circnets

# WP1 REPORT

# D.1.2.1 Fishing gear report: Review on quantities and qualities of fishing gear in the NPA area

Interreg
Co-funded by the European Union
Northern Periphery and Arctic
CIRCNETS

# Contents

# 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. (Raateoja et al., 2020)

**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 gear, which are approaching their best before date, should be collected separately and recycled in order to prevent them from ending in oceans and contributing to 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 (2019/904/EC) 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.1.2.1 is to provide an assessment of the quantities and qualities of fishing gear in use in the NPA area. If the collected fishing gear waste is to be recycled, to be used in the making of new products, it is important to know what kind of quantities and qualities we are dealing with. This information – together with data about the life span of fishing gear – would make it possible to assess how much fishing gear waste is produced annually and what is the material content of this waste. This information is now missing in the NPA countries.

To establish this baseline, this report will address this issue in a systematic way. The second chapter of the report shortly describes fishing gear used in the NPA countries and their material composition. The third chapter takes a closer look at the businesses involved in production and imports of fishing gear in the NPA countries. In the fourth chapter the quantities of annual fishing gear outputs to the market will be assessed using production and foreign trade statistics. The gaps in these statistics will be discussed as well. In the fifth chapter the focus is on the information that is available about the fishing gear in use. Chapter six brings the previous chapters and their findings together for a material flow analysis that is followed by conclusions.

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

# 2

# FISHING GEAR AND THEIR MATERIAL COMPOSITION

# 2 FISHING GEAR AND THEIR MATERIAL COMPOSITION

*"A fishing gear is any physical device or part thereof, or combination of items that may be placed on or in the water or on the seabed with the intended purpose of capturing or controlling for subsequent capture or harvesting marine or freshwater organisms."*

(Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL))

The above definition of fishing gear, as stated by MARPOL, explains in plain English the purpose of fishing gear. For thousands of years humankind has used different kinds of tools to catch fish. Over the years these have evolved, specific kinds of gear have been designed to target certain fish species and their habitat. The size class of fishing gear varies a lot and they range from small-scale hand-operated methods to large commercial and industrial-scale ones. (Cashion et al., 2018) Study of fishing gear associated with catches reveals that a total of 42 distinct types of fishing gear have been linked to worldwide catches that have been studied since 1950's. The most commonly used fishing gear types can be classified into following primary categories: gillnets, seine nets, midwater trawls, bottom trawls, hook and line setups, dredges, and traps. (Watson et al., 2006)

In this section, we will focus on the most common fishing gear types that are used in the NPA project countries. Midwater and bottom trawls can also be referred here as trawls without making a more precise distinction between them.

## 2.1 Gillnets

Gillnets are a common form of fishing in small-scale and larger-scale commercial fishing around the world. The nets are suitable for both sea and freshwater fishing and the method is popular due to, for example, the price and ease of use. The selection of the mesh size of the net can affect the target fish. (Global Ghost Gear Initiative, 2021) A Gillnet is essentially a wall of netting positioned vertically in the water, anchored by weights at the bottom and buoyed by floats at the surface. Its purpose is to ensnare fish as they traverse the fishing area. Once the fish land in the net, they are trapped by the gill cover for example and cannot go back. Gillnets can be divided into two major types. Set gillnets are anchored nets and the other main type is drift gillnet that catch fish by drifting with the current. (He, 2006)

## 2.2 Trawl nets

The trawl represents a conical structure made of netting, typically containing one codend, which is drawn behind either one or two vessels with the aim of capturing fish by guiding and filtering them. These nets are specifically crafted for either skimming the seabed (referred to as bottom trawls) or targeting fish in the midwater (known as midwater trawls). The idea is that the fish end up inside the trawl and cannot escape. Trawls possess remarkable adaptability,

enabling them to ensnare various species. The velocity at which the trawl is towed is typically dictated by the behavior and swimming abilities of the targeted species, in addition to the propulsion capabilities of the vessel. The size of the mesh in the codend plays a pivotal role in determining the dimensions and types of fish retained, often subject to stringent regulations. (He et al., 2021)

### 2.2.1 Bottom trawl

Bottom trawls are dragged along the seabed with the aim of catching demersal fish species. These trawls commonly comprise robust materials like heavy-duty ropes, chains, discs, bobbins, or weights, which serve to maintain contact with the seabed during fishing operations, while simultaneously reducing the likelihood of net damage. In the case of single boat bottom trawls, otter boards are additionally employed to aid in ensuring continuous contact between the net and the seabed. (He et al., 2021) Material compositions vary a lot. For example, ground gear disc can be made from old dump truck tires threatened into heavy wires. The structure of the bottom trawl includes essential components such as trawl doors, bridles, sweeps, and ground gear. This ground gear, alternatively referred to as the rock hopper, comprises a combination of steel and rubber materials, whereas the wipers and doors are crafted from steel. Additionally, dolly ropes, depicted in and employed to protect the main net, are constructed from plastic polyethylene. (Syversen & Lilleng, 2022)

### 2.2.2 Midwater trawl

A midwater trawl refers to a conical net that is towed at mid-depths by one or two vessels with the intention of capturing pelagic or semi-demersal fish inhabiting the water column. Typically, these nets target schooling species. Compared to bottom trawl nets, midwater trawl nets are generally much larger, particularly in terms of their vertical dimensions. The anterior section of the net typically features larger meshes or ropes to reduce drag while still effectively corralling the targeted fish. To uphold the vertical opening of a midwater trawl, weights are commonly affixed to the lower wing ends, often referred to as clump weights. (He et al., 2021)

## 2.3 Seine Nets

Seine nets are like big cone-shaped nets with long wings and a part at the end to hold the catch. They're used to catch fish by surrounding them and guiding them into the net. The mesh size of bunt or the codend usually decides what size of fish get caught. These nets can be used from the shore or from boats. The main categories of seine nets are purse seines and Danish seines. A purse seine is like a big wall of netting made to surround a group of fish swimming near the top of the water. They use a special line called a purse line to close up the bottom of the net. To help the net sink quickly and stop fish from getting out sideways, they attach weights, lead lines, or chains to the bottom edge of the net, and they use strong materials like PA or PES for the netting. (He et al., 2021)

The Danish seine is another common form of seine in the NPA region and is widely planted around the world. It is also referred to as anchor seining because Danish seine is anchored

with one end of the seine rope attached to the buoy when the vessel sets out the rope and net to encircle an area. When the fishing vessel returns to the buyo, the boat attaches to the anchor line and the net is hauled. The Danish seine fishing gear consists of a cone-shaped net with rope arms on each side. These rope arms, which can stretch for several kilometers, are pulled along the seabed while the net gathers the catch. Since the ropes constantly touch the bottom of the sea, they wear out quickly, and fishermen typically change them every 18 months in Norway. This replacement frequency might vary for fisheries in different countries. (He et al., 2021; Syversen & Lilleng 2022)

Seine nets are made up of nets, low stretch seine ropes, floats, lead, and twine. In Danish seine fishing gear, the ropes usually contain a steel wire core to handle the strong forces while being dragged along the seabed. These nets are crafted from durable nylon material, attached to robust ropes with plastic floats and lead sinkers for added stability. (He et al., 2021)

## 2.4 Traps and pots

Besides marine fish, crustaceans and mollusks are also considered seafood and hold economic value for fishermen worldwide. Pots and traps are engineered contraptions that effectively channel fish or crustaceans into them and minimize the possibility of escape. Traps and pots are used worldwide, and this type of gear is especially used in shallow coastal waters, rivers and lakes. (Huntington, 2017) In definitions, traps are large structures attached to the shore like fyke nets, while pots are smaller movable traps set from a boat or by hand. Different regions utilize varying materials for traps and pots, determined by the specific type of trap and the species being targeted. Pots can be crafted from natural resources or from synthetic materials like plastic and metal. Traps are typically laid in strings connected by ropes and marked with buoys at each end of the string. (He et al., 2021)

## 2.5 Hooks and lines

Fishing with hooks and lines involves using either natural or artificial bait (known as lures) placed on a hook attached to the end of a line or snood to attract fish. Alternatively, metallic points (referred to as jigs) can be utilized to capture fish by snagging them as they move within the gear's range. These fishing setups can be employed individually or in groups. In smaller-scale fishing operations, these gears are typically manually operated, whereas larger-scale fisheries often equip their vessels with powered line haulers, automatic jiggers, line reels, coilers, and systems for handling hooks and bait automatically. Hook and line setups are adaptable to various vessel sizes and types suitable for the fishing area. They can also be used directly from shorelines such as jetties, rocks, and beaches. Once fish are enticed by the bait and hooked, they are held by the mouth until they are retrieved onto the vessel, which periodically hauls the gear. (FAO Fisheries & Aquaculture, 2024)

Hooks and lines are effective in a wide range of depths, both in inland waters and oceans worldwide. This method allows for fishing in rough terrain, including rocky areas where fish may hide. The target fish can actually be any of the pelagic, demersal of benthic species. (FAO Fisheries & Aquaculture, 2024) Hooks and lines can be used in different shapes. There are

different hand lines and pole and line method as a simple manual method. Other methods are droplines, demersal longlines, drifting longlines and trolling. (FRDC Fisheries Research and Development Corporation, 2024)

Hooks and lines and their different applications and combinations offer different material compositions. The hook and line setup comprises various elements including the mainline, branch line, buoys or floats, and hooks. Typically, the lines utilized in this fishing gear are crafted from materials such as nylon multifilament, polyamide monofilament, or polyester. Connectors like swivels, stoppers, and clamps are employed to join the different lines and hooks together, and these components are typically metallic, commonly composed of steel or lead. (Syversen & Lilleng, 2022) The buoys are usually made from polyurethane, PVC and polyethylene (Domingo et al., 2016). Hooks commonly employed in hook and line gear typically come in either "J" or circular shapes and fishing hooks are crafted from high carbon steel wire derived from steel materials (Edappazham et al., 2008). The pole and line, which has a configuration different from the other hook and line methods, has a pole structure that is normally made from fiber glass (FRDC Fisheries Research and Development Corporation, 2024).

## 2.6 Fishing gear used in aquaculture

Aquaculture, fish farming above all, has increased significantly in the latter part of the 20$^{th}$ century as the existing wild fish stocks have been depleted by overfishing. Fish farming takes place in different forms; some utilize natural ponds for this, there are flow-through facilities, facilities on dry land and then there are net pen farms.

