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CIEM Conseil International pour l'Exploration de la Mer

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

5.1 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 is supported by differences in length and age structures between areas as well as in growth and maturity. Egg and larval data from early studies also suggest the existence of many spawning grounds in each of areas of the northern and southern stocks and elsewhere suggest further 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 scale large spatial migrations and therefore limited population structuring. The conclusion is that stock structure is uncertain within the areas under consideration.

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 14. All remaining areas are grouped together as “other areas". This latter unit includes Subareas 1 and 2 and Division 4.a and 3.a were historical landing have been significant and subareas, 8 and 9, where the species does not occur. Landings reported in 8 and 9 are ascribed to the related Spanish ling (*Molva macrophtalma*). The situation in 12 is different as this subarea includes part of the Mid-Atlantic Ridge (12.a1, 12.a2, 12.a4 and 12.c) and the western slope of the Hatton Bank (12.c). None of these have represented major landings in the 2000s. However, based upon the continuity of bathymetric features and lesser abundance, blue ling from the western Hatton Bank is likely to be similar to those from the northern Hatton Bank (6.b). Therefore, including ICES Division 12.b in the assessment unit 5.b, 6 and 7 could be considered. Because of the much lesser abundance of blue ling on the Hatton Bank, this should not impact on stock modelling.

Historical total international landings show that blue ling have been exploited for long. Before the start of the time-series used by WGDEEP, Norway landed 1000–2000 t per year in the 1950s and 1960s. These landings might have been mainly from Subareas1 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 country have been the Faroe Islands, France, Germany, Iceland and Norway (Figure 5.1.1). Except in a few recent years where large amount where caught in Division 5.a, the stock unit of Division 5.b and Subareas 6 and 7I have had the main contribution to total landings (Figure 5.1.2).

Blue ling is known to form spawning aggregations. From 1970 to 1990, the bulk of the fishery for blue ling was seasonal fisheries targeting these aggregations which were subject to sequential depletion. Known spawning areas are shown in Figure 5.1.3. In Iceland, the depletion of the spawning aggregation in a few years was documented (Magnússon, 1995) and blue ling is an aggregating species at spawning time. To prevent depletion of adult populations temporal closures have been set in the Icelandic and EU EEZs as well as in the NEAFC RA.

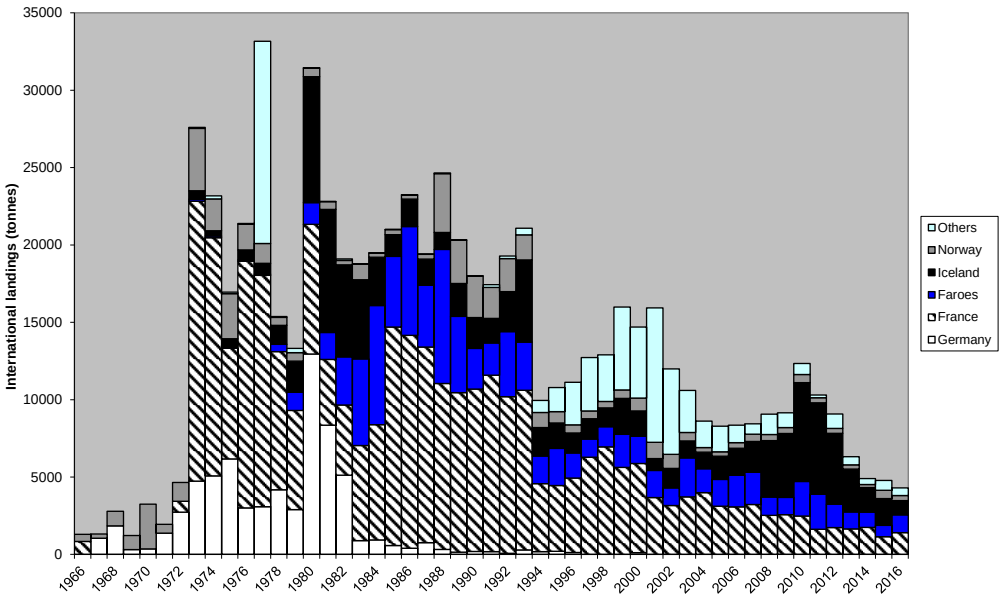

Figure 5.1.1. Total international landings of blue ling in the Northeast Atlantic, by country, 1966–2015.

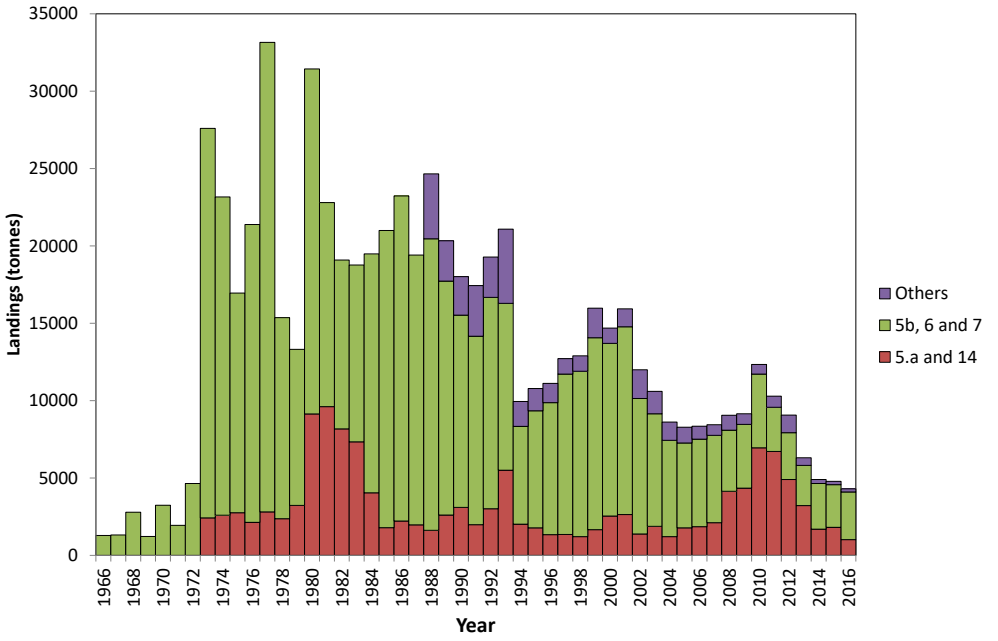

Figure 5.1.2. Total international landings of blue ling in the Northeast Atlantic, by stock unit, 1966–2015.

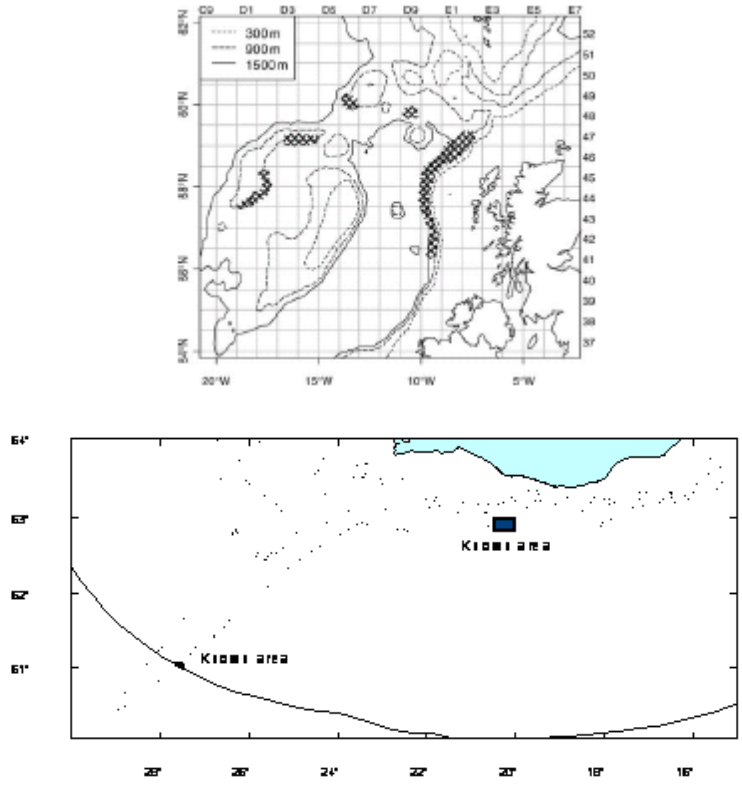

Figure 5.1.3. Known spawning areas of blue ling in Icelandic water (a) and to the West of Scotland (b, from Large *et al.*, 2010).

5.2 Blue Ling (*Molva dypterygia*) In Division 5.a and Subarea 14

5.2.1 The fishery

The change in geographical distribution of the Icelandic blue ling fisheries from 1999, to 2016 (Figures 5.2.1 and 5.2.2) indicates that there has been an expansion of the fishery of blue ling to northwestern waters. This increase may partly be the result of increased availability of blue ling in the northwestern area.

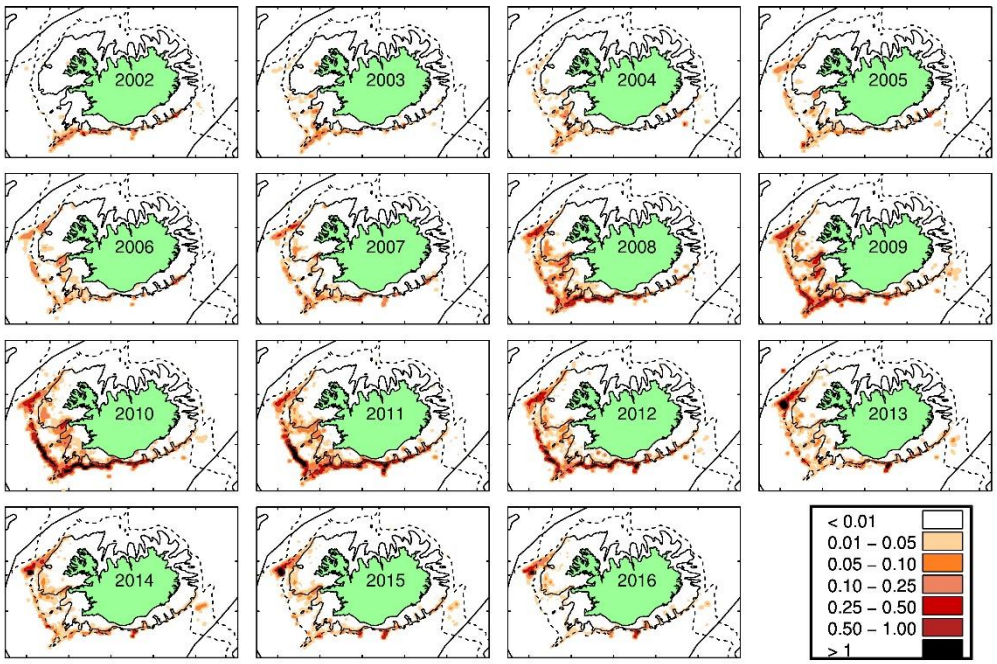

Figure 5.2.1. Blue ling in 5.a and 14. Geographical distribution of the Icelandic blue line fishery since 2002 as reported in logbooks. All gear types combined.

Before 2008 the majority of the catches of blue ling in 5.a were by trawlers, as bycatch in fisheries targeting Greenland halibut, redfish, cod and other demersal species (Table 5.2.3). 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 2007 there was a substantial change in the fishery for blue ling in 5.a (Table 5.2.3). 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. The trend has reversed and in 2015–2016 the proportion of longline catches decreased to 20–30%. At the same time longliners have started fishing in deeper waters than before 2008 and since then the bulk of the longline catches have been taken at depths greater than 500 m (Figure 5.2.3).

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

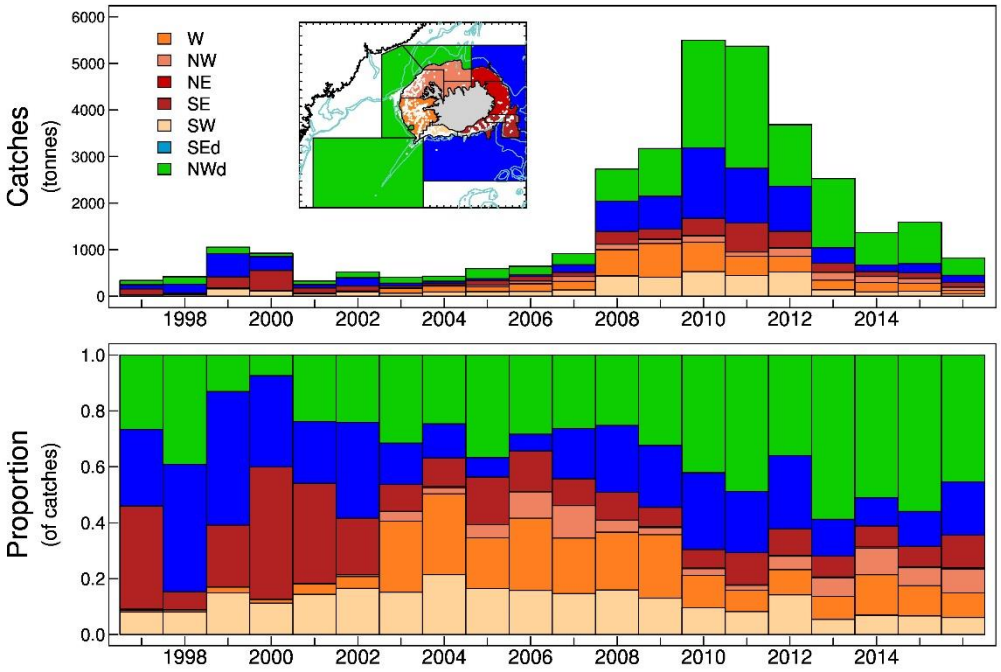

Figure 5.2.2. Blue ling in 5.a and 14. Spatial distribution of reported catches in 5.a in tonnes (upper) and as annual proportions (lower). The inserted map shows the area division and location of operations in 2013 (hauls and lines) as white points.

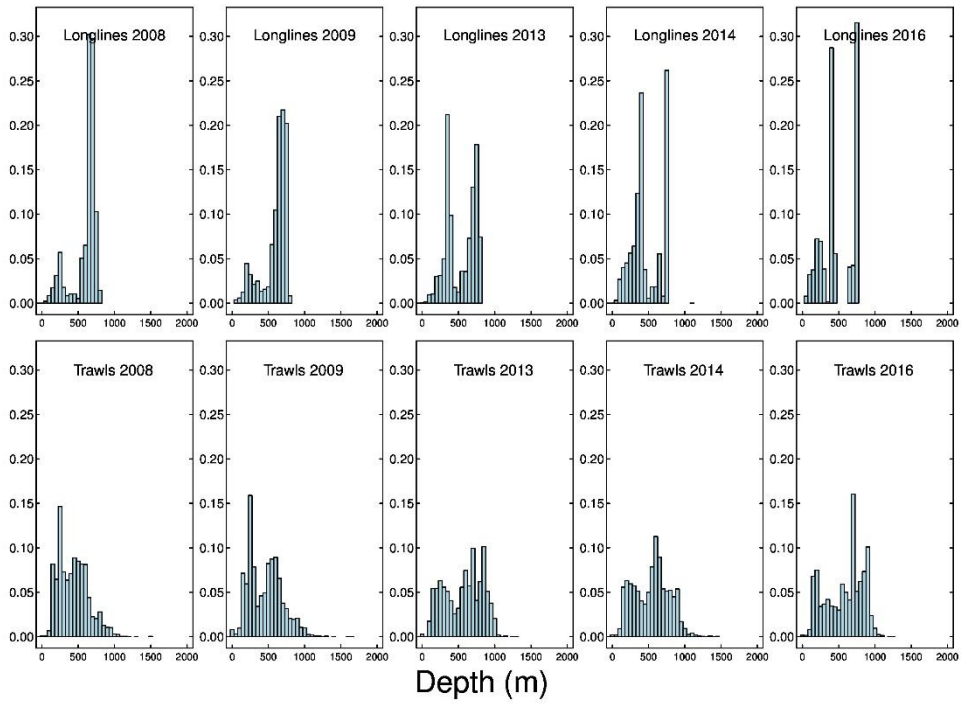

Figure 5.2.3. Blue ling in 5.a and 14. Depth distribution of longlines (upper row) and trawls (lower row) catches in 5.a according to logbook entries.

