LOOKING AHEAD TO 2021

aquaculture europe

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An update on our AE2020 and 2021 events next year

A Norwegian Portal for aquaculture sustainability

Phage therapy for seabass/seabream

CORK, IRELAND APRIL 12-15

MADEIRA, PORTUGAL OCT. 4-7

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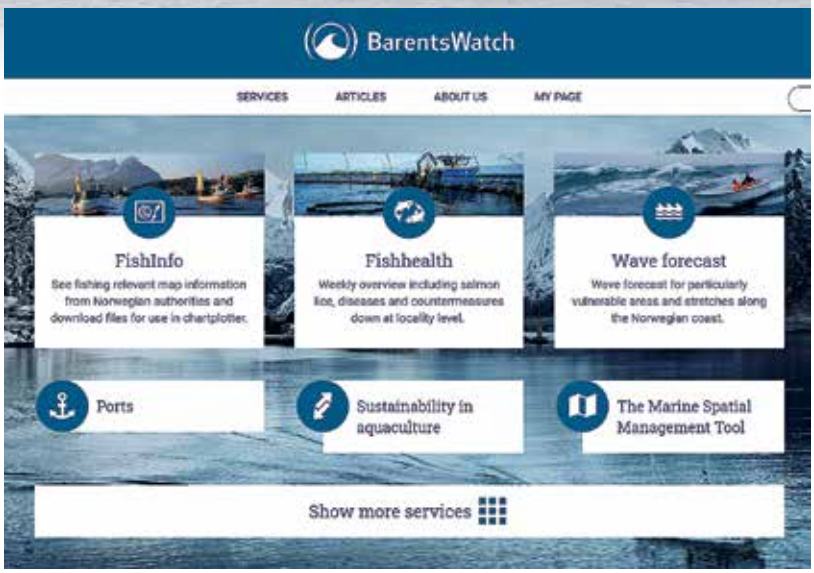
A portal to collect, develop and share information about Norwegian coastal and marine areas.

BarentsWatch www.barentswatch.no is an open information system providing the basis for better cooperation, professional development and information sharing for public agencies, trade and industry, and the public. The Norwegian Coastal Administration is responsible for the implementation of the programme that brings together 10 ministries and 29 administrative agencies and research institutes through its "Centre for the Sharing of Sea and Coast Information" (The BarentsWatch Centre) situated in Tromsø.



The Portal provides information and database applications for fishing area maps, fish health(salmon lice, disease and treatments), wave forecasts, port information and traffic and marine spatial management.

It also includes a sub-section (still under development) on sustainable aquaculture, partially funded by the Norwegian Seafood Research Fund (FHF). This sub-section is the focus of this article.

The sustainable aquaculture sub-portal https://www.barentswatch.no/en/havbruk/ is based on the pillars and themes shown below. The themes are placed under each sustainability dimension to make the website more user friendly, although in the same way that the environment, society, and economy are intertwined and mutually affect each other, the individual themes can also be relevant for several sustainability dimensions.

ENVIRONMENT	ECONOMY	SOCIAL
How does the aquaculture industry affect the environment?	What does the production and economy of the aquaculture industry look like?	How does the aquaculture industry impact community development and social conditions?
• Disease • Emissions from fish farming plants • Escapes • Fish mortality and losses in production • Impact on wild salmon • Sales of pharmaceuticals • Salmon lice • Utilisation of residual raw materials.	• Costs • Feed composition and origin from feed ingredients to produced fish • Production value • Profitability • Value added– contribution to GDP.	• Area use • Certifications • Employment • Absence from work (sickness, etc) • Occupational injuries • Societal contributions, taxes and charges.

Rather than presenting all the themes in this article, one theme from each pillar has been chosen to show the data provided. Each theme a common template, based on Good Practice on Sustainability Indicators. It has an introductory description of the theme to explain the indicator and its unit of measure; key figures for the latest data year; graphs showing the trend of that indicator over time and information about the dataset. In addition, links are provided to external web sites to provide more extensive information.

