

OCTOBER 2025

Fish Farmer

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Editor's welcome

SEAWEED is an industry that seems constantly on the verge of a breakthrough – but it faces many challenges that appear to be holding it back.

Now, a research project coordinated by the Sustainable Aquaculture Innovation Centre has cast valuable light on how these could be addressed, not least the question of how to process a crop that has such a short life, after harvest, in its natural state.

We also profile SeaDyes, a biotech start-up and now a “spin-in” at the James Hutton Institute, which is finding new applications for seaweed extracts in the fashion industry.

Meanwhile, Sandy Neil analyses the implications of the Scottish Government’s decision to greenlight Loch Long Salmon’s bid to build a semi-closed fish farm in a sheltered loch. What does the semi-closed approach offer for the industry, and who is pioneering it so far?

Annisa Dinulislam compares and contrasts aquaculture in Scotland and Indonesia, and suggests that both sectors have things they could learn from each other.

Nicki Holmyard reflects on a busy season for shellfish events, with oyster shucking skills very much to the fore.

September saw the European Aquaculture Society’s annual conference, held this year in Valencia. Andrew Watson was there to report on it for *Fish Farmer* and you can read his article in this issue.

We also report on the latest Aqua Agenda webinar, held in association with Tidal X, which discussed Feed and Feed Strategies; in particular, the role artificial intelligence is beginning to play in managing feeding regimes.

We look at examples of trout farming internationally and at what has been happening in the sector; and Vince McDonagh considers the impact for salmon farmers of Labour’s victory in the Norwegian general election.

Finally, Nick Joy challenges the criticism of farmers over mortality, by those who often do not understand the reality of livestock farming – or of nature itself.

Best wishes
Robert Outram

Robert Outram

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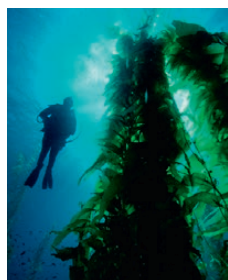
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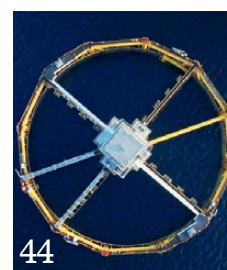
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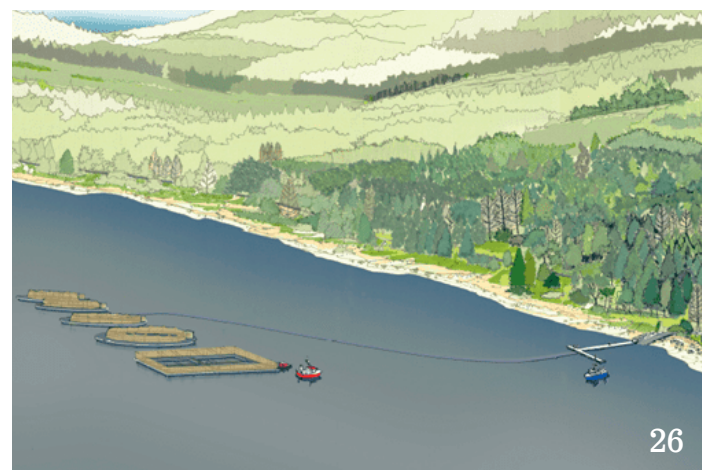


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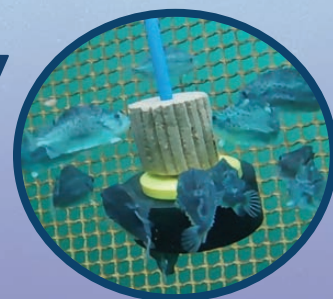
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SAIC-funded projects move salmon healthcare forward

TWO projects supported by the Sustainable Aquaculture Innovation Centre have helped to increase the salmon industry's understanding of fish health. The projects focused on, respectively, the role of biological markers in diagnosis, and gill health.

The first of these explored the use of biological markers - natural signals in the fish's blood - to help producers identify and respond to health issues faster and more effectively.

Led by the University of the West of Scotland, the project - funded by the UK Seafood Innovation Fund - was valued at £439,500. The other partners were Bakkafrøst Scotland, Vertebrate Antibodies Ltd, Fleet Bioprocessing, and the University of Waterloo, with collaboration from Environment Canada.

By focusing on biomarkers, the project team was able to create rapid, cost-effective tests to detect bacterial and viral infections early. These tools can help farmers respond quickly to health issues, improving fish welfare and reducing environmental impact.

Key outcomes of the project include the development of immunoassay designs for four immune markers,



Photo: H. Rodger

Above: Atlantic salmon with gill disease

assay optimisation to demonstrate acceptable performance and reproducibility, and validation of methods across different automated platforms using serum from health-challenged and experimentally infected salmon.

SAIC said: "By enabling earlier disease detection, the outcomes of this project will help to support the long-term resilience of the aquaculture sector, and strengthen Scotland's position as a leader in the production of sustainable seafood."

Gill health breakthrough

The other study addressed complex gill disease (CGD) in Atlantic salmon.

SAIC said a project partnership between Scottish Sea Farms, the University of Aberdeen and BioMar

has made important progress in understanding and managing gill disease in farmed Atlantic salmon. The total value of this project was close to £860,000.

Gill health is vital for fish welfare, SAIC said, and can be threatened by changing ocean conditions and disease. This project studied salmon in Scotland and Tasmania, using advanced methods to identify genetic and microbial markers that signal early signs of gill disease.

Researchers found that as gill disease worsens, the diversity of helpful microbes in the gills drops. They developed a set of over 90 genetic markers that might help farmers detect disease earlier and respond more effectively. While special diets alone did not significantly improve gill health, the research showed that a combination of monitoring, targeted interventions, and adapting to environmental changes is key.

The project's findings have been shared to support better disease surveillance and more sustainable salmon farming. By providing new tools for early detection and management, this research helps the aquaculture sector protect fish health and adapt to the challenges of a changing climate.

EU rules on arsenic content could impact UK seafood exports

NEW EU rules on food safety were due to take effect as from 8 October - and now the organisation representing the shellfish industry is planning its own monitoring system to help producers comply.

The Shellfish Association of Great Britain (SAGB) is intending to implement a new monitoring programme to help the UK shellfish industry comply with new EU food safety rules on inorganic arsenic in seafood.

From 8 October, Commission Regulation (EU) 2025/1891 will introduce maximum permitted levels of inorganic arsenic in a wide range of seafood, including all shellfish. This new regulation will therefore affect all UK exports of seafood to the EU.

Inorganic arsenic testing, and/or proof of compliance, may be required both in the UK (prior to export) and on arrival into the EU; and it may take up to 15 days to receive test results. The new regulation only applies to inorganic arsenic levels in seafood.

To support the UK shellfish industry, SAGB says it will coordinate an inorganic arsenic monitoring programme, initially sending monthly samples of a variety of shellfish species from differing ICES areas for accredited laboratory testing.

SAGB is inviting all shellfish exporting businesses to join the programme. Costs will be shared among all participating businesses, and results shared only with those same participants. Testing for other heavy metals can also be arranged.

SAGB said: "This shared approach, modelled on the successful operation of the SAGB Crab Exporters data sharing group (for China), will reduce cost burdens, generate robust evidence, and ensure the UK shellfish industry remains compliant, competitive and trusted in both domestic and export markets."

The Association is calling on producers to contact SAGB Chief Executive David Jarrad at david@shellfish.org.uk for further information.



Bakkafrost Scotland Q3 harvest steady, but mortality costs hit almost £7 million

BAKKAFROST has reported a 3,000 metric ton plus increase in its third quarter harvest, all of it taking place in the Faroe Islands. Scotland's harvest was more or less unchanged.

Mortality costs for Scotland are, however, estimated to be DKK 59 million or almost £6.9 million.

These mainly occurred in September at the Portree farming site, said the company.

Announcing its trading update for the three months between July and September, Bakkafrost announced a total harvest of 30,700 tons against 27,000 tons in Q3 last year.

The Faroe Islands showed the best performance, up by almost 3,800 tons at 25,400

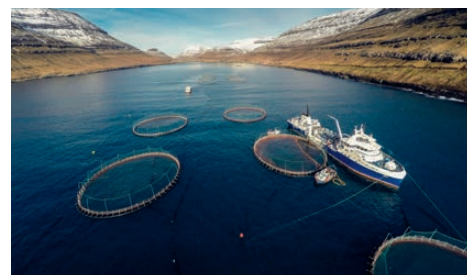
tons against 21,600 tons a year ago. The average weight was 5.2 kilos.

Scotland, where the company has been having problems, produced a harvest of 5,300 tons, just 100 tons down on a year ago.

All harvest figures are heads on, gutted (HOG) equivalents. The average weight was 4.8 kilos.

The smolt release numbers in Q3 2025 were: Faroe Islands 4.8 million and Scotland 3.3 million.

In July Bakkafrost issued a second quarter profit warning following "extraordinary mortality" issues in Scotland. Biological performance in the Faroes continued to be



strong, however. It said weak salmon prices, which continued through July and August, had also harmed the overall results.

The full Q3 2025 report will be released on 4 November.

AquaGen Scotland opens new RAS freshwater breeding facility for the salmon industry

AQUAGEN Scotland has celebrated the opening of its new freshwater recirculating aquaculture system (RAS) for the incubation of high-quality Atlantic salmon eggs.

The Holyrood Breeding Centre is based in Dumfries and Galloway. With Finlay Carson MSP, Convener of the Scottish Parliament's Rural Affairs & Islands Committee and members of Salmon Scotland in attendance, the company marked the opening with a formal ribbon-cutting ceremony.

AquaGen Scotland described the move as a significant step forward in sustainability and performance control, leveraging advanced technology to minimise environmental impact while maximising egg health and viability, based on experience gathered from trial work on RAS incubation in past seasons.

The RAS system allows for precise control over critical water parameters, ensuring optimal conditions for egg development and reducing the risk of disease and stress. It also has substantial sustainability benefits, including reduced water usage through efficient recirculation and treatment along with lower energy input



Above: Keith Drynan (L) and Finlay Carson at the opening

for water temperature control, minimising the facility's carbon footprint.

It also includes decreased water abstraction volume requirements, further reducing the environmental impact, and enhanced protection against environmental contamination through UV filtration, ensuring the removal of biological contaminants.

Managing Director Keith Drynan said: "The new RAS system is a game-changer for AquaGen Scotland, securing the supply of

high-quality best of breed salmon eggs to the Scottish aquaculture industry. By combining advanced technology with sustainable practices, we're not only improving the health and quality of our Atlantic salmon eggs but also reducing our environmental footprint. This facility showcases our commitment to innovation and sustainability in aquaculture."

AquaGen Scotland said the new system underlined its commitment as a global breeding company to provide secure, biosecure and sustainable salmon egg supply to the markets in which it operates.

2026 ALBAS Awards nominations now open



Above: ALBAS 2025 winners

NOMINATIONS are now open for the 2026 ALBAS Awards, which will recognise the talents of people and organisations involved in the land-based and aquaculture sectors.

The ALBAS (Awards for Land-based and

Aquaculture Skills), organised by Lantra Scotland, are designed to celebrate the achievements of individuals, schools, businesses and partnerships in the field of agricultural and aquacultural skills.

The awards recognise successful trainees of all ages and encourage employers to invest in the next generation of talent, while promoting the many rewarding careers available.

Industry categories in the ALBAS cover animal care, aquaculture, equine, environmental conservation, fisheries management, game and wildlife, horticulture, land-based engineering, vet nursing and trees and timber.

As well as prizes for Overall Winner, Runner-up and Modern Apprentice of the

Year, there are awards for Pre-Apprentice of the Year, Higher Education, School Pupil, Secondary Schools, Research Project, the Tam Tod Trophy for Outstanding Young Learner, The Carstairs Mentoring Award and the Anna Murray Award for Partnership Working.

Winners of the ALBAS will be announced at an event in the Crieff Hydro Hotel on Thursday 5 March 2026, hosted by MT O'Donnell, publisher of Scotland Grows horticulture magazine, and writer and host of the Scotland Grows podcast.

Secondary schools nominations must be in by Monday 27 October, with entries for all other categories closing on Friday 28 November. More information can be found on the Lantra website.

NEWS IN BRIEF

Seafood Scotland's Wing chairs leading chef academy



ADAM Wing, Head of Trade Marketing - UK, Middle East & Asia at Seafood Scotland (pictured), has taken up the position of Chair at the Bocuse d'Or UK Academy. He will be guiding Team UK as it prepares to compete in this international

culinary competition. The Bocuse d'Or is the world's largest cooking competition and considered the most prestigious award for any chef. More than 60 countries enter every other year to be whittled down to just 24 candidates in the world final. The teams are competing for worldwide recognition, a gold trophy and prize of €20,000 (£17,430). The UK Academy will be hosting a gala dinner in London, with dishes by seven leading chefs, on 17 November.

School visit raises profile of fish farming for pupils

PRIMARY pupils at Tarbert Academy in Argyll and Bute were given the chance to be fish farmers for the day, as part of an interactive workshop set up by Bakkafrøst Scotland. The P6 and P7 pupils were able to watch a live feed of fish from their classroom, observing feeding

time as well as being shown what PPE should be worn and the chance to get up close to jellyfish and plankton. The visit also featured a presentation by seafood enthusiast and educator Catriona Frankitti, who shared insights into the salmon life cycle, the health benefits of eating fish, and offered samples for the pupils to taste.

Craig Johnstone, Marine Site Manager in Gigha, who helped organise the interactive workshop, said: "We wanted to organise something for the school's P6s and P7s to give them a flavour of what it's like to be a fish farmer."



SAMS scientist awarded UHI professorship

PROFESSOR Adam Hughes, of the Scottish Association for Marine Science (SAMS), based in Oban, has been awarded a professorship by the University of the Highlands and Islands (UHI). He has been given the title of Professor of Innovation in the Blue Economy at UHI. In this role he will investigate ways in which ocean-related commerce can create jobs and growth, while helping to address the twin challenges of climate change and biodiversity loss. The new professorial title signals an intent by SAMS and UHI to develop solutions to these challenges, and follows a joint collaboration agreement signed in August between the two bodies.

Professor Hughes said: "I believe that the Highlands and Islands region of Scotland should be a national and global leader for the blue economy. Our marine environment should be at the centre of vibrant, sustainable and inclusive coastal communities.

"The role will also help the wider UHI to contribute to the Scottish Government's National Innovation Strategy (2023–2033), and specifically its Innovation-led Entrepreneurship and Commercialisation Programme."



Above: Adam Hughes

Scotland's salmon farmers have delivered on reforms, industry body says

DEMANDS for the salmon farming sector in Scotland to clean up its act have been met, according to the industry's organisation, Salmon Scotland. A letter to members of the Scottish Parliament has set out in detail how producers have delivered on the reforms the Parliament has called for.

In a letter to the Chairman of the Parliament's Rural Affairs and Islands Committee, Salmon Scotland Chief Executive Tavish Scott has set out significant progress across a range of key areas.

It follows a committee report published earlier this year which, Salmon Scotland said, included out-of-date data in reaching its conclusions.

Scott's letter highlighted new data showing record survival rates, record low medicine use and booming exports – all backed by more than £1 billion of investment in fish health and welfare since 2018.

He pointed to the imminent refreshed Code of Good Practice for Scottish finfish aquaculture as evidence of continuous reform.

The code, which will be updated next month, is the only one of its kind in the world. It raises the bar on fish health, welfare and biosecurity, with every farm independently checked.

The letter outlines that salmon survival in the first eight months of 2025 reached a record 92.3%.

Antibiotic use in 2024 fell by nearly 80% to the lowest level since reporting began.

Tavish Scott said: "This is testament to the hard work of the sector's farmers, veterinarians and fish health professionals, as well as the £1 billion invested in fish health and welfare since 2018."

He also commented: "The government's 2003 Strategic Framework for Scottish Aquaculture said: '...a robust, audited code of practice does obviate (in part) the need for detailed, costly and inflexible regulation'. We concur."

Exports and innovation

The letter also points out that exports are on track to exceed £1bn in 2025 for the first time, with producers preparing to tap into the lucrative Indian market in the wake of a new free trade agreement brokered by the UK Government.

The sector supports 12,500 jobs in Scotland and generates £760m for the local economy.

Farmers invested more than £10m in audits and inspections in 2024, with more than 1,600 independent checks carried out against standards such as RSPCA Assured, ASC and Global GAP.

Looking ahead, Tavish Scott underlined the importance of innovation, highlighting the development of semi-closed containment systems, with SeaSure Farming beginning commercial trials and Loch Long Salmon granted planning permission in Argyll after a lengthy process.

He also confirmed that the sector has commissioned independent analysis of research and innovation and is urging the Scottish Government to put in place a replacement for Sustainable Aquaculture Innovation Centre (SAIC) funding.



Above: Tavish Scott

Scottish Sea Farms teams keep local beaches clean

FOR the eighth year running, salmon farmer Scottish Sea Farms took part in the Great British Beach Clean, helping to clear rubbish from the coastline in Shetland, Orkney and on the Scottish mainland.

The mass clean-up, involving Scottish Sea Farms staff, community volunteers and local suppliers, is overseen nationwide by the Marine Conservation Society (MCS).

Farm teams across the company's estate retrieved debris, from discarded fishing nets and ropes to disposable barbecues, during the event, which ran from September 19-28.

The beach clean teams also recorded what they found so the MCS can compile a national database to help inform and shape future policy around protecting UK shores.

The effort is part of a wider initiative by the salmon farming sector to keep Scotland's beaches free of marine litter by recovering any items, regardless of their origin.

The MCS said collating this data has helped to make a positive impact on the ocean, with the information driving its conservation work and also feeding into the International Coastal Clean-up.

Among the Scottish Sea Farms locations involved this year, the mainland engineering team worked on the shores of Loch Creran, where they picked up mattresses, mussel farm



Above: SSF beach clean, Shetland

floats, tyres and gas canisters.

Mainland engineering Manager Craig Cameron said: "This is an important part of our calendar each year, a dedicated week-long focus helping to keep our shores clean and free from debris, whether fish farming-related or not. The beach clean was very productive and no fish farm waste was found, but we did collect several beer kegs, two mattresses, a TV and a cooker, among other items.

'Huge thanks to the whole team – and Shuna Farm Manager Andy MacDougall – for taking time out of their busy days and making a visible difference to our communities.'

Further north in Kishorn, Farm Manager Siobhan Murray and Trainee Farm Manager Iain

Flack collaborated with the local community to help identify the key areas that needed to be worked on.

"It was our best attended clean-up to date, a community focused event pulled together by the Kishorn Community Trust and Siobhan with, for the first time, very welcome support from the local supply chain, including AKVA, Gael Force and fellow producer Bakkafrost," said Flack.

Over the past year, the Kishorn team has also been leaving a tote bag in an area where beach walkers leave rubbish they collect from the shore, which is then removed by farm staff.

"Because of the success of this initiative, there are now two more 'stations' in the village where beach rubbish can be left and we collect and dispose of it," said Murray.

In Shetland, Grant Masson and his engineering team collected more than 40 bags across three beaches after a combined effort between marine engineering, the net store and Score Holms teams.

Scottish Sea Farms Managing Director Jim Gallagher said: "These are our local communities too and we want to look after the environment we live and work in. The more of us who give a few hours of our time doing our bit to protect our local beaches, the bigger the difference we'll make."

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Winners announced in Scottish Shellfish Awards

JUDITH and Angus Vajk's Caledonian Oysters was once again among the winners in the Scottish Shellfish Awards.

The award winners were announced at a dinner in Oban held by the Association of Scottish Seafood Growers at the Fishhouse Restaurant, as part of the ASSG's annual conference.

Caledonian Oysters was the winner in the Native Oyster category and the runner-up was Gerard McDonald of Isle of Barra Oysters. The winner in the Pacific Oyster category was Gordon Turnbull of Isle of Mull Oysters, with John Barrington of Creran Oysters in runner-up position.

In the Mussels category, the winner was Inverlussa Shellfish with Hebridean Mussels in runner-up place.

Nicki Holmyard, who chaired the judging panel, said the quality of entries this year had been excellent.

A report from the ASSG conference will be out in the November issue of *Fish Farmer*.

Right: Judith and Angus Vajk



Wild Fisheries Fund announces grants for 2025/26

SCOTLAND'S salmon farmers are investing in 10 projects nationwide to protect rivers, restore habitats, and safeguard wild salmon and sea trout.

More than £230,000 has been awarded this year through Salmon Scotland's Wild Fisheries Fund for practical work tackling long-term species decline. The fund is part of a £1.5m commitment to preserve and protect wild fish populations across Scotland.

Jon Gibb, Co-ordinator of the Salmon Scotland Wild Fisheries Fund, said: "This crucial funding gives rural and coastal communities vital support to protect wild salmon and sea trout."

"These keystone species face serious threats both in rivers and at sea, and projects that help understand and tackle these challenges are urgently needed."

This year's grants cover a mix of practical conservation, habitat restoration and scientific research.

The Loch Lomond Fisheries Trust will receive £30,625 for river bank improvements and tree planting on the River Fruin, while £17,541 will go towards erosion mitigation and spawning ground protection on the River Doon in Ayrshire.



Above: Jon Gibb

The Stornoway Angling Association on the Isle of Lewis has been awarded £25,000 for urgent repairs to a key dam on the River Creed.

In Lochaber, £72,000 will support the Drimsallie Hatchery live salmon gene bank, and £11,600 will help the Lochaber Fishery Trust and the University of the Highlands and Islands in Inverness screen four rivers for juvenile salmon populations and genetic diversity.

Other projects include research led by biologist Bob Kindness on the River Carron, with £10,000 to track how conservation stocking contributes to returning adult fish.

Together these initiatives are designed to tackle the long-term decline in wild salmon and sea trout populations.

Since 2021, the fund – previously called the "Wild Salmonid Fund" – has invested around £475,000 in projects, including a £35,000 grant to repair the Fincastle Dam in West Harris, safeguarding an important salmon fishery.

Tavish Scott, Chief Executive of Salmon Scotland, said: "Through the Wild Fisheries Fund, we are supporting community-led projects that restore rivers, improve spawning grounds, and give wild salmon and sea trout a better chance of survival."

Krucial directors' appointments are terminated

CO-FOUNDERS Allan Cannon and Kevin Quillien are no longer directors of marine communications technology business Krucial, according to papers filed at Companies House.

Krucial, under its initial name R3 IoT Limited, was placed in administration in June this year.

Krucial used satellite-based communications technology, combined with sensor expertise, to provide digital connectivity solutions for remote fish farms.

As well as Quillien and Cannon, fellow directors Clive Scrivener and Ryan Johnson have also been confirmed as leaving the board.

Administrators David McGinness and Judith Howson, of AAB in Glasgow, estimated in a statement of affairs last month that the company had a net deficit of just over £1m.

The company was founded in 2018 and had been successful in raising sufficient

capital to grow and prove its technology, up until last year when funding proved hard to find. Attempts to sell the company in April and May proved unsuccessful, the administrators said. In early June, the directors attempted to work out a "pre-pack" deal, in which the company would have gone into insolvency immediately prior to a prearranged sale, but this also proved impossible to achieve.

Following their appointment, the administrators opened negotiations with the four potential buyers from earlier that year. These have not been identified, but include parties connected with the company.

In their last update the administrators confirmed that a bid had been accepted in principle from one of the four, and said that negotiations were continuing on the deal. The administrators have declined to comment further, but it appears a sale may be imminent.



Above: Krucial co-founders Allan Cannon (L) and Kevin Quillien

Scottish Government consults on streamlining offshore regulation

THE Scottish Government is taking another step towards an offshore fish farming sector, with proposals to ensure consistent environmental regulation for inshore and offshore fish and shellfish farming.

The Scottish Environment Protection Agency (SEPA) is the responsible authority for the regulation of environmental discharges between 0-3 nautical miles, and the Marine Directorate, on behalf of Scottish Ministers, is the responsible authority for this activity between 3-12 nautical miles.

This, the consultation paper says, creates an inconsistent approach and may lead to duplicated effort.

Environmental discharges covered by the regulations include organic waste, medicinal residues and sea lice. The latest consultation proposes that SEPA will be the responsible authority regulating discharges anywhere up to 12 nautical miles from shore, creating a single lead for this area for the whole aquaculture sector.

From November 2025 SEPA's regulatory powers, out to three nautical miles, will come from the new framework provided in The Environmental Authorisations (Scotland) Regulations 2018 (EASR), and the proposal is that fish farm environmental discharges between 3-12 nautical miles will also be identified as a regulated activity under EASR.

Currently, fish and shellfish farms operating within three nautical miles of the shore are exempt from the requirement to seek a marine licence for certain types of discharge – that is, those regulated by SEPA – in order that the same activity is not subject to two regulators. The consultation proposes that this exemption be extended to farms operating 3-12 nautical miles offshore.



Cabinet Secretary for Rural Affairs Mairi Gougeon said: "Innovations in technology mean that aquaculture sites can now be located further from the shore. These developments have the potential to reduce the environmental impact of marine farming by lessening interactions with wild salmonids and supporting farmed fish health and welfare. The Scottish Government proposes a consistent approach to the regulation and consenting of aquaculture development and activity right across the zero to 12 nautical mile zone. This could boost the marine fish and shellfish farming industry, whilst ensuring consistency and robust assessment of development proposals."

Regulation of fish and shellfish farm deposits: consultation is available to read or download online. Comments are invited by 16 December.

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Norwegian salmon exports to US down, but China taking up the slack



Above: Norwegian seafood

TOTAL Norwegian seafood exports in September totalled NOK 17.9 billion (£1.3 billion) with salmon as usual accounting for the lion's share. The value was 8% higher on a year ago.

Seafood Council CEO Christian Chrømer said: "Seafood exports had a strong month in terms of value and a solid third quarter. This is primarily due to increased prices for, among other things, mackerel, cod, saithe and king crab.

"The EU is still our largest overall market, but Norway is now taking an increasingly larger share of the growing Chinese salmon and shrimp market. This is encouraging at a time when world trade is experiencing challenging times with increased tariffs and economic turmoil."

September was the first full month in which Norway was faced with a 15% tariff on seafood imported to the US

market. In September, the United States purchased seafood from Norway for NOK 1.3 billion (£98m). This is a growth in volume and value of 9% for seafood as a whole compared to the same month last year.

The value of salmon exports to the US fell by 5% to a year ago, however. This was due to stronger competition, increased tariffs and a weaker dollar which hit exports of fresh whole salmon to the US, which have fallen significantly in recent months, Chrømer said.

China had the largest value growth in September, with an increase in export value of NOK 352 million (£25m) or 78%, compared to September last year.

