ALASKA HERRING MARKET RECOVERY PROJECT

By Alaska Seafood Marketing Institute

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ALASKA SEAFOOD®

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FOREWORD

Alaska Herring Market Recovery Project

The Alaska Herring Market Recovery Project report is an in-depth study, funded by the State of Alaska through the Alaska Seafood Marketing Institute. The report is needed to bring a new perspective to an old business that is stuck in the 1980s. It is hoped that this report will propagate new market strategies to bring prosperity to an iconic Alaskan fishery.

Modern Alaska herring fisheries were developed in the 1970s to meet the demands of a burgeoning Japanese herring egg market that increased in demand into the 1980s. Driven by ancient traditions for gift-packed herring egg skeins, Japanese fish buyers and importers offered Alaskan fishermen crazy amounts of money for spawn ripe herring.

Industrial herring fishing first came to Alaska in 1882 when a failing whaling station at Killisnoo in Southeast Alaska converted its operations to herring reduction. Over the next 20 years, herring reduction plants sprang up along the Gulf of Alaska from Craig to Kodiak and peaked in 1946 when over 14,000 tons of meal and 3.7M gallons of oil were produced. From the 1920s through the 1950s, overall harvests varied from yearly lows of 20,000 tons to a high of 138,000 tons in 1937 (113,400 mt). Annual harvest dominance was split between SE Alaska and Kodiak as resource, market demands, and management changed through the years. Through the 1950s, state-wide harvest dropped due to lower-cost Peruvian fisheries and large Russian harvests severely impacting markets and causing Alaska's herring reduction fisheries to decline until the last Alaska reduction plant closed in 1966.

Around 1900, new markets for local bait needs and human consumption developed, however the bait fishery's harvest of only a few thousand tons has never been much consequence to the fishery as a whole. During these same times, the production of salt-cured herring for food markets was quite significant with some yearly volumes approaching 10M pounds. As with the rest of the Alaska Herring products, in the Late 40's and early 50s, production for human consumption virtually vanished due to increased costs and market fluctuations.

Today's primary market for Alaska's herring emerged about 1970 when a burgeoning, post-WWII middle-class in Japan, willing to pay high prices for kazunoko, (salt-cured herring eggs) became Alaska's most valuable seafood product. Then in 1988, the Japanese economy began a steep decline. At this, the elder population who revered Kazunoko as a traditional food lost their appetite for expensive, gift-packed Kazunoko products, and ex-vessel prices in Alaska fell from the high of $2000/ton in 1988 to $200/ton or less in 2001. Since then the price for Alaska's sac roe herring harvest has never recovered.

Today, Alaskan herring populations are strong across their range and remarkably, there is a dominant year class of herring - YC-2016 - that has spiked herring populations to levels never seen in modern times so that today, the volume of harvestable herring far exceeds demand.

In the harvest year of 2022, the two biggest herring fisheries in the state caught just a small portion of the intended harvest levels. The Sitka Sound fishery harvested 25,500 tons or just 56% of the 46,164-ton GHL (guide line harvest) . The much larger Togiak fishery, with a total allowable harvest (seine and gillnet) of over 65,000 tons, was harvested at a much smaller percentage closer to 20%. (With only two processing companies buying herring from the Togiak fishery, actual harvest numbers are considered confidential due to low buyer participation)

Faced with today's abundant resources, and a very limited and continually declining market, the Alaska Herring Market Recovery Project commissioned this report to discover and report on the fisheries, products, and markets and consumers of the massive herring fisheries of the North Atlantic that dominate the market. Worldwide, over 3M tons of herring are harvested and sold for oil, meal, and human consumption.

It is hoped that this project will educate and stimulate industry to diversify Alaska's herring fisheries beyond the present limits of the stagnant Japanese roe market. New, Wild Alaska Herring products are needed to benefit the economies of Alaska's communities that rely on local resources, fishermen, processors, and for the tax base that commercial herring harvest provides all Alaskans.

Scott McAllister

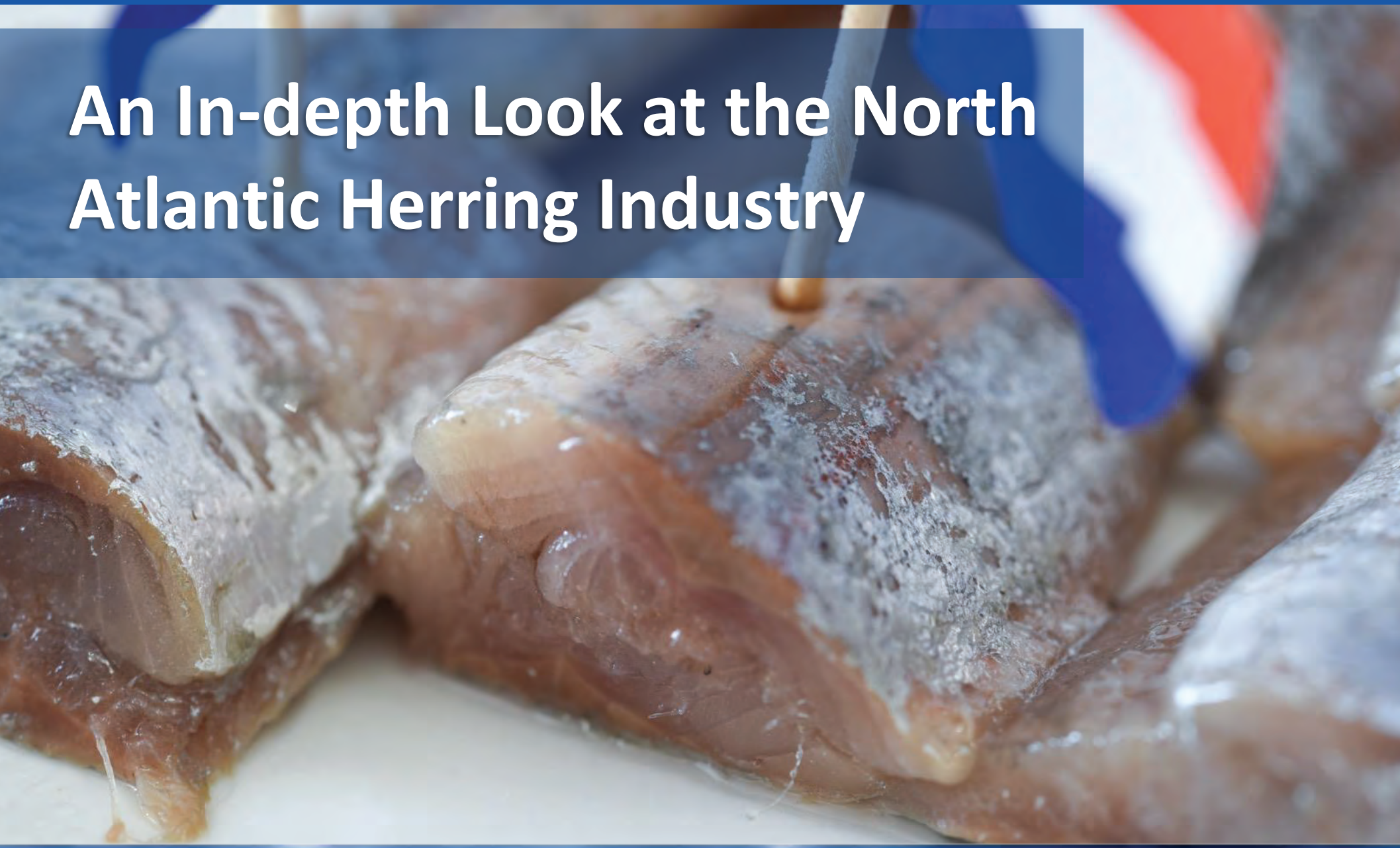
Bruce Schactler

Bruce and Scott are both herring fishermen and have fished all across Alaska for 40 years.

Both men have worked closely with the Brickyard Association to help with scientic study of the herring fisheries.

Bruce Schactler is captain of the F/V Natalia fishing vessel and Scott McAllister is captain of the F/V Owyhee fishing vessel.

An In-depth Look at the North Atlantic Herring Industry



Final Deliverable – September 2022

BRICKYARD ASSOCIATES Spheric

ASM001 European Herring Market Final 2022-09 v5

Contents

”The trouble is, herring is perceived as cheap.”

- *UK exporter*

Project Objectives, Scope and Approach

Project Background

The Alaska Seafood Marketing Institute (ASMI) would like to acquire a deep understanding of the northern Atlantic herring industry with a view to maximizing revenue from its own herring fishery. The study should investigate the following issues:

- Supply and demand dynamics
- Variance in fish size, oil content and how this affects prices and markets
- The herring roe market
- Pricing and outlook
- Markets in Europe, Africa, Russia

The primary business goals of the exploration research were:

- Explore the needs (including meat specifications) of herring buyers in European and some African markets
- Provide some preliminary recommendations for forward looking work on branding and marketing herring in new markets

Project Scope – Key Questions

- Who are the key actors in the northern Atlantic herring industry
- What are the supply and demand dynamics?
- When does herring go to European markets, get made into flaps/filets, or get sold to fishmeal plants?
- How does oil content and fish size affect this market behavior?
- What are the meat specifications required by European canneries?
- What specifications are buyers in West Africa looking for?
- What is the outlook for herring roe and where is it sold? What will happen to that market once there is a regular supply of capelin roe?

Approach

- Spheric Research and Brickyard Associates collaborated to draft an Interview questionnaire at the project outset to guide the external expert interviews
- We engaged with 18 herring subject matter industry experts/buyers through 60-minute interviews during the project

Conferences + Trade Shows

- Some of the research was conducted at key seafood events. We attended:

1. North America Seafood Expo in Boston
2. Global Seafood Expo in Barcelona
3. Fish for Waste Conference – Reykjavik, Iceland
4. North Atlantic Seafood Forum – Bergen, Norway

Secondary Research

- Spheric Research and Brickyard Associates conducted selective secondary research on the market and competitive landscape

Executive Summary: Key Findings (1/3)

"In the UK, the market is not huge and it's a real struggle to get people to eat herring. But 100 years ago, even when I was a boy in the 1950s, everybody ate a herring. They would have a herring once a week. It's a really nutritious food."

- *UK processor and exporter*

Herring Industry Overview

- The North Atlantic herring industry is **centuries old,** and its history is entwined with the economic development of several Nordic countries since the Middle Ages

- Today's European pelagic industry bears little resemblance to early ancestors or even the fishing fleet of two decades ago. The industry has consolidated into a handful of major actors operating **state-of-the-art, 70-meter trawlers using refrigerated seawater (RSW)** to bring back fish fresh

- Optimization is at the heart of today's pelagic industry. About 250 medium and large pelagic vessels in northern Atlantic waters catch four major species — mackerel, herring, capelin and blue whiting. The combination of each species, with their complementary seasonality, **is what allows both fishing companies and processors to achieve profitability**

- Roe has become a significant derivative market for some pelagic fishing companies and processors. Capelin roe has become a desirable ingredient for sushi. A **collapse in the Icelandic capelin industry in 2020 opened the door to substitute herring roe**, but Iceland announced a big total allowable catch (TAC) for capelin in 2022.

Executive Summary: Key Findings (2/3)

Herring Industry Overview

- Different **markets pay premium prices for herring with exacting specifications** — Dutch maatjes in June with 14% fat content from the North Sea, for instance. Other secondary processors demand tolerance levels for fat, format and size based on their process and end customer requirements, which vary by country. At the bottom of the pyramid are the lowest paying markets: whole frozen fish going to Russia and Ukraine, or Africa. And fish in sub-optimal condition — for reduction into fishmeal and fish oil.

- **About 40% of the Atlanto-Scandic herring resource goes to the European Union**. But the customer base leans toward the elderly, and attrition is a significant challenge. The industry has been losing customers for decades to convenience (boneless) proteins like chicken. Some efforts to bring in younger users have been successful, but the premium market is reliant on Europe's poor and elderly.

- Russia's invasion of Ukraine will likely lead to an extensive economic slump in both countries and consumers will likely favor cheap herring protein. The industry also has an abundant customer base in Africa, but these countries are **highly price sensitive.** Currency depreciation in **countries like Nigeria has seen a transition to blue whiting**, a fish that has historically gone into salmon feed. Relatively wealthier countries like Egypt have become a target for herring sellers.

Executive Summary: Key Findings (3/3)

Opportunities and Challenges

- The highest paying consumers in today's seafood industry are those buying **sustainability certified products in developed countries** that come in appealing preparations and convenience formats.
- The industry has several significant advantages. There **is resurgent demand for healthy, omega-3 rich seafood** since the Covid pandemic and a desire to consume locally-sourced food.
- On the flipside, **the industry has an unresolved major issue** with the **loss of its MSC certification** due to overfishing. At the root cause of this is climate change, and countries that have seen their territorial fish populations migrating north attempting to cling onto historical quotas.
- The loss of sustainability certification for large volumes of pelagic fish sold in Europe has been overwhelming for Northern European retailers who insist on **certified seafood, and they have bent their own rules** for now. But the enforcement of a 'no exceptions' rule would deprive the industry of one of its most profitable markets.
- Regardless of how the loss of certification is managed, the fact the conflict exists places pressure on stakeholder **governments to limit total allowable catch** (TAC) quotas.
- This presents an opportunity for pelagic fisheries from other continents, especially those with sustainability certified industries, to win market share in Europe and some of the other associated markets.
- Europe's processors and **canneries are hungry for raw material**, especially in off season periods.

Experts interviewed

Expert	Country	Position/Company	Experience	Years of Experience
1	**UK / Scotland**	Owner of herring processing firm	More that 30 years of experience in the herring industry. Owned seafood secondary processing firm that produces herring-based products	35
2	**Denmark**	Former owner of herring processing firm	Involved in the Danish herring industry with 40 years of experience working as an independent producer. Owner of a herring processing plant	40+
3	**Norway**	Sales Manager at seafood exporting firm	Experienced seafood sales manager. Worked at various Norwegian seafood associations/firms related to pelagic fishing operations	20
4	**UK**	Quality staff at fish processing firm	4 years of experience working in Quality at one of Europe's largest processor of pelagic fish.	10

Experts interviewed

Expert	Country	Position/Company	Experience	Years of Experience
5	**Denmark**	Executive of a pelagic fish producers' organization	An executive with more than 10 years of experience in fisheries and natural resource management.	10+
6	**Iceland**	Executive of Icelandic fishing and fish processing co.	Icelandic seafood executive, overseeing integrated assets in both fishing and pelagic processing	30+
7	**Norway**	Executive at pelagic sales association	Norwegian fishing industry expert with knowledge in the global pelagic fishing industry. Familiar with implementation of the environmental certification of Norwegian mackerel and herring fisheries	40
8	**Norway**	Executive at Herring Exporter	Feed operations experts at one of the main herring exporters in Norway	10

Experts interviewed

Expert	Country	Position/Company	Experience	Years of Experience
9	**UK**	A Science Advisor at Fishing Organization	Experienced seafood executive with a background in scientific studies on fisheries and marine environment. Held positions such as researcher and advisor in different fisheries-focused organizations	20+
10	**UK**	Journalist at Seafood specialized media	Journalist with more than 10 years of experience covering the European seafood market. Particularly knowledgeable about the pelagic fish industry in Northern Europe, herring being one of the mostly covered species among others.	10+
11	**Ghana**	Managing director at fish importer	Ghana expert with experience in whitefish aquaculture and fish distribution in West Africa. Currently specialized in seafood distribution networks in the región, and cold storage facilities	15+
12	**UK**	Sales agent at large pelagic processing firm	Experienced sales agent with a long track record in the fishery industry	10

Experts interviewed

Expert	Country	Position/Company	Experience	Years of Experience
13	**Poland**	Marketing professional at large secondary processing	Experienced marketing professional at Lisner, Polish manufacturer of herring products. Specialized in both trade marketing and portfolio management. Responsible of creating marketing strategies for the company herring brands.	5+
14	**Poland**	Former Executive at large secondary processor	Former Executive with more than 20 years of experience in the food processing business. Held senior executive positions in two large herring processing companies in Poland.	25+
15	**Europe**	Executive at seafood certification company	More than 20 years of experience exclusively in the seafood industry in northwest Europe. Specialized in sustainability and environmental impact in fisheries.	25+
16	**Poland**	Buyer at fish canning company	Experienced professional who has held a buyer role at several seafood processing companies in Poland	5+

Experts interviewed

Expert	Country	Position/Company	Experience	Years of Experience
17	**Baltic Region**	Sales director, canning company	Expert has held sales and marketing roles in Baltic seafood companies for two decades, including 10+ years at one of Europe's largest canneries	20
18	**Nigeria**	Consultant and former director of fisheries in West Africa	Expert was director of fisheries and oversaw key policies such as mandating that all fish importers must develop aquaculture farms to win licenses to import pelagic fish. Now a recognized consultant and member of World Aquaculture Society	10+

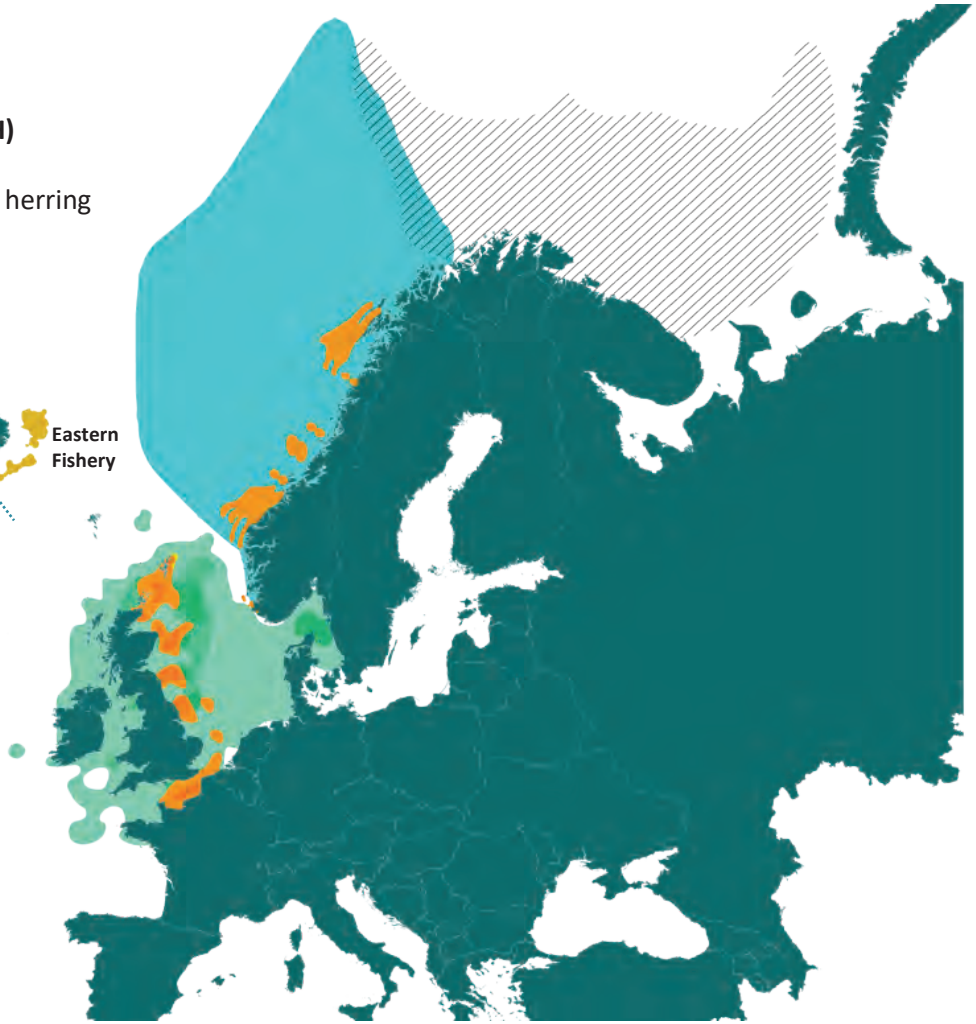
There are two major populations of herring, the Norwegian Spring Spawning Herring (“NSSH”) and the North Sea Herring (“NSH”)

Norwegian Spring Spawning Herring (NSSH)

- Aka “NVG”
- Aka Atlanto-Scandian herring

Any herring

North Sea Herring (NSH)



Norway

- Maturity/growth area
- Fishing zone
- Spawning

North Sea

- Fishing zone
- Spawning

Iceland

- Fishing zone (Western fishery)
- Fishing zone (Eastern fishery)

Spawning time relative to best catch period varies for Norwegian Spring Spawning Herring and North Sea Herring

Norwegian spring spawning herring **spawns between February and March** and is at its best in the autumn

North Sea herring **spawns from August to January**. The premium catch period of the North Sea herring is in the summer, when it migrates close to the Norwegian coastline

Fishing areas for NSSH (Norwegian landings)

Fishing areas for NSH (Norwegian landings)

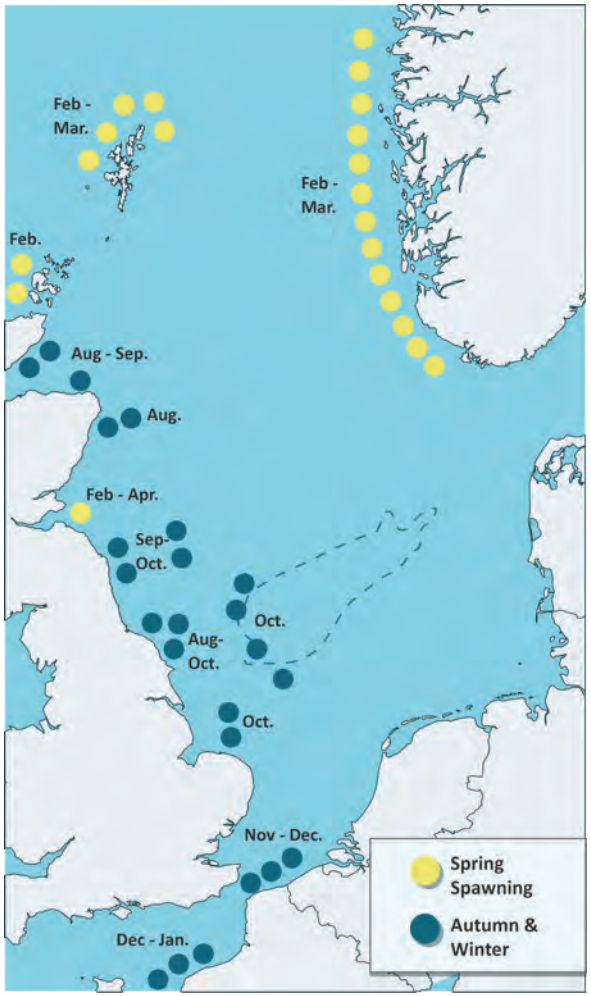
Source: Norwegian Seafood Council

Norwegian Spring Spawning Herring spawning is usually Feb-Mar whereas North Sea Herring spawning times get later as spawning locations are more southerly

These differences exist despite the fact that all populations have overlapping feeding grounds

Oceanic Spawners

- **Greenland:** Small numbers on the W and E coast and in the Denmark Strait, spawning in Aug & Sep Iceland: Spring spawners in the Selvogsbanki area, off the SW coast; summer spawners in the same area, further W at Faxafloi and south-east at Horna Fjord.
- **Faroes:** Spring spawners (Mar & Apr) to the S & SE of the Faroe Islands
- **Hiberno-Caledonian**: Spring and summer spawners in the Minch and on the continental shelf W of the Hebrides; also possibly near the Flannan Isle.
- Shetlands, Orkneys and the Scottish coast: Spring spawners to the N and W of the Shetlands, to the W & E of the Orkneys, off the coasts of Sutherland and Caithness, Fife Ness and Berwick.
- **Northern North Sea Plateau:** Some spring spawners on the NE edge of the plateau and on the W edge of the Norwegian Rinne.
- **Norway:** Off the SW coast between Egersund and Bergen and between Stadt and Kristiansund (the Norwegian spring herring); off Lofoten and Vesterålen on the N coast (the Murman spring herring).



