

4 Blue Ling (*Molva dypterygia*) in the Northeast Atlantic

4.1 Stock description and management units

Biological investigations in the early 1980s suggested that at least two adult stock components were found within the area, a northern stock in Subarea 14 and Division 5.a with a small component in 5.b, and a southern stock in Subarea 6 and adjacent waters in Division 5.b. This was supported by differences in length and age structures between areas as well as in growth and maturity. Egg and larvae data from early studies also suggested the existence of many spawning grounds in each of areas of the northern and southern stocks and this was considered as indications of stock separation. However, in most areas small blue ling below 60 cm do not occur and fish appear in survey and commercial catch at 60–80 cm suggesting large spatial migrations and therefore limited population structuring. The conclusion is that stock structure of blue ling in the ICES area is uncertain.

As in previous years, in addition to one stock in Division 5.b and subareas 6 and 7 and one in Division 5.a and Subarea 14. All remaining areas (subareas 1, 2, 8, 9 and 12 and divisions 4.a and 3.a) are grouped as in a single stock unit, labelled "Northeast Atlantic" for advice purposes". Historical landing in subareas 1 and 2 and Division 4.a and 3.a have been significant. Whilst landings reported in 8 and 9, where the species does not occur, are now ascribed to the related Spanish ling (*Molva macrophthalmus*).

The situation in Subarea 12 is different as this subarea includes part of the Mid-Atlantic Ridge (ICES Divisions 12.a1, 12.a2, 12.a4 and 12.c) and the western slope of the Hatton Bank (ICES Division 12.b). Since 2012, none of these areas presented major landings. However, based upon the continuity of bathymetric features and lesser abundance, blue ling from the western Hatton Bank is likely to be related to those from the northern Hatton Bank (ICES Division 6.b) and blue ling from other divisions of Subarea 12 is likely to be related to those from Icelandic and east Greenland waters. At least this revised stocks units would be more consistent that the current stocks units where the "Northeast Atlantic" unit comprises two blocks separated by the two main stock units combines Subarea 12. Because of the much lesser landings from Subarea 12, compared to landings from the main stock unit areas, the assessment of the two main stocks would not be significantly impacted.

Historical total international landings show that blue ling have been exploited for long. Before the start of the time-series considered by WGDEEP, Norway landed 1000–2000t per year in the 1950s and 1960s. These landings might have been mainly from subareas 1 and 2. German landings starting in the 1950s were mainly reported in Statlant from ICES Division 5.a and 5.b. Since 1966, the main fishing countries have been the Faroe Islands, France, Germany, Iceland and Norway (Figure 4.1.1). Except in a few recent years where large amount were caught in Division 5.a, the stock unit of Division 5.b and subareas 6 and 7 have had the main contribution to total landings (Figure 4.1.2).

Blue ling forms spawning aggregations, i.e., blue ling is an aggregating species at spawning time. From 1970 to 1990, the bulk of the fisheries for blue ling were seasonal and targeted those aggregations which were thus subject to sequential depletion. Known spawning areas are shown in Figure 4.1.3. In Iceland, the depletion of one spawning aggregation in a few years was documented (Magnússon, 1995). To prevent depletion of adult populations temporal closures have been set in the Icelandic and EU EEZs as well as in the NEAFC RA.

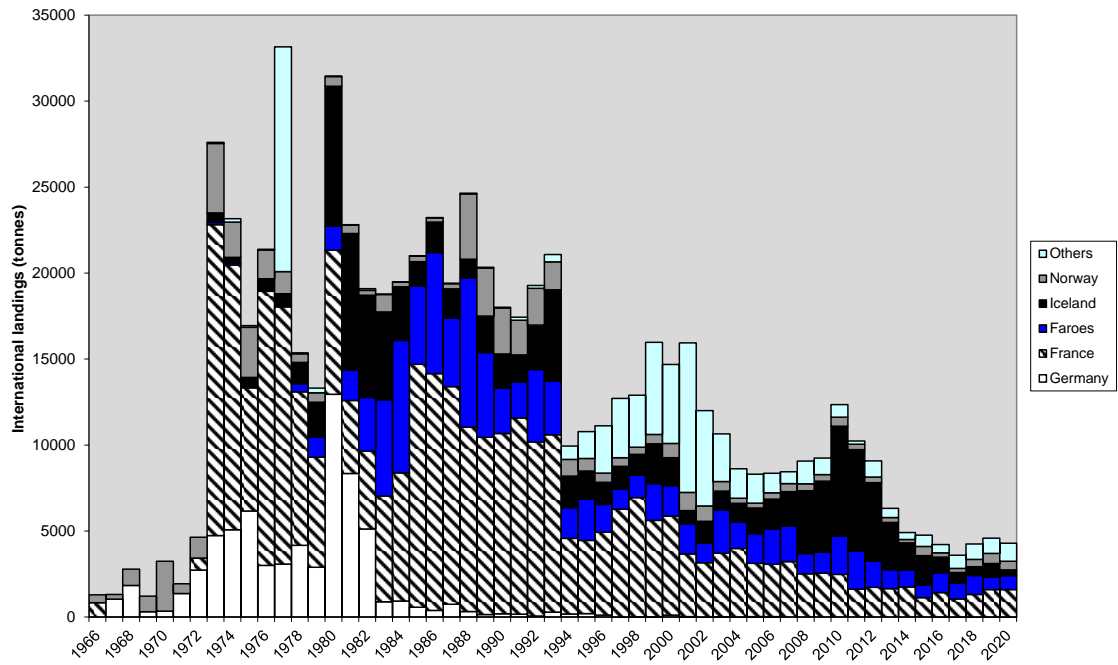


Figure 4.1.1. Total international landings of blue ling in the Northeast Atlantic, by country, 1966–2020.

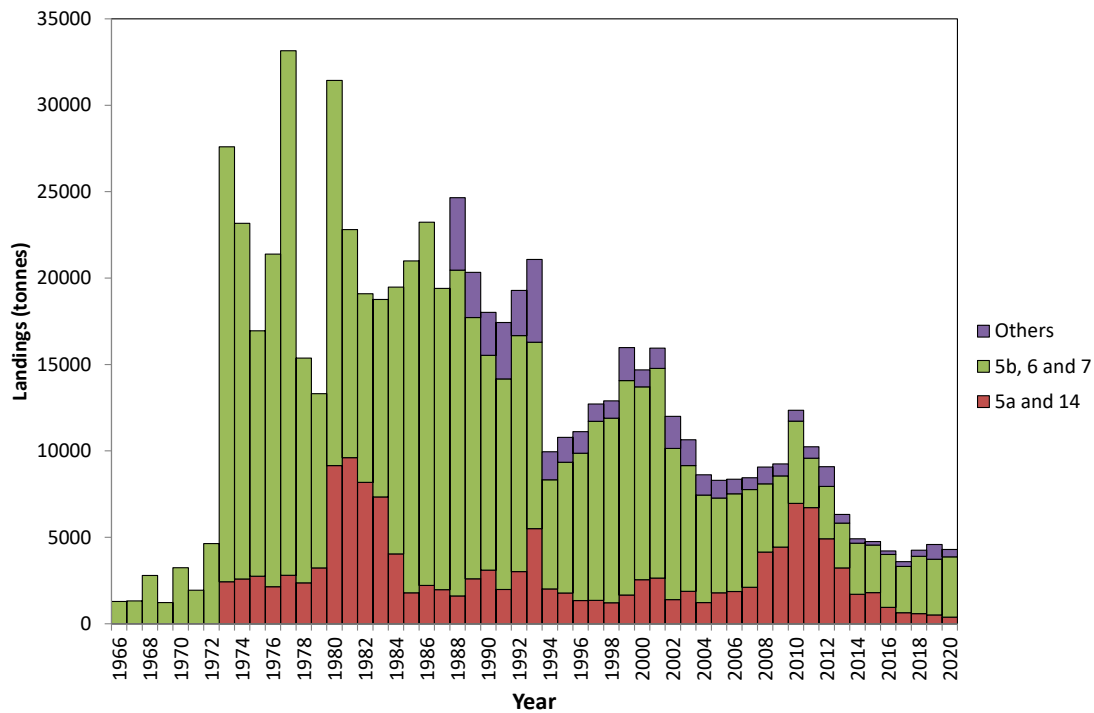


Figure 4.1.2. Total international landings of blue ling in the Northeast Atlantic, by stock unit, 1966–2020.

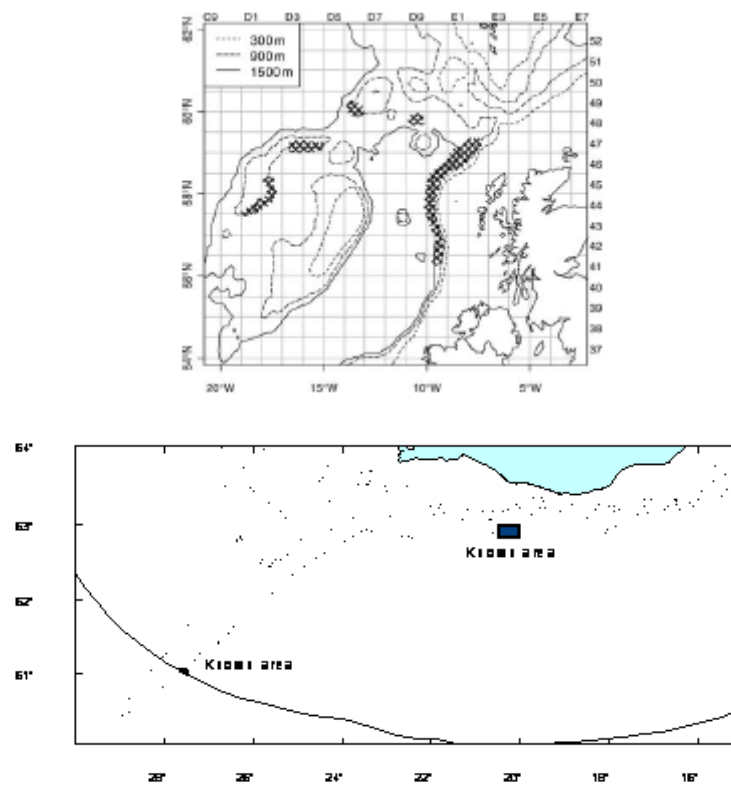


Figure 4.1.3. Known spawning areas of blue ling in Icelandic water (lower panel) and to the West of Scotland (upper panel, from Large *et al.*, 2010).

4.2 Blue ling (*Molva dypterygia*) in 5a and 14

4.2.1 Fishery

The geographical distribution of the Icelandic blue ling fisheries from 2000 to 2020 (Figure 4.2.1 and Figure 4.2.2), indicates an expansion of the fishery of blue ling to north-western waters. This increase may partly be the result of increased availability of blue ling in the north-western area.

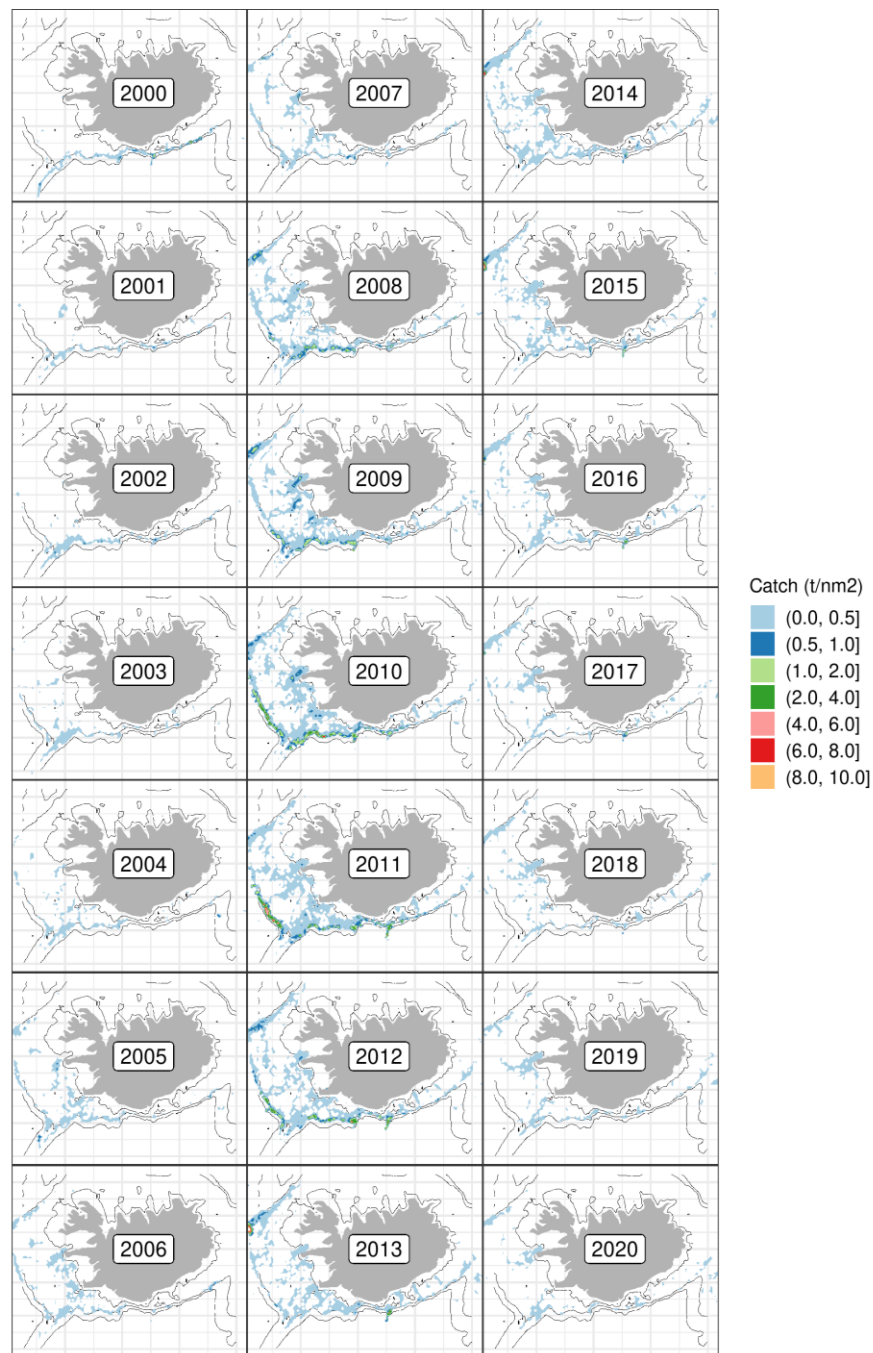


Figure 4.2.1. Blue ling in 5.a and 14. Geographical distribution of the Icelandic blue line fishery since 2000 as reported in logbooks. All gear types combined.

Before 2008, most blue ling catches were by trawlers, as bycatch in fisheries targeting Greenland halibut, redfish, cod and other demersal species (Table 4.2.1). Most of the catches by trawlers are

taken in waters shallower than 700 m and by longliners until 2008 mostly at depths shallower than 600 m.

After 2008 there was a substantial change in the fishery for blue ling (Table 4.2.1 and Figure 4.2.3). The proportion of catches taken by longliners increased from 7–20% in 2001–2007 to around 70% in 2011 as longliners started targeting blue ling.

In 2015–2020, the trend has reversed; the proportion of longline catches decreased to 20–30% and longliners started fishing in shallower waters. From 2008–2014, longline catches were mostly taken at depths greater than 500 m. Now, the depth distribution resembles the one observed before 2008, or at depths less than 400 m., (Figure 4.2.4).

Historically the fisheries in Subarea 14 have been relatively small but highly variable.

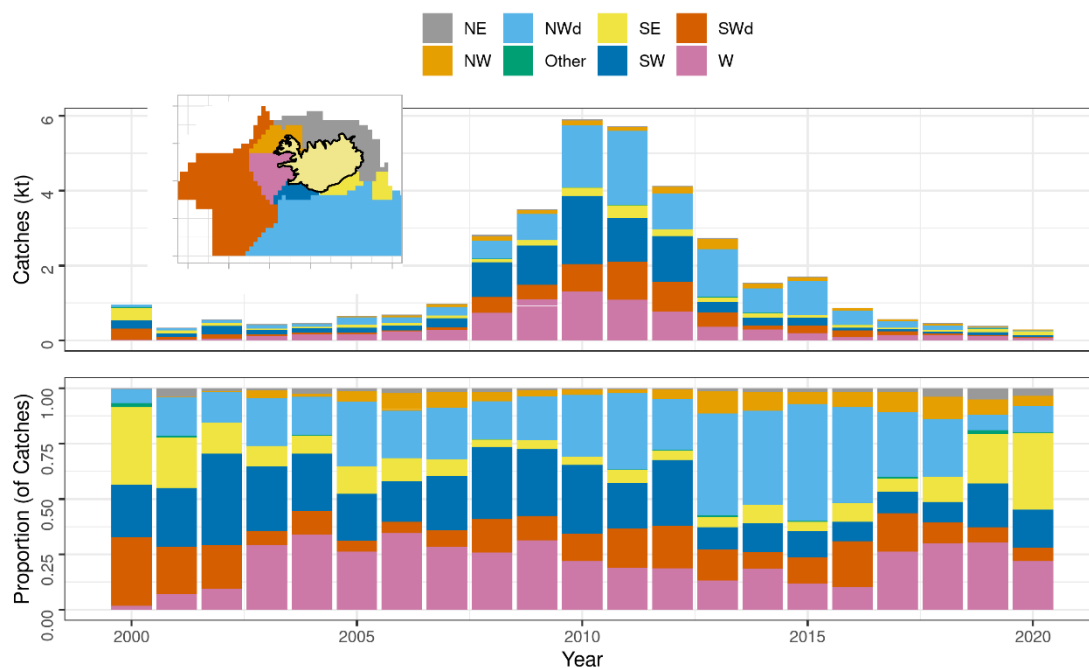


Figure 4.2.2: Blue ling in 5.a and 14. Catch distribution and proportions by area according to logbooks. All gears combined.

