021, the top 10 companies had a market share of about 54% measured by revenue. The companies in this subsegment mainly specialize in broodstock and smolt production. Some operate independently while others are fully or partially owned by sea farmers or other industry players. Due to the increasing production challenges related to sea lice and diseases, broodstock producers invest heavily in research and development. These companies work towards developing knowledge in breeding, spawn production and disease control. They aim to enhance resistance to diseases and improve the growth rate by utilizing genetic technology.

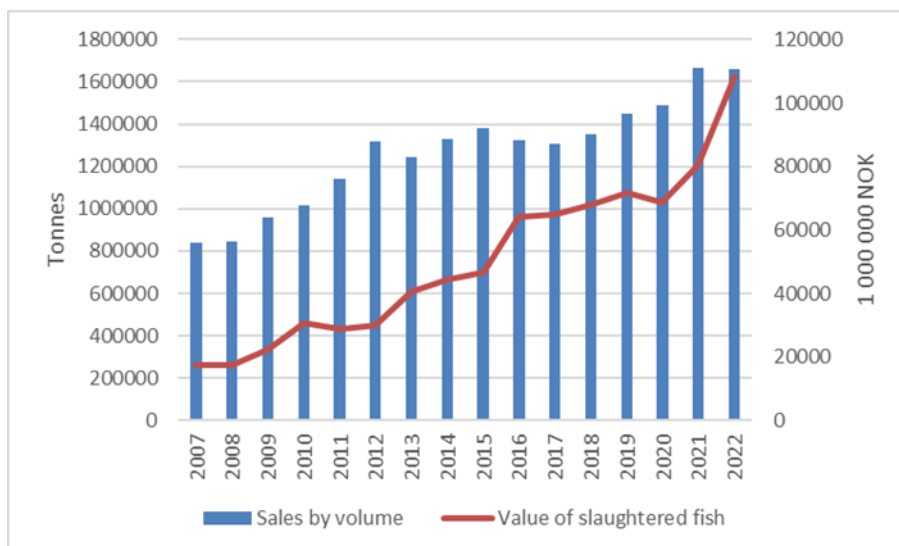


Figure 9. Sales of Norwegian farmed fish by volume and value of slaughtered fish, 2000–2022 (Fiskeridirektoratet, 2024)

Smoltification is the biological process that makes young fish ready for the transition from freshwater to seawater. The companies that specialize in this process are known as smolt producers. In optimized fish farms, this process takes 10 to 16 months. Over the last decade, these companies have experienced continuous revenue growth, with increasing margins in the period after 2018. However, this trend shifted in 2021 with a decline in revenue and margins. This was due to mergers where companies previously vertically integrated through separate entities are now merged. The margin drop is driven by a few entities, with one player having significantly fewer smolt generations in 2021 due to maintenance and upgrades. Furthermore, the fear of illness resulted in the destruction of fish. All the top five companies by revenue in this subsegment are fully or partially owned by sea farming companies. Being present in the entire value chain enables the sea farming companies to control more of their production cycle. The high degree of cross-ownership and intergroup trade, along with other long-term business relations, is believed to contribute to stable revenue growth.

Sea farming

The last stage in the production process of the Norwegian aquaculture industry is sea farming. This is the largest sub-segment of the industry where fish are placed in seawater and nurtured until they reach the ideal harvest size, which is about 4kg-5kg. The time it takes for this process to be completed varies between 10 to 24 months, depending on factors such as the size of the smolt and other growth elements (Norwegian Aquaculture industry, 2022).

Land based farming

The production volume in this subsegment is currently limited, but it has the potential to become an important complementary production method in Norway given the current number of identified land-based projects. However, the sector is facing continuous challenges related to sea lice and other biological and environmental issues (Norwegian Aquaculture industry, 2022).

Table 8. Key indicators of aquaculture sector in Norway by product

	Sales volume in 2022 (Tonnes)			Sales value in 2022 (1 000 000 NOK)			Number of sites in sea water in 2023		
	National	NPA	NPA%	National	NPA	NPA%	National	NPA	NPA%
Products									
Farmed fish	1,658,874	1,037,646	63%	108,242	66,700	62%	1,065	608	55%
Molluscs, crustaceans & Echinoderms	2646	2591	98%	16.8	14.5	86%	134	83	62%
Farmed algae	221	N.d	N.d.	4.2	N.d.	N.d.	111	39	35%

Source: Fiskeridirektoratet, 2024

Salmon is the main product of the Norwegian aquaculture sector with other segments having a minimal role, as can be seen from table 8. As with commercial fishing, aquaculture is an important sector for the Norwegian NPA region, which hosts over half of the aquaculture sites in sea water of the whole country. The sector employs 10157 people nationwide, and 55% of them are employed at sites located in the NPA region. In total, of the 200 companies operating in this sector, 45 percent are located in the NPA region.

2.5 Sweden – from mountain brooks to the North Sea

Sweden has about 3200 km of coastline from the Skagerrak on the west to the Bothnian bay in the north, the northernmost part of the Baltic Sea. Even if the longest stretch of the shoreline is to be found on the east, it is the West coast of the country, which is the hot spot of the Swedish fishing industry. There is about 1000 licensed vessels in the Swedish commercial fishing fleet, and the capacity of the fleet is heavily concentrated on the West coast of the country, as can be seen from the figure 10 below. The development of small-scale fisheries has been problematic for a long time. Weak fish stocks and declining catch quantities provide poor conditions for economic growth. Lean cod and diseased salmon indicate that something is not functioning in our ecosystems.

Trawls, hooks, gillnets, seines, cages and pots are used for fishing, and there is also some commercial freshwater fishing. Fishing is a popular hobby also in Sweden with 1.4 million leisure fishers. They use various fishing gear, which include gillnets, lines, handheld fishing gear, etc.

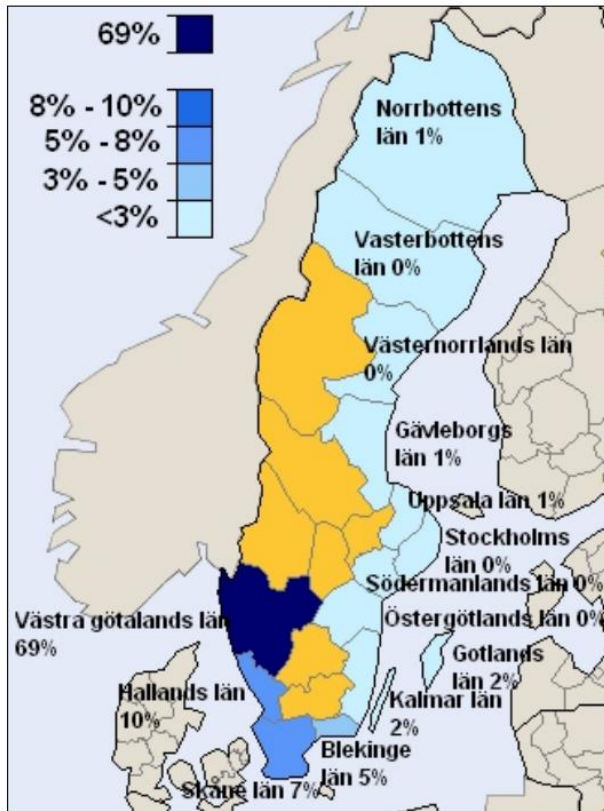


Figure 10. Fishing fleet capacity in the Swedish counties (as a percentage of the total gross tonnage), 2010 (Source: IPOL-PECH_NT(2010)438579_SV.pdf (europa.eu))"

The Swedish NPA area includes the four northernmost counties of Jämtland, Västernorrland, Västerbotten and Norrbotten, and the three last mentioned counties are situated by the Baltic Sea. Even if their land area constitutes over half of that of the whole country, they are the backwaters, when it comes to fishing. Only a small fraction of the national fishing fleet capacity is located in these counties.

There is a big difference between fishing in the Bothnian Bay, where the sea is covered with ice for half the year and the fish population is dominated by a few freshwater species, compared to fishing on the west coast where the conditions are purely marine with high salt content in the water. There, fishing can target many different marine fish species and shellfish.

2.5.1 Fishing ports

In 2010, there were 838 registered fishing harbors in Sweden. However, in that same year, only 356 of them had at least one registered fishing vessel, and merely 35 harbors had more than ten vessels (IPOL-PECH_NT(2010)438579_SV.pdf (europa.eu)). The active professional fishermen are becoming fewer and older. What we are facing is small fishing harbors that have fallen silent and a coastal population that no longer maintains a steady year-round residency but is increasingly utilized for recreational purposes (Nottbotten county: [Fiskerinäringen vid Norrbottenskusten – en lägesbeskrivning | Länsstyrelsen Norrbotten \(lansstyrelsen.se\)](#)). As most of the fishing fleet's capacity is located on Sweden's west coast, the fishing ports in the Swedish NPA area are few. Herring and sprat that is caught in the Baltic Sea totaling more than

5 tons in live weight, can be landed only in four ports in Norrbotten county and in four ports in Västernorrland (HAV: Landing ports: [Landningshamnar - Fiske och handel - Havs- och vattenmyndigheten \(havochvatten.se\)](#)). In addition, there are many small harbors along the coast, which serve very small-scale coastal fishing. Many of the fishermen involved in coastal fishing basically land their fish at their "own jetty" (Email correspondence with Västerbotten county, County fisheries consultant).

2.5.2 Commercial fishing and catches

The trend in the Swedish fishing fleet indicates a decline both in the number of vessels and their capacity. The number of vessels in the Swedish fishing fleet decreased from 1362 vessels in 2013 to 990 vessels by December 31, 2022. Starting from 2015, there has been a continuous annual decrease in the number of vessels.

Diagram 4. Antal fartyg i den svenska fiskeflottan 2013 - 2022

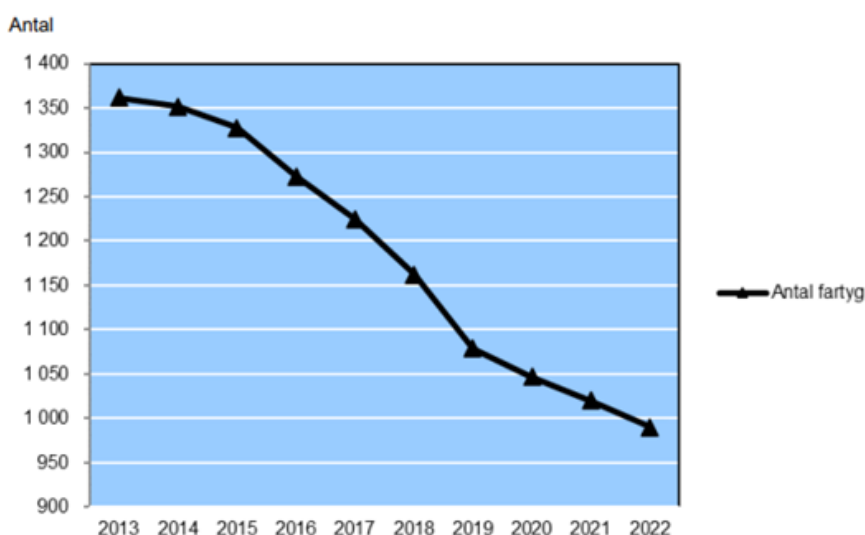


Figure 11. The size of the Swedish fishing fleet, 2013–2022 (HAV "Det yrkesmässiga fisket i havet, år 2022", [havochvatten.se](#))

Despite the rapid drop in the number of fishing vessels, the value of the catch has not decreased at the same rate during this period. The fishing fleet has lost a quarter of its numbers, but the value of the catch is only slightly lower in 2022 when compared to that of 2013. In fact, the value of the catch was SEK 827 million in 2022, which means that the value has increased by 7.8 percent compared to the year 2021. This can be explained partly by raising prices, as the total catch in Sweden decreased from previous year, from 153 400 tons to 139 000 tons. The catch was 180 000 tons back in 2013 but peaked at 222 000 tons in 2017 during this ten-year period. Since 2018 the overall catch has decreased steadily.

Diagram 3. Värdet av ilandförda fångster 2013 - 2022

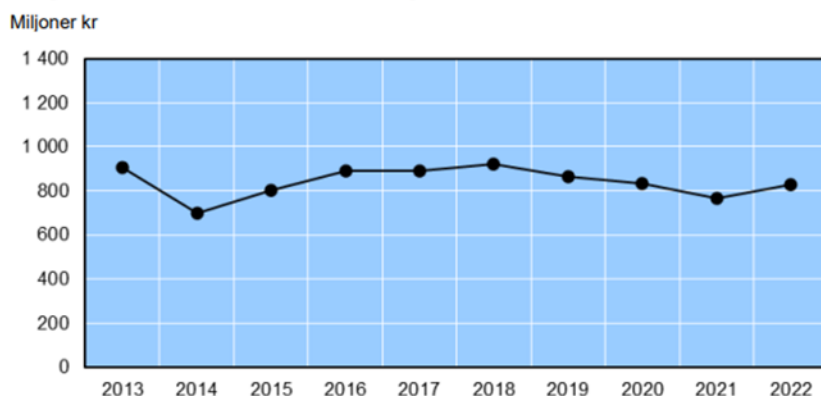


Figure 12. The value of landed catches in Sweden 2013–2022 (HAV "Det yrkesmässiga fisket i havet, år 2022", havochvatten.se)

Although some phenomena and issues are common across small-scale fishing regardless of where it operates in Sweden, there are also significant regional differences in how the fishing industry evolves. The development is not always negative. Norrbotten, for instance, is the only Swedish county in the Baltic Sea region where the number of licenses is stable or possibly shows a slight increase over time (Norrbottnens county: [Fiskerinaringen vid Norrbottenskusten – en lägesbeskrivning | Länsstyrelsen Norrbotten \(lansstyrelsen.se\)](http://fiskerinaringen.norrbottnen.se)). The county has as many professional fishermen as all the other Norrland counties combined, and it is the county in Norrland with by far the largest professional fishing industry, both in terms of the number of professional fishermen and its economic scope. As can be seen in table 9, Norrbotten has the highest fishing fleet when compared to the other Swedish NPA region counties, but the total tonnage of this fleet is just 2 percents from the total tonnage of the fishing fleet.

Table 9. Key indicators of commercial fishing activity by county in the Swedish NPA region and the whole of the country

	Norrbotten	Västerbotten	Västernorrland	Whole of country
Fishermen, in 2019	72	25	25	NA
Commercial sea fishing vessels, in 2022				
<12m in length	103	31	28	853
>12m in length	12			137
Tonnage, Bt	582.17	36.49	75.08	25306.45

Source: HAV "Det yrkesmässiga fisket i havet, år 2022", havochvatten.se

The north cannot compete with the rest of the country with their fleet size. In 2019, the catch in Norrbotten was under 1500 tons, whereas the national catch was just under 180 000 tons.

Fishing for vendace, used for the production of bleak roe, is economically the most important fishing activity for the county's coastal fishing and accounts for a significant portion of the total economic value. Active fishing gear is used, but this is time-limited fishing depending on the spawning period. The fish lands locally, close to the fishing area. Passive fishing gear is used for bigger species and smaller ports of landing (Source: Bekken Björkman, M., Wehner, J & Hjerpe Olausson, J. (2022). *Upplägg för nationell insamling och annan logistik för uttjänta fiskeredskap i Sverige*. Chalmers Industriteknik.).

The economic development is good to very good. This is especially true for trawling for vendace, where the price development of bleak roe has been positive even during years with large catches. Fishing using fixed gear, primarily for salmon, also shows a clearly positive economic development. This is due to the fact that the catch volumes have been maintained and, to some extent, increased in the county's salmon fishing despite significantly reduced catch quotas in the Baltic Sea and favorable price developments for salmon.

Freshwater fishing is only a fraction of that of commercial sea fishing. In 2022 the catch was 1659 tons and majority of this, about 80 %, was caught on the big lakes of southern Sweden. (Source: Swedish Agency for Marine and Water Management, SwAM).

