

2 Demersal Stocks in the Faroe Area (Division Vb and Subdivision IIa4)

2.1 Overview

2.1.1 Fisheries

The main fisheries in Faroese waters are mixed-species, demersal fisheries and pelagic fisheries. The demersal fisheries are mainly conducted by Faroese fishermen, whereas the major part of the pelagic fisheries are conducted by foreign fishermen licensed through bilateral and multilateral fisheries agreements. The usual picture has changed since 2011, however, since no mutual agreement has been possible between the Faroe Islands and the EU and Norway, respectively, due to the dispute regarding the mackerel.

Pelagic Fisheries. Three main species of pelagic fish are fished in Faroese waters: blue whiting, herring and mackerel; several nations participate. The Faroese pelagic fisheries are almost exclusively conducted by purse seiners and larger purse seiners also equipped for pelagic trawling. The pelagic fishery by Russian vessels is conducted by large factory trawlers. Other countries use purse seiners and factory trawlers.

Demersal Fisheries. Although they are conducted by a variety of vessels, the demersal fisheries can be grouped into fleets of vessels operating in a similar manner. Some vessels change between longlining, jigging and trawling, and they therefore can appear in different fleets. The following describes the Faroese fleets first followed by the fleets of foreign nations. The number of licenses can be found in Table 2.1.3.

Open boats. These vessels are below 5 GRT. They use longline and to some extent automatic, jigging engines and operate mainly on a day-to-day basis, targeting cod, haddock and to a lesser degree saithe. A majority of open boats participating in the fisheries are operated by part-time fishermen.

Smaller vessels using hook and line. This category includes all the smaller vessels, between 5 and 110 GRT operating mainly on a day-to-day basis, although the larger vessels behave almost like the larger longliners above 110 GRT with automatic baiting systems and longer trips. The area fished is mainly nearshore, using longline and to some extent automatic jigging engines. The target species are cod and haddock.

Longliners > 110 GRT. This group refers to vessels with automatic baiting systems. The main species fished are cod, haddock, ling and tusk. The target species at any one time is dependent on season, availability and market price. In general, they fish mainly for cod and haddock from autumn to spring and for ling and tusk during the summer. The spatial distribution is concentrated mainly around the areas closed to trawling (Figure 2.1.1). On average 92% of their catch is taken within the permanent exclusion zone for trawlers. During summer they also make a few trips to Icelandic waters.

Otter board trawlers < 500 HP. This refers to smaller fishing vessels with engine powers up to 500 Hp. The main areas fished are on the banks outside the areas closed for trawling. They mainly target cod and haddock. Some of the vessels are licensed during the summer to fish within the twelve nautical miles territorial fishing limit, targeting lemon sole and plaice.

Otter board trawlers > 500 HP. Traditionally this group, also called the deep-water trawlers, have targeted several deep-water fish species, especially redfish, blue ling, Greenland halibut, grenadier and black scabbard fish. Saithe is also a target species with by-catches of cod and haddock on the Faroe Plateau. The distribution of hauls by this fleet in 2010-2011 is shown in Figure 2.1.1. Since 2011 this fleet has been included in the fishing days regulation and most of the vessels have changed to pairtrawling.

Pair trawlers <1000 HP. These vessels fish mainly for saithe, however, they also have a significant by-catch of cod and haddock. The main areas fished are the deeper parts of the Faroe Plateau and the banks to the southwest of the islands.

Pair trawlers >1000 HP. This category targets mainly saithe, but their by-catch of cod and haddock is important to their profit margin. In addition, some of these vessels during the summers have special licenses to fish in deep water for greater silver smelt. The areas fished by these vessels are the deeper parts of the Faroe Plateau and the banks to the southwest of the islands (Figure 2.1.1).

Gill netting vessels. This category refers to vessels fishing mainly Greenland halibut and monkfish. They operate in deep waters off the Faroe Plateau, Faroe Bank, Bill Bailey's Bank, Lousy Bank and the Faroe-Iceland Ridge. This fishery is regulated by the number of licensed vessels and technical measures like depth and gear specifications. The areas fished by these vessels are the deeper parts of the Faroe Plateau and the banks to the southwest of the islands (Figure 2.1.1).

Jiggers. Consist of a mixed group of smaller and larger vessels using automatic jigging equipment. The target species are saithe and cod. Depending on availability, weather and season, these vessels operate throughout the entire Faroese region. Most of them can change to longlines.

Foreign longliners. These are mainly Norwegian vessels of the same type as the Faroese longliners larger than 110 GRT. They target mainly ling and tusk with by-catches of cod, haddock and blue ling. Norway has a bilateral fishery agreement with the Faroes for a total quota of these species while the number of vessels can vary from year to year.

