

Sinking ship

Why the EU's wild fish need protecting from extractive aquaculture

Key findings:

- Nearly one-fifth (17%) of EU fishery landings are converted into fishmeal and fish oil (FMFO). The majority of the EU's FMFO exports supply the salmon aquaculture industry in Norway and Scotland.
- EU fish exported to feed Norwegian and Scottish salmon in the form of FMFO return to the EU as salmon imports with lower nutritional value than the wild fish used as feed.
- Denmark is by far the largest producer of FMFO by volume, followed by Finland, Estonia and Sweden. Feed fish landings accounted for over two-thirds (68%) of Denmark's overall landings, and over three-quarters (81%) of Finland's in 2024.

Foodrise calls on the EU to prohibit the use of whole, wild-caught fish to produce FMFO and to withdraw support for extractive, high-impact aquaculture production systems, including the feed fisheries that supply them.

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Fish that could feed people are instead feeding farmed fish

Aquaculture accounted for over a quarter (28.5%) of fish consumed in the EU in 2025. Salmon, almost all of which is farmed, was the most consumed species.¹

Extractive aquaculture – which comprises farming of carnivorous species such as salmon and seabass – is heavily reliant on wild caught fish in the form of fishmeal and fish oil (FMFO), which is used in feed.² It can take up to 6 kilograms of wild fish to produce just 1 kilogram of farmed

salmon³; as this sector grows in the coming years, pressure on wild fish populations is set to intensify.⁴

According to the European Fishmeal and Fish Oil Producers (EFFOP) trade association, over 60% of FMFO comes from whole fish, the rest from trimmings.^{a,5} The primary species used are small pelagic fish including European sprat, sandeel, herring and blue whiting.⁶

Wild Atlantic Herring – a fish species typically used in FMFO manufacture



Fish destined for FMFO in the EU are primarily landed in Northern Europe

Nearly one-fifth (17%) of the EU's fishery landings were processed into FMFO in 2023, amounting to over 600,000 tonnes of wild fish.^{b,7} However, the proportion of fish processed into FMFO varied considerably across EU Member States. For example, two of the EU's largest fishing countries, Spain and France, landed significant volumes of fish but 1% or less went towards FMFO production (see Table 1).^c On the other hand, a large proportion of fish catches in smaller fishing countries such as Sweden and Finland were processed into FMFO.⁸

Denmark is the EU's largest producer of FMFO, accounting for 35% – 50% of total EU production.⁹ Denmark's feed

fishing industry is supported by its large share of EU quotas for pelagic species such as sandeels, sprat, blue whiting and herring.¹⁰ In 2023, Denmark accounted for a massive 95% of all of the sprat landed in the EU, much of which was destined for FMFO production.¹¹

Foodrise's research shows that in 2024 **over two-thirds (68%) of Denmark's fish landings were used for FMFO**. This was trumped by Finland, where over three-quarters (81%) of fish landings were destined for FMFO, albeit for a much smaller volume of fish.¹² A large share of Sweden and Estonia's landings were also used for FMFO, well above the EU average share of 17%.^{d,13} (See Table 1)

a Co-products from fish processing deemed unsuitable for direct human consumption

b According to EUMOFA's 2025 Fishmeal and Fish Oil report, the EU landed 3,550,000 tonnes of fish in 2023. 17% of 3,550,000 comes to 603,500 tonnes.

c Based on Eurostat data, using total tonnes of fishery landings and tonnes of fish destined for industrial uses.