5.2.2 Landings trends

The preliminary total landings in 5.a 2016 were 925 t of which the Icelandic fleet caught 928 t. (Table 5.2.2 and Figure 5.2.4). Catches of blue ling in 5.a increased by more than 370% between 2006 and 2010, the main part of this increases can be attributed to increased targeting of blue ling by the longline fleet. Since then catches in 5.a decreased compared to 2010 or by around 4600 tonnes (Table 5.2.3).

Total international landings from 14 (Table 5.2.2) 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), but there is no further information available on this fishery. These larger landings are very occasional and in most years total international landings have been between 50 and 200 t. Preliminary landings in 2016 were 7 t.

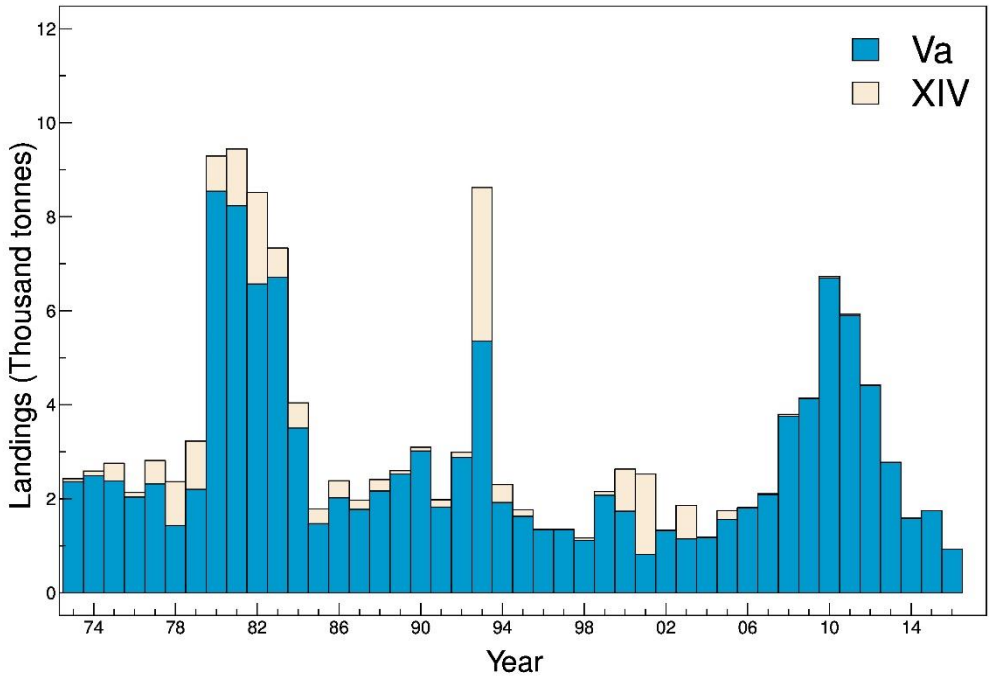

Figure 5.2.4. Blue ling in 5.a and 14. Nominal landings.

5.2.3 ICES Advice

The ICES advice for 2016 is: Based on the ICES approach for data-limited stocks, ICES advises that catches should be no more than 2032 tonnes. Area closures to protect spawning aggregations should be maintained and expanded as appropriate.

The basis for the advice was the following: The ICES framework for category 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 is based first on a comparison of the latest index value (index A) with the preceding value (index B), combined with the F_{proxy} target (catch/survey biomass). The index is estimated to have decreased by less than 20% which means that the uncertainty cap was not applied. So, in estimating the catch advice the F_{proxy} is used directly with the survey observation (index A).

5.2.4 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 2015/2016 fishing year was set at 2550 based on the recommendations of MRI using the same advisory procedure as in 5.2.3.

Table 5.2.5. Blue ling in 5.a and 14. TAC recommended for tusk in 5.a by the Marine Research Institute, national TAC and total landings from the quota year 2013/2014.

FISHING YEAR	ICES/MRI ADVICE	NATIONAL TAC	ICELAND	OTHERS	LANDINGS
2013/2014	2400	2400	1653	101	1754
2014/2015	3100	3100	1898	41	1939
2015/2016	2550	2550	1734	90	1824
2016/2017	2032	2032			

5.2.5 Data available

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

5.2.5.1 Landings and discards

Landings data are given in Tables 5.2.1 and 5.2.2. Discarding is banned in the Icelandic fishery. There is no available information on discarding of blue ling in 5.a and 14. Being a relatively valuable species and not being subjected to TAC constraints before 2013/2014 fishing year nor minimum landing size there should be little incentive to discard blue ling in 5.a.

5.2.5.2 Length compositions

Length distributions from the Icelandic trawl and longline catches for the period 2001–2016 are shown in Figure 5.2.5. Mean length from trawls has increased from 86 cm in 2012 to 94 cm in 2016. On average mean length from longlines is higher than from trawls.

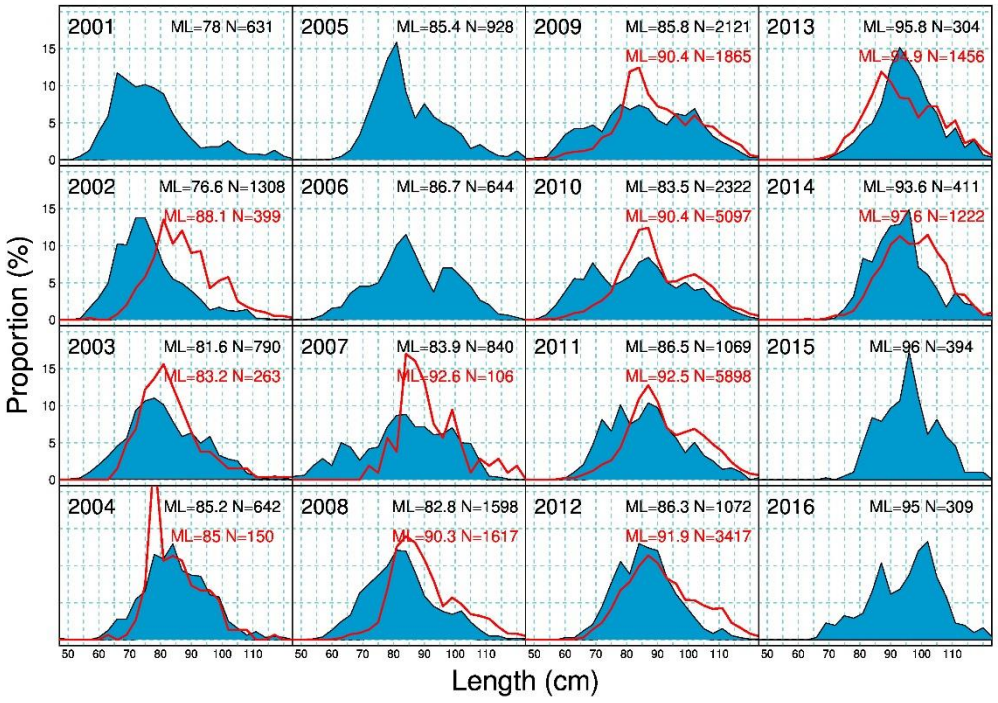

Figure 5.2.5. Blue ling in 5.a and 14. Length distribution of blue ling from trawls (blue area) and longlines (red lines) of the Icelandic fleet in 5.a since 2001. The number of measured fish (N) and mean length (ML) is also given.

5.2.5.3 Age compositions

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

5.2.5.4 Weight-at-age

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

5.2.5.5 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*).

5.2.5.6 Catch, effort and survey data

Effort and nominal cpue data from the Icelandic trawl and longline fleet are given in Figure 5.2.6. 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 in 5.a and therefore no attempt has been made to standardize the series. However looking at fluctuations in cpue and effort may be informative in regards to the development of the fishery. Cpue from longlines has remained high since 2008. No marked changes are observed from trawls since 2000.

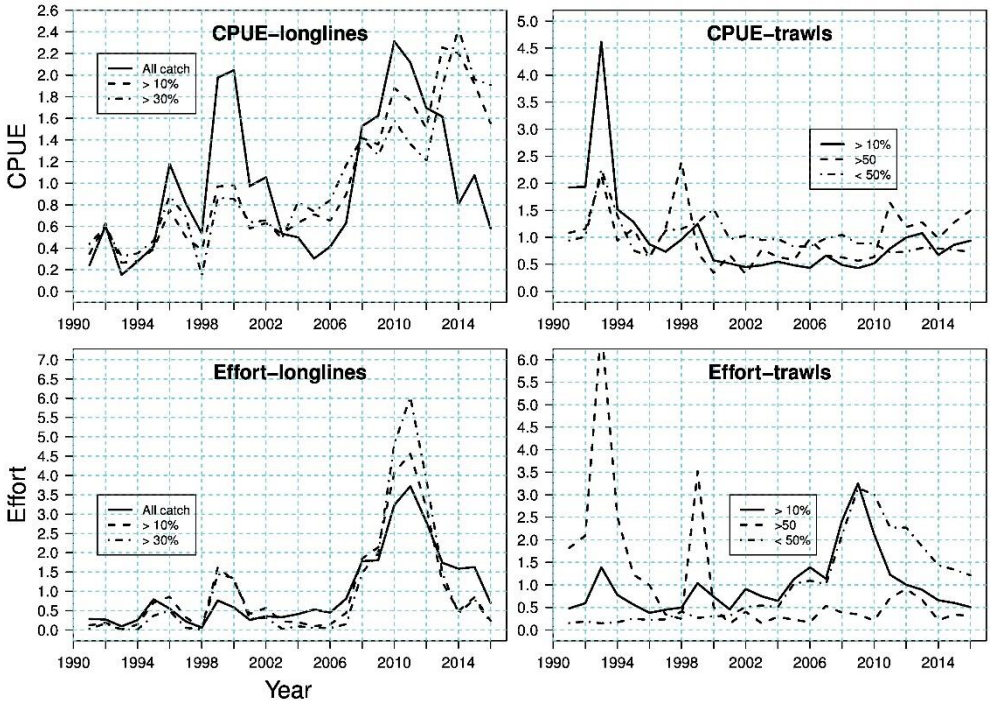

Figure 5.2.6. Blue ling in 5.a and 14. Nominal cpue and effort from longlines and trawls in 5.a based on logbook data where blue ling was either recorded in catches or above certain level.

Time-series stratified abundance and biomass indices from the spring and autumn trawl surveys are shown in Figure 5.2.7 and length distributions from the autumn survey and its spatial distribution in Figures 5.2.8 and 5.2.9. 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.

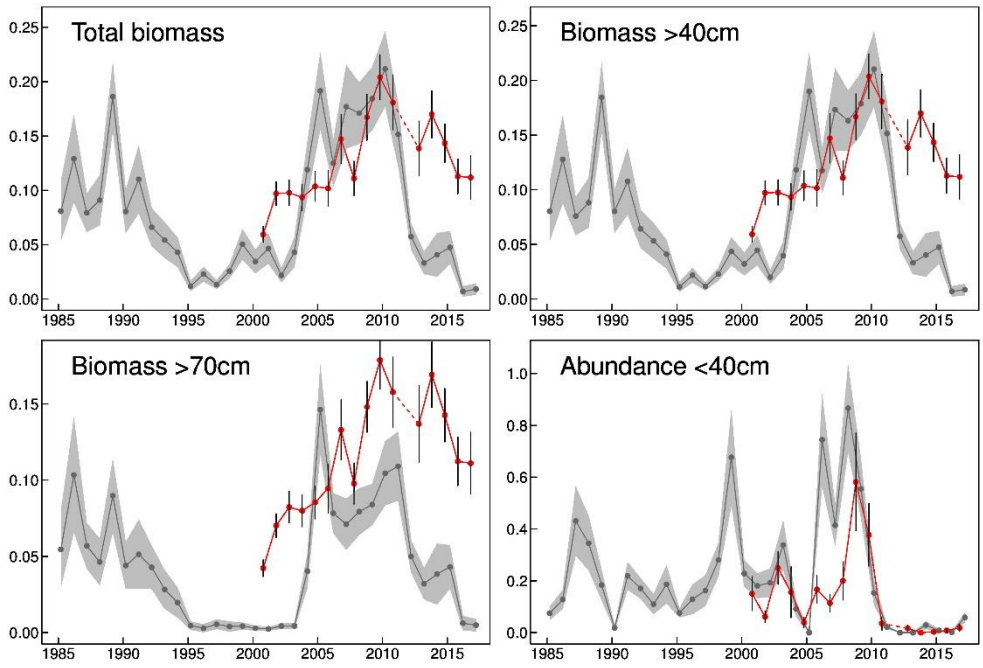

Figure 5.2.7. Blue ling in 5.a and 14. Abundance indices for blue ling in the Icelandic spring survey since 1985 (line and shaded area) and the autumn survey since 2000 (red points and vertical lines). A) total biomass index, b) biomass of 40 cm and larger c) biomass of 70 cm and larger, d) abundance index of <40 cm. The shaded area and the vertical bar show +/- standard error of the estimate.

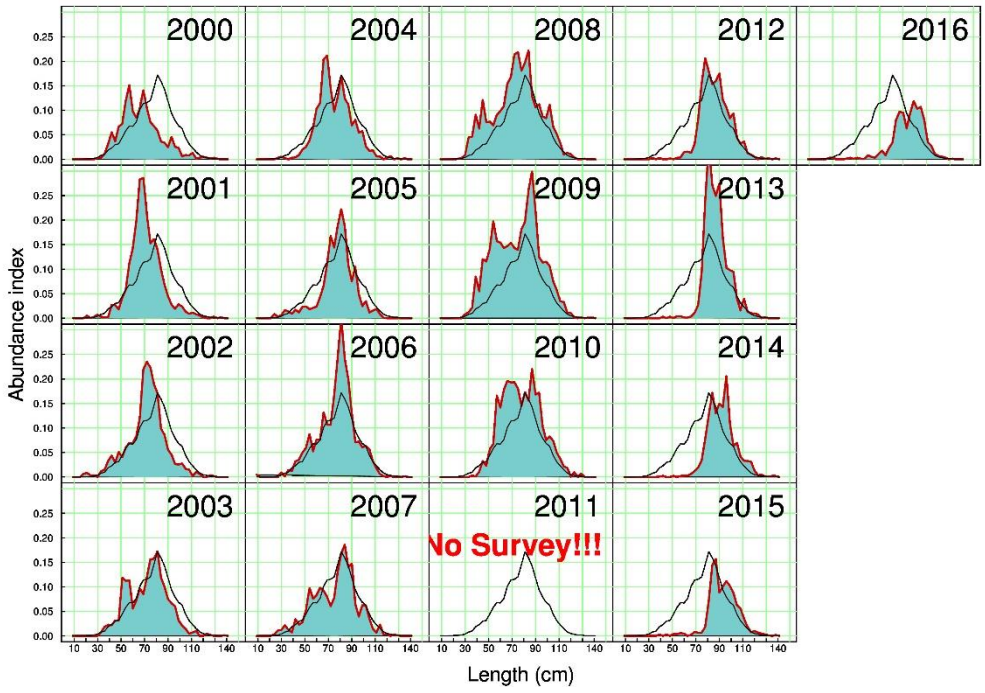

Figure 5.2.8. Blue ling in 5.a and 14. Length distributions from the Icelandic autumn survey since 2000. Black line is the average by length over the whole survey period.