Foreign trawlers. These are mainly otter board trawlers of the same type as the Faroese otter board trawlers larger than 1 000 HP. Participating nations are United Kingdom, France, Germany and Greenland. The smaller vessels, mainly from the United Kingdom and Greenland, target cod, haddock and saithe, whereas the larger vessels, mainly French and German trawlers, target saithe and deep-sea species like redfish, blue ling, grenadier and black scabbardfish. As for the foreign longliners, the different nations have in their bilateral fishery agreement with the Faroes a total quota of these species while the number of vessels can vary from year to year. Due to the dispute on mackerel, only Greenland are allowed to fish at present.

2.1.2 Fisheries and management measures

The fishery around the Faroe Islands has for centuries been an almost free international fishery involving several countries. Apart from a local fishery with small wooden boats, the Faroese offshore fishery started in the late 19th century. The Faroese fleet had to compete with other fleets, especially from the United Kingdom with the result that a large part of the Faroese fishing fleet became specialised in fishing in other areas. So except for a small local fleet most of the Faroese fleet were fishing

around Iceland, at Rockall, in the North Sea and in more distant waters like the Grand Bank, Flemish Cap, Greenland, the Barents Sea and Svalbard.

Up to 1959, all vessels were allowed to fish around the Faroes outside the 3 nm zone. During the 1960s, the fisheries zone was gradually expanded, and in 1977 an EEZ of 200 nm was introduced in the Faroe area. The demersal fishery by foreign nations has since decreased and Faroese vessels now take most of the catches. The fishery may be considered a multi-fleet and multi-species fishery as described below.

During the 1980s and 1990s the Faroese authorities have regulated the fishery and the investment in fishing vessels. In 1987 a system of fishing licenses was introduced. The demersal fishery at the Faroe Islands has been regulated by technical measures (minimum mesh sizes and closed areas). In order to protect juveniles and young fish, fishing is temporarily prohibited in areas where the number of small cod, haddock and saithe exceeds 30% (in numbers) in the catches; after 1–2 weeks the areas are again opened for fishing. A reduction of effort has been attempted through banning of new licenses and buy-back of old licenses.

A quota system, based on individual quotas, was introduced in 1994. The fishing year started on 1 September and ended on 31 August the following year. The aim of the quota system was, through restrictive TACs for the period 1994–1998, to increase the SSBs of Faroe Plateau cod and haddock to 52 000 t and 40 000 t, respectively. The TAC for saithe was set higher than recommended scientifically. It should be noted that cod, haddock and saithe are caught in a mixed fishery and any management measure should account for this. Species under the quota system were Faroe Plateau cod, haddock, saithe, redfish and Faroe Bank cod.

The catch quota management system introduced in the Faroese fisheries in 1994 was met with considerable criticism and resulted in discarding and in misreporting of substantial portions of the catches. Reorganisation of enforcement and control did not solve the problems. As a result of the dissatisfaction with the catch quota management system, the Faroese Parliament discontinued the system as from 31 May 1996. In close cooperation with the fishing industry, the Faroese government has developed a new system based on individual transferable effort quotas in days within fleet categories. The new system entered into force on 1 June 1996. The fishing year from 1 September to 31 August, as introduced under the catch quota system, has been maintained.

The individual transferable effort quotas apply to 1) the longliners less than 110 GRT, the jiggers, and the single trawlers less than 400 HP (Groups 4,5), 2) the pair trawlers (Group 2) and 3) the longliners greater than 110 GRT (Group 3). The single trawlers greater than 400 HP were in 2011 included into the fishing days system and were allocated a number of fishing days. They are not allowed to fish within the 12 nautical mile limit and the areas closed to them, as well as to the pair trawlers, have increased in area and time. Their catch of cod and haddock is limited by maximum by-catch allocation. This fleet has now started to pair-trawl, and in the present fishing year they have been included merged with the pair-trawlers group. The single trawlers less than 400 HP are given special licenses to target flatfishes inside 12 nautical miles with a by-catch allocation of 30% cod and 10% haddock. In addition, they are obliged to use sorting devices in their trawls in order to minimize their by-catches. One fishing day by longliners less than 110 GRT is considered equivalent to two fishing days for jiggers in the same gear category. Longliners less than 110 GRT could therefore double their allocation by converting to jigging. Table 2.1.1 shows the number of fishing days used by fleet category for 1985–1995 and 1998–2008 and Table 2.1.2 shows

the number of allocated days inside the outer thick line (the “ring”) in Figure 2.1.2. Holders of individual transferable effort quotas who fish outside this line can fish for 3 days for each day allocated inside the line. Trawlers are generally not allowed to fish inside the 12 nautical mile limit. Inside the innermost thick line only longliners less than 100 GRT and jiggers less than 110 GRT are allowed to fish. The Faroe Bank shallower than 200 m is closed to trawling. Due to the serious decline of the Faroe Bank cod, the Bank has been closed since 1 January 2009 for all gears.

