

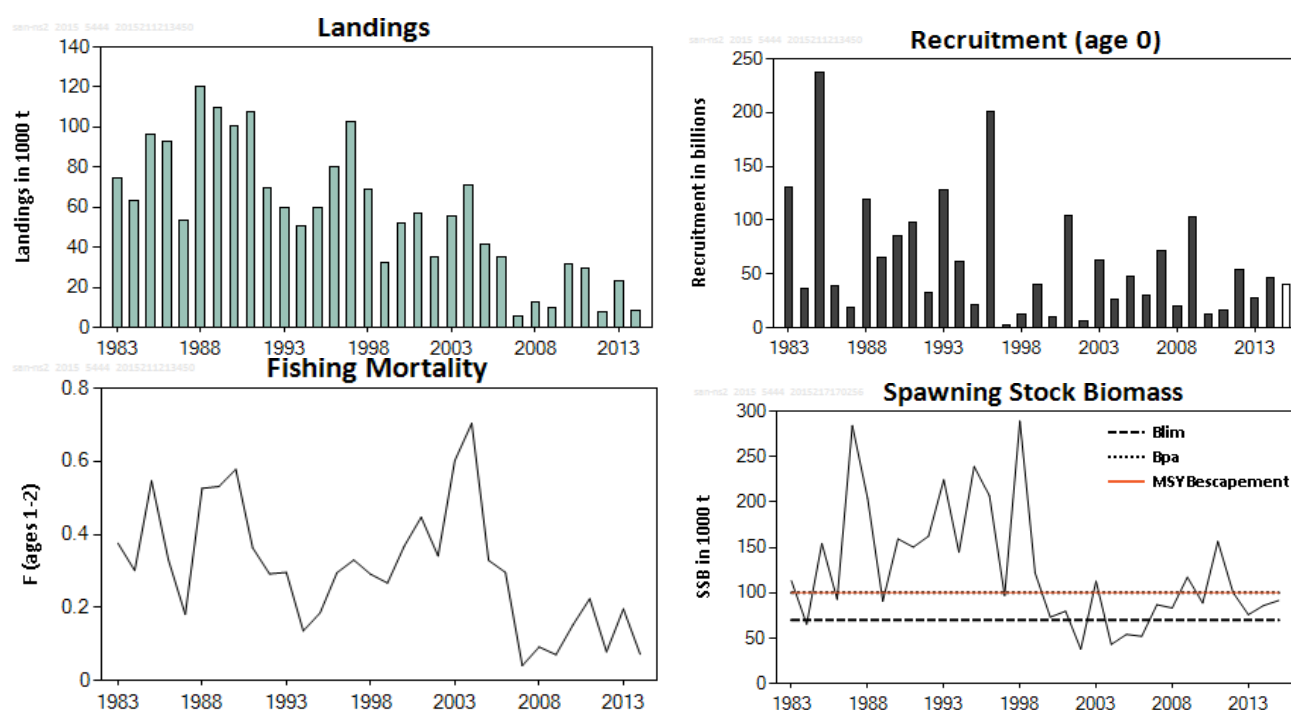
### 6.3.42 Sandeel (*Ammodytes* spp.) in Divisions IVb and IVc, SA 2 (Central and South North Sea)

#### ICES stock advice

ICES advises that when the MSY approach is applied, catches in 2015 should be no more than 29 000 t to maintain SSB in 2016 above MSY B<sub>escapement</sub>.

#### Stock development over time

The sandeel area 2 (SA 2) spawning-stock biomass (SSB) has increased since 2014, but it remains below the precautionary biomass level (B<sub>pa</sub> = MSY B<sub>escapement</sub>). Recruitment in 2014 is estimated to be around the average.



**Figure 6.3.42.1** Sandeel in the North Sea (SA 2). Historical development of the stock from the summary of the stock assessment (weights in thousand tonnes and recruitment in billions of fish). Predicted values are not shaded.