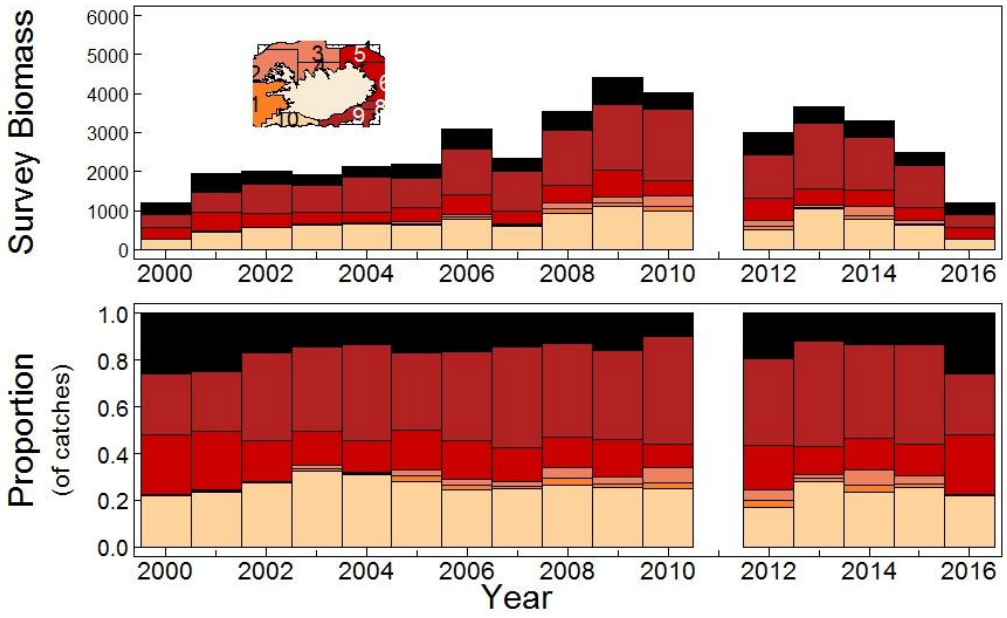

Figure 5.2.9. Blue ling in 5.a and 14. Spatial distribution from the Icelandic autumn survey.

5.2.6 Data analyses

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. This can be seen when looking at Table 5.2.3. In 2005 longliners caught 102 tonnes of blue ling when trawlers caught 1260 tonnes or 84% of the total catches (1505 tonnes). In 2011 trawlers caught 1618 tonnes, out of 5900 tonnes or 27%, but longliners 4138 tonnes or 70%. Since then the proportion taken by longliners has decreased and in 2016 longliners caught 29% of the catches, trawls 67% and other gear 4%.

As longliners take on average larger blue ling (Figure 5.2.5) 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 in 2011 but in longlines in 2012 and 2013. The expansion of the longline fleet to deeper waters (Figure 5.2.3) may be the result of decreased catch rates in shallower areas.

Cpue and effort

As stated above cpue indices from commercial catches are not considered a reliable index of stock abundance. Therefore the rapid increase in cpue 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 5.2.6). 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 5.2.6).

Surveys

The spring survey covers only the shallower part of the depth distributional range of blue ling and shows high interannual variance (Figure 5.2.7). 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 than the spring survey does indicate that there was an increase in blue ling biomass since 2007 (Figure 5.2.7). 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 (Figures 5.2.7 and 5.2.8). Due to industrial action only part of the autumn survey was conducted in 2011.

F_{proxy}

Relative fishing mortality (F_{proxy} = Yield/Survey biomass) derived from the autumn survey (+40 cm) and the combined catches from 5.a and 14 indicates that fishing mortality may have increased by more than 150% between 2007–2010 (Figure 5.2.10 and Table 5.2.4). 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 between 2015 and 2016. The reason for the decrease is because of proportionally greater decrease in landings than in the survey index.

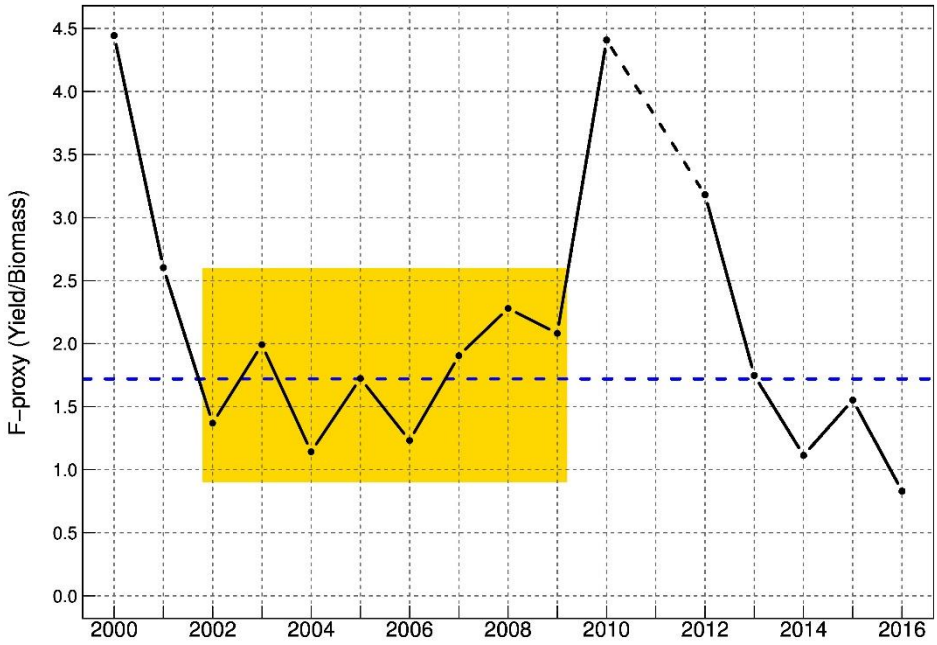

Figure 5.2.10. Blue ling in 5.a and 14. Changes in relative fishing mortality (Yield/Survey biomass >39 cm). The yellow box highlights the reference period used by ICES as basis for the 2012 advice and the blue dotted line is the target F_{proxy} of 1.75 (Mean of 2002–2009).

Analytical assessment

Exploratory stock assessment on Blue ling in 5.a and 14.b using Gadget

An exploratory stock assessment of blue ling in 5.a using the Gadget model was presented at WGDEEP 2012. Updated results of the model were not presented at WGDEEP 2016.

5.2.7 Comments on the assessment

The assessment presented above is based on the ICES DLS approach for category 3 stocks and was proposed by the ADG in 2012. In the 2012 advice the target F_{proxy} was set at 1.7 or the average F_{proxy} in 2002–2009, however the landings from 14 were not correct and using the revised landings the target should be 1.75.

The autumn survey index in 2016 was 1118.0. Using the same procedure as last year would result in the advice for 2017 to set the TAC at 1956 t (1118.0 * 1.75).

5.2.8 Management considerations

Landings have decreased considerably in the last year and as blue ling in 5.a 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 in should be maintained and expanded where appropriate.

5.2.9 Application of MSY_{proxy} reference points (ToR h)

In the ICES response to the: EU request to provide a framework for the classification of stock status relative to MSY proxies for selected category 3 and category 4 stocks in ICES Subareas 5 to 10. ICES set the F_{MSY} proxy for greater silver smelt in 5.a as 0.171 but did not set a B_{MSY} trigger proxy for the stock.

This year WGDEEP re-ran the length-based indicator model used to answer the request and also tried the SPiCT model on the index used for the assessment.

Length–Based Indicator (LBI)

Data and settings

In the LBI-model model run presented here length-at-maturity (L_{mat}) was set at 76 cm. This value was obtained from data collected in the Icelandic autumn survey. Linf was at 128 cm taken as the 99% quantile of all blue ling measurements in the MFRI database. This value is in line with values reported for blue ling in other areas. The length distributions came from commercial catches from 2004 to 2016. Mean weight-at-length was estimated from a length–weight relationship from the Icelandic autumn survey (Figure 5.2.11). The length-bin used was 4 cm.

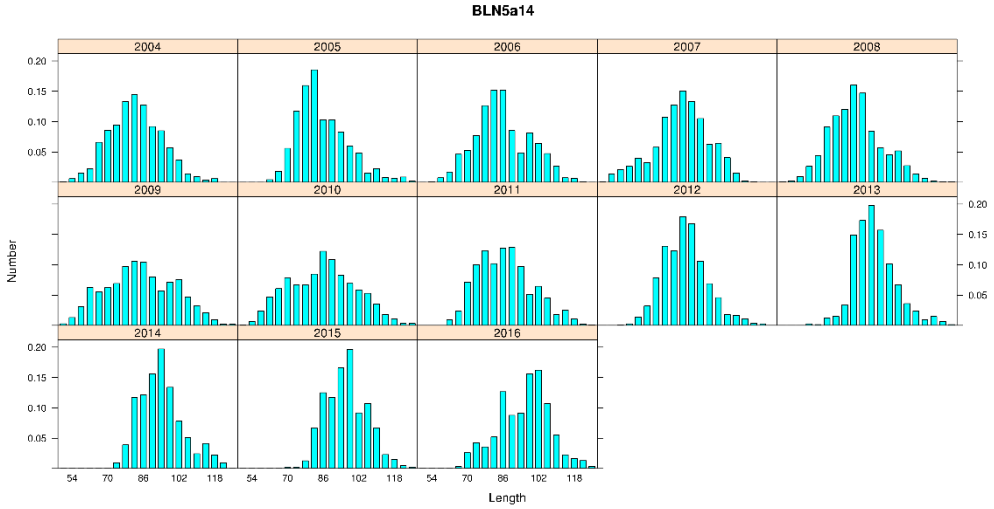

Figure 5.2.11. Length distributions used for estimating LBI.

Results

According to the results, blue ling in 5.a is being harvested at a sustainable level in the period as $L_{mean}/L_{F=M}$ is always larger than 1 (Table 5.2.5 and Figure 5.2.12).

Table 5.2.5. LBI results for 2014 to 2016.

	Traffic light indicators					
	Conservation				Optimizing Yield	MSY
	Lc/Lmat	L25%/Lmat	Lmax5%/Linf	Pmega	Lmean/Lopt	Lmean/$L_{F=M}$
Ref	**>1**	**>1**	**>0.8**	**>30%**	**~1 (>0.9)**	**≥1**
2014	1.08	1.13	0.92	46%	1.11	1.02
2015	1.08	1.17	0.90	61%	1.13	1.03
2016	0.92	1.14	0.92	58%	1.12	1.13

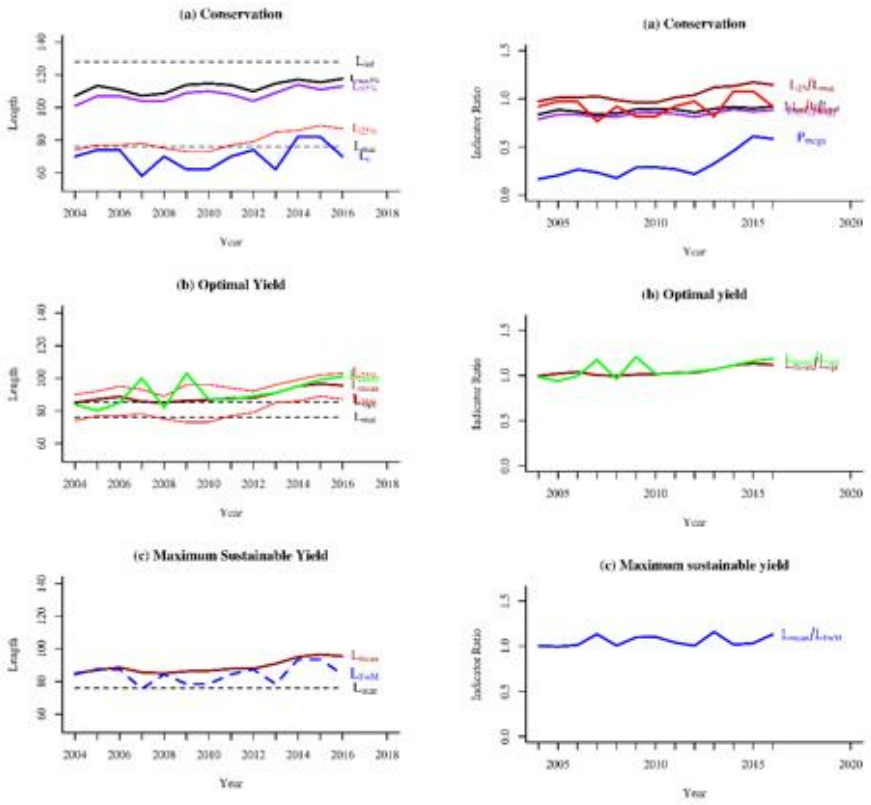

Figure 5.2.12. Results of LBI to commercial length distributions from 5.a.

SPiCT

Settings and data

The model could not converge using the catch history back to 1973 therefore the input data in the model was the catch history from 1998 and the index from the Icelandic Autumn survey used for the assessment that goes back to 2000 (Figure 5.2.13). The model run presented here deviates from the default settings in two ways. The uncertainty in the survey was taken into account in the model. The model was very sensitive to the prior for the K/B0 ratio and the only way fishing at any effect in the model was by setting it at 0.035 which indicates a seriously depleted stock in 1998 which is not in conformity with the perception of the stock status in that period.

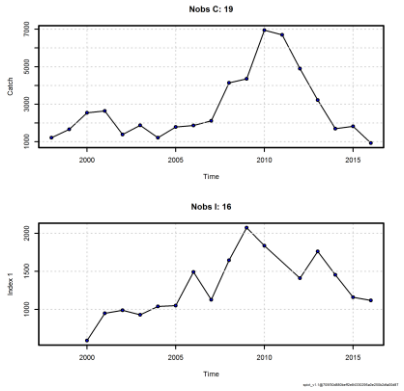

Figure 5.2.13. Input data to the SPiCT model.