The export volume to China ended at 8,147 tonnes, which is 68% higher than in September last year.

Seafood Council Analyst Paul T Aandahl said that when it came to salmon sales into China, Norway was now taking market share from Chile.

Interestingly, neighbouring Sweden was Norway's second largest growth market for salmon in September, with an increase of 23% to NOK 317 million (£23m). Export growth was greatest for frozen fillets.

Norwegian Seafood Council Sweden Manager Charlotte Rapp said this was primarily due to an adjustment of inventory towards winter.

Both price declines and growth in home consumption of fresh salmon and smoked salmon had contributed positively.

Some 70% of Swedes state that price is the biggest barrier to eating more seafood, she added.

Salmon prices up again but recovery may be stalling

FRESH salmon prices in Norway were up again at the end of last month, but the optimism may be drawing to a close.

Forward reports suggest that prices are starting to fall back after the bounce of the past month.

The monitoring organisation Statistics Norway said that between September 22 and 28 (week 39) the export price was NOK 79.91 (£5.97) per kilo, a rise of 3.2% over the previous week.

The last time they were around this level was in late May and that was just briefly. Fresh salmon prices

have been on the slide throughout most of the summer, only starting to perk up at the start of September.

Export volumes were down by just over 1,000 tons during week 39. They totalled 23,396 tons against 24,495 tons in week 38.

But volumes are on average 4,000 to 5,000 tons higher than the first part of the year, clearly driven by the lower spring and summer prices.

And so far this year, the Norwegian economy has been enjoying a clear upturn with increased household purchasing

power which was probably one of the factors in Labour holding onto power in last month's election.

This optimism is now filtering down to the aquaculture industry which is enjoying a sharp upward trend in earnings and one that is expected to continue into 2026 even though there may be a few bumps along the way.

Frozen salmon prices were down in the last week of September by around NOK 2.5 (19p) per kilo. They totalled NOK 71.33 (£5.33) per kilo on a volume of 796 tons, against 864 tons the previous week.



Bluefin tuna blamed for salmon escape

A LARGE bluefin tuna may have triggered a salmon escape in Norway, a report from the country's Directorate of Fisheries suggests.

The Bergen area based company Eide Fjordbruk AS said it has identified damage to a seine at the Lyngholmane location in Solund after finding a large bluefin tuna in a cage, which in Norway is often referred to as a mackerel sturgeon.

The Directorate says that the company reported on 1 October that it had discovered major damage to a seine at its location at Lyngholmane in Solund Municipality, Vestland.

The hole is around one metre



wide and the dead fish was found at the bottom of the net. The extent of the escape is not yet known but the salmon in the affected net weigh an average of 4.2 kilogrammes.

The Directorate of Fisheries said it will follow up on the case according to normal procedure.

Large marine creatures such as sturgeon, seals and dolphins can cause serious damage to coastal farms as they break in pursuing the salmon.

Two weeks earlier the company Varde Fiskeoppdrett AS reported that major damage had been discovered in a cage at the Andal location in Bømlo municipality in Vestland.

The farmed salmon in the cage in question are over 2kg in size. The company says it has deployed recapture nets, but has not reported any recaptures. The full extent of the escape has so far not been disclosed but the Directorate is following up with inspections.

Sale rumours swirling around another family salmon business

ANOTHER large, independent family-owned salmon farmer could be put up for sale, according to Norwegian seafood industry press reports.

The business is Lingalaks which employs around 60 people in the Kvinnherad and Radøy municipalities.

Established in the late 1970s, it is wholly owned by the Haugarvoll family, and has an annual turnover approaching a billion kroner (£75m). It releases an estimated 2.5 million fish into sea cages each year.

Lingalaks exports its fish across the world although Europe, including the UK, is its main market.

The company has confirmed that it is carrying out a strategic review of the business, but has not gone as far as to say outright that it is considering a sale. However, the reports are starting to gather momentum.

Lingalaks said that many people were looking at how best they can plan for the future and confirmed it was doing the same. It stressed that nothing had yet been decided.

If it is put up for sale it would certainly attract the interest of one of the big salmon farmers such as SalMar, Lerøy – or even Mowi.

The last major independent family business sale was in January this year when Mowi raised its stake in Nova Sea to 95% for around £525m.

That deal is currently being studied by the Norwegian and EU competition authorities before it receives final approval.



Authorities claim victory in major fish escape case

THE Norwegian Directorate of Fisheries is claiming full victory in its case brought over an escape incident three years ago.

The incident, which the Directorate has described as serious, involved the company Aller Aqua and took place in October 2022.

Aller Aqua Norway produces fish feed and has a marine facility for testing feed in Vadheim in the Sognefjord, Norway's longest fjord. It was from this facility that approximately 35,000 salmon escaped during the loading of fish onto the combined well and harvester vessel "Norwegian Gannet" on the night of 28-29 October 2022.

Inspections conducted by the Directorate after the escape showed 11 discrepancies. The case was then reported to the police for further follow-up. The police issued the company a fine of NOK 4.5 million (around £330,000), which the company refused to accept. So this meant the case had to go to court.

The Sogn and Fjordane District Court,



which handled the case, has ruled that Aller Aqua must pay a fine although it has been reduced from the original figure imposed by the police.

The figure is NOK 2.7m (just short of £200,000) plus legal costs of NOK 100,000 (£7,300).

Fisheries Director Frank Bakke-Jensen said: "This is a thorough verdict that established important principles in the supervision and response work we will conduct going forward.

"The company was not convicted of a serious violation and the fine has been

reduced from 4.5 million kroner, but otherwise the verdict is in our favour on all points."

He added: "The case is also a good example of good interdisciplinary cooperation between our sections, and between us and the police."

The Directorate announcement also said the cause of the escape was a lack of risk assessment, grounding and control of the net during a risky work operation.

This led to one of the propellers on the vessel "Norwegian Gannet" pulling the net on one of the cages and creating two large rips through which the salmon escaped.

Some of the escaped fish were sick with PD (pancreatic disease) and were sexually mature and thus had a greater potential for harm than fish that were not sexually mature.

"The fact that the escape occurred during the spawning period for wild salmon in a national salmon fjord also underlines the seriousness of the escape case," the Directorate statement added.

NEWS IN BRIEF

Lerøy in £37 million green bond issue

THE Lerøy Seafood Group, one of Norway's largest salmon and trout farmers, has raised around half a billion kroner in green bond loans. The issue was oversubscribed. The group



will use the capital of NOK 500 million (£37.23 million) to finance or refinance "green projects", as defined by the green finance framework. Danske Bank and DNB Carnegie acted as Joint Lead Managers for the operation. Along with extensive aquaculture and fish processing operations, Lerøy owns Scottish Sea Farms in a half share partnership with SalMar. It also owns one of Norway's largest whitefish trawler fleets.

Nofima and Salmon Living Lab team up

NORWEGIAN research organisation Nofima has joined SalMar's Salmon Living Lab as a partner. The parties say they will work together to advance global salmon research and ensure that new knowledge is rapidly applied in the aquaculture industry.

Kristine Hartmann, CEO of Salmon Living Lab, said: "We are

delighted to welcome Nofima as a partner in Salmon Living Lab. The institute is one of the leading players in food and aquaculture research. We look forward to having them take part in building a global innovation and research centre to close biological knowledge gaps, improve survival rates and enhance fish welfare."



Above: Kristine Hartmann, CEO of Salmon Living Lab (left), and Bente E Torstensen, CEO Nofima

Nordlaks backs new football stadium

SALMON farmer Nordlaks is pumping NOK 10 million (£750,000) into Bodø-Glimt, one of Norway's most northerly professional football clubs. The money will be used to help fund the Arctic Arena, a fully covered planned new super-stadium for the area. Nordlaks has a strong

affiliation with the club and its success. The Bodø-Glimt team, which uses the stadium as its home ground, is currently sitting on top of Norway's main league table and if it wins the title for the fifth time in six years it will again find itself in European competition next year.



Above: How the new Bodø-Glimt stadium will look

Mowi contractor 'would have let dead fish enter human food chain'



Above: Salmon on ice

A MOWI supplier has been accused of sorting dead salmon as human food at one of Mowi's sites in Norway.

The charge was made by the national broadcaster NRK, which is claiming that the incident took place on a slaughter boat this month.

The alleged transgression was spotted by the Norwegian Food Safety Authority during a routine inspection two weeks ago.

Geir Arne Ystmark at the Norwegian Food Safety Authority told NRK that for bacterial health reasons, dead fish must not be permitted to enter the food chain.

"This is a serious violation," he said.

NRK said lifeless salmon were found at the bottom of Mowi's fish farm in Nordfjord two weeks ago. Mowi, the world's largest fish farming company, had had problems with its fish outside Endal in Nordfjord and needed to bring forward the harvest.

It also said a harvest vessel had been hired to slaughter fish at the farm.

The NRK report continued: "It was in full swing when the Norwegian Food Safety Authority came on an unannounced inspection on September 10.

"The Norwegian Food Safety Authority saw that almost all the fish that were pumped on board had no signs of life.

"Nevertheless, the fish were sorted as human food – right in front of the inspectors."

NRK said the Norwegian Food Safety Authority then made an emergency decision banning slaughter and trade.

"Fish that die naturally should not enter the food chain. This is about risk and bacterial growth on the fish," says Ystmark.

For the past month the Food Safety Authority has been travelling on an unannounced operation along the Norwegian coast. The aim was to inspect slaughter boats that handle fish, and it did find violations on two boats.

Mowi's Communications Director, Ola Helge Hjetland, told NRK: "We take the findings very seriously. It is totally unacceptable that fish that have died of themselves have not been sorted out."

The company also said it expects its suppliers to work in accordance with the regulations. It has stopped using the vessel and the supplier until further notice.

But the Food Safety Authority is insisting that Mowi itself must take responsibility for removing any dead fish before the slaughter boat arrives.

Iceland salmon farmer wins ASC certificates for two more sites

ICELANDIC salmon farming company Kaldvik has won certification from the Aquaculture Stewardship Council for two more of its locations.

The ASC certification for Kaldvik's Hovdehusabotn and Fagerøya farm sites means that all of the company's facilities are now certified, marking an important milestone for both the company and the region.

With ASC certification in place for the facilities, Kaldvik – formerly known as Ice Fish Farm – says it is now fully certified to the world's strictest requirements for sustainable farming.

Sandra Eidsdatter, Quality Manager at Kaldvik, said ASC certification is an important step for responsible aquaculture: "Achieving ASC certification at these facilities shows that we take sustainability seriously – not just in words, but in practice. Sustainability is about action, not just words."

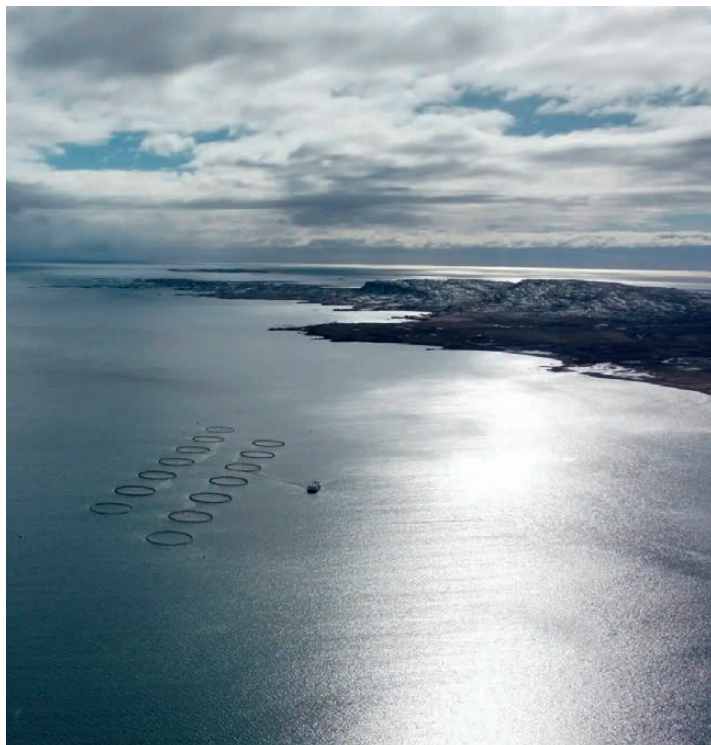
The ASC (Aquaculture Stewardship Council) covers everything from environmental concerns and fish health to working conditions and traceability. Among other things, it requires that the sites have minimal impact on surrounding nature and wildlife, and that operations are conducted in close dialogue with local communities and employees.

"This is not just about the environment – it is also about operating fairly, responsibly and openly. The certification is proof that we have good systems and solid implementation capabilities at all levels," said Eidsdatter.

The certification also has a direct impact on the market. Kaldvik currently exports to Europe, Asia and North America, where more and more customers are demanding products with documented sustainability. For the company, this means both a strengthened reputation and increased competitiveness.

But Kaldvik says it does not see this as an end point – rather a starting point for the next phase.

"We will continue to invest in technology, environmental monitoring and collaboration with local communities. It is not enough to be good once – we have to prove it every day," Eidsdatter said.



Above: Kaldvik salmon farm, Iceland

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Andfjord completes successful smolt release



Above: Smolt release at Andfjord

THE Arctic land-based fish farmer Andfjord Salmon has just completed a successful smolt release.

Approximately 350,000 smolt, with an average weight of around 180 grams, were released into pool K0 at Kvalnes.

The company said the operation went as planned and the fish have quickly adapted to

their new surroundings.

The biological conditions in the pool are good, as anticipated. Stable pool conditions support the smolt in settling.

“We have been looking forward to this day for quite some time,” said Martin Rasmussen, CEO of Andfjord Salmon.

“Our team of aquaculture experts is excited

to begin a new period of farming operations and eager to once again demonstrate the biological benefits of our proprietary flow-through system.

“I am proud of how carefully they have planned and safely executed this smolt release.”

Andfjord Salmon also said it now plans to release approximately 750,000 smolt in pool K1 towards the end of October.

“Today marks the beginning of a new chapter for Andfjord Salmon, with fish farming operations once again taking centre stage. The current and upcoming smolt releases represent the launch of a significant scale-up of salmon farming activities at Kvalnes,” CEO Rasmussen added.

Andfjord Salmon is a Norwegian land-based fish farming company focused on sustainable aquaculture using innovative flow-through technology.

Since its previous production cycle that ended in June 2023, Andfjord Salmon has been working on developing new pools, a harbour area, and waterways that can handle large-scale production at Kvalnes.

The Andfjord site infrastructure is designed to support future production of approximately 48,100 tonnes (head on gutted and post-smolt) at Kvalnes, which is located at Andøya on the Arctic archipelago of Vesterålen.

Bluegreen's Salmon Donut moves into commercial phase

AQUACULTURE

technology developer Bluegreen reports that its Marine Donut closed containment system has delivered strong results in its second production cycle with SalMar this summer. It says this is a clear demonstration that the technology works.

Nearly 1,000 tonnes of salmon, averaging just under 5kg, were safely and efficiently harvested from the Donut in just 12 hours. No lice treatment was needed and the mortality was very low, accompanied by strong growth.

The company added: “The improvement measures, implemented in close collaboration with SalMar, ensured safe and stable operations.

“The test programme is now complete, and the application to convert the development licence is underway.”

Bluegreen said the Marine Donut 2.0 – with structural upgrades – is already in development, based on real operational data.

“We can now confidently say we have a commercial product,” it concludes.



Above: The Marine Donut in operation

The first full-scale pilot of the Marine Donut, including its associated development licences, is owned by SalMar while Bluegreen is the technology provider and responsible for the design and construction of the unit, and SalMar has led the operation and execution of the testing programme.

“We are very grateful for the trust SalMar has shown us by adopting this technology, and for the close collaboration throughout the entire

project. It has been crucial to getting us to where we are today,” said Nils-Johan Tufte, CEO of Bluegreen.

The final stage of the test programme was completed, when nearly 1,000 tonnes of salmon were harvested from the unit.

The operation was completed in 12 hours and was described as safe, efficient, and gentle – following risk-reducing measures implemented in close cooperation with SalMar.

“The fish were delivered with high quality, and it’s clear that Marine Donut provides a strong production environment with high welfare and low stress levels,” added Tufte.

Long hot summer is too much for land-based Arctic char farmer

NORWAY'S only land-based Arctic char producer has declared bankruptcy, hit by a combination of financing difficulties and the impact of warming temperatures.

Blåfjell, based in Lierne, Trøndelag, recorded a pre-tax loss of NOK 10.5 million (£782,000) in 2024 and was struggling to find investors to tide the company over.

The last straw appears to be Norway's long, hot summer this year which

took its toll on both fish and equipment at the company. Char, a relative of Atlantic salmon, thrives best in cooler conditions.

Company Chairman Arne Øvereng told Norwegian news site E24: "We have not been able to get investors to be involved in the long term, and then the only thing left to do is to stop the business."

Øvereng had been on the Blåfjell board for just four

weeks, having been brought in with a mission to build on what had been achieved previously and attract new finance. As he put it, however: "...the foundation for it was not really there. So we have spent the weeks here over the summer to make a final round with potential investors."

The liquidity crisis, due to production problems, was the final straw. Blåfjell has been placed in the hands of the receiver, who will have to decide the fate of its eight permanent employees and 15 temporary staff.

Blåfjell means "blue mountain". Its facility is located close to the Blåfjella-Skjækerfjella national park in Lierne, north of Trondheim.



Above: Jan Håkan Aksnes at the Blåfjell facility

Record sea temperatures bring salmon lice alert for Norway

RISING sea temperatures along the Norwegian coast this summer have led to a warning about a higher than usual number of sea lice.

Salmon companies have been put on alert by the authorities after almost a thousand delousing treatments were carried out. That figure is far higher than a year ago.

Some areas have experienced the highest temperatures so far recorded. It is generally accepted that the warmer the seas, the higher the number of lice – and coastal water temperatures have been on the up over the past couple of years.

The situation was particularly bad in the northerly fish farms where temperatures were worryingly high last year.

Bård Skjelstad, Director of the Aquaculture Supervision Division at the Norwegian Food Safety Authority, said it was important that the rapid escalation of lice problems is not viewed as an exceptional situation that opens up [justifies] changes in fish welfare priorities.

"To solve the challenges, breeders must follow and respect the decisions of authorised animal health personnel regarding lice

treatments," he added.

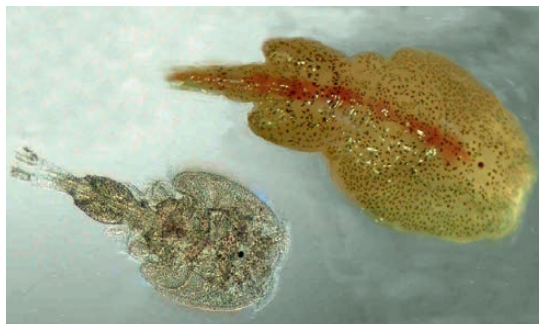
It also appears that not all salmon farming areas of the country are fully geared up to deal with the problem.

Aquaculture vessel operators are operating flat out to deal with delousing operations with most of them unable to take on extra assignments at present.

Controlling salmon lice is the responsibility of the fish farming companies, the government has said.

The Food Safety Authority has warned it is working with the coastguard this autumn in carrying out unannounced inspections at fish farms.

This will include the inspection of salmon lice treatments, and will follow up on serious incidents in connection with delousing.



European Commission to investigate Mowi takeover move



Above: The European Commission, Brussels

THE European Commission has said it will investigate Mowi's proposed acquisition of the salmon farmer Nova Sea.

Mowi announced in January that it had agreed to take virtual full control (95%) of the independent aquaculture business in which it has held a 45% stake for a number of years.

Nova Sea is a leading salmon farmer in production area 8 in northern Norway and covers the entire value chain from broodstock and smolt production to harvesting and sales. The company expects to harvest 52,000 tonnes of salmon this year.

Mowi has agreed to pay around £525m to seal ownership.

The deal is also being looked at by the Norwegian competition authority, which has yet to deliver its verdict.

Now, the European Commission is to open a review of the proposal under its own merger rules.

Norway is not a member of the EU, but it does sell a huge amount of salmon and other seafood into the bloc.

Although Nova Sea is still a mainly family-owned business, it is a sizeable salmon farmer while Mowi, as the world's largest producer of Atlantic salmon, is clearly a powerful force in the industry.

The Commission will consider whether the acquisition could potentially fall within the scope of the EU Merger Regulation and has invited third parties to submit comments.

The deal was notified to the Commission earlier this month, and a preliminary examination suggests it could fall under EU merger rules.

The Commission said it finds that the transaction "could fall within the scope of its merger regulation" but added "the final decision is reserved".



Atlantic Sapphire secures increased loan limit

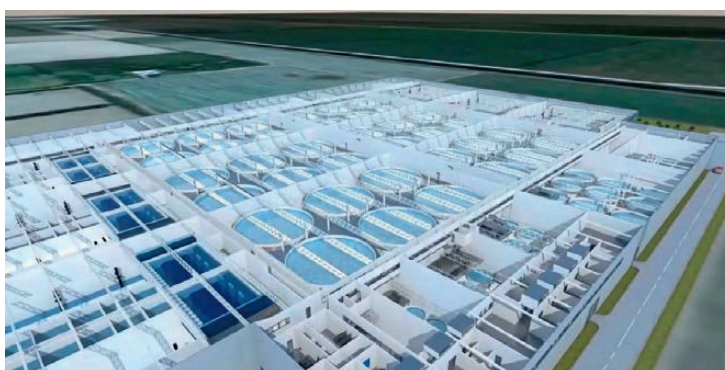
FLORIDA-BASED salmon farmer Atlantic Sapphire is extending its loan limit by more than US \$24m (£17.9m).

Atlantic Sapphire operates a land-based salmon farm with RAS (recirculating aquaculture system) technology, and is looking to finance the next phase of growth.

In September, on the back of a rapidly improving performance, the company raised US \$35m (£26m) in a convertible loan, thanks to a number of Norwegian and US investors. Among them was the north Norwegian salmon company Nordlaks.

Now, subject to approval by an extraordinary general meeting, it has decided that the loan be set at US \$59,246,066 (£44m).

In a message on the Oslo Stock Exchange, Atlantic Sapphire said: "This amount includes capitalisations for capitalisation of; (i) a previously granted bridge loan and



Above: Atlantic Sapphire phase 2

associated fees and interest; (ii) a previously granted convertible loan of USD 20 million and incurred interest thereunder, and (iii) underwriting fee payable in connection with the Convertible Loan. Further, the Board of Directors has resolved to withdraw the proposal for

issuance of independent subscription right that was put on the agenda." It added: "The issuance of instruments in the contemplated Long-Term Incentive Plan will instead be based on Board authorisations. However, the Board of Directors may propose to a later general meeting to issue independent subscription rights to cover instruments in the Long-Term Incentive Plan."

In August, Atlantic Sapphire reported that it was making good progress after a difficult period, citing a near first half doubling of revenues to \$21.5m (almost £16m). The company says it is "transitioning to scalable growth".

Nordic Aqua Partners 'delivering high quality salmon'

NORDIC Aqua Partners has published 2024 second quarter results for its land-based salmon plant in China, which continues to show strong progress.

The company has also secured fresh capital from two Chinese investors to help expand its operations. The new investors will inject RMB 300 million (about €36m or £31m) cash into Nordic Aqua Ningbo, giving an ownership share of 20%.

Nordic Aqua Partners operates a land-based facility in northern China to serve the Chinese and surrounding market. It produced a Q2 commercial harvest of 756

metric tons (head on, gutted) with a 99% superior quality and an average harvest weight of 4.6kg.

Commercial revenue during the April to June period amounted to €5.1m (£4.4m) with an average sale price of €6.74 per kilo (£5.89).

Nordic Aqua is located in Ningbo in the Zhejiang province. The company says it is in a position to deliver locally farmed fresh Atlantic salmon to about 100m of China's wealthiest consumers within five hours.

The Q2 report said that Stage 2 construction was developing according to plan, and on time with a 16% reduced capex (capital

expenditure) of €65m (£56.8m), down from a previous figure of €77m (£67.7m).

The second quarter 2025 was marked by continued operational and commercial progress for Nordic Aqua.

The report adds: "Overall biological performance remains strong with good fish health, no maturation and high survival rates for all batches.

"Production, however, was somewhat impacted by transfers of fish to optimise stock size sorting. Transfers normally lower the fish's appetite, thus reducing growth."

The construction of Stage 2 is progressing as planned.

Nordic Aqua says: "The overall biological performance in Q2 2025 developed well with very strong fish welfare with low mortality.

"The exception was the low feeding levels related to transfer of fish in the second half of May and first half of June. Feeding levels normalised during June and continued through July and August 2025.

"The company has revised the production strategy to target an average harvest weight of 7.0kg, live weight. This is to secure a leading position in the Chinese high end salmon market."



Above: Nordic Aqua Partners' first harvest at Ningbo

Tasmania's Huon announces major hatchery contract

TASMANIAN fish farmer Huon Aquaculture has signed a deal with Pure Salmon Technology for the construction of a hatchery facility.

Huon Aquaculture is the second largest salmon producer in the southern Australian state, employing almost 500 people and currently producing 25,000 tons a year.

Under the agreement, Pure Salmon will design, deliver and install the hatchery which will be constructed in Tasmania. It said the facility will include RAS technology to ensure optimal biosecurity, water efficiency and fish health.

A joint statement from the two companies said: "When operational, it [the new hatchery] will allow Huon to produce larger fish on land and deliver high-quality smolt. The new facility is designed for flexible operation, with high recycling intensity and near zero environmental impact."



Above: Hatchlings, Huon Aquaculture

Construction of the facility is scheduled to begin in the next few weeks with full commissioning expected in 2027. The deal is still subject to regulatory approval.

Depha Miedecke, Huon's Aquaculture Production Manager, said: "Huon has been a leader in Tasmania in investing in recirculating aquaculture systems, and the proposed project will more than double our land-based production capacity."

Luke Kellgren Parker, CEO of Pure Salmon Technology AS, said: "The project

not only marks our expansion into the Australian market, but also showcases the delivery of a plant built around fixed-bed biofilter technology (FBFR), a tailor-made solution for Huon that complements our traditional moving-bed portfolio (MBBR)."

He added: "The expansion into Australia is a strategic milestone in our global plan, and we are pleased to support a project that reflects our shared commitment to innovation."

Licence renewed for Cooke's Nova Scotia salmon subsidiary



Above: Kelly Cove farm, Nova Scotia

THE Nova Scotia Department of Fisheries and Aquaculture has approved the 10-year term renewal of the Lunenburg county marine aquaculture operation of Kelly Cove, which is part of the Cooke Seafood group. The decision comes despite some local objections.

The salmon farm is located near Saddle Island offshore from Bayswater Beach and

has been producing Atlantic salmon for around 30 years.