#### Stock and exploitation status

**Table 6.3.42.1** Sandeel in the North Sea (SA 2). State of the stock and fishery, relative to reference points.

|                                    |                                    | Fishing pressure |      |      | Stock size                         |                  |                  |
|------------------------------------|------------------------------------|------------------|------|------|------------------------------------|------------------|------------------|
|                                    |                                    | 2012             | 2013 | 2014 | 2013                               | 2014             | 2015             |
| Maximum Sustainable Yield approach | F <sub>MSY</sub>                   | ?                | ?    | ?    | MSY                                | Below escapement | Below escapement |
|                                    | F <sub>pa</sub> , F <sub>lim</sub> | ?                | ?    | ?    | B <sub>pa</sub> , B <sub>lim</sub> | Increased risk   | Increased risk   |
|                                    | F <sub>MGT</sub>                   | ?                | ?    | ?    | SSB <sub>MGT</sub>                 | Undefined        | Undefined        |

## Catch options

**Table 6.3.42.2** Sandeel in the North Sea (SA 2). The basis for the catch options.

| Variable   | Value      | Source      | Notes                      |
|------------|------------|-------------|----------------------------|
| F (2014)   | 0.06       | ICES, 2015a | Sum of half-yearly Fs      |
| R (2014)   | 47 billion | ICES, 2015a |                            |
| R (2015)   | 41 billion | ICES, 2015a | Geometric mean (1983–2013) |
| SSB (2015) | 92 kt      | ICES, 2015a |                            |

**Table 6.3.42.3** Sandeel in the North Sea (SA 2). Annual catch options. All weights are in thousand tonnes.

| Rationale     | Catches (2015) | Basis                                  | F (2015) | SSB (2016) | %SSB change* | %TAC change** |
|---------------|----------------|----------------------------------------|----------|------------|--------------|---------------|
| MSY approach  | 29             | $SSB_{2016} = MSY \text{ Bescapement}$ | 0.18     | 100        | 9%           | 480%          |
| Zero catch    | 0              | $F = 0$                                | 0        | 117        | 27%          | –100%         |
| Other options | 3              | $F_{2014} \times 0.25$                 | 0.02     | 115        | 26%          | –40%          |
|               | 5              | $F_{2014} \times 0.5$                  | 0.03     | 114        | 24%          | 0%            |
|               | 7              | $F_{2014} \times 0.75$                 | 0.04     | 112        | 23%          | 40%           |
|               | 10             | $F_{2014} \times 1$                    | 0.06     | 111        | 21%          | 100%          |
|               | 12             | $F_{2014} \times 1.25$                 | 0.07     | 109        | 20%          | 140%          |

\* SSB 2016 relative to SSB 2015.

\*\* Catch option for 2015 relative to TAC in 2014 (5 kt).

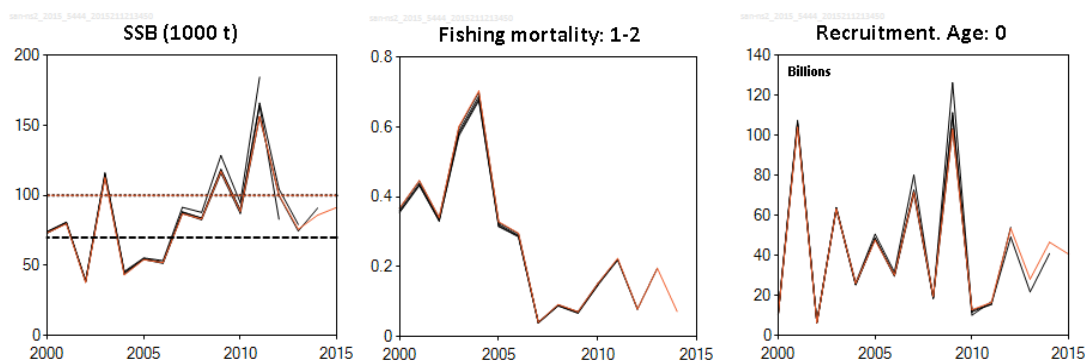
## Basis of the advice

**Table 6.3.42.4** Sandeel in the North Sea (SA 2). The basis of the advice.

|                 |                                                       |
|-----------------|-------------------------------------------------------|
| Advice basis    | MSY approach (Escapement strategy)                    |
| Management plan | There is no management plan for sandeel in this area. |