Results

The output from the model is shown below. The estimates of r and K do seem plausible for a long-lived species like blue ling. It would be expected that r would be somewhere in the range of 0.05–0.15 and is estimated at 0.05. K is estimated at 143 kt. B_{MSY} is estimated at 20 kt, which is quite low. The diagnostic plots are shown in Figure 5.2.14, the results in Figure 5.2.15 and finally the analytical retrospective analysis in Figure 5.2.16.

```
> summary(res)
Convergence: 0  MSG: relative convergence (4)
Objective function at optimum: 16.6138966
Euler time step (years):  1/16 or 0.0625
Nobs C: 19,  Nobs I1: 16

Priors
      logn  ~  dnorm[log(2), 2^2]
  logalpha  ~  dnorm[log(1), 2^2]
   logbeta  ~  dnorm[log(1), 2^2]
 logbkfrac  ~  dnorm[log(0.035), 0.02^2]

Model parameter estimates w 95% CI
           estimate        cilow        ciupp   log.est
alpha  2.074363e-01 5.228120e-02 8.230457e-01 -1.572931
beta   5.235551e-01 1.897500e-01 1.444584e+00 -0.647113
r      4.790960e-02 5.544800e-03 4.139637e-01 -3.038439
rc     4.477635e-01 1.923150e-02 1.042518e+01 -0.803490
rold   6.095330e-02 6.747900e-03 5.505893e-01 -2.797647
m      4.499699e+03 1.945602e+03 1.040670e+04  8.411766
K      1.429101e+05 1.099765e+04 1.857060e+06 11.869971
q      5.600650e-02 1.166820e-02 2.688273e-01 -2.882288
n      2.139951e-01 2.453220e-02 1.866682e+00 -1.541802
sdb    1.817885e-01 1.034885e-01 3.193309e-01 -1.704911
sdf    3.216214e-01 1.892796e-01 5.464948e-01 -1.134380
sdi    3.770950e-02 1.359410e-02 1.046046e-01 -3.277842
sdc    1.683865e-01 8.221480e-02 3.448773e-01 -1.781493

Deterministic reference points (Drp)
          estimate        cilow        ciupp   log.est
Bmsyd 2.009855e+04  689.9555361 5.854751e+05  9.908403
Fmsyd 2.238818e-01    0.0096158 5.212588e+00 -1.496637
MSYd  4.499699e+03 1945.6015632 1.040670e+04  8.411766
Stochastic reference points (Srp)
          estimate        cilow        ciupp   log.est rel.diff.Drp
Bmsys 1.934612e+04  741.3574353 5.048476e+05  9.870247 -0.038892946
Fmsys 2.302724e-01    0.0106193 4.993289e+00 -1.468492  0.027752523
MSYs  4.459686e+03 1933.0580606 1.028878e+04  8.402834 -0.008972123

States w 95% CI (inp$msytype: s)
                    estimate        cilow        ciupp    log.est
B_2016.00       2.061112e+04 4240.3644153 1.001843e+05  9.9335858
F_2016.00       6.003570e-02    0.0118204 3.049207e-01 -2.8128153
B_2016.00/Bmsy  1.065387e+00    0.0850237 1.334980e+01  0.0633384
F_2016.00/Fmsy  2.607162e-01    0.0166645 4.078905e+00 -1.3443228

Predictions w 95% CI (inp$msytype: s)
                   prediction        cilow        ciupp    log.est
B_2017.00       2.213200e+04 4704.5319533 1.041178e+05 10.0047798
F_2017.00       4.696210e-02    0.0086593 2.546902e-01 -3.0584152
B_2017.00/Bmsy  1.144002e+00    0.0857674 1.525918e+01  0.1345324
F_2017.00/Fmsy  2.039414e-01    0.0121534 3.422265e+00 -1.5899228
Catch_2017.00   1.106301e+03  547.1400163 2.236909e+03  7.0087775
E(B_inf)        6.729053e+04           NA           NA 11.1167747

>
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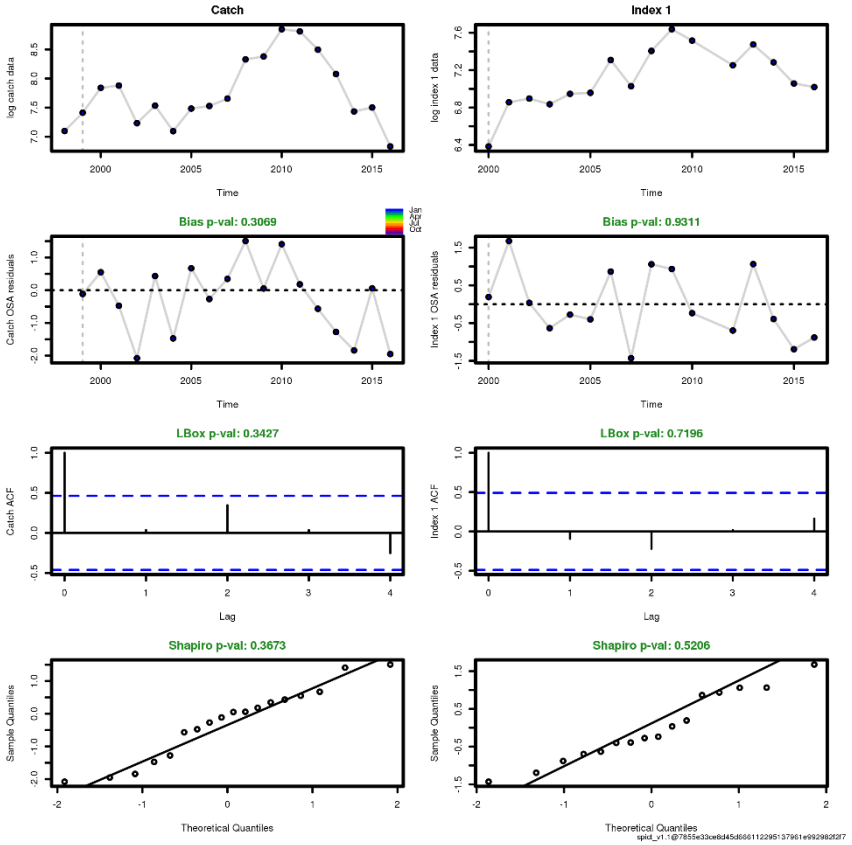

Figure 5.2.14. Diagnostics from the SPiCT-model.

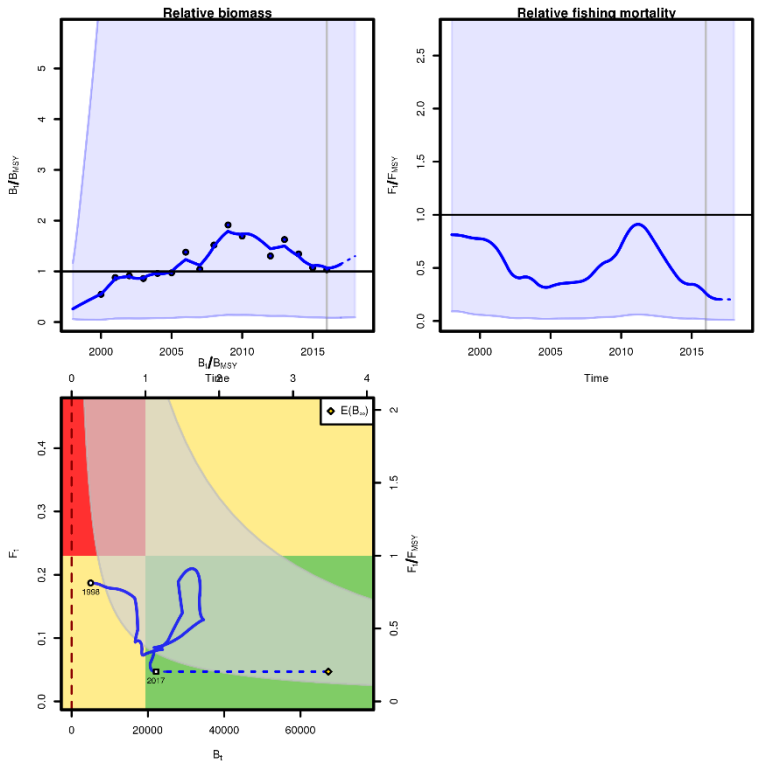

Figure 5.2.15. Results from the SPiCT-model.

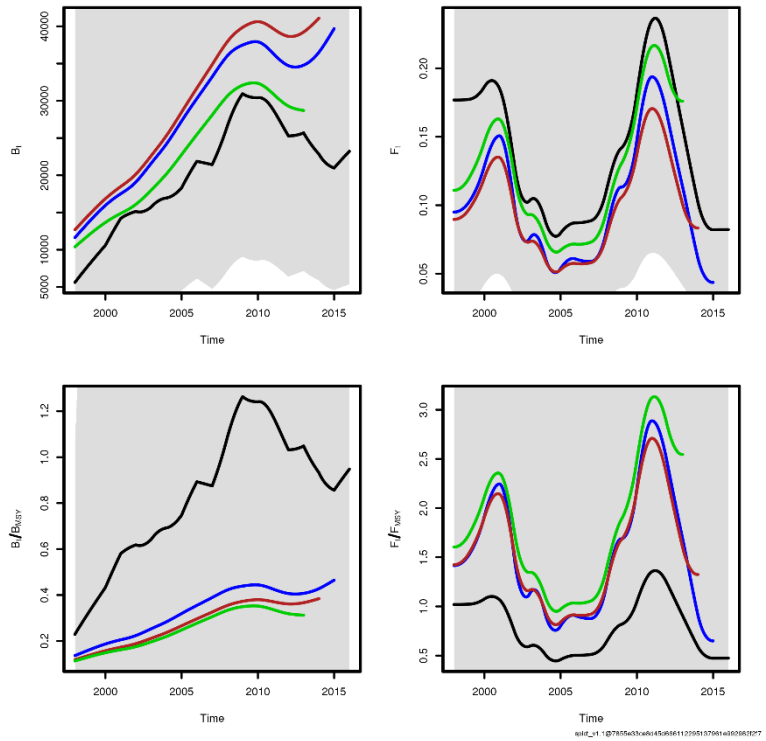

Figure 5.2.16. Analytical retrospective analysis from the SPiCT-model.

Conclusions

The analysis presented above indicates that the fishing pressure is below F_{MSY} and the stock biomass is above possible MSY $B_{trigger,proxy}$. This does not sound unlikely given that the biomass index is still rather high compared to its lowest values. The selection pattern from the fishery is good as only large blue ling are being caught but that is most likely because there is no recruitment coming into the stock at present.

The findings presented here support the general view of WGDEEP that the stock is at a sustainable level and that the selection pattern is good. However there is a question whether LBI and SPiCT are the correct tools to state that.

Table 5.2.1. Blue ling: Landing in ICES Division 5.a.

Year	Faroe	Germany	Iceland	Norway	UK	Total
1973	74	1678	548	6	61	2367
1974	34	1959	331	140	32	2496
1975	69	1418	434	366	89	2376
1976	29	1222	624	135	28	2038
1977	39	1253	700	317	0	2309
1978	38	0	1237	156	0	1431
1979	85	0	2019	98	0	2202
1980	183	0	8133	83	0	8399
1981	220	0	7952	229	0	8401
1982	224	0	5945	64	0	6233
1983	1195	0	5117	402	0	6714
1984	353	0	3122	31	0	3506
1985	59	0	1407	7	0	1473
1986	69	0	1774	8	0	1851
1987	75	0	1693	8	0	1776
1988	271	0	1093	7	0	1371
1989	403	0	2124	5	0	2532
1990	1029	0	1992	0	0	3021
1991	241	0	1582	0	0	1823
1992	321	0	2584	0	0	2905
1993	40	0	2193	0	0	2233
1994	89	1	1542	0	0	1632
1995	113	3	1519	0	0	1635
1996	36	3	1284	0	0	1323
1997	25	0	1319	0	0	1344
1998	59	9	1086	0	0	1154
1999	31	8	1525	8	11	1583
2000	0	7	1605	25	8	1645
2001	95	12	752	49	23	931
2002	28	4	1256	74	10	1372
2003	16	16	1098	6	24	1160
2004	38	9	1083	49	20	1199
2005	24	25	1497	20	26	1592
2006	63	22	1734	27	9	1855
2007	78	0	1999	4	10	2091
2008	88	0	3653	21	0	3763
2009	178	0	4132	5	0	4315
2010	515	0	6377	13	0	6905
2011	797	0	5903	2	0	6702
2012	312	0	4207	2	0	4521
2013	435	0	2769	2	0	3204
2014	71	0	1588	30	0	1689
2015	10	0	1734	4	0	1748
2016[1)]	6	0	925	84	0	1015

[1)] **Provisional figures.**

Table 5.2.2. Blue ling: Landing in ICES Division 14. Source: STATLANT database.

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	0	4	0	0	889	2	0	896
2001	1	0	0	11	61	0	1631	6	0	1710
2002	0	0	0	11	1	0	0	0	0	12
2003	0	0	0	0	36	0	670	5	0	711
2004	0	0	0	0	1	0	0	7	0	8
2005	2	0	0	0	1	0	176	8	0	187
2006	0	0	0	0	3	1	0	0	0	4
2007	19	0	0	0	1	0	0	0	0	20
2008	1	0	0	0	2	0	381	0	1	385
2009	1	0	0	0	3	0	111	4	0	119
2010	1	0	0	0	9	0	34	0	3	47
2011	0	0	0	0	2	0	0	1	6	9
2012	0	0	0	367	9	0	0	0	3	379
2013	0	0	4	0	0	0	0	3	9	16
2014	0	0	0	0	3	0	0	0	0	3
2015	0,3	0	59	0	0,9	0	0	0	5	65
2016[1)]	0	0	0	0	0	0	0	0	7,2	7,2

[1)] Provisional figures.

Table 5.2.3. Blue ling. Catches by gear type and numbers of boats participating in the blue ling fishery in 5.a.

Year	Longline	Trawl	Other gear	Total landings	Longliners		Trawlers	
	(tonnes)	(tonnes)	(tonnes)	(tonnes)	No boats	Hooks (mill.)	No. boats	Hrs (thous)
2000	804	797	25	1626	15	5.6	23	2.1
2001	129	576	51	756	15	2.3	26	1.6
2002	255	980	22	1257	12	2.8	30	3.1
2003	197	879	22	1098	9	1.4	37	2.7
2004	145	891	44	1080	10	2.1	39	2.8
2005	102	1260	143	1505	8	0.9	52	4.3
2006	151	1461	121	1733	12	1.5	53	4.9
2007	373	1537	81	1991	12	2.8	51	4.2
2008	1453	2111	88	3652	23	10.2	67	9.6
2009	1678	2245	208	4131	25	10.6	64	13.1
2010	3977	2184	213	6374	37	20.0	61	10.0
2011	4138	1618	144	5900	35	21.2	57	5.9
2012	2425	1306	476	4207	24	15.1	53	5.2
2013	1421	1293	53	2767	28	6.6	49	4.0
2014	622	911	54	1588	23	4.4	47	3.8
2015	868	841	25	1734	29	4.9	46	2.9
2016	293	681	30	1015	16	1.5	50	2.6

Table 5.2.4. Blue ling in 5.a and 14. Catches in 5.a and 14 along with survey biomass index (larger than 40 cm) from the Icelandic Autumn survey and the calculated F_{proxy} ($(C_{5.a} + C_{14})/I$).

Year	5.a	14	Index	F_{proxy}
2000	1645	896	574.5	4.42
2001	931	1710	950.2	2.78
2002	1372	12	988.3	1.40
2003	1160	711	930.1	2.01
2004	1199	8	1039.7	1.16
2005	1592	187	1051.4	1.69
2006	1855	4	1492.9	1.25
2007	2091	20	1128.1	1.87
2008	3758	385	1645.2	2.52
2009	4233	119	2073.8	2.10
2010	6905	47	1836.8	3.78
2011	6702	9	*No survey*	
2012	4521	379	1411.5	3.47
2013	3082	16	1762.3	1.76
2014	1588	3	1455.8	1.09
2015	1734	65	1161.1	1.55
2016	1015	7	1118.0	0.92

5.3 Blue Ling (*Molva dypterygia*) in Division 5.b and Subareas 6 and 7

5.3.1 The fishery

The main fisheries are those by Faroese trawlers in 5.b and French trawlers in 6.a and, to a lesser extent, 5.b. Total international landings from Subarea 7 are small and are mostly bycatches in other fisheries, except in in ICES Division 7.b–c where there are more fishing hauls directed to deep-water fish.

Landings by Faroese trawlers are mostly taken in the spawning season. Historically, this was also the case for French trawlers fishing in 5.b and 6.a. However, during the last decade blue ling has been taken round the year together with roundnose grenadier and black scabbardfish as well as deep-water sharks until 2009.

5.3.2 Landings trends

Total international landings from Division 5.b (Tables 5.3.1a–f and Figure 5.3.1) peaked in the late 1970s at around 21 000 t and then decline until the 2010s, where landings stabilized around 1500 t per year.

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 last five years, landings have been stable at 1300–1500 tonnes in 6.a and minor in 27.6.b.