2.5.3 Recreational fishing

Statistics Sweden collects information about recreational fishing in Sweden (SCB report: [Fritidsfiske 2021 \(scb.se\)](https://www.scb.se/pressmeddelanden/2022/09/20220914_fritidsfiske)). Fishing is popular hobby also in Sweden and about 1.5 million Swedes are estimated to have “fished for fun” during 2021. Based on the survey the number of recreational fishing days in Sweden amounted to around 12.4 million. Unlike commercial fishing, recreational fishing takes place mostly on freshwaters with 2/3 of the days taking place in rivers and lakes. Roughly a bit over half of the fishing days, 6.9 million, were spent on boats. Especially the great, southern lakes attracted spare time fishers, whereas in the sea area central Baltic Sea, followed by Skagerrak, were popular fishing areas.

The published data does not give detailed information about the number of spare-time fishers by county, so the figures for the NPA region cannot be calculated. The figures are available for Norrland, which also includes county of Gävleborg besides the counties included in the Swedish NPA region. The number of spare-time fishers in Norrland in 2021 was about 101 000 on freshwaters and about 174000 by the coast.

Statistics Sweden has collected information also about the annual recreational catch, which was in 2021 12,300 tons. 6,500 tons of this total catch originated from lakes and watercourses, the remaining 5,900 tons from the coasts and the sea. There is also data about the released catch, which was estimated at 11,500 tons in 2021. About 74 % of this were caught in freshwater, and 26 % tons in the sea.

2.5.4 Aquaculture industry

In Sweden, aquaculture is very small-scale. The focus of Swedish aquaculture today lies in food fish production of cold-water species, such as char and rainbow trout, as well as the cultivation of mussels. (Source: Matfiskodlarna: [Vattenbruk \(matfiskodlarna.se\)](https://www.matfiskodlarna.se/)) Whereas

southern and above all western Sweden was the hub for commercial fishing, Northern Sweden dominate the aquaculture business. In 2021 about 11 900 tons of food fish was produced in the country, and 10,700 tons, or approximately 90 percent, was produced in the 28 facilities located in Northern Sweden. Northern Sweden in this case includes also few other northern counties besides the NPA part of the country. There is also some eel farming (90 tons) and mussels farming (3500 tons), but this is carried out solely in Southern Sweden. (Jordbruksverket Vattenbruk 2021: <https://jordbruksverket.se/om-jordbruksverket/jordbruksverkets-officiella-statistik/jordbruksverkets-statistikrapporter/statistik/2022-08-26-vattenbruk-2021>)

For almost ten years, Sweden has experienced a trend of decreasing cultivation volume, down to below 10,000 tons of char and rainbow trout in 2020, where over 95 percent originate from cage farming in regulated waters, namely hydroelectric dams. However, there is now a reverse trend from 2020 to 2021, with a 20 percent increase in production. It is expected that the production in these systems will exceed 20,000 tons in just a few years, provided that new/renewed permits are utilized. From being characterized by widespread pessimism, there is now optimism among fish farmers in Norrland about the future, an optimism that could benefit the inland areas of Norrland in the form of a vibrant rural community. (SLU report:, Anders Kiessling & Martyn Futter, 2023) [1cb608b3-6921-4480-bdc1-81a70fe1514a.pdf](https://www.misssite.com/1cb608b3-6921-4480-bdc1-81a70fe1514a.pdf) ([misssite.com](https://www.misssite.com))



3

EOL FISHING GEAR RELATED LEGISLATION



3 EOL FISHING GEAR RELATED LEGISLATION

3.1 Key aspects of the EU Legislation on EOL fishing gear

In this chapter, we delve into the primary EU directives and regulations governing waste management from the perspective of the fishing sector. The focus is on the legal framework related to waste management within ports and the disposal of fishing gear waste. EU legislation in this field is based on Waste Framework Directive (2008/98/EC), Single-Use Plastic Directive (2019/904), Directive on port reception facilities for the delivery of waste from ships (2019/883) and Commission Regulation on monitoring data methodologies and the format for reporting passively fished waste (2022/92)

3.1.1 Waste Framework Directive

Waste Framework Directive (WFD) (2008/98/EC) creates the basis for the waste legislation in EU Member States and countries of the European Economic Area. The Directive stipulates that the management of waste must be conducted in a manner that avoids causing harm or endangering both the environment and human health. The directive specifies that waste management encompasses various stages of the waste handling process, encompassing activities such as transportation, disposal, collection, and recovery, emphasizing that it extends beyond the act of users simply discarding waste. The process is supervised to ensure that the member countries operate according to the regulations and the waste management plan. This plan should include at least specific information on the generated waste, current state of waste management, waste management policies, assessment for new collection options and information about used locations and capacity for disposal of waste. (Directive 2008/98/EC)

An important goal of WFD is also to improve the cycle of waste by reducing the amount of waste through re-use and recycling. The directive describes that once products reach the end of their usable life, waste products should be handled to enable the continued use of their material. Final disposal of waste in landfills is the last option if the material cannot be recycled and typically this involves the polluter pays principle (PPP). That principle dictates that those who hold the waste, did hold the waste, or originally caused it is responsible to handle it appropriately and pay costs of it. It is the responsibility of the member state to ensure adherence to the Polluter Pays Principle. (Directive 2008/98/EC)

In addition, the Waste Framework Directive introduces Extended Producer Responsibility (EPR) as one form of PPP. It means that producers bear responsibility for their products beyond the usage phase, encompassing the proper collection and treatment of waste. (European Commission, 2023). Extended Producer Responsibility (EPR) pertains to a range of stakeholders including manufacturers, developers, importers, sellers, treaters, and processors. Applied to various product types, if a product falls under EPR regulations, the responsibility for organizing and financing its waste management rests with the entities covered by EPR. The idea of EPR is to give responsibility for producers to develop designing and materials towards

circular economy and, for example from the perspective of the fishing sector, to look for materials for fishing equipment that are best suited to material recycling. The Circular Economy package has amended the Waste Framework Directive (WFD) through Directive 2018/851, emphasizing a sustainability-focused approach. Directive 2018/851 also focuses on marine litter and says that the member states must jointly participate in the prevention of pollution and the reduction of marine litter. (Directive 2008/98/EC)

3.1.2 Single-Use Plastics Directive

The directive on Single-Use Plastics SUP (2019/904) specifically aims to reduce marine litter, but it also aims to prevent other pollution caused by single-use plastic products. The SUP directive includes plastic containing fishing gear because a large part of the marine litter found in the EU area is caused by them and they have high recycling potential. In the EU waters, the predominant marine litter consists mainly of plastic, with single-use plastics accounting for 50%, and fishing gear comprising 27% of the cumulative total. The aim of the directive is to reduce marine litter and to support collection of EOL fishing gear, which will make it possible to include them in the circular economy. (Directive 2019/904)

The directive initiates collection efforts only within EU member states with marine waters and the countries concerned should set an annual minimum collection rate for plastic containing fishing gear waste. Regarding waste collection itself, the directive does not give specific guidance on how that should be handled. This collection has been carried out using EPR, which means that the producers are responsible for the collection, transport and handling of the waste after the user has brought plastic-containing fishing gear waste to the collection. In EPR, producers are responsible, but small producers should be left outside of it. For the responsible producers, their costs will rise because of the collection. Users should be informed about this, and other issues related to producer responsibility. Focus should be on spreading information about good and harmful waste management practices and about the environmental effects of fishing equipment. Producers' responsibility involves providing annual reports on products introduced to the market and the collection of fishing gear waste, contributing to the generation of accurate statistical data for the EU. (Directive 2019/904)

3.1.3 Directive on waste reception facilities at ports

Directive on port reception facilities for the delivery of waste from ships (2019/883) aims to protect marine environment from negative impacts from the ships and ensure appropriate waste reception facilities in ports. Waste reception facilities at ports must be easily accessible to visiting ships, ensuring they also handle the waste generated by these vessels. Effective preparation enhances the likelihood of successful separate waste collection and recycling while simultaneously mitigating marine pollution. According to the directive, smaller ports with lower levels of traffic do not have to have as complete waste reception facilities as larger ports managed by municipalities or governmental organisations have to provide. The MARPOL convention and its Annexes (International Maritime Organization, 2019) have been used as a norm in the formulation of legislation. (Directive (EU) 2019/883)

Based on the MARPOL Convention and Directive (2019/883), EU Member States must have waste reception and handling plan that is in use in ports. This must include information about the location of the facilities and how they work, for what waste reception of fractions is at the port. The plan must be available and easily accessible and in the spoken language of the Member State. The plan must also provide information on how waste is to be delivered at the port and how the port charges for the delivered waste. The port authority must fill out a form about the delivered waste, but this does not apply to smaller ports that are remote or unmanned. Passively fished waste should also be reported to the EU. (Directive (EU) 2019/883)

3.1.4 Commission regulation on passively fished waste

Based on the Commission Implementing regulation on data collection of passively fished waste (2022/92), member countries have to provide information about passively fished waste annually from 2022 onwards. Passively fished waste means basically marine litter that is recovered while fishing and can also contain abandoned, lost or discarded fishing gear (ALDFG). The collection of passively fished waste improves marine environment and must be reported. The reported data must contain the total weight of the collected marine waste, but more detailed information can also be collected. This can include information about the material of the passively fished waste, which can be plastic, metal, rubber, wood, textiles, etc., but using this reporting category is optional. (Commission implementing regulation (EU) 2022/92)

3.2 Implementation of the EU Legislation on EOL fishing gear in EU partner countries

As EU member states Finland, Ireland and Sweden are obligated to follow the legislation of EU. In this chapter we will discuss the implementation of the above-mentioned directives in these three EU member states and other relevant national legislation on EOL fishing gear.

3.2.1 Finland

EU directives on Waste framework (2008/98/EC), Single-use plastics (2019/904), Waste management facilities at ports (2019/883) and Passively fished waste (2022/92) have been included in national legislation in Finland. How this has been done, and how they regulate the fishing and aquaculture sector, is described in detail below.

Waste legislation in Finland

National waste legislation in Finland is based on Waste Act (646/2011) and additional parts of it. The main goal of waste legislation is to improve the sustainable use of natural resources and to prevent harm and dangers caused by waste to the environment and human health. By following EU legislation on this issue, it is possible to reduce the amount of litter with the help of a functional waste management system. National modifications within the framework of the EU legislation are also possible. (Ministry of Environment, 2023)

The owner of the waste is responsible for handling the waste unless it falls under the responsibility of the municipalities or the producer. Municipalities in Finland are, for example, responsible for housing-related waste and organizing waste reception facilities. Extended producer responsibility shifts the obligation of waste management for specific products from municipalities to producers. Producers of certain items are accountable for organizing waste management for their products, and according to EU directive 2019/904, plastic-containing fishing gear will fall under the producer's responsibility. This mandates producers to arrange and bear the expenses of end-of-life plastic-containing fishing gear once the transition period in Finland concludes. (Jätelaki 646/2011)

This transition period ends in Finland on 1.1.2025, when Extended Producer Responsibility with plastic containing fishing gear starts in earnest. In Finland, producers must join the producer organizations and registration period for this has expired at the end of 2023 (Laki jätelain muuttamisesta 1096/2022). These non-profit organizations manage the responsibilities of the EPR among the members. Distributing duties among producers should be fair, considering the quality and scope of operations. Producers in the same field cannot be excluded from the organization. The activities of the producer organization are public knowledge. (Jätelaki 646/2011)

Government decree on plastic containing fishing gear

This Government decree on plastic containing fishing gear (1319/2022) is based on EU SUP-directive (2019/904). The EU directive targets marine waters but in Finland the directive is implemented to cover both sea and freshwaters. The goal is to enable the collection of end-of-life fishing gear with plastic, preventing harm to aquatic environments both in sea and fresh waters. Producers are obligated to establish and fund the collection and waste management of end-of-life fishing gear. The directive specifies that each country adhering to its terms must establish a collection rate. Initially, Finland has set this at 10% of the weight of fishing gear entering the market annually. (Valtioneuvoston asetus 1319/2022)

The collection rate given by the Government decrees the minimum level for collection. The collection system should be set in a way, that it is easily available for customers and the items can be returned for free. Distribution of collection points should be equitable nationwide, aligning with the volumes of generated fishing gear waste. For plastic-containing standing gear, unmounted nets, as well as associated ropes and floats, a minimum of 150 collection points is required. These points can take the form of a pick-up service, mobile collection, or a similar method instead of fixed points. Plastic-containing fishing gear for angling, lure fishing, and ice fishing must be separately collected and organized by the producer. Plastic-containing gear used in fish farming is also covered by EPR. (Valtioneuvoston asetus 1319/2022)

This decree came into force on 1.1.2023 and it includes also reporting to EU about the amounts of gear entering the market and the recycled plastic containing fishing gear. Initial reports on plastic-containing fishing gear placed on the Finnish market (in tons) are due by June 2024. The second report, covering separately collected plastic containing fishing gear, as well as tons reused, recycled, or otherwise utilized gear is due by June 2026. Producers submit this information to the Pirkanmaa ELY-Center, which annually informs the European Commission about the recorded amounts in Finland. (Valtioneuvoston asetus 1319/2022)

Act on Environmental Protection in Maritime Transport

Dumping solid waste into Finnish territorial waters and the economic zone is forbidden. Ships must adhere to this regulation, considering MARPOL Convention Annex V, EU laws, and other international regulations on this matter. Act on Environmental protection in maritime transport (1672/2009) outlines essential waste management requirements at ports. It specifies the mandatory collection of waste fractions based on port types, users, vessels, and locations. In marinas with at least 25 berths the waste fraction that have to be collected is mixed municipal waste, sewage water and oil-based waste. In addition to these, in other ports there are many different requirements for the reception of waste fractions such as plastic, glass, biowaste, metal and electrical waste. Even though these types of harbors are prescribed for the reception of waste fractions, there is no information available for the reception of waste from fishing ports in Finland. (Merenkulun ympäristönsuojelulaki 1672/2009)

Depending on the port type, waste reception methods can vary. Some ports may organize collection days for waste pickup, potentially resulting in ports without fixed waste reception facilities. The ports should have a waste management plan. The acceptance authority is either the ELY-Centre or the environmental authority of the municipality, depending on the port's size and type. The waste management plan must contain information about provided waste reception facilities for different waste fractions and their locations, but also annual estimation about generated waste and number of port users. (Valtioneuvoston asetus 674/2021) LUKE also collects information about passively fished waste (Natural Resources Institute Finland). LUKE sends surveys for professional fishermen annually and results are reported to European Commission as the directive (2022/98) obligates. (Laki merenkulun ympäristönsuojelulain muuttamisesta 669/2021)

3.2.2 Ireland

In Ireland the two main bodies tasked with implementation and enforcement of environmental legislation in Ireland are the Local Authorities (Municipalities) and the Environmental Protection Agency (EPA). Specifically, within the EPA it is the Office of Environmental Enforcement (OEE) who are dedicated to the implementation and enforcement of environmental legislation in Ireland. They put the environment first and encourage individuals and businesses to integrate good environmental practices into normal working methods. The office seeks to prevent environmental pollution before it has a chance to occur.

The OEE exercises a supervisory role in respect of the environmental protection activities of local authorities and in this regard, it may take action against local authorities that are not discharging their environmental protection functions properly.

EU directives on Waste framework (2008/98/EC), Single-use plastics (2019/904), Waste management facilities at ports (2019/883) impact Ireland's national legislation regarding to the fishing and aquaculture sector, as outlined below. The Passively fished waste (2022/92) has not yet been enacted in Ireland.

Waste framework directive

This law doesn't apply directly to fishing gear waste management but to general waste. Within Municipal waste, it does not include waste from production, agriculture, forestry, fishing, septic tanks and sewage network and treatment, including sewage sludge, end-of-life vehicles or construction and demolition waste.

Waste Management Act 1996

This Act provides for a general framework of waste management requirements, establishes definitions for the basic waste management principles and lays down the five-step hierarchy of waste management options, with waste prevention as the preferred option, followed by re-use, recycling, recovery and safe disposal, in descending order. In addition, the Act deals with the issue of 'end of waste' and clarifies the definitions of recovery, disposal and by-product.

Following the new WFD (Directive (EU) 2018/851 of the European Parliament, amending Directive 2008/98/EC on waste) which was approved by the EU in July 2018 and has been transposed into Irish Law by 5 July 2020 – a national waste management plan for a Circular Economy was developed – 'The Whole of Government Circular Economy Strategy 2022-2023' – again, not specifying the Fishing Industry – but taking a holistic approach to the transition to a circular economy.

Single Use Plastics Directive

In Ireland the Directive has been transposed through S.I. No 516 of 2021, as amended by S.I. No. 136 of 2022.