## Quality of the assessment

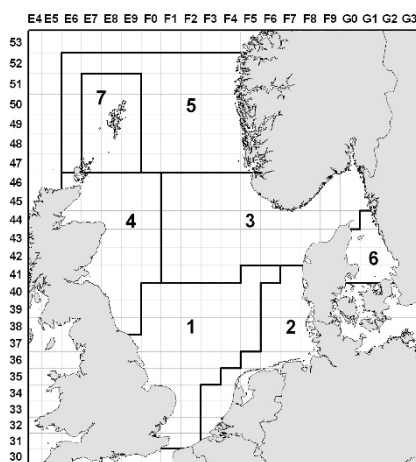
The assessment relies on the assumption that the fisheries age selection pattern has remained the same since 1999 and that the commercial fishery supplies sufficient sampling information on older age groups. A change in the fishing pattern would make the current advice less accurate. The available survey time-series in SA 2 is still short (2010–2014) and has not yet been reviewed by ICES; therefore, the survey index from SA 1 (age 0) is applied in the SA 2 assessment. There appears to be a sufficiently robust relationship between the recruitments in SAs 1 and 2 to be able to apply the data sources and procedures from SA 1 to estimate the incoming year-class strength in SA 2 as well. The assessment is considered to be of medium quality, but will be further improved once a longer time-series of dredge survey catches from SA 2 exists.



**Figure 6.3.42.2** Sandeel in the North Sea (SA 2). Historical assessment results (final-year recruitment estimates included).

### Issues relevant for the advice

With the average recruitment estimated for 2014, the escapement strategy results in  $F = 0.18$  in 2015. This is well below the long-term average  $F$  and does not suggest a high risk of overfishing. Additional precautionary measures, such as an  $F_{cap}$ , are not necessary.



**Figure 6.3.42.3** Sandeel in the North Sea (SA 2). Sandeel are largely sedentary after settlement and form a complex of local (sub-) stocks in the North Sea. To avoid local depletion, ICES advice for sandeel is provided separately for seven areas in Division IIIa and Subarea IV. Advice for sandeel in the North Sea (SA 2) specifically applies to sandeel in rectangles 31–34 F3–F4; 35 F4–F6; 36 F5–F8; 37–40 F6–F8; and 41 F7–F8.

## Reference points

**Table 6.3.42.5** Sandeel in the North Sea (SA 2). Reference points, values and their technical basis.

| Framework              | Reference point  | Value        | Technical basis                                                                                                                        | Source     |
|------------------------|------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------|------------|
| MSY approach           | MSY              | 100 000 t    | $= B_{pa}$                                                                                                                             | ICES, 2010 |
|                        | $B_{escapement}$ | Not defined. |                                                                                                                                        |            |
|                        | $F_{MSY}$        | Not defined. |                                                                                                                                        |            |
| Precautionary approach | $B_{lim}$        | 70 000 t     | Median SSB in the years (2000–2006) of lowest SSB and no impaired recruitment.                                                         | ICES, 2010 |
|                        | $B_{pa}$         | 100 000 t    | $B_{pa} = B_{lim} \times \exp(\sigma \times 1.645)$ , with $\sigma = 0.23$ estimated from assessment uncertainty in the terminal year. | ICES, 2010 |
|                        | $F_{lim}$        | Not defined. |                                                                                                                                        |            |
|                        | $F_{pa}$         | Not defined. |                                                                                                                                        |            |
| Management plan        | $SSB_{MGT}$      | Not defined. |                                                                                                                                        |            |
|                        | $F_{MGT}$        | Not defined. |                                                                                                                                        |            |

