THE NORWEGIAN SMALL SCALE FISHERY AND DATA PROVIDED FOR THE IHH FAO-DUKE-WORLDFISH PROJECT

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Det norske småskalafiskeriet og databidrag til FAO-Duke-WorldFish prosjekt

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Summary (English):

This report describes the Norwegian fisheries with a focus on Norwegian small-scale fishing (SSF), defined as fishing with vessels less than 15 meters within 12 nautical miles, and is part of the FAO-Duke-WorldFish project Illuminating Hidden Harvest (IHH). The report describes the Norwegian SSF and how the Norwegian data have been included in the IHH data sheets for the years 2013-2017. The same vessels in this fleet participate in different fisheries during the year in different areas and often with different fishing gear. The average age of the vessels in 2017 was about 23 years and the average crew on board the smallest vessels (<11m) was 1.6 people and on the larger vessels (11-14.99m) 2.7 people. Vessels that are not registered in the "Mark Register", but with permission to catch and sell fish worth NOK 50,000 per year, are referred to as NORFISHSUB009. Catch for own household without market value is referred to as NORFISHSUB999. In Norway, planned "catching and release" is prohibited, but permitted if the fish is undamaged and below the minimum size.

The Norwegian total annual SSF catch has been fairly stable, approximately 222,000-256,000 tonnes for 2013-2017 with an average of 233,391 tonnes, which is approximately 10% of the total catch in the Norwegian fisheries. The value of the SSF catch increased from NOK 2,064 million in 2013 to NOK 3,562 million in 2017, with an average of NOK 2,880 million which is approximately 18% of the value of the total Norwegian fishery. The large-scale industrial fishing with vessels over 15 meters is thus the dominant part of the Norwegian fishery both in volume and value.

The report describes Norwegian small-scale fishing both in terms of species composition, catch quantity and value, catch utilization, vessels, manning, gear and fuel consumption ("carbon footprint").

27.10.2022: Corrections: The word «extracted» has replaced the word “subtracted” several places in chapter 3.1.3, and a new sentence has been added in chapter 5.2 for clarification.

Summary (Norwegian):

Denne rapporten beskriver norske fiskerier med fokus på norsk småskala fiskeri (SSF), definert som fiske med fartøyer mindre enn 15 meter innenfor 12 nautiske mil, og er en del av FAO-studien Illuminating Hidden Harvest (IHH). Rapporten beskriver norsk SSF og hvordan de norske dataene har blitt inkludert i IHH-databladene for årene 2013-2017. De samme fartøyene i denne flåten deltar i forskjellige fiskerier i løpet av året i forskjellige områder og ofte med ulike fiskeredskaper. Gjennomsnittsalderen for fartøyene i 2017 var om lag 23 år og gjennomsnittlig mannskap om bord på de minste fartøyene (<11m) var 1,6 personer og på de større fartøyene (11-14,99m) 2,7 personer. Fartøyer som ikke er registrert i “Merkeregister”, men med tillatelse til å fange og selge fisk for en verdi av 50 000 NOK per år, er referert til som NORFISHSUB009. Fangst for egen husholdning uten markedsverdi omtales som NORFISHSUB999. I Norge er planlagt «fangst og utsetting» forbudt, men tillatt hvis fisken er uskadd og under minimumsstørrelse.

Den norske totale årlige SSF-fangsten har vært ganske stabil, ca 222 000-256 000 tonn for 2013-2017 med et gjennomsnitt på 233 391 tonn som er omtrent 10% av den totale fangsten i det norske fiskeriet. Verdien av SSF-fangsten økte fra 2064 millioner kroner i 2013 til 3562 millioner kroner i 2017, med et gjennomsnitt på 2880 millioner kroner som er omtrent 18% av verdien av det totale norske fiskeriet. Det industrielle storskala fiskeriet med fartøyer over 15 meter er den dominerende delen av det norske fiskeriet både i volum og verdi.

Rapporten beskriver det norske småskala-fisket både med hensyn til artssammensetning, fangstkvantum og -verdi, fangstanvendelse, fartøyer, bemanning, redskaper og drivstofforbruk ("miljø fotavtrykk").

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1 - Introduction

The present report covers the Norwegian small- and large-scale marine fisheries and is part of the FAO-Duke-WorldFish project Illuminating Hidden Harvest (IHH). In 2012 the World Bank, FAO and WorldFish completed a study entitled " HIDDEN HARVEST: The Global Contribution of Capture Fisheries (World Bank, 2012). This study provided essential information and estimates on the large role of small scale fisheries (SSF) within the world's fisheries. However, many of the potential role of socio-economic contributions from these fisheries still remain underappreciated in helping to end poverty and hunger toward achieving the first two Sustainable Development Goals. Thereby leading to insufficient attention and support from policy makers for implementation of the SSF Guidelines. For this reason, FAO, WorldFish and Duke University collaborate on a new global study entitled "Illuminating Hidden Harvests (IHH). The Contribution of Small-Scale Fisheries to Sustainable Development" that aims to help fill this gap, and particularly to highlight the role that SSF could play in achieving the Sustainable Development Goals.

The new global study aims to investigate the social, environmental, economic and governance contributions of SSFs at local and global scales. The study will apply different methods to leverage local and global data to provide a broader perspective than what is currently available about the contributions and impacts of SSF to sustainable development. The study is based on three levels:

- To provide the most accurate description to date of the SSF sector at country level for the years 2013-2017.
- To leverage global datasets by correcting for misreporting and/or applying ratio estimates to disaggregate contributions from SSF and large-scale fisheries (LSF).
- To develop and document a methodology to assess the contribution and impacts of small-scale fisheries to sustainable development that is suitable for each country's context and data availability.

Norway was not a part of the 2012 study. The present report describes how Norway defines its SSF and how the Norwegian data have been collected and adapted to be included in the IHH datasheets for the years 2013-2017. The Norwegian SSF is described both in terms of species composition, catch quantity and value, catch utilization, vessels, manning, gear and fuel consumption ("carbon footprint").

2 - Definitions and fisheries

The definitions of the Small-Scale Fisheries (SSF) and Large-Scale Fisheries (LSF) in this report are:

SSF:

a. fishing vessels registered in the “Merkeregister” (The Norwegian Fishing Vessels Register/Register over merkepliktige norske fiskefartøy) participating in the Norwegian SSF with length overall (LOA) below 15-meter and fishing within the Norwegian 12. nautical miles zone.
b. The fishery is carried out in the Norwegian fjords and along the coast that stretches from the Swedish border in the south to the Russian border in the north covering parts of Skagerrak, the North Sea, the Norwegian Sea and the Barents Sea. The straight coastline is 26 700 km long and 83 300 km including the fjords and islands. The same vessels in this fleet take part in different fisheries during the year in different areas and often with other specific fishing gears. The average age of the vessels in 2017 was about 23 years and the average crew on board the smallest vessels (<11m) was 1.6 persons and on the larger vessels (11-14.99m) 2.7 persons.
c. fishing vessels with a registered number, but expired at the last day of fishing, below 15- meter LOA and fishing inside 12. nautical miles zone.
d. fishing vessels not registered in the “Merkeregister” but with a license to only fish with beach seines, vessels not registered in the “Merkeregister” but with the permit to catch and sell fish for a value of 50 000 NOK per year, fishing within the Norwegian 12 nautical miles zone and referred to as NORFISHSUB009 in IHH-sheet *1_ENV_catch_SSF* (for IHH sheets see section 3.1).
e. Listed in IHH-sheet *1_ENV_catch_SSF* , but not included as part of SSF in the sheet *2_ENV_ catch LSF* , is the recreational fishing, that contribute significantly to the household supply. In Norway, planned fishing by “catch and release” is forbidden, but allowed if the fish is unhurt and below minimum size. Catch for household with no marked value is referred to as NORFISHSUB999.

Henriksen (2014) describes the Norwegian SSF fleet and fishery based on data and information from the Norwegian Directorate of Fisheries. The fleet is divided in three groups: <11m and 11-15m (as our definition) and 15-21m. Nedreaas et.al (2015, 2016) give a brief summary of the Norwegian fishery to the Sea Around Us project (www.seaaroundus.org).

All catches have to be sold through the sales organisation that has a regional sale’s monopoly and the right to grant permission for where to sell/land the catch in Norway or in a foreign country. All landings both in Norway and abroad have to be reported to and registered through the sale’s organisation and the Directorate of Fisheries. Cooperation between Norway and European countries with exchange of information on landings, gives a valuable control, conducted by the Directorate of Fisheries.

LSF:

a. all vessels registered in the “Merkeregister” above 15-meter LOA, fishing both outside and inside of 12 nautical miles.
b. all vessels below 15-meter LOA, fishing outside 12 nautical miles. However, there are only few vessels/occations of this kind and are therefore included in other SSF data.

The SSF fleet is certified to fish everywhere except beyond legal distance from coast (due to safety) and in protected areas. The LSF fleet has no such outer limits. However, they are limited by so called *fjordliner* north of 62 º . *Fjordliner* are outer limits of coastal areas where fisheries are limited or closed. The LSF fleet can use trawls and purse seines outside 12 nm, but in some areas and seasons they are allowed to fish with such gears into 4 nm if bycatch of undersized and protected species are kept below limits. For more details, we refer to the official Norwegian regulations (Forskrift om utøvelse av fiske i sjøen, see www.lovdata.no).

The Norwegian LSF fleet are mostly active in the ICES (International Council for the Exploration of the Sea) and the NAFO (North Atlantic Fisheries Organization) areas, but also in the CCAMLR (Commission for the Conservation of the Antarctic Marine Living Resources) area, and occasionally in joint ventures in other areas.

2.1 - The Norwegian Small Scale Fishery (SSF)

The only part of the Norwegian fishery that is so called hidden harvest is the recreational fisheries which do not enter into the market. This fishery, named NORFISHSUB99 in the Norwegian IHH study, is carried out by vessels/persons fishing for household supply for private consumption. A catch and release fishery might be part of hidden harvest, but this is so far forbidden in Norway. All other fisheries are regulated and included in the official Norwegian statistics.

The present study does not include the inland fishery that is managed by a different ministry and directorate. However, the catches are negligible. There are no official catch statistics from this fishery, but catches are estimated at 8 000-10 000 tons per year (Anon, 2010).

The SSF fleet totally outnumber the LSF fleet. At present about 5 000 vessels take part in the Norwegian SSF, and that is only 1/5 of the vessels participating in 1980 (Figure 1).

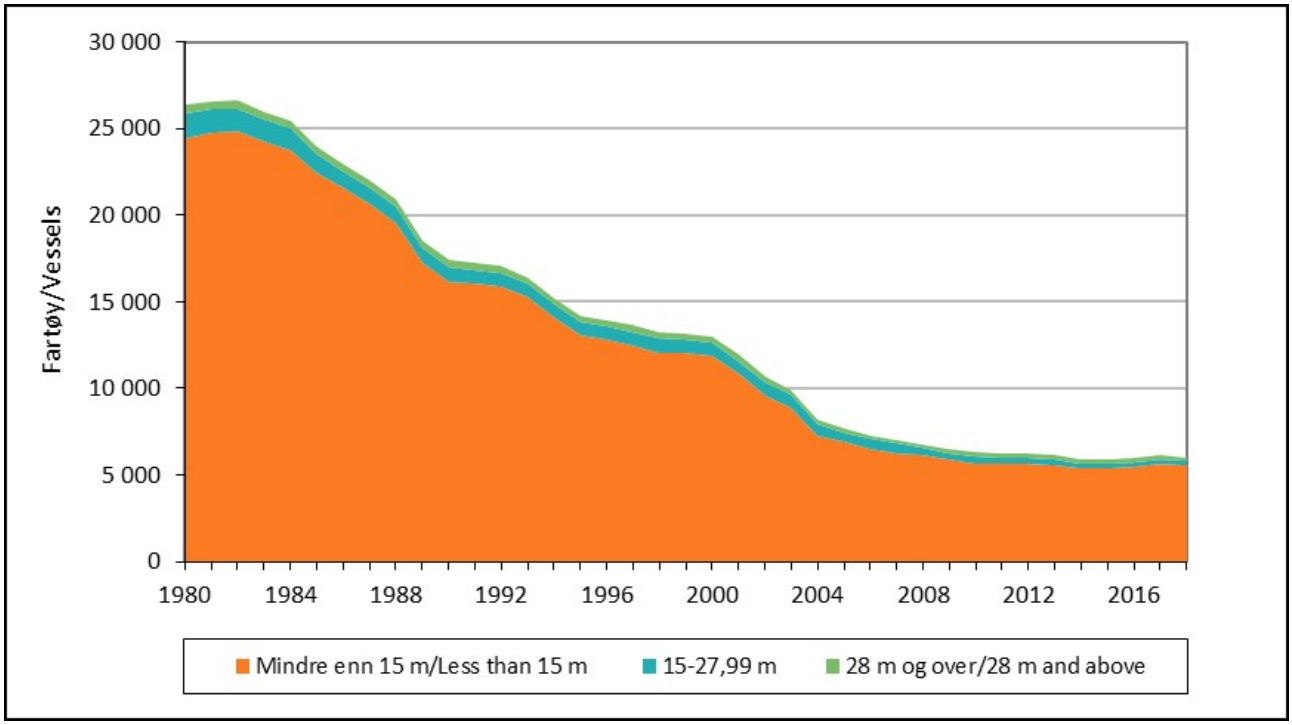

Figure 1. Number of Norwegian fishing vessels by length group (1980-2018).

