

CAUGHT OUT

How UK retailers are tackling the use of wild fish in their aquaculture supply chains

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The purpose of this report is to shed light on industry-specific issues related to the environmental and food security impacts of the use of wild-caught fish as feed inputs in the aquaculture industry.

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EXECUTIVE SUMMARY

With most UK seafood purchased in supermarkets, and 70% of shoppers keen to buy sustainable fish, retailers have a duty to lead the way on ocean stewardship. This report explores how well they are living up to this responsibility when it comes to the farmed seafood on their shelves.

In 2015, **93% of the world's marine fish stocks were either fished to their limit or overfished.**

With communities around the world depending on healthy fish stocks for their nutritional needs and livelihoods, it is imperative that our oceans are properly managed and valued. In this context, aquaculture – fish farming – appears to present a solution. Instead of taking fish from the ocean, we can farm them on land or in the sea, creating a healthy source of protein without reaching environmental limits. Unfortunately, the picture is not so simple. One of the biggest buyers for the world's catch of pelagic fish, such as sardines, herring and anchovies, are the aquaculture and agriculture industries. **Almost one-fifth of global fish landings are currently used to produce fishmeal and fish oil (FMFO) to supply industrial livestock and aquaculture, and demand is set to grow as the aquaculture industry expands** (see Chapter 2).

In the UK, we are most likely to encounter the aquaculture industry in the form of a small number of ubiquitous farmed-seafood species that now dominate our supermarkets' fresh-fish aisles and counters. Farmed salmon (largely from Norway, Chile, Canada and Scotland) and farmed warm-water prawns (from China, Thailand, Vietnam, Indonesia and India) are the two most common farmed seafood products. Farmed sea bass, basa and trout are also widely sold in the UK. All of these species are farmed using wild fish, in the form of FMFO, in their feed. This is known as 'fed aquaculture'.

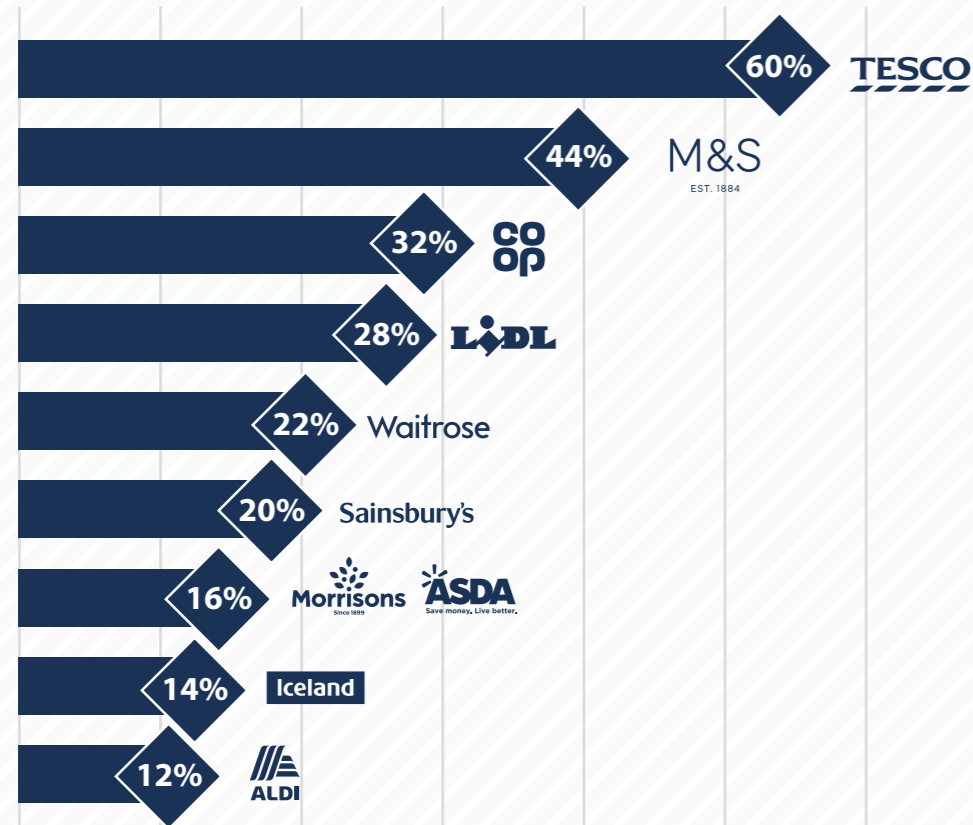
Yet very few shoppers are aware of the origins of their farmed fish dinners – or even the fact that the fish they are eating was farmed, let alone what it was fed. In 2019, UK shoppers purchased 103,000 tonnes of the top six farmed seafood species. In doing so, they indirectly and unknowingly consumed 177,000 tonnes of wild fish in the form of the feed used to farm these products.^A

In their role as intermediaries between aquaculture producers and the public, supermarkets are

^A This figure is based on the 103,000 tonnes of the top farmed species (salmon, trout, seabass, seabream, prawns and basa) consumed by the UK population in 2019. It was calculated by quantifying the wild fish needed to produce fish oil required for salmon, trout seabass and sea bream consumed by the UK population. In the model, prawns and basa were fed on fishmeal created in the process of producing fish oil. See Appendix A for full calculations.

arguably the most powerful players in the market. They are the arbiters of standards for food production throughout their supply chains; as such, they bear a critical responsibility to hold their suppliers to account, and to guarantee that ocean stewardship is upheld as an overriding principle from fishery to fork.

This report ranks the top ten UK retailers against a set of criteria designed to assess how effectively they are addressing the ocean sustainability implications of the farmed seafood they sell. We ranked the retailers as follows:



Our research placed discount retailer ALDI at the bottom of our scorecard. Despite taking the promising step last year of stocking a wider range of wild fish alternatives, to relieve pressure on species such as cod and haddock, ALDI's policy and practice on its farmed fish did not live up to the broader sustainability image it is cultivating. ALDI did not reply to our research questions – a lack of engagement reflected in its wider failure to recognise the importance of ending farmed fish reliance on wild-caught marine ingredients, and a lack of serious corporate engagement with research on alternative feed ingredients. While ALDI, in common with most of its competitors, labelled farmed seafood on its shelves, there was no labelling information on the origin of the farmed seafood sold.

At the top of the scorecard, Tesco provided evidence of extensive internal engagement with the questions raised in this report, and was the only retailer to provide 'Fish In, Fish Out' calculations for its top five

aquaculture products. We were also encouraged by Tesco's sustainability policies, which went beyond relying on certification as a proxy for sustainability, as well as by the retailer's commitment to supporting the development of alternative feed ingredients for farmed fish, such as algal oil. We encourage Tesco, alongside all retailers, to set a target to eliminate wild-caught seafood ingredients in its aquaculture supply chains. Full details about the scoring of each retailer is available in Chapter 3.

Rather than being a solution to the complex crisis threatening the health of our oceans and marine life, aquaculture reliant on FMFO for feed is placing an unacceptable burden on wild fish populations and marine ecosystems, and compromising the health and livelihoods of the people who depend on them. With growing public interest in where our food comes from, and more focus on eating responsibly and healthily, retailers cannot afford to turn a blind eye to this issue. If done responsibly, seafood farming might one day deliver on its promise of alleviating pressure on wild populations. However, the current model is deeply unsustainable and scientists warn that, if we continue with business as usual, our oceans will be pushed beyond a tipping point. Supermarkets have huge power to shape public tastes and buying choices, as well as to educate consumers on the impact of different types of seafood consumption.