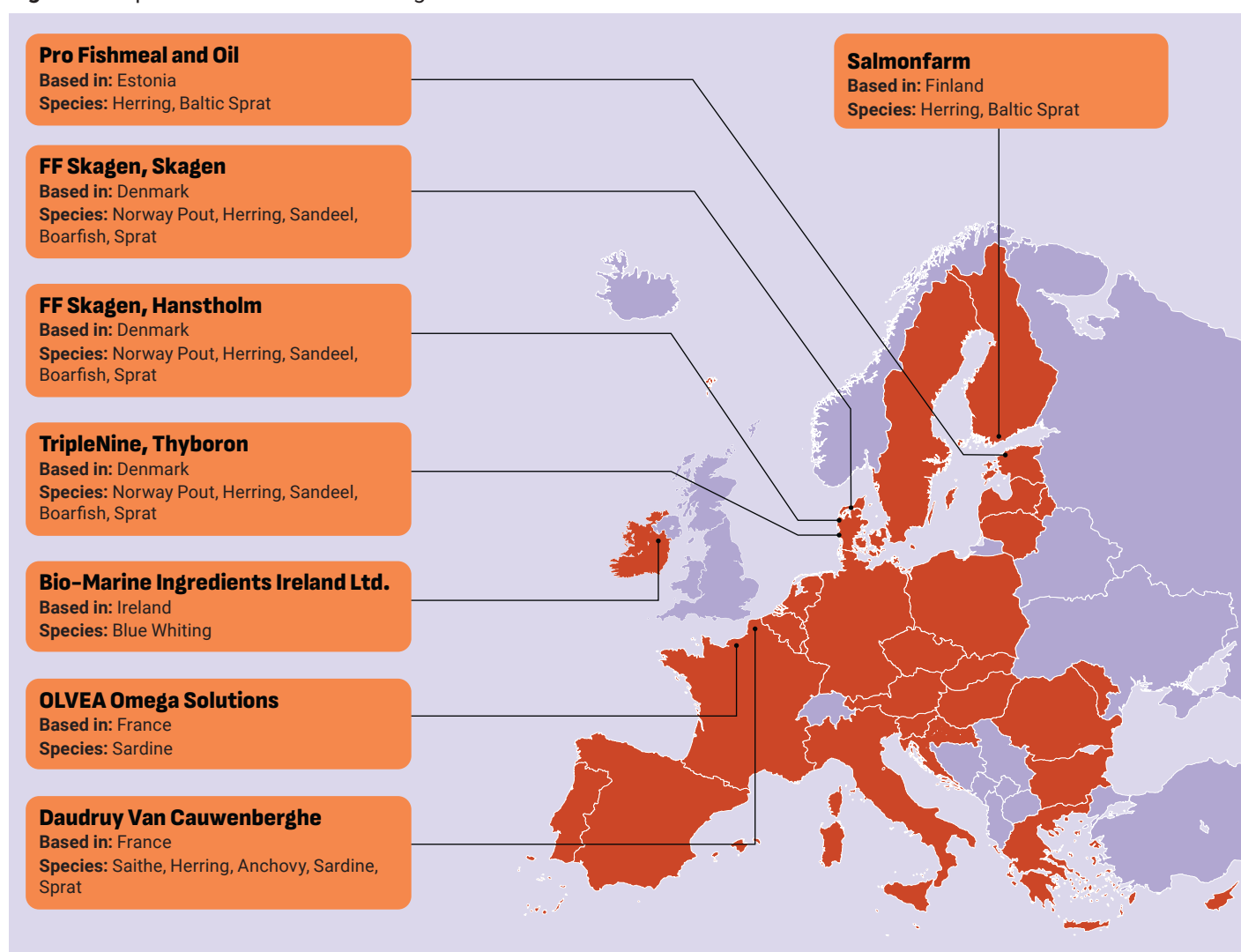
d Based on Eurostat data, using total tonnes of fishery landings and tonnes of fish destined for industrial uses.

Table 1: EU fishery landings destined for FMFO in key EU Member States in 2024^e

Country	Fishery landings 2024 (tonnes)	Fishery landings destined for FMFO 2024 (tonnes)	% of fishery landings destined for FMFO production 2024
Denmark	561,129	381,925	68%
Finland	55,905	45,211	81%
Estonia	73,662	22,586	31%
Sweden	34,627	15,044	43%
Spain	479,234	2,823	1%
Belgium	12,532	487	4%
France	265,065	311	0.1%
Germany	27,768	278	1%

Figure 1 shows that FMFO factories using whole fish are primarily concentrated in the Baltic states, as well as in Ireland and France.