Landings from Subarea 7 are comparatively small, mostly less than 500 t per annum in the whole time-series and less than 100 t during the last ten years.

Landings data by country and ICES Division considered for 2016 were extracted from InterCatch, ICES preliminary landings are national data supplied to WGDEEP, whichever was the larger.

5.3.3 ICES Advice

The ICES advices for 2017 and 2018 is "when the MSY approach is applied, catches should be no more than 11 314 tonnes in 2017 and no more than 10 763 tonnes in 2018. All catches are assumed to be landed".

Following reference points development carried out in 2015 for stocks of ICES category 1, F_{MSY} for the stock was set to 0.12 in 2016, and this was the reason for the higher ICES catch Advice for 2017 and 2018. The previous advice, delivered in 2014, was based on an F_{proxy} defined as $F_{50\%SPR}$=0.07.

5.3.4 Management

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 5.b, 6 and 7. TACs are fixed according to bilateral agreements between EU and Faroe Islands and EU and Norway. The EU TAC includes quota for Norway and the Faroe Islands and the Faroe Islands attribute quotas of ling and blue ling to French and UK vessels. The latter include an allowance for bycatch of roundnose grenadier and black scabbardfish (see EU council regulation 2015/104 and Faroese regulation). There was no such agreement between the Faroe Island and the EU in 2011–2013 but these were resumed in 2014.

The table below provides the EU TAC the TAC 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 FAROESE 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(4)	2712
2016	5b67	5046	5046	4746	150(2)	150(3)	2100	3071
2017	5b67	11 314	11 314	11 014	150(2)	150(3)	2000	
2018	5b67	10 763						

(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 500 t.

(2) To be fished in Union waters of 27.2.a and 27.4-7 (BLI/*24X7C).

(3) Including bycatch of roundnose grenadier and black scabbardfish.

(4) including a quota of 419 t to Germany, which was caught as ling without blue ling landings

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.

Like in 2015 and 2016, the EU TAC for 2017 in EU and international waters amounts was set to the level of catch advice. Therefore international catch from the stock, which include catch in EU, international and Faroese waters, are legally allowed to exceed the ICES catch advice.

In 2009, the EU introduced protection areas of spawning aggregations of blue ling on the edge of the Scottish continental shelf and at the edge of Rosemary Bank (6.a). 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. In 2013, NEAFC introduced a protection of the spawning area located near the southwest boundary of the Icelandic EEZ, this area was banned to bottom fishing gears from 15 February to 15 April from 2013 to 2016 (rec 5:2013, http://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 5.1.3b.

5.3.5 Data availability

5.3.5.1 Landings and discards

Landings data were updated. International landings in 2016 amounted to 3071 t at 10% increased from 2016 but well below the TAC. Some EU fleet, in particular the French fleet of large trawlers, appear to be in a situation of under capacity. Although higher fishing opportunities for blue ling became available in 2015, vessels kept fishing mostly for saithe. This under capacity is the results of the reduction of the number of French trawlers >=30 m, based in harbours where deep-waters species are landed from 35 in 2005 to 16 in 2016 (Common Fleet Register data). Further the restriction of fishing at spawning time no longer allows for major target catch at the spawning season as in the 1980s and 1990s.

Based upon data provided to ICES through InterCatch, international discards in 2016 were less than 1% of landings for country reporting through InterCatch. Faroese data were provided separately and Faroese vessels are considered making no discards. The proportion of blue ling discarded by year in the French deep-water trawl fishery in 2010–2015 based upon French on-board observations carried out under the DCF was estimated to 0.01–0.3%, well below the maximum 5% level where discards are considered negligible in ICES advice. This low discarding proportion comes from the absence of catch of small fish.

Similarly, Spanish observer on board trawlers fishing in 6.b reported that discards for this species are negligible, in the range of 0–0.5% of the catch.

Some blue ling discards were reported in 2012 in the French bottom-trawl fishery for demersal fish in the Celtic Sea and West of Ireland. An estimated raised discards of 55 tonnes (95% confidence limit 18–117 t) was calculated for this fishery. Owing to the latitudinal range of this fishery, this discard is likely to comprise a large proportion of the Spanish ling (*Molva macrophthalma*), which is more abundant than blue ling at latitude south of 50–52°N and can be misidentified. Small Spanish ling are caught on the Celtic Sea outer shelf and upper slope.

5.3.5.2 Length compositions

Length distribution of blue ling landings from Faroese trawlers was available from 1981 to 2016 (Figure 5.3.2).

Length distribution of blue ling in Faroese spring and summer groundfish surveys are shown in Figures 5.3.3 and 5.3.4. A deep-water survey was initiated in 2014 in Faroese water, the length of blue ling in this deeper survey is larger than in the two other surveys (Figure 5.3.5).

Time-series of number and occurrence (percent of haul) of blue ling smaller than 80 cm in Faroese surveys was provided (Figure 5.3.6).

The length distribution of French landings shows a decreasing trend up to the early 2000s followed by an increase (Figure 5.3.7) to levels of the late 1980s. (Figure 5.3.7). This is considered to reflect the overexploitation in the 1990s, followed by a rebuilding.

5.3.5.3 Age compositions

Age estimation of blue ling sampled in 2014 and 2015 was available from France. In application of the DCF regulation about 250 age estimations have been carried out for every quarter since 2009.

5.3.5.4 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. Weight and length data were provided by Faroe Island and the parameters of the length–weight relationship from new data were similar to the previous estimates.

5.3.5.5 Maturity and natural mortality

No new data.

5.3.5.6 Catch, effort and RV data

The standardized cpue time-series from the Faroese trawler fleet was updated (Ofstad, 2016 WD). This time-series was not used in assessment.

The standardized cpue from haul-by-haul data provided by the French industry skipper tally books (see stock annex) was not updated in 2017.

The Scottish deep-water research survey has been set to be biennial, there was no survey in 2016; the available time-series is presented in Figure 5.3.8).

No deep-water Irish survey was carried out since 2009.

The standardized time-series from the Faroese spring and summer surveys were updated (Table 5.3.2).

The standardized abundance index from the Norwegian longliner fleet operating in 6.a was updated (Table 5.3.3). The standardization method was the same as that developed for ling (Helle *et al.*, 2015) and is also used for stocks of ling and tusk (see chapters 4 and 6). This index shows large year-to-year variation probably in relation to the small size of the fleet and the small fishing effort and catch.

5.3.6 Data analyses

Length distribution of catches of Faroese fleets show that fish caught are mostly in the length range 70–120 cm (Figures 5.3.2). Recruitment inputs are visible in survey catches in some years, e.g. 2007–2009.

Mean length in French trawl landings (Figure 5.3.7) declined until the mid-1990s and has been increasing since the mid-2000s, with some low levels in some years probably reflecting recruitment pulses, in particular in 2007 and higher mean length in 2014–2015 (Figure 5.3.7).

Surveys

The Faroese surveys show varying biomass since 1994 with high values in 2004, 2005 and since 2009. The depth range (<500 m) does not extend down to the core depth distribution of blue ling. The provided indices used all hauls and are stratified indices.

Multiyear catch curve (MYCC) model

The Multiyear catch curve (MYCC, see stock annex) model was not run in 2017, results from 2016 are presented in Figures 5.3.9 and 5.3.10. The total mortality was estimated to 0.14 in 2015 and 0.15 one year earlier, corresponding to fishing mortalities of 0.03 and 0.04 respectively. The fishing mortality has been smaller than 0.07 (MSY F_{lower}) since 2008. The total number of individuals of age 9 and over was estimated to 23 million at the start of 2016.

