

# Analysis of nutrients and contaminants – the Norwegian seafood database

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# Institute of Marine Research (IMR)

- Ministry of Trade and Fisheries
- 1000 employees
- Research
- Advisory work
- Monitoring



Leading supplier of knowledge relating to the sustainable management of the resources in our marine ecosystems and the whole food chain from the sea to the table



# Seafood data

Seafood data is a database where you can search for and compare the contents of contaminants and nutrients in fish and other seafood.

*Search for seafood or substance*



## Seafood

No. of items to compare 0

- Wild fish
- Farmed fish
- Shellfish wild
- Shellfish farmed
- Seafood product

## Substance

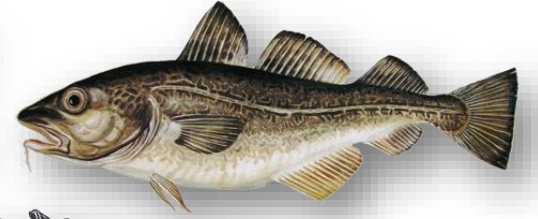
No. of items to compare 0

- Nutrients
- Contaminants

- Launched 2017
- Data from 2006 until 2019
- 100% analytical values
- English and Norwegian
- No user cost



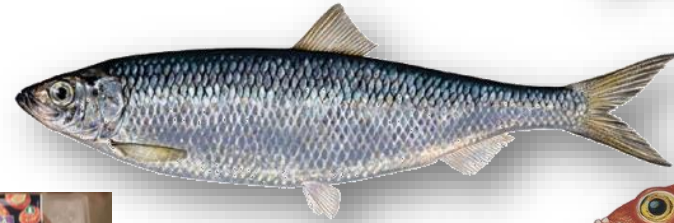




30 fish species, 25 different shellfish and almost 40 seafood products



~ 70 nutrients and ~ 70 contaminants





# Quality assurance and laboratory facilities

- National Reference Laboratory
- ~ 60 methods are NS-EN ISO/IEC 17025 accredited
- Quality assurance:
  - Certified reference material
  - Proficiency tests
  - Validation
- Monitoring nutrients in seafood
  - Food Security and Nutrition
- The Norwegian Food Safety Authorities
- Directorate of Health



# Life cycle of analytical values




Atlantic cod fillet  
Gardula morhua  
Wild fish

from 2009 to 2011, NIFES took 2,200 samples of food from 80 positions during a thorough an extensive baseline study. Cod is monitored annually and samples are taken from four positions in the Barents Sea, two in the Norwegian Sea and two in the North Sea.

Read more on fish → Download page (pdf) → Remove from comparison

### Seafood data



Selected undesirable substances for this species  
Content per 100 grams

0.094 Dioxin (PCB) measured 2010	0.089 Dioxin and dl-PCBs measured 2010	0.44 Estradiol measured 2010
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Selected nutrients for this species  
Content per 100 grams

<LOQ Vitamin D (D3) measured 2010	0.093 Iodine (I) measured 2010	240 Selenium (Se) measured 2010
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All substances: Current, Contaminants: Historical, Nutrients: Historical

LABWARE  
LIMS

March 26 2018

Projects: Nytt prosjekt, Nytt journalnr, Open

Reports: Run report, Data Explorer

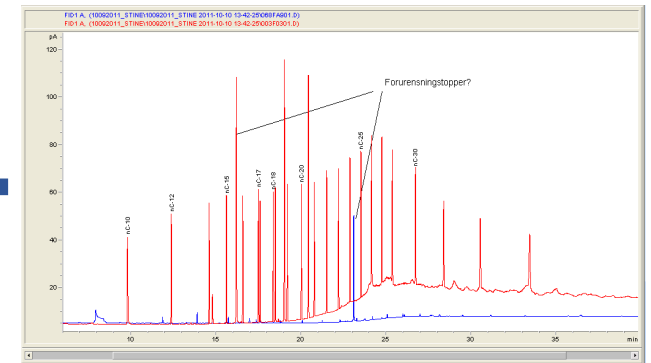
Review Samples: Analytiker godkjenning, Godkjennt, Kvalitetstest, Analytiker analyse