No retailer has a clear target for reducing – and ultimately eliminating – whole wild-caught fish in feed, and with even top-ranking retailer Tesco achieving a middling score of 60%, it is clear that UK supermarkets still have a long way to go to ensure their aquaculture supply chains do not harm fish in the wild. Rapid action is needed to transition away from relying on wild fish, and to ensure the growth and profits of the booming farmed fish industry do not come at the expense of our oceans – and the communities whose lives depend on them. **It is time for retailers to step up their commitments to sustainability, recognise the risks posed by their aquaculture supply chains, and commit to measures to phase out the use of wild-caught fish in farmed-fish feed, setting a target to achieve this goal of no later than 2025.**



Salmon, prawns and sea bass are among the five most commonly consumed farmed seafood products in the UK

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1. INTRODUCTION

More than half of the seafood we eat is farmed. As the world's fastest-growing food-production sector, farmed seafood will account for 60% of global fish consumption within the next 10 years.¹ This global trend is reflected in supermarket fish aisles in the UK: as a share of total seafood consumption, sales of aquaculture products grew by 20% between 2009 and 2019, accounting for over half of supermarket seafood sales by value last year.²

Aquaculture is promoted as a sustainable solution to exceeding natural limits on wild seafood, decreasing pressure on overfished species while providing the public with a healthy source of protein and other key nutrients. However, few shoppers are aware of how farmed seafood is produced, and even fewer of aquaculture companies' reliance on huge quantities of fishmeal and fish oil (FMFO) – made from wild fish and crustaceans – to sustain the industrial production of mass-marketed species, such as salmon

and prawns. This reliance has huge implications for the sustainability of the industry as a whole.³



© istock

Every year, around 15 million tonnes⁴ of wild fish from across the globe are used to produce FMFO (see Box 1) – two essential ingredients in feed intended for farmed seafood commonly sold in our supermarkets, including salmon, sea bass and prawns. The extractive model underpinning the global aquaculture industry poses a real and present danger for the long-term health of our oceans,

and that of many communities around the world whose livelihoods and food security depend on fish⁵ (see Chapter 2). While several industries – including the pet food, chicken feed and pig feed industries – also make use of FMFO, aquaculture is rapidly displacing other uses and now accounts for 70% of FMFO consumption.⁶ This report sets out to address the gulf between public awareness of this industry's impacts and the reality of its production in one of Europe's largest consumer markets for farmed seafood: the UK.

In this scorecard – the first of its kind – Changing Markets and Feedback have selected a series of indicators to assess how seriously the top ten UK supermarkets are taking their responsibility to protect our oceans and provide their customers with sustainable seafood options. This scorecard takes as its starting point the understanding that using wild fish to feed farmed fish is a poor use of available nutrients, and poses a risk to both future food security and the health of marine ecosystems. In developing the scorecard, we have drawn on evidence from retailers' responses to our survey, desk-based research looking at company websites, annual reports, Corporate Social Responsibility materials and an in-store survey of a selected sample of stores (see the Methodology section in Chapter 3 for more information).

BOX 1: What do farmed fish eat? The rise of the marine ingredients industry

Worldwide, aquaculture systems are split into *fed aquaculture* (in which the farmed fish or crustacean are fed using commercial or farm-made aquafeed) and *unfed aquaculture* (largely of molluscs – such as oysters, clams and mussels – in which no external feed inputs are used and the farmed seafood nourishes itself from nutrients already available in the water). The most widely sold farmed seafood species in UK supermarkets are carnivorous or omnivorous; that is, they eat a mixture of other fish and vegetable matter in the wild. The diet of a modern, commercially farmed salmon contains 14.5–25% fishmeal and 10–15% fish oil, alongside other ingredients such as vegetable oils, soy and wheat.⁷

Roughly two-thirds of FMFO is made from wild fish caught specifically for this purpose; the other one-third is made from what the industry describes as trimmings and by-products of fish caught for human consumption.⁸ However, it is important to note that there is significant regional variation (for instance, by-product use in South America is a mere 16%), and that the lack of transparency within the sector raises questions as to whether 'by-products' truly are waste products and are not in fact putting further pressure on wild-fish populations. As shown by Changing Markets' on-the-ground investigations,¹⁰ juvenile fish and fish fit for human consumption are frequently misclassified as 'trash fish' and diverted to FMFO processing.

FMFO is used in several industries aside from aquaculture – for example, in feed for pets, chickens and pigs and for direct human consumption in the form of supplements. As with all commodities with a global market, there is a risk that rising demand for FMFO distorts local markets or places excessive and damaging pressure on ecosystems.

In addition to FMFO, farmed salmon feed contains ingredients, such as soy, that present their own sustainability challenges. In 2019, Feedback found that the farmed salmon industry in Scotland alone uses around 50,000 tonnes of soya protein concentrate, with considerable implications for the reliance of the industry on overseas land use and deforestation risks.¹¹

With fish populations under pressure from environmental change – wrought by global heating on the one hand and industrialised fishing on the other¹² – it is vital that the public is provided with sustainable seafood options by the organisations with the most power over our buying choices: supermarkets.

Of all UK adults who eat fish, 95% eat it at home, 57% also eat it out of home (at restaurants, fish and chip shops and cafes) and most of the fish and crustaceans bought in the UK are purchased at a supermarket.¹³ Supermarkets therefore play a preponderant role in determining seafood tastes and choices, as well

as customer awareness of sustainability issues. Visit the chilled seafood section of an average UK supermarket and a limited selection of products dominates shelf space, especially on the most coveted eye-height shelves. While a handful of wild-caught species (mainly cod, haddock and mackerel) continues to be widely available – in particular in breaded, smoked or other value-added forms – farmed-seafood products, especially farmed salmon, feature most prominently (see Box 2).

BOX 2: Spot the farmed fish

Our in-store surveys found that farmed products (such as salmon, prawns and sea bass) dominated the supermarket chilled seafood shelves, alongside less prominently displayed wild-fish products (such as cod, haddock and smoked mackerel). While a greater variety of fish (such as herring, mussels, anchovies and plaice) was sometimes available, there were far lower quantities of these types of fish, and they were frequently only offered in one form, rather than in a range of packaging sizes and value-added recipes. In general, salmon, prawns, cod and haddock dominated shelving space, with a wide variety of product types on offer (for example, fresh fish, smoked or cured fish, fishcakes and breaded fish). Farmed salmon dominates supermarket seafood sales, making up 60% by volume of all farmed-seafood sales, with warm-water prawns taking second place at 22%.¹⁴ Farmed white fish, such as sea bass and basa, have also become increasingly popular. Meanwhile, consumption of wild pelagic fish, such as anchovies and herring, has decreased since a peak in the early 2000s.¹⁵ With low customer understanding of which fish are farmed, there is even less awareness of the difference between 'fed' and 'unfed' aquaculture (aquaculture species that require external feeds) and those such as filter-feeding molluscs and shellfish (for example, oysters, clams and mussels). Figure 1 illustrates these long-term trends.



