

# BLUE LING - BLÁLANGA

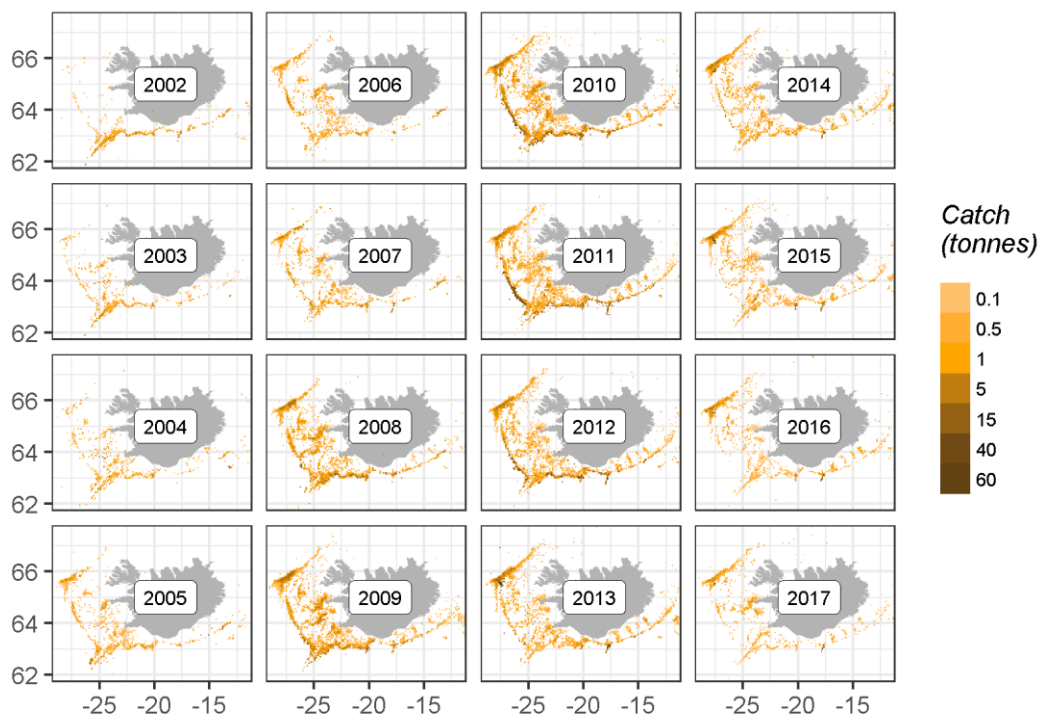
## *Molva dypterygia*

### GENERAL INFORMATION

Blue ling is a so-called cod-like species with an elongated shape compared with cod and dark greyish blue dorsal side and a light coloured ventral side. It is most common in south, west and northwest of Iceland along the Icelandic continental shelf, in deeper areas than most of the other gadoids. It is smaller than the common ling, reaching an average length of ~80 cm and a maximum of 152 cm according to the Icelandic autumn groundfish survey data 1996-2017. Sexual maturity is reached at 75-90 cm, males mature smaller/younger than females.

### THE FISHERY

The change in geographical distribution of the Icelandic blue ling fisheries from 1999 to 2017 (Figures 1-2), 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.