The development of the total engine power of the different Norwegian fleet segments are given in Figure 2.

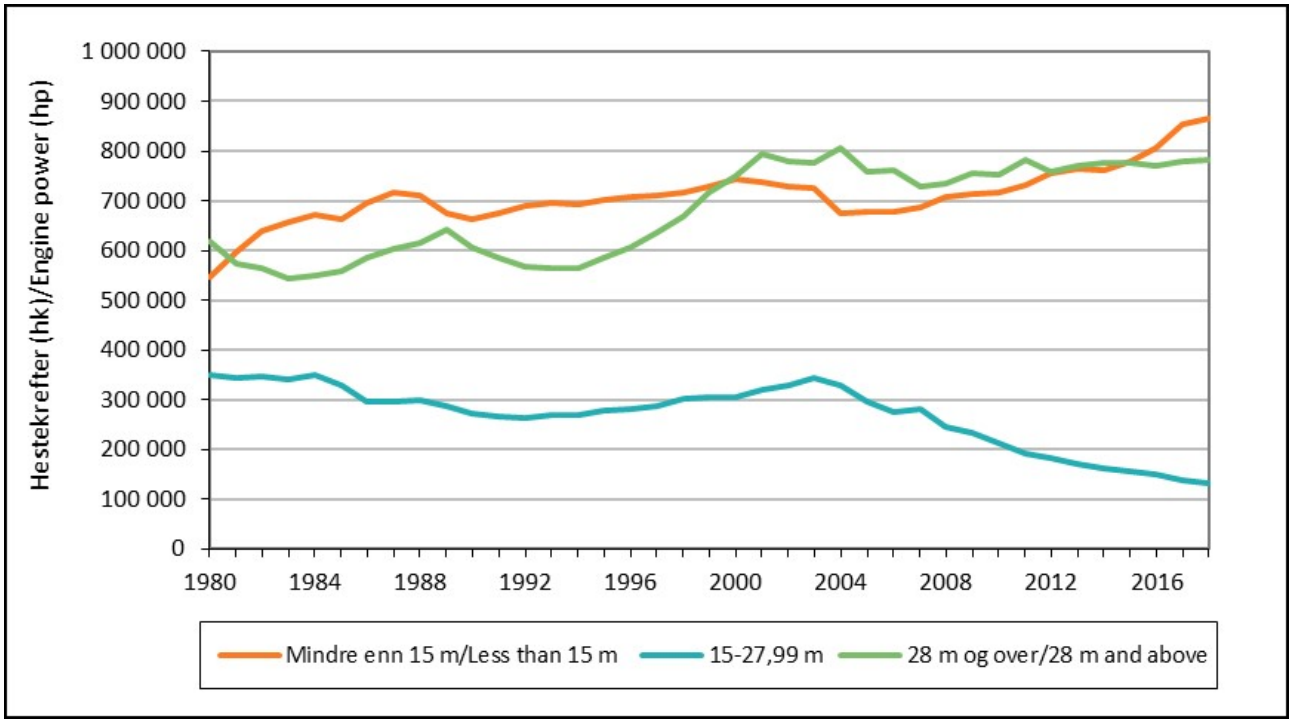

Figure 2 . Total engine power (hp) by vessel length group (1980-2018).

The IHH requirements to convert information from stocks to FAO species codes, eliminates the possibility to elaborate information on stocks level, necessary to understand the Norwegian fishery management system. The management regulates the important fisheries according to stocks and if possible fishery data are also collected by stock. The Norwegian SSF exploits and lands about 70 different species. The same species can belong to different stocks that are managed individually by the Norwegian Directorate of Fisheries/Ministry of Fisheries. As an illustration, the FAO-code COD and HER represents fisheries in Norway that takes place on more than one stock:

- *COD* : The North-East Artic Cod stock, defined as mostly located north of 62°N is of very high importance to the small-scale fisheries. This stock is in healthy condition. But the SSF fleet also catches cod from the North Sea- and the Coastal stocks, both in more serious conditions.
- *HER:* The Norwegian Spring-spawning herring, North Sea herring, Western Baltic herring and local fjord stocks.

The total yearly SSF catch has been quite stable, about 222 000-256 000 tons for 2013-2017 (Table 1 and Figure 3) with an average of 233 391 tons which is about 10% of the total catch in the Norwegian fisheries. The value of the SSF catch increased from 2064 mill NOK in 2013 to 3562 mill NOK in 2017, with an average of 2880 mill NOK which is about 18% of the value of the total Norwegian fishery. The LSF fishery is the dominant part of the Norwegian fishery both in volume and value (Figure 3).

Table 1. Average catch (2013-2017) and average values (NOK) for the most important species in the SSF fishery and their relative importance to the total Norwegian fishery (SSF+LSF).

			SSF % of total Norwegian	
	SSF		fishery (SSF+LSF)	
	Tons	Mill NOK	Catch	Value
Cod	129552	1394.6	5.8	8.6
Herring	22758	114 .9	1.0	0.7
Saithe	21142	155.8	0.9	1.0

Haddock	16116	143.4	0.7	0.9
Mackerel	12286	82.5	0.5	0.5
Crustaceans	7120	284.4	0.3	1.7
Shrimp	3592	174.3	0.2	1.1
Other fish	20826	529.7	0.9	3.3
Total	233391	2879.7	10.4	17.7

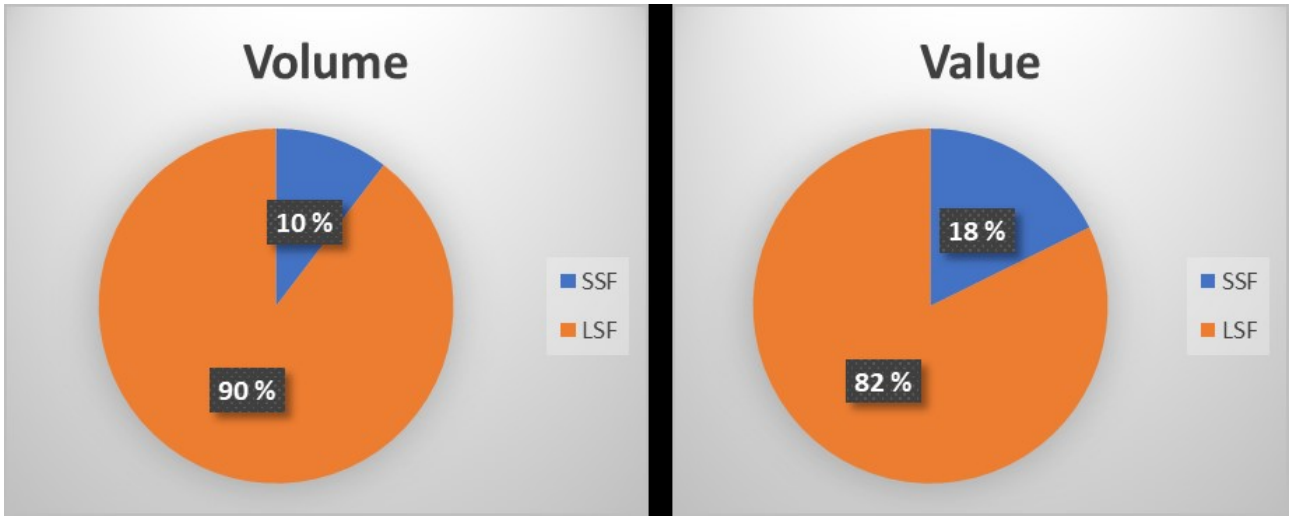

Figure 3 . The average volume (left) and value (right) of the small-scale fisheries (SSF) versus the large-scale fisheries (LSF) in the period 2013-2017.

The cod dominates the SSF fishery accounting for 5.8% of quantum and 8.6% of the value of the total Norwegian fishery. The SSF fleet catch on average 29.5% of the Norwegian catch of cod.

Herring is the second most important species in the Norwegian SSF and LSF fisheries. Cod and herring complement each other when it comes to nutrient content (Table 2). Herring is an oily species and thus a good source of the fatty soluble vitamins A and D, and the very long-chained polyunsaturated fatty acid docosahexaenoic acid (DHA). Cod is regarded a lean fish and a good source to iodine. All species are valuable sources of highly bioavailable proteins.

Table 2. Nutrient content (edible part, wet weight) in the seven most important species in the Norwegian small-scale fisheries (SSF). Values given as mg/100 g for all nutrients except proteins which are given as g/100 g.

Species	Latin name	Protein (crude)	Total fat	Vitamin A1	Vitamin D3	Vitamin B12	Calcium	Iron	Iodine	Zinc	DHA*
Cod	*Gadus morhua*	17.8	1.10	0.0051	< LoQ	1.01	ND	0.11	0.190	0.37	211
Herring	*Clupea harengus*	17.8	12.5	0.038	0.028	12.0	ND	1.0	0.017	0.66	688
Saithe	*Pollachius virens*	19.4	1.40	0.018	< LoQ	3.44	ND	0.36	0.790	0.45	307
Mackerel	*Scomber scombrus*	16.9	17.6	0.010	0.004	9.90	ND	0.84	0.019	0.57	2030
Edible crab	*Cancer pagurus*	15.2	0.97	ND	<LoQ	4.60	ND	0.35	0.11	7.60	51.5
Red king crab	*Paralithodes camtschaticus*	16.0	1.50	<LoQ	<LoQ	5.65	110	0.40	0.058	3.80	108
Shrimps	*Pandalus borealis*	23.2	2.00	<LoQ	<LoQ	3.26	ND	0.49	0.031	1.40	167

* Docosahexaenoic acid (very long-chained polyunsaturated fatty acid)
LOQ: Limit of quantification; ND: no data. Data retrieved from https://sjomatdata.hi.no/#search/

The average numbers of fishing days per vessel for the SSF fleet decreased from 150 days in 2013 to 108 days in 2017, while the daily fuel (diesel) consumption for the SSF fleet almost doubled from 106 400 liters to 207 200 liters in the same period.

Since the SSF is carried out by a variety of vessels with different gears on several species it is problematic to calculate a robust overall catch per unit effort (CPUE; Annex 2). Catch per liter diesel consumed by the conventional Norwegian SSF fleet is therefore probably a better proxy for CPUE than catch per fishing time unit (see Table 1 in ANNEX 2). The LSF CPUE for 2013-2017 varied between 4.2 and 5.2 kg/liter fuel, while the SSF catch per liter fuel was about 2-3 times higher and was reduced by about 30% from 2013 to 2017, from 14.4 kg/liter to 10.1 kg/liter (ANNEX 2).

The annual footprint defined as emission of CO_2 for the SSF increased from 41 500 tons in 2013 to about 58 200 tons in 2017. The average annual footprint for the LSF was about 20 times higher than for the average annual SSF footprint and increased from 970 000 tons in 2013 to 1 172 000 tons in 2017 (ANNEX 2).

Scientists in ICES evaluate the stocks and give advice on the fishing pressure (fishing mortality) on different stocks. These advices are important and basic parts of governmental fishery management of regulations and their implementation. Most of the stocks caught by the Norwegian SSF are evaluated by ICES. Of the Norwegian SSF catches in 2017 were:

- 93.4% of the catch were from stocks evaluated as sustainable.
- 6% from stocks not evaluated.
- 0.6% from stocks evaluated as not sustainable.

About 90% of the Norwegian SSF are regulated by quotas and the rest by other regulations as minimum/maximum legal landing size, open/closed areas or seasons, by-catch and discard bans etc. by Norwegian authorities (ANNEX 1, and Gullestad et al. 2017).

2.2 - The Norwegian Subsistence Fishery

In the IHH project the subsistence fishery in Norway has been splitted in one commercial part entering the public market (NORFISHSUB009 or Subsistence Type 1) and one part including the Norwegians' own household fish (NORFISHSUB999 or Subsistence Type 2). The first part is included in the *1_ENV_catch_SSF* , *2_ENV_catc* h_ *LSF* and the *3_ENV_Catch_use* spread sheets. The latter part is only shown as fishing unit NORFISHSUB999 in the spread sheet *1_ENV_catch_SSF* .

A private Norwegian citizen, a vessel with several fishers, or a non-commercial event (like fishing competitions) are allowed to sell fish for up to NOK 50 000 per calendar year. North of 62 ° N, these fishers can fish and land a maximum of 2 000 kg of cod (round fish) for sale per calendar year. South of 62 ° N, they can fish and land a maximum of 1 000 kg of cod (round fish) for sale per calendar year.

Currently, the only survey of marine household fishing by Norwegian (i.e., subsistence fishery) was conducted in 2003 by Hallenstvedt and Wulff (2004). A representative sample of the Norwegian population over 15 years of age were interviewed and asked to give catch per trip and total annual catch by species. In this survey, 43% reported that they had fished in the sea last year, or about 1.5 million people nation-wide.

Data from Hallenstvedt and Wulff (2004) show that the Norwegian population caught approximately 48 000 tons in 2003 for personal-, family- and household-consumption. The eastern, western and central Norway regions caught approximately 10 000 tons each, in total 30 000 tons, while in northern Norway the catch was estimated at 18 000 tons.