The fleet segmentation used to regulate the demersal fisheries in the Faroe Islands and the regulations applied are summarized in Table 2.1.3.

The effort quotas are transferable within gear categories. The allocations of number of fishing days by fleet categories was made such that together with other regulations of the fishery they should result in average fishing mortalities on each of the 3 stocks of 0.45, corresponding to average annual catches of 33% of the exploitable stocks in numbers. Built into the system is also an assumption that the day system is self-regulatory, because the fishery will move between stocks according to the relative availability of each of them and no stock will be overexploited. These target fishing mortalities have been evaluated during the 2005 and 2006 NWWG meetings (2.1.6) The realized fishing mortalities have been substantially higher than the target for cod, appear to have exceeded the target for saithe in recent years, while for haddock, fishing mortality remains below the target.

As can be seen in Table 2.1.2 and Table 2.1.4, there have been large reductions in the number of allocated fishing days in order to reduce the fishing mortality. For the most recent fishing years, a considerable number of fishing days have not been used.

In addition to the number of days allocated in the law, it is also stated in the law what percentage of total catches of cod, haddock, saithe and redfish, each fleet category on average is expected to fish. These percentages are as follows:

Fleet category	Cod	Haddock	Saithe	Redfish
Longliners < 110GRT,				
jiggers, single trawl. < 400HP	51 %	58 %	17.5 %	1 %
Longliners > 110GRT	23 %	28 %		
Pairtrawlers	21 %	10.25 %	69 %	8.5 %
Single trawlers > 400 HP	4 %	1.75 %	13 %	90.5 %
Others	1 %	2 %	0.5 %	0.5 %

The technical measures as mentioned above are still in effect. An additional measure to reduce the fishing mortality on cod and haddock and to especially reduce the mortality on the youngest age groups have been introduced (Figure 2.1.3).

2.1.3 The marine environment

The waters around the Faroe Islands are in the upper 500 m dominated by the North Atlantic current, which to the north of the islands meets the East Icelandic current. Clockwise current systems create retention areas on the Faroe Plateau (Faroe shelf) and on the Faroe Bank. In deeper waters to the north and east and in the Faroe Bank channel is deep Norwegian Sea water, and to the south and west is Atlantic water. From the late 1980s the intensity of the North Atlantic current passing the Faroe area decreased, but it has increased again in the most recent years. The productivity of the Faroese waters was very low in the late 1980s and early 1990s. This applies also to the

recruitment of many fish stocks, and the growth of the fish was poor as well. From 1992 onwards the conditions have returned to more normal values which also is reflected in the fish landings. There has been observed a very clear relationship, from primary production to the higher trophic levels (including fish and seabirds), in the Faroe shelf ecosystem, and all trophic levels seem to respond quickly to variability in primary production in the ecosystem (Gaard, E. et al. 2001). There is a positive relationship between primary production and the cod and haddock individual fish growth and recruitment 1-2 years later. The primary production indices has been below average since 2002 except for 2004 and 2008-2009 when it was above average (Figure 2.1.4). The estimate of primary production in 2012 will not be available until July, but preliminary estimates suggest it to be at the same level as in 2011 when it was small.

2.1.4 Summary of the 2012 assessment of Faroe Plateau cod, haddock and saithe

A summary of selected parameters from the 2012 assessment of Faroe Plateau cod, Faroe haddock and Faroe saithe is shown in Figure 2.1.5. As mentioned in previous reports of this WG, landings of cod, haddock and saithe on the Faroes appear to be closely linked with the total biomass of the stocks. For cod, the exploitation ratio and fishing mortality has remained relatively stable over time, although they have been more fluctuating in recent years. For haddock, the exploitation rate was decreasing from the 1950s and 1960s, while it have been fluctuating since the mid 1970s. For saithe, there is a suggestion that the exploitation rate was increasing at the beginning of the period, it decreased from the early 1990s to 1998 and has increased since close to the highest values observed in 2009. It has since declined again.

Another main feature of the plots of landings, biomasses, mortalities and recruitment is the apparent periodicity during the time series with cod and haddock showing almost the same trends.

2.1.5 Reference points for Faroese stocks and evaluation of the Faroese management system

Multispecies models may give very different perception of Fmsy reference points than single-species models. Therefore, a long-term simulation was performed in last year's report to evaluate MSY reference points for cod, haddock and saithe, all in the same ecological model (see working document 22 in last year's report). The model settings and the results were presented in the 2011 Overview section for the Faroese stocks.

The ecological model was driven by 1) Yearly primary production on the Faroe Shelf (<130 m bottom depth), 2) yearly primary production over the outer areas on the Faroe Plateau (130-500 m bottom depth), as well as the fishing mortality of 3) cod, 4) haddock and 5) saithe. The recruitment of saithe, being positively affected by the primary production over the outer areas on the Faroe Plateau and negatively affected by the age 7+ biomass of saithe had a very large influence on the results. For example, when fishing mortality of saithe increased, the age 7+ biomass decreased, which increased the saithe recruitment and biomass. A higher biomass of saithe decreased the condition factor of cod, and hence cod recruitment.

