

# Stichting Wageningen Research Centre for Fisheries Research (CVO)

## **Dab (*Limanda limanda*) Age Reading Exchange 2019**

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## Summary

The goals of the 2019 dab exchange were (1) an estimation of ageing uncertainty for the dab.27.3a4 stock, (2) compare different preparation methods, and (3) examine seasonality in deposition of opaque/translucent material on the edge of the otolith across a latitudinal gradient. The second and third goals were follow-up actions proposed by the Workshop on Age Reading of Dab in 2015 (WKARDAB2).

Sixteen age readers from seven countries (Belgium, France, Iceland, Netherlands, Germany, Denmark, England) participated in the exchange. Two sets of otoliths were examined. The first set (SmartDots event 244) consisted of 64 otoliths from ICES Subarea 4 (North Sea) and Division 3a (Skagerrak and Kattegat). These were prepared in three different manners (whole, sectioned, and sectioned-and-stained), resulting in 192 images. The second set (SmartDots event 245) consisted of 68 otoliths from ICES Subarea 4 (North Sea) and Division 5a (Icelandic waters). These were prepared in two different manners (whole and sectioned-and-stained), resulting in 136 images. Age readers were also asked to determine the edge type for each otolith in the second set.

First, the data were analysed for each event and method separately, including all age readers. Then, the combined set of otoliths from Subarea 4 and Division 3a were analysed for each method separately, including only the advanced age readers who supply age data for the assessment of the dab.27.3a4 stock. Additional analyses were carried out to compare the different preparation methods, and to examine seasonality by area in the deposition of opaque/translucent material.

Age reading uncertainty was high in dab compared to most other North Sea flatfish species. The percentage agreement was 69-73% and the coefficient of variation was 13-14% for dab.27.3a4, based on the age determinations of readers who supply age data for the assessment. As observed previously, uncertainty was highest in the third quarter.

Comparison of methods showed better calibration results for sectioned-and-stained otoliths than for whole otoliths or sectioned otoliths. However, the ages of young fish (1-6) were on average estimated to be higher based on sectioned-and-stained otoliths than based on whole otoliths. Age reading certainty may improve if sectioned-and-stained otoliths are used by all readers, preferably after validation that this is the best method to estimate true age.

The edge analysis was hampered by low number of otoliths per month and area, and inconsistency between readers. Nevertheless, the analysis did show high variability in the timing of deposition of opaque/translucent material. Consequently, a fixed rule on how to interpret the edge of the otolith in the third quarter is not applicable for dab.

# 1 Introduction

## 1.1 Biology

Dab (*Limanda limanda*) is a widespread demersal species on the Northeast Atlantic shelf and distributed from the Bay of Biscay to Iceland and Norway, including the Barents Sea and the Baltic Sea. In the North Sea it is one of the most abundant species distributed over the whole area in depths down to 100 m, but it was also found occasionally down to depths of 150 m. The main concentration of dab can be found in the south eastern North Sea, especially that of the younger age groups 1–2. Older age groups are more distributed in the central and more northern parts of the North Sea. Generally, dab abundance decreases towards the northern parts of the North Sea (ICES 2020).

Early sexual maturation was reported for dab; dab mature at ages of 2 to 3 years, corresponding to approximately 11 cm to 14 cm total length (ICES 2020). Dab has a relatively long spawning season; peak spawning in the south eastern North Sea occurs from February to May (van der Land 1991).

## 1.2 Management regulations and stock assessment

Dab is mainly a bycatch species in fisheries for plaice and sole. The discard rates for dab can be extremely high (~90%). No minimum landing size is defined for dab (ICES 2020).

Dab in Subarea 4 (North Sea) and Division 3.a (Skagerrak, Kattegat) was assessed for the first time in 2013, by WGNEW (ICES 2013). Since 2014, dab is assessed by WGNSSK (Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak). Because only official landings and survey data were available at that time, according to the ICES guidelines for data limited stocks (ICES 2012), dab was defined as a category 3 stock (stocks for which survey-based assessments indicate trends). In 2015, dab was included in the official data call for the WGNSSK, including discard estimates. In 2016, a benchmark assessment was conducted and the use of a survey based assessment model (SURBAR) was agreed upon. In 2017, MSY proxy references were determined (applying SPiCT) and catch advice for dab was provided for 2017 and 2018.

In 2017, the European Commission requested ICES to evaluate the possible effects on the stocks of dab and flounder of having no TAC. ICES advised that given the current fishing patterns of the main fleets catching dab and flounder, which are the same fleets targeting plaice and sole, the risk of having no TAC for dab and flounder is considered to be low. Therefore, the European Commission removed the combined TAC for these two stocks in 2017. Since then, North Sea dab has become a non-target species with no TAC, and ICES has not been requested to provide advice on fishing opportunities. However, WGNSSK has continued to update the catch data, indices and assessment for dab (ICES 2020).

## 1.3 Age determinations

The assessment method applied for dab in Subarea 4 and Division 3a (dab stock 27.3a4) is age based. Besides, age readings are also important in a variety of other biological studies on dab. For instance, dab serves as an important indicator species in disease and toxicology studies. This underlines the need of age readings for this species, as well as the need of quality control of those age determinations.

In 2008, the Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS) identified dab as a species requiring an age reading exchange and a workshop. The first pre-workshop

exchange and workshop were held in 2009-2010 (WKARDAB, ICES 2010). Subsequently, PGCCDBS recommended a follow-up small-scale dab otolith exchange in 2013 (Haslob, 2013). Based on the results of this exchange, PGCCDBS recommended a second pre-workshop exchange and workshop to be held in 2015 (WKARDAB2, ICES 2015). WKARDAB2 consequently recommended a large scale exchange, focussing on specific issues (see below). This recommendation was endorsed by the Working Group on Biological Parameters (WGBIOP), which led to the current exchange that was carried out in 2019.

The main issues in dab age reading are:

- Using the best preparation method  
Only whole otoliths were included in the 2009-2013 calibration events. Whole and sectioned otoliths were included in the 2015 calibration events. At the 2015 workshop a small set of stained and sectioned otoliths was presented and this appeared to be a promising way to age dab otoliths.
- Interpretation of the edge of the otolith  
Especially in the case of a translucent zone on the edge of the otolith in the early part of the 3<sup>rd</sup> quarter; this caused doubt regarding whether or not the new opaque zone still had to be deposited. Clear differences occurred between northern and southern readers on this issue.
- Split rings  
Split rings often occur in dab otoliths. This was an important issue during the first workshop, but this did not appear to be a major problem during the second workshop, which was mainly attended by experienced readers.

WKARDAB2 (ICES 2015) proposed two follow-up actions:

- An international exchange containing images of whole, sectioned and sectioned-and-stained preparations of the same otolith.  
Proposed stratification: ages 1-10, months February and July, North Sea.
- A study of the edge of the otolith, to determine the timing of deposition of opaque and translucent material on the edge of the otolith across a latitudinal gradient.  
Proposed stratification: ages 3-4 and 6-7, months Jan-Dec, North Sea and Icelandic waters.

The two follow-up actions proposed by WKARDAB2 were incorporated in the 2019 dab exchange, consecutively in event 244 and 245.

#### **1.4 CVO quality assurance**

CVO is certified to ISO 9001:2015 (certificate number: 268632-2018-AQ-NLD-RvA). This certificate is valid until December 15<sup>th</sup>, 2021. The certification was issued by DNV GL Business Assurance B.V

## 2 Methods

The 2019 dab exchange was carried out in SmartDots. It consisted of two events (244 and 245) to address the recommendations by WKARDAB2 (see above and below).

### 2.1 Samples

The first event (244) contained otoliths from ICES Subarea 4 (North Sea) and Division 3a (Skagerrak and Kattegat), corresponding to the dab stock "dab.27.3a4".

The otolith set was stratified by area (3a, 4a, 4b, 4c), quarter (Q1, Q3), and age (1-10) based on the initial age determination by the contributing laboratory (Table 1). The quarter 1 otoliths were mainly from February, a few otoliths were from January and none were from March. The quarter 3 otoliths were mainly from July, a few otoliths were from August and none were from September.

Three preparation methods for each otolith were included: whole, sectioned, and sectioned-and-stained, resulting in  $64 * 3 = 192$  images in event 244.

The goal of this first event was twofold:

- (1) comparison of preparation methods
- (2) estimation of ageing uncertainty for the dab.27.3a4 stock (by quarter and region)

The second event (245) contained otoliths from ICES areas 5a (Icelandic waters), 4b (central North Sea) and 4c (southern North Sea). The otolith set was stratified by area (5a, 4b, 4c), month (January-December), and age (3-4 or 6) based on the initial age determination by the contributing laboratory (Table 2).

Two preparation methods for each otolith were included: whole and sectioned-and-stained, resulting in  $68 * 2 = 136$  images in event 245.

The primary goal of the second event was to

- (1) examine seasonality in deposition of opaque/translucent material on the edge of the otolith across a latitudinal gradient.

The data were also used for:

- (2) comparison of preparation methods
- (3) estimation of ageing uncertainty for the dab.27.3a4 stock (by quarter and region; otoliths from area 5a were excluded)

Table 1: Otolith set in event 244. The set was stratified by area, quarter and age. Each otolith was examined using three preparation methods (whole, sectioned, and sectioned-and-stained).

Age	area 3a		area 4a		area 4b		area 4c		Total
	Q1	Q3	Q1	Q3	Q1	Q3	Q1	Q3	
1				1	2			1	4
2	1	1		1	2		1	1	7
3		1	2	1	1	1	2	1	9
4	1	1	2	1	1	1	1	1	9
5	1	1	1	1	1	1	1	1	8
6	1	1	1	1	1	1	1	1	8
7	1		1	1	1	1	1	1	7
8			1	1	1		1	1	5
9					1		1		2
10			1	1	1	1	1		5
Total	5	5	9	9	12	6	10	8	64

Table 2: Otolith set in event 245. The set was stratified by area, month and age. Each otolith was examined using two preparation methods (whole and sectioned-and-stained).

Month	area 5a		area 4b		area 4c		Total
	age 3-4	age 6	age 3	age 6	age 3	age 6	
1	1	1	1	1	1	1	6
2	1	1		1	1	1	5
3	1	1	1	1	1	1	6
4	1	1	1	1	1	1	6
5	1	1	1	1	1	1	6
6	1	1	1	1	1	1	6
7	1	1	1	1	1	1	6
8	1	1	1	1	1	1	6
9	1	1	1		1		4
10	1			1	1	1	4
11	1	1	1	1	1	1	6
12	1	1	1	2	1	1	7
Total	12	11	10	12	12	11	68

## 2.2 Readers

Seven countries (Belgium, France, Iceland, Netherlands, Germany, Denmark, England) participated in the exchange. Thirteen readers from six countries participated in event 244, and sixteen readers from seven countries in event 245 (Table 3).

Ten of the participants were advanced readers. An advanced reader is considered well trained and provides ages for stock assessment or similar purposes. The status of an age reader is determined by her/his national age coordinator. Only six of the advanced readers participating in this exchange supply age data for the dab.27.3a4 stock assessment: R01 BE, R02 BE, R03 FR, R06 NL, R07 NL, R10 DK.



Table 3: Reader overview

Reader code	244 whole	244 sectioned	244 sectioned- and- stained	245 whole	245 sectioned- and- stained	245 edge	Expertise
R01 BE	✓	✓	✓	✓	✓	✓	Advanced
R02 BE	✓	✓	✓	✓	✓	✓	Advanced
R03 FR	✓	✓	✓	✓	✓	-	Advanced
R04 IS	✓	✓	✓	✓	✓	✓	Advanced
R05 IS	✓	✓	✓	✓	✓	✓	Advanced
R06 NL	✓	✓	✓	✓	✓	✓	Advanced
R07 NL	✓	✓	✓	✓	✓	✓	Advanced
R08 DE	-	-	-	✓	✓	✓	Advanced
R09 DE	-	-	-	✓	✓	✓	Advanced
R10 DK	✓	✓	✓	✓	✓	✓	Advanced
R11 DK	✓	✓	✓	✓	✓	✓	Basic
R12 DK	✓	✓	✓	✓	✓	✓	Basic
R13 FR	✓	✓	✓	✓	✓	✓	Basic
R15 DE	✓	✓	✓	✓	✓	✓	Basic
R16 NL	✓	✓	✓	✓	✓	✓	Basic
R17 GB	-	-	-	✓	✓	✓	Basic

### 2.3 SmartDots Reporting Tool

The SmartDots Reporting Tool provides standardised analyses of age comparison data, including tables and plots from the Guus Eltink 'Age Reading Comparisons' in Excel (Eltink, 2000). The following analyses are included in the SmartDots Reporting Tool.

- **Percentage Agreement (PA)**

The percentage agreement (PA) is calculated as the ratio between the total number of age readings in agreement with modal age and the total number of age readings.

- **Coefficient of Variation (CV)**

The coefficient of variation (CV) is calculated as the ratio between the standard deviation and mean value. As the calculations of CV pose problems if the mean age is close to 0, all observations for which modal age was 0 were omitted from the CV calculations.

- **Average Percentage Error (APE)**

The average percentage error (APE) is calculated based on the method outlined by Beamish & Fournier (1981). This method is not independent of fish age and is thus considered to provide a better estimate of precision than CV. As the calculations APE pose problems if the mean age is close to 0, all observations for which modal age was 0 were omitted from the APE calculations.

- **Age error matrix (AEM)**

Age error matrices (AEM) are produced following procedures outlined by WKSABCAL (2014). The matrix shows the proportion of assigned ages for each modal age. Consequently, the sum of each row is 1.

- **Otolith Growth Analysis**

SmartDots provides a measure of distance between the annotations made by the readers and thus provides a measure of increment size. This data is used to establish growth curves for each reader.

The SmartDots reporting tool analyses the data twice; the first time all readers are included and the second time only the advanced readers are included. If different preparation methods are included for the same fish than separate reports for each preparation method need to be generated.

## **2.4 Analyses**

Only the growth curve analyses were taken from the output of the SmartDots reporting tool. The reason for this was that the approach for calculating statistics (by reader, modal age, and overall) differed between the SmartDots reporting tool and the Guus Eltink spreadsheet (pers.com. Alfonso Perez-Rodriguez), resulting in discernible differences in the outcomes. Some of the analyses needed to be done in the Guus Eltink spreadsheet, because the required data selections were not available in SmartDots. That is statistics by stratum=quarter, combining data from two events and selecting specific readers. Therefore, to be able to compare the results, all statistics were calculated the same way: PA, CV and relative bias were calculated using the Guus Eltink spreadsheet, and APE and AEM were calculated manually.