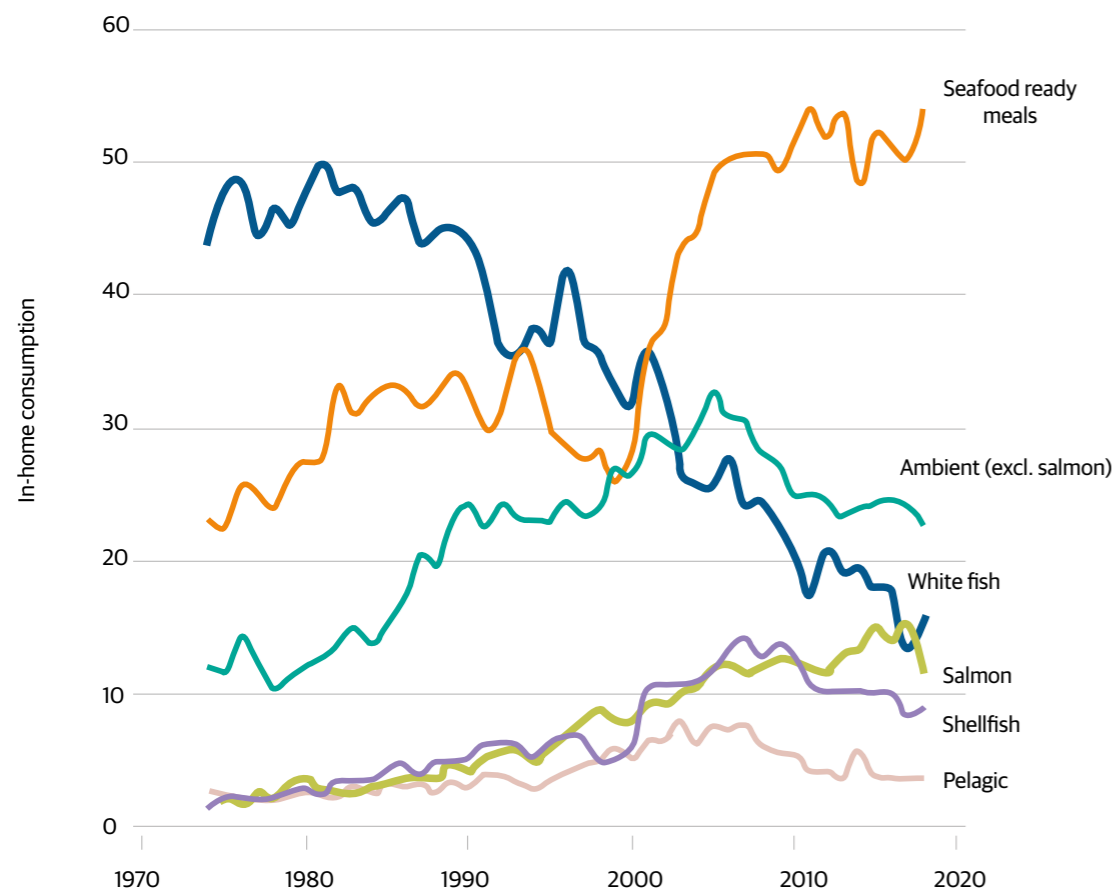


Figure 1. Long-term trends in UK seafood eaten at home
 Source: Defra Family Food 2019 cited in: Seafish (2019).

Overall, seafood sustainability is an important issue for UK shoppers. Following decades of awareness raising by marine charities, the UK public is largely aware of the need to buy wild fish and seafood that is not fished in unsustainable or illegal ways. Seventy percent of UK shoppers think seafood sustainability is important, and over one-third feel it is retailers’ responsibility to source sustainable seafood.¹⁶ Yet, while consumption of farmed seafood continues to rise, customer awareness of its origins and the sustainability implications of different aquaculture methods is low. Many shoppers may even assume the farmed fish they buy is wild.¹⁷

‘Many shoppers are aware of the existence of farmed salmon and prawns, but most assume their purchases are wild caught, as it’s not common practice to have “farmed” in a prominent place on front of pack.’ Seafish, 2019¹⁸

Our research found that shoppers had good reason to be confused: some farmed-seafood products are either not clearly labelled as such or inconsistently labelled, and there is no information about what farmed fish were fed. In the wake of scandals, such as the 2 Sisters Food Group chicken safety scandal in 2017,¹⁹ there is increased public concern about the origin of the food we are sold. It is therefore vital that UK supermarkets take responsibility for clear and transparent communication about the products on their shelves, and for ensuring the sustainability of their farmed-seafood supply chains.

The aquaculture industry’s reliance on wild fish to support its production methods and bottom line, coupled with its massive growth, risks placing a burden on wild marine ecosystems that is no less damaging for not being widely seen or understood. While farmed seafood will undoubtedly play an important role in delivering protein and micronutrients to our diets, retailers’ current preference for aquaculture systems and species that rely heavily on plundering wild-fish populations is not the answer to supplying UK customers with sustainable and healthy protein.

BOX 3: The problem with Scottish salmon

Scottish farmed salmon is presented as an archetypal farmed-seafood success story. From small beginnings, it has grown to be one of the most recognisable global aquaculture brands, and the country is the third-largest producer of farmed salmon worldwide,²⁰ with companies selling products such as ‘Tartan Salmon’ in markets ranging from the US to China.²¹ Yet the Scottish salmon industry has not so far provided sufficient transparency about its operations, particularly its sourcing of feed ingredients made from wild fish, to justify its image of sustainability.



In 2018, according to Feedback calculations, the Scottish salmon-farming industry used around 460,000 tonnes of wild fish to feed its salmon.²² While the Scottish salmon industry represents only a relatively small percentage of the overall market for FMFO ingredients (about 3% of total FMFO production), it is something of a standard-bearer for the farmed-salmon industry; higher levels of marine ingredients are used in farmed salmon produced in Scotland to maintain the industry’s image of providing high-quality farmed fish. In addition, the Scottish Salmon Producers Organisation has set an aspirational target to grow the industry by 100–160% by 2030 (against a 2017 baseline).⁸ If the industry achieves this growth, it will use up to 310,000 tonnes more wild fish in salmon feed. The industry has yet to explain how it plans to achieve these growth ambitions without placing an unjustifiable burden on wild-fish stocks in the context of broader global aquaculture expansion.

⁸ The Scottish aquaculture industry plans to increase finfish production to 300,000–400,000 tonnes by 2030 (Scotland Food and Drink, 2016; The Scottish Parliament, 2018). Currently, 96% of finfish production in Scotland is salmon (Marine Scotland Science, 2018). Salmon production for 2017 was 189,707 tonnes, and estimated production for 2018 was 150,774 (Marine Scotland Science, 2018), meaning that 300,000 tonnes would represent a 100–165% increase in production (from a 2018 baseline).

Industrial herring fishing. Herring is one of the species commonly used to make fishmeal and fish oil for use in aquaculture and animal agriculture © iStock

2. WHY FEEDING FISH TO FISH MATTERS

The oceans play an indispensable role in maintaining the health of our planet – from producing more than half of the world's oxygen and acting as a huge reservoir of carbon dioxide to regulating climate, temperature and weather.²³ They also perform an essential function in the global food chain, providing a home and sustenance for countless species of fish, crustaceans and other marine life, as well as being the number one source of protein for an estimated 3 billion people.²⁴

However, the oceans are increasingly showing the strain of climate heating and human overexploitation.²⁵ The Intergovernmental Panel on Climate Change's (IPCC) 2019 *Special Report on the Ocean and Cryosphere in a Changing Climate* warned that carbon emissions from human activity are leading to ocean warming, acidification and oxygen loss, with increasing ocean temperatures already having a visible impact on the growth, reproduction and survival of fish stocks.²⁶ At the same time, the exponential expansion of industrial fishing over the past century has severely damaged increasingly vulnerable fish populations with the result that, by 2015, 93% of the world's marine-fish stocks were either fished to their limit or overfished.²⁷ Nevertheless, demand for seafood continues to grow; since 1961, annual global growth rates in fish consumption has been twice as high as population growth.²⁸

A fish market in The Gambia. Gambians rely on fish as a staple food but recent investigations have shown that a significant share of the country's catch is being diverted to make fishmeal and fish oil for the international market.

© Tim Webster/Reelmedia Film



Within this context, aquaculture's proponents claim it has the potential to sustainably deliver affordable, healthy protein, in line with rising global demand, without placing further strain on already-overstretched wild fish populations. However, the industry is itself reliant on wild-caught fish, for use in feed, extracted from the same oceans it purports to protect. Every year, around 15 million tonnes of wild fish from around the globe is used to produce FMFO, accounting for nearly 20% of the world's total catch.²⁹ Of this, 69% of fishmeal and 75% of fish oil production is used to feed farmed fish.³⁰ Almost 70% of all landed forage fish are processed into FMFO – and 90% of this catch could be used for direct human consumption.³¹

This inherently unsustainable use of wild-caught fish to feed farmed fish is placing even more pressure on delicate ocean ecosystems, as well as increasing food insecurity in countries that are reliant on pelagic fish for protein and other micronutrients. On-the-ground investigations by the Changing Markets Foundation in 2019 exposed the extensive social and environmental damage caused by the FMFO industry in the Gambia, India and Vietnam.³²

In the Gambia – where GDP was \$1,700 per capita in 2018³³ and the population relies on fish as a staple food – our investigation found that the combined catch of just one FMFO plant accounted for approximately 40% of the country’s total reported fish catch in 2016. In India, investigators found that the expansion of fishing to produce FMFO has led to the extraction of new species from the ocean, disrupting aquatic food webs with unknown consequences. And in Vietnam, significant underreporting of catches destined for fishmeal factories was found to be enabling overfishing. In all three countries, local people – who rely on fish as an essential source of protein and micronutrients – were affected by decreasing fish populations and blighted by the pollution and health impacts of FMFO production.