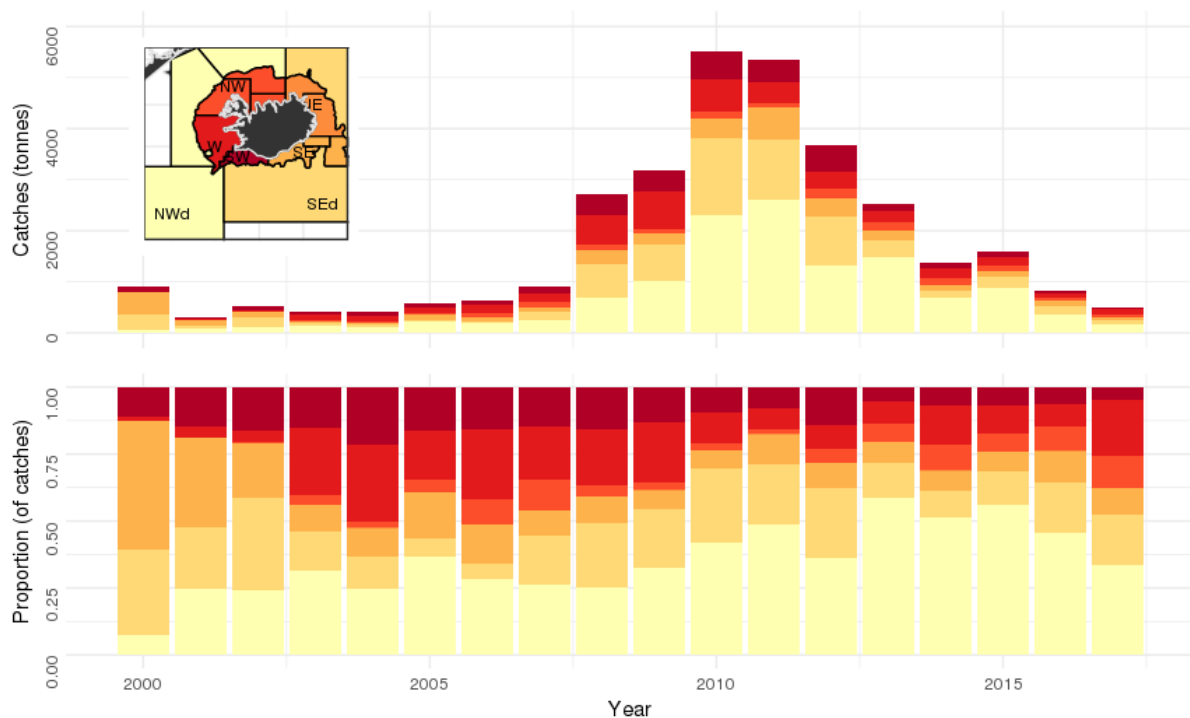


**Figure 1. Blue ling. Geographic distribution of the Icelandic fishery since 2002 as reported in logbooks.**

*Mynd 1. Blálanga. Útbreiðsla á Íslandsmiðum frá 2002 samkvæmt afladagbókum.*

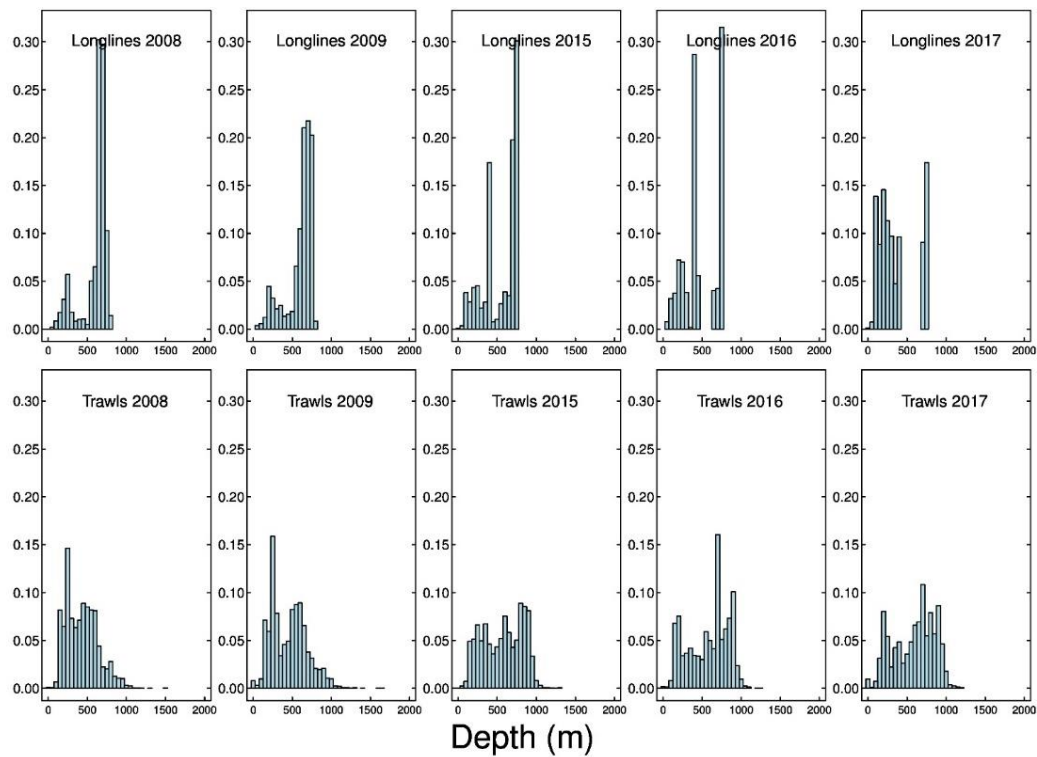
Before 2008, the majority of the catches of blue ling were by trawlers, as bycatch in fisheries targeting Greenland halibut, redfish, cod and other demersal species (Table 1). Most of the catches by trawlers are taken in waters shallower than 700 m and by longliners until 2008 mostly at depths shallower than 600 m.

After 2007 there was a substantial change in the fishery for blue ling (Table 1 and Figure 4). 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 2015–2017 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 3).