All catches delivered to sales organizations by private Norwegian citizens not registered as commercial fishermen, are included in the officially reported landings statistics of the commercial fishery with a particular statistical code. These reported catches, amounted to 3 320 tons in 2002 and have to be subtracted from Hallenstvedt and Wulff’s estimate. This then gives approximately 45 000 tons in 2003 (all species) for non-commercial personal-, family- and household-

consumption.

In Norway, each commercial fisher has the right to take home so called cooking fish for their own household consumption. This fish is not reported, and hence a hidden harvest. The value of fish from their own catch taken out privately is taxable income. Each commercial fisher is taxed with NOK 1 500 (2017) per household member. Based on responses from coastal fishermen, it seems that 100 kg per fisherman per year can be a representative figure. For the 4 360 vessels less than 11 meters with on average 1.5 fishers, this amounts to 654 tons, and likewise for the 642 vessels between 11-15 meters with on average 2 fishers on board, this amounts to 128 tons. We have hence rounded up the amount of cooking fish for the SSF to be 1 000 tons per year.

The not traded part of the Norwegian subsistence fishery, i.e. the real subsistence fishery, has in this project been set to 46 000 tons per year, including 1 000 tons "take home" fish by commercial fishers, hereof approximately 23 000 tons cod, 8 500 tons saithe, 8 500 tons mackerel and 6 000 tons others. This subsistence fishery will have impact on the Norwegian citizens' purchase of fish in the market. These catches are not included in Table 1.

The vessels participating in the subsistence fishery are not licensed or registered in the fishing vessel register. The number of vessels in the Subsistence Type 1 fishery in 2017 was, according to the voluntary small vessel register, 1 800 which was 90% more than in 2013. The number of vessels in the first years of the time series are probably underestimated due to lack of vessel registered in the voluntary vessel register.

3 - Methodology to adapt Norwegian data to the IHH files

The Norwegian IHH files (EXCEL sheets) are stored in both the FAO/Duke/WorldFish- and IMR data banks. These data sheets can be made available upon request to IHH-Small-Scale-Fisheries@fao.org , one of the co-authors or *postjournal@hi.no*.

Customized SQL scripts were written for each task and run on the Directorrate of Fisheries' databases. Further information on definitions are given for each variable below.

All information is related to marine water including fjords. Harvests of seaweeds are not included.

The Norwegian marine SSF and LSF data have been filled in/converted to the IHH-format accordingly:

- We have retrieved and adapted data available from the Norwegian Directorate of Fisheries, the Institute of Marine Research and data directly available in web sites of relevant institutions.
- If data were not directly applicable, we have used proxies when we found it possible and relevant.
- Where this has not been possible, we consider the work too extensive to collect and adapt the data and it might also involve new research and thereby outside the present scope of the IHH study. In thesecases and when no data exist we have used ND.
- Our data only includes fisheries carried out by vessels (including beach seines) and fishers fishing. Subsistence fisheries Type 2 includes fishing from land.
- The subsistence fishery in Norway is composed of one commercial part entering the public market (denoted as Subsistence Type 1) and one part including Norwegian's own household (denoted as Subsistence Type 2).
- Recreational catches by Norwegian citizens and foreign tourists are not included in this study.
- The report includes 6 ANNEXES.

For the demersal fisheries the areas are divided according to north and south of the 62-degree latitude. This is useful for some of the species but do not for all. We have also given Fishing Unit name and areas name to illustrate different fisheries along the coast where the regional dimensions are important. The Fishing Units also takes into consideration four different gear groups.

3.1 - The Norwegian IHH-files

3.1.1 - Environmental

- *Species, landed catch, live weight equivalent catch (nominal catch) and conversion factors* The species and catch information in ENVIRONMENTAL are extracted from a database at the Norwegian Directorate of Fisheries. This database contains the basis for producing the official Norwegian fisheries statistics, published through Statistics Norway.
- Information on species are collected from the database at the Directorate of Fisheries. Each first-hand sales note is registered upon landing and sale and submitted electronically to the sales organisation with the geographic/ species monopoly covering the landing place. The fisheries statistics is based on live weight directly or by calculate live weight from product landed applying conversion factors.
- The conversion factors for the most important shared stocks north of 62°N, are established through a cooperation program between Norway and Russia.
- A list of conversion factors for the most important stocks are published on the web-site of the Directorate of Fisheries (https://www.fiskeridir.no/Yrkesfiske/Statistikk-yrkesfiske/Omregningsfaktorer).
- The established average conversion factors are based on data-collection from representative areas and seasons and gears. In relation to SSF catch, large part of the catch of cod takes place in the spawning season north of 62°N. The use of average conversion factors could therefor slightly underestimate the catch of cod for the SSF fleet defined in

NORFISHDEM112.

- The FAO species code PEL, GRO, CRU are used as explained in ANNEX 3.
- A list of all species specified on year, vessel length groups, horsepower groups, intended use groups and FAO species gives more than 16 700 records and therefore have to be grouped.

Sheet *1_ENV_catch_SSF* and Sheet *1_ENV_catch_log* **:**

3.1.2 - Fishing Unit Unique ID

One of the characteristics of Norwegian fishery is the high degree of flexibility in the use of different types of gear and targeting different species by the same vessels, especially for the SSF fleet but also for the LSF fleet. Therefore one vessel most likely will by present within more than one Fishing Unit group. The number of vessels in sheet *1_ENV_catch_SSF* will therefore not be unique and are not included for each fishing unit-ID but presented for length groups less than 11m and 11-14.99m.

The Norwegian Profitability study classifies each vessel in the study uniquely into one defined group. This will be too time consuming to do in this study. To exemplify the large flexibility of the fleet, the vessels classified in the study as below 11 meter , using conventional gear (i.e. passive gear and Danish seine) targeting cod, wrasses, king crab, haddock, prawns, Greenland halibut, pollock, halibut, herring, edible crab, and a lot of other species, listed according to value, with cod as the most important.

For the vessels between 11 and 14,99 meters, using conventional gear, targeted species are cod, prawns, herring, pollock, haddock, Greenland halibut, mackerel, ling, king crab, halibut and other species.

This illustrates the mixture of target species, using different gears and fishing for both demersal, pelagic and crustacean species by one vessel. This flexibility maintains the possibility to have a steady income, even in times where quotas on one species are reduced.

The Fishing Unit Unique ID also partly illustrate some important regulation aspects for different stocks. In Norway, the regulations are most often by stocks. Since FAO fish codes does not take stocks into consideration, the north/south division on demersal species, are the closest approximation.

3.1.3 - Taxonomic resolution

The Norwegian SSF fleet exploits 69 different species. It was impossible to treat all of them individually. The most important species both in tonnages and values are treated individually, but the others are treated in different taxonomic groups. These might be slightly different form year to year since some of the group's species were not caught every year.

The SSF fisheries is divided into ten groups, with an additional group added for information:

The Norwegian management for fish species focus on both stock, gear used and vessels quotas are partly distributed according to vessel-size groups for the small scale fisheries.

The definitions of the Norwegian Fishing Units Unique ID are based on fishing groups, area, gears and target species :

- The Unique code begins with NORFISH according to IHH.
- Most important species group are then presented as PEL=pelagic, DEM=demersal, CRU= crustaceans, OTH= species not included in the previous, SUB=subsistence.
- Of the three last digits the first illustrates the regulation along the coast, where stocks often differ between north and south of 62 ^{o} N. (0= no division of the coast, 1= north of 62 ^{o} N, and 2= south of 62 ^{o} N and 9=not specified).
- The second digit refers to the gear groups (1= passive gears, 2= active gears, 3= seines, 4= others not included in the previous groups, 9=not specified). The gear groups with reference to FAO's ISSCFG-codes are listed in NOR Attachment on Gear Description.

- The third digit number refers to most important target species groups (1=Pelagic, 2= demersal, 3= crustaceans, 4= other target groups and 9=not specified).

NORFISHPEL001 : Vessels that primarily target pelagic species, with different types of gear. Small quantities of other types of species as bycatch. Information extracted from database at the Directorate of Fisheries.

NORFISHDEM022 : Vessels that primarily target demersal species with active types of gear. Small quantities of other types of species as bycatch. Information extracted from database at the Directorate of Fisheries.

NORFISHDEM112 : Vessels that primarily target demersal species with passive type of gear, fishing north of 62 degree north. Small quantities of other types of species as bycatch. Information extracted from database at the Directorate of Fisheries.

NORFISHDEM212 : Vessels that primarily target demersal species with passive type of gear, fishing south of 62 degree north. Small quantities of other types of species as bycatch. Information extracted from database at the Directorate of Fisheries.

NORFISHDEM032 : Vessels that primarily target demersal species with seines. The use of seines on demersal species are strictly regulated. Information extracted from database at the Directorate of Fisheries.

NORFISHCRU013 : Vessels that primarily target crustacean etc. with the use of passive gear. Small quantities of other types of species as bycatch. Information extracted from database at the Directorate of Fisheries.

NORFISHCRU023 : Vessels that primarily target crustacean etc. with the use of active gear. Small quantities of other types of species as bycatch. Information extracted from database at the Directorate of Fisheries.

NORFISHCRU043 : Vessels that primarily target crustacean etc. with the use of miscellaneous type of gears. Small quantities of other types of species as bycatch. Information extracted from database at the Directorate of Fisheries.

NORFISHOTH999 : Vessels fishing with miscellaneous type of gear, targeting demersal species and other type of species. Information extracted from database at the Directorate of Fisheries.

NORFISHSUB009 : Vessels fishing for miscellaneous types of species with passive gear. Information subtracted from database at the Directorate of Fisheries. Vessels/persons fishing as a source of additional income, limited to 50 000 NOK per year. Information extracted from database at the Directorate of Fisheries.

NORFISHSUB999 : Vessels/person fishing for household supply of fish. This is in Norway called recreational fisheries, and do not enter into the marked. Recreational fisheries are for private consumption, since catch and release is forbidden. Information is based on research conducted in 2003 and the catch is estimated. Not included in worksheet *2_ENV_catch_LSF* and 3_ENV_catch_use but included in 1_ENV_catch_SSF. We have no proper species resolution to do this, and there are only data for 2003. FAO may however include this in 2_ENV_catch_LSF and 3_ENV_catch_use. New research to achieve better estimates of fish fished for own households by residents in Norway has been conducted since 2019, but results have hitherto not been published.

3.1.4 - Number of vessels

According to our definition there are 5004 registered SSF vessels, and several of these conduct mixed fisheries with different target species and gears. The criteria of unique counting of vessels in sheet *1_ENV_catch_SSF* is hence not possible to accommodate. However, some more information is given in sheet 7 *_ENV_effort_SS* F.

To illustrate the problem, we have created rows with information on numbers of vessels participation in each Fishing Unit ID, but this will sum to a much higher number than the actual vessels defined as SSF, because of the multipurpose vessels, crossing the unique definitions.

Unique groupings are done in a profitability survey with vessels defined as “full-time” fishing vessels. The criteria in this

study are defined as first-hand value of the landings above a given level, depending of the size of the vessel, and landing registered in minimum 25 weeks, with some exceptions, and addition classification according to licences. (Profitability survey on the Norwegian fishing fleet, (https://fiskeridir.no/Yrkesfiske/Statistikk-yrkesfiske/Statistiske-publikasjoner/Loennsomhets-undersoekelse-for-fiskefartoey).

3.1.5 - Species, landed catch, live weight equivalent catch (nominal catch) and conversion factors

The species and catch information in ENVIRONMENTAL are extracted from a database at the Norwegian Directorate of Fisheries. This database contains the basis for producing the official Norwegian fisheries statistics, published through Statistics Norway.

Information on species are collected from the database at the Directorate of Fisheries. Each first-hand sales note is registered upon landing and sale and submitted electronically to the sales organisation with the geographic/ species monopoly covering the landing place. The information is then forwarded electronically to the database at the Directorate of Fisheries for consistence control against other sources. The species classification is done by both the fishermen and buyer, and both must verify the information in the first-hand sales document by signature.

The sales notes also contain information with product description and the product weight upon landing. Each sales note is submitted to the Directorate of Fisheries as an XML-document. When updated in the database at the Directorate of Fisheries, the landed weight is calculated to live weight equivalent (nominal weight) by using measured average conversion factors.

The conversion factors for the most important shared stocks north of 62ºN, are established through a cooperation in a measurement program between Norway and Russia. The conversion factors are collected and calculated using the established agreed method between Norway and Russia.

The receivers of fish have asked for codes for 77 different types of products, needed for a correct registration of landed fish products. Some of the products are “by-products” such as liver and roe, guts etc. that have a value, but the weight is already included in the conversion factor, and therefore gives a zero live weight in the tables. A list of conversion factors for the most important stocks are published on the web-site of the Directorate of Fisheries (https://www.fiskeridir.no/Yrkesfiske/Statistikk-yrkesfiske/Omregningsfaktorer).

The established conversion factors are measured both onboard vessels, and on land, in a designed survey, when receiving whole fish from vessels.

The established average conversion factors are based on data-collection from representative areas and seasons and gears. In relation to SSF catch, large part of the catch of cod takes place in the spawning season north of 62ºN. The use of average all-seasons conversion factors could therefore slightly underestimate the catch of cod for the SSF fleet defined in NORFISHDEM112.

