MAPPING OF MARINE REST RAW MATERIALS IN THE NORWEGIAN SEAFOOD INDUSTRY

VIRTUAL GREENOVATION CAMP – BLUE ECONOMY

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The global focus

- Growing population → growing demand for food
- Need for change and circular economy
- Sustainable production and full utilization of resources

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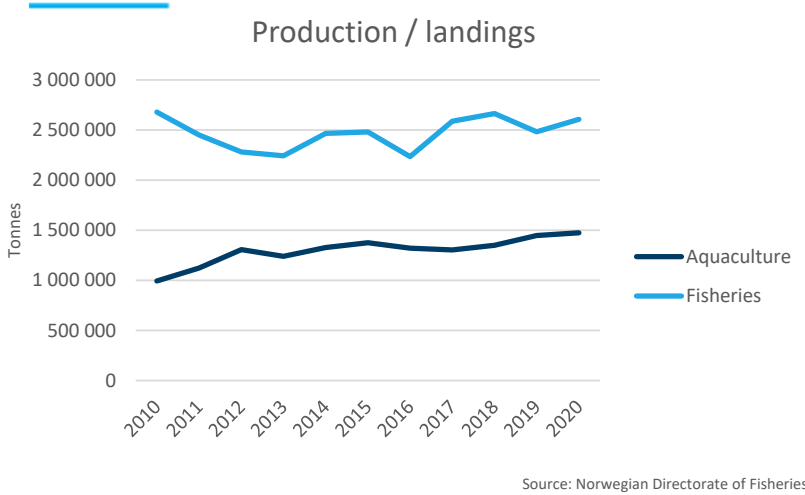
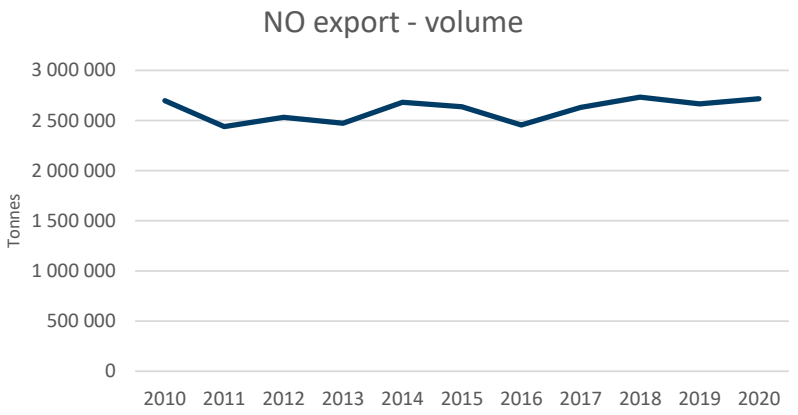
Norway - catch, production and trade



Source: Norwegian Directorate of Fisheries



Source: Norwegian Seafood Council

- 285 000 tons / 98 % of mackerel was exported from Norway round/unprepared
- 16 000 tons / 3 % of cod was exported from Norway as filets
- 155 000 tons / 14 % of farmed salmon was exported from Norway as filets

→ **Large volumes of marine *rest raw materials* disappears from Norwegian industry**

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What is marine rest raw materials?

- The parts/fractions of a product which is not considered as the main part(s) for human consumption in Norway
  - Occurring in gutting and preparation of seafood
- Example cod
  - Main product – filet (35 %)
  - Rest raw material – head, viscera, bones ++ (65 %)

