



NCE Seafood
Innovation



Working together
for sustainability
and innovation

Annual | 2022
Report

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Managing Director

A year of growth, new relationships and projects

This year has been filled with new collaborations, high growth in project portfolio and activity. We see that our strategy for 2022-2024 is giving positive results for the cluster members and partners.

New projects and members

We have welcomed seven new members, ten startups, one risk capital company, and three collaborative partners in 2022. Thus, by the end of December, we reached a total of 121 members and partners, for which we are grateful!

Furthermore, we have seen a substantial growth in projects and activities, as well as strong participation in meetings and activities. During the year, we organised 103 activities, with about 4000 participants attending.

Strategic areas and collaborations

In 2022 we started incorporating our five new priority areas:

- Climate, environment, and circular economy
- Digital transformation and digitalization
- Fish health and welfare
- Future feed ingredients
- Future competence and talent attraction

The five areas have been identified together with our members, to reflect the challenges they face and are unable to solve as individual companies. Cooperation is vital to succeed within these areas, and that is exactly what the cluster aims to facilitate.

That is why strategic partnerships have been prioritised this year. Some of our most recent collaborations include the Norwegian Retailers' Environment Fund, The Bellona Foundation, Ungt Entreprenørskap and Future Ocean Incubator. Collaborations like these are essential because they produce meaningful projects that benefit our members.

Getting the best competence

I would also like to mention the efforts being made to attract new talents to our industry. The competition for future employees is increasing, and we must prioritise this. Seafood Trainee and our collaboration with Ungt Entreprenørskap are key parts of our talent attraction initiatives.

Additionally, we are continuously working to enhance industry competence through knowledge sharing. In this area, the launch of our new competence program Seafood Circular, and our first Industry Insight report on future feed were two highlights in 2022. We are already excited for a new group on the program as well as two new Industry Insights in 2023.

A strengthened cluster thanks to our members

I believe we have done a unique job in recent years. Since 2019 we have doubled our annual turnover from 12,7 MNOK to a budget of 25,2 MNOK in 2023. This means that we will be able to do more projects, share more knowledge, and provide more value to our members and partners. Because that is our role - to work together to fulfil the seafood industry's potential for innovation and sustainability.

To all our partners and members - thank you for your contribution in 2022.

*Nina Stangeland
Managing Director
NCE Seafood Innovation/
The Seafood Innovation Cluster AS*



Together with our members we aim to fulfil the UN's sustainability goals

We believe that seafood will be part of a future sustainable and healthy food system. Contributing to its development through innovation and collaboration with our members and partners is the most important contribution we can make. Particularly relevant to the cluster's work are the six following goals:



3 Good health and well-being
Because salmon is a healthy product, the seafood industry has a favourable starting point for contributing to health and wellbeing. In line with our ambitions of being an inclusive industry, NCE Seafood Innovation will also work determinedly to secure good health and promote good quality of life for everyone working in the seafood industry. An important part of this work is to ensure ideal environmental, financial, and social conditions for people working in the seafood industry, for them to use their skills and contribute to the development of our society.



9 Industry, innovation and infrastructure
As part of one of Norway's largest industries, it is our duty to support the efforts to develop infrastructure that will steer our country and the world towards a low emission society. Consequently, we are working to promote research and technology development within the seafood industry as well as investments in transport and infrastructure that contributes to sustainable development.



12 Responsible consumption and production
In keeping with our overall vision, the cluster as a supplier to the global community aims to ensure sustainability throughout the entire seafood value chain, with the firm belief that innovation and knowledge sharing is a vital contribution.



13 Climate action
As part of an international industry, we are aware of the importance of making every effort to reduce activities that may have a negative impact on the climate. NCE Seafood Innovation works actively for the seafood industry to achieve sustainability at every level while leaving the smallest climate footprint possible.



14 Life below water
Through leading-edge technology, innovation perspective, industry driven research and knowledge sharing we apply our joint expertise to achieve sustainable ocean farming and value creation in the utilization of marine resources - to protect our ocean resources for the future generations.