In the SUP directive (2019/904/EC) plastic containing gear that is used in aquaculture has been defined as fishing gear as well, which is subject to separate collection requirements of extended producer responsibility. Some of the gear that is used in aquaculture is quite similar or even identical to those that are used in fishing. Floats, buoys, ropes, etc. are used also both in fishing and aquaculture, but plastic rearing tanks and net cages are used only in aquaculture. Rearing tanks are just plastic containers which come in different sizes as do the net cages used in net-pen farming. The main components of cages are nets and the cage structures, to which the net is attached. The structures can be floating or attached to the bottom of the sea, lake or riverbed. The structure includes in some cases also walkways and there can be also protective nets on top of the structure to keep birds away. (Kong et al., 2022)

## 2.7 Material composition of fishing gear

As the world has become plastic after the Second World War, plastics have also entered the world of fishing. Woven plant fibers have been replaced in many fishing gear by synthetic fibers, such as polyester and nylon. These synthetic materials are more durable than natural ones, but also lighter, which has made it possible to grow the size of the gear. (Seppänen & Lappalainen, 2019) The drawback of this durability has been revealed by the ghost gear, abandoned, discarded and lost fishing gear (ALDFG), which can continue to fish passively for several years. The nets will slowly decompose and release micro plastics in this process, so

collecting these from seas or from the shores is essential. (Raateoja et al., 2020) The aim of the separate collection of EOL fishing gear is to address this issue. By offering a free-of-charge collection system, where fishing gear can be returned when it is no longer needed or is past it best before date, this should decrease the impact of fishing on marine plastic pollution. The gear will not be left in nature, and they won't therefore cause unnecessary deaths of marine mammals, birds or fish, nor will they spread around microplastics.

The fishing gear are expensive and valuable tools for their owners, so many professional fishers and aquaculture companies want to extend their lifetime by repairing them. (Seppänen & Lappalainen, 2019) Despite these efforts there comes a point when the item cannot be used for its original purpose anymore and it is of no use. However, if the item is returned to a separate collection point that has been set up for fishing gear, the gear can be recycled. The item can be taken apart and useful materials can be collected from it, which are suitable for reuse as such or can be turned into raw material for making of new goods. (Global Ghost Gear Initiative 2021) There is a lot of economic potential in these materials, which can be used by various industries and companies, but we need to know the composition of the fishing gear in order to assess the value of these materials.

Material compositions of several key fishing gear have been studied, which are presented in Table 1. The table contains values from two sources: a master thesis (Alnes 2022), which studied the material composition of the fishing gear sold in Norway in 2020, and from Sotenäs Marine Recycling Center. Alnes has collected information about the material content of fishing gear from fishing gear producers, whereas the figures from Sotenäs are based on the fishing gear waste received and processed at their facility since 2019. All sorted materials are weighed as they are delivered to the facility, and statistics are kept about the different plastic and metal fractions of the treated fishing gear. There is no precise statistics from Sotenäs regarding the material contents of seine nets and ropes, but it was estimated by the experts at the facility that the values found by Alnes are close to those that have been collected in Sotenäs.

Table 1. Material composition of fishing gear. (Alnes, 2022 & Petterson, 2024)

| Fishing gear | Polyamide/ Nylon (PA) | Polypropylene (PP) | Polyetylene (PE) | Other plastics | Metals | Other materials |
|---|---|---|---|---|---|---|
| **Trawls** | 3–5 % | 5 % | 45–46 % | 0–9 >% | 37–45 % | 0 % |
| **Purse Seines** | 73 % | 0 % | 2 % | 0 % | 20 % | 5 % |
| **Danish Seines** | 5–20 % | 35–59 % | 21–30 % | 0 % | 15 % | 0 % |
| **Gillnets** | 15–95 % | 5–25 % | 0 % | 0–15 % | 0–45 % | 0 % |
| **Lines** | 5 % | 20–40 % | 10 % | 25–50 % | 15–20 % | 0 % |
| **Traps and Pots** | 5–10 % | 0 % | 10–15 % | 0 % | 80 % | 0 % |
| **Ropes** | 5 % | 60 % | 20 % | 15 % | 0 % | 0 % |

Regarding the other fishing gear types, the values collected by Alnes and Sotenäs Marine Recycling center differ greatly for certain fishing gears. Rather than giving exact, absolute figures about the material content of fishing gear types, it is better to emphasize the variations within these. Therefore, it was decided to compile one table, which included values from both sources. Table 1 provides rough estimations about the variability of certain material segments in certain gear types.

As can be seen from the table, the material composition of fishing gear varies a lot. There is significant variability even in some gear types, the gillnets being the prime example of this. Even if we have values from two Nordic sources about the material composition of the gear, is difficult to give a clear picture about the material compositions for fishing gear in the entire NPA area. These variations within certain gear type might be due to different sizes of gears that are used in different circumstances (Baltic Sea vs. North Sea/Norwegian Sea/Barents Sea), even if they are still labelled as same type of gear. The material content might be different also with different producers, etc. Taking these material variations into account, it is difficult to use these values to calculate material flows of fishing gear in the NPA region. The figures give still a good overall picture of the material content of different fishing gear, and above all, what kind of plastics are used in certain type of gear. In some cases, the variability between materials is quite significant, which is good to consider, before making too far-reaching conclusions about the material volumes of certain kinds of plastics found in different gears.

# 3

# MANUFACTURERS AND IMPORTERS OF FISHING GEAR IN NPA COUNTRIES

# 3 MANUFACTURERS AND IMPORTERS OF FISHING GEAR IN NPA COUNTRIES

The SUP directive (2019/904/EC), as was mentioned in the previous project report of the project (D.1.1.1 Review of the current collection responsibilities and disposal practices in NPA fishing ports and aquaculture sector), requires that EU member countries will enforce extended producer responsibility (EPR) also to plastics containing fishing gear. Finland, Ireland and Sweden have all ratified the SUP directive and set up the framework for the national implementation of EPR within this sector. All the countries are now in the middle of a transition period, during which the system is put in place and steps are taken to prepare for the collection of the EOL fishing gear. The transition period ends in all these three countries at the turn of the year 2024/2025, when collection is supposed to start.

## 3.1 PROs, manufacturers and importers in EU countries

The foundation of the EPR is – as stated in the term itself – that producer is responsible for providing the users of their product also the "exit strategy", when the customer does not want to use the product anymore. The producers and the importers of plastic containing fishing gear must set up Producer Responsibility Organisations (PRO), which will organise and fund the collection of EOL fishing gear. Once the producers and importers have come together and established a PRO, the PRO must be accepted into the PRO register before it can start its operations. The national authorities, in charge of supervising the implementation of the EPR system, will handle these applications and grant rights to approved PROs. Depending on the size of the market and other factors, the authorities can issue PRO grants to several organisations, in which case the collection efforts must be synchronized between the different PROs. It is mandatory for each producer and importer to join a PRO, if they wish to engage in production and import of fishing gear in that very country.

Supporting and sustaining fishing and aquaculture operations requires that professional fishers and private individuals engaged in spare-time fishing can purchase fishing and aquaculture gear. Modern fishing gear manufacture is a worldwide business, which is highly specialized and dominated by big players. In the EU countries of the NPA region – in Finland, Ireland and Sweden – the role of fishing and aquaculture sector varies a lot as was noted in project report D.1.1.1.

Ireland is the top country of these three in terms of value and volume of this activity, and there is significant domestic manufacture of fishing gear for commercial fishing in Ireland. Still, even in Ireland, most of the fishing nets are imported from the UK, Germany and Netherlands (Volza Grow Global, 2023). Some aquaculture gear, such as oyster bags for oyster farming, are solely imported (Thornberry, 2019). Some of the Irish fishing gear producers and suppliers offer also repair services for their customers. 24h net repair services at repair depots across the country,

pick-up and delivery services, rigging and re-rigging of customers' gear seem to be one way to keep the national producers in the business. Table 2 shows the main producers, suppliers and importers of fishing and aquaculture gear in Ireland, together with the products manufactured and supplied by each company, as well as other services provided.

Table 2**:** Producers, suppliers and importers of fishing and aquaculture gear in Ireland.

| | Products manufactured | Products supplied | Other services | Webpage |
|---|---|---|---|---|
| ***Producers and suppliers:*** | | | | |
| **SNG nets Ltd** | Pelagic fishing trawls and bottom trawling fishing nets | Pelagic fishing trawls and bottom trawling fishing nets, lobster creels, crab pots, potting ropes, buoys and aquaculture equipment | 24h net repair service | https://sng.ie/ |
| **Cavanagh nets Ltd** | n.d. | Wide range of fishing gear equipment: potting and accessories, netting material, floats, float lines and ropes | Netting repair and rope splicing | https://cavanaghnetsltd.com/home/ |
| **G.K nets Ltd** | Prawn trawls, dual purpose trawls, white fish trawls, quad rigs | Prawn trawls, dual purpose trawls, white fish trawls, quad rigs | Fishing net repair and mending service | https://www.gknets.ie/ |
| **KT nets Ltd** | n.d. | Anchors, pot ropes, fenders and marker buoys, fish bins and potting accessories | n.r. | https://ktnets.ie/ |
| **Carrymacarry Ltd** | Ropes, netting and twines | Ropes, twines Gill nets, tangle nets and Trammel nets, pot netting | n.r. | http://carrymacarry.com/ |
| **Castlecords Ltd** | Braided ropes and cords | Braided ropes and cords | n.r. | https://castlecords.com/ |
| ***Importers*** | | | | |
| **Intermas S.A.U** | Aquaculture equipment and accessories for the culture of oysters, mussels, clams, abalone, shrimp, tilapia and seaweed | Aquaculture equipment and accessories for the culture of oysters, mussels, clams, abalone, shrimp, tilapia and seaweed | Involved in projects for the restoration of marine ecosystems | https://www.intermas.com/es.html |
| **Kloska group S.L.** | Active and passive fishing gear | Active and passive fishing gear, ropes, mooring ropes and wire ropes | n.r. | https://www.kloska.com/en/ |

***Notes:*** n.d., no data; n.r., not relevant.

In Finland and Sweden, the role of commercial fishing and aquaculture in general is less significant than in Ireland, but spare-time fishing is more commonplace. Imports are significant here as well, but there is also some domestic production, especially in the leisure fishing sector. Lures, jigs and other items are mainstay of Rapala VCM Ltd, which is one of the major sports fishing gear producers in the world and hails from Finland. There are other smaller producers in this field, whereas commercial fishing and aquaculture mostly use imported fishing gear.

Overall, there is limited information available on the fishing gear and aquaculture sector, there are no official reports or statistics on producers, suppliers and importers of fishing and aquaculture gear in the country. Some indication of these numbers can be obtained by looking at the national Producer Responsibility Organisations for fishing gear. Manufacturers and importers, who must observe the EPR, must form PROs, and in Sweden they must also inform directly to the Swedish Environmental Protection Agency (Naturvårdsverket) that their operations fall in this category.

In Finland, a similar process is in place where producers or PROs have to apply for a producer register, maintained by the Pirkanmaa ELY Centre (Centre for Economic Development, Transport and the Environment). In exceptional cases, a producer can directly apply for the register without joining a PRO. Finnish Environment Institute is also required to maintain an information service (Jätehuoltokompassi), which lists producers and PROs accepted to the producer register.

In Sweden, there are 75 registered companies in this list (the situation on 14.11.2024) and the segment is dominated by importers for sports fishing gear. A few of the registered companies are also producers of fishing gear. (https://www.naturvardsverket.se/vagledning-och-stod/producentansvar/producentansvar-for-fiskeredskap/verksamhet/) Both the Swedish and Finnish PROs for fishing gear have been registered by the authorities in their respective countries. There are 43 companies on the membership list of the Finnish fishing gear PRO (the situation at the end of 2024), and majority of these are also importers. (Jätehuoltokompassi, 2024) They include major supermarket and department store chains, local representatives of international brands and independent fishing gear importers, but the list includes also a few local manufacturers, such as lure producers (https://suptuottajat.fi/en/tietoa-meista/).