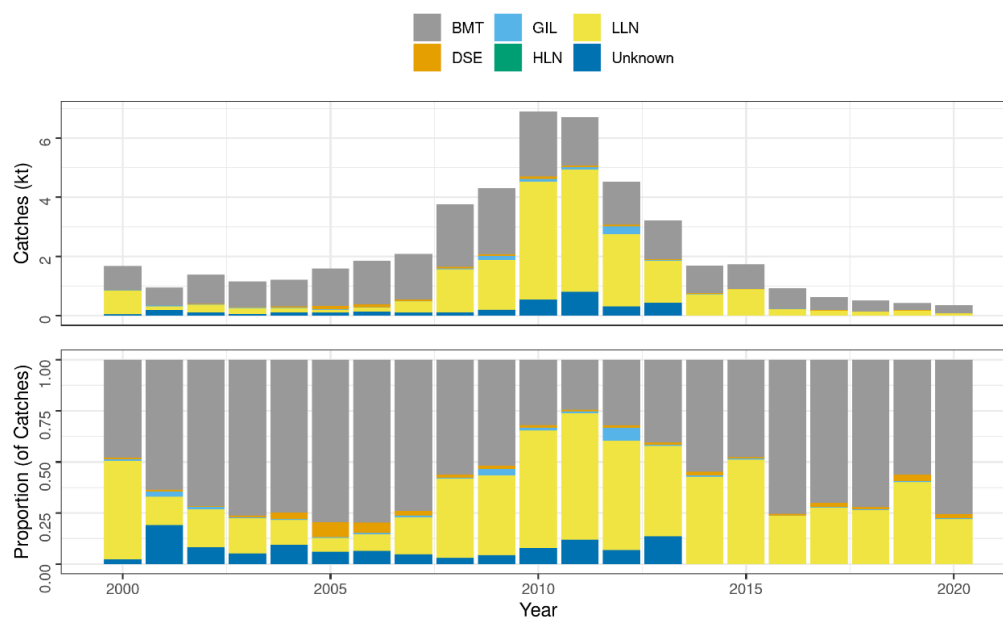


Figure 4.2.3: Blue ling in 5.a and 14. Total catch (landings) and proportion by fishing gear since 2000. according to logbooks.

In 2020, the total landings of the Icelandic fleet were 349 t (Table 4.2.1). Between 2006 and 2010, the catches of blue ling increased by more than 370%; the main part of this increases can be attributed to increased targeting of blue ling by the longline fleet. Since then, catches decreased substantially due to increased management procedures. Now, blue ling is mainly caught as by-catch in the redfish and Greenland halibut fisheries (Table 4.2.1).

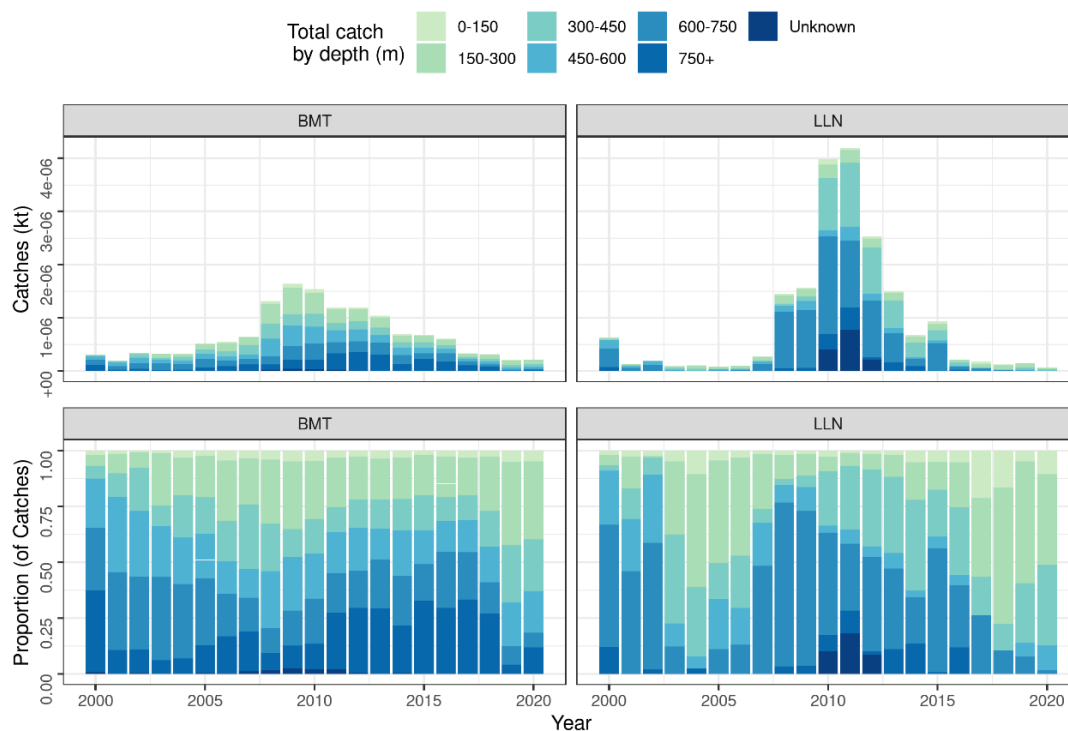


Figure 4.2.4: Blue ling in 5.a and 14. Depth distribution and proportion of longlines (LLN) (right) and trawls (BMT) (left) catches according to logbook entries.

4.2.2 Landings trend

In 2020, the preliminary total landings in ICES Division 5.a were 349 t of which the Icelandic fleet caught 343 t. (Table 4.2.2 and Figure 4.2.5). Catches of blue ling in ICES Division 5.a increased by more than 370% between 2006 and 2010, the main part of this increase can be attributed to increased targeting of blue ling by the longline fleet. Since then, catches in ICES Division 5.a decreased compared substantially due to increased management procedures (Table 4.2.1).

Total international landings from Subarea 14 (Table 4.2.2) have been highly variable over the years, ranging from a few tonnes in some years to around 3700 t in 1993 and 950 t in 2003. Most of the landings in 2003 were taken by Spanish trawlers (390 t). Since then, no further information is available on this fishery. The high landing values in Subarea are very occasional, and in most years, total international landings have been between 50 and 200 t. Preliminary landings in 2020 were 27 t.

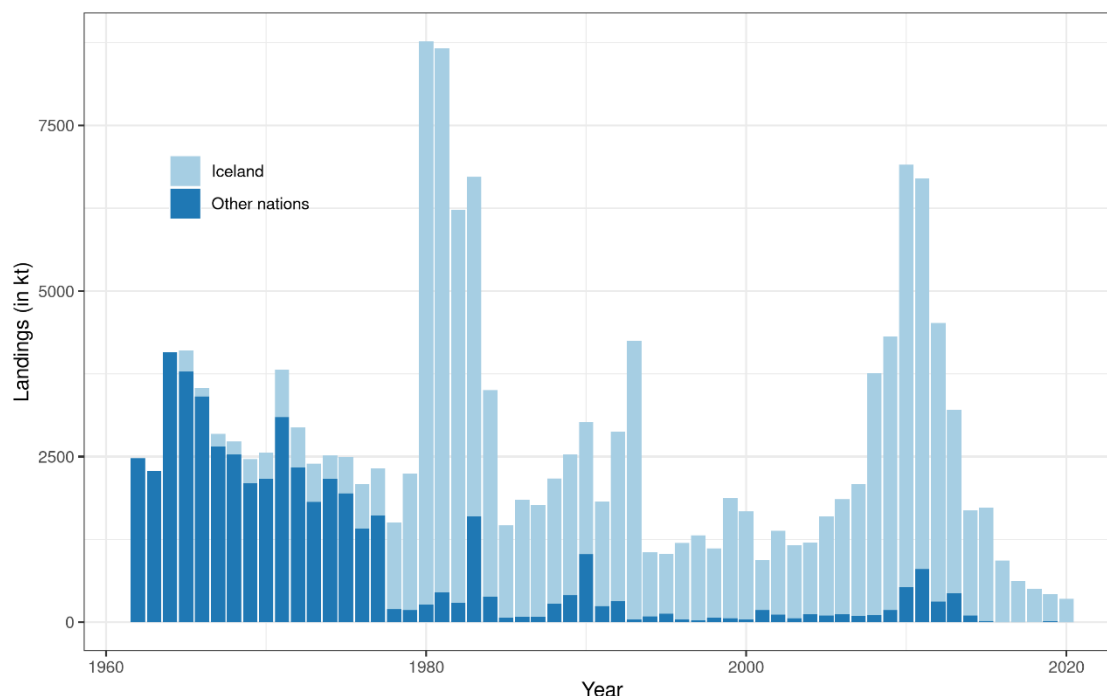


Figure 4.2.5: Blue ling in 5.a and 14. Nominal landings

4.2.3 ICES advice

The assessment presented above is based on the ICES DLS approach for category 3 stocks. The Icelandic autumn trawl survey (IS-SMH) was used as the index for the stock development. The advice is based on the ratio of the mean of the last two index values (index A) and the mean of the three preceding values (index B) multiplied by the last years advice. The index/ratio is estimated to have decreased by less than 20% and thus the uncertainty cap was not applied. The stock status relative to candidate reference points is unknown and the precautionary buffer was applied. The result is advice for 2021/2022 set at 349 t ($(840.6/976.7) \cdot 406$), which is a 14% decrease from last year's advice. The basis for the advice 2012/2020 was the following: The ICES framework for category 3.3 stocks was applied (ICES, 2012). The Icelandic autumn trawl survey was used together with the catch to calculate a harvest rate index. Based on this an F_{proxy} has been chosen from a reference period, 2002–2009, when the fishing pressure was relatively constant and the SSB increased steadily, which implies that the harvest was considered sustainable. The advice was based first on a comparison of the latest index value (index A) with the preceding value

(index B), combined with the Fproxy target (catch/survey biomass). When the index was estimated to have changed by more than 20% the uncertainty cap was applied. However, following the close of the WGDEEP working group meeting in 2019 and during the preparation of the draft advice for 2020, there were discussions about the appropriateness of using the Fproxy in deriving the advice. It was concluded that the recruitment estimates of recent years were much lower than those observed during the period used for the calculation of the Fproxy and that the Fproxy is likely no longer appropriate. Consequently, the ICES framework for category 3 stocks using survey trends was applied instead.

4.2.4 Management

Before the 2013/2014 fishing year the Icelandic fishery was not regulated by a national TAC or ITQs. The only restrictions on the Icelandic fleet regarding the blue ling fishery were the introduction of closed areas in 2003 to protect known spawning locations of blue ling, which are in effect. As of the 2013/2014 fishing year, blue ling is regulated by the ITQ system (regulation 662/2013) used for many other Icelandic stocks such as cod, haddock, tusk and ling.

The TAC for the 2018/2019 fishing year was set at 1520t based on the recommendations of MFRI using the same advisory procedure as for ICES category 3 stocks. The difference between national TAC and landed catch in Icelandic waters can be attributed to species transformation which for blue ling is only from blue ling to other species and not vice versa as for other species in the ITQ system (Figure 4.2.6).

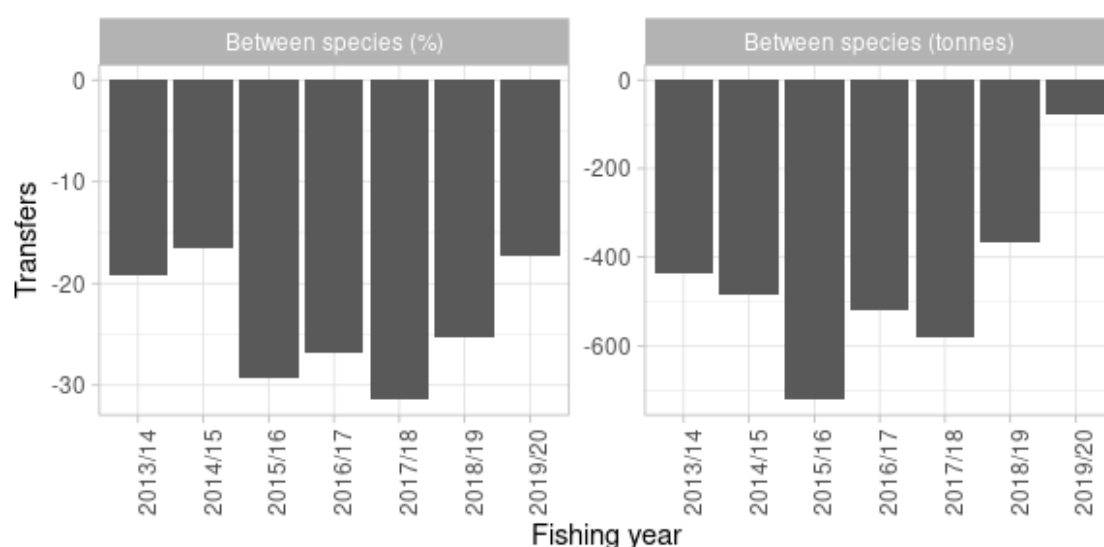


Figure 4.2.6: Blue ling in 5.a and 14. Net transfer of quota, from blue ling to other species, in the Icelandic ITQ system by fishing year.

4.2.5 Data available

In general sampling is considered adequate from commercial catches from the main gears (long-lines and trawls). The sampling does seem to cover the spatial distribution of catches for long-lines and trawls. Similarly, sampling does seem to follow the temporal distribution of catches (WGDEEP 2012).

4.2.5.1 Landings and discards

Landings data are given in Table 4.2.4 and Table 4.2.2. Discarding is banned in the Icelandic fishery. There is no available information on discarding of blue ling. Being a relatively valuable

species and not being subjected to TAC constraints prior to 2013/2014 fishing year nor minimum landing size there should be little incentive to discard blue ling.

4.2.5.2 Length composition

Length distributions from the Icelandic trawl and longline catches for the period 2005–2020 are shown in Figure 4.2.8. No length measures were called for from commercial catches in 2017. In 2020, only three sample were collected from commercial catch; one from long line and two from bottom trawls and does therefore not cover the spatial distribution of catches (Figure 4.2.7, Table 4.2.5).

Mean length from catches increased from 86 cm in 2005 to 103 cm in 2018. On average mean length from longlines is higher than from trawls.

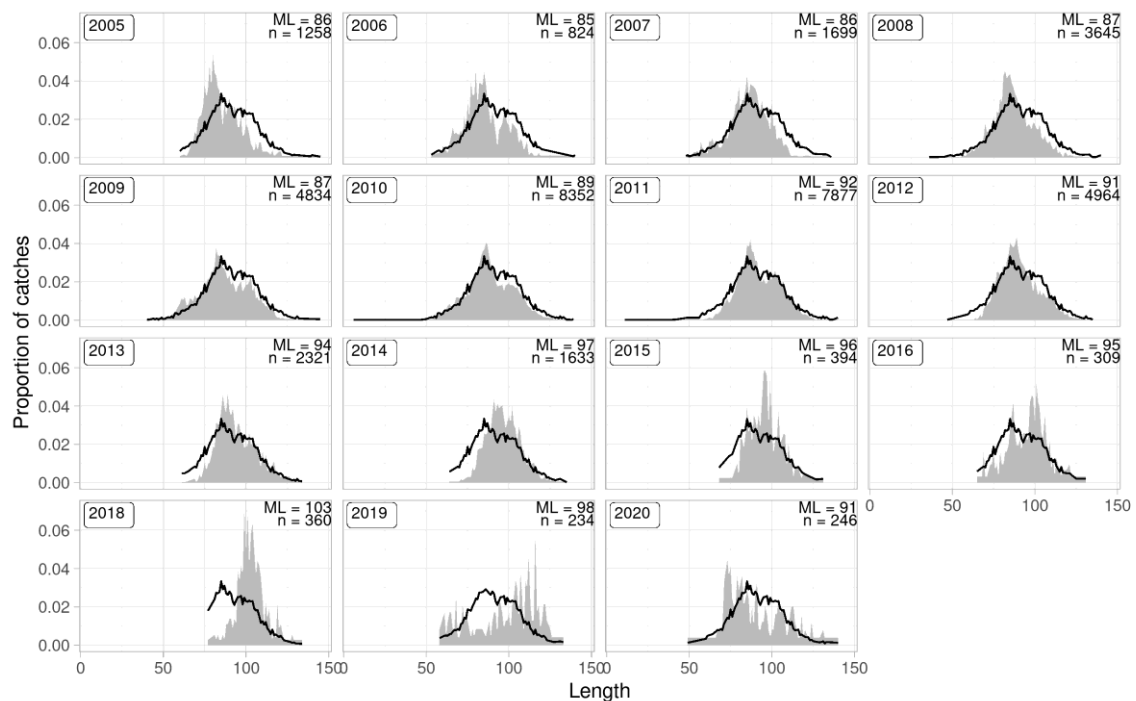


Figure 4.2.7: Blue ling in 5a. Length distribution of blue ling from trawls (grey area) and longlines (red lines) of the Icelandic fleet since 2004. No data available in 2017.