Environment: Emissions from fish farming plants

Each year, the seabed around 500 marine cage sites is subject to environmental surveys, mainly monitoring emissions of organic compounds (faeces from the fish and uneaten feed) and nutrient salts. The impact is usually the greatest just under the facilities and decreases further away from the cages. Sea currents, depth and sink rate of fish feed influence how much the emissions spread in any one area.

Over time, these surveys show that the vast majority of plants have good or very good environmental standards. About ten percent of the investigated production plants have poor or very bad conditions. On the two graphs below, note that new requirements came into force in 2016, which means that the surveys conducted after that time cannot be directly comparable to previous environmental reporting.

The authorities have requirements on how much environmental impact is allowed for the production of farmed fish. To monitor this, conducting environmental surveys of the impact on the seabed from the plants in the sea is a legal obligation. Samples are taken from under the plant (MOM-B) and the area surrounding the plants (MOM-C). During a production period, several surveys can be done at a plant.

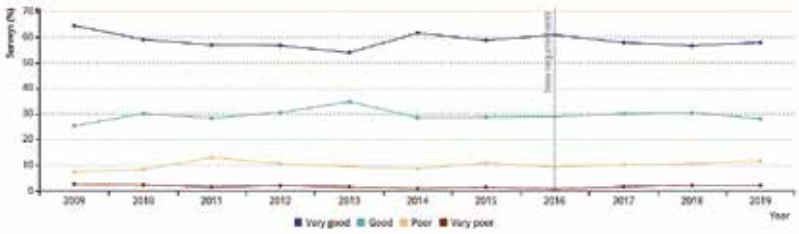
The production of fish in the sea takes approximately two years, with the second year accounting for much of the impact due to the increased biomass of fish in the production plants. This is why about half of the production plants in operation are surveyed each year.

The dataset is taken from the Norwegian Directorate of Fisheries. The figures only show MOM-B surveys. The dataset is presented in terms of the number of locations that have reported fish (unique localities) during the year.

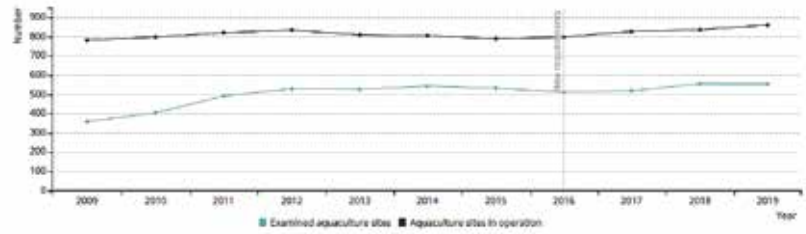
MOM-B is used for mapping bottom conditions under a facility or in the immediate vicinity. This examines the wildlife and sediment (including acidity, odour, consistency, colour). Bottom sediment is collected using a grab that is lowered to the bottom. The result is divided into four categories, where 1 is very good environmental condition, 2 good, 3 poor and 4 very poor. 4 is considered to indicate overload, and the authorities will initiate action. All operational plants must be environmentally monitored (cf. Section 35 of the Norwegian Aquaculture Regulation). How often the surveys must be conducted is determined by the production cycle and the environmental condition. If the environmental impact increases, the frequency at which the surveys are conducted must be increased.

Key figures 2019

Environmental condition under plants 2009-2019



MOM-B examined aquaculture sites 2009-2019



Key figures 2018

The MOM-B surveys must be carried out by an approved organisation, which can document professional competence and is independent of the client. Survey results are sent to the Directorate of Fisheries via Altinn. It must be reported no later than one month after the survey has been completed. The dataset for MOM-C is not shown here, as it is not available for automatic transfer. The plan is that MOM-C will also be presented here eventually.