In Ireland, the process of setting up a PRO for fishing gear is still ongoing. An interim body, Reel-It-Pack initiative, has been set up to bring the industry and producers together to form a PRO. (Foster, P. 2025) However, as the sector is only organising itself, the member register is still “work in progress” (https://reelitback.ie/producers/).

## 3.2 Non-EU countries of Iceland and Norway

In Iceland and Norway, where fishing and aquaculture sector is more important than in the other NPA countries, the situation differs from the EU countries. In Iceland the fishing and aquaculture sector has come together, and they have set up a comprehensive collection scheme in place, which has been operational for close to 20 years. The system is run by Fisheries Iceland (Samtök fyrirtækja í sjávarútvegi - SFS) and the local fishing gear producers are also involved in the collection scheme. Iceland has not ratified the EEA articles regarding SUP directive, and introducing EPR for fishing gear does not seem to be on the agenda, as

there is a local scheme in place already. There is limited statistical data available about the fishing gear manufacturers and producers, but there is a lot of activity in this field and many operators. Some of the manufacturing companies are also significant players in the world fishing gear manufacturing market. One of these is Hampidjan, which has its main office in Iceland, but has a lot of subsidiaries across Europe and beyond. These include for instance Mørenot and Von, which originate from Norway and Faroe Isles respectively, but have facilities in other countries as well. (https://hampidjan.com/about-us/organisation-chart/) The sector is tightly knitted together, and pre-fabricated materials for fishing gear are transported between different facilities in different countries. Even if the materials might cross state borders, this might be a case of internal material transfers within the same company.

Norway, on the other hand, is planning to implement EPR for EOL fishing gear. Norway is required to implement Extended Producer Responsibility (EPR) for fishing gear by December 31, 2024, in accordance with the European Union's Single-Use Plastics (SUP) Directive, which mandates EPR for fishing gear. Given the prevalent use of take-back schemes for other product categories and the foundational studies supporting their implementation for fishing gear in Norway (Sundt et al., 2018), EPR for fishing gear is anticipated to be similarly implemented. Based on that, a PRO for fishing gear should be set up also in Norway and producers and importers would be required to join it. As a PRO has not been set up yet, unlike in the NPA EU countries, there is limited statistical information available on producers, suppliers, and importers in Norway. There are a lot of companies working in this sector, and the sector regularly organizes fairs and other similar events. The following table (Table 3) of the largest producers of fishing and aquaculture nets and cages have been compiled from two such participant lists: https://aquanor.no/en/exhibitors/exhibitor-list-2023/ and https://nor-fishing.no/en/exhibitor-list-2024/

Table 3. Major producers and suppliers of fishing and aquaculture gear in Norway

| Producers and suppliers | Products made | Products supplied | Other services | Webpage |
|---|---|---|---|---|
| **Scale/ AQ** | Large variety | Based in Trondheim, they produce nets and equipment for use in aquaculture | | ScaleAQ |
| **AKVA Group** | Large variety | Global technology and service partner to the aquaculture industry. The group offers a wide range of products and services, including fish farming cages, feeding systems, and software solutions. | Netting repair and rope splicing | Akva Group |
| **MAT-KULING** | | Equipment design, manufacturing, and supply of training and installation support at customer's fish farm. Development of any land-based aquaculture application | Fishing net repair and mending service | Mat-Kuling |
| **HighComp:** | | Produces composite solutions (fish tanks, LESS-STRESS™ bridges and water treatment tanks) for the Aquaculture Industry: both land and marine-based fish farms, tanks and fish farming equipment | | HighComp |
| **Certex Norway** | | Supplier of wire rope, lifting products, mooring and marine equipment | | Certex Norway |
| **Mørenot** | | Global provider of solutions and services to the global fishing, aquaculture and seismic industries | | Mørenot |
| **Selstad AS** | | Global provider of equipment for the aquaculture and fishing industries, as well for the offshore and other similar industries | | Selstad AS |
| **NOFITECH** | | Nofitech designs and deliver solutions for production of smolt, postsmolt, grow-out and broodstock. | | Nofitech |

# 4

# THE QUANTITIES AND QUALITIES OF FISHING GEAR PUT ON THE MARKET IN THE NPA REGION

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A key issue for any manufacturer is to make sure that there is a steady flow of materials, which can sustain the business. This aspect is even more important when the business is not using virgin raw materials but depends on recycled materials. It is important to know how much recycled materials are available now and, in the future, so that business can grow and flourish without the fear of losing one's raw material source. As EPR is introduced to plastics containing EOL fishing gear, which will be subject to separate collection, the materials that are collected will be available for re-use and recycling. However, a person who is planning to use materials that originate from recycled fishing gear in one's business needs to know how much and what kind of material will be available.

The first step of looking into the recycling potential of EOL fishing gear is to look at the volumes and qualities of fishing gear entering the market. The basic formula is simple: Imports and industrial production are added together, and exports are deducted from this. (Unsbo et al., 2023) The challenge is, however, that there are many kinds of fishing gear in use in the NPA countries with different kinds of material compositions and with varying average life spans. But, if the annual additions can be calculated, and the above-mentioned variables can be taken into account, then it should be possible to give rough estimates about the future return rate of EOL fishing gear and about their material composition.

The primary assumption of this task was that official statistics about foreign trade and production would be able to provide country-based figures for all individual NPA countries about the volume of fishing gear that is put on the market in these countries. The EU has harmonised compilation of statistics by introducing common tools and procedures for this. One of them is the Combined Nomenclature (CN) code system, which is a tool for classifying goods that meets the requirements of Common Customs Tariff and of the EU's external trade statistics. The goods have been divided into 97 harmonised system chapters (with two digits), which have HS headings (4 digits), HS Subheadings (6 digits) and CN subheadings (8 digits). The chapter refers to the general type of material that the good is made of. Chapter 56 is for instance "Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cable and articles of thereof", whereas 5608 is "Knotted netting of twine, cordage or rope; made-up fishing nets and other made-up nets, of textile materials". The next level, HS Subheading CN6 describes the more specific type of good with 560811 being "Made up fishing nets". Below this there are still CN8 categories, which describe the material that the "Made up fishing nets" have been made of. Below is an extract from the official Combined Nomenclatura directory with categories for fishing gear (Regulation 2023/2364)

**5608** **Knotted netting of twine, cordage or rope; made-up fishing nets and other made-up nets, of textile materials:**

| | |
|---|---|
| | **- Of man-made textile materials** |
| **5608 11** | -- **Made up fishing nets** |
| **5608 11 20** | --- Of twine, cordage, rope or cables |
| **5608 11 80** | --- Other |
| **5608 19** | -- **Other** |
| | --- Made up nets: |
| | ---- Of nylon or other polyamides: |
| **5608 19 11** | ----- Of twine, cordage, rope or cables |
| **5608 19 19** | ----- Other |
| **5608 19 30** | ---- Other |
| **5608 19 90** | --- Other |
| **5608 90 00** | -- **Other** |

| | |
|---|---|
| **9507** | **Fishing rods, fish-hooks and other line fishing tackle; fish landing nets, butterfly nets and similar nets; decoy 'birds' (other than those of heading 9208 or 9705) and similar hunting or shooting requisites** |
| **9597 10 00** | **- Fishing rods** |
| **9597 20** | **- Fish-hooks, whether or not snelled** |
| **9507 20 10** | **--** Fish-hooks, not snelled |
| **9507 20 90** | **--** Other |
| **9507 30 00** | **- Fishing reels** |
| **9507 90 00** | **- Other** |

The CN Code system is used for trade statistics, but the EU has another system for production statistics. Prodcom codes are used for economic activities of mining and quarrying, manufacturing, and materials recovery. Similar eight-digit system is in place as in CN code system and most eight-digit PRODCOM codes have a complete reference to the Combined Nomenclature (CN). Below is an extract from the PRODCOM list of 2024 that refers to "made up fishing nets" (PRODCOM List 2024).

| | |
|---|---|
| **NT1** | **13.94.12 Knotted netting of twine, cordage or rope, made up nets of textile materials; articles of yarn, strip n.e.c.** |
| NT2 | 13.94.12.33 Made-up fishing nets from twine, cordage or rope of man-made fibres (excluding fish landing nets) |
| NT2 | 13.94.12.35 Made-up fishing nets from yarn of man-made fibres (excluding fish landing nets) |
| NT2 | 13.94.12.53 Made-up nets from twine, cable or rope of nylon or other polyamides (excluding netting in the piece produced by crochet, hairnets, sports and fishing nets) |
| NT2 | 13.94.12.55 Made-up nets of nylon or other polyamides (excluding netting in the piece produced by crochet, hairnets, sports and fishing nets, those made from twine, cable or rope) |
| NT2 | 13.94.12.59 Knotted netting of textile materials (excluding made-up fishing nets of man-made textiles, other made-up nets of nylon or other polyamides) |
| NT2 | 13.94.12.80 Articles of twine, cordage, rope or cables |

The systems are not fully compatible with PRODCOM being more detailed. Still, calculating annual additions to the markets should be possible by using statistics, if these directories been applied in the compiling of statistics and the statistics are precise and representative enough.

## 4.1 Finland – low fishing gear production, not shown in the statistics

Keeping statistics and collecting information for statistics runs deep in the blood of Finns (and Swedes). Statistics Finland can trace their history to the founding of "Tabellverket" of 1749, which is the world's oldest regular national population statistics. Finland and Sweden are the only countries that have continuous information about their population so far back in time. (https://stat.fi/org/tilastokeskus/historia.html) However, information and statistics are always collected for a certain purpose, from a certain point of view. The Swedish Crown wanted to know how many subjects it had; it was not interested back then about the various qualities of the people. A person who wants to know more about the people of 1749 must use other sources as well to elaborate on the subject.

Finnish customs collect information about the Finnish exports and imports and maintains the foreign trade statistics. When it comes to fishing gear, the customs use the CN6 level in reporting imports and exports. (Finnish Customs Statistical Database 2024) This is not the most precise CN level, as this does not describe the more concrete material contents of the item as CN8 would. The difficulty with CN6 level – and that of the Combined Nomenclatura in general – seems to be that the "Made up fishing nets" includes all possible types of fishing nets – trawls, seine nets, etc. As the material content of these individual net types can differ a lot, it is difficult to draw conclusions about the material contents of the items included under this category. This is not an issue for some less complex items, such as fishing hooks, but the problem remains the same for fishing rods.

Some of the CN6 categories are also too wide, they cover several different types of items. For instance, CN950790 includes line fishing tackles, but also such items as hunting decoys. It is therefore impossible to get to the material contents of this category, as it is not even possible to say how much of the reported volume is actual fishing gear. There are also items which can be used in fishing gear, even though that is not their primary use (for example CN83061000 includes also bells that can be used in fishing gear, CN420291 and CN420292 include bags for fishing gear, etc. and CN5607 includes Twines, cordages, ropes and cables that can be used in making of fishing nets) (Kaarna 2024). The Table 4 includes imports, industrial production (more of this shortly), exports and finally the volume of fishing gear put on the market in Finland divided into CN6 categories.