**Figure 2. Blue ling. Spatial distribution of reported catches in tonnes (upper) and as annual proportions (lower). The inserted map shows the area division.**

*Mynd 2. Blálanga. Afli eftir svæðum ásamt hlutfalli innan hvers svæðis frá árinu 2000 samkvæmt aflagabókum.*

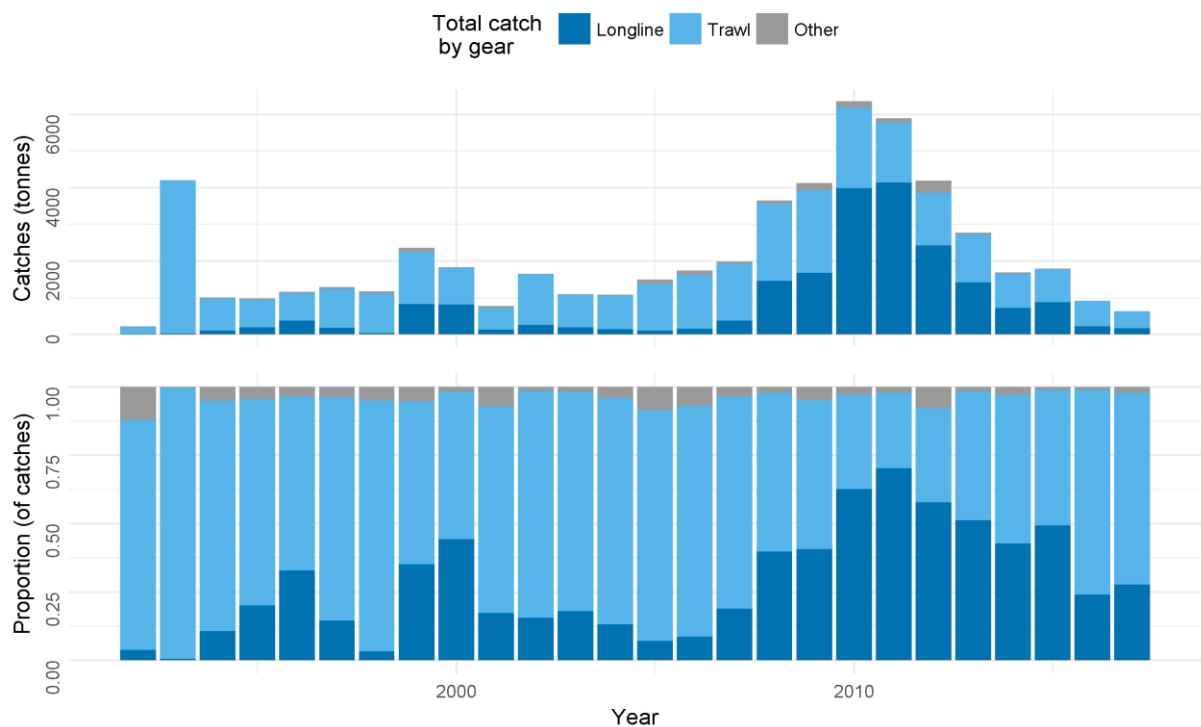


**Figure 3. Blue ling. Depth distribution of longlines (upper row) and trawls (lower row) catches according to logbook entries.**

*Mynd 3. Blálanga. Afli eftir dýpi línuveiða (efri röð) og botnvörpu (neðri röð) samkvæmt aflagagbókum.*

## LANDINGS TRENDS

The preliminary total landings 2017 were 636 t of which the Icelandic fleet caught 619 t. (Table). Catches of blue ling 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 decreased compared to 2010 or by around 4900 tonnes (Table 1).



**Figure 4. Blue ling. Total catch (landings) and proportion by fishing gear since 1991, according to statistics from the Directorate of Fisheries.**

*Mynd 4. Blálanga. Landaður afli ásamt hlutfalli eftir veiðarfærum frá árinu 1991, samkvæmt aflskráningarkerfi Fiskistofu.*

**Table 1. Blue ling. Catches by gear type and numbers of boats participating in the blue ling fishery.**

*Tafla 1. Blálanga. Afli eftir veiðarfærum og fjöldi báta sem stundar blálönguveiðar.*

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	213	681	30	925	16	1.5	50	2.6
2017	169	436	14	619	23	2.1	46	1.2