Standard age-comparison-analyses (excluding AEM) were carried out separately for each event and preparation method (Annex 1-5). All readers were included in these analyses, but the modal age was based on the age readings of the advanced readers only.

Standard age-comparison-analyses (excluding growth curves) were also carried out for all otoliths from Subarea 4 and Division 3a combined (event 244 and part of event 245). Only the six readers who provide age data for the stock assessment of dab in Subarea 4 and Division 3a were included in these analyses. (Not all of the age readers who are listed as advanced readers in SmartDots provide age data for the assessment of this stock.) In principle, the age reading based on the preparation method that the reader routinely uses should be included in these analyses. This was not possible, however, because sectioned otoliths were not included in event 245. The analyses were carried out separately for whole and sectioned-and-stained otoliths (Annex 6-7). As all of the six assessment readers had experience in reading whole otoliths, this preparation method was considered to be the most appropriate for an evaluation of ageing uncertainty in relation to stock assessment (Annex 6).

Three different preparation methods for the same otolith were included in event 244, and two methods in event 245 (see section 2.1). The performance of the age readers was compared between methods based on the calibration statistics PA, CV, APE and bias. The outcome of the age determinations was compared between methods by means of x-y plots: the age based on the sectioned-and-stained or sectioned otolith as a function of the age based on the whole otolith. The significance of the differences was tested separately for each age based on the whole otolith (Student's T-test).

In event 245, the readers were asked to determine whether the edge of each otolith was translucent or opaque. The proportion of opaque edges throughout the year, for each area separately, indicates when the new opaque zone is deposited in that area. Determination of the edge type proved to be difficult for the images of sectioned-and-stained otoliths, so only the observations from images of whole otoliths were included. The basic readers and the readers who filled in the same edge type for all otoliths were removed from the analysis, leaving six readers. The analysis was hampered by the small number of otoliths per month and area. Furthermore, the level of agreement between the readers on the edge type

varied between otoliths, and was never 100%. Therefore the proportions of opaque edges were calculated as the number of opaque observations divided by the total number observations, instead of the number of otoliths with opaque edges divided by the total number of otoliths.

### 3 Results

#### 3.1 Age reading uncertainty

Age reading uncertainty was relatively high in dab compared to most other North Sea flatfish species. Percentage agreement was 69-73% (depending on the preparation method) for otoliths from Subarea 4 and Division 3a, if only the age readers who supply age data for the stock assessment were included (dab.27.3a4). Percentage agreement dropped if more readers were included and if Division 5a was included (Table 4).

Examination of the percentage agreement by quarter and by area for dab.27.3a4 showed that age reading uncertainty was highest in quarter 3 and area 4a, and lowest in quarter 2 and area 4c (Table 5).

Age reading uncertainty can be incorporated in the assessment through an age error matrix (AEM, ICES 2014). When the AEM is compiled for assessment purposes it should only include those readers who provide age data for the stock assessment in that specific area. As all dab.27.3a4 assessment readers had experience in reading whole otoliths, this method was considered to be most appropriate (Table 6).

For each event and method, a data overview and detailed results (by reader and modal age) are presented in Annexes 1-7.

Table 4. Overall statistics for each event and method. The otoliths from Subarea 4 and Division 3a are combined in dab.27.3a4. For events 244 and 245, all readers are compared to the modal age of advanced readers. For dab.27.3a4, only the six age readers who supply age data for the stock assessment are included.

	n readers	n otoliths	modal age	PA	CV	APE	bias
<b>event 244</b>							
whole	13	64	1-10	67%	15%	12%	-0.06
sectioned	13	64	1-10	59%	20%	14%	-0.07
sectioned-and-stained	13	64	1-11	65%	17%	12%	-0.06
<b>event 245</b>							
whole	16	68	2-9	61%	17%	12%	0.01
sectioned-and-stained	16	68	2-11	66%	14%	10%	0.13
<b>dab.27.3a4</b>							
whole	6	106	1-11	69%	14%	11%	-0.04
sectioned-and-stained	6	106	1-11	73%	13%	10%	-0.15

Table 5. Percentage agreement by quarter and by area for otoliths from Subarea 4 and Division 3a. Only the age readers who supply age data for the stock assessment are included.

	n otoliths	whole	sectioned- and- stained-
<b>dab.27.3a4</b>			
Q1	44	71%	72%
Q2	14	80%	80%
Q3	36	63%	68%
Q4	12	67%	86%
<b>dab.27.3a4</b>			
3a	10	68%	59%
4a	18	59%	59%
4b	37	69%	72%
4c	41	74%	84%

Table 6. Dab.27.3a4 age error matrix (proportion of assigned ages for each modal age), based on whole otoliths and the age readers who supply age data for the stock assessment.

Modal age	1	2	3	4	5	6	7	8	9	10	11
Age 0	0.034										
Age 1	0.897		0.013								
Age 2	0.069	0.800	0.076	0.015	0.012						
Age 3		0.133	0.791	0.092	0.023	0.006					
Age 4		0.033	0.101	0.723	0.116	0.035				0.167	
Age 5		0.033	0.006	0.108	0.674	0.197	0.071	0.273			
Age 6				0.015	0.116	0.636	0.190	0.182	0.059		
Age 7			0.006	0.015	0.047	0.098	0.571	0.182	0.118	0.167	
Age 8			0.006		0.012	0.023	0.143	0.364	0.235		0.167
Age 9				0.031		0.006	0.024		0.471		0.333
Age 10									0.059	0.500	0.167
Age 11									0.059	0.167	0.333

### 3.2 Comparison of methods

Higher PA, and lower CV and APE were observed in sectioned-and-stained otoliths than in whole otoliths, in the case of event 245 and dab.27.3a4. In the case of event 244, the calibration statistics for whole otoliths were better than for sectioned-and-stained otoliths, but the differences were small. The statistics were clearly worse for sectioned otoliths than for the other two preparation methods in event 244 (Table 4). So, despite the fact that most of the readers had less experience with sectioned-and-stained otoliths than with whole otoliths, sectioned-and-stained otoliths appeared to give better calibration results.

The outcome of the age analyses was compared by x-y plots in which the age based on sectioned-and-stained or sectioned otoliths was plotted as a function of the age based on whole otoliths (Figure 1). The significance of the difference was tested separately for each age based on the whole otolith. No significant differences were observed between sectioned and whole otoliths. Significant higher ages were observed for sectioned-and-stained otoliths than for whole otoliths: for ages 1 to 6 in event 244, and for ages 2 to 6 in event 245.

In event 245 two suspect outliers were observed: whole age = 0 and sectioned-and-stained age = 8 (Figure 1, bottom right). In both cases (Fish IDs: dab\_NL\_2015\_6000685\_024 and dab\_NL\_2015\_6000778\_028), a reader did not age the image of the whole otolith in SmartDots (deducted from the absence of the reading line), but they did approve the annotation.

Two noticeable outliers for whole age = 1 in event 245 were also observed. These observations were found not to be due to a mistake in the use of SmartDots, contrary to the previous two outliers. These two otoliths actually clearly illustrate that sometimes more structures are interpreted as annuli in the sectioned-and-stained otolith than in the whole otolith (Figure 2).

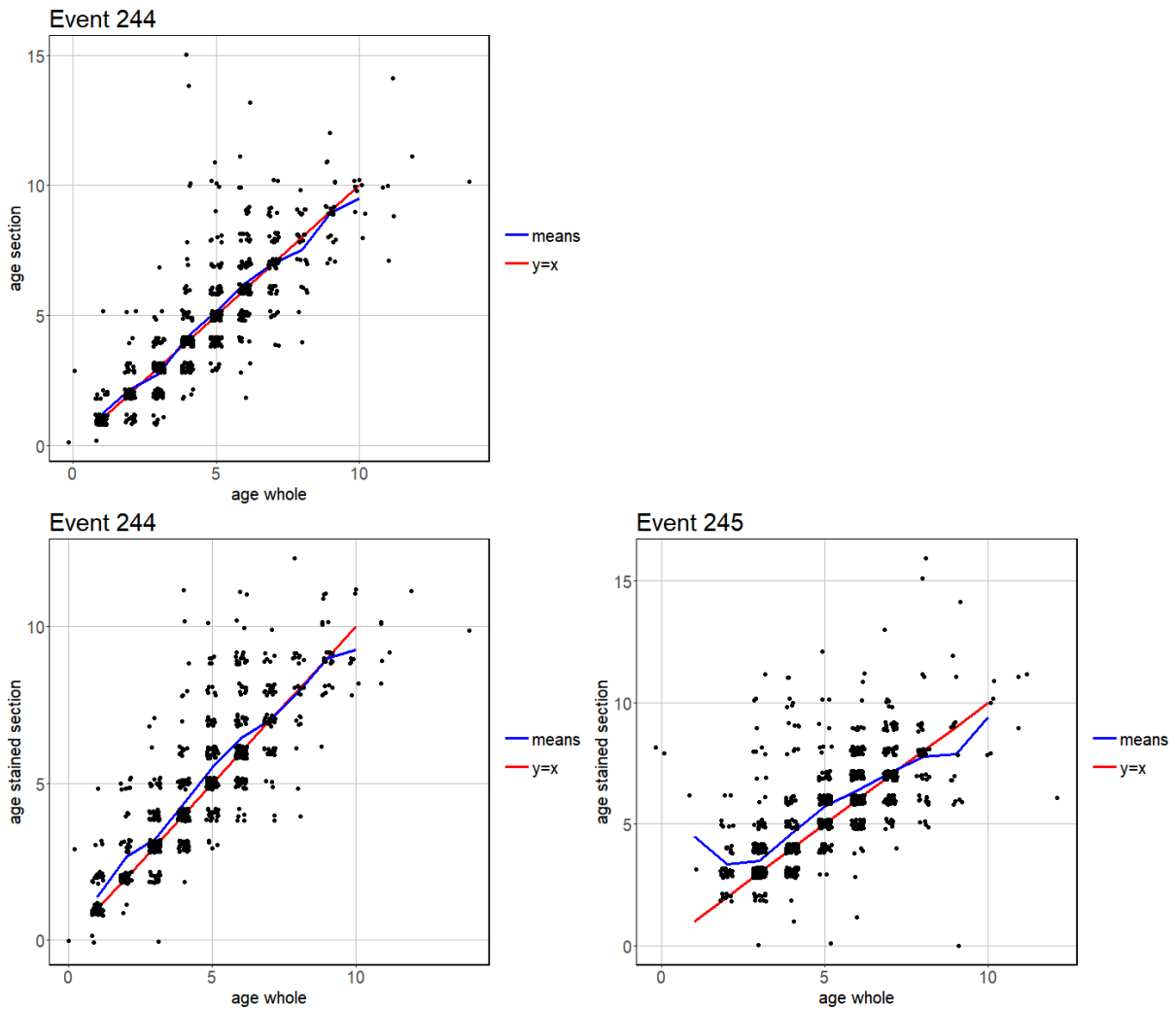


Figure 1. Age based on sectioned otoliths as a function of age based on whole otoliths in event 244 (top), and age based on sectioned-and-stained otoliths as a function of age based on whole otoliths in event 244 (bottom left) and in event 245 (bottom right). X- and Y-values are jittered to visualize the number of observations.

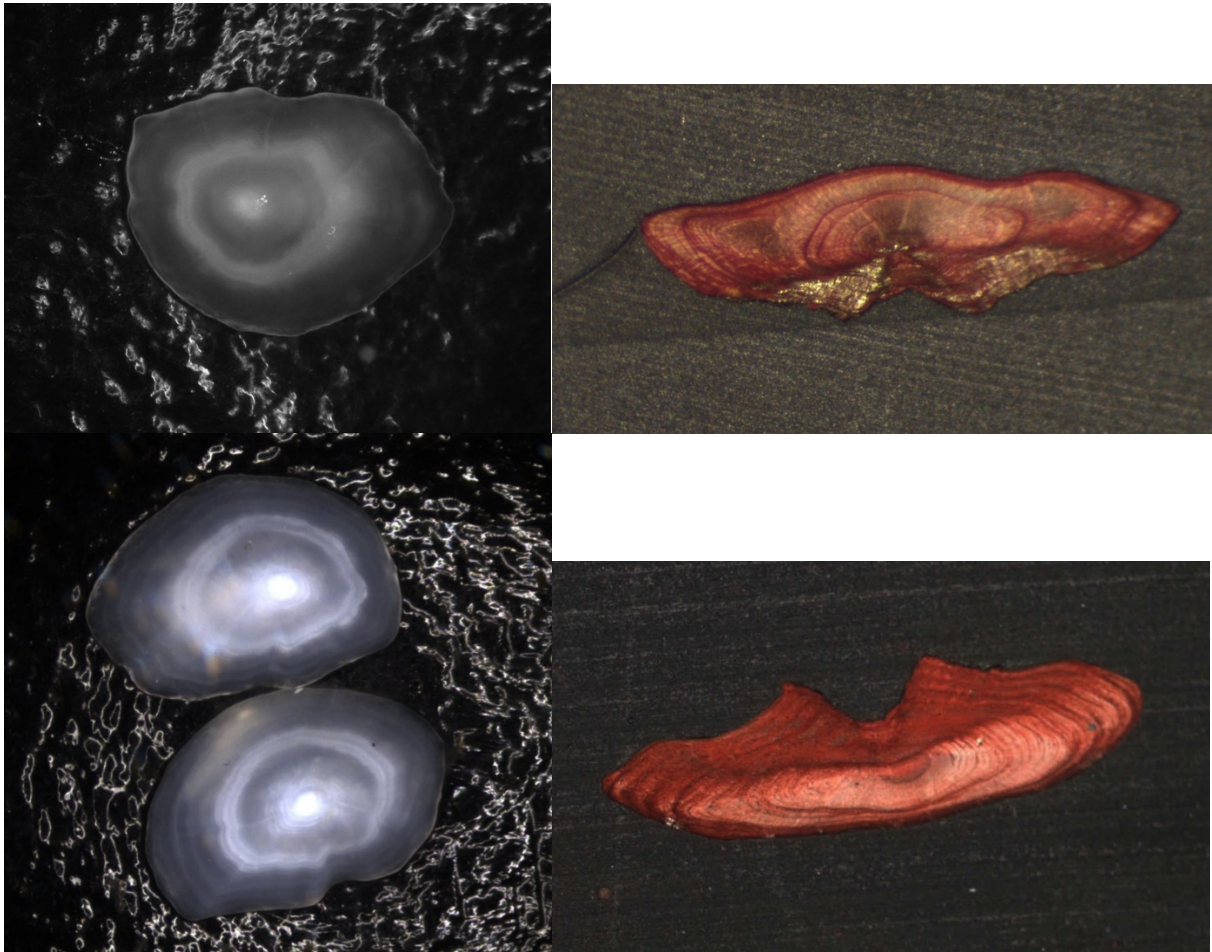


Figure 2. Images of the same otolith prepared in different ways. Left whole otoliths, right sectioned-and-stained otoliths. FishIDs: dab\_BE\_BYDR03\_47582 (top) and dab\_BE\_BYDR01\_00007 (bottom).