Table 4. The quantities of fishing gear placed on the market in Finland in 2022

| CN-code | Description | Import [tonne] | Industrial production [tonne] | Exports [tonne] | Put on the market [tonne] |
|---|---|---|---|---|---|
| 560811 | **Fishnets**, made up of man-made fibres | 114 | | 9 | 105 |
| 950710 | **Fishing rods** | 161 | | 52 | 109 |

| | | | | | |
|---|---|---|---|---|---|
| 950720 | **Fish-hooks**, wheather or not snelled | 69 | | 14 | 55 |
| 950730 | **Fishing reels** | 95 | | 27 | 68 |
| 950790 | **Line fishing tackle** n.e.s; fish landing nets, butterfly nets and similar nets; decoys and similar hunting or requisites (excl. decoy calls of all kinds and stuffed birds of heading 9705) | 638 | | 332 | 306 |
| **Total** | | 1,077 | | 434 | 643 |

Source: Finnish Customs Statistical Database 2024, Statistics Finland 2024a. n.e.s – not elsewhere specified.

Statistics Finland maintains the database for industrial production in Finland, but the statistics about fishing gear are even less extensive as for imports and exports. There is no information about the volume of total production, which was confirmed from the Statistics Finland (Ahonen 2024). Even statistics about the sales volumes and their value, and on the other hand about the value of the sales have been compiled varyingly. The statistics include only the value of industrial production of fishing rods for 2021 and 2022 (Table 5), not for fishing nets. Volume and value of sold industrial production of man-made fishing nets was reported until 2014, but this has been discontinued. There is either no production of fishing nets anymore in Finland, or production takes place in small businesses with less than 10 person-work years, so the data is not publicly available. In 2014 the value of the industrial production of man-made fishing nets in Finland was just 0.5 MEUR. The volume of sold industrial production of fishing rods was reported for the last time in 2018, whereas statistics of their value are still published annually. This was about 23 MEUR in 2022 (Statistics Finland 2024b).

Table 5. Industrial output in Finland by PRODCOM heading by Year, PRODCOM code and information in 2021 and 2022

| PRODCOM CODE | Description | Value of industrial production (1000 euro) | Volume of sold industrial production | Volume of total industrial production |
|---|---|---|---|---|
| ***2021*** | | | | |
| 13941233 | Made-up fishing nets from twine, cordage or rope of man-made fibres (excluding fish landing nets) | 0 | 0 | ….. |
| 13941235 | Made-up fishing nets from yarn of man-made fibres (excluding fish landing nets) | 0 | 0 | ….. |
| 32301600 | Fishing rods, other line fishing tackle; articles for hunting or fishing n.e.c. | 23,154 | ….. | ….. |
| ***2022*** | | | | |
| 13941233 | Made-up fishing nets from twine, cordage or rope of man-made fibres (excluding fish landing nets) | 0 | 0 | ….. |
| 13941235 | Made-up fishing nets from yarn of man-made fibres (excluding fish landing nets) | 0 | 0 | ….. |
| 32301600 | Fishing rods, other line fishing tackle; articles for hunting or fishing n.e.c. | 20,047 | ….. | ….. |

Source: Statistics Finland 2024a

As the current production reporting unit for industrial production is euros, this does not help us in assessing the material contents of the fishing gear inputs to the market. We know the value of fishing rod production, but there is a big gap in our knowledge about the production of fishing nets, as their value is not reported anymore. However, judging by the figures from 2014, this activity is very marginal in Finland. Based on the customs statistics, there is some export activity in this field, but the exports amount to less than 10 % of the imported volumes. What is then the final assessment of the Finnish statistics, can the annual inputs of quantities and qualities of fishing gear to Finnish markets be calculated based on them? The short answer is “No”.

The imports and exports statistics give a general overview of the volumes that reach the Finnish markets, but the CN6 level is too general, especially when it comes to reporting fish nets. Different kind of fish net types have different material composition, so it is not possible to calculate the material contents of the 105 tonnes of fishing nets (see Table 4), put into the Finnish markets in 2022. As there are no statistics about the domestic production volume, one key factor is missing from the whole calculation, but as the volume of domestic fish net production is too small to be included in statistics, the harm done by this is minimal. The final takeaway takes us back to where we started from. Statistics that have been collected for a certain purpose are not necessarily as useful for other purposes. The level of detail, which is sufficient for Statistics Finland and for the Finnish Customs, as they map the external trade and production, is not enough for mapping out the circular economy potential of the reported goods.

## 4.2 Iceland – more data, but still gaps

In Iceland, import and export statistics have been taken to a totally different level, when compared to Finland. The categorization system that is in use in Iceland seems to utilize the CN codes but takes it to CN08 level. Eight numbers are given to specify each product group, which gives the statistics more breadth. There are over 30 different categories that are linked to fish nets and ropes meant for nets, whereas in Finland only one was given. In some cases, the level of detail exceeds even the EU’s official CN code.

CN08 codes used in Icelandic import and export statistics for fishing nets and materials that are linked to fishing gear making are the following ones (Hagstofa Islands: Innflutningur eftir tollskrárnúmerum 2022-2024, kafli 41-83):

56072901 Ground lines and fishing lines of sisal or other textile fibres of the genus Agave
56072902 Cables of sisal or other textile fibres of the genus Agave
56072909 Twine, cordage and ropes of sisal or other textile fibres of the genus Agave
56074100 Binder or baler twine of polyethylene or polypropylene
56074901 Ground lines and fishing lines of polyethylene or polypropylene
56074902 Cables of polyethylene or polypropylene
56074903 Catgut of polyethylene or polypropylene
56074909 Twine, cordage and ropes of polyethylene or polypropylene
56074910 Ground lines and fishing lines of polyethylene or polypropylene
56074921 Cables of polyethylene or polypropylene for making fishing gear
56074929 Other cables of polyethylene or polypropylene

56074930 Single tread catgut of polyethylene or polypropylene for making fishing gear
56074990 Other cables of polyethylene or polypropylene
56075010 Ground lines and fishing lines of synthetic fibres
56075021 Cables of synthetic fibres for making fishing gear
56075029 Other cables of synthetic fibres
56075090 Other catgut of synthetic fibres
56079010 Ground lines and fishing lines of other materials
56079021 Cables of other materials for making fishing gear
56079029 Other cables of other materials
56079090 Other from other synthetic fibres
56081101 Seines of man-made textile materials
56081105 Other complete and made-up fishing nets of man-made textile materials
56081109 Other made up fishing nets of man-made textile materials
56081901 Fishing net ropes of man-made textile materials
56089001 Other fishing nets and fishing net ropes
56089009 Other nets
56090001 Fish-tailing loops
56090002 Fish hook trace
56090003 Codend protectors

Even though there is over 30 different kind of fishing gear related categories in the Icelandic statistics, the heavy hitters, with annual import or export volumes of exceeding 10 tonnes, are few. Table 6 contains import and export figures of the ten product categories, which topped export and import statistics in January-September 2024. There are no details about the domestic production volumes of these items, but as there is significant manufacture of fishing gear in the country, also the materials used for fishing nets are included. It is not possible to calculate the full "put on the market volume", but these figures give a good indication about the level of production in the country and about the dynamics of Icelandic fishing gear manufacture and gear imports and exports.

Table 6. The quantities of fishing gear placed on the market in Iceland, Jan-Sept 2024

| CN-code | Description | Import [tonne] | Industrial production [tonne] | Exports [tonne] | Put on the market [tonne] |
|---|---|---|---|---|---|
| 56074910 | **Ground lines and fishing lines** of polyethylene or polypropylene | | | 11 | -11 |
| 56074921 | **Cables of polyethylene or polypropylene** for making fishing gear | 148 | | 9 | 139 |
| 56074990 | **Other cables** of polyethylene or polypropylene | 23 | | 3 | 20 |
| 56075010 | **Ground lines and fishing lines** of synthetic fibres | 83 | | 0.01 | 83 |
| 56075021 | **Cables of synthetic fibres** for making fishing gear | 15 | | 0.2 | 15 |
| 56079021 | **Cables of other materials** for making fishing gear | 11 | | 8 | 3 |
| 56081105 | **Other complete and made-up fishing nets** of man-made textile materials | 43 | | 245 | -202 |

| | | | | | |
|---|---|---|---|---|---|
| 56081109 | **Other made-up fishing nets** of man-made textile materials | 82 | | 2 | 80 |
| 56089001 | **Other fishing nets and fishing net ropes** | 102 | | 0 | 102 |
| 56089009 | **Other nets** | 49 | | 2 | 47 |
| **Total** | | 556 | | 280.21 | 276 |

Source: Hagstofa Islands: Innflutningur eftir tollskrárnúmerum 2022-2024, kafli 41-83

There is significant import of pre-fabricated materials for fishing gear and respectively there is significant exports of ready-made nets. Certain kinds of net types are also imported at high volumes. When the total import-exports balance of these items is reviewed and all product categories that were listed earlier are considered, the statistics show that imports exceeded exports by 276 tonnes during this period. If we take an even closer look and divide these figures into materials for nets and finished nets, it is clear that exports of materials constitute only about 10 % of the imports of materials, whereas exports of finished nets are just 10 % smaller than their imports. Based on this, even though industrial production statistics are missing, it would appear that about 300 tonnes of plastic containing fishing gear was placed to the markets in Iceland during the first three quarters of 2024.

## 4.3 Ireland – gaps in production statistics, uncertainties about import and export data

Central Statistics Office (CSO, https://data.cso.ie/) is the national statistical authority in Ireland, but it does not publish data about imports and exports of fishing gear, so this information was retrieved from the United Nations (UN) Comtrade Database (https://comtradeplus.un.org/). The UNComtrade database aggregates detailed global annual and monthly trade statistics by product and trading partner for use by governments, academia, research institutes, and enterprises. Data compiled by the UN Statistics Division covers approximately 200 countries and represents more than 99% of the world's merchandise trade. The database uses CN codes. However, when the data from Finnish and Swedish national statistics was compared to those published at UNComtrade, it was noticed that these did not match. Similar kind of uncertainties might be connected to the Irish data, but since imports and experts of fishing gear is not published on the national statistics, the UNComtrade figures have been collected to Table 7. This includes imports, industrial production (more of this shortly), exports and finally the volume of fishing gear put on the market in Ireland divided into CN6 categories.

The trend of imported and exported materials shows that the fishing gear industry in Ireland is mainly focused on recreational fishing. In Ireland, the recreational fishing equipment market generated a revenue of 19 MEUR in 2024, and it is projected to grow annually by 2.54% (CAGR 2024-2028). A significant increase in demand for high-quality fishing equipment has resulted from the country's rich fishing heritage and flourishing angling tourism industry (Statista, 2024).