Stock Reduction Analysis (SRA) using $FL_{aspm.}$

SRA estimates were made using the natural mortality *M=0.11*, which, was chosen in 2014, because it resulted in the smallest difference in number-at-age estimated from the MYCC and SRA. This value is also similar to F=0.1 used for blue ling in 5.a and 14.b.

The cpue index from the Norwegian longline fleet was updated. This index shows large year-to-year variation probably in relation to the small size of the fleet and the small fishing effort and catch. It is reminded that the Irish index from the Irish deep-water survey 2006–2009 was no longer used in this model since 2015. These changes had however only minor impact on the estimated biomass and exploitation rate over the whole time-series. The fit of each time-series of index to the estimated stock biomass trajectory is shown in Figure 5.3.11.

At *M*=0.11, trials without the Norwegian fleet index (either fitting only to the Scottish and Faroese surveys or adding the former Irish survey) led to similar biomass estimates with a slightly higher B2015/B0 ratio. The initial (1966) biomass was estimated to about 275 000 t. The time-series of the biomass and fishing mortality is given in Figure 5.3.12 for *M*=0.11and in Table 5.3.5.

SRA estimated that fishing mortality in recent years were low. The estimated F in the past was five to ten times above the current level for 20 years from 1984 to 2003. The exploitable biomass in 2015 was estimated to 95 000 tonnes, corresponding to 37% of the exploitable biomass at the start of the time-series (1966), before the development of the main fisheries. The exploitable biomass was at its lowest historical level, 54 000 tonnes, in 2002–2003. It was then less than 20% of the initial biomass, i.e. close or below the precautionary approach B_{lim} level as expected, at the time, in assessment comments, although without quantification, at the time (ICES, 2002). For this stock the exploitable biomass and the spawning biomass (SSB) are equal because the fish recruit to the fishery and to the adult stock at the same time.

Reference points

Reference points the stock were defined by WKMSYref 4 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 WKMSYref4 analysis. This is because the only input available to WKMSYref4 was SRA as the MYCC does 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 by WKMSYref4. B_{lim} was set as B_{loss}, the lowest biomass estimate in the time-series (here the time-series of biomass from SRA).

Reference points for bli-5b67 estimated by WKMSYref4.

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

Further, F_{lim} was estimated to 0.17 by WKMSYref4 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}≈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 of mean of B_{MSY} could not be projected in a projection taking account of recruitment variability.

5.3.7 Comments on assessment

The assessment of blue ling in ICES Division 5.b and Subareas 6 and 7 is based on two models. A multiyear catch curve model (MYCC) is used to estimate the total annual mortality taking into account annual variations in recruitment, a stock reduction analysis (SRA) is used to predict the biomass dynamics of the stock. Although F_{MSY}=0.12 was estimated for the stock, WKMSYref4 reported that *"it seems most appropriate to use ' F_{MSY} lower with $B_{trigger}$* [=0.08] *as an interim F_{MSY} reference point for management purpose. This would allow increasing the catch and continuing the rebuilding of the stock biomass, while getting more years in the assessment"*. The advice delivered in 2016 was however based on F_{MSY}=0.12.

No short-term projection was carried out in 2017.

5.3.8 Management considerations

Blue ling is susceptible to sequential depletion of spawning aggregations. Maintaining the current closed areas will provide protection for the spawning aggregations. This may not be needed as far as a TAC management regime is effective in limiting fishing mortalities as intended and if highly aggregated fisheries in these areas do not cause local depletion. In Faroese waters, from which one third to half the catch has been taken in recent years, the catch is mainly taken in the spawning season.

5.3.9 References

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Table 5.3.1a. Landings of blue ling in Subdivision 5.b.1.

YEAR	FAROES	FRANCE(1)	GERMANY(1)	NORWAY(2)	E & W(1)	IRELAND	RUSSIA(1)	TOTAL
1966		839		430				1269
1967			1006	238				1244
1968			1838	823				2661
1969			303	798				1101
1970			348	2718				3066
1971			1367	557				1924
1972			2730	1203				3933
1973	51	80	3009	4003	4			7147
1974	43	390	1808	1554	3			3798
1975	17	2147	1528	2492	1			6185
1976	42	10475	896	1482				12 895
1977	23	6977	870	858	4		12 500	21 232
1978	423	3369	744	237	35			4808
1979	1072	2683	691	331				4777
1980	1187	2427	5905	304				9823
1981	1481	371	2867	167				4886
1982	2761	843	2538	121				6263
1983	3933	668	222	256				5079
1984	6453	515	214	105				7287
1985	4038	1193	217	140				5588
1986	4830	2578	197	94				7699
1987	3361	3246	152	81				6840
1988	3487	3036	49	94				6666
1989	2468	1802	51	228				4549
1990	946	3073	71	450				4540
1991	1573	1013	36	196	1			2819
1992	1918	407	21	390	4			2740
1993	2088	192	24	218	19			2541
1994	1065	147	3	173				1388
1995	1606	588	2	38	4			2238
1996	1100	301	3	82				1486
1997	778	1656		65	11			2510
1998	1026	1411	0	24	1			2462
1999	1730	1067	4	38	4			2843
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

YEAR	FAROES	FRANCE(1)	GERMANY(1)	NORWAY(2)	E & W(1)	IRELAND	RUSSIA(1)	TOTAL
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	139	0	140	0	0	0	900
2016	1100	555	0	74	0	0	0	1729

(1) Includes 5.b.2; (2) includes 5.b.2 up to 1974.

Table 5.3.1b. Landings of Blue ling in Subdivision 5.b.2.

YEAR	FAROES	NORWAY	SCOTLAND	FRANCE	TOTAL
1966					0
1967					0
1968					0
1969					0
1970					0
1971					0
1972					0
1973					0
1974					0
1975	1				1
1976	6	37			43
1977		86			86
1978	7	83			90
1979	14	87			101
1980	36	159	1		196
1981	48	93			141
1982	128	66			194
1983	463	182			645
1984	757	50			807
1985	396	70			466
1986	81	41			122
1987	209	90			299
1988	2788	72			2860
1989	622	95			717
1990	68	191			259
1991	71	51	21		143
1992	1705	256	1		1962
1993	182	22	91		295
1994	239	16	1		256
1995	162	36	4		202
1996	42	62	12		116
1997	229	48	11		288
1998	64	29	29		122
1999	15	49	24		88
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

YEAR	FAROES	NORWAY	SCOTLAND	FRANCE	TOTAL
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

(1) **Includes 5.b.1.**

Table 5.3.1c. Landings of blue ling in Division 6.a.

YEAR	FAROES	FRANCE	GERMANY	IRELAND	NORWAY	SPAIN(1)	E & W	SCOTLAND	LITHUANIA(2)	TOTAL
1966					20					20
1967			37		35					72
1968					126					126
1969			6		112					118
1970					176					176
1971					15					15
1972		696			14					710
1973		18 000			25					18 025
1974	33	15 000	1218		362		164			16 777
1975		5000	2941		20		8			7969
1976		5462	818		10		1			6291
1977		7940	470		16		556			8982
1978		5495	2498		19		21			8033
1979		3064	993		2		279			4338
1980		2124	773		10					2907
1981		3338	335		11			1		3685
1982		3430	79		16		99			3624
1983		5233	11		118		13			5375
1984		3653	183		45		5			3886
1985	56	5670	5		75		2			5808
1986		8254	7		47		2	1		8311

YEAR	FAROES	FRANCE	GERMANY	IRELAND	NORWAY	SPAIN(1)	E & W	SCOTLAND	LITHUANIA(2)	TOTAL
1987		9389	45		51		1			9486
1988	14	6645	2		29		2	1		6693
1989	6	7797	2		143					7948
1990		6114	44		54			1		6213
1991	8	6165	18		63		1	35		6290
1992	4	7742	4		129			24		7903
1993		6793	48	3	27		13	42		6926
1994		3363	24	73	90	433	1	91		4075
1995	0	3073		11	96	392	34	738		4344
1996	0	4116	4		50	681	9	1407		6267
1997	0	4053		1	29	190	789	1021		6083
1998	0	4735	3	1	21	142	11	1416		6329
1999	0	3731		10	55	119	5	1105		5025
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
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

YEAR	FAROES	FRANCE	GERMANY	IRELAND	NORWAY	SPAIN(1)	E & W	SCOTLAND	LITHUANIA(2)	TOTAL
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	933	0	0	127	83	8	371	0	1522
2016	0	827			37	127	0	273	0	1264

. (1) Includes 5.b; (2) Includes 6.b for all countries up to (and including) 1974.

Table 5.3.1d. Landings of blue ling in Division 6.b.

YEAR	POLAND	RUSSIA	FAROES	FRANCE	GERMANY	NORWAY	E & W	SCOTLAND	ICELAND	IRELAND	ESTONIA	SPAIN	TOTAL
1975			1			37							38
1976			13			6							19
1977			6	36		7							49
1978			3	58		8							69
1979			4	652	187	28							871