The science is clear: Intensifying pressure on pelagic fish stocks to feed the fast-growing aquaculture industry will soon ‘create a tipping point of feasible seafood supply, driven by limits to forage fish production’.³⁴

There simply aren’t enough fish in the sea to feed the voracious FMFO industry – and, by extension, the expansion of fed-aquaculture production. Protecting and conserving fish stocks and ecosystems (for example, through the creation of marine reserves) should be the priority in responding to the ocean crisis if we want to be able to rely on marine ecosystems for food and livelihoods in the future.

BOX 4: Forage fish and the health of the oceans

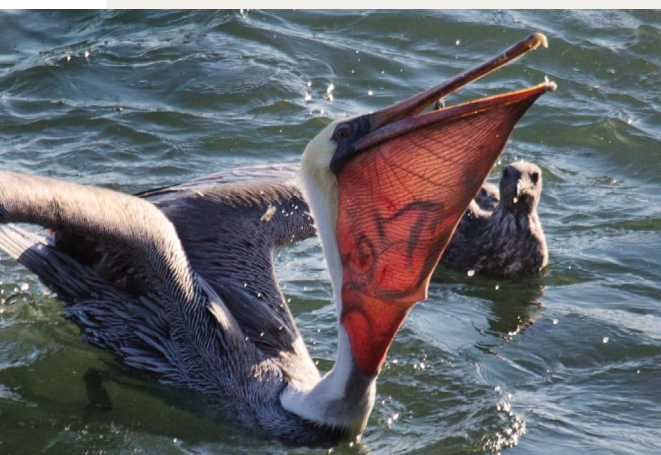
The primary target of the ‘reduction fisheries’ industry, which catches wild fish and crustaceans to produce marine ingredients, is populations of ‘forage’ or ‘pelagic’ fish. The Lenfest Forage Fish Taskforce (a panel of marine experts) has characterised pelagic fish as vulnerable to collapse, including at relatively low catch rates. Because forage fish are a primary source of food for many ocean predators – from larger fish to marine mammals and birds – their health has major knock-on effects on larger ocean ecosystems.

The Taskforce found that conventional management techniques, based on maintaining catch levels at ‘maximum sustainable yield’ (the maximum level at which fish stocks can be routinely exploited without long-term depletion), were not sufficient to prevent forage fish collapse – or a decline in the predators that depend on them – and recommended a much more precautionary, ecosystems-based management approach.

The Taskforce also found that in many parts of the world where forage fisheries are most active, such as Peru, wider ecosystems are impoverished compared to their state prior to the onset of industrial reduction fisheries. For Atlantic Menhaden – another species commonly used in aquafeed – the Taskforce found that management of the fishery did not consider predator needs, and that catch levels exceeded the sustainable threshold.³⁵

This research casts considerable doubt on the inherent sustainability of

fisheries following conventional approaches such as maximum sustainable yield – an approach whose adopters include the Marine Stewardship Council (MSC).



Changing Markets investigation 2019



Trash fish transhipment from an offshore fishing vessel in Vietnam

Workers claimed the vessel had been in Indonesian waters and the trash fish are sold to Minh Tam Fishmeal factory

A brown pelican feeding on anchovies, Monterey Bay California

© Jodi Frediani

Changing Markets investigation 2019

Fishing the feed: Supply-chain risk in the FMFO market

Global aquaculture supply chains are interwoven and highly complex. While the aquafeed sector itself is quite concentrated, and dominated by a handful of large corporations, the whole supply chain from fishery to fork can involve as many as eight different stages: fishery, FMFO plant, aquafeed producer, aquaculture farms, seafood processor, distributor, retailer and many middlemen in between.³⁶ On the other hand, some companies have a highly integrated value chain, with operations across several different activities: FMFO production, aquafeed manufacturing, fish farming and seafood distribution. One such example is Mowi, which is both the world’s biggest salmon producer³⁷ and a leading aquafeed supplier.

This complexity, combined with a lack of transparency and corporate accountability across the sector, makes comprehensive external scrutiny impossible and masks the full scale of social and environmental problems in aquaculture supply chains from the consumer. Retailers often rely on thin assurances of sustainability from seafood processors and aquaculture and aquafeed producers, who, in turn, hide behind one of the many certification schemes for marine products, such as GlobalG.A.P., the Aquaculture Stewardship Council (ASC) or IFFO.³⁸

Changing Markets’ Fishing for Catastrophe report showed that all top ten UK retailers have sourced products from aquafeed companies and seafood processors linked to unsustainable FMFO supply chains.³⁹

The role of certification

Reacting to consumer demand, major retailers have embraced certification as a way of ensuring sustainability in wild- and farmed-seafood supply chains. However, the rigour and independence of seafood certification is increasingly called into question, and recent analyses of major schemes – including the MSC, ASC and IFFO – casts doubt over their effectiveness in curbing unsustainable fishing and seafood-farming practices.⁴⁰ Many of the unsustainable practices in India, Vietnam and the Gambia have received the stamp of approval from one or more of these certification schemes.

In addition to challenges with current approaches to certification, there are concerns that the impacts of climate change reduce the ability of fisheries experts to confidently set catch limits at sustainable levels; for example, the IPCC has highlighted that climatic changes to our oceans present concerns for the effectiveness of fisheries’ management policies and governance in the future.⁴¹ As highlighted in Box 4, pelagic fish populations are already unpredictable, and particularly vulnerable to overfishing, with knock-on effects on wider ocean food webs.⁴²

Regardless of the effectiveness of certification schemes, the use of wild fish in farmed-fish feed is a fundamentally unsustainable way to produce protein. Certifying fisheries that reduce fish caught in the wild to produce farmed fish is in direct contradiction of the FAO Code of Conduct for Responsible Fisheries and elementary ethics, as it undermines food security for local populations in many developing countries.⁴³ In addition to this, most certification schemes that address the sourcing and use of FMFO fail to take important elements of sustainability into account, such as the ecosystem impacts of removing a keystone species from the food chain. Therefore, in our assessment, we have discounted retailers’ use of certification schemes of various kinds to guarantee the sustainability of wild fish caught for the purpose of feeding farmed fish.

BOX 5: IFFO RS certification: A sustainability smokescreen?

Unlike the MSC, the 'Global Standard for Responsible Supply' of marine ingredients (known as IFFO RS) is little known to the public. Describing itself as 'the leading business to business certification programme for the production of marine ingredients', IFFO RS claims to cover around 45% of the world's supply of FMFO.⁴⁴

However, significant concerns have been raised about IFFO RS certification. In terms of governance, IFFO RS is closely linked to IFFO, the trade association representing FMFO producers. The Technical Director of IFFO sits on the Governing Body Committee of IFFO RS, as does the Director of the world's largest fishmeal producer, alongside other representatives from the feed ingredients and aquafeed sector and the salmon-farming industry.⁴⁵ Several of the companies represented are also members of IFFO. Given the presence on the Board of so many players with strong vested interests in the drive to expand certification of FMFO, the chances for conflict of interest are high. According to Changing Markets' investigations, FMFO and aquafeed plants with links to highly unsustainable fishing practices are certified by, or members of, IFFO. For example, Danish FMFO producer, FF Skagen, proudly declares its IFFO RS certification but sources from Alfa Service Ltd. in Mauritania, where there are no IFFO RS-certified sites.⁴⁶

In addition, the IFFO RS approach to certification involves assessing various factors at factory level. Fisheries' sustainability is assessed via desk-based research, with the risk that assessed fisheries do not meet the objectives of maximum sustainable yield – let alone the objectives of an ecosystems-based fisheries-management system.⁴⁷ For example, in early 2019, a typical IFFO RS assessment of the sustainability of the round sardinella fishery off the Moroccan coast⁴⁸ presented some inherent contradictions. After stating that the fish stock failed to meet the required standard of either having a biomass above the reference limit or having negligible fishing catches, the assessment moved onto a 'risk assessment' approach. This stated that, because the fish population was highly productive and had limited susceptibility to overfishing, it passed the risk assessment. This is despite the fact that the most recent data from the FAO Fisheries and Monitoring Resource System states that round sardinella in this region are overexploited.⁴⁹ This raises questions about the effectiveness of IFFO RS certification in preventing overfishing.