### 3.3 Otolith edge analysis

The proportion of opaque edges on the otoliths roughly indicates that the new opaque zone is deposited in May-September in area 4c, and in June-October in area 4b. In area 5a, the opaque zone appears to be deposited in January-May (Figure 3). These results need to be treated with care, because of the low number of otoliths per month and area, and because of inconsistency between readers.

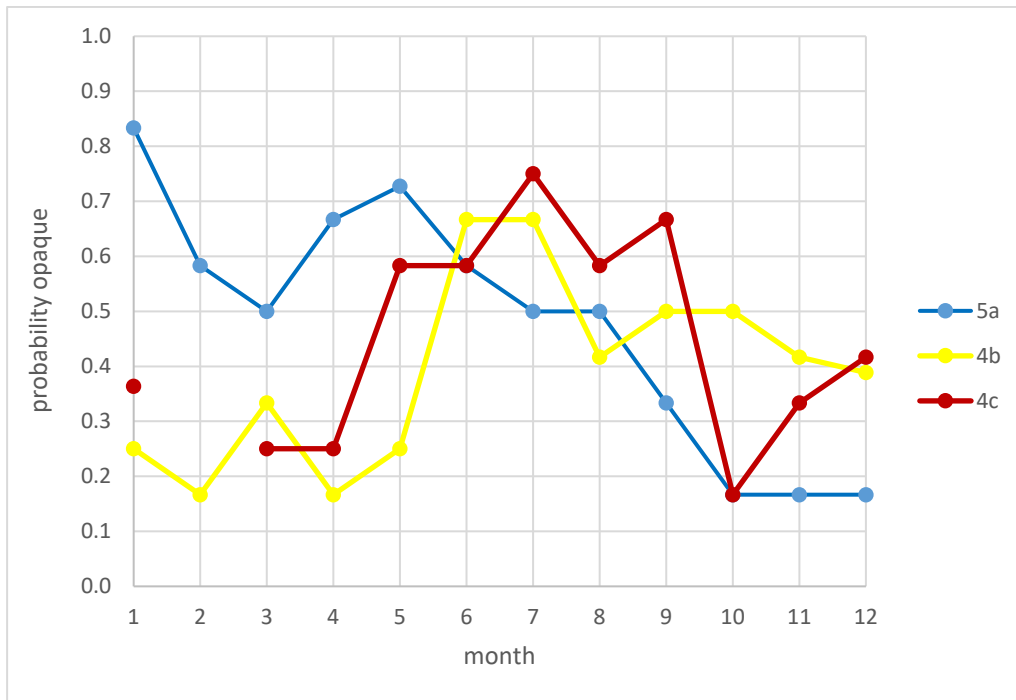


Figure 3. Seasonality in the proportion of opaque edges by area (5a= Icelandic waters, 4b=central North Sea, 4c= southern North Sea).



## 4 Discussion and recommendations

The detailed results are presented in Annexes and not further discussed in the report, due to the large number of analyses. Participating age readers are nevertheless encouraged to examine these detailed results, to evaluate their performance compared to modal age for different preparation methods.

In hindsight it would have been wiser to incorporate the two follow-up actions proposed by WKARDAB2 into one SmartDots event. Then less output would have been generated and larger sample sizes would have been achieved. This would, however, have increased the workload for the readers substantially.

Comparison of preparation methods based on calibration statistics suggests that using sectioned-and-stained otoliths is the best way to age dab otoliths. Several readers were not familiar with this method, so if these age readers would be trained to use it then the agreement between readers might further increase. However, a significant bias was observed between the age determinations based on whole otoliths and sectioned-and-stained otoliths. Often in flatfish species an underestimation of the age of older fish is observed in whole otoliths compared to sectioned otoliths, due to the 'cliff-edge' effect. That is otoliths of older flatfishes become thicker instead of larger, making it difficult to see all rings on the edge if whole otoliths are used. The older ages were not well represented in this exchange, and no significant differences between whole and sectioned otoliths were observed. The significant differences were observed in the younger ages (1-6) when sectioned-and-stained otoliths were compared to whole otoliths. More structures were interpreted as annuli in the sectioned-and-stained otolith than in the whole otolith. Although the additional structures counted in sectioned-and-stained otoliths did not appear to be false rings, this can only be verified with a validation study. As no validation studies have been carried out for dab age reading yet, this is considered to be worthwhile.

### Recommendation 1 (dab age reading):

It is tentatively recommended for all labs to switch to sectioned-and-stained otoliths for age reading of dab.

### Recommendation 2 (dab age reading):

It is recommended to carry out a validation study for age reading of dab, to verify if ages based on sectioned-and-stained otoliths are closer to true ages than ages based on whole otoliths.

The second event (245) contained otoliths from area 5a (Icelandic waters), area 4b (central North Sea) and area 4c (southern North Sea), thus constituting a latitudinal gradient. It also contained otoliths from all months of year, thus enabling examination of seasonality in deposition of opaque and translucent material. The formation of the new opaque zone was expected shift gradually to a later period, from south to north. Information on when the opaque zone is deposited in different regions would help the age reading issues encountered in the third quarter. Especially in the case of a translucent zone on the edge of the otolith in the early part of the third quarter, doubt existed on whether or not the new opaque zone still had to be deposited. The results of this analysis should be considered as preliminary, because of the low number of otoliths per month and area, and because of the inconsistency between readers. The results for area 4b and 4c corresponded to what was expected: deposition of the opaque zone between May to October with a shift from south to north. The results for area 5a were surprising: the opaque zone appears to be deposited in January to May, which seems unlikely. One thing has become quite clear based on this analysis though: the timing of deposition of opaque/translucent material is highly variable in dab, possibly as a consequence of the relatively long spawning season. Consequently, a fixed rule on how to interpret the edge of the otolith in the third quarter is not applicable for dab.

Age reading uncertainty was high in dab compared to most other North Sea flatfish species. As observed previously (ICES 2015), uncertainty was highest in the third quarter. This is caused by variability in timing of deposition of opaque and translucent material on the edge of the otolith, as shown in the edge analysis. In general, for a better understanding of age reading issues, it is important that the data can be analysed by month or quarter. This option is not yet available in Smart Dots.

Recommendation 3 (SmartDots):

It is recommended to include month and quarter as options for stratum in SmartDots.

During the analyses for this exchange it became clear that the approach for calculating calibration statistics (by reader, modal age, and overall) differs between the SmartDots reporting tool and the Guus Eltink spreadsheet, resulting in discernible differences in the outcome. To enable comparisons and to avoid confusion it is recommended to change the approach in SmartDots.

Recommendation 4 (SmartDots):

It is recommended to change the calculation of the statistics in the SmartDots reporting tool conform the approach in the Guus Eltink spreadsheet.

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## Annex 1 – Event 244 whole otoliths

Table A1.1. Event 244 whole otoliths: Data overview including modal age and statistics per otolith. Modal age is based on advanced readers only.

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	Modal age	PA %	CV %	APE %	
dab_BE_BYDR01_00033	160		6/2/2015	27.4.c	5	4	3	3	3	3	3	3	3	-	3	-	4	3	73	20	16	
dab_BE_BYDR01_00035	170		6/2/2015	27.4.c	3	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0	
dab_BE_BYDR01_00042	190		6/2/2015	27.4.c	5	4	4	4	4	4	4	3	4	4	4	4	6	4	77	17	10	
dab_BE_BYDR01_00050	220		6/2/2015	27.4.c	5	5	5	5	5	5	5	5	5	5	5	5	5	5	100	0	0	
dab_BE_BYDR01_00058	260		6/2/2015	27.4.c	6	6	6	6	6	6	6	6	6	6	6	6	6	6	100	0	0	
dab_BE_BYDR01_00059	150		6/2/2015	27.4.c	2	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0	
dab_BE_GNKT07_50684	200	F	4/7/2015	27.4.c	3	2	2	3	3	3	2	2	2	2	3	2	3	2	3	46	21	20
dab_BE_GNKT07_50688	170	F	4/7/2015	27.4.c	2	1	1	2	2	-	1	1	1	1	1	1	1	1	1	75	36	30
dab_BE_GNKT07_50695	200	F	4/7/2015	27.4.c	5	4	4	5	3	6	4	4	3	3	4	6	4	4	46	24	18	
dab_BE_GNKT07_50718	195	F	4/7/2015	27.4.c	4	3	3	3	3	3	3	3	3	3	3	3	3	3	92	9	5	
dab_BE_N24_00019	245	F	9/7/2015	27.4.c	6	6	5	6	6	6	6	5	6	6	6	6	6	6	85	6	4	
dab_DE_097_20	130	F	31/01/2015	27.4.a	3	3	1	3	3	-	3	3	3	3	3	3	3	3	100	0	0	
dab_DE_098_01	160	F	31/01/2015	27.4.a	4	4	2	4	4	3	4	3	-	3	4	4	4	4	67	19	16	
dab_DE_098_13	180	M	31/01/2015	27.4.a	8	3	3	3	3	2	7	4	2	4	2	7	2	3	31	55	43	
dab_DE_148_02	130	M	6/2/2015	27.4.a	3	3	3	3	3	-	3	2	3	2	3	3	3	3	83	14	10	
dab_DE_148_05	150	M	6/2/2015	27.4.a	4	4	3	5	4	4	4	3	3	4	4	4	4	4	69	14	10	
dab_DE_148_27	210	F	6/2/2015	27.4.a	6	6	4	5	4	6	6	5	5	3	6	6	6	6	54	19	16	
dab_DE_148_28	210	F	6/2/2015	27.4.a	8	7	5	6	3	-	8	7	8	5	8	8	8	8	50	25	20	
dab_DE_148_32	230	F	6/2/2015	27.4.a	5	5	4	5	5	5	4	5	4	5	5	5	5	5	77	9	7	
dab_DE_148_36	250	F	6/2/2015	27.4.a	10	10	4	6	5	11	10	7	11	6	10	10	10	10	46	29	26	
dab_DK_2015_928901_002	130		1/7/2015	27.3.a	4	3	3	4	3	2	2	3	3	2	3	3	3	3	62	22	15	
dab_DK_2015_928901_006	170		1/7/2015	27.3.a	5	4	4	4	4	5	4	4	4	5	5	4	4	4	69	11	10	
dab_DK_2015_928901_007	180		1/7/2015	27.3.a	6	5	4	5	5	5	5	4	5	5	5	5	5	5	77	10	6	
dab_DK_2018_257303_004	190	F	1/2/2018	27.3.a	5	4	2	3	2	2	2	2	2	2	2	5	2	2	69	44	36	
dab_DK_2018_258003_002	230	M	14/02/2018	27.3.a	8	7	6	7	7	7	7	7	7	7	8	7	7	7	77	7	4	
dab_DK_2018_258003_003	230	F	14/02/2018	27.3.a	5	5	5	5	5	5	5	5	5	5	5	5	5	5	100	0	0	
dab_DK_2018_258003_004	200	F	14/02/2018	27.3.a	6	6	6	6	6	6	6	6	6	6	6	6	6	6	100	0	0	
dab_DK_2018_258003_010	180	M	14/02/2018	27.3.a	6	6	6	6	6	6	6	5	5	6	6	6	6	6	85	6	4	
dab_DK_2018_263801_010	210	F	11/7/2018	27.3.a	7	6	6	6	5	7	6	5	7	5	6	7	6	6	46	12	9	
dab_DK_2018_263801_014	130	F	11/7/2018	27.3.a	4	3	3	4	3	1	4	3	4	1	2	4	4	3	31	36	28	
dab_NL_2010_6000634_001	83	M	4/2/2010	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0	
dab_NL_2010_6000634_004	75	M	4/2/2010	27.4.b	1	1	1	1	1	1	0	1	1	1	1	1	1	1	92	30	15	
dab_NL_2014_0121003_050	309	F	14/02/2014	27.4.c	9	9	8	9	9	9	9	6	9	9	9	9	9	9	85	10	6	
dab_NL_2014_1400025_271	262	F	26/08/2014	27.4.a	9	9	4	8	7	4	7	4	6	5	7	8	4	4	31	31	26	
dab_NL_2015_0121003_009	246	F	13/02/2015	27.4.c	-	5	4	5	5	5	5	4	4	4	4	5	5	5	67	11	10	
dab_NL_2015_0121003_015	252	F	13/02/2015	27.4.c	7	8	4	6	5	6	6	5	6	4	5	7	5	6	31	21	17	
dab_NL_2015_0121003_023	262	F	13/02/2015	27.4.c	8	7	6	6	7	7	6	6	6	6	7	7	7	6	46	10	9	
dab_NL_2015_0121009_033	268	F	10/7/2015	27.4.c	5	4	4	5	5	4	4	4	4	4	4	4	4	4	77	10	8	
dab_NL_2015_0121009_034	264	F	10/7/2015	27.4.c	7	6	-	6	6	5	6	5	5	4	6	6	5	6	50	14	12	
dab_NL_2015_0121010_018	261	F	13/07/2015	27.4.b	7	6	6	6	6	5	6	5	5	6	5	6	6	6	62	10	8	
dab_NL_2015_0121010_039	283	F	13/07/2015	27.4.b	6	5	5	6	6	5	7	4	6	4	5	6	5	6	38	16	13	
dab_NL_2015_1400011_131	144	F	20/08/2015	27.4.a	2	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0	
dab_NL_2015_1400016_165	272	F	21/08/2015	27.4.a	7	7	5	7	7	6	7	6	6	6	7	7	6	7	54	10	9	
dab_NL_2015_6000521_005	238	F	2/2/2015	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	3	92	9	5	
dab_NL_2015_6000521_007	227	F	2/2/2015	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	3	92	9	5	
dab_NL_2015_6000521_012	216	M	2/2/2015	27.4.b	3	3	3	3	3	3	3	-	3	3	3	3	3	3	100	0	0	
dab_NL_2015_6000605_018	155	F	3/2/2015	27.4.b	4	4	4	4	3	4	4	4	2	3	4	4	4	4	77	17	13	
dab_NL_2015_6000605_021	163	F	3/2/2015	27.4.b	4	4	4	4	4	4	4	3	3	4	4	4	4	4	77	12	9	
dab_NL_2015_6000605_036	212	F	3/2/2015	27.4.b	6	6	5	6	5	-	5	5	5	5	5	5	6	5	67	9	8	
dab_NL_2015_6000607_008	143	M	3/2/2015	27.4.b	3	3	3	3	3	3	3	3	3	3	3	3	0	3	92	30	15	
dab_NL_2015_6000733_022	173	F	15/07/2015	27.4.b	4	3	3	3	4	4	3	3	3	3	3	3	4	3	69	15	13	
dab_NL_2015_6000733_033	201	M	15/07/2015	27.4.b	7	6	5	5	-	6	6	5	5	5	6	6	5	6	42	12	10	
dab_NL_2015_6000733_039	226	M	15/07/2015	27.4.b	6	5	4	5	6	6	5	3	5	5	6	5	5	6	31	17	11	
dab_NL_2015_6000733_043	245	M	15/07/2015	27.4.b	9	8	5	6	6	8	8	6	8	6	8	6	6	8	38	18	17	
dab_NL_2016_0121003_011	278	F	12/2/2016	27.4.b	7	7	6	6	6	6	6	5	5	5	7	6	6	6	54	12	8	
dab_NL_2016_0121003_018	277	F	12/2/2016	27.4.b	-	9	8	7	9	9	8	7	10	6	8	9	9	9	42	14	11	
dab_NL_2016_0121003_033	292	F	12/2/2016	27.4.b	11	10	9	8	9	9	11	8	14	9	11	9	12	9	38	17	14	
dab_NL_2016_0121012_003	256	F	11/7/2016	27.4.a	8	7	5	5	6	3	3	5	4	3	7	7	6	5	23	32	27	
dab_NL_2016_0121012_005	263	F	11/7/2016	27.4.a	3	4	2	4	3	3	3	2	3	3	4	4	4	3	54	22	17	
dab_NL_2016_0121012_028	302	F	11/7/2016	27.4.a	5	4	4	5	5	4	4	-	4	4	4	4	4	4	75	11	9	
dab_NL_2016_0121012_042	312	F	11/7/2016	27.4.a	9	8	6	7	6	6	5	5	4	5	6	7	6	6	38	22	16	
dab_NL_2016_0121012_047	332	F	11/7/2016	27.4.a	6	7	5	6	7	5	4	-	5	4	7	7	7	6	17	20	18	
dab_NL_2016_1400011_127	131	M	25/08/2016	27.4.a	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0	
dab_NL_2016_6000054_001	124	M	14/07/2016	27.4.c	2	1	1	1	1	1	1	1	1	1	1	1	1	1	92	26	13	

