

DAB – SANDKOLI

Limanda limanda

GENERAL INFORMATION

Dab is found in shallow waters all around Iceland, but in greatest quantity off the Southwest coast. It is a demersal species on a sandy or muddy substrate, occurring at depths ranging from the coast down to 150 meters but most commonly at 20-40 m.

Females grow larger than males; only a small proportion of males become larger than 30 cm long, about same proportion of females grow larger than 35 cm. Size at sexual maturity differs considerably between the sexes. At the length of 12 cm about half the males have reached maturity, but females reach that level at 22 cm length.

THE FISHERY

Main fishing grounds for dab are in the west and south-west of Iceland, with smaller fishing grounds in the southeast and several fjords in the north of the island.

Demersal seine is the main fishing gear for dab in Iceland, while a small proportion of the catch is taken in demersal trawl, gillnets and longline. Dab fishing grounds in 2008-2016, as reported by mandatory electronic logbooks are shown on Figure 1.

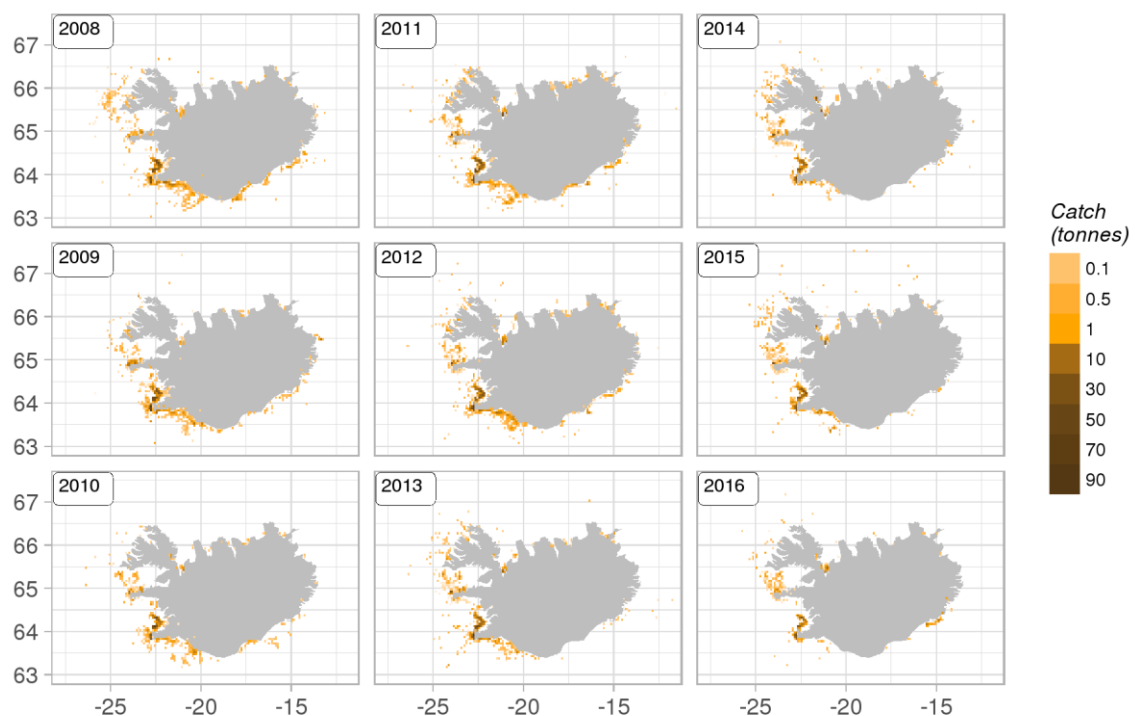


Figure 1. Dab. Geographical distribution of the Icelandic fishery since 2008. Reported catch from logbooks.

Mynd 1. Sandkoli. Útbreiðsla veiða á Íslandsmiðum frá 2008 samkvæmt afladagbókum.

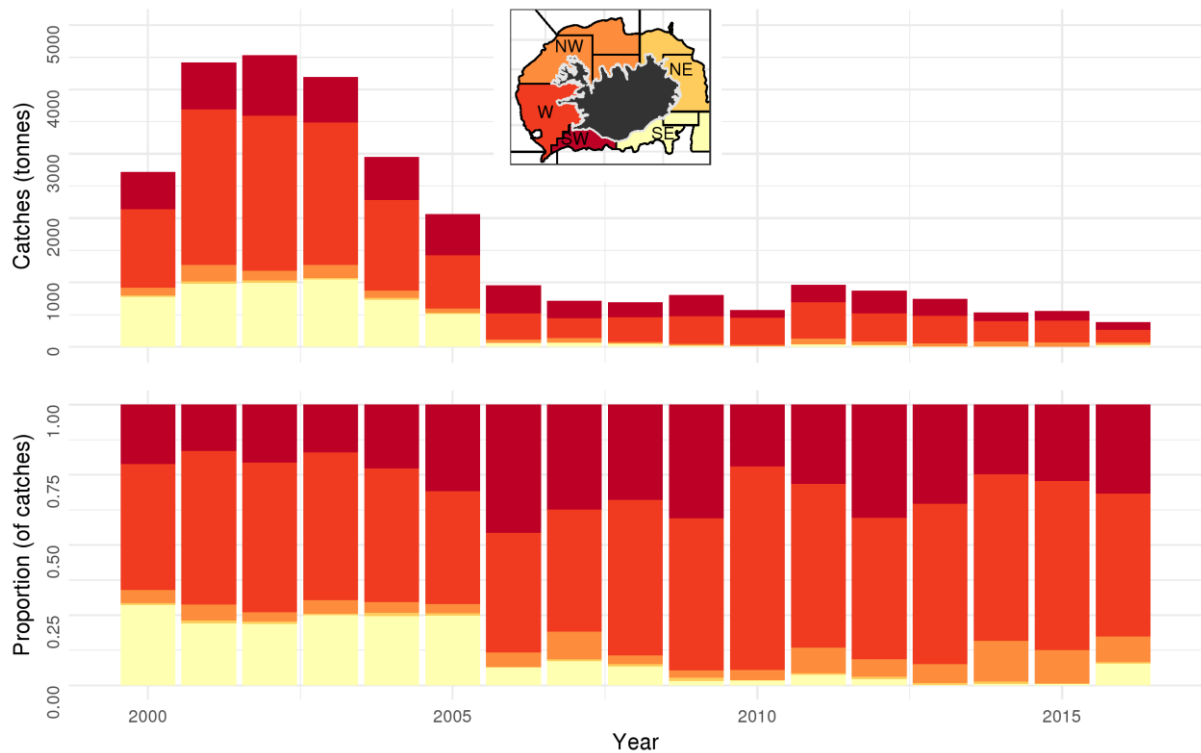


Figure 2. Dab. Spatial distribution of the Icelandic fishery by fishing area from 2000-2016. All gears combined.
Mynd 2. Sandkoli. Útbreiðsla veiða á íslensku veiðisvæði árin 2000-2016. Öll veiðarfæri samanlagt.

Since 2000, the main fishing grounds of dab have been in the southwestern and western part of the Icelandic shelf (Figure 2) according to logbook entries. Spatial distribution of the Icelandic dab fishery has been relatively stable, with around 75% of the dab caught on the western and south-western part of the shelf. Before 2005, around 20-30% of the catch was taken in the SE area, compared to 0-10% after 2005 suggesting a shift in the fishing distribution or distribution of the stock.

Dab is caught in relatively shallow water, with most of the catch (60-80%) taken between 21-80 meters depth (Figure 3).

Dab is mainly caught in demersal seine or around 95% of all catch (Figure 4). This proportion has been very stable through the years, as well as the amount caught in other gear (demersal trawl, longline and gillnets) with around 4% of the catch. Since 2000, the number of seiners reporting catches over 1000 kg of dab in total have decreased. Simultaneously, the total catches have also been decreasing, particularly since 2003, and in the last year the lowest landed catch since 1983 was observed (Table 1).