4.2.5.3 Age composition

No new data were available. Existing data are not presented due to the difficulties in the ageing of this species.

4.2.5.4 Weight-at-age

No new data were available. Existing data are not presented because of difficulty in ageing.

4.2.5.5 Maturity and natural mortality

Length at 50% maturity is estimated at roughly 77 cm and the range for 10–90% maturity is 65–90 cm. No information is available on natural mortality (M)

4.2.5.6 Catch, effort and survey data

Effort and nominal CPUE data from the Icelandic trawl and longline fleet are given in Figure 4.1.9. Due to changes in the fishery (expansion into new areas, fleet behaviour, etc.) and technical

innovations CPUE is not considered a reliable index of biomass abundance of blue ling and therefore no attempt has been made to standardize the series.

However, looking at fluctuations in CPUE may be informative regarding the development of the fishery. CPUE from longlines was high from 2008 to 2013 but has decreased markedly since then. CPUE from trawls has been gradually decreasing in the period.

Effort from longlines peaked in 2009 but has since then decreased sharply. Effort from trawls peaked in 2011 but has remained relatively stable since. Non-standardised estimates of CPUE (left) and fishing effort (right) from longlines and trawls, based on logbook data where blue ling was recorded in catches.

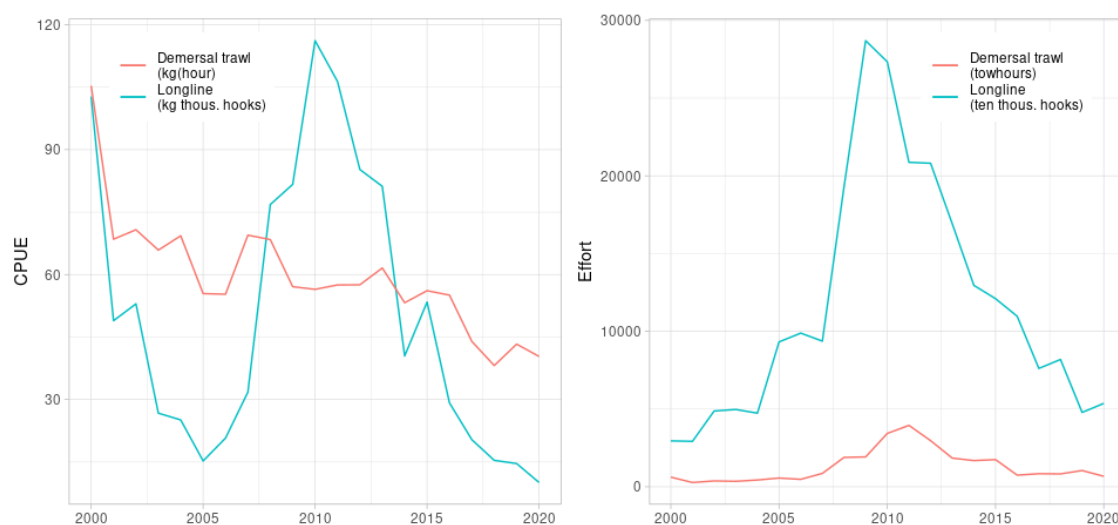


Figure 4.2.8: Blue ling in 5.a and 14. Nominal CPUE and effort from longlines (blue line) and trawls (red line) in 5.a based on logbook data where blue ling was either recorded in catches or above certain level.

Time-series stratified abundance and biomass indices from the spring (G3239) and autumn (G4493) trawl surveys are shown in Figure 4.2.9.

The length distributions from the autumn survey and its spatial distribution are presented in Figure 4.2.10 and Figure 4.2.11. Due to industrial action in 2011 the autumn survey was cancelled after about one week of survey time. Therefore, no estimates are presented for 2011.

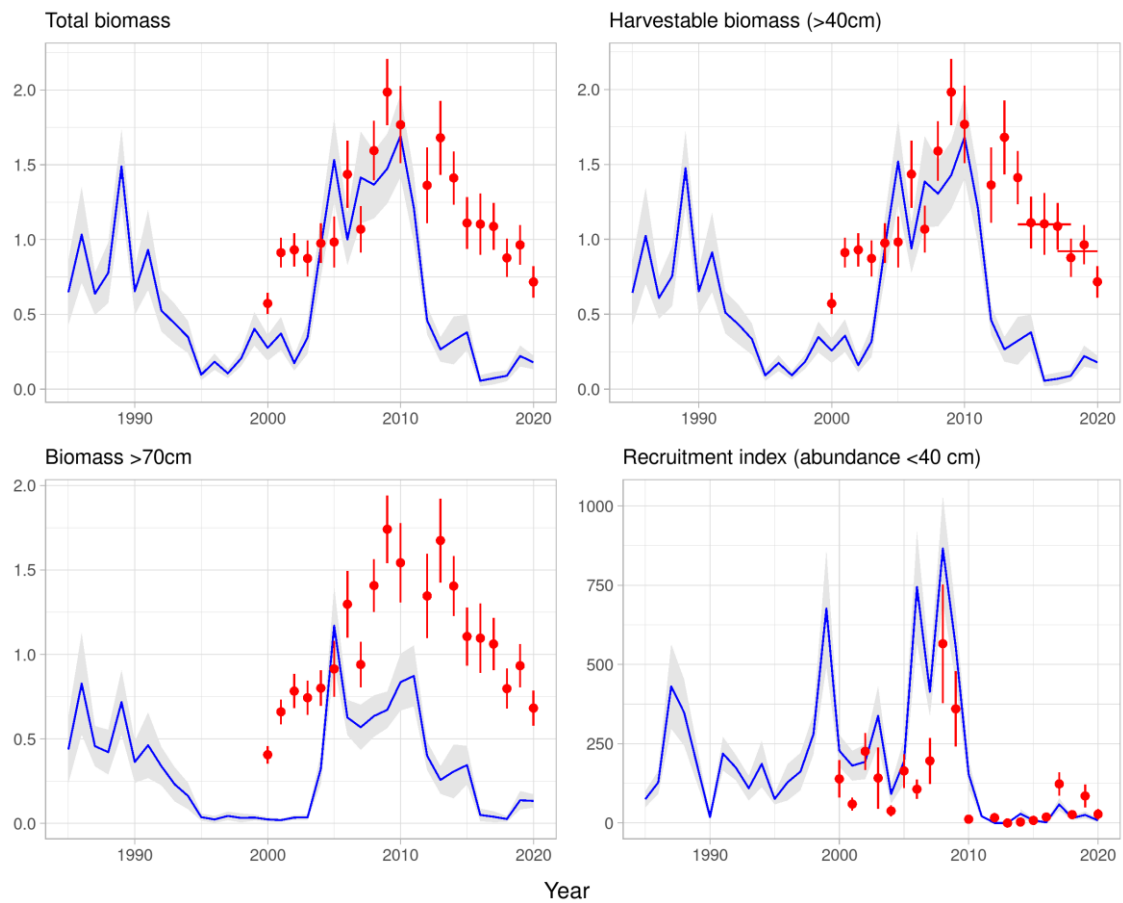


Figure 4.2.9: Blue ling in 5.a and 14. Abundance indices for blue ling in the Icelandic autumn survey since 2000 (red points and vertical lines) and the spring survey since 1985 (faded lines and shaded area). Total biomass index (top-left), biomass of 40 cm and larger (top-right), biomass of 70 cm and larger (bottom-left) and abundance - standard error of the estimate.

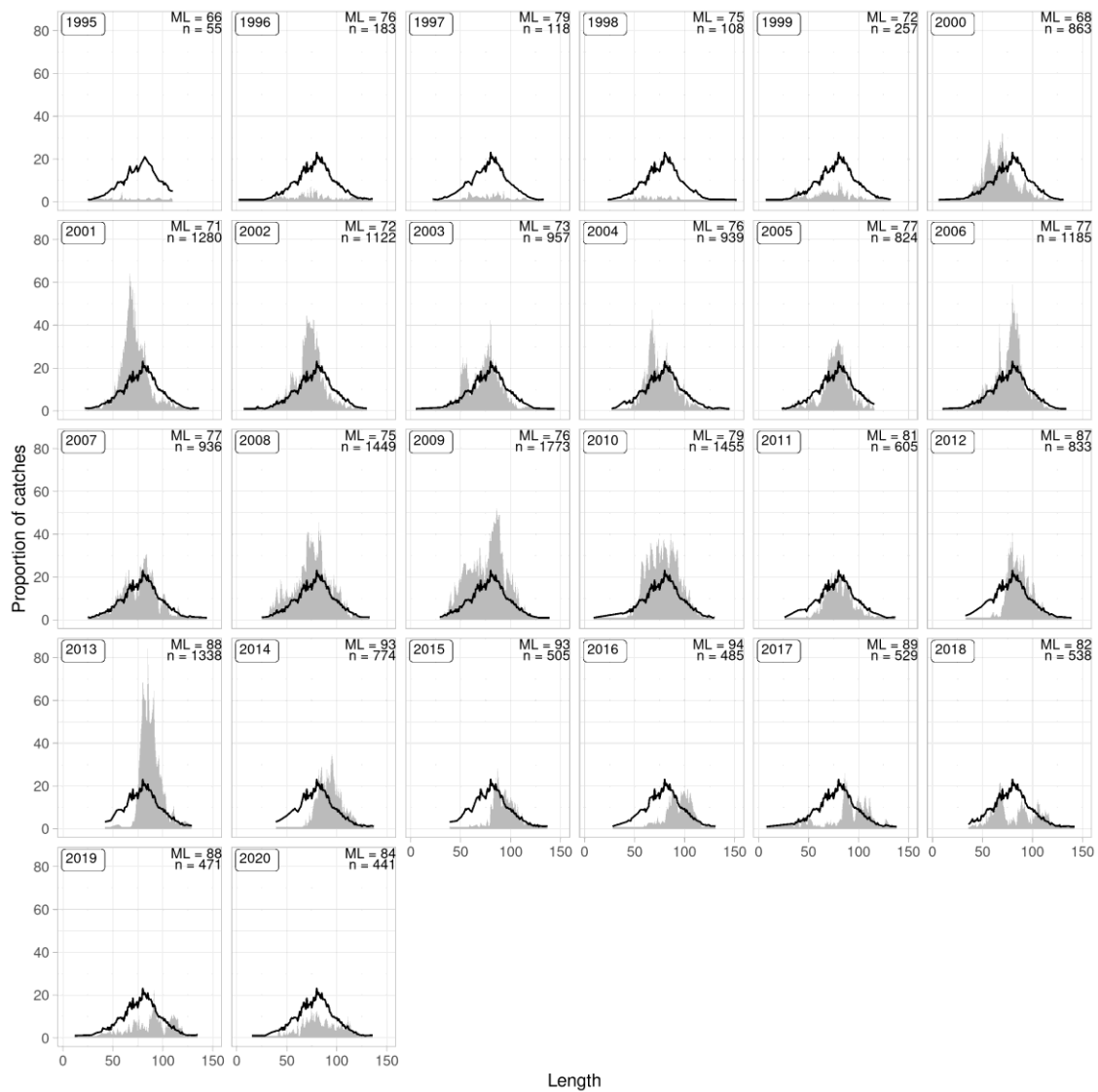


Figure 4.2.10: Blue ling in 5.a and 14. Length distribution from the Icelandic autumn survey since 1995. Black line is the average by length over the displayed period.

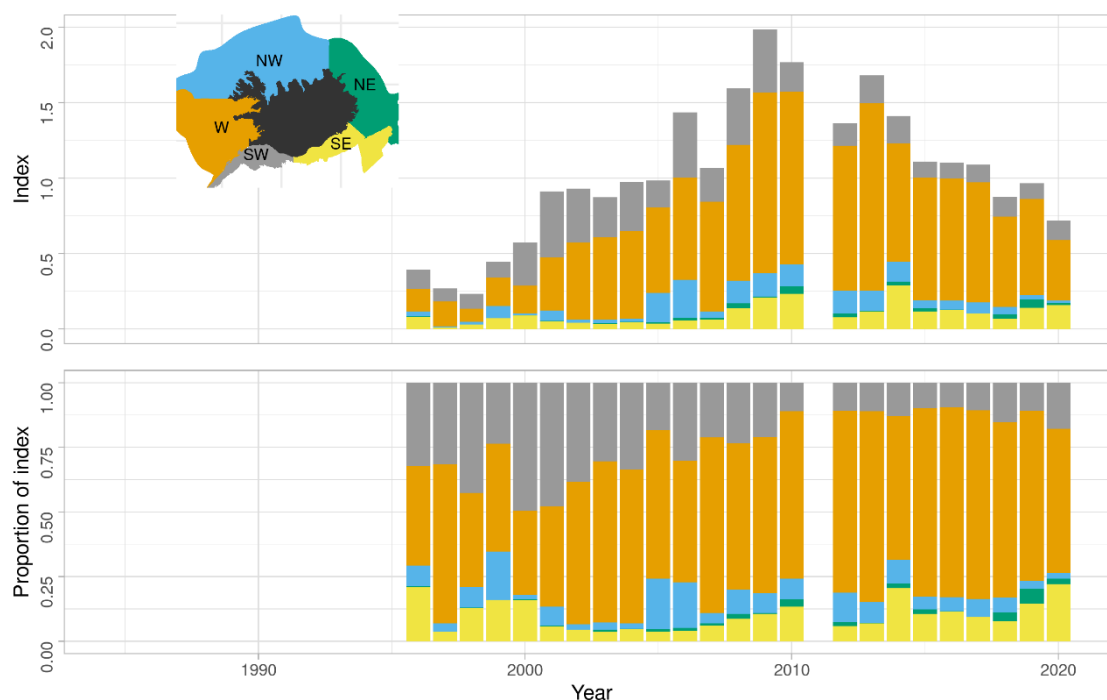


Figure 4.2.11: Blue ling in 5.a and 14. Spatial distribution of biomass index from the Icelandic autumn survey in 1996-2020.

4.2.6 Data analysis

Landings and sampling

Catches from the Icelandic longline fleet increased rapidly from 2007–2010 resulting in a rapid expansion of the fishing area and change in the selectivity of the fishery although there are now strong indications since 2012 that this may have reversed (Table 4.2.1).

In 2005 longliners caught 102 tonnes of blue ling when trawlers caught 1260 tonnes or 83% of the total catches (1505 tonnes). In 2011 trawlers caught 1618 tonnes, out of 5900 tonnes or 23%, but longliners 4138 tonnes or 70%. Since then, the proportion taken by longliners has decreased and in 2020 longliners caught 70 or 20.5% of the catches, trawls 264 or 77% and other gear 8, or 2.5%. As longliners take on average larger specimens of blue ling, this will have resulted in an overall change in the selection pattern in 2006–2015.

Total catches by the Icelandic fleet decreased between 2010 and 2013 and this decrease is mainly the result of decrease in trawls fishing activity in 2011 and longlines in 2012 and 2013. The expansion of the longline fleet to deeper waters (Figure 4.2.4) may be the result of decreased catch rates in shallower areas.

CPUE and effort: CPUE indices from commercial catches are not considered a reliable index of stock abundance. The rapid CPUE increase from longlines should not be viewed as an increase in stock biomass but rather as the result of increased interest by the longline fleet and its expansion into deeper waters (Figure 4.2.8). In 2011 to 2012 there was a slight decrease in CPUE from longline but the CPUE increased again in 2013 to its highest value in the time-series. CPUE from trawling has remained at low levels while effort increased until about 2009 after which it has decreased (Figure 4.2.8).

Surveys The spring survey covers only the shallower part of the depth distributional range of blue ling and shows high interannual variance (Figure 4.2.11). It is thus unknown to what extent the spring indices reflect actual changes in total blue ling biomass, given that it does not cover

the depths were largest abundance of blue ling occur. It is however not driven by isolated large catches at a few survey stations. The shorter autumn survey, which goes to greater depths and is therefore more likely to reflect the true biomass dynamics, does indicate that there was an increase in blue ling biomass 2007–2009 (Figure 4.2.11). Since 2010 the biomass index has decreased to similar levels as observed in 2002–2005. A large increase of more than 200% in the recruitment index was observed in 2008 but in the 2010 it had decreased again to its lowest observed value and has not increased again for nine years, with the exception of 2017, when an increase was observed (Figure 4.2.10 and Figure 4.2.11). As a result, mean length measured in the autumn survey has been higher after 2009 than it was before. Due to industrial action, only part of the autumn survey was conducted in 2011.

Fproxy Relative fishing mortality ($F_{\text{proxy}} = \text{Yield}/\text{Survey biomass index}$) derived from the autumn survey (+40 cm) and the combined catches from Iceland and Greenland, indicates that fishing mortality may have increased by more than 150% between 2006–2010 (Figure 4.2.13 and Table 4.1.6). Since then, there are indications that it has decreased by similar percentage between 2012 and 2014, to the same levels as observed in 2002 and 2009 but has decreased even further in 2015–2017.

