

Ocean Health Index for northern Norway

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Contents

Chapter 1

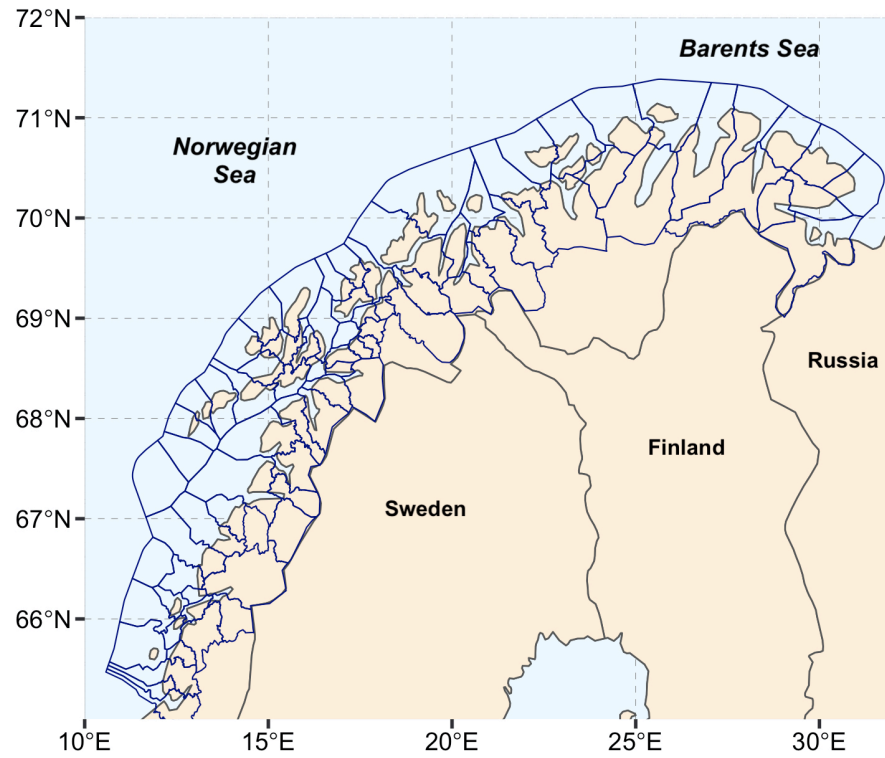
About the project



The growth in the blue economy is changing coastal ecosystems and communities in northern Norway. To guide ecosystem-based management, decision-makers need measures of ocean health and an analysis of how industrial development affects sustainability of the human-ocean interactions.

The Ocean Health Index for Northern Norway (Coastal barometer) proposes a set of sustainability indicators that are measuring the progress towards societal sustainability goals related to the coast, and evaluates the effect of coastal industries on these sustainability goals.

The study area of the project covers 81 coastal municipalities in northern Nor-



way:

To learn more about the project, please visit our [blog](#).

Chapter 2

Food provision goal

2.1 Aquaculture sub-goal

Aquaculture index measures sustainable production of farmed fish in northern Norway. The table below explains the structure of aquaculture goal: the components of the goal and the data layers used to estimate them.

Component of the goal	Data layers description	Temporal coverage	Data source
Production	Standing biomass of salmon and trout per municipality each month; amount of fish lost during the production	2005-2018	The Fisheries Directorate of Norway
Fish lost during production	Amount of fish died, escaped or lost due to other reasons during production each year	2005-2018	The Fisheries Directorate of Norway
Lice abundance	Average lice abundance at a farm, compared to thresholds abundance	2005-2018	Norwegian Marine Data Center, Bar-entwatch.no portal

Component of the goal	Data layers description	Temporal coverage	Data source
MOM B examinations	The category of environmental impact at a farm from very good (1) to very bad (4)	2005-2018	The Fisheries Directorate of Norway
Economic feed conversion ratio (eFCR)	Consumption of feed per municipality each year	2005-2015	The Fisheries Directorate of Norway

2.1.1 Estimating sustainable aquaculture

Aquaculture goal consists of two components: total production and sustainability indices. When both components are calculated, they are combined into the amount of aquaculture production (in tonnes or kg) produced sustainably.

Aquaculture production



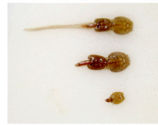
Salmon production



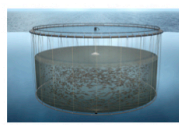
Trout production

Sustainability indicators :

Lice prevalence



MOM B investigations



Economic feed conversion ratio



Below is the description of each component of the aquaculture sub-goal.

Annual production We calculated total annual aquaculture production per municipality, as follows: $Tot.prod = \Delta Biomass + Harvest - Discard - Seeded smolts$

Biomass change and harvest were corrected for slaughter weight, by multiplying their weight by 0.88. The weight of smolts was assumed to be 100 gramms, and the weight of discarded salmon - $5 \times 0.88 = 4.4$ kg.

Where, $\Delta Biomass$ is the difference of standing biomass of fish in December of the given year minus December of the previous year, *Harvest* is biomass of fish harvested (kg); *Seeded smolts* is the biomass of smolts (kg), seeded for production at the beginning of the production cycle; *Discard* is the biomass of fish (kg) discarded at the slaughter plant, and *Removed* is the biomass of fish (kg) removed from the cages for slaughtering at another location or for other reasons

$\Delta Biomass$ is the difference between standing biomass of fish in Desember of a given year minus standing biomass in Desember of the previous year. When it was not possible to subtract standing biomass of the previous year, for instance, when there was no fish in the cages at the end of the previous year, we calculated the difference between earliest and latest month of the give year, when there were fish in the cages.

For some municipalities, the total annual aquaculture production was negative, due to underestimation of fish biomass. In these cases, the total production was set to a missing value (NA). These missing values were replaced with a nearest observed produciton (either of the previous or of the following year). Of the 81 coastal municipalities in Northern Norway, 10 did not have aquaculture in any of the studied years (1994 - 2018):

- Andoy
- Berlavag
- Hemnes
- Malselv
- Prosanger
- Rost
- Tana
- Vado
- Vaeroy
- Vardo

For code on estimation of aquaculture produciton, please see [here](#).

Economic feed conversion ratio (eFCR) Economic feed conversion ratio (eFCR) is the ratio of the amount of feed used during the produciton of fish, to the final biomass of fish released to the market (?).

$$eFCR = \frac{Feed\ used, kg}{Biomass\ produced, kg}$$

We calculated eFCR as a ratio of total feed used for production in a county (Norwegian “fylke”), to the total biomass of fish produced annually in the county. The total feed consumption and total biomass produced per region were calculated as a sum of feed consumption and produced biomass of all municipalities