Recent work (Steingrund *et al.*, 2012), however, indicates that another ecological model may be more appropriate. There is a moderate positive correlation between primary production on the Faroe Shelf and the subsequent production of cod

(Steingrund and Gaard, 2005). There is also a moderate positive correlation for haddock and saithe. However, if all three species are combined, the positive correlation becomes very strong. This indicates that a nearly fixed portion of the energy produced by the primary production goes to predatory demersal fish on the Faroe Plateau, but that the portion to each of the fish stocks (to cod, haddock or to saithe) may vary much between years. For example, the portion to saithe varied between 30 and 80 % between 1961 and 2008, and was high when sandeels were scarce. Surprisingly, the fit between primary production and cod+haddock+saithe production was not improved by including the outer primary production, i.e., this ecological model is simpler than the former one with regards to primary production. On the other hand, other variables needed to be included in the model, for example the influx of *Calanus finmarchicus* onto the Faroe Shelf. It is hoped that the ecological model work can be done with sufficient pace to be included in future NWWG reports.

In 2011 the Faroese minister of fisheries established a group of experts to formulate a management plan for cod, haddock and saithe including a harvest control rule and a recovery plan. The group consisted of scientists from the Faroe Marine Research Institute and the Faroese University, of 1 representative from the industry (trawlers) and 1 from the Ministry of Fisheries. The results of this work was delivered to the Minister of Fisheries in the spring 2012 but the outcome has not been discussed politically so far and not been implemented. Basically the plan builds on the MSY framework developed by ICES.

2.1.6 References:

- Gaard, E., Hansen, B., Olsen, B and Reinert, J. 2001. Ecological features and recent trends in physical environment, plankton, fish stocks and sea birds in the Faroe plateau ecosystem. In: K- Sherman and H-R Skjoldal (eds). Changing states of the Large Marine Ecosystems of the North Atlantic.
- Steingrund, P., and Gaard, E. 2005. Relationship between phytoplankton production and cod production on the Faroe Shelf. ICES Journal of Marine Science, 62: 163-176.
- Steingrund, P., and Hátún, H. 2008. Relationship between the North Atlantic subpolar gyre and fluctuations of the saithe stock in Faroese waters. NWWG 2008 Working Document 20.

Table 2.1.1.

Number of fishing days used by various fleet groups in Vb1 1985-95 and 1998-08. For other fleets there are no effort limitations. Catches of cod, haddock saithe and redfish are regulated by the by-catch percentages given in section 2.1.1. In addition there are special fisheries regulated by licenses and gear restrictions. (This is the real number of days fishing not affected by doubling or tripling of days by changing areas/gears)

Year	Longliner 0-110 GRT, jiggers, trawlers < 400 HP	Longliners > 110 GRT	Pairtrawlers
1985	13449	2973	8582
1986	11399	2176	11006
1987	11554	2915	11860
1988	20736	3203	12060
1989	28750	3369	10302
1990	28373	3521	12935
1991	29420	3573	13703
1992	23762	2892	11228
1993	19170	2046	9186
1994	25291	2925	8347
1995	33760	3659	9346
Average(85-95)	22333	3023	10778
1998	23971	2519	6209
1999	21040	2428	7135
2000	24820	2414	7167
2001	29560	2512	6771
2002	30333	2680	6749
2003	27642	2196	6624
2004	22211	2728	7059
2005	21829	3123	6377
2006	14094	2764	5411
2007	10653	3279	5971
2008	10212	2827	3722
Average(98-08)	21488	2679	6290

Table 2.1.2.

Number of allocated days for each fleet group since the new management scheme was adopted and number of licenses per fleet (by May 2006).

Fishing year	Group 1 Single trawlers > 400 HP	Group 2 Pair trawlers > 400 HP	Group 3 Longliners > 110 GRT	Group 4 Longliners and jiggers 15-110 GRT, single trawlers < 400 HP	Group 5 Longliners and jiggers < 15 GRT
1996/1997		8225	3040	9320	22000
1997/1998		7199	2660	9328	23625
1998/1999		6839	2527	8861	22444
1999/2000	Regulated by area and by-catch limitations	6839	2527	8861	22444
2000/2001		6839	2527	8861	22444
2001/2002		6839	2527	8861	22444
2002/2003		6771	2502	8772	22220
2003/2004		6636	2452	8597	21776
2004/2005		6536	2415	8468	21449
2005/2006		5752	3578	5603	21335
2006/2007		5752	3471	5435	20598
2007/2008		5637	3402	5327	20186
2008/2009		5073	3062	4795	18167
No. of licenses	12	29	25	65	593

Table 2.1.3. Main regulatory measures by fleet in the Faroese fisheries in Vb. The fleet capacity is fixed, based on among other things no. of licenses. Number of licenses within each group (by May 2006) are as follows: 1: 12; 2:29; 3:25; 4A: 25; 4B: 21; 4T: 19; 5A:140; 5B: 453; 6: 8. These licenses have been fixed in 1997, but in group 5B a large number of additional licenses can be issued upon request.