Results Entry: LIS Journalnr, Velg import

Folders: Analytiker folder, New, Open Group

Batches: New, Open

PROVER: Apne reg journalnr, Apne journalnr folder



# Example of number of analysis

**Table.** Example from seafood data showing *number of analysis* accounting for data

Species*	Total	Total	Marine fatty	Vitamin	Vitamin	Vitamin	Iodine	Selenium
	Fat	Protein	acids	D	A	B12		
Cod	194	35	50	42	32	43	20	3267
Farmed Atlantic salmon	746	310	620	603	10	249	591	2383
Saith	40	30	40	40	30	40	10	2136
Atlantic herring	2037	10	225	326	10	223	216	1989
Cusk	237	43	43	43	43	0	43	1614
Atlantic mackerel	1647	10	365	464	10	365	365	1174
Common ling	282	50	50	50	50	50	50	1024
Haddock	38	0	0	0	0	0	0	214
Wild Atlantic salmon	125	122	114	27	27	27	47	126
Pollock	55	0	50	50	0	0	50	100
Blue ling	9	10	10	10	10	10	0	47
European sprat^	27	0	0	0	0	0	3	32
Spotted wolffish	2	0	0	0	0	0	0	12
Northern wolffish	2	0	0	0	0	0	0	12

\*fillet

^whole fish



# Undesirable substances in seafood-farmed fish

- Reporting to EFSA
  - Council Directive 96/23/EC (animal protein foods)
  - Regulation (EC) No 396/2005 (pesticides)
  - Commission Regulation (EC) No 333/2007 (heavy metals)
- Must be below the maximum limits of each substance



Arsenic (As)

BHA

BHT

Brominated flame retardants

Cadmium (Cd)

Dioxins, furans and dioxin-like PCBs

Ethoxyquin (EQ)

Lead (Pb)

Mercury (Hg)





# Undesirable substances in seafood -wild fish

- No strict requirements
- Must be below the maximum limits of each substance
- Used to be spot-sampling
- Now:
  - thorough baseline study
  - smaller follow-up study
  - spot-sampling



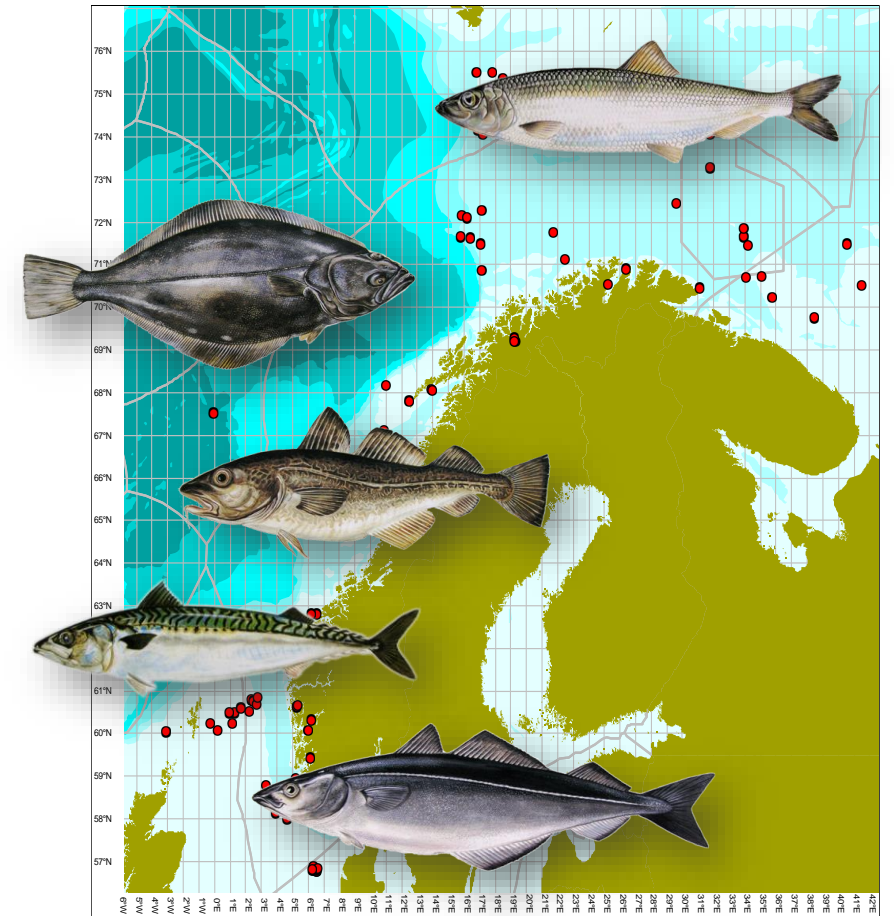
Atlantic herring

Blue Halibut

Cod

Atlantic mackerel

Saith





# Seafood data

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Seafood	No. of items to compare 0	Substance	No. of items to compare 0
Wild fish	▼	Nutrients	▼
Farmed fish	▼	Vitamin D	▼
Shellfish wild	▼	Contaminants	▼
Shellfish farmed	▼		
Seafood product	▼		



