A composite background image featuring a blue sky with a satellite and an airplane, a coastal town with a bridge, and an offshore oil rig in the ocean.

MAPPING OF MARINE REST RAW MATERIALS IN THE NORWEGIAN SEAFOOD INDUSTRY

VIRTUAL GREENOVATION CAMP – BLUE ECONOMY

Magnus Stoud Myhre
SINTEF Ocean

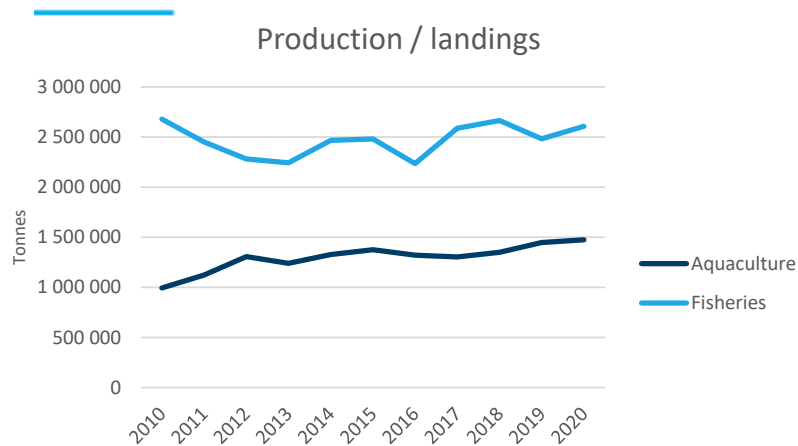
26.10.2021

The global focus

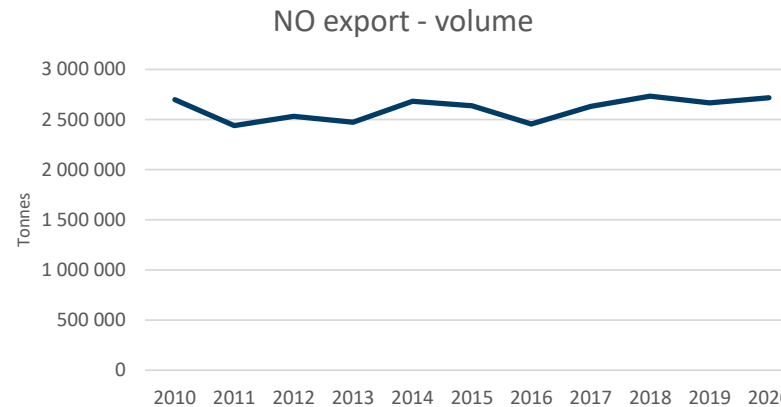
- Growing population → growing demand for food
- Need for change and circular economy
- Sustainable production and full utilization of resources



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

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

Mapping since 2013



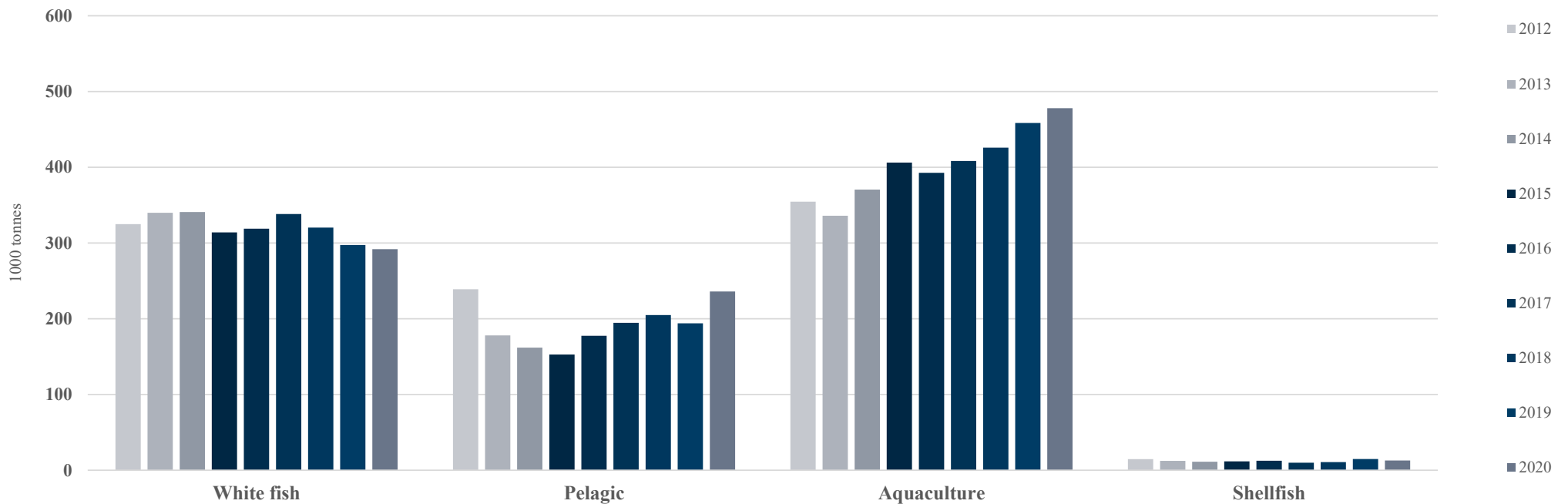
- Goals
 - Availability
 - Degree of utilization
 - Application