General information fishing gear regulations:

The regulations provide for the establishment of an extended producer responsibility scheme for fishing gear. Commencing in 2022, Ireland is required to monitor and report on such fishing gear placed on the market and waste fishing gear collected to the European Commission (EC). In Ireland, the EPA is the competent authority to monitor and report this data. The first return of data is due by July 2024

Scope fishing gear regulations:

These Regulations apply to:

- Fishing gear containing plastic.
- Components of fishing gear containing relevant plastic products for the purposes of these Regulations.

With effect from 31 December 2024, producers of fishing gear containing plastic will face new requirements related to the proper management of such fishing gear when it becomes waste. Producers must set up an organisation that can meet the new legal obligations on their behalf. These obligations are set down in national regulations. Extended Producer Responsibility schemes already exist in Ireland to manage other material waste streams: tyres, packaging, farm plastics, vehicles, batteries and waste electronic and electrical equipment. Producers in

these sectors have a responsibility to finance the collection and environmentally-sound waste management of their products at end of life.

Ireland is also required to set a national minimum collection rate for waste fishing gear containing plastic. The rate is non-binding. Monitoring collections against this minimum rate will provide data which is intended to inform binding quantitative EU-wide collection targets planned for introduction by the EC sometime in the future. The Minister has now set a collection rate of 100 tonnes for 2023. The rate, which is not binding, is based on estimated tonnages collected in Ireland in 2022

Waste management practices in ports and fishing gear:

EU (Port Reception Facilities Directive for the Delivery of Waste from Ships) Regulations 2022 (SI No. 351 of 2022)

These regulations transpose the Ports Reception Directive with a view to ensuring the availability and use of adequate port reception facilities and the delivery of waste to those facilities.

General information:

This Directive aims to protect the marine environment against the negative effects from discharges of waste from ships using European union ports by improving the availability and use of adequate port reception facilities and the delivery of waste to those facilities.

The Requirements mean that ships are required to offload the waste they produce into waste disposal facilities in port. Ports are required to provide adequate reception facilities and to develop port waste reception and handling plans, and to submit those plans to the Minister for approval. They must also make certain information from the plan available publicly and through SafeSeasIreland.

In addition, certain ships, that is ships of 300 gross tonnage and upwards, other than fishing vessels, traditional ships and recreational craft with a length of less than 45 metres, must submit an advance waste notification to the port. This must be done electronically through SafeSeasIreland.

Ships under 300 gross tonnage and other vessels who are not obliged to submit advance waste notifications to a port should contact a port directly or refer to the ports waste reception and handling plan for details of how to notify the port of their waste delivery. A ship should deliver all waste carried on board to a port reception facility.

However, the Regulations set out circumstances under which a ship may proceed to the next port of call without delivering the waste on board and the parameters around ensuring there is sufficient dedicated storage capacity for the waste that has been and will be accumulated during the intended voyage to the next port of call.

Once waste has been offloaded, the operator/master of the ship should be supplied with a waste delivery receipt from the port or harbour authority as appropriate. This requirement does not apply in small ports with unmanned facilities or ports that are remotely located. In the case of ships of 300 gross tonnage and upwards, other than fishing vessels, traditional ships and

recreational craft with a length of less than 45 metres, the waste delivery receipt must be uploaded onto SafeSeasIreland by the operator/master.

As an incentive to deliver their waste on shore, ships pay a mandatory (indirect) fee to the port, regardless of whether they use the waste facilities provided. The delivery of passively fished waste is also covered by the indirect fee so there are no direct charges for these once the amount of waste delivered doesn't exceed the dedicated storage capacity of each vessel. All other types of waste are charged based on the quantities delivered.

3.2.3 Sweden

The European Single Used Plastic directive was one of the starting points for a Swedish EPR Regarding Fishing gear.

Regulation (2021:1001) on Producer Responsibility for Fishing Gear

The purpose of the regulation is to establish a system to:

- Increase the collection, reuse, and material recycling of fishing gear, and
- Reduce litter from fishing gear.

Additional provisions in other regulations:

3 § In Chapter 3, Section 5 of the Regulation (1980:789) on measures against pollution from ships, there are provisions stating that waste reception facilities must be available in ports. In Chapter 4, Section 8 of the Waste Regulation (2020:614), there are provisions stating that a municipality is responsible for ensuring that waste is transported away from such reception facilities.

4 § In Chapter 15, Sections 20 and 20a of the Environmental Code, there are provisions stating that a municipality should manage waste consisting of fishing gear as municipal waste. This responsibility is limited by this regulation only regarding waste collected by someone who, according to this regulation, is obligated to treat the waste.

5 § In Chapter 3, Sections 12a and 12b of the Waste Regulation (2020:614), there are provisions stating that fishing gear should be collected separately, and there is an obligation to separate waste consisting of fishing gear from other waste.

SUP-directive and fishing gear:

EPR systems are in force since 2023 01 01 and will be fully implemented by latest 2024-12-31.

There will, because of practical reasons, probably several systems:

- Commercial fishing
- Recreational fishing
- Fish farming (?)

Who is liable to provide waste management for fishing gear?

The producer of fishing gear through the EPR (Producer Responsibility) scheme. The EPR scheme shall establish a collection system for used fishing gear that the fishers don't want to use anymore. Target by 2027 is 20% collection rate.

A producer is a company who is:

- Importing fishing gear
- Manufacturing fishing gear
- Selling fishing gear

B. The Municipality through the Port Facility Directive. Shall establish a collection system for used fishing gear, collected by special activities e.g. KIMO activities.

There can/will be a conflict between A and B, which the Producers and the Municipalities have to solve together. Old/used fishing gear left by the fishermen are much cleaner than fishing gear collected via "cleaning sea activities" like KIMO fishing for litter. Most of this material from "Cleaning sea activities" (in Europe) goes today directly to incineration and not to material recycling. So, there will be two fractions of fishing gear in the harbor, needing two different pre-sorting and recycling processes.

Companies should register as producers and report information to the Swedish Environmental Protection Agency. Starting from January 2025, producer responsibility organizations are obligated to actively contribute to achieving the waste collection target. The target is to be achieved no later than 2027, and the calculation should be done by weight. (The Swedish Environmental Protection Agency [Producentansvar för fiskeredskap \(naturvardsverket.se\)](https://naturvardsverket.se))

3.3 Legislation about EOL fishing gear in Iceland and Norway

3.3.1 Iceland

SUP Directive and Icelandic legislation on EOL Fishing gear

Iceland is part of the European Economic Area (EEA) and therefore collaborates closely with the EU on environmental policies. Iceland is implementing the EEA law on SUP directive, but not fully. The directives regarding fishing gear are not implemented, as there is another scheme on place already, which addresses EOL fishing gear. Iceland has been a pioneer on this field, as collection of EOL fishing gear has been mandatory in the country for close to 20 years already.

The predecessor of Fisheries Iceland, the Federation of Icelandic Fishing Vessel Owners (LÍÚ), reached an agreement with the Recycling Fund (Úrvinnslusjóður) in August 2005 regarding the processing of fishing gear waste made of synthetic materials. Fishing gear made of synthetic materials was therefore exempted from recycling fees, which were to be imposed on 1st of September 2005. The agreement entered into force on 1st of January 2006. The

agreement obligated the Federation to operate or reach an agreement with a third party to operate a certified collection station for recyclable fishing gear waste made of synthetic materials and ensure that such waste was recycled (sfs.is)

EU Directive 2019/904 (DIRECTIVE (EU) 2019/904 aims to reduce of the impact of certain plastic products on the environment, and this aim has been largely reached already in Iceland, when it comes to fishing gear. Manufacturer's liability for fishing gear that contains plastic is discussed in articles 7, 8 and 9, and Article 8 In paragraph 2 8. TI stipulates the obligation of certain countries to set numerical targets for the collection of fishing gear. The Processing Fund and the Association of Fisheries Companies (SFS) have agreed in their contract that at least 60% of the collected fishing gear will be recycled.

All major fishing ports are included in the agreement between SFS and recycling fund, so all the larger vessels of the Icelandic fishing fleet are covered by the agreement as are the smaller boats operating from the larger ports. Smaller ports dispose EOL fishing gear in containers, which are then collected by the net makers, Hampidjan, Isfell, Egersund or G Run. Foreign fishing vessels can also use this service, but they are charged for this.

An exemption from the imposition of a processing fee on fishing gear can be found in the Processing Fee Act no. 162/2002, paragraph 3 Article 8 and the agreement referred to above is concluded on the basis of that provision.

Icelandic legislation regarding the ports' responsibilities in terms of waste management

The ports have to have an approved environmental plan that applies in accordance with regulation no. 1200/2014 on the reception of waste and cargo residues from ships arriving at port. The basis of the program is the Act on Protection against Pollution of Seas and Coasts no.33/2004, law no. 55/2003 on waste management and regulation no. 737/2003 on handling of waste, law no. 33/2004 on protection against pollution of seas and beaches, regulation no. 1200/2014 about reception of waste and cargo residues from ships, regulation no. 1201/2014 on charging in ports due to of discharge, reception, handling and disposal of waste and cargo residues from ships, regulation no.806/1999 on hazardous substances, with the subsequent amendment, regulation no. 586/2017 on the implementation of the annex to International Convention for the Prevention of Pollution from Ships, 1973, as amended by the Protocol of 1978 (MARPOL Convention) no. 809/1999 on oil waste, with subsequent amendments.

The Port Authority is obliged to establish suitable facilities for the reception of waste and cargo residues from ships, while the Environment Agency supervises facilities in ports and confirms the port authorities' plans for the reception and handling of waste and cargo residues. The aim is to protect the marine environment and reduce the discharge of waste and cargo residues into the sea from ships.

The Environment Agency supervises facilities for receiving waste and cargo residues from ships in ports. Regular monitoring of the ports takes place at least every five years, and the Environmental Agency carries out the monitoring according to a monitoring plan that is presented for five years at a time. The inspection shall review whether activities are in

accordance with the ports plans for the reception and handling of waste and cargo residues, whether the handling of waste in reception facilities is in accordance with the requirements of laws and regulations on waste handling, and whether there is consistency between the delivery of waste and ship notifications about waste and cargo residues. The Environment Agency is authorized to carry out additional inspections of reception facilities in ports if the available information indicates that the provisions of regulation no. 1200/2014 on the reception of waste and cargo residues from ships are not fulfilled.

Discharge of garbage from the port area is strictly limited. Netmakers' employees, the landing service and/or port employees are responsible for taking general garbage, net and rope waste and steel wires and placing them in specially designed reception containers, and there is an agreement with Íslenska Gámafélagið ehf (Icelandic garbage company) for the transport of these containers to landfill or recycling. Port employees keep a record of waste and cargo residues from ships and it is recorded in the port's computerized form, every year and month separately. All waste and cargo residues except oil sludge are weighed and recorded on a port scale according to type and then compared with the monthly accounts of the Icelandic Gámafélagið while oil sludge taken from ships is reported by an employee of Óliudreifingar.

3.3.2 Norway

Norway is part of the European Economic Area (EEA) and therefore collaborates closely with the EU on environmental policies. Elements of the EU directives mentioned above can be found within several Norwegian regulations.

Waste and pollution regulations in Norway

Regulations relating to recycling and treatment of waste (Avfallsforskriften, 2004) and the pollution control act (Forurensingsloven, 1983) form the legal basis in Norway for waste and pollution management. The first emphasises sorting and material recycling of certain waste types including plastic with the aim to protect the environment, better utilize resources and reduce greenhouse gas emissions. Fishing gear is not specified as a separate category. To put this into context, this regulation has for example a separate provision for the collection and recycling of discarded tyres. The pollution control act (Forurensingsloven, 1983) further defines waste management. The purpose being the protection of the environment from pollution, better treatment of waste and to reduce the amount of waste to achieve good environmental quality and prevent damage to health and to nature's ability to produce and self-renewal. Waste from fisheries is categorised as industrial waste if coming from private enterprises requiring the producer of waste to ensure that the waste is brought to a legal waste facility or undergoes recycling. Common pollution from fishing is permitted, as there are no special regulations tied to it. It is not specified what common pollution is. It is highlighted that pollution which may cause significant damage or inconvenience requires a permit. However, fishing gear is not mentioned as a stand-alone waste issue. There is a general prohibition of littering applied to any type of waste along with orders to clean up waste or pay for cleanup if a person or owner of a ship has left, emptied or stored waste in the environment.

Single-use Plastics directive in Norway

The regulation relating to the restriction on the use of chemicals and other products hazardous to health and the environment (Produktforskriften, 2004) purpose is to prevent and reduce marine littering of certain plastic products and microplastics. It bans specific single-use plastic products and requires labelling for some single-use plastic products. Fishing gear is not mentioned within this regulation.

Legislation related to waste reception facilities in Norwegian ports

The pollution control act (Forurensingsloven, 1983) has a provision on receiving facilities for waste from ships. The pollution control authority can order individual municipalities, port authorities and port owners to establish and operate adequate port reception facilities. They are also responsible for the regulations of fees for port calls and delivery of waste. Moreover, regulations relating to the limitation of pollution (Forurensingsforskriften, 2004) lays down general provisions related to the delivery and receipt of waste and cargo residues from ships with the purpose to protect the environment and ensure that waste residues from ships are delivered to port facilities. The provision includes fishing vessels. Port managers (private or municipalities) are responsible for providing port reception facilities that meet the needs of the ships' waste being disposed of at the ports. They need to ensure that waste is received and handled according to a waste management plan. This includes an assessment of types and quantities of waste residues from ships received and a description of how the waste from ships will be further handled. Shipowners and port managers are both responsible that waste is delivered to reception facilities.

The ship needs to notify the port manager that there will be a waste delivery before arriving at the port. It needs to include the amount of plastic waste to be delivered. Ships have to ensure to deliver waste to reception facilities in ports before departure. Ships have to pay a fee regardless of whether they bring waste to the port or not, this way the treatment and disposal of waste can be covered. However, the fee varies according to whether waste is delivered or not. This is not valid for recreational boats that hold no more than 12 person and smaller fishing vessels. They do not need to pay a fee when calling at ports (unless they are required to do so). Where no fee is paid for ports calls, there might be payments for the delivery of waste. There may be a deduction of fees if the ship's design, equipment or operation contributes to better environmental management. Country governors are the authority for approving waste management plans and check compliance of port managers. The Norwegian Maritime Authority is responsible for controlling the compliance. Moreover, there are the ship safety and security act (Skipssikkerhetsloven, 2007) and the regulations on environmental safety for ships (Forskrift om miljømessig sikkerhet for skip mv., 2012). The first bans the discharge or dumping from ships whereas the latter incorporates the MARPOL annex V in this act covering waste pollution prevention from ships.

Legislation on actively and passively fished waste

The Marine Resources Act (Høstingsforskriften, 2022) outlines the duty to search for and report on lost fishing gear and cutting tools when lost. If the lost gear is not recovered, it must be reported to the coast guard (e.g. vessel, gear type, amount, time of loss, positions of loss), and found gear needs to be reported as well. The act also covers labelling requirements on fishing

gear, including collection bags designed to store wild living marine resources with the vessel's registration mark or the owner's name and address subject to vessel registration requirements. Other provisions include fishing while keeping safe distances to fixed fishing gear to avoid damage to those. For gear used for crabs and lobsters it is mandatory to use a cotton rope for the escape opening of the cage.

Extended Producer Responsibility (EPR)

Norway is currently planning in collaboration with the EU to introduce mandatory Extended Producer Responsibility schemes for fishing gear made of plastic used by aquaculture and commercial fishing industries (OECD, 2022) by the end of this year (2024).



4

EOL FISHING GEAR COLLECTION IN NPA COUNTRIES



4 EOL FISHING GEAR COLLECTION IN NPA COUNTRIES

Fishing gear becomes trash when the user no longer sees it as usable and decommissions it from use. Fishing gear waste is called discarded gear. Usually, the reason for taking the gear out of use is that it is somehow broken or may not be safe to use anymore. (Fishing Gear Coalition of Atlantic Canada, 2023). In this chapter of the report, we outline what is done to EOL fishing gear in the CIRCNETS partner countries. In each country an online survey and additional case studies were carried out, which targeted fishing ports and aquaculture companies.