North Sea Spawners

- Buchan: Northern North Sea summer and autumn spawners with grounds off Copinsay in Orkney, in the Moray Firth and on the Turbot, Aberdeen, Montrose and Berwick Banks.
- Dogger: The autumn spawning stock on the Dogger Bank has collapsed. Other grounds for this group lie off Whitby and Scarborough, off the Humber, the Wash and the NE east coast of Norfolk.
- Downs: Winter spawners, also referred to as Channel or Southern Bight herring, from the Gabbard Light Vessel of the East Anglian coast to Pointe d'Ailly to the west of Dieppe.

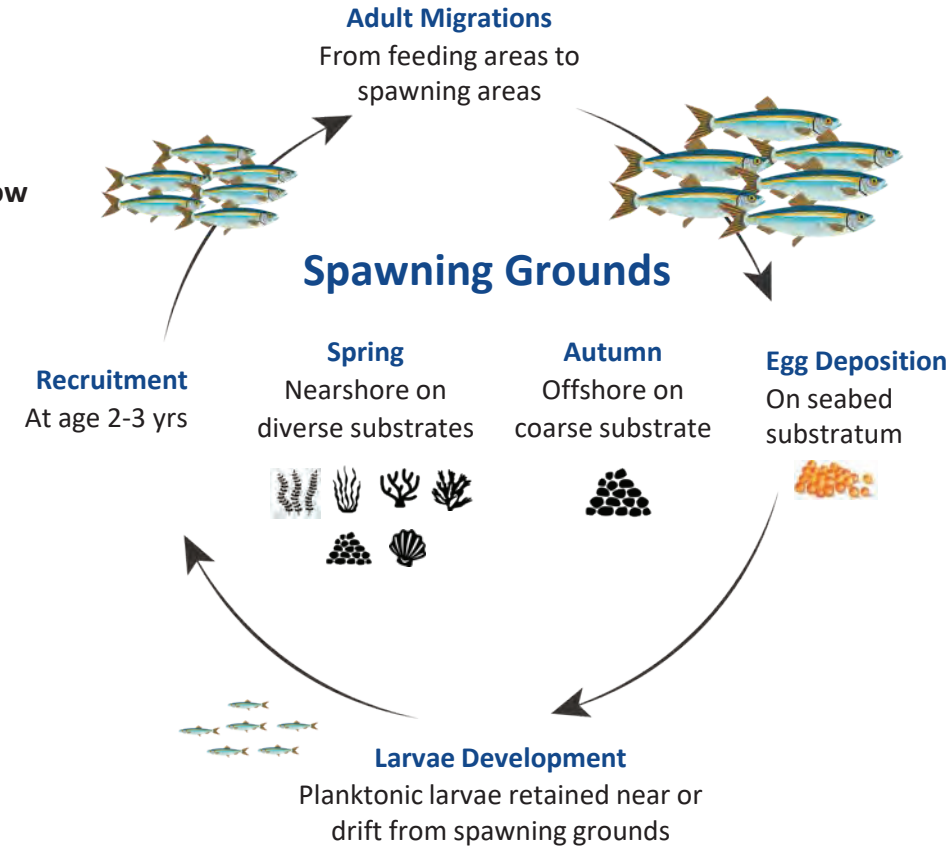
Other Main Groups

- The S Entrance to the Irish Sea: Winter/spring spawners, related to the Hiberno-Caledonians.
- The Danish Straits: A complex of mixed populations including winter herrings of the Kattegat, autumn herrings of the NE Kattegat, autumn herrings of the S Kattegat and the Sound and spring herrings of the Skagerrak, Kattegat and the Belt. They are variously related to Oceanic, Bank and Baltic herrings.
- Baltic: Spring spawners normally close to the shores in the E Baltic and the Gulfs of Bothnia and Finland; autumn spawners closer to the open sea.

Source: https://www.herripedia.com/spawning/
"Hodgson's chart of North Sea herring spawning grounds (1957). "

Herring spawn in relative shallows: which may be as little as 1m for spring spawners and up to 200m for autumn spawners

- The herring is unusual amongst pelagic species of the Atlantic in **having demersal eggs – laid on the bottom rather than floating**. **Shallow is a relative term**.
- They are between .9 and 1.5mm in diameter, heavier than water and adhesive, deposited in a sticky mass and in large numbers.
- Shoals of herring gather at the edges of their spawning grounds before moving into shallow waters to lay and fertilize the eggs.
- Near the shores of Greenland, this can be less than 1m, but in some oceanic, offshore populations it occurs at **depths of up to 200m**.



Substrate types are represented by the following symbols:

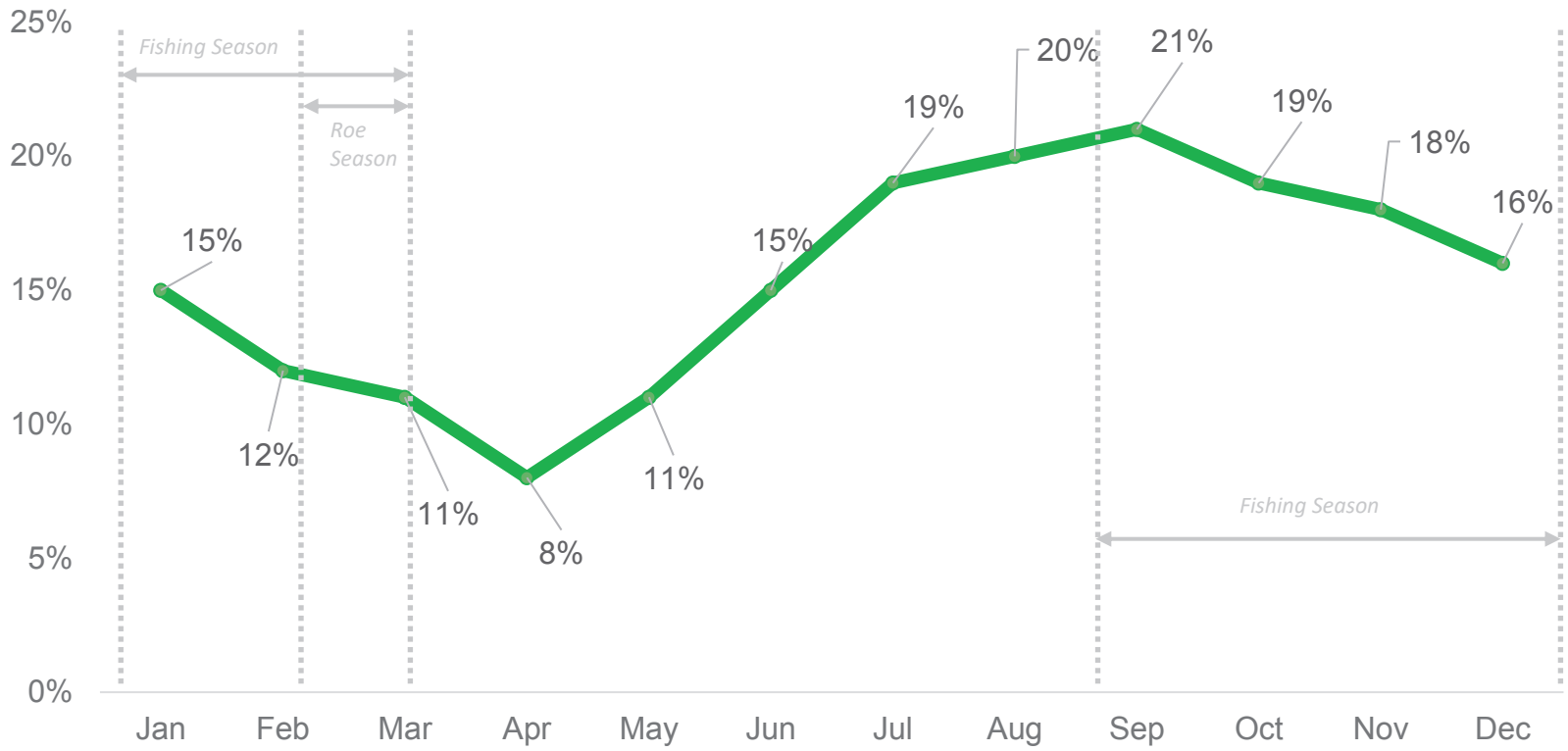
Coarse substrate | Kelp | maerl | Sea fir | shell | Non-coraline macroalgae

Geographic region	Substrate type
Atlantic Ocean	Coarse substrate, Non-coraline macroalgae
Baltic	Coarse substrate, Non-coraline macroalgae
British waters	Coarse substrate, Non-coraline macroalgae
English Channel	Coarse substrate, shell
Iceland	Coarse substrate
Ireland	Coarse substrate
Isle of Man	Coarse substrate, Non-coraline macroalgae, shell, Non-coraline macroalgae
North Sea	
Norway	Coarse substrate
Scotland – all waters	Coarse substrate, Non-coraline macroalgae, shell, Non-coraline macroalgae, Sea fir
Scotland - Cycle	Coarse substrate
	Coarse substrate, Kelp, shell, Non-coraline macroalgae, Sea fir
Scotland – Firth of Forth / Moray Firth	Coarse substrate, Kelp
Scotland – Isle of Mull	Coarse substrate
Scotland – West coast	Coarse substrate

https://www.herripedia.com/spawning/
https://link.springer.com/article/10.1007/s11160-022-09703-0

Fat content of Norwegian Spring Spawning herring is at a peak in early autumn

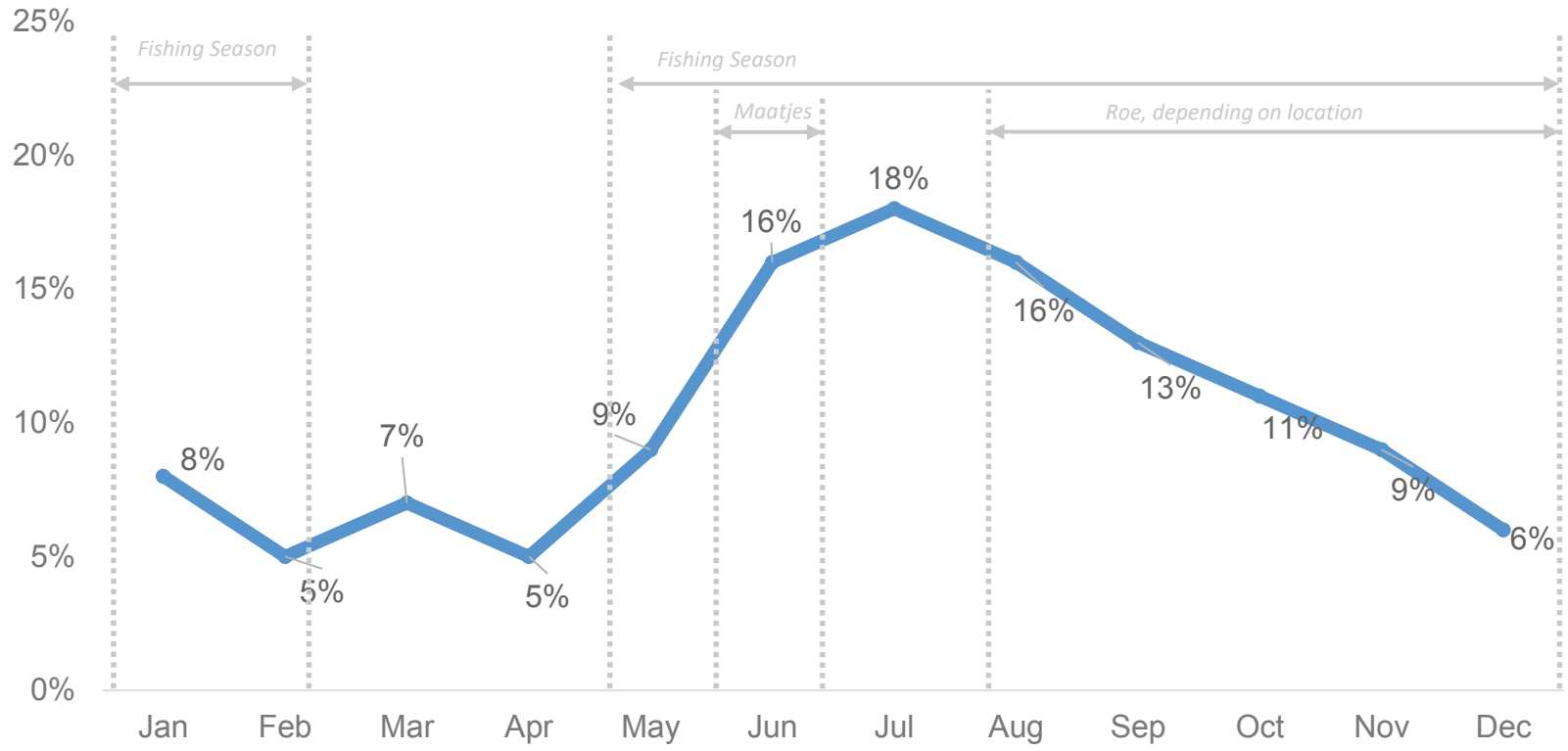
Norwegian Spring Spawning Herring Fat Content



Sources:
1985: Seasonal Changes in the Lipid Composition of Herring (Clupea Harengus) in relation to gonad maturation. R.J. Henderson and S.M. Almatar
1998: Differential utilization of energy during wintering and spawning migration in Norwegian spring-spawning herring. A. Slotte
2022: Icelandic Pelagic product information flier
1996: "Relations between seasonal migrations and fat content in Norwegian spring spawning herring (Clupea Izarellglls L.)"
2019: Pelagia product information flier
1984-2019: Fiskeviden (Danish Technological Institute)
https://herring.fromnorway.com/value-chain/season/

Fat content in North Sea Herring is at a peak starting in late summer and declining as spawning occurs North to South

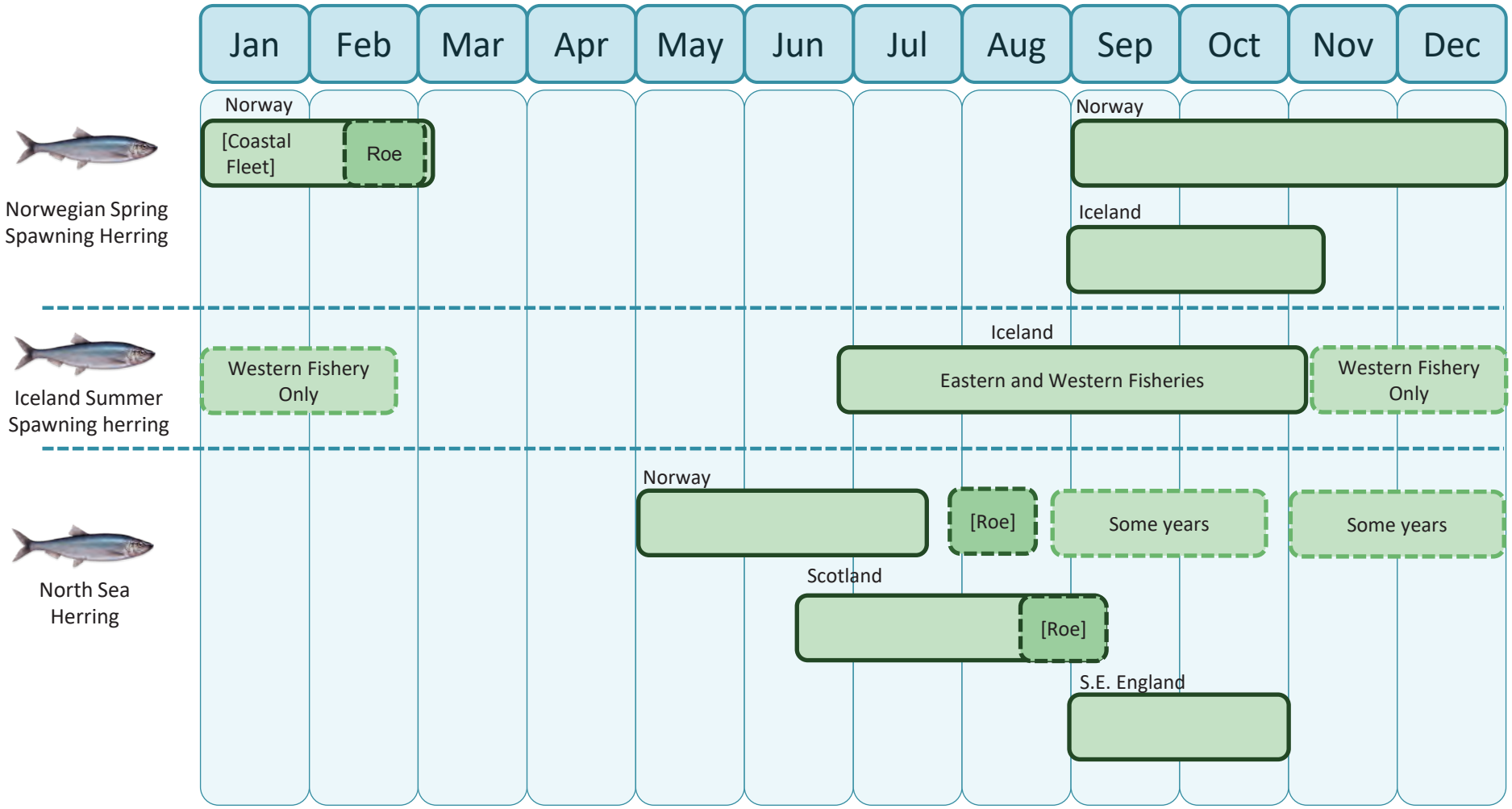
North Sea Herring Fat Content



Sources:
2022: ICES, Journal of Marine Science - Paper on Intra- and inter-annual variability in the fat content of Atlantic herring (Clupea harengus) as
1973: A note on the seasonal change in fat content of the Autumn-spawning herring in the Northern Irish Sea. P.D. Wallace
2019: Pelagia product information flier
2004-2006: Nielsens Fiskeeksport
2015-2019: "PFA self-sampling report for North Sea herring fisheries"
https://herring.fromnorway.com/value-chain/processing/