## DATA AVAILABLE

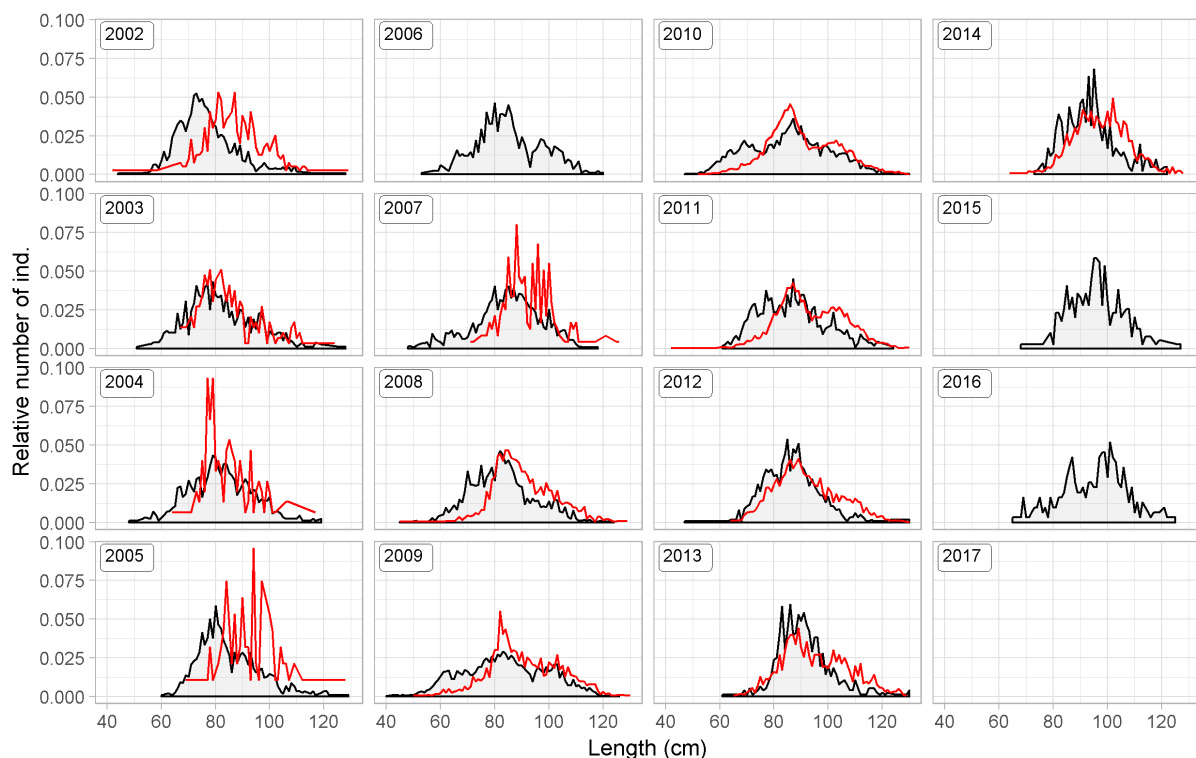
In general sampling is considered adequate from commercial catches from the main gears (longlines and trawls). The sampling does seem to cover the spatial distribution of catches for longlines and trawls. Similarly, sampling does seem to follow the temporal distribution of catches (WGDEEP 2012).

## LANDINGS AND DISCARDS

Landings data are given in Tables 1 and 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 before 2013/2014 fishing year nor minimum landing size there should be little incentive to discard blue ling.

## LENGTH COMPOSITIONS

Length distributions from the Icelandic trawl and longline catches for the period 2001–2016 are shown in Figure 5. Due to a mistake, no length measures were called for from commercial catches in 2017. Mean length from trawls increased from 86 cm in 2012 to 94 cm in 2016. On average mean length from longlines is higher than from trawls.



**Figure 5. Blue ling. Length distribution of blue ling from trawls (grey area) and longlines (red lines) of the Icelandic fleet since 2002, though 2017 is missing due to lack of data.**

*Mynd 5. Blálanga. Lengdardreifing frá 2002-2017 á botnvörpuveiðum (grá svæði) og línuveiðum (rauð lína) samkvæmt aflagabókum. Engin gögn fengust árið 2017.*

## AGE COMPOSITIONS

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

## WEIGHT-AT-AGE

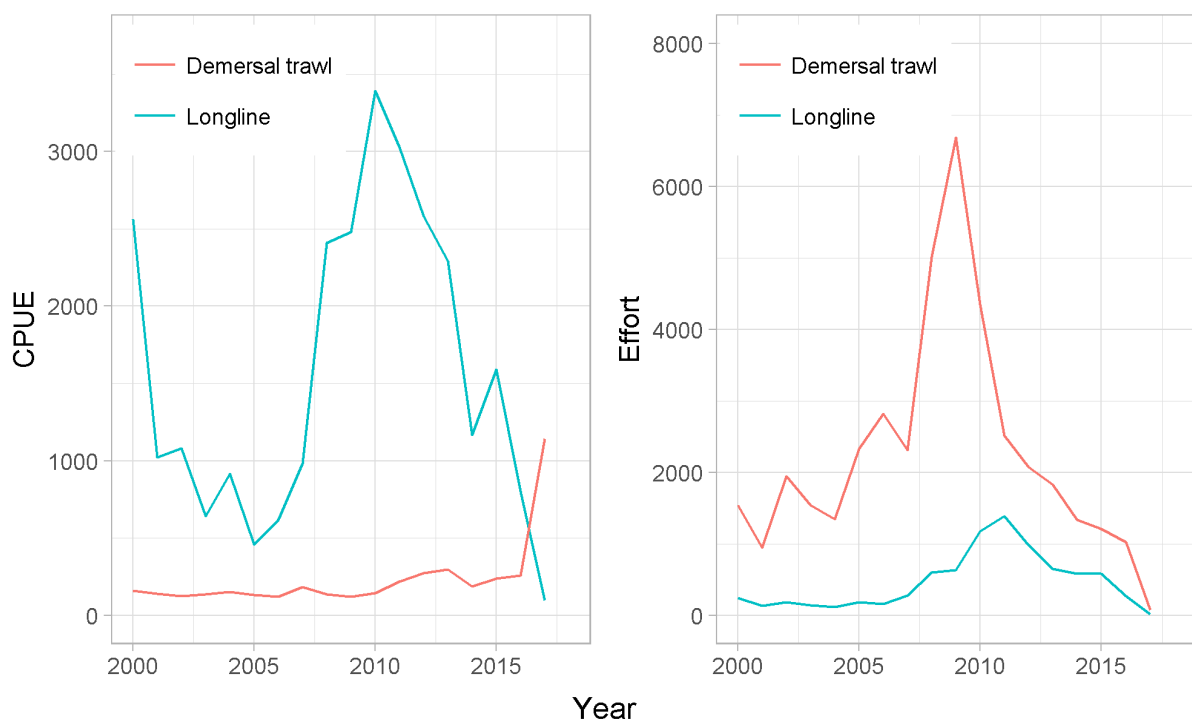
No new data were available. Existing data are not presented because of difficulty in ageing.