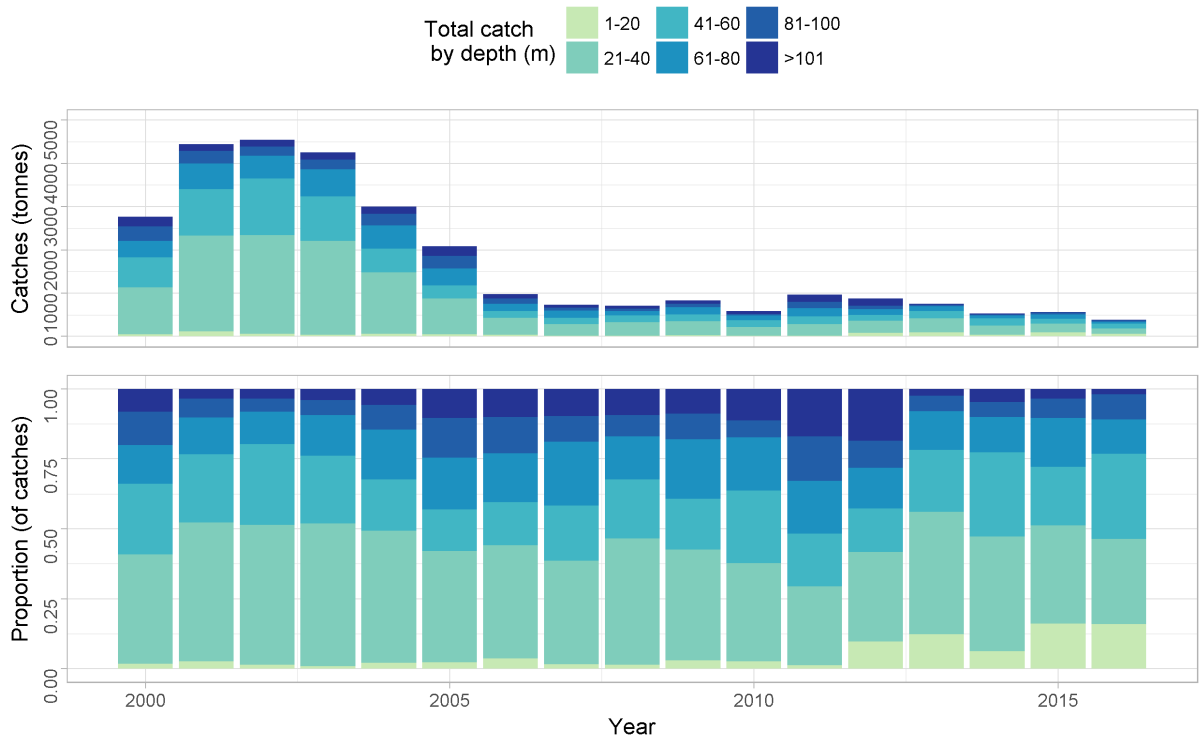


Figure 3. Dab. Depth distribution of catches according to logbooks.
Mynd 3. Sandkoli. Afli samkvæmt afladagbókum, skipt eftir dýpi.

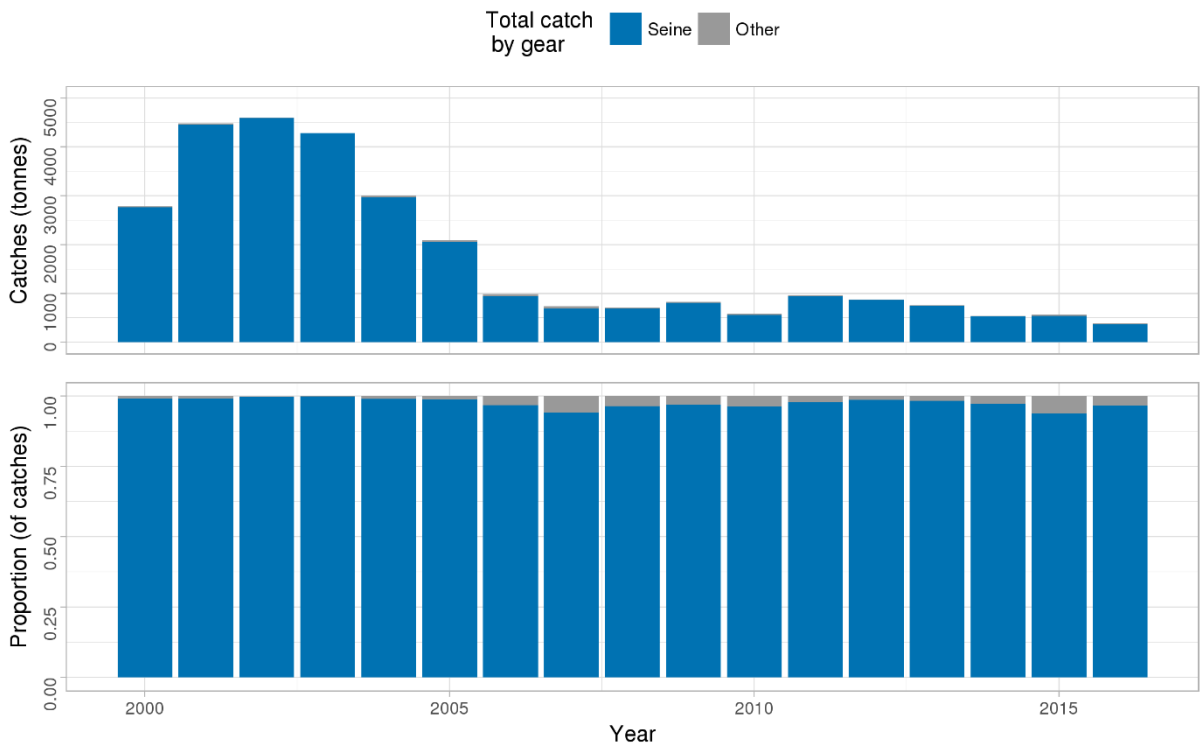


Figure 4. Dab. Total catch (landings) by fishing gear since 2000.
Mynd 4. Sandkoli. Landaður afli eftir veiðarfærum frá 2000.

Table 1. Dab. Number of Icelandic vessels landing 1000 kg or more of dab, and all landed catch divided by gear type.

Tafla 1. Sandkoli. Fjöldi íslenskra skipa sem landað hafa 1000 kg eða meira af sandkolla og allur landaður afli eftir veiðarfærum.