Fleet segment		Sub groups		Main regulation tools
1	Single trawlers > 400 HP	none		Fishing days, have from 2011/12 been merged with the pair trawlers, area closures
2	Pair trawlers > 400 HP	none		Fishing days, area closures
3	Longliners > 110 GRT	none		Fishing days, area closures
4	Coastal vessels>15 GRT	4A	Trawlers 15-40 GRT	Fishing days
		4A	Longliners 15-40 GRT	Fishing days
		4B	Longliners>40 GRT	Fishing days
		4T	Trawlers>40 GRT	Fishing days
5	Coastal vessels <15 GRT	5A	Full-time fishers	Fishing days
		5B	Part-time fishers	Fishing days
6	Others		Gillnetters	Bycatch limitations, fishing depth, no. of nets
			Others	Bycatch limitations

Table 2.1.4. Allocated and used number of fishing days by fleet group under the fishing day system. Allocated number of days in 2008/09 for Groups 4A, 4B and 4T are here added together.

Fleet segment	Allocated days 2008/09	Used days 2008/09	% used days 2008/09	Allocated days 2009/10	Used days 2009/10	% used days 2009/10	Allocated days 2010/11	Used days 2010/11	% used days 2010/11	Allocated days 2011/12
Group 1 - inside the "ring"							900	534	59%	
Group 1 - outside the "ring"							1700	718	42%	1530
Group 2	4638	4065	88%	4406	4585	104%	4274	3179	74%	4657
Group 3	3095	2273	73%	2940	2078	71%	2852	1875	66%	2567
Group 4A	1393	415	30%	1323	426	32%	1323	312	24%	1058
Group 4B	1848	1016	55%	1756	1158	66%	1756	727	41%	1405
Group 4T	1621	1434	88%	1540	1382	90%	1540	966	63%	1385
Group 5A	7267	3256	45%	6904	3534	51%	5304	2856	54%	1386
Group 5B	10900	3803	35%	10355	6215	60%	7955	4525	57%	10607
Total	30762	16262	53%	29224	19378	66%	27604	15692	57%	24595

In the fiscal year 2011/2012 all trawlers are included in the sama group, here group 2.