1980				3827	5526	8							9361
1981				534	3944	5							4483
1982				263	554	13		1					831
1983				243	38	50		2					333
1984			133	3281		43							3457
1985			11	7263	31	38							7343
1986			1845	2928	39	66	7	1					4886
1987			350	10	356	76	3	10					805
1988			2000	499	37	42	9	14					2601
1989			1292	61	22	217		16					1608
1990			360	703		127		2					1192
1991			111	2482	6	102	5	15					2721
1992			231	348	2	50	2	14					647
1993			51	373	109	50	66	57					706
1994			5	89	104	33	3	25					259
1995			1	305	189	12	11	38					556
1996			0	87	92	7	37	74					297

YEAR	POLAND	RUSSIA	FAROES	FRANCE	GERMANY	NORWAY	E & W	SCOTLAND	ICELAND	IRELAND	ESTONIA	SPAIN	TOTAL
Year	Poland	Russia	Faroes	France	Germany	Norway	E & W	Scotland	Iceland	Ireland	Estonia	Spain	Total
1997			138	331		6	65	562	1				1103
1998			76	469		13	190	287	122	11			1168
1999			204	654		9	168	2411	610	4			4060
2000				514		184	500	966		7			2171
2001			238	210	1	256	337	1803		4	85		2934
2002		3	79	345		273	141	497		1			1339
2003	4	2		510		102	14	113			5		750
2004	1	5	4	514		2	10	96			3		635
2005		15	1	235		1	9	80					341
2006			3	313		2	4	29					351
2007		1	15	112		4	7	30					169
2008		12	2	29		2	2	9		0			56
2009		1		10		1		7		0			19
2010		0	0	39		15		1		0			55
2011		0	0	9		11		0					20
2012				3		3						1	217(2)
2013				5				0				3	39(2)
2014								3					4(2)
2015	0	0	0	0	0	2	0	0	0	0	0	31	33
2016	0	0	0	0	0	0	0	0	0	0	0	18	18

(1) **Included in 6.a. (2) includes unallocated catch.**

Table 5.3.1e. Landings of blue ling in Subarea 7.

YEAR	FRANCE	GERMANY	SPAIN	NORWAY	E & W	SCOTLAND	IRELAND	TOTAL
1988	21	1	0	0	0	0	0	22
1989	292	0	0	2	0	0	0	294
1990	223	0	0	0	0	0	0	223
1991	211	0	0	0	0	1	0	212
1992	398	0	0	3	0	6	0	407
1993	273	0	0	2	16	30	0	321
1994	298	0	4	1	9	26	1	339
1995	155	0	13	0	43	16	3	230
1996	189	0	21	1	57	97	0	365
1997	179	8	0	2	170	15	9	383
1998	252	3	22	1	283	30	10	601
1999	115	2	59	1	168	18	27	390
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	13	0	25	0	0	1	1	40

Table 5.3.1f. Blue ling landings in Division 5.b and Subareas 6 and 7.

YEAR	5.B	6	7	TOTAL
1966	1269	20		1289
1967	1244	72		1316
1968	2661	126		2787
1969	1101	118		1219
1970	3066	176		3242
1971	1924	15		1939
1972	3933	710		4643
1973	7147	18 025		25 172
1974	3798	16 777		20 575
1975	6186	8007		14 193
1976	12 938	6310		19 248
1977	21 318	9031		30 349
1978	4898	8102		13 000
1979	4878	5209		10 087
1980	10 019	12 268		22 287
1981	5027	8168		13 195
1982	6457	4455		10 912
1983	5724	5708		11 432
1984	8094	7343		15 437
1985	6054	13 151		19 205
1986	7821	13 197		21 018
1987	7139	10 291		17 430
1988	9526	9294	22	18 842
1989	5266	9556	294	15 116
1990	4799	7405	223	12 427
1991	2962	9011	212	12 185
1992	4702	8550	407	13 659
1993	2836	7632	321	10 789
1994	1644	4334	339	6317
1995	2440	4900	230	7570
1996	1602	6564	365	8531
1997	2798	7186	383	10 367
1998	2584	7497	601	10 682
1999	2931	9085	390	12 406
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

YEAR	5.B	6	7	TOTAL
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	1125	1555	78	2758
2016	1749	1282	40	3071

Table 5.3.2. 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

Table 5.3.3. Standardized cpue index (kg/1000 hooks) from the Norwegian longliners in ICES Division 6.a.

YEAR	LOWER LIMIT	MEAN INDEX	UPPER LIMIT
2000	5.555	8.832	12.11
2001	1.361	5.25	9.139
2002	5.703	10.28	14.86
2003	0.7733	3.954	7.134
2004	-1.763	1.826	5.414
2005	0.7071	3.801	6.895
2006	6.867	9.824	12.78
2007	3.361	6.839	10.32
2008	11.31	15.06	18.82
2009	8.333	12.68	17.03
2010			
2011	10.7	13.27	15.83
2012	14.73	17.54	20.35
2013	16.82	19.29	21.76
2014	6.574	9.662	12.75
2015	18.24	21.07	23.89

Table 5.3.4. Total and fishing mortality, stock number and recruitment estimates from the MYCC model under the assumption M=0.1. (2014 assessment).

YEAR	Z	Z STANDARD DEV.	RECRUITMENT NUMBER (MILLIONS)	RECRUIT. STANDARD DEV.	TOTAL NUMBERS AGES 9+ (MILLIONS)	NUMBER AGE 9+ SD	F
1995	0.22	0.01	3.62	0.41	17.63	1.94	0.11
1996	0.22	0.01	3.66	0.42	17.83	1.76	0.11
1997	0.26	0.01	3.74	0.43	18.02	1.59	0.15
1998	0.26	0.01	3.64	0.41	17.55	1.47	0.15
1999	0.30	0.02	3.77	0.43	17.30	1.36	0.19
2000	0.30	0.02	3.63	0.39	16.45	1.30	0.19
2001	0.32	0.02	3.68	0.38	15.85	1.25	0.21
2002	0.26	0.01	3.47	0.40	15.03	1.27	0.15
2003	0.24	0.01	3.53	0.38	15.08	1.31	0.13
2004	0.21	0.01	3.92	0.39	15.76	1.31	0.10
2005	0.20	0.01	4.14	0.44	16.92	1.34	0.09
2006	0.20	0.01	4.05	0.40	17.92	1.42	0.09
2007	0.19	0.01	3.90	0.37	18.56	1.51	0.08
2008	0.17	0.01	3.86	0.37	19.15	1.60	0.06
2009	0.17	0.01	3.63	0.35	19.79	1.68	0.06
2010	0.18	0.01	3.49	0.36	20.21	1.75	0.07
2011	0.15	0.00	3.66	0.37	20.62	1.84	0.04
2012	0.15	0.00	3.40	0.38	21.17	1.92	0.04
2013	0.15	0.00	3.38	0.41	21.56	2.00	0.04
2014	0.15	0.00	3.27	0.47	21.92	2.10	0.04
2015	0.14	0.00	3.68	0.42	22.59	2.14	0.03
2016			3.62	0.44	23.18	2.17	

Table 5.3.5. Time-series 1966–20116 of exploitable biomass (thousand tonnes), fishing mortality (*F*, year^{-1}) and Spawning–Stock Biomass relative to the Spawning–Stock Biomass in the first year (*SSB*/*SBB0*) from the stock reduction analysis (SRA), with *M*=0.11.

YEAR	EXPLOITABLE BIOMASS	F	SSB/(SSB0)	YEAR	EXPLOITABLE BIOMASS	F	SSB/(SSB0)
1966	273.1	0	1	1992	64.7	0.25	0.237
1967	271.8	0.01	0.995	1993	60.8	0.21	0.223
1968	270.5	0.01	0.991	1994	59.7	0.12	0.219
1969	267.9	0	0.981	1995	63.1	0.14	0.231
1970	266.9	0.01	0.977	1996	64.8	0.15	0.237
1971	264	0.01	0.967	1997	65.2	0.18	0.239
1972	262.5	0.02	0.961	1998	63.5	0.2	0.233
1973	258.5	0.11	0.946	1999	61.3	0.24	0.224
1974	233.9	0.1	0.856	2000	57.1	0.23	0.209
1975	215.2	0.07	0.788	2001	54.1	0.27	0.198
1976	204	0.1	0.747	2002	50.4	0.2	0.184
1977	188.3	0.19	0.69	2003	50.4	0.17	0.184
1978	162.3	0.09	0.594	2004	52	0.13	0.191
1979	155.3	0.07	0.569	2005	54.8	0.11	0.201
1980	151.8	0.17	0.556	2006	58.2	0.11	0.213
1981	136.2	0.11	0.499	2007	61.1	0.1	0.224
1982	130.5	0.09	0.478	2008	63.8	0.07	0.234
1983	127.6	0.1	0.467	2009	67.9	0.07	0.249
1984	124.3	0.14	0.455	2010	71.7	0.07	0.262
1985	116.9	0.19	0.428	2011	74.7	0.04	0.274
1986	105.9	0.23	0.388	2012	79.8	0.04	0.292
1987	93.4	0.22	0.342	2013	84.7	0.03	0.31
1988	84.9	0.27	0.311	2014	90.2	0.04	0.33
1989	75.2	0.24	0.275	2015	95.2	0.03	0.348
1990	69.6	0.21	0.255	2016	100.4	0.03	0.368
1991	67	0.21	0.245				

Table 5.3.6. Estimated SSB and yield in the long term (after stabilization) of the stock bli-5b67 under a range of fishing mortality. Projection initiated from the stock number-at-age in 2014 and run for 200 years, with a range of F value from the current F to ten times more.

F	SSB (TONNES)	YIELD (TONNES)
0.031	188 088	5414
0.046	158 906	6810
0.062	135 982	7712
0.077	117 597	8274
0.093	102 593	8598
0.108	90 163	8750
0.111	87 932	8764
0.114	85 777	8774
0.123	79 731	8778
0.139	70 875	8713
0.154	63 280	8580
0.17	56 710	8396
0.185	50 979	8174
0.201	45 945	7922
0.216	41 493	7649
0.231	37 534	7359
0.247	33 992	7058
0.262	30 810	6748
0.278	27 936	6432
0.293	25 331	6112
0.309	22 960	5789

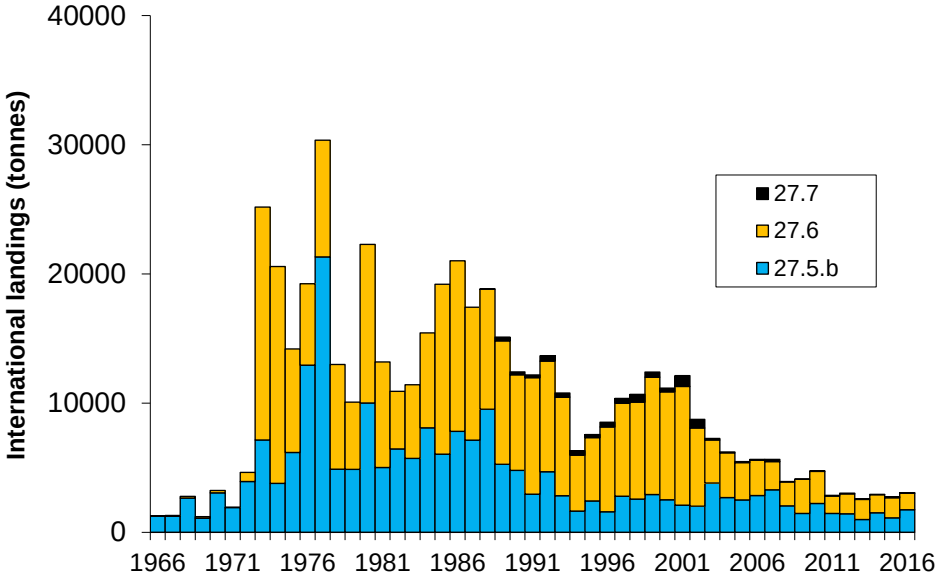

Figure 5.3.1. Trends in total international landings for bli-5b67.

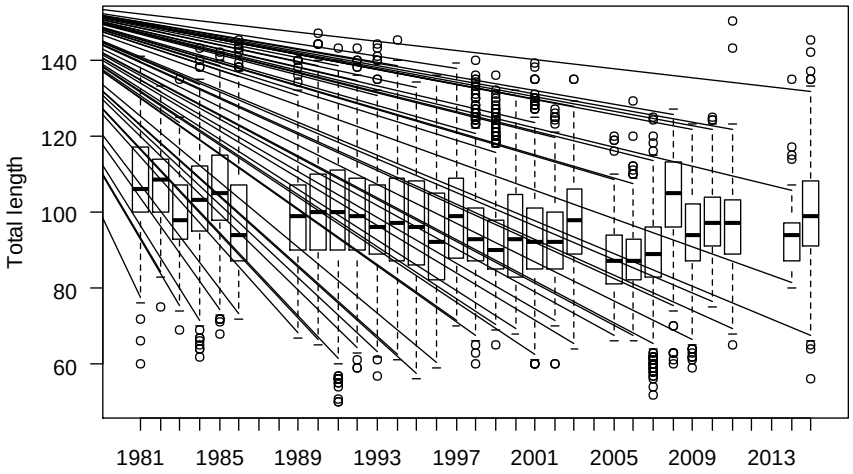

Figure 5.3.2. Boxplot of length distribution of blue ling landings from Faroese otter-board trawlers >1000 HP in ICES 5.b.

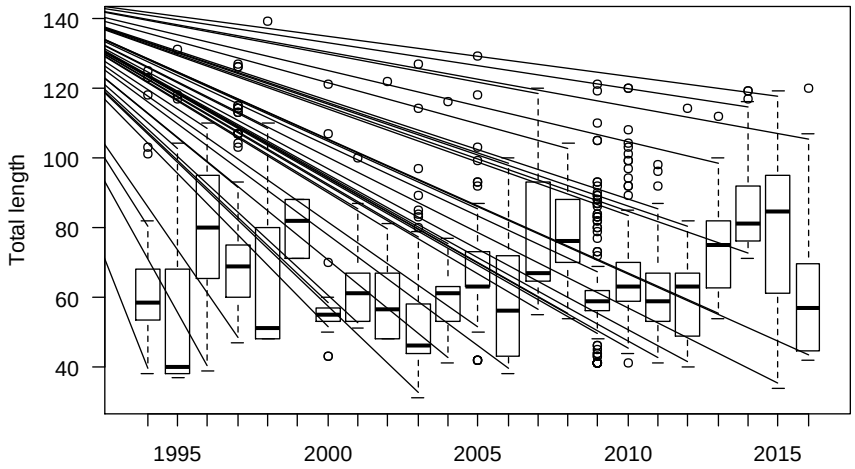

Figure 5.3.3. Boxplot of length distribution of blue ling in the spring groundfish Faroese survey on the Faroe Plateau.

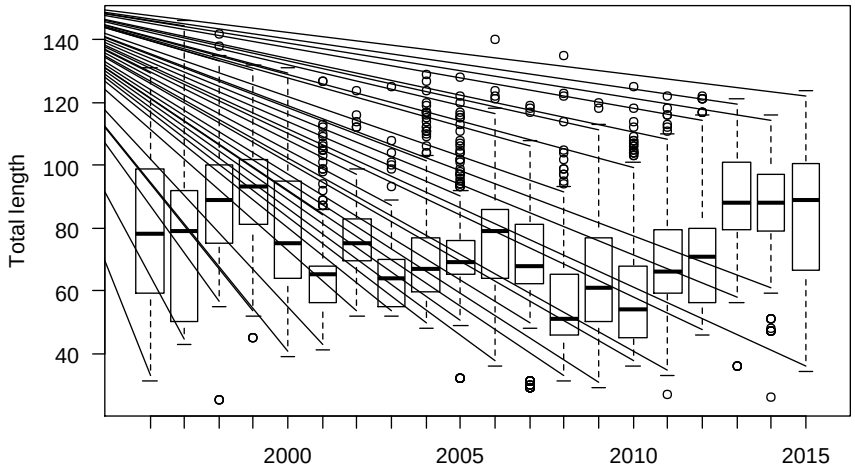

Figure 5.3.4. Length distribution of blue ling in the summer groundfish Faroese survey on the Faroe Plateau.

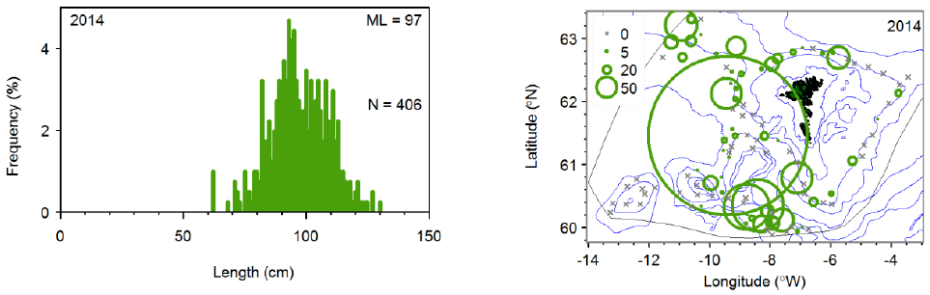

Figure 5.3.5. Length distribution of blue ling in the 2014 deep-water survey in Faroese waters and spatial distribution of catches of blue ling in the survey.

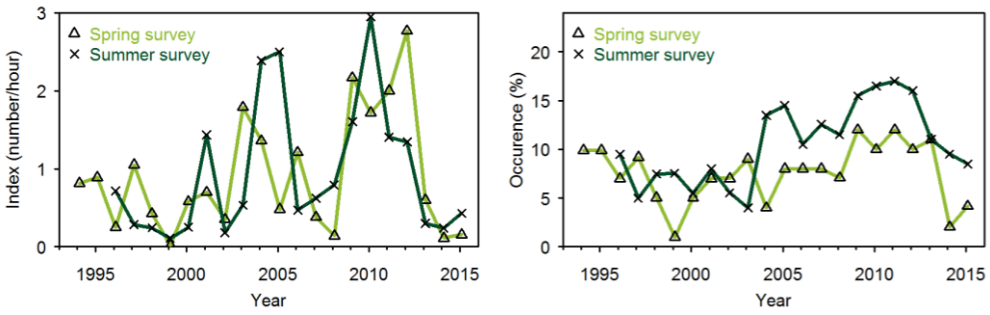

Figure 5.3.6. Juvenile (<80 cm) blue ling caught in groundfish surveys on the Faroe Plateau (left) number per hour and (right) occurrence.

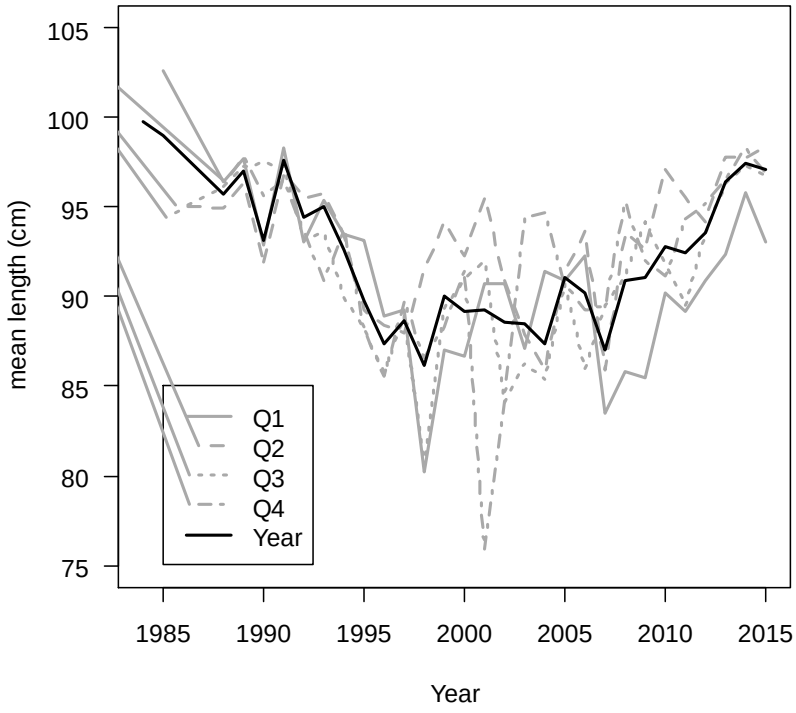

Figure 5.3.7. Quarterly mean length in French trawl landings, 1984–2016.

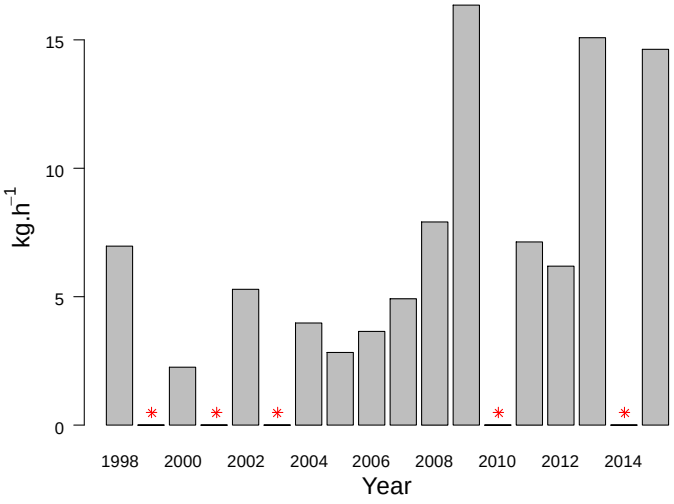

Figure 5. 3.8. Biomass index in the Scottish deep-water survey, based on haul carried out from 400 to 1600 m along the Scottish slope. Red stars depict years without surveys.

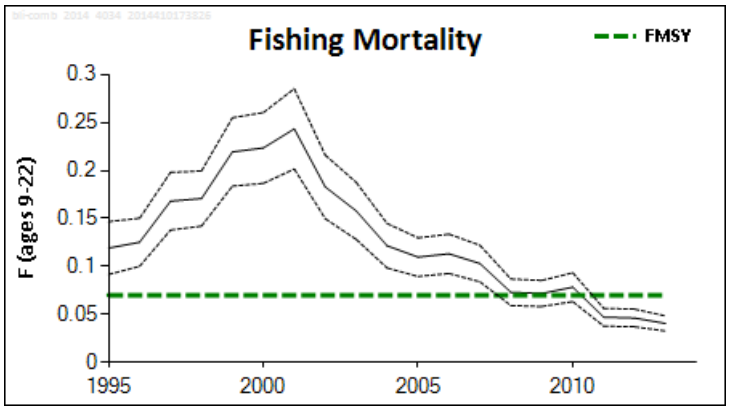

Figure 5.3.9. Estimated fishing mortality from the MYCC, the green dotted line depicts F lower MSY.

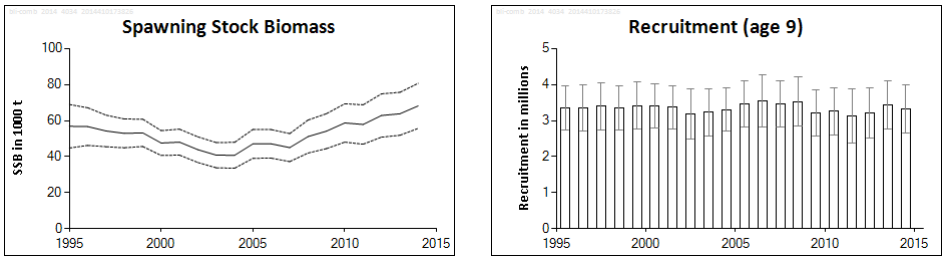

Figure 5.3.10. Estimated biomass of age 9+ and recruitment numbers-(at-age 9) from the MYCC.

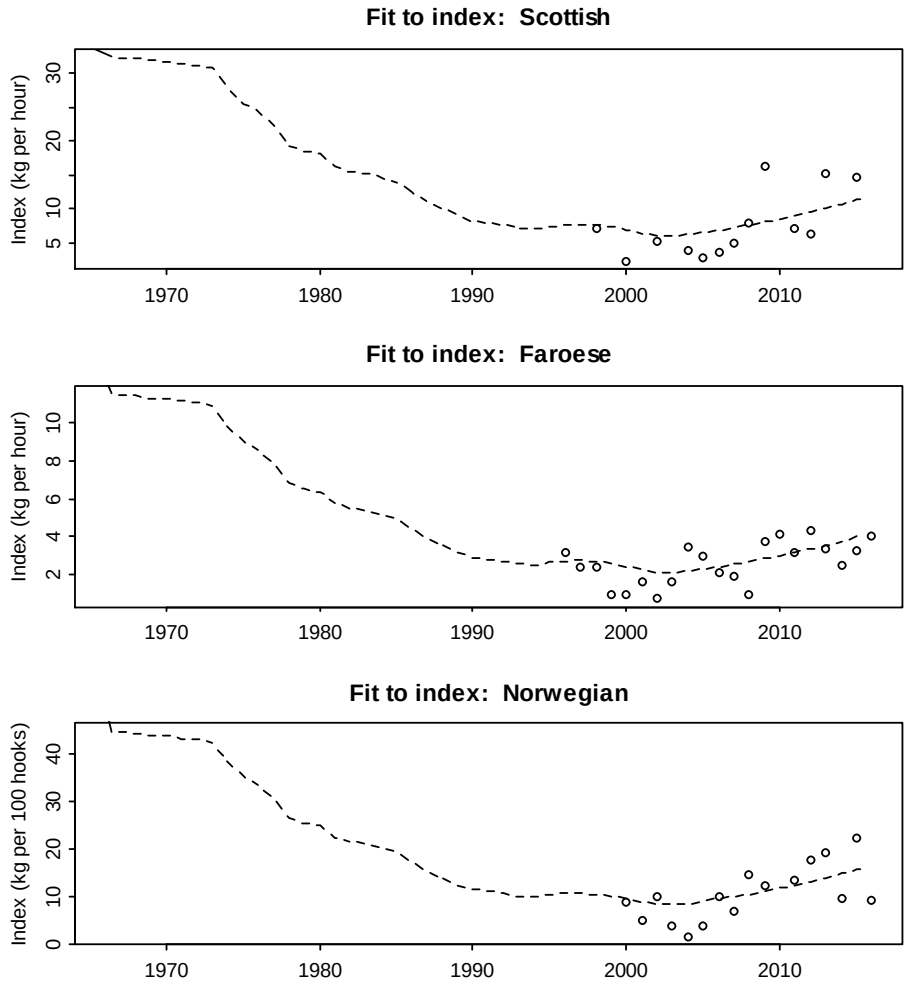