17 Partnerships for the goals
As a world leading seafood cluster and Norwegian Centre of Expertise, we see it as our natural obligation to facilitate and initiate new partnerships. We acknowledge the pressing importance of sustainable development. This is why we strive to incorporate sustainability in all our projects, interactions, activities and knowledge sharing across every business area.

Ability to adapt and push forward

We are thankful for a year with less limitations due to covid, allowing NCE Seafood Innovation to focus more on creating relevant projects and meeting arenas. However, the cluster has learnt from the pandemic and adapted the activities to our new reality, which includes physical, hybrid and digital gatherings. In other words, we are better suited to deliver value to our members, regardless of where they are geographically. On top of that the cluster continue to grow, adding more talents to the team, increasing our capacity to develop projects and services for our members.

To summarise, the board is highly satisfied with the NCE Seafood Innovation team, and their ability to adapt, keep up and even increase the activity level. In addition, I am pleased to see that the new initiatives, Seafood Circular and Industry Insight on future feed, generated a lot of interest.

Board of Directors

Einar Wathne
Chairman of the Board, NCE Seafood Innovation/The Seafood Innovation Cluster AS



"There is an enormous potential for circular solutions in the industry and reducing the footprint of feed, and we look forward to continuing this work with NCE Seafood Innovation's members and partners."

Einar Wathne
Managing Director,
Bioakva Consult



"We need to collectively intensify our work within digitalization. Now is the time to create more insight and value from our data - in order to grow and develop the industry in a sustainable way going forward".

Andreas Kvame
CEO
Grieg Seafood



"Continued genetic progress for salmon and other species ensures better animal welfare and higher feed efficiency. Producing more without increasing the input or area accordingly is both good economics and allows for sustainable growth".

Jan-Emil Johannessen
CEO
Benchmark Genetics



"The Industry Insight on future feed ingredients showed the potential, barriers, and critical success factors around future sustainable feed ingredients - and that we need to work on all areas to make an impact on this going forward".

Fredrik Witte
Managing Director Cargill
Aqua Nutrition North Sea



"More focus on improvement and measurement of fish welfare will soon give positive results in regard to fish health and reduction in mortality".

Bente E. Torstensen
Division Director
Nofima



"I truly believe that one of our main critical resources in the future is competent employees. That's why we constantly need to work together on making the industry attractive for new talent and lifelong learning of our employees".

Henning Beltestad
CEO
Lerøy Seafood Group



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Cluster management



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Cooperation is key

Industry Partners



THOMMESSEN

COAST

Deloitte.

R&D Partners

BI Norwegian Business School
Institute of Marine Research
Western Norway University of Applied Science (HVL)
NIVA - Norwegian Institute of Water Research
NMBU - Norwegian University of Life Sciences
Nofima AS
NORCE Norwegian Research Centre AS
NORD University
NHH Norwegian School of Economics
Sintef Ocean AS
University of Bergen
Norwegian Veterinary Institute

Start-ups

Ace Aquatec AS
Akvareforma AS
AlgaePro AS
Algena Developments AS
Anteo AS
AquaByte AS
AquaFarm Equipment AS
Aquaticode Ltd.
Bioceanor SAS
BioFeyn
BioVivo Technologies AS
Blue Breeder AS
Blue Lice AS
BuoyTech AS
Columbi Farms AS
Digital Tvilling AS
Dynamic Space Technologies AS
EasyX
eMar Digital AS
Evoy AS
Fishency Innovation AS
Fjord Maritime AS
H2 Marine AS
Hauge Aqua AS
Innomar AS
Konree Innovation Limited
Kuehnle AgroSystems
Marea
Marimetrics AS
MicroClean AS
MonitorFish GmbH
Moreld Aqua AS
Norwegian Mycellium AS
Observe Technologies
Optimeering Aqua AS
Pronofa ASA
Pure Lobster AS
Quantidoc AS
Remora Robotics AS
Resqunit AS
Salmo AS
Scantrol Deep Vision AS

SeaChange Biochemistry Inc.