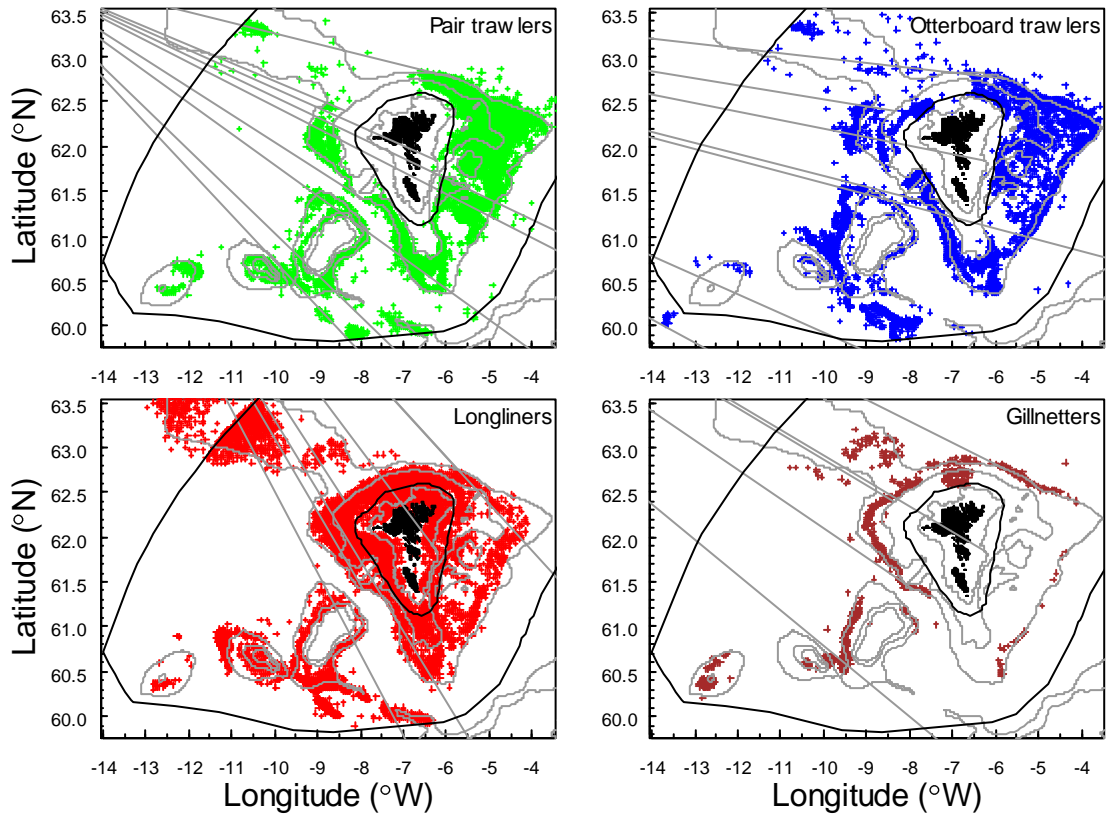
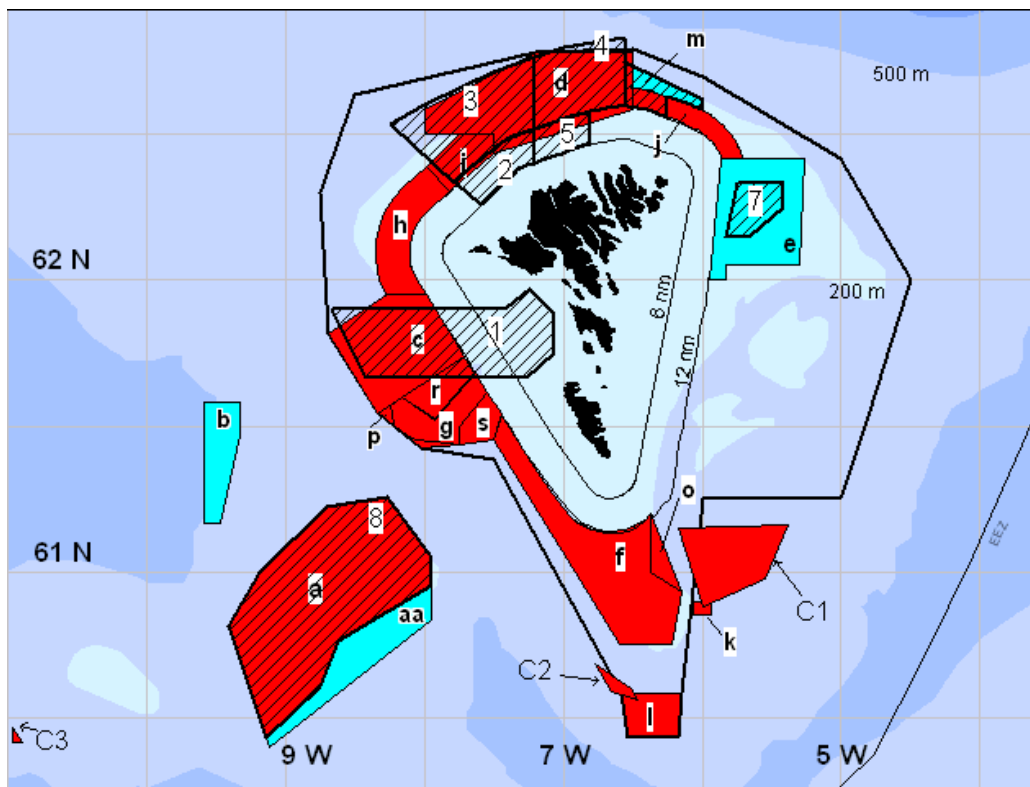


Figure 2.1.1. The 2010-2011 distribution of fishing activities by some major fleets. The longline fleet below 15 GRT is not shown here since they are not obliged to keep logbooks.