Table A1.2. Event 244 whole otoliths: Age composition and total number of age readings by reader and for modal age. Modal age is based on advanced readers only.

Age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	modal age
0							1						1	
1	3	5	6	4	4	5	4	5	5	6	5	5	5	5
2	4	3	6	3	4	5	5	8	6	7	5	2	5	3
3	9	12	13	13	17	11	12	13	15	14	13	11	8	15
4	8	12	15	8	7	8	11	9	8	12	9	9	13	10
5	10	7	11	13	11	10	8	14	13	11	10	9	10	7
6	10	10	9	16	12	12	12	7	8	10	10	11	14	16
7	7	7		4	5	3	5	4	2	1	5	10	3	2
8	5	3	2	2		1	3	1	2		4	2	1	2
9	4	3	1	1	3	3	1		1	2	1	3	2	3
10	1	2					1		1		1	1	1	1
11	1					1	1		1		1			
12													1	
14									1					
Total	62	64	63	64	63	59	64	61	63	63	64	63	64	64

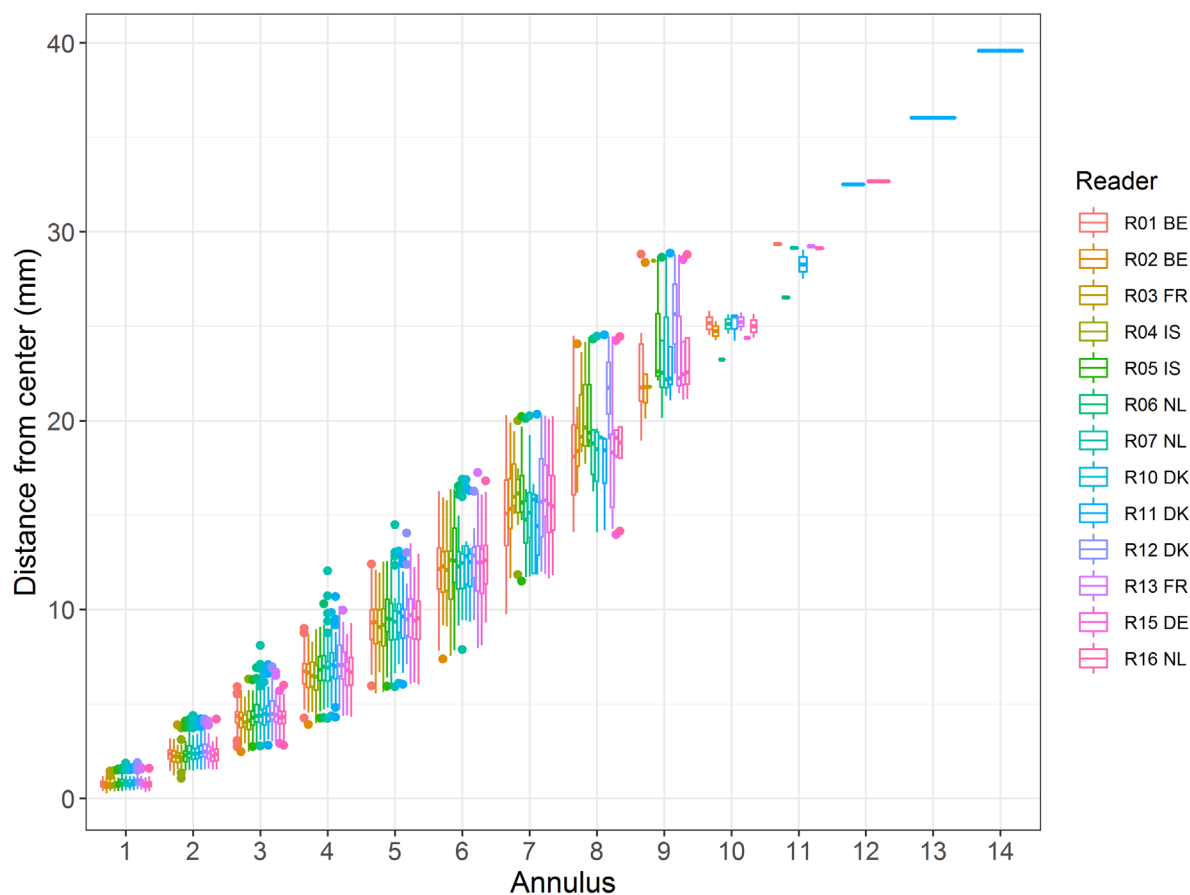


Figure A1.1. Event 244 whole otoliths: Average distance from the nucleus to the start of the new annulus. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

Table A1.3. Event 244 whole otoliths: Coefficient of variation (CV in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	39	0	0	37	37	0	56	0	0	0	0	0	0	18
2	58	43	0	25	0	0	0	0	0	0	0	58	0	15
3	36	15	22	13	8	26	36	23	16	28	12	32	35	19
4	30	35	18	26	27	19	22	15	30	18	22	28	15	17
5	20	14	12	7	7	17	16	10	10	18	17	14	9	10
6	13	14	15	9	13	11	11	16	13	19	11	10	11	12
7	9	0	13	0	0	11	0	11	11	11	9	0	11	9
8	8	9	0	0	47	-	0	11	0	13	0	20	20	21
9	14	6	7	13	0	0	16	14	24	22	16	0	17	14
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	26	17	14	15	15	14	22	14	14	18	12	19	16	15

Table A1.4. Event 244 whole otoliths: Percentage agreement (PA in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	60	100	100	80	80	100	80	100	100	100	100	100	100	92
2	67	67	100	67	100	100	100	100	100	100	100	67	100	90
3	60	80	80	80	93	69	73	57	80	57	87	79	53	73
4	40	90	80	50	50	70	90	56	44	50	80	70	90	66
5	50	71	57	86	86	83	86	71	71	57	71	86	71	73
6	50	56	53	75	67	63	75	27	38	38	63	56	56	55
7	50	100	0	100	100	50	100	50	50	50	50	100	50	65
8	50	50	0	0	0	100	100	0	100	0	100	50	50	44
9	50	67	33	33	100	100	33	0	33	67	33	100	67	55
10	100	100	0	0	0	0	100	0	0	0	100	100	100	46
Weighted Mean	53	75	65	69	75	73	80	51	62	54	77	75	69	67

Table A1.5. Event 244 whole otoliths: Relative bias by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	0.40	0.00	0.00	0.20	0.20	0.00	-0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.05
2	1.00	0.67	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.23
3	0.73	0.07	-0.27	0.20	0.07	-0.23	0.20	-0.29	-0.07	-0.36	-0.13	0.43	-0.07	0.03
4	1.00	0.50	-0.30	0.80	0.30	0.20	0.30	-0.44	-0.33	-0.30	0.40	0.70	0.20	0.24
5	0.83	0.43	-0.43	0.14	0.14	-0.33	-0.29	-0.29	-0.29	-0.57	0.14	0.29	0.29	0.00
6	0.69	0.31	-0.67	-0.13	-0.13	-0.13	-0.19	-0.93	-0.56	-1.00	-0.13	0.31	-0.19	-0.20
7	0.50	0.00	-1.50	0.00	0.00	-0.50	0.00	-0.50	-0.50	-0.50	0.50	0.00	-0.50	-0.23
8	0.50	-0.50	-3.00	-2.00	-3.50	0.00	0.00	-1.50	0.00	-2.50	0.00	-1.00	-1.00	-1.16
9	1.00	0.33	-0.67	-1.00	0.00	0.00	0.33	-2.00	2.00	-1.00	0.33	0.00	1.00	0.00
10	0.00	0.00	-6.00	-4.00	-5.00	1.00	0.00	-3.00	1.00	-4.00	0.00	0.00	0.00	-1.54
Weight Mean	0.74	0.25	-0.59	0.02	-0.13	-0.08	0.02	-0.61	-0.14	-0.65	0.05	0.33	-0.00	-0.06

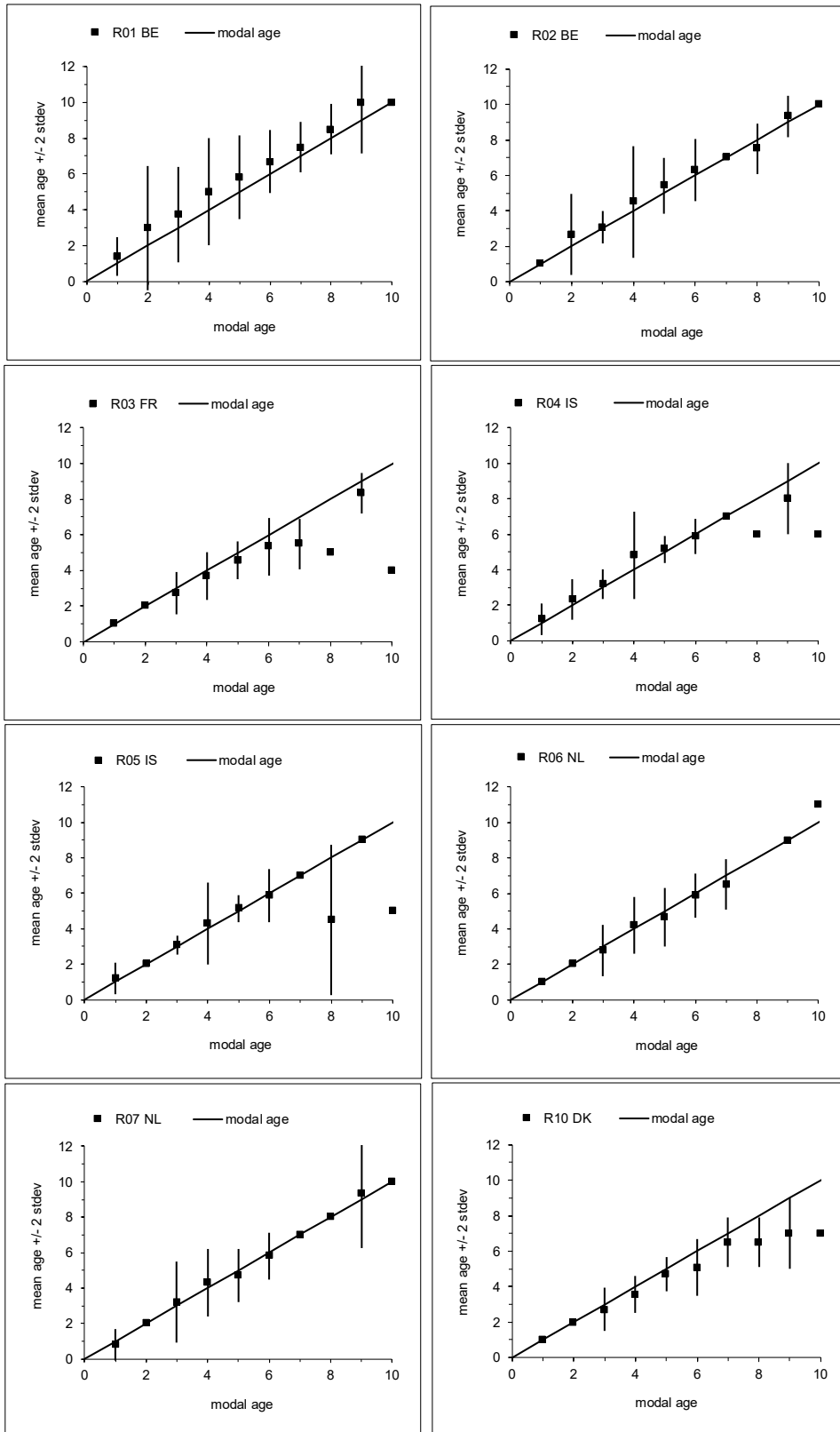


Figure A1.2. Event 244 whole otoliths: Reader bias plots. For each reader the mean age (+/- 2 stdev) as a function of modal age. Modal age is based on advanced readers only.