Cooke said: "In its decision, the department concluded that concerns and claims made by special interest groups and individuals about impacts to the ocean environment, wild salmon, lobster populations, Bayswater Beach and local tourism industry were unproven and were subjective and speculative in nature."

The department concluded that there was no evidence that the salmon farm has had a detrimental effect on the lobster population and fishery.

It also concluded that odorous, black sediments at Bayswater Beach Provincial Park are not from the salmon farm, but are rather consistent with the underlying geology of the area and naturally decaying organic matter not from the salmon farm.

The production history of the site has demonstrated that the area remains suitable for the cultivation of finfish, the report said.

Kelly Cove said it had complied with the government's Environmental Monitoring Programme. The company also maintains the social and economic benefits that Kelly Cove and the salmon farm offer to the community, charitable groups and provincial economic development are positive.

"In the future we welcome the opportunity to participate in a Community Liaison Committee as established by the Minister of Fisheries and Aquaculture," said Joel Richardson, Vice President of Public Relations for Kelly Cove.

"There is much for people to learn about the animal protein farming sector with the lowest carbon footprint and lowest greenhouse gas emissions – finfish aquaculture."

New Zealand King Salmon expands with large site purchase

NEW Zealand King Salmon, one of the southern hemisphere's leading aquaculture companies, is expanding. It has just purchased a large commercial site near Blenheim on the south island for NZ\$8.14m (£3.5m) so it can develop its expansion plans.

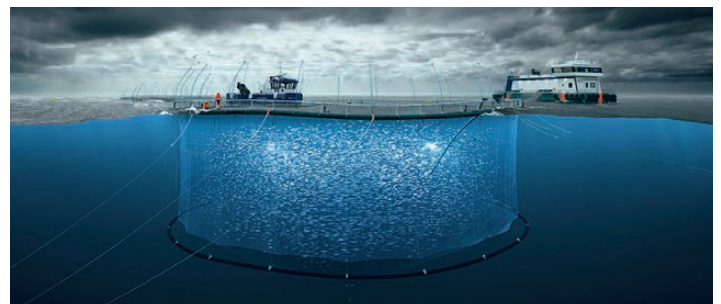
Chief Executive Carl Carrington says the purchase is an exciting step in plans to achieve growth for the company and New Zealand aquaculture, as it scales up salmon farming and production when the new Blue Endeavour open ocean farm is operational.

But he also stressed to staff that any new factory operations on the site are at least three years away, adding there are no immediate or near-term impacts on the company's current Nelson-based factory operations and staffing.

"Nelson is the base for our research and development, and corporate functions and will continue to host some factory processing operations," he said.

The Blue Endeavour open ocean farm has been around a decade in the making. It will entail the creation of New Zealand's first open ocean aquaculture farm and the world's first farm of its type for the valuable king salmon (Chinook) fish species.

The company said a thorough process was undertaken over more than



Above: Blue Endeavour pen, side view

two years to assess and undertake due diligence for potential new factory sites – in Nelson, Tasman and Marlborough. The location brings the New Zealand listed company closer to its farms and fish in the Marlborough Sounds, and to State Highway 1 and its access to international airports from where NZ King Salmon's products are distributed around the world.

The Blue Endeavour farm will have the capacity to produce around 10,000 metric tons of king salmon, with an anticipated revenue of around NZ \$350m (£153m) a year.

Challenge for the industry – can aquafeed go fish-free?

CAN carnivorous fish like salmon thrive on a diet free of marine animals? Farms that can prove this is possible are in with a chance of winning a share of US \$200,000 (around £146,000) in a new challenge being set by not-for-profit body The Future of Fish Feed (F3).

The challenge is the latest in a series set to help aquaculture move onto a more sustainable footing. The aim is to eliminate all wild-caught marine animal ingredients, including fish meal, fish oil and krill, from aquafeed.

Cash prizes will be awarded to four top-performing farms



that sell the most carnivorous finfish raised on marine-animal-free feeds in one of two contest tracks: a two-year contest that rewards farms already producing and selling carnivorous finfish on feeds free of marine-animal ingredients; and a four-year contest for farms embarking on new feed and farming innovations and those raising slower-growing finfish species.

The prize money will be awarded to the registered farm, which may team up with feed companies, ingredient suppliers, or other partners. To qualify, farmers must use marine-animal-free diets beginning no later than the fingerling stage, though they may start earlier.

Registration for both contest tracks opened on 16 September, 2025. Full contest rules are available at: www.f3challenge.org

Barramundi Group share offer raises NOK 1.35m

THE Singapore-based fish farmer, Barramundi Group, has raised around NOK 1.35m (£100,862) in its latest share offering on the Oslo Stock Exchange.

Earlier this summer, the financially troubled company had secured a refinancing deal with its creditors.

Barramundi, which farms the fish of the same name in Singapore and Brunei, now hopes the latest equity-raising exercise will put the group on a sound footing to further expand its Brunei operations to commercial scale.

The company says a total of 5,859,885 offer shares have been allocated to eligible shareholders.

Following completion of the private placement and the subsequent offering, the company's share capital will be increased by SGD 3.9m (£2.24m) (inclusive of a debt to equity conversion) through the issuance of 135,032,761 new shares, each with a nominal value of SGD 0.90 / NOK 6.90 / £0.52 (approximate), resulting in a new total share capital of SGD 157.88m / NOK 1.211bn / (£91m) (approximate) divided into 175,402,744 shares.

The Barramundi Group had experienced severe biological challenges in its Singapore operations, and sold up its Australian operations to Tassal, a Cooke subsidiary, in 2023 after finding it hard to finance growth in Australia.

The group is currently developing its Brunei operation, which it hopes will produce 1,000 tonnes annually, and it is also working on a vaccine for scale drop disease virus (SDDV) which had been a serious problem for its Singapore farm.



Salmon pioneer Una Rockcliff dies aged 91

TRIBUTES have been paid to Una Rockcliff, co-founder of Petuna, one of Australia's oldest salmon farming businesses, who has died at the age of 91.

The Petuna aquaculture operation was born out of a small fishing business in Tasmania more than 70 years ago.

In a post on LinkedIn, the now Sealord-owned producer said she had died with her husband Peter, who established the business with her, by her side.

"Peter and Una were the foundation of what became Petuna," wrote the company.

Una suggested in 1949, the year they married, that they should combine their

names to create Petuna Seafoods.

Petuna said: "Their vision, hard work and commitment created more than a business, they created a legacy."

"In the early days of the company, Peter would go out fishing, with Una selling the day's catch, first from the boat, and later from a small shop in Tasmania in the south of the country."

In 1990, the company diversified into aquaculture, setting up salmon and trout farming operations and becoming one of the country's three key producers, beside Huon and Tassal.

Petuna added: "Their shared belief was



Above: Peter and Una Rockcliff

that Tasmania could earn global acclaim for the quality and environmental excellence of its seafood."

EFTA's South American trade deal is huge boost for salmon producers

ICELAND, Norway and their fellow Nordic countries have signed a trade deal with several South American nations which is likely to boost their salmon exports – over time.

The agreement is between the EFTA trade bloc, which includes Iceland and Norway, and the Mercosur trade bloc which comprises Brazil, Argentina, Uruguay, and Chile among others.

The agreement will create a free trade zone of 300 million people and a combined GDP of US \$4.3 trillion (£3.2trn). Negotiations were first launched eight years ago.

Both Iceland and Norway's main export commodity is seafood and salmon in particular - Norway is also a major exporter of aquaculture related technology.

Most seafood products currently have a tariff rate of 9% and this

will be scaled down to zero over time.

Marianne Sivertsen Næss, Norway's Fisheries and Oceans Minister, (pictured) said: "For the seafood industry, it is positive that the agreement contributes to a tariff reduction for seafood exports. This could open up the export of products that we have previously exported little of to Latin America, such as salmon."

The Norwegian Minister of Trade and Industry, Cecile Myrseth, said: "The agreement sends a clear message that we believe in cooperation and the power of trade to bring about progress and is very important to us."

Iceland's Minister of Culture, Innovation, and Universities Logi Már Einarsson also referred to global uncertainty and said he "believes in rules-based trade".



US authorities identify 13 potential aquaculture zones

US environmental regulator the National Oceanic and Atmospheric Administration (NOAA) has identified 13 "Aquaculture Opportunity Areas" totalling more than 21,000 acres in US federal waters. NOAA says these represent simply "the tip of the iceberg" when it comes to aquaculture's potential.

The exercise opens up the possibility for major expansion of the USA's open ocean aquaculture, and follows two presidential executive orders: President Trump's 2020 Executive Order, "Promoting American Seafood Competitiveness and Economic Growth" and the Executive Order, "Restoring American Seafood Competitiveness," issued this year.

The selected Opportunity Areas are located in what the administration calls the "Gulf of America" (Gulf of Mexico) and off southern California.

The multi-year process identified areas that may be suitable for developing multiple commercial aquaculture projects.

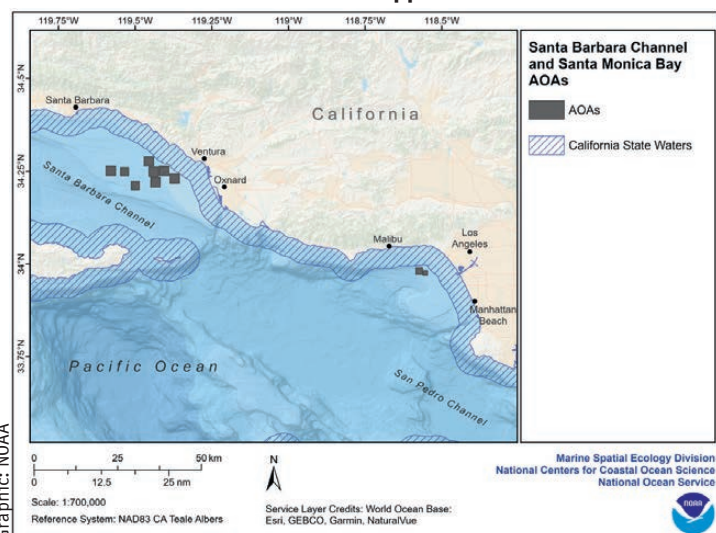
Danielle Blacklock, Director of NOAA's Office of Aquaculture, said: "When farmed sustainably and based on sound science, as it is in the United States, aquaculture is good for people, the economy, and the environment."

A statement from NOAA stressed that the identified zones are just "the tip of the iceberg" and applications for fish farm developments would also be considered elsewhere in federal waters.

In southern California, NOAA experts identified 10 locations. Eight are in the Santa Barbara Channel and two are in Santa Monica Bay, ranging in size from 500 to 2,000 acres, totalling 16,500 acres. The document analyses the impacts of various kinds of aquaculture: seaweed, shellfish and finfish.

In the Gulf of America, NOAA experts identified three locations off the coast of Texas, each ranging in size from 500 to 2,000 acres and totalling 4,500 acres. The final programmatic impact statement analyses the impacts of various kinds of aquaculture and determines that these areas may be suitable for seaweed, shellfish, and finfish aquaculture.

Forthcoming baseline environmental surveys in the Gulf of America will provide detailed data on the benthic environment of these areas. At this depth, baseline environmental surveys can be resource-intensive. By shouldering the investment for these surveys, NOAA says it is benefiting future farm applicants in the Gulf.



Above: Aquaculture Opportunity Areas, California

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Scottish Ocean Cluster sets out plans to turn waste into value

SIX months on from its beginning, an initiative to minimise waste in the Scottish seafood sector, and potentially treble its value, has seen around 70 organisations agreeing in principle to take part.

The Scottish Ocean Cluster is spearheaded by Seafood Scotland in partnership with the Industrial Biotechnology Innovation Centre (IBioIC), Zero Waste Scotland, Opportunity North East and Aberdeenshire Council.

Six months on, the Cluster has revealed its plans for the future. As well as carrying out a recruitment drive to find a dedicated project manager for the initiative, the Cluster has been carrying out detailed research on volumes of Scotland's whole fish imports, exports and landings, to more accurately calculate the potential future value of more than 10 different types of side-stream products.

By harnessing biotech expertise, these fish side-streams can be used to create a range of products for a variety of sectors. For example, this could include using scallop shells in construction or making value added nutritional supplements from marine collagen.

The 70 organisations which have already expressed interest in working with the Cluster comprise seafood processors, converters and public sector bodies including those in construction,

energy, nutritional supplements, enzyme extraction, specialist feeds and start-up investors.

Over the space of three years, the Scottish Ocean Cluster believes it could potentially treble the market value of the estimated 265,000 tonnes of fish "waste" from all sectors which currently either goes to fish meal, fish oil or back to source.

This week, the Scottish Government announced that it was earmarking nearly £2m in funding for collaborative action across a range of industries. And earlier this year, at Seafood Expo Global in Barcelona, both the Scottish Cabinet Secretary for Rural Affairs, Land Reform and Islands, Mairi Gougeon, and UK Fisheries Minister Daniel Zeichner, welcomed the Cluster's contribution.

Donna Fordyce, CEO of Seafood Scotland, said: "In the six months since its official launch, the Scottish Ocean Cluster has reached a pivotal point in its journey. The funding and interest we've seen so far is a clear indication of the appetite across some of Scotland's key sectors to embrace innovation and secure a sustainable future for our coastal rural fishing communities."

"Our research and incoming enquiries so far have uncovered even more opportunities to extract value from

Scotland's fish and shellfish than we knew existed. It's a clear indication that, as one of the world's largest producers, our seafood sector has the potential to help Scotland live up to its reputation for forward-thinking innovation.

"We're making excellent progress so far, but we still have a long way to go, and realising our ambitions requires cross-sector support as well as funding to bring planned projects to life."

Audrey Nicoll, MSP for Aberdeen South and North Kincardine, has also shown support for the Cluster. She said:

"I wholeheartedly welcome the progress made by those driving the Scottish Ocean Cluster. The initiative promotes entrepreneurship and the evolution of the blue economy - marrying one of Scotland's most historic industries with the latest biotech innovations to create vibrant and sustainable local economies."



Top left: Donna Fordyce
Above: Audrey Nicoll MSP

"We're making excellent progress so far, but we still have a long way to go"

Hofseth Q2 profits up thanks to strong processing results

NORWEGIAN salmon farmer Hofseth International has announced a 12% reduction in second quarter revenues due to lower sales in processing. Strong profitability in processing, however, also helped the company to record a higher operating profit.

Sales for Hofseth totalled NOK 1.456bn (£108m) against NOK 1.656bn (£124m) a year earlier.

The EBITDA (or operating profit) rose from NOK 149.4m (£11m) to NOK 168.6m (£12.5m), a year on year increase of 13% mainly due to a stronger performance in processing which more than offset a weaker performance in farming.

During the period, Hofseth successfully completed the acquisition of the remaining 50% of shares in Hauge Aqua Innovation Holding AS, now renamed Hofseth Development AS, which holds six development licences for the Egg closed



pen technology.

The investment to double the harvest plant capacity was completed in May, and additional external harvest contracts were secured for the second half of this year.

The company said that while farming revenues were relatively stable year on year, processing however saw lower sales compared to the previous year when elevated inventory destocking took place.

Raw material prices also acted as a brake on production during April before declining throughout the second quarter. Farming generated total revenue of NOK 310.3m (£23m) where increasing harvest volumes offset a softening in sales prices.

Processing generated revenues came out slightly lower at NOK 1.345m (£100m) which was in line with the previous quarter but behind the same period last year.

Bidfresh relocates seafood hub to Enfield

SPECIALIST fresh produce supplier Bidfresh has moved its specialist distribution depot, Daily Fish, from its Kings Cross base in north London to a new 24,298 sq ft state-of-the-art facility in Enfield.

Daily Fish supplies a wide range of wild caught finfish and other seafood, as well as farmed salmon, rainbow trout, halibut and other species.

The site, now fully operational, is designed to deliver faster, more reliable logistics across London, helping chefs receive the freshest fish at the highest quality. The move also represents a significant investment in sustainability, customer engagement and capacity for growth, Bidfresh says.

The Enfield depot, north of London, includes modern preparation and filleting areas, improved storage and workflow, and facilities designed to boost capacity and efficiency while ensuring the highest levels of quality and consistency.

Sustainability is central to the building's refurbishments, Bidfresh says, with solar panels, EV charging points to support a future electric vehicle fleet and LED lighting that has been fitted over a number of months to meet the needs of the business.

A new customer experience centre will open on site in early 2026, offering chefs an innovative space to collaborate with expert fishmongers and development chefs on menu planning, skills training and market insights.

For its employees, Bidfresh says, the new depot provides a brighter, more comfortable

working environment through its lighting and ergonomic design, while meeting health and safety standards. Importantly, there is no change to order processes for customers, who can continue to order in the same way as before.

Andy Farnworth, Managing Director at Bidfresh, said: "This investment marks an exciting new chapter for Daily Fish and Direct Seafoods. Enfield gives us a stronger base to grow, with modern facilities that support both our team and our customers."

"The new depot means we can deliver even fresher fish, more efficiently across London, while our customer experience centre will let us work more closely with chefs, supporting menu development, skills and creativity."

"At the same time, we've created a better place to work for our people and built a more sustainable operation."

Founded more than 30 years ago, Daily Fish sources fresh fish every day from Brixham, Peterhead, Cornwall and Billingsgate.



Above: The Enfield depot

Loch Duart smoked salmon wins excellence award

LOCH Duart has clinched the prize for Best Fish and Seafood Product at the Scotland Food & Drink awards for its own brand smoked salmon offerings, launched just a few months ago.

The independent Scottish salmon farmer launched the Loch Duart "Signature Smoke" and "Double Smoked" products earlier this year.

On Thursday 4 September, at the Scotland Food & Drink Awards in Glasgow, Loch Duart was declared the winner in the seafood category.

Mark Warrington, Managing Director of Loch Duart Salmon, said: "We are very proud of our new smoked salmon range, which was launched earlier this year and is already a favourite with top chefs and restaurants around the world. At

Loch Duart we have always strived to raise the very best, premium, heritage breed Scottish salmon and we took particular care in creating a smoked product which highlighted the natural eating qualities of our fish.

"I'd like to congratulate all the finalists in this year's awards, it's a real honour to be part of the Scottish food and drink sector, which is valued and sought out by food lovers across the globe for its quality, taste and provenance."

Also at the awards, smokehouse Farne Salmon & Trout was declared Employer of the Year. The company is based in Duns, in the Scottish Borders, and produces hot and cold smoked salmon and trout as well as flavoured fillets.

The Product of the Year award, as well as the award for Dairy Product of the Year (Small Business) went to Orkney Ice Cream.

Iain Baxter, Chief Executive at Scotland Food & Drink, said: "The Excellence Awards shine a spotlight on the outstanding producers whose passion, innovation and hard work continue to drive Scotland's food and drink industry forward. The quality of this year's entries has been exceptional, showcasing the creativity and craftsmanship that set new standards for our sector."



Above: Loch Duart was presented with a Scotland Food & Drink Excellence Award

Mitsubishi pulls out of Thai Union deal



Above: Thai Union brands

MITSUBISHI has unexpectedly dropped its offer to buy further into the seafood giant Thai Union.

In a statement to the Stock Exchange of Thailand, Thai Union Group Public Company Limited said the company had been informed that the Mitsubishi Corporation had automatically cancelled the offer it made earlier this year. The reason given was that the offer period closed with insufficient shares tendered by shareholders to meet the minimum threshold of 11.95%. The deal would have lifted Mitsubishi's stake in Thai Union to around 20%.

Now, as agreed, the shares that were intended to be sold will be returned to the respective shareholders.

The offer to acquire shares was part of a broader business alliance agreement between the two companies. Mitsubishi, which recently acquired much of Grieg Seafood's salmon business through its subsidiary Cermaq, saw the move as a logical one because Thai Union is an important salmon supplier.

Salma brand makes VIP return to market



Above: Salma brand relaunch

THE well-respected quality Norwegian salmon brand Salma is back on the market, with a relaunch after months in limbo.

News of Salma's threatened demise was greeted with dismay by salmon connoisseurs when it disappeared from store shelves last year.

Salma was rescued in March by the Witzøe family, owners of SalMar (which had no connection to the brand Salma at the time) through their

holding company Insula.

In September, Salma was relaunched at a special ceremony attended by leading chefs, and salmon industry VIPs and the Norwegian seafood press, who greeted its return with enthusiasm.

For now, Salma will be restricted to Norway, but there are plans to launch it overseas before long.

Salma was originally created by Bremnes Seashore in 2016.



The price of fish

Salmon producers are anticipating higher prices this year, but as **Dr Martin Jaffa** asks, what is the best price for the industry in the long term?

ANALYSTS working for various Norwegian banks are predicting a bumper year for salmon producers in 2026 with much higher prices throughout the year. The basis on which this prediction is made is that the biomass is lower than expected, so the number of fish coming to market will not be as previously anticipated.

With fewer fish in the marketplace, prices should be above those for this year. Of course, these predictions will have been long forgotten by the end of 2026 and if they fail to materialise, I don't think these analysts will be apologetic. This is because there are always so many things that could go wrong between making these predictions and their realisation.

One of the issues is that, whilst overall biomass might be lower, the number of fish coming to the market at any time could be higher if too many farms need to harvest fish for whatever reason. Equally, salmon is also produced outside Norway, and this could affect the number of fish coming to market.

I sometimes wonder whether the salmon farming industry is now producing salmon to satisfy investors or consumers. High prices might be desired by the banks as they push share prices upwards, but high prices also dampen consumer demand because whilst many consumers like to eat salmon, they will not do so at any price.

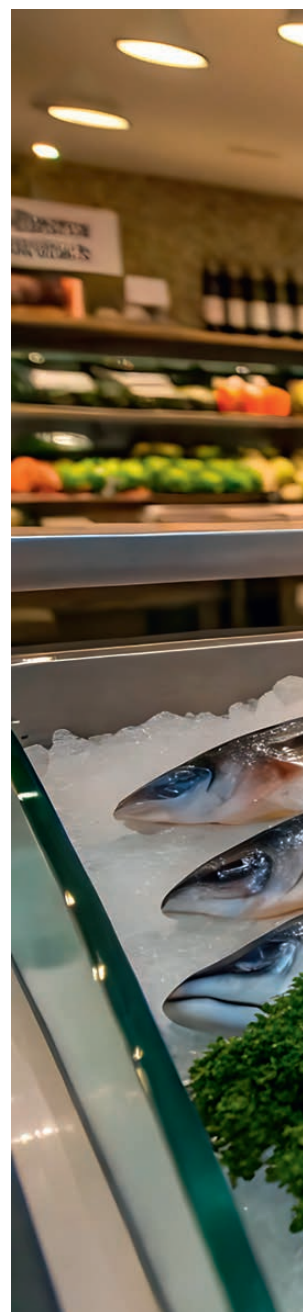


What makes for a premium price?

Over the years that I have been monitoring the market, the emphasis has changed regarding sales and prices. It used to be that the focus was on long-term contracts in which farmers were locked into a deal supplying their customer with salmon at a fixed price. This provided the farmer with certainty, especially in a volatile marketplace. The spot price market was considered risky as prices could be high but equally, they could be low. However, as the international industry has expanded along with demand, the restrictive nature of contracts means that they have become less welcome, and the spot market has become more important. This is fine as long as prices remain high, which can never be guaranteed.

I have always held the view that spot prices are not the be all and end all of the salmon market. It should be expected that as production expands, then prices should go down. Most consumers are reluctant to purchase items at a high price if they are produced in volume. I have previously suggested that if luxury cars were made in the volumes of a small run-around, then aspiring owners would not pay a premium price to own one.

Equally, consumers are less willing to pay a premium price for an everyday food item. It is possible to observe this



Above: Salmon in a supermarket
Left: Freshly grilled salmon fillets garnished with lemon slices and herbs



High prices also dampen
consumer demand



unwillingness in the fish and seafood sector. In UK supermarkets, most pre-packed fish is sold under the stores' own label. However, some fish fillets are also sold under a branded label. What is interesting is that these are repeatedly on price promotion, suggesting presumably that the price is cut in order to persuade shoppers to buy these branded products in the hope that they will be so impressed that they will continue to buy them when they return to their full list price. I suspect that the jury is still out as to whether consumers are attracted to such higher price branded products.

I personally think branding is one way forward for the salmon farming industry and have suggested so for many years but not by branding a simple piece of fish flesh. Instead, I would argue that the product needs to be transformed before branding works. If consumers see that there is value in a transformed product, then they are more willing to put their hand in their pockets and pay a higher price.

Over the years, there have been many transformed salmon products reaching the market but in order to succeed, the price of the raw material must be competitive. Unfortunately, as the industry moved towards the spot market and increased prices, the section of the industry that suffered was that of transformational products. This is because rising raw material

prices made the cost of transforming fish flesh into an added value product too great to ensure that the product could be sold at a price attractive to consumers. Consequently, the fish and seafood market is now dominated by a return to fish flesh that has not been interfered with.

The best example of high-cost fish that consumers are reluctant to buy is yellowfin tuna. Two 120g steaks are typically priced at £10 or £5 a steak (£41.67/kg). Currently one supermarket is promoting their pack at a third off making the pack selling at £27.08/kg. Another store is selling a branded version of the same tuna at £24.92/kg equating to a 40% discount. The same store is selling their own label salmon at £16.17/kg and a branded salmon at £18.87/kg equating to a discount of 25%. To put this into perspective, cod at the same store sells for £21.04/kg and basa (pangasius) fillets at £7.83/kg so it's not all about price but rather the right price for the right product.

Talking up prices to satisfy shareholders may be the job of the analyst, but the salmon market is complex and has many influences. The reality for the salmon farming industry is that production will never meet potential consumer demand as long as the price does not exceed the capacity of consumer pockets. ●



The world wants our salmon - we must deliver

Tavish Scott says new markets in India and the Gulf offer huge opportunities, but swift government action is needed to unlock them



SCOTTISH salmon has long been a global success story, renowned for its quality, sustainability and the skilled people who produce it. Now the next chapter is taking shape, and it is genuinely exciting.

New markets in India and the Gulf are opening up, offering opportunities that could transform the sector and deliver real benefits to communities across Scotland.

India represents a vast untapped market. The UK-India free trade agreement, approved by the Indian cabinet in July, will remove the current 33% tariff on Scottish salmon.

While the deal still awaits ratification by the UK Parliament, likely taking at least a year, farmers are already preparing.

Supply chains are being tested, logistics refined and plans developed to ensure that when the agreement comes into effect, Scotland can deliver high-quality salmon to top hotels, restaurants and retailers across the sub-continent.

India is the world's third-largest fish market, with domestic consumption reaching nearly 12m tonnes in 2021 and rising steadily in major cities.