SeaGuard AS
SeaSmart AS
Searas AS
ShrimpVision AS
Tekslø AS
TomKat Global Solutions Pty Ltd
Tracio
Viking Aqua AS
WellFish Diagnostics
W-Sence AS

Risk capital

Farvatn AS
FundingPartner AS
Momentum Venture Management AS
Olaisen Blue AS

Financial Collaborators

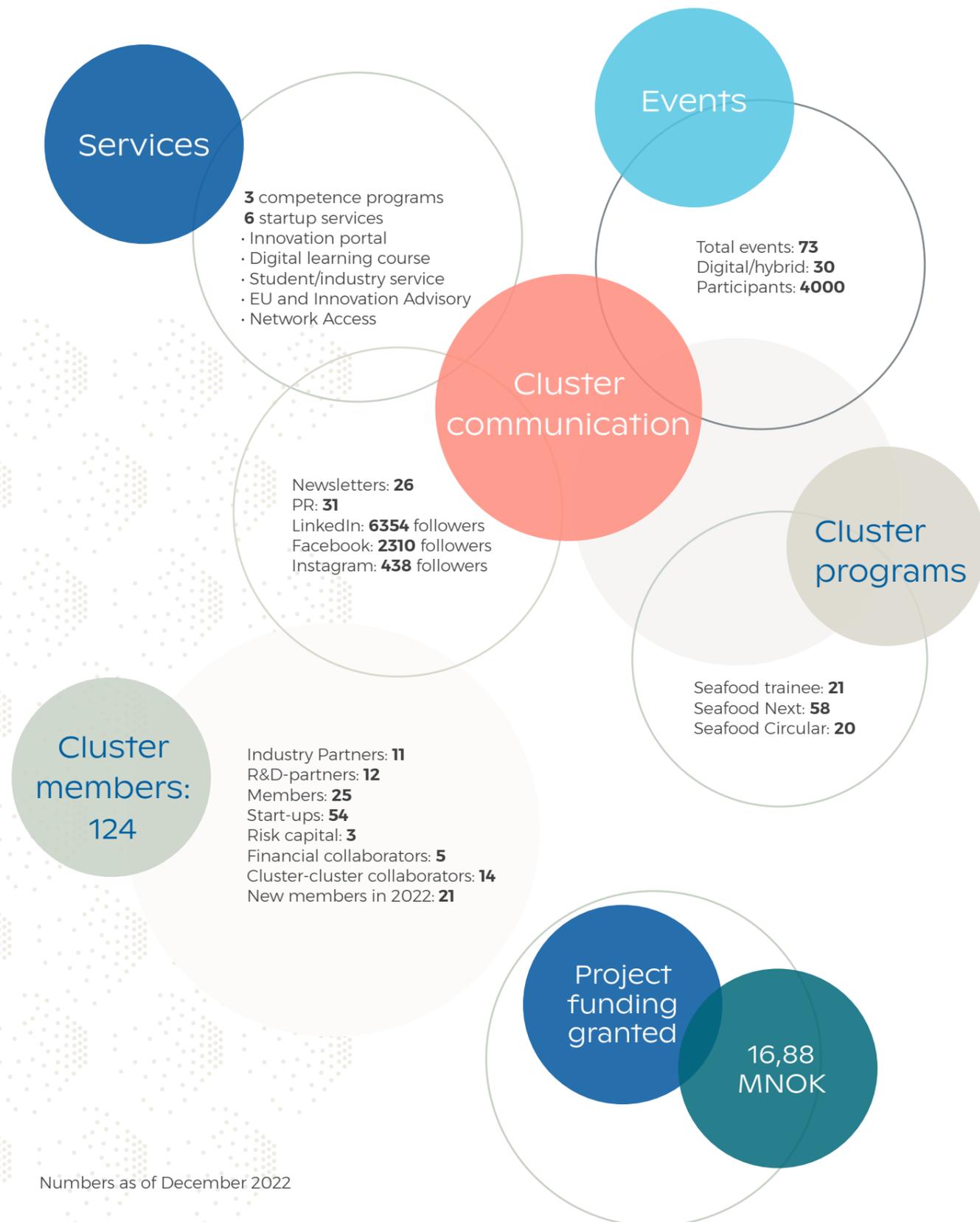
Innovation Norway
Siva
The Research Council of Norway
Vestland County Council
City of Bergen