Photo: Magnus Myhre, SINTEF Ocean

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Mapping since 2013

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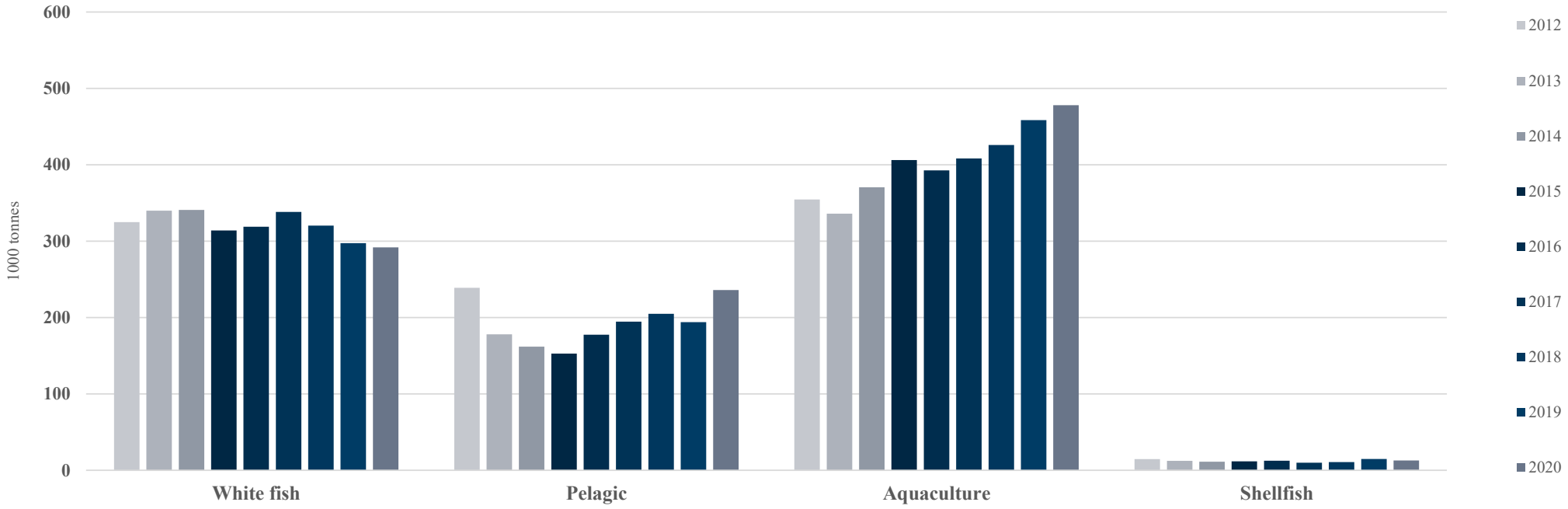
- Goals
  - Availability
  - Degree of utilization
  - Application

- Financed by the Norwegian seafood research fund (FHF)