Premium seafood is in growing demand, and Scottish salmon

is perfectly positioned to meet it. This deal could unlock tens of millions of pounds in exports every year, supporting jobs, investment and communities across Scotland. Working closely with UK and Indian partners, the sector is determined to make the most of this opportunity.

Meanwhile, the Gulf offers a complementary opportunity. The UK is close to signing a £1.6bn trade agreement with Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

In 2024, Scottish salmon exports to the Middle East and North Africa totalled just 900 tonnes, worth £9m - around 1% of total exports. Clearly, there is enormous scope to grow.

These regions are high-end, discerning markets, ready to pay for Scottish quality, and our producers are already gearing up to meet that demand.

Scotland's international advantage is reinforced by timing. Imports into India from EFTA countries, including Norway, are being phased out over five years, giving Scottish salmon the chance to gain an early foothold.

Work is also underway to ensure that internal supply chains are ready so that premium Scottish salmon can reach tables quickly and efficiently once trade agreements come into effect.

Left: Salmon on ice
Opposite from top: More Scottish salmon could soon be appearing in Indian supermarkets; Shetland salmon fillet; Loch Long Salmon (illustration)



Scotland's international
advantage is reinforced by timing



Production capacity matters

But unlocking these markets is not just about opportunity. It is also about capacity and the regulatory framework that enables growth. The recent approval of Loch Long Salmon's semi-closed containment farm in Argyll is a powerful example.

After years of planning, engagement and navigating a complex process, Scottish ministers gave the green light to a project that had previously been rejected by the Loch Lomond and The Trossachs National Park Authority.

Loch Long Salmon's semi-closed system is innovative. It isolates farmed fish from the loch, collects most waste for onshore treatment and represents £40m of investment, bringing jobs and community benefits.

The approval comes with 35 conditions, many requiring further engagement with the National Park Authority, covering environmental safeguards, restoration plans, landscaping, access, travel management and archaeological programmes.

The company is committed to working

with the Authority and local communities to satisfy these conditions and finalise the site development plan.

Beyond jobs, investment in projects like Loch Long brings tangible benefits to local communities, supporting schools, services and small businesses. It also reinforces Scotland's reputation as a leader in sustainable aquaculture, giving investors the confidence to back further expansion.

Yet Loch Long also highlights a wider challenge. Red tape is holding Scottish salmon back. Consenting new and existing farms involves four separate regulators, often pulling in different directions. The process is slow, clunky and deters investment.

Professor Russel Griggs' independent review in 2022 provided a clear roadmap for better regulation, yet three years on, full implementation is still awaited. Since 2020, 60 statutory deadlines have been missed. That is not regulation; it is stagnation. What the sector needs is not less regulation, but better regulation to enable sustainable growth.

Loch Long also shows how innovation

can drive international competitiveness.

Technology has matured since the original application, offering more advanced containment options while remaining within the environmental impact assessment parameters. Approving projects like this, and doing so efficiently, sends a clear signal to investors that Scotland is a forward-thinking, innovative country capable of meeting global demand.

The message is simple. Scottish salmon has the quality, the reputation and the demand to thrive internationally. But government support and faster decision-making are critical. We cannot afford to lose momentum as new markets in India, the Gulf and beyond open up. Every month lost is a month of missed opportunity in highly competitive global markets.

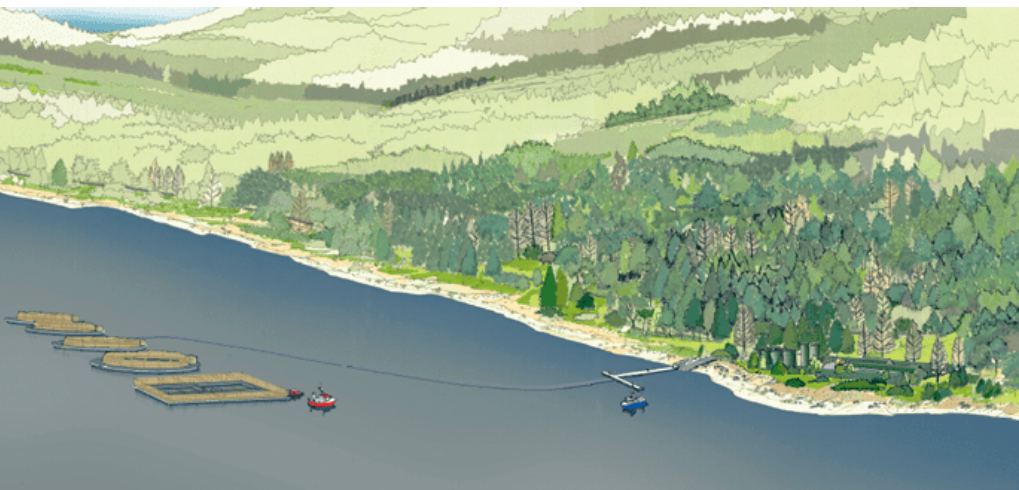
This is not growth for growth's sake. It is about securing well-paid jobs, sustaining coastal communities and reinforcing Scotland's position as a global leader in sustainable aquaculture. It is about ensuring that when trade deals come into effect, Scottish salmon can reach the markets that want it most.

The excitement is real. Scottish salmon is in demand around the world. New markets are opening, trade barriers are falling and the sector is ready to rise to the challenge.

With the right support at home, we can ensure that Scottish salmon continues to flourish, creating jobs, driving investment and enhancing the reputation of our country and our people.

But the clock is ticking. To turn opportunity into success, we need decisions and regulation that are as swift and forward-looking as the markets we aim to serve.

Tavish Scott is Chief Executive of Salmon Scotland. ●





Autumn – the season of seafood festivals!

Nicki Holmyard reports on a busy time for shellfish aficionados



Photo: Colin Hattersley

”

This event has become one of Scotland's most successful food festivals

SEPTEMBER is always a busy month on the festival calendar, especially for oysters. It kicks off with the Stranraer Oyster Festival, which is a great weekend community event that commemorates the start of Scotland's native oyster season with world-class chefs, local produce, and a focus on the Loch Ryan oyster beds.

Over the past few years this festival has grown in importance, and now attracts visitors from far and wide. Crowds flock to Stranraer's scenic waterfront to celebrate the region's unique marine heritage and generate a welcome late season boost to local tourism.

This year the event featured chefs including Matt Tebbutt, who was recently confirmed as a judge for the next series of MasterChef: The Professionals, Rosemary Shrager, Tony Singh and Julie Lin. Local chef Ryan McCutcheon and food suppliers

the Lisi Brothers also gave cookery demonstrations.

Over the weekend, visitors enjoyed local craft stalls, music and dancing into the night, and some excellent food and drink. An exciting new addition for 2025 was a Speakers' Corner event on Sunday morning, featuring conversations with chefs, oyster experts and marine ecologists in a dedicated marquee.

"This event has become one of Scotland's most successful food festivals, generating almost £10 million in economic impact since 2017," said Allan Jenkins, Events Officer for Stranraer Development

Above left: BBC Saturday Kitchen Star Matt Tebbutt (centre) with Tony Singh (left) at the Stranraer Oyster Festival

Opposite from top: Stranraer Oyster Festival; Rosemary Shrager meets Tristan Hugh-Jones and Ben Wallace; London Oyster Championships judges Nicki Holmyard, David Jarrad (SAGB CEO) and Chris Leftwich (SAGB President); Discovery Zone, London

Trust, which organises the festival.

Loch Ryan Oysters personnel were on hand throughout, to make sure that the importance of sustainable management of the local wild oyster fishery was highlighted.

The oyster beds have been protected by Royal Charter since 1701 and today are operated by The Loch Ryan Oyster Company under the management of David and Tristan Hugh-Jones of Rossmore Oysters. The beds house more than 20 million native oysters and are recognised as an important marine conservation success story.

Oyster shucking at its best

A major highlight of the event is the Scottish Oyster Shucking Championship, using Loch Ryan oysters. There is fierce competition for the title, as chefs, oyster growers, producers, fishermen and industry professionals battle it out against the clock, in a bid to be named the Scottish Champion.

The winner was Alexander Wallace, who went on to represent Scotland at the World Oyster Opening Championships in Galway.

The London Oyster Opening Championships, held at Bentley's Oyster Bar and Grill, was also a lively affair, and featured both a "best dressed" oyster competition and a shucking competition.

A series of heats, where contestants had to open 12 native oysters against the clock, enabled the judges to whittle the competition down to five finalists, who were challenged to open a further 30 oysters.

The judges (myself included) work



Photo: Pete Robinson



of the world we live in. A free-to-enter Discovery Zone, located just off Regent Street, offered a space for the public to learn and be inspired, and the organisers were delighted with attendance.

The space featured colourful wall panels that took food back to basics and included sections on sustainable fisheries and aquaculture. Contributions were made by the Shellfish Association of Great Britain, whose panel included information on regenerative marine aquaculture and its benefits, along with a film on the Ropes to Reefs project; the Zoological Society of London on seascape and river restoration projects; and Shell to Shore, which is working on oyster restoration projects in partnership with Blue Marine Foundation, Wright Brothers and Essex Wildlife Trust, supported by the Crown Estate.

Shell to Shore collects waste oyster shells from participating London restaurants and recycles them to help restore native oyster populations in coastal waters. This collaborative initiative is addressing the significant decline of vital native oyster reefs.

The collected shells are weathered for at least six months to remove bacteria and organic material, making them safe for reuse in the ocean. Cured shells are transported to coastal restoration projects, where they are placed on the seabed to provide cultch - a hard surface for juvenile oysters to attach and grow, thereby helping to re-establish reefs. School groups were welcomed during the week for interactive sessions and teachers report that they found these most informative. ●

from a closed room, to ensure that no favouritism can take place and that the whole process is anonymous. Trays of oysters arrive with a sticker indicating the time taken to open. These are examined for appearance, and penalty seconds added for flaws, including the meat not being severed from the shell, grit on the flesh, cut or sliced flesh, blood on the oyster, and missing oysters. Bonus points are awarded for attractive presentation of the tray of opened oysters. The test for the judges is how attractive the tray would look for a customer in a hotel or restaurant.

The winner, determined by the lowest combined time, bonus and penalties, was previous winner and expert opener Federico Fiorillo from Bentley's.

Future of food pop-up

The future of food was the subject of a Crown Estate-sponsored series of ticketed events in London throughout September, focused around sustainability, innovation and creativity. The aim was to show how our food from land and sea plays an integral role in shaping our future and that



A long road to progress

The Scottish Government has overturned the Loch Lomond park planning authority to give the go-ahead to what would be Scotland's first commercial scale semi-closed fish farming facility. But what would a 'semi-closed' system look like and has this approach been tried and tested elsewhere?

Sandy Neil investigates

THE clue is in the name. Loch Long, a sea loch in the Loch Lomond and The Trossachs National Park, stretches fully 20 miles from the Firth of Clyde up to the village of Arrochar, cleaving the peninsulas of Rosneath and Cowal in Argyll.

And it has been a lengthy saga for Loch Long Salmon to build Scotland's first commercial scale semi-closed fish farming facility, in the shadow of Beinn Reithe.

The Edinburgh-based firm first submitted its planning application back in 2021, with the hope of becoming operational in 2023. But after opposition from many residents

along the fjord, a rejection from the National Park Authority, an appeal to the Scottish Government, delays to a decision, and Ministers' consent in August 2025, Loch Long Salmon (LLS) can finally start building its dream.

Semi-closed cages are one of several solutions that can help address the challenges facing the aquaculture industry.

"From the surface a semi-

closed containment site looks like a traditional salmon farm," LLS explained, "but underneath the water, the net is surrounded by an impermeable membrane, with water drawn up and circulated from deeper in the loch.

"This removes the threat of sea lice and

attacks by seals, meaning it won't ever use sea lice treatments or acoustic devices that can harm dolphins or other cetaceans.

"The lack of medicinal or other treatments needed for sea lice has been shown to improve the welfare of the farmed fish overall, and to prevent breeding populations of lice establishing in the enclosures, preventing retransmission to wild salmon and trout.

"Hundreds of cycles of this technology in other countries have proven these facts, as well as showing no escapes.

"The farm will also capture more than 85% of the organic waste that is produced. This will be used as a fertiliser ingredient or in green energy production."

Why build in Loch Long, in the middle of a National Park? LLS explained:

"While the site would not be suitable or economical for conventional open net aquaculture due to its low current, it is ideal for Scotland's first semi-closed farm, due to its sheltered location, deep water, geographical isolation from other salmon farms, and proximity to a suitable shore base location."

The planned farm comprises four circular enclosures, each with an outer diameter of up to 50m, plus a square harvesting facility with a side length of up to 50m, all sitting in single file in an 80m x 80m mooring grid, approximately 300m from the western bank.

Locally, LLS promised, the farm would represent up to £40m of investment to the rural economy, plus create 12 full-time jobs, and a £100,000 community benefit fund every year for a minimum of 20 years.

However, the plan attracted 192 objections, far more than its 67 supporters.





It was recommended for refusal by a planning officer at Loch Lomond and The Trossachs National Park, and board members agreed, 10 votes to one, at a public hearing in Arrochar's Three Villages Hall in October 2022.

Concluding its ruling, the board's then Convener, James Stuart, said: "Such a nationally important landscape is not the appropriate location to host development of such an industrial scale, and where the risk of an escape of farmed fish could impact on designated water courses.

"The proposed development also presents a number of significant landscape, seascape and visual issues. It would have an industrial character and would notably contrast with the largely undeveloped and remote character of the local landscape.

"The semi-closed containment systems proposed – whilst noted as a substantial step forward for the industry – have not yet been trialled in Scotland and there is not a sound body of evidence on which to base decision making."

LLS's then Managing Director, Stewart Hawthorn, reacted: "The National Park Board has missed an opportunity to sensitively use the natural resources within the park to support local communities and fulfil its mission to improve the wider environment beyond the borders of the park."

Four months later, in February 2023, LLS lodged an appeal to

the Scottish Government's Planning and Environmental Appeals Division (DPEA).

"We believe the National Park's decision to prevent this proven, transformative technology being brought to Scotland for the first time was based on fear and a lack of knowledge and understanding," Mr Hawthorn said.

"The National Park has no experience of handling this kind of application and, rather than listening to experts such as NatureScot, SEPA and Forestry & Land Scotland, who all said the project could go ahead, they based their view on a misunderstanding that our plans were the same as existing open net salmon farms. This is fundamentally flawed.

"The project would also demonstrate the commercial viability of this farming system and place the area at the forefront of sustainable economic growth, while overcoming environmental concerns about existing salmon farming techniques."

Campaign group AFFtheClyde, which had successfully fought the application, countered: "While this new technology certainly goes a long way to tackling the sea lice problem, it presents other potential dangers. The claim that the technology had been successfully tried and tested is, at best, questionable."

Their cause was backed by the Scottish Green Party, which launched a campaign urging the Scottish Government to reject the appeal. Over 4,000 supporters joined the call. Highlands and Islands MSP Ariane Burgess said: "Our lochs and the delicate ecosystems they support are too valuable to put be at risk of long-term damage."

Opposite from top: FiiZK semi closed cage in Norway; Mark Shotter, Loch Long Salmon; Cage illustration used by Loch Long Salmon in its publicity, in 2021

Above: FiiZK Protectus closed cage

Left: FiiZK Protectus, Mulingen, Northern Norway



It won't ever use sea lice treatments or acoustic devices



Ministers decide

Fast forward to February 2024, and the DPEA Reporter submitted their findings to Scottish Ministers. But it was taking a long time for them to reach a decision – too long for LLS Project Manager Mark Shotter.

"The lack of progress is disheartening," he said. "Delays to projects like ours risk undermining Scotland's ability to attract international trade and investment and discourage further innovation. The Scottish Government must act decisively – inaction is not an option."

At last came a decision in August 2025. The Reporter had recommended that the appeal be thrown out, but after considering the evidence, the DPEA upheld the appeal.

In its decision letter, the Scottish Government said: "The Scottish Ministers acknowledge that the development is larger in scale than open-net fish farms due to the SCCS (semi-closed containment systems) technology.

"The Scottish Ministers agree with the Reporter that fish farm development is inevitably industrial in appearance but consider this should not count against it.

"The Scottish Ministers also agree with the Reporter that no identified 'important views' would be significantly affected and that design of the proposed development has sought to minimise visual effect."

Since the farm supported the development and marine plans and offered economic benefit, they ruled the pros outweighed the policy conflicts.

A delighted LLS said it "can now progress with its ambitious vision to bring semi-closed containment technology to Scotland for the first time. [It] is already widely used in countries including Canada, Norway and the Faroe Islands, where it is transforming industries by improving the welfare of salmon whilst creating economic benefit and greener outputs."

A global endeavour

How is the technology being deployed around the world? In its publicity material, LLS distributed an image of a semi-closed containment pen in Norway, made by the cage designer and manufacturer FiiZK, that is "similar to the design that is being planned for the Beinn Reithe site development".

Trondheim-based FiiZK supplies "Protectus", which it says unites "the best of traditional pens and land-based systems". "A solid double barrier shields the production volume from the natural

surroundings, keeping both the farmed salmon and the environment safe," FiiZK explains. "Lice free deep water is pumped in, circulated, monitored and regulated. Waste is collected for further treatment.

"The system holds 2,000 cubic metres of production volume, and can farm up to 1 million post-smolt from 100g up to 1kg. It is the latest of all our systems, and is a result of 12 years of knowledge and experience from over 24 delivered closed cages and more than 80 production cycles, with a total of over 30 million fish.

"The result is an energy effective, sustainable production with optimal growth conditions, and a significant reduction in environmental impact."

Elsewhere in Norway, Mørenot Aquaculture, a supplier of fibre-based products to the fisheries and aquaculture industry, has developed the MarWall. Mørenot explained: "By combining shielding from the surroundings with a controlled system for water pumping and oxygen supply, we can create an optimal, lice-free environment.

"This solution is both easier to operate and more flexible than many other alternatives. In a semi-closed cage, we draw deep water and pump it up to the surface, where it is mixed into the water column. The challenge lies in the natural differences between deep water and surface water, but we have solved this with a specially designed shielding skirt system that ensures proper circulation and mixing.

"A key principle is to handle the fish as little as possible. We have developed two systems based on the same principle, both of which can be retrofitted onto existing cages.

"Both systems use deep lice skirts attached to the sink tube, which can be raised and lowered. For cages without sinker tubes, we design tailored skirts to fit the existing net structure.

"The internal system (Hydro2) consists of 3–4 pumps that draw water from 2–3 metres below the skirt edge and circulate it to create optimal hydrodynamics. Each pump operates independently, with adjustable frequency control, and oxygen can be added when needed. Oxygen levels are automatically regulated by sensors to maintain the desired saturation. Each pump has a capacity of 80 m³/min.

"The external system (Hydro-2) is based on the same principle, but the units are installed outside the net and beneath the walkway. This design is ideal for sites exposed to stronger currents. Unlike the internal pumps, the external Hydro-2 units can draw water from even greater depths, ensuring nearly lice-free intake water. They can also help regulate temperature, either by accessing cooler deep water in warm seas or by maintaining a more stable thermal environment.

"Together, these solutions offer flexibility, reliability, and improved fish welfare, while supporting sustainable and cost-effective salmon farming."

The Canadian experience

Across the Atlantic, after trialling a made-in-BC semi-closed technology solution at its farms off the Sunshine Coast region, Grieg Seafood BC installed its system at all three of its farms in Esperanza Inlet, off the west coast of Vancouver Island.

The new CO2L Flow system (pronounced Cool Flow) is a form of semi-closed containment, which allows for farmers to raise or lower custom designed farm enclosures. "In all the trials, farmers noted better growth, lower mortality, better feed conversion rates (meaning the fish are more effective at converting feed into growth), and most significantly – a dramatic reduction in the need for sea lice treatments," the company said.

Dean Trethewey, Seawater Production, Certifications and Regulatory Director, explained: "The CO2L Flow Max system has taken some tried and true technology, such as sea lice curtains, and paired them with cutting edge aeration technology, to create a completely new system.

"During sensitive wild salmon migration periods or times when we know there is harmful algae in the region, we can lower the barriers on the farm, forming a barrier between the wild salmon and the farmed population, this prevents lateral interaction, and significantly reduces the transmission of sea lice between the populations. The barriers can be fully lifted outside of these periods, allowing the farmed fish to benefit from natural ocean conditions, temperatures, currents, and oxygen levels."

Managing Director Rocky Boschman added: "We are continuing to look for solutions that will support the recovery of solid waste and ways in which it could be used for some type of value-add product like fertiliser or soil enrichment.

"There is no denying that this new system represents a transition towards what in-ocean farms can one day become."

The system was installed at all three farms in Esperanza Inlet (Lutes Creek farm, Steamer Point farm and the Esperanza farm) in time for the outmigration of juvenile wild salmon in early 2023.

While LLS once hoped to operate Scotland's first semi-closed fish farm, given the long delays before a decision, it may now be beaten to it.

SeaQure in Scotland

Inverness-based Gael Force Group, which supplies equipment, technology and services for farming and catching seafood, has been developing its SeaQureFarm for several years, and is now ready to deploy the first system over the next six months.

Group Managing Director Stewart Graham told us: "SeaQureFarm consists of one or more SeaQureWells which are semi-closed containment pens manufactured from impermeable membrane supported by a floating and sinking structure.

"The system is subject to several patents which have been granted and multiple patents still pending. The system involves



pumping cooler seawater from depth in a flow through arrangement, with water exchange every 50 minutes.

"The system has 100% redundancy from peak demand and alternates between pairs of pumps daily. The submersible pumps are extremely high volume, very low energy and very low maintenance (five year maintenance cycles).

"Supplementary oxygen requirements are provided from the leading nano bubble systems in order to maintain growth and health supportive levels of DO at all times. The SeaQureWell has double containment security with an internal SeaQureNet which provides the ability to grade and harvest the fish as well as provide additional security.

"Survival is projected to be greater than 95% and all morts are collected and lifted up out of the well for further processing. Sludge collection is being modelled at c95% collection and returned to barge or to shore for processing.

"Due to the unique design of the system the cost base is very substantially lower than other systems which will lead to the system being a strong commercial prospect for both post-smolt operations and on-growing too.

"Gael Force Group are working with the newly established SeaQureFarming Group and producer partners to build up to five full scale sites in Scotland over the next few years.

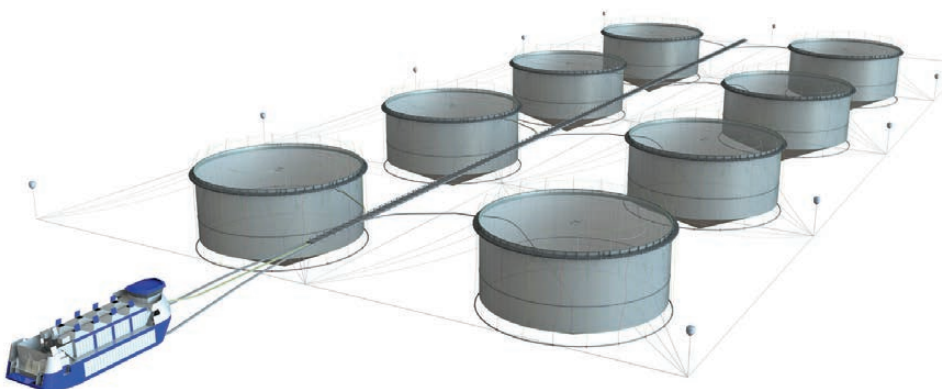
"Gael Force Group have been appointed preferred supplier to Dawnfresh Farming, who are planning to deploy a first SeaQureWell at their Ardnish site in Lochaber in Scotland over the next six months."

Meanwhile Loch Long Salmon has been consulting with the local community on a second option, a bigger semi-closed fish farm on Loch Linnhe at Lurignish, composed of eight 50m pens – double the number at the Loch Long facility. This would make it Scotland's largest fish farm by volume, but not by size. In 2023 LLS lodged a scoping request with Argyll and Bute Council.

Will that too turn into a long saga? ●

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A key
principle is
to handle
the fish
as little as
possible

Opposite page: Mørenot
MarWall in operation
Above: Stewart Graham
Below: SeaQureFarm
system



Back for more

Those hoping for a change of course for Norway's policy on aquaculture look set to be disappointed following the election, says **Vince McDonagh**



SO Norway has a new government following last month's general election. Does this mean a new approach in its aquaculture policy?

That is very unlikely because Labour and most of the same faces from the previous administration are back in power.

Marianne Sivertsen Næss is, at the time of writing, still Fisheries Minister and she has already said the sea lice emissions from salmon farms must be reduced and fish welfare improve.

Whether she continues in that post will be up to the Prime Minister, but any successor will offer more or less the same.

Many observers had assumed that Labour leader Jonas Gahr Støre was down and out. His fortunes revived after the Conservatives were hit by a tax controversy, and also after the return to politics of ex-Labour PM Jens Stoltenberg, the former Secretary-General of NATO.

Aquaculture businesses, whose owners had hoped for a shift to the right, will have to live with the policies of the previous four years – most of which they did not like.

The ground rent tax on fish farming companies – also known as the "salmon tax" – will certainly stay and it is more than possible the industry will face a further fiscal caning.

It is interesting to note, however, that the Centre Party, which was the architect of the hated ground rent tax, suffered badly in the election, especially along the coast which was supposed to be its electoral stronghold. It is also where most of the salmon farms are located.

Of course, it wasn't all bad. For the first two years of the last government, the industry enjoyed rapid growth.

Money came rolling in, profits ballooned and investors were being paid handsome dividends.

Little wonder then that the Labour-Centre Party alliance said to themselves: "We are going to grab some of that!"

But regulating an industry is about more than taxation. It is also about influencing the way it works.

Perhaps the industry exaggerates its own importance sometimes. Despite its huge contribution to the national

economy, it barely featured in the election debates.

Views among observers and within the industry itself vary widely as to what will happen over the next four years, but the general mood is not cheerful.

Pareto analyst Henrik Longva Knutsen writing in the business newspaper *Finansavisen* says the outcome will be "slightly negative" for the sector.

The "red-green bloc", which Labour heads, won a total of 87 seats compared to 82 seats for those on the right.

While few expected a change of government, Pareto Securities still sees the election result as a negative event for fish farming companies.

"First, it limits the possibility of a reduced salmon tax, with SV, Rødt and MDG instead pushing for stricter regulations and more taxation," writes analyst Henrik Longva Knutsen.

Furthermore, the analyst points to "regulatory overhang" in the sector, with the white paper review of aquaculture resurfacing under a left-wing majority.

For example, SV, Rødt and MDG, all parties on the far left, are pushing to phase out open cages, demanding higher taxation and proposing time-limited licences.