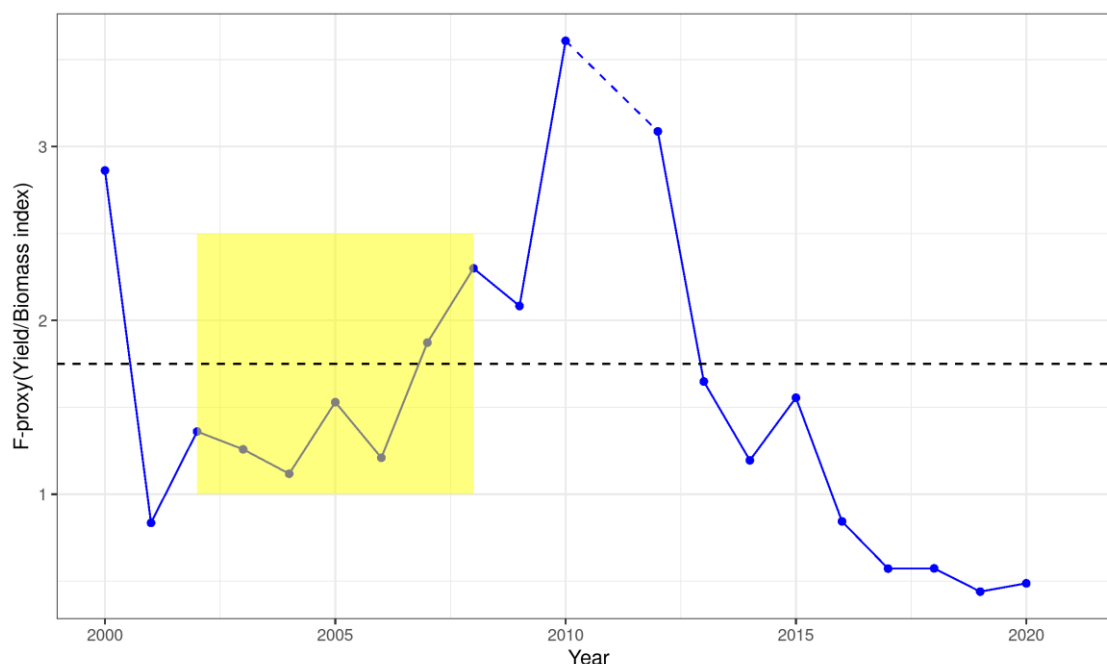


Figure 4.1.12: Blue ling in 5.a and 14. Changes in relative fishing mortality (Yield/Survey biomass >39 cm). The yellow box highlights the reference period used as basis for the advice in 2012–2020, and the horizontal dotted line used to be the target Fproxy.

Analytical assessment *Exploratory stock assessment on blue ling using gadget*

An exploratory stock assessment of blue ling using the Gadget model was presented at WGDEEP 2012. Updated results of the model were not presented at WGDEEP 2021.

4.2.6.1 Comments on the assessment and advice

The assessment of this stock is based on the ICES DLS approach for category 3 stocks. The Icelandic autumn trawl survey (IS-SMH) was used as the index for the stock development. The advice is based on the ratio of the mean of the last two index values (index A) and the mean of the three preceding values (index B) multiplied by last year's advice. The index/ratio is estimated to have decreased by 20% and thus the uncertainty cap was not applied.

The result is advice for 2021/2022 set at 349 t $((840.6/976.7)*406)$, which is a 14% decrease from last year's advice. The Icelandic autumn trawl survey was used together with the catch to calculate a harvest rate index. Based on this an Fproxy has been chosen from a reference period, 2002–2009, when the fishing pressure was relatively constant and the SSB increased steadily, which implies that the harvest was considered sustainable. However, following 2019 WGDEEP there were discussions about the appropriateness of using the Fproxy in deriving the advice. It was concluded that the recruitment estimates of recent years were much lower than those observed during the period used for the calculation of the Fproxy and that the Fproxy is likely no longer appropriate.

4.2.7 Management considerations

Landings have decreased considerably in the last year and as blue ling is now part of the ITQ system such a rapid increase in landings as observed between 2006 and 2011 is unlikely. Blue ling is caught in mixed fisheries by the trawler fleet, mainly targeting redfish and Greenland halibut. After the inclusion of blue ling in the ITQ system the longliners have shifted from a directed fishery to a more mixed fishery for the species. Because of the restrictions of the TAC the implications of low blue ling TAC for the trawlers can be considerable, although the species is a low percentage in their catches. Recruitment index from the autumn survey indicates very little recruitment to the stock since 2010, resulting in a truncated length distribution from both the survey and commercial catches. Closure of known spawning areas should be maintained and expanded where appropriate.

Table 4.2.1: Blue ling in 5.a and 14. Number of Icelandic boats with blue ling landings and their total landings in 5a.

Year	Bottom trawl	Gill nets	Longlines	Other	Bottom trawl	Gill nets	Longlines	Total catch
2000	797	13	808	17	102	18	44	1635
2001	573	24	131	35	94	27	39	763
2002	961	15	256	33	88	14	41	1265
2003	869	6	197	26	88	14	47	1098
2004	869	5	145	65	98	19	53	1084
2005	1242	8	108	138	94	16	60	1496
2006	1441	13	151	129	93	16	69	1734
2007	1483	22	374	116	88	24	90	1995
2008	2082	28	1454	90	82	25	92	3654
2009	2076	136	1677	241	77	30	87	4130
2010	1904	91	3978	405	73	30	96	6378
2011	1381	76	4140	307	67	24	96	5904
2012	1306	274	2425	201	67	22	78	4206
2013	1113	14	1420	220	64	20	71	2767

Year	Bottom trawl	Gill nets	Longlines	Other	Bottom trawl	Gill nets	Longlines	Total catch
2014	763	11	622	192	60	15	73	1588
2015	736	9	868	99	59	18	76	1712
2016	641	3	213	68	62	11	53	925
2017	381	1	169	67	56	8	52	618
2018	338	2	132	30	63	6	59	502
2019	238		161	25	57	8	53	416
2020	264	1	70	7	58	9	46	343

Table 4.2.2: Blue ling in 5.a and 14 and 14.b.Landing in ICES Division 14. Source: STATLANT database and WD02 (Annex 2).

YEAR	FAROE	GERMANY	GREENLAND	ICELAND	NORWAY	RUSSIA	SPAIN	UK	DENMARK	TOTAL
1983	0	621	0	0	0	0	0	0	0	621
1984	0	537	0	0	0	0	0	0	0	537
1985	0	315	0	0	0	0	0	0	0	315
1986	214	149	0	0	0	0	0	0	0	363
1987	0	199	0	0	0	0	0	0	0	199
1988	21	218	3	0	0	0	0	0	0	242
1989	13	58	0	0	0	0	0	0	0	71
1990	0	64	5	0	0	0	0	10	0	79
1991	0	105	5	0	0	0	0	45	0	155
1992	0	27	2	0	50	0	0	32	0	111
1993	0	16	0	3124	103	0	0	22	0	3265
1994	1	15	0	300	11	0	0	57	0	384
1995	0	5	0	117	0	0	0	19	0	141
1996	0	12	0	0	0	0	0	2	0	14
1997	1	1	0	0	0	0	0	2	0	4
1998	48	1	0	0	1	0	0	6	0	56
1999	0	0	0	0	1	0	66	7	0	74
2000	0	1	2	4	0	0	889	2	0	898
2001	1	0	1	11	61	0	1631	6	0	1711

YEAR	FAROE	GERMANY	GREENLAND	ICELAND	NORWAY	RUSSIA	SPAIN	UK	DENMARK	TOTAL
2002	0	0	0	11	1	0	0	0	0	12
2003	0	0	3	0	36	0	670	5	0	714
2004	0	0	7	0	1	0	0	7	0	15
2005	2	0	6	0	1	0	176	8	0	193
2006	0	0	6	0	3	1	0	0	0	10
2007	19	0	1	0	1	0	0	0	0	21
2008	1	0	5	0	2	0	381	0	1	390
2009	1	0	5	0	3	0	111	4	0	124
2010	1	0	8	0	9	0	34	0	3	55
2011	0	0	8	0	2	0	0	1	6	17
2012	0	0	13	367	9	0	0	0	3	392
2013	0	0	16	0	0	0	0	3	9	28
2014	0	0	14	0	3	0	0	0	0	17
2015	0	0	66	0	1	0	0	0	5	72
2016	0	0	9	0	0	0	0	0	7	16
2017	0	0	12	0	4	0	0	0	3	19
2018	0	0	34	0	12	0	0	0	5	51
2019	0	7	20	0	36	0	0	0	0	62
2020	0	7	18	0	2	0	0	0	0	27

Table 4.2.3: Blue ling in 5.a and 14. Advised TAC, national TAC and total landings since the quota year 2013/2014.

Fishing Year	MFRI Advice	National TAC	Iceland	Others	Landings
2013/14	2400	2400	1653	101	1754
2014/15	3100	3100	1898	41	1939
2015/16	2550	2550	1734	90	1828
2016/17	2032	2032	932	23	955
2017/18	1956	1956	554	79	592
2018/19	1520	1520	424	62	424
2019/20	483	483	371	5	376

Fishing Year	MFRI Advice	National TAC	Iceland	Others	Landings
2020/21	406	406			
2021/22	349				

Table 4.2.4: Blue ling in 5.a and 14.: Landings from Icelandic fishing grounds (5a)

Year	Faroe	Germany	Iceland	Norway	UK
2002	28	4	1264	74	10
2003	16	16	1098	6	24
2004	38	9	1083	49	27
2005	24	31	1496	20	26
2006	63	22	1734	27	11
2007	78		1995	4	13
2008	88		3653	21	
2009	178		4129	5	
2010	515		6378	13	
2011	797		5904	2	
2012	312		4207	2	
2013	435		2769	2	
2014	70		1588	30	
2015	12		1712	4	
2016	6		925		
2017	4		619		
2018	28		502		
2019	28		415	4	
2020	6		343	0.1	

Table 4.2.5: Blue ling in 5.a and 14. Catches along with survey biomass index (larger than 40 cm) from the Icelandic Autumn survey and the calculated Fproxy (Catches in Iceland and Greenland)/Index)

Year	Iceland	Greenland	Index	Fproxy
2000	1635.876	896	566.3	4.4709094
2001	761.809	1710	911.9	2.7106141
2002	1264.674	12	929.4	1.3736540
2003	1098.029	711	872.7	2.0729105
2004	1089.908	8	975.0	1.1260595
2005	1502.326	187	982.0	1.7202912
2006	1736.037	4	1435.0	1.2125693
2007	1998.092	20	1067.3	1.8908386
2008	3653.183	385	1588.8	2.5416560
2009	4129.245	119	1982.5	2.1428726
2010	6377.866	47	1767.7	3.6345907
2012	4206.665	379	1362.6	3.3653787
2013	2769.869	28	1680.4	1.6650018
2014	1687.642	17	1412.1	1.2071680
2015	1727.363	72	1110.7	1.6200261
2016	930.790	16	1103.2	0.8582215
2017	622.257	19	1087.0	0.5899328
2018	502.955	17	877.1	0.5928115
2019	423.983	62	963.9	0.53215
2020	349.307	27	716.4	0.5252750

4.3 Blue Ling (*Molva dypterygia*) in Division 5.b and subareas 6 and 7

4.3.1 The fishery

In the last decade, the main fisheries have been from French, Faroese and Scottish trawlers. Faroese vessels have been fishing almost exclusively in ICES Division 5.b, French and Scottish vessels have been mostly fishing in in ICES Division 6.a, with a smaller catch in in ICES Division 5.b from French trawlers. Scottish vessels have been catching an increasing proportion of annual international landings. The two other countries, which contribute notably to the total catch are Norway and Spain. Total international landings from Subarea 7 are small and are mostly bycatches in other fisheries. There used to be more fishing in divisions 7.bc, but these have declined to very small bycatch in recent years.

Landings by Faroese trawlers are mostly taken in the spawning season. Historically, this was also the case for French trawlers fishing in in ICES Division 5.b and 6.a. However, since the 2000s blue ling has been taken round the year together with roundnose grenadier and black scabbardfish, as well as deep-water sharks until 2009. Since 2016 trawling is banned deeper than 800 m, whilst blue ling is abundant down to at least 1200 m.

In 2019, 94.2 % of the landings were from bottom trawlers and 5.8% from longliners. In 2020, the contribution of longliners increased to 9%. As in previous years, all Norwegian catch were from longliners. The Spanish fleet as a component of longliners, which represented one quarter of Spanish catches in 2019.

4.3.2 Landings trends

See the stock annex for the time-series of landings from 1966 to 1999. Total international landings from Division 5.b (Tables 4.3.1a–f, Figure 4.3.1 and stock annex) peaked in the late 1970s at around 21 000 t and then declined until 2010. Thereafter landings have oscillated between 1000 and 1700 tonnes per year.

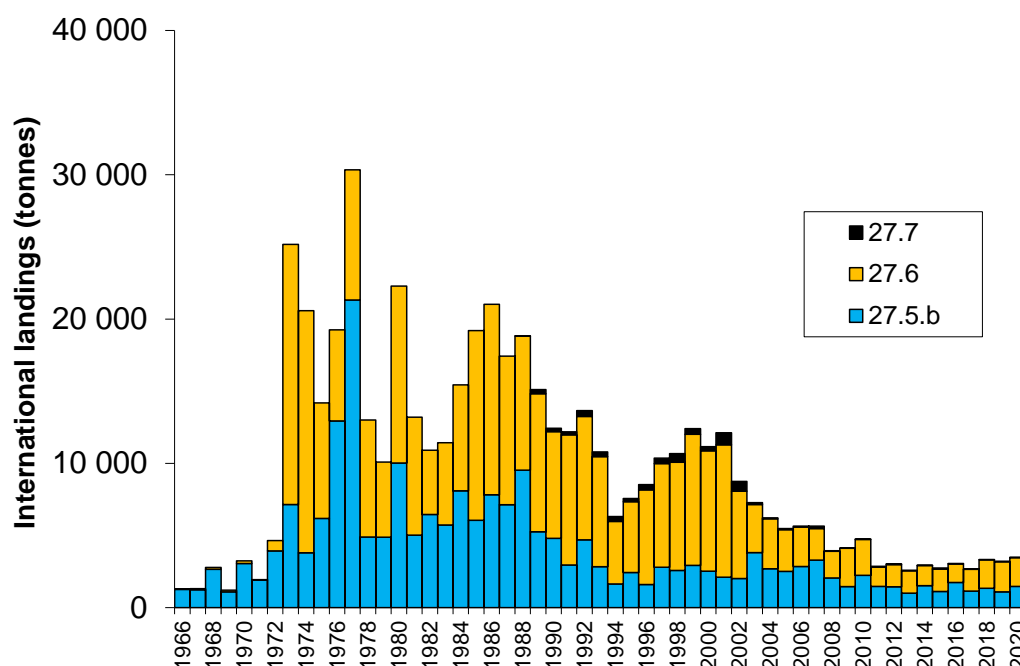


Figure 4.3.1. International landings for bli.27.5b67 in ICES subareas 6 and 7 and Division 5b.

The landings from Subarea 27.6 peaked at about 18 000 t in 1973 and fluctuated throughout the 1980s within the range of 5000–10 000 t and have since gradually declined. In the 2000s reducing EU TACs have been the main driver of the catch level. In the 2010s, the landings declined to an historical low level of less than 1300 tonnes in 2016 but have increased since to more than 2000 tonnes in 2019. Although significant in the past, landings in Division 6b were minor in the last 10 years.

Landings from Subarea 7 are comparatively small, mostly less than 500 t per year in the whole time-series and less than 50 t during the last ten years, except in 2015 when 78 t were landed.

Landings in the two last years are the highest since 2010. This recent increase was spread across all fishing countries and all areas. This increase was therefore not the consequence of an emerging fishery but that of higher catch in all fisheries. Nevertheless, landings remain well below the TAC and maximum catch level recommended in the ICES advice. Some EU fleets, in particular the French fleet of large trawlers, appear to be in a situation of under capacity. Although fishing opportunities for blue ling have increased from 2015, vessels kept fishing mostly for saithe. This under capacity is the result of the reduction of the number of French trawlers ≥ 30 m, based in harbours where deep-water species are landed, from 35 in 2005 to 16 in 2016 (Common Fleet Register data). Further the EU regulation limiting fishing at spawning time no longer allows for large targeted catch during the spawning season as in the 1980s and 1990s.

Like in recent years, landings data by country and ICES Division were extracted from InterCatch for all countries, except for the Faroe Islands for which official Faroese landings were provided. Preliminary landings for 2018 were updated with final figures.

4.3.3 ICES Advice

The ICES advice for 2021 and 2022 is "when the MSY approach is applied, catches should be no more than 11522 tonnes in 2021 and no more than 10859 tonnes in 2022."

4.3.4 Management

This stock is classified as Category 4 in the NEAFC categorization of deep-sea species/stocks which implies that fisheries are primarily restricted to Coastal State exclusive economic zones (EEZs) and therefore management measures are not taken by NEAFC unless complementary to coastal state conservation and management measures.

Prior to 2009, EU deep-water TACs were set on a biennial basis; however from 2009 onwards, annual TACs were applied for the components of this stock in EU waters of in ICES Division 5.b, and Subareas 6 and 7. TACs are fixed according to bilateral agreements between EU and Faroe Islands and EU and Norway. The EU TAC includes quotas for Norway and the Faroe Islands and the EU has a quota for ling and blue ling in Faroese waters (1885 t in 2019 and 2020). This EU quota in Faroese waters is divided in national quotas between Germany, France and UK.

The table below provides the EU TAC the quota allocated to EU vessel in Faroese waters and the ICES estimate of international landings in recent years.