Table 7. The quantities of fishing gear placed on the market in Ireland in 2022

| CN-code | Description | Import [tonne] | Industrial production [tonne] | Exports [tonne] | Put on the market [tonne] |
|---|---|---|---|---|---|
| 560811 | **Fishnets**, made up of man-made fibres | 9 | | 31 | -22 |

| | | | | | |
|---|---|---|---|---|---|
| 950710 | **Fishing rods** | 6 | | 0.02 | 6 |
| 950720 | **Fish-hooks**, wheather or not snelled | 1 | | 0.16 | 1 |
| 950730 | **Fishing reels** | 3 | | 0,04 | 3 |
| 950790 | **Line fishing tackle** n.e.s; fish landing nets, butterfly nets and similar nets; decoys and similar hunting or requisites (excl. Decoy calls of all kinds and stuffed birds of heading 9705) | 41 | | 1,700 | -1,659 |
| **Total** | | 60 | | 1,731.22 | -1,671 |

Source: United Nations (UN) Comtrade Database (https://comtradeplus.un.org/)

CSO collects information about the production of fishing gear in the country. As in Finland, the PRODCOM codes are used for the goods, and these statistics from 2021 and 2022 have been collected to Table 8 As can be seen from it, there is gaps in this data. For some of the products, there wasn't industrial production for any of the years, whereas for some goods it is so low that it has not been made public due to confidentiality reasons (-99999999 values). Industrial production figures were only available for one product (i.e., 13941233: Made-up fishing nets from twine, cordage or rope of man-made fibres (excluding fish landing nets)), specifically for the year 2021. Unlike in the Finnish case, this production is given both in volumes (tonne) and value (€) for 2021, but unfortunately only in value for 2022.

Table 8: Industrial production of fishing gear and related materials in Ireland.

| PRODCOM CODE | Description | Volume [tonne] | Value [€] |
|---|---|---|---|
| ***2021*** | | | |
| 13941233 | Made-up fishing nets from twine, cordage or rope of man-made fibres (excluding fish landing nets) | 1,821.84 | 11,627 |
| 13941235 | Made-up fishing nets from yarn of man-made fibres (excluding fish landing nets | 0 | 0 |
| 13941253 | Made-up nets from twine, cable or rope of nylon or other polyamides (excluding netting in the piece…) | -99999999 | -99999999 |
| 13941255 | Made-up nets of nylon or other polyamides (excluding netting in the piece produced by crochet, hairn…) | 0 | 0 |
| 13941259 | Knotted netting of textile materials (excluding made-up fishing nets of man-made textiles, other made-up nets) | -99999999 | -99999999 |
| 13941280 | Articles of twine, cordage, rope or cables | 0 | 0 |
| ***2022*** | | | |
| 13941233 | Made-up fishing nets from twine, cordage or rope of man-made fibres (excluding fish landing nets) | -99999999 | 14,244 |
| 13941235 | Made-up fishing nets from yarn of man-made fibres (excluding fish landing nets | 0 | 0 |
| 13941253 | Made-up nets from twine, cable or rope of nylon or other polyamides (excluding netting in the piece…) | -99999999 | -99999999 |
| 13941255 | Made-up nets of nylon or other polyamides (excluding netting in the piece produced by crochet, hairn…) | 0 | 0 |
| 13941259 | Knotted netting of textile materials (excluding made-up fishing nets of man-made textiles, other made-up nets) | 0 | 0 |
| 13941280 | Articles of twine, cordage, rope or cables | 0 | 0 |

***Note:*** Confidential values are expressed as -9999999. Source: Central Statistics Office (CSO)-PRODCOM statistics (https://data.cso.ie/)

Two main inconsistencies between the databases used to obtain data on industrial production, exports and imports of fishing gear hinder the calculation of the volumes of materials placed on the market. Most of the industrial production data is confidential, therefore, it is not possible to access the real production values of certain materials. On the other hand, the CN and PRODCOM codes do not match. Although some codes have similar descriptions, in general it is difficult to compare them because in some cases, the materials they include are not compatible with each other. The figures from UNComtrade would indicate that there is significant production of fishing nets (CN code 560811) and line fishing tackle et al. (CN code 950790) in Ireland, as exports exceed significantly imports. However, CN 950790 is a bit problematical goods group, as it includes also other items, not just fishing gear, as has been mentioned earlier.

With regard to aquaculture gear data, there are no official statistics available in Ireland on the production or use of aquaculture gear and related materials. It is important to consider that the aquaculture industry in Ireland is small, especially in production of finfish. Therefore, low industrial production of aquaculture equipment is expected. On the other hand, it is possible that industrial production data for aquaculture nets and ropes could be included in the statistical data for materials described for fishing gear (Table 8).

For other materials commonly used in shellfish and seaweed production (e.g., oyster bags and floats), industrial production, export and import data were collected (Table 9). Industrial production of floats was again obtained from CSO-PRODCOM statistics in Ireland, covering several years (from 2019 to 2022). However, no industrial production of these materials has been recorded for any of the years. On the other hand, import and export values from the UN Comtrade database showed a higher import volume of floating materials compared to export volumes.

The oyster farming industry is one of the leading aquaculture sectors in Ireland, where HDPE oyster bags are the main farming materials needed for oyster production, together with metal trestles. (Thornberry, 2019) No data on industrial production, exports or imports could be found in the databases used. However, as indicated above, most of the oyster bags used for oyster farming in Ireland are imported from companies such as Intermas S.L. (Thornberry, 2019)
In addition, most of the materials used in finfish and shellfish aquaculture have a long lifespan and tend to be reused due to the high cost of purchasing new materials. In the case of oyster farms, the oyster bags used can have a useful life of more than 10 years and, when they break down, farmers tend to amend them to prolong their use. (Thornberry, 2019) In mussel production, many farms buy second-hand floats from the finfish aquaculture sector. Another example of repair and reuse of aquaculture equipment is MOWI, an aquaculture salmon producer that repairs its cage nets at their recycling facility for future reuse.

Table 9: Industrial production, imports and exports data from aquaculture gear in Ireland

| Industrial production data | | | |
|---|---|---|---|
| **PRODCOM CODE** | **Description** | **Volume [tonne]** | **Value [€]** |
| ***2022*** | | | |
| 30115000 | Other floating structures (including rafts, tanks, coffer-dams, landing stages, buoys and beacons) | 0 | 0 |
| ***2021*** | | | |
| 30115000 | Other floating structures (including rafts, tanks, coffer-dams, landing stages, buoys and beacons) | 0 | 0 |
| ***2020*** | | | |
| 30115000 | Other floating structures (including rafts, tanks, coffer-dams, landing stages, buoys and beacons) | 0 | 0 |
| ***2019*** | | | |
| 30115000 | Other floating structures (including rafts, tanks, coffer-dams, landing stages, buoys and beacons) | 0 | 0 |
| **Imports and exports data** | | | |
| **CN CODE** | **Description** | **Import [tonne]** | **Export [tonne]** |
| ***2022*** | | | |
| 890790 | Floating structures: tanks, coffer dams, landing stages, buoys and beacons | 480.84 | 79.69 |

Source: PRODCOM statistics from Central Statistics Office (CSO)- Ireland (https://data.cso.ie/) and UN Comtrade Database (https://comtradeplus.un.org/)

As there are significant gaps in the collected statistics, and some uncertainties regarding import and export figures, it is not possible to give exact figures for fishing gear placed in the market. The imports of fishing nets seem to be quite low, but the figures by UNComtrade might have to be taken with a pinch of salt. The figures for imported and exported fishing nets are very low, especially the first mentioned figures. For instance, in Finland imports of fishing nets exceeded over 100 tonnes and even in Iceland a significant part of the fishing gear put on the market originates from overseas, over 200 tonnes. There is local production of fishing nets in Ireland, but it is highly unlikely, that this would cover the whole domestic demand and would enable as significant exports overseas as has been given by UNComtrade. Especially, as the volumes are much smaller than for instance in Finland, where the fishing sector is much smaller. The volumes for CN 957090 – which is problematic in itself – are also exceptionally high, with 1,700 tonnes given as annual exports.

## 4.4 Norway – unexpected gaps in the statistics

Among the NPA countries, Norway is the one that holds the top position in fishing and aquaculture sector. The importance of the sector, not just in terms of volume and monetary value of fish caught and farmed, is great, but there is also significant fishing gear manufacture in the country. Therefore, it was expected that there would be good statistics also about the imports, exports and industrial production of fishing gear itself, but unfortunately the expectations were not met.

Data on Norwegian imports and exports of fishing gear and related materials was available only from collected the United Nations (UN) Comtrade Database. There were no national statistics

publicly available about the imports and exports of fishing gear. As there are some uncertainties linked to the usage of these statistics, as was mentioned earlier in chapter 4.3, these figures must be treated with caution. The most recent data input is from 2023, which is shown in Table 10. There is no statistics about the fishing gear production in Norway, nor data about exports of fishing nets. Even if the data from the UN Comtrade Database is correct, it is not possible to calculate the actual "Put on the market" volume. Most of the "put on the market figures" are negative, meaning more fishing gear is exported than imported. The overall figures are very low, not to mention those of the fishnets, which are totally inadequate. Fishing and aquaculture sector is big in Norway, but statistics about fishing gear production and imports & exports leave a lot to be desired for. It is not possible to assess, how much fishing gear is put on the market in Norway based on the publicly available statistics.

Table 10. The quantities of fishing gear placed on the market in Norway in 2023

| CN-code | Description | Import [tonne] | Industrial production [tonne] | Exports [tonne] | Put on the market [tonne] |
|---|---|---|---|---|---|
| 560811 | **Fishnets**, made up of man-made fibres | 133 | | Not reported | |
| 950710 | **Fishing rods** | 1 | | 2 | -1 |
| 950720 | **Fish-hooks**, wheather or not snelled | 3 | | Not reported | |
| 950730 | **Fishing reels** | 0.5 | | 1 | -1 |
| 950790 | **Line fishing tackle** n.e.s; fish landing nets, butterfly nets and similar nets; decoys and similar hunting or requisites (excl. Decoy calls of all kinds and stuffed birds of heading 9705) | 21 | | 76 | -55 |
| **Total** | | 158.5 | | 79 | -57 |

Source: United Nations (UN) Comtrade Database (https://comtradeplus.un.org)

## 4.5 Sweden – no data about fishing gear production

Swedish foreign trade and production statistics are collected by Statistics Sweden SCB (2024). CN and Prodcom codes are used in Sweden as in the other countries. The level of collected data varies a bit from the other countries. A search of SCB's database revealed that there was no data for fishing gear production, neither for volume nor for the value of this production. Unlike in Finland and Ireland, where there was this kind of data from some previous years and the collection had been since discontinued, the Swedish statistics regarding fishing gear production from 1996 onwards were totally empty. SCB was contacted to confirm that this finding was correct. SCB's data included information about export and import of fishing gear, which has been added to Table 11 and the put on the market volume has been calculated based on these. The overall figures of fishnets put on the market, are close to the volumes that were calculated for Finland.