Cluster-Cluster Collaborators

Biotech North
GCE Ocean Technology
Invest in Bergen
Katapult Ocean AS
Maritime Bergen
Miljøstiftelsen Bellona
NCE Blue Legasea
NCE Heidner Biocluster
Norwegian Retailers' Environment Fund
Startuplab AS
UE - Ungt Entreprenørskap
VIS - Vestlandets Innovasjonsselskap

Members as of March 2023

Cluster facts



Numbers as of December 2022

Events and meeting arenas

It has been a hectic, but exciting year with 73 organized events and a total of 4000 participants on different activities. As a member you have access to various meeting arenas and services:

Focus groups:

Experts and business leaders meet in focus groups for discussion regarding challenges the industry is facing.

Merete Skage, EY, and Nina Stangeland at the launch of Aquaculture Analysis 2021.



Executive Seafood Forum:

Our partners' executive leaders meet for discussions, inspiration, industry updates and knowledge sharing.

Henning Beltestad, Jan-Emil Johannesen, Fredrik Witte and Håvard Walde at Executive Seafood Forum.

Partners and members meeting:

Networking, knowledge sharing, and innovation stories are presented twice a year on this meeting, which is open for all partners and members.



Photo: Silje K. Robinson

Other meeting arenas:

- HAVlunsi
- Seafood Innovation Day (NASF)
- Innovation camps
- R&D meetings
- Project meetings
- Startup Morgen
- Launch of Fish Health Report
- Launch of The Norwegian Aquaculture Analysis
- One Ocean Conference

Find all our events and meetings arenas on our website.

Climate, environment and circular economy

Innovation and knowledge drives sustainability



Nina Stangeland and Solveig Holm with collaborators Sveinung Jørgensen and Lars Jacob Tynes Pedersen.

“Seafood Circular aims to provide knowledge and inspiration for new circular business models across value chains and more circular economic solutions”.

Solveig Holm,
Senior Project Manager,
NCE Seafood Innovation

Module 1, Seafood Circular



Other projects within this area:

- Biosirkel
- Green Aquaculture Platform
- Industry Insight - Future feed
- R&D meeting: Future feed raw materials
- R&D meeting: Kelp farming offshore



Case workshop is a key part of the program



Seafood Circular module 1, visited Egersund Net

Our aim is to reduce the seafood industry's environmental footprint, and actively simulate new circular business models and circular solutions. We do this by increasing industry collaboration, establishing, and joining projects and facilitate knowledge sharing and competence programs.

This year, we are especially proud of the BlueMusselFeed project and our new competence program Seafood Circular. They both show how cooperation across sectors, companies, and value chains, can contribute to creating more sustainable and circular solutions.

Cooperating through Land Meets Ocean

A crossover initiative established together with NCE Blue Legasea, Biotech North, and NCE Heidner Biocluster to strengthen the Norwegian bioeconomy, by encouraging collaboration across green and blue sector. Our aim with the collaboration is to enable innovation and industrial growth across agriculture, aquaculture and fishery industries.

Land Meets Ocean focuses on stimulating circular business models, new sustainable feed ingredients, better utilization of waste resources, and creating new value chains across the two sectors. In 2022 they got funding for their project BlueMusselFeed.

Seafood Circular

In 2022 we launched our new competence program Seafood Circular, and 20 participants from 16 companies got to network, learn and discuss circular solutions at Bekkjærøya, Austevoll.

Seafood Circular is facilitated in collaboration with Sveinung Jørgensen and Lars Jacob Tynes Pedersen, leading experts in sustainable business and circular economy, and leaders of Centre for Sustainable Business at NHH.



Seafood Circular, module 2, visited Larveriet and Invertapro



"AquaCloud has a unique opportunity to fulfil a role that is necessary for the industry's goals around production improvements, fish health and welfare as well as sustainability".

Kristian Blom,
General Manager, AquaCloud



Photo: Silje K. Robinson

Digitalization and digital transformation To unleash the potential in digitalization

We believe digitalization is a necessary part of the industry's future, and our aim is therefore to show the potential value creation of digital transformation as well as to contribute to increased digitalization.