- Financed by the Norwegian seafood research fund (FHF)



Historical development of available RRM – per seafood sector



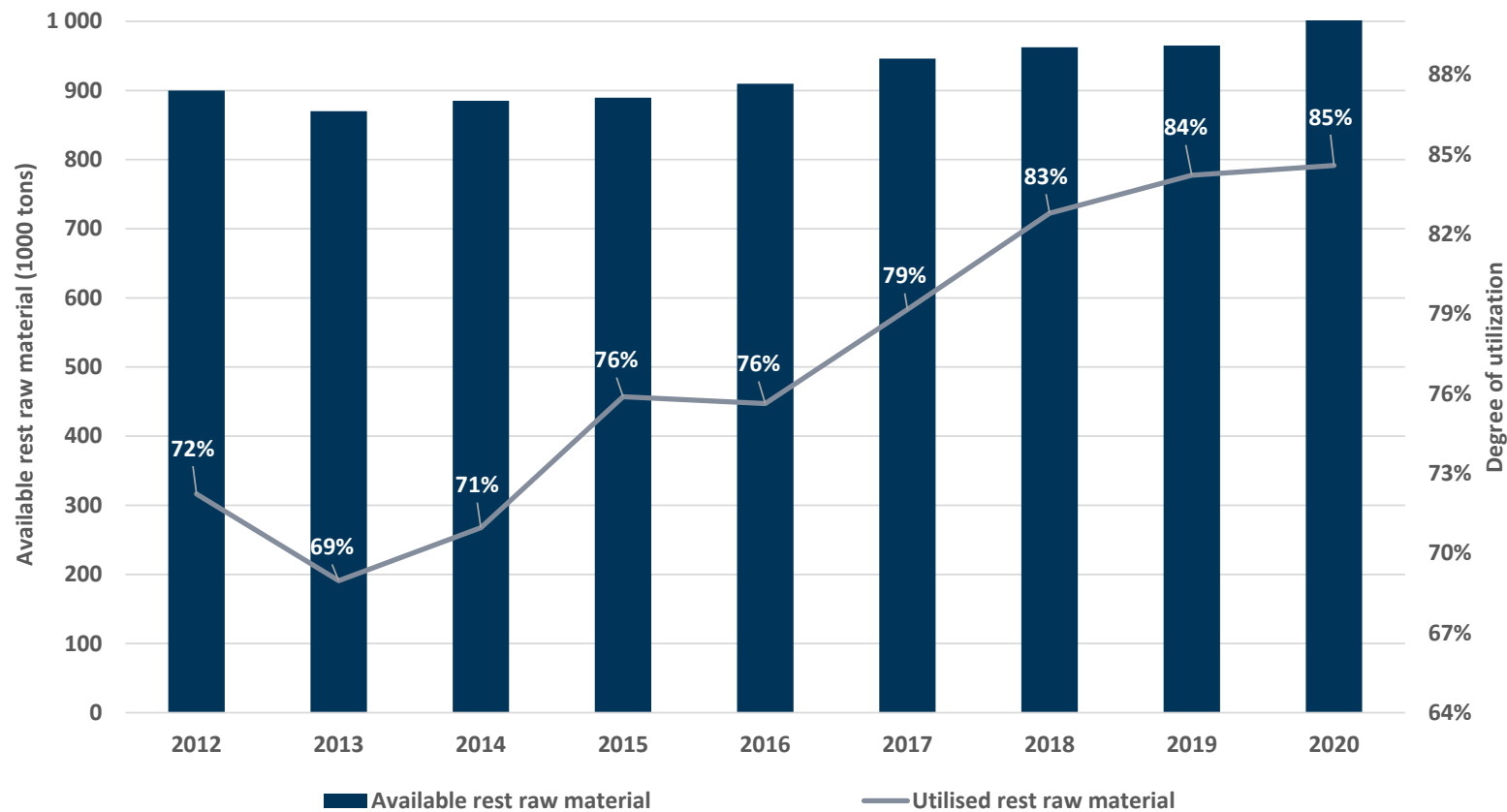
- ~292 000 t
- 58 %

- ~236 000 t
- 100 %

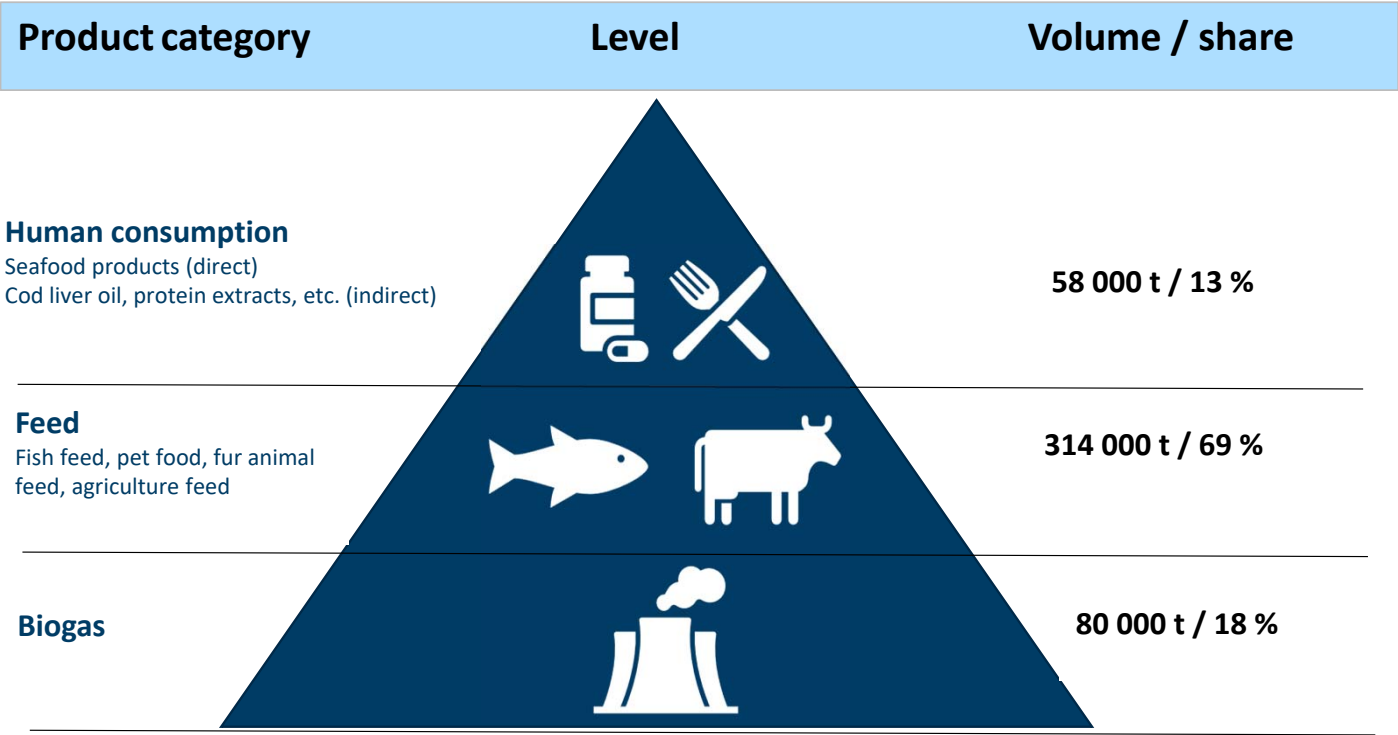
- ~478 000 t
- 93 %

- ~13 000 t
- 62 %

Development for overall degree of utilization



Product categories based on marine rest raw materials



Still more to utilize

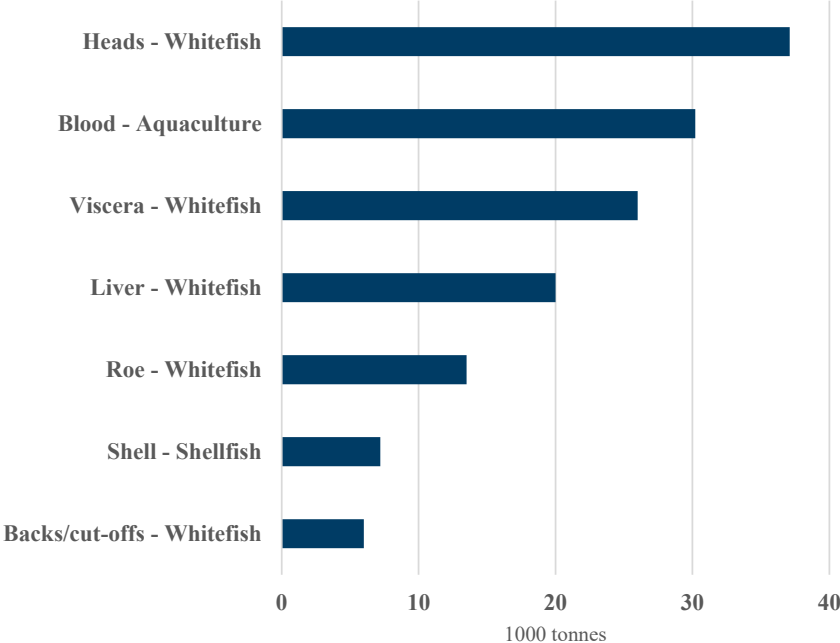


Photo: Magnus Myhre, SINTEF Ocean

Project: *Bærekraft i havbruk*



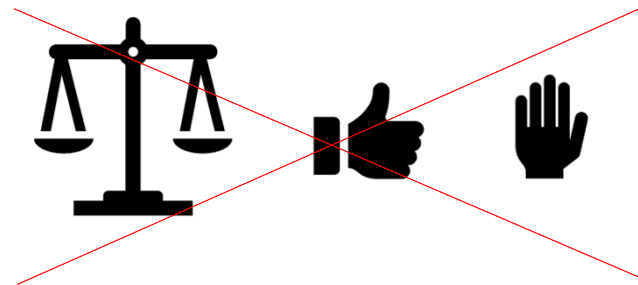
- Initiated in 2016
- Webportal published for the first time in December 2018
- Financed by Fiskeri- og havbruksnæringens forskningsfinansiering (FHF)




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





ArcticInfo
Service for vessels in Arctic waters.




Fishhealth
Weekly overview including salmon lice, diseases and countermeasures down at locality level.



Wave forecast
Wave forecast for particularly vulnerable areas and stretches along the Norwegian coast.




FishInfo




Sustainability in aquaculture




The Marine Spatial Management Tool




Saltstraumen




Download




Fishery activity



Polar Lows



Maps



Open data

<https://www.baerekraftportal.no>

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.