## Basis of the assessment

**Table 6.3.42.6** Sandeel in the North Sea (SA 2). The basis of the assessment and advice.

|                          |                                                                                                                                                                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ICES stock data category | 1 (see ICES, 2015b).                                                                                                                                                                                                                                                                                |
| Assessment type          | Seasonal age-based analytical (SMS-effort) (ICES, 2015a).                                                                                                                                                                                                                                           |
| Input data               | One survey index (dredge survey since 2004) from SA 1 is applied. Total international catch and fishing effort. Annual maturity data from the dredge survey. Natural mortality estimated from multispecies assessment (assumed constant over time). Age and length frequencies from catch sampling. |
| Discards and bycatch     | Discarding is considered to be negligible.                                                                                                                                                                                                                                                          |
| Indicators               | None.                                                                                                                                                                                                                                                                                               |
| Other information        | Last benchmark in 2010 ( <a href="#">ICES, 2010</a> ).                                                                                                                                                                                                                                              |
| Working group            | Herring Assessment Working Group ( <a href="#">HAWG</a> ).                                                                                                                                                                                                                                          |

## Information from stakeholders

Representatives of the fishing industry reported that the catch rates in SA 2 were very high in 2014 at the time where the TAC was exhausted and the fishery was closed. The ICES cpue estimate for the entire season was slightly below average in 2014.

## History of advice, catch, and management

**Table 6.3.42.7** Sandeel in the North Sea (SA 2). History of ICES advice, the agreed TAC, and ICES estimates of catch. All weights are in thousand tonnes.

| Year   | ICES advice                                                                                                                            | Catch corresponding to advice | TAC    | ICES catch SA 2 | Total ICES catch (SAs 1–7) |
|--------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------|-----------------|----------------------------|
| 2005 * | Exploitation to be kept below the level of 2003. Adjustment to be made conditional on the abundance of the 2004 year class.            | -                             | 661 ** | 41              | 177                        |
| 2006 * | The fishery should remain closed until information is available which assures that the stock can be rebuilt to $B_{pa}$ by 2007.       | -                             | 300 ** | 35              | 293                        |
| 2007 * | The fishery should remain closed until information is available which assures that the stock can be rebuilt to $B_{pa}$ by 2008.       | -                             | 173 ** | 6               | 230                        |
| 2008 * | The fishery should only be allowed if monitoring information is available and shows that the stock can be rebuilt to $B_{pa}$ by 2009. | -                             | 375 ** | 13              | 348                        |
| 2009 * | The fishery should only be allowed if monitoring information is available and shows that the stock can be rebuilt to $B_{pa}$ by 2010. | -                             | 377 ** | 10              | 353                        |
| 2010 * | The fishery should only be allowed if monitoring information is available and shows that the stock can be rebuilt to $B_{pa}$ by 2011. | -                             | 377 ** | 32              | 414                        |
| 2011   | MSY approach: allow for sufficient stock ( $MSY B_{escapement}$ ) to remain for successful recruitment.                                | < 34                          | 34     | 30              | 438                        |
| 2012   | Catches for monitoring purposes should not exceed 5 000 t.                                                                             | < 5                           | 5      | 8               | 102                        |
| 2013   | MSY approach: allow for sufficient stock ( $MSY B_{escapement}$ ) to remain for successful recruitment.                                | < 17.544                      | 18     | 23              | 278                        |
| 2014   | Catches for monitoring purposes should not exceed 5 000 t.                                                                             | < 5                           | 5      | 8.7 ***         | 262 ***                    |
| 2015   | MSY approach: allow for sufficient stock ( $MSY B_{escapement}$ ) to remain for successful recruitment.                                | < 29                          |        |                 |                            |

\* Advice for Subarea IV, excluding the Shetland area.

\*\* Set for EU waters of Divisions IIa and IIIa and Subarea IV.

\*\*\* Preliminary.

## History of catch and landings

**Table 6.3.42.8** Sandeel in the North Sea (SA 2). Catch distribution by fleet in 2014 data as estimated by ICES.

| Total catch (2014) | Landings                        | Discards   |
|--------------------|---------------------------------|------------|
| 8.7 kt             | 100% industrial trawl fisheries | Negligible |
|                    | 8.7 kt                          |            |