FHF

Historical development of available RRM – per seafood sector



- ~292 000 t
- 58 %

- ~236 000 t
- 100 %

- ~478 000 t
- 93 %

- ~13 000 t
- 62 %

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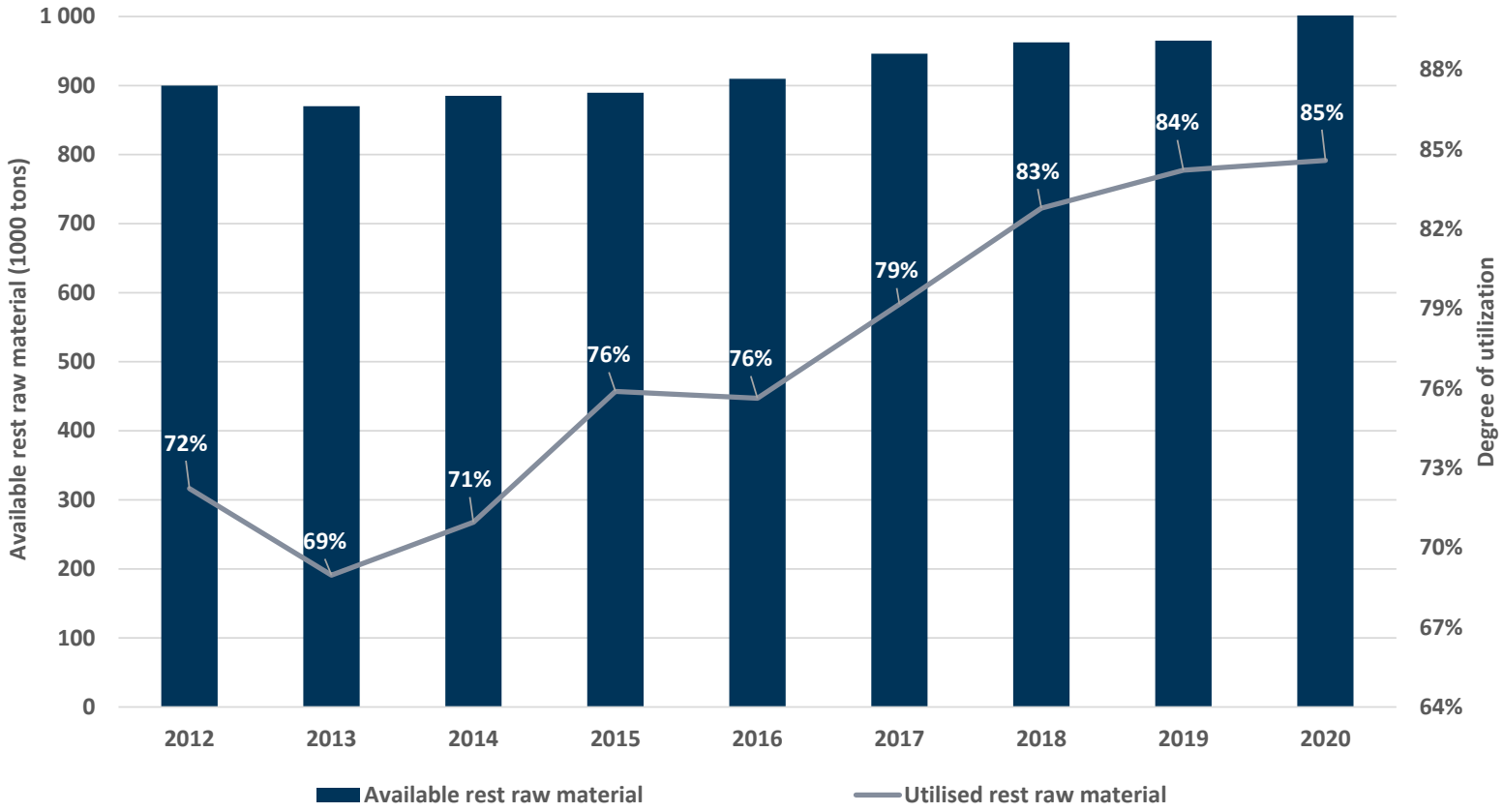
Development for overall degree of utilization



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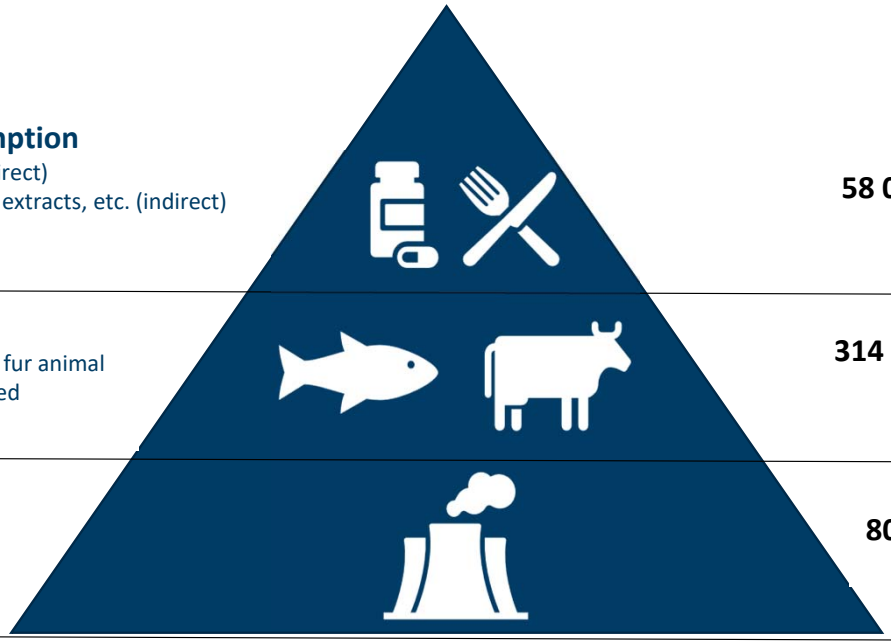
Product categories based on marine rest raw materials