While many major industry players recognise the need to move to alternative feed ingredients, IFFO staunchly defends the extraction of forage fish, maintaining that FMFO is primarily produced from fish 'unwanted' by the market⁵⁰ – despite multiple independent investigations finding that FMFO producers often outbid local markets for fish, and that the very presence of an FMFO market means fishers have an incentive not to preserve fish for direct consumption.

IFFO highlights its commitment to the UN Sustainable Development Goals, including Responsible Consumption and Production, Reduced Inequalities and Life Below Water. It asserts that fish are a 'naturally renewable resource'⁵¹ – a statement that is woefully out of touch with the state of the world's wild-fish populations. Once a fish stock has been depleted, it takes decades to recover – and may not ever fully do so. In addition, research on the wider ecosystem impacts of overfishing forage fish shows that depletion of the fish stocks used for FMFO production can have knock-on effects on other marine life (including marine mammals and seabirds) – and could have other, as-yet-unknown consequences, given the extreme complexity of marine ecosystems and the potential impacts of climate change.



| Antarctic krill © iStock



BOX 6: Krill: A keystone species under threat from the aquafeed industry

Krill, a type of zooplankton eaten by whales, seals and penguins, is found mostly in the waters around the Antarctic Peninsula.⁵² It is already used as an ingredient in aquafeed,⁵³ albeit in smaller quantities than FMFO. However, with growing awareness of the negative impacts of FMFO production and the hunt for alternative solutions well underway, krill-fishing companies have spied an opportunity and are stepping up their efforts to market krill as an efficient and 'sustainable' alternative to FMFO.

In 2018, 312,745 tonnes of krill were caught in the Southern Ocean, representing a 47% increase since 2010 – and a 173% increase since 2000.⁵⁴ The world's largest krill-harvesting company, Norway's Aker BioMarine, recently invested \$120 million (€106 million) in a new state-of-the-art krill-fishing trawler,⁵⁴ and has commissioned an additional \$65 million (€58 million) vessel for the 2021 harvesting season.⁵⁵ The company's CEO has publicly stated: 'The need for a sustainably sourced marine ingredient for aquafeed has never been higher and we believe krill is the answer.'⁵⁶

However, scientists paint a very different picture. A study published in February 2020 found direct evidence that krill fishing has harmed penguins at about the same level as certain severe climate events, and recommended that the body responsible for managing Antarctic krill populations, the Commission for the Conservation of Antarctic Marine Living Resources, set more protective catch limits that account for where and when predators feed.⁵⁷ According to a 2019 study in *Nature Climate Change*,⁵⁸ rapid regional warming means that krill populations are now concentrating in a narrowing band towards the coast of Antarctica.⁵⁹ Speaking at the time of publication, co-lead author Simeon Hill of the British Antarctic Survey said: 'Our analysis reveals a **species facing increasing difficulty in replenishing itself and maintaining high numbers at the northern edge of the Southern Ocean.**'⁶⁰

Contrast these scientific findings and calls for caution with a recent statement by the CEO of Aker BioMarine: 'There is lots of scope to broaden the horizons, to go to "new" areas where fisheries are allowed but not conducted.'⁶¹

^C Based on catch of 114,425 tonnes in 2000 and 211,973 in 2010 (see: <https://www.ccamlr.org/en/fisheries/krill>). Krill, which are a keystone species in the Antarctic ecosystem, are extremely vulnerable to climate change. While the krill fishery has historically grown slowly, new technologies now allow catches to be processed more quickly, stimulating more industry interest in krill fishing (see: <https://www.asoc.org/advocacy/krill-conservation>).

Caught Out

A scorecard assessing how the UK's top ten retailers are tackling the use of wild fish in their aquaculture supply chains



CORPORATE PRACTICE AND POLICIES

TRANSPARENCY AND SUPPLY CHAIN

INDICATORS	POINTS AVAILABLE:	ALDI	ASDA	COOP	Iceland	M&S	Morrisons	Sainsbury's	TESCO	Waitrose	LIDL
Quality of engagement and disclosure in response to this research	1 0.5 FOR A TOP-LINE RESPONSE			●	●	●	●	●	●	●	●
Policy on sustainable aquaculture feed	2	●	●	●	●	●	●		●	●	●
Target to eliminate farmed fish fed on whole wild-caught fish	2 1 POINT FOR HAVING A TARGET; 1 POINT FOR A DATE FOR THE TARGET										
Senior named staff member with responsibility to oversee sustainable aquaculture	2 2 POINTS FOR AQUACULTURE SPECIALIST, 1 POINT FOR FISH SPECIALIST			●		●	●		●	●	●
Investment in research and development of sustainable alternative aquaculture feeds	1					●		●	●	●	
Publish information on quantity of farmed fish sold; broken down by species	2			●	●	●	●		●	●	●
Publish information on the wild fish used for aquaculture feed in their supply chain (including wild fish species and source of origin)	2					●			●		
Suppliers of farmed fish listed publicly on website (including information on feed suppliers)/ provided on request	2 2 POINTS IF PROVIDED ON WEBSITE; 1 POINT IF PROVIDED TO US;					●			●		●
Provides information on the Feed Conversion Ratio* for top 5 selling aquaculture products (*the weight of feed administered over the lifetime of an animal divided by the weight gained)	2								●	●	
Policy to blacklist aquaculture farms with consistently high mortality rates	2			●		●	●	●	●	●	
Clear labelling of farmed seafood (shoppers can distinguish between farmed and wild-caught seafood)	1	●	●	●				●	●		●
Clear information regarding provenance of seafood including country of origin, production company and farm name	3 1 POINT FOR EACH; COUNTRY OF ORIGIN, AQUACULTURE FARM, AQUACULTURE COMPANY		●	●		●		●	●	●	●
Information provided on packaging regarding feed given to farmed seafood	2										
Signed up to Ocean Disclosure Project	1	●	●	●			●		●		●

1 1 POINT 2 2 POINTS 3 3 POINTS

TOTAL	3	4	8	3.5	11	4	5	15	5.5	7
TOTAL PERCENTAGE %	12%	16%	32%	14%	44%	16%	20%	60%	22%	28%

Man walking on by-catch of
Triggerfish at Mangalore port.
Changing Markets investigations
in 2019 found evidence that
Indian FMFO plants are supplying
multinational aquafeed companies,
including players based in Europe,
Canada and Japan.

3. THE SCORECARD

Indicators

To assess UK retailers, we developed a set of indicators that focus on two aspects of their business: first, how they set policies and criteria for sourcing farmed fish, and how transparent they are at a corporate level in terms of the farmed fish they source and who they work with in their supply chain; and second, how they market, position and sell different farmed seafood in-store, and how this compares with the marketing of non-farmed fish or more sustainable farmed fish options (see Box 7 on alternatives to current approaches to farmed fish production).

Below, we describe the indicators used, then explore how well retailers are meeting the standards we set out.

1. Corporate practice and policies

Supermarkets were scored on the basis of their willingness to engage with this research – and, by implication, with the wider aquaculture sustainability issues we are exploring.

One point: *One point for full engagement with our questionnaire; half a point for good engagement falling short of answering all questions.*

1.1. Policy on sustainable aquaculture feed

More than half the seafood we eat is farmed. A responsible retailer needs to clearly outline its principles for sourcing farmed seafood – and, in particular, how it will deal with the industry's current reliance on wild-caught fish.

Two points: *One point for mentioning sustainable feed within a wider policy on aquaculture; two points for a specific and developed set of policy goals on feed.*

1.2. Target to eliminate farmed fish fed on whole wild-caught fish

It is unsustainable to continue to use whole wild-caught fish for fed aquaculture. A retailer truly committed to the health of the oceans would recognise this, and establish a target with a specific timeline for phasing out wild-caught fish in aquaculture.

Two points: *One point for a target; two points for a set date to achieve the target.*

1.3. Named sustainable aquaculture champion

Appoint a senior staff member as a sustainable aquaculture 'champion' responsible for the sustainability of the aquaculture supply chain through sourcing policies, product development and marketing.

Two points: *One point for a named fish specialist; two points for a named aquaculture specialist.*

1.4. Investment in research and development of sustainable alternative feeds

Retailers should recognise that continuing to sell farmed fish that rely on external feed inputs requires investment in alternative and sustainable feeds (see Box 7). This should be more than a tokenistic measure; it should involve significant financial/resource investment, as well as a commitment to a life-cycle assessment approach to avoid unintended consequences.