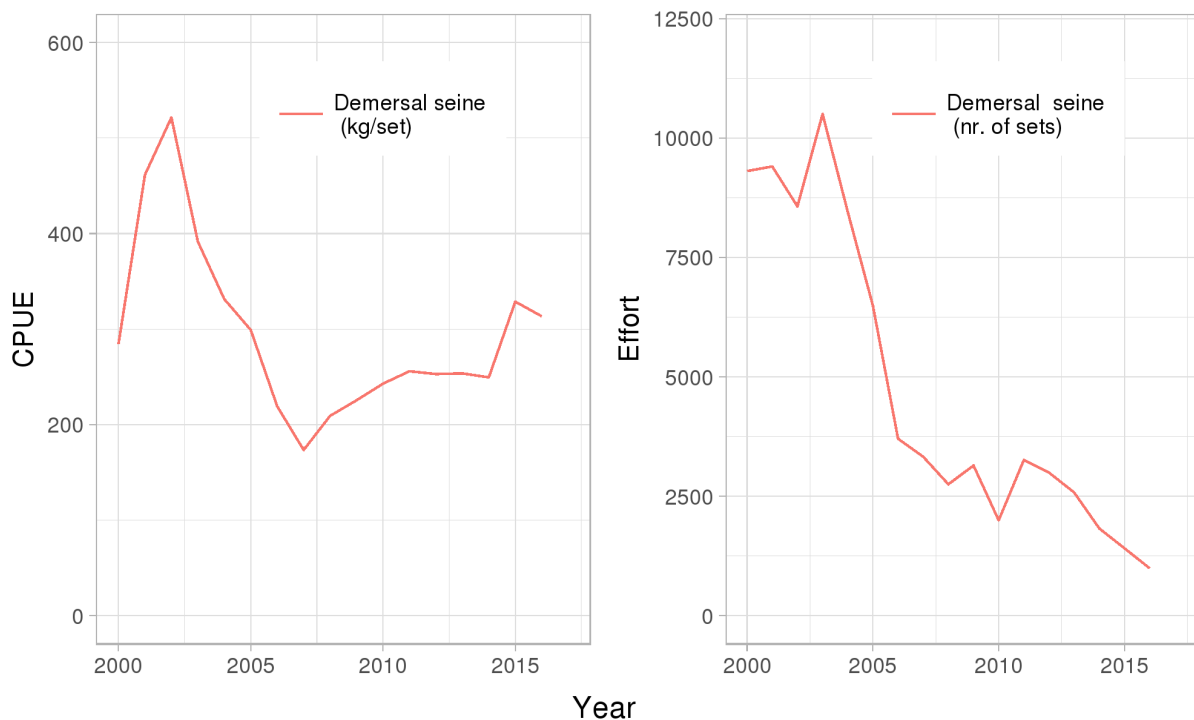
| YEAR | NUMBER OF VESSELS | | CATCHES (TONNES) | | |
|------|-------------------|--------------|-----------------------|--------------|------------|
| | <i>Seiners</i> | <i>Other</i> | <i>Demersal seine</i> | <i>Other</i> | <i>Sum</i> |
| 2000 | 62 | 10 | 2948 | 64 | 3012 |
| 2001 | 67 | 7 | 4322 | 53 | 4375 |
| 2002 | 67 | 7 | 4323 | 35 | 4358 |
| 2003 | 73 | 7 | 4165 | 48 | 4213 |
| 2004 | 72 | 11 | 2894 | 60 | 2954 |
| 2005 | 53 | 10 | 2079 | 35 | 2114 |
| 2006 | 43 | 6 | 1055 | 24 | 1079 |
| 2007 | 44 | 7 | 777 | 33 | 810 |
| 2008 | 35 | 9 | 754 | 38 | 792 |
| 2009 | 35 | 8 | 838 | 45 | 883 |
| 2010 | 35 | 8 | 574 | 38 | 612 |
| 2011 | 36 | 8 | 866 | 37 | 903 |
| 2012 | 36 | 4 | 840 | 19 | 859 |
| 2013 | 33 | 4 | 690 | 18 | 708 |
| 2014 | 28 | 2 | 490 | 15 | 505 |
| 2015 | 20 | 5 | 471 | 29 | 500 |
| 2016 | 19 | 1 | 331 | 9 | 341 |

CATCH PER UNIT EFFORT (CPUE) AND EFFORT.

CPUE estimates of dab in Icelandic waters are not considered representative of stock abundance as changes in fleet composition, technical improvements and differences in gear setup among other things have not been accounted for when estimating CPUE.

Non-standardised estimate of CPUE in demersal seine (kg/set) is calculated as the average weight of dab in sets in which dab was more than 10% of the catch. According to logbooks, dab CPUE decreased rapidly from around 500 kg per set in 2002 to less than 200 kg per set in 2007. However, since 2008 CPUE has gradually increased and was over 300 kg per set last year (Figure 5).

Total fishing effort for dab in demersal seine is estimated as the number of sets where dab was more than 10% of the total catch. The fishing effort has been decreasing almost continuously since 2003, and has never been as low as in 2016 (Figure 5).



**Figure 5. Dab. Non-standardised estimate of CPUE (left) and fishing effort (right) from demersal seine (kg/set or nr. of sets).
Mynd 5. Sandkoli. Afli á sóknareiningu (vinstri) og sókn (hægri) með dragnót (kg í kasti eða fjöldi kasta).**

AGE DISTRIBUTION OF LANDED DAB

Annually 300-500 otoliths are collected from commercial catches of dab (Table 2, Figure 6). All samples are from demersal seine. 4-6 year old dab are the majority of the commercial catch taken, and fish older than 8 years old are rarely seen in the fishery (Figure 7).

Table 2. Dab. Number of samples and aged otoliths from landed catch.

Tafla 2. Sandkoli. Fjöldi sýna og aldursgreindra fiska úr lönduðum afla.

| Year | Demersal seine | |
|------|----------------|----------|
| | Samples | Otoliths |
| 2010 | 7 | 350 |
| 2011 | 10 | 500 |
| 2012 | 10 | 500 |
| 2013 | 6 | 300 |
| 2014 | 13 | 500 |
| 2015 | 15 | 525 |
| 2016 | 9 | 350 |

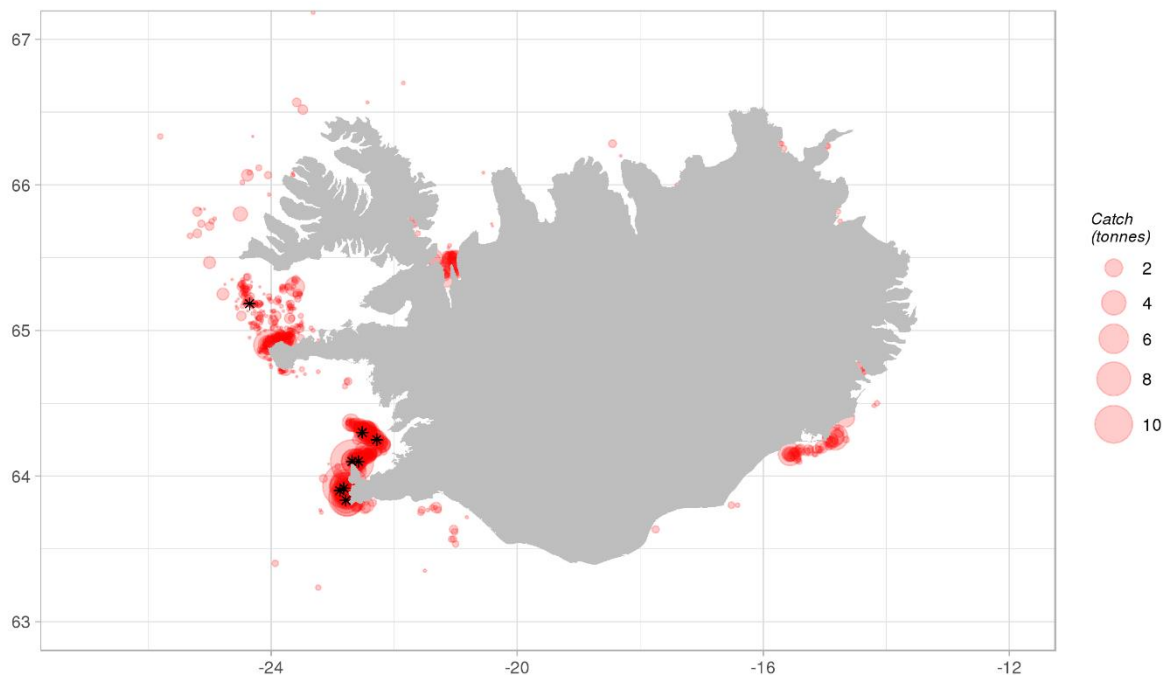


Figure 6. Dab. Fishing grounds in 2016 as reported in logbooks (red) and positions of samples taken from landings (asterisks).

Mynd 6. Sandkoli. Veiðisvæði við Ísland árið 2016 samkvæmt afladagbókum (rautt) og staðsetningar sýna úr lönduðum afla (stjörmur).