The FAO species code PEL, GRO, CRU are used as explained in ANNEX 3.

A list of all species specified by year, vessel length groups, horsepower groups, intended use groups and FAO species gives more than 16700 records and therefore have to be grouped.

3.1.6 - Value

Price and total value for each species, and product type on the sale-note (one line per product on the sales note) are registered before any taxes etc are calculated, except the fee to the sales organisation. The value expresses the first-hand value paid to the fishermen. In the table the value is given in NOK and in running prices. Value of all landed “by-products” are included.

Since the first-hand value are given exactly, there are no need to give the price for the diversity of different product landed. Actual value and nominal catch give the best information, without any additional calculations.

An average conversion from NOK to US$ for the year 2013 to 2017, could be calculated using the following currency rates NOK 5.87, 6.30, 8.07, 8.39, 8.26, respectively, for 1 US$. Source of information based on figures from “Norges Bank”.

In addition, a standardized comparison of values over time should be corrected for consumer price index. With year 2015 as 100, the consumer price index is 96.2 in 2013, 98.0 in 2014, 100.0 in 2015, 103.9 in 2016 and 105.8 in 2017. The source of information is Norway Statistics (https://www.ssb.no/).

We leave these calculations to IHH, FAO, to secure a standardized method.

The explanation for the "negative price" in the Norwegian data in *sheet 1_ENV_catch_SSF* is due to the underlying documents when trading fish in Norway. It is illegal for a fisher to sell fish if the quantities exceed the given quota for the fisher. It is also illegal to sell quota-regulated species if the fisher has not been assigned a quota.

The data from Norway are extracted from the database containing all transactions (each sales document) between the fishers and the buyers, handled by the sales organizations. The payment for the catch goes from the buyer to the sales organization and from the sales organization to the fisher.

The sales organizations have the duty to control the transactions, both the quantities of fish for each species and the price.

- If the control is conducted after the payment has already been done to the fisher, the value is withdrawn from the fisher’s account. In these cases, the value will be negative in the database and in the reported data.

In these cases, the information is reported with actual catch, but with negative value.

- If the control is conducted before the payment to the fisher, the payment will be stopped, and the payment will be zero (0.00).

Furthermore, the “CATCH EX-VESSEL PRICE (per tons)” is the price paid to the fisherman, i.e. the first-hand sales price. If later controls discover that a fisher have caught and delivered more fish than he had the right to do, he may subsequently have to pay back to the buyer, and therefore negative money values. In the other worksheets these data are more aggregated, and the negative values will hence not be visible but incorporated/subtracted.

Note that all values (money) statistics delivered to FAO in this project have been first-hand sales values, and not market values. Any fish caught unintended beyond the fisherman’s rights/quotas, and which the fisherman don’t get paid for, can the first-hand buyer sell further for full price.

3.1.7 - Gear

Information on gear is collected from the database of the sales note system, where the fishermen describe the gear used for each trip. For the SSF fleet in some cases more than one gear could have been used for one trip. 41 specific types of gear have been defined in total, but not all are relevant for SSF. The definition in passive, active, seins and other gears in relation to FAO gear codes, are given in an ANNEX 4.

Data about life span of fishing gears are given by Sundt et.al. (2018, Table 11).

3.1.8 - Overall vessel length and engine information

Information on vessel length overall and horsepower are extracted from the Register of fishing vessels. A vessel might change length within one year. In this study, we have used actual length, not the length at 31th of December.

All fishing vessels in both the Fishing vessels register and the Sales note register are assigned a unique identification number, i.e, a virtual “hull number” within the database.

The information from the Register of fishing vessels have been linked to the Sales note register, and these combined

registers have been used in these tables.

Vessels not in the Fishing vessel register but only in the Catch register will lack information on length and horsepower.

3.1.9 - Number of crew members per vessel, and the fishermen register

The only information available about people on board vessels had to be derived from the yearly profitability surveys on "full-time" vessels, using conventional gear fishing for demersal species. Despite this is not an accurate figure for each Fishing Unit group, it is the best available data and is probable acceptable close to target.

The register of fishermen is established to secure social benefits for the fishermen. It is a register on individuals, identified with the personal number given at birth. This number gives date of birth and a gender code, and the number is not public. When registered as a fisher, the person is classified according to the intended income as full-time or part-time fisher. This register can be combined with the Fishing vessels owner register. In many cases the fishing regulations require a full-time skipper on the vessel. There is no information about employment on given fishing vessels. This means that the data cannot be used for classifying gender or crew separately for the SSF and LSF fleets.

3.1.10 - Ecosystem

The Ecosystem is defined as COAST since the fishery is taken place in coastal- (inside 12 n mile) and fjord areas.

Sheet 2_ENV_catch_LSF

Some species is only caught by the LSF vessels, and other species are only caught by the SSF vessels. To illustrate this, we have included all species caught by the fleets. The quantities are given in tons nominal catch and value in NOK. Additional comments were given in connection with sheet *1_ENV_catch_SSF* .

The quantities in sheet *2_ENV_catch_LSF* , the catch for the SSF fleet, is the same as in *1_ENV_catch_SSF* , but without the estimated quantities of group NORFISHSUB999.

Relevant information for the SSF and LSF is extracted from the database at the Directorate of Fisheries.

Sheet *3_ENV_catch_use*

3.1.11 - Intended use

The sales note system gives information of the buyer's intended use on time of landing, but this intention could be altered.

3.1.12 - Domestic consumption

The information on domestic consumption is based on a household survey on consumption of fish. The national consumption of farmed salmon is high but not included in this study.

Data from the survey is only available through secondary sources and we do not know the proportion of fish from recreational fishing compared to the commercial fishing fleet. In this sheet the catch is derived from commercial data.

We have assumed that all subsistence catches are consumed domestically.

3.1.13 - Domestic non-consumption

There is explicit information about domestic use of fish landed for bait.

3.1.14 - Export

The exported quantities have been calculated from total catch of the SSF fleet including subsistence fisheries, but without recreational fisheries, and with the subtraction of domestic human and non-human consumption.

Norway is a major exporter of fish. For the wild marine fish, conventional products like dried and salted fish, makes a large part of the export. These conventional products are often exported later than the year of catch. The export

statistics is a rather problematic source of information to be used when related to catch figures because:

a. lack of information of catch year in the export statistics.
b. lack of information on yield in the land-based industry.
c. lack of information on quantities stored from one catch year to the next.

Studies of salted cod products have established different results due to input factor being fresh or frozen fish, amount of salt, time of salting all dependent of the tradition of each firm.

Due to these factors we find our approach to be the most relevant.

Sheet 4_ENV_stock_status

Questions 4A and 4B

The Norwegian data cover 69 different species. The same species can belong to different stocks that are managed individually by the Norwegian Directorate of Fisheries/ Ministry of Fisheries. The herring fishery is harvesting several stocks, North Sea herring, Norwegian spring spawning herring, Skagerrak herring and several smaller local coastal stocks, that are managed individually.

In ANNEX 1 we have summarized stock statuses set by The Advisory Committee (ACOM) of ICES (ICES, http://www.ices.dk) for the different species harvested by the Norwegian SSF.

100% of the Norwegian fisheries (both SSF and LSF) are managed by regulations, 90.1% by quotas, and the rest by other regulations (ANNEX 1).

Most vessels in the Norwegian SSF fleet are harvesting a mixture of species with different gears and are moving between fishing areas along the coast and fjords during the year. There are no traditional data to estimate catch per unit effort (CPUE) for each species or stock. We have used total catch (all species) per liter diesel consumed by the vessels as a proxy for the total CPUE for the SSF, see ANNEX 2.

Sheet 5_ENV_carbon

We have applied the diesel consumption by the SSF fleet as a proxy for the footprint. According to SINTEF (Winter et.al. 2009) one liter diesel is equivalent to 2.6 kg CO_2 emission for fishing vessels above 8 meters (Winter et.al. 2009). We have used this value for all vessels in the Norwegian SSF fleet. See ANNEX 1.

Sheet 6_ENV_SSF_fleet

A typical vessel below 11 meter is made of glass fiber, composite, aluminium, ferrocement or wood. A few small vessels are also built of steel. Most vessels were built from 1960 to 2009, but in 2016 and 2017, 228 new vessels below 10 meters were built. In the period 2013 to 2017 there were built 571 vessels below 15 meters. The fleet is very flexible, and can use more than one type of gear, and catches both demersal fish, pelagic fish and crustaceans.

Table 3. Data of length and motor power of the SSF fleet as published in Anon (2018b).

Size	Minimum length (m)	Maximum length (m)	Average length (m)	Minimum Hp	Maximum Hp	Average Hp
<11m	4.10	10.99	8.80	4	750	136
11-14.99m	11.30	14.99	13.42	100	1015	305

The typical fuel is diesel, but electrical motors are now being introduced.

Sheet 7_ENV_effort_SSF

The Norwegian data are explained in sheet *7_ENV_effort_log*

In this worksheet the number of vessels is not double counted, as in sheet *1_ENV_catch_SSF* . The number of fishing vessels, fishing inside the 12 nautical miles are retrieved from the database with a SQL- script.

Information from The Profitability survey is used to calculate the other figures in this sheet (Anon. 2015, 2016, 2017a,b, 2019) .

Estimated fishing days for the two size groups participating in the SSF are retrieved from Tables G10 and G11 from the Profitability survey on the Norwegian fishing fleet for each of the years 2013-2017 (Anon. 2015, 2016, 2017a,b, 2019).

The income to a Norwegian fisherman consists of two parts:

1. fixed salary.
2. a part derived from the value of the catch per trip (called “lott”).

Average (total) cost per vessel type, includes salary, cost for maintenance and repairs, average running costs per year (not per day) and are extracted directly from the Profitability survey; Tables G10 and G11 (Anon. 2015, 2016, 2017a, 2017b, 2019).

3.1.15 - Average fuel consumption per day fishing

There are no direct retrievable data for daily fuel consumption. Based on total cost of fuel and the average price of fuel/litre, the total consumed fuel per year was calculated (from unpublished data made available by the Norwegian Directorate of Fisheries). Total number of days fished by the two SSF fleets were weighted according to the number of vessels registered and given in yellow cells in the table below. The average daily consumption of fuel by the SSF fleet, also given in yellow cells in the table below, was calculated by dividing the total fuel consumption per year with the weighted average numbers of fishing days per year.

Table 4. Average fuel consumption by the SSF per year (million liters) and per day (liters) at sea. No information available on average fuel consumption per vessel size category, but only for vessels less than 15 meters as a group.

Vessel size (LOA in meters)	Motor type (hp)	Fuel type	Number of vessels					Estimated number of days fishing				
			2017	2016	2015	2014	2013	2017	2016	2015	2014	2013
Less than 11 meters	<10-899	Diesel	4362	4132	4051	4017	4049	103	113	127	142	145
11 to 14.99 meter	100->900	Diesel	642	644	655	677	703	139	129	149	152	181
Total			5004	4776	4706	4694	4752	108	115	130	143	150
			Average fuel consumption (million liters) per year at sea					Average fuel consumption (liters) per day at sea				
			2017	2016	2015	2014	2013	2017	2016	2015	2014	2013
Total for vessels less than 15 meters			22.3	17.6	20.9	20.3	16.0	207213	152834	160693	141520	106436

NOR_ECONOMICS

Sheet 1A_Econ_harvest

There are no data about numbers of fishers involved in the SSF fleet. For 2017 we have applied the average number of fishers per vessel as 1.6 and 2.7 persons respectively for vessels less than 11 m and 11-14.99m (Anon 2019). The total number of fishers in the SSF was estimated as the sum of the products of fishers and number of vessels. To estimate

numbers of male and female fishers working full or part time we applied the percentages by genders of full and part time fishers in the Norwegian list of fishers. This list just gives the number of fishers without allocating them to the SSF- or LSF fleets. We have applied the percentages of males and females working as fishers all or part time in the SSF fleet to be the same as for the total fleet. There are no data about occasional participations. According to the Directorate of Fisheries 1 801 vessels participated in the subsistence fishery. As a proxy for the total fishers involved, we applied one person occasionally per vessel, totalling 1 801 persons. About 40% of the participants in the subsistence fishery (type 1 and 2) are females (Hallenstvedt and Wulff (2004).

Fiskeridirektoratet 2019. Lønnsomhetsundersøkelse for fiskeflåten 2017. (Profitability survey on the Norwegian fishing fleet 2017). Directorate of Fisheries, ISSN 2464-3009, 128pp.

http://www.fiskeridir.no/Yrkesfiske/Statistikk-yrkesfiske/Statistiske-publikasjoner/Loennsomhetsundersoekelse-for-fiskefartoey

NOR_DRIVERS

Sheet *2_DRIVERS_fishing_unit*

Answers are given as common answers for all 11 unique fishing units, and therefore presented only once (Section A in sheet).

Question 13 driver of change.

There are no known habitat loss/degradation caused by the Norwegian LSF.

NOR_SOCIAL

Sheet *1_SOCIAL_species*

Limit of quantification (LoQ) is the lowest analyte concentration that can be quantitatively detected with a stated accuracy and precision. The analytical methods are given in Table 5. See also Moxness Reksten *et al.* (2020). Data are retrieved from the Seafood Data Base, https://sjomatdata.hi.no/#search/.