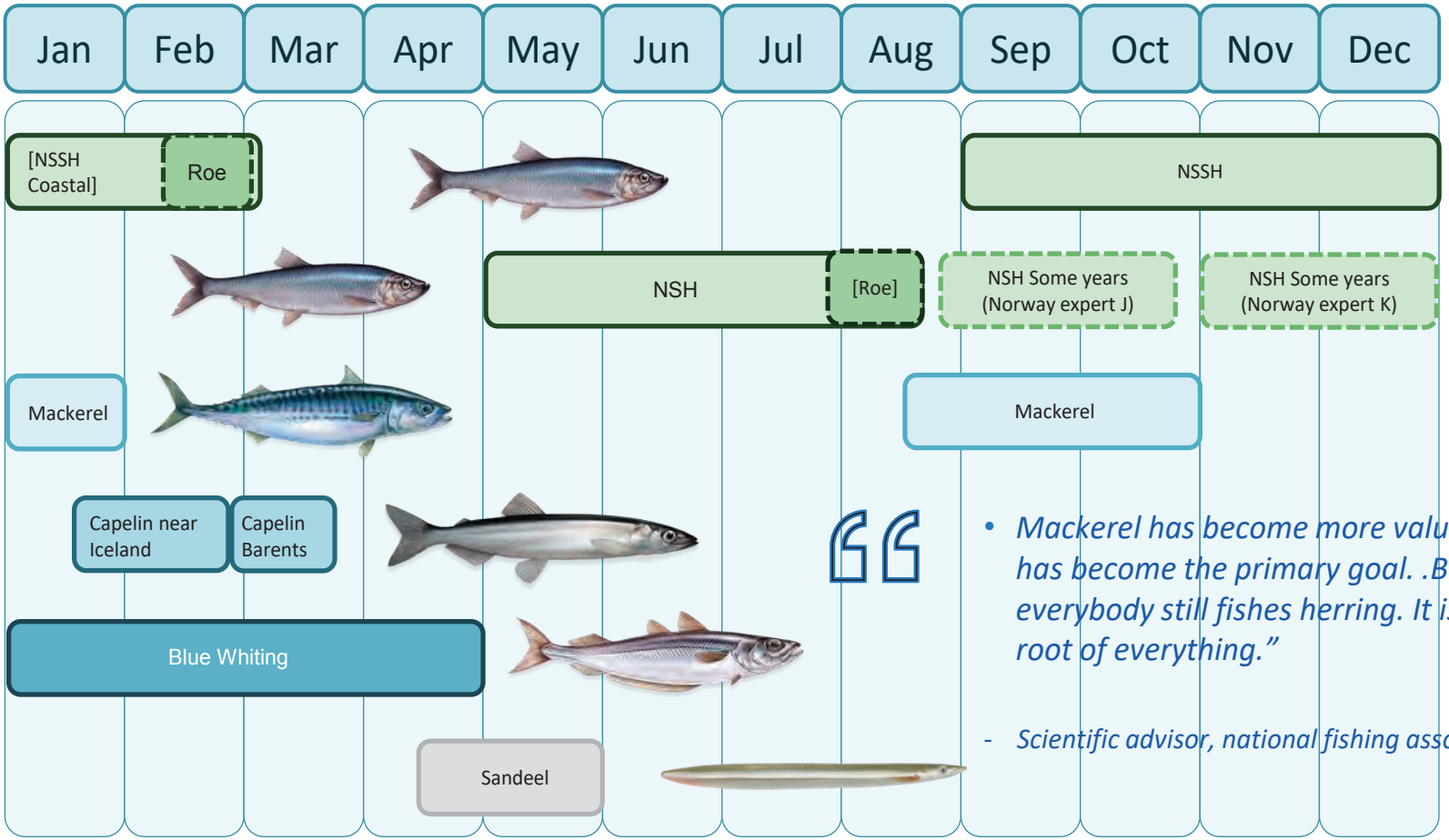
Herring fishing season varies by fishery, and by geography

Norwegian Spring Spawning Herring vs North Sea Herring fishing season



The pelagic fleets optimize the use of vessels throughout the year, based on the season for each species and the relative economics

Norwegian Pelagic Fleet -- Annual Fishing Calendar



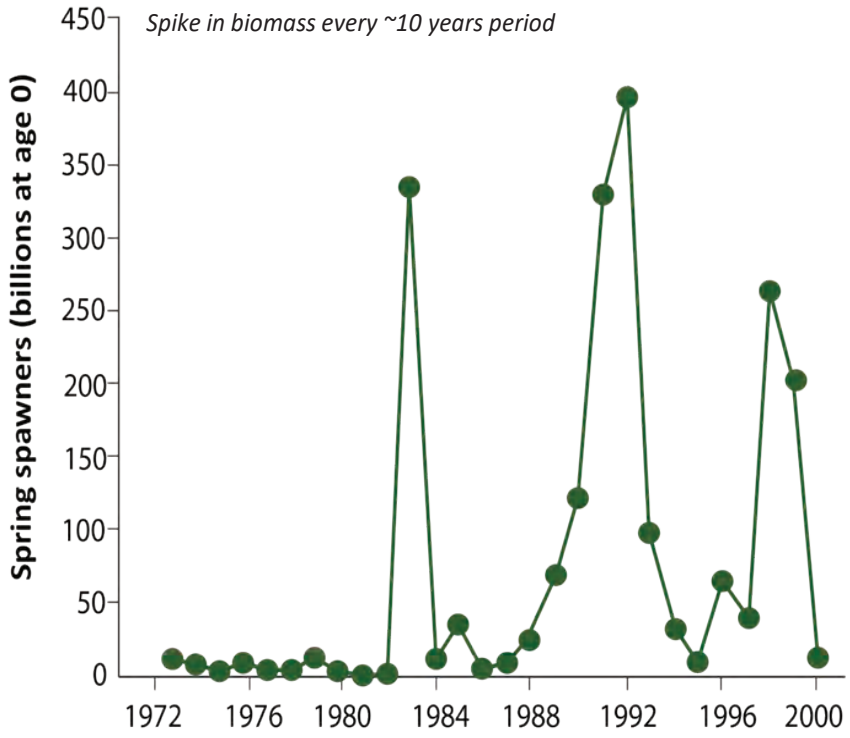
- *Mackerel has become more valuable and has become the primary goal. .But everybody still fishes herring. It is still the root of everything."*

- *Scientific advisor, national fishing association*

Source:https://bergfrost.com/fish-species/

The Norwegian Spring Spawning Herring exhibits year class dynamics with a massive biomass spike every ten years or so

Year Class size of NSSH in Billions of Fish



Executive from the Danish Pelagic Producers Organization explains the year class phenomenon

"There is substantial overfishing of the Norwegian spring spawning herring, but we haven't seen declines in the stock yet**. The biological traits of that stock are very particular.** "

"You have horse mackerel and this Norwegian spring spawning herring - it spawns every year. You see an average low success rate in spawning. The spawning biomass, it will only generate 20,000t every year, **and then every 10-12 years it goes bananas,** and it produces 500,000t of fish. You get one huge biomass of fish**. If you don't go crazy, you can exploit that one bumper fishing class for many years with the spawning**"

"They live quite long these herring, you have a one-year class of herring, they enter the fishery every 5-10 years. Herring can live until 10-15 years old "

"There has been a lot of studies on what happens and why. It's difficult to say what's going on."

Source: Mixing of populations or year class twinning in Norwegian spring spawning herring. Husebo, Slotte, Clausen, Mosegaard 2005. Marine and Freshwater Research 2005, 56, 763-772

The arc of consolidation illustrated in two leading producer countries

Norway fishing capacity evolution

Across all species, the Norwegian fleet including artisanal vessels stood at **~10,000** in 2020, compared with **>23,000** in the 1980s

PELAGIA™ **45%** of Norway processing capacity

Herring stocks collapsed

Vessels decommissioned with government support

New quota system kicks in

1967-1968 | 1980 | 1995 | 2004 | 2005 | 2018

400 pelagic trawlers → **115 trawlers** — Fleet modernized while older ships decommissioned → **~ 70 larger vessels and ~100 medium sized**

Denmark

25-30 processing companies

500 vessels

1990s

2 processing companies

7-8 vessels

2021 - 2022

7-8 vessels produce more than the 500 vessels of the 1990s.– **FAO Report***

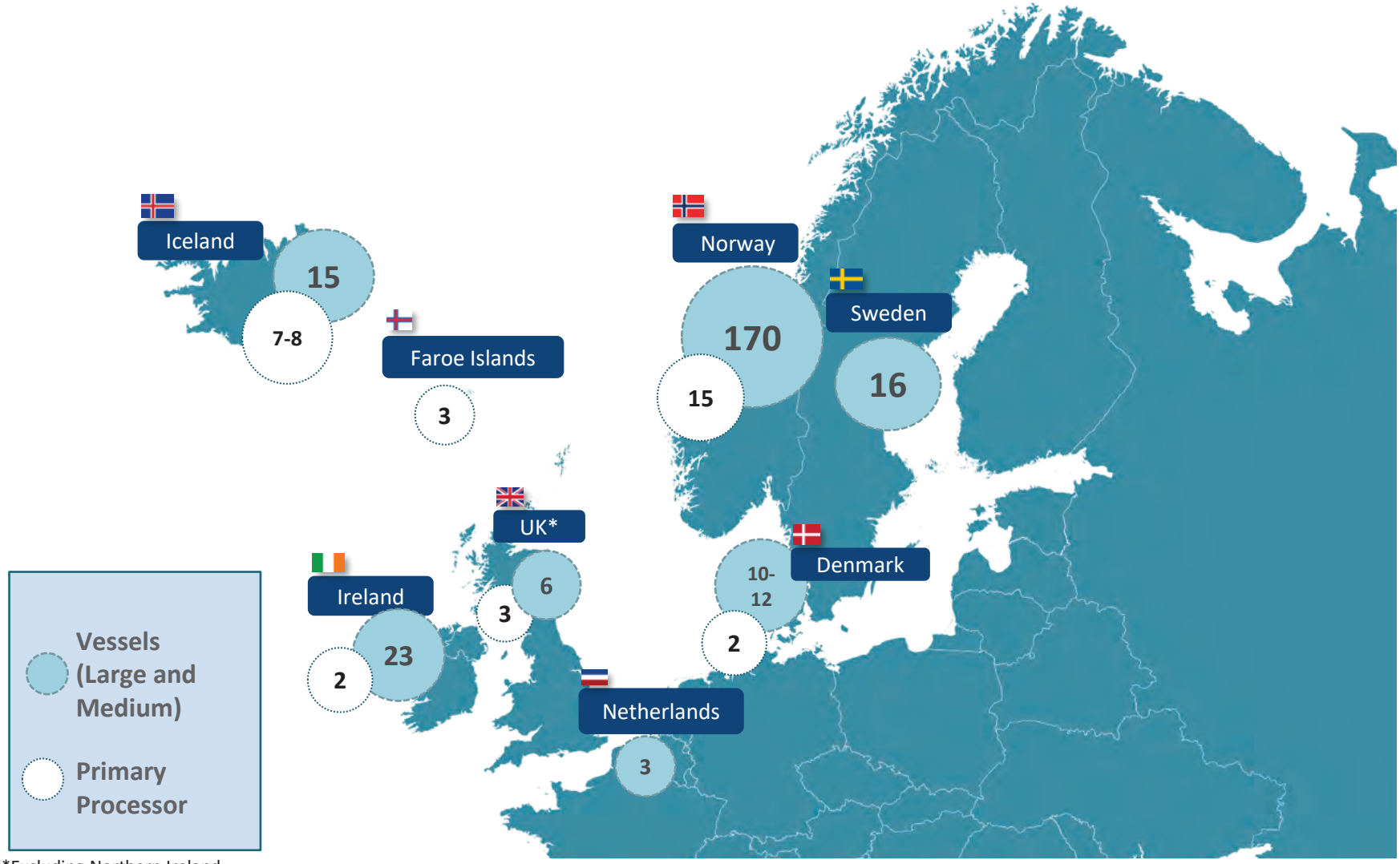
Only two companies processing for **human consumption.** Denmark's two surviving processors are specialists in marinated products for European markets

SCANDIC PELAGIC **100,000tpy** of processing capacity. Specialists in marinating

PELAGIA™ Denmark Pelagia division

*Review of the Techno-economic Performance of the Main Global Fishing Fleets, published by the FAO in February 2020

The current industry map of vessels and processors illustrates the significant consolidation which has occured



*Excluding Northern Ireland

Business is booming for European shipyards as pelagic fleet renovates

The **88-meter Finnur Fridi vessel** commissioned for Vardin in the Faroe Islands will cost **$45m to build**, the most valuable contract that Danish shipbuilder Karstensens Skibsvaerft has won to date

Owner	Length	Country	Order/Commission Date
Rederiet Rogne	83 meters	Norway	Ordered June 2022, delivery 2025
Hargun Havfiske	83 meters	Norway	Ordered June 2022, for 2025
Ivan Ulsund Rederi	73.3 meters	Norway	Ordered June 2022, delivery 2025
Vardin	88 meters	Faroe Islands	Ordered March 2022, delivery 2025
Veibest	75 meters	Norway	Ordered March 2022
Skinney-Thinganes	75 meters	Iceland	Ordered Dec 2021, delivery 2024
Fiskebas Fishing Co.	69.9 meters	UK	Ordered Nov 2021
Christina S Fishing	77 meters	UK	Ordered July 2021, delivery 2023
Gifico	63.80 meters	Denmark	Ordered June 2021, delivery 2023
Gollenes	70 meters	Norway	Ordered June 2021, delivery 2023
Altaire	80 meters	UK	Ordered Jan 2021, delivery 2023
Veibust	80 meters	Norway	Delivered 2021

The average age European fleet is getting younger according to a 2020 report (*)

Norway **~13 Yrs**

UK **~25 Yrs**

Europe **~20 Yrs**

Source: (*) Review of the Techno-economic Performance of the Main Global Fishing Fleets, published by the FAO in February 2020

Key primary processors in Europe

"There is a lot of competition to get raw material and you are extremely compressed on the margins."

- Technical role at UK processing company

Denmark	Faroe Islands	Iceland	Ireland	UK	Norway
• **Scandic Pelagic (1930)** • **Pelagia Denmark (2011)** Scandic Pelagic is the largest processing plant in Europe (100,000 tpy) and one of the oldest. It is the specialist in marinated fillets sold in Eastern Europe. Pelagia operates a plant with a similar product line in Denmark	• **Vardin (1985)** • **PP Faroe Pelagic (2009)** • **Pelagos (2014)** The Faroese plants are vertically integrated, make frozen blocks, fillets and flaps. Salmon giant Bakkafrost owns 30% of Pelagos and takes trimmings from all facilities for salmon feed.	• **Isfelag Vestmannaeyja (1901)** • **Lodnuvinnslan (1933)** • **SVN (1957)** • **Brim (1985)** These companies own most of Iceland's TAC and operate processing facilities that mainly freeze whole round herring. Significant consolidation in recent years	• **Atlantic Dawn (1968)** • **Killybegs Seafoods (1968)** Irish integrated companies with a modern fleet, produce fillets and frozen block. John West sources canned herring from Killybegs	• **Denholm Seafoods** • **Pelagia Shetland** • **Northbay Pelagic** Processors indirectly own vessels, Scottish firms produce frozen blocks and fillets. Selling into UK's FTA partners such as Egypt	• **Pelagia (2014)** • **Nergard(1947)** Biggest processing country with 15 plants, 9 of which are operated by Pelagia (part of the Austevoll Group). Pelagia is the pelagic industry's only $1 billion company. Nergard operates two processors. Mainly production of whole round frozen herring

Some of the oldest names in European fishing are stronger than ever after huge consolidation of the industry

Source: Expert interviews, Seafood Events, Companies official websites.

Pelagia is the world's leading pelagic and herring exporter with over $1 billion in revenue

Norway Landings

~600K tons

Whole Round
163K tons
Exports

Processed
187K tons
Exports

Meal/Oil
250K tons

Pelagia North Atlantic

- Fishmeal and oil output: **807,000t**
- Human consumption (intake): **430,000t**

Norway pelagic fleet

70 large vessels
230+ small/medium vessels

15 processing facilities

PELAGIA™

45% of Norway processing capacity

4 out of **7** fishmeal + fish oil plants in Norway

Pelagia has a vested interest in providing raw materials for the salmon industry. Joint venture owners also control SalMar (No 2 salmon farmer worldwide) and Leroy Seafood (No 3)

SALMAR Passion for Salmon

LERØY

Footnote: Tonnage doesn't include trimmings from prepared products that are sent to fishmeal plants

The Norwegian pelagic fleet comprises large state-of-the-art purse seiners and trawlers as well as smaller coastal trawling vessels.

Pelagic Vessels: Norwegian Examples

# active vessels (Norges Sildesalgslag):	Ocean Going: 77 vessels	Lg Coastal: 92 vessels	Sm Coastal: 77 vessels
			
Typical Size	>60m	30-60m	15-30m
Typical Max Capacity	1,000-3,200 tons	300-1,000 tons	50-300 tons
Trip Duration	1-5 days	Can be <1 day	Can be <1 day
Crew	10-12	6-7	<= 6-7

- All Refrigerated Sea Water (RSW). Mainly purse seiners. Some trawlers.
- The proportion of fish to sea water depends on the value of the catch. For blue whiting an ocean-going ship may load 2000 tons of fish but for mackerel may load no more than 500-750 tons and the rest sea water to preserve quality
- Quota is allocated by vessel. One vessel may have multiple quotas (quota for herring, quota for mackerel, etc and may have quotas for non-pelagics)
- In addition, there are a lot of smaller vessels catching close to shore but volumes are small. The Norges Sildesalgslag register of active vessels includes another 615 of length under 15m with typical capacity of 1-70 tons.

Note: The images are illustrative of vessels in the category. There is variation in vessel size and capacity even within each category
Source: Experts 3,7. The typical size, max capacity, and number of active vessels comes from Norges Sildesalgslag (auction house) records of "active vessels" in 2022 and they can participate in various fisheries

Scotland processing example: one of three processor/fishing operations in Peterhead, Scotland

Fishing

RSW storage at 0-1°C
Max 80% fish to 20% water to avoid bruising & "explosions"

Unloading at the Quai

Fish piped directly into factory
300-500T of herring at a time despite vessel's larger capacity

Freezing

Blast Freezing

15% Whole round for export (larger)

5% Whole round for bait (smaller)

Blast Freezing Specs

-20°C to -23°C for 12-15 hours
-or-
-25°C for 8 hours, with compromise to quality

Processing

0%

Fillets

This particular plant used to do skinless fillets but discontinued due to microbiological challenges

60%

Flaps

Majority is "flaps"
6-10 pc/kilo
8-12 pc/kilo
10-16p c/kilo

20%

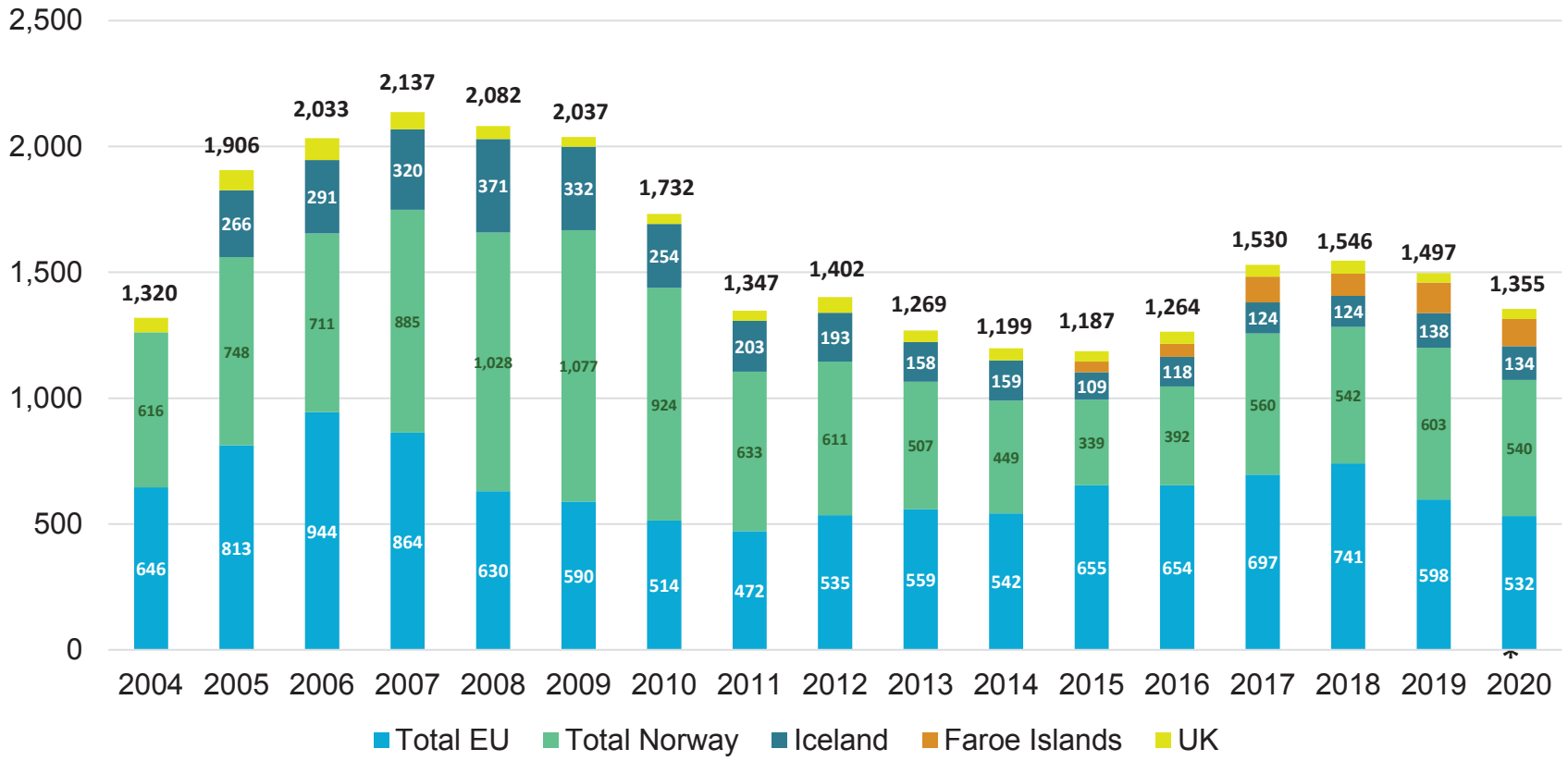
"Deli's"

Another preparation: gutted and no head. May or may not have tail

Atlantic herring catches have declined in the past two decades

Total herring landings including the EU, Norway, Iceland, UK, Faroe Islands volumes (2004-2020)