They also want tougher biomass restrictions and stricter regulation for farming in fjords.

As a result, we may see increased



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The current tax regime and other regulatory innovations will... stifle the business sector

This page from top: Norwegian Parliament; Jonas Gahr Støre; Geir Ove Ystmark
Opposite from top: Ola Braanaas, Sea lice on salmon

merger and acquisition activity in the sector, as smaller farmers may choose to sell as a result of the increased regulatory uncertainty, Knutsen believes.

The slow drip of executives to tax-liberal Switzerland could become a full blown exodus, he suggests.

"In short, we do not expect any short-term impact on the sector, but it is not a positive event. As such, delta-negative – if anything," Knutsen writes.

Trout farmer Ola Braanaas is also worried about what might happen in the industry over the new parliamentary term.

He tells the industry website iLaks.

no that he fears a period of more unpredictability and horse trading.

The Labour Party, he says, only returned to winning ways after it got rid of the Centre Party which became weak in its core base.

He believes that Labour will have problems with the three minority parties left if it tries to go easy on the aquaculture companies.

Norwegian aquaculture is also facing problems from outside the country thanks to President Trump's tariff policy.

At the time of writing, Norwegian salmon exporters were paying 5% more than their UK and Chilean counterparts to sell into the US, which puts them at a major disadvantage.

Canadian salmon farmers are in an even better situation, facing zero tariffs thanks to the USMCA trade deal, negotiated during Donald Trump's first term, which also includes Mexican seafood.

The impact of Trump's tariffs on Norway is already beginning to show up in recent export statistics. Geir Ove Ystmark, Chief Executive of the industry employer organisation Seafood Norway, sees rising protectionism as one of the biggest dangers facing fish farmers – and business in general.

He fears that with the US situation and

even hurdles from within the European Union, Norwegian producers could be facing a shrinking market.

Ystmark says it is vital that trade agreements and market access are kept open. He says: "Together with the new Storting [Parliament], we want to secure access to the EU and other markets, to ensure competitiveness in the short and long term.

"This will also ensure Norway's preparedness, where the seafood industry has great potential and can contribute and strengthen Norway's preparedness, at a time when we see geopolitical unrest."

On tax, he says levels are both unpredictable and too high. Seafood Norway is looking for a broad settlement that stands the test of time.

But, at the moment, there is very little chance of any movement on tax, given Labour's dependence on the left-wing parties.

These parties do not like the salmon industry and the people who run it, even though the industry argues that they provide plenty of jobs and substantial benefits

for areas of the country which would otherwise struggle economically.

Labour's Prime Minister Jonas Gahr Støre will need to stand up to these fringe parties if their demands become unreasonable – and they probably will.

Helge Singelstad is the CEO of Laco AS, the major shareholder in Austevoll Seafood ASA, and writing for the business website e.24 recently (as a private individual), was severely critical of the last four years.

He said: "For coastal Norway, the property tax, combined with the government's ignorant introduction of a special tax on the aquaculture industry, is destructive to innovation, restructuring and value creation, something the welfare state will need in the decades ahead.

"The next decade will require major restructuring away from fossil energy, but does the government and its partners (Red, SV, MDG and SP) understand the consequences?

"I don't think so. The prerequisite for Norway to have viable local communities that continue to contribute to the welfare state is that the business sector is given liveable framework conditions.

"The current tax regime and other regulatory innovations will, over time, stifle the business sector that can enable the restructuring that society must go through."

Gloomy words indeed. But, unfortunately, he may well be right. ●



'Decisions are made far removed from everyday life'



ALICE Strømmegjerde (pictured), CEO of the Global Aquaculture Tech Hub (GATH), says that all along the Norwegian coast, there are small and medium-sized businesses employing 10 to 15 people that create great value for the country every day.

It may be hardly noticeable in Oslo – but for coastal communities it can mean the difference between growth and decline.

Yet it is precisely in the capital that much of the policy is shaped.

"For those of us who are at the heart of the industry, it often feels as if decisions are made far removed from everyday life on the quay, in the smolt plants or at the supplier companies," she says.

"And what is creating the greatest uncertainty right now is not necessarily the level of a single tax, but the lack of predictability in the framework conditions.

"The election result has given us a continuation of the current course. It is creating unrest in the industry, because the signals from political quarters contribute to uncertainty about investments and commitment."

One of the most obvious violations in recent years, she argues, was the introduction of the land rent tax on aquaculture, which the parties ruled out during the prior election campaign.

She adds: "We understand the argument that value created from community resources should benefit the community. But claiming that taxes do not lead to lower investments or fewer jobs is perceived as unrealistic by those in the middle of everyday life.

"Our member companies have seen projects postponed, investments shelved and capital moved out of the country."



'Step change' for kelp

A new study has yielded valuable lessons on harvesting and processing seaweed



Photo: KelpCrofters

A SCOTTISH-LED project has helped open the way for major progress in the kelp farming industry, the participants say. Led by KelpCrofters Ltd, the partners included EcoCascade, Scottish Agronomy, the Danish Technological Institute, PRM Waste, and Efficiency Technologies. The funders were the Seafood Innovation Fund (SIF) and SAIC, and the cost of the project totalled £283,160.

SAIC says: "This project represents a step change for the Scottish kelp industry, tackling critical bottlenecks and unlocking new commercial pathways."

Kelp farming offers sustainable benefits for food production and carbon capture, but the sector faces challenges such as short harvest windows, biofouling and limited post-harvest infrastructure.

The sector's most valuable product, food-grade kelp, requires early-season harvests when yield is at its lowest and the risk of biofouling is highest. Biofouling, particularly from bryozoans, hydroids and molluscs, reduces market value and forces producers to discard large portions of their crops. To meet strict food-market standards, including allergen-free certification, farmers often rush to harvest clean fronds, shortening the season and further reducing yields. Delays caused by poor weather or processing backlogs increase the risk of crop loss.

The project involved trialling new harvesting, preservation and processing techniques to improve efficiency and reduce waste.

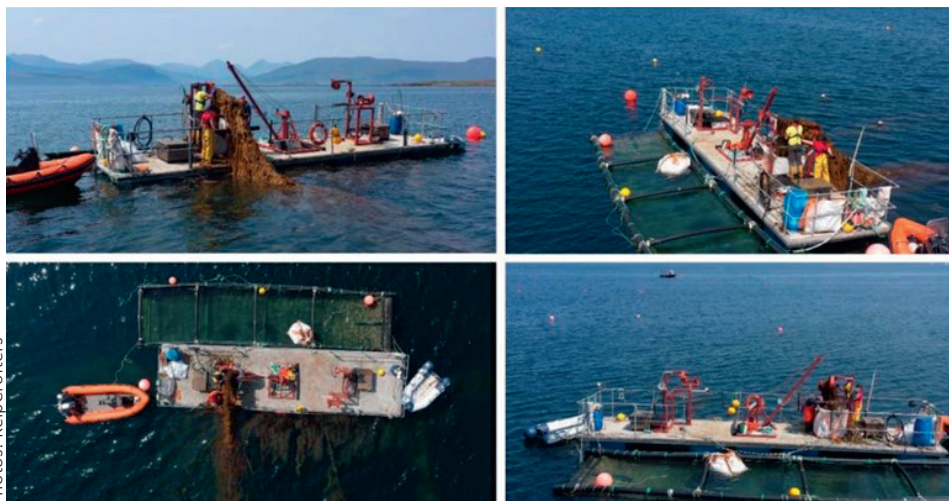
This project set out to address the above challenges by developing more efficient harvest, storage and processing strategies for farmed kelp, while also exploring new product development opportunities.

The key objectives were to:

1. Increase harvest efficiency and extend the productive season;
2. Manage biofouling and identify value-added uses for lower-grade kelp;
3. Reduce the environmental and financial costs of drying through dewatering;
4. Develop ensiling and fermentation techniques to stabilise kelp post-harvest;
5. Investigate commercial opportunities for kelp-derived liquid by-products.

The project was structured into five work packages (WPs) spanning the kelp value chain: project coordination, harvesting improvements, post-harvest preservation, dewatering and market development.

To enhance harvesting, a custom-built pontoon increased harvest capacity and flexibility. This helped alleviate seasonal bottlenecks and reduced crop losses from weather delays. Paired with a semi-submerged barge, the system allowed fresh kelp to be stored and



transported at sea, preserving quality between harvest and landing. This innovation increased harvest capacity and allowed operations to continue during a broader range of weather conditions.

While freshwater washing removed some biofouling such as snails and crustaceans, it had a limited effect on more persistent organisms like hydroids and bryozoans, which can cause lasting damage to seaweed quality. As such, monitoring biofouling onset remains essential, the researchers say.

Processes such as ensiling and fermentation enabled long-term, low-energy storage of kelp. These methods also enhanced the nutritional and bioactive properties of liquid extracts, showing promise for use in agriculture and cosmetics.

Laboratory trials tested the effect of various acid and microbial inoculants, including lactic acid, formic acid, and lactic acid bacteria (LAB), with and without added sugar. And pH stability, odour, and microbial activity were monitored across 12 months.

The most effective fermentation approach involved adding lactic or formic acid to rapidly drop the pH, maintaining levels below 3.7 for up to a year. Adding sugar accelerates fermentation, it was found.

The preserved biomass and resulting liquid extracts were then analysed for heavy metal content, iodine levels and digestibility to assess suitability for feed, food, and high-value ingredient markets. Heavy metals and iodine in kelp are a major barrier to accessing food and feed markets, with concentrations often above permitted EU limits.

Chopping trials showed that reducing kelp size improved packing density and pumpability, so the processed kelp needed less storage space.

To address kelp's high water content and bulk, mechanical dewatering (WP4) was tested using a screw press. Fresh kelp, containing up to 90% water, is difficult to store and transport. High in natural sugars, it decomposes quickly if not preserved. The dewatering process reduced water content before drying and enabled recovery of liquid extracts, which were further analysed for nutritional and chemical properties. Chopping methods were also evaluated to reduce kelp volume for transport and storage, as well as to support ensiling.

Finally, liquid by-products were assessed for use in biostimulants and cosmetics (WP5). Samples were analysed for minerals, bioactive compounds and antioxidant properties, and field trials evaluated their potential as ingredients in the cosmetic and biostimulant sectors. These are two fast-growing markets increasingly seeking sustainable, natural alternatives.

Field trials on spring barley confirmed the biostimulant potential of kelp extracts. All treatments improved yields, with ensiled *Saccharina* at 10 L/ha achieving up to 19% increases and an average 8% improvement across test plots, and with ensiled *Alaria* also delivering significant increases in yield. Fermented *Alaria* showed diminished returns at higher doses, indicating that formulation and dosage need refining, and that fermented products illicit a different response

in plants when compared to ensiled kelp extracts.

In cosmetics, fermented extracts consistently outperformed cold-pressed counterparts, with fermented *Saccharina* showing the highest antioxidant activity. This suggests microbial fermentation may unlock phenolic compounds, positioning fermented seaweed extracts as promising ingredients for skincare, however, its sensory attributes remain challenging. This is pending further work on formulation compatibility and safety.

SAIC concludes: "This project represents a step change for the Scottish kelp industry, tackling critical bottlenecks and unlocking new commercial pathways. The custom-built harvesting pontoon significantly improved capacity and reduced weather-related downtime, offering a scalable solution for producers. Rinsing protocols and monitoring also helped extend the food-grade harvest season, though persistent biofouling remains a barrier, emphasising the need for alternative markets for lower-quality kelp."

The development of ensiling and fermentation protocols is particularly significant, SAIC finds. These methods enable long-term, low-energy storage of wet kelp, reducing waste and seasonal pressures while enhancing market flexibility. In parallel, fermentation improved product digestibility and reduced heavy metal content, opening the door to feed applications currently restricted by regulatory limits.

Dewatering technologies, especially the screw press, delivered practical wins in reducing energy use, transport costs and emissions. By simplifying logistics and decreasing processing time, these techniques improve both economic and environmental sustainability.

"Perhaps most importantly," SAIC says, "the project demonstrated viable routes to higher-value products. Liquid extracts from fermented and ensiled kelp show promise as plant biostimulants and cosmetic ingredients. Early field trials and lab tests indicate strong potential, setting the stage for future product development and commercialisation."

Overall, SAIC concludes: "The project delivered practical innovations that support industry growth, reduce environmental impact and unlock new commercial opportunities across the seaweed value chain." ●

“The project demonstrated viable routes to higher value products

Opposite: Seaweed harvesting pontoon 'Harvie' consists of two harvesting 'gantries' with haulers to allow two lines of kelp to be harvested simultaneously
This page from top: Harvest time for KelpCrofters; barley





True colours

The disciplines of science and fashion design are coming together to find an exciting new application for seaweed extracts. **Robert Outram** reports

THE fashion industry arguably accounts for a disproportionate amount of pollution. In 2024, textile dyeing and finishing accounted for 3% of global CO₂ emissions, and projections suggest that figure could rise to 10% by 2050.

The industry is also the second largest contributor to global industrial wastewater pollution, impacting entire ecosystems and millions of people. Textile dyes can be toxic, mutagenic, carcinogenic agents and can persist as pollutants.

But what if there was a sustainable alternative, drawing on the resources of the ocean itself? That is the vision of marine scientist and biotech innovator Jessica Giannotti and her start-up company, SeaDyes. Giannotti aims to create stunning natural dyes sourced from seaweed – and earlier this year she joined forces with research institution The James Hutton Institute.

In February, SeaDyes became a “spin-in” for the Institute, with the help of a £75,000 grant from Scottish Enterprise’s High Growth Spinout Programme.

SeaDyes, which was founded in July 2023, aims to revolutionise the fashion and textiles industry. Giannotti says the collaboration aims to expand SeaDyes’ capabilities and capacity, allowing them to refine their intellectual property and complete the validation of their dye production and business model in an industrial environment.

Being based at The James Hutton Institute means access to world-class scientists, laboratories and support teams, allowing SeaDyes to focus on developing a scalable and proven technology.

Giannotti says: “Having the opportunity to focus on the science and the technology is

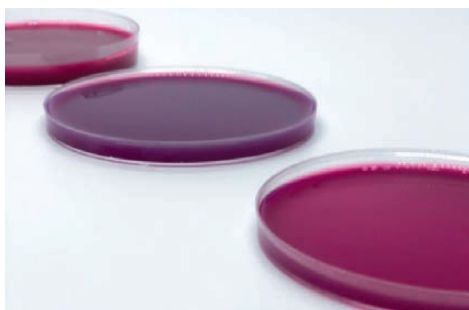
very important. We’re making sure we have a sound technology that is scalable, that is proven and it’s a great culture here as well. It’s great to work with people. Everyone here wants us to do well and thrive and it’s good to be in such a nurturing, wholesome environment.”

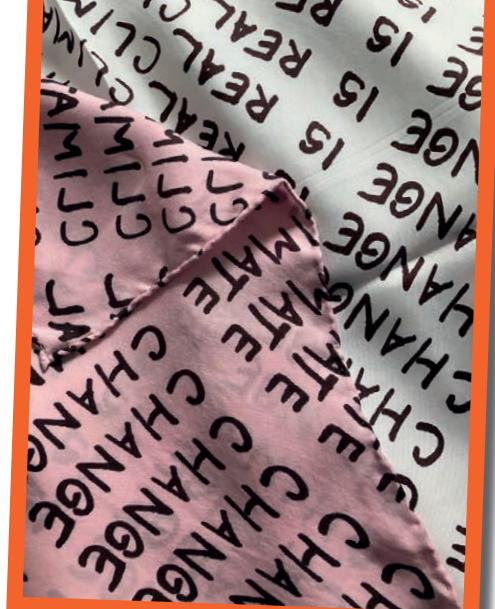
Giannotti’s interest in seaweed as a natural source of dyes began when she graduated with a degree in marine science.

She says: “I was so inspired by the ocean as a system, and the beauty of the ocean, that instead of going down the academic route I started a new company, Crùbag, which is Scottish Gaelic for ‘crab’. It was all about communicating this unseen beauty and unseen knowledge of the ocean, and we ended up developing beautiful textiles and doing textile design, inspired by marine science, and creating collections in collaboration with marine scientists.”

SeaDyes started as a joint research project for Crùbag, along with the Scottish Association for Marine Science (SAMS).

Giannotti says: “I realised that there was more that we could do as marine scientists and also with 10 years of knowledge in the





textile industry, I started to think about which ways we could look at the ocean as a source of solutions to improve sustainability in the fashion and textile industry."

SAMS suggested exploring the possibilities in using five seaweed species as dye sources, and the study concluded that it was feasible. When it finished, Crùbag decided to pursue the commercial possibilities and SAMS agreed to support it.

Presenting the seaweed dyes at the Future Fabrics expo in London, one of the leading showcases for sustainable fashion worldwide, Giannotti found the concept received a warm reception.

She says: "We had so much traction and excitement from the industry and I realised, OK, there is an opportunity here. There was momentum, there was interest and we started testing the dye with industry partners."

The time was right to launch SeaDyes as a biotech company, while Crùbag continues as a design business. The deal with the James Hutton Institute means that SeaDyes can focus on both the hard science and the commercialisation of the idea.

Giannotti says: "Becoming a spin-in at the James Hutton Institute is a transformative step for SeaDyes. We can now treat seaweed as a crop and our dyes as a natural product, and have the capacity, skills and space to refine our technology, develop a market-fit product and scale. Their research excellence and commitment to sustainability and innovation perfectly align with our vision of providing planet-friendly solutions. We have a bold shared vision for the future driven by creative science-led innovation."

Speaking in February, Jonathan Snape, Head of James Hutton Limited, added: "James Hutton Limited is pleased to welcome SeaDyes as part of our spin-in initiative and is eager to collaborate on advancing sustainability in the textile and fashion industries. Together, we are committed to driving innovation in eco-friendly dye solutions and making a meaningful impact on a more sustainable future."

Because there are still patents being

applied for, SeaDyes is not disclosing which seaweed species appear to be the most promising, but Giannotti says they are looking at seaweeds that grow widely around the Atlantic and North Pacific, and which could be harvested sustainably as wild crops or farmed.

The company currently has a short-term supply from established wild harvesters for R&D and initial pilots, but is planning for a transition to farmed seaweed for large-scale production. Their strategy includes initially developing a high-value, traceable Scottish seaweed-based dye as a premium product, then expanding to global farmed seaweed sources for mass market production.

Giannotti says: "We have to be realistic. Sustainability alone, and being bio-based and having dye from seaweed, is not enough reason for the market, for us to grow and be successful. We have to perform well. We have to have a high quality product that is useful to our customers that is developed with our customer in mind."

"So we have to be quite customer-centric and we have been visiting dyeing houses, factories, textile mills, partnering with key players in Scotland, in Portugal and listening to the pain points, listening to their problems, trying to position our dyes within a supply chain and understanding the entire value chain."

SeaDyes is working with Luis Cristino, a sustainability expert with long experience in the textile business, to build that understanding and grow relationships with the industry.

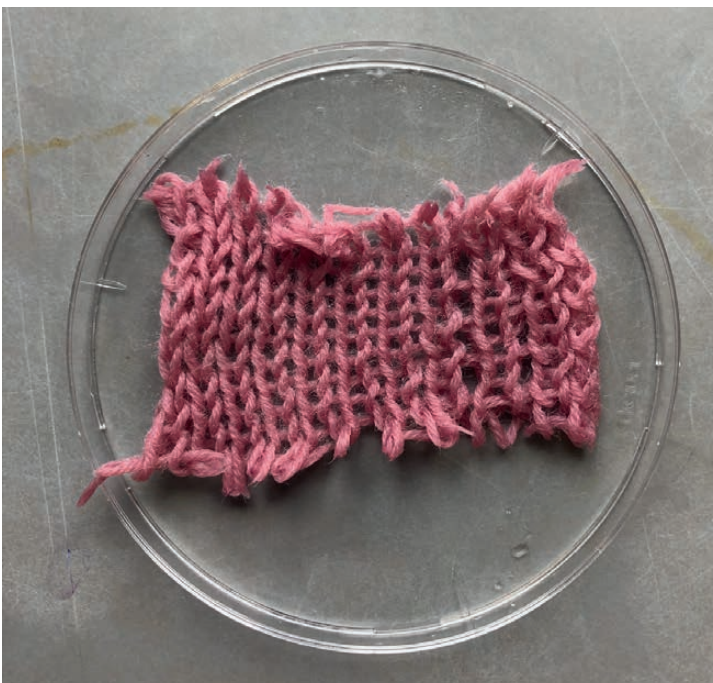
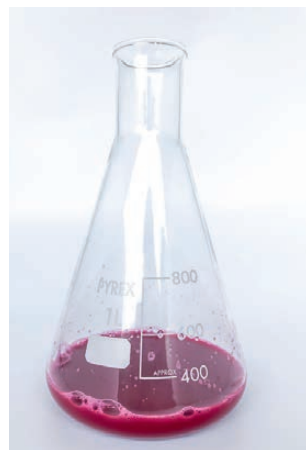
The company aims to offer both a premium product and a mass-market commodity to maximise impact and accessibility. The idea is to prioritise working with supply chain partners like dyeing houses and textile finishers early on, ensuring their dyes are compatible with industrial environments, before approaching fashion brands.

This approach creates direct routes to market through their textile partners and allows for thorough product testing and integration.

Additionally, SeaDyes aims for zero waste, assessing residual biomass for potential uses such as biostimulants, fertilisers, animal feed, or even new products like fibres and bioplastics to create an ecosystem of products within the fashion and textile industry.

Leah Pape, Head of High Growth Services at Scottish Enterprise, has confidence in the concept. She says: "By providing funding and wraparound support to SeaDyes we can help Jessica turn a novel concept into a commercially viable business that can steer the textile industry in a more sustainable direction, and stimulate the continued growth of the industrial biotechnology sector in Scotland." ●

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Opposite from top: (L to R) Jonathan Snape (Head of James Hutton Limited), Jessica Giannotti (SeaDyes Founder and CEO) and Graeme Rogers (Innovation Manager at James Hutton Limited). Photo: The James Hutton Institute; seaweed dye
This page from top: Printed fabric; seaweed dye in flask; dyed fabric

New markets, new technology



Trout producers from Finland to the south of England are continually looking to improve their stock and find new routes to the consumer, as **Robert Outram** reports

HOFSETH is one of Norway's biggest salmon processors, handling more than 50,000 tonnes each year, but it is also a producer of farmed salmon and trout, totalling around 16,000 tonnes with 70% accounted for by trout.

In March, Hofseth reached a major milestone by releasing the first trout into a submersible cage at Bugane in Storfjorden. This marks the beginning of a new chapter in sustainable aquaculture, as the company becomes the first in Norway to test this technology specifically on trout.

There are nine submersible cages at Bugane, six with trout and three holding salmon.

Bugane is located in Storfjorden, a 110-km long fjord in Møre og Romsdal county. It is a large fjord with five fish farming sites,



all operated by Hofseth.

As Didrik Vartdal, Quality Manager at Hofseth Aqua, explains: "We invested in submersible farming at the location we saw as most exposed to acquiring and spreading sea lice, making it a good test area for the new cages."

Hofseth has been working with Norway's Institute of Marine Research (IMR), which has carried out smaller scale tests of submersible cages with sea trout.

Vartdal says: "One of our goals is to increase production without increasing the lice population.

"The more sites you have, the higher the transmission intensity for sea lice, so taking out two or three sites can significantly reduce lice transmission."

It is part of a programme to achieve better fish welfare using delousing methods that are specifically adapted to each fish group. This can include freshwater treatments or combination treatments that are less harmful to the fish.

Another measure is to rear salmon and trout smolts for a longer period on land before releasing them into sea cages.

The new cages are suspended at a depth of 20 metres from the surface, below the

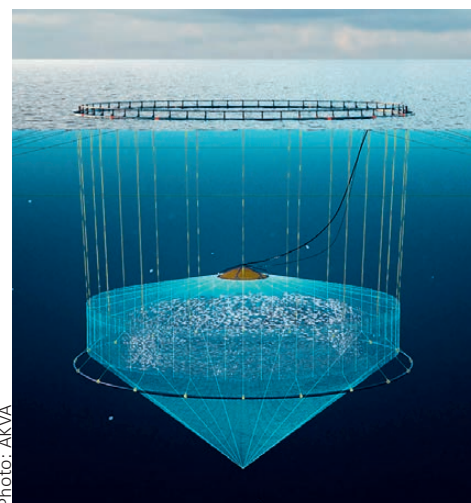


Photo: AKVA

five-metre layer of ocean in which most sea lice can be found. Each cage holds 40,000 cubic metres and can take up to 180,000 individual fish at 5kg.

An air dome in the cage provides access to air for the trout's swim bladders, which the fish need for buoyancy.

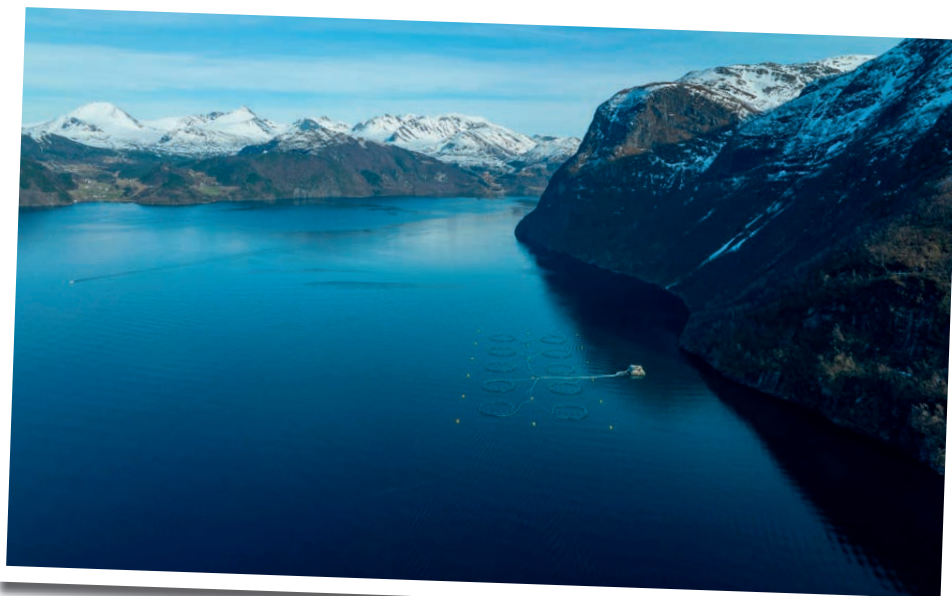
To get pellets to the fish that far below the surface, waterborne feeding is used, governed by camera surveillance which makes use of machine learning to monitor not only feeding behaviour but also the condition of the fish. Waterborne feeding is also more energy efficient, and quieter, Vartdal says.