Figure 5.3.11. SRA model: fit of biomass indices to the estimated stock biomass: (top) Marine Scotland deep-water research survey, (centre) combined Faroese surveys, (bottom) Norwegian longliner fleet cpue.

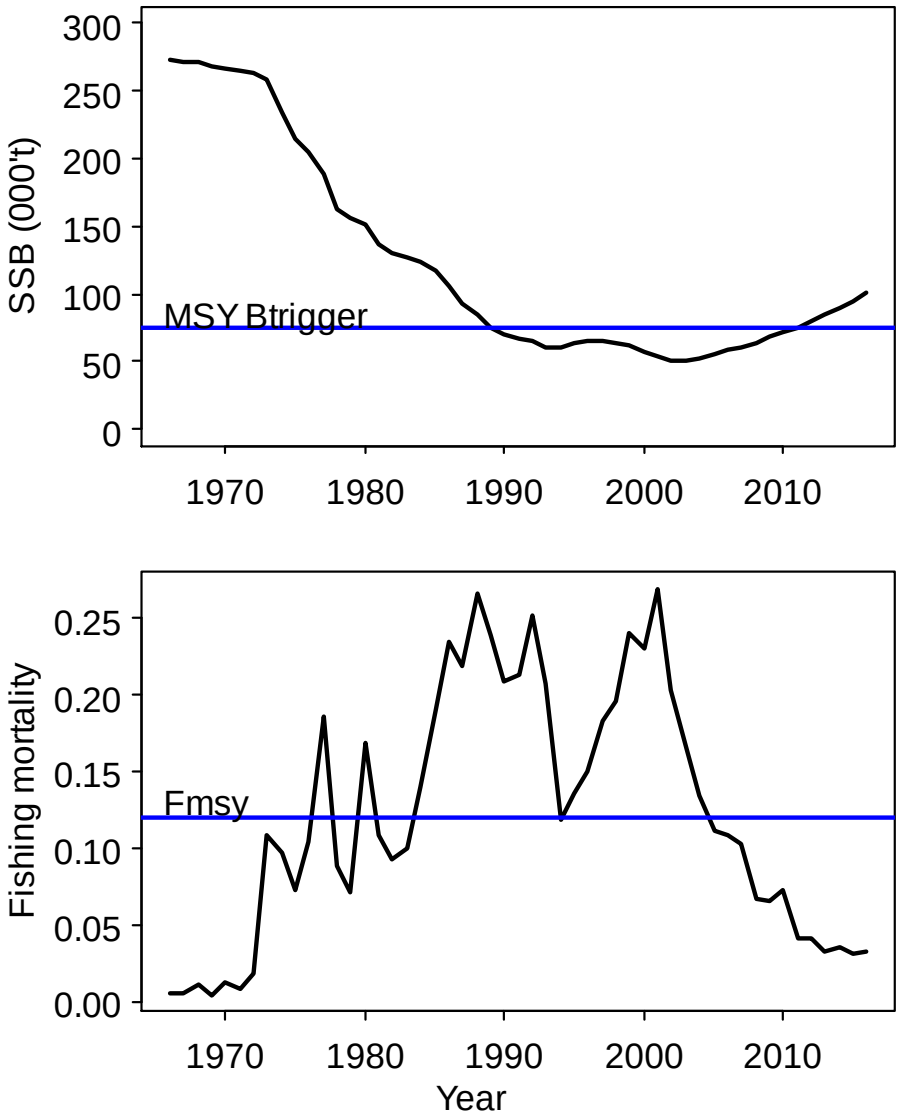

Figure 5.3.12. Spawning–stock biomass (SSB, thousand tonnes, top panel) and fishing mortality (bottom panel) from 1966 (onset of the fishery) to 2016.

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

5.4.1 The fishery

The directed fisheries on spawning aggregations for blue ling on Hatton Bank (Division 12.b) and 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 represents a significant bycatch of trawl fisheries for mixed deep-water species. In Division 2.a there is also a bycatch from the longline and gillnet fisheries.

In other ICES subareas blue ling is taken in minor quantities. Small reported landings in Subareas 8, 9 and 10 are now ascribed to the closely related Spanish ling (*Molva macropthalma*) since the species is not known to occur in any significant numbers in these subareas.

5.4.2 Landings trends

Landing data are presented in Tables 5.4.0a–f. There are also historical landings from the Norwegian fishery, mainly from Division 2.a, back from 1896 (Figure 5.4.1). During the whole time-series, around 90% or more of the total landings were taken in Subareas 2, 4 and 12 combined. Landings from other areas are currently at a low level. In 2016, 85% of the landings came from Subarea 2 and 4.

For all areas, a continuous decline on landings has been observed after the higher landing levels in the 1988–1993 period. Landings from individual subareas and divisions have since the three last year been below 200 tonnes but apparently still declining.

5.4.3 ICES Advice

The ICES advice for 2016 and 2017 was:

"No directed fisheries for blue ling, and a reduction in catches should be considered until such time there is sufficient scientific information to prove the fishery is sustainable:

- Measures should be implemented to minimize the bycatch;
- Closed areas to protect spawning aggregations should be maintained and expanded where appropriate."

5.4.4 Management

A 2017 precautionary TAC for EU vessels in international waters of 12 was set to 357 tonnes and value for bycatches only. TACs for vessels in EU waters and international waters of 5.b, 6 and 7 were set to 11 314 tons, an increase from 5046 tons in 2016; of this a quota for Norwegian vessels was set to 150 tonnes to be fished in Union waters of 2.a, 4, 5.b, 6 and 7. In Union and international waters of 2 and 4, a precautionary TAC for EU vessels was set to 53 tonnes.

5.4.5 Data availability

5.4.5.1 Landings and discards

Landings data are presented in Table 5.4.0a–f. No discard data are available.

5.4.5.2 Length compositions

No length data are available.

5.4.5.3 Age compositions

No age data are available.

5.4.5.4 Weight-at-age

No weight-at-age data are available.

5.4.5.5 Maturity and natural mortality

No data were available.

5.4.5.6 Catch, effort and research vessel data

For the Norwegian catches there was presented a cpue from Subarea 1, 2, 3.a and 4 combined (Figure 5.4.5.). The cpue series is calculated from 2000–2016 and is based on longline data from the Norwegian fishery. The cpue show a low and stable level in this period.

5.4.6 Data analyses

The assessment for this stock is based on landing trends. The landings have declined and for all areas except for Subarea 4, the mean landings are now less than 5% of the mean landings from the years 1988–1993 (the period with stable landings). The increase in landings seen for Subarea 4 in 2015 has stabilized at the same level in 2016. The 2015 increase was a result of increased Norwegian landings (Figures 5.4.2–5.4.4).

The historical Norwegian landings, mainly in 2.a show that landings 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.

In Subarea 12 and after relative high levels for the period 2001–2005 landings have declined. This decline is likely to be due to reductions in Spanish fishing activity in this area.

In Subarea 4 an increase on French and Norwegian landings were registered in 2010 and 2011. The landings for 2016 are at the same level as in 2015 and landing levels are still at the low levels seen in mid-2000s.

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

The Norwegian cpue series show a low and stable level for the years 2000–2016 and although there is no directed fishery from this area there seems to be no recovery for this part of the stock.

5.4.6.1 Biological reference points

There are not yet suggested methods to estimate biological reference points for category 5 and 6 stocks. Therefore, no attempt was made to run SPiCT or LBI-method for this stock.

5.4.7 Comments on assessment

Not applicable.

5.4.1 Management considerations

Trends in landings suggest serious depletion in Subarea 2. 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 2015 remains appropriate “No directed fisheries for blue ling, and a reduction in catches should be considered until such time there is sufficient scientific information to prove the fishery is sustainable”.

Measures should be implemented to minimize the bycatch.

Closed areas to protect spawning aggregations should be maintained and expanded where appropriate.

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

The bulk of current bycatches of blue ling from subareas and divisions treated in this section are taken within EEZs. The exception is the 12.b catches from the Hatton Bank within the NEAFC Regulatory Area. In accordance with the interim guidelines from NEAFC established in 2014, the blue ling for this subarea would fall into Category 2. The only measure NEAFC can contribute, i.e. complementing measures within EEZs, is to further reduce bycatches in 12.b.

Table 5.4.0a. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Sub-area 1. (* preliminary).

Year	Iceland	Norway	France	Faroes	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
2015					0
2016*		0.84			1

Table 5.4.0b. 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
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

Table 5.4.0c. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Sub-area 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
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

Table 5.4.0d. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Division 4.a. (* preliminary).

Year	Denmark	Faroes	France (IV)	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
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

Table 5.4.0e. Blue ling (*Molva dypterygia*). Working group estimates of landings (tonnes) in Subarea 12. (* preliminary).

Year	Faroes	France	Germany	Spain	E & W	Scotland	Norway	Iceland	Poland	Lithuania	Russia	unallocated	Total
1988		263											263
1989		70											70
1990		5					547						552
1991		1147											1147
1992		971											971
1993	654	2591	90			1							3336
1994	382	345	25										752
1995	514	47			12								573
1996	445	60		264		19							788
1997	1	1		411	4								417
1998	36	26		375	1								438
1999	156	17		943	8	43		186					1353
2000	89	23		406	18	23	21	14					594
2001	6	26		415	32	91	103	2					675
2002	19			1234	8	48	9						1318
2003		7		1096			40		12	37			1192
2004		27		861		10					7		905
2005		10		657		35				8			710
2006		61		436							4		501
2007	1			353									354
2008				564									564

Year	Faroes	France	Germany	Spain	E & W	Scotland	Norway	Iceland	Poland	Lithuania	Russia	unallocated	Total
2009		+		312							+		312
2010				50									50
2011				55									55
2012				205								427	632
2013				178								76	254
2014				80									80
2015				12									12
2016*				29									29

Table 5.4.0f. Blue ling (*Molva dypterygia*). Total landings by Subarea/Division (From 2010 landings from Areas 8, 9 and 10 given in previous reports are now considered to represent *Molva macropthalma*). (* 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
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*	0,84	87	1	87	29	205

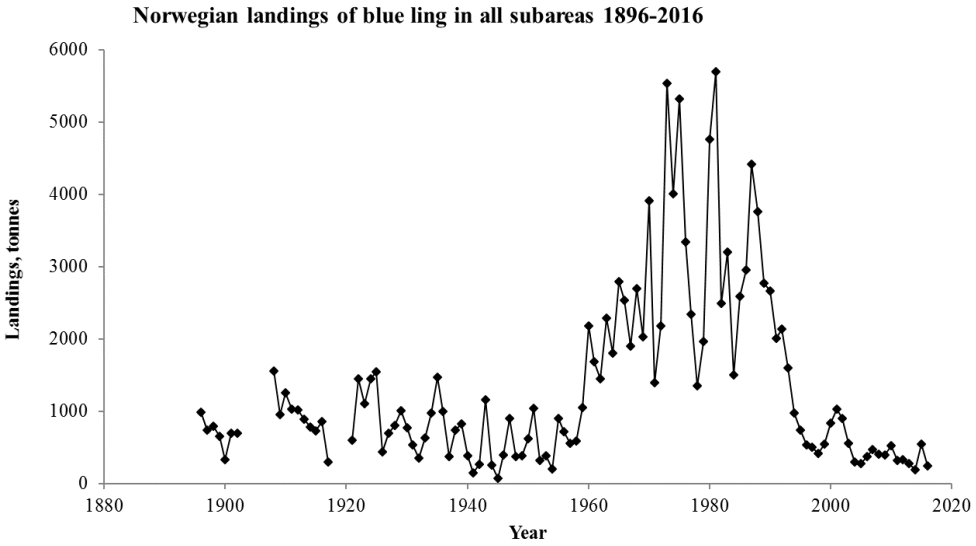

Figure 5.4.1. Reported Norwegian landings on blue ling from 1896–2016.

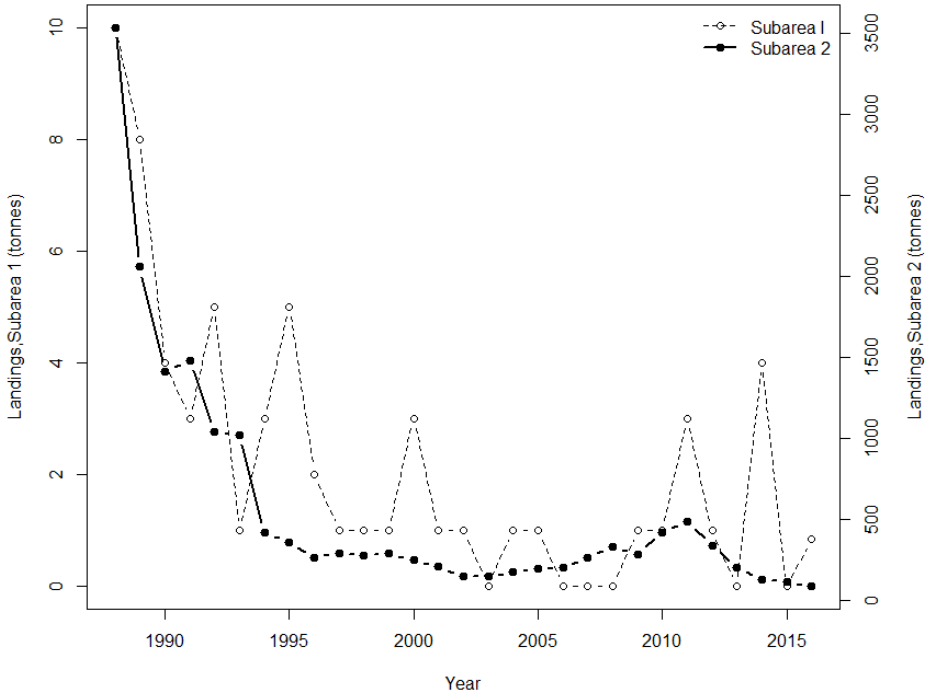

Figure 5.4.2. Landings of blue ling in Subareas 1 and 2.

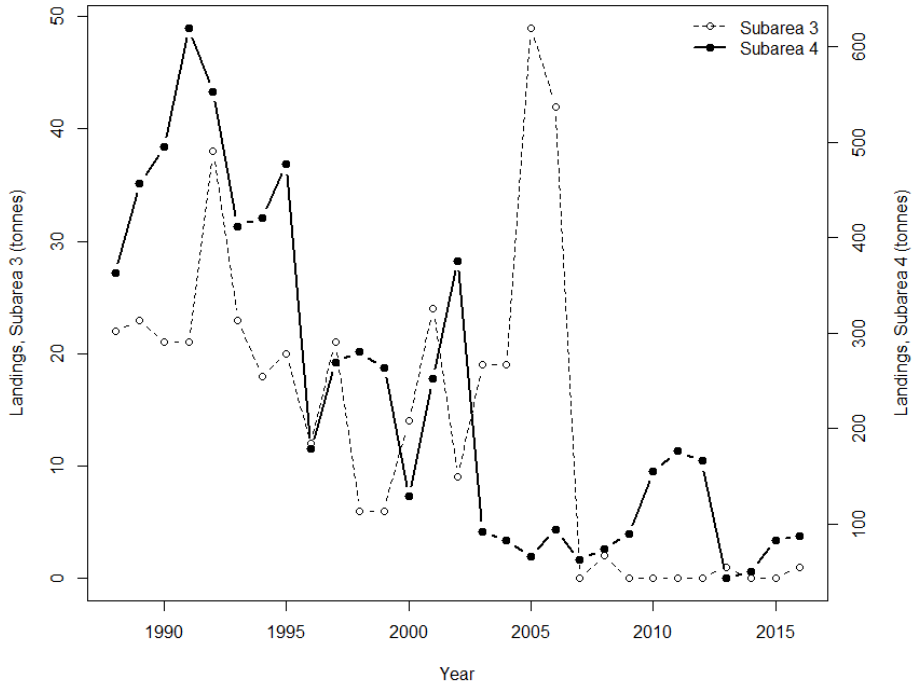

Figure 5.4.3. Landings of blue ling in Subareas 3 and 4.

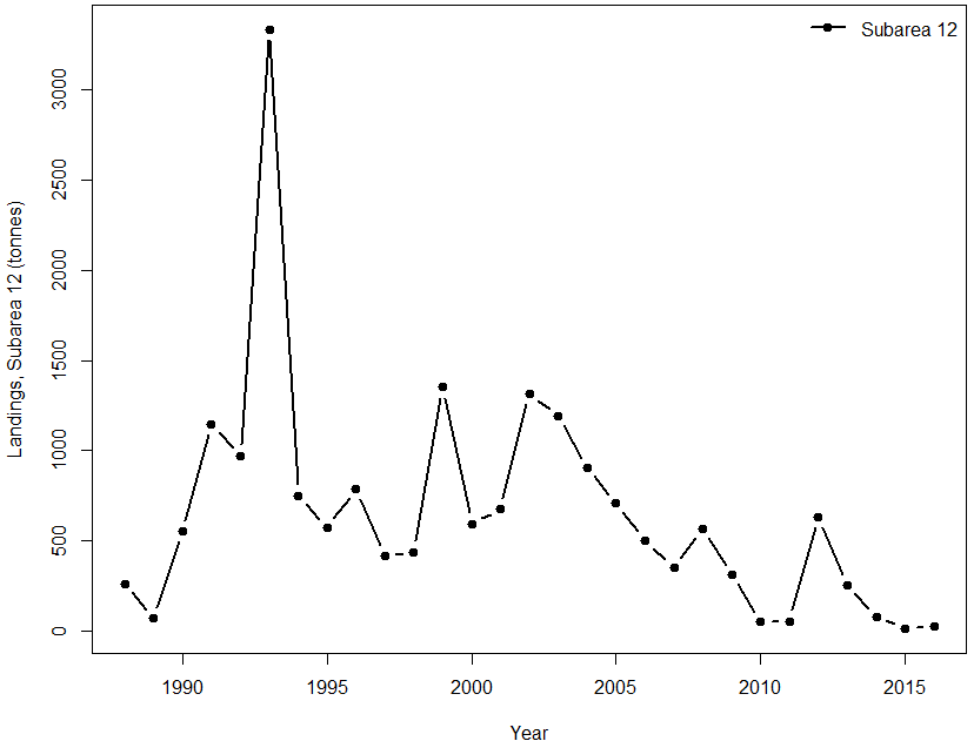

Figure 5.4.4. Landings of blue ling in Subarea 12.

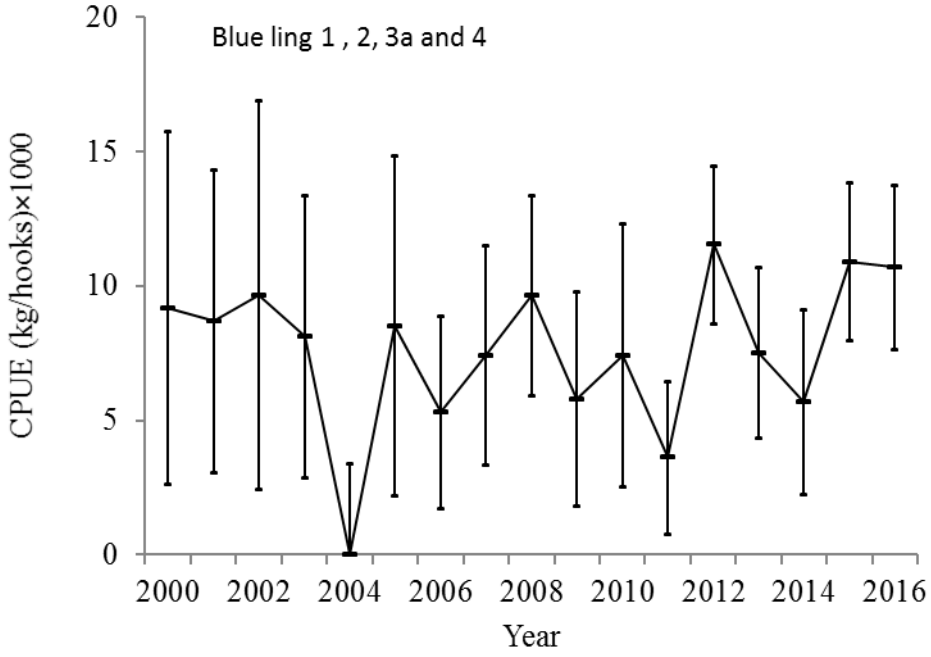

Figure 5.4.5. Norwegian cpue (kg/1000 hooks) from longlines catches in areas 1, 2, 3.a and 4 from 2000–2015.