One point.

2. Transparency and supply chain

2.1. Publish information on quantity of farmed fish sold, broken down by species

Certain aquaculture products are fed using a higher proportion of marine inputs; providing detailed sales information helps to assess the environmental impact of the aquaculture supply chain.

Two points: *One point for publishing details of the different types of farmed seafood sold; one point for publishing volumes of farmed seafood sold.*

2.2. Publish information on the wild fish used in aquaculture feed in their supply chain (including wild-fish species and source of origin)

Supermarkets should make their aquaculture supply chain transparent. This involves outlining what fish were used to produce the FMFO for their aquaculture products.

Two points: *One point for fisheries' origin of wild fish used in FMFO in aquaculture supply chain; one point for quantities used.*

2.3. Suppliers of farmed fish listed publicly on website (including information on feed suppliers), or providing this information when requested

Supermarkets should make their aquaculture supply chain transparent – outlining who supplies them, and who provides the feed for their aquaculture products, is an important part of providing transparent information to their customers.

Two points: *One point if information supplied directly to Feedback and Changing Markets; two points if information made publicly available on website.*

2.4. Provide information on the feed-conversion ratio (the weight of feed administered over the lifetime of an animal, divided by the weight gained) for top five aquaculture products sold (by volume)

The feed-conversion ratio is important information that shows how efficiently different products make use of feed ingredients, including marine ingredients. This information can act as a benchmark that is assessed over time. If the feed-conversion ratio is not significantly declining, this should act as an impetus for the supermarket to adapt its policies.

Two points *for providing feed-conversion ratio information for top five aquaculture products.*

2.5. Blacklist farms with a high mortality rate for farmed fish

The aquaculture industry has high mortality rates, with rates on some salmon farms in Scotland sometimes running as high as 20%.⁶² High mortality within farmed fish populations not only poses significant welfare concerns but is also an unjustifiable waste of feed ingredients used to nourish farmed fish. Supermarkets should monitor mortality rates and blacklist farms that consistently breach mortality targets.

Two points: *One point for demonstrating specific assessment criteria for farms related to mortalities; one point for action to blacklist farms based on mortality indicators.*

3. In-store practice

3.1. Clearly label farmed fish so that customers can distinguish between farmed and wild-caught fish

Retailers must enable their customers to make informed choices by providing clear information on the origins of farmed and wild-caught fish. This must be done in a meaningful way; it needs to go beyond providing information on the company website and translate to labelling on supermarket shelves.

One point *for clear, on-pack labelling that fish is farmed.*

3.2. Provide clear information regarding provenance

Customers should be able to tell, by looking at the pack, the provenance of the product – including country of origin and aquaculture company.

Three points: One point for labelling country of origin, one point for production company and one point for production/farm site.

3.3. Provide on-pack information on aquaculture feed used

To enable them to make an informed choice, customers should be able to access information on packs regarding the type of feed used to rear farmed seafood.

Two points.

3.4. Sign up to the Ocean Disclosure Project

Being a signatory to the Ocean Disclosure Project (ODP) indicates the retailer is willing to provide transparent information to customers and civil society regarding the fish they sell. Most retailers only report wild-caught fish for direct human consumption through the ODP; retailers should disclose information about both farmed and wild-caught fish products, including the wild-caught fish used for aquaculture feed.

One point.

Methodology

To develop this scorecard, evidence of action from the top 10 UK supermarkets was compared against a set of 14 criteria. These criteria were chosen to represent steps that a retailer, committed to the health of the oceans and to providing transparent information to their customers, should be taking in relation to their aquaculture products.

The analysis drew on three sources of information:

- 1. Direct engagement with retailers:** Retailers were sent a questionnaire to assess their policies and actions on aquafeed.
- 2. Desk-based research:** Research into publicly available information and data on supermarkets' websites and in the media.
- 3. 'Mystery shopper' visits:** Feedback and Changing Markets staff made a number of 'mystery shopper' visits to stores to gather information on how supermarkets are promoting seafood to customers and influencing their purchasing habits. These visits also assessed the level of information supermarkets provide at store level to their customers regarding farmed-seafood products.

The research was completed in January and February 2020. Supermarkets were given a minimum of two weeks to respond to the questionnaire. Tesco, Co-op, Morrisons, Lidl and M&S provided detailed responses, whereas ALDI, Iceland, Sainsbury's and Waitrose provided short responses. Asda failed to respond at all.

Companies frequently cited commercial sensitivity as a reason for not engaging with requests for transparency on sustainability issues. However, information that some retailers regarded as sensitive was readily provided by others, suggesting commercial sensitivity is simply being used as a pretext.

How the supermarkets performed

No retailer had a clear target for reducing – and ultimately eliminating – whole wild-caught fish in feed. Even top-scorer Tesco achieved a middling 60%, making it clear that UK supermarkets still have a long way to go to ensure their aquaculture supply chains do not harm fish in the wild.



ALDI focuses on certification of its seafood products as a proxy for sustainable supply chains. It has been ranked number one in the MSC League Table for having the highest percentage of MSC-certified wild-caught products, which garnered the company significant positive publicity in 2018.⁶³ However, for a supermarket which describes itself as 'committed to the sustainability of the world's oceans',⁶⁴ ALDI's approach to farmed seafood is weak. At the corporate level, there is a lack of meaningful engagement on the aquafeed issue: There is no senior staff member responsible for seafood or aquaculture, and the company declined to respond to our questionnaire. Its corporate policy on fish and seafood includes some recommendations for fish feed ('Fish feed contains no "endangered" or "critically endangered" seafood species'),⁶⁵ but – unlike other aspects of its policy – these are not binding requirements and do not go far enough. We encourage ALDI to develop robust and binding requirements, to be included in a detailed aquaculture policy.

In its short response to us, ALDI stated: 'The use of wild-caught raw material as marine ingredients in fishmeal is becoming progressively more efficient as novel ingredients are gaining more traction as sustainable additions to the feed basket, which is alleviating pressures on wild fish stocks.' However, without information to substantiate that claim and serve as a benchmark for its own supply chain, ALDI displays a passive attitude to this issue, and we could not accurately assess the company's progress.

We are concerned about the following statement from ALDI: 'Most remaining wild-caught fish used in fishmeal and oil would not typically be fished in significant quantities for human consumption and are sustainably and responsibly fished.' This is not borne out by recent evidence from production countries (see Chapter 2).

ALDI scored a point for signing up to the ODP, but needs to extend the information it discloses to include farmed seafood and wild-caught species used in feed. At the store level, ALDI also scored a point for clear labelling of which fish was farmed.

Iceland



Iceland was one of the few retailers to provide us with transparent information regarding the quantities of farmed fish it sells, including their certification status. It is not a signatory to the ODP, but it provides information on source fishing and farming areas on its website; we encourage Iceland to extend this to the wild fish used in feed for its aquaculture products.

Iceland informed us: *'We are in the process of commissioning an updated Fish and Seafood Sustainability Policy for suppliers, which will cover feed for farmed fish.'* This document should be developed by late spring/early summer, and we look forward to reviewing it.⁹ A step in the right direction would be to delegate aquaculture sustainability to a senior member of staff.

At the store level, Iceland lost points for not making it clear which fish was farmed and which was wild. This information is available on its website but, for it to be accessible to customers, it needs to be reflected on packaging.



Asda did not respond to our survey. Its seafood policy states: *'We are working with our suppliers on reducing the impacts of aquaculture systems especially environmental and those related to diet ingredients'*⁶⁶ however, no explanation is provided as to what this entails.

Regarding transparency, Asda is the only retailer to disclose information on its farmed fish supply chain through the ODP. It is encouraging that the retailer also plans to publish all seafood sourcing – including indirect sourcing, such as aquaculture diets – through the ODP.⁶⁷

At the store level, Asda scored points for differentiating between wild and farmed products, and for providing information regarding provenance.



In its questionnaire response, **Morrison's** supplied basic information on farmed species and their country of origin, but lost points for a lack of transparency regarding its suppliers, citing *'commercial sensitivity'*.