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 eat 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 this leads to a higher 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 weekly in a host. This can increase the infection pressure on wild fish in the area. Smolt (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 its 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 10 days. If the temperature is higher than 10 degrees, they are counted every week. It is particularly important to have control over female lice, because they carry eggs.

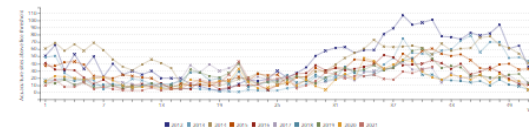
If quantities of salmon lice exceed set limits, the fish farmers must initiate measures such as the use of medication, mechanical methods or putting out waste, which was salmon lice. Today, most of the focus is on using mechanical treatment and waste. In addition, the fish farmers coordinate and discuss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

Key figures 2020

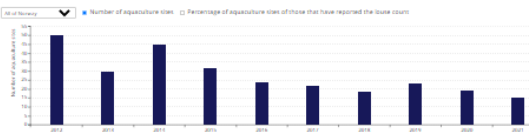


There are several salmon lice thresholds. The general requirement is 0.5 adult female lice per fish per week. In the following periods, the threshold is increased to 1.0 adult female lice per fish. Week 16-27 for Nord-Trøndelag and southern and central Østlandet, and for Nordland, Troms and Finnmark. Week 18-27 for Hordaland and southern and central Østlandet. In the following periods, the threshold is increased to 1.0 adult female lice per fish per week if the sea temperature is 8 degrees or higher. All the key figures apply to those who have reported and registered 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 shows only marine