Through knowledge sharing and by facilitating network groups and activities, we highlight the benefits of data collecting, data sharing and standardisation.

AquaCloud

The AquaCloud platform is essential to our work within this area, and it serves as a supplier of data sets from project partners and various data standards. It was established in 2017 as a big data initiative aiming to solve common challenges in aquaculture industry. The platform receives updates from participating companies and represents a unique repository of high-resolution data from their farming operations.

One of the highlights this year was when AquaCloud hosted a successful webinar about data sharing in aquaculture on September 1st, 2022. 250 participants followed online when speakers from NHH,

Thommessen, Institute of Marine Research and the Norwegian Food Safety Authority, presented the possibilities and challenges of data sharing.

iFishIENCi

In 2022 we highlighted one of our exciting EU collaboration projects called iFishIENCi. The overall goal of the project is to provide new intelligent feeding technologies to support ambitious, but sustainable growth for the European aquaculture industry.

A part of the project involves creating a fictional-like creation. Imagine a digital copy of a fish, which mimics the behaviour and physiology of a real one. This is called a digital twin, and the process of creating a digital twin fish is part of the iFishIENCi project and the ambition of the 16 partners' cooperating is to make genuine improvements to fish farming worldwide.

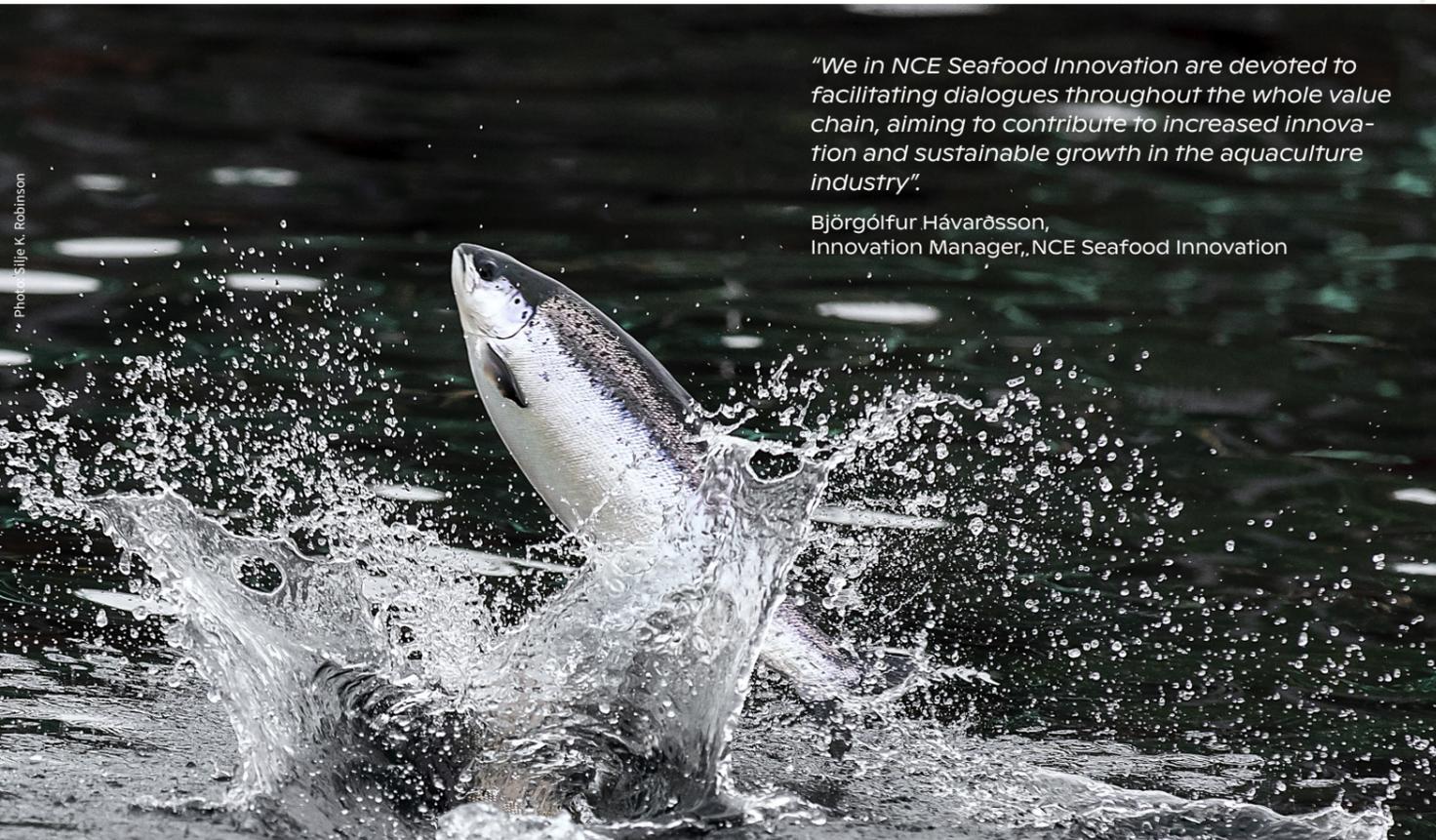
iFishIENCi has received funding from the European Union's Horizon 2020 research and innovation programme.