Table 5. Overview of analytical methods, LoQ (per 100 g sample), and measurement uncertainty (%).

Analyte	Method	LoQ/100g	Measurement uncertainty (%)
Proximate components			
Total fat	Ethyl acetate	0.1 g	12 (0.1-5 g/100 g); 8 (5-15 g/100 g)
Protein	Determination with nitrogen analyser	0.1 g N	40 (0.1-0.7 g N/100 g); 12 (0.7-16 g N/100 g)
Vitamins			
Vitamin A	HPLC-DAD	0.5 µg	20
Vitamin D	HPLC-UV	1.0 µg	20
Cobalamin	Microbiological analysis	0.1 µg	30
Minerals [a]			
Calcium	ICP-MS	3.5 mg	15
Iron	ICP-MS	0.01 mg	25 (40% LOQx10)
Selenium	ICP-MS	1 µg	25 (40% LOQx10)
Zinc	ICP-MS	0.05 mg	20 (40% LOQx10)

Iodine	ICP-MS	4 µg	40
Fatty acids	GLC-FID	1 mg, 0.1%	100 (0.1%), 50 (0.2-0.5%), 10 (0.6-100%) [b]

[a] LoQ by dry weight. Abbreviations : DAD: diode-array detector; FID: flame ionization detector; GLC: gas liquid chromatography; HPLC: high performance liquid chromatography; ICP-MS: inductively coupled plasma mass spectrometry; LOQ: limit of quantification, N: nitrogen; UV: ultraviolet detect.

[b]The measurement uncertainty for fatty acids is divided into four levels, depending on the area percentage of the fatty acid. The area percentage is presented within the parentheses, and the corresponding measurement uncertainty is presented in front of the parentheses.

Sheets *2_SOCIAL_income, 3_SOCIAL_dependence*

No Norwegian data available, need for further research.

Sheet *5_Social_protein*

No Norwegian data available

A paper, “Small-scale fisheries contribution to food and nutrition security – a case study from Norway”, which is based on the present study, is being submitted for publication in an international journal (Kjellevold et al. 2022). The manuscript includes an estimation of the potential nutritional value of SSF and how these resources could benefit the Norwegian population in case of crises. The fish resources harvested by the SSF is of high importance for food and nutrition security in Norway.

NOR_GOVERNANCE

No further comments, see data sheets. References used:

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NOR_CHARCTERIZATION

No further comments, see data sheets. No references used/included.

3.1.16 - Acknowledgment and disclaimer

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ANNEXES

ANNEX 1 Stock status and regulations (Sheet 4_ENV_4A_stock status).

ANNEX 2 Footprint and catch per unit effort in the Norwegian SSF (Sheet 4_ENV_4B_stock status).

ANNEX 3 Taxonomic groups (Sheet 1_ENV_catch_SSF).

ANNEX 4 Gear description (Sheet 7_ENV_effort).

ANNEX 5 Data used from the Profitability survey (Sheet 7_ENV_effort_SSF).

ANNEX 6 Answers to the methodology questions from the FAO group.

5 - Annex

5.1 - Annex 1 - Stock status and regulations

The International Council for the Exploration of the Sea (ICES) assesses and evaluates fish stocks on a yearly basis for most of the stocks harvested partly by the Norwegian SSF. The fractions taken by this fleet compared with the total international catches of these stocks are quite small. The ICES' advicory committee (ACOM) makes scientific advices on total allowable catch (TAC). The TAC is set according to the size of the evaluated spawning stock size (B). This evaluation is done according to B is below or above the precautionary reference point Bpa. (http://www.ices.dk/publications/library/Pages/default.aspx#Default).This reference point is defined, based on historical data, as the spawning stock size that has relatively low probability of reduced recruitment. (https://doi.org/10.17895/ices.pub.4503).

The table below summarizes how the species fished by the Norwegian SSF are categorized in the red list system (http://www.artsdatabanken.no/Rodliste).

The different fisheries are managed by quotas or by: minimum/maximum legal size, open/closed areas or seasons, by-catch, discard bans etc. A fishing vessel has to be licensed to participate in the Norwegian SSF. The management regulations are given by the Norwegian Directorate of Fisheries (https://www.fiskeridir.no/).

Percentages of the total Norwegian SSF catch in tonnage and value in 2017 are summarized below according the red list categories, ACOM (below or above Bpa) and regulations.

Redlist				**ACOM**				**REGULATIONS**			
Least Concern		Equal or >Bpa		<Bpa		XBpa[2)]		Quota		Other	
Catch	Value	Catch	Value	Catch	Value	Catch	Value	Catch	Value	Catch	Value
99.4[1)]	99.5[1)]	93.5	84.5	0.6	0.8	6.0	14.4	90.1	90.7	9.9	9.3

[1)] The rest of the catch was taken from species evaluated as NT, VU, EN or CR (i.e. Blue skate, *Raja batis* :

0.004% of SSF catch).

[2)] Bpa is unknown or not assessed.

5.2 - Annex 2 - Footprint and catch per unit effort (CPUE) in the Norwegian SSF

Catch per unit effort (CPUE)

There are several proxies for estimating CPUE-trends in the Norwegian SSF. Catch per liter diesel consumed by the conventional Norwegian SSF fleet is probably a better proxy for CPUE than fishing days and catch per day since time spent for searching or the use of energy is often not considered being part of the effort (Table A1). If catch per liter fuel consumed is applied as a proxy for the CPUE there has been a reduction by about 30% from 2013 to 2017 (Table A1).

We present in this report previously unpublished data from the Norwegian Directorate of Fisheries of kg/liter for the SSF and the conventional-, pelagic trawl-, purse seine- and bottom trawl LSF fleets (Table A1). The catches of these fleets provide on average 99% of the total LSF catch and the weighted values of kg/ liter fuel for the LSF fleet is therefore considered a robust estimate of the CPUE proxies for the total LSF fishery for each of the years 2013-2017. The difference in the LSF CPUE for 2013-2017 was negligible, while the SSF CPUE was reduced by 30% from 2013 to 2017.

Footprint

According to a SINTEF report from 2009 (Winter et al, 2009) it is possible to convert the fuel consumption by the fishing fleet to kg CO_2 emission using the following relationship: ***One liter diesel is equivalent to 2.6 kg CO_2 emission for fishing vessels >8m.*** This value is applied both for the SSF and the LSF fleets in the present evaluation.

Based on this the carbon footprint, as emission of CO_2 , was calculated for each year for the Norwegian SSF and LSF fleets (Table A1). The footprint for the SSF increased by 27% from 41 500 tons in 2013 to average 52 700 tons per year for the period 2014-2017 or by 40% from 2013 to 58 200 tons in 2017 (Table A1). The average footprint (CO_2 emission) for the LSF was about 20 times higher and increased by 21% from 970 000 tons in 2013 to 1 172 000 tons in 2017. Measured as kg fish catch per liter fuel, the LSF above 15 m has a 2-3 times higher carbon footprint than the SSF below 15 m.

Table A1. Data for catch per unit effort and footprint for the SSF- and LSF fleets.

Fleets and parameters	2013	2014	2015	2016	2017
SSF catch (tons)	229560	256109	233438	222158	225692
SSF number boats	4752	4694	4706	4776	5004
SSF catch per boat (tons)	48	55	50	47	45
SSF fuel liters/day	106436	141520	160693	152834	207213
SSF fish days	150	143	130	115	108
SSF catch per day (tons)	1530	1791	1796	1932	2090
SSF Total fuel mill liters	15965400	20237360	20890090	17575910	22379004
SSF kg catch/liter	14.38	12.66	11.17	12.64	10.08
SSF Ktons CO_2	41.51	52.62	54.31	45.70	58.19
Convent. LSF fleet					
Fleet liter diesel/kg	0.27	0.22	0.28	0.28	0.28
Catch	295606	285108	273345	290836	284966
kg/liter diesel	3.70	4.55	3.57	3.57	3.57

Mill liter diesel consumed	79.81	62.72	76.54	81.43	79.79
Ktons CO_2	207.52	163.08	198.99	211.73	207.46
Pel. Trawl LSF fleet					
Fleet liter diesel/kg	0.09	0.09	0.08	0.12	0.08
Catch	284217	460778	573742	390544	488950
kg/liter diesel	11.11	11.11	12.50	8.33	12.50
Mill liter diesel consumed	25.58	41.47	45.90	46.87	39.12
Ktons CO_2	66.51	107.82	119.34	121.85	101.70
Purse seine LSF fleet					
Fleet liter diesel/kg	0.09	0.09	0.10	0.11	0.09
Catch	782369	736270	652596	563196	730018
kg/liter diesel	11.11	11.11	10.00	9.09	11.11
Mill liter diesel consumed	70.41	66.26	65.26	61.95	65.70
Ktons CO_2	183.07	172.29	169.67	161.07	170.82
Bottom trawl LSF fleet					
Fleet liter diesel/kg	0.41	0.40	0.48	0.43	0.39
Catch	481997	557561	576524	580415	682330
kg/liter diesel	0.41	0.40	0.48	0.43	0.39
Mill liter diesel consumed	197.62	223.02	276.73	249.58	266.11
Ktons CO_2	513.81	579.86	719.50	648.90	691.88
LSF data					

SUM CATCH	1844190	2039718	2076206	1824991	2186264
Weigthed liter diesel/kg	0.20	0.19	0.22	0.24	0.21
kg/liter diesel	4.94	5.18	4.47	4.15	4.85
Mill liter diesel consumed	373.43	393.48	464.43	439.83	450.72
Ktons CO_2	970.91	1023.05	1207.51	1143.56	1171.86

5.3 - Annex 3 - Taxonomic groups

Content of the Constructed Species Groups PEL, GRO, CRU, MZZ in Table Environment, Sheet *1_ENV_Catch* , specified on Species Codes for each Fishing Unit Uniqe ID. Species identified with FAO codes and Latin name. Catch in tons. 0.0 means less than 0.04 tons. (English Decimal Point) Data for 2017 and 2016.

Fishing Unit Unique ID	**NORFISHPEL001**			
ID name	**Pelagic SSF fisheries and cartilage fishes, all gear**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	PEL	ARG	Argentina spp.	0.0
2017	PEL	BFT	Thunnus thynnus	0.0
2017	PEL	BON	Sarda sarda	0.1
2017	PEL	BSS	Dicentrarchus labrax	0.0
2017	PEL	CMO	Chimaera monstrosa	2.4
2017	PEL	COE	Conger conger	0.8
2017	PEL	DCA	Deania calceus	0.1
2017	PEL	DGH	Squalidae Scyliorhinidae	0.0
2017	PEL	DGS	Squalus acanthias	181.3
2017	PEL	ETX	Etmopterus spinax	0.0
2017	PEL	GAR	Belone belone	0.1
2017	PEL	JOD	Zeus faber	0.1
2017	PEL	POA	Brama brama	0.0
2017	PEL	POR	Lamna nasus	3.5
2017	PEL	RJB	Dipturus batis	9.4
2017	PEL	RJC	Raja clavata	0.6
2017	PEL	RJO	Dipturus (Raja) oxyrinchus	0.0
2017	PEL	SAL	Salmo salar	6.1
2017	PEL	SAN	Ammodytes	0.0
2017	PEL	SHO	Galeus melastomus	0.3

2017	PEL	SKH	Selachimorpha (Pleurotremata)	0.1
2017	PEL	SPR	Sprattus sprattus	133.2
2017	PEL	SRX	Rajiformes	334.2
2017	PEL	TRS	Salmo trutta	0.1
2017	**PEL SUM**			672.5
2017	**NORFISHPEL001 Total**			38,796.2
Fishing Unit Unique ID	**NORFISHPEL001**			
ID name	**Pelagic SSF fisheries and cartilage fishes, all gear**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	PEL	ARG	Argentina spp.	0.1
2016	PEL	BSS	Dicentrarchus labrax	0.0
2016	PEL	CMO	Chimaera monstrosa	1.1
2016	PEL	COE	Conger conger	0.4
2016	PEL	DCA	Deania calceus	0.0
2016	PEL	DGS	Squalus acanthias	232.5
2016	PEL	GAR	Belone belone	0.1
2016	PEL	JOD	Zeus faber	0.1
2016	PEL	POA	Brama brama	0.0
2016	PEL	POR	Lamna nasus	3.6
2016	PEL	RJB	Dipturus batis	9.6
2016	PEL	RJC	Raja clavata	1.4
2016	PEL	RJO	Dipturus (Raja) oxyrinchus	0.2
2016	PEL	SAL	Salmo salar	3.5
2016	PEL	SHO	Galeus melastomus	1.0
2016	PEL	SKH	Selachimorpha (Pleurotremata)	0.0
2016	PEL	SPR	Sprattus sprattus	919.3
2016	PEL	SRX	Rajiformes	305.4
2016	PEL	TRS	Salmo trutta	0.1
2016	**PEL SUM**			1,478.4
2016	**NORFISHPEL001 Total**			36,569.4
Fishing Unit Unique ID	**NORFISHDEM022**			
ID name	**Demersal SSF fisheries, active gear**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	GRO	BLI	Molva dypterygia	0.5
2017	GRO	BLL	Scophthalmus rhombus	3.9
2017	GRO	CAA	Anarhichas lupus	14.6