Volumes in 000s of metric tons

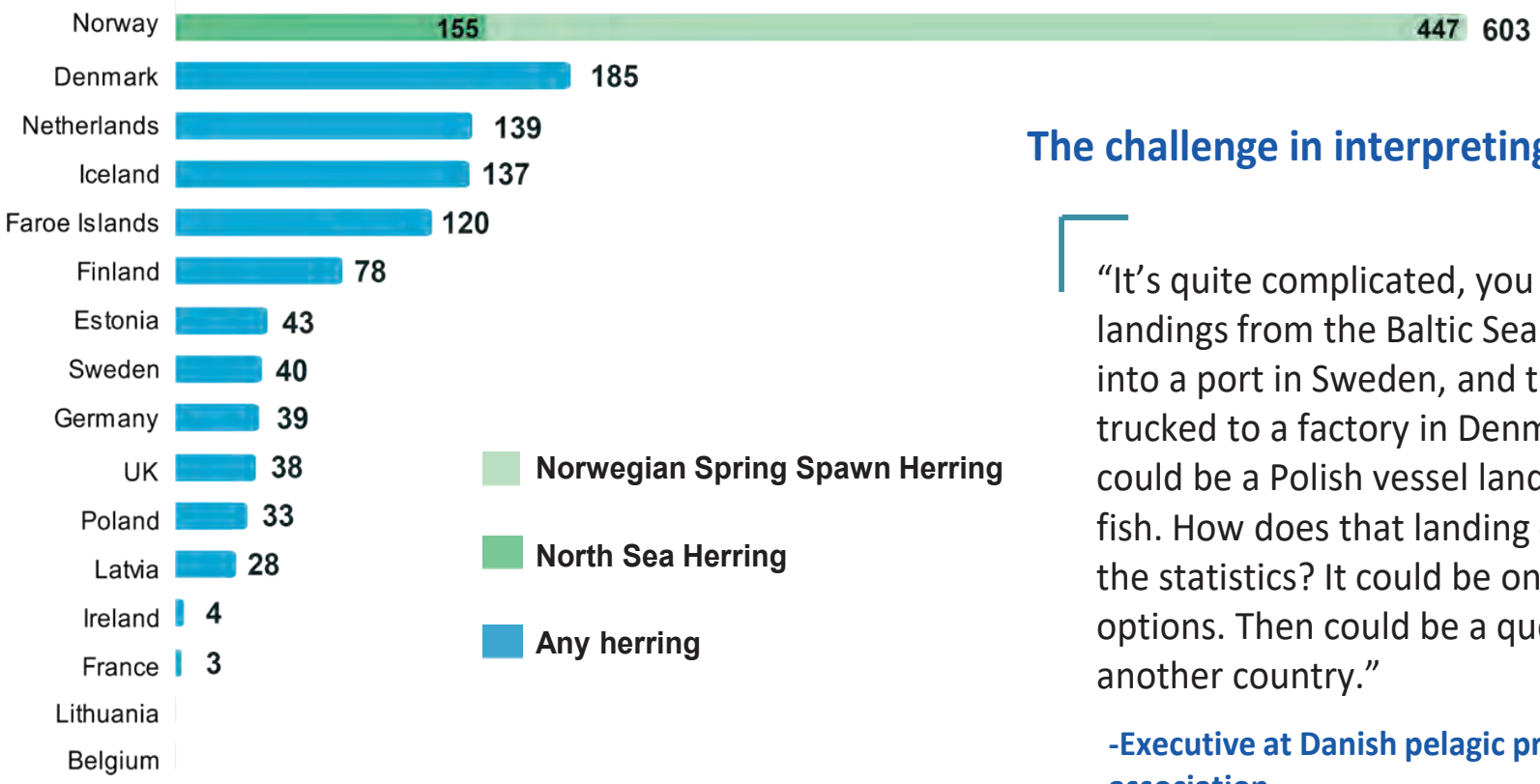


Source: Data from EUMOFA, EUROSTAT and The Norwegian Statistics Bureau
Note: Faroe Islands data not available before 2015
Footnote: Use of "tons" in this presentation refers to metric tons (1000 kg)

Norway is dominant in landing herring, whereas Denmark and the Netherlands lead North Sea captures

Norway leads the total of herring landings

2019 volumes in thousands of tons



Source: Data from EUMOFA, EUROSTAT and The Norwegian Statistics Bureau

The challenge in interpreting the data:

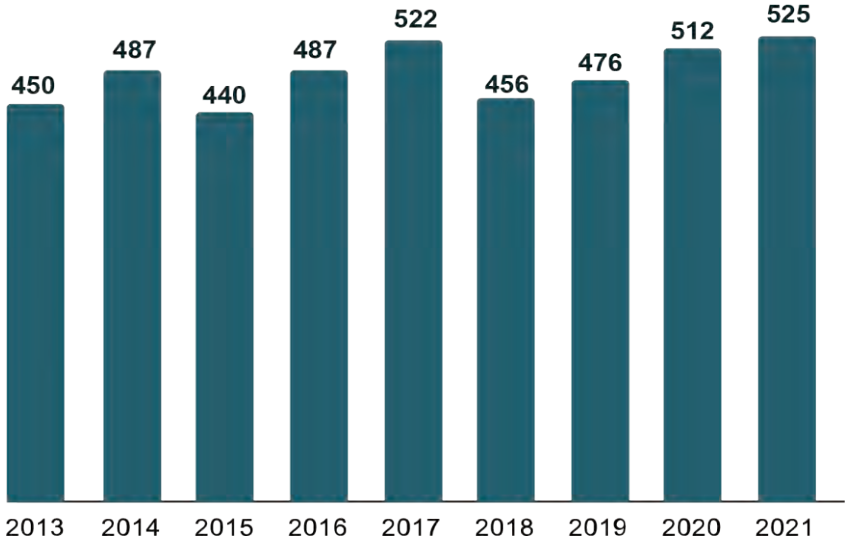
"It's quite complicated, you have landings from the Baltic Sea landed into a port in Sweden, and then trucked to a factory in Denmark. It could be a Polish vessel landing the fish. How does that landing end up in the statistics? It could be one of three options. Then could be a quota from another country."

-Executive at Danish pelagic producers' association

Russia supplies a half million tons from the Pacific that impacts the Atlantic herring market

Over 500,000 tons of Pacific herring are caught in the Sea of Okhotsk

Volumes in thousands of tons



Russian Pacific landings are sold across Asia and Africa, often competing with Atlantic herring in West African markets

Source: Russian Federal Agency of Fisheries

Coastal states collaborate with ICES to set pelagic quotas, but there has been some controversy

ICES CIEM

Fishing zone overseen by ICES

- The International Council for the Exploration of the Sea (ICES) employs scientists to monitor biomass and plankton levels

EU
Faroe Islands
Iceland
Norway
Russia
UK

- North East Atlantic Fisheries Commission sets the annual TAC, based on advice from ICES
- Countries can sign bilateral agreements for EEZ quotas
- Commission sets quotas for international waters, not coastal territorial waters
- The TAC based on historical rights and catching records of coastal states

Atlanto-Scandian herring and blue whiting fisheries to be suspended

December 1, 2020

In 2020 the Marine Stewardship Council (MSC) revoked its certification of blue whiting and herring, having suspended mackerel in 2019, because the resource has been overfished

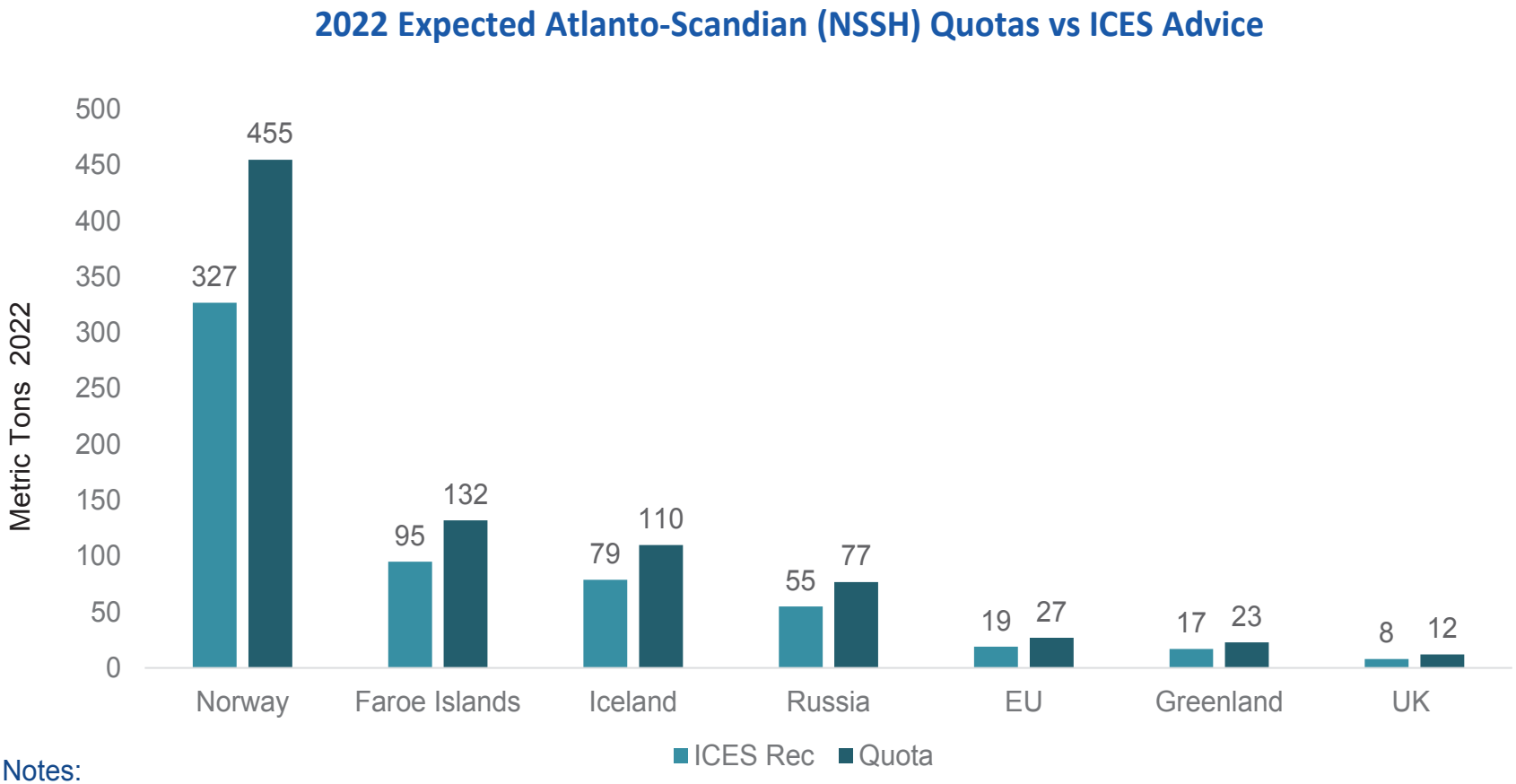
"There is substantial overfishing of the Norwegian Spring Spawn herring, but we haven't seen declines in the stock yet"

- *Expert at Danish Pelagic Exporters Association*

"We have health to sell, and we have a sustainability profile"

- *Icelandic Exporter*

Coastal states set pelagic quotas systematically higher than ICES recommendations



Notes:

- Herring Quotas 40% over ICES Advice
- Mackerel Quotas 41% over ICES Advice
- Blue Whiting Quotas 38% over ICES Advice

Source: North Atlantic Seafood Forum Conference June 2022, Pelagics Summit
Russia and Greenland are estimates

Most Northern European retailers demand MSC certification on seafood products as do some foodservice firms

Markets urge reinstatement of MSC certification

- Migration of pelagic populations to **cooler waters** around Iceland and Greenland sparked the dispute among northern Atlantic coastal states
- Despite ICES advice, **states have not agreed on quotas in a decade**, resulting in overfishing
- Coastal states and ICES working science and genetics to determine **what is happening to stocks**
- Coastal states urged to **base quotas on science** and not historical catch statistics
- **Brexit** has complicated the setting of quotas, Faroe Islands under pressure to end fishing rights to Russian vessels

The North Atlantic Pelagic Challenge

1. 3 fish stocks: Mackerel, Blue whiting and Herring
2. 7 states: Coastal and Fishing States
3. All states agree on the scientific advice for total catch
4. The states do not agree on how to split the catches
5. The states set their own quotas and the sum of individual quotas exceed the scientific advice
6. **Outcome is too high fishing mortality and declining fish stocks**

Getting this certification back is not an easy process. Countries have to agree again on quotas through international dialogue, and this will take time. A new consensus would have to be based on science, and not historical quotas.

- Executive at seafood certification company

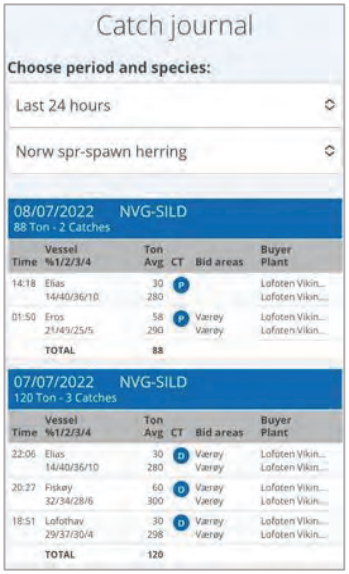
Vessels required to provide specific and standardized details of catch via auction system

Norges Sildesalgslag standardized catch details, made publicly available on website

- **Total catch in tonnage**
  (Norwegian vessels can hold 2000-2500 tons in refrigerated seawater), usually fresh

- **Grading per size**
  There are 5 size classes that depend on the area and species (for example – 200g-300g, >350g)

- **Where the catch is caught**
  Giving GPS location and time

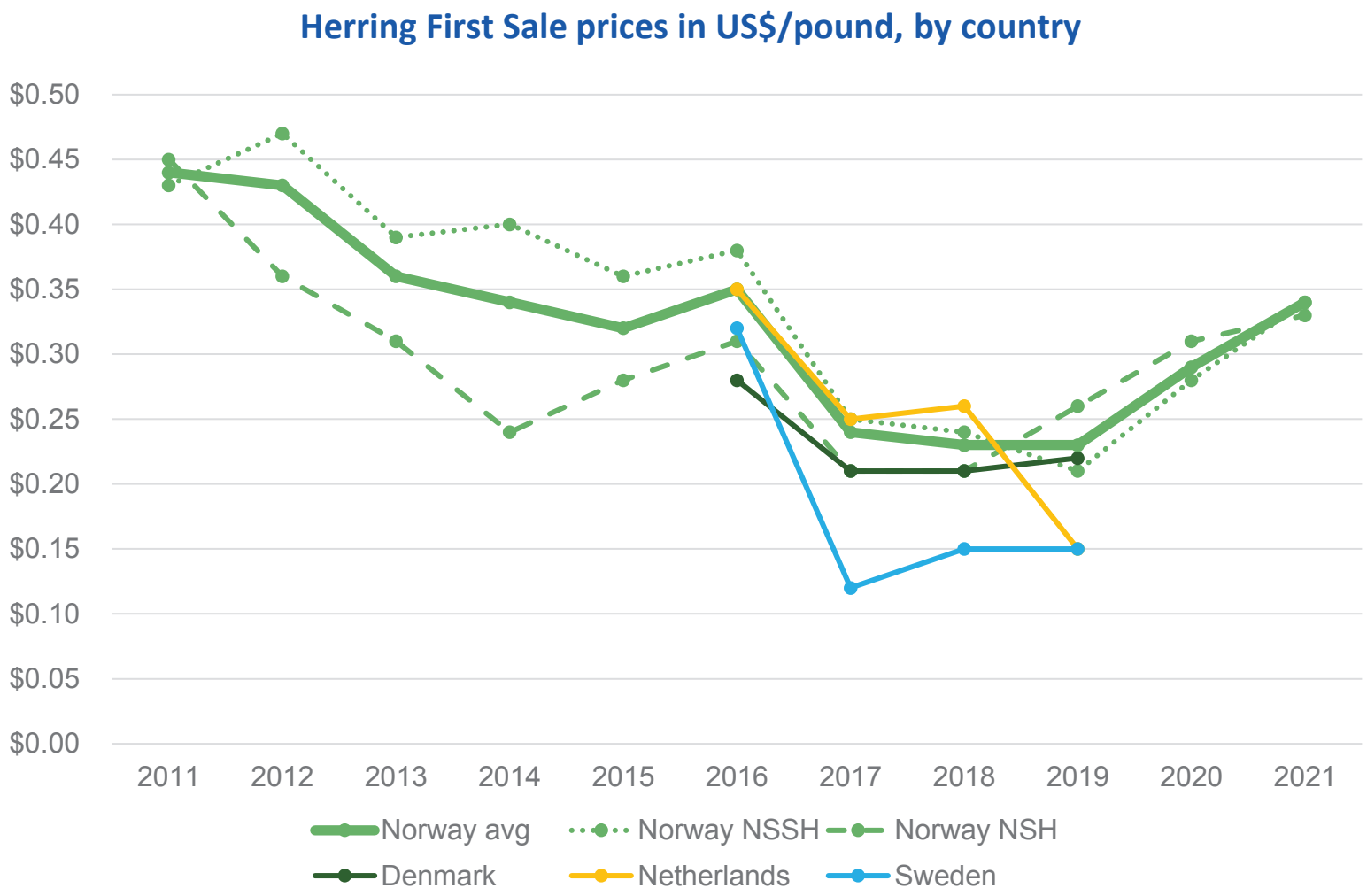


Species	Norw spr-spawn herring
Catch type	Pen
Fishing gear	Purse seine coastal
Start fishing	07/07/2022
Grid	49
Quantity (Average)	58 Ton (290)
Usage	Freezing
Assortment	G1: 21% / G2: 49% / G3: 25% / G4: 5%
Area East	Værøy - 05:00 8/7 Værøy - 05:00 8/7
Area West	
Coop. vessel(s)	Hilmarson N -0061-B
Buyer	Lofoten Viking AS
Plant	Lofoten Viking AS
Bait	Åtefri (1)

Norges Sildesalgslag devised an electronic system as vessels are better equipped to keep catch in optimal condition before delivery to processors. Larger vessels have capability to deliver to any part of Norway **– Norwegian industry executive**

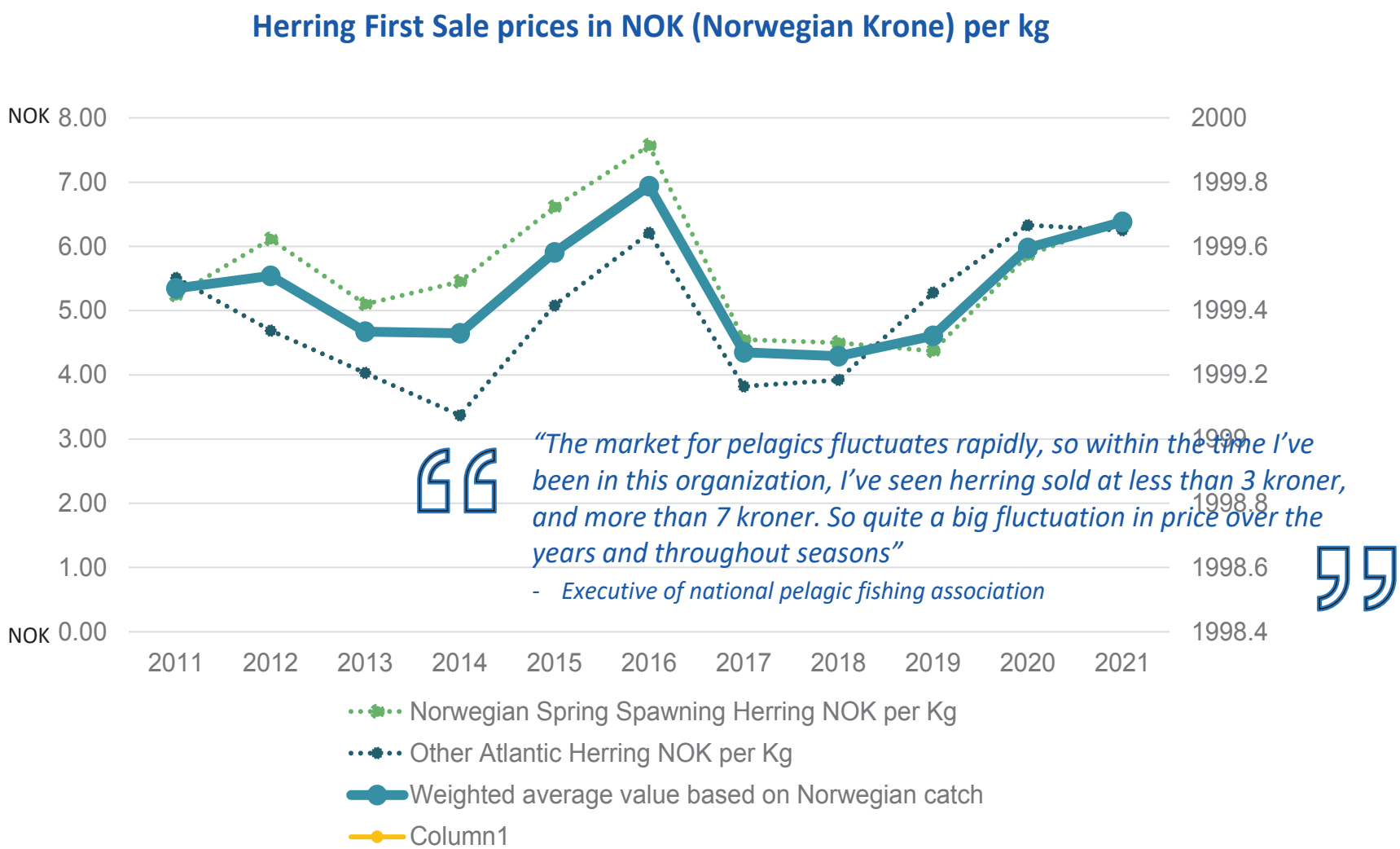
Source: Norges Sildesalgslag

Prices of Atlantic herring have declined in USD during the past decade but coming back up in the last 2 years



Source: EUMOFA for Denmark, Netherlands and Sweden data.
Norway first hand prices: https://www.fiskeridir.no/English/Fisheries/Statistics/Economic-and-biological-key-figures

In Norwegian currency terms there is a similar recent rise



"The market for pelagics fluctuates rapidly, so within the time I've been in this organization, I've seen herring sold at less than 3 kroner, and more than 7 kroner. So quite a big fluctuation in price over the years and throughout seasons"