production plants the problem of 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 AqSim. The fish farmers must report sea temperature, treatment for salmon lice, the number of salmon lice and the use of cleaner fish (if [Article 10 of the Norwegian Aquaculture Regulations](#) applies). This must be done within three days of the weekly lice count.

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 limits. The [general requirement](#) in the law 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 limit is reduced to week 16-21. In Nordland, Troms and Finnmark, the limit is reduced to week 21-26.

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

- [Luskytt bekjemping av lakselus](#) (in Norwegian)
- [Luskytt og overlevingsstrategier for lakselus](#) (in Norwegian) (The Institute of Marine Research)
- [Kvalitet og risiko i norsk laksoppsøst](#) (in Norwegian) (The Institute of Marine Research)
- [Luskytt i lakselus](#) (in Norwegian) (Norwegian Seafood Council / Norwegian Seafood Federation)
- [Luskytt](#) (in Norwegian) (Norwegian Seafood Federation)

Basic data: Salmon Lice
Source: [Barentswatch Fish Health](#)
Last updated: October 20, 2021

Feedback We welcome feedback and suggestions for improvements.

This website has been developed by Nofima, SINTEF Ocean and Barentswatch.

[About us](#)

[Nofima](#) [SINTEF](#) [Barentswatch](#)

Subscribe to our newsletter

Edsmonnshol Senior scientist Erik Mikkelsen, Nofima

© 2021



Teknologi for et bedre samfunn