The cages were developed by AKVA and the camera system comes from Aquabyte, but other suppliers are also competing in this field.

Not all locations are suitable for submersible cages. The best are exposed locations with a high rate of water exchange, and therefore rich in dissolved oxygen. The cages also require relatively deep water, with a minimum of around 200 metres, but they also need to be close enough to shore for the necessary infrastructure and access to power.

Norway's coastal geography has plenty of such locations, but that is not true of all fish farming regions.

Fouling at such depths is less severe than





Opposite from top: AKVA submerged cage; Hofseth staff installing submerged cages; Hofseth farm, Bugane
This page from top: Rainbow trout; Finnforel Varkaus 'gigafactory'; Nora Hortling; LoHi fish tasting, Dubai

for cages nearer the surface, but the nets are impregnated with a biocide and can be cleaned with a remotely operated vehicle (ROV) if needed.

How are the fish doing?

Vartdal says: "The trout have adapted well – faster than the salmon have."

So far, signs are that lice treatments have not been needed, the feed conversion ratio (FCR) has been good and mortalities are down.

The first harvest from the submersible cages is expected towards the end of this year, when the fish should have reached between four and four and half kilos.

Meanwhile Norway's "traffic light" system, which regulates fish farming by region depending on the perceived sea lice risk, does not make allowances for submersible cages as a special case, but as Vartdal points out, actually reducing sea lice transmission could help to turn a "red" zone "green".



One of our goals is to increase production without increasing the lice population

Finnforel branches out

In a field where the product can often be seen as a commodity, Finnish trout farmer Finnforel is looking to differentiate not only its fish but its whole production process, based on what the company calls the "gigafactory" concept.

Finnforel farms its trout in a land-based, recirculating aquaculture system (RAS) facility which prioritises quality and a low environmental impact. CEO Nora Hortling, who took up her post in February this year, explains that Finnforel controls the entire value chain, from breeding to processing and packaging.

This includes having the company's own breeding facility and a programme with the National Resource Institute of Finland to develop a breed even more suitable for a RAS environment. She highlights convenience as a key differentiator for the product, noting that Finnforel's fish fillets are portioned for single servings, reducing food waste and making meal preparation easy for consumers.

How does the operation compare with farming trout at sea? While the initial capital expenditure for a RAS farm is significant, the environment means costs are more predictable, Hortling argues, unlike open net farming.

She says: "We have a quite stable environment. Of course it needs a lot of expertise and experience to run that environment in a sustainable way, but I'd say it is very competitive. As the industry evolves and learns, it will constantly also get more efficient."

Finnforel's newer plant, completed last year and based alongside the company's first RAS farm, utilises raceways that are shallower and more energy-efficient than the traditional deep, round tanks in the older farm, leading to better environmental control and energy savings.

Finnforel's home market is Finland, but its primary current focus for export is the Middle East. Last month, the company announced that its LoHi export brand trout is now available in the





United Arab Emirates (UAE). The products have already made their debut with the start of sales in selected LuLu Hypermarket stores in Dubai, one of the UAE's largest retail chains.

Additional retail partnerships with two other major local supermarket chains in the UAE are set to begin in the coming months.

Nora Hortling confirms that Finnforel is systematically exploring new export markets in Europe, Asia and the US, although she notes that these discussions require significant time and effort for a relatively small brand from Finland (the site's full capacity is around 2,800 tonnes).

Hortling also shares the company's vision to expand the "gigafactory concept" globally to be closer to consumers, with several potential international locations already identified and initial plans underway.

She says: "We need to scale our sales to match production. So, that's where our focus right now is. But of course, in the background, we are constantly also working on our future expansion plans internationally."

Finnforel has already collaborated with the UAE-based investment organisation ADQ on the schematic design for a plant in the UAE. The two partners mutually decided to delay further decisions on this project, however, which remains active but not currently in full development. Meanwhile Finnforel intends to observe market reception to its brand in the region.

UK trout farming: the times they are a-changing

In the UK, the scale and nature of trout farming contrasts starkly with the huge salmon sector – but trout farmers are having a good year, says the industry's association.

Oliver Robinson, Chair of the British Trout Association (BTA), reported that the demand for trout is strong, but the industry has seen significant changes and a reduction in UK production. Notably, in 2023 Dawnfresh, which operated trout farms in the west of Scotland, was acquired by Mowi, which converted two sites to salmon smolt production. This has resulted in a loss of approximately 5,000 tons of trout production.

The remaining Dawnfresh sites were sold to Gael Force's subsidiary SeaQure Farming in April of this year, which is enthusiastic about developing trout production, particularly at the Ardnish site which will operate a semi-closed containment system. Some of the Dawnfresh staff were retained by Gael Force, preserving valuable industry experience.

Meanwhile in England, the Trafalgar Fisheries rainbow trout farm near Salisbury closed in March this year and another company, Coldwater Salmon Ltd, is seeking planning permission to convert the site to a land-based salmon farm. Its proposal

to cover the open farm site with a 3,240 square metre steel and PVC canopy could prove controversial.

Oliver Robinson estimates that UK trout production for the table is now around 12,000-13,000 tonnes, from 17,000 tonnes prior to the Dawnfresh takeover. Included in this is 3,000 tonnes, estimated, for restocking in rivers and lakes.

He has observed a significant industry trend over the past few years toward producing large freshwater trout, often three kilogram-plus fish, through flow-through systems, rather than the smaller portion trout that used to be a feature of the market, noting a very strong demand for this product. These larger trout tend to be processed either as fillets, G&G (gilled and gutted) or as hot or cold smoked trout.

Finally, while many hatcheries in the fry or fingerling sector have closed over the years, Robinson says, those that remain have full order books, indicating continued demand.

It has been a warm summer, which can typically be challenging for fish welfare, but the BTA has so far seen 2025 as a good year for the trout farmers. Robinson says: "Health and welfare has been quite an interesting battle for people this year, because of the summer we've had, but generally, because we had such a wet winter, there were very good flows in the rivers in the early summer.

"Antibiotic use is down again down to the realms of about four to five mg per kilo produced, which is quite good."

Proliferative kidney disease (PKD) has been a challenge across the UK and globally. A significant grant from the Sustainable Aquaculture Innovation Centre (SAIC) is funding research into PKD with Aberdeen and Nottingham Universities, which are working with leading Scottish trout farmer Kames. Meanwhile, a worldwide PKD group has been established with the hope of driving understanding and solutions.

Robinson is excited about the potential for a PKD vaccine, with a group in Vienna possibly conducting lab trials next year, for example. Currently, farms rely on a natural immunity process, in which fish are exposed to PKD in July to develop immunity for the following year.

Robinson emphasises the vital need for continued funding for SAIC, particularly for the trout industry, which is generally the preserve of independent companies rather than well-financed multi-nationals.

Trout welfare hit the news this summer when campaign group Animal Equality released video footage of fish at



”
We
believe in
saltwater
farming

This page from top: Rainbow trout; Oliver Robinson
Opposite from top: Kames Loch Craignish farm; Cate, Andrew and Stuart Cannon

Bibury Trout Farm being despatched in an inhumane manner. Bibury, in the Cotswolds, raises fish to be caught by paying visitors. The fish are killed – as is regular practice in angling – with a “priest” or baton, and it was members of the public rather than staff who appeared to be disregarding the instructions given to visitors on humane slaughter.

Just as for salmon, fish welfare is an increasingly public issue and the UK trout sector has been working for three years with Lord Trees – a qualified veterinary practitioner as well as a member of the House of Lords – on health and welfare at the time of slaughter for trout, with recommendations now awaiting ministerial decision for the UK.

Efforts are underway to develop an affordable and usable batch stunning solution, potentially electrical, for smaller farms, in collaboration with Ace Aquatech, with a long-term goal of rolling this out across the entire trout sector.

Meanwhile, another concern for Oliver Robinson is a potential change in the law on licensing water extraction. Environmental legislation currently underway for England and Wales, known as environmental protection regulation, would swap a “licence of right” (effectively a permanent licence) for a “permit” under which, it seems, the Environment Agency could change abstraction volumes if it was felt a greater need presented itself.

Robinson says that the Environment Agency has assured the industry that permits will not be time-limited, and that if they are changed then compensation will be payable. These details could be changed by a future government, however, and the BTA is calling on government to provide stronger guarantees in the legislation, so as not to deter investment in aquaculture.

Kames: a year of accolades

It's been quite a year for Kames Fish Farming, which farms trout on the west coast of Scotland. Stuart Cannon, now Chairman of the company, was awarded the MBE in the New Year honours list,



and in June he was given the Outstanding Contribution award, as voted on by the aquaculture sector at the 2025 Aquaculture Awards in Inverness.

The company also picked up an award for Innovation, and Fish Health Manager Andre Van was named as Emerging Talent of the Year, at the M&S Select Farm awards.

Meanwhile, in February the company rolled out its new brand, MòR Atlantic Trout. “MòR” is Scots Gaelic for “big” or “great”.

The brand aims to emphasise the size and superior nature of the steelhead trout from Kames’ own broodstock programme, while stressing “Atlantic” identifies the fish as raised in the sea, with the clean water and strong currents of the Inner Hebrides – differentiating the product from river-based trout which can be associated with a muddy flavour.

Stuart’s son Andrew, Kames’ Managing Director, says the key focus of the MòR brand was the US market. While Kames’ steelhead trout already has a reputation in the UK, especially in the hotel and restaurant sector, it was less well known in the States.

He says: “We wanted to put our mark on the industry and it’s been great. It’s really helped us to get nearer to the chefs and to the end consumer.”

Cannon adds that 2025 production has been good so far, despite initial concerns about the warm spring and early summer sea temperatures. He notes: “It held back some of our production a little bit, because you have to treat the fish a little bit more gently and you don’t feed them as hard.”

He explains that Kames’ broodstock programme, working with genetic specialists Xelect, helps them manage challenges like jellyfish activity and helps the fish to adapt to warmer sea temperatures, making their strain more resilient.

Cannon says: “We’re continually breeding from the ones who are the strongest survivors.”

“We believe in saltwater farming. We think that gives you the purest, cleanest taste for the trout, but also gives you that texture and colour you want. They are the three things that we’re after.”

In fact, this year the freshwater stage has been one of the most challenging parts of the business. As other trout farmers have found, PKD is a concern and Kames is working with the universities of Nottingham and Aberdeen to help find solutions for the industry.

Trout is also subject to the same price pressures as salmon, and Cannon has seen the latest uptick in the market with some relief.

Expansion for fish farming along the Scottish coast is not easy, but Kames holds out hopes that some existing salmon farm sites might prove more suitable for a trout farmer.

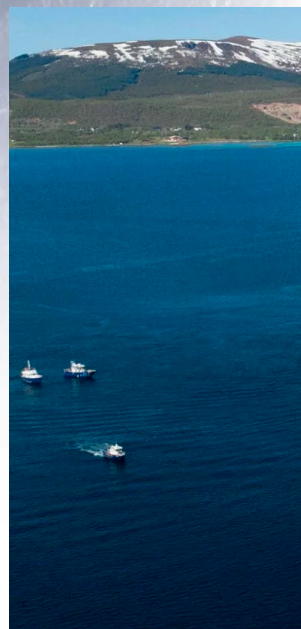
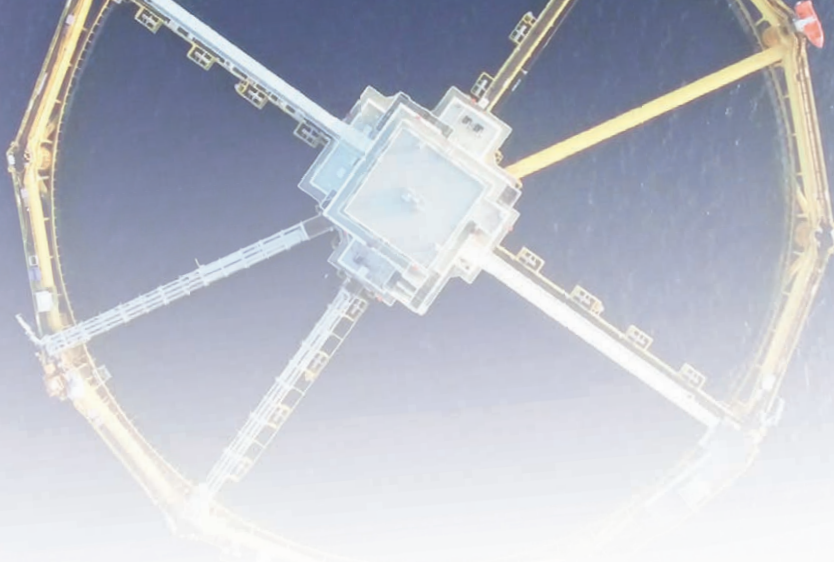
Cannon says: “There are some sites that don’t suit the salmon farmers very well, maybe in slightly more brackish water and slightly smaller sites. The 1,000 to 1,500 tonne sites suit us down to the ground as more artisanal trout farmers.

“They [the salmon farmers] don’t want to be going along to a 70 metre cage and taking out salmon from there. It’s not a big enough infrastructure for them, but it’s perfect for us.”

Meanwhile, Cannon is very proud of his dedicated team.

As he puts it: “We probably have to work harder than the salmon farms because I’m asking people to do a little bit of everything rather than a lot of one thing. But I think that we’ve got fantastic personalities who like that. They really know how valuable they are to us, and they really believe in trout.” ●





Can interest become investment?

Warm words have welcomed Norway's latest blueprint for offshore aquaculture, reports **Vince McDonagh**, but will this translate into tangible projects?

AT long last, the Oslo government has agreed the areas where it wants to see Norway's new offshore salmon farms stationed.

And the general consensus from the industry is that it has chosen the right locations. "Offshore" is the new buzzword in salmon aquaculture today.

A lot of people are talking about it, but apart from SalMar and Nordlaks in the north, few are yet to spend big money.

One of the big problems is that getting started is expensive with only a few companies possessing the necessary capital and the specialist knowledge.

Yet the advantages are potentially huge

– freedom from lice and many of the diseases that affect fjord or shore aquaculture.

There are also environmental benefits such as eliminating the need for pesticides and medical treatments – and effluent from the farms is more easily dispersed.

But there are also dangers for those on board. The waters off Norway, Iceland and Scotland can be very rough and in the past North Sea platforms have been known to collapse. A large fish escape can pose a threat to the ecosystem, quite apart from the threat to life for

workers on the farm.

That said, marine safety is much improved today and the salmon companies believe Norway's safety record is second to none and the risks are minimal.

SalMar, Norway's second largest salmon farmer, is certainly a believer. Earlier this year it bought out Aker's

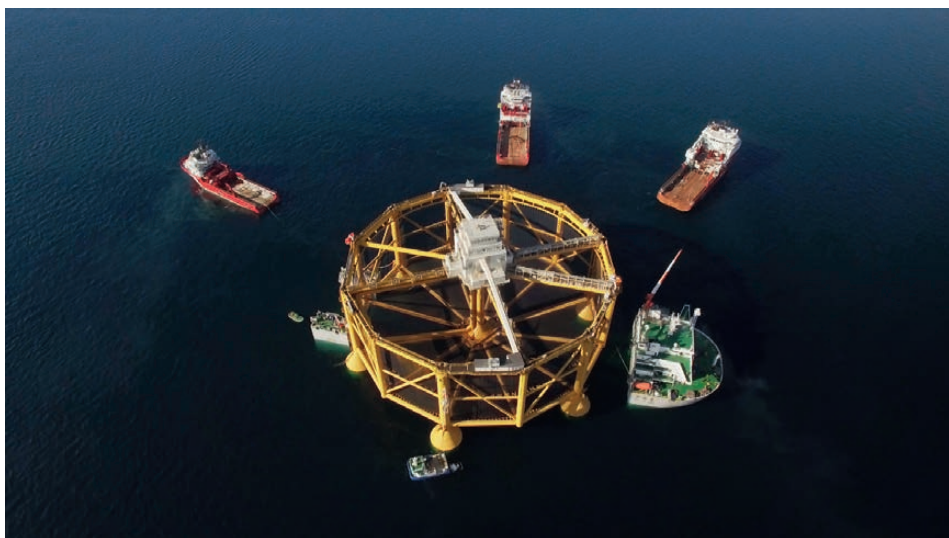
share of a joint offshore venture for £5.5m cash plus one million SalMar shares, arguing that offshore offers major growth opportunities both at home and abroad.

That said, SalMar has also made it clear that the state must take some risk or not get involved at all when it comes to offshore. The company's Strategy Director, Rune Sivertsen, told news website iLaks the worst outcome would be if companies took all the risk and the state introduced a resource rent tax once the sector became profitable.

The Norwegian government recently proposed three initial areas for setting up what would be a completely new food production industry.

Fisheries and Oceans Minister Marianne Sivertsen Næss described the decision as a new industrial venture and a new milestone, adding that deciding the areas sends a clear signal to the industry that the government will invest in offshore aquaculture in the years to come

The zones are large parts of Frøyabanken





“It is good that the government has listened

north, between 30 and 70 miles off Trondheim, Trænabanken off Nordland and Norskerenna south, off Stavanger and reasonably close to Scotland.

The areas provide a good starting point for realising aquaculture at sea, with high demands for sustainability, safety and professionalism throughout the value chain, says Ole Fretheim, Head of Aquaculture Technology at Seafood Norway.

He is working on the theme with a group of companies focussed on the development of offshore aquaculture.

Fretheim says: “That the areas are not delimited too early in the process is an important principle that Seafood Norway and the industry have highlighted. It is good that the government has listened, as it gives the players the opportunity to work strategically with biosecurity and site structure.”

He believes the proposed areas are large enough to enable knowledge-based area planning and impact assessments. This provides room for the establishment of production clusters and set-aside zones adapted to local power conditions, technology and natural conditions, all of which are crucial for good biosecurity and efficient operations.

Together with the planned changes to the salmon allocation regulations, the authorities are demonstrating a long-term approach. It is planned that more of the preparatory work and responsibility will lie with the players who want to establish themselves offshore, says Fretheim.

Seafood Norway says it supports the main content of the proposal and believes that the Ministry is creating good conditions for actors to establish offshore aquaculture in a holistic and long-term manner, which ensures fish welfare and socio-economic value creation.

It also reminds the government that major investments will be required in the entire value chain associated with the facilities and the proposal's approach to developing all the areas is an important prerequisite for realising the establishment and socio-economic value creation in the best possible way.

And it supports the idea of an area plan, adding it should be a central and long-term management tool for development, operation and decommissioning.

Another employer-related organisation, Sjomatbedriftene.no (Seafood Companies), praised the Ministry of Trade for submitting a proposal that sets a clear direction for the investment in offshore, and which largely meets what the organisation believes are the necessary prerequisites for being able to succeed with an industrial investment in offshore salmon farming.

At the same time, it believes the proposal has a number of shortcomings that do not contribute to the necessary predictability for industry players who want to establish offshore farms.

Seafood Companies says that it represents several companies that are investing, as well as large parts of the value chain that will feel the ripple effects of a new industry succeeding.

It says a report from Oslo Economics states that a successful venture in just one of the three areas off the coast will mean over 1,000 jobs and many billions in necessary investments.

Seafood Companies adds: “The regulatory development to enable offshore aquaculture has now taken place for three parliamentary terms, and there are several players who are impatiently waiting for this. In the past year, the pace of regulatory development has picked up, which the Seafood Companies are pleased with.

“We think it is good that the authorities continue to keep the pressure up to achieve a regulatory regime that facilitates Norway's new industrial adventure. This is a historic opportunity to merge two industries in which we Norwegians are world champions: salmon farming and offshore activity.” ●

Major risk to seabed and wild salmon, environmental groups warn



NOT everyone is in favour of developing offshore aquaculture. A number of Norway's largest environmental and outdoor organisations are warning against the government's plans.

Among them are the Norwegian Hunters and Fishermen's Association, the Norwegian Nature Conservation Association, WWF, the Reddvillaksen Foundation, Nature and Youth, and Norwegian Salmon Rivers.

They have submitted a joint consultation paper in which they say that the risk in all three areas to the environment and wild salmon is far too great.

“The consequences for biodiversity, wild salmon and marine ecosystems are too serious, and the knowledge base is too weak to be able to defend such an initiative,” says Øyvind Fjeldseth, Head of the Norwegian Hunters and Fishermen's Association.

The groups also claim there is also a risk to the seabed, of which there is too little knowledge.

Opposite from top: Ole Fretheim; SalMar's Ocean Farm is one of the frontrunners in the offshore sector
Above: Nordlaks' Havfarm 1 has been designed for offshore, high-energy sites

An AI revolution



Robert Outram sums up the key points from the Aqua Agenda Feed & Feed Strategies webinar, co-hosted with TidalX AI

THE PANEL



KRISTINE LANGAUNET
Senior Sales Executive
TidalX AI



STEPHANIE HORN,
Co-founder and Lead Analyst
Blue Food Performance



PADDY CAMPBELL
Vice-President
Salmon Division, BioMar



FRANK WIIK RENDAL
Production Coordinator
Nova Sea AS



ANN KRISTIN ULSET
Feed Centre responsible
Nova Sea AS

Artificial intelligence and underwater camera technology are transforming the industry's understanding of what is happening in fish cages – with important implications for the way feed is managed

FISH FARMER'S Feed & Feed Strategies webinar, held on 10 September in association with our Panel Partner and co-hosts TidalX AI, addressed the key issues and opportunities around feed for fish farmers, and looked at how to ensure that the feeding regime is efficient and sustainable, and supports growth and healthy outcomes for the fish.

The panellists were:

- **Kristine Langaunet**, Senior Sales Executive, TidalX AI
- **Stephanie Horn**, Co-founder and Lead Analyst, Blue Food Performance
- **Paddy Campbell**, Vice-President, Salmon Division, BioMar
- **Frank Wiik Rendal**, Production Coordinator, Nova Sea AS
- **Ann Kristin Ulset**, Feed Centre responsible, Nova Sea AS

As Senior Sales Executive, Kristine Langaunet works closely with salmon farmers in Norway and internationally, to understand their production goals and challenges, and help them to get the most out of Tidal's technology.

As she explained, Tidal's technology is essentially an underwater camera and AI system that works as a "superfeeder", working alongside the farmers.

The camera follows the fish in the water and the system detects appetite signals and uneaten pellets in real time. Based on that, it can adjust feeding autonomously throughout the meal.

Langaunet said: "What this means in practice is that farmers can feed closer to the real appetite of the fish, which we have seen leads to better growth, improves the feed conversion rate and gives less feed waste."

"So, the system provides them with daily insights and tools to make more precise decisions."

Frank Wiik Rendal is Production Coordinator with Norwegian salmon farmer Nova Sea AS, which produces around 12 million fish annually.

Nova Sea has been using Tidal's system. Rendal explained: "We are always looking for possibilities to produce our salmon in a better way. So in the last few years, we have installed a lot of equipment and cameras in the cages."

"Our main goal is to increase growth, and we believe that technology can help us."

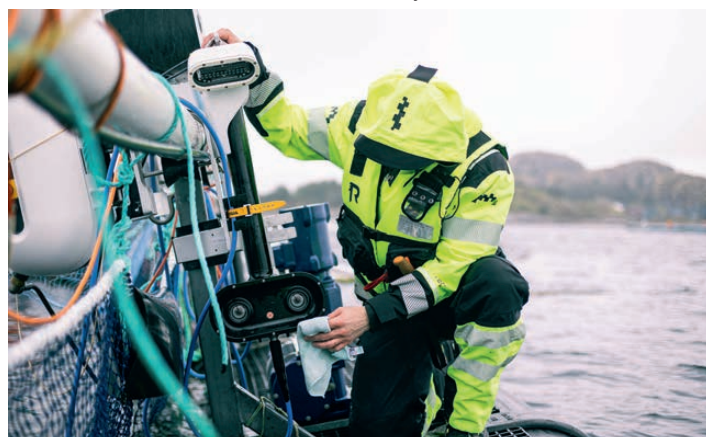
Also at Nova Sea, Ann Kristin Ulset has a management and coordination role at the company's Feed Centre and was formerly one of the technicians feeding the salmon.

She explained that her aim is to make sure that all the feeders manage to feed fish in the different pens and in all the locations they have to satiation without wasting any of the feed.

Stephanie Horn is Co-founder and Lead Analyst with sustainability consultants Blue Food Performance.

She said: "Our main focus is to help aquaculture become more efficient, resilient, and ultimately more sustainable, and we do this by providing clear, data-driven insights into how different inputs, especially feed, can affect factors like productivity, profitability, and ultimately environmental impact."

She added that the cost of feed is a major issue for farmers and the



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We
believe
that
technology
can help
us

volatility of feed prices can be a challenge. Maximising efficiency in feed use is therefore important, both in economic terms and for sustainability.

Paddy Campbell is Vice President of the Salmon Division with BioMar, one of the leading aquafeed businesses worldwide, producing around 1.6 million tonnes annually. Of this around 1 million tonnes is salmon feed. Norway is BioMar's biggest market for salmon, followed by Chile, Scotland and Tasmania.

One of the most important metrics for farmers is the feed conversion ratio. As Paddy Campbell stressed, the “economic feed conversion ratio” (eFCR) is probably the most useful way to understand this, as it takes into account mortalities which are in effect “wasted feed” on fish which do not survive to harvest. This is typically calculated as the total mass of feed deployed divided by the harvested weight of the fish.

Salmon farmers in Norway, Chile and Scotland can normally expect an eFCR of 1.3 to 1.4, Campbell explained. He added: “We know that if you can feed really efficiently you can really reduce mortality in fish, and feed conversion is very much linked to the growth rate of the fish. The more efficiently you feed, the fish will be closer to satiation and the faster they will grow, which is really important for the farmer. You'll also minimising the time the fish are at sea, which means you're also... by definition, reducing the likelihood of mortality events as well.”

The impact of AI

Artificial intelligence seems to have implications for every aspect of industry, but what does it mean for feed?

Kristine Langaunet explained that Tidal's camera is not static or reliant on being guided by a human operator. Instead, it is mounted on an autonomous winch, which enables the camera to patrol the entire pen at different depths.

Langaunet said: “With AI, we can now continuously analyse what's happening underwater. We can monitor the appetite signals, the swimming patterns of the fish, and also pellet detection.

“And based on this, the system will control the meal and make sure that it's continuously, in real time, adjusting to the fish's appetite.

“The real shift is that farmers are no longer guessing or relying on routines, so they're working with data and insights that are objective and consistent, and that means that they can feed closer to a true appetite, which will reduce waste. What we've seen is that it's optimising growth in a way that simply wasn't possible before AI.”