Separate survey forms were drafted for both fishing ports and aquaculture companies, which were done using Google Forms platform. The surveys are included in the report annexes. Participants were notified that the survey was part of an international Blue Circular Nets project, and the purpose of the survey was to find out how waste management is organised at ports and fish farming plants, and if there was separate collection of fishing gear waste at these facilities.

Conducting fishing port survey

The fishing port survey was carried out by sending the survey by e-mail to the fishing ports located in the NPA area. Each partner had to first map out the fishing ports in their country. Fishing ports with known fish handling buildings were primarily selected as the target group, as it was more likely that this kind of fishing ports would have proper waste management system in place. The survey was organised separately in each partner country.

The fishing port survey included two sections: one focused on the port and the users of the port (six questions), and the other one on waste management and fishing gear (10 questions). The initial section aimed to understand the port type and its activity level, crucial factors influencing waste management. The aim of the second section was to find out more about port's waste management and knowledge of the type and quantity of fishing gear waste generated in the port and whether it undergoes separate collection or not. The survey included four mandatory questions: permission to use answers, port name and location, interest in a more in-depth survey, and interest in learning more about the CIRCNETS project. In total, there were 19 questions, along with a query seeking permission to use the collected data.

Conducting aquaculture survey

The aquaculture survey was also distributed by email to fish farming companies located in the NPA area of the project countries. Survey was divided into three parts and included 18 questions. The first five questions were related to the operation of the aquaculture company, e.g. type of facility and primary form of production. The second part of the survey – 10 questions in total - dealt with waste management and fishing gear. The respondents were asked about the waste reception facilities at the site, about the fishing equipment used by the company and whether there is a separate collection for fishing equipment waste. As in the port

survey, the aquaculture survey included four mandatory questions: permission to use answers, port name and location, interest in a more in-depth survey, and interest in learning more about the CIRCNETS project.

CASE STUDY INTERVIEWS AND VISITS

In addition to the online survey, some project partners organised interviews or site visits to ports and aquaculture companies. The respondents were asked in the survey, if they were interested in contributing more for the research, and some positive answers were received. The aim of these online interviews/site visits was to fill gaps left by the online survey and to get a better understanding about the operations of the fishing ports and aquaculture plants. Additionally, engaging in conversations with the port operators, professional fishers and representatives of aquaculture companies, was crucial to understanding their perspectives on the matter. Gathering information on the types of fishing gear used and the corresponding waste was also a key focus.

Interview topics were based on the survey and preliminary questions and were related to the port and its users/aquaculture company operations, waste management, fishing gear and separate collection of fishing gear. The intention was to engage in discussions on these subjects, providing a more in-depth understanding of the actual situation in the port/fish farming plant. In these conversations the project members shared information about the future separate collection and EPR concerning plastic containing fishing gear, and the interviewees expressed their opinions about these plans and what challenges there might be in putting these plans in practice especially in their port, etc.

4.1 Finland – the land of thousands of lakes and thousands of uncollected fishing gears

The fishing port survey and the online interviews and site visits were carried out between May and August of 2023. Eveliina Koistiainen, who was working as a research assistant in the project at the University of Oulu, did her diploma thesis on the subject. Detailed information about the survey can be found in her thesis (Koistiainen 2023). The aquaculture survey was open for responses between October–December 2023 and the online interviews were organised in January-February 2024.

4.1.1 Fishing port survey

Online survey

In the Finnish NPA area there is 45 fishing ports with fish processing facilities. Some municipalities operate more than one port, so the survey was sent in the end to 33 municipalities and 2 privately owned ports. 13 responses were received by the time of the deadline, and six of the responses were received from freshwater fishing ports and seven from fishing ports situated by the sea. The response rate for the survey was 28%. Not all respondents answered every question, and the response rate for individual questions ranged from 50% to 100%.

In most cases – roughly three out of four - fishing ports were part of marinas, whereas only two ports out of 13 identified themselves exclusively as a fishing port. Building with ice maker was found in most of the ports (81.1% of the surveyed ports), whereas only one had only an ice maker. There was also one port with more sophisticated fish processing facilities, including a smokehouse for fish. The number of professional fishermen using the port varied between 0 and 20, with most ports declaring having between 0 and 6 professional fishermen. Also, the answers to the question about the annual catch handled in the ports varied a lot and some did not reply to this question at all. The catch ranged from 12 tons by a single professional fisher to 150 tons involving by 20 professional fishers. Another respondent stated a substantial output of 300 tons through their own company. The number of spare time fishermen varied between 0 and 50 in the ports.

All 13 ports answered questions related to waste treatment. 8 out of 13 ports (61.5%), had waste reception facilities and one port said they had waste collection days. Mixed waste collection was found in these eight ports, but other waste fractions were collected only in couple ports, as as can be seen in the figure 13 below. There was no separate collection of fishing gear in any of the ports

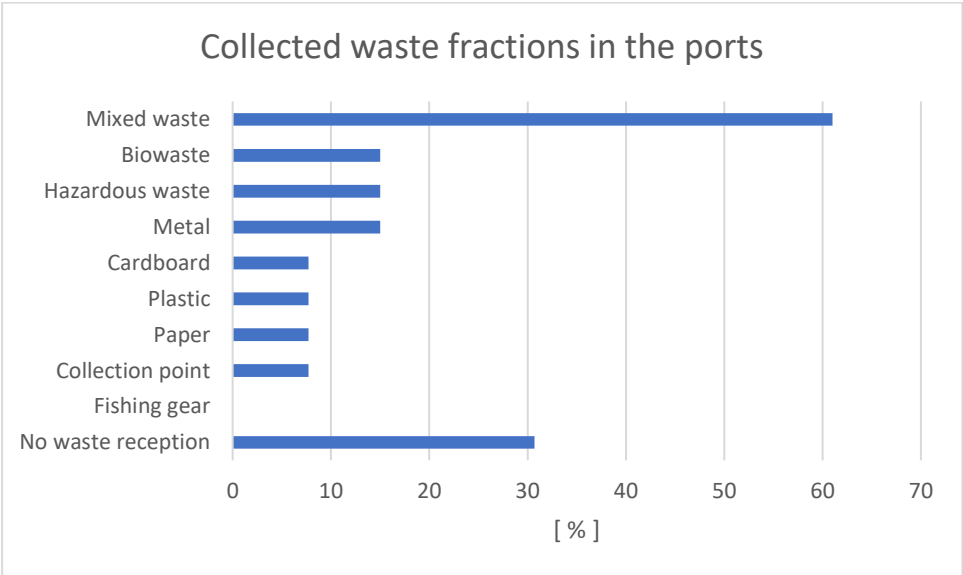


Figure 13. Collected waste fractions in the 13 fishing ports that answered the online survey

Regarding inquiries about fishing gear waste, over half of the respondents, 53.8% - 7 out of 13, did not have knowledge about the quantity of fishing gear waste generated in their respective fishing ports. The rest of the respondents declared that their annual fishing gear waste falls within the range of 0-999 kilograms. One of them provided a specific response, citing an annual fishing gear waste generation in that specific port of 5 kilograms. In over half of the surveyed fishing ports, specifically 53.8%, there were no instances of abandoned fishing gear on the port premises. On the other hand, 30.8% of the ports acknowledged the presence of nets, and two respondents specifically identified the existence of fyke nets. One participant mentioned occasional items being left behind, with the municipality stepping in to clean them every two to three years. Further details provided by participants included references to anchors and

weights, totaling around 50 pieces. Additionally, responses mentioned six fyke nets, and one participant described the presence of miscellaneous pieces.

The survey included a question about the fishing gear used by professional fishers in the port, and 11 out of 13 ports had replied to this question. According to the responses, the predominant fishing gear employed by professional fishers is nets, which was mentioned by ten respondents (90.9%). The next ones were fyke nets (8 ports - 72.7%). Seine nets, pots, and traps received three responses, accounting for 27.3%, while trawl nets garnered four responses, constituting 36.4%. More specific questions about the number of used fishing gear used by professional fishers had less answers and few of the respondents didn't know the amounts.

Port visits and interviews

Five fishing ports were part of the case study in Finland. Four ports were subject to on-site visits, while one port was interviewed online. Only one of these five ports was located by freshwater and the rest were by the sea. Two of the ports were privately owned, while the rest were under municipal ownership.

	Port A	Port B	Port C	Port D	Port E
Interviewed person / port type	Municipality/ port with marina	Fisher /port with marina	Municipality/ port with marina	Fisher/ port with fish processing	Fisher/ port with marina
Waste collected in the port	Mixed waste, oil, paper	Cardboard, mixed, hazardous waste	Mixed waste, metal	Cardboard, mixed, hazardous waste	Cardboard, mixed, hazardous waste
Number of professional / spare time fishers	5 / 50	2 / 4	4 / 10	1 / 6	10 / -
Fishing gear used by professional fishers	Nets and traps	Fyke nets, nets, trawl nets	Fyke nets, nets	Fyke nets, nets, seine nets, traps	Fyke nets, seine nets, nets, trawl nets
Annually generated fishing gear waste	0-999kg, 2-3 kg per fisher	0-999kg	0-999kg	0-999kg, 2-3 kg per fisher	1000 kg, Mostly nylon by volume

Figure 14 Summary of fishing port interviews.

Each port had both professional fishing operations and infrastructure for processing their catches. There were 1-10 professional fishermen per port and their annual fishing gear waste varied from two to three kilos per fisherman up to 1000kg per port. In this 1000kg estimate, the largest part of the weight is metal, but measured by volume, plastic waste is the biggest contributor. Nets were used in all fishing ports and fyke nets were also used in 4 out of 5 ports. Other gear in use in those ports were trawl nets, traps and seine nets.

None of the ports was collecting fishing gear waste separately. One of the ports had had a collection point for fishing gear waste earlier, but the open container, which was set up as a collection point for this, had also attracted unwanted attention. People had brought there their own non-fishing gear waste so the collection had to be stopped and it has not been renewed since then. Opinions on separate collection for fishing gear waste differed between ports. 2 out of 5 ports considered separate collection as a good thing, while in 3 ports it was considered a waste of time and money. In one port single-use polystyrene boxes intended for fish storage caused more concern because they can only be used once as they are part of food supply. Some pointed out that the annually generated fishing gear waste is so small that creating a separate collection for these low volumes seems pointless.

The amount of historical fishing waste also varied between ports. Most of the ports had historical waste and some of them had significant quantities of this. As the legislation does not require old historical waste to be collected under the EPR, something would have to be done about this. At the moment there is a lot of historical fishing gear waste, which should not end up in separate collection, as this begins in early 2025. One of the ports proposed a temporary collection for this old fishing waste and the port expressed its willingness to act as a pilot, should this kind of trial be set up.

Especially the fishermen interviewed in the ports were also worried about the possible price increases of fishing equipment caused by the EPR. They were afraid that the costs of the separate collection would increase the cost of fishing gear, which fishermen on their part would have to add to the price of their fish, which could reduce demand for fish in general. Ghost nets did not cause concern in the ports that were subject to this study. The general notion among the interviewees was that fishers take good care of their gear, as they are valuable for them. If gear is lost, the owner would search for it until it was found. The fishermen also acknowledged the environmental impact of ghost gears, they were very conscious about this and the efforts to reclaim lost gear from the sea were driven also by these environmental reasons. Opinions have improved significantly from what they were 40-50 years ago, sea is a source of livelihood for fishers, and the fishers know that they must take care of it, if they want to depend on it also in future.

4.1.2 Aquaculture survey

Online survey

As mentioned earlier, LUKE collects information about the location of the fish farms, but there is no similar data about the locations of the companies. The number, but also the contact details of fish farming companies that operate at the Finnish NPA region is not available from public

sources easily. The Finnish Fish Farming Association was therefore contacted to help with reaching out the fish farming companies located in the NPA region.

The association sent the survey to its members located in the NPA area and the survey was promoted also in the association's newsletter. The aquaculture firms were slow to pick up the survey and contacting the plants directly by phone was needed in the end secure responses from the aquaculture firms. 11 responses were received and one of them originated just outside of the NPA region, which is not included in the presented responses.

Of the fish farms that responded, the primary form of production was fry production. Six out of ten farms were involved in this, three in food fish production and one plant was a natural pond farm. Eight out of ten fish farms had flow-through facilities and 2 farms were based on net-pen farming. One fish farm with flow-through facility had also an additional natural food pond facility. Waste collection was carried out in all plants except one. Only half of the fish processing plants had waste reception facilities on the site and four of the remaining ones used scheduled collection days.

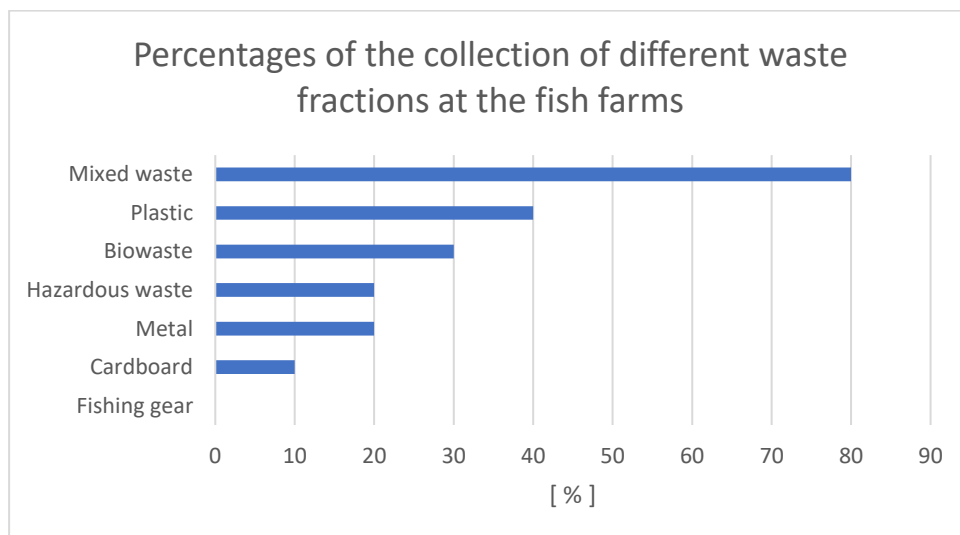


Figure 15. Collection percentages of different waste fractions at the fish farms.

Figure 15 above shows the different waste fractions collected at the fish farms. Mixed waste was collected from 80% of the plants, whereas 40% of plants also had reception facilities for plastic waste and 30% for biowaste. Hazardous and metal waste was collected on every fifth plant and cardboard waste only at one plant out of ten. There was no separate collection of fishing gear waste at any of these sites.

All plants chose response category 0-999kg as the annual generated amount of fishing waste. Two plants specified their annually generated waste amount, which was 0-30kg and 0-10kg. To the question of what type of gear is used on the fish farm, half of the plants used nets or net pens, as well as plastic containing rearing tanks. 90% of the plants used ropes and in two facilities declared that they were also using pool seines and another two plants glass fibre rearing tanks. Figure 16 below shows in detail the distribution of the different types of fishing gear that are used at the fish farms.

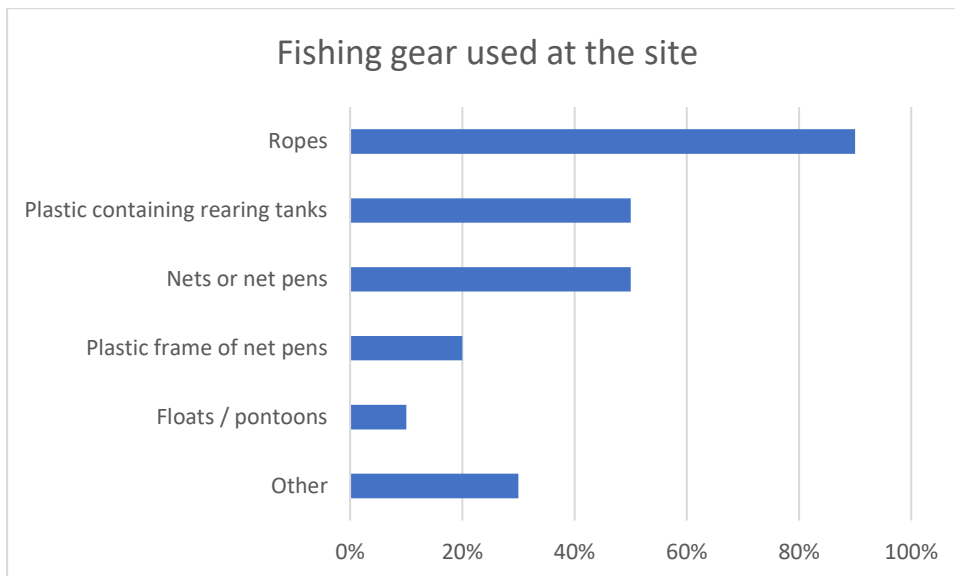


Figure 16. Fishing gear used at the fish farms

Based on the responses, nets and net pen amounts remained below 10 per facility. The number of plastics containing rearing tanks per plant varied widely and ranged from 15 to 150. Also, responses on the lifespan of fishing gear varied a lot. The lifespan of plastic containing rearing tanks were estimated to be 40 years on average and 10 years for nets. Regarding historical fishing gear waste, 70% of the fish farms responded they do not have EOL fishing gear stored at their sites. The remaining 30% of the respondents had historical waste on their site, which included nets or net pens and one listed also ropes and floats in addition to these.