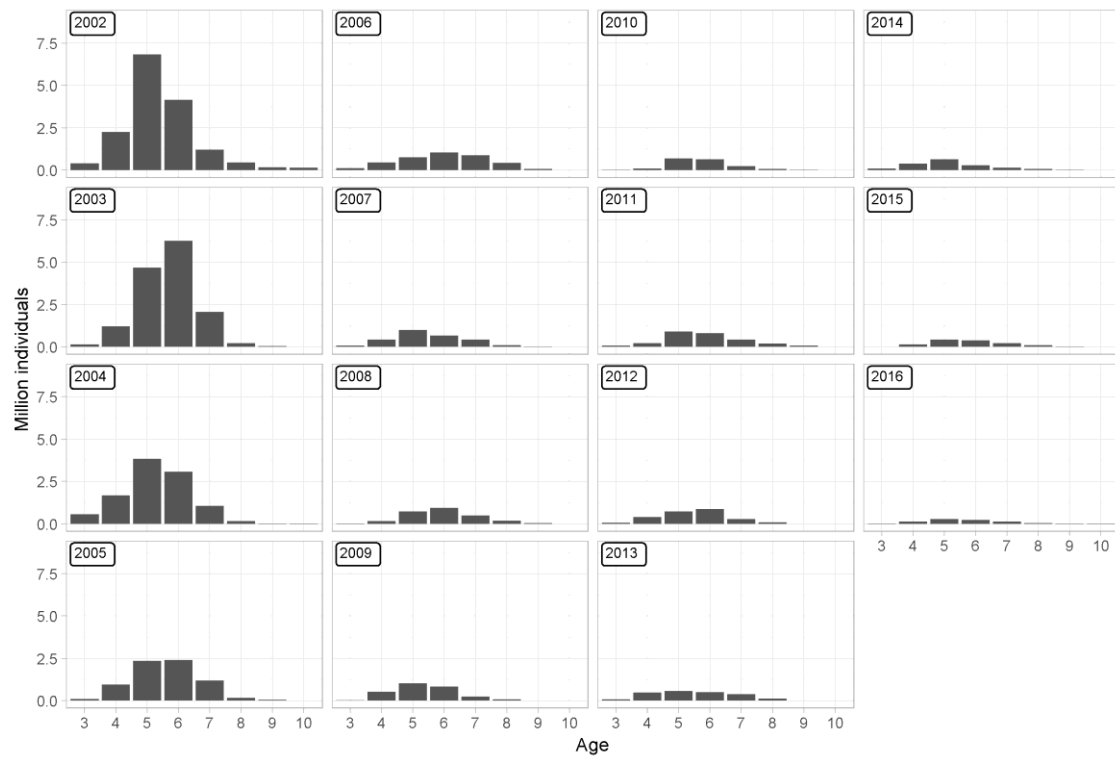


Figure 7. Dab. Estimated age distribution of landed catch based on landings and otoliths collected from landed catch.
Mynd 7. Sandkoli. Áætluð aldursdreifing landaðs afla byggð á aldursgreiningum á fiskum úr afla

LENGTH DISTRIBUTION OF LANDED DAB

For the years 1993-2001 the average length of dab in samples from landed catch was 28.5-29.7 cm, lowest in 2001. From 2001 the average length increased each year to 2010 when the average length was 31.8 cm. In the years that follow the average length has been around 32 cm, with exception of 2014 and 2015 when it was around 31 cm (Figure 8).

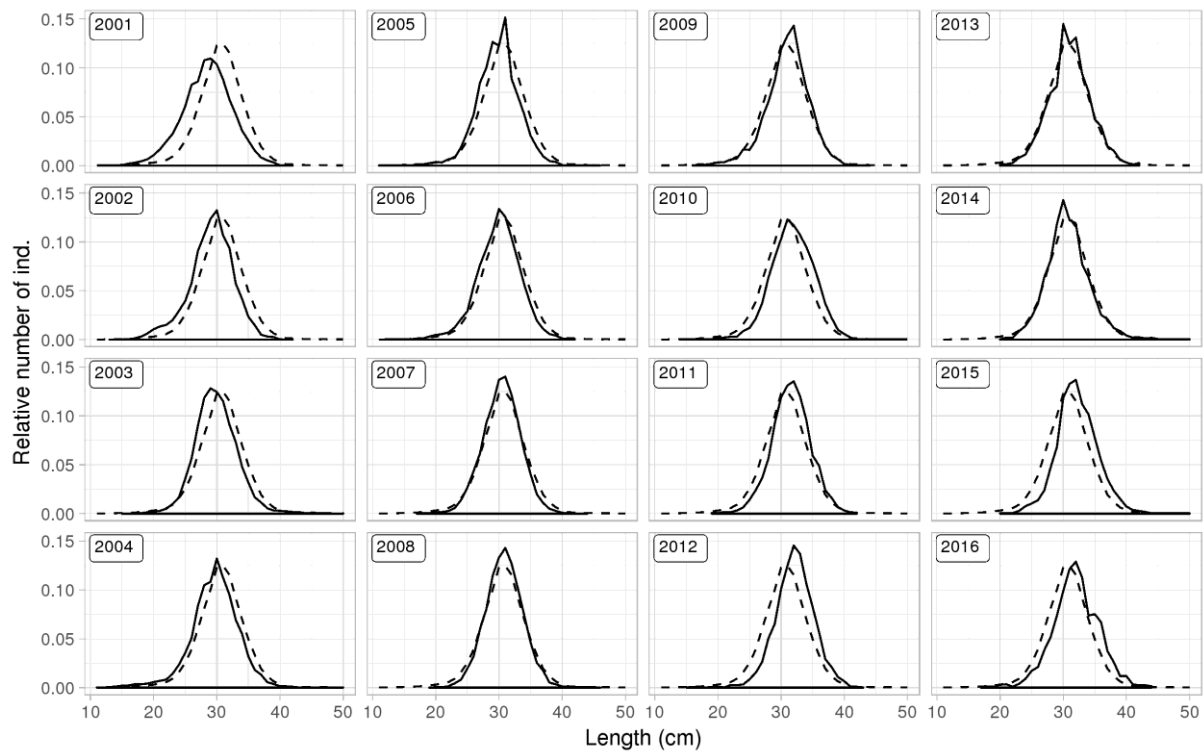


Figure 8. Dab. Length distributions from landed catch. The dotted line represents the mean length for all years.
Mynd 8. Sandkoli. Lengdardreifing aflasýna frá árinu 2001 með meðallengdardreifingu fyrir öll árin (punktalína).

SURVEY DATA

The Icelandic spring groundfish survey (hereafter spring survey, IS-SMB), which has been conducted annually in March since 1985, covers the most important distribution area of the dab fishery. In addition, the Icelandic autumn groundfish survey (hereafter autumn survey, IS-SMH) was commenced in 1996. However, a full autumn survey was not conducted in 2011 due to a labour dispute and therefore the results for 2011 are not presented. The spring survey is considered to measure changes in abundance/biomass better than the autumn survey. It does not, however, adequately cover the main recruitment grounds for dab as recruitment takes place in shallow water in habitats unsuitable for demersal trawling. In addition to these two major surveys, a designated flatfish survey with beam trawl was started in 2016 and will be expanded in 2017 to cover most of the recruitment grounds of dab and other flatfish species. It will potentially be used for stock assessment of dab in the future.

Figure 9, shows both a recruitment index based on abundance of dab smaller than 20 cm, and trends in various biomass indices.

Total biomass index and the biomass index for dab larger than 25 cm (harvestable part of the stock) has been quite low but stable with two peaks in 1997-98 and 2003 (Figure 9).