## 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 ( $M$ ).

## CATCH, EFFORT AND SURVEY DATA

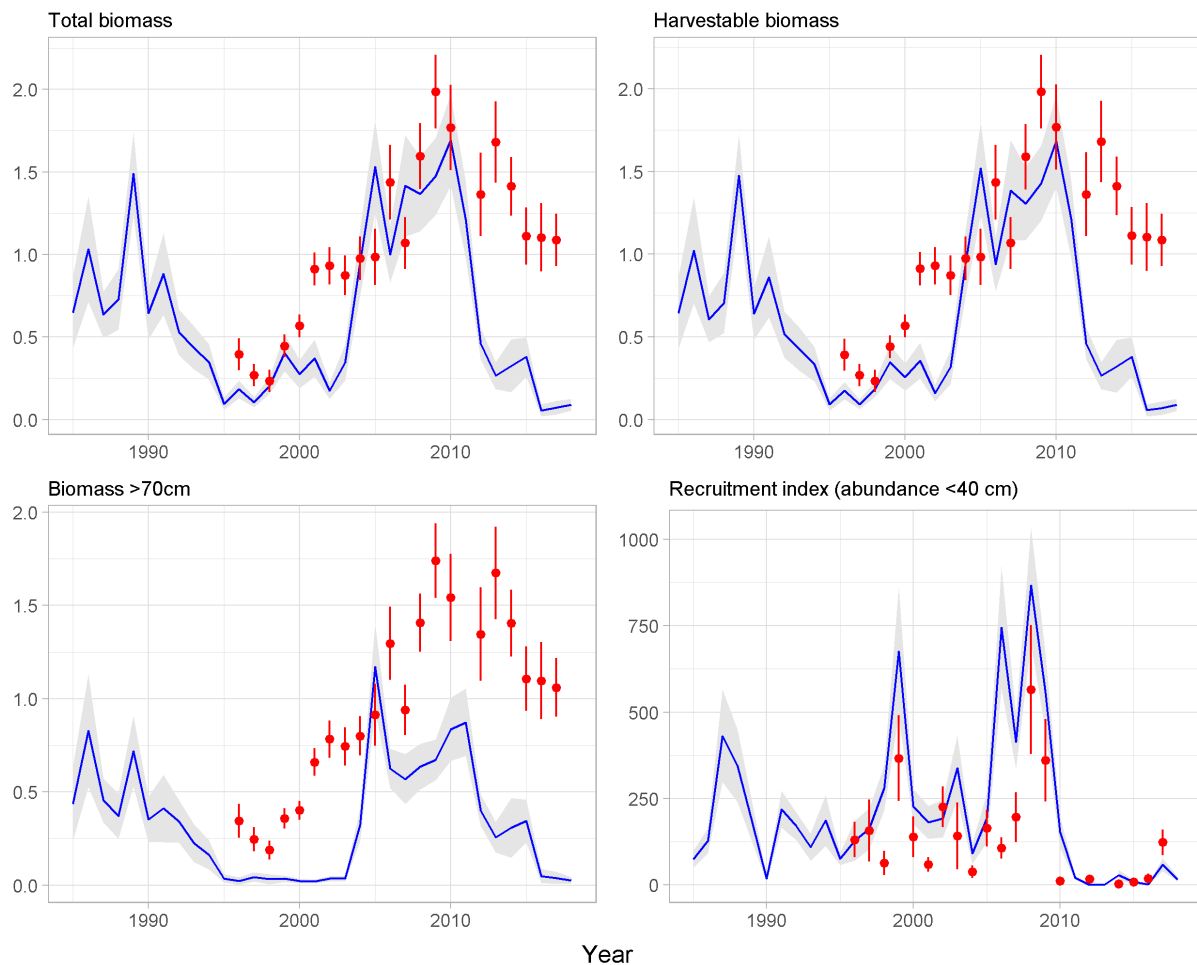
Effort and nominal cpue data from the Icelandic trawl and longline fleet are given in Figure 6. Due to changes in the fishery (expansion into new areas, fleet behaviour, etc.) and technical innovations cpue is not considered a reliable index of biomass abundance of blue ling and therefore no attempt has been made to standardize the series. However, looking at fluctuations in cpue and effort may be informative regarding the development of the fishery. Cpue from longlines was high from 2008 to 2013 but has decreased markedly since. No marked changes were observed from trawls from 2000 apart from an increase in 2017. At the same time, effort has been reduced substantially since 2011.