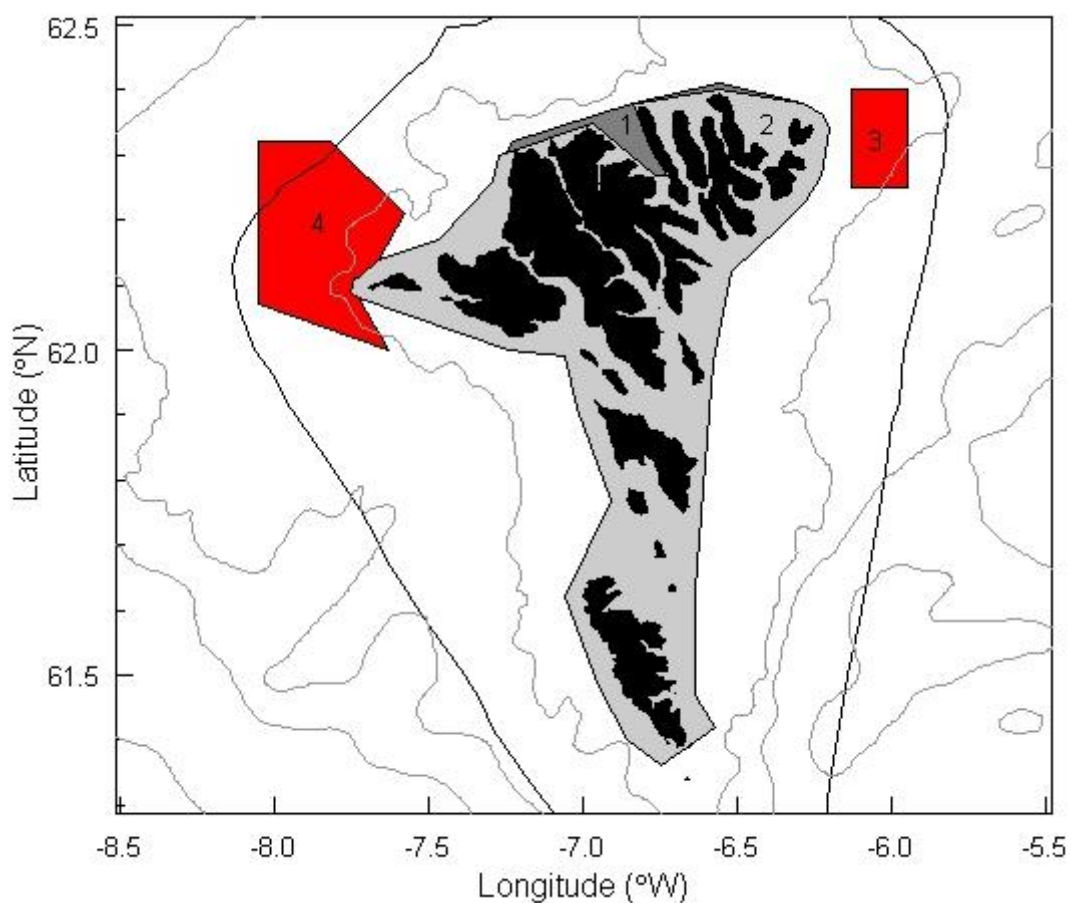
Exclusion zones for trawling

Area	Period
a	1 jan - 31 des
aa	1 jun - 31 aug
b	20 jan - 1 mar
c	1 jan - 31 des
d	1 jan - 31 des
e	1 apr - 31 jan
f	1 jan - 31 des
g	1 jan - 31 des
h	1 jan - 31 des
i	1 jan - 31 des
j	1 jan - 31 des
k	1 jan - 31 des
l	1 jan - 31 des
m	1 feb - 1 jun
n	31 jan - 1 apr
o	1 jan - 31 des
p	1 jan - 31 des
r	1 jan - 31 des
s	1 jan - 31 des
C1	1 jan - 31 des
C2	1 jan - 31 des
C3	1 jan - 31 des

Spawning closures

Area	Period
1	15 feb - 31 mar
2	15 feb - 15 apr
3	15 feb - 15 apr
4	1 feb - 1 apr
5	15 jan - 15 mai
6	15 feb - 15 apr
7	15 feb - 15 apr
8	1 mar - 1 may

Figure 2.1.2. Fishing area regulations in Division Vb. Allocation of fishing days applies to the area inside the outer thick line on the Faroe Plateau. Holders of effort quotas who fish outside this line can triple their numbers of days. Longliners larger than 110 GRT are not allowed to fish inside the inner thick line on the Faroe Plateau. If longliners change from longline to jigging, they can double their number of days. The Faroe Bank shallower than 200 m depths (a, aa) is regulated separate from the Faroe Plateau. It is closed to trawling and the longline fishery is regulated by individual day quotas.



Area	Period
1+2	1. Feb - 30. Apr
2	1. May - 31. Jan
3	1. Jan - 31. Dec
4	1. Jan - 31. Dec

Figure 2.1.3. New fishing area regulations in Division Vb introduced in 2011. These areas are closed to all fishing except for jiggers.