- *Executive of national pelagic fishing association*

Norway source: Norwegian Statistics Bureau

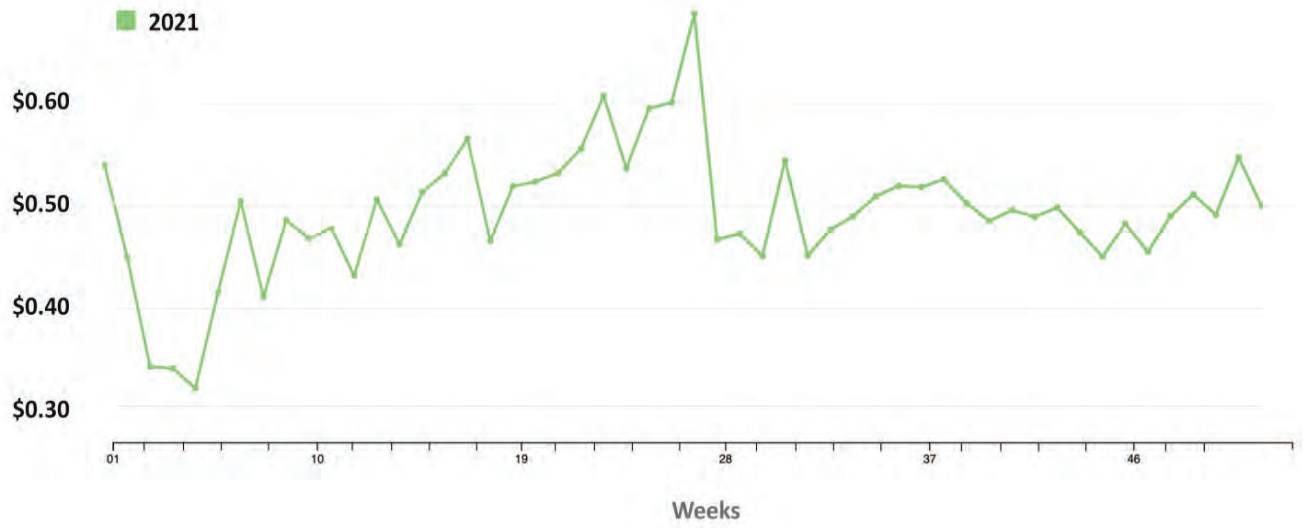
There is daily and weekly fluctuation in the herring price driven by multiple factors

Weekly price fluctuations driven by a variety of factors

- Fat content
- Size
- Quality
- Maatjes herring catch
- Roe catch
- Available plant capacity
- Type of contract
- Inventory levels
- Freight rates
- Fuel rates

> "The market for herring is volatile, to some extent depending on the price of other protein/oil sources. Also, currency fluctuations, invasions of the Crimea in 2014 and the war now in Ukraine. And changes in quotas from year to year".
>
> **- Executive, Norwegian Industry**

Average weekly export price (i.e. 2nd price) of frozen whole round herring ex Norway in US$ per pound

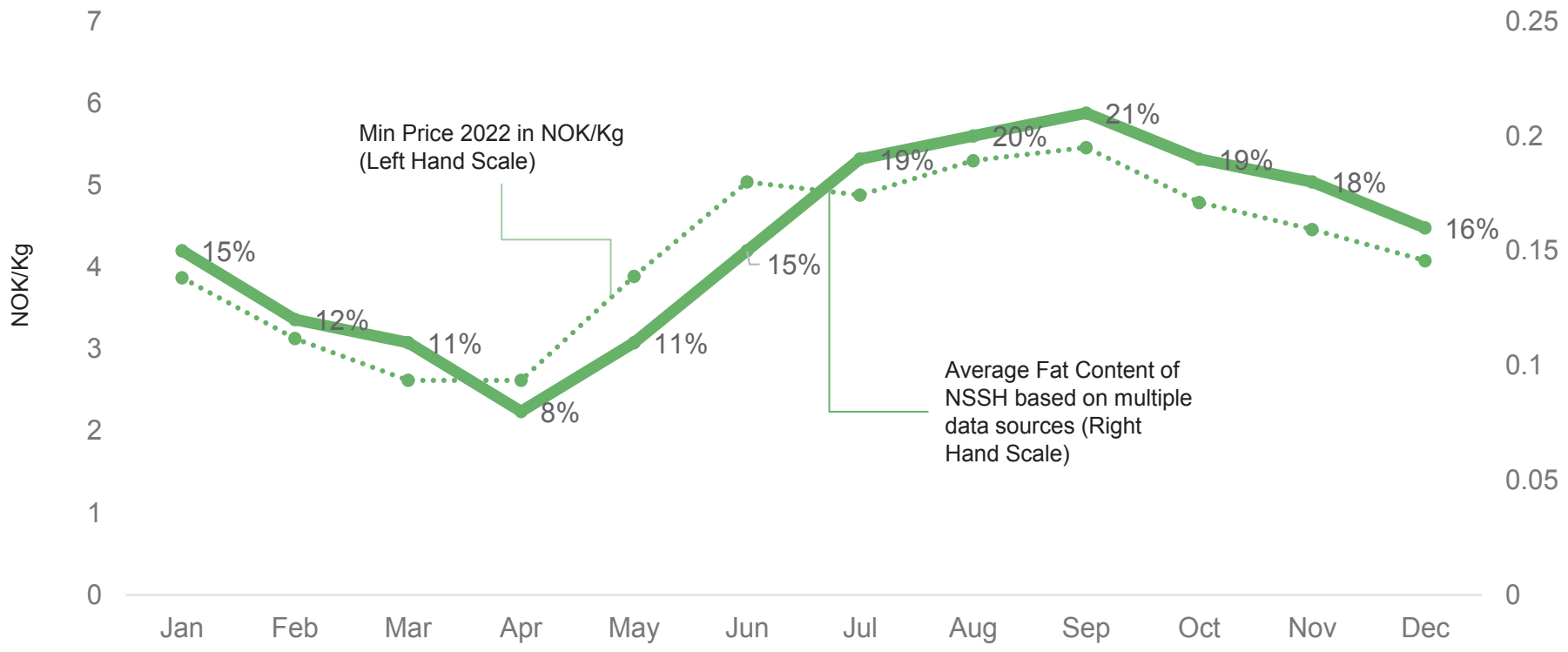


Source: Undercurrent News, Norwegian Seafood Council data

Norges Silgesalgslag minimum pricing for herring used for fishmeal/fish oil tracks seasonal fat variation

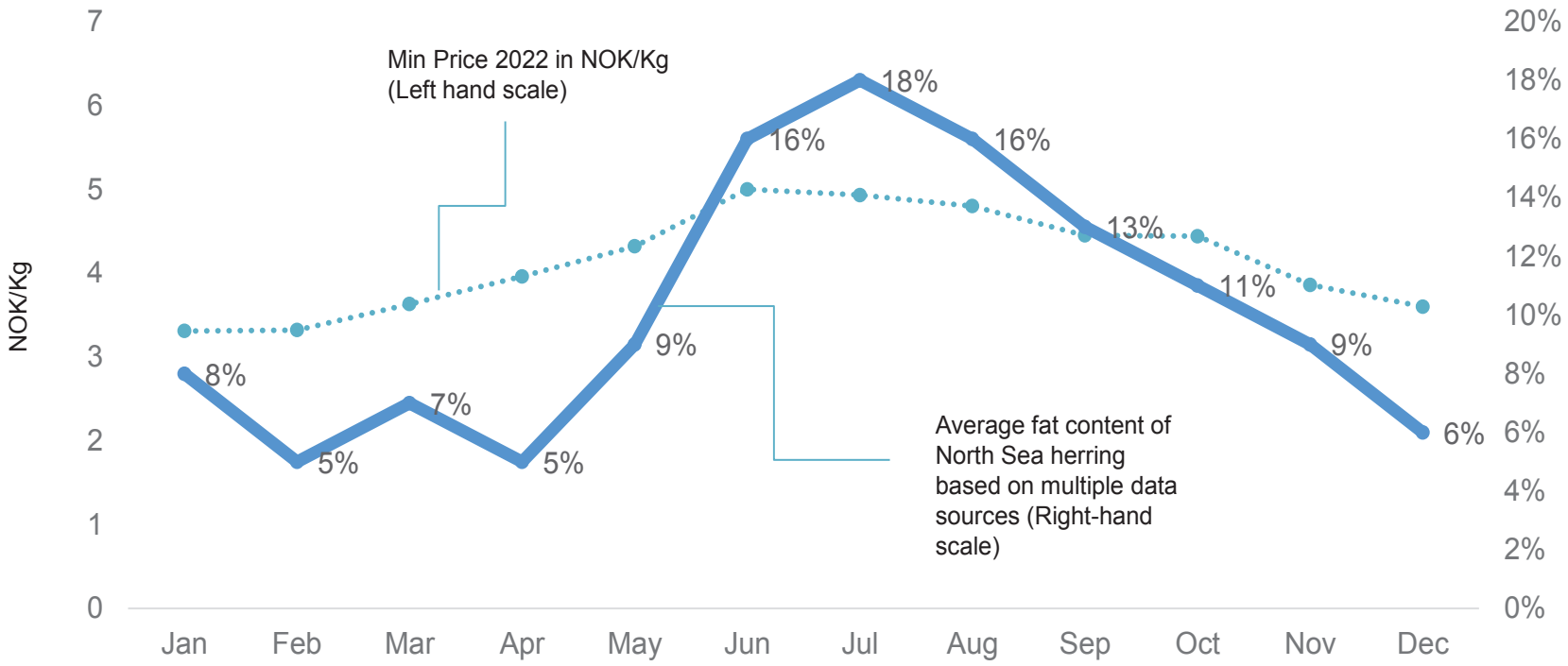
Auction house agrees minimum pricing with industry actors at start of season as a market setting device. The setting of minimum prices is a legal requirement in Norway

Norwegian Spring Spawning Herring Fat Content vs. Minimum Price for use in Fish Meal/ Fish Oil



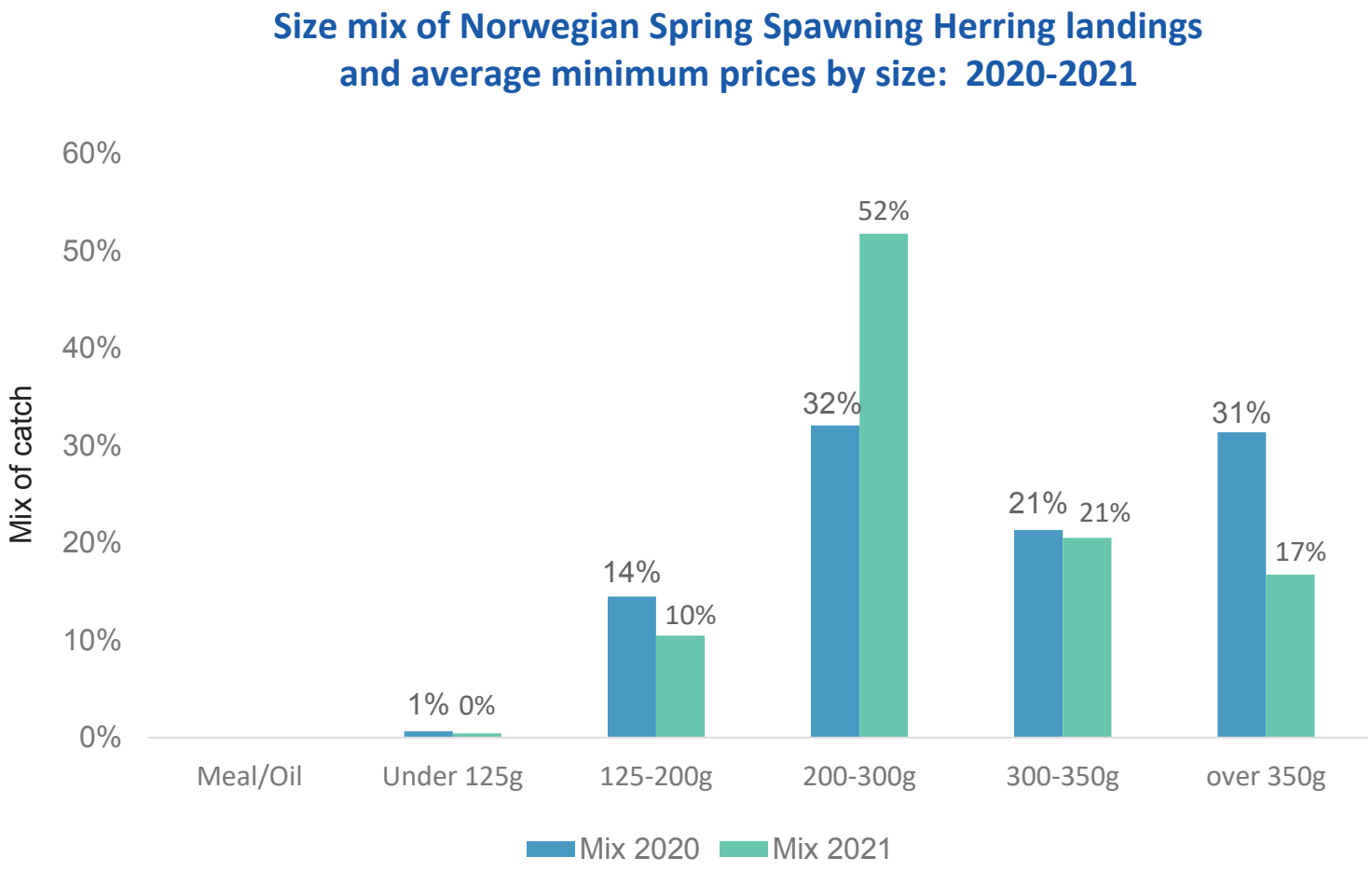
The N. Silgesalgslag min. pricing for NSH used for FM/FO tracks seasonal variation, with a bias probably reflecting the fat levels of the more northern catch

North Sea herring fat content versus minimum Price for use in fishmeal/fish oil



Note: the North Sea Herring sold through the Norwegian Auction House is more likely to spawn in August whereas the fat content represents samples over many locations in the North Sea, wish spawners from August through December. This probably explains why the fit of the curves is looser than for NSSH

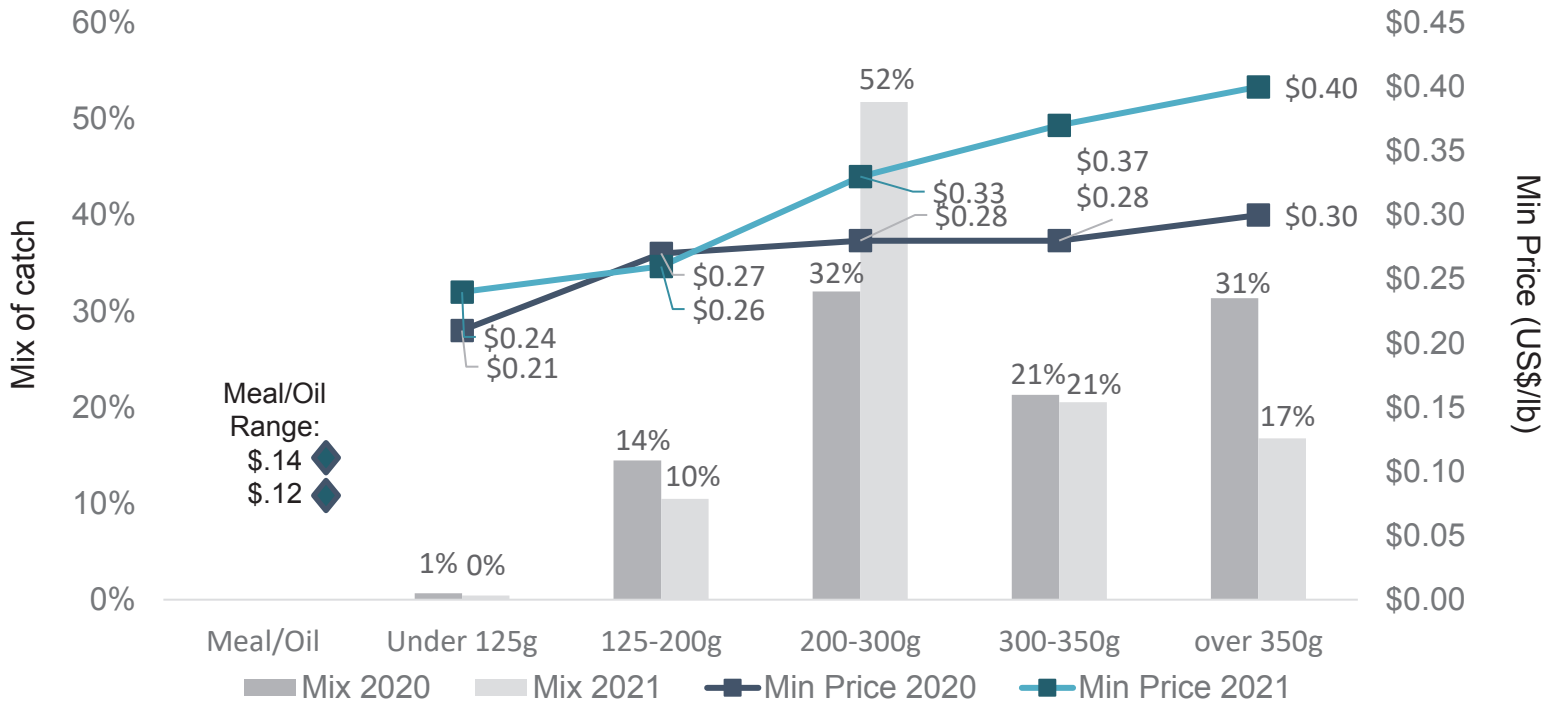
The bulk of the herring catch is in the 200-300g size



Size mix variations vary depending on the strength of the different year classes in the stock
Source: Size distribution and minimum prices from Sales Department of Norges Sildesalgslag
Source: Meal and oil pricing: https://www.sildelaget.no/en/fisheries/norw-spr-herring/ as of Feb 2022

Minimum prices are set based on size, and vary annually

Size mix of Norwegian Spring Spawning Herring landings and average minimum prices by size: 2020-2021



Notes: Min price based on realized prices over last 14 days; Prices in 1Q are fixed minimum prices
Size mix variations vary depending on the strength of the different year classes in the stock
Source: Size distribution and minimum prices from Sales Department of Norges Sildesalgslag
Source: Meal and oil pricing: https://www.sildelaget.no/en/fisheries/norw-spr-herring/ as of Feb 2022

Note: Min price for human consumption cannot be lower than fishmeal/fish oil price plus NOK 0.60/kg or about US$0.035 per pound

Relative value received by fishing vessel vs primary processor: Norway 2021

Primary Price (price received by vessel)

Norwegian Spring Spawning Herring

NOK 6.42/Kg
USD $0.34/lb

Secondary Price (price received by primary processor)	NOK/ Kg	% Value Added	USD/ Lb
Whole Round Frozen: NSSH frozen	8.50	32%	$0.45
Whole Round Fresh: NSSH fresh whole	6.40	0%	$0.34
Butterflies: Herring butterflies frozen	13.10	104%	$0.69
Fillets: NSSH frozen fillet without skin	14.70	129%	$0.78
Salted: Herring salted fillet	16.20	152%	$0.86
Preserved: preserved whole/pieces vinegar cured	19.20	199%	$1.01
Roe: Herring liver/roe/milt frozen	86.40	1246%	$4.57

North Sea Herring

NOK 6.25/Kg
USD $0.33/lb

Secondary Price (price received by primary processor)	NOK/ Kg	% Value Added	USD/ Lb
Whole Round Frozen: NSH frozen	11.60	86%	$0.61
Whole Round Fresh: NSH fresh whole	6.70	7%	$0.34
Butterflies: Herring butterflies frozen	13.10	110%	$0.69
Fillets: NSH frozen fillet without skin	17.50	180%	$0.93
Salted: Herring salted fillet	16.20	159%	$0.86
Preserved: preserved whole/pieces vinegar cured	19.20	207%	$1.01
Roe: Herring liver/roe/milt frozen	86.40	1282%	$4.57

Source: Norwegian Directorate of Fisheries for first price.
Norwegian Seafood Council. For export (2nd price)

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Norway herring export volumes and value (2021) provide indicative average pricing based on preparation and value added

	Volume (MT)	NOK/Kg	USD/Kg	USD/Lb
Whole Round Frozen				
Norwegian spring spawning herring frozen	144,272	8.50	$0.99	$0.45
North sea herring frozen whole	19,329	11.60	$1.35	$0.61
Whole Round Fresh				
Norwegian spring spawning herring fresh whole	17,293	6.40	$0.74	$0.34
North sea herring fresh whole*	8,873	6.70	$0.78	$0.35
Butterflies (Flaps)				
Herring butterflies frozen (flaps)	75,932	13.10	$1.52	$0.69
Fillets				
Norwegian spring spawn Herring frozen fillet without skin	49,821	14.70	$1.71	$0.78
North Sea Herring frozen fillet without skin	3,108	17.50	$2.04	$0.93
Herring frozen fillet skin on	2,373	15.90	$1.85	$0.84
Salted				
Herring salted fillet	4,497	16.20	$1.88	$0.86
Herring salted not fillet	3,731	12.00	$1.40	$0.63
Preserved				
Herring prepared/preserved whole/pieces vinegar cured*	13,507	19.20	$2.23	$1.01
Herring prepared/preserved whole/pieces spice cured*	3,037	19.70	$2.29	$1.04
Herring prepared/preserved whole/pieces not spice cured/vinegar cured	560	20.30	$2.36	$1.07
Roe				
Herring liver/roe/milt frozen	3,897	86.40	$10.05	$4.57
Total	**350,272**	**12.10**	**$1.41**	**$0.64**

Source: Norwegian Seafood Council.