As the official statistics left a lot of questions in the air, couple companies involved in fishing gear business were interviewed to get a better grasp of the fishing gear production and sales in Sweden. One of these companies was **Laxen Specialnät AB**, which is an importer and

producer of special nets and fishing gear, located in Umeå, Västerbotten, in the Swedish NPA region. The fishing sector has declined in the past 50 years, which has had an impact also on the operations of this company. The company was founded already in 1948 as Laxen Fiskredskapsfabrik AB, but the "Fishing gear factory" was dropped from the name in 1995, as the main income streams had moved away from fishing nets to special nets, safety nets. They stock still fishing nets for commercial and recreational use, which are sold directly to customers. The nets are imported from Finland, where they are produced. The sales of fishing nets vary a lot from year to year. The individual nets weight from 0.5 kg to 1 kg and they consist mainly of nylon, PA. Also, bigger nets are sold occasionally. (Laxen, 2024)

Table 11. The quantities of fishing gear placed on the market in Sweden in 2022

| CN-code | Description | Import [tonne] | Industrial production [tonne] | Exports [tonne] | Put on the market [tonne] |
|---|---|---|---|---|---|
| 560811 | **Fishnets**, made up of man-made fibres | 99 | | 5 | 94 |
| 950710 | **Fishing rods** | 449 | | 85 | 364 |
| 950720 | **Fish-hooks**, wheather or not snelled | 69 | | 23 | 46 |
| 950730 | **Fishing reels** | 219 | | 138 | 81 |
| 950790 | **Line fishing tackle** n.e.s; fish landing nets, butterfly nets and similar nets; decoys and similar hunting or requisites (excl. Decoy calls of all kinds and stuffed birds of heading 9705) | 837 | | 338 | 499 |
| **Total** | | 1,673 | | 589 | 1,084 |

Source: SCB Database (https://www.statistikdatabasen.scb.se/)

Another company that was interviewed was **FF Norden**, which is a small trawl producer in Smögen on the West coast of Sweden. Founded in 1937, they are the largest remaining trawl manufacturer in Sweden. As business has shifted more towards the manufacture of sports and specialty nets, also this company has gone through a name change. Their trawls are sold also to commercial fishers in Northern Sweden, to Kalix, where they are used to catch vendace. The sale volumes vary a lot, which is partly due also to the fact that the trawls have a longer lifetime. The trawls have a metal structure with plastic nets, which consist of PA and PE, Terylene. Some of the customers also send their trawls back to FF Norden for repairs, but when the trawls are beyond repair FF Norden delivers them to Sotenäs Marine Recycling Center for sorting and recycling.

There is some manufacture of fishnets even in Sweden, but data about this is not collected to official statistics. This is however much smaller compared to Iceland and Norway, so the import and export figures give a better indication – when compared to some other countries that have been addressed above – about the volume of fishnets that is put on the market.

# 5

# THE QUANTITIES AND QUALITIES OF FISHING GEAR IN USE IN THE NPA REGION

# 5 THE QUANTITIES AND QUALITIES OF FISHING GEAR IN USE IN THE NPA REGION

The calculations about the fishing gear put on the market gave a rough overview of the total volume of gear entering the markets in some of the NPA countries. In couple cases, such as in Norway and Ireland, there were significant uncertainties related to the data that was available. Especially in the Norwegian case the data available was definitely inadequate and it was not possible to make any conclusions about the volume of fishnets put on the market based on the available figures.

There were limitations also regarding the data available for other NPA countries. There were several categories both in external trade and production statistics for fishing gear, but there was also one category – CN950790 – which included other items beside fishing gear. The total volume of fishing gear in this category leaves a lot of room for interpretation. The external trade and production statistics included also goods which could be used to make fishing gear, such as ropes and cables. These can be imported and produced in the country and be utilized by net manufacturers, so the materials should appear in finished goods. However, the gaps in the production statistics meant that these production volumes could not be charted. The final put on the market volume is therefore incomplete. We will return to this later.

There are uncertainties related to the calculated volumes, but defining the material content is not problem-free either. This is easier for some categories - such as fishing rods (CN950710) and fish-hooks (CN950720). Their material content is usually quite uniform, but that is not the case with fishnets (CN560811), which varies a lot between the different types. As these come in many forms and shapes, and their material composition can vary a lot between these types, it is difficult to say anything certain about the volumes of different materials that the annual additions of nets to the market contain. If CN8 code, which specifies also the material content, had been used in external trade statistics of all the NPA countries, it would have been easier to assess the material contents of the reported fishing net volumes. In the Icelandic case, material to be used in fishnet manufacture were sometimes divided into different categories based on the material content of it, but this was not done for the finished nets. The nets usually contain different materials, so specifying them by one material alone is not possible.

As the life span of fishing gear is several years, in some cases up to ten years or more, these items that have only recently entered the market, will end up in the fishing gear collection bins only later. The items that have already several years under their belts are the ones which will find their way to separate collection first and can be recycled. Therefore, it would be important to know what kind of fishing gear and what type of fishing gear is already in use. If we know the volume of gears in use and their average lifespan, we can estimate how often they would need to be replaced. That is, if the ones that are taken out of use will be replaced. Commercial fishing has been decreasing in the past decades in some NPA countries, but on the other hand aquaculture activity has increased and this is expected to continue in the near future as well.

## 5.1 Finland – no suitable fishing gear data, but net cages well recorded

The purpose of the production and external trade statistics is to provide information to different authorities and decision makers about the scale of these economic activities. As we have seen above, the information that is collected is sparse at best. Commercial fishing is an economic activity as well, but how well are the authorities aware of this activity and what kind of data is being collected about it? In Finland, Natural Resources Institute (LUKE) maintains the national statistics of commercial fish catches. The purpose is not just to collect information about the monetary value of these catches, but also to make sure that the fishing quotas set for Finnish commercial fishing are not exceeded.

Information about the caught fish by form of fishing is collected both for commercial and spare time fishing. Freshwater commercial fishers report the volume of catch that has been caught with a certain fishing gear, but this does not reveal how many fishing gears of certain type have been used by them. Reporting commercial fish catches on the sea differs from this, as fishing days with a certain fishing gear is the reporting unit in addition to the volume of catch. These numbers from the year 2023 have been collected to Table 12.

Table 12. Commercial fishing in Finland by gear type in 2023

| Gear type | Marine fishing | | Freshwater fishing |
|---|---|---|---|
| | Gear days* | Volume of catch in tonnes by gear | Volume of catch in tonnes by gear |
| **Trap nets** | 133,284 | 8,085 | 649 |
| **Gillnets** | 1.589,206 | 1,200 | 904 |
| **Longlines** | 104,179 | | |
| **Trawls** | 3,818 | 80,246 | 1,276 |
| **Seine** | | | 936 |
| **Other** | 16,934 | 44 | 181 |
| **Management fishing** | | | 875 |

Source: Natural Resources Institute Finland 2024a, 2024b and 2024c. *Gear day, i.e. when one gear is in use one day (or less), it is one gear day

Reporting fishing gears in spare-time fishing is the closest that we can get to the actual number of fishing gear in use. The number of users of different fishing gear is reported, so we have a rough idea about the number of nets, crab traps, fishing poles, etc. that have been used by spare-time fishers during a certain year. As can be seen from Table 13, there was almost 1 million hook and lines in use by Finnish recreational fishers in 2022. However, as all of them are not in continuous use, people don't make their living out of them, their lifespan differs greatly from those which are used by commercial fishers. The same, simple net, which is used in coastal fishing in shallow waters by a professional fisher, has to be replaced more often than a net used by spare-time fisher at the summer cottage, which is put into lake perhaps only once or twice in the summer. The first one might last only a couple years, whereas the latter one might have been in use already for 20+ years and is not showing any signs of tear and wear yet.

Table 13. Number of households and persons using different gear types, and their proportions of fishing households and fishermen by gear in Finland in 2022

| Gear type | Number | Percentage |
|---|---|---|
| **Fish trap** | 326,000 | 18 |
| **Gillnets** | 337,000 | 19 |
| **Crayfish trap** | 106,000 | 6 |
| **Jig** | 606,000 | 3 |
| **Hook and line** | 998,000 | 56 |
| **Spinning rod** | 947,000 | 53 |
| **Fly rod** | 79,000 | 4 |
| **Trolling gear** | 541,000 | 30 |
| **Other** | 55,000 | 3 |

Source: Natural Resources Institute Finland 2024f (note, data is collected every other year)

Spare-time fishing and commercial fishing – both in inland waters and in the sea – use all different methods of statistics for reporting the forms of fishing which are not compatible. LUKE was contacted and they confirmed our observation. (Lappalainen 2024) Spare-time fishing statistics bring us closest to the number of fishing gear in use, but it is not possible to estimate their real lifespan, so even there we fall short of our goal of calculating the material flow of fishing gear. Assessing the volume of fishing gear in use in Finland is therefore impossible based on these statistics, and even making very crude generalizations is doubtful.

As a summary, there is very little data available about the number of fishing gear used by commercial fishers in Finland. There is better data available for spare time fishing, but different gears are used mainly by different fisher groups. In coastal, marine fishing and in freshwater fishing similar gear might be used by both commercial and recreational fishers. However, the lifespan of similar fishnets in commercial use is generally shorter than in recreational fishing.

However, there is some light at the end of the tunnel and the situation is not nearly as bleak about the data available for aquaculture. External trade and production statistics proved to be problematic for this equipment, as the CN classifications in the sector only extended to the CN6 level. LUKE on the other hand collects statistics about the number of fish farming cage nets in use. The statistical database includes the number of fish farms and their location in Finland.

The number of aquaculture companies and the fish farms was discussed in detail in report D.1.1.1, but in this review the natural food pond farmers can be ignored, because they do not use cage nets. The number of facilities without natural food pond farmers, i.e. the number of facilities where cage nets are used, was 244 farms in 2022. These facilities can be divided into the marine area and the inland waters. (Natural Resources Institute Finland 2024a) There is information also about the location of the fish farms by region. Roughly about half of the fish farms are located in the NPA part of the country, as can be seen in Table 14. However, part of the Ostrobothnia region is outside of the NPA region, so the figures for that region include also fish farms which are not in the NPA region. (National Resources Institute Finland 2024b)