Product category	Level	Volume / share
Human consumption Seafood products (direct) Cod liver oil, protein extracts, etc. (indirect)		**58 000 t / 13 %**
Feed Fish feed, pet food, fur animal feed, agriculture feed		**314 000 t / 69 %**
Biogas		**80 000 t / 18 %**



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Still more to utilize

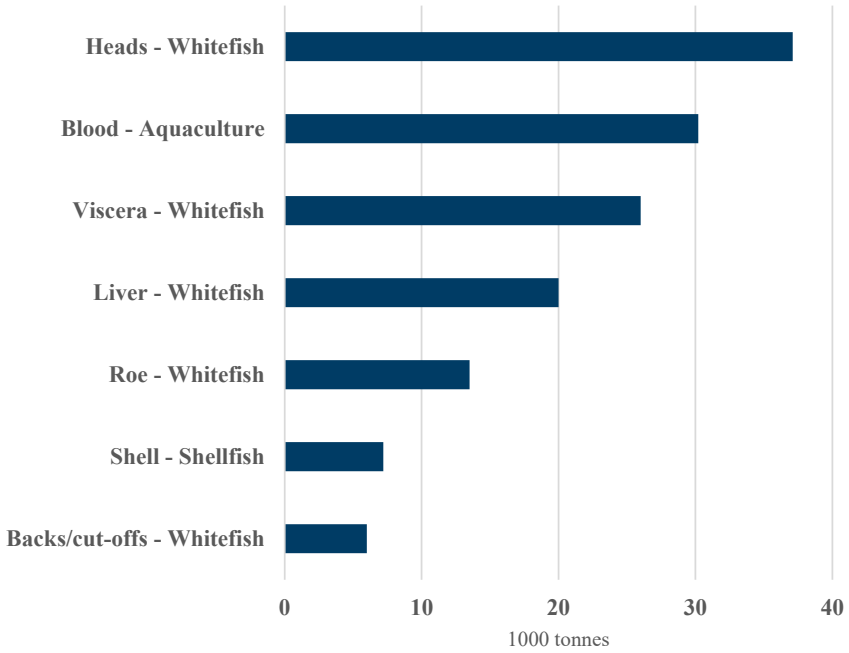

Photo: Magnus Myhre, SINTEF Ocean

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Project: *Bærekraft i havbruk*

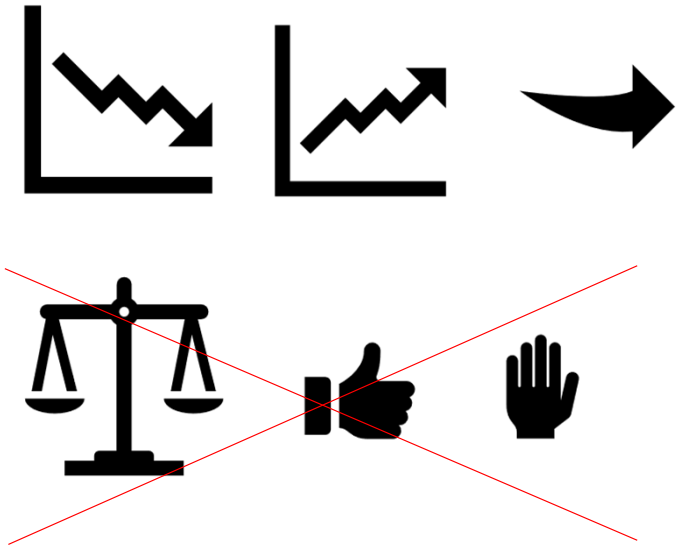
FISKERI- OG HAVBRUKSNÆRINGENS FORSKNINGSFINANSIERING

- Initiated in 2016
- Webportal published for the first time in December 2018
- Financed by Fiskeri- og havbruksnæringens forskningsfinansiering (FHF)