Figure 1: Map of EU FMFO factories using whole fish^f



^e Irish data not available via Eurostat as of 12.09.2026, excluded to keep methodology consistent.

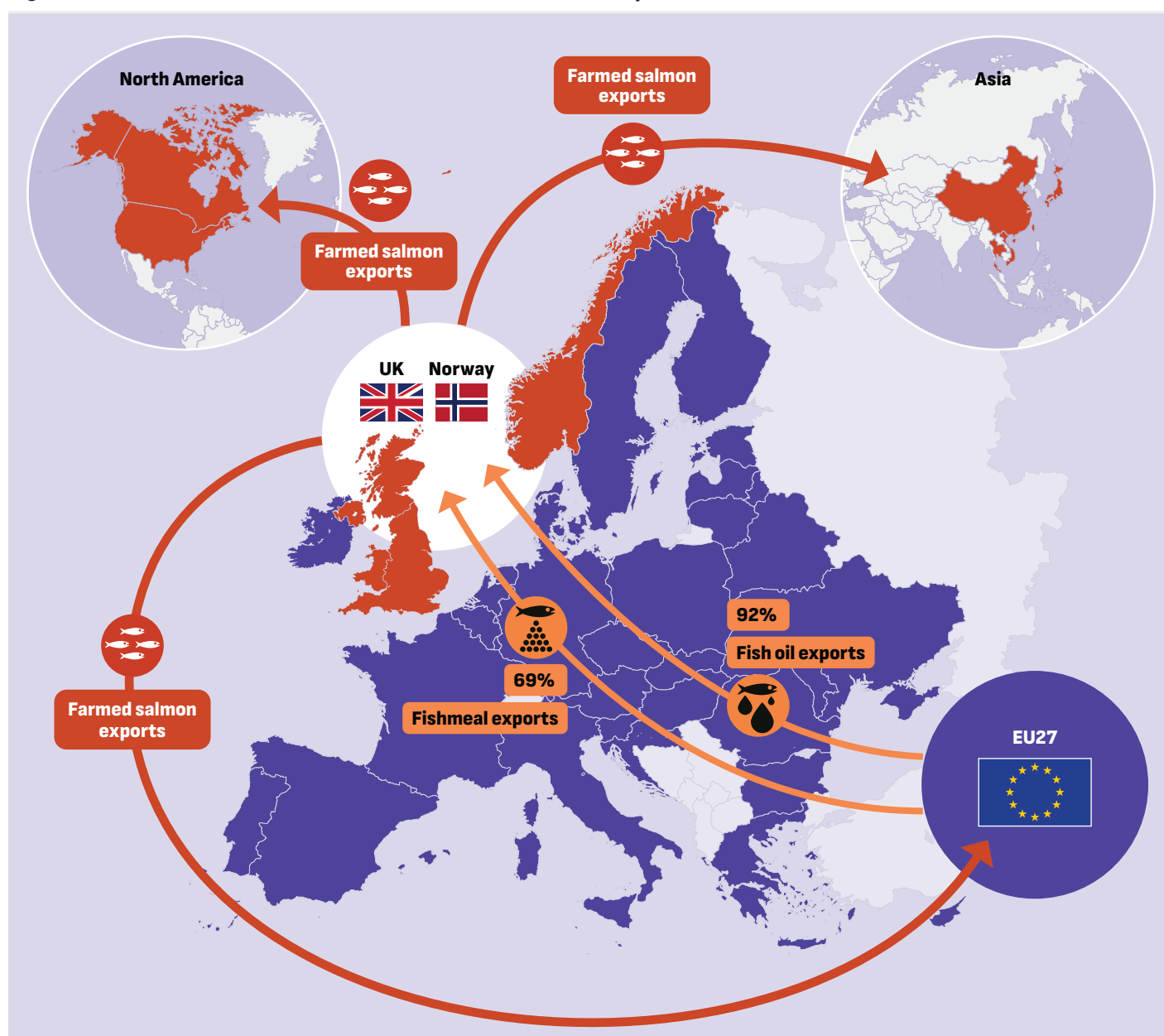
^f This information has been extracted from Lauren Shea and Rashid Sumaila, 'Replication Data for: Spatial Distribution of Fishmeal and Fish Oil Factories around the Globe', version 2.0, Borealis, 5 March 2025, <https://doi.org/10.5683/SP3/P0GLZF>, filtered by EU countries and whole fish.