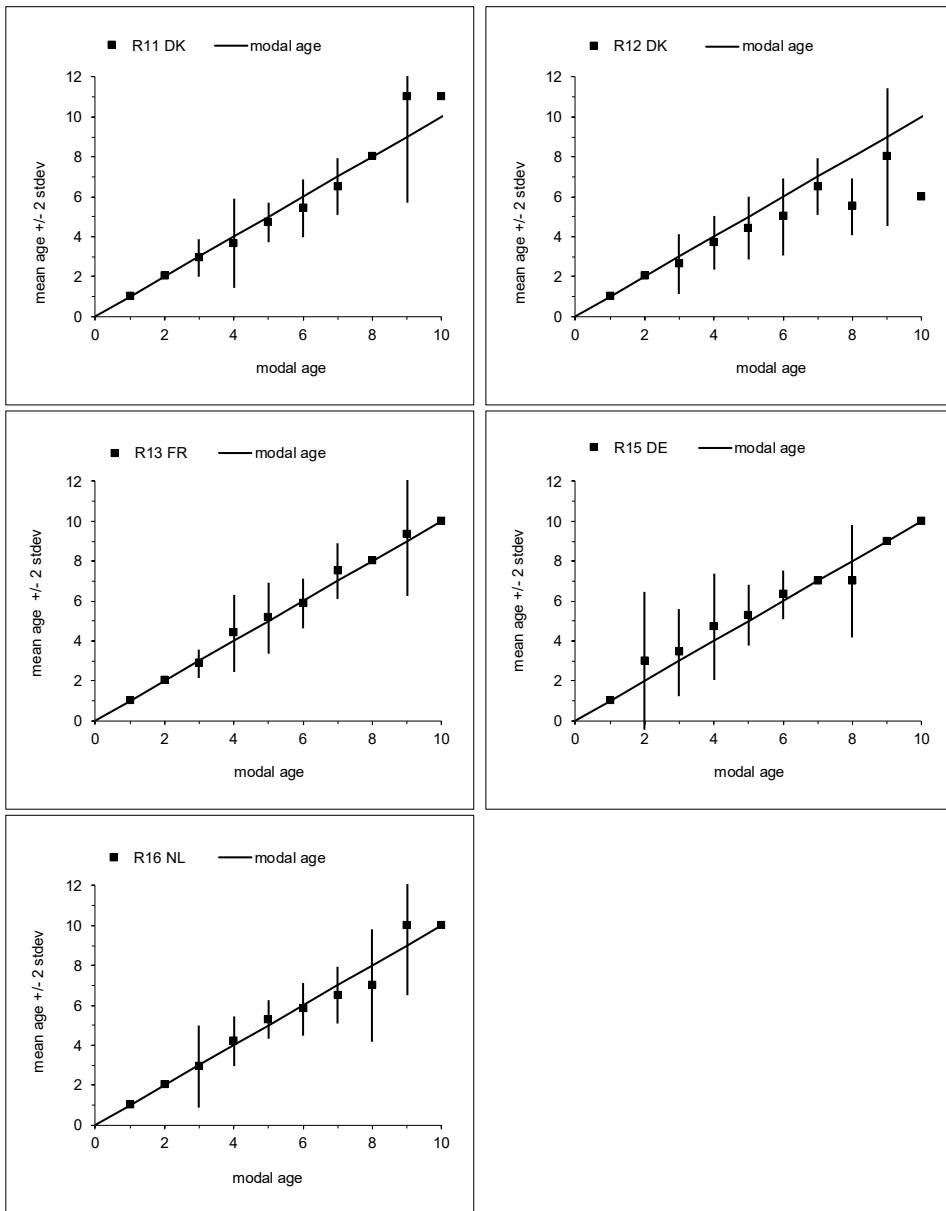


Figure A1.2. Continued



## Annex 2 – Event 244 sectioned otoliths

Table A2.1. Event 244 sectioned otoliths: Data overview including modal age and statistics per otolith. Modal age is based on advanced readers only.

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	Modal age	PA %	CV %	APE %
dab_BE_BYDR01_00033	160		6/2/2015	27.4.c	4	2	2	2	2	2	2	2	3	2	2	2	2	2	85	27	18
dab_BE_BYDR01_00035	170		6/2/2015	27.4.c	3	3	3	2	2	3	3	3	3	2	2	3	2	3	62	19	18
dab_BE_BYDR01_00042	190		6/2/2015	27.4.c	4	4	4	4	4	4	4	4	4	4	3	4	3	4	85	10	7
dab_BE_BYDR01_00050	220		6/2/2015	27.4.c	4	4	4	4	4	4	5	5	4	4	4	4	4	4	85	9	6
dab_BE_BYDR01_00058	260		6/2/2015	27.4.c	6	6	5	6	5	6	6	6	6	6	5	6	6	6	77	8	6
dab_BE_BYDR01_00059	150		6/2/2015	27.4.c	2	2	2	1	2	2	2	3	2	1	1	2	1	2	62	34	27
dab_BE_GNKT07_50684	200	F	4/7/2015	27.4.c	3	2	2	2	3	2	2	3	2	2	1	2	2	2	69	26	18
dab_BE_GNKT07_50688	170	F	4/7/2015	27.4.c	2	2	1	1	2	1	1	5	1	1	1	1	1	1	69	73	48
dab_BE_GNKT07_50695	200	F	4/7/2015	27.4.c	-	4	3	3	3	4	3	4	5	3	3	5	4	3	50	21	18
dab_BE_GNKT07_50718	195	F	4/7/2015	27.4.c	3	2	1	1	3	2	3	2	1	1	1	2	1	3	23	47	40
dab_BE_N24_00019	245	F	9/7/2015	27.4.c	6	6	5	5	6	6	6	5	6	6	5	6	6	6	69	8	7
dab_DE_097_20	130	F	31/01/2015	27.4.a	3	2	-	2	2	2	2	2	2	2	2	2	2	2	92	14	7
dab_DE_098_01	160	F	31/01/2015	27.4.a	-	3	3	3	3	3	4	3	3	3	3	4	4	3	75	14	12
dab_DE_098_13	180	M	31/01/2015	27.4.a	6	4	3	2	5	5	5	2	2	3	4	7	5	5	31	39	32
dab_DE_148_02	130	M	6/2/2015	27.4.a	3	2	2	2	2	3	3	3	3	2	2	3	2	2	62	21	20
dab_DE_148_05	150	M	6/2/2015	27.4.a	4	3	3	3	3	3	4	4	3	3	3	4	3	3	69	15	13
dab_DE_148_27	210	F	6/2/2015	27.4.a	6	6	4	4	5	6	5	4	5	4	5	-	5	6	25	16	12
dab_DE_148_28	210	F	6/2/2015	27.4.a	8	10	5	5	7	10	7	7	9	7	6	8	10	7	31	23	19
dab_DE_148_32	230	F	6/2/2015	27.4.a	5	5	5	4	5	5	5	5	5	5	4	5	4	5	77	9	7
dab_DE_148_36	250	F	6/2/2015	27.4.a	10	10	7	5	6	10	10	7	10	7	9	10	8	10	46	22	19
dab_DK_2015_928901_002	130		1/7/2015	27.3.a	4	3	3	4	3	3	3	3	3	2	2	3	3	3	69	19	10
dab_DK_2015_928901_006	170		1/7/2015	27.3.a	5	4	4	4	5	4	5	4	4	3	3	5	4	4	54	17	13
dab_DK_2015_928901_007	180		1/7/2015	27.3.a	6	6	6	5	7	6	6	7	7	7	6	6	5	6	54	11	8
dab_DK_2018_257303_004	190	F	1/2/2018	27.3.a	4	3	3	4	4	3	2	-	3	2	2	5	3	4	25	30	23
dab_DK_2018_258003_002	230	M	14/02/2018	27.3.a	7	6	7	6	8	9	8	9	8	7	6	8	7	7	31	14	12
dab_DK_2018_258003_003	230	F	14/02/2018	27.3.a	4	4	4	4	5	4	4	-	4	4	3	4	4	4	83	11	4
dab_DK_2018_258003_004	200	F	14/02/2018	27.3.a	6	6	6	6	6	6	6	5	6	5	5	6	6	6	77	8	6
dab_DK_2018_258003_010	180	M	14/02/2018	27.3.a	6	6	5	6	6	6	6	5	6	6	5	6	6	6	77	8	6
dab_DK_2018_263801_010	210	F	11/7/2018	27.3.a	10	9	6	7	7	8	8	-	9	9	6	8	8	7	17	16	12
dab_DK_2018_263801_014	130	F	11/7/2018	27.3.a	4	2	3	3	4	2	4	-	4	2	2	4	4	4	50	30	26
dab_NL_2010_6000634_001	83	M	4/2/2010	27.4.b	1	1	1	1	1	1	1	2	1	1	1	1	-	1	92	27	14
dab_NL_2010_6000634_004	75	M	4/2/2010	27.4.b	1	0	1	1	1	1	0	2	1	1	1	1	1	1	77	53	31
dab_NL_2014_0121003_050	309	F	14/02/2014	27.4.c	10	10	7	7	9	11	9	7	-	8	7	-	8	7	36	17	14
dab_NL_2014_1400025_271	262	F	26/08/2014	27.4.a	-	12	5	9	8	15	9	10	13	10	5	9	14	9	25	32	24
dab_NL_2015_0121003_009	246	F	13/02/2015	27.4.c	5	4	4	4	5	4	4	4	5	4	3	4	4	4	69	13	9
dab_NL_2015_0121003_015	252	F	13/02/2015	27.4.c	6	6	6	6	5	9	6	5	8	6	5	7	-	6	50	19	14
dab_NL_2015_0121003_023	262	F	13/02/2015	27.4.c	-	6	5	6	5	7	6	5	8	6	6	-	6	6	55	15	9
dab_NL_2015_0121009_033	268	F	10/7/2015	27.4.c	5	4	4	4	-	4	4	4	4	4	3	4	4	4	83	11	4
dab_NL_2015_0121009_034	264	F	10/7/2015	27.4.c	7	6	6	6	5	6	6	4	6	6	6	6	6	6	77	12	7
dab_NL_2015_0121010_018	261	F	13/07/2015	27.4.b	7	4	5	6	6	6	6	5	5	4	5	5	3	6	31	21	16
dab_NL_2015_0121010_039	283	F	13/07/2015	27.4.b	10	10	8	8	7	11	9	8	9	10	8	9	10	8	31	13	10
dab_NL_2015_1400011_131	144	F	20/08/2015	27.4.a	-	1	2	1	1	1	2	2	2	1	1	2	1	1	58	36	34
dab_NL_2015_1400016_165	272	F	21/08/2015	27.4.a	9	8	7	7	7	8	8	-	8	7	7	7	11	8	33	15	11
dab_NL_2015_6000521_005	238	F	2/2/2015	27.4.b	3	4	3	2	3	3	3	2	2	3	2	3	3	3	62	22	17
dab_NL_2015_6000521_007	227	F	2/2/2015	27.4.b	3	3	3	3	3	3	3	3	3	3	2	3	-	3	92	10	5
dab_NL_2015_6000521_012	216	M	2/2/2015	27.4.b	3	3	-	3	3	3	3	3	3	3	2	3	3	3	92	10	5
dab_NL_2015_6000605_018	155	F	3/2/2015	27.4.b	4	4	4	4	4	4	4	3	2	4	4	4	4	4	85	16	10
dab_NL_2015_6000605_021	163	F	3/2/2015	27.4.b	4	4	4	4	4	4	4	-	3	4	2	4	5	4	75	19	12
dab_NL_2015_6000605_036	212	F	3/2/2015	27.4.b	6	7	5	6	6	6	5	-	8	6	6	5	7	6	50	15	10
dab_NL_2015_6000607_008	143	M	3/2/2015	27.4.b	3	3	4	3	3	3	3	-	3	3	2	3	3	3	83	14	6
dab_NL_2015_6000733_022	173	F	15/07/2015	27.4.b	3	3	3	4	4	3	3	3	3	3	3	3	3	3	85	12	8
dab_NL_2015_6000733_033	201	M	15/07/2015	27.4.b	7	6	5	6	6	6	6	5	4	6	5	6	5	6	54	14	11
dab_NL_2015_6000733_039	226	M	15/07/2015	27.4.b	5	5	5	5	5	5	5	5	4	5	4	5	-	5	83	8	6
dab_NL_2015_6000733_043	245	M	15/07/2015	27.4.b	9	9	8	8	9	9	9	7	8	9	8	8	10	9	46	9	8
dab_NL_2016_0121003_011	278	F	12/2/2016	27.4.b	8	7	7	6	7	7	7	6	8	7	6	6	9	7	46	13	9
dab_NL_2016_0121003_018	277	F	12/2/2016	27.4.b	9	9	8	7	8	9	8	7	9	8	7	9	9	9	46	10	9
dab_NL_2016_0121003_033	292	F	12/2/2016	27.4.b	14	10	8	8	9	11	9	7	10	9	7	9	11	8	15	20	15
dab_NL_2016_0121012_003	256	F	11/7/2016	27.4.a	4	4	3	4	7	3	2	3	3	4	5	6	2	4	31	38	28
dab_NL_2016_0121012_005	263	F	11/7/2016	27.4.a	-	3	3	3	4	3	2	3	3	3	2	4	3	3	67	20	11
dab_NL_2016_0121012_028	302	F	11/7/2016	27.4.a	5	4	3	5	6	4	4	3	4	4	3	4	3	4	46	23	15
dab_NL_2016_0121012_042	312	F	11/7/2016	27.4.a	7	5	5	7	7	7	5	6	6	5	7	4	7	7	38	18	16
dab_NL_2016_0121012_047	332	F	11/7/2016	27.4.a	7	5	4	6	7	7	5	5	6	6	5	6	4	7	23	19	16
dab_NL_2016_1400011_127	131	M	25/08/2016	27.4.a	1	1	1	2	1	1	1	2	1	1	1	1	1	1	85	33	23
dab_NL_2016_6000054_001	124	M	14/07/2016	27.4.c	1	1	1	2	1	1	1	-	1	1	1	1	1	1	92	27	14

Table A2.2. Event 244 sectioned otoliths: Age composition and total number of age readings by reader and for modal age. Modal age is based on advanced readers only.