**Figure 6. Blue ling. 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.**

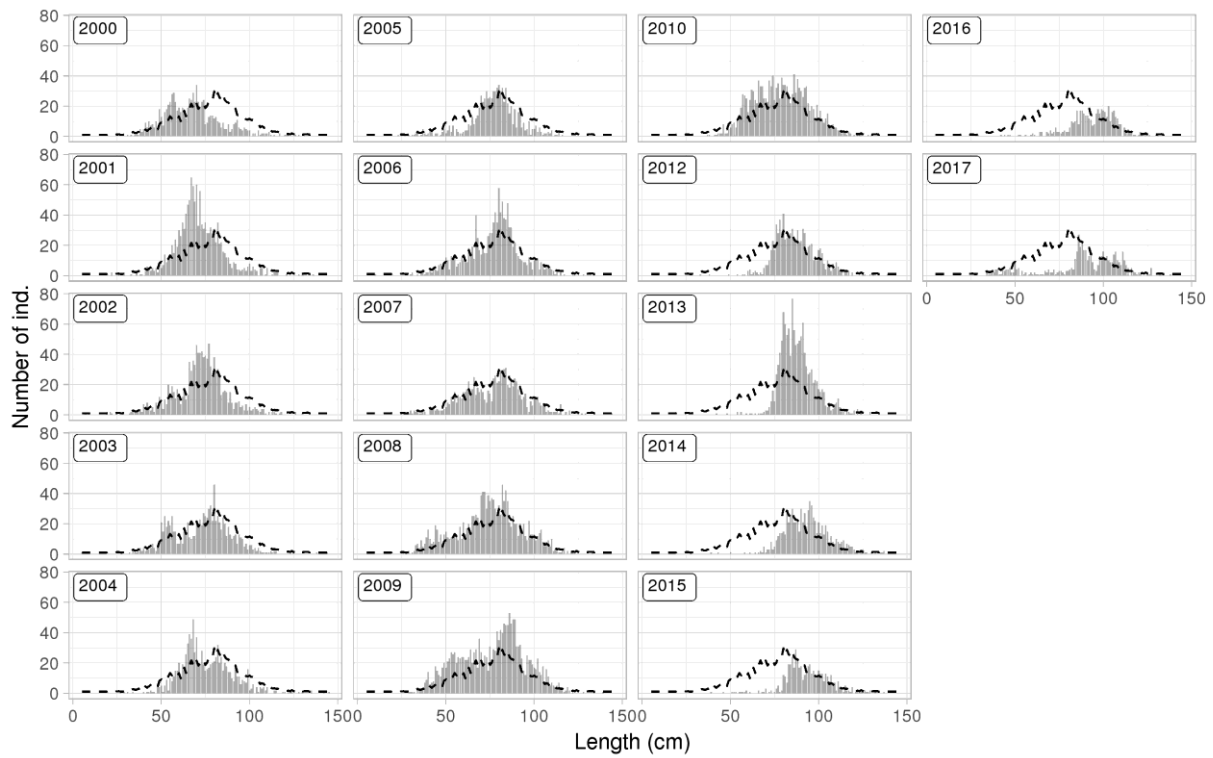
*Mynd 6. Blálanga. Afli á sóknareiningu (vinstri) og sókn (hægri) með línu og botnvörpu samkvæmt afladagbókum þar sem blálanga var skráð í afla.*

Time-series stratified abundance and biomass indices from the spring and autumn trawl surveys are shown in Figure 7 and length distributions from the autumn survey and its spatial distribution in Figures 8 and 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.