The EU's feed fisheries supply the Norwegian and Scottish farmed salmon industries

FMFO produced in the EU supports some aquaculture production within the bloc, but a significant share is exported to feed extractive aquaculture beyond EU boundaries.¹⁴ In **2024 the vast majority (92%) of the fish oil and over two-thirds (69%) of the fishmeal exported from the EU went to Norway and the UK** (Figure 2).^{g,15}

Farmed salmon dominates aquaculture production in Norway and Scotland,^{16,17} far outpacing any other species; combined these countries made up nearly two-thirds of global farmed salmon production in 2025.^{h,18} This indicates that **the majority of FMFO exported out of the EU goes to feed salmon farming**. The salmon produced in Norway and Scotland is in turn exported into the EU, as well as sold to North American and Asian markets.¹⁹

Figure 2: Flows of FMFO and salmon between the EU27 and Norway and UK



g According to EUMOFA's 2025 Fishmeal and Fish Oil report, the EU exported 137,000 tonnes of fish oil, 126,200 tonnes of which went to Norway and the UK combined, equating to 92%. For fishmeal 171,000 tonnes were exported in total, 118,500 tonnes of which went to Norway and the UK combined, equating to 69%.

h According to the Mowi's 2026 Salmon Farming Industry Handbook, in 2025 global farmed salmon production came to 2,733,500 tonnes. Norway made up 1,534,300 tonnes (56%) and UK 169,500 tonnes (6%). Together they made up 62% of global farmed salmon production in 2025.

Feeding the EU's wild fish to farmed salmon wastes critical micronutrients

With the health benefits of fish widely recognised, European dietary guidance often cites salmon as a nutritious option.²⁰ **This guidance glosses over a complex and inefficient supply chain which results in the loss of critical micronutrients.**

Most (90%) of wild caught fish used in FMFO are food-grade fish.²¹ Pelagic fish that could be eaten directly by EU citizens are being used to produce FMFO for aquaculture, resulting in a product of reduced nutritional value and declining availability of wild fish. Research has shown that over 72% of protein in feed is lost in salmon production²² and that most edible wild caught fish species in FMFO have higher

concentrations of key micronutrients than farmed salmon. For some of these micronutrients, as little as 1% is retained in farmed salmon.²³

EU fish exported to feed Norwegian and Scottish salmon in the form of FMFO **return to the EU as salmon imports with lower nutritional value than the wild fish used as feed.** Norway is the EU's largest farmed salmon supplier, providing over 80% of the EU's total import volume amounting to 827,171 tonnes in 2024.²⁴ The UK was the EU's second-largest farmed salmon supplier.²⁵

The EU's feed fisheries threaten marine environments

Beyond nutrition and food security concerns, the EU's feed fisheries for extractive aquaculture pose a significant threat to the health of marine environments. The European Commission recently warned that carnivorous fish farming's reliance on wild caught fish is "increasingly unsustainable" given the aquaculture sector's "rapid growth and ongoing pressure on marine ecosystems."²⁶

Extractive aquaculture's demand for feed has put the pelagic species fished for FMFO at risk. **In the Baltic Sea, herring populations are down 80% since the 1960s.**²⁷ Independent assessments have also found severe stress in

the North-East Atlantic and the North Sea.²⁸ The Sustainable Fisheries Partnership's 2024 report on Reduction Fisheries categorised European sprat (North Sea, Skagerrak and Kattegat), blue whiting (North-East Atlantic) and sandeels (Central Eastern North Sea) as poorly managed fisheries – the lowest rating.²⁹

The precipitous decline in catches of pelagic fish targeted for FMFO has serious consequences for other forms of life, given the vital role these species play in marine ecosystems. Their decline therefore often compromises the integrity of the ecosystem as a whole.