Interviews with aquaculture companies

The aquaculture companies were asked in the online survey about their willingness to participate in an in-depth interview, and two online interviews were organised in the end in January-February. The idea was again to fill gaps left by the survey and to learn more about the operations of the aquaculture companies.

The first company to be interviewed was a food fish producing company that was located by the seacoast in County of Ostrobothnia, which falls just outside of the NPA region. Even though the fish farm was not from the programme region, the interview would give valuable information about the sector in general and would be useful for the research of the NPA area. The fish farm has a long history, being established about 35 years ago. The company was breeding both salmon and whitefish.

The fish farm has 16 cage nets with a circumference of 50 m - 80 m and mesh size of 50 mm to 150 mm depending on fish sizes. The life cycle of these cage nets, which are made of nylon, is 10-15 years. The nets are treated with water-based anti-fouling material every two years and at the same time the cage nets are checked for holes. Earlier on this was done with treatment agents that contained heavy metals such as copper and lead, but the environmental regulations have become stricter. However, disposing of the cold cage nets is challenging, as the heavy metal contents make them unsuitable for regular waste management. Because of that, the

company has stored old EOL cage nets at its own premises. The company has a lot of historical waste, which cannot be taken to a landfill or to waste incineration plant either.

Another interviewed company was Laitakarín Kala Oy, which has two facilities in the Oulu region, a food fish farm site in Martinniemi and a fry farm in Vatunki. Large net cages are used at the the Martinniemi food fish production site. The circumference of the cages is 120 m, and the width is 40 m, and the depth of the cone-shaped channel is 15 m. The net weighs 2.5-3 tons and the plastic structure weighs approx. 5 tons including the bridges. The size of the Martinniemi facility is indicated by the fact that it has the largest single fish farming permit in the country. Another facility of the same size recently received a permit, which is located outside of the NPA region in County of Ostrobothnia.

Vatunki Fry production site has smaller cages in use which are 95m in circumference, 30m in diameter and 6m deep. The total weight is about 4 tons, of which the weight of the nets is approximately 1 ton. For both larger and smaller cages, the lifespan of the nets is about 5-6 years, and the lifespan of the frame is approximately 25-30 years. The company acquired a lot of secondhand pools from companies that have closed their operations. The company has been operational for about 10 years and does not have historical EOL fishing gear waste stored in its premises. Broken net bags are sent Lithuania to be repaired, but they need to be first disinfected properly for biosafety reasons. Scandinet has previously offered this kind of disinfection service.

4.2 Iceland – pioneer of industry-initiated collection schemes

As mentioned in 3.3.1, there is a centralised collection system for end-of-life fishing gear in place in Iceland. This differs from the situation in the other NPA countries, and the survey was thus modified for the local circumstances. Interviews played a key role in finding out how the system has been set up in Iceland and how it works.

4.2.1 Icelandic survey

When the Icelandic survey was planned, it became apparent that the correct target group to answer the survey was not the public organisations (municipalities or other local authorities, etc.) or private fishing companies in charge of the fishing ports. The agreement, which Icelandic Recycling Fund and the Association of Fisheries Companies (SFS) have concluded about the collection of collection and handling of fishing gear waste, is being enforced in 14 fishing ports in Iceland (figure 17). The survey was sent to eight supervisors in charge of these 14 collection stations in August-September 2023 and seven replies were received. Each respondent was interviewed, and two ports were visited.

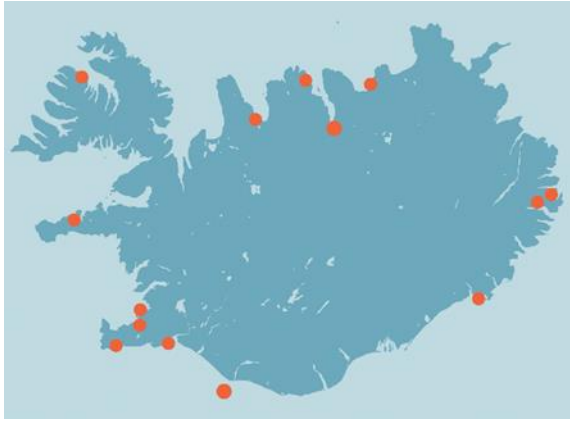


Figure 17. Locations of ports involved in the SFS fishing gear collection system.
<https://samfelag.sfs.is/endurvinnsla-veidarfaera/>

The key finding of the online survey itself was the high volume of fishing gear waste, which is annually generated at the ports. In all of these ports the volumes were more than 10 000 kg per year and in most cases actually over 50 000 kg per year, as can be seen from the figure 18 below.

Port survey

End of line fishing gear

How much used fishing gear is generated locally each year?

7 responses

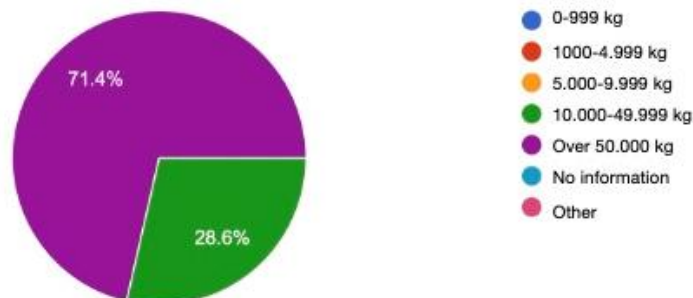


Figure 18. Annual fishing gear waste volumes in Icelandic ports

Interviews and literature searches were conducted in addition to the online survey to find out more about the Icelandic collection system. The foundation of the Icelandic collection system is the agreement between Icelandic Recycling Fund and the Association of Fisheries Companies (SFS). With this agreement SFS assumed responsibility for the collection and handling of fishing gear waste that contains plastic. SFS will fund this operation instead of paying a processing fee for fishing gear that is placed on the market. The aim of the agreement is to minimize the negative environmental effects of the fishing gear waste and to organise the collection in an economical way. The fishing industry wants to be responsible and make it possible, that the synthetic materials that are included in the fishing gear can be processed and reused.

As mentioned, EOL fishing gear is collected from 14 ports. All major fishing ports are included, so the fishing gear waste created by all big trawlers of the Icelandic fishing fleet are covered by this agreement. As all fish farming companies in Iceland are members of SFS, all recycleble nets from aquaculture are collected as well. However, smaller ports with smaller vessels are not included in this agreement.

Today, 90 % of the collected EOL fishing gear is from Icelandic fishing vessels, but foreign entities or their representatives may deposit fishing gear waste made of synthetic materials from foreign vessels to collection facilities in exchange for direct payment to the contractor. Annual EOL fishing gear waste has more than doubled from 2019 to 2022, as SFS is now also collecting old fishing gear collected from the coastline. All is transported from Iceland for recycling in Lithuania, Denmark and the Netherlands. The annual collection volumes are presented below: (source: <https://www.sfs.is/frett/munadarlaus-net-i-endurvinnslu>)

- 2019: 758.382 kg
- 2020: 526.489 kg
- 2021: 729.852 kg
- 2022: 1.685.832 kg

As mentioned in chapter 3, the Icelandic recycling rate of the collected fishing gear has been set at 60 percent. Only in couple years during the 16 years, when the contract has been in force, this has not been reached. During 2020 and 2021 this dropped under the set limit temporarily due to logistical difficulties caused by the pandemic. In 2022 a record rate of 108 percent was achieved, as the collected stockpiles of fishing gear were delivered for recycling. (<https://www.althingi.is/alttext/pdf/154/s/0393.pdf>)

Key aspect of the agreement is that SFS has an agreement with the Icelandic fishing gear manufacturers about the collection of fishing gear these are listed below:

- Veiðarfærþjónustan ehf. Grindavík
- Netaverkstæði G.Run, Grundarfjörður
- Veiðarfæragerð Skinneyar-Þinganes, Hornafjörður
- Egersund Ísland, Eskifjörður
- Ísfell in Húsavík, Akureyri, Hafnarfirði, Ólafsfjörður, Sauðárkrókur, Vestmanneyjar
- Hampiðjan in Reyjavík, Ísafjörður, Akureyri, Neskaupstaður, Vestmanneyjar

In order to be able to leave an EOL fishing gear at a collection point in port, the fishing gear should be produced by one of the manufacturers mentioned above. The more specific terms for the reception are the below and these apply to also foreign made fishing gears. In that case, however, the disposal of the fishing gear is not free of charge for the user.

Terms of reception for plastic containing fishing gear:

- Fishing gear made of synthetic materials refers to fishing gear specified in Annex XVII to Act No. 162/2002 in Icelandic law, as subsequently amended.
 - Fishing gear waste must be dry (6% maximum moisture content) and sorted according to type.
 - The fishing gear waste must be free of all foreign items, foreign materials and impurities such as sand, oils, fish and marine vegetation.
 - The fishing gear waste must be free of all accessories such as floats, lead, rubber, chains and wires.
- The collection entity accepts recyclable fishing gear waste from the depositor on working days from 08:00 to 17:00.
- Reception must be booked with at least 24 hours' notice if the volume is greater than one tonne. If less, then it must be booked with at least 4 hours' notice. When booking, the estimated volume must be specified, as must the type of fishing gear in question.
- On receipt, the collection entity and the depositor or his representative must complete a collection form specifying the volume, origin and type of fishing gear waste. Both parties must confirm the report with their signatures, and the depositor shall be provided with a copy.
- In the event that there is any doubt that the fishing gear waste fulfils the conditions of first item, the collector may refuse acceptance or require payment from the depositor for the cost of necessary treatment to make the waste recyclable.

4.3 Ireland – private collection schemes in use, still room for improvement

In Ireland, the fishing port survey was carried out in Summer 2023. Fourteen suitable ports were contacted via email and phone calls to request their participation in the survey. Of those 14 ports, only one response to the survey was obtained. Due to low participation and representation, it was not possible to obtain useful results through the fishing port survey. Other sources had to be consulted to get an overall picture about the waste management situation in Irish ports.

An online aquaculture survey was carried out at the end of 2023, which was met with more enthusiasm in the field than the port survey received. Twenty-two aquaculture companies,

covering finfish, shellfish and seaweed production were contacted via emails and phone calls. From the 22 aquaculture companies, 4 responses were obtained. In addition to the survey responses, 2 interviews were conducted with an Atlantic salmon producing company and a mussel producing company at the beginning of 2024.

The following section sets out the key findings of BIM's study on fisheries waste managed in Irish ports, and the results from the online aquaculture survey and interviews. In addition, this sections also provides information on the waste classification system and current plans in place to recycle end-of-life fishing/aquaculture gear in Ireland.

4.3.1. Fishing gear waste in Irish ports

One reason that can explain the lack of interest towards the port survey is that the Irelands Seafood Development Agency (BIM - Bord Iascaigh Mhara) had recently conducted a study about the waste management situation in Irish ports. This study was done between 2018 and 2020, so perhaps the ports were not too eager to take part in another, similar survey, as these issues had been already addressed a couple years ago. Even if the port survey failed to deliver up-to date data about the Irish situation, it is possible to put together an overall picture about the waste management issue of the ports with the help of the BIM report. In this chapter the main findings of this study will be summarised in order to understand the management of fishing-gear waste in Irish ports.

BIM, (2020) study is part of the Clean Oceans Initiative program developed by BIM. The Clean Ocean initiative (<https://bim.ie/fisheries/sustainability-and-certification/clean-oceans-initiative/>) covers a range of BIM and seafood industry supported programs to minimize the impact of the seafood sector on Irish oceans, including Fishing for Litter (FFL), Co-ordinated Local Aquaculture Management Systems (CLAMS), Gear Retirement Scheme, shore and pier cleans, and waste management services.

BIM, (2020) adds value to previous work conducted under the Clean Ocean initiative, where it was examined for the first time in Ireland, the composition of wastes from the Irish fishing fleet from two waste streams: a) The municipal waste generated onboard fishing vessels; and b) The industry wastes disposed of in the FFL waste stream. Results from this work showed that 70% of the FFL waste reported was directly related to fishing (e.g., nets, ropes, and fishing-based clothing). However, a distinction between the different types of gear (i.e. abandoned, lost, or discarded) was not made, nor was there a differentiation between the different types of net materials (i.e. nylon, PE, etc.).

Therefore, BIM, (2020) aimed to provide more detail on the types and potential sources of waste occurring in Irish fishing ports. To get a better understanding of the type of fishing gear waste generated in Irish ports, 4 surveys were conducted across 12 fishing ports (8 out of 12 were located within the NPA region), based on the EPA's National Waste Characterization material list with more detailed material classifications of fishing gear.

Moreover, a comprehensive assessment of the facilities in place at 12 Irish ports was undertaken to determine what good practices are in place. And finally, it was assessed how the ports are aware of the new European legislative drivers (i.e., Port Reception Facilities

Directive (PRFD), and the Single Use Plastics Directive (SUPD)) and how they impact the ports' performance.

Fishing gear waste results (BIM study)

The expanded FFL results from BIM, (2020) showed that discarded trawls nets were the largest waste material by weight, with 34% of the total nets and ropes (Figure 19). In second place by weight were discarded ropes at 22%, followed by lost/abandoned trawl nets at 12%. Discarded gillnets (10%) and abandoned/lost gillnets (9%) were retired as a single material (nylon). End of life materials accounted for 10%. Meanwhile, discarded long lines made up 3% of the total weight, with a small quantity of lost/abandoned longlines found. Lost/abandoned longlines are the lightest gear type, whose weight will underestimate their frequency of occurrence within the marine litter retrieved.

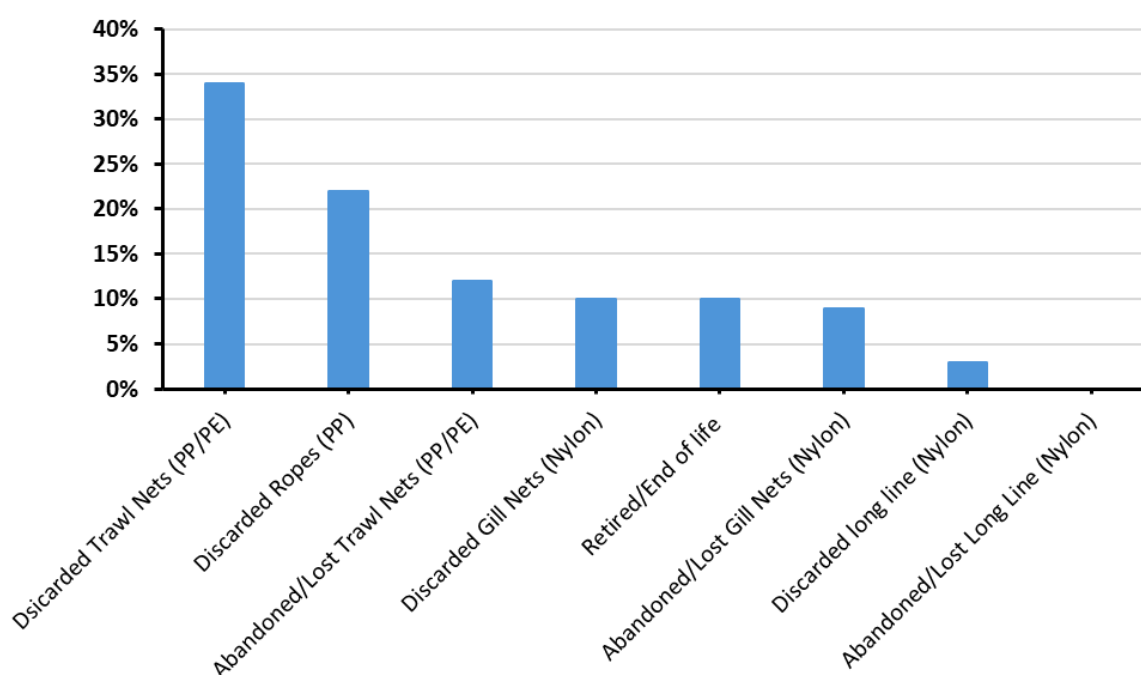


Figure 19: Waste characterization of nets and ropes by weight from BIM, (2020).