Through the ODP, Morrison's has provided information on its wild-caught fish, but needs to extend the data it discloses to include farmed seafood and wild-caught species used in feed.⁶⁸ Like other retailers, Morrison's relies on certification as a proxy for sustainable seafood supply chains. The retailer forfeited a point for not having a member of staff specifically designated to oversee its aquaculture supply chains. Morrison's has not been directly involved in the development of alternative feeds, but plans to investigate this in 2020.

At the store level, Morrison's lost points for not clearly differentiating between farmed and wild products, and for not providing clear information on country of origin.

Sainsbury's



Sainsbury's told us that it was *'unable to provide specific supplier and commercial information for business sensitive reasons'*. The company is not a signatory to the ODP and, like other retailers, relies on certification as a proxy for sustainable supply chains.

Sainsbury's policy on prawns⁶⁹ recognises the need to develop targets and monitor the feed-conversion ratio. However, this policy needs to apply to all aquaculture products, including the most commonly stocked farmed seafood, salmon.

Sainsbury's scored a point for investing in sustainable alternative ingredients. The retailer has a dedicated Aquaculture and Fisheries Manager, who appears to engage frequently with the aquaculture industry. However, we were disappointed with Sainsbury's engagement with us on this issue; notably, it was one of the few retailers that failed to complete the questionnaire. This is particularly disappointing in the context of Sainsbury's recently committing – to great public fanfare – to reduce the impact of its business on the environment.⁷⁰

At the store level, points were gained for providing some level of transparency regarding provenance of aquaculture products.

Waitrose



Like other retailers, **Waitrose** is heavily reliant on certification as a proxy for sustainable seafood supply chains. It is not a signatory to the ODP, and demonstrates limited transparency overall, failing to disclose to us information on any aspect of its farmed fish supply chains and claiming that the information requested was *'commercially sensitive'*.

Waitrose scored points for having a farmed-fish feed policy. However, the policy lacks substance. Waitrose must recognise the need to go beyond certification and incorporate a goal to eliminate wild-caught fish from feed into its policy.

Waitrose scored points for its investment in sustainable alternative feeds, as it is taking part in two EU projects focused on the development of alternative proteins. Points were forfeited for a lack of transparency regarding its aquaculture supply chain.

At the store level, wild fish was clearly labelled as such but it was difficult to tell what fish was farmed.



Lidl scored a point for providing information on the suppliers of its farmed fish and seafood. It forfeited two points for not having a designated aquaculture champion. Like other retailers, Lidl relies heavily on third-party certification as a proxy for sustainable seafood supply chains; it needs to go beyond this to ensure the sustainability of its aquaculture products. It provides information on its wild-caught fish to the ODP, but needs to extend the data it discloses to include farmed seafood and wild-caught species used in feed.

At the store level, Lidl scored points for differentiating clearly between wild and farmed products and for providing some information on the country of origin and, in some cases, the identity of the supplier.

D Iceland has previously taken on criticism from NGOs – for example, it came bottom in Feedback's sustainable meat scorecard – but it has since become a supporter of the Cerrado Manifesto and developed a soy policy.



32%

Co-op engages with the aquaculture industry but, like many other retailers, is heavily reliant on certification as a proxy for sustainable supply chains. However, Co-op appears to recognise the need to go beyond certification; it launched a Scottish Salmon Farming Group in 2017, which aims to 'build more strategic, long-term relationships with its Scottish suppliers whilst also focusing on best practice and performance, in support of its new Salmon farming standard.'⁷¹ Co-op also stated it has a feed risk-assessment tool that holistically evaluates existing and novel feed ingredients.

At the store level, it was easy to tell what fish was farmed and what was wild. It also scores a point for being a signatory to the ODP, but needs to extend the information it discloses to include farmed seafood and wild-caught species used in feed.⁷²



44%

M&S scored points for having its own code of practice for aquafeed, which went beyond relying on external certification.⁷³ It also supplied detailed information on its suppliers, volumes and country of origin of farmed fish and seafood, as well as data on the percentage of FMFO used in aquafeed for different farmed species and information on the 'primary marine ingredients' (fish) used to produce the FMFO. Furthermore, the retailer is actively investing and researching alternative feeds.

However, it has sent mixed messages concerning the need to remove wild-caught fish from aquafeed. M&S has previously spoken out against the ASC standard for asking the retailer to reduce the amount of fish oil in its products, arguing that this would reduce Omega 3 levels⁷⁴ and that fish oil comes from fisheries certified as sustainable. However, it also claims to 'support the standards' aim of reducing the use of forage fish in salmon feeds, and will only use oil and meal from fisheries which have been certified by a third party as sustainable.⁷⁵ It is concerning that, on its website, it emphasises that all its 'conventionally farmed salmon' is reared on dedicated farms which ensure that 'fish were reared on an aquafeed diet unique to M&S, formulated for high Omega-3 levels'⁷⁶ as this suggests that it contains high marine ingredient levels. M&S should also develop a clear target for reducing – and ultimately eliminating – whole wild-caught fish in feed.

At the store level, points were lost for unclear marketing regarding whether fish is farmed or wild. Moreover, although M&S has publicly commented that it is phasing out its misleading Lochmuir 'fake loch' brand, more efforts are needed to ensure the transparency it provides on its website extends to its shelves.



60%

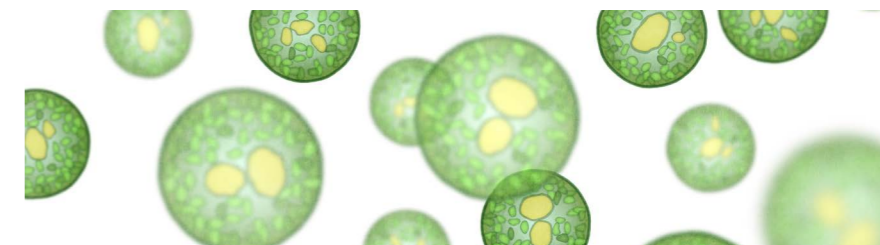
Tesco supplied the most detail of all retailers in its questionnaire response. It provided a breakdown of data on volumes of farmed fish species sold, as well as its aquaculture supplier names, and was the only retailer to provide 'Fish in, Fish Out' calculations (similar to feed-conversion ratios but focused on marine ingredients in feed) for its top five aquaculture products. Tesco is a signatory to the ODP, where it shares information on its wild-caught species; it told us it plans to share data on its farmed species in quarter 1 of 2020 (this information was not online at the time of this report's publication).

Tesco pointed us towards its aquafeed suppliers' ODP entries and one annual report⁷⁷

for information on the origin of wild fish used in its farmed-salmon supply chain, which provides limited clarity on its aquafeed supply chain for one farmed species it sells. In future, the retailer should report this information, as well as data on feed ingredients for other farmed species (not just salmon) in its own ODP disclosure. Tesco should also develop a clear target for reducing – and ultimately eliminating – whole wild-caught fish in feed.

Tesco shows an understanding of the need to go beyond certification to ensure the sustainability of its aquaculture supply chain. It is encouraging to see that it is developing farmed-salmon standards, which will include targets to reduce the amount of wild-caught fish fed to the salmon it sources. Points were also gained for its support of the research and development of alternative feeds, including algal oil and insect protein.

At the store level, points were gained for displaying which fish was wild and which was farmed.



BOX 7: What's the alternative?

It is important to explore sustainable alternatives to feeding farmed seafood a diet containing wild-caught fish. There are two approaches to this challenge. The first is to replace FMFO in current feed with alternative feed ingredients; for example, those made from plants. The second is to promote the aquaculture of species that do not require marine ingredients in their feed, such as mussels, clams and oysters.

On the first approach, there are signs of progress. Supermarkets in the European Union, such as Auchan⁷⁸ and Kaufland,⁷⁹ are already selling farmed fish products that are fed using algal oil. These can be produced to contain the levels of micronutrients (such as Omega-3s) required to produce highly nutritious seafood. However, full life-cycle assessments are not yet available to demonstrate that alternative feeds, such as algal oil, can replace FMFO in farmed fish diets without imposing other environmental burdens, such as high energy use. Further research is needed to validate their use.