Being enlightening - and only that

Public web page presenting facts - both positive and negative – for Norwegian aquaculture

- 22 different themes
  - Environment: 9
  - Society/social: 7
  - Economy: 6



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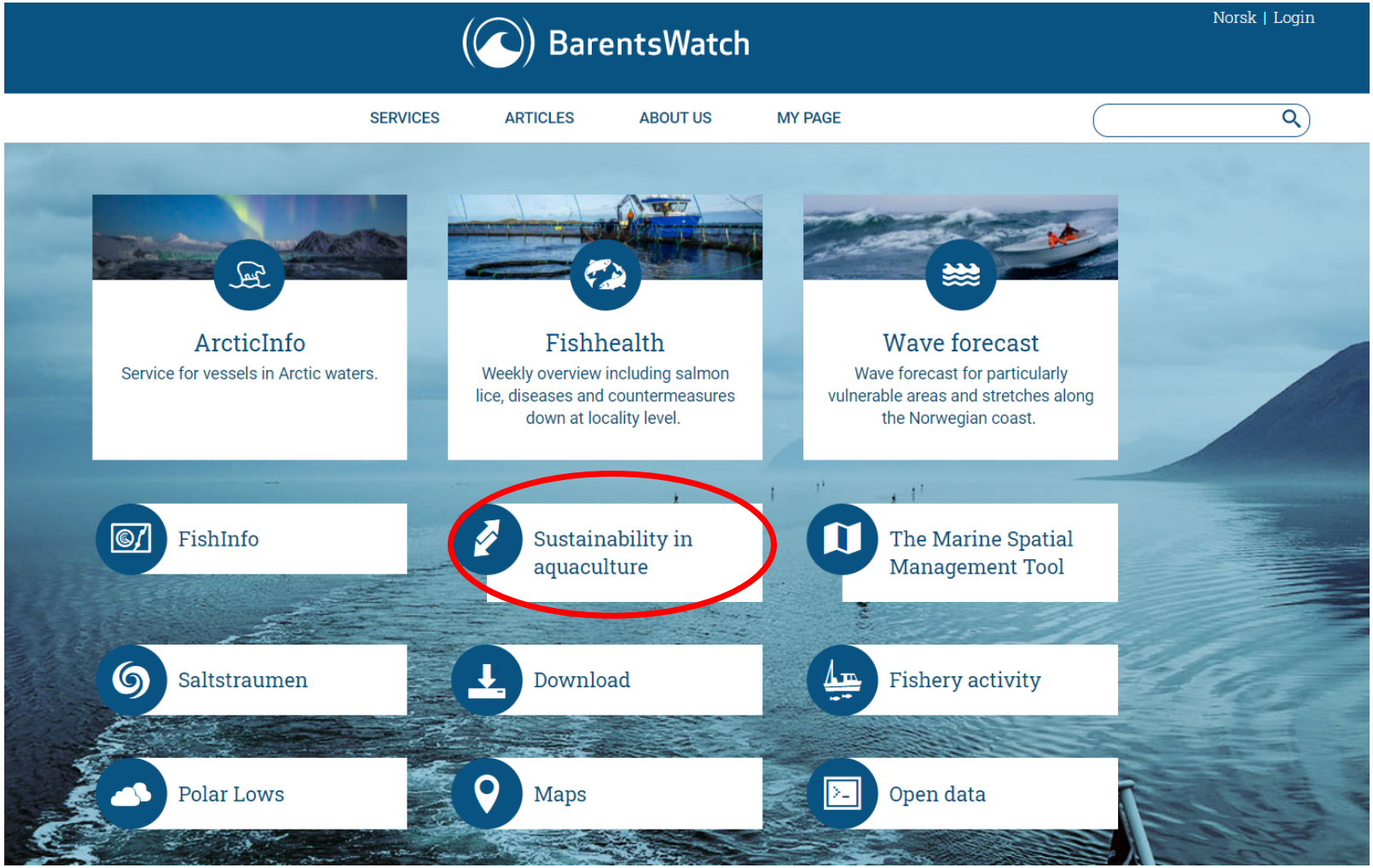

https://www.bærekraftportal.no

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SUSTAINABILITY IN AQUACULTURE

English

What impact does Norwegian aquaculture have on the environment, the economy and society?