In order to improve the statistical basis for a national profile, results from previous work on FFL were combined with results from BIM, (2020). Additionally, this national profile was applied to the 190 tonnes of FFL figures reported by BIM in 2019, allowing tonnages of the various materials in the FFL stream to be estimated (Table 10).

Table 10: FFL waste characterisation as % of total weight and estimated tonnes based on 190 tonnes collected in 2019 from BIM, (2020).

Material	% of Total	Total tonnes 2019
Discarded Trawl Nets (PP/PE)	23.8%	45.3
Discarded Ropes (PP)	15.0%	28.5

Abandoned/Lost Trawl Nets (PP/PE)	8.6%	16.3
Discarded Gill Nets (Nylon)	6.8%	12.9
Retired/End of Life	6.8%	12.9
Abandoned/Lost Gill Nets (Nylon)	5.3%	10.1
Discarded Long Line (Nylon)	2.0%	3.7
Abandoned/Lost Long Line (Nylon)	0.1%	0.2
Other waste streams	31.7%	60.1

Notes: Other waste streams include metal, plastic, textiles, wood, unclassified combustibles, unclassified incombustibles, cardboard, organic waste, composites, glass paper, fines, and other industry waste.

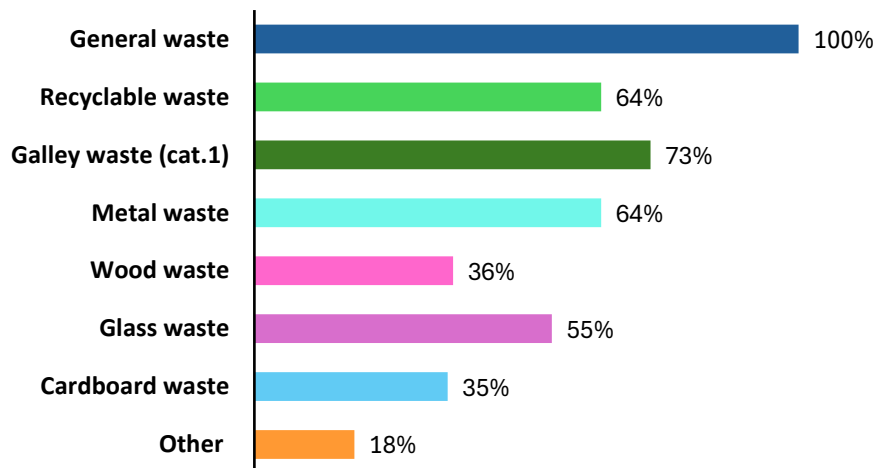
Port waste facilities and legislation results (BIM study)

The BIM, (2020) study also conducted a survey on waste management facilities in fishing ports. This survey was sent to harbour master’s from 12 fishing ports (8 of them located in the NPA region) and a number of local authority officers.

A)

Waste management facilities

Answered: 11 | Skipped: 1



B)

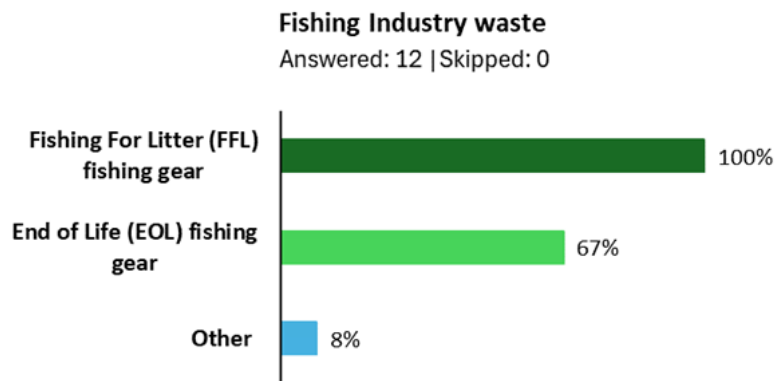


Figure 20: Survey results of: A) Waste management facilities; B) fishing industry waste from BIM, (2020)

With regard to waste management facilities in place (Figure 20, A), results showed a high variety in services provided, ranging from just a municipal skip for all wastes and a waste oil container to services for all municipal and industry-related waste materials. From the results, only 63% provide facilities for recyclable municipal materials (i.e., organic and dry recyclables) and 72% provide Category 1 waste services (galley waste).

In terms of industrial wastes (Figure 20, B), only 67% of the ports receive retired or EOL fishing gear, with few having facilities in place for the management and disposal of such waste as a dedicated stream. Considering these findings, management of fishing gear in Irish ports needs further improvement to ensure that all the reusable/recyclable materials are kept separate from 'true FFL' materials which are only fit for disposal.

Harbour master consultations (BIM study) and key observations

The BIM, (2020) study supported the information provided from the surveys by conducting follow up visit, when possible, to the participating port facilities in order to: a) determine the best practices currently in place throughout the country; b) understand better how local factors affect waste management practices in Irish ports; c) Understand how the SUP and PRF directive are viewed on the ground and determine what support (i.e., technical, infrastructural or institutional) is needed; and d) Clarification and gather further information on the waste management situation in Irish ports. Through Harbour master consultations the following aspects related to fishing gear waste - among others - were discussed and analysed:

- **Waste management and local infrastructure:** many ports receive waste from other users outside the fishing industry (e.g., passenger ferries, cruise ships, sailors, etc.). There is need to expand these services provided in ports, which also includes industry wastes (including retired gear and FFL) and category 1 waste. In addition to that, there are still sites which lack efficient waste management.
- **National infrastructure:** due to the big volumes of fishing gear waste generated and the work involved in managing it, harbour masters suggested that there should be two to three regional centres to retire fishing gear and a central deposit location where

volumes are managed, and appropriate expertise could be applied to generate marketable outputs.

Nowadays, the FFL pilot system brought by BIM is the only system in place to collect fishing gear waste in ports. Sometimes, port users have difficulties in distinguishing true discarded FFL (i.e., passively fished wastes) and EOL gear that is managed within the existing FFL system (rather than being disposed of in general waste). After discussions with the Harbour Masters who noted that, they agree that there is a need for a national net management scheme to ensure that the EOL materials are kept separate from true FFL materials (typically heavily soiled and can only be landfilled) and managed for appropriate disposal and further reuse (or recycling) as part of a the EPR directive.

- **Staffing:** Regarding the staff available, it is insufficient considering the existent workload for gear waste management. Consequently, most fleets have developed net dismantling services where available (especially for nylon nets). It was stated that there has been good buy-in, and it is important that this momentum is built upon and not lost. Additional requirements under the new directives must promote the recruitment of more specialized staffing and builds good communication with the fishing fleets to avoid conflicting messages in terms of gear waste management.
- **Legislation:** the SUP directive closes the loop over the lifetime of netting and the establishment of the EPR scheme. Many of the mechanics of such legislation are external to fishing activities, however, waste management and reporting of such is part of this process. In a similar way, the PRF directive requires better segregation and reporting of all waste streams, including FFL and end-of-life gear. Therefore, both directives will have an impact on ports and the vessels that use them.

As stated before, in Irish ports, some of the materials currently managed through the FFL scheme are not true FFL. Distinction between true FFL and discarded EOL materials (that aren't full nets) needs to be communicated to the sector. Passively fished waste must be recorded under the PRF directive and MARPOL. Meanwhile, the SUP directive is responsible for EOL fishing gear, as there are specific reporting formats for 'putting on the market' and, 'retiring off the market'. Consequently, proper facilities for both streams and their management need to be in place in ports and vessels.

4.3.2 Aquaculture survey

In Ireland, the aquaculture survey was modified to include all relevant aquaculture sectors in the country (i.e. finfish, shellfish, and seaweed). Responses from 4 aquaculture companies were obtained in the survey, with variability in the type of aquaculture production. One respondent focuses on the production of freshwater smolt and on growing Atlantic salmon production, with 21 licensed facilities throughout the country. The remaining respondents are shellfish producers, one of them being a mussel farm with 1 licensed facility, and 2 oyster producers, one of them with 5 licensed areas and an industrial unit for storage. Although seaweed farms were contacted, no responses were collected from this sector. In the Irish NPA

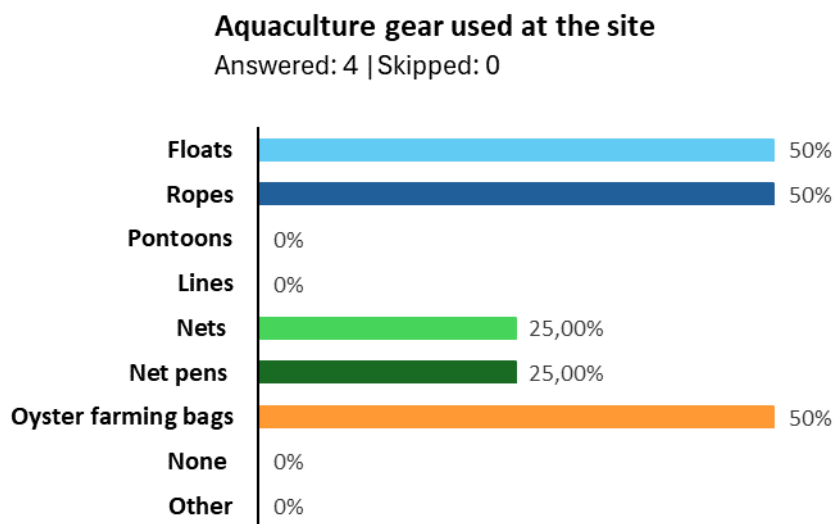
region there are 201 aquaculture licensed units, of which 26 participated in the survey, thus representing 13% of the aquaculture industry in this region.

The salmon producer operates flow-through aquaculture facilities for the production of freshwater smolts, consisting of 163 tanks with a total capacity of 4,500 m³. On growing salmon production is carried out in 162 net pens with a capacity of 2,193,333 m³. In addition, one of the oyster producers presents 6 purification tanks that can hold up to 1,200 kg of oysters per tank.

Aquaculture gear waste results

The survey results showed great variability in the type of aquaculture gear used (Figure 21, A). Fifty percent of the respondents use floats, ropes, and oyster bags. Meanwhile, 25% of the respondents use nets and net pens in their facilities. None of the respondents use pontoons and ropes. Mussel producers specified the use of 480 km of culture rope and 2,500 floats, all of which are reusable, and polypropylene rope (6 to 10 mm). Oyster producers estimated the use of 3,000 to 12,000 oyster bags, in most cases repaired and reused. The Atlantic salmon producer estimated the use of 260 nets and 200 floats.

A)



B)

Aquaculture gear stored at aquaculture site

Answered: 4 | Skipped: 0

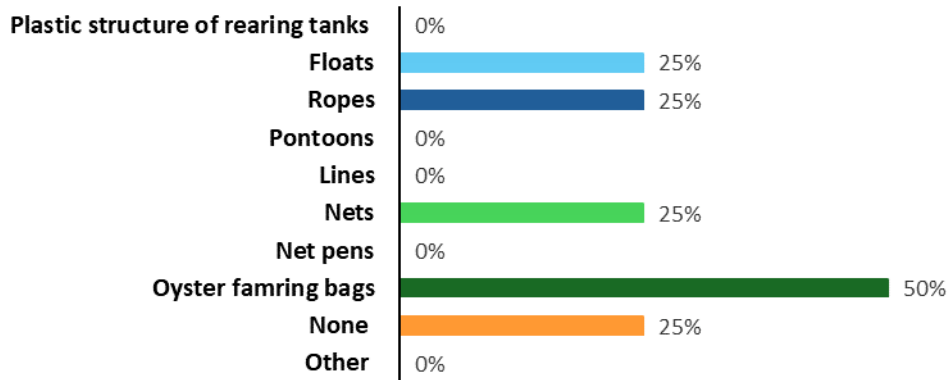


Figure 21: Survey results on: A) fishing gear used; and B) fishing gear stored at the aquaculture site.

Regarding the storage of EOL aquaculture gear (Figure 21, B), survey results showed that 50% of respondents store oyster bags. One of the oyster producers estimated a total of 500 oyster bags stored at the facility. Twenty-five percent of respondents store floats, ropes, and nets. Salmon producers estimated a total of 25 floats, 64 nets (156 tons) and 1.5 tons of ropes stored at their facilities. One of the respondents does not store EOL aquaculture gear.

Results on the collection of EOL aquaculture gear showed that 75% of the respondents don't collect EOL aquaculture gear separately. In terms of the volume of aquaculture waste generated, the survey results show wide variety, ranging from 0-999kg up to more than 50,000kg.

Aquaculture waste facilities and legislation results

Results on the presence of waste reception facilities in aquaculture sites showed that only 25% of the aquaculture companies have waste reception facilities. Meanwhile, 50% lack waste reception facilities but have a scheduled waste collection day. Regarding the type of waste facilities (Figure 22), cardboard waste services are present in 75% of aquaculture sites, followed by metal waste, municipal waste and plastic waste facilities (50% each). Similarly to fishing ports, hazardous waste and biological waste services are less common in the aquaculture industry, being present in only 25% of the sites. In addition, 25% of the sites didn't have any type of waste reception facilities.

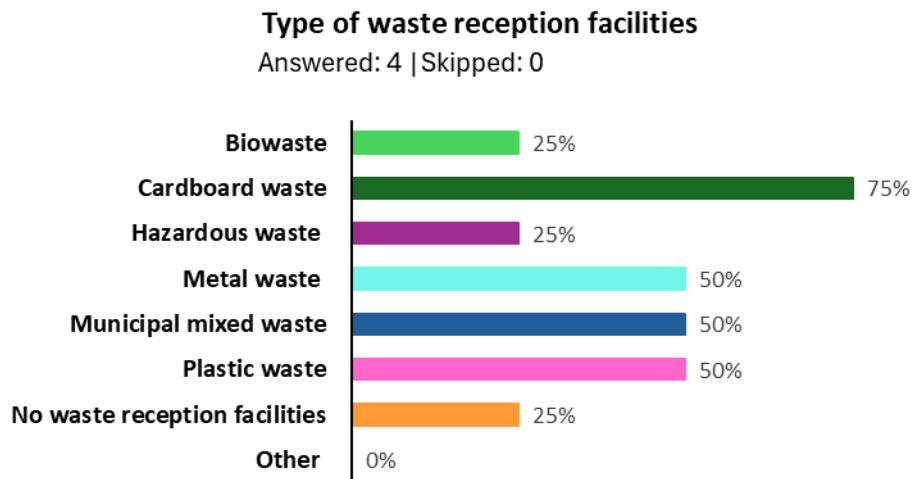


Figure 22. Type of waste reception facilities at the aquaculture site.

Interviews and key observations

Following the aquaculture surveys, two interviews were conducted with one of Ireland’s largest salmon producers, covering 21 licensed farming sites, and a major national representative of mussel production. Similar to fishing ports, these interviews aimed to better understand: a) how aquaculture waste is managed at farm facilities; b) Identify further improvements and best practices in waste management; c) what is the perception of aquaculture producers towards the EPR directive and what guidance and suggestions are needed; and d) Identify how the aquaculture industry is reducing plastic waste production.

- **Waste management and local infrastructure:** depending on private investment and waste volumes generated at aquaculture site, waste management practices can differ greatly between farms and sectors.

The mussel producer uses the national colour-code container system to sort industrial waste: green (cardboard and plastic), brown (organic) and grey (mixed waste). However, when it comes to aquaculture gear waste, they don’t have a specific system in place due to the low volumes generated and the complexity of removing biofouling from ropes. Therefore, aside from some old floats purchased in by local farmers, most of the EOL aquaculture gear is sent to landfill.