On the second approach, rather than promoting existing popular farmed fish, which are highly reliant on wild marine ingredients, supermarkets could raise consumer awareness of the health and environmental benefits of eating more mussels or clams. Mussels, in particular, are very high in Omega-3 and vitamin B-12⁸⁰ – both essential micronutrients in the human diet. They do not require external feed inputs, instead feeding off minerals and nutrients in the surrounding water. Alongside carefully selected, sustainably fished wild seafood, unfed aquaculture could provide a solution to the problem of delivering high-quality micronutrients, which are vital for human health, within a sustainable diet.



In France, Auchan has begun selling farmed trout fed on insects.

4. CONCLUSION

This report has explored how well UK supermarkets are addressing the sustainability challenges presented by the supply chains of the farmed fish they sell. It concludes that they are falling far short of the level of ambition required for responsible ocean stewardship.

Key findings

- No retailer currently has a time-bound target to eliminate farmed seafood fed on wild-caught fish. Without this, the future of aquaculture supply chains cannot be assured.
- There were large discrepancies between the level of information supermarkets were willing to provide. Tesco, Co-op, Morrisons, Lidl and M&S provided detailed responses, whereas ALDI, Iceland, Sainsbury's and Waitrose provided short responses. Asda failed to respond at all.
- Some supermarkets – including Tesco, Waitrose, M&S and Sainsbury's – are investing financial capital, or time and resources, in sustainable alternative feed ingredients. This is a promising step in the right direction, but supermarkets must ensure a rigorous life-cycle approach is adopted to assess the sustainability of any alternative feed ingredient.
- At the store level, our investigations highlighted that salmon is heavily marketed to customers. In every store we visited, the variety of salmon products on offer far outweighed the variety of other seafood products, and salmon products were almost always prominently placed at eye level on shelves.
- Also at the store level, there was a lack of accessible information for customers regarding methods of production and provenance. In many cases, it was not easy to tell whether the fish was farmed, but wild-caught fish was clearly labelled as such.
- Stocking and marketing sustainable alternatives to farmed seafood fed on wild marine ingredients is a key step towards shaping consumer tastes in the right direction. While some retailers stocked a broader range of seafood than others, none provided a range of alternatives to rival the dominance of farmed products, such as salmon and prawns.

5. RECOMMENDATIONS

Retailers

A retailer with deep and serious commitments to ocean health should demonstrate this by taking the following urgent action:

- To ensure that natural limits on wild-fish populations are not exceeded, commit to completely phasing out the use of FMFO sourced from wild-caught fish in its aquaculture supply chain, including setting a date to achieve this target of no later than 2025.
- Commit to offering a wide range of seafood – including a greater diversity of sustainably caught wild fish, and aquaculture products produced without the use of FMFO – that can deliver the same key nutrients as mass-marketed farmed seafood, such as salmon, sea bass and prawns.
- Adopt high standards of transparency and corporate policy on their suppliers, including full disclosure of suppliers – from source fisheries upwards.
- Reduce reliance on certification as a proxy for sustainability by developing their own robust and transparent standards for sustainably produced seafood, including farmed seafood.

The current extractive model of fish farming – which commodifies wild fish for use in animal and aquaculture feed – is undermining the promise of aquaculture, and driving overfishing and inequitable



Dead fish dumped on Sanyang beach, The Gambia (Changing Markets investigations 2019)
© Tim Webster/Reelmedia Film

access to key nutrients. What happens now to guide the development of this industry will have serious and long-term implications for the health of the oceans and global food systems. It is therefore vital that supermarkets play their role responsibly, by making their supply chains fully transparent to their customers and promoting a rapid shift towards more sustainable alternatives.

Customers

Customers' decisions about which products they buy are heavily influenced by the marketing, labelling and options provided by retailers. Customers also expect high standards from their retailers to make it easier for them to make the sustainable choice. However, shoppers could help shift supermarkets in the right direction by taking the following actions:

- Diversify their consumption of seafood to include a wider range of sustainably fished wild species, as well as farmed species (such as mussels) that do not rely on feed containing FMFO.
- Stop buying farmed salmon and prawns until products are available that incorporate sustainable alternatives to wild marine ingredients.
- Show companies they care by contacting retailers requesting higher standards on farmed seafood.
- Sign our petition at [fishingthefeed.com](https://www.fishingthefeed.com)

It is time for UK retailers to show that their commitments to safeguarding the health of the world's oceans for future generations are not just window dressing. We expect them to take meaningful action to ensure marine life and wellbeing are respected *throughout* their supply chain – including in the diets of the farmed fish they sell.

Interior of an FMFO factory in Ullal, Karnataka (Changing Markets investigations 2019)



6. COMPANY POLICIES AND INFORMATION USED IN OUR RESEARCH

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Volume Sales in tonnes		Source	Notes				
For 52 weeks to 15.06.2019							
Salmon and trout	66,810	Seafish 2019a					
Prawns	23,954	Seafish 2019a					
Seabass and seabream	5,312	Seafish 2019a					
Basa	7,382	Seafish 2019a					
Total	103,458						
Wild-fish required for salmon and trout							
Total amount of wild-caught fish needed to produce fish oil used in total Scottish salmon production in 2014	460,625	Feedback 2019					
Scottish salmon production 2014	179,022	Marine Scotland 2018					
Salmon / trout volume sales UK 2019	66,810	Seafish 2019	Since there has been no significant change in FFDR ratios since 2014 - When the industry provides updated figures on feed volumes the calculations can be adjusted				
UK volume sales as % of total production	37%	Calculation					
Total amount of wild-caught fish used in salmon and trout sold in the UK on the basis of the fish oil in salmon and trout feed	171,903	Calculation					
Fish meal yield	22.50%	IFFO 2017					
Total amount of fishmeal available from wild-caught fish	38,678	Calculation					
Total amount of fishmeal needed in salmon production 2014	55,000	Shepherd et al. 2017					
Amount of fishmeal needed for salmon and trout sold in the UK (37% of total)	20,526	Calculation					
Left-over fishmeal not needed for salmon production	18,152	Calculation					
Wild-fish required for sea-bass and sea bream							
Amount of seabass and seabream sold in the UK	5,312	Seafish 2019a	Seabass				
Total amount of feed used with an FCR of 2	10,624	Calculation based on information from Seafish 2019b	Fishmeal	15%	20%	17.5%	Seafish 2019b
Total amount of fishmeal used in feed	1,859	Calculation based on information from Seafish 2019b	Fish Oil	02%	5%	3.5%	Seafish 2019b
Total amount of fish oil used in feed	372	Calculation based on information from Seafish 2019b	Feed Conversion Ratio	2			
Proportion of marine ingredient from wild-caught (as opposed to trimmings)	67%	IFFO 2017					
Total amount of fish oil for seabass/bream from wild	249.13	Calculation	Seabream	exactly same as seabass			Seafish 2019c
Fish oil yield	4.80%	IFFO 2017					
Wild-caught fish for fish oil for seabass and bream	5,190.27	Calculation					
Total amount of wild-caught fish for fish oil for salmon, trout, seabass and seabream	177,093.27	Calculation					
Leftover fishmeal used for prawn and basa production							
Fishmeal required for prawn production							
Prawn sales UK 2019	23,954	Seafish 2019a	Global aquaculture prawn production 2012			4,000,000	Anderson JL, Valderrama D, Jory D 2016
Volume of fishmeal needed for this	5,989	Calculation	Global fishmeal used in prawn feed 2012			1,000,000	Malcorps et al., 2019
			Amount of prawn that can be produced per tonne of fishmeal			4	Calculation
Fishmeal required for basa production							
Basa sales UK 2019	7,382	Seafish 2019a					
Volume of fishmeal needed for this	517	Calculation					
Total spare fishmeal in our model							
Fishmeal leftover from salmon, trout, seabass seabream minus fishmeal needed for prawn and basa	15,776						
		Calculation					
Fishmeal required for basa/Pangasius production							
Pangasius sold in UK	7,382	Seafish 2019a	Basa FCR		1.4	Fry et al., 2018	
Total feed used	10,335	Calculation	Basa fishmeal in diet		5%	Seafish 2019d	
Fishmeal used	516.74	Calculation	Basa fish oil in diet		0%	Seafish 2019d	



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