This website presents facts about the environmental, economic and societal sustainability of Norwegian aquaculture.

Environment

How does the aquaculture industry affect the environment?

Disease
Emissions from fish farming plants
Escapes
Fish mortality and losses in production
Greenhouse gas emissions
Impact on wild salmon
Sales of pharmaceuticals
Salmon lice
Utilisation of residual raw materials

Economy

What are the production and economy of the aquaculture industry like?

Costs
Feed composition and origin
From feed ingredients to produced fish
Production value
Profitability
Value added– contribution to GDP

Social

How does the aquaculture industry impact community development and social conditions?

Area use
Certifications
Employment
Job absence
Nutrients and unwanted substances
Occupational injuries
Societal contributions, taxes and charges

Different sustainability themes in aquaculture are presented on this website. Selecting themes are based on a preliminary project and a main project. The themes are placed under each sustainability dimension to make the website more user friendly. 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.

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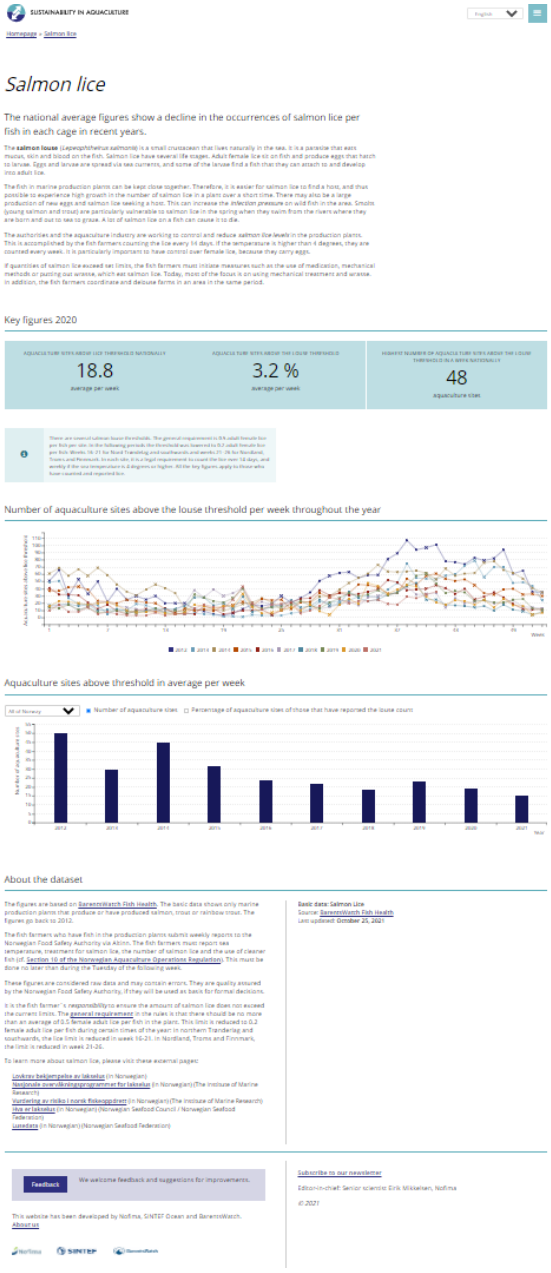

SUSTAINABILITY IN AQUACULTURE

Homepage > Salmon lice

Salmon lice

The national average figures show a decline in the occurrences of salmon lice per fish in each cage in recent years.

The **salmon louse** (*Lepeophtheirus salmonis*) is a small crustacean that lives naturally in the sea. It is a parasite that eats mucus, skin and blood on the fish. Salmon lice have several life stages. Adult female lice sit on fish and produce eggs that hatch to larvae. Eggs and larvae are spread via sea currents, and some of the larvae find a fish that they can attach to and develop into adult lice.