On the other hand, the Atlantic salmon producer has an efficient recycling system with a zero-landfill policy. All waste streams are segregated in different containers for reuse and recycling into new products or by-products. The most significant aspects regarding fishing gear waste are the following ones:

- **Plastic equipment material:** as one of the largest salmon producers in Ireland, they produce tons of plastic waste, which makes impossible to store in containers. Nets are reused as much as possible due to their high costs and recycled to other plastic materials.

- **EOL plastic aquaculture gear (e.g., nets, floats, buoys, ropes, cage rings, etc):** all EOL farming materials is sent to a private net recycling centre, where it is sorted and repaired (if possible) or sent for further recycle (Figure 23)

Cage nets are disassembled from the cage structure and tested annually for strength and integrity. The nets used don't present antifouling material to prevent contamination of the water with chemicals and pesticides. During the annual inspection, all nets are washed to remove fouling fauna and patched for reuse (Figure 23, B and D). If broken, nets are fixed with repair material from older nets. However, if the nets are no longer usable, they are sold to a Norwegian recycling company for processing into other products and purposes (e.g., EOL aquaculture nets are used to stabilize forest paths). In addition, all nets are labelled and tracked throughout their life cycle. The structure of salmon cages is usually made of high-density plastic. To reduce plastic waste production, as much material as possible is used for the construction of other cages. Ropes are more difficult to sort and recycle due to the materials used in them. They are usually sold to recycling companies. In contrast, floats are easy to recycle and reuse. They are usually sold to other aquaculture farms (e.g., oyster farms and mussel farms). Those that are not sold can be broken down into different materials (i.e., high-density plastic and polystyrene). Polystyrene from floats and cage rings is compacted with an on-site compactor and used to produce more floats. The plastic skin is sorted into different containers and sold to recycling companies.



Figure 23: MOWI's Recycling net centre in Ireland. A) Used and EOL nets from MOWI's fish farms; B) Net inspection and repairment; C) Cage rings and cage structure materials; and D) net washer equipment.

- **National infrastructure:** to date, there is no system in place in Ireland for the collection and recycling of EOL plastic fishing/aquaculture gear. From an aquaculture producer's perspective, both companies agreed that, to move towards a circular economy, such a

system is needed. In addition, implementing a public/privatized system could improve the transparency on what happens to plastic materials at the end of their useful life. It was also noted that some challenges could arise in terms of economic viability, especially considering the waste volumes generated on farms and the investment in facilities and personnel required.

Regarding the type of system (i.e., centralized collection/recycling system or several collection points and 1 centralised recycling centre), opinions differed. Both companies agreed that, from an aquaculture producer's point of view, there isn't a preference. However, for the organization in charge of such scheme, there is disparity in the recommendations. The main aspects causing these disparities are related to investment and transportation costs due to the location of aquaculture farms. One of the interviewed stated that Ireland is a small country where most of the seafood production takes place in the west. Therefore, it is more feasible to implement a recycling centre located in the mid-west to avoid higher investment and transportation costs.

The implementation of a collection and recycling system requires the payment of fees. Both companies are willing to pay such fees, as long as it is known that the waste is recycled and if the quota is lower than what they currently pay.

- **Staffing:** waste management of plastic EOL aquaculture gear requires additional training and investment. For instance, training is needed for the correct collection of the waste to reduce its loss at sea and sorting to avoid mixing it with regular plastic waste. In terms of investment, many farms don't have proper infrastructure or facilities to effectively store and manage these waste streams.
- **Sustainable alternatives:** the aquaculture industry is more inclined to invest in and implement sustainable alternatives to reduce waste production. The long-term goal of the mussel producer is to reduce their waste production to 0. They are applying some sustainable techniques, such as using biodegradable cotton mesh, expanding the life span of polypropylene ropes, and prototyping ropes made from biopolymers.
- **Legislation:** It is a good opportunity to include the aquaculture industry into the EPR directive as, regardless fishing ports, it is easier to manage aquaculture operations to promote the recycling of plastic materials and reduction of plastic waste. It was also noted that the EPR directive will directly affect net producers and suppliers. However, aquaculture producers may be affected through material costs, being higher if a recycling scheme is implemented. From an aquaculture producer's perspective, proper communication, transparency, and product traceability are some of the key aspects to ensure the correct implementation of the EPR directive in the aquaculture sector.

4.4 Norway – aquaculture more active in collection efforts than fishing

The fishing port survey started in August 2023 with reminders sent every two weeks until the survey was finally closed in late September.

4.4.1 Fishing port survey

The fishing port survey in Norway aimed to target ports with existing fish handling buildings, as they were more likely to have waste management systems. In the NPA project area of Norway, a total of 45 such fishing ports were identified. A survey was sent to these 45 fishing ports, and 14 responses were received, giving a response rate of about 22%. Of these ports 35.7% of the, specifically 5 out of 14, identified the ports exclusively as fishing ports, whereas about half of the ports were part of marinas.

The number of professional fishermen in the answered ports varied a lot, but most of the ports, 11 out of 14, reported having between 25 and 200 professional fishers at the port. Also, the amount of catch handled in the ports each year varied. Some could not give any exact figures about this, whereas the catch ranged all the way from 10 tons year to 1 500 000 tons/yr. The number of leisure fishermen varied between 7 and 300 in the ports.

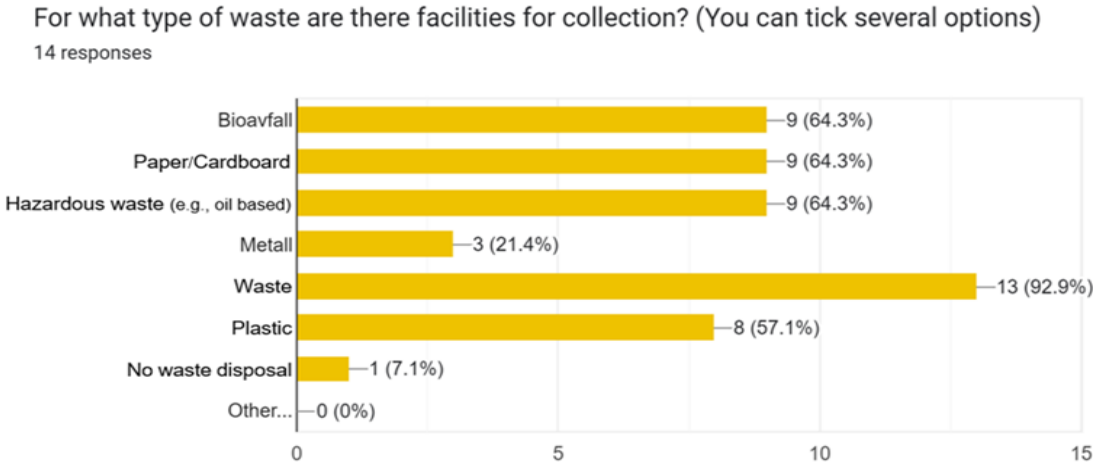


Figure 24. Collected waste fractions in Norwegian fishing ports

All 14 ports answered questions related to waste treatment. 13 out of 14 ports (85.7%), had waste reception facilities and in one port (7%) waste collection was organised in another way. Biowaste, paper waste and hazardous waste was collected in 9 ports (64.3%), mixed waste in 13 ports (92.9%), plastic waste in 8 ports (57.1%), and metal waste 3 ports (21.4%) as can be seen in the figure 24 below. Fishing gear is collected separately in five (35.7%) of the surveyed ports while there was no separate collection of fishing gear in nine (64.3%) ports. Figure 24 also shows the response on the different type of waste collection facilities.

Regarding inquiries about fishing gear waste, 43% admitted to lacking knowledge about the quantity of fishing gear waste generated in their respective fishing ports. Around 14.3% of respondents asserted that the amount of fishing gear waste falls within the range of 0-999 kilograms, 14.3% collects 1000-4999 kg/yr, 21.4% collects between 10 000-49 999 kg/yr and 7% over 50000 kg/yr.

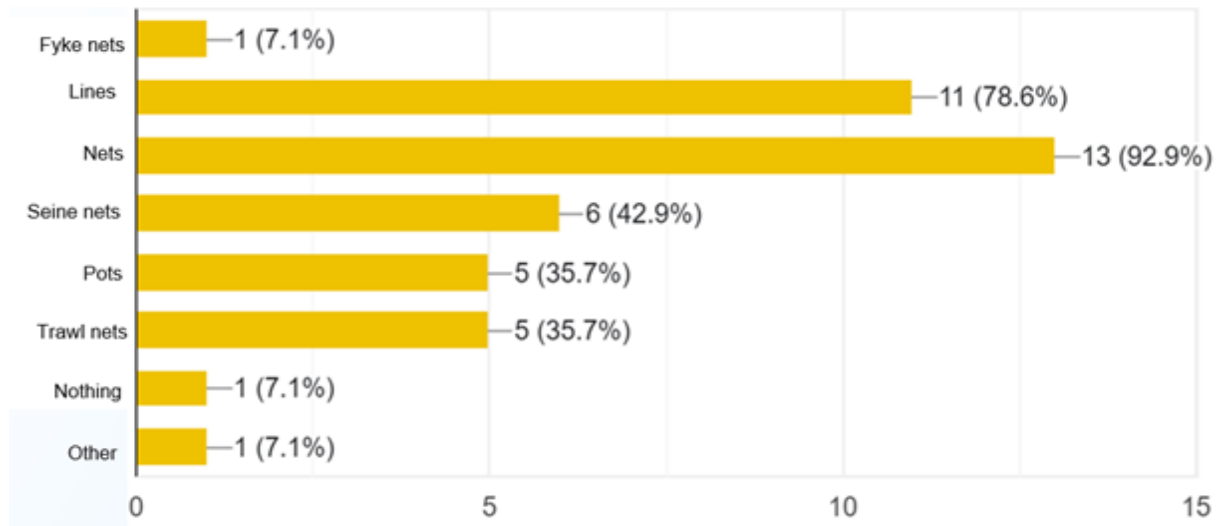


Figure 25: type of fishing equipment is used by professional fishermen at Norwegian ports

According to the survey responses, the predominant fishing gear employed by professional fishers is nets, with 13 ports (92.9%) of indicating their use, followed by lines at 11 ports (78.6%) and seine nets at 6 ports (42.9 %). Pots, and trawl nets were used in 5 ports (35.7 %), fyke nets in one port (7.1%) and one port (7.1 %) had selected also other fishing equipment. Figure 25 illustrates the breakdown of various fishing gear utilized by professional fishers in the surveyed ports.

In summary, nets 93% (13) and lines 79% (11) are the most common fishing gear types used by professional fishers in these ports. In addition, there is a lot of variation between ports regarding the numbers (/type) of fishing gear that is used by professional fishers. There was also historical fishing gear waste in the ports with the main type of fishing gear being nets (57%), whereas 43% of the answered ports did not report any historical waste. Questions about waste management were well answered but replies about fishing gear numbers and types were not as extensively covered.

4.4.2 Aquaculture survey

The aquaculture survey in Norway was carried out from October to December 2023. The companies selected for this survey were chosen according to the geographical limits of the NPA-region and according to the largest aquaculture companies in Norway with activities in the NPA-region. The survey was sent to 37 aquaculture companies of which 10 companies responded to the survey representing a response rate of 27%. The companies that answered to the survey represent a total of 74 farms throughout Norway. Each responding aquaculture company had between 13 and 188 fish ponds. Thus, they represent a total of 544 fish farming

ponds (volumes were difficult to add since some of the respondents answered in different units).

All participating companies produce fish for food consumption using traditional aquaculture facilities. Three companies indicated that had in addition to this either a through-flow facility, a recirculating aquaculture system (RAS) or a semi-closed production unit. 60% of the sites have waste reception facilities whereas 30% have a specific day for waste collection and the rest take waste to reception facilities only when necessary.

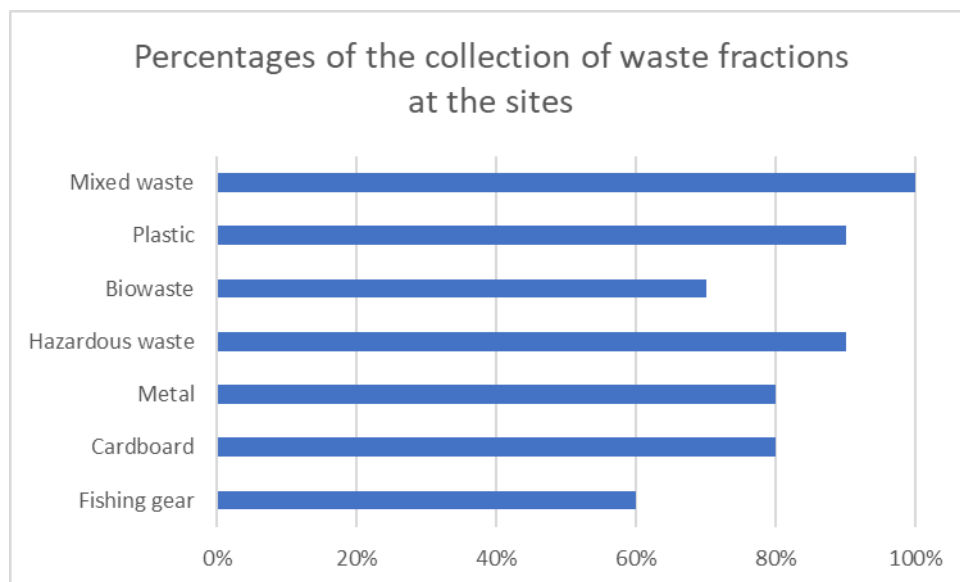


Figure 26. Percentages of the collection of waste fractions at the Norwegian sites

Figure 26 shows the types of waste collected at the facilities. 60% of the companies collect fishing gear and 90% plastic waste. Only one company indicated that they do not collect used fishing gear separately. Some companies reported that they differentiate in the sorting between ordinary ropes and environmental ropes and have a dedicated container just for ropes. The respondents indicated that the fishing gear collected is sent to Oceanize or Nofir for recycling or, the used fishing gear is sent back to suppliers to be reused (e.g. nets, hides and lice skirts to Selstad). In some cases, it is also delivered to a waste management company. The overall distribution of how much used fishing gear is generated at the facility annually is quite dispersed. 30% of the facilities generate 5000-9999 kg of used fishing gear and another 30% between 10000 and 50000kg. Only 10% have either over 50000kg or between 0-999kg used fishing gear generated annually at their site. The remaining 20% do not know how much used fishing gear waste is generated annually at their facility. As highlighted by one respondent, the amount varies from year to year though.

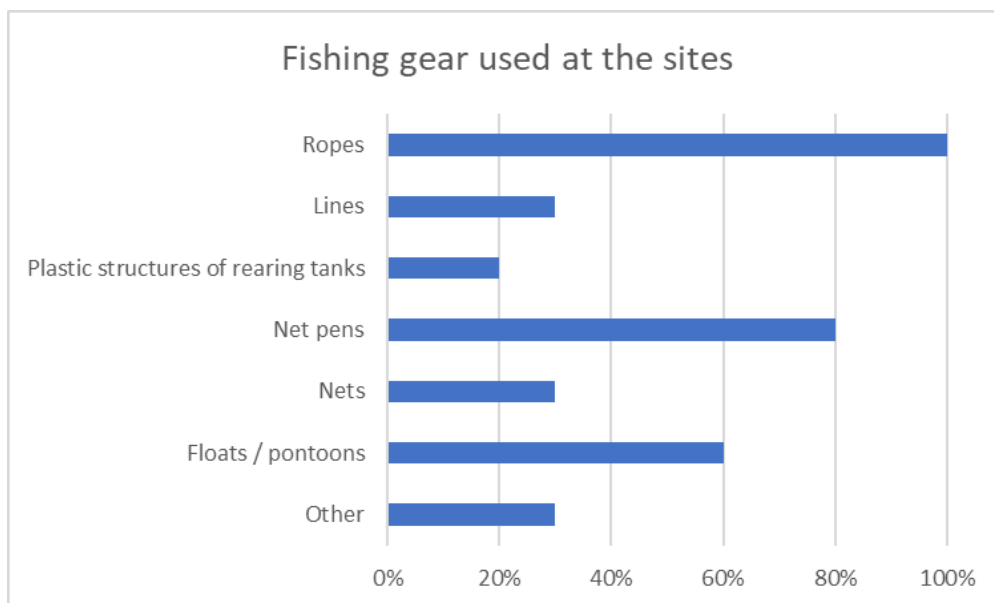


Figure 27. Fishing gear used at the Norwegian sites

Figure 27 shows the types of fishing gear used at the facilities. All companies use ropes. Among the other most used ones are net pens (80%), floats (60%), pontoons (60%) whereas a smaller fraction of nets (30%), lines (30%) and plastic structures of rearing tanks (20%) are used. The remaining 30% of companies also use chains, ankers, buoys, tank nets and feeding pipes. The participants were also asked the approximate proportion (%) of the type of fishing gear used at the facility. Only half of the respondents answered with accurate numbers on specific types of fishing gear used. From the individual percentages on diverse types of fishing gear given from the different companies, average percentages were calculated to have a general overview. From these responses, 68% of fishing gear used are floating collars (including feeding hoses), 58% are nets, 29% are ropes, 10% are chains/anchors or pontoons, 5% are floats and 3% are plastic pipes. In addition, the companies were asked whether they have expired fishing gear stored at the facilities. Half of the facilities do not have expired fishing gear stored. For the companies which have expired fishing gear stored, most are ropes and floats and some smaller storage of pontoons, net pens, chains and anchors.