To learn more about environmental surveys, please visit these external pages:

- Lovkrav miljøundersøkelser (In Norwegian)
- Om miljøovervåkning (In Norwegian) (The Norwegian Directorate of Fisheries)
- MOM-C undersøkelser (In Norwegian) (The Norwegian Directorate of Fisheries)
- Standard for gjennomføring av miljøundersøkelser (In Norwegian) (Standards Norway)
- Vurdering av risiko i norsk fiskeoppdrett (In Norwegian) (The Institute of Marine Research)
- Yggdrasil,Fiskeridirektoratet sin kartløsning (In Norwegian) (The Norwegian Directorate of Fisheries)

Economy: Value added– contribution to GDP

High demand and prices for salmon products have increased the value-added contribution of the Norwegian aquaculture industry significantly in recent years.

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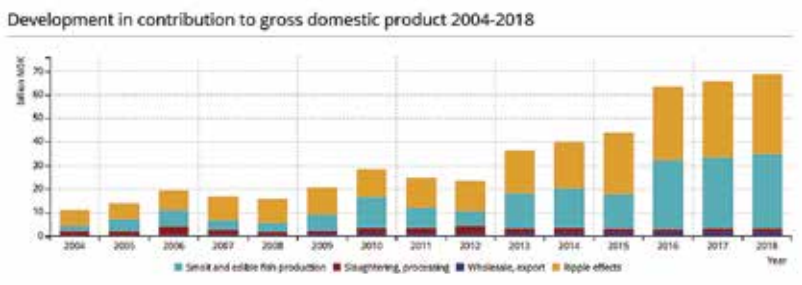
Long-term growth has been greatest within the production stage, which has increased value added fivefold over ten years. Value added is used more accurately regarding the value increase the (unfinished) product or service is given in each stage of the manufacturing process or value chain, where the value added is the additional value that each stage or business gives the product or service.

Since economic growth in the aquaculture industry has been much larger than the total growth in the Norwegian economy, the aquaculture industry has increased its share of total gross domestic product (GDP) significantly over time. During the last ten years, the aquaculture industry has doubled its share.

There are many ways of calculating the economic significance of an industry. Some people choose to focus on total export value, some on total revenues or production value, but one of the most precise methods of illustrating economic significance is to look at the value added as a contribution to GDP.

The basic data for calculating gross product (value added measured as a contribution to GDP) in Norwegian



aquaculture is obtained from the National accounts at Statistics Norway. Value added is a central concept in the analysis. Here, we have added the base value measurement used in the National accounts for value added in the individual industries and sectors, namely gross product. The actual production of a good or service has a value in the market. This is often measured at the production value or revenue value. However, the gross product is the value left after deducting costs related to consumption of goods and services in the production process.

SINTEF Ocean has carried out the calculation and uses figures from the National accounts in current prices for the entire economy divided into 50 industries. In addition, cross-product accounting and investment efforts are also being collected.

Goods and operating costs distributed among the industries from which deliveries are received. Imports and fees are separated out because we want to focus on domestic goods deliveries in the analysis.

Supplies from the industry, divided into production efforts in other industries, investments and final deliveries (consumption and export)

To calculate ripple effects from the aquaculture industry, an analysis of the complete value chains in the seafood industry is needed. This requires splitting the fish processing, wholesale and food industries into the respective parts connected with the two primary industries. As a basis for this, other available open sources are used within the industry, including statistics from the Norwegian Directorate of Fisheries, fishing sales teams, and the Norwegian

Seafood Council. SINTEF Ocean has also used Statistics Norway`s structural business statistics for wholesale trade as a basis for distinguishing the part related to the seafood industry.