**Table 6.3.42.9** Sandeel in the North Sea (SA 2). History of total catch (tonnes) as estimated by ICES.

| Year | Catch  |
|------|--------|
| 1982 | 86059  |
| 1983 | 80482  |
| 1984 | 66352  |
| 1985 | 99428  |
| 1986 | 94604  |
| 1987 | 53761  |
| 1988 | 121394 |
| 1989 | 109691 |
| 1990 | 100960 |
| 1991 | 107663 |
| 1992 | 69848  |
| 1993 | 59820  |
| 1994 | 50648  |
| 1995 | 60143  |
| 1996 | 80205  |
| 1997 | 102730 |
| 1998 | 68950  |
| 1999 | 32117  |
| 2000 | 52235  |
| 2001 | 58645  |
| 2002 | 35553  |
| 2003 | 56262  |
| 2004 | 71426  |
| 2005 | 41447  |
| 2006 | 35392  |
| 2007 | 5910   |
| 2008 | 13065  |
| 2009 | 10177  |
| 2010 | 31750  |
| 2011 | 29874  |
| 2012 | 8130   |
| 2013 | 23477  |
| 2014 | 8652   |

## Summary of the assessment

**Table 6.3.42.10** Sandeel in the North Sea (SA 2). Assessment summary with weights (in tonnes), Recruits (at age 0, in thousands). The SSB is estimated for January 1<sup>st</sup>. Yield values used for the assessment do not include catches of age 0 in the 1st half of the year and, hence, may differ slightly from the ICES catch estimates presented in other tables.

| Year    | Recruits<br>(thousands) | SSB<br>(tonnes) | Yield<br>(tonnes) | Mean F<br>(ages 1–2) |
|---------|-------------------------|-----------------|-------------------|----------------------|
| 1983    | 130213000               | 113244          | 74481             | 0.376                |
| 1984    | 36772000                | 65456           | 63046             | 0.301                |
| 1985    | 237782000               | 154275          | 96645             | 0.546                |
| 1986    | 38960000                | 92849           | 93146             | 0.33                 |
| 1987    | 18755000                | 284086          | 53284             | 0.181                |
| 1988    | 119599000               | 204378          | 120382            | 0.526                |
| 1989    | 65995000                | 90668           | 109703            | 0.531                |
| 1990    | 84925000                | 159264          | 100917            | 0.578                |
| 1991    | 98644000                | 150293          | 107795            | 0.363                |
| 1992    | 32663000                | 162289          | 69825             | 0.292                |
| 1993    | 128158000               | 224304          | 59652             | 0.296                |
| 1994    | 61414000                | 144586          | 50656             | 0.136                |
| 1995    | 20949000                | 239038          | 60138             | 0.185                |
| 1996    | 201419000               | 206790          | 80012             | 0.295                |
| 1997    | 3064000                 | 97017           | 102726            | 0.33                 |
| 1998    | 13081000                | 289021          | 68953             | 0.291                |
| 1999    | 39973000                | 121841          | 32108             | 0.267                |
| 2000    | 10234000                | 73255           | 52228             | 0.368                |
| 2001    | 104184000               | 79780           | 56934             | 0.447                |
| 2002    | 6457000                 | 37998           | 35494             | 0.341                |
| 2003    | 63313000                | 112694          | 55924             | 0.602                |
| 2004    | 26082000                | 43279           | 71413             | 0.704                |
| 2005    | 47656000                | 54155           | 41420             | 0.329                |
| 2006    | 30190000                | 52065           | 35351             | 0.296                |
| 2007    | 71529000                | 86901           | 5911              | 0.041                |
| 2008    | 19652000                | 83215           | 13064             | 0.092                |
| 2009    | 103073000               | 117151          | 10240             | 0.071                |
| 2010    | 12873000                | 88704           | 31747             | 0.152                |
| 2011    | 16487000                | 156475          | 29900             | 0.224                |
| 2012    | 53494000                | 100390          | 8098              | 0.079                |
| 2013    | 28187000                | 75905           | 23599             | 0.196                |
| 2014    | 46658000                | 85940           | 8651              | 0.072                |
| 2015    | 40588000**              | 91545*          |                   |                      |
| Average | 61639000                | 125420          | 56983             | 0.307                |

\* Using mean weight-at-age from 2012 to 2014.

\*\* Geometric mean (1983–2013).

## Sources and references

ICES. 2010. Report of the Benchmark Workshop on Sandeel (WKSAN), 6–10 September 2010, Copenhagen, Denmark. ICES CM 2010/ACOM:57. 201 pp.

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