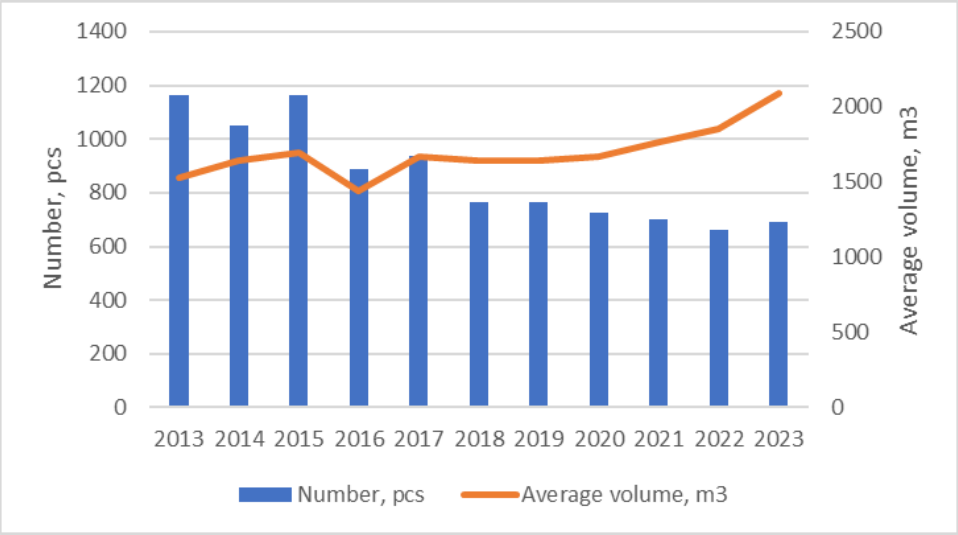
Table 14. Fish farms by production type in Finland, 2023

| Region | Food fish farms | Fry farms | Total |
|---|---|---|---|
| **Southern Savo** | 3 | 9 | 12 |
| **Northern Karelia** | 4 | 3 | 7 |
| **Northern Savo** | 5 | 7 | 12 |
| **Central Finland** | 5 | 19 | 24 |
| **Ostrobothnia** | 11 | 3 | 14 |
| **Kainuu** | 23 | 23 | 46 |
| **Lapland** | 9 | 8 | 17 |
| **In total NPA area** | **60** | **72** | **132** |
| **The rest of Finland** | **84** | **34** | **118** |

Source: National Resources Institute Finland 2024d

In addition to the number of farms, LUKE collects also information about the number of net cages used in fish farming and their average volume. This database goes back several years and in the light of this historical data (Figure 1) it is clear that the number of individual cages has decreased, and their volume has increased. (Mikkola 2024) This is a sign of the development of the aquaculture business in Finland in general and about the transition towards larger units and increased professionalism.

Figure 1. Number of net cages used in aquaculture in Finland and their average volume, 2013–2023




Source: National Resources Institute Finland 2024e

The only drawback of these statistics is that the data is not available on a regional basis, so the number and average volume of net cages used in the NPA region is not clear. The only location-based characteristics that are given refer to the cages being used either by sea or by freshwater, and since the region-based statistics about the number of fish farms was not divided either to farms by sea or freshwater, this angle is not helpful either. Therefore, let's focus first on the national figures from 2022, which have been collected below. (National

Resources Institute Finland 2024e) As can be seen, the cage nets in the sea area are significantly larger in size than average cage nets used in inland waters.

| | | |
|---|---|---|
| Inland waters | 167 nets | average volume 862 $m^3$ |
| Sea area | 491 nets | average volume 1,848 $m^3$ |
| In total | 658 nets | average volume 1,598 $m^3$ |

But what can be said then about the number of net cages in use in the NPA region? About half of the aquaculture companies are located in the NPA region, but the majority of these are based on inland waters. Lapland and Ostrobothnia are the only NPA regions with sea coastline and at least in Lapland there is also freshwater aquaculture. As the number of net cages in use in inland waters and their average volume is smaller, most of the aquaculture waste is generated by companies located outside of the NPA region and at sea area. Of the 658 net cages in use in Finland in 2022, most likely around 25 % or less than 200 units are in use in the NPA region.

## 5.2 Iceland – no data about gear in use

Iceland set the bar high with the external trade statistics of fishing gear, which the other countries could not reach. Unfortunately, they could not repeat this with the statistics about fishing gear and aquaculture gear in use. Information is not collected – or is not at least publicly available – about the number of fishing gear in use, nor is there data about cage nets in use by aquaculture companies and their volume. As was mentioned in report D.1.1.1 fish farming has only very recently expanded in Iceland and the production levels are lower than for instance in Finland and Sweden.

## 5.3 Ireland – no data about gear in use

As in Finland and in Iceland, there is significant gaps in the statistics about the fishing gear in use in the country. There is no publicly available information on the volume and type of fishing gear used on commercial fishing vessels in Ireland. Statistics are collected about the types of gear used and catches retained on board by Irish vessels and foreign vessels landing in Ireland. These logbooks are managed by the Maritime Fisheries Protection Authority and, generally, complete gear and landing data are only available for Irish vessels.

The “Atlas of commercial fisheries around Ireland - Third edition 2024” (Gerritsen, 2024) provides a series of detailed maps of commercial fishing activity around Ireland with the aim of providing insights into fishing activities and fisheries resources. The atlas contains maps of:

1. Fishing effort of vessels of all nationalities by gear type inside the Irish Exclusive Economic Zone (EEZ)

2. Fishing effort of Irish vessels by gear type in all areas where they operate

3. Landings taken by Irish vessels for the main commercially exploited species.

Some of this information could elucidate on the types of fishing gear used by the fisheries (national and international) operating in the Irish EEZ. As for the international fisheries, the vessels nationality includes the following countries: Spain, France, UK, Belgium, Germany and the Netherlands. According to Gerritsen, (2024), the fishing gears recorded in national and international fisheries operating in the Irish EEZ are: demersal otter, trawlers, longliners, gill netters, trammel netters, pelagic trawlers, beam trawlers, seiners, potters and dredges. However, the quantities of fishing gear used are not publicly available.

There are no exact figures about the number of fishing gear in use in Ireland and similar data is missing regarding aquaculture as well. The aquaculture industry in general is quite small in Ireland, especially for the production of finfish. The oyster farming industry is one of the leading aquaculture sectors in Ireland, where HDPE oyster bags are the main farming materials needed for oyster production, together with metal trestles. (Thornberry, M. 2019) However, there is no data of the number of this gear either.

## 5.4 Norway – some information about cage nets on national level

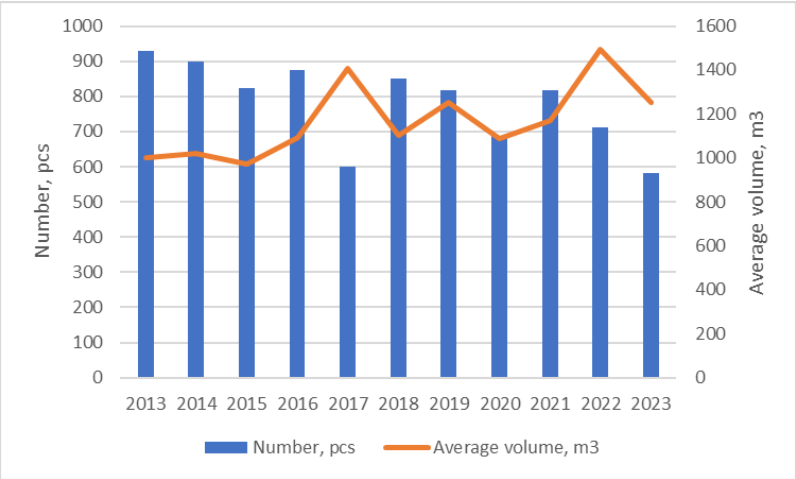
As for other countries, there is no data about the quantities and qualities of fishing gear in use Norway. There are statistics (https://www.fiskeridir.no/English/Fisheries/Statistics/Fishermen-fishing-vessels-and-licenses) about the professional fishers, vessels registered, but no record of the equipment in use. Therefore, it is difficult, even impossible, to estimate the volume and quality of the fishing gear in use. The introduction of EPR will shed some light into this, as from 2025 the producers and assemblers (such as Mørenot and Selstad) have to report the plastic containing fishing gear that is put on the market.

There is a bit more information available about the aquaculture industry. According to the Department of Fisheries there are about 3,800 cage nets in active use at present in Norway, but the overall volume of net cages is not public information, unlike in Finland. Regarding the number of net cages in the NPA area of Norway, according to the Norwegian aquaculture register, out of about 1,300 sea-based fish farming locations in Norway, about 700 were in the Norwegian NPA area (e.g. from Trondheim to north). Over half of the 900 sites that are producing salmon in, are located on the Norwegian NPA area (Directorate of Fisheries of Norway, 2024). The number of fish cages that are in use in the northern Norway, is most likely around 2,000 nets, as the number for the whole country is about 3,800 units.

## 5.5 Sweden – national cage net data known, but not for NPA region

The Swedish case does not differ greatly from most of the ones that have been addressed already. There is no information about the fishing gear numbers in use, but there is some data about the gear used by aquaculture. The Ministry of Agriculture collects information about the different technologies used in aquaculture, the number of units and their volume, which includes also information about cage nets. Information about food fish and restocking fishing are presented separately in these statistics, but Figure 2 includes the combined data about number of net cages and their volume in Sweden from 2013 to 2023.

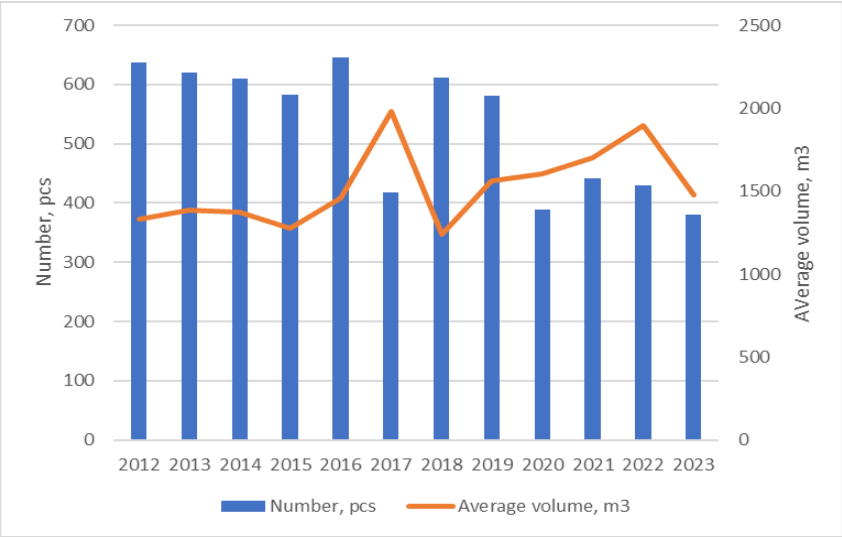
Figure 2. Number of net cages used in food fish and restocking fishing aquaculture in Sweden and their average volume, 2013–2023




Source: Jordbruksverket 2024

As was mentioned in Report D1.1.1, the statistics do not give a clear answer to the volume of aquaculture production and to the number of aquaculture facilities that are located in the NPA area. This information is given for Southern, Eastern and Northern Sweden, and the information for Northern Sweden includes also other counties, which are outside of the NPA region. There are only national figures available for the number of net cages and their volume, but as fish food production takes place predominantly only in Northern Sweden (only 10% of production is outside Northern Sweden), the figures about cage nets used for food fish in Sweden, could be used as basis for estimates about the number and volume of cage nets used in the Swedish NPA area (Figure 3). The number of net cages that are used in the NPA part of Sweden is most likely in hundreds.