Other projects within this area:

- Competence program for standardised environmental data
- iFishIENCi
- Infrastructure, OINK
- NewTechAqua
- Norwegian Cognitive Center
- SFI Smart Ocean

Fish health and welfare

Our most important mission



"We in NCE Seafood Innovation are devoted to facilitating dialogues throughout the whole value chain, aiming to contribute to increased innovation and sustainable growth in the aquaculture industry".

Björgólfur Hávarðsson,
Innovation Manager, NCE Seafood Innovation

Improving fish welfare and reducing mortality are challenges we as an industry work with every day.

Our efforts include making new and established data sets available through AquaCloud, to support research projects and the development of new solutions that can increase fish health and welfare, in addition to other activities such as R&D-meetings and workshops.

Launching the Fish Health Report together with The Norwegian Veterinary Institute was one of the highlights related to the area this

year. More than 800 participants tuned in digitally to follow the launch of the report. The report stated that more salmon than ever died prematurely in Norwegian farming in 2021, so further work within this area is critical.

R&D meeting: Melanin spots in salmon filet

In a series of R&D meetings facilitated by the cluster, the goal is to bring stakeholders together to identify knowledge gaps in important areas in the industry. We aim to connect industry players in the meetings, and in 2022 we held three R&D meetings.

One of them addressed melanin spots, which is a common, and costly, challenge in the industry.

Melanin spots in salmon filet affects both fish welfare and profits. In June, representatives from the entire value chain, gathered in an initiative to combat the problem through cooperation and research.

Fish health and startups

Startup companies play a significant role in the seafood innovation ecosystem. One startup service in the cluster is Upcoming Seafood Startup. The aim is to create a meeting arena where

startups, industry experts and investors can network and learn from each other's perspectives. We host four meetings each year on different themes and with various participating startups. On the second Upcoming Seafood Startup of the year the topic of discussion was fish health and fish welfare. Three of our startups, Konree Innovation, Wellfish Diagnostics and Biovivotech presented their contributions to solve the biggest challenges in Norwegian aquaculture.

The focus being salmon lice, non-lethal blood testing, AI based health tracking and external sensors for fish movements and behaviour.

This event is a unique opportunity for early-stage companies to meet and discuss with targeted expertise and key people in the aquaculture industry. Equally important is the opportunity for industry and investors to gain an overview of the entrepreneurial landscape and innovative solutions for sustainable seafood.

From the launch of Fiskehelsesrapporten 2021.



Photo: Bryndis Holm



Other projects focused on fish health and welfare:

- AquaCloud
- Competence program for standardised environmental data (NS 9417)
- KABIS

Björgólfur Hávarðsson and Espen Rimstad from NMBU at R&D meeting. Photo by Peter Tubaas.

Future feed ingredients

What will Norwegian salmon eat in the future?

Increasing the supply of sustainable raw materials for feed is the biggest single bottleneck to be solved in the seafood industry. Thus, our aim is to realise the potential of new raw materials for feed and enable commercialisation of future feed ingredients.