2017	GRO	CAB	Anarhichas denticulatus	0.0
2017	GRO	CAS	Anarhichas minor	0.6
2017	GRO	DAB	Limanda limanda	0.8
2017	GRO	FLE	Platichthys flesus	0.4
2017	GRO	GAD	Gadiformes	0.0
2017	GRO	GFB	Phycis blennoides	0.1
2017	GRO	GHL	Reinhardtius hippoglossoides	1.4
2017	GRO	GUG	Eutrigla gurnardus	1.0
2017	GRO	HAL	Hippoglossus hippoglossus	18.8
2017	GRO	HKE	Merluccius merluccius	25.2
2017	GRO	LEM	Microstomus kitt	8.7
2017	GRO	LIN	Molva molva	37.3
2017	GRO	MON	Lophius piscatorius	64.4
2017	GRO	MZZ	Osteichthyes	14.5
2017	GRO	NOP	Trisopterus esmarkii	4.5
2017	GRO	PLA	Hippoglossoides platessoides	0.7
2017	GRO	PLE	Pleuronectes platessa	360.3
2017	GRO	PLZ	Pleuronectidae	0.1
2017	GRO	POL	Pollachius pollachius	72.4
2017	GRO	REG	Sebastes norvegicus	3.9
2017	GRO	RNG	Coryphaenoides rupestris	0.0
2017	GRO	SOL	Solea solea	0.8
2017	GRO	TBR	Ctenolabrus rupestris	0.3
2017	GRO	TUR	Scophthalmus maximus	3.8
2017	GRO	USB	Labrus bergylta	0.1
2017	GRO	USK	Brosme brosme	6.2
2017	GRO	WHG	Merlangius merlangus	7.0
2017	GRO	WIT	Glyptocephalus cynoglossus	10.9
2017	GRO	YFM	Symphodus melops	0.3
2017	**GRO SUM**			663.6
2017	**NORFISHDEM022 Total**			14,652.7
Fishing Unit Unique ID	**NORFISHDEM022**			
ID name	**Demersal SSF fisheries, active gear**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	GRO	BLI	Molva dypterygia	0.5
2016	GRO	BLL	Scophthalmus rhombus	4.3
2016	GRO	CAA	Anarhichas lupus	17.3
2016	GRO	CAS	Anarhichas minor	1.4
2016	GRO	DAB	Limanda limanda	0.0

2016	GRO	GFB	Phycis blennoides	0.1
2016	GRO	GHL	Reinhardtius hippoglossoides	9.3
2016	GRO	GUG	Eutrigla gurnardus	0.0
2016	GRO	HAL	Hippoglossus hippoglossus	18.2
2016	GRO	HKE	Merluccius merluccius	86.5
2016	GRO	LEM	Microstomus kitt	9.2
2016	GRO	LIN	Molva molva	39.9
2016	GRO	MON	Lophius piscatorius	62.2
2016	GRO	MZZ	Osteichthyes	2.8
2016	GRO	NOP	Trisopterus esmarkii	1.4
2016	GRO	PLA	Hippoglossoides platessoides	0.1
2016	GRO	PLE	Pleuronectes platessa	327.9
2016	GRO	PLZ	Pleuronectidae	0.2
2016	GRO	POL	Pollachius pollachius	100.4
2016	GRO	REG	Sebastes norvegicus	4.8
2016	GRO	RNG	Coryphaenoides rupestris	0.1
2016	GRO	SOL	Solea solea	1.1
2016	GRO	TBR	Ctenolabrus rupestris	0.5
2016	GRO	TUR	Scophthalmus maximus	3.1
2016	GRO	USB	Labrus bergylta	0.5
2016	GRO	USK	Brosme brosme	8.3
2016	GRO	WHG	Merlangius merlangus	8.7
2016	GRO	WIT	Glyptocephalus cynoglossus	18.9
2016	GRO	YFM	Symphodus melops	1.2
2016	**GRO SUM**			728.7
2016	**NORFISHDEM022 Total**			12,693.3
Fishing Unit Unique ID	**NORFISHDEM112**			
ID name	**Passive gear, demersal SSF fisheries, northern areas**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	GRO	BLI	Molva dypterygia	4.6
2017	GRO	BLL	Scophthalmus rhombus	0.0
2017	GRO	CAA	Anarhichas lupus	86.4
2017	GRO	CAB	Anarhichas denticulatus	15.6
2017	GRO	CAS	Anarhichas minor	228.1
2017	GRO	DAB	Limanda limanda	0.2
2017	GRO	FLE	Platichthys flesus	0.0
2017	GRO	GFB	Phycis blennoides	0.8
2017	GRO	GHL	Reinhardtius hippoglossoides	3,974.7
2017	GRO	HAL	Hippoglossus hippoglossus	2,124.5

2017	GRO	HKE	Merluccius merluccius	470.5
2017	GRO	LEM	Microstomus kitt	1.2
2017	GRO	LIN	Molva molva	2,790.2
2017	GRO	LUM	Cyclopterus lumpus	542.5
2017	GRO	MON	Lophius piscatorius	1,319.4
2017	GRO	MZZ	Osteichthyes	0.0
2017	GRO	PLA	Hippoglossoides platessoides	3.2
2017	GRO	PLE	Pleuronectes platessa	47.0
2017	GRO	PLZ	Pleuronectidae	0.0
2017	GRO	POL	Pollachius pollachius	748.6
2017	GRO	REB	Sebastes mentella	1.6
2017	GRO	REG	Sebastes norvegicus	1,014.8
2017	GRO	RHG	Macrourus berglax	0.2
2017	GRO	RNG	Coryphaenoides rupestris	0.1
2017	GRO	TBR	Ctenolabrus rupestris	92.8
2017	GRO	TUR	Scophthalmus maximus	4.0
2017	GRO	USB	Labrus bergylta	76.1
2017	GRO	USK	Brosme brosme	3,330.8
2017	GRO	WHG	Merlangius merlangus	14.6
2017	GRO	WIT	Glyptocephalus cynoglossus	0.2
2017	GRO	YFM	Symphodus melops	68.2
2017	**GRO SUM**			16,961.0
2017	**NORFISHDEM112 Total**			154,327.6

Fishing Unit Unique ID	**NORFISHDEM112**			
ID name	**Passive gear, demersal SSF fisheries, northern areas**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	GRO	BLI	Molva dypterygia	2.3
2016	GRO	CAA	Anarhichas lupus	152.9
2016	GRO	CAB	Anarhichas denticulatus	35.5
2016	GRO	CAS	Anarhichas minor	194.0
2016	GRO	DAB	Limanda limanda	1.2
2016	GRO	GFB	Phycis blennoides	3.2
2016	GRO	GHL	Reinhardtius hippoglossoides	3,435.0
2016	GRO	HAL	Hippoglossus hippoglossus	2,147.7
2016	GRO	HKE	Merluccius merluccius	491.9
2016	GRO	LEM	Microstomus kitt	1.7
2016	GRO	LIN	Molva molva	2,829.9

2016	GRO	LUM	Cyclopterus lumpus	294.1
2016	GRO	MON	Lophius piscatorius	1,223.9
2016	GRO	MZZ	Osteichthyes	0.2
2016	GRO	PLA	Hippoglossoides platessoides	0.3
2016	GRO	PLE	Pleuronectes platessa	50.8
2016	GRO	POL	Pollachius pollachius	752.2
2016	GRO	REB	Sebastes mentella	0.1
2016	GRO	REG	Sebastes norvegicus	776.9
2016	GRO	RHG	Macrourus berglax	4.4
2016	GRO	SOL	Solea solea	0.0
2016	GRO	TBR	Ctenolabrus rupestris	72.4
2016	GRO	TUR	Scophthalmus maximus	4.0
2016	GRO	USB	Labrus bergylta	55.6
2016	GRO	USK	Brosme brosme	3,959.2
2016	GRO	WHG	Merlangius merlangus	17.9
2016	GRO	WIT	Glyptocephalus cynoglossus	0.9
2016	GRO	YFM	Symphodus melops	74.5
2016	**GRO SUM**			16,582.3
2016	**NORFISHDEM112 Total**			153,632.0
Fishing Unit Unique ID	**NORFISHDEM212**			
ID name	**Passive demersal SSF fisheries, southern area**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	GRO	BLI	Molva dypterygia	7.8
2017	GRO	BLL	Scophthalmus rhombus	4.3
2017	GRO	BRF	Helicolenus dactylopterus	0.0
2017	GRO	CAA	Anarhichas lupus	2.1
2017	GRO	CAB	Anarhichas denticulatus	0.0
2017	GRO	CAS	Anarhichas minor	0.0
2017	GRO	DAB	Limanda limanda	1.1
2017	GRO	ELE	Platichthys flesus	9.5
2017	GRO	ENX	Centrolabrus exoletus	12.2
2017	GRO	FLE	Platichthys flesus	0.5
2017	GRO	GFB	Phycis blennoides	1.6
2017	GRO	GHL	Reinhardtius hippoglossoides	0.0
2017	GRO	GUG	Eutrigla gurnardus	0.1
2017	GRO	HAL	Hippoglossus hippoglossus	13.7
2017	GRO	HKE	Merluccius merluccius	137.8
2017	GRO	LEM	Microstomus kitt	1.3
2017	GRO	LIN	Molva molva	275.3

2017	GRO	LUM	Cyclopterus lumpus	2.7
2017	GRO	MEG	Lepidorhombus whiffiagonis	0.3
2017	GRO	MON	Lophius piscatorius	453.2
2017	GRO	MZZ	Osteichthyes	1.0
2017	GRO	NOP	Trisopterus esmarkii	0.2
2017	GRO	PLA	Hippoglossoides platessoides	0.0
2017	GRO	PLE	Pleuronectes platessa	11.6
2017	GRO	POL	Pollachius pollachius	296.8
2017	GRO	REG	Sebastes norvegicus	13.9
2017	GRO	RNG	Coryphaenoides rupestris	0.1
2017	GRO	SOL	Solea solea	1.2
2017	GRO	TBR	Ctenolabrus rupestris	212.8
2017	GRO	TUR	Scophthalmus maximus	7.1
2017	GRO	USB	Labrus bergylta	185.3
2017	GRO	USI	Labrus (bimaculatus) mixtus	0.1
2017	GRO	USK	Brosme brosme	87.4
2017	GRO	WHG	Merlangius merlangus	0.4
2017	GRO	WIT	Glyptocephalus cynoglossus	1.8
2017	GRO	YFM	Symphodus melops	463.9
2017	**GRO SUM**			2,207.0
2017	**NORFISHDEM212 Totalt**			3,569.8
Fishing Unit Unique ID	**NORFISHDEM212**			
ID name	**Passive demersal SSF fisheries, southern area**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	GRO	BLI	Molva dypterygia	16.7
2016	GRO	BLL	Scophthalmus rhombus	4.1
2016	GRO	BRF	Helicolenus dactylopterus	0.0
2016	GRO	CAA	Anarhichas lupus	2.1
2016	GRO	CAB	Anarhichas denticulatus	0.0
2016	GRO	DAB	Limanda limanda	1.4
2016	GRO	ELE	Platichthys flesus	2.8
2016	GRO	ENX	Centrolabrus exoletus	9.8
2016	GRO	FLE	Platichthys flesus	0.3
2016	GRO	GFB	Phycis blennoides	2.0
2016	GRO	GUG	Eutrigla gurnardus	0.1
2016	GRO	HAL	Hippoglossus hippoglossus	12.2
2016	GRO	HKE	Merluccius merluccius	138.6
2016	GRO	LEM	Microstomus kitt	1.6

2016	GRO	LIN	Molva molva	297.6
2016	GRO	LUM	Cyclopterus lumpus	7.1
2016	GRO	MEG	Lepidorhombus whiffiagonis	0.8
2016	GRO	MON	Lophius piscatorius	384.8
2016	GRO	MZZ	Osteichthyes	1.3
2016	GRO	PLA	Hippoglossoides platessoides	0.0
2016	GRO	PLE	Pleuronectes platessa	9.5
2016	GRO	POL	Pollachius pollachius	256.4
2016	GRO	REG	Sebastes norvegicus	24.9
2016	GRO	RNG	Coryphaenoides rupestris	0.0
2016	GRO	SOL	Solea solea	1.2
2016	GRO	TBR	Ctenolabrus rupestris	128.5
2016	GRO	TUR	Scophthalmus maximus	6.6
2016	GRO	USB	Labrus bergylta	123.1
2016	GRO	USI	Labrus (bimaculatus) mixtus	0.0
2016	GRO	USK	USK	162.0
2016	GRO	WHG	WHG	0.8
2016	GRO	WIT	WIT	1.6
2016	GRO	YFM	YFM	432.7
2016	**GRO SUM**			2,030.6
2016	**NORFISHDEM212 Total**			3,613.4

Fishing Unit Unique ID	**NORFISHDEM032**			
ID name	**Seines demersal**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	GRO	CAA	Anarhichas lupus	0.0
2017	GRO	HAL	Hippoglossus hippoglossus	0.6
2017	GRO	HKE	Merluccius merluccius	0.3
2017	GRO	LIN	Molva molva	0.0
2017	GRO	MON	Lophius piscatorius	0.2
2017	GRO	MZZ	Osteichthyes	0.1
2017	GRO	PLE	Pleuronectes platessa	0.6
2017	GRO	POL	Pollachius pollachius	0.6
2017	GRO	TUR	Scophthalmus maximus	0.0
2017	GRO	USK	Brosme brosme	0.0
2017	GRO	WHG	Merlangius merlangus	0.0
2017	GRO	WIT	Glyptocephalus cynoglossus	0.0
2017	**GRO SUM**			2.5