Ecosystem benefits of pelagic species targeted by FMFO fisheries

Sprat and herring are found throughout European waters and play a particularly central role in the Baltic Sea ecosystem, preyed on by larger fish such as cod, salmon, seabirds and marine mammals.³⁰ They also feed on plankton, acting as an energy and nutrient link between tiny plants, animals and large predators, giving them an important role in the marine food web.³¹ In Irish waters, sprat constitutes up to 70% of the diet of humpback whales, which migrate through the area to build fat reserves for breeding. According to the Irish government,³² the collapse of sprat stocks would have devastating consequences across the ecosystem, affecting humpback whales, puffins, razorbills, and terns – many of which are already in steep decline due to food shortages and habitat loss.³³

Throughout the North Atlantic, **sandeels** are targeted exclusively using bottom trawls, which extract hundreds of thousands of tonnes of them per year.³⁴ Few prey are more important for seabirds than sandeels. Packed with nutritious oils, they are essential to nourish chicks and sustain breeding adults, enabling the longevity of healthy populations.³⁵ In 2024, fishing for sandeels in UK waters was banned on biodiversity protection grounds. The EU challenged the ban claiming that it discriminated against Danish vessels and was therefore in breach of the UK-EU trade deal, however it was upheld by the Permanent Court of Arbitration in 2025.³⁶

Blue whiting play a central ecological role in the North-East Atlantic food web, in part due to their broad geographic distribution.³⁷ They are valuable prey for sharks, marine mammals, seabirds and fish such as cod.³⁸ They are also a crucial component of the diet of harbour porpoises which have a high demand for small fish species; due to their fast metabolisms, they must eat frequently to survive.³⁹

Recommendations to policy makers

Given the significant pressure on European fish populations, Foodrise calls on the EU to prohibit the use of whole, wild caught fish to produce FMFO and to withdraw support from extractive, high-impact aquaculture production systems, including the feed fisheries which supply them. Specifically, we urge decisionmakers to:

1. **Prohibit EU funding for feed fisheries and extractive aquaculture** — which comprises conventional farming of carnivorous species such as salmon and seabass, as well as land-based production of these species.
2. **Prioritise the development and funding of low-trophic (seaweed, algae, mussels) aquaculture systems**, which can produce nutritious food while delivering ecosystem services.
3. **Phase out the use of FMFO in aquaculture feed, beginning with ingredients derived from whole wild fish**. Edible wild fish must be prioritised for direct human consumption and local and regional food security rather than used to produce feed.
4. With the ultimate aim of ending extractive fish farming in the EU, halt the expansion of carnivorous aquaculture by:
 - a. **Immediately capping production at current levels;**
 - b. **Preventing the farming of new species such as octopus, tuna and cod;**
 - c. **Preventing the embedding of emerging technologies such as land-based salmon production.**
5. **Place small-scale, low-impact aquaculture, fishers and fishworkers, small-scale fish producers, processors and traders** at the heart of the EU's fisheries and aquaculture policies.
6. Extend the food protein transition into the fisheries and aquaculture sector, as part of the shift towards healthier, sustainable diets. **Encourage consumption of a more diverse range of low-impact, locally sourced fish and algal products**, to accelerate the switch away from resource-intensive aquaculture species.

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Image on page 2: Atlantic herring *Clupea harengus* swimming in clear blue Norwegian fjord waters, underwater view. Credit: iStockphoto

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