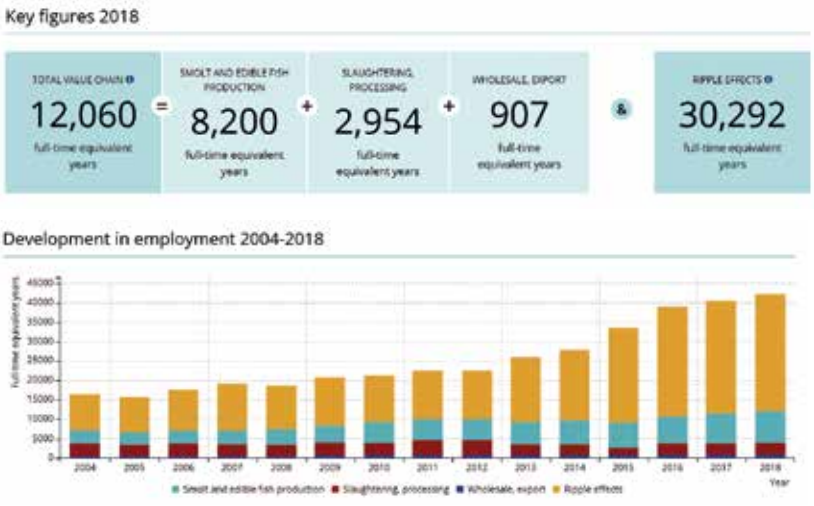
To learn more about value added and information used to calculate this, you can visit these external pages:

- Nasjonal verdiskapings- og ringvirkningsanalyse (In Norwegian) (Nofima)
- Verdiskapings- og restråstoffanalyser i norsk sjømatnæring 2017 til 2019 (In Norwegian) (Norwegian Seafood Research Fund)
- The Norwegian seafood industry - Importance for the national economy (Scientific article)
- Akvakulturstatistikk (In Norwegian) (The Norwegian Directorate of Fisheries)

Social: Employment

Aquaculture creates many jobs in producing companies, but also value chain operators that supply goods and services to the aquaculture industry. As for most other industries, the number of jobs (people) within the aquaculture industry is far higher than the number of man-years.

The employment figures show an average of the number of employees during the year. Employment is stated in man-years defined as the number of people employed full-time plus the part-time employees converted to full-time employment. The hours of work



in a normal full-time equivalent year is equal to the actual working time for full-time employees.

The number of hours worked per normal full-time equivalent year can vary between industries and over time. In Norway, it is common for employees to have a fixed wage rate for 37.5 hours of work per week with five weeks` holiday, which makes a full-time equivalent year around 1,695 hours. The number of employees (people) would normally be higher than the figures entered here (full-time equivalent years), because the industry and the processing stage in the Norwegian seafood industry have significant elements of seasonal employment and part-time employees. This results in fluctuations in the number of people employed.

The basic data for calculating full-time equivalent years in Norwegian aquaculture is obtained from the National accounts at Statistics Norway. The definition of man-years is based on agreed and performed hours per week in Statistics Norway`s labour survey.

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The sustainable aquaculture portal has been conceived and put together by Nofima, SINTEF Ocean and BarentsWatch. The site is still under development and FEEDBACK is welcomed. Please contact havbruk@barentswatch.no if you have suggestions for improvement.

FREE WEBINAR

SPAROS is organizing another free webinar on our nutritional tool FEEDNETICS™, this time for the Aquafeed sector, on October 1st, 2020. SPAROS has been presenting a series of webinars to show a diverse audience how our nutritional tools can help users to predict the effects of nutritional and environmental factors on fish growth, feed conversion, feed costs, body composition, and waste emissions based on a mechanistic simulation model.

FEEDNETICS™ can be used by feed manufacturers for customer support and by the aquafeed industry, including ingredient and additive suppliers, to evaluate formulation performance and diet screening to improve the rationality of feed treatments to be tested in trials. FEEDNETICS™ also enables fish farmers and technical consultants to quantify trends observed on farm and make predictions for different feeding strategies, with the most interesting solutions being tested in the field before implementation.

FEEDNETICS™ is available for the following species: Gilthead seabream, European seabass, and Rainbow trout.

This online event brings together SPAROS researchers who developed FEEDNETICS™ to explain its applications through several examples of use cases and offers a combination of live presentations and Q&A sessions.

To register and learn more about the webinar, please go to **https://www.sparos.pt/news/** or directly to the registration page: **https://zoom.us/webinar/register/WN_0wd0Y6mzQ-GxF5UnQ139wQ**