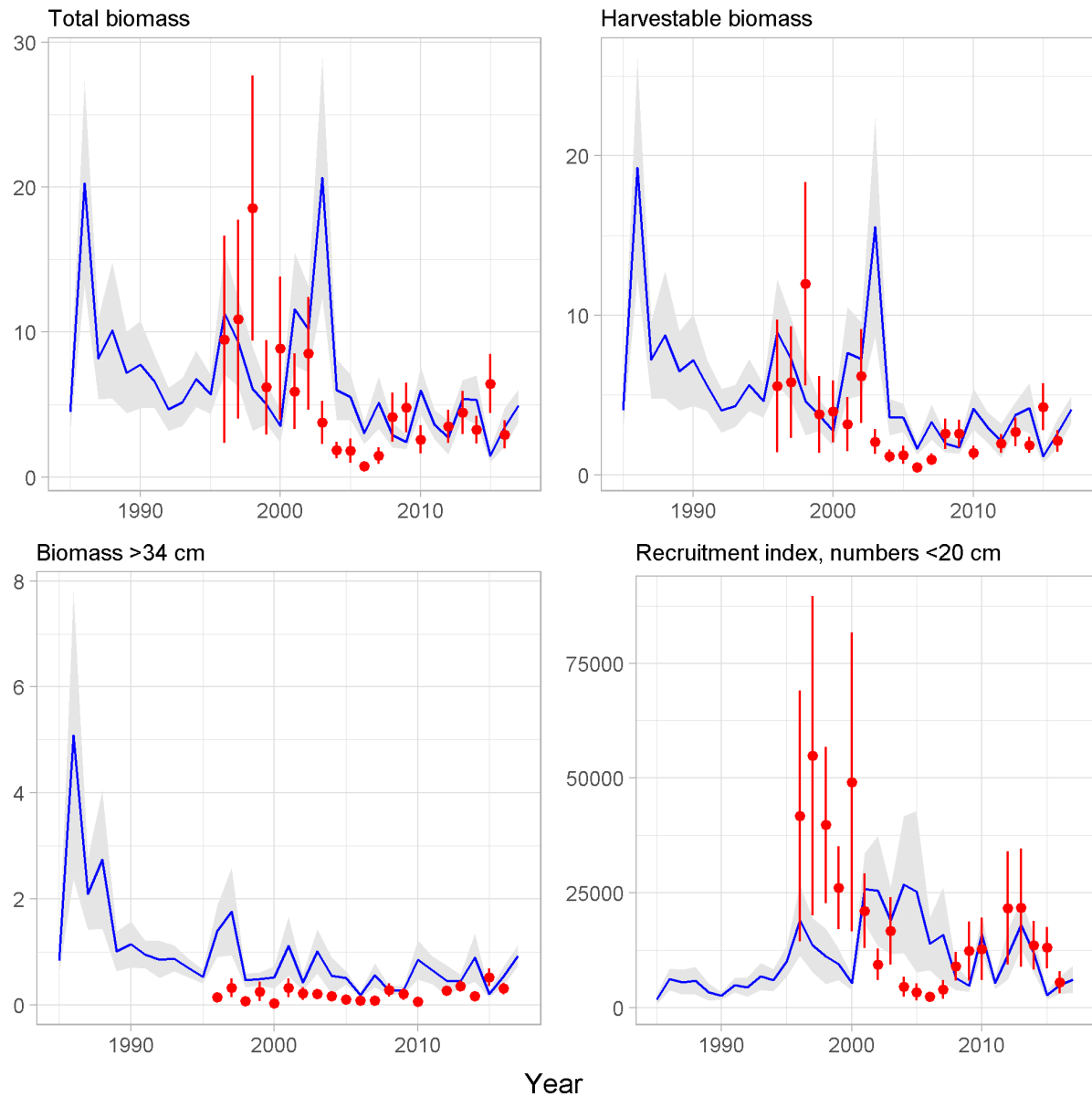


Figure 9. Dab total biomass indices (upper left) and harvestable biomass indices (>25 cm) (upper, right), biomass indices of larger individuals (>34cm) (lower left) and juvenile abundance indices (<20 cm) (lower right) from the spring survey (blue) from 1985 and autumn survey (red) from 1996, along with the standard deviation.

Mynd 9. Stofnvísitala sandkola (efri til vinstri), vísitala veiðistofns (25 cm og stærri, efri til hægri) og vísitala stærri einstaklinga (34 cm og stærri, neðri til vinstri) og nýliðunarvísitala (neðri til hægri), úr stofnmælingu botnfiska að vori (blátt) frá árinu 1985 og hausti (rautt) frá árinu 1996, ásamt staðalfrávik.

The first two years of the spring survey the average length of dab in measured samples was 28.2 cm (Figure 10). After that the average length declined almost each year until 2001 when it was 24 cm. After some fluctuation in the years that followed, it again reached this low value in 2012 and 2013. Since 2013 the average length has gradually been increasing and was 27 cm in 2017. Data from the autumn survey tells a similar story, with a marked increase in average size of dab in most recent years (Figure 11).

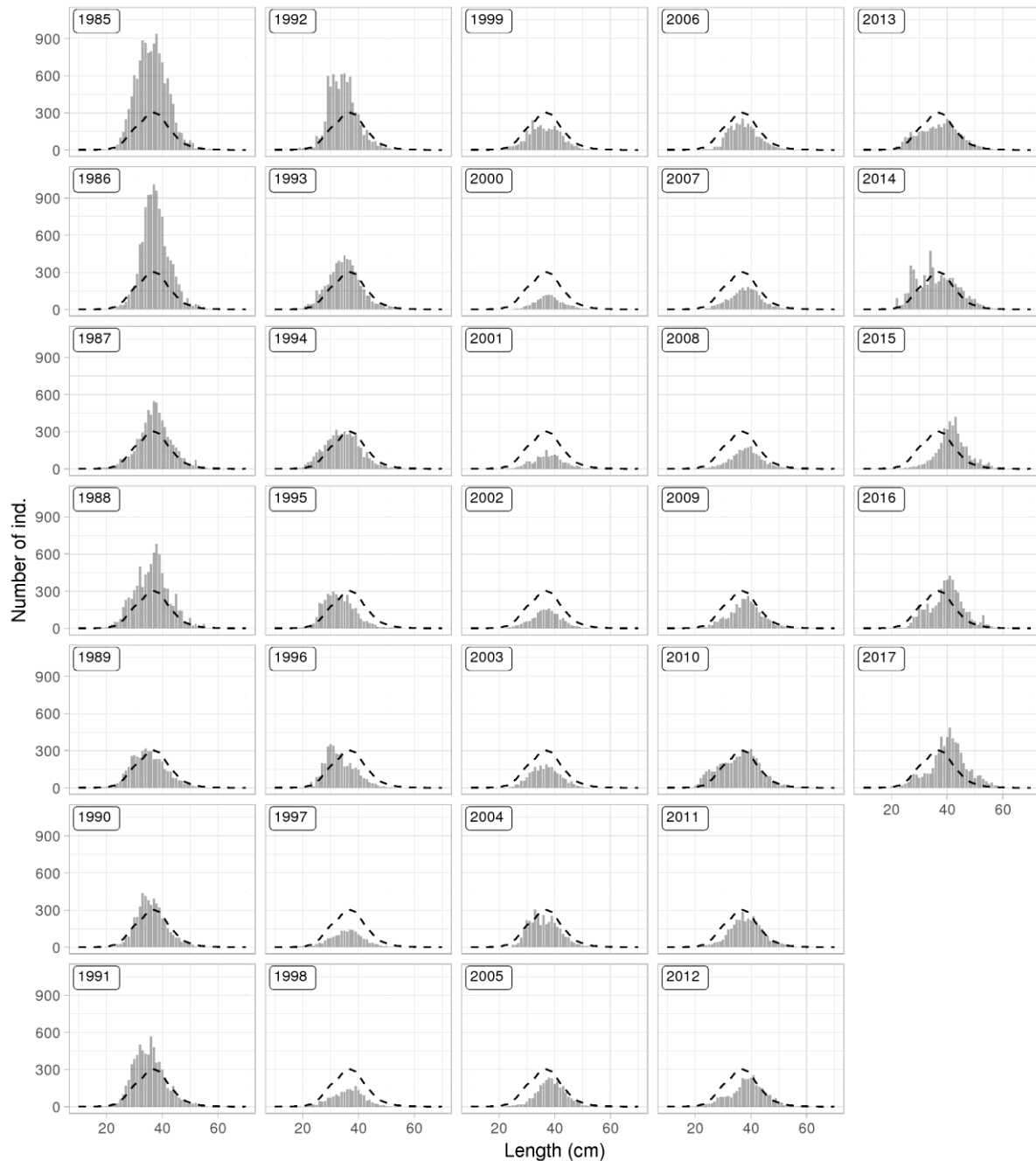


Figure 10. Dab. Length distribution from the spring survey. The dotted line shows mean length distribution for all years combined.