Age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	modal age
0		1					1							
1	4	4	6	6	5	6	4		6	8	9	5	7	6
2	2	8	5	9	6	7	8	9	7	8	13	6	6	5
3	10	10	14	8	10	12	10	13	14	11	10	8	11	12
4	11	14	11	14	8	10	10	8	9	11	5	12	12	12
5	6	4	12	6	11	3	9	12	5	4	12	7	5	3
6	9	11	5	12	8	10	10	3	7	9	8	10	6	12
7	6	2	5	5	9	4	2	7	1	6	4	4	2	7
8	2	1	4	3	3	2	4	1	7	2	2	4	3	3
9	3	3		1	3	4	5	1	4	3	1	4	2	3
10	4	5				2	1	1	2	2		1	3	1
11						3							2	
12		1												
13									1					
14	1												1	
15						1								
Total	58	64	62	64	63	64	64	55	63	64	64	61	60	64

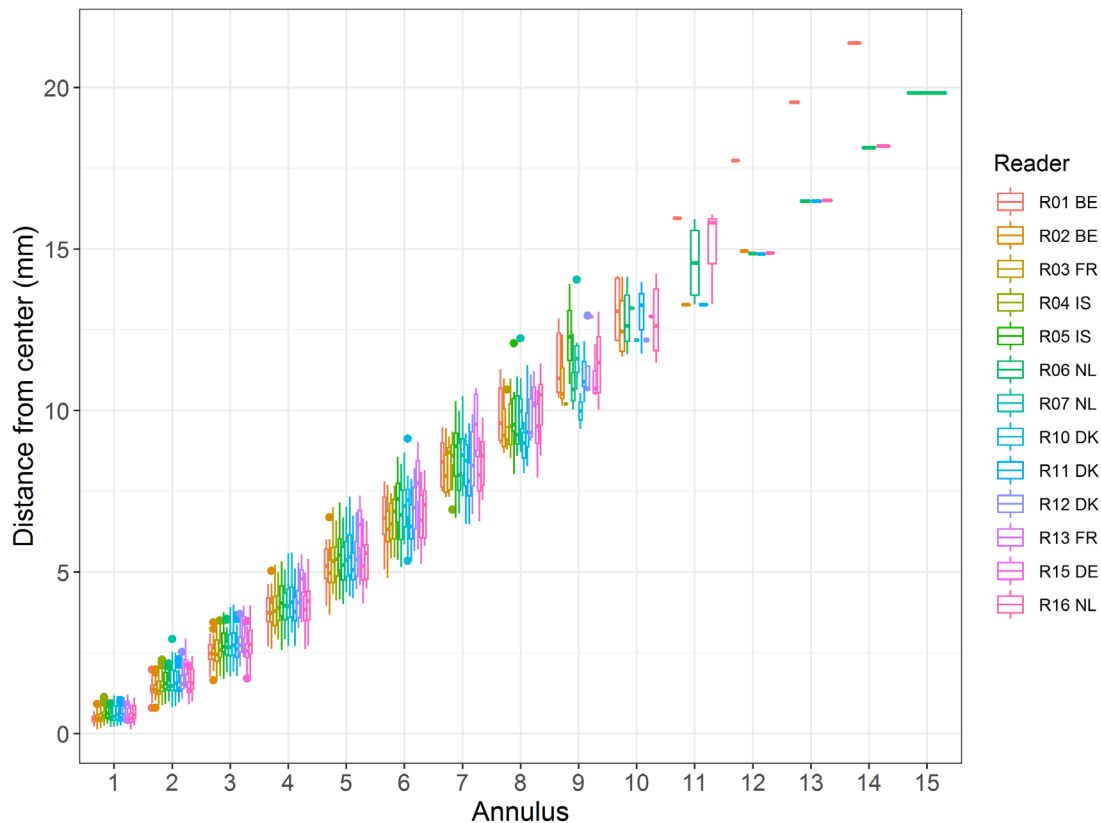


Figure A2.1. Event 244 sectioned otoliths: Average distance from the nucleus to the start of the new annulus. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

Table A2.3. Event 244 sectioned otoliths: Coefficient of variation (CV in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	37	63	35	39	35	0	63	52	35	0	0	35	0	41
2	24	0	0	25	20	0	20	21	23	25	34	20	25	24
3	14	17	24	29	17	14	17	21	31	24	28	23	29	19
4	11	17	13	11	21	18	24	19	21	22	29	15	21	19
5	11	12	27	42	0	0	0	43	42	27	0	20	16	19
6	7	11	12	11	11	14	7	16	21	16	9	10	19	13
7	17	30	21	12	11	19	22	20	18	18	12	14	33	17
8	24	12	8	8	15	17	7	9	11	18	8	14	5	16
9	0	17	25	13	7	31	7	22	26	11	23	7	24	17
10	37	63	35	39	35	0	63	52	35	0	0	35	0	41
Weighted Mean	15	20	18	19	16	13	19	23	24	18	18	18	21	20

Table A2.4. Event 244 sectioned otoliths: Percentage agreement (PA in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	80	67	83	67	83	100	67	0	83	100	100	83	100	79
2	20	100	100	80	80	100	80	40	60	80	60	80	80	73
3	78	75	82	58	75	83	75	64	75	75	33	58	64	69
4	67	83	67	83	55	75	67	50	58	75	17	75	58	64
5	67	67	67	33	100	100	100	67	33	67	0	67	50	63
6	73	83	33	75	50	83	83	9	42	67	33	70	55	58
7	43	14	43	43	71	43	29	33	0	43	14	17	14	32
8	0	33	67	67	0	33	33	50	33	0	33	0	0	26
9	100	67	0	33	33	67	67	0	33	33	0	67	33	39
10	100	100	0	0	0	100	100	0	100	0	0	100	0	46
Weighted Mean	62	70	60	64	62	78	69	35	52	66	33	62	53	59

Table A2.5. Event 244 sectioned otoliths: Relative bias by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	0.20	0.00	0.17	0.33	0.17	0.00	0.00	1.60	0.17	0.00	0.00	0.17	0.00	0.20
2	1.00	0.00	0.00	-0.20	0.20	0.00	0.20	0.60	0.40	-0.20	-0.40	0.20	-0.20	0.13
3	0.22	0.08	-0.09	-0.17	0.08	0.00	0.08	0.00	-0.08	-0.33	-0.75	0.33	-0.09	-0.06
4	0.33	-0.25	-0.33	0.00	0.73	-0.33	-0.17	-0.25	-0.33	-0.42	-0.92	0.33	-0.33	-0.15
5	0.33	-0.33	-0.67	-1.33	0.00	0.00	0.00	-1.00	-1.33	-0.67	-1.00	0.67	-0.50	-0.45
6	0.27	-0.08	-0.75	-0.33	-0.33	0.33	-0.17	-0.91	0.25	-0.33	-0.67	-0.10	-0.45	-0.25
7	1.14	0.43	-1.14	-0.71	0.43	1.43	0.00	-0.33	0.67	0.00	-1.14	0.17	0.14	0.08
8	3.00	1.33	-0.33	-0.33	-0.33	2.00	0.67	-0.50	1.00	0.67	-0.67	0.33	2.67	0.76
9	0.00	1.00	-2.00	-1.00	-0.67	2.00	-0.33	-1.00	1.00	0.00	-2.33	-0.33	2.00	-0.13
10	0.00	0.00	-3.00	-5.00	-4.00	0.00	0.00	-3.00	0.00	-3.00	-1.00	0.00	-2.00	-1.62
Weight Mean	0.57	0.09	-0.53	-0.36	0.05	0.34	-0.02	-0.24	0.11	-0.27	-0.80	0.20	0.02	-0.07

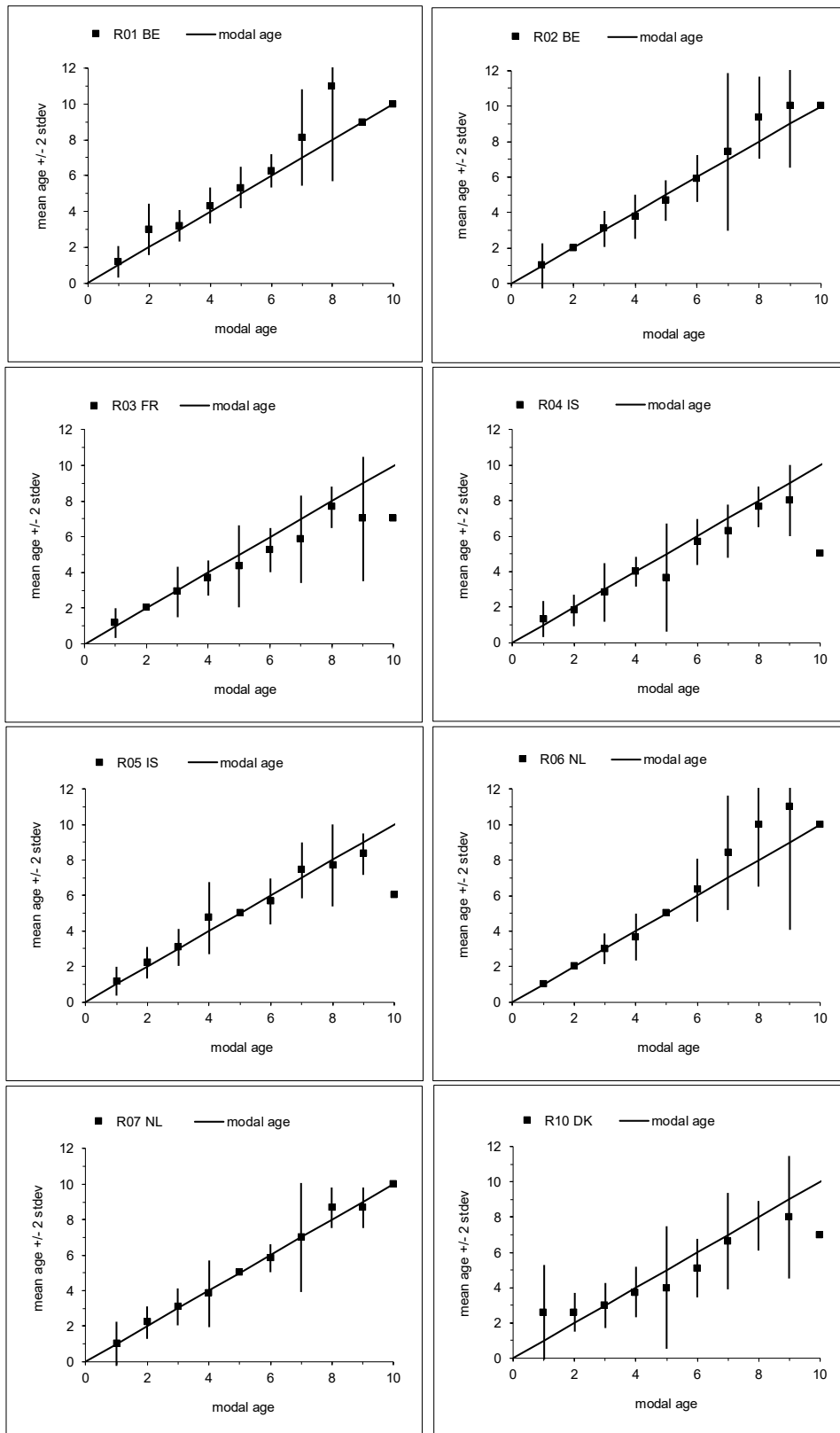


Figure A2.2. Event 244 sectioned otoliths: Reader bias plots. For each reader the mean age ( $\pm 2$  stdev) as a function of modal age. Modal age is based on advanced readers only.

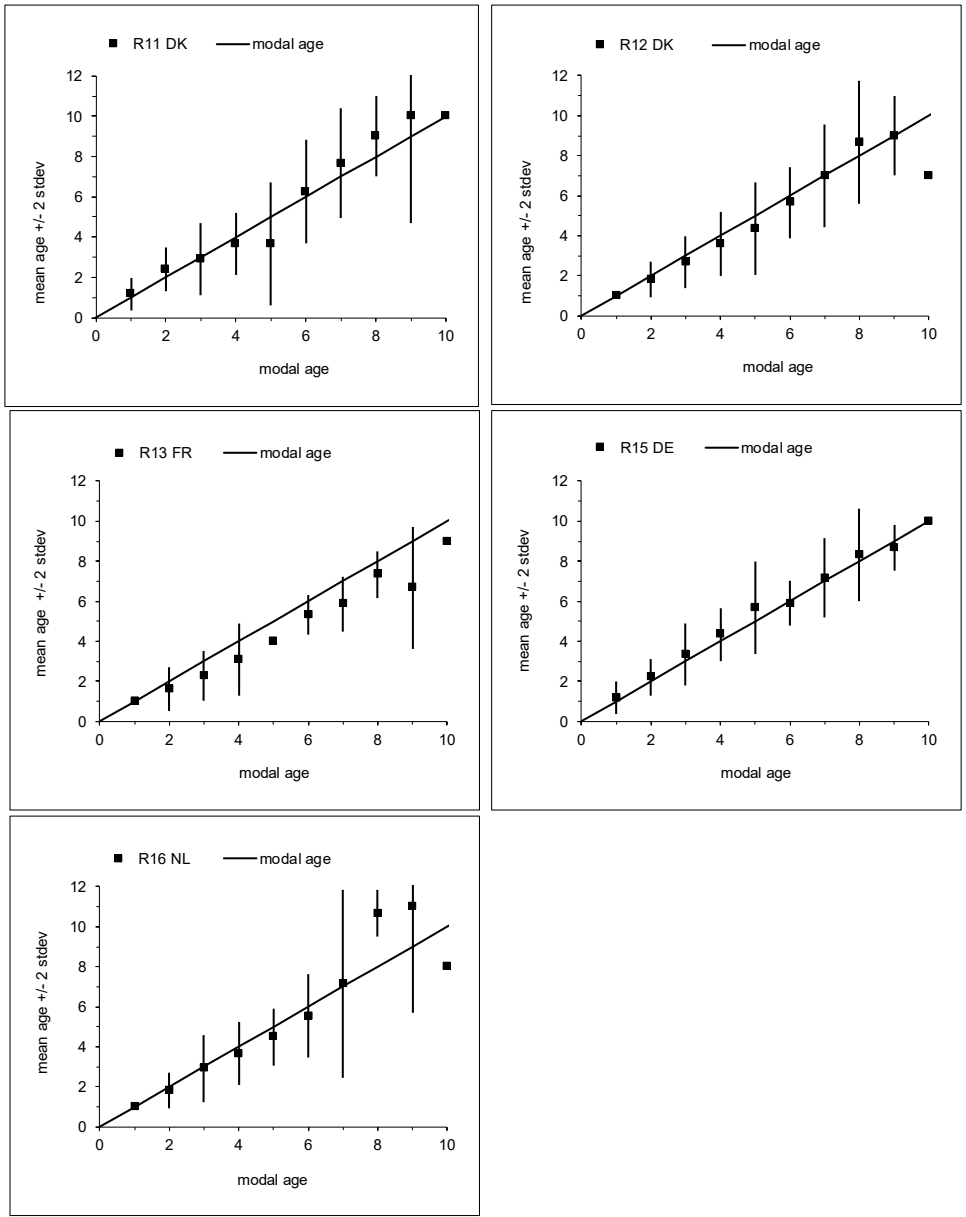


Figure A2.2. Continued.