## Examples of functions..



# Atlantic mackerel fillet

*Scomber scombrus*

Wild fish

NIFES has mapped undesirable substances in mackerel through thorough surveillance studies known as baseline studies. In the period 2007–2009, 1166 samples of individual mackerel were taken from 42 different positions, mostly in the North Sea, but also some from Skagerrak, the Norwegian Sea and the area west of Scotland. Monitoring of undesirable substances in mackerel is now conducted in the North Sea every third year during the mackerel fishing season in autumn. Annual mackerel samples are taken in the Skagerrak.

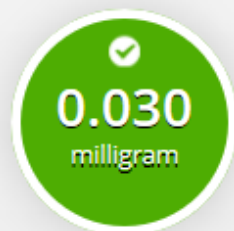
[Read more on nifes.no](#) [Download page \(pdf\)](#)

[+ Add to comparison](#)

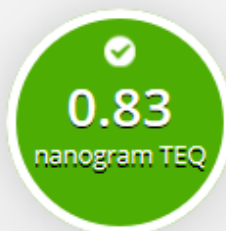


## Selected undesirable substances for this species

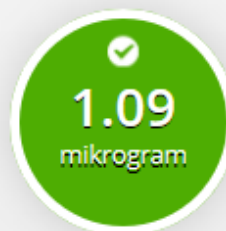
Content per kilos



Mercury (Hg)  
(measured 2016)  
Threshold: 0.50



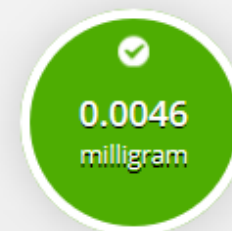
Dioxins and dl-PCBs  
(measured 2016)  
Threshold: 6.50



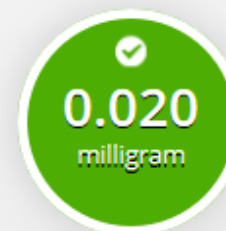
Endosulfan  
(measured 2006)

## Selected nutrients for this species

Content per 100 grams



Vitamin D (D3)  
(measured 2012)



Iodine (I)  
(measured 2012)



Sum EPA + DHA  
(measured 2012)







All substances  
Current

Contaminants  
Historical

Nutrients  
Historical

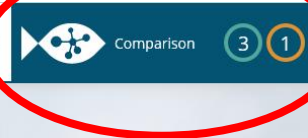
Select group

Contaminants

## Current results for contaminants per kg

Substance	Measured	Unit	Maximum level	Mean	Min	Max	Median	Analyses	Below LOQ
<a href="#">Alpha-HCH</a>	2012	mikrogram	-	-	<0.13	0.19	<0.16	50	48
<a href="#">Arsenic (As)</a>	2017	milligram	-	2.14	0.88	3.30	2.20	72	0
<a href="#">Beta-HCH</a>	2012	mikrogram	-	-	<0.13	0.63	<0.19	50	26
<a href="#">Cadmium (Cd)</a>	2017	milligram	0.10	0.010	<0.0040	0.023	0.0090	72	3
<a href="#">Chlordan</a>	2006	mikrogram	-	2.63	2.46	3.16	2.60	25	0
<a href="#">Dioxin-like PCBs</a>	2017	nanogram TEQ	-	0.40	0.20	0.66	0.39	11	0

# Comparing Selenium in cod (*Cadus morhua*), salmon (*Salmo salar*) and rainbow trout (*Oncorhynchus mykiss*) (mg/100g)



## Seafood data

Seafood data is a database where you can search for and compare the contents of contaminants and nutrients in fish and other seafood.