Mynd 10. Sandkoli. Lengdardreifing úr stofnmælingu botnfiska að vori frá 1985 ásamt meðallengdardreifingu allra ára (punktalína).

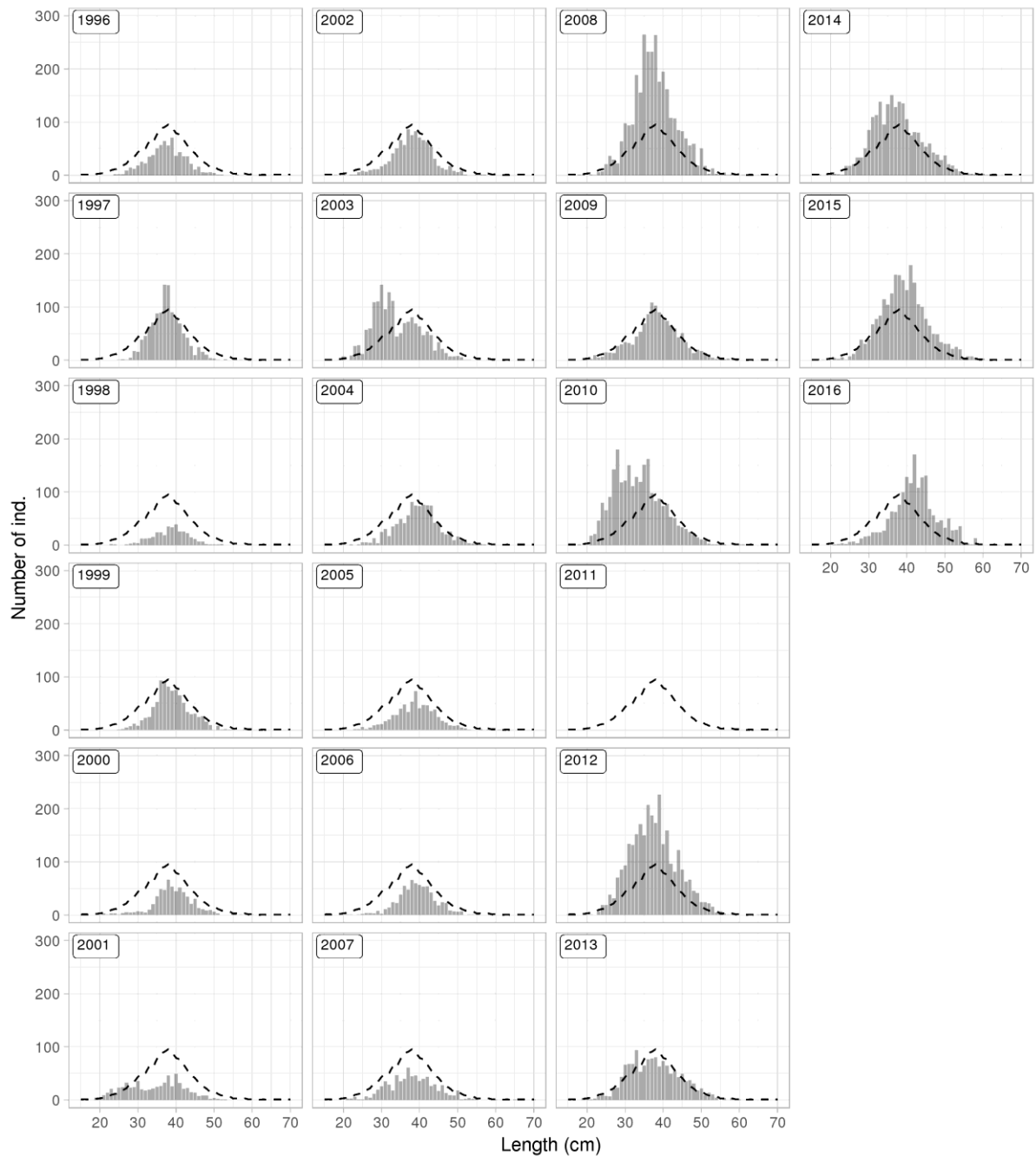


Figure 11. Dab. Length distribution from the autumn survey. The dotted line shows mean length distribution for all years combined.

Mynd 11. Sandkoli. Lengdardreifing úr stofnmælingu botnfiska að hausti frá 1996 ásamt meðallengdardreifingu allra ára (punktalína).

Dab were most abundant in the south and west in the spring survey in 2017, with most of the catch coming from several tows in the SW part of the country (Figure 12). From the onset of the spring survey a considerable part of the biomass has been measured in the SE area. After 2004 this changed, and very little has been observed in this area ever since, suggesting a change in the spatial distribution of dab around the country (Figure 13). Biomass in the NW and W areas has increased over the same period.

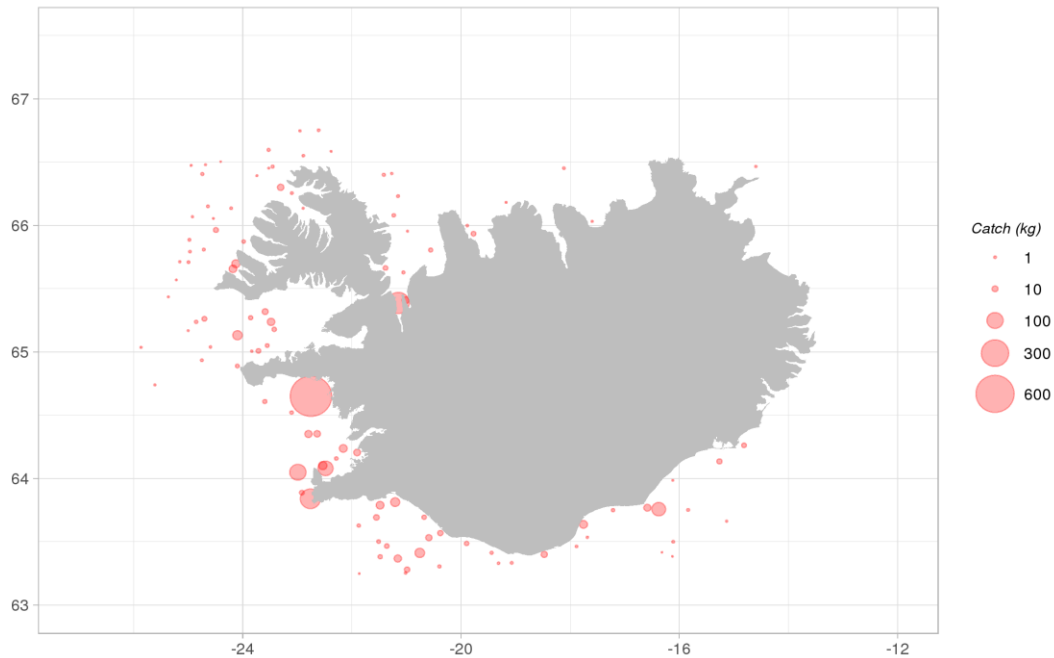


Figure 12. Dab. Spatial distribution in the spring survey in 2017.

Mynd 12. Sandkoli. Útbreiðsla í stofnmælingu botnfiska að vori 2017.