				QUOTA INCLUDED IN EU TAC			EU QUOTA IN FARO- ESE WATERS OF 5.b(1)	INTERNATIONAL
Year	Area	ICES advice	EU TAC	EU	Norway	Faroe		landings
2006	67	Biennial		3037	200	400	3065	5650
2007	67	No direct fisheries		2510	160	200	3065	5648
2008	67	Biennial		2009	150	200	3065	3940
2009	5b67	No direct fisheries	2309	2009	150	150	3065	4121
2010	5b67	Biennial	2032	1732	150	150	2700	4759
2011	5b67	No direct fisheries	2032	1717	150	0	0	2861
2012	5b67	Same as 2011	2031	1882	150	0	0	3031
2013	5b67	3900	2540	23905	150	0	0	2588
2014	5b67	3900	2540	2210	150(2)	150(3)	1500	2949
2015	5b67	5046	5046	4746	150(2)	150(3)	1500	2793
2016	5b67	5046	5046	4746	150(2)	150(3)	2100	3059
2017	5b67	11314	11314	11014	150(2)	150(3)	2000	2669
2018	5b67	10763	10763	11463	150(2)	150(3)	2000	3322
2019	5b67	11778	11778	11378	250(2)	150(3)	1885	3218
2020	5b67	11150	11150	10750	250(2)	150(3)	1885	
2021	5b67	11522	5425(4)	5425	0	0	(5)	

Year	Area	ICES advice	QUOTA INCLUDED IN EU TAC				EU QUOTA IN FARO- ESE WATERS OF 5.b(1)	INTERNATIONAL landings
			EU TAC	EU	Norway	Faroe		
2022	5b67	10859						
<p>(1) TAC for ling and blue ling, against which a bycatch roundnose grenadier and black scabbard fish may be counted, up to a limit of 665 t in 2018.</p> <p>(2) To be fished in Union waters of 27.2.a and 27.4-7 (BLI/*24X7C).</p> <p>(3) Including bycatch of roundnose grenadier and black scabbardfish.</p> <p>(4) preliminary TAC from 01.01.2021 to 07.31.2021, according to agreement between EU and UK</p> <p>(5) status of this quota unknown</p>								

In Faroese waters, Faroese vessels are encouraged to land all fish, which is thought to be done for blue ling, owing to the species value and the absence of fish of unmarketable size. Faroese vessels in Faroese waters are regulated by licences and fishing days but no quota.

From 2015 to 2020, the EU TAC in EU and international waters was set to the level of the ICES catch advice. As a significant fraction of the catch comes from Faroese waters, setting the EU TAC at the level of the ICES advice implied that the ICES advice could have been overrun without any illegal catch, so creating a risk of exploiting the stock beyond the recommended level.

In 2009, the EU introduced protection areas of spawning aggregations of blue ling on the edge of the Scottish continental shelf (6.a) and at the edge of Rosemary Bank (6.a). Fishing for blue ling is restricted in known spawning areas during 3 months corresponding to the spawning season. Entry/exit regulations apply and vessels cannot retain >6 t of blue ling from these areas per trip. On retaining 6 t vessels must exit and cannot re-enter these areas before landing. This regulation and the coordinate of the prohibited area are included in regulation 2019/1241 of the European parliament and of the Council. Since 2021 and the Brexit, these spawning areas are no longer in EU but in UK waters. In 2013, NEAFC introduced a protection of the spawning area located near the southwest boundary of the Icelandic EEZ, this area is banned to bottom fishing gears from 15 February to 15 April (rec 7:2017, https://www.neafc.org/managing_fisheries/measures/current).

In ICES Division 27.6.b, areas closed to bottom fishing gears have been extended and these include some of the spawning areas identified by Large *et al.* (2009), see Figure 4.1.3b.

Blue ling has been subject to a minimum conservation reference (MCRS) of 70 cm in EU North-Western and South-Western waters (EU regulation 2019/124). This regulation also apply to the NEAFC RA. The impact of this MCRS regulation is minor as the proportion of blue ling smaller than 70 cm has always been minor.

4.3.5 Data availability

4.3.5.1 Landings and discards

The time-series of landings was updated (Tables 4.3.1a-f).

As in previous years, landings from the Faroe Islands in 2020 were not uploaded to InterCatch but provided to the expert group. From all countries, except the Faroe Islands, landings estimates submitted to InterCatch were used. In InterCatch, official landings were available for a subset of fleets only, in these case official landings and estimates were similar. For the Faroe Islands, official landings from Statland were used.

Data submitted to InterCatch showed that international discards in 2018-20 were less than 1% of landings for country reporting through InterCatch. Faroese vessels are considered making no discards. This low discarding proportion comes from the absence of catch of small blue ling on

most of the fishing grounds. Overall, discarding is well below the maximum level of 5% for considering it negligible in ICES advice.

4.3.5.2 No catch in international waters were reported in 2020.Length compositions

Length composition times-series previously used were all updated (see below section 5.3.6 data analyses). The length composition of the landings used for the stock assessment was taken from InterCatch.

4.3.5.3 Age compositions

Age estimations have been carried out by France since 2009, using a consistent protocol (see stock annex) .so even that ageing are not validated for this species, comparable data are now available for 11 years. The MYCC model uses not only the age composition but also the variability of age-at-length, so that in addition to the catch in number at age, the age-length key is necessary to this model. The age length ley from France is applied to the international length distribution of the landings.

4.3.5.4 Weight-at-age

Blue ling is landed gutted in France, the only EU country where age estimation of this species is carried out. Weight-at-age is calculated using the length-at-age and length–weight relationship. Since the stock was benchmarked in 2014, the length–weight relationship used comes from the Faroese surveys, which cover a wide range of size (see stock annex).

4.3.5.5 Maturity and natural mortality

No new data.

4.3.5.6 Catch, effort and RV data

Catch data were updated, discards data reported to InterCatch were negligible (less than 5% of total catch). Effort data are not used for modelling the dynamics of the stock.

Abundance and biomass indices from surveys were all available. Blue ling is sampled in three Faroese surveys and one Scottish survey. The commercial CPUE series from the Norwegian long-liner fleet was updated (Table 4.3.3).

4.3.6 Data analyses

4.3.6.1 Length compositions

Possible recruitment inputs are visible in length compositions of Faroese commercial catches in some years, e.g. 2007–2009 and again in 2018 (Figure 4.3.2).

In the sampling of Faroese landings, large numbers of fish have been measured in the last five years, making this data set useful to appraise change in the stock. On the contrary, in years 2000 to 2014, the number of fish measured seemed low. Despite the good data quality in recent years,

these length distributions were not included in the assessment because quarterly length distribution was not available.

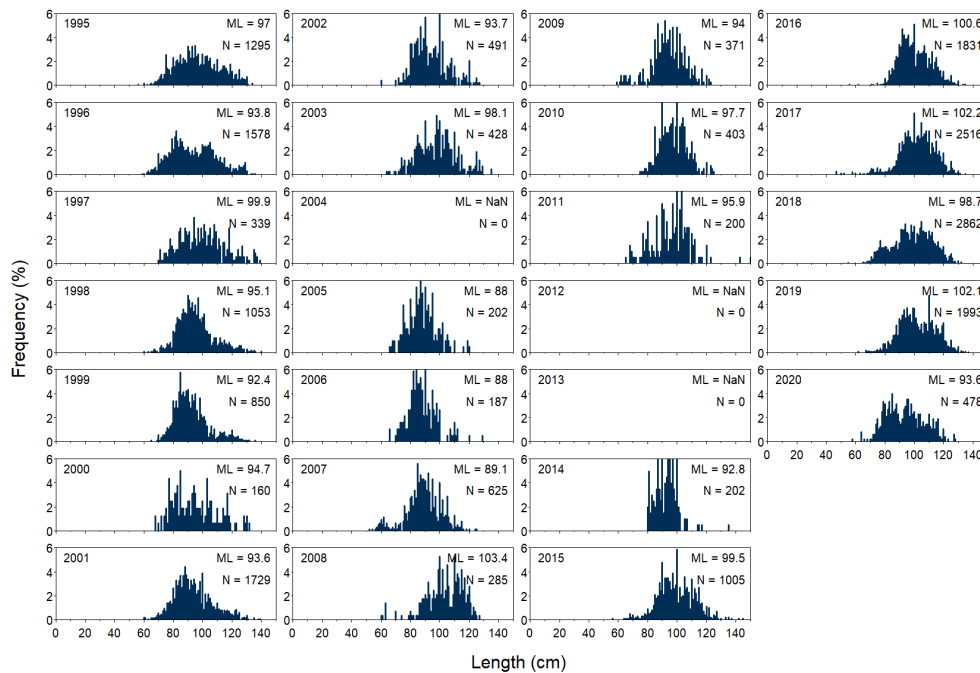


Figure 4.3.2. Length composition of blue ling landings from Faroese otter-board trawlers >1000 HP in Division 5.b from 1995 to 2020.

Small blue ling (between 40 and 60 cm total length) were caught in higher number during both surveys in the three last years than during most of the time series (Figures 4.3.3 and 4.3.4). The length distribution of the Faroese deep-water survey initiated in 2014 is shifted to the right compared to the other survey, which is expected as blue ling move to deeper areas with age. Nevertheless, in 2019 the deep-water survey also shows a higher proportion of smaller (60-80 cm) individuals (Figure 4.3.5).

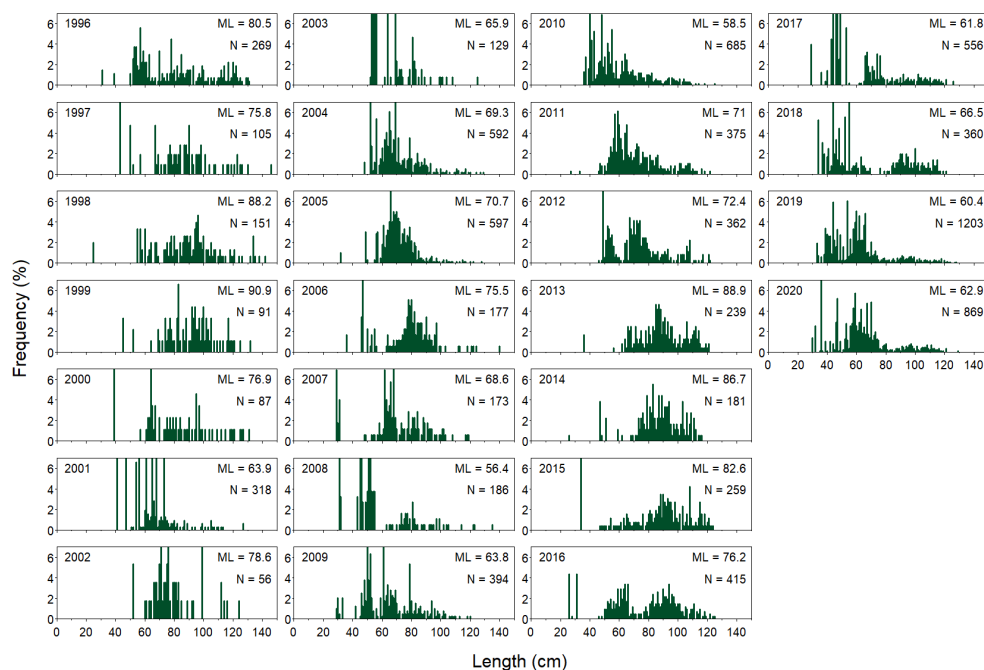


Figure 4.3.3. Length composition of blue ling in the Faroese summer groundfish survey on the Faroe Plateau (1996-2020).

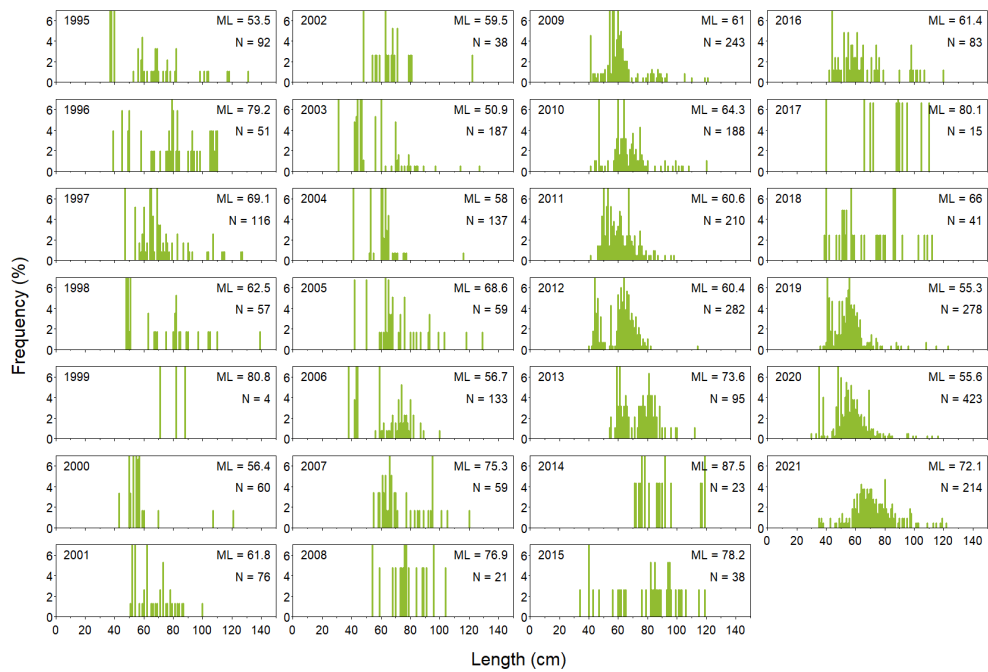


Figure 4.3.4. Length composition of blue ling in the Faroese spring groundfish survey on the Faroe Plateau (1995-2021).

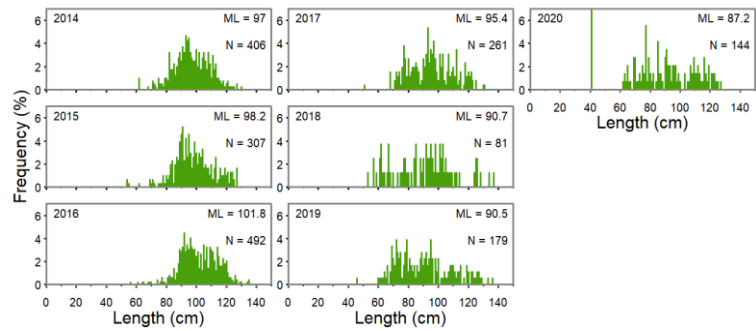


Figure 4.3.5. Length composition of blue ling in the Faroese deep-water survey in Faroese waters (2014-2020).

The length composition in French commercial data show an increasing proportion of larger fish over the past decade with an increasing proportion of fish on size larger than 1 m in the catch compared to the late 1990s to 2010 (Figure 4.3.6). The mean length was lower in years 1995-2006 and increased to a peak in 2014, then decreased further. This decreasing reflects a large income of small fish (recruitment) as in 2014-2018 the stock biomass increased and the fishing mortality was low. On the contrary, the large increase in mean length in 2019 probably reflects a lesser recruitment (Figure 4.3.7).

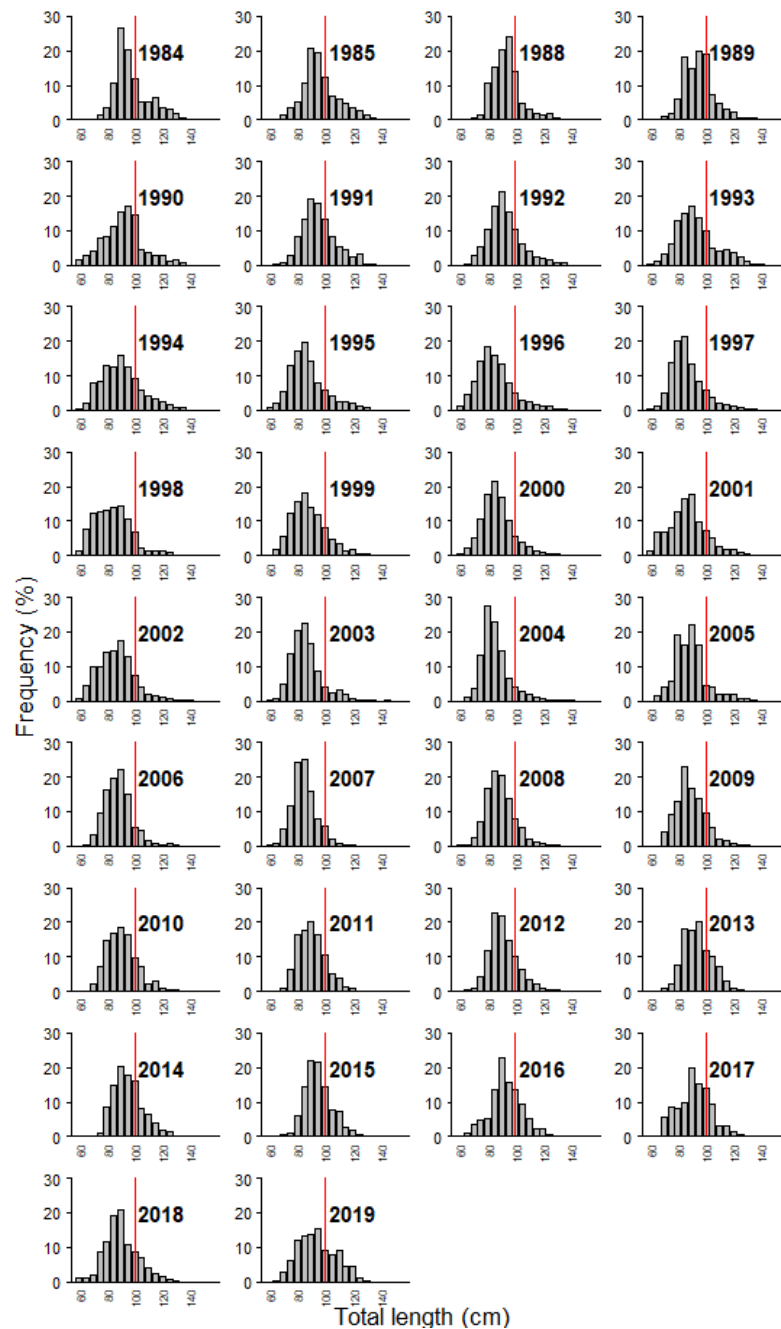


Figure 4.3.6. Length distribution of French landings from 1984 to 2019 (no data in 1986-87) by 5 cm intervals. The red line represent the 100 cm size class.