Search for seafood or substance



### Seafood

No. of items to compare 3

- Wild fish
- Farmed fish
- Arctic char fillet
- Atlantic cod fillet
- Atlantic cod liver
- Atlantic cod roe
- Atlantic halibut fillet
- Atlantic salmon fillet
- Rainbow trout fillet
- Turbot fillet
- Shellfish wild
- Shellfish farmed
- Seafood product

### Substance

No. of items to compare 1

- Nutrients
- Macro nutrients
- Fatty acids
- Amino acids
- Vitamins
- Minerales and trace elements
- Calcium (Ca)
- Chromium (Cr)
- Iodine (I)
- Iron (Fe)
- Magnesium (Mg)
- Phosphorus (P)
- Potassium (K)
- Selenium (Se)
- Sodium (Na)
- Zinc (Zn)
- Contaminants





Overview **Last results** Development

Table Diagram Diagram

# Comparison

● Milligram (mg)

		Atlantic cod fillet (wild)	Atlantic salmon fillet (farmed)	Rainbow trout fillet (farmed)
▼ Selenium (Se) (2018)	<b>mg</b> pr. 100 g	-	0.017	-
2017		0.025	0.014	0.013
2016		0.024	0.013	0.014
2015		0.024	0.012	0.012
2014		0.026	0.012	0.013
2013		0.023	0.012	0.014
2012		0.027	0.014	0.018
2011		0.026	0.015	0.017
2010		0.029	0.019	0.022
2009		0.025	0.022	0.026
2008		0.027	0.022	0.026
2007		0.027	0.025	0.027
2006		0.021	0.023	-