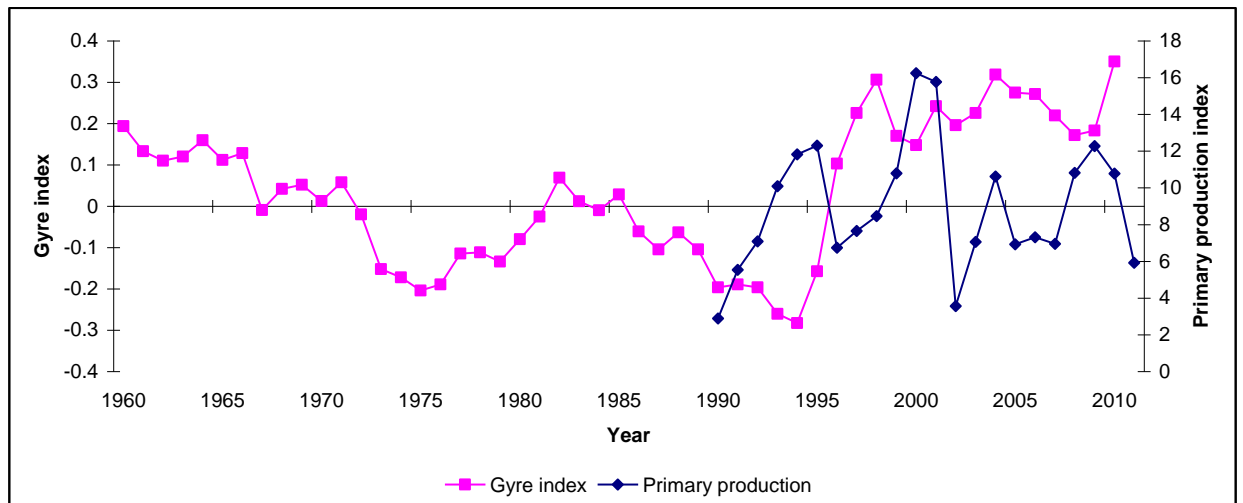


Figure 2.1.3. Temporal development of the phytoplankton index over the Faroe Shelf area (< 130 m) and the subpolar gyre index which indicates productivity in deeper waters.

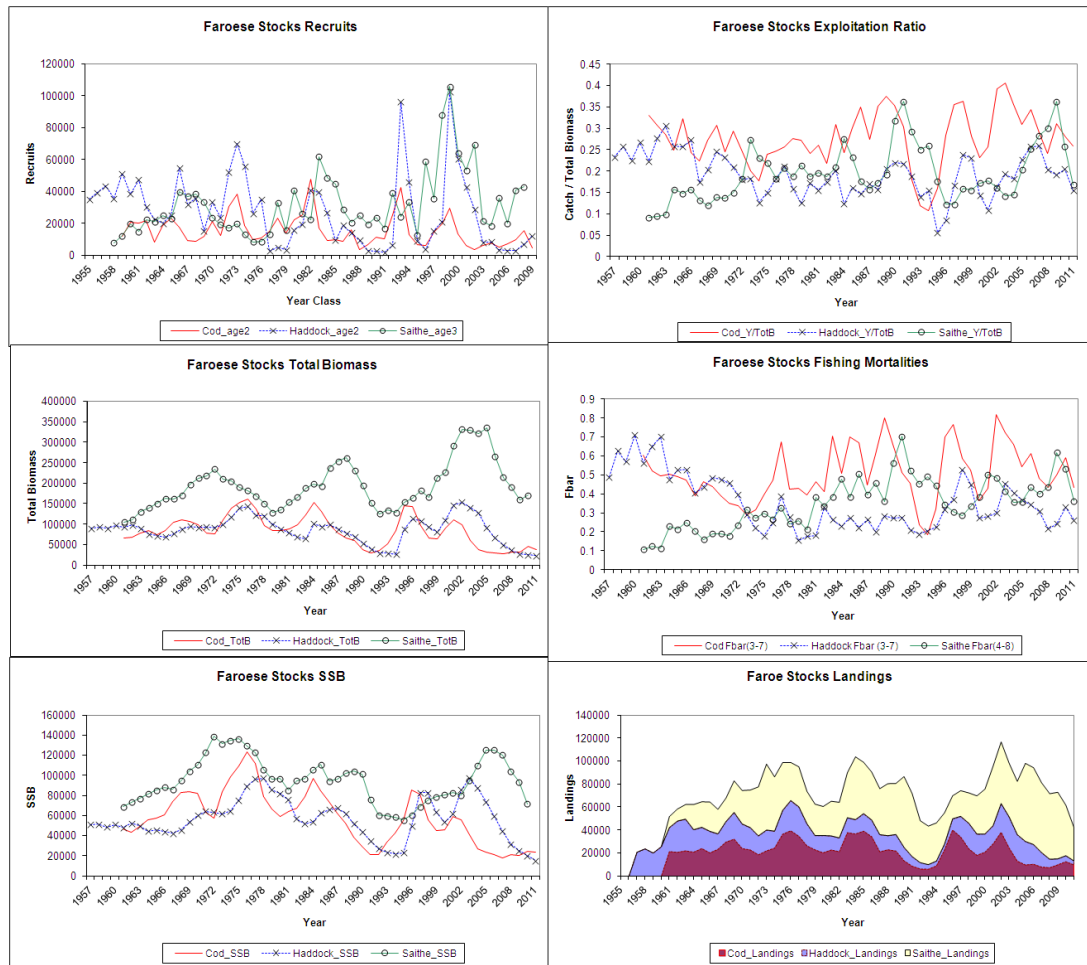


Figure 2.1.8. Faroe Plateau cod, Faroe haddock and Faroe saithe. 2012 stock summary.