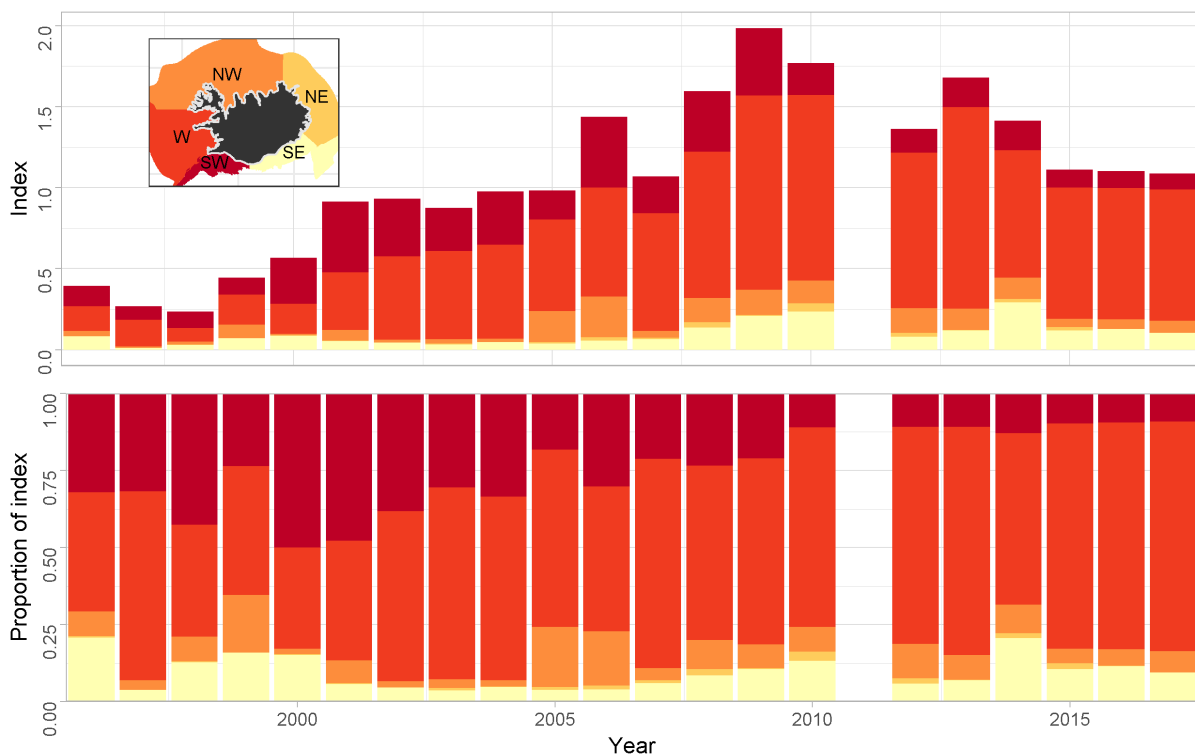
**Figure 7. Blue ling.** Abundance indices for blue ling in the Icelandic spring survey since 1985 (blue line and shaded area) and the autumn survey since 1996 (red points and vertical lines). A) total biomass index, b) biomass of 40 cm and larger c) biomass of 70 cm and larger, d) abundance index of <40 cm. The shaded area and the vertical bar show +/- standard error of the estimate.

*Mynd 7. Blálanga. Stofnvisitala (efri til vinstri), vísitala veiðistofns (40 cm og stærri, efri til hægri), vísitala stærri einstaklinga (70 cm og stærri, neðri til vinstri) og nýliðunarvísitala (neðri til hægri), úr stofnmælingum botnfiska að vori (blá lína) frá árinu 1985 og hausti (rauðir punktar) frá árinu 1996, ásamt staðalfrávik.*



**Figure 8. Blue ling. Length distributions from the Icelandic autumn survey since 2000. Black line is the average by length over the displayed period.**

*Mynd 8. Blálanga. Lengdardreifing úr stofnmælingu botnfiska að hausti frá 2000 ásamt meðal lengdardreifingu tímabilsins.*



**Figure 9. Blue ling. Spatial distribution of biomass index from the Icelandic autumn survey 1996-2017.**

*Mynd 9. Blálanga. Dreifing lífmassavísitölu í stofnmælingum botnfiska að hausti árin 1996-2017.*



## 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 1. 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 2017 longliners caught 27% of the catches, trawls 70% and other gear 3%.

As longliners take on average larger blue ling (Figure 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 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 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 6).