# Overview of average values each year

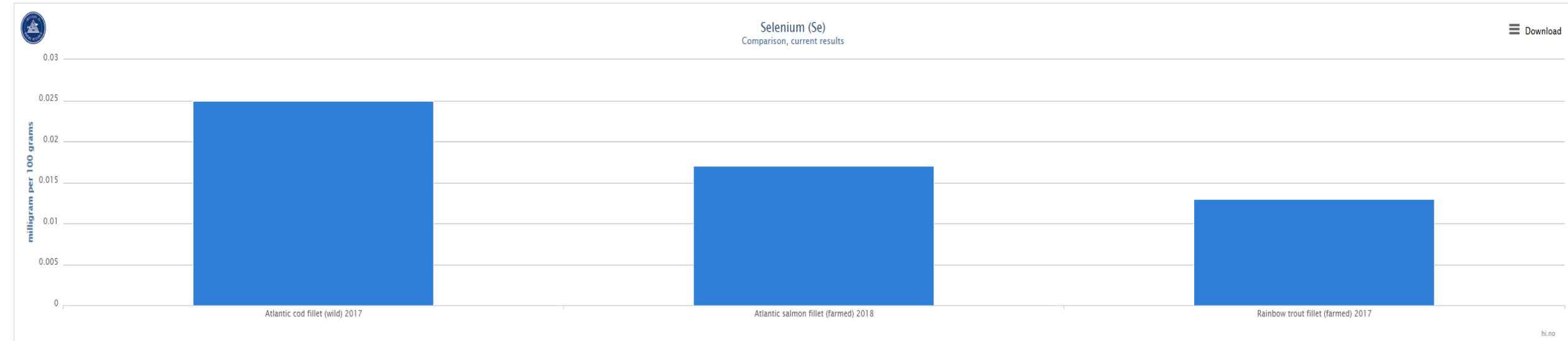






Overview Table **Last results** Diagram Development Diagram

## Last results

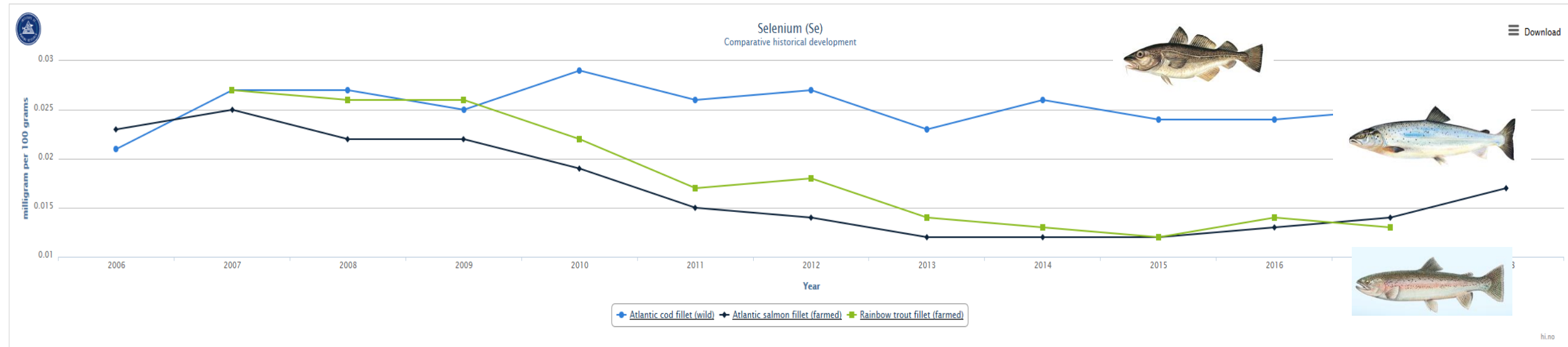


# Most recent average values





# Development



# Development of average values



2018, 62: 1291

DOI: <https://doi.org/10.29219/fnr.v62.1291>

ORIGINAL ARTICLE

## Iodine content of six fish species, Norwegian dairy products and hen's egg

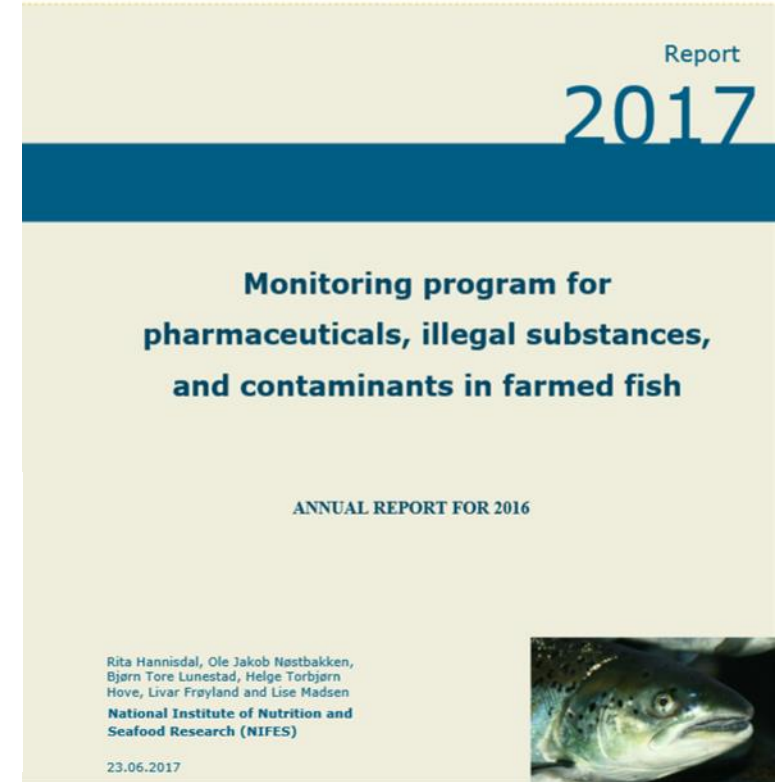
Ive Nerhus, Maria Wik Markhus, Bente M. Nilsen, Jannike Øyen, Amund Maage, Elisabeth Rasmussen Ødegård, Lisa Kolden Midtbø, Sylvia Frantzen, Tanja Kögel, Ingvild Eide Graff, Øyvind Lie, Lisbeth Dahl\* and Marian Kjelleevold

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### **Nutrient composition in seafood products available for Norwegian consumers**

Inger Aakre<sup>a\*</sup>, Synnøve Næss<sup>a\*</sup>, Marian Kjelleevold<sup>a</sup>, Maria Wik Markhus<sup>a</sup>, Anita Røyneberg Alvheim<sup>a</sup>, Jorån Østerholt Dalane<sup>b</sup>, Ellen Kielland<sup>b</sup> and Lisbeth Dahl<sup>a\*\*</sup>

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# Thank you for your attention!



We'll continue our work on sampling, analyzing and give public access to seafood data



**Acknowledgement to colleagues at Food Security and Nutrition, and Seafood in Model Systems at the Institute of Marine Research**

Marian Kjellevold, Inger Aakre, Rita Hanisdal, Synnøve Næss, Astrid Elise Hasselberg, Anita Røyneberg Alvheim