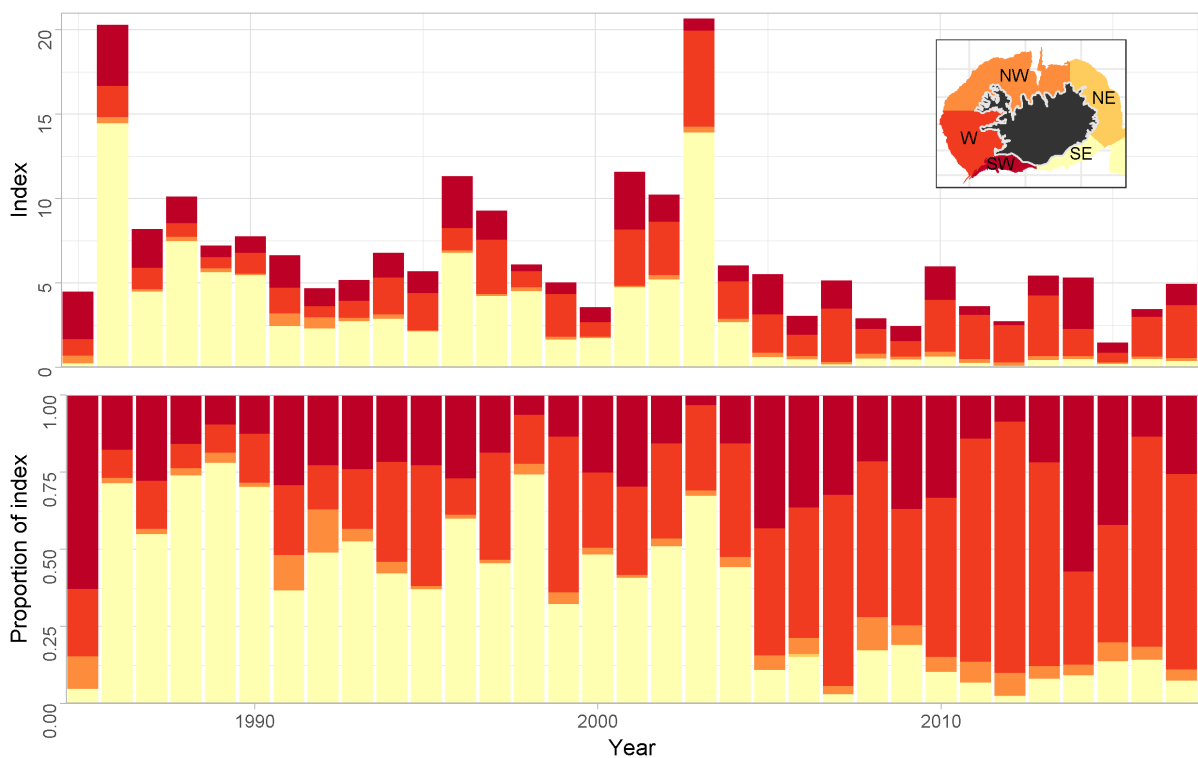


Figure 13. Dab. Spatial distribution of biomass index from the spring survey in 1986-2017.

Mynd 13. Sandkoli. Dreifing lífmassavísitölu í stofnmælingu botnfiska að vori, árin 1986-2017.

Dab were mainly observed in the south, west and northwest of Iceland in the 2016 autumn survey (Figure 14). Abundance is patchy, and the majority of the observed dab came from a few large tows. Comparable changes in spatial distribution of dab are observed in the autumn and spring surveys (Figure 13 and 15). The importance of the SE area diminishes as the importance of more westerly areas increases.

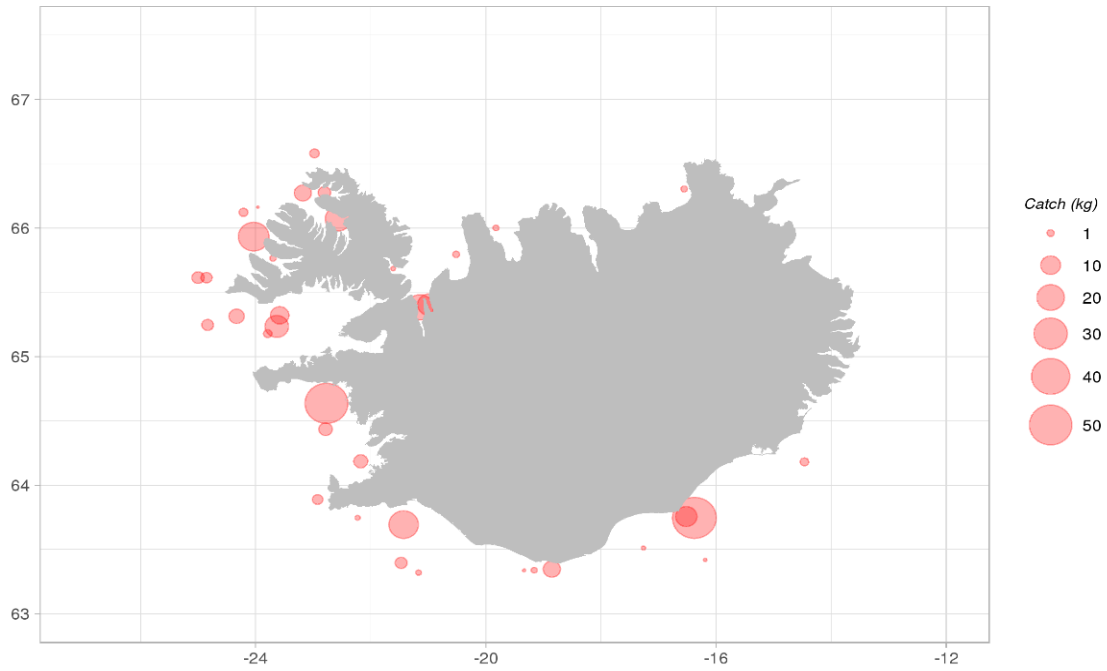


Figure 14. Dab. Spatial distribution of Dab in 2016 in the autumn survey.
Mynd 14. Sandkoli. Útbreiðsla í stofnmælingu botnfiska að hausti árið 2016.

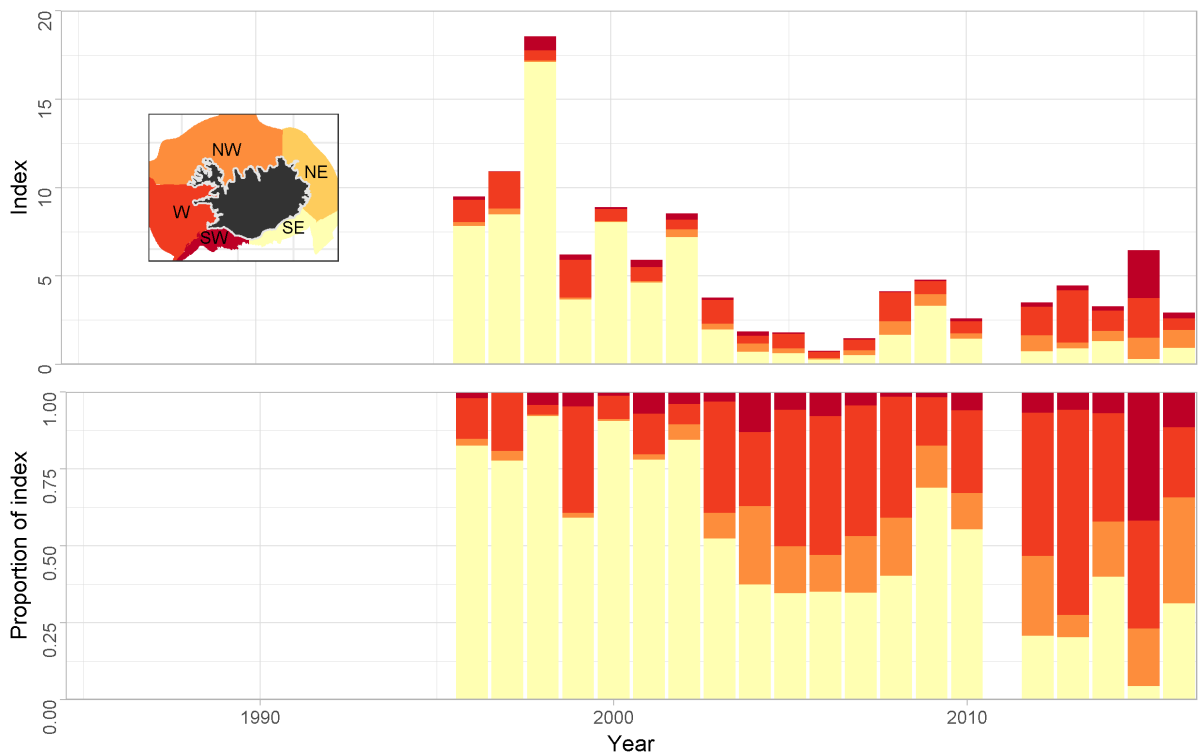


Figure 15. Dab. Spatial distribution of biomass index from the autumn survey in 1996-2016.
Mynd 15. Sandkoli. Dreifing lífmassavísitölu í stofnmælingu botnfiska að hausti, árin 1996-2016.