Frank Wiik Rendal commented that, having used the system at Nova Sea for six months, it was much quicker to react to observed changes and feed the fish more, or less, as required.

He said: “We feel that the system is helping



our feed people to do a better job.”

Getting an idea of what is happening below the surface can be hard in a fish farm. What are the key data points that an AI-based system could monitor?

“The short answer,” Rendal said, “is ‘a lot of data’! We like to see how many lice there are, and of course we would like to see how big the fish is.”

Ann Kristin Ulset added: “For feeding, the data we need includes the amount of fish, the size of the fish and also temperature, because all of these parameters will affect how the fish eats and how quickly it grows.

“I would say it's a lot of guesswork, especially in the early days, where you didn't have a camera at all, and you just looked at how much the fish were jumping.”

Kristine Langaunet agreed that environmental parameters like oxygen level and temperature are important indicators. She added that Tidal's autonomous system can act as an “aggressive” feeder,

TidalX

ORIGINALLY developed within Google parent Alphabet's innovation lab X, Tidal provides a comprehensive software and hardware platform for aquaculture operations. Enabled by a fully autonomous winch, Tidal's camera system tracks fish and enables farmers to simplify and declutter pen operations while providing data-driven insights for optimal harvest, treatment, and feeding decision making.

Tidal combines visual and behavioural indicators to deliver insights around real-time biomass estimation, sea lice detection, fish welfare monitoring, and autonomous feeding control across the entire pen.

Pictured: TidalX camera



Tidal

Opposite: Installing the TidalX camera
This page from top: Kristine Langaunet and Frank Wiik Rendal at the webinar

throughout the day increasing the feed rate when no pellets are detected in the water, or stopping or reducing the rate when pellets appear to be falling through the water.

As Stephanie Horn pointed out, feed not only represents up to 70% or more of a farm's day-to-day running costs, but also of its environmental footprint, in terms of carbon emissions.

"So," she said, "when feed efficiency leads to small improvements in the FCR, that can really make big improvements to the overall sustainability of the farm itself."

Global perspective

BioMar operates around the world, but are there important differences in the approach to feed for salmon farmers in different regions?

Paddy Campbell said: "Environments are very, very different in the different farming locations, so the extreme would be to compare, say northern Norway with winter temperatures, of 1, 2 degrees C, to Tasmania, for example, in the summer, where they're dealing with temperatures above 20 degrees C in summertime. So the environments are very different, for sure. And of course, salmon will behave very differently in terms of feeding, depending on temperatures.

"There are also differences in environment, in genetic stocks, and from a feed perspective, differences in raw materials as well."

The overriding thing, he stressed, is to have nutritionally balanced diets that are designed optimally for that environment and that fish.

There are also differences in practice, he explained. In Chile, where the farms are often in remote locations and staff are present throughout the whole day, the approach is commonly to provide "micro-meals", in other words feeding little and often. In contrast, in Norway and Scotland feeding is more often in the form of two meals a day, starting with a main meal in the morning and a top-up in the evening.

Campbell added: "I think the most important thing in how anyone is feeding is to make sure you're feeding the fish to satiation.

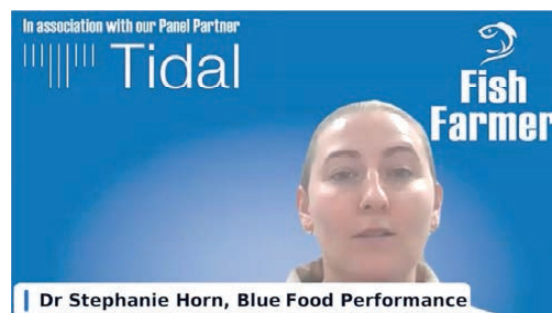
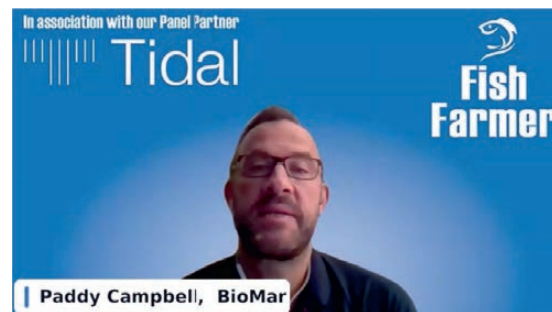
"That's the critical thing... once you've fed to satiation with no feed waste, you're not getting an environmental impact from the feed waste, because there isn't any.

"Because retention of nutrients is at the highest point when you feed to satiation, so protein retention, energy retention in the fish is absolutely optimal and you see the highest growth rate and the lowest FCR."

He pointed out that when the temperature is very low, FCR can still be efficient but growth is slower, and added: "But when the temperature or the photo-period starts to increase, then you have to be absolutely ready to increase your feed rate. I think some farmers are a little bit slow to do that, and if you don't catch it properly then you are losing out on some growth. That is really critical coming from winter into early spring."

Can technology also help to improve welfare for salmon?

Yes, was the answer from Kristine Langaunet. The Tidal system includes a welfare product which can track issues like wounds on



fish, scale loss or eye cloudiness.

She added: "If you know that you're going to need to treat the fish, it can be very relevant to understand the skin condition of your fish, etc.

"If your fish has an underlying health condition, feeding can also be compromised to a certain degree. So that can mean that the fish is not converting as you would be expecting from the feed, or it can also mean that the fish appetite is reduced."

Stephanie Horn said: "We've been developing some welfare metrics that we can include in our performance assessments, and we know that, especially in salmon farming, it's something that is a huge focus not only for the producers themselves, but also for the consumers.

"AI technology can really help with tracking the type of data required for doing really full, in-depth welfare assessments of salmon farms, but also a load of different aquaculture systems across the world as well."

Questions from the audience

One question for the panel was about the economics of AI. What is the return on investment for a salmon farmer?

Kristine Langaunet responded: "I can't give a general answer to that one, because it all depends on how many systems you choose to use, and how many sites.

"At the end of the day, it's a tool and it's dependent on how you use it and your ability to actually get the most value out of it.

"There are a lot of gains that can be used in an ROI calculation in terms of feeding... efficiency and automation gains, you can improve your growth and your FCR, which will get you better, bigger fish, with less feed. It can give you less time at sea, which again, can potentially reduce necessary handling operations for your fish."

"If you take out your manual feeding

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We have
to find
solutions
in terms of
new raw
materials

This page from top: Paddy Campbell, Stephanie Horn and Ann Kristin Ulset at the webinar
Opposite: TidalX camera snapshot



cameras, it's less equipment to maintain; and automatic lice counting at one farm is basically saving you a day and a half of labour."

How close are we to a fully autonomous farm?

"It's a balance," said Langaunet. "The technology is ready but we are also humans working with the technology, and we are adapting and getting used to it. The biggest potential that we can see in the short term is one feeder can feed more pens. A fully autonomous farm is one for a more long-term perspective."

Another question was: are the feed companies looking at efficiency in terms of global resources as well as strictly economic efficiency from a farmer's perspective?

Paddy Campbell said: "We absolutely have to. Depending on where you are, around about 80% of the carbon footprint for a salmon farmer is feed. So we have to strive to find solutions in terms of new raw materials that are having less environmental impact. We've got to look at more restorative, circular raw materials. We've got to look at where we're getting the raw materials from in terms of agriculture and land use."

He added that the industry is also looking at how to source long chain fatty acids, which are essential for fish health, from algae rather than relying on marine raw materials,



of which there is a finite supply.

Campbell said: "It's really important to be able to actually measure these things first in a scientific way, and then it's about efficiency, working with the customers."

Having more information about what is actually happening on a farm is crucial for this, he stressed, so the latest AI technology helps the partnership between feed companies and their customers.

Stephanie Horn added that Blue Food Performance and other organisations are looking at new metrics for sustainability. For example, rather than the traditional Fish In, Fish Out (FIFO) metric based on weight, it is possible to analyse the nutrients from the ocean used in feed and compare that to the nutrients available from the fish when harvested.

Finally, how applicable is AI technology to other species beyond Atlantic salmon? Tidal's focus is on Atlantic salmon now, but Kristine Langaunet said the technology is built ready to expand the system to other farmed species like coho, rainbow trout, yellowtail kingfish or tilapia.

BioMar provides feed for a wide range of species, Paddy Campbell observed, and AI applications have a lot of potential. He mentioned, for example, that one company is developing an acoustic-based system for monitoring shrimp feeding – because shrimp are typically grown in ponds where visibility is too limited for cameras.

As the discussion showed, aquaculture is on the verge of an AI revolution – one for which farmers are only just beginning to realise the possibilities. ●



Autonomous Feeding – Proven Value for Salmon Farmers

Tidal

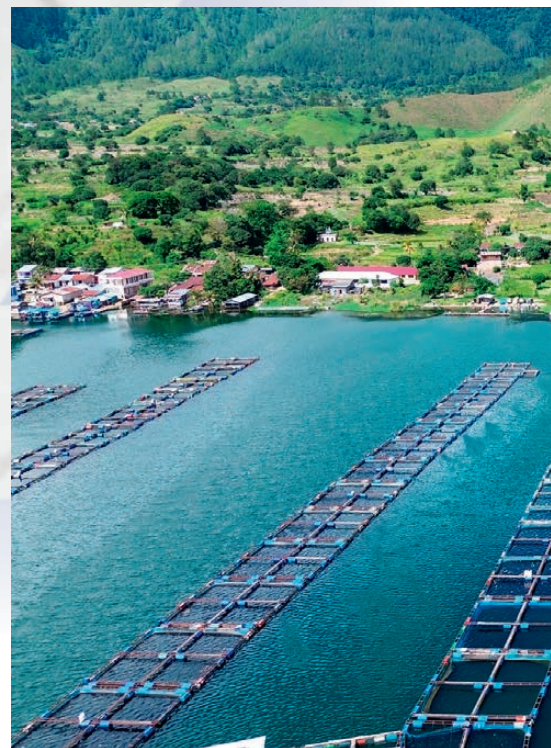
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Two worlds of aquaculture

Annisa Dinulislam reflects on what the aquaculture sectors in Indonesia and Scotland can learn from each other



AQUACULTURE has become a vital pillar of the global food system. According to data from the Food and Agriculture Organization (FAO) in 2022, more than half of the fish we consume today comes from farming rather than wild capture. With the challenges of climate change, environmental degradation and a growing world population, aquaculture is increasingly viewed as a key answer to sustainable food security.

Indonesia and Scotland both play significant roles in this field, though with very different faces. Indonesia is known for its diversity; shrimp, tilapia, catfish, seaweed, and even ornamental fish, while Scotland is almost synonymous with just a few species, notably premium trout and salmon, consumed domestically and exported worldwide.

For me, as an Indonesian who has only recently stepped into the world of aquaculture in Scotland, these contrasts feel striking. In Indonesia, aquaculture is deeply rooted in the lives of coastal and rural communities, often practised as a family side business. In Scotland, however, aquaculture has emerged as a modern, regulated industry integrated into the global market.

Aquaculture in Indonesia: diversity and everyday life

Indonesia is one of the world's largest aquaculture producers. With more than 80,000 kilometres of coastline, the country possesses extraordinary natural wealth. Whiteleg shrimp (*Litopenaeus vannamei*) and black tiger shrimp (*Penaeus monodon*) are the main export commodities, while freshwater fish such as catfish, tilapia and pangasius cater to domestic needs. Indonesia is also a global giant in seaweed, supplying raw materials for food and pharmaceutical industries.

Yet behind these impressive numbers lie compelling human stories. In many villages, aquaculture serves as a lifeline during difficult times.

Heru Winarto, a fish farmer and fisher from Kediri, began his journey in 1986 while he was still in school. He raised catfish and tilapia to support his family's economy, later shifting to ornamental fish such as betta (also known as Siamese fighting fish) and koi.

"Betta fish became a favourite because they required little capital but could fetch high prices, even millions of rupiah, if they had unique patterns," says Winarto.

What began as a side business eventually made Winarto well-known; his products reached markets as far as Jakarta and Bali. Today, he continues to mentor other farmers voluntarily, both online through his YouTube channel *Heru Tirta Fishing* and offline, showing how Indonesian aquaculture often grows through community spirit and self-taught learning.

In the coastal region of Rajabasa, Lampung, a different story unfolds. Meita Saniyyah Ubay, a fisheries extension officer, explains that many locals still depend heavily on wild capture fishing.

"Farming, especially shrimp, is usually done as a supplementary source of income," Ubay explains.

Government support through fisheries departments ranges from seed distribution and disease control to bank facilitation, but such assistance is easier to access for groups rather than individuals. This reflects a typical Indonesian pattern: aquaculture exists in many forms, from small family-run ventures to large corporations, yet challenges in outreach and regulatory consistency remain.

Aquaculture in Scotland: salmon, regulation and sustainability

If Indonesia represents a mosaic of species and farming scales, Scotland is the image of concentration. Almost the entire value of aquaculture here comes from Atlantic salmon, with only small contributions from trout, mussels, oysters and seaweed.

As Andrew Davie, Partner and Head of Aquaculture at Aquascot, explains, although the industry has developed only over the past 50 years, it has become the backbone of rural economies and the UK's largest food export.

What sets it apart is not only the species farmed but also the way the sector is managed. Scotland places regulation and standards at its very core. The industry must meet strict requirements on fish welfare, environmental impact and engagement with local communities. Third-party certification and consumer transparency are key to maintaining market trust.

Davie also describes how the sector operates. He emphasises that Scottish aquaculture fulfils multiple roles at once: providing nutritious, low-carbon food, supporting local economies and creating jobs in remote areas.

"Farming successfully in our changing



Photo: Meita Saniyyah Ubay



climate is the biggest overall challenge facing our sector in my view," he notes.

Yet he remains confident in the industry's adaptability, highlighting technological innovation and effective production strategies as crucial for long-term sustainability.

Davie further explains that aquaculture in Scotland was initially imagined as a small part of rural farming portfolios, similar to how many Indonesian families treat aquaculture as a household endeavour. Over time, however, the sector grew larger, integrated and consolidated into a modern industry with global standards.

Key differences: between community and industry

When comparing the two contexts, several key differences stand out:

1. Scale and structure

- **Indonesia:** Highly diverse, dominated by small-scale farmers, many treating aquaculture as a side business or even hobby.
- **Scotland:** Concentrated in large companies focused on one main commodity, salmon. Regulation and public trust
- **Indonesia:** Regulations exist but are unevenly implemented, especially for smallholders.
- **Scotland:** Strict regulations and certifications uphold transparency and environmental standards.

2. Technology and innovation

- **Indonesia:** Innovation exists but often remains localised and resource dependent.
- **Scotland:** Advanced technology adoption, from sensors to automated systems.

3. Social identity

- **Indonesia:** Aquaculture is intertwined with family and community identity, sometimes even expressed as an art form in ornamental fish farming.
- **Scotland:** Aquaculture is a vital industrial sector with an identity tied to national economic performance.

Reflections and opportunities for collaboration

For me, this experience has been eye-opening. From Scotland, Indonesia can learn about the importance of regulation, product traceability and fish welfare standards. The use of digital technologies and scientific approaches in farm management could enhance competitiveness while ensuring sustainability.

But Scotland, too, has lessons to draw from Indonesia. The diversity of species and the close connection between aquaculture and communities provide resilience that a monoculture system lacks. Locally driven innovation, such as Heru's, demonstrates how creativity can thrive even with limited resources.

The closing message I took from Andrew Davie feels particularly relevant: knowledge exchange is key. Cross-country and cross-scale dialogues reveal that the challenges faced are, in many ways, similar. Whether a salmon farmer in the Highlands or a betta breeder in Kediri, both are seeking ways to feed the world responsibly.

Conclusion

Aquaculture in Indonesia and Scotland may appear worlds apart, yet both are threads in the same global tapestry. Indonesia offers diversity and community resilience, while Scotland brings regulatory discipline and technological innovation. From my journey, spanning tropical ponds to cold lochs,

I have learned that aquaculture is not only about fish, but also about people, communities and the future of our food.

By bridging these two worlds, we can uncover not only differences but also common ground, a space for collaboration to build aquaculture that is more sustainable, inclusive and resilient in the years to come.

Annisa Dinulislam is a freelance writer and content creator. She has an MSc in Sustainable Aquaculture from the University of Stirling. ●



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Aquaculture
in Scotland
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Opposite from top: Salmon farm in the Firth of Lorn opposite Oban, Scotland; Meita Saniyyah Ubay (second from the left) assisted in channelling government aid to a shrimp farmer group in Rajabasa, Lampung, for seed supply.
This page from top: Fish farms, Lake Toba, Sumatra; whiteleg shrimp, *Litopenaeus vannamei*; Heru Winarto

Innovation in action

Underwater technology is addressing a range of challenges, **Robert Outram** reports, from net cleaning to disposing of large, unwelcome visitors

TUNA are powerful carnivores, and when on occasion they break into a salmon pen they can create major problems. They normally do not eat the salmon but their presence poses other problems: not only do they make gashing holes in the net, when a tuna is present in a cage, the fish are stressed and often will not eat, holding back their growth.

With warming seas, northern waters have seen increasing numbers of tuna and Norway alone has seen tuna entering pens up to eight occasions per year. Fish farmers, therefore, need a way to despatch tuna quickly and humanely, and further, with a method that will not harm or distress the salmon, or damage the quality of the tuna – which is a valuable fish in its own right.

Inventor and trained gunsmith Alf Helland lives on the Norwegian coast and is well aware of the problem. He explains: "I got to know about tuna through my neighbours. They told me, 'Alfie, we have got a problem here. We've got tuna shooting through the cages and we don't know what to do.

"I really didn't give it much thought, however, until I was contacted by the Institute of Marine Research [IMR] and the Project Manager of the Directorate of Fisheries."

The IMR had previously experimented, unsuccessfully, with percussive stunning and electrocution. One of the problems was that these did not kill the tuna instantly, leading to stress, increased body temperature and the production of enzymes, all of which damage the quality of the tuna meat.

The challenge for Helland was to create a device to despatch the tuna inside a salmon pen. The concept was inspired by the



"lupara", a short-barrelled shotgun originally used by shepherds in Sicily to kill wolves.

The initial idea was to provide something that a diver could operate in the pen, but experience with similar devices in southern Europe had shown that firing the equivalent of a 12-bore cartridge underwater created a serious hydraulic shock for a diver. Still, the use of underwater harpoons, "luparas", is very common in the Mediterranean tuna industry.

Helland, therefore, started to explore the idea of mounting the lupara, basically a rocket-powered harpoon, on a remotely operated vehicle (ROV) or drone, which could be deployed safely in the pen.

The drone chosen for the task was Chasing's M2 Promax. Helland says its small size and manoeuvrability make it ideal: "It has proven to be absolutely spot on... it's so small, about 2ft long, 16 inches wide and 10 inches deep. It's a handy little thing!"

The whole kit can be carried and operated by one person. Helland adds that he has also been impressed by Chasing's reliability and responsive service.

The harpoon has successfully undergone underwater trials – it works! The next step will be to try it against a live target. Over the past two years, the IMR's specialist research vessel Vestbris has succeeded in capturing live bluefin tuna for storage in sea cages as part of a pioneering project, and this means there will be test subjects for the lupara concept, although first mounted on a rod and operated by hand.

Testing on live tuna is scheduled to begin this month, following current work focusing on trajectory and other technical aspects in shooting a moving target. How the tuna will react to swimming alongside a mini ROV also needs to be further explored. The product is anticipated to be commercially available next year after thorough testing for saltwater corrosion, handling in rough weather, and ensuring it does not negatively affect salmon.

Helland and the team are also working on a method to retrieve the tuna from the cage as quickly as possible to minimise disruption to the salmon.

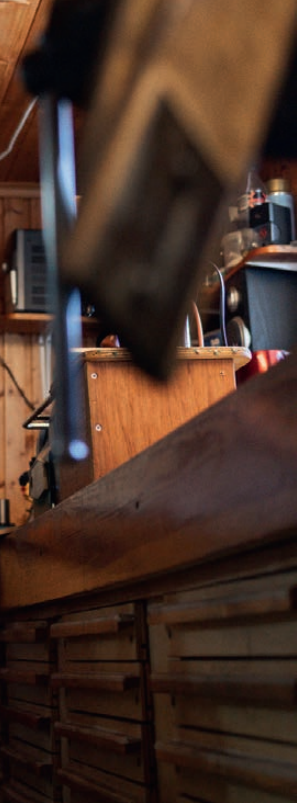
If all goes well, next summer could see a solution in sight to the tuna problem, in Norway and beyond.

Underwater innovation

In an increasingly crowded market for underwater vehicles, MoROV Subsea Solutions has come up with an application most ROV suppliers have not addressed – the removal of dead fish – "morts" – from salmon pens.

The company's ROV, known as the DS-500, can be easily





manoeuvred around a pen, picking up morts for disposal. The machine runs off a small generator or an inverter/battery power supply. It is silent and energy-efficient, and has a basket capacity of 480 litres or 500kg by weight.

Also, as co-founder John Macphee notes, it only takes one to two hours to train an operator to use it. The ROV is manufactured in Scotland with some parts sourced internationally.

It is already in use in the Scottish fish farm sector, and this year the company took the product to Aqua Nor, the world's biggest aquaculture trade show, in Trondheim, Norway.

In fact, says Macphee: "We had a lot of interest expressed at the show by potential customers from outside Norway. For example we have had enquiries from yellowtail kingfish producers in Japan who felt we had presented the best product they had seen in this field, as well as farmers from Tasmania, New Zealand and Italy."

It was also interesting to learn, he adds, that for sea bass and seabream farmers a smaller ROV would be even better.

A key requirement generally, Macphee says, is reliability, and the ability to service the ROV for customers is critical.

Now, as well as potentially marketing the ROV to species beyond Atlantic

salmon, MoROV is also looking at other applications such as net repair, a complex job that normally requires the dexterity of a diver. An ROV, however, could be used to attach a patch to a small tear ahead of a permanent repair.



Far left: Alf Helland with the harpoon on the ROV

Left: MoROV's Dom Smith (L) with co-founder Matthew MacPherson (R) with the MoROV DS-500, Aquaculture UK 2024
Opposite: Alf Helland with the harpoon



They told me, 'Alfie, we have got a problem here'

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Meanwhile, MoROV's original machines are still in use, a year and a half on.

Macphee says: "The feedback we are getting couldn't be better."

ROV applications

Alpha Geo is the UK distributor for the successful Chasing range of ROVs, developed and manufactured in China. Now, Alpha Geo is working with water quality sensor specialist Seneye, based in Norwich, England, to facilitate the integration of the Seneye solid state optical sensor with Chasing's ROVs, creating a calibration-free platform to measure key aquatic parameters such as temperature, oxygen, pH, turbidity and uniquely, toxic ammonia.

As Cat O'Neill, Business Development Lead for Seneye, explains: "This opens new opportunities for real-time environmental surveys in sectors like aquaculture, as well as wider ecological monitoring projects."

"Advances in multi-sensor integration and autonomous ROV navigation are transforming underwater monitoring. The Alpha Geo-Seneye-Chasing ROV integration is a step towards smarter, more autonomous surveying, giving operators live water-quality data alongside structural inspections."

Meanwhile, Tom Elworthy, Sales Director with Boss Aqua, says international interest has been strong regarding his company's ROV net cleaning solution. The team recently attended Aqua Nor



in Norway with the AutoBoss v4 on display.

Elworthy says: "We were almost overrun at times with visitors looking to see and learn about the machine, which was launched late last year. The v4 has around 50% more cleaning capacity per hour than the previous model. We closed deals on four machines during the show and are in follow-up discussions with numerous other customers."

Now, the company is looking at adding net monitoring capabilities to inspect for damage, and a hybrid and possibly EV option, for customers with main-grid connectivity or a renewable power source.

Elworthy adds: "Reliability of machinery is critical in underwater applications, even more so when fish health is on the line. This is our North Star as far as design goes: durable equipment that performs at the top of its class." ●

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The
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This page from top: Chasing X at Oceanology International 2024; Chasing M2 Pro Max; AutoBoss on boat; AutoBoss net cleaner ROV on crane



MoROV
SUBSEA SOLUTIONS

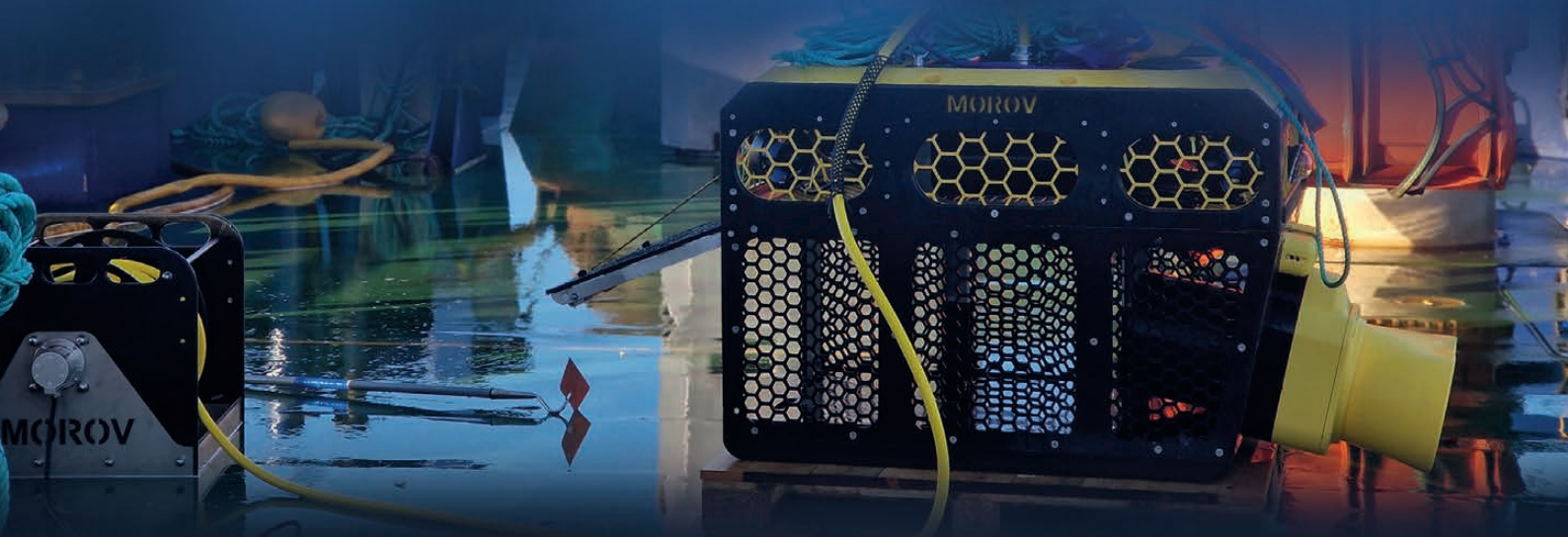
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Aquaculture for all?