2017	**NORFISHDEM032 total**			1,109.8
Fishing Unit Unique ID	**NORFISHDEM032**			
ID name	**Seines demersal**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	GRO	CAA	Anarhichas lupus	0.0
2016	GRO	HAL	Hippoglossus hippoglossus	0.3
2016	GRO	HKE	Merluccius merluccius	0.8
2016	GRO	LIN	Molva molva	0.0
2016	GRO	MON	Lophius piscatorius	0.2
2016	GRO	PLE	Pleuronectes platessa	0.3
2016	GRO	POL	Pollachius pollachius	1.5
2016	GRO	SOL	Solea solea	0.0
2016	GRO	TUR	Scophthalmus maximus	0.0
2016	GRO	WHG	Merlangius merlangus	0.6
2016	**GRO SUM**			3.7
2016	**NORFISHDEM032 total**			945.9
Fishing Unit Unique ID	**NORFISHCRU013**			
ID name	**Passive crustacean**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	CRU	CEP	Cephalopoda	0.0
2017	CRU	CRA	Reptantia	0.0
2017	CRU	CRG	Carcinus maenas	0.1
2017	CRU	CTL	Sepiidae, Sepiolidae	0.0
2017	CRU	KCT	Lithodes maja	0.2
2017	CRU	LBE	Homarus gammarus	41.2
2017	CRU	NEP	Nephrops norvegicus	185.6
2017	CRU	PER	Littorinidae	0.1
2017	CRU	SQE	Todarodes sagittatus sagittat	0.0
2017	CRU	WHE	Buccinum undatum	325.6
2017	**CRU SUM**			552.9
2017	**NORFISHCRU013 Total**			7,206.2
Fishing Unit Unique ID	**NORFISHCRU013**			
ID name	**Passive crustacean**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**

2016	CRU	CEP	Cephalopoda	0.0
2016	CRU	CRA	Reptantia	0.0
2016	CRU	CRG	Carcinus maenas	0.9
2016	CRU	CTL	Sepiidae, Sepiolidae	0.0
2016	CRU	KCT	Lithodes maja	0.1
2016	CRU	LBE	Homarus gammarus	45.6
2016	CRU	NEP	Nephrops norvegicus	157.6
2016	CRU	PER	Littorinidae	0.8
2016	CRU	SQE	Todarodes sagittatus sagittat	0.1
2016	CRU	WHE	Buccinum undatum	357.7
2016	**CRU SUM**			562.9
2016	**NORFISHCRU013 total**			7,946.0
Fishing Unit Unique ID	**NORFISHCRU023**			
ID name	**Active crustacean**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	CRU	CSH	Crangon crangon	0.0
2017	CRU	NEP	Nephrops norvegicus	50.8
2017	CRU	SQE	Todarodes sagittatus sagittat	0.4
2017	**CRU SUM**			51.3
2017	**NORFISHCRU023 total**			3,339.5
Fishing Unit Unique ID	**NORFISHCRU023**			
ID name	**Active crustacean**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	CRU	CSH	Crangon crangon	0.6
2016	CRU	NEP	Nephrops norvegicus	55.3
2016	CRU	PER	Littorinidae	0.0
2016	CRU	SQE	Todarodes sagittatus sagittat	0.3
2016	**CRU SUM**			56.3
2016	**NORFISHCRU023 total**			4,076.6
Fishing Unit Unique ID	**NORFISHCRU043**			
ID name	**Other gears**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	CRU	BXL	Semibalanus balanoides	20.6
2017	CRU	CLQ	Cyprina islandica	4.3
2017	CRU	CLS	Mya arenaria	1.5

2017	CRU	COC	Cardium edule	0.2
2017	CRU	MUS	Mytilus edulis	182.9
2017	CRU	OYC	Crassostrea spp.	5.2
2017	CRU	OYF	Ostrea edulis	0.3
2017	CRU	PER	Littorinidae	56.6
2017	CRU	SCX	Pectinidae	0.9
2017	CRU	URC	Echinoidea	0.2
2017	**CRU SUM**			272.8
2017	**NORFISHCRU043 total**			760.8
Fishing Unit Unique ID	**NORFISHCRU043**			
ID name	**Other gears**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	CRU	CLQ	Cyprina islandica	2.7
2016	CRU	CLS	Mya arenaria	0.0
2016	CRU	MOD	Modiolus spp.	0.0
2016	CRU	OYC	Crassostrea spp.	0.8
2016	CRU	PER	Littorinidae	60.1
2016	CRU	SCX	Pectinidae	0
2016	CRU	WHE	Buccinum undatum	0.6
2016	**CRU SUM**			64.2
2016	**NORFISHCRU043 total**			606.8
Fishing Unit Unique ID	**NORFISHOTH999**			
ID name	**Other gears**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	MZZ	BFT	Thunnus thynnus	0.3
2017	MZZ	BLL	Scophthalmus rhombus	0.0
2017	MZZ	CAA	Anarhichas lupus	0.0
2017	MZZ	DAB	Limanda limanda	0.0
2017	MZZ	DGS	Squalus acanthias	0.0
2017	MZZ	HAL	Hippoglossus hippoglossus	0.6
2017	MZZ	HER	Clupea harengus	0.3
2017	MZZ	HKE	Merluccius merluccius	2.2
2017	MZZ	GUG	Eutrigla gurnardus	0.0
2017	MZZ	LIN	Molva molva	1.0
2017	MZZ	MON	Lophius piscatorius	0.2
2017	MZZ	PLE	Pleuronectes platessa	0.0

2017	MZZ	POL	Pollachius pollachius	0.5
2017	MZZ	REG	Sebastes norvegicus	0.0
2017	MZZ	SAL	Salmo salar	0.5
2017	MZZ	TBR	Ctenolabrus rupestris	0.0
2017	MZZ	TUR	Scophthalmus maximus	0.0
2017	MZZ	USK	Brosme brosme	1.4
2017	MZZ	WIT	Glyptocephalus cynoglossus	0.0
2017	**MZZ SUM**			7.2
2017	**NORFISHOTH999 Totalt**			18.9
Fishing Unit Unique ID	**NORFISHOTH999**			
ID name	**Other gears**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	MZZ	BFT	Thunnus thynnus	0.4
2016	MZZ	BLL	Scophthalmus rhombus	0.0
2016	MZZ	CAB	Anarhichas denticulatus	0.0
2016	MZZ	CAS	Anarhichas minor	0.0
2016	MZZ	DGS	Squalus acanthias	0.0
2016	MZZ	HAL	Hippoglossus hippoglossus	0.2
2016	MZZ	HKE	Merluccius merluccius	0.0
2016	MZZ	LEM	Microstomus kitt	0.0
2016	MZZ	LIN	Molva molva	0.0
2016	MZZ	MON	Lophius piscatorius	0.4
2016	MZZ	MZZ	Osteichthyes	0.3
2016	MZZ	PLE	Pleuronectes platessa	0.0
2016	MZZ	POL	Pollachius pollachius	0.1
2016	MZZ	REG	Sebastes norvegicus	0.1
2016	MZZ	RJO	Dipturus (Raja) oxyrinchus	0.1
2016	MZZ	SAL	Salmo salar	0.7
2016	MZZ	SRX	Rajiformes	0.1
2016	MZZ	TRS	Salmo trutta	0.0
2016	MZZ	TUR	Scophthalmus maximus	0.0
2016	MZZ	USB	Labrus bergylta	0.1
2016	MZZ	USK	Brosme brosme	0.3
2016	MZZ	WHG	Merlangius merlangus	0.0
2016	MZZ	WIT	Glyptocephalus cynoglossus	0.0
2016	MZZ	YFM	Symphodus melops	0.1
2016	**MZZ SUM**			3.0
2016	**NORFISHOTH999 Totalt**			22.2

Fishing Unit Unique ID	**NORFISHSUB009**			
ID name	**Subsistence type 1**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2017	MZZ	BFT	Thunnus thynnus	0.3
2017	MZZ	BLI	Molva dypterygia	0.1
2017	MZZ	BLL	Scophthalmus rhombus	0.1
2017	MZZ	BXL	Semibalanus balanoides	20.6
2017	MZZ	CAA	Anarhichas lupus	0.0
2017	MZZ	CAS	Anarhichas minor	0.0
2017	MZZ	CEP	Cephalopoda	0.0
2017	MZZ	CLQ	Cyprina islandica	4.3
2017	MZZ	CLS	Mya arenaria	1.5
2017	MZZ	COC	Cerastoderma edule	0.2
2017	MZZ	CRG	Cancer pagurus	2.1
2017	MZZ	DAB	Limanda limanda	0.1
2017	MZZ	DGS	Squalus acanthias	3.2
2017	MZZ	ENX	Centrolabrus exoletus	0.4
2017	MZZ	FLE	Platichthys flesus	0.1
2017	MZZ	GFB	Phycis blennoides	0.0
2017	MZZ	GHL	Reinhardtius hippoglossoides	0.1
2017	MZZ	GUG	Eutrigla gurnardus	0.0
2017	MZZ	HAD	Melanogrammus aeglefinus	56.7
2017	MZZ	HAL	Hippoglossus hippoglossus	0.0
2017	MZZ	HER	Clupea harengus	3.0
2017	MZZ	HKE	Merluccius merluccius	6.7
2017	MZZ	HOM	Trachurus trachurus	0.0
2017	MZZ	KCD	Paralithodes camtschaticus	1.7
2017	MZZ	KCT	Lithodes maja	0.4
2017	MZZ	LEM	Microstomus kitt	0.1
2017	MZZ	LIN	Molva molva	0.0
2017	MZZ	LUM	Cyclopterus lumpus	3.8
2017	MZZ	MAC	Scomber scombrus	3.1
2017	MZZ	MEG	Lepidorhombus whiffiagonis	0.0
2017	MZZ	MON	Lophius piscatorius	10.1
2017	MZZ	MZZ	Perciformes	0.0
2017	MZZ	NEP	Nephrops norvegicus	6.0
2017	MZZ	OYC	Crassostrea spp	5.2
2017	MZZ	OYF	Ostrea edulis	0.3
2017	MZZ	PLA	Hippoglossoides platessoides	0.0

2017	MZZ	PLE	Pleuronectes platessa	4.3
2017	MZZ	POL	Pollachius pollachius	55.0
2017	MZZ	POR	Lamna nasus	0.0
2017	MZZ	REG	Sebastes norvegicus	7.4
2017	MZZ	RJC	Raja clavata	0.0
2017	MZZ	SAL	Salmo salar	3.1
2017	MZZ	SCE	Pecten maximus	0.0
2017	MZZ	SCX	Pectinidae	0.9
2017	MZZ	SHO	Galeus melastomus	0.0
2017	MZZ	SOL	Solea solea	0.1
2017	MZZ	TRS	Salmo trutta	0.1
2017	MZZ	TUR	Scophthalmus maximus	0.5
2017	MZZ	URC	Echinoidea	0.2
2017	MZZ	USB	Labrus bergylta	2.8
2017	MZZ	USK	Brosme brosme	56.3
2017	MZZ	WHE	Buccinum undatum	9.7
2017	MZZ	WHG	Merlangius merlangus	0.6
2017	MZZ	WIT	Glyptocephalus cynoglossus	0.0
2017	**MZZ SUM**			271.2
2017	**NORFISHSUB009 Total**			2,183.5

Fishing Unit Unique ID	**NORFISHSUB009**			
ID name	**Subsistence type 1**			
Catch year	**Collected Group Name**	**FAO code**	**Latin name**	**Catch (tons live weight)**
2016	MZZ	BLI	Molva dypterygia	0.1
2016	MZZ	BLL	Scophthalmus rhombus	0.0
2016	MZZ	CAA	Anarhichas lupus	3.8
2016	MZZ	CAS	Anarhichas minor	0.4
2016	MZZ	CLQ	Cyprina islandica	2.7
2016	MZZ	CLS	Mya arenaria	0.0
2016	MZZ	COE	Conger conger	0.0
2016	MZZ	CRG	Carcinus maenas	4.0
2016	MZZ	DAB	Limanda limanda	0.0
2016	MZZ	DGS	Squalus acanthias	1.5
2016	MZZ	ENX	Centrolabrus exoletus	1.2
2016	MZZ	GFB	Phycis blennoides	0.1
2016	MZZ	GHL	Reinhardtius hippoglossoides	0.0
2016	MZZ	GUG	Eutrigla gurnardus	0.0
2016	MZZ	HAD	Melanogrammus aeglefinus	65.3
2016	MZZ	HAL	Hippoglossus hippoglossus	1.7