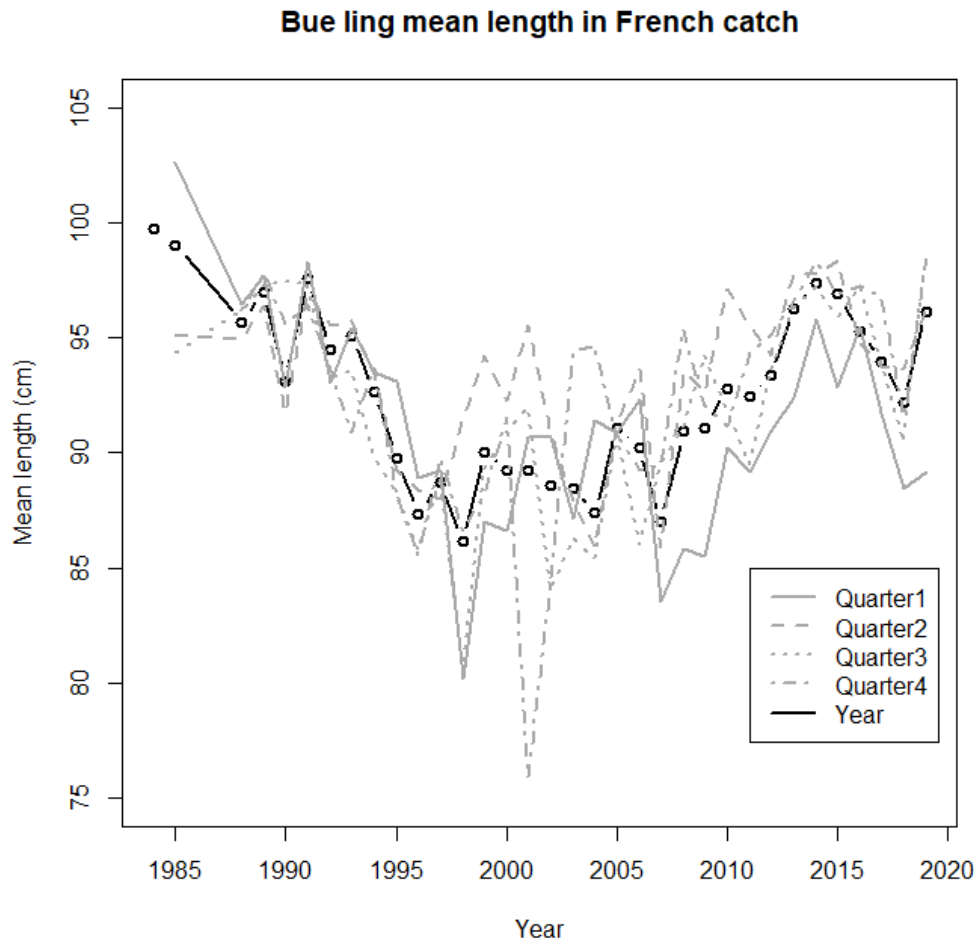


Figure 4.3.7. Quarterly mean length in French trawlers landings, 1984–2019 (no data in 1986–87).

4.3.6.2 Abundance and biomass indices

The previously used indicators of abundance and occurrence of blue ling smaller than 80 cm, also reflect this higher abundance of juveniles in Faroese surveys (Figure 4.3.6). The numbers per hour and occurrence of blue ling smaller than 80 cm caught in the last survey of both series (summer 2019 and spring 2020) are the highest since the start of these time-series.

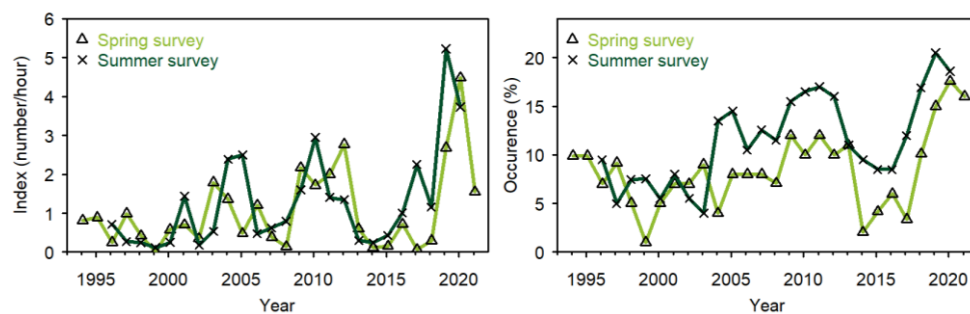


Figure 4.3.6. Juvenile (<80 cm) blue ling caught in groundfish surveys on the Faroe Plateau (left) number per hour and (right) occurrence.

The indices of total biomass from Faroese are uncertain with high values in 2004, 2005 and since 2009 for the summer survey. The spring summer shows a sharp increase since a low level in 2017. The two last points of the two surveys are amongst the highest from the whole time-series (Figure 4.3.7, Table 4.3.2). Over the last decade the indices from the two surveys did not track each other. The depth range (mostly <500 m) of these surveys do not extend down to the core depth distribution of blue ling. The indices include all hauls and are calculated using a design-based stratification.

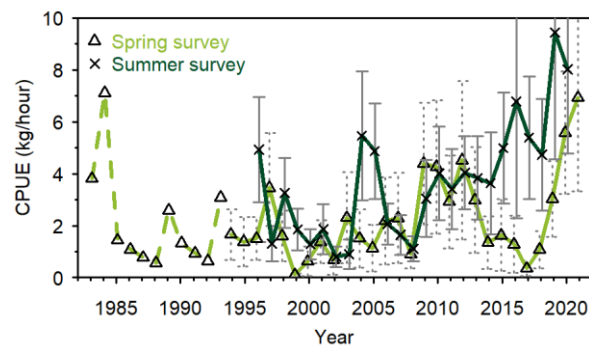


Figure 4.3.7. Biomass indices (kg.hour⁻¹) of blue ling in Faroese surveys.

Indices from the Marine Scotland trawl deepwater survey carried out on the fisheries research survey SCOTIA are uncertain (Figure 4.3.8, Table 4.3.4) probably owing to the small number of hauls per year and the aggregating distribution of blue ling. The indices are averaged numbers and weights caught per haul carried out in the depth range 400 to 1600 m ($n = 377$ hauls for the whole time-series), which is the core range of the species along the Scottish slope. Only hauls from the Scottish slope are included, excluding data from Rockall and seamounts. The survey was performed biennially since 2013 and annually before (with no surveys in 1999, 2001, 2003 and 2010). There was no survey in 2020.

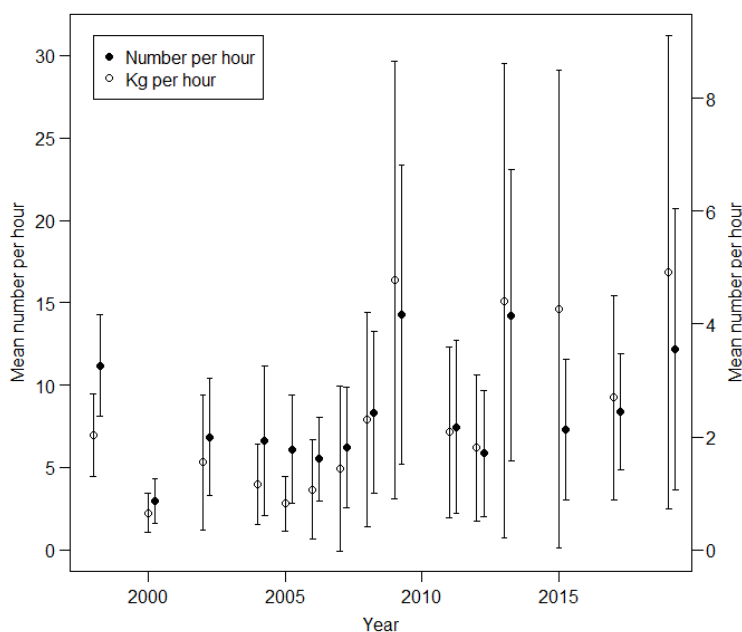


Figure 4. 3.8. Biomass and abundance indices of blue ling from the Marin Scotland deep-water survey.

Multiyear catch curve (MYCC) model

No stock assessment was made in 2021. Stock Reduction Analysis (SRA) using $F_{L\text{aspm}}$.

The model was not fitted in 2021.

Reference points

Reference points the stock were defined as $F_{MSY}=0.12$, $MSY F_{lower}=0.08$ and $MSY F_{upper}=0.17$. $MSY B_{trigger}$ was set as $B_{pa}=1.4*B_{lim}$ (table below), because the variability of the stock dynamics was not fully captured by the analysis (ICES 2016). This is because the only input available, at the time was the Stock reduction analysis (SRA) as the MYCC did not cover a sufficient time-series to estimate a stock–recruitment relationship. SRA does not allow for significant variability of recruitment. In these circumstances a $MSY B_{trigger}$ based on 5% of B_{MSY} is not meaningful and was not recommended. B_{lim} was set as B_{loss} , the lowest biomass estimate in the time-series (here the time-series of biomass from the SRA estimated in 2014).

Reference points for bli-5b67 estimated by WKMSYref4.

$MSY F_{lower}$	F_{MSY}	$MSY F_{upper}$ with AR	$MSY B_{trigger}$ (tonnes)	$MSY F_{upper}$ with no AR
0.08	0.12	0.17	75 000	0.14

Further, F_{lim} was estimated to 0.17 based on simulated fishing mortality to B_{lim} and F_{pa} was estimated to 0.12 as $F_{lim}*\exp(-1.645*0.2)$. Therefore, F_{pa} is estimated to be equal to F_{MSY} and F_{lim} to $MSY F_{upper}$. This comes from setting B_{lim} at $B_{loss}\approx 20\%$ of the unexploited biomass, which is in all circumstances much more than 5% B_{MSY} , again, a level not used here because the long-term mean of B_{MSY} could not be projected in a projection taking account of recruitment variability.

4.3.7 Comments on assessment

No assessment in 2021.

4.3.7.1 Management considerations

International landings have been well below the ICES advice for several years. This is the consequence of several factors including:

- in Faroese waters, fleet have other resources available and do not target particularly blue ling,
- in EU waters the major fishing country has been France since the 1970s, the French fleets of large trawlers has reduced and the remaining vessels fish primarily for saithe and hake,
- historically most of the landings were caught in quarter 2 during the spawning season, the fishing for spawning blue ling is now restricted in particular in Division 6a (EU regulation 2019/1241),
- the ban of trawling deeper than 800 m for EU fleets, reduced the access to the stock which depth distribution extends deeper.

4.3.8 References

ICES. 2016. Report of the Workshop to consider F_{MSY} ranges for stocks in ICES categories 1 and 2 in Western Waters (WKMSYREF4), 13–16 October 2015, Brest, France. ICES CM 2015/ACOM:58. 187 pp.

Large, P. A., G. Diez, J. Drewery, M. Laurans, G. M. Pilling, D. G. Reid, J. Reinert, A. B. South, and V. I. Vinnichenko. 2010. Spatial and temporal distribution of spawning aggregations of blue ling (*Molva dypterygia*) west and northwest of the British Isles. ICES Journal of Marine Science 67:494–501.

4.3.9 Tables

Table 4.3.1a. Landings of blue ling in Subdivision 5.b.1 (see stock annex for years before 2000).

YEAR	FAROEES	FRANCE(1)	GERMANY(1)	NORWAY	UK (E & W) (1)	UK (Scot.)	IRELAND	RUSSIA(1)	TOTAL
2000	1677	575	1	163	33			1	2450
2001	1193	430	4	130	11		2		1770
2002	685	578		274	8				1545
2003	1079	1133		12	1				2225
2004	751	1132		20				13	1916
2005	1028	781		15	1				1825
2006	1276	839		21	1			16	2153
2007	1220	1166		212	8			36	2642
2008	642	865		35				110	1652
2009	523	325						0	848
2010	840	464		49			0	0	1353
2011	838	312		0			0	0	1150
2012	799	424		8			0	5	1236
2013	440	423		0			0	3	866
2014	730	609		29					1368
2015	621	142	0	140	0		0	0	9503
2016	1100	555	0	74	0		0	0	1730
2017	766	267	0	21	0	3	0	0	1057
2018	818	222	0	150	0	0	0	0	1190
2019	573	379		29					981
2020	697	580	0	0	87	0	0	5	1369

(1) Includes 5.b.2.

Table 4.3.1b. Landings of Blue ling in Subdivision 5.b.2 (see stock annex for years before 2000).

YEAR	FAROES	NORWAY	SCOTLAND	France	TOTAL
2000	0	37	37		74
2001	212	69	63		344
2002	318	21	140		479
2003	1386	84	120		1590
2004	710	6	68		784
2005	609	14	68		691
2006	647	34	16		697
2007	632	6	16		654
2008	317	0	91		408
2009	444	8	161		613
2010	656	10	225		891
2011	319	0	0		319
2012	211	0			211
2013	133	0	2		135
2014	150	6	2		158
2015	82	97		46	225
2016	13	0	7		20
2017	88	9	0	0	97
2018	150				150
2018	151	0	0	0	151
2019	64	56	0	0	120
2020	102	0	4	0	106

Table 4.3.1c. Landings of blue ling in Division 6.a (see stock annex for years before 2000).

YEAR	FAROES	FRANCE	GERMANY	IRELAND	NORWAY	SPAIN(1)	E & W	SCOTLAND	LITHUANIA	TOTAL
2000		4544	94	9	102	108	24	1300		6181
2001		2877	6	179	117	797	116	2136	16	6244
2002		2172		125	61	285	16	2027	28	4714
2003	7	2010		2	106	3	3	428	29	2588

YEAR	FAROEES	FRANCE	GERMANY	IRELAND	NORWAY	SPAIN(1)	E & W	SCOTLAND	LITHUANIA	TOTAL
2004	10	2264		1	24	4	1	482	38	2824
2005	17	2019		2	33	88		390	1	2550
2006	13	1794		1	49	87	3	433	2	2382
2007	13	1814			31	47		113	1	2019
2008	14	1579			73	10		112	2	1790
2009	11	2202			74	165		178		2630
2010	43	1937			86	223		134		2423
2011	10	1136			93	10		74		1323
2012	5	1178			86	6		47		1322
2013	2	1168			132	11		203		1516
2014		1094			18			278		1390
2015	0	920	0	0	127	83	8	371	0	1509
2016	0	831			37	125	0	273	0	1266
2017	0	772	0	0	29	44	0	641	0	1486
2018		1128			87	72		735		2022
2019		1192			67	92		718		2069
2020		985				28	244		719	1976

Table 4.3.1d. Landings of blue ling in Division 6.b (see stock annex for years before 2000).

[illegible]

YEAR	POLAND	RUSSIA	FAROEES	FRANCE	GERMANY	NORWAY	E & W	SCOTLAND	ICELAND	IRELAND	ESTONIA	SPAIN	TOTAL
2017	0			0	0	1						21	22
2018				0				1				6	7
2019						3		1				5	9
2020	0		0	0	0	0	2	0	0	6	0	3	11

⁽¹⁾ Includes unallocated catch.

Table 4.3.1e. Landings of blue ling in Subarea 7 (see stock annex for years before 2000).

YEAR	FRANCE	GERMANY	SPAIN	NORWAY	E & W	SCOTLAND	IRELAND	TOTAL
2000	91	2	65	5	31	17	73	284
2001	84	2	64	5	29	17	634	835
2002	45	4	42	0	77	55	453	676
2003	27	1	42	0	8	16	28	122
2004	23	1	15	0	4	1	19	63
2005	37	0	25	0	1	0	11	74
2006	30	0	31	0	2	0	4	67
2007	121	0	38	0	2	1	2	164
2008	28	0	6	0	0	0	0	34
2009	10	0	1	0	0	0	0	11
2010	13	0	24	0	0	0	0	37
2011	23	0	26	0	0	0	0	49
2012	19	0	21	5	0	0	0	45
2013	32	0	0	0	0	0	0	32
2014	24				3	2		29
2015	11	0	63	0	3	1	0	78
2016	23	0	0	0	0	1	1	25
2017	5	1	0	0	1	0	0	7
2018	4	0	58	0	0	1	0	63
2019	3	0	35	0	0	0	0	38
2020	4	0	0	0	24	0	0	28

Table 4.3.1f. Blue ling landings in Division 5.b and subareas 6 and 7 (see stock annex for years before 2000).