## Annex 3 – Event 244 sectioned-and-stained otoliths

Table A3.1. Event 244 sectioned-and-stained otoliths: Data overview including modal age and statistics per otolith. Modal age is based on advanced readers only.

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	Modal age	PA %	CV %	APE %
dab_BE_BYDR01_00033	160		6/2/2015	27.4.c	-	3	3	3	3	2	3	3	3	3	3	3	4	3	83	14	6
dab_BE_BYDR01_00035	170		6/2/2015	27.4.c	3	3	3	3	3	3	3	3	3	3	3	3	4	3	92	9	5
dab_BE_BYDR01_00042	190		6/2/2015	27.4.c	4	4	4	3	4	4	4	4	4	4	4	4	4	4	92	7	4
dab_BE_BYDR01_00050	220		6/2/2015	27.4.c	5	5	5	5	5	5	5	5	5	5	5	5	6	5	92	5	3
dab_BE_BYDR01_00058	260		6/2/2015	27.4.c	6	6	6	6	6	6	6	5	6	6	5	6	7	6	77	8	5
dab_BE_BYDR01_00059	150		6/2/2015	27.4.c	-	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0
dab_BE_GNKT07_50684	200	F	4/7/2015	27.4.c	2	2	2	2	3	3	2	-	2	2	2	2	2	2	83	18	13
dab_BE_GNKT07_50688	170	F	4/7/2015	27.4.c	2	2	2	2	3	2	1	-	3	3	2	2	2	2	67	27	19
dab_BE_GNKT07_50695	200	F	4/7/2015	27.4.c	4	4	4	4	4	4	5	4	5	4	3	4	4	4	77	12	7
dab_BE_GNKT07_50718	195	F	4/7/2015	27.4.c	3	3	3	3	4	3	3	4	3	3	3	5	5	3	69	22	18
dab_BE_N24_00019	245	F	9/7/2015	27.4.c	6	6	5	4	6	6	6	6	6	5	6	6	6	6	77	11	8
dab_DE_097_20	130	F	31/01/2015	27.4.a	2	2	-	2	2	0	2	0	2	2	2	2	4	2	75	56	33
dab_DE_098_01	160	F	31/01/2015	27.4.a	3	3	3	3	4	3	5	3	3	3	3	3	5	3	77	23	17
dab_DE_098_13	180	M	31/01/2015	27.4.a	-	4	3	3	-	5	7	4	-	5	4	6	5	4	30	27	22
dab_DE_148_02	130	M	6/2/2015	27.4.a	-	3	2	2	2	2	3	2	2	2	2	2	3	2	75	20	17
dab_DE_148_05	150	M	6/2/2015	27.4.a	3	3	3	3	3	2	4	-	3	3	3	4	4	3	67	18	13
dab_DE_148_27	210	F	6/2/2015	27.4.a	5	5	-	4	5	5	5	3	5	5	5	6	6	5	67	16	10
dab_DE_148_28	210	F	6/2/2015	27.4.a	9	9	6	6	7	8	7	5	-	7	7	9	8	9	25	18	14
dab_DE_148_32	230	F	6/2/2015	27.4.a	5	5	4	4	5	4	5	3	4	4	4	5	5	5	46	15	13
dab_DE_148_36	250	F	6/2/2015	27.4.a	9	11	9	6	9	9	8	8	9	9	8	11	9	9	54	14	9
dab_DK_2015_928901_002	130		1/7/2015	27.3.a	4	4	3	4	4	3	2	-	3	3	5	4	4	4	50	22	18
dab_DK_2015_928901_006	170		1/7/2015	27.3.a	4	4	4	4	5	4	4	3	4	4	4	5	4	4	77	12	7
dab_DK_2015_928901_007	180		1/7/2015	27.3.a	7	6	5	6	7	7	8	4	9	8	7	6	7	7	38	20	15
dab_DK_2018_257303_004	190	F	1/2/2018	27.3.a	5	4	5	4	4	3	2	-	5	5	5	4	4	33	23	18	
dab_DK_2018_258003_002	230	M	14/02/2018	27.3.a	8	8	8	7	9	7	7	4	8	10	7	8	8	8	46	18	12
dab_DK_2018_258003_003	230	F	14/02/2018	27.3.a	5	5	5	4	6	4	5	3	5	6	4	5	4	5	46	18	15
dab_DK_2018_258003_004	200	F	14/02/2018	27.3.a	6	6	6	6	6	6	6	5	11	6	7	6	6	6	77	23	13
dab_DK_2018_258003_010	180	M	14/02/2018	27.3.a	6	6	6	6	6	5	6	5	7	8	6	6	6	6	62	15	11
dab_DK_2018_263801_010	210	F	11/7/2018	27.3.a	7	9	7	8	8	8	9	6	7	10	7	9	11	8	23	17	14
dab_DK_2018_263801_014	130	F	11/7/2018	27.3.a	4	4	4	4	4	3	4	3	4	2	3	4	3	4	62	19	16
dab_NL_2010_6000634_001	83	M	4/2/2010	27.4.b	1	2	1	1	2	1	1	0	2	1	1	1	1	1	69	48	34
dab_NL_2010_6000634_004	75	M	4/2/2010	27.4.b	1	2	1	0	2	1	0	5	1	1	1	1	1	1	62	96	60
dab_NL_2014_0121003_050	309	F	14/02/2014	27.4.c	9	8	9	8	9	9	9	-	9	9	8	10	9	9	67	7	5
dab_NL_2014_1400025_271	262	F	26/08/2014	27.4.a	11	10	6	8	6	10	7	7	10	8	9	12	11	10	23	23	19
dab_NL_2015_0121003_009	246	F	13/02/2015	27.4.c	4	5	5	5	6	5	5	4	5	5	4	4	5	5	62	13	10
dab_NL_2015_0121003_015	252	F	13/02/2015	27.4.c	6	6	6	6	6	6	6	-	6	8	6	6	6	6	92	9	5
dab_NL_2015_0121003_023	262	F	13/02/2015	27.4.c	7	6	6	6	6	7	6	7	7	6	7	7	7	6	46	8	8
dab_NL_2015_0121009_033	268	F	10/7/2015	27.4.c	4	5	4	5	5	5	4	5	5	5	5	5	5	5	77	9	7
dab_NL_2015_0121009_034	264	F	10/7/2015	27.4.c	6	6	5	6	6	6	6	6	6	6	6	6	6	6	92	5	2
dab_NL_2015_0121010_018	261	F	13/07/2015	27.4.b	6	6	7	6	6	5	7	6	5	5	5	6	5	6	46	13	10
dab_NL_2015_0121010_039	283	F	13/07/2015	27.4.b	9	9	8	9	9	9	9	8	9	8	9	9	9	9	77	5	4
dab_NL_2015_1400011_131	144	F	20/08/2015	27.4.a	2	2	2	2	3	3	2	3	3	1	2	2	2	2	62	27	21
dab_NL_2015_1400016_165	272	F	21/08/2015	27.4.a	8	8	8	8	8	-	8	6	9	7	7	8	9	8	58	11	7
dab_NL_2015_6000521_005	238	F	2/2/2015	27.4.b	4	3	3	4	5	4	3	5	3	3	2	3	5	4	23	27	23
dab_NL_2015_6000521_007	227	F	2/2/2015	27.4.b	3	3	3	3	3	-	3	3	3	3	3	3	4	3	92	9	5
dab_NL_2015_6000521_012	216	M	2/2/2015	27.4.b	3	3	3	3	3	-	3	3	3	3	3	4	4	3	83	12	9
dab_NL_2015_6000605_018	155	F	3/2/2015	27.4.b	4	4	4	4	4	4	4	4	4	4	4	4	4	4	92	7	3
dab_NL_2015_6000605_021	163	F	3/2/2015	27.4.b	5	4	4	4	3	5	4	5	6	3	4	4	5	4	46	20	16
dab_NL_2015_6000605_036	212	F	3/2/2015	27.4.b	6	6	6	6	6	6	5	5	6	5	6	6	6	6	77	8	6
dab_NL_2015_6000607_008	143	M	3/2/2015	27.4.b	3	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0
dab_NL_2015_6000733_022	173	F	15/07/2015	27.4.b	3	3	3	3	4	3	3	3	3	3	3	4	3	3	85	12	8
dab_NL_2015_6000733_033	201	M	15/07/2015	27.4.b	6	6	5	6	-	6	6	-	5	5	5	6	6	6	64	9	8
dab_NL_2015_6000733_039	226	M	15/07/2015	27.4.b	5	5	4	5	5	5	5	5	5	5	5	5	5	5	85	8	5
dab_NL_2015_6000733_043	245	M	15/07/2015	27.4.b	9	9	7	8	9	9	9	-	9	8	9	9	10	9	67	9	6
dab_NL_2016_0121003_011	278	F	12/2/2016	27.4.b	7	7	7	7	8	8	7	7	7	7	7	8	8	7	69	7	6
dab_NL_2016_0121003_018	277	F	12/2/2016	27.4.b	9	8	8	8	9	8	8	8	9	8	8	9	9	8	62	6	6
dab_NL_2016_0121003_033	292	F	12/2/2016	27.4.b	10	9	8	8	9	11	10	7	10	11	8	10	11	10	31	14	12
dab_NL_2016_0121012_003	256	F	11/7/2016	27.4.a	4	4	3	5	5	5	3	4	3	7	5	6	4	4	31	27	21
dab_NL_2016_0121012_005	263	F	11/7/2016	27.4.a	3	3	3	3	3	4	3	2	3	5	3	3	3	3	77	22	13
dab_NL_2016_0121012_028	302	F	11/7/2016	27.4.a	6	6	5	5	6	6	4	4	6	6	4	5	4	6	46	17	15
dab_NL_2016_0121012_042	312	F	11/7/2016	27.4.a	6	5	6	6	7	9	5	4	5	6	5	6	5	6	38	21	15
dab_NL_2016_0121012_047	332	F	11/7/2016	27.4.a	6	5	6	6	6	-	5	6	6	5	6	6	6	6	75	8	7
dab_NL_2016_1400011_127	131	M	25/08/2016	27.4.a	1	1	1	2	1	1	1	1	2	1	1	1	1	1	85	33	23
dab_NL_2016_6000054_001	124	M	14/07/2016	27.4.c	1	1	1	1	1	2	1	2	1	1	1	1	1	1	85	33	23

Table A3.2. Event 244 sectioned-and-stained otoliths: Age composition and total number of age readings by reader and for modal age. Modal age is based on advanced readers only.

Age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	modal age
0	-	-	-	1	-	1	1	2	-	-	-	-	-	-
1	4	2	4	2	2	3	4	1	2	5	4	4	4	4
2	4	7	5	7	5	6	6	4	6	5	7	6	4	6
3	9	12	14	12	11	10	11	13	15	13	12	8	4	10
4	10	10	9	12	9	8	9	10	4	6	9	9	16	11
5	7	9	9	6	8	10	10	11	13	12	11	9	11	7
6	12	12	10	14	14	8	8	7	8	6	6	14	10	13
7	4	1	4	2	3	3	6	4	4	4	7	2	3	2
8	2	4	5	7	4	3	4	3	1	7	5	3	3	4
9	6	5	2	1	6	6	4	-	7	2	3	5	5	5
10	1	1	-	-	-	1	1	-	2	2	-	2	1	2
11	1	1	-	-	-	1	-	-	-	2	-	1	3	4
12	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Total	60	64	62	64	62	60	64	55	62	64	64	64	64	64