2016	MZZ	HKE	Merluccius merluccius	6.4
2016	MZZ	JOD	Zeus faber	0.0
2016	MZZ	KCD	Paralithodes camtschaticus	1.5
2016	MZZ	LEM	Microstomus kitt	0.4
2016	MZZ	LIN	Molva molva	0.0
2016	MZZ	LUM	Cyclopterus lumpus	0.4
2016	MZZ	MAC	Scomber scombrus	4.9
2016	MZZ	MEG	Lepidorhombus whiffiagonis	0.0
2016	MZZ	MON	Lophius piscatorius	9.9
2016	MZZ	MZZ	Perciformes	0.0
2016	MZZ	NEP	Nephrops norvegicus	3.2
2016	MZZ	OYC	Crassostrea spp	0.8
2016	MZZ	PLE	Pleuronectes platessa	3.8
2016	MZZ	PLZ	Pleuronectidae	0.0
2016	MZZ	POL	Pollachius pollachius	46.5
2016	MZZ	REG	Sebastes norvegicus	4.9
2016	MZZ	RJB	Dipturus batis	0.0
2016	MZZ	RJC	Raja clavata	0.0
2016	MZZ	RJO	Dipturus (Raja) oxyrinchus	0.0
2016	MZZ	SAL	Salmo salar	2.5
2016	MZZ	SCX	Pectinidae	0.0
2016	MZZ	SOL	Solea solea	0.0
2016	MZZ	SRX	Rajiformes	1.2
2016	MZZ	SWO	Xiphias gladius	0.1
2016	MZZ	TRS	Salmo trutta	0.0
2016	MZZ	TUR	Scophthalmus maximus	0.4
2016	MZZ	USB	Labrus bergylta	2.7
2016	MZZ	USI	Labrus (bimaculatus) mixtus	0.0
2016	MZZ	USK	Brosme brosme	56.2
2016	MZZ	WHE	Buccinum undatum	7.2
2016	MZZ	WHG	Merlangius merlangus	0.3
2016	MZZ	WIT	Glyptocephalus cynoglossus	0.0
2016	**MZZ SUM**			234.3
2016	**NORFISHSUB009 Total**			2,116.9

5.4 - Annex 4 - Gear description

GEAR DESCRIPTION, ref. sheet *1_ENV_catch_SSF* , ref. sheet *7_ENV_effort_SSF*

GEAR USED BY VESSELS LESS THAN 11 METER OVERALL LENGTH:

GEAR TYPE GROUPS	ISSCFG-codes	English name 1	English name 2
01) PASSIVE GEAR	GN	Gillnets and entangling nets	Gillnet (not specified)
01) PASSIVE GEAR	GNS	Gillnets and entangling nets	Set gillnets
01) PASSIVE GEAR	LX	Hooks and lines	Hooks and lines not specified
01) PASSIVE GEAR	LLD	Hooks and lines	Drifting longlines
01) PASSIVE GEAR	LL	Hooks and lines	Longlines (not specified)
01) PASSIVE GEAR	LHP	Hooks and lines	Handlines and pole-lines
01) PASSIVE GEAR	LTL	Hooks and lines	Trolling lines
01) PASSIVE GEAR	LLD	Hooks and lines (auto)	Drifting longlines, automatice)
01) PASSIVE GEAR	FYK	Traps	Fyke nets
01) PASSIVE GEAR	FPO	Traps	Pots
02) ACTIVE GEAR	TBS	Bottomtrawl	Shrimp trawles
02) ACTIVE GEAR	TBN	Bottomtrawl	Nephrops trawls
02) ACTIVE GEAR	SDN	Seine nets	Danish seines
03) SEINES	PS	Seine nets	Purse seines
03) SEINES	SB	Seine nets	Beach seines
4) OTHER GEAR	MIS	Miscellaneous	"Scallop dredge"
4) OTHER GEAR	NK	Not given	Not given
GEAR USED BY VESSELS 11 TO 14,99 METER OVERALL LENGTH:			
GEAR TYPE GROUPS	**ISSCFG-codes**	**English name 1**	**English name 2**
01) PASSIVE GEAR	GN	Gillnets and entangling nets	Gillnet (not specified)
01) PASSIVE GEAR	GNS	Gillnets and entangling nets	Set gillnets
01) PASSIVE GEAR	LX	Hooks and lines	Hooks and lines not specified
01) PASSIVE GEAR	LLD	Hooks and lines	Drifting longlines
01) PASSIVE GEAR	LL	Hooks and lines	Longlines (not specified)
01) PASSIVE GEAR	LHP	Hooks and lines	Handlines and pole-lines
01) PASSIVE GEAR	LTL	Hooks and lines	Trolling lines
01) PASSIVE GEAR	LLD	Hooks and lines (auto)	Drifting longlines, automatice)
01) PASSIVE GEAR	FYK	Traps	Fyke nets
01) PASSIVE GEAR	FPO	Traps	Pots
02) ACTIVE GEAR	TBS	Bottomtrawl	Shrimp trawles
02) ACTIVE GEAR	TBN	Bottomtrawl	Nephrops trawls
02) ACTIVE GEAR	SDN	Seine nets	Danish seines

03) SEINES	PS	Seine nets	Purse seines		
03) SEINES	SB	Seine nets	Beach seines		
4) OTHER GEAR	MIS	Miscellaneous	"Scallop dredge"		
4) OTHER GEAR	NK	Not given	Not given		

5.5 - Annex 5 - Data used from the Profitability survey

Data used from the Profitability survey (Sheet 7_ENV_effort_SSF)

Relationship between collected data form the survey and columns in Environment table marked with X.

Total list of variables in the survey	**Information used in sheet 7_ENV_effort_SSF (marked with X or reference number)**	**Column reference in Sheet 7_ENV**
PROFIT AND LOSS ACCOUNT		
OPERATING INCOME:		
R.01 Operating revenues		
OPERATING EXPENDITURE:		
R.02 Special tax (paid to the social security system)		
R.03 Special tax (tax to finance fisheries research)		
R.04 Labour wages and shares to the crew (included extra shares etc.)	R.04 =Average salary per year,	column T to X
R.05 Food expenses to crew	X	
R.06 Social expenses		
R.07 Contribution to pension scheme		
R.08 Depreciation on vessel		
R.09 Depreciation on fishing licenses and permits		
R.10 Fuel and lubrication oil	X	
R.11 Bait, ice, salt and packing	X	
	Sum R.05,R10,R11 = Average running cost per year	Column AP to AT
R.13 Maintenance/investment on gear	R.13 = Maintenance/investment cost	Column AX to BB
R.12 Maintenance on vessel		
R.14 Insurance on vessel		
R.15 Other insurances		
R.16 Other operating and administrative expenses		
	Sum R.12,R.13,R.14,R.15,R.16 = Average annual cost of maintenance and repairs	Column AK to AO

R.17 Total operating expenses	R.17. = Average total cost per year	Column Z to AD
R.18 Driftsresultat Operating profit		
FINANCE		
R.19 Financial income		
R.20 Agio, Profit on exchange		
R.21 Total financial revenues		
Total list of variables in the survey, continued	Information used in sheet 7_ENV_effort_SSF marked	Column reference in Sheet 7_ENV
R.22 Financial costs		
R.23 Disagio, Loss on exchange		
R.24 Total financial expenses		
R.25 Result of financial items		
R.26 Profit on ordinary activities before taxation		
R.27 Total shares to the crew		
BALANCE SHEET		
ASSETS		
B.01 Book value of fishing licenses and permits		
B.02 Book value of vessel		
B.03 Other fixed assets		
B.04 Total fixed assets		
B.05 Other current assets		
B.06 Cash in hand and at bank		
B.07 Total current assets		
B.08 Total assets		
B.09 Equity		
B.10 Long-term liabilities		
B.11 Current liabilities		
B.12 Total equity and liabilities		
OPERATING MEASURES		
D.01 No. of days in operation		
D.02 No. of days at sea (per year)	D.02 = No. of days at sea (per year)	Column J to N

VESSEL MEASURES		
P.01 Over all length (o.a.l.)		
P.02 Size GT		
P.03 Size GRT		
P.04 Vessel age	P.04 = Vessel Age	Column AF to AJ
P.05 No. of vessels in sample		
P.06 No. of vessels in the population		
KEY FIGURES		
Operating Margin		
Return on Total Assets		
Current Ratio		

5.6 - Annex 6 - Answers to the methodology questions from the FAO-Duke-Worldfish project coordinators

The answers are given in bold italic.

- 1) Catch figures
  - i. Of the catch figures you have provided us with (including both official and unofficial/estimated data), what is the estimated overall coverage (in terms of a percentage) for total catch in your country that your IHH catch data includes?

    100% landed catch, no data on discards. Discarding is forbidden in Norway. For commercial species, discarding may occasionally occur due to damaged fish or illegal economic high-grading. For non-commercial species discarding may occur to a larger extent. Discards of cod in the demersal part of the SSF has been investigated and is negligible, less than 1% (Berg, 2019)

- ii. Considering the catch figures that you have included in the worksheets that comes from unofficial/estimated data, is this already accounted for in the official data that you also provided (i.e., is there any double counting)?

  No double counting

- iii. Does adding up all of the 'official' catch data you have provided us with result in the national figure reported to FAO? Why or why not?

  All except in NORFISHSUB999

- 2) Disaggregation between SSF and LSF:
  - i. Have you included disaggregated data for SSF according to your country's definition of SSF?

    YES

- ii. If not, how did you calculate the split in the data between what comes from SSF?
- iii. This split was done based on what metrics (e.g., species, gears, vessel types, areas landed/fished)?
- 3) Exclusions for catch data: The purpose of this document is to provide answers to some of the most frequently

asked questions related to completing the country case study and filling out the Excel data files. This is a live document that will be updated periodically as new questions arise.

- i. On a scale of 1 to 5 (1 = Not confident at all, 5 = Extremely confident), how confident are you in terms of excluding aquaculture data?

  No data in the catch figures so 5, but in the processing industry data which usually include wild fish and farmed fish we cannot be certain so 3 for these categories.

- ii. On a scale of 1 to 5 (1 = Not confident at all, 5 = Extremely confident), how confident are you in terms of excluding recreational fisheries data?

  3

- 4) Exclusions for nutrition/consumption data:
  - i. On a scale of 1 to 5 (1 = Not confident at all, 5 = Extremely confident), how confident are you in terms of excluding consumption data from aquaculture sources?

    Norwegian statistics does not split between wild fish and aquacultured fish regarding consumption, so 1

- ii. On a scale of 1 to 5 (1 = Not confident at all, 5 = Extremely confident), how confident are you in terms of excluding consumption data from recreational fisheries sources?

  3

- iii. On a scale of 1 to 5 (1 = Not confident at all, 5 = Extremely confident), how confident are you in terms of excluding consumption data from exports?

  5

- 5) Currency conversions:
  - i. Were they done according to the corresponding data year? ii. Were they done according to IMF standards https://www.imf.org/external/np/fin/ert/GUI/Pages/CountryDataBase.aspx

    For time being all given in NOK.

- 6) Sex-disaggregated data for employment:
  - i. Were you able to provide sex-disaggregated data for Employment? If not, explain why not.

    Given where possible

- ii. Is it possible to provide some kind of estimation using other methods?

  Possible when adequate data

DATA SOURCES 2013 TO 2017

- Subtract from the database at the Norwegian Directorate of Fisheries, Landing og sluttseddeldatabasen (sales-note system and Register over norske fiskefartøy (Register of Norwegian Fishing Vessels) in combination. Quality controlled data 2013 to 2017. Further references are given in the respective tables and text sections.
- Data are also subtracted from the web-sites of The Central Bank of Norway, www.norges-bank.no and Statistics Norway, www.ssb.no .

Data on content of nutrients and food safety parameters are subtracted from the “Seafood data bease”, https://sjomatdata.hi.no/#search

NORWEGIAN FISHERS IMPACT ON FISHERY REGULATIONS

In particular, we would like to know more about cases in which fishers have the right to resource management but do not engage. Ultimately, we would like to understand the extent to which management rights coincide with fishers' power and involvement in decision-making. In many cases, you've indicated that fishers do have rights to resource management, but that none or only some engage. In these cases, does lack of fisher engagement reflect a lack of fishers' power and involvement in decision-making?

It is the fisheries organizations (both fishermen's- and sales-organizations) and not individual fishermen who have the right to participate in Norwegian regulatory meetings to submit proposals on the allocation of certain quotas (determined by the Fisheries Department) within the various fisheries and fleet groups. Most of the Norwegian fishermen are members of a fishermen organization. All fishers are, however, member of one or more sales organizations if they want to sell their fish, and automatically the fishers get a saying in these sales organizations, too. On top of this, the sales organizations are owned by the fishermen's organizations, based on business rules approved by the government.

The Norwegian Recreational- and Small-scale fisheries Association and the Norwegian Hunter's- and Fishermen's Association also participate in the Norwegian regulatory meetings. The same does journalists and environmental NGOs (e.g., Greenpeace, WWF, Norwegian Society for the Conservation of Nature).

The Director of Fisheries invites for two meetings during the year to discuss regulation of the fisheries (regulatory meeting) at the Directorate of Fisheries in Bergen, Norway. The Regulatory Meeting is an important arena for the Director of Fisheries to inform about developments in the fisheries in the current year, and to discuss proposals for future fisheries regulations. Only representatives of the organizations mentioned in an official list have access to ask at the meeting. Private individuals are not allowed to participate. If the enrollment of participants becomes large, it may be necessary for practical reasons to limit the number of participants from each organization. The Directorate of Fisheries does not cover the participants' expenses in connection with the meeting, and does not provide meeting remuneration. Input or suggestions for matters are sent to the Directorate of Fisheries within a set deadline.

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