We approach this mainly through collaborations with our members and partners, project development and knowledge sharing. In 2022 we had two big highlights within this area; the first Industry Insight on future feed ingredients and we secured funding for a project called BlueMusselFeed.

Industry insight - future feed ingredients

The report "Future ingredients for Norwegian salmon feed" was launched in October, and it addresses the gap between government ambitions and the status of future feed ingredients towards 2030. Researchers, industry pioneers and a panel of sector specialists have contributed to sum up the accumulated

knowledge and pointed to challenges that need to be solved. Feed and feed production make up a big part of the climate emissions in aquaculture. The aim of the report is therefore to contribute to more knowledge sharing, strengthen the focus on future sustainable feed ingredients and support companies' strategy processes around future feed ingredients. In 2020 Norway imported 92% of the 1,92 million tonnes of the ingredients to salmon feed, and only 0,4 percent was classified as novel, sustainable feed ingredients. The industry cannot achieve significant growth from status quo without a breakthrough in this field.

Read the report here:



Photo: Sijje K. Robinson

"BlueMusselFeed is a great example of how we can solve complex issues through collaboration across blue and green sector".

Elise Sæle Dahle,
Project Developer, Land Meets Ocean.

BlueMusselFeed

This crossover project aims to increase Norway's self-sufficiency in food production by establishing blue mussel as a feed ingredient for poultry. In October 2022, the Research Council of Norway awarded 11 million NOK in funds to BlueMusselFeed. The total budget is 26 million NOK.

It has sprung out of the project Land Meets Ocean – a crossover initiative between NCE Seafood Innovation, NCE Blue Legasea, Biotech North, NCE Heidener Biocluster and Innovation Norway. The industry partners are Fiskå Mølle, Lerøy Ocean Forest, Eide Fjordbruk, Norforsk, Animalia and Nortura.

Other projects focused on future feed ingredients:

- Land meets ocean
- R&D meeting: future feed raw materials



Photo: Ocean Forest



Future competence and talent attraction

Constant need for new knowledge and competence

Future competence is put together by new talents and lifelong learning, which is continued knowledge enhancing. This is necessary to build a sustainable, viable industry. Through competence programs for new talents and more experienced professionals, we aim to ensure that the industry always has access to the right expertise.

"Innovation camps are a great arena for increasing interest in the seafood industry and presenting the industry's opportunities to the young, while it also is valuable for the companies that participate".

Fride Iversen,
Senior Project Manager,
NCE Seafood Innovation

Our competence programs



Photo: Silje K. Robinson



Photo: Silje K. Robinson



Our competence programs are popular, and in 2022 21 trainees attended the Seafood Trainee program, 58 participants at Seafood Next and 20 at the new program Seafood Circular. We also launched industry insight, which is a series of reports based on our five industrial areas of priority, starting with a report on future feed ingredients.

The competition for future employees is increasing, and we need to work hard to attract and hold on to the talents in our industry. Updated competence programs and knowledge sharing are also important to develop lifelong learning.

Attracting new competence through innovation camps

849 students at upper secondary school participated in innovation camps arranged together with Ungt Entreprenørskap in the fall of 2022.

We challenged them to present solutions to challenges the seafood industry faces every day, for example reducing plastic pollution or increasing seafood consumption. It resulted in a lot of different ideas, and the youngsters impressed the participating companies Nutrimar, Cargill, Grieg Seafood, Patogen, Lerøy and NHH with their creativity.



Photo: Tiril Kvalsvik

SEAFOOD Trainee

A one-year program for new graduates, attracting fresh competence to the industry.

SEAFOOD Next

A module-based program for professionals in the industry taking their knowledge to the NEXT level.

SEAFOOD Circular

A competence program designed to provide knowledge and inspiration for future circular solutions.

Other arenas for knowledge sharing:

- Conferences
- EU Advisory and public funding
- Focus groups
- KABIS
- Open meeting arenas
- R&D meetings
- RAS online course
- Seapoint
- Webinars
- Workshops

Check out our website for more.



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