Figure 3. Number of net cages used in food fish aquaculture in in Sweden and their average volume, 2013–2023




Source: Jordbruksverket 2024

# 6

# MATERIAL FLOWS OF FISHING GEAR IN THE NPA REGION

# 6 MATERIAL FLOWS OF FISHING GEAR IN THE NPA REGION

The aim of this report was to provide analysis of the quantities and qualities of fishing gear in the NPA region. As was discussed in Chapter two, the material contents of different types of fishing gear can vary quite significantly. Plastics is the dominant material, which has replaced organic fibers, such as hemp, in the manufacture of nets and ropes. In most cases fishing gear contains several different kinds of plastics – polyamide (PA), polypropylene (PP) and polyetelene (PE) being the most common ones. Even traps and pots, which are mostly made of metal, contain significant amounts of PA and PE.

The material content of fishing gear can vary a lot even within the same product category, so the information from Table 1 should not be taken as the whole truth on the matter. The gear that bears the same name might have different material content, depending on who has manufactured it and where it is being used. Each material has its own strengths, which has led to a quite diverse material content even in very simple items such as in the "simple, ordinary fishing nets". Certain kinds of plastics enhance certain kinds of properties, others serve other purposes. However, this mix of materials, which makes the gear what it is, stand up to the high requirements what is expected from it, becomes a handicap when the gear is collected and should be recycled. Identifying the materials and separating them manually is a laborious task, but finding a recycler for each material segment can be difficult in itself. We will take a closer look at this matter in our project report D.1.3.1 "EOL fishing gear report: Review of EOL gear collection and responsibilities in the NPA region".

One key element of this report was to find out information about the fishing gear put in the market and the fishing gear in use. As was explained in Chapters 3 and 4, the statistical data that is collected about these themes and is publicly available is quite incoherent. There is more information available for some countries than for others, but the bottom line is that there is no knowledge of how much and what kind of gear is placed on the market in the NPA area. However, the situation is expected to improve. The European Commission requires that the member states that are implementing EPR for plastics containing fishing gear report annually the inputs of fishing gear to the markets and the collected fishing gear waste. Once these volumes are reported to the Commission, then it is possible to make some very rough assessments of the material flows of fishing gear. However, as was mentioned above, material content even within the same product category can vary a lot, so more exact information about the material is available as the material content of collected fishing gear is being studied.

But let's return to the statistics. There were huge gaps in the information that was found, data was unreliable, but one specific fishing gear group was better recorded than others. Both in Finland and in Sweden information is being collected about the number and size of net cages that are used by aquaculture. The number and volume of the cages provided a starting point for their closer examination, which can't be done with other fishing gear due to lack of knowledge. The data was reviewed with hopes that something concrete could be said about the material flow of cage nets.

As the name states, a net cage is made of a net and a fixed structure, to which the net has been attached, but they come in many sizes and shapes. The information collected in Finland and Sweden did not specify the actual material content of the listed net cages either, why further information about cage nets were collected. For instance, **Laitakarin Kala Oy**, which was interviewed during the aquaculture survey, uses two different kinds of net cages in their facilities by the sea. The smaller ones are cylindrical in shape with a diameter of 30 m and a depth of 6 m. The weight of the whole structure is 4,000 kg of which the mesh bag weighs about 1,000 kg. The company's larger ponds are 40 m in diameter and 15 m in depth. The bottom of these ponds is in the shape of a circular cylinder and a circular cone, so that the straight section continues below the surface of the water for 8 m at first and the last 7 m are in the shape of a cone. The weight of the cage net is about 5,000 kg and roughly half of this is due to the net itself, which weighs around 2,750 kg. (Karjalainen 2024) Additional information about the net cages used in the Finnish NPA region were obtained from **Keski-Puula osakaskunta**, a fish farming company with fish farms in inland waters. They were using a bag, which is circular cylinder shaped with a diameter of 12 m and a depth of 6 m. The weight of the mesh material was estimated to be around 200 kg. (Taskinen 2024)

As the diameter and depth (and shape) of the nets is known, the volume of these individual nets can be calculated. With this data and the weight of mesh net, a ratio of volume and mass can be calculated, which has been done for these three case studies. The ratio of volume and mass varies quite significantly between these three net types, as can be seen from Table 15. Also, the overall volume of the nets varies a lot, so it is difficult to estimate, which one of these would be the typical net cage in use in the Finnish NPA area. As was mentioned in 5.1, the average volume of a net cage could be calculated based on the collected data. This was about 1,598 $m^3$ in, but none of the three net cages seem to have been "average" net cages. The Puula net cage is relatively close to the net volume of an average inland water net cage (863 $m^3$), but the ones operated by Laitakarin Kala Oy are way bigger than the average is for a sea based net cage (1,848 $m^3$).

Table 15. Cage net volumes, mass of nets and ratio of volume and mass

| CASE | VOLUME OF CAGE NET [$m^3$] | MASS OF NET [kg} | RATIO OF VOLUME AND MASS [$m^3/kg$] |
|---|---|---|---|
| **VATUNKI** | 4,241 | 1,000 | 4.2 |
| **MARTINNIEMI** | 12,982 | 2,750 | 4.7 |
| **PUULA** | 679 | 200 | 3.4 |
| **AVERAGE OF RATIO NUMBERS** | | | 4.1 |

Source: Karjalainen, 2024; Taskinen, 2024

Another uncertainty, which has to be taken into consideration, is linked to the number of net cages per fish farm. The average number of fish cage nets by fish farm in Finland ranged from 4.2 by sea area, to 2.7 in the whole country and just 1.3 cage nets in inland waters. Laitakarin Kala Oy is more representative of the sea area fish farms as it operates several net cages, whereas Keski-Puula seems to be a typical freshwater farm with just one net cage. But the composition of the NPA Finland based fish farms with cage nets is not clear. How many of the

118 farms are located by sea, how many of them are located by freshwater? The statistics do not include this information. If the number of net cages in the NPA area of Finland was calculated using the average figure for the whole country (2.7 net cages per farm) and for inland water (1.3 cage nets per farm), the number of cage nets would range from 340 to 164 units.

Besides the number of net cages, there is also other factors, which make it difficult to calculate the overall weight of nets used in cage net fish farms in the NPA part of Finland. There are too many uncertainties in the volumes of nets, the ratio of volume and mass of individual nets, etc., so the calculations made with these figures and their outcomes would leave too much room for interpretations. The cage nets can be also equipped with walkways made from plastics, which are also subject to separate collection. The current, collected statistics do not, however, address this issue at all, so the weight of these structures is not known. Therefore, it is not advisable to give even indicative estimations about the weight of the nets used by fishing farms in the NPA region by calculating this from the statistics collected by LUKE. Yet again we are in the same position as earlier, the data that has been collected into the statistics has not been collected with our agenda in mind, but for other purposes. Same uncertainties are valid also with the Swedish data about cage nets. The number of cage nets in the Swedish NPA region is not known, neither their volume, the type of cage net that are in use nor their ratio of volume and mass.

From Norway there is some information available about the number of net cages in use, but not their volume. In general, the net cages used in Norway are significantly bigger than those in use in Finland and Sweden. Table 16 includes dimensions of various cage nets that are produced by Norwegian company Akva Group. The netting areas of these nets vary a lot, and as key figures about the number, average size of net cage, etc. are not known, it does not make sense to try to estimate approximate volume of nets in the Norwegian aquaculture industry based on the measures given below. Even in the Finnish case, where more factors were known, the outcomes of these calculations would leave too much room for interpretation as the range of variation is quite significant.

Table 16. Dimensions of various net cages used in Norway

| | Coned nets | | Straight-wall circular net | Nets for square cages | |
|---|---|---|---|---|---|
| **Construction** | ENCA 160 253580 60 | ENCC 160 405255 60 | ENC 160 2035 60 | ENR 24x51 2035 48 | ENS 25x25 1010 16 |
| **Circumference** | 160 m | 160 m | 160 m | 150 m | 100 m |
| **Depth to bottom rope** | 25 m | 40 m | 20 m | 20 m | 10 m |
| **Depth to center of inner bottom** | 35 m | 52 m | | | |
| **Depth to center bottom** | 80 m | 55 m | 35 m | 35 m | 10 m |

| | | | | | |
|---|---|---|---|---|---|
| **Number of side ropes** | 60 | 60 | 60 | 48 | 16 |
| **Netting area** | 6,632 m2 | 5,626 m2 | 7,770 m2 | 1,853 m2 | 5,149 m2 |
| **Volume** | 43,568 m3 | 40,353 m3 | 55,616 m3 | 6,825 m3 | 54,601 m3 |

Source: Akva Group, 2024

There is more data available about the number of cage nets used in aquaculture, from Finland and Sweden even their total volume, but this does not take us much further. It is not possible to calculate the amount of plastics that the 800 or so net cages, which are in use in Sweden and Finland contain, even if we can calculate the average volume of a single net cage. The nets come in so many different sizes and shapes that the figures would leave too much room for interpretation.

As with the fishing gear, once the industry and importers have to comply with the EU requirements and declare how much gear is placed on the market, assessing the material flows of fishing gear has a firmer foundation. The Finnish PRO for EPR of plastic containing fishing gear had set up a survey for its members and asked, how much fishing gear is put on the market in 2024. 25 out of 38 members replied to the survey. The results were made public in a seminar, which the PRO organised in October 2024. Based on the survey, about 150 tonnes of aquaculture gear and 93 tonnes of nets and similar fishing gear is put on market in Finland. These figures – even though they do not include replies from all the members of the PRO – sets a starting point for defining the volume of fishing gear put on the market in Finland. But the road is still long, till we have a realistic picture about the material flows of fishing gear in Finland, not to mention in other NPA countries.

# 7

# CONCLUSIONS

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One aspect which the EPR is expected to have an impact on is the recyclability of the fishing gear. As the producers and importers must fund the collection of EOL fishing gear, these costs can be decreased through recovery and reuse of the collected materials. In order to get most out of the collected materials, the fishing gear should be designed so that they are easier to recycle. This is an aspect which has not been necessarily considered in product development, the durability and usability of the gear has been the driving force in the gear design. These two qualities are important for the gear, but it should be possible to make good, safe gear, which are also easier to recycle. If the materials can be separated and there is a buyer for these materials, this will bring revenues for the PRO instead of expenses. This can guide product design significantly, as has been witnessed with other EPR schemes.

What matters for companies, who want to use recycled materials in their products, is the volumes and quality of materials. We have tried to map out the material contents of fishing gear in this report, and the volumes of these gears in order to highlight, what is the hidden potential of EOL fishing gears for the NPA programme area. It has become clear that the material contents of fishing gear varies a lot between gear types and that there is material, which could be recycled. However, the current statistics that were used to calculate the amounts of gear entering the markets or volumes in use at the moment do not offer us a solid foundation, on which assessments of material flows could be made on.

We have not been able to provide exact figures of how much of plastics – in all their different types – there is in the fishing gear that is used by fishing and aquaculture industries in the NPA countries. We have not been able to find out how many of certain kinds of gear are in use either, or how many have entered the markets. We got closest to the first mentioned one with the cage nets of aquaculture in Finland and Sweden, but calculating the material contents of these items included still too many variables. Still, acknowledging the gaps that exist is a first step in changing the situation. If the circular economic potential of fishing gear is to be fully embraced, we can't rely on existing statistics and information. New information needs to be gathered, which will serve this purpose first and foremost.

# 8

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# 8 REFERENCES


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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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