Herring is still a conveniently priced protein for many consumers amid high inflation

Inflation in herring vs mackerel and other proteins

	2017 - 2022	July 2022	July vs 5 yr. average
Atlantic Mackerel (Under 600gm)	€ 1.56/kg	€ 2.09/kg	+34%
Atlantic Herring	€ 0.80/kg	€ 1.32/kg	+65%
Herring discount on Mackerel	€ 0.76	€ 0.77	
Salmon (whole frozen)	$6.15/kg	$10.91/kg	+77%
Chicken (whole body price index, FDA)	$2.07/kg	$3.67/kg	+77%
Atlantic Herring (fillet price)	$1.32/kg	$1.73/kg	+31%

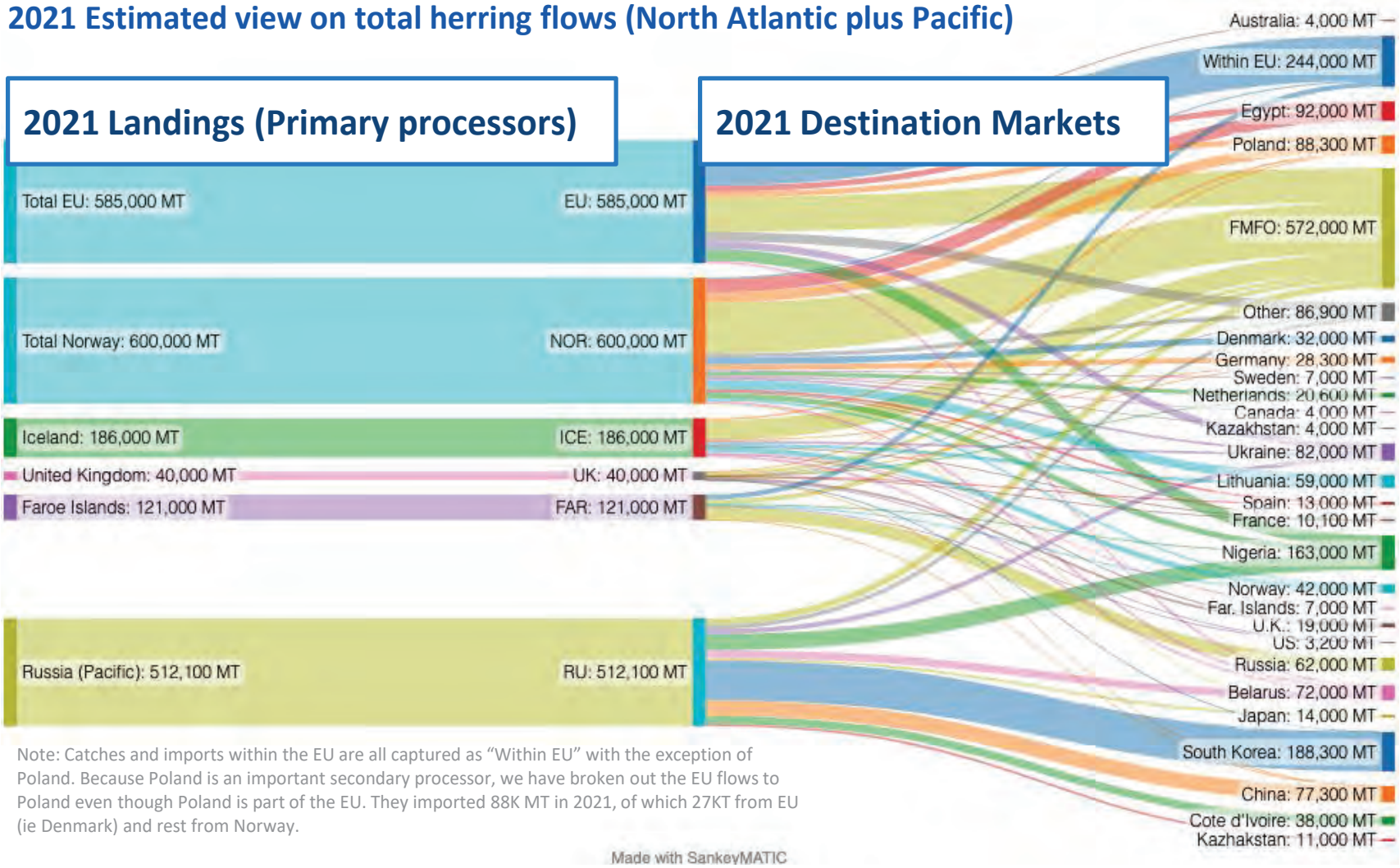
Pelagic species are cheap and healthy proteins, even though increasing in prices, we think there will be stable demand

- Ragnar Ronning, Global Sales and Marketing Director for Kontali

Source: Norwegian Seafood Council based on Norwegian origin. Atlantic salmon prices based on Norwegian origin, NSC. Chicken prices published by the U.S. Department of Agriculture

Atlantic herring goes to the EU and Eastern European markets plus offcuts to FMFO. The Russian Pacific catch goes to Asia. Africa buys whole round from both.

2021 Estimated view on total herring flows (North Atlantic plus Pacific)



Note: Catches and imports within the EU are all captured as "Within EU" with the exception of Poland. Because Poland is an important secondary processor, we have broken out the EU flows to Poland even though Poland is part of the EU. They imported 88K MT in 2021, of which 27KT from EU (ie Denmark) and rest from Norway.

Market destinations for herring worldwide

Atlantic herring is sold on 4 continents

Resource

North America

- Jewish population
- Russian and Ukraine diaspora
- Bait market

Europe

- Premium fat levels (~14%)
- Processed, marinated fish
- Whole fish to Russia, Ukraine

Africa

- Oversize, undersize fish
- Inferior quality
- Whole fish

Asia

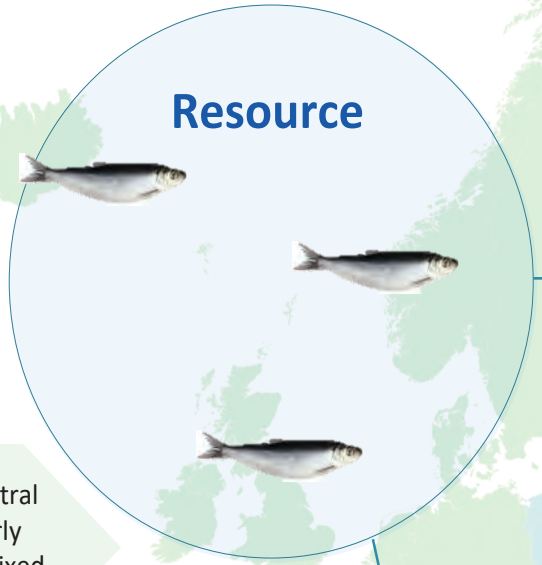
- Smaller volumes (mainly supplied by Russian herring)
- China emerging customer

A closer look at the European herring supply chain, very distinct markets

Greater Europe + Russia: stable volumes

"There have been marketing campaigns, but the experience is that it is really difficult to get changes in habits. It is an older generation fish full stop now."

- Scientific expert at a UK pelagics association



Eastern Europe + Russia

- Demand declined since EU sanctions imposed after 2014 Russian invasion of Crimea
- Whole round frozen a stable cheap protein for Russian and former Soviet States

Demand will resume as soon as distribution routes are reestablished

Chairman of Icelandic Exporter

European demand faces demographic challenge

- Most consumers of herring in Central and Western Europe are the elderly
- Marketing campaigns have had mixed success in recruiting new consumers

"The challenge, which we are facing very soon, is that the herring eating population will die out. There is a huge group of the post war generation, they are all going to die in the next 10 years. We need to make sure that the next generation eats herring."

- Executive Danish Pelagic Producers Association

Western and Central Europe

- Value added products
- Stable demand from certain ethnicities
- Baby boomers

Examples of herring products for end consumers in Europe

Herring products sold on main European retail chains

Carrefour
France

Packaged smoked fillets

Smoked fillets with rapeseed oil and herbs

Smoked fillets with rapeseed oil and herbs

Canned smoked herring in oil

EDEKA
Germany

Herring salad with apple and onions

Marinated fillets with cream

Canned fillets in sweet chilli sauce

Canned fillets in tomato sauce

Sainsbury's
UK

Marinated herring fillets with onions

Smoked fillets with pepper

Reformed herring product

Canned fillets in tomato sauce

Skinless fillets with marinated onion

Netherlands

Brined fillets with onions

Brined fillets with herbs

Canned fillets in tomato sauce

Smoked fillets

Popular formats and effective sustained advertising have grown the Polish herring market and made herring a popular snack food

Marinated

Market Share of Format

50%

Cream Sauce

Market Share of Format

20%

Acidic/ pickled

Market Share of Format

10%

Matjes style

Market Share of Format

10%

- *It is the cheapest fish which exists. But the way it is consumed is totally different. In Poland we use it like an appetizer or a snack. In Russia or Ukraine, it's a meal."*

- *Polish Processor*

Future Markets -- Baltic, Nordic states fund research to innovate in the herring industry

Nordic states supported by government agencies such as Natural Resources Institute Finland (Luke), and Iceland's Ocean Cluster

- Finland Technology Institute LUKE conducted a study into herring and found that by-products can ''easily'' be upscaled and have ''quite high commercial potential'' according to **LUKE Scientist Jaakko Hildenhovi**

- LUKE is also working on fish protein hydrolysate from Baltic herring, working with peptides
- Fermentation can reduce the smell
- Product can be used as a health supplement

B3

Underutilized roe in herring are rich source of B3 and could also be converted into a health supplement – **LUKE**

- Herring gelatin and collagen have several potential end uses, including biodegradable film that shows effectiveness against bacteria and viruses
- Research is ongoing and is mixing herring gelatin with plant extracts

''We have to modify the film properties and make some optimization of manufacturing systems''

- Jaakko Hildenhovi, LUKE

Source: Iceland's Fiskolia

Future Markets -- Icelandic companies are positioning herring oil products to compete with krill oil

Improved handling of herring on vessels and better cooling techniques in fishmeal allows for a **premium herring oil** that can compete with a fashionable krill oil and cod liver oil as an omega-3 rich health supplement

– Margildi CEO Snorri Hreggvi Osson

Krill oil

Margildi sells odorless fish oil for $10-$17/kg

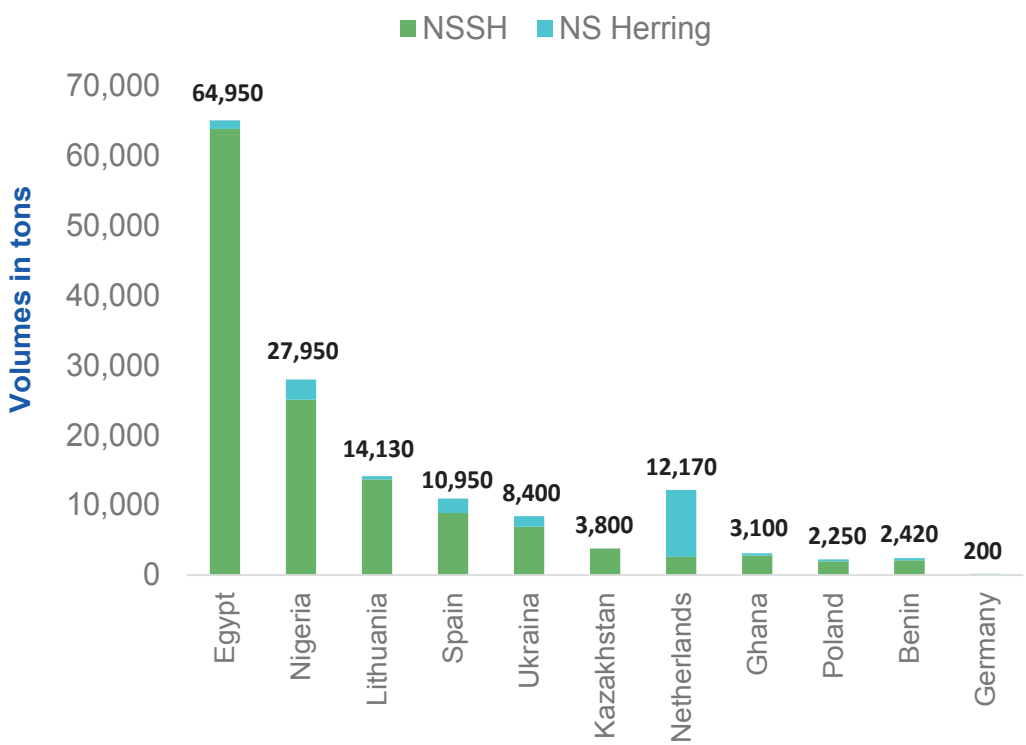
Dietary Supplements **Food Ingredient**

$3/kg when sold unrefined (aquaculture grade)

Source: Iceland's Fiskolia

Whole herring has been a protein source for low-income families in former Soviet countries and Africa

Main importers of Norwegian frozen whole herring in 2021



African fish consumption will slide **2.2% by 2030, from 2020** levels, because of the price sensitivity of that market*

Frozen herring block sizes

45Kg

20Kg

10Kg

Source: Norwegian Seafood Council
Footnote: *OECD-FAO Agricultural Outlook 2021-2030

Grading and specs available from primary processors and perception of customer fat requirements

	Iceland Pelagic	Pelagia (Norway)	Pelagia (Norway)	Denholm (Scotland)	Insights on fat specs from a primary processor (Scotland)	
Herring type		*Spring Spawn.*	*North Sea*	*North Sea*	*North Sea*	
Whole Round						*Fat specs*
	200 gr + 250 gr + 300 gr + 330 gr + 350 gr + 400 gr +	125-200 gr 200-300 gr 250 gr + 300 gr + n/a 350 gr + 400 gr +	125-200 gr 200-300 gr 250 gr + 300 gr +		< 200 gr 200 gr + 250 gr +	11-18% Egypt usually takes 11-12% because they take the first of the July season
Fillets						*Fat specs*
	30-50 gr 40-70 gr 50-80 gr 60-90 gr 70-100 gr	30-50 gr 30-60 gr 40-70 gr 50-80 gr 60-90 gr	25-50 gr 30-60 gr 40-70 gr	30-50 gr 30-60 gr 40-70 gr 50-80 gr 60-90 gr	35 gr + 40 gr + 40-70 gr	for skinless you need big fish, and that usually implies higher fat. We say 14-15% but it could be 12-16% max used for marinating or canning
Flaps						*Fat specs*
	10-16 pc/kg 8-12 pc/kg 6-10 pc/kg 5-8 pc/kg 4-7 pc/kg 4-6 pc/kg	10-16 pc/kg 8-12 pc/kg 6-10 pc/kg 5-8 pc/kg 4-7 pc/kg	10-16 pc/kg 8-12 pc/kg 6-10 pc/kg	12-18 pc/kg 10-16 pc/kg 8-12 pc/kg 6-10 pc/kg	10-18 pc/kg 10-16 pc/kg 8-12 pc/kg 6-10 pc/kg	need lower fat because usually for marinating or brine ideal is 10-11%, can accept 12-14% If canning you can have higher fat Looks nicer if it is lower fat
Deli Cut						*Fat specs*
				10-16 pc/kg 10-14 pc/kg 8-12 pc/kg 6-10 pc/kg	8-16 pc/kg 8-12 pc/kg 6-10 pc/kg	If for smoking 14-16%. Will not accept 18% For marinating 11-12% ideal, 12-14% is usable Tail on is "fancy"

Source: Company product brochures and expert interview of a Scotland processor

Meat specs as required by secondary processor based on end product

Poland meat specs based on application (Lisner)

End Product	Acceptable Fat %	Ideal Fat %	Size	Preferred Format
Oil Marinade	6-12%	under 10%	30-50g	North Sea. already marinated, non sugared. 1-4cm pieces
Cream Sauce	6-12%	under 10%	30-50g	North Sea. already marinated and sugared
Acidic (pickled)	8-14%	12%	30-50g	
"A la Matjes"	10-18%	10-14% (Germany 12%+)	40-70g	Norwegian skinless fillet
Salt brine in bucket	8-14%	12%+	100gr+ 50-80gr	skinless fillet usually from Iceland
Smoking	8-14%	high is good		Only Frozen
Canning	6-15%	12-15%	40-60g	Double flap. Frozen only. “only cheap fish”
Salad (potato/mayo/herring)	6-10%	6-8%	chunks	2-3 cm pieces, usually marinated but can be frozen
Real Dutch Maatjes	14-15% (Max 16%)			

Source: Expert interviews: Marketing professional and former executive of Eastern European processing facility

Meat specs for canners focus more on size than on fat content

Graal and Karavela are the two largest herring canners in Europe. Some specs are governed by the process, but many are governed by the customer taste in 40+ export markets they serve.

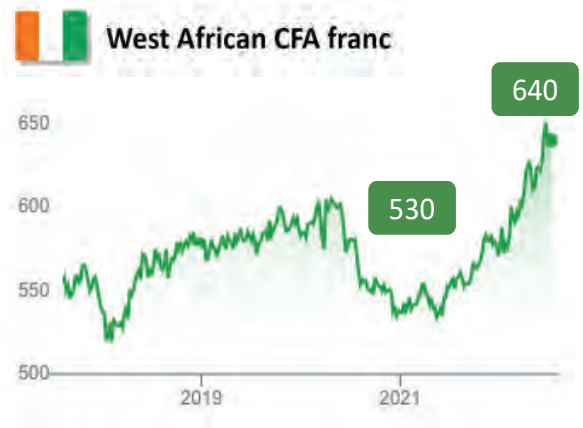
	Graal (Poland)			Karavela (Latvia)	
	Canning	Smoking	Marinating	Canning	Marinating
Size Specs	15-30 or up to 40 pieces per kilo, whole round; 8-12's for double flaps and delis; 30-50g/ single fillet.	Whole fish 200g+. Single fillet 60-90g ideal. 50-70g ok. Flaps any size 8-10, 12-18	Single fillet 60-90g	Flaps: 8-12 is ideal. 10-14 or 10-16 is ok.	Whole round 300g or 350g; Flaps: 6-10, 4-8, 5-8
Fat	5-14% range for Whole Round or deli. For single fillet or flaps, the fat content should be ~12% but can vary somewhat	12-14%	12-14-16% 12% is ideal 10% is low Maatjes also 14%+/-	Fat does not matter.	15-16%
Comments		More flexible in size but same fat as for canning	Salt or vinegar marinating have same requirements	Buys 20kg block frozen butterfly flaps. Mostly blanch then can, a little smoke then can.	Fat does not matter unless very tiny fish and also very low fat. But the size we buy is usually not very low fat

Source: Expert interviews

Africa grows as key market for herring but there is price sensitivity due to currency depreciation and economic decline

Key markets lost purchasing power to weaker currency and switched to fishmeal staple blue whiting

- Africa consumes **13%** of global mackerel supply and **18%** of Atlantic herring **– Kontali**
- Africa is 2nd biggest market behind the **EU (40%)**, but remains highly price sensitive
- Small pelagic fish well suited to **African cuisine**: cheap, strong flavor and Africans like seeing entire fish on plate
- Africa buys all inferior quality fish: Chairman Iceland Exporter



- Nigeria is getting priced out of the herring market and buying blue whiting (competing directly with the salmon industry for blue whiting as the source of fishmeal and fish oil)
- Blue whiting exports to Cameroon, Congo-Brazzaville and Nigeria up 10% between 2020 and 2022 to 176,000 tons
- Blue whiting is cheaper than herring:

Blue Whiting €0.70/kg vs Herring €1/kg

Note: as of August 2022, 1.00 € = $1.00, which means that Herring at Herring €1/kg is approx. US$0.45/lb.

Source: Herring export prices published by the Norwegian Seafood Council. Blue whiting prices published by Nordea.

Egypt is the outlier in the Africa market, buys more volume at a higher price from main suppliers

Bigger fish at a lower price

- Egypt gets bigger sizes like 300-350g+ from Norway
- We (UK exporter) supply them 200-250g (because it's what we have)
- Egypt can take any size

"Egypt takes anything"

- Egypt will buy any fat content
- We usually sell them 11-12% fat: they get the first of our season in end July when we are starting up the factory and want to get ready for processing

-- Expert from UK exporter

Particularities of trading with Egypt

- Requires fish to be received within 9 months of catch, and given possible delays at sea we ship them the first catch of the season (July)
- Egypt as a free trade agreement with the UK
- They pay TT within 7 days so that cash helps fund the season/ The French and Germans pay in 30 days.

In order to do reduce cost, Egypt can buy a whole reefer of whole round herring : 1,000 metric tons from one supplier, or even 4,000 metric tons. But our company, we only do 20,000 MT/ year in total and probably only do 1,200 MT of whole round across all customers

- UK Exporter

Nigeria is a huge market but highly price sensitive

A country of **>200 million habitants** with a preference for fish over meat because of lack of refrigeration in the country

- Nigeria's aquaculture industry is shrinking as farmers struggle with the cost of imported feed
- Market more dependent than ever on pelagics as the cheapest fish around
- Nigerians reeling from inflation: carton (10kg) cost $50 (21,000 naira) in August, up from $40 earlier in the year

"The market trend for herring fish is very good and for other pelagics such as blue whiting, and sardine. Blue whiting is the most preferred fish now because the price is the cheapest."

- Consultant and former director of fisheries in Nigeria

"In the old days Nigeria was the place to get rid of big quantities. There's not too many questions asked about fat content."