Andrew Watson reports from Valencia on the European Aquaculture Society's annual conference



Riera, of market research organisation Kantar Worldpanel.

From sustainability to regenerative aquaculture

Feeding the world is beyond the capacity of conventional food systems – which have traditionally relied on agriculture and wild-caught fisheries – making aquaculture “not a choice, but an imperative”.

That's the view of Professor Carlos Duarte, distinguished Professor of Marine Sciences at King Abdullah University of Science and Technology in Saudi Arabia.

In his keynote speech to open the conference, he argued that human population and food systems are on a “collision trajectory”, food production is in the “red zone” and only aquaculture can fill the gap.

But it's not enough for aquaculture to be sustainable by minimising impacts on the environment: industry needs to be actively contributing towards “betterment” of our seas and oceans.

Regenerative aquaculture operations

– including low trophic species like

seaweed that have a positive impact on ecosystems – are increasingly needed.

First introduced in Japan in the 1950s, 2,000km² of ocean space is dedicated to seaweed farming, mostly in Asia where the sector is thriving. While seaweed farming is politically popular there is no more than 1km² across the whole of Europe.

“It is mesmerising that it's more difficult to get a concession for a hectare of a seaweed farm in Europe than to get a concession for oil and gas trading. So that is totally unacceptable, and it must change,” Prof Duarte said.

Fish farmers also need to reduce dependence on wild caught fish for fish meal and fish oil, replacing it with alternatives like seaweed that would release small pelagic fish for human consumption.

Using wild-caught fish to feed people rather than as an ingredient for fish feed could

WHETHER you're a top chef or curious tourist, step inside Valencia's Mercado Central and you're immediately hit by sights, sounds and scents of a vast selection of locally-produced food and drink.

Its walls and roof of ornate iron and stained glass houses Europe's largest fresh produce market. Valencian farmed sea bream and bass sit appetisingly alongside wild-caught seafood steeped in Spanish fishing tradition.

When you visit places like this it's no surprise

that Spain is the only country in Europe where seafood consumption isn't declining, but rising.

On the other side of the city, for three days in September the sleek Valencia Conference Centre played host to a near record 3,000 delegates of Aquaculture Europe 2025.

Under the banner “aquaculture for all” the European Aquaculture Society's annual conference brought together scientists, students, industry leaders and academics. The event highlighted Spain's role as the largest aquaculture producer in the EU, and shone a spotlight on the opportunities – and urgent challenges – the European sector now faces.

The three plenary addresses were given this year by Dr Carlos M Duarte of the King Abdullah University of Science and Technology (KAUST), in Saudi Arabia; Dr Elisabetta Giuffra of the National Research Institute for Agriculture, Food and Environment (INRAE), France; and Joan



Aquaculture Europe 2025 in numbers

3 days in Valencia

3,115 attendees including 381 students

97 countries represented

597 presentations in 57 sessions

571 ePosters

155 booths at the international trade exhibition

1,254 abstracts



“
We are
lucky to
work with
aquaculture
because
it's a very
dynamic
sector

prevent between 500,000 and 750,000 deaths in middle and low income nations each year. It would also contribute to the United Nations' sustainable development goals, particularly goal two – ending hunger. In fact the evidence shows global hunger is on the rise.

The regulatory environment in Europe and throughout the Western world is “adverse and aggressive towards aquaculture”. Policy-makers prioritise offshore wind and marine protected areas, with very little space left for aquaculture. “And yet aquaculture is the only viable pathway to feed the world with healthy and sufficient food for all.”

Aquaculture already produces more than half of all seafood, which is 12 times higher than the volume of production in 1970. Yet there is still deep scepticism about aquaculture and more work needs to be done to communicate the benefits and improve public perception of the industry.

“The public has come to accept that we have transformed about two-thirds of the planet, of the land area, for agriculture, for food production, yet they object to the transformation of even 1% of the ocean for aquaculture.”

Professor Duarte was open about the challenges facing industry and regulators, from impacts on the environment and wild fish through to organic pollution, disease, antibiotics and the use of medicines that need to be mitigated. The introduction of genetically modified animals is also “risky and unnecessary”.

“When history books discuss what happened in the 20th century, I believe it will not be AI [artificial intelligence], it will not be the internet. It will be the time in which we learned how to produce food from the ocean in a safe and sustainable manner,” he concluded.

Europe losing global aquaculture market share

If the history books of the future will show global aquaculture as one of the most important innovations of our time, the news today tells a different story: one where Europe continues to lose market share to global competitors.

In 2023 Europe's share of global aquaculture was just 3%. Only Norway was among the top ten aquaculture producers as Europe continues to underperform and lose market share. Norway's nearest European rival, Turkey, is 18th in the world.



Opposite from top: Valencia Conference Centre; Elisabetta Giuffra
This page from top: Valencia city centre; Valencia's Mercado; Carlos Duarte

Interview with the President



Above: Dr Marc Vandeputte

IN his first conference as EAS President, Dr Marc Vandeputte spoke with *Fish Farmer* about the challenges and opportunities facing the sector. Marc is a research scientist at INRAE, the French National Research Institute for Agriculture, Food and Environment and holds a PhD in animal genetics from AgroParisTech.

FISH FARMER: “Did the conference deliver for members of the European Aquaculture Society?”

MARC VANDEPUTTE: “I think so. The attendance has been very high, we have passed 3,100 people there and the sessions I went to were, as usual now, very high quality. So I think people can only be satisfied. And the venue, of course, is fantastic!”

FF: “The theme of this year's event has been ‘aquaculture for all’. What does this mean to you and how does the European Aquaculture Society take that message forward?”

MV: “Today, seafood production can only be fulfilled by aquaculture. I'm not saying that fisheries are not important, but the increasing demand that you see at the world level can only be met by aquaculture. So aquaculture is really the future way to deliver high quality seafood to the people.”

FF: “We've heard a lot about the challenges, opportunities and solutions. What are you most excited about?”

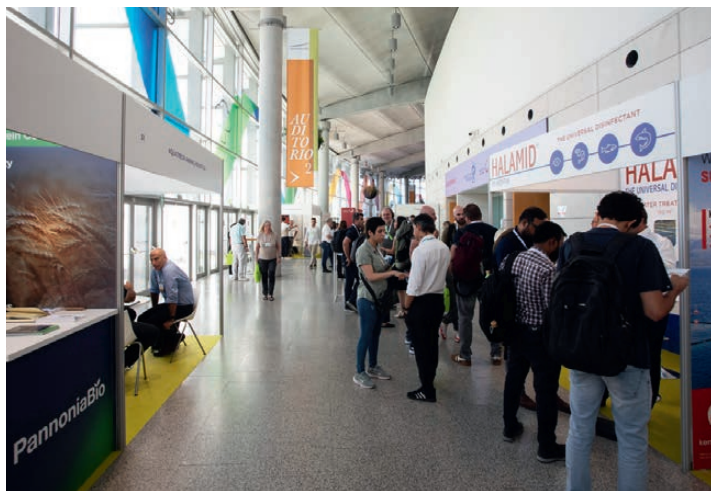
MV: “We are lucky to work with aquaculture because it's a very dynamic sector. It really requires knowledge, engagement from the people. I'm a scientist, and it's always a little bit disappointing to see all that energy, all that knowledge, all those things that are produced, and to see that we don't manage to have European aquaculture grow as it should grow because we need it.”

FF: “Is the sector doing enough to communicate the good that it does?”

MV: “I think we're doing a lot but obviously not enough because the result is not here. The general public, many of them, are convinced that aquaculture's not that great of an activity. There is some discrepancy with the public, who may have biased view of aquaculture and this is really something we have to work on.”

FF: “Across Europe, seafood consumption is declining, apart from here in Spain, and the only species that isn't in decline is farmed salmon. That must give you a confidence for the future?”

MV: “Salmon is a very positive example of a sector that has turned into a real industry, very tightly managed, but has managed to make the product a real commodity. Aquaculture is so diverse so you will always have segmentation where some species are commodities and some are luxury foods and this is needed. I think the example of salmon shows that when you work correctly in the production, in the commercialisation, the future is there.”



At a session on the UN's Food and Agriculture Organization (FAO)'s new Guidelines for Sustainable Aquaculture (GSA) framework, one contributor highlighted that the European Union has a single market, a single currency, a common agricultural policy and a common fisheries policy, but no common aquaculture policy.

This inevitably leads to fragmented regulation and implementation at a member state level, leaving pan-European and international voluntary frameworks like the Guidelines for Sustainable Aquaculture to fill the gap.

"Sustainable aquaculture has the potential to provide enough healthy, nutrient-rich food for a world population expected to reach 9.7bn by 2050," the FAO says.

But the lack of strategic coordination at EU level may explain the stalled growth of the European sector. Judging from some of the questions from the floor, whether the sector wants a Europe-wide regulation is another matter.

Deep water – nascent offshore aquaculture pushes new boundaries

This year's industry forum focused on one of the sector's most promising – and challenging – issues: offshore aquaculture.

Kicking off the discussion, Dr Bela Buck, a marine biologist at Germany's Alfred Wegener Institute, highlighted a basic challenge facing offshore development: a lack of shared definitions that can make planning and policy-making difficult.

The emerging consensus is that "offshore" aquaculture happens more than three nautical miles from land and beyond the visual horizon of 2.9 nautical miles. Along with many others, being out of sight of people on land may have the added benefit of reducing visual impact issues in the same way people consider offshore wind, oil and gas.

Working with the International Council for the Exploration of the Sea (ICES), a standardised exposure index that quantifies physical conditions – like wave height, current strength and water depth and quality – has been developed to understand how aquaculture systems will perform.

Of six different indices, the first two – exposure velocity index and the exposure energy index – are the most important. Beyond a certain level of wave height and current speed, offshore farms would not survive the sea conditions.

Next to speak was Dr Hans Bjelland, Research Director of Aquaculture at SINTEF, one of Europe's largest independent research organisations and a member of the Independent Scientific Panel with Scotland's Sustainable Aquaculture Innovation Centre (SAIC). He brought insights from the Norwegian salmon farming industry. Bjelland summarised the benefits of offshore salmon farming over nearshore in terms of better biology and better environmental impact leading to higher production.

Norway has begun designating official offshore production zones with the first three sites selected for ocean aquaculture, signalling that government policy is starting to catch up with industry ambitions.

Across Europe, Bjelland believes offshore aquaculture is relevant to

a number of species including sea bream and bass in the Mediterranean and Bay of Biscay, as well as Orkney and Shetland in the north of Scotland.

The second session heard from companies actively looking to develop offshore fish farm infrastructure and sites in Norway, Spain and Portugal.

The experts discussed the myriad advantages and challenges of moving further offshore, including the eye-watering cost of development, with one project estimated to cost €65m – many times more than a conventional nearshore salmon farm.

The development of offshore salmon farming remains expensive, risky and slow, but there is plenty of appetite from existing farming companies and challenger companies to make this dream a reality over the coming decades.

€100bn price tag for new Norwegian lice regulations

Meeting controversial new Norwegian government sea lice levels could cost the salmon sector NOK 100bn (£7.48bn) over the next ten years. That's the warning from Ragnar Tveterås, Professor and Vice-Dean of Research at the University of Stavanger.

The new regulations, contained in a White Paper published in April, would replace the controversial "traffic light system", which attempts to regulate lice-induced mortality on wild salmon smolts based on modelling and improve the welfare of farmed salmon.

Lice quotas under the new regulations would require an average 36-42% reduction in sea lice, which equates to just 2-6 lice per 100 salmon, which is a challenging target.

Based on modelling, any farm with higher than 10% "lice-induced mortality" would be deemed to be in breach.

The Norwegian salmon farming sector was strongly opposed to the proposals and the Norwegian government has postponed implementation while further consultation takes place.

But this delay coincides with the Norwegian Food Safety Authority, Mattilsynet, warning of above-average sea lice levels as a result of elevated seawater temperatures.

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Norway
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This page from top: The conference centre; Aquaculture Europe bag

Opposite from top: Fish at Valencia Mercado; delegates at lunch; Joan Riera



Essential oils from everyday household ingredients could hold key to sea lice reduction

Incentivising offshore salmon farming is one way of keeping sea lice levels low. But herbs and spices found in kitchen cupboards could be another solution, according to a Scottish pilot.

Essential oils derived from oregano, thyme and citrus fruits have shown promising results in reducing sea lice attachment to Atlantic salmon, with up to 70% reduction in test conditions.

Speaking at a session on functional feeds, DSM-Firmenich's Global Innovation Lead Ester Santigosa highlighted the promising results of the functional feed Digestarom, which was trialled on live fish populations at a seawater research facility operated by Stirling University's Institute of Aquaculture on the west coast of Scotland.

DSM-Firmenich now plans to share its product with salmon farmers across northern Europe as part of a wider trial process.

Spain and salmon bucking the trend of declining seafood consumption

Salmon is the only fish bucking the trend of declining European seafood consumption and is only set to grow as Europe gets older, according to a leading expert in consumer behaviour.

And Spain is the only European country that hasn't seen a decline in seafood consumption in recent years.

Today, only 29% of people consume fishery or aquaculture products at least once a week at home, with convenience, price and availability playing a huge part in shifting consumer choices.

Amidst an 11% decline in overall fish demand in Europe since 2019, salmon is the only species that has seen an increase in consumer demand.

Speaking in the third plenary session, Worldpanel by Numerator's Joan Riera said Spanish consumers are paying 30% more for fish than a few years ago, as price inflation eats into monthly household budgets across Europe.

Consumers are increasingly looking to discounters and visiting more retailers in search of cheaper prices and promotions. Sales of supermarkets' own label brands are increasingly favoured, with purchases up from 43% to 45.9% in the past two years alone.

As well as a shift to cheaper protein like chicken, consumers are also shifting to cheaper species within the seafood category.

"Convenience" is the biggest driver of food purchasing behaviour. For time-poor millennials with young families to care for, seafood is viewed as a less convenient option than meat or vegetables, which have seen a rise in purchases over the same period.

Seen as healthy, convenient and tasty, salmon is the only seafood species that has bucked the trend of declining seafood purchases. Demand is up, rising by 4% since 2019 while every other species has seen a fall. Salmon retains its place as the most popular seafood with 78% of households purchasing the nutritious fish at least once a week.

And there are good reasons for optimism in the future.

First, European supermarkets are changing the way they sell fish, eschewing the traditional staffed fish counter and moving to pre-packed fish which is more in line with UK supermarket offerings.

Second, salmon is ideally placed to ride the wave of "protein hype", with younger, more health (and image) conscious people choosing salmon for its protein-rich and nutritional benefits as part of a healthy and active lifestyle.

Last, Europe is getting older. As the age profile of the continent shifts to the right over the next two decades, there will be fewer families and more older and retired people. As they age, these groups will have more time to shop, prepare meals and take healthy eating more seriously.

Seeing is believing

People living near fish farms are more likely to back the industry and its expansion.

60% of people living on Norway's west coast expressed general acceptance of the industry. However, opinions were split when it came to growth: just over one-third supported further expansion,



while a slightly lower proportion opposed it, according to new research by Norwegian food research institute, Nofima.

This pattern isn't unique to Norway. In Connemara, on Ireland's rugged Atlantic coast, local sentiment echoed similar levels of cautious acceptance – only 11% of people living locally see aquaculture as a "threat", compared to 40% nationally.

With 95% acceptance, aquaculture has more support in Ireland than marine renewables (92%) according to Máire Ní Éinniú, Head of Nua Mara – Ireland's marine innovation centre.

Irish aquaculture in numbers

The inaugural *Seafood Sustainability Progress Report: Aquaculture 2025*, presented by Ronan Cooney of Bord Iascaigh Mhara (BIM), paints a largely positive picture of the country's farmed seafood industry, as assessed for its environmental impact, economic value, social contributions and innovation.

Farmed salmon is Ireland's most productive aquatic food system, yielding an impressive 13 tonnes per hectare – enough to provide over 86 million meals annually. In terms of labour productivity, salmon farming leads the pack: each of the 423 employees in the

”
Gonzalez-Posada has dedicated his career to communicating the benefits and challenges of aquaculture

This page from top: Javier Ojeda Gonzalez-Posada; Dr Marc Vandeputte and Gonzalez-Posada; the conference centre; Carl John Saromines, Student Spotlight Awards winner



sector produces nearly 50% more edible protein per person than those in mussel farming.

The salmon sector also creates significant ripple effects across the economy. With a multiplier effect of 3.3, each direct job supports an additional 2.3 roles, bringing the total number of people economically dependent on salmon farming to over 800, with a combined wage bill of €22m, far higher than oyster and mussel farming. However, the report also raised the issue of an aging workforce especially in mussel farming, where nearly 70% of workers are over 45. While the salmon sector skews younger, gender diversity remains a challenge across the board — just 4% of salmon farmers are women, compared to 9% in shellfish farming.

Recognising achievement Honorary Life Member Award

The opening ceremony and awards at Aquaculture Europe 2025 saw Spanish and European industry veteran Javier Ojeda

Gonzalez-Posada presented with the EAS Honorary Life Member Award.

Gonzalez-Posada has dedicated his career to communicating the benefits and challenges of aquaculture to consumers, policymakers and society at large. As General Secretary of the Federation of European Aquaculture Producers (FEAP) and Head of APROMAR — Spain's aquaculture trade body — he has been a tireless ambassador for the sector.

He has supported the EAS over many years, served on the Aquaculture Europe 2025 Steering Committee and developed this year's Industry Forum programme.

The award was presented by the European Aquaculture Society President, Dr Marc Vandeputte.

Although this award is usually given to people at the end of their career, Javier maintains he has no plans to bring his aquaculture career to an end any time soon.

Student Spotlight Awards

The award ceremony was hosted by EAS Student Representative Silvia Natale, who invited the student finalists to give a three-minute presentation of their research topics before a vote on the floor: The projects were:

- Mushroom meal as an alternative aquafeed protein ingredient: impact on growth performance and gut microbiome of rainbow trout (*Oncorhynchus mykiss*) — Carl John Saromines, Institut de Recerca i Tecnologia Agroalimentàries (IRTA) (winner);
- Circular production of mealworm (*Tenebrio molitor*) meal: effects on bioactive properties and implications for rainbow trout (*Oncorhynchus mykiss*) immune and oxidative status — Diogo Amaral, University of Porto and
- Decoding biological ageing to enhance welfare in farmed sea bream: a transcriptional and epigenetic approach — Alice Gasperini, Universidad Católica de Valencia.

All three shortlisted candidates received a cash prize to support their continued studies. Recognising achievement of individuals at the start and towards the end of their aquaculture careers was in keeping with this year's theme: aquaculture for all.

Aquaculture Europe 2026

Aquaculture Europe 2025 was organised by European Aquaculture Society, supported by the Spanish government's CSIC (Higher Council for Scientific Research) and Spanish Ministry of Agriculture, Fisheries and Food, the Generalitat Valenciana, the Valencia Convention Bureau and ThinkinAzul-Valencia.

Aquaculture Europe 2026 takes place in Ljubljana, Slovenia, from 28 September to 1 October 2026. ●



WHISKY WINNERS

Fish Farmer magazine was there at the trade show for AE25, and two lucky winners received bottles of fine Scotch whisky in our prize draw.

The winner on the first day was Pierre Fortin, Aquaculture Manager with Techna France Nutrition.

Our second winner was William H Nowell, of AquaBioTech. Congratulations to both!



Above: (L-R) Pierre Fortin, William H Nowell

What's NEW

Monthly update on industry innovations and solutions from around the world



From Scotland to the world: aquaculture innovation gains ground

Still a relatively small Scottish company, MoROV Subsea Solutions has marked 2025 as a breakthrough year on the international stage. After attending two major trade shows, interest in its aquaculture technology has translated into global connections being made, including in New Zealand, Italy and Japan. The expansion reflects how innovation from smaller players can make a meaningful impact far beyond home waters. By connecting with farmers worldwide facing shared challenges, trade events have become a vital platform for exchange and collaboration. This momentum underlines how Scotland's contribution to aquaculture technology is increasingly recognised as part of a global drive for safer and more efficient fish farming.

www.morov.co.uk

Onshore aquaculture suppliers to merge

Artec Aqua and VAQ, both wholly owned subsidiaries of the Norwegian industrial and construction group Endúr, are merging. Artec Aqua will be the acquiring company. Both companies are focused on providing technology for land-based fish farming. The new organisation will continue with the established two-part departmental structure, ensuring dedicated focus on both hybrid and RAS operations, while maintaining the geographical presence in Ålesund and Asker. Fredrik Langehaug will continue as CEO of the merged company.

Pictured: Artec Aqua tanks



Salmon farmer signs diving contract

Family-owned salmon farming company Bjørøya AS has entered into a deal with diving specialist Norwegian Underwater Intervention (NUI AS), for consultancy and professional support related to diving operations. Diving is one of the riskiest activities in aquaculture operations at sea. The "framework agreement" gives Bjørøya AS predictable access to specialised expertise within HSEQ, risk assessment, operational planning and compliance with applicable regulations. NUI provides advanced testing, verification, and research services to support subsea operations around the world. Bjørøya AS says it is one of the first aquaculture companies to take such a step.

Now students can learn fish farm skills in a virtual world

Students looking to take their first steps into aquaculture can now practise their skills without leaving the classroom, thanks to a virtual reality application developed in Norway and Scotland. "Seafood VR", a joint initiative from higher education institution UHI Shetland, in partnership with the Norwegian University of Science and Technology (NTNU), has delivered innovative virtual reality (VR) experiences that support career guidance and vocational training. "Seafood VR" is centred around the Blue Sector VR application, an open-source and freely available tool designed to simulate real-world tasks in aquaculture, developed within NTNU. The app has been significantly extended and improved, now including a fully interactive fish laboratory scenario, developed with input from UHI Shetland's aquaculture team.

Pictured: First Minister of Scotland, John Swinney, tries out the application



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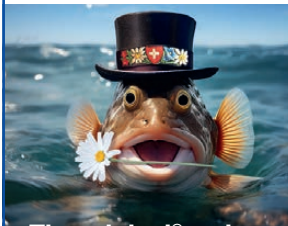
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Are we alone?

By Nick Joy

MORTALITY is the perennial problem of all livestock farming industries and it is often used by people with little understanding of food production to lambast those involved. Aquaculture is no different. Of course it is true that mortality is a key indicator of health and welfare in a system of production but animals reared in an uncontrolled environment suffer disproportionately from disease encountered from that environment.

Part of the problem with activists' views is that they do not see the mortality in the wild. Nowadays there is a perception that nature is pristine and perfect unlike the "nature red in tooth and claw" that used to be the view. I remember well a debate in Bristol in which involved a woman attacking one of the RSPCA inspectors about working with salmon farmers. I got involved because whether you like the RSPCA or not, the people involved are highly principled and decent and they deserve respect.

She was incensed with rage and when I countered that the welfare on a farm was much better than in the wild, she became incandescent. She used mortality as the cudgel with which to beat me but of course the easy response is that mortality in the wild is about 99.9% and the fish die in the most horrid circumstances. Like most of her ilk she replied that it was natural so it is acceptable. To be free and die horribly is apparently better than to live on a farm and live a fuller life, in such people's view.

I have heard this view from so many so-called environmentalists, who have no real answer to how to produce food for the population but know what they disapprove of. More and more research is done on the basis of stopping man having any interaction with wild fauna other than to take pictures.

These pseudo-scientists suggest that nature will sort itself out, as if nature cares for all of its components, and extinctions only started occurring when man gained the ascendancy. It is a set of ideas born of an academic mindset which only understands what can be researched by sitting in an office looking at a computer screen. Field trips are only undertaken in order to verify that which has been calculated.

If it sounds like I am fed up with it, you are reading this article correctly. Such thinking is born of valuing theory over experience or reading books over working every day in the environment. Particularly in the UK, our environment is man-made and no amount of rewilding or wishful thinking will return it to what it was before man existed.

So having got that off my chest - sorry about that! - mortality occurs in every facet of farming. Those of a vegetarian persuasion are welcome to stand up now and claim their righteousness but I am afraid get ready for a blow to your pride. Crops are protected against as many, if not more, challenges as stock farming and a very large number of insects, animals and plants die to allow those crops to be produced.

Activists will use whatever weapons they have to hand to attack whatever it is they oppose. The truth is usually the first casualty of war and so it is with activism. If you oppose windfarms you will use whatever correct or incorrect information you can find to try and stop it. So it is with aquaculture.

For many years I have advocated for our industry to get closer to agriculture. The rehabilitation of poultry farming from

the worst days of high mortality, deformity and disease is a brilliant case study of how to get yourself out of a horrible hole. Salmon may think it has had a bad press but in those days chicken was regularly eviscerated and it was done in front of the public. Chickens are regarded with much more sentimentality than fish and so the impact was significant. Yet nowadays, despite the industrialised production of chicken, it is regarded as one of the staples of most people's diet.

As a beef and sheep farmer, I am regularly confounded by the ability of large, sentient mammals to die in the most complicated ways imaginable. We all face this challenge. I just feel and have always felt that if aquaculture was regarded as just another branch of farming, we would be much better off.

It is not as though we get large amounts of subsidy or are a small irrelevant food producer. I would plead that we look at this area again and stop being the lone fish outside a large shoal. ●

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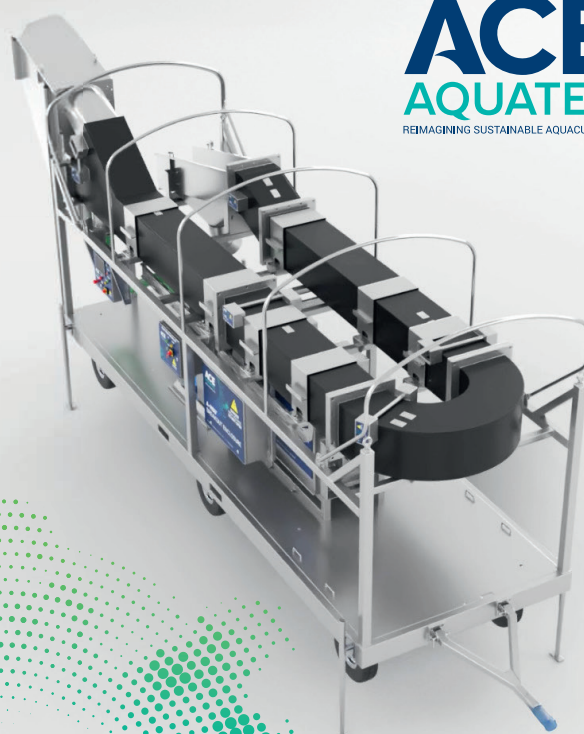
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