YEAR	5.b	6	7	TOTAL
2000	2524	8352	284	11 160
2001	2114	9178	835	12 127
2002	2024	6053	676	8753
2003	3815	3338	122	7275
2004	2700	3459	63	6222
2005	2516	2891	74	5481
2006	2850	2733	67	5650
2007	3296	2188	164	5648
2008	2060	1846	34	3940
2009	1461	2649	11	4121
2010	2244	2478	37	4759
2011	1469	1343	49	2861
2012	1447	1539	45	3031
2013	1001	1555	32	2588
2014	1526	1394	29	2949
2015	1128	1542	78	2748
2016	1750	1284	25	3059
2017	1154	1508	7	2669
2018	1338	2029	63	3431
2019	1102	2078	38	3,218
2020	1475	1987	28	3 490

Table 4.3.2. Standardized biomass indices (kg/h) of blue ling in the annual demersal trawl spring and summer survey on the Faroe Plateau.

YEAR	SPRING SURVEY		SUMMER SURVEY	
	Index	SE	Index	SE
1994	1.66	0.98		
1995	1.38	0.95		
1996	1.39	0.78	4.93	2.03
1997	3.46	2.10	1.31	0.67
1998	1.60	0.97	3.26	1.34
1999	0.10	0.06	1.85	0.81
2000	0.63	0.58	1.28	0.57
2001	1.38	0.83	1.87	0.96
2002	0.68	0.58	0.80	0.40
2003	2.31	1.76	0.90	0.57
2004	1.51	1.12	5.46	2.47
2005	1.13	0.90	4.87	1.84
2006	2.18	1.68	2.06	0.80
2007	2.30	1.74	1.64	0.76
2008	0.90	0.55	1.11	0.48
2009	4.39	2.35	3.04	1.48
2010	4.27	2.58	4.01	1.80
2011	2.92	1.79	3.41	1.55
2012	4.52	3.05	4.04	1.41
2013	2.99	2.04	3.84	1.61
2014	1.36	1.01	3.63	1.97
2015	1.63	1.38	5.00	2.14
2016	1.28	1.1	6.78	4.50
2017	0.35	0.3	5.38	2.36
2018	1.08	0.72	4.73	2.14
2019	3.03	1.47	9.44	4.88
2020	5.59	2.36	8.02	3.23

YEAR	SPRING SURVEY		SUMMER SURVEY	
	Index	SE	Index	SE
	6.93	3.60		

Table 4.3.3. Standardized cpue index (kg/1000 hooks) from the Norwegian longliners in ICES Division 6.a.

YEAR	LOWER LIMIT	MEAN INDEX	UPPER LIMIT
2000	8.07787	11.5548	15.0318
2001	4.60621	8.82401	13.0418
2002	8.40796	13.3235	18.2389
2003	4.54772	7.89182	11.2359
2004	1.55956	5.33972	9.11989
2005	5.68665	8.7668	11.847
2006	10.7495	13.8033	16.8571
2007	7.18068	10.7865	14.3923
2008	14.6099	18.4694	22.3289
2009	11.7957	16.2868	20.778
2010			
2011	14.141	16.7851	19.4292
2012	16.9459	19.8301	22.7144
2013	19.1724	21.7229	24.2733
2014	8.23313	11.3728	14.5126
2015	21.8908	24.7353	27.5797
2016	8.60406	11.761	14.918
2017	8.91193	11.9361	14.9602
2018	12.3624	15.0228	17.6833
2019	12.2703	15.1831	18.096

Table 4.3.4. Abundance (nb.hour⁻¹) and biomass (kg.h⁻¹) indices from the Scottish deep-water survey in ICES Division 6.a. Lower in upper bounds of 95% confidence intervals of the mean are estimated assuming a normal distribution.

Year	Number per hour			Weight per hour (kg)			Number of hauls
	Lower bound	Mean	Upper bound	Lower bound	Mean	Upper bound	
1998	2.366	3.263	4.160	4.47	7.0	9.48	19
1999							
2000	0.462	0.857	0.648	1.04	2.2	3.45	35
2001							
2002	0.964	2.000	0.188	1.22	5.3	9.39	27
2003							
2004	0.599	1.929	0.225	1.55	4.0	6.43	28
2005	0.820	1.778	0.202	1.16	2.8	4.48	18
2006	0.864	1.607	-0.092	0.65	3.7	6.67	28
2007	0.739	1.810	-1.153	-0.08	4.9	9.94	21
2008	0.994	2.429	-0.016	1.42	7.9	14.39	28
2009	1.524	4.167	0.428	3.07	16.4	29.64	24
2010							
2011	0.641	2.172	0.433	1.96	7.1	12.32	20
2012	0.596	1.711	0.629	1.74	6.2	10.63	27
2013	1.571	4.154	-1.882	0.70	15.1	29.51	23
2014							
2015	0.875	2.130	-1.138	0.12	14.6	29.14	24
2016							
2017	1.423	2.447	2.019	3.04	9.2	15.46	29
2018							
2019	1.058	3.554	-0.028	2.47	16.9	31.23	18

4.4 Blue ling (*Molva dypterygia*) in 1, 2, 3.a, 4, and 12

4.4.1 The fishery

The directed fisheries on spawning aggregations for blue ling on Hatton Bank (ICES Division 12.b) and ICES Division 2.a (Storegga) are no longer conducted. Blue ling is now only taken as bycatch of other fisheries taking place in these areas.

In Hatton Bank (Division 12.b) blue ling has represented a significant bycatch of trawl fisheries for mixed deep-water species; especially from Spanish freezer trawlers. In Division 2.a there is a bycatch from the longline and gillnet fisheries on ling, tusk and saithe.

In other ICES subareas blue ling is taken in minor quantities. Small reported landings in Subareas 8 and 9 are now ascribed to the closely related Spanish ling (*Molva macrophthalma*) since the species is not known to occur in any significant numbers in these subareas.

4.4.2 Landing trends

Landing data are presented in Tables 4.4.0a–f. There are also historical landings from the Norwegian fishery, mainly from Division 2.a, back from 1896 (Figure 4.4.1). During the whole time-series, around 90% or more of the total landings were taken in Subareas 2, 4 and 12 combined. Landings from Subarea 12 which primarily are from the western slope of Hatton Bank (ICES Division 12.b) are now very low. Landings are now reported mostly from ICES Divisions 2a and 4a. In 2020, 96% of the landings came from Subarea 2 and 4 and this was mainly Norwegian landings. In 2019 and from Subarea 1, Iceland has landed 45% of total landings from the whole stock area but there are some uncertainties about this number. In 2020, Iceland had no landings from this area.

For all areas, a continuous decline on landings has been observed after the higher landing levels in the 1988–1993 period and total landings are now 13% of that level. However, the total landings have increased since 2015 which was the lowest level recorded since 1988. As a result of the Icelandic landings from Subarea 1, the total landings from 2018–2019 more than doubled (348–862 tons). For 2020, the total landings are at recent levels.

4.4.3 ICES Advice

The ICES advice for 2020 to 2023 is:

“ICES advise that when precautionary approach is applied, there should be zero catches in each of the years 2020 to 2023. Closed areas to protect spawning should be maintained.”

4.4.4 Management

A 2020 precautionary TAC for EU vessels in international waters of ICES Subarea 12 was set to 34 tonnes and only applicable to bycatches; no directed fishery for blue ling was allowed in this area. TACs for vessels in EU waters and international waters of ICES Division 5.b, and Subareas 6 and 7 were set to 2790 tons; of this a quota for Norwegian, Faroese and UK vessels was set to 618 tonnes (63, 38 and 517 respectively), each to be fished in Union waters of ICES Divisions 2.a, 4, 5.b, and Subareas 6 and 7. In European Union and international waters of Subareas 2 and 4, a precautionary TAC for EU vessels was set to 10 tonnes. In European Union and international waters of ICES Division 3.a, a precautionary TAC for EU vessels was set to 2 tonnes.

4.4.5 Data availability

4.4.5.1 Landings and discards

Landings and discards data are presented in Table 4.4.0a–f and 4.4.1 respectively. The discards data from Scotland were revised in 2021 and the Scottish discards were updated in the table for 2015–2020 (Table 4.4.1).

4.4.5.2 Length compositions

Length compositions from the Norwegian longline and gill net fishery from 2002–2020 are available (Figure 4.4.2). Length compositions from the Spanish fishery from 2017 in Stock Annex.

4.4.5.3 Age compositions

No age data are available.

4.4.5.4 Weight-at-age

No weight-at-age data are available.

4.4.5.5 Maturity and natural mortality

No data were available.

4.4.5.6 Catch, effort and research vessel data

For the Norwegian catches there was presented a CPUE from Subareas 1, 2 and 4 and ICES Division 3.a combined (Figure 4.4.3). The CPUE series was calculated for the time period 2000–2020 and is based on longline data from the Norwegian fishery.

4.4.6 Data analyses

The assessment for this stock is based on landing trends (Figures 4.4.4–4.4.6). This is followed by some uncertainties because the trends in landings can be a consequence of changes in effort rather than changes in the stock. However, it is regarded that the situation for the stock is reflected by the landings and it is also thought that discards are minimal since the fishery is exclusively done on larger individuals.

The landings have declined for all areas and the mean landings are now only 13% of the mean landings from the years 1988–1993 (the period with stable landings). There has been however, some fluctuations in landings for some areas.

Landings from Subarea 1 has always been low (less than 5 t for the whole time series). However, for 2019 Iceland landed 389 tons (45% of total landings for the whole stock area) which were assigned to in Subarea 1. For 2020 and for Subarea 1, there were no Icelandic landings and the total landings are back on recent levels.

The historical Norwegian landings, mainly in ICES Division 2.a reached almost 6000 tonnes in 1980. Since then, landings have decreased. In 2010, there was an increase in landings from Subarea 2 as a result of an increase in Faroese landings. From 2013 onwards, landings are at the same low levels as seen in the early 2000s. Landings in 2015 were lowest on record but have increased since then.

The increase of landings in Division 3a in 2005 (2.5 times increase from 2004–2005) is likely to be associated to the increase of the Danish roundnose grenadier fishery. This fishery stopped in 2006 and the landings of blue ling have since been insignificant.

The landings in Subarea 4 increased from 2019-2020. This increase came from Norwegian and French landings. Norwegian landings increased from 66 to 138 tons in this area.

An increase on French and Norwegian landings was also registered in 2010-2012. The landings then decreased to less than 100 tons and the landings have been stable around this level since 2015. The 2020 level of landings are back to the increased level in 2010-12. An analyse of the Norwegian 2020 landing data by gear type revealed that 28% of the blue ling was taken with gillnet that year compared with 23% for 2019.

In Subarea 12 and after relative high levels for the period 2001–2005 landings have declined. There have been reductions in Spanish fishing activity in this area which for now is the only country reporting landings from this area. The reported landings from this Subarea have always been from Division 12b; however, from 2019-20 there was also some landings from Division 12a.

Denmark and Scotland report discards from Division 4a. A revision of the Scottish discard data for 2015-2020 was done. The revised values for Scottish discards increased, especially in 2019.

The Norwegian length compositions from the longline and gill net fishery from 2002-2020 show some years inclusions of smaller fish. It is also possible to follow a dominant group of ages from year to year in some periods (from 2009-2014 and 2015-2020). The mean length varies from 77-100 cm.

The length compositions from Spanish landings from 2017 show lengths from 69-129 cm (See Stock Annex). This is in the same range as seen in length compositions from Faroese catches from areas 5.b, 6 and 7.

The Norwegian CPUE series shows a low level and varies without any trend for the years 2000–2020. Although there is no directed fishery from this area there seems to be no recovery for this part of the stock.

4.4.6.1 Biological reference points

There are not yet suggested methods to estimate biological reference points for category 5 and 6 stocks.

4.4.7 Comments on assessment

Assessment is based on landing trends. Landings have declined since the 90's (Figure 4.4.7) and are thought to represent stock status. However, there is some concern about the last year increase in Norwegian landings in Subarea 4. In this subarea, blue ling is bycatch in ling and tusk fishery and these bycatch landings may come from a shift to larger proportion of gill nett landings in the fishery for ling.

4.4.8 Management considerations

Trends in landings suggest serious depletion in Subarea 2 and perhaps also for the other Subareas. Landings have also declined strongly in Subarea 12 from 2002 onwards. Landings in other subareas and divisions are minor but there is some evidence of a persistent decline.

The advice given in 2019 remains appropriate.

Blue ling specimens caught in Division 12.b probably belong to the same stock that is exploited in Subarea 6. Management of Division 12.b should be consistent with the Advice for ICES Division 5.b and for Subareas 6 and 7.

The bulk of current bycatches of blue ling from subareas and divisions treated in this section are taken within EE (Table 4.4.2).

4.4.9 Tables

Table 4.4.0a. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Subarea 1. (* preliminary).

Year	Iceland	Norway	France	Faroes	Greenland	Total
1988		10				10
1989		8				8
1990		4				4
1991		3				3
1992		5				5
1993		1				1
1994		3				3
1995		5				5
1996		2				2
1997		1				1
1998		1				1
1999		1				1
2000		3				3
2001		1				1
2002		1				1
2003						0
2004		1				1
2005		1				1
2006						0
2007						0
2008						0
2009		1				1
2010		1				1
2011			3			3
2012			1			1
2013						0
2014				4		4

Year	Iceland	Norway	France	Faroes	Greenland	Total
2015						0
2016		1				1
2017						0
2018	6				16	22
2019	389					389
2020*		1				1

Table 4.4.0b. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Divisions 2.a, b. (* preliminary).

Year	Faroes	France	Germany	Greenland	Norway	E & W	Scotland	Sweden	Russia	Total
1988	77	37	5		3416	2				3537
1989	126	42	5		1883	2				2058
1990	228	48	4		1128	4				1412
1991	47	23	1		1408					1479
1992	28	19		3	987	2				1039
1993		12	2	3	1003					1020
1994		9	2		399	9				419
1995	0	12	2	2	342	1				359
1996	0	8	1		254	2	2			267
1997	0	10	1		280					291
1998	0	3			272		3			278
1999	0	1	1		287		2			291
2000		2	4		240	1	2			249
2001	8	7			190	1	2			208
2002	1	1			129	1	17			149
2003	30				115		1	1		147
2004	28	1			144				1	174
2005	47	3			144	1			2	197
2006	49	4			149					202
2007	102	3			154		3			262
2008	105	9			208		11			333

Year	Faroes	France	Germany	Greenland	Norway	E & W	Scotland	Sweden	Russia	Total
2009	56	1			219		9			285
2010	183	1			234		4			422
2011	312	7			167					486
2012	188	7			142		1			338
2013	79	16			107					202
2014	29	16			73		9			127
2015	16	6			91					113
2016	22	7	0.059		57		1			87
2017	57	5			112		3			177
2018	112	4			124	0,105	0,69			241
2019	48	7			321					376
2020*		2			237					239

Table 4.4.0c. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Subarea 3. (* preliminary).

Year	Denmark	Norway	Sweden	FRANCE	Total
1988	10	11	1		22
1989	7	15	1		23
1990	8	12	1		21
1991	9	9	3		21
1992	29	8	1		38
1993	16	6	1		23
1994	14	4			18
1995	16	4			20
1996	9	3			12
1997	14	5	2		21
1998	4	2			6
1999	5	1			6
2000	13	1			14
2001	20	4			24
2002	8	1			9

Year	Denmark	Norway	Sweden	FRANCE	Total
2003	18	1			19
2004	18	1			19
2005	48	1			49
2006	42				42
2007					0
2008		2			2
2009		+			0
2010		+			0
2011					0
2012					0
2013		1			1
2014		+	+		0
2015	+	+			0
2016	0.154	0.64	0.005	0.307	1
2017		0,775			1
2018	0,286	0,97	0,085		1
2019	0,885	0,63	0,047		2
2020*	0,775	0,948	0,070		2

Table 4.4.0d. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Division 4.a. (* preliminary).

Year	Denmark	Faroes	France (4ab)	Germany	Norway	E & W	Scotland	Ireland	Total
1988	1	13	223	6	116	2	2		363
1989	1		244	4	196	12			457
1990			321	8	162	4			495
1991	1	31	369	7	178	2	32		620
1992	1		236	9	263	8	36		553
1993	2	101	76	2	186	1	44		412
1994			144	3	241	14	19		421
1995		2	73		201	8	193		477
1996		0	52	4	67	4	52		179

Year	Denmark	Faroes	France (4ab)	Germany	Norway	E & W	Scotland	Ireland	Total
1997		0	36		61	0	172		269
1998		1	31		55	2	191		280
1999	2		21		94	25	120	2	264
2000	2		15	1	53	10	46	2	129
2001	7		9		75	7	145	9	252
2002	6		11		58	4	292	5	376
2003	8		8		49	2	25		92
2004	7		17		45		14		83
2005	6		7		51		2		66
2006	6		6		82				94
2007	5		2		55				62
2008	2		9		63		+		74
2009	1		12		69		7		89
2010	1		24		109		21		155
2011			129		46		1		176
2012			96		70				166
2013			5		38				43
2014			4		34		12		50
2015	+		6		74	+	3		83
2016	0,48		6	0,041	74		6		87
2017	0,499		3		65	0,012	5		73
2018	3,209		3	0,018	50	0,025	3		60
2019	2,521		12		66	0,027	4		85
2020*	6,823		21	0,004	138		10		176

Year	Fa- roes	France	Ger- many	Spain	E & W	Scot- land	Nor- way	Ice- land	Po- land	Lithua- nia	Rus- sia	unallo- cated	To- tal
2016				29									29
2017				28									28
2018				24									24
2019				10									10
2020*				13									13

Table 4.4.0f. Blue ling (*Molva dypterygia*). Total landings by Subarea (past reported landings from subareas 8 and 9 are ascribed to *Molva macrophthalma* and not included). (* preliminary data).