4.5 Sweden – initiator of a government funded collection scheme for fishing gear

As mentioned in in chapter 2.5., the Swedish NPA region is not precisely a hotspot of Swedish fishing and aquaculture sector. The number of professional fishers and the tonnage of the commercial fishing fleet was marginal in the northern counties, and it proved to be a challenge to get information about the fishing ports in this area. However, the contribution of Sweden to the report was not limited to this, as there is a national collection system for EOL fishing gear in use.

4.5.1 Fishing port survey

The survey was sent to 13 respondents in Sweden. Eight of them were fishing ports and 5 were other public organisations or authorities, who could have knowledge about the fishing ports in their region. The respondents were not eager to answer the survey and, in the end, only two fishing ports filled the online survey.

The two ports were small, as can be expected, and one of them identified as a fishing port whereas the other one was a fishing port with marina. One was privately owned, the other publicly owned and the annual catch ranged from 0-10 tonnes to 100 tonnes. The privately owned port was well equipped with different kinds of fish processing facilities, whereas the other one did not have any facilities at all. One of them did not answer the question about the waste management system in the port, and the other one did not have such. There were just a couple of professional fishers at each port and also the number of spare time fishers was low, less than ten in both of them. Nets, trawls and net traps were used by the professional fishers. Because of the lack of responses it is hard to make any far reaching conclusions about the Swedish NPA ports. However, either of them did not have separate collection of EOL fishing gear and did not report historical fishing gear waste.

4.5.2 FISKERETUREN – collection of EOL Fishing gear in Sweden

There does not seem to be separate collection of EOL fishing gear on the Swedish side of the bay of Bothnia, just as there is no such on the Finnish side of the bay either, but the situation in Northern Sweden does not give a representative picture of the whole country. There is in fact a national collection scheme for EOL fishing gear, but it has not reached the north yet.

Swedish Agency for Marine and Water Management has initiated a Fiskereturen project (Fiskereturen – Återvinn fiskeredskapen) with the aim of establishing a national collection scheme for EOL fishing gear. Fisher association FF Norden is collecting fishing gear from ports on west coast and southern Sweden and Boat scraping association Båtskroten is collecting these on the east coast and plans to extend the collection scheme to Northern Sweden in 2024. The collected fishing gear is transported to Sotenäs Municipality, which is also the project leader. The collected fishing gear will be sorted into individual material fractions at the Sotenäs Marine Recycling center and the sorted materials will be sent to other facilities to be recycled. Keep Sweden Tidy is involved in the project as well as partner responsible for dissemination. The project was started in 2019 and will run till November 2024. As the project will expand its operations to Northern Norrland in 2024, even the fishers in the Swedish NPA area are able to dispose their EOL fishing gear in a sustainable way (source, interview with the project Fiskereturen on 9th of November 2023).

4.5.3 Aquaculture survey

Unlike with commercial fishing, fish farming, and above all food fish farming is well settled in northern Sweden with 28 sites in total. An online survey was set up for the aquaculture companies located in the Swedish NPA region, which was sent to 8 companies. The response rate was higher than in the port survey, four responses were received by the deadline. All the

respondents own and operate several facilities, some up to four different units, so the responses cover very significant part of the fish food aquaculture sector.

The sites included, besides food fish production also breeding of fry and trial sites. The number and volume of the tanks varied a lot, as did the types of facilities. In addition to flow through farms, there were also cage farms and box cultivation. Some had more sophisticated waste management facilities on the site, whereas one did not have any. Plastics structures of breeding tanks, floats, net cages, collection bags and plastic tubs were reported as the types of fishing gear in use at the sites. Some sites also had historic waste, but what was interesting was that two of the respondents reported that they are collecting EOL fishing gear separately.

4.5.4 Interview with a Swedish aquaculture company

Based on the Swedish aquaculture survey it seems that the aquaculture companies in the Swedish NPA region are more actively involved in collection of EOL fishing gear than the ports are. A further confirmation for this issue was received during the Nordic Seafood Summit, which was held on 25th of January 2024 in Gothenburg. Some Swedish aquaculture companies attended the fair and the CSO of an aquaculture company located in the Swedish NPA region in County of Jämtland was interviewed at the fair.

The company has freshwater fish farming facilities in the County of Jämtland and they breed food fish – Rainbow Trout and Char – in cage culture systems/net pens. The system consists of the structure of the cage itself and the net that is attached to it. The cages are made of PA with a lifespan of about 10-15 years. Every year, the cages are taken up and the nets are inspected and repaired. In addition to cages and nets, seines are also used at the site. The volume of the nets varies with the largest nets being 100-120 m in circumference and 10-12 m deep and the smallest are 50 m in circumference. Processing the fish is not done by the company, they deliver the fish to other companies, which prepare them for the wholesalers.

The company has been operational for about 15 years, so some of the cages have already reached the end of their lifespan. These are transported to Lithuania where they are recycled in Lithuania. They have also started a collaboration with the company ACCON to recycle feed packaging. ACCON will make granules that will go back to the fish farming company as new feed packaging to circulate these products.



5

CONCLUSIONS



5 CONCLUSIONS

Fishing and aquaculture play a significant role in the economies of all the NPA countries – Finland, Iceland, Ireland, Norway and Sweden. However, the level of activity varies a lot between the countries, and even more between the NPA areas. Commercial sea fishing, for example, is marginal activity in the short NPA coastlines of Finland and Sweden at the northern end of the Baltic Sea. In Ireland and Norway the counties that make up the NPA area, are the truly the national hot spots of commercial sea fishing. They are the least populated regions, but about half and in some cases even more than half of the commercial fish catch is landed there.

Importance of fishing and aquaculture in general for the national economy is also a good indicator of whether there is separate collection of fishing gear. Among the NPA countries, commercial fishing is least important in Finland, and there is no separate collection of EOL fishing gear at least in the NPA region. Iceland, on the other hand, where the role of fishing is most important for the economy, has had a separate collection scheme for EOL fishing gear for close to 20 years.

The other NPA countries can be placed between these two extremities and Sweden is an interesting case. The commercial fishing and aquaculture sector falls behind those of the three western NPA countries, but there has been a national collection scheme for EOL fishing gear since 2019, which has been funded by the government. This kind of scheme is missing from both Norway and Ireland, which might come as a surprise, especially considering the scale of fishing activity in Norway in particular. There is some separate collection of fishing gear in ports, which is delivered to private recycling companies, but it is also interesting to note that aquaculture companies in both countries seem to be more actively collecting and recycling their EOL fishing gear than commercial fishers are. Some aquaculture companies also in the Swedish NPA region are collecting EOL fishing gear separately, but that is not the case in the Finnish NPA area, perhaps not in the rest of the country either.

In Iceland it was the industry, which was mainly behind the national collection scheme about 20 years ago and who finances it still today, whereas in Sweden the government wanted to fund a national collection scheme. The overall aim of both schemes is to mitigate the impacts of fishing gear on marine plastic pollution. In Norway the collection scheme seems to be more market driven. There is industrial activity that is linked to the collected EOL fishing gear, reusable materials are used to make new products. The sheer volume of Norwegian commercial fishing and aquaculture means that even a partly functioning collection system can sustain industrial activity that draws raw material from collected fishing gear.

Reuse potential of collected materials and improving the environment can be identified as drivers for setting up of collection schemes, but if these are not strong enough incentives, then compulsion might be the only instrument that works. Finland, Ireland and Sweden as EU member countries have agreed on the national implementation of the SUP directive. The transition period of this law is in force now and is due to end at the end of 2024. Starting from 2025, there must be separate collection for EOL fishing gear in place and the member countries must report the collected amount to the EU. Minimum collection levels have been set

by national legislatures in all three countries, but there is also a lot of historical fishing gear waste, to which the EPR does not apply. This can be several decades old, and therefore the current producers and importers of fishing gear are not required to finance the collection of this waste. In Sweden, the historical waste is currently being collected, but these schemes would be needed also in other countries with large stockpiles of historical fishing gear waste.

Norway and Iceland as EEA members have agreed to implement the SUP directive in their own countries, and some parts of the directive have been already implemented, but not those ones that are linked to EOL fishing gear. Iceland, on the other hand, has already an extensive national collection system in place, and it is expected that even Norway will initiate similar national schemes.



6

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6 REFERENCES

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Annexes

Annex 1. Fishing port online survey

Fishing port survey

This survey is part of Blue Circular Nets -project, which aims to improve collection and recycling of plastic containing fishing gear. Responses to the survey will be used in the work packages of the project. More information about data protection and about this research in general can be found in the attachments of the e-mail, which you have received. You can find out more information about the project from the following website:

<https://www.oulu.fi/en/projects/blue-circular-nets>

Information about the research

Privacy notice for scientific research

* Mandatory questions

Permission to use data in the research project

Port name, location and contact information* (contact information not mandatory)

What is the type of your port?

- Fishing port
- Fishing port with marina
- Fishing and cargo port
- Other

What kind of fish processing facilities there is in the port?

- Only ice maker
- Fish handling building with ice maker
- Fish handling building without ice maker
- No facilities
- Other

Who owns the port?

- Public owner
- Private owner
- Other

How many professional fishers operates from the port?

What are the annual catches handled in the port in tons? *Estimate average of catches from 3 previous years.*

How many leisure fisher uses the port? (estimation)

Waste management and fishing gear

Do you have waste reception facilities at the port?

- Yes
- No
- No, but there is scheduled waste collection day
- Other

For which waste fractions there is waste reception facilities in the port? *You can choose multiple choices.*

- Biowaste
- Cardboard
- Dangerous waste (e.g. oil based waste, paint etc.)
- Metal
- Municipal mixed waste
- Plastic
- No waste reception facilities
- Other

Are you collecting used fishing gear separately?

- Yes
- No

How much fishing gear waste is generated in the port annually?

- 0-999 kg
- 1000-4999 kg
- 5000-9999 kg
- 10000-49999 kg
- Over 50000 kg
- No idea

Is there abandoned fishing gear in the port premises? *You can choose multiple choices.*

- Fyke nets
- Lines
- Nets
- Seine nets
- Pots
- Trawl nets
- None
- Other

If you answered yes to the previous question, add the type and number of them below (e.g. trawl nets 5 pcs.).

What kind of fishing gear is used by professional fishers at your port? *You can choose multiple choices.*

- Fyke nets

- Lines
- Nets
- Seine nets
- Pots
- Trawl nets
- None
- Other

If you answered yes to the previous question add the type and number of the fishing gear used in the port (e.g. seine nets 5 pcs.).

Estimate the number of lost fishing gear by fishers operating from your port(annually/during other time period).

Are you aware of the extended producer responsibility for plastic containing fishing gear?

- Yes, I'm well aware about it.
- Yes, I have heard of it, but I'm interested in learning more.
- Yes, I have heard of it, but I'm not interested in learning more.
- No, this is the first time I hear of it but I'm interested in learning more.
- No, and I'm not interested about it.

Are you interested to take part in a more in-depth port survey besides this online survey?*

- Yes, I am open for an interview and possible visit to my port
- Yes, I am open for an online interview
- No thank you

Are you interested to find out more about CIRCNETS-project and its activities?*

- Yes, by email
- Yes, by social media
- Yes, about webinars
- Yes, about seminars and workshops
- No thank you

Annex 2. Aquaculture online survey

Aquaculture survey

This survey is part of Blue Circular Nets -project, which aims to improve collection and recycling of plastic containing fishing gear. Responses to the survey will be used in the work packages of the project. More information about data protection and about this research in general can be found in the attachments of the e-mail, which you have received. You can find out more information about the project from the following website:

(<https://www oulu.fi/en/projects/blue-circular-nets>)

Information about the research

Privacy notice for scientific research

Mandatory question*

Permission to use the provided information in the research project

Select this option

I have read the data protection notice. By answering to this survey I agree that my answers can be used in this research project as defined in the Privacy notice for scientific research.

Operation of aquaculture company

Name of the company name and location*

Contact details of the form filler (not mandatory)

How many fish farming facilities does your company have?

How many fattening ponds does your company have and what is their total volume?

What is your primary production form? Select only one option.

- Alevin supply
- Fish production for food
- Other:_____

What kind of facilities do you have? You can select several options.

- Circulatory aquaculture
- Natural food pond
- Flow-through facility
- Net-pen farming
- Other:_____

Waste management and fishing gear

Background for upcoming questions:

EU directive 2019/904 defines fishing gear as following: "any item or piece of equipment that is used in fishing or aquaculture to target, capture or rear marine biological resources or that

is floating on the sea surface, and is deployed with the objective of attracting and capturing or of rearing such marine biological resources"

[EUR-Lex - 32019L0904 - EN - EUR-Lex \(europa.eu\)](#)

(Add here more info about possible national legislation on extended producer responsibility and aquaculture and also the link)

Do you have waste reception facilities at the site? Select only one option.

- Yes
- No
- No, but there is scheduled waste collection day
- Other: _____

For which waste fractions there is waste reception facilities at the site? You can select several options.

- Biowaste
- Cardboard
- Dangerous waste (e.g. oil based waste, paint etc.)
- Metal
- Municipal mixed waste
- Plastic
- No waste reception facilities
- Other: _____

Are you collecting used fishing gear separately?

- Yes
- No
- Other: _____

How much fishing gear waste is generated in the port annually?

- 0-999 kg
- 1000-4999 kg
- 5000-9999 kg
- 10000-49999 kg
- Over 50000 kg
- No idea
- Other: _____

What kind of fishing gear is used at your sites? You can select several options.

Plastic structures of rearing tanks

- Floats
- Ropes
- pontoons
- Lines
- Nets
- Net pens
- None

- Other:_____

Add the type and number of the fishing gear used at your site (e.g. nets 5 pcs.).

Do you have end-of-life fishing gear stored at your site? You can select several options.

Plastic structures of rearing tanks

- Floats
- Ropes
- pontoons
- Lines
- Nets
- Net pens
- None
- Other:_____

If you answered yes to the previous question, add the type and number of them below (e.g. ropes 5 pcs.).

Are you aware of the extended producer responsibility for plastic containing fishing gear?

- Yes, I'm well aware about it.
- Yes, I have heard of it, but I'm interested in learning more.
- Yes, I have heard of it, but I'm not interested in learning more.
- No, this is the first time I hear of it but I'm interested in learning more.
- No, and I'm not interested about it.

Are you interested to take part in a more in-depth port survey besides this online survey?*

Select only one option.

- Yes, I am open for an interview and possible visit to our site
- Yes, I am open for an online interview
- No thank you

Are you interested to find out more about CIRCNETS-project and its activities?*

- Yes, by email
- Yes, by social media
- Yes, about webinars
- Yes, about seminars and workshops
- No thank you

Thank you for answering this survey.

Do you have anything else to add about the topic or information you would like to share with us?

circnets

Improving the management of end-of-life fishing gear

Blue Circular Nets (CIRCNETS) supports collection, treatment and recycling of fishing gear, so that these end-of-life nets are disposed appropriately, and they will not end up in seas and degrade the marine environment.

interreg-npa.eu/projects/circnets/



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