MANAGEMENT

The Ministry of Industries and Innovation (MII) is responsible for management of the Icelandic fisheries and implementation of legislation. Dab was included in the ITQ system in the 1997/1998 quota year and as such subjected to TAC limitations (Table 3). For most of the fishing years up to 2004/05 the TAC was set according to recommendations, but for the fishing years 2005/06-2012/13 the TAC was somewhat higher than recommendations.

Figure 16 shows the net transfers for dab in the Icelandic ITQ-system. The net transfer has always been from dab to other species, the amount ranging from 5 to almost 60% of the allocated quota of the respected quota year.

Table 5. Dab. Recommended TAC, national TAC set by the Ministry, and landings (tonnes).

Tafla 5. Sandkoli. Tillögur Hafrannsóknastofnunar um hámarksafla, ákvörðun stjórnvalda um aflamark og landaður afli (tonn).

| FISHING YEAR | REC. TAC | NATIONAL TAC | CATCH |
|-------------------------|-----------------|---------------------|--------------|
| 1995/96 | 7000 | - | 6800 |
| 1996/97 | 7000 | - | 8200 |
| 1997/98 | 7000 | 7000 | 6000 |
| 1998/99 | 7000 | 7000 | 4300 |
| 1999/00 | 7000 | 7000 | 2700 |
| 2000/01 | 4000 | 5500 | 2300 |
| 2001/02 | 4000 | 4000 | 3800 |
| 2002/03 | 7000 | 7000 | 4300 |
| 2003/04 | 7000 | 7000 | 3600 |
| 2004/05 | 5000 | 5000 | 2600 |
| 2005/06 | 2500 | 4000 | 1200 |
| 2006/07 | 1000 | 2000 | 800 |
| 2007/08 | 500 | 1500 | 600 |
| 2008/09 | 500 | 1000 | 700 |
| 2009/10 | 500 | 1000 | 570 |
| 2010/11 | 500 | 900 | 600 |
| 2011/12 | 500 | 900 | 700 |
| 2012/13 | 500 | 800 | 590 |
| 2013/14 | 500 | 500 | 400 |
| 2014/15 | 1000 | 1000 | 330 |
| 2015/16 | 500 | 500 | 330 |
| 2016/17 | 500 | 500 | |
| 2017/18 | 500 | | |

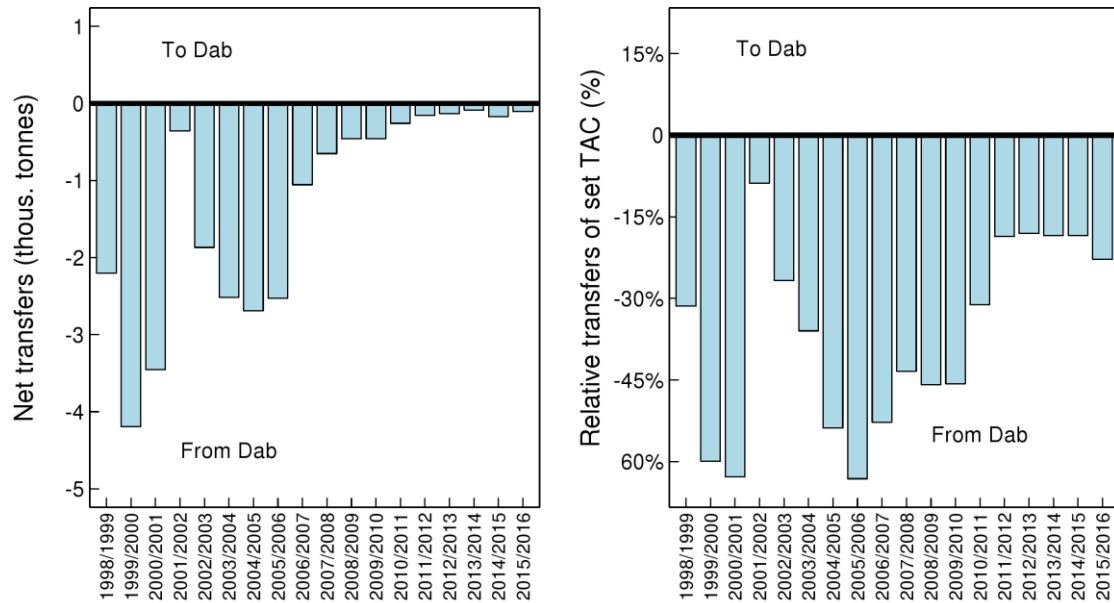


Figure 16. Dab. Net transfers of quota to/from dab in the Icelandic ITQ system by fishing year. Positive values indicate that other species are being transferred to dab but negative mean that dab quota is being converted to other species.
Mynd 16. Sandkoli. Tilfærsla á kvóta milli sandkola og annarra tegunda í kvótakerfinu eftir fiskveiðiárum. Jákvæð gildi tákna að kvóta annara tegunda er breytt í sandkola, en neikvæðar að sandkolakvóta sé breytt í aðrar tegundir.

ADVICE 2017

The MFRI recommends a TAC no higher than 500 tonnes for the 2017/2018 fishing year. Survey biomass indices are at an all-time low, so the TAC is set to cover dab caught as by-catch in other fisheries.

The MFRI also recommends that the defined management area from Snæfellsnes to Stokksnes will be abolished, and all dab fishing grounds be under TAC limits.

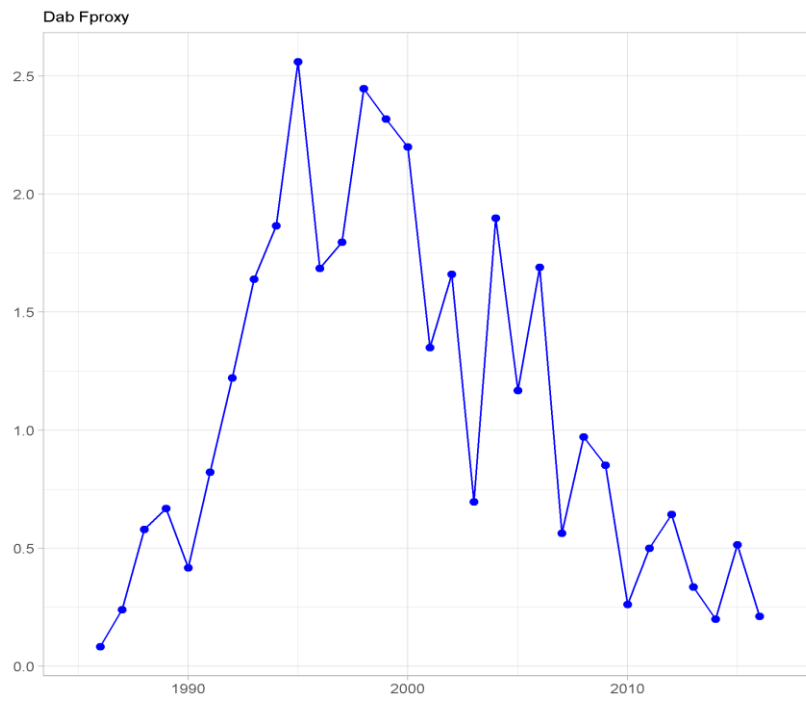


Figure 17. Dab. F_{proxy} (catch/survey biomass).

Mynd 17. Sandkoli. Vísitala veiðihlutfalls ($F_{\text{proxy}} = \text{afli/vísitala}$).