- Danish Processor

Nigeria supply chain

Major importers

TRITON GROUP

STALLION

+

25-30 Medium sized importers

quotas of ≈ 100,000 tons license

Major distributors

- Cold storage facilities will purchase hundreds and thousands of tons
- + N1,000 mark-up at distributor level

Agents

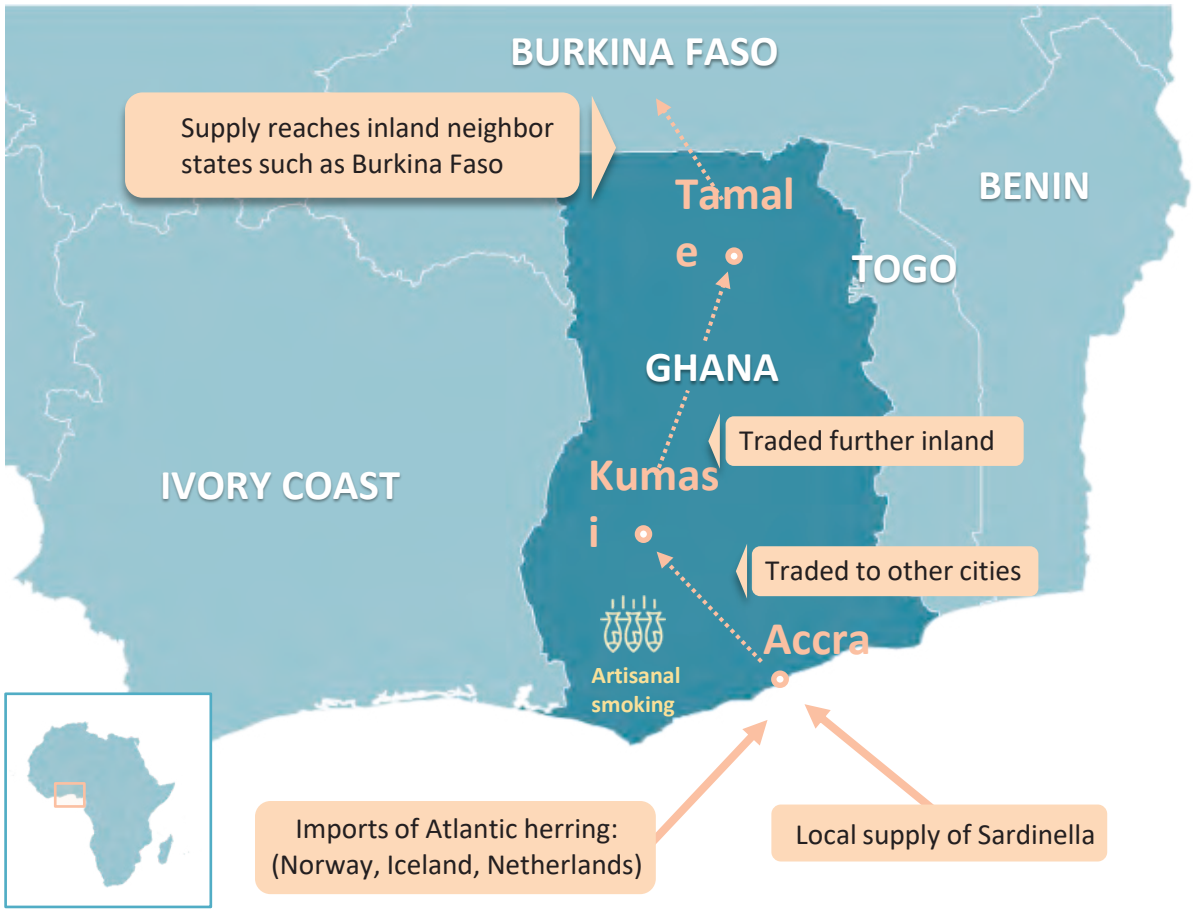
- Minimum purchase 50 cartons (1 cartons =10 kg)
- Agents will sell to smokers or to fish markets
- + N1,500 in additional mark-up

Market sellers

- Market sellers
- Other vendors

Note: Former government minister and consultant

Ghana Case Study: An example of how a West African consumes herring



- Ghana started importing Atlantic herring as locally sourced sardinella became scarce
- Product smoked due to lack of cold storage, smaller sizes preferred (as sold by piece and longer lasting). Fat content 12%-17%. Some fish gets grinded into shito (served as a sauce)
- Much of the local sardinella is spoiled because of lack of refrigeration capacity. Ghana's largest cold storage facility is shut down – Ghanaian importer
- Some exporters reluctant to engage with West African markets due to scammers

Source: Former fish importer and consultant

Contents

Interaction Summaries of Expert Interviews

#1 Scottish herring exporter with decades of experience and previous vessel owner	#2 Owned a pelagic processing plant in Denmark, handling 15,000 tons of fish a year
• The UK fishing season has some subtle differences between northern and southern fishing grounds. Fishing starts in the Orkney Islands in June, at the start of the North Sea maatjes season. It is more likely to start in July in the seas around northern England. • The herring fishing season lasts until August and then British vessels will concentrate on blue whiting for the rest of the year • The UK has suffered from overfishing and especially since the emergence of purse seiners since the early 2000s, which hoover up fish. It is a similar problem to tuna fisheries in the Pacific Ocean • The onset of larger vessels pushed smaller processing plants out of business, since they couldn't handle the larger volumes coming from the newer boats. The cold chain is hugely important for herring, nematodes can be fatal to humans and fish either have to be frozen or kept in brine for 30 days • Herring was an artisanal fishery in places like Scotland and Norway big companies like John West started to gain market share in the 1960s • Herring has declined in popularity in the UK and the only meaningful purchasers are Jewish people "who have eaten herring for hundreds of years". Expert previously sold to Jewish supermarkets in the US such as Acme and Raskins, and even Costco • *"In the UK, the market is not huge and it's a real struggle to get people to eat herring. But a hundred years ago, even when I was a boy in the 1950s, everybody ate a herring. They would have herring once a week. It's a really nutritious food."* • Experts predicts the market is not going to increase in the UK. Also said Norwegian marketing dollars have not converted new customers. • In Eastern Europe, demand is there as long as people in countries like Ukraine can still afford it. • *"What's happening in Ukraine will change the market totally for herring. I don't think they will have the money to pay for it. Poland is a big market, everybody wants it. The trouble is herring is perceived as cheap. Everybody is trying to undercut everybody else."*	• The Danish pelagic fleet has transformed from an artisanal fleet to modern vessels with up 1,500 tons in capacity, and this was more volume that processing factories could handle • The Danish fleet is consolidated to only 7-8 vessels using RSW technology, from 500 boats in the 1970s. Today's handful of vessels catch more than the entire fleet did in the 1970s. • "This is the only food industry where you are relying on hunting." • Denmark has refashioned itself into an exporter of processed herring products, transitioning from selling whole frozen fish to now preparing skinless filets, marinades, or herring cut into pieces. Norway, the Faroe Islands and Iceland all have huge processing plants with limiting secondary processing capacity. • *"In the old days Nigeria was the place to get rid of big quantities. There's not too many questions asked about fat content."* • There are two types of processing plants. One is a plant to freeze whole round herring. These plants will maybe filet 20% of their volume. This is more than half of total processing capacity. The other is a full-service processing and marinating facilities with offal that goes into fishmeal. Then there is frozen-at-sea, done by the Dutch. Today's processing plants are all located in places where herring fishing takes place more than 2.5 months a year • Buyers and sellers in Norway use the auction process, but all other buyers observe the Norwegian way in OTC trades

Interaction Summaries of Expert Interviews

#3 Expert has worked at the Norwegian Seafood Council and a leading Norwegian exporter	#4 Executive at one of Iceland's leading pelagic exporters Trained as a fisheries biologist
• Fillets and flaps gets mainly sold to European markets, and whole round fish goes to Africa and some European markets • Norway's fleet consists of 70 large and 230 smaller coastal vessels, catching about $400m of herring or about 350,000 metric tons a year • The bigger vessels are between 60 to 80 meters in length and can hold 2,000 tons of fish. The middle size vessels move in coastal waters and are 25-30m long, and then there are smaller artisanal boats. The larger ones are mainly purse seiners but there are some trawlers. Vessels are mainly family-owned. • Norway's industry went through a severe consolidation process emanating from the collapse of the Atlanto-Scandic herring resource in the late 1960s. The industry lost money for a long time, but it is now profitable. • Norway straddles two fisheries. The Bering Sea, which produces the Norwegian Spring Spawning Herring (NSSH). And then the North Sea, in waters close to the UK and Norway. • There are now 10-12 processing companies in Norway and there used to be hundreds. Processing companies buy fish from Norway's developed electronic auction house. Although the auction house, the Norges Sildesalgslag doesn't publish prices, The Norwegian Seafood Council has pricing information derived from export data • One company, Pelagia, controls about 45% of Norwegian volume. The next player probably controls about 15%, and the rest only really have a 1-2% market share. The main product is whole round frozen, also some companies have processing capacity to produce filets and flaps • Prices closely correlated to the size of the quota, but there can be other factors influencing price. Almost all herring goes for human consumption. Fishmeal plants take the residue from filleting. • Egypt has emerged as a No. 1 market for larger NSSH fish and take "huge volumes", Nigeria also a substantial. Africa is taking volumes previously destined for Eastern Europe and Ukraine. Poland remains the most important market for fillets.	• Iceland didn't start fishing for herring until the 1970s but it has become a significant business for the country besides the cod and white fish industry, and in recent years salmon farming. The Icelandic Summer Herring is a 200,000-ton catch. For Icelandic vessels, the Icelandic companies can own fishing vessels and processors, although no one company can hold more than 12% of fishing pelagic quotas (they can hold up to 20% for herring individually however). Fishing vessels are bound to very specific laws. The fishing crew takes one third of the value of the catch, the vessel owner takes the rest. • Vessels are modern. The market has been very liquid and companies such as Brim can get attractive financing terms from Norwegian banks like DNB (using assets as collateral) • The industry is now highly consolidated, and it is profitable because of "mass economies of scale". There are two processing plants in Iceland that can process 1,100 tons a day. There are some 7-8 processing plants in Iceland (and 3 in the Faroe Islands). • Iceland mainly produces whole round frozen and filets. Fishmeal plants in Iceland take the leftovers from filet lines. In herring, top quality fish goes to Europe, and inferior quality goes to Africa. In mackerel, top grades go to Japan. Iceland got severed from the Russian market in 2014 when that country invaded Crimea. • *"In the Ukraine and Belarus, they will have economic problems for years to come. Then, they tend to eat cheaper fish, so the market demand is not going anywhere."* • Roe is an unstable business because of the unpredictability of the capelin catch. It can from zero to one million one year to the next. If capelin starts to prematurely spawn, the fish goes to reduction (at a loss). • *"We have health to sell, and we have a sustainability profile. Over 90% of our catches in Iceland are MSC certified."*

Interaction Summaries of Expert Interviews

#5 Executive in a pelagic fishing industry association, representing fishing companies that hold 10-12 large vessels in Nordic state	#6 Quality department staff at one of Scotland's major export companies. Food technology and engineering background
• The Danish fleet catches about 400,000 metric tons a year of pelagic fish, including 100,000 tons of herring. It is now – average vessel age is 8 years old. Catches a mix of Scandinavian and North Sea herring (the major processing company in Denmark processes fish from several countries) • *"The port of Skagen has the Mercedes of pelagic fishing vessels"* • Danish vessels enjoy higher quotas on average to the Norwegians (about 10,000 tons versus 2,000-3,000t per vessel in Norway) • Some Swedish and Poland quota catches land in Danish ports, sometimes the country-of-origin can be quite confusing as there are several variables (fish can be trucked into Denmark as well) • Denmark has a herring eating tradition that is focused around festive periods – Easter and Christmas. It's salted or preserved in vinegar • Herring is losing popularity among younger consumers. The association has a marketing campaign called "Crazy about herring" which aims to entice younger people to try herring products. Also using chefs as influencers • *"A lot of chefs like to play with old fashioned products. We try and play into this, with this campaign. The challenge, which we are facing very soon, is that the herring eating population will die out. There is this huge group of post war generation people, they are all going to die in the next 10 years. We need to make sure that the next generation eats herring."* • It has been difficult to convince producers to back this campaign • Danish processors follow the prices set by the Norwegian auction house • *"The market for pelagics fluctuates rapidly so within the time that I've been in this organization I've seen herring sold at less than 3 kroner, and plus 7 kroner. So quite a big fluctuation in price over the years and through the season."* • Prices collapsed when Russia invaded Crimea in 2014 • *"It's a huge market, and herring is a big commodity in the Russian market. It's probably not going down, it's a cheap way of getting your protein."*	• Scotland has three processing companies, all based in the port of Peterhead. Each owns 2 fishing boats • Company produces flaps rather than skinless products because they are easier to make • Companies focus on roe from late August to early September, when roe can represent 5-8% of the catch weight. Sold to Far East Asian countries • The roe fishery is 4 hours from Peterhead – the product is very pure with a nice texture and sells well in Asian markets. The price for the fish for roe is 2.5x fish made into flaps or fillets. Flats + fillets 1.5x on whole frozen round • Mackerel has emerged in popularity as a healthy fish. Less so with herring, but it is still popular in Scandinavian countries • Herring under 200g is sold whole round to the bait industry. Crabbing in North America and Europe. Bait 5% of total catch, another 15% frozen whole round for other markets, and the remaining 80% is processed • Of this, 60% is flaps and the remaining 20% is deli preparation • The market has been resilient for processed products in 2022 • *"The market likes picked and canned fish."* • France is a major buyer of skinless herring and also buys a lot of flaps. Germany is a major buyer. Scandinavia, Baltics, Eastern Europe all strong markets. • Company is only one in Scotland that doesn't process NSSH, only focuses on autumn spawning herring in UK waters

Interaction Summaries of Expert Interviews

#7 Executive at major Norwegian pelagic exporter	#8 Executive at herring producing firm in Norway
• The Auction House has existed since 1917 in Bergen and is enshrined in Norwegian law. Mediates sale of all pelagic fish from Norwegian vessels by mandate, now other flagged vessels landing at Norwegian ports participate in bidding process. Mediates $1.5 billion of fish sales annually. • The most significant species in value is mackerel, followed by herring • A minimum price for fish, and fishmeal/fish oil is pre negotiated with processors • Four auctions daily for human consumption market, and 3 auctions for fishmeal • Data is shown to participants on any unsold catch from any given day • There are five size classes for human grade fish • In Norway there are 70 big purse seiner vessels (from 800t to 3,000t capacity but averaging 1,500t), 100+ medium-sized trawlers (300t-500t) capacity, hundreds of smaller vessels • Catches in January are suitable for fileting, butterlies, flaps (some whole round) • February is roe season, this has become a significant market in last 4-5 years • *"Last year the average prices paid for the capelin quota was about NOK14.5/kg, that was an OMG price"* • A bulk of the NSSH catch is then caught in Sept-Dec period • Norway's ports now handle 700-800t of pelagic fish a day, it used to be 400-500t a few years ago • UK vessels will often land mackerel in Norwegian ports because they can achieve better prices through the auction system • In Norway prices ownership of vessels and processing companies are separated by law • *"The end buyer wherever they are from and that can be Nigeria for example, can rely on a transparent system. You have the same kind of business for all the players. A kilo is a kilo. You keep at bay all the uncertainty if the buyers can rely on the information, they don't need to hold back much, and they can give the correct price and they don't get that much surprise."*	• Biggest pelagic company in the world with two salmon farming companies as owners, also owns pelagic assets in South America • Norway's prime mackerel season is late August until September – two main products – the highest paying consumers (in Asia), or processing for roe and then into fillets • Herring caught towards to end of autumn until December, then some in January, then herring roe in February. Eastern Europe biggest buyer or the herring roe • Barents Sea capelin roe is also February-March (just after Iceland) • Fishing companies will save some of their quota for the roe market • Roe fish will be sold at multiple times the value of regular pelagic, up to 20x • Most herring will go to human consumption unless the FMFO prices are unusually high and "consumption" markets are unusually low • Company sells an increasing share of fish to Egypt and Nigeria • Sand eel is "quite a valuable fishery" and happens April-May • There is overcapacity among processors • *"There is a lot of competition on getting raw material and you are extremely compressed on the margins"* • Company has 21 filleting machines, most in world (between different plants), Scandic Pelagic alone in Denmark has 27 machines (most at one single site) • "There is stranded capacity and low margins. Getting payback on a new factory – there are other better ways to lose money." • Some factories only run for 50-100 days a year, many work 3 days a week, processors trying to figure out how to tap higher margin VAP products • Selling mackerel in tomato sauce in Sweden, for instance

Interaction Summaries of Expert Interviews

#9 Scientific Expert at a UK pelagic fishing organization	#10 Reporter with specialization on herring and pelagic markets, global seafood media
• Herring fishery has important to the UK since the 1700s. Fortunes were built on the back on this history and the exceptionally large churches in East Anglia (on the eastern coast) were built on herring money • The super modern fleet in the UK nowadays (there are 22 Scottish vessels, which of which average 78 meters in length) were built on the back of mackerel money, and through its newfound popularity • *"In the 1970s, the herring stock collapsed in the North Sea, and the west coast of Scotland, and that led to the search for mackerel. Since that time, mackerel has become more valuable and has become the primary goal."* • *"But everybody still fishes herring, it is still the root of everything."* • The fishing companies are a tight business (skippers are all related and you must be family to get involved. Three processing companies. Pelagia got into the UK because Shetland Catch was reliant on the Russian market and collapsed • Herring always produced into flaps and fillets but a "significant development" has been the transition and focus to roe fishing • *"Roe has become a dominating market because of prices, and because of the loss of the capelin market in the Bering (or Barents?) Sea. It's not just a stop gap, it's becoming a permanent feature."* • *"Canned fish is becoming a big thing now, and they will be selling to all the big supermarkets."* (there is one cannery in Peterhead in Scotland) • Stock identity is a "key topic" right now, there is a newfound genetic understanding of the herring stock, and countries can prove country-of-origin • *"This is relevant because of Brexit and access to waters, and if we establish that fish in UK waters are NSSH, that will open a can of worms."* • Herring is held back by its bony structure. • *"There have been marketing campaigns, the experience is that it is really difficult to get changes in habits. It is an older generation fish full stop now."* • ICES and certification: all about proving what is in your waters to argue what share you should get • *"We are moving away from a system that is about historical catch, to something that looks at proportionally catching fish that actually are in your waters."*	• Assembles a weekly story on pelagic pricing, often based on the same sources (Norwegian processors, couple of sources in Denmark, Iceland). • Norway is transparent about the whole supply chain and publishes series of data, from monthly statistics from the Norwegian Seafood Council, to the minimum pricing mechanisms set by the auction house • Capelin market in the last few years "went crazy" because of the roe and herring roe can be used as a substitute – they are going to the same markets • In Japan the roe is becoming used for "masago" in Japanese cuisine • Asia has a "slight preference" for North Sea roe, over the NSSH variety • *"With herring it all seems to be dictated by demand at a particular moment in time. If there is higher demand for a certain product type of market, they will switch how they are processing."* • It could be fishmeal/fish oil depending on prices, and it could be flaps or canning • Capelin tended to go to Ukraine for smoking, but without that market, it was processed into fillets and flaps for the German canning business • Africa gets supplied when there is an abundance of fish for European processors • "The African markets don't pay anything like as much as the European markets or other parts of the world do" • Herring *"is one of those traditional products and the companies are quite happy to keep supplying as is and there's not been huge innovation."* • The innovation was really on the roe side, and turning capelin roe into a sushi ingredient, tapping into the booming sushi demand (demand has gone from 3,000 tons a year to 20,000 tons a year" • There are now 7-8 companies preparing roe for the market • On the certification topic, countries have been fishing for so long that this contributes to the inaction to find a dispute • "The markets are just slowly adjusting their buying policies to say they are sustainable, even if it is not MSC certified" • Modern day pelagic fishing profitable, can see this from Danish and Scottish financial results (which have to be disclosed) -- Scottish profit margins 50% before fuel price inflation

Interaction Summaries of Expert Interviews

#11 Ghana pelagic fish importer, owner of cold storage facility in Accra Previously worked as sales and marketing director for tilapia farmer	#12 Exporter with major Scottish exporter Decade of experience
• Ghana's domestic fishery (mainly sardinella) collapsed, and the country now relies on imports, out of the main fishing season. Local catch abundant in June-August but significant volume goes to waste because of lack of cold storage • Herring is smoked until it is hard and rubbery, then it gets sold all over the country and to neighboring countries (Burkina Faso and Ivory Coast for instance) • Smoked product lasts for "weeks on end" and it is significant because many households have no electricity and no coolers • Ghana market has suffered with the devaluation of local currency versus USD • Local catch can be half the price, depending on how abundant the catch was • Ghana will also take fish from other African markets: Angola, Mauritania • The bulk of the market is smaller fish because it is easier to smoke • It is also easier to sell smaller fish (fish is not sold by the kilo) • Smoked fish is rehydrated in soups • Traders like smaller fish because people can't afford a whole fish • Horse mackerel is different, that will be deep fried • Fat content is high in herring imports (12%-17%) it needs this higher amount because it has to retain a sheen of fat after smoking • Cold storage facilities will turn away herring, they prefer to use capacity for other products. Volumes will go unsold from a bumper catch and fed to pigs. • *"All of this is just because we cannot preserve the fish."* • Herring is one of the cheapest types of proteins available in Ghana • Horse mackerel and tilapia are the more expensive forms of fish in the market • Imported fish is subject to 50% tax. $1 of fish becomes $2 with tax/port costs, without freezing or preparing it. Another 50 cents added for freezing • Tilapia is an expensive luxury for inland Ghanaians. Cost of production way cheaper for marine fish. West African prefer fish over meat. Meat can't be kept • *"The fact that you can smoke the fish makes fish a better choice than meat."* • Expert's company went into receivership in weeks prior to interview because of currency devaluation. Companies have no access to finance in Ghana • Companies able to preserve fish will make money because they can release it to the market when prices are high	• Scottish season starts in May but herring at this time is tiny and low in fat (8%-9%) not worth it. Marinating business however is better with low fat. July-to-September main season whole frozen round to Egypt. Rest of year: mature fish for roe, flaps + deli preparation (high fat will be deli) • Under current ownership firm only buys Scottish fish, would previously buy Norwegian volumes for processing • Scottish fishing costs are higher than Norwegian, Scottish exporters follow Norwegian auction process for pricing • The unloading of vessels takes time and the catch that is removed towards the end of the process can be of an inferior quality to the first unloaded. Like the Norwegian process, vessels will report to the processing plant: tonnage in the hold, fat content, size average, MSC status (i.e. GPS location of catch). And customs procedures • Ideal fat range is 13-15% in the maximum average, 18% fat is too much for anybody to handle. Larger fish within a catch can be 14-15% and the smallest fish are at 11-12% so need to take into account the difference between sizes • Lower fat will bring marinating companies into the process – higher fat is dead weight to them because it is loss in the marinating process • 250g is the target average size. Processing company pays the same price for all sizes but will sell based on size differentials. Larger sizes = higher prices • Processing company will buy 55 landings a year and each will average 1,000t • Egypt market pays higher prices for any sizes compared with the rest of Africa. Other African countries can have scammers. UK has FTA with Egypt. • Selling to the EU market has become more onerous after Brexit • German and French buyers marinate and want best quality, they send inspectors to ensure that. Poland is more price sensitive and Poland smokes (want high fat) • Eastern European buyers mix up herring from different origins • Roe – high end goes to Japan and low goes to Romania. Middle range – Kazakhstan is a significant buyer. Kazakhstan can buy roe from Russia and Europe and sell it to Japan. You can mix quality herring roe with capelin roe. Roe to Japan is $9.50/kg and $4.50/kg to Romania. Top quality – yellow with no bits • Certain companies specialize on herring roe because it is a fussy process

Interaction Summaries of Expert Interviews

#13 Marketing professional for major Polish processing company

- Company is the biggest processor in Poland. Main product is chunks – 1cm-4cm strips made from fillets or may buy pre-cut from Norway (NSSH preferred)
- 4cm strips a more recent trend, they look nice and is a move to making fish look nice on a plate (borrowing from the Japanese concept of "Ikebana" or *"painting the plate with fish"*
- More fat content can make herring turn brown -- Polish like white herring
- Salad – a potato-mayo-herring mix – uses offcuts from herring.
- Polish buyers purchase chunks and full fillet with skin on
- Over 50% of market is marinated in oil, 2nd is cream sauce and herring fillets (~20% of the market). Acidic (i.e. pickled) is popular in Poland is ~10% of market
- Buy from NSSH and NSH fisheries to reduce dependence on a single provider
- There is a non-Dutch maatjes product – herring marinated in oil, then salted
- This is the only product that requires putting into milk or water two hours before preparation because otherwise it is too salty
- Herring fillets are sold from buckets in supermarkets – 70% of those sold in 3-6 weeks before Christmas and Easter festive periods – low gross margin product
- Biggest product is "village herring" which is marinated in oil in a jar
- Company only buys MSC but does not show MSC labeling on packs. This is table stakes for entry to German market. Started to buy non-MSC last year.
- Company doesn't go near Baltic states, this is dominated by Viciunai, Santa Bremor in Belarus used to compete, but they are locked out of Poland market
- Viciunai by contrast is expanding into Europe, they have already taken market share in Germany and could enter Poland
- Company sells one line of smoked herring to France
- Kapitan Navi in Poland took 11% market share in Poland by dealing with major retailers. This firm only does one receipt – salt and oil marinated
- In Poland, Biedronka is 45% of the retail market but they sell 50% to 60% of all herring in Poland. It is all private label, but that can include some high-end private label products. Lidl is 15-20% of the market, exclusively private label.