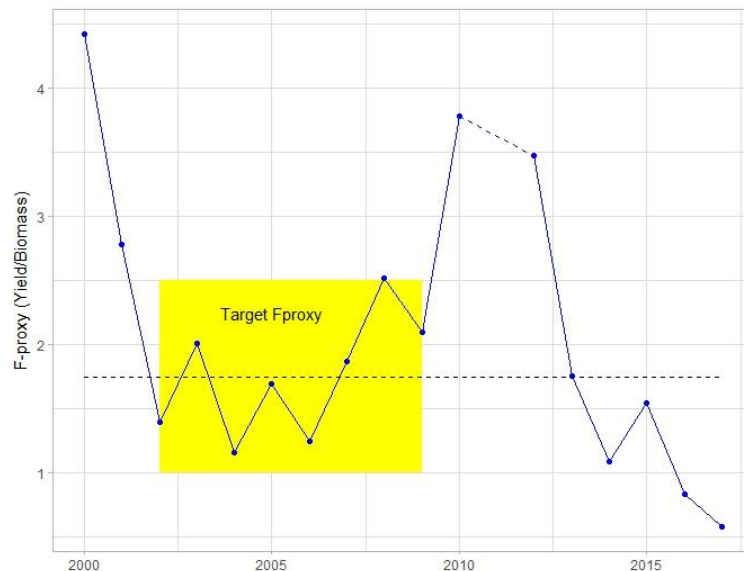
### SURVEYS

The spring survey covers only the shallower part of the depth distributional range of blue ling and shows high interannual variance (Figure 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 where 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 since 2007 (Figure 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 7 and 8). Due to industrial action, only part of the autumn survey was conducted in 2011.

### F<sub>PROXY</sub>

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 2007–2010 (Figure 10 and Table 5). 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 2017. The reason for the decrease is because of proportionally greater decrease in landings than in the survey index.



**Figure 10. Blue ling. Changes in relative fishing mortality (Yield/Survey biomass >39 cm). The yellow box highlights the reference period used as basis for the advice and the horizontal dotted line is the target  $F_{\text{proxy}}$  of 1.75 (mean of 2002–2009).**

*Mynd 10. Blálanga. Breytingar á vísitölu veiðihlutfalls (afli/vísitala stofnmælinga >39 cm). Gulí kassinn sýnir viðmiðunartímabilið sem er notað sem grunnur að ráðgjöfinni og lárétta punktalínan sýnir markgildið 1.75 (meðaltal viðmiðunartímabilsins 2002–2009).*

## 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 2017.

### 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  $F_{\text{proxy}}$  was set at 1.7 or the average  $F_{\text{proxy}}$  in 2002–2009, however the landings from Greenland were not correct and using the revised landings the target should be 1.75.

The autumn survey index in 2017 was 1086.0. Using the same procedure as last year would result in the advice for 2018 to set the TAC at 1900.5 t ( $1086.0 \times 1.75$ ). However, as recruitment has been at a low level since 2010 (>7 years), the precautionary buffer (0.8) was applied resulting in 1520 ( $1900.5 \times 0.8$ ).

## ADVICE

The ICES advice for 2018 is: Based on the ICES approach for data-limited stocks, ICES advises that catches should be no more than 1520 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  $F_{\text{proxy}}$  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  $F_{\text{proxy}}$  target (catch/survey biomass). The index is estimated to have decreased by less than 20% which means that the uncertainty cap was not applied. But due to lack of recruitment since 2010, the precautionary approach was used resulting in a 20% decrease as mentioned earlier.

## 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 2017/2018 fishing year was set at 1956 based on the recommendations of MFRI using the same advisory procedure as in 3.

**Table 2. Blue ling. Advised TAC, national TAC and total landings since the quota year 2013/2014.**

*Tafla 2. Blálanga. Tillögur Hafrannsóknastofnunar um hámarksafli, ákvörðun stjórnvalda um aflamark og landaður affli.*

FISHING YEAR	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	932	7	932
2017/2018	1956	1956			
2018/2019	1520				

## 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 in should be maintained and expanded where appropriate.

## CONCLUSIONS

The analysis presented above indicates that the fishing pressure is below  $F_{\text{MSY}}$  and the stock biomass is above possible MSY  $B_{\text{trigger,proxy}}$ . 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.

**Table 3. Blue ling: Landings from Icelandic fishing grounds.***Tafla 3. Blálanga. Landaður afli af Íslandsmiðum.*

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	6	0	925	84	0	1015
2017 <sup>1)</sup>	4	0	619	0	0	623

<sup>1)</sup> Provisional figures.

**Table 4. Blue ling. Landing in Greenlandic fishing grounds. Source: STATLANT database.***Tafla 4. Blálanga. Landaður afli á Grænlandsmiðum samkvæmt STATLANT gagnagrunni.*

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	0	0	0	0	0	0	0	0	7,2	7,2
2017 <sup>1)</sup>	0,2	0	3,7	0	4	0	0	0	3,2	11,1

<sup>1)</sup> Provisional figures.

**Table 5. Blue ling. Catches along with survey biomass index (larger than 40 cm) from the Icelandic Autumn survey and the calculated  $F_{\text{proxy}}$  ((Catches in Iceland and Greenland)/Index).**

*Tafla 5. Blálanga. Afli og vísitala (40 cm og stærrri) úr stofnmælingu botnfiska að hausti ásamt reiknuðu markgildi ((afli á Íslands- og Grænlandsmiðum)/vísitala).*

YEAR	ICELAND	GREENLAND	INDEX	F <sub>PROXY</sub>
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	<i>No survey</i>	
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	925	7	1118.0	0.92
2017	623	11,1	1086.0	0.58