The fish in marine production plants can be kept close together. Therefore, it is easier for salmon lice to find a host, and thus possible to experience high growth in the number of salmon lice in a plant over a short time. There may also be a large production of new eggs and salmon lice seeking a host. This can increase the *infection pressure* on wild fish in the area. Smolts (young salmon and trout) are particularly vulnerable to salmon lice in the spring when they swim from the rivers where they are born and out to sea to grow. A lot of salmon lice on a fish can cause it to die.

The authorities and the aquaculture industry are working to control and reduce *salmon lice levels* in the production plants. This is accomplished by the fish farmers counting the lice every 14 days. If the temperature is higher than 4 degrees, they are counted every week. It is particularly important to have control over female lice, because they carry eggs.

If quantities of salmon lice exceed set limits, the fish farmers must initiate measures such as the use of medication, mechanical methods or pairing out wrasse, which eat salmon lice. Today, most of the focus is on using mechanical treatment and wrasse. In addition, the fish farmers coordinate and delouse farms in an area in the same period.

Key figures 2020

AQUACULTURE SITES ABOVE LICE THRESHOLD NATIONALLY
18.8
average per week

AQUACULTURE SITES ABOVE THE LOUSE THRESHOLD
3.2 %
average per week

HIGHEST NUMBER OF AQUACULTURE SITES ABOVE THE LOUSE THRESHOLD IN A AREA NATIONALLY
48
aquaculture sites

There are several salmon louse thresholds. The general requirement is 0.5 adult female lice per fish per site. In the following periods the threshold was lowered to 0.2 adult female lice per fish: Weeks 16-21 for Nord-Trøndelag and southwards and weeks 21-26 for Nordland, Troms and Finnmark. In each site, it is a legal requirement to count the lice over 14 days, and weekly if the sea temperature is 4 degrees or higher. All the key figures apply to those who have counted and reported lice.

Number of aquaculture sites above the louse threshold per week throughout the year

Aquaculture sites above threshold in average per week

About the dataset

The figures are based on BarentsWatch Fish Health. The basic data shown only marine production plants that produce or have produced salmon, trout or rainbow trout. The figures go back to 2012.

The fish farmers who have fish in the production plants submit weekly reports to the Norwegian Food Safety Authority via Altinn. The fish farmers must report sea temperature, treatment for salmon lice, the number of salmon lice and the use of cleaner fish (cf. Section 16 of the Norwegian Aquaculture Operations Regulation). This must be done no later than during the Tuesday of the following week.

These figures are considered raw data and may contain errors. They are quality assured by the Norwegian Food Safety Authority, if they will be used as basis for formal decisions.

It is the fish farmer's responsibility to ensure the amount of salmon lice does not exceed the current limit. The general requirement in the rules is that there should be no more than an average of 0.5 female adult lice per fish in the plant. This limit is reduced to 0.2 female adult lice per fish during certain times of the year: in northern Trøndelag and southwards, the lice limit is reduced in week 16-21. In Nordland, Troms and Finnmark, the limit is reduced in week 21-26.

To learn more about salmon lice, please visit these external pages:

Lovkrav bekjempelse av lakselus (in Norwegian)
Nasjonale overvåkingsprogrammer for lakselus (in Norwegian) (The Institute of Marine Research)
Veiledning av risiko i norsk fiskeoppdrett (in Norwegian) (The Institute of Marine Research)
Hva er lakselus (in Norwegian) (Norwegian Seafood Council / Norwegian Seafood Federation)
Luseatere (in Norwegian) (Norwegian Seafood Federation)

Basic data: Salmon Lice
Source: BarentsWatch Fish Health
Last updated: **October 25, 2021**

Feedback
We welcome feedback and suggestions for improvements.

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This website has been developed by Nofima, SINTEF Ocean and BarentsWatch.
About us

Editor-in-chief: Senior scientist Eirik Mikkelsen, Nofima

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Teknologi for et bedre samfunn