#14 Former executive of major Polish processing company

- Company deals with all types of marinated products, maatjes and salads. No smoking or canning (these two product lines are sub-contracted)
- Meat structure varies throughout year – water temperature, spawning times, fishery, fat content, meeting specs is constantly a challenge and technology is required. The key Norwegian herring season is October to January.
- NSSH fat content goes from 15-16% in September to <10% in February
- Polish priced out of the market in June because of Dutch maatjes season
- Baltic fish unsuitable for maatjes, Polish style maatjes needs >10% fat
- Netherlands maatjes requires 14-15% fat, 16% highest acceptable
- NSSH September fish too fatty, so buy from October to November ideally for marinating. Also to achieve fillet weight between 40-60g for maatjes style
- Norwegian style has the right fat content and meat structure for Polish
- German demand is "huge", much bigger than Poland market, can obtain higher prices in German market for >12% fat vs 10%
- Marinating is done by primary processors, in Denmark. Never in Norway. There were attempts to do this in Poland, but they were unsuccessful.
- Denmark offers single fillets, and flaps with skin on
- Company has a specific marinade recipe with sugar (carried out by primary processor). But customers can buy non-sugar marinades
- NSH better for fillets – sizes are 25—40g, this is for fillets in cream
- Canning and smoking only use frozen, not marinated. Canning – flaps with skin on of filets with no skin. Scotland and Ireland perfect for small flaps (for cans). Canning has greater flexibility with fat content.
- Other products requiring skin on: roll mops and Bismarck
- Product quality is consistent across European countries: Poland, Czech Republic, Slovakia, etc. Only difference is smaller packages for Polish market
- Russia, Ukraine: *"It is a more basic protein in these markets. It is the cheapest fish which exists. The way they consume is totally different. In Poland we use it like an appetizer or snack. In Russia and Ukraine, it's a meal"*
- Herring became "fancy" snack product in Poland

Interaction Summaries of Expert Interviews

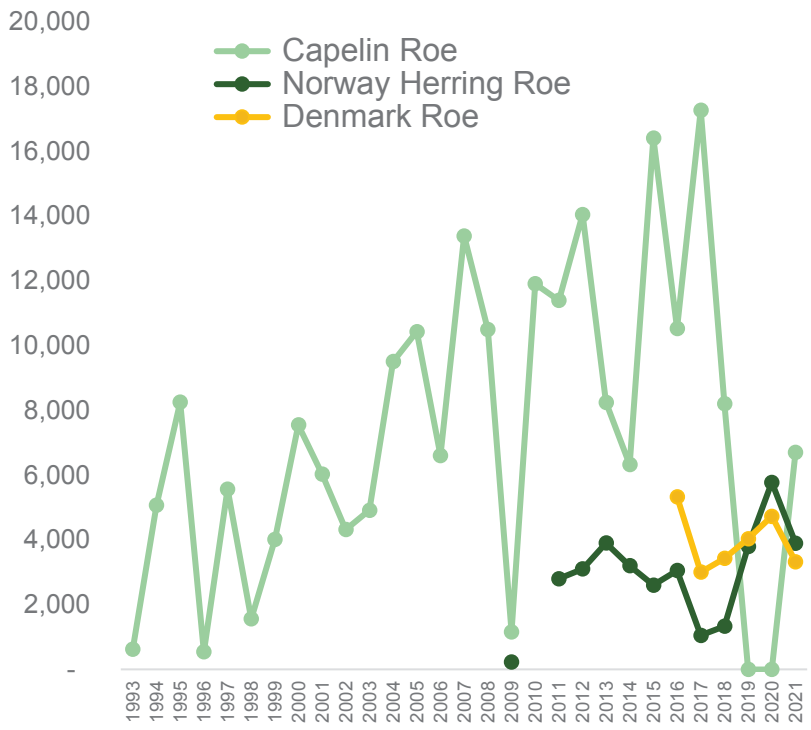
#15 Executive at Seafood Certification Organization	#16 Marketing professional with major European canning and processor of pelagic fish
• The North Atlantic fishery is one that is comprised of developed nations, and these developed nations should be able to set the example on how to reach a fisheries agreement • This has failed to happen, the coastal states have not agreed to stay within limits proposed by ICES for more than a decade. The dispute arises from movements in the stocks further north with climate change as the probably cause, and states clinging on to historical quotas. It becomes more difficult when the migration of one species to a certain zone pushes another out to a different place • All states agree on the scientific quotas, but just don't observe them. They have only agreed to them 3-4 times in 25 years, and not once in the previous decade • There is too much fishing and declining fishing stocks that is only held together by once-in-a-decade oversized recruitment classes that keep stocks in check • There is big pressure on the coastal states to come to an agreement because the market pays a premium for certified fish • The feed companies for salmon could also apply pressure on the fishery. About half of the 2.6 million tons produced between mackerel, herring and blue whiting goes to the feed industry • "Getting this certification back is not an easy process. Countries have to agree again on quotas through international dialogue, and this will take time. A new consensus would have to be based on science, and not historical quotas." • There has been an encouraging trend of more regular talks, rather than just a yearly meeting • ICES survey will be published in late September. Traditionally, the coastal states will meet in October to reach an agreement • There has been some meetings in non-traditional locations, so there is some optimism	• Executive has held several roles in the Eastern European seafood processing and canning industries • Size is the big requirement of the European canning industry for herring. For canning 30-50g is the best size, or 20 to 40 pieces per kilo. It's easier to work with fillets or flaps for canning • These are smaller fish and they are more likely to come from the Baltic Sea, rather the NSSH stock which is too large for most of the year. NSH herring is good for canneries. NSSH is ideal for marinating, and this is consumed in Poland • Fat specs – 14% is ideal but there is some flexibility. 18% is too fatty, and 10% start to get problematic. Size has more weighting in importance • Trials in Eastern European country with fish from Pacific North America were unsuccessful. Similar results with Russian Pacific fish. • Canneries prefer to take fish fresh if possible, as freezing adds cost. But the length of the season makes this impossible to observe all year round • No cannery in Europe can process 2,000 tons a month. The main players are GRAAL in Poland, Karavela in Latvia. King Oskar is a Thai Union brand that is canned in central Europe and is popular • There is a scarcity of herring, all processing companies are struggling with this • *"There is a scarcity of whole herring. There is not enough, the sea does not give out enough fish of this size. It's becoming more problematic every year."* • The fat requirements for smoking and canning are similar, although they are two completely different technologies • The Baltic Sea season starts in July because the structure of the fish is too weak then, temperatures have to fall, so more autumn months • Canned herring is a snack for Eastern Europeans, it can be eaten as an easy lunch with bread or a snack. Marinated fish goes into salads. Smoked fish is used in a salad or with pasta, like an antipasti • Skinpack products, ready-to-cook with garlic and herbs, are gaining in popularity and this also holds true for pelagic fish

Interaction Summaries of Expert Interviews

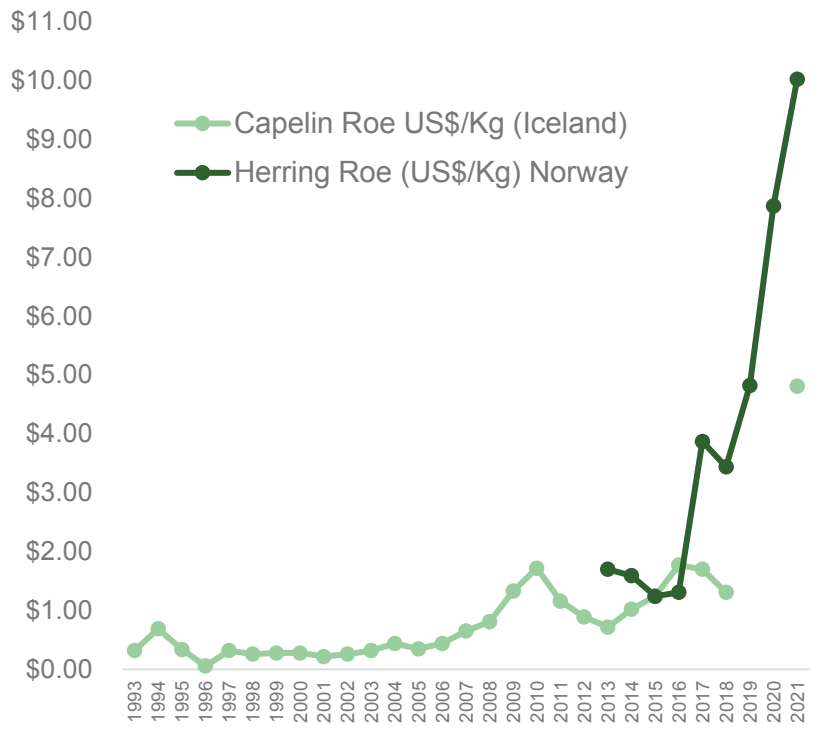
#17 Marketing professional at Eastern European Seafood processing and canning company	#18 Consultant and former director of fisheries In West Africa
• European buyers have been forced to relax their standards on MSC mandatory certification because of the sheer volume of fish that became non-certified • Canning – size is the most important, best size is 8-12 or 10-16 and in flaps, 8-12 preferred over all else. Like others Company sells product in 200g flat cans • Company exports to 46 countries, has inhouse R&D and developing new products with clients. Private label and co-man big part of business • The canneries are on the side of the coastal states in setting quotas exceeding what ICES recommends. *"We are fighting about the quotas and trying to prove there is enough fish"* • Argues that MSC is a political organization • Conflict because MSC did a lot of marketing in European countries • Customers asking for alternative certification such as "Friend of the Sea", one retailer took mackerel off the shelf because it was not MSC certified • *"Today when there is no MSC, they really changed their attitude and now they buy non-MSC. MSC is available in Scotland and a little in Norway and Iceland, but the regions where you can big and fat fish for chilled are not MSC."* • Growing scarcity means the canneries cannot hold the cost and *"retailers are objecting to price increases"* • Fat content is not a concern for smoked and canned fish, fish available is always usually above 10% content • Company buys flaps from Scotland, Faroes, and Iceland. Norway is more expensive • Also buy frozen butterfly and frozen block • Smoked is a very small part of the market, company does prepare kippers • For marinated herring and fermented (put in oil) fat is key and has to be 15% and above – this is for the Latvia and US and Australian markets, and it also goes to Jewish populations	• A former official who mandated that fish importers have to build aquaculture farms to earn a license to import • Country imports more than $1 billion a year in imported fish, most of which is pelagic whole fish • Nigeria has an established seafood importer distribution chain. There are five or so major importers such as Triton and Stallion • Then there are several major distribution companies in the country, who deal directly with the major importers. And each distribution has agents, who will sell to market sellers and small-scale smokeries • *"It is not as if I can just walk into the company now and buy directly from the importer by carton. That does not make economic sense. When somebody only wants to buy 10 bags, or women who want 2 bags, they have to buy through different levels."* • There is a N1000 mark up from the importer to the distributor, and another N1500 by the time the fish is in markets in Lagos • Herring demand is strong, but Nigeria's economic troubles means that blue whiting (previously used almost exclusively for fishmeal) is now growing in popularity • Within herring, importers are preferring Russian fish. There is a packaging advantage. The fish comes in two slates and you end up with 22kgs of frozen fish, more than the 20kg of frozen fish from Norway or the Netherlands. This Russian fish has gained market share in Nigeria. • The Russian slates thaw quicker, allowing distributors to handle the size the fish quicker. Time to market is key with a dearth of cold storage in Nigeria • Sellers and smokers will often try and sell all the fish they prepare in one day • The Nigerian economic troubles are also leading to the closure of aquaculture farms, which is exacerbating the supply of fish to the market

Two years of no capelin catch accelerated the opportunity for herring roe and prices skyrocketed

Metric tons of Capelin roe exports from Iceland vs Herring Roe exports (Norway + Denmark)



Export Value in US$/Kg of capelin roe exports from Iceland vs herring roe from Norway



Source: Iceland data from Icelandic Directorate of Fisheries. Norway data from Kontali - represents "Herring liver/roe/milt frozen"

While Japan is the primary market for the highest grade roe, Romania and Kazakhstan are also markets for mid range and "industrial" grades

Japan is a high value roe market but difficult to deal with. **But Japan is not the preferred market**. Because it is difficult to ship. There are different complications involved.

- a UK pelagic expert

Kazakhstan has emerged as a place that reprocesses herring roe, **doing mixing and coloring** and then re-selling to Japan

- a UK pelagic expert

Roe season is mid-August but it depends - we start and check how much roe there is… we try and test a few metric tons. If poor quality, then we pack and sell to Romania for a cheap price. They use it to make salad (dressing?) and sauce in a tube.

- a UK pelagic expert

Japan

Grade A
US$9.50/Kg
delivered

- **Japan** processors usually buy from factories like ours or from Norway or Denmark. They arrive and check and teach us how they would like it. 5 years ago, nobody did it properly. They were putting the roe in brine, therefore high salt.
- They come many times a year, and they will sleep in your factory. It doesn't matter if it's cold or there is Covid. For Japanese, it must be best quality. They come and check and are willing to wait for the best. Tons of people there in the plant inspecting.

Kazakhstan

- Middle range roe can go to **Kazakhstan**. For some reason it's a good place. They buy cheap herring roe from Russia. And expensive roe from us and from Norway and Denmark. Sells to Japan. They mix coloring. Roe now is very big and good demand. It was usually for capelin roe for sushi. Usually capelin roe. Now very clean herring roe which you can easily mix with expensive capelin roe and can be colored and sold like that

Romania

Grade C
"Industrial"
US$4.50/Kg
delivered

- If you have 150 tons then half goes to Japan. One container to **Romania**. Now also Ukraine is also interested in herring roe.

Not all processors do roe because of the involved process and low yield

Grades of herring roe

Grade A
- Yellow color, very good eggs, looks clean, no bits and pieces

Grade B
- A bit yellow, still clean and looks good

Grade C
- Industrial
- Pink color or immature

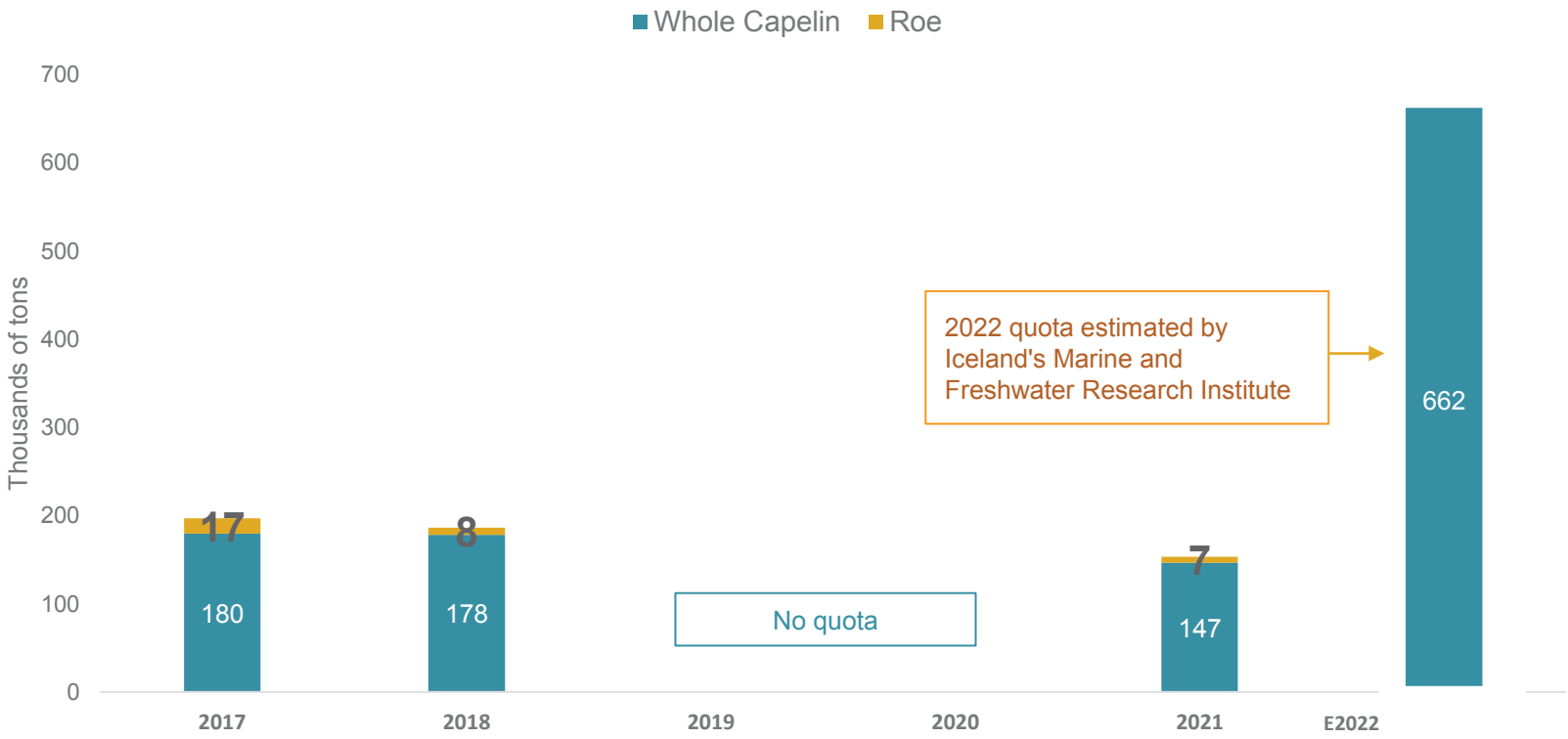
Source: NorthBay Pelagic expert

Insights from a Scottish processor

- "Our herring roe is fished 4 hours off-shore (in the regular herring fishery)
- Roe season is 6 weeks, from August until mid-September
- **Usually poor roe in the beginning and poor roe at the end, good roe in the middle**
- During roe season you can't cut nice flaps so we prefer to just cut Deli's
- Not a lot of factories do roe because **it's fussy**
- Processing is complicated
- Need to spin the roe continuously in a "cyclone" to clean it
- **Low yield:** if you land 600 metric tons of fish you might get 5-6 metric tons of roe ready product in 10kg boxes
- **We only get 150 metric tons in a whole season** out of 20,000 metric tons of herring landed in the season

Icelandic capelin quota is likely to be very high in 2022, which will presumably dampen prices but not cut off herring roe supply

Icelandic capelin quota is expected to reach its highest peak in 2022 season



Source: Kontali and Nordea. NASF 2022 presentations from the Pelagic Fish Summit.

The Team

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- Market research expert in consumer and B2B research especially in the food industry
- Served as CEO for $400 million diversified packaged food company in Australia for 8 years
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BAADER 35


Alaska
Wild
Herring


ALASKA SEAFOOD
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