Year	1	2	3	4	12	Total
1988	10	3537	22	363	263	4195
1989	8	2058	23	457	70	2616
1990	4	1412	21	495	552	2484
1991	3	1479	21	620	1147	3270
1992	5	1039	38	553	971	2606
1993	1	1020	23	412	3336	4792
1994	3	419	18	421	752	1613
1995	5	359	20	477	573	1434
1996	2	267	12	179	788	1248
1997	1	291	21	269	417	999
1998	1	278	6	280	438	1003
1999	1	291	6	264	1353	1915
2000	3	249	14	129	594	989
2001	1	208	24	252	675	1160
2002	1	149	9	376	1318	1853
2003	0	147	19	92	1192	1450
2004	1	174	19	83	905	1182
2005	1	197	49	66	710	1023
2006	0	202	42	94	501	839
2007	0	262	0	62	354	678
2008	0	333	2	74	564	973

Year	1	2	3	4	12	Total
2009	1	285	0	89	312	687
2010	1	422	0	155	50	628
2011	3	486	0	176	55	720
2012	1	338	0	166	632	1137
2013	0	202	1	43	254	500
2014	4	127	0	50	80	261
2015	0	113	0	83	12	208
2016	1	87	1	87	29	205
2017	0	177	1	73	28	279
2018	22	241	1	60	24	348
2019	389	376	2	85	10	862
2020*	1	239	2	176	13	431

Table 4.4.1 Blue ling in Subarea 27.nea. Discards from 2015-2020. Discards from Denmark are taken from Inter-Catch. Discards from Scotland are estimated in 2021.

Year	Denmark	Scotland	Total discards	Scotland old ¹
2015		0		
2016		0		
2017	0.808	2.403	3.211	0.117
2018	0.300	0.774	1.074	0.002
2019	0.750	14.110	14.860	0,023
2020*	1.448	0	1.448	0

¹ The old InterCatch values for discards from Scotland; revised in 2021. The new values are estimated from 2015-2020.

Table 4.4.2 Blue ling in Subarea 27.nea. Landings inside and outside the NEAFC Regulatory Area (RA). Landings inside NEAFC area are from 12a and 12b. Weights are in tonnes.

Year	Inside the NEAFC RA	Outside the NEAFC RA	Total landings
2014	80	181	261
2015	12	196	208
2016	29	176	205
2017	28	251	279
2018	24	324	348

Year	Inside the NEAFC RA	Outside the NEAFC RA	Total landings
2019	10	852	862
2020*	13	418	431

4.4.10 Figures

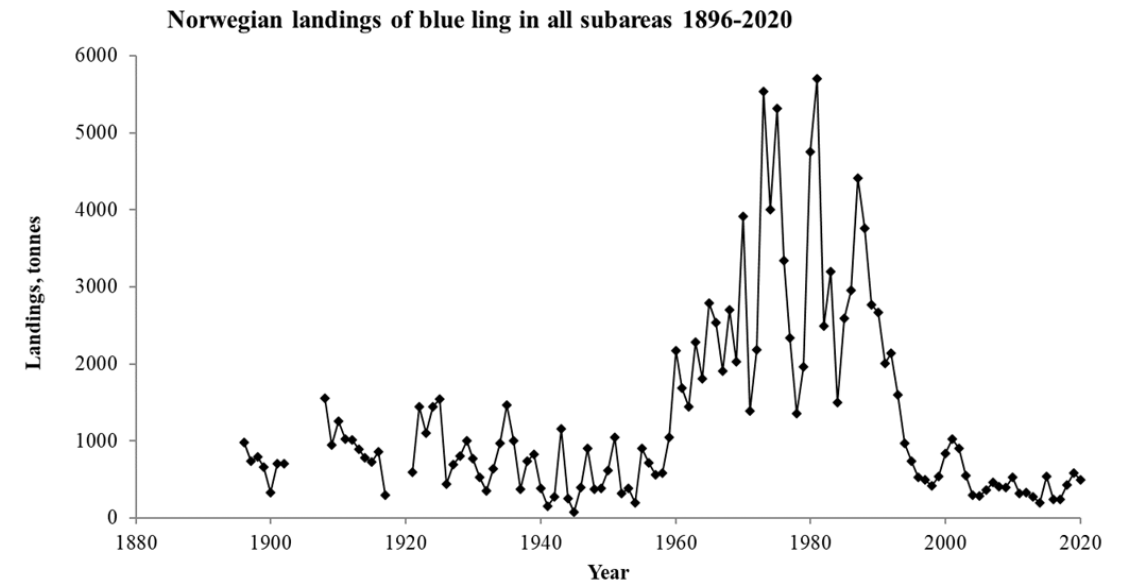


Figure 4.4.1. Reported Norwegian landings on blue ling from 1896–2020.

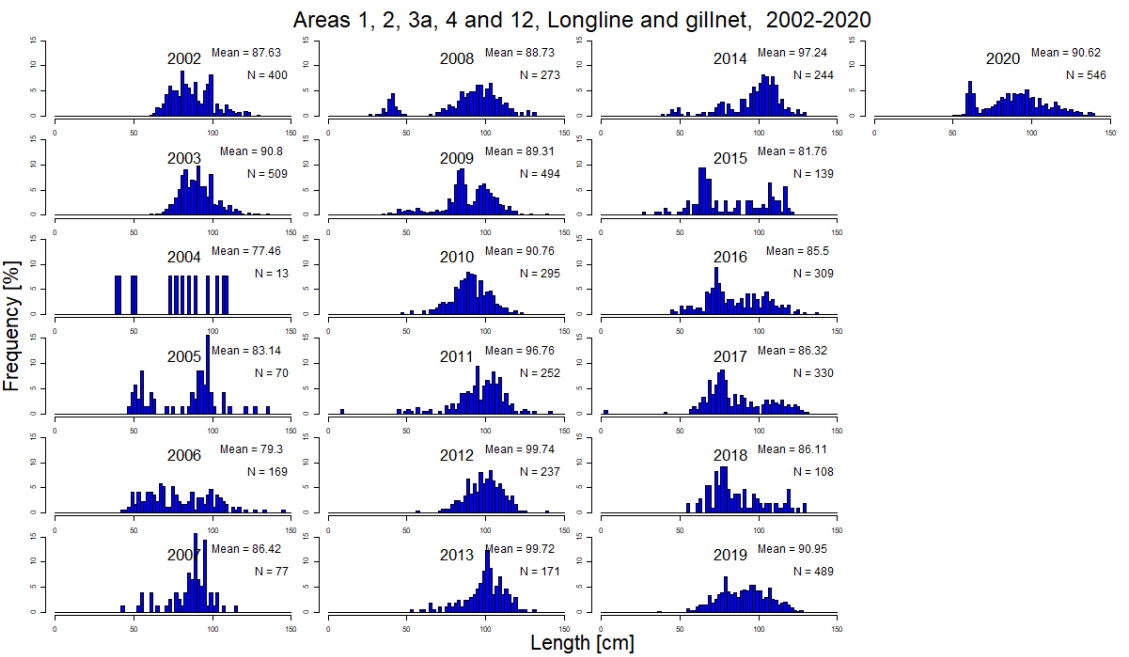


Figure 4.4.2. Length compositions from Norwegian longline and gill net fishery from 2002-2020.

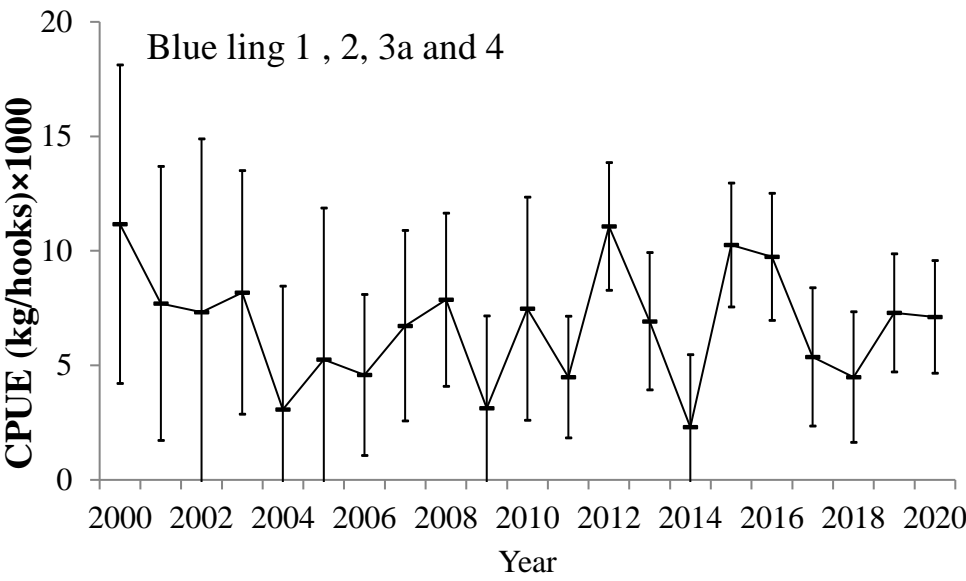


Figure 4.4.3. Norwegian cpue (kg/1000 hooks) from longlines catches in areas 1, 2, 3.a and 4 from 2000–2020.

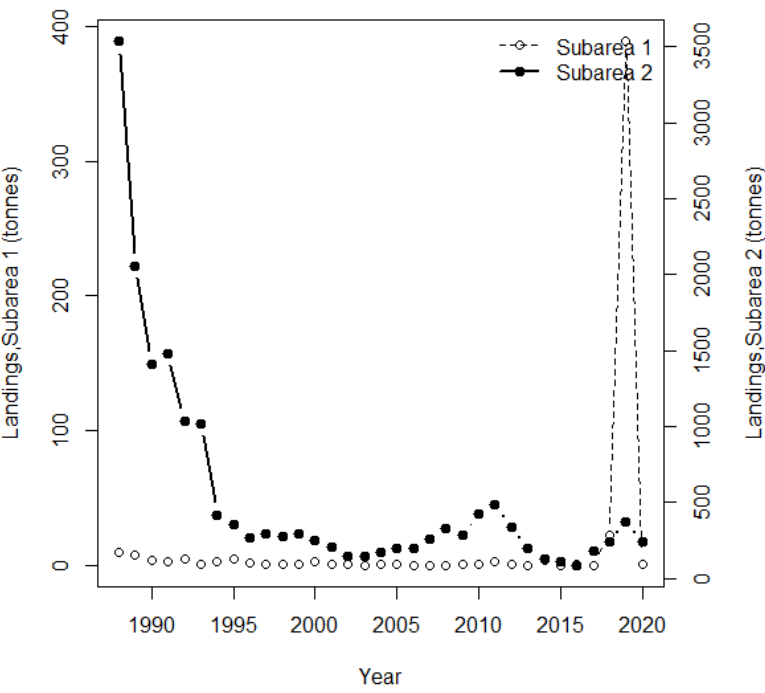


Figure 4.4.4. Landings of blue ling in Subareas 1 and 2. Subarea 1: open circles, left axis. Subarea 2: filled circles, right axis.

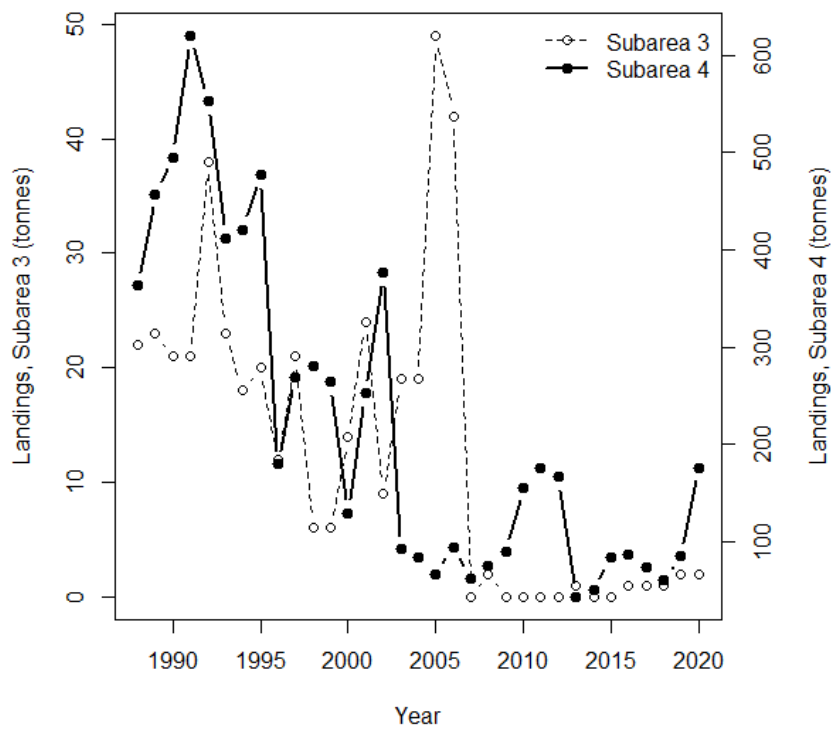


Figure 4.4.5. Landings of blue ling in Subareas 3 and 4. Subarea 3: open circles, left axis. Subarea 4: filled circles, right axis.

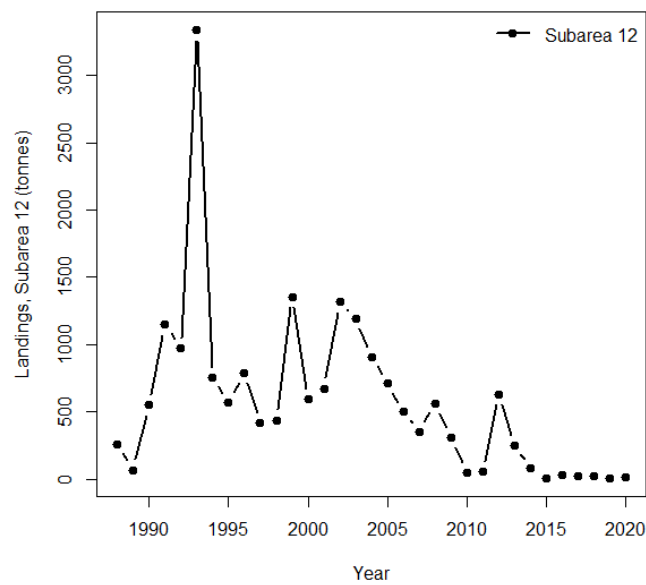


Figure 4.4.6. Landings of blue ling in Subarea 12.

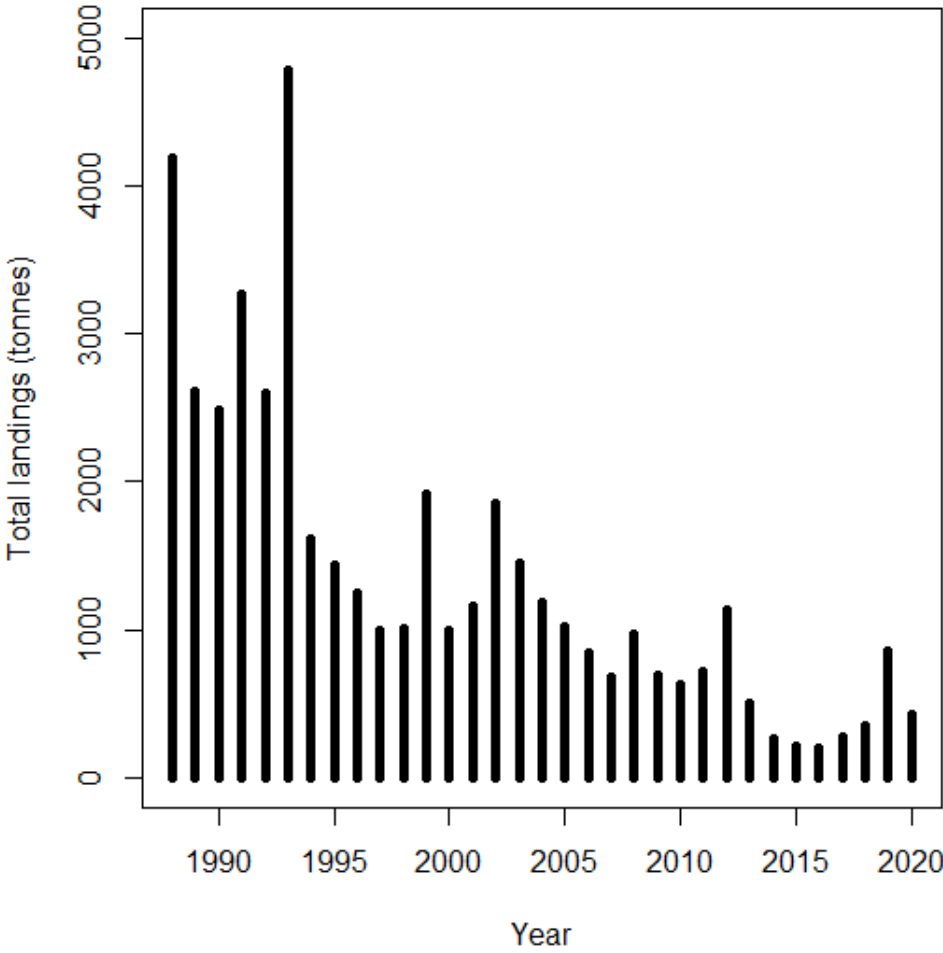


Figure 4.4.7. Total landings of blue ling from stock area 1,2,3a,4 and 12 from 1988-2020.