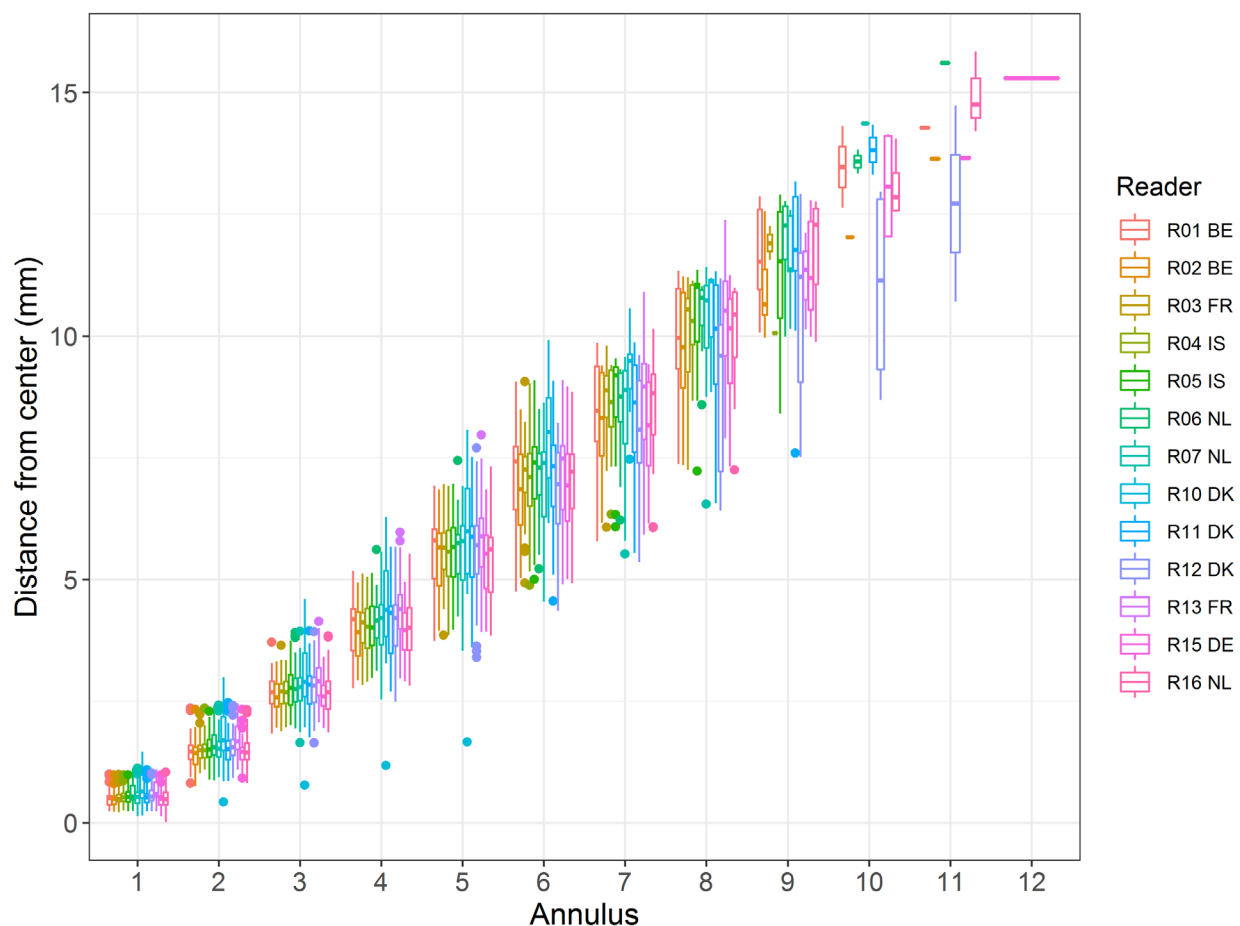


Figure A3.1. Event 244 sectioned-and-stained otoliths: Average distance from the nucleus to the start of the new annulus. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

Table A3.3. Event 244 sectioned-and-stained otoliths: Coefficient of variation (CV in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	0	38	0	82	38	40	67	108	38	0	0	0	0	52
2	0	19	0	0	22	55	32	72	22	32	0	0	33	25
3	0	0	0	0	15	22	20	17	0	20	0	21	17	14
4	10	8	17	14	15	19	36	19	25	34	24	21	14	18
5	10	0	12	12	9	10	8	25	8	14	12	12	13	12
6	5	6	10	10	5	17	13	17	12	28	18	8	14	12
7	0	11	24	11	9	9	9	39	18	9	0	20	9	13
8	10	6	6	6	6	13	10	27	12	17	7	7	14	13
9	0	12	17	18	10	5	11	25	0	10	10	9	8	10
10	7	7	20	0	28	7	25	0	0	22	8	13	0	18
Weighted Mean	5	9	10	13	14	21	23	30	13	22	10	12	14	17

Table A3.4. Event 244 sectioned-and-stained otoliths: Percentage agreement (PA in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	100	50	100	50	50	75	75	25	50	100	100	100	100	75
2	100	83	100	100	50	50	67	50	67	67	100	100	67	77
3	100	100	100	100	70	63	80	78	100	90	100	70	20	83
4	80	91	55	73	60	45	55	44	30	36	45	55	64	57
5	71	100	50	57	71	71	86	43	86	57	57	71	57	68
6	92	85	62	85	92	67	62	45	54	38	46	77	62	67
7	100	50	50	50	50	50	50	50	50	50	100	0	50	54
8	50	75	75	75	75	33	50	25	25	25	25	50	25	47
9	100	60	40	20	80	80	60	0	100	40	40	60	60	58
10	50	50	0	0	0	50	50	0	100	0	0	50	0	27
Weighted Mean	87	83	68	72	68	60	66	44	65	53	63	69	53	65

Table A3.5. Event 244 sectioned-and-stained otoliths: Relative bias by reader and modal age. Modal age is based on advanced readers only.

Mod. age	R01	R02	R03	R04	R05	R06	R07	R10	R11	R12	R13	R15	R16	all
	BE	BE	FR	IS	IS	NL	NL	DK	DK	DK	FR	DE	NL	
1	0.00	0.50	0.00	0.00	0.50	0.25	-0.25	1.00	0.50	0.00	0.00	0.00	0.00	0.19
2	0.00	0.17	0.00	0.00	0.50	0.00	0.00	-0.25	0.33	0.00	0.00	0.00	0.50	0.11
3	0.00	0.00	0.00	0.00	0.30	-0.13	0.30	0.00	0.00	0.20	0.00	0.40	1.00	0.17
4	0.20	-0.09	-0.27	-0.09	0.20	0.00	-0.27	0.11	0.20	0.00	-0.09	0.45	0.18	0.04
5	-0.29	0.00	-0.50	-0.43	0.29	-0.29	-0.14	-1.00	-0.14	-0.14	-0.43	0.00	0.14	-0.22
6	0.08	-0.15	-0.23	-0.23	0.08	0.17	-0.31	-0.55	-0.15	0.31	-0.23	0.08	-0.15	-0.10
7	0.00	-0.50	-1.00	-0.50	0.50	0.50	0.50	-1.50	1.00	0.50	0.00	0.00	0.50	0.00
8	0.00	0.25	-0.25	-0.25	0.25	0.00	0.00	-2.00	0.25	0.75	-0.75	0.50	1.25	0.00
9	0.00	0.20	-1.20	-1.60	-0.40	-0.20	-0.60	-2.00	0.00	-0.80	-0.80	0.60	0.00	-0.48
10	0.50	-0.50	-3.00	-2.00	-2.50	0.50	-1.50	-3.00	0.00	-0.50	-1.50	1.00	1.00	-0.88
Wei Mea	0.03	-0.00	-0.39	-0.33	0.13	0.02	-0.17	-0.58	0.10	0.06	-0.27	0.27	0.34	-0.06



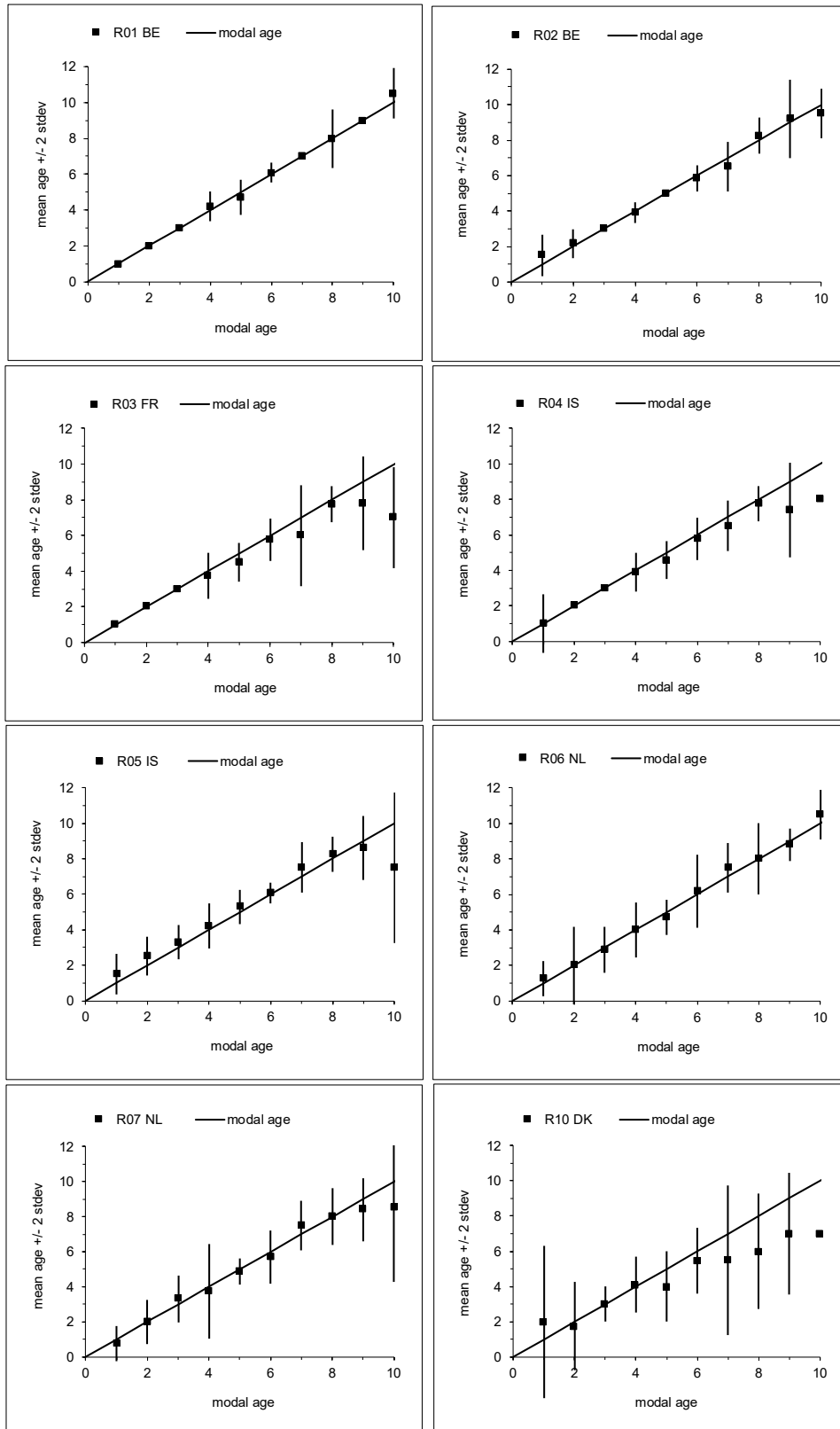


Figure A3.2. Event 244 sectioned-and-stained otoliths: Reader bias plots. For each reader the mean age ( $\pm 2$  stdev) as a function of modal age. Modal age is based on advanced readers only.

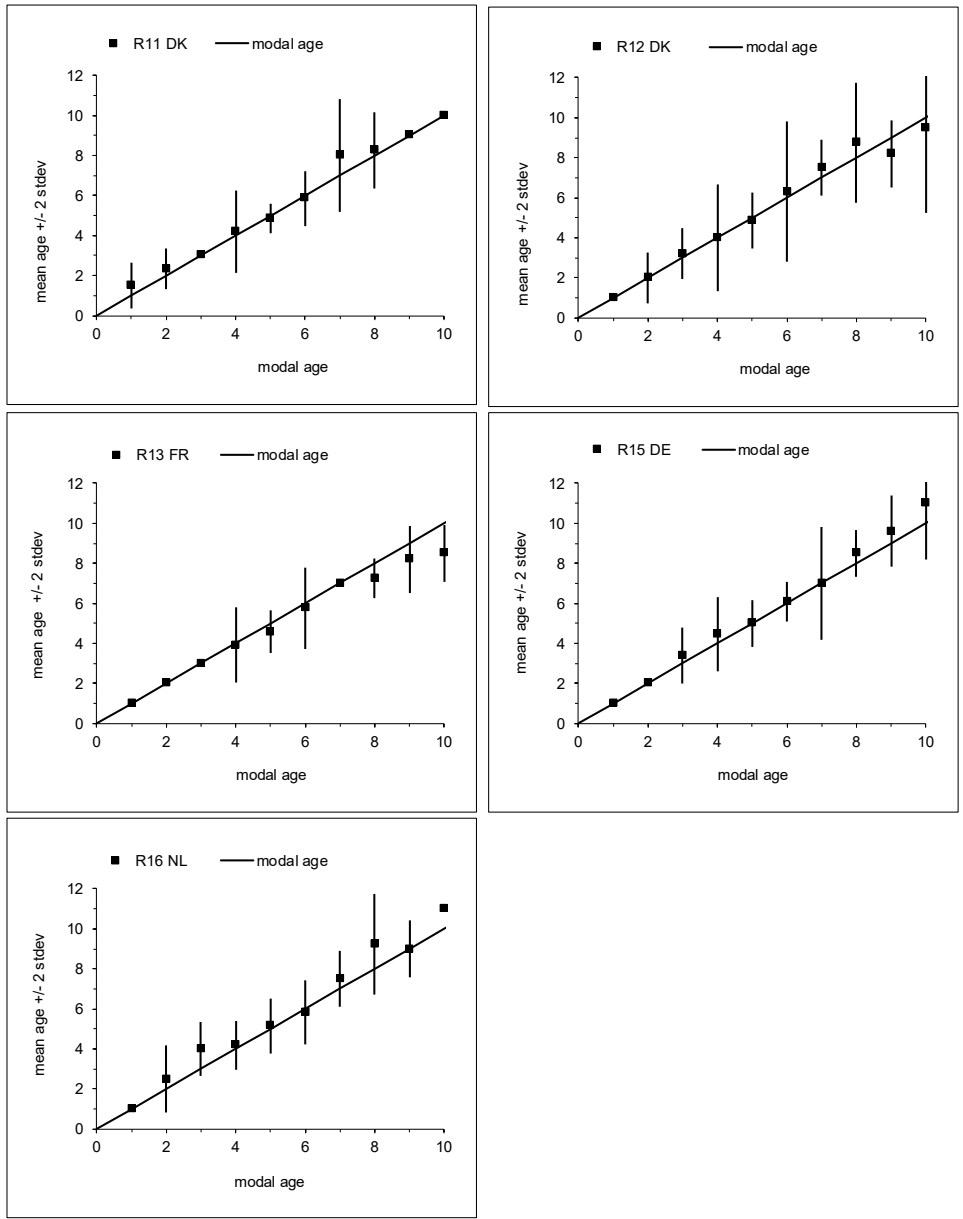


Figure A3.2. Continued.

## Annex 4 – Event 245 whole otoliths

Table A4.1. Event 245 whole otoliths: Data overview including modal age and statistics per otolith. Modal age is based on advanced readers only.

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	Modal age	PA %	CV %	APE %	
dab_BE_BYDR01_00001	160		15/jan/13	274.c	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3	81	14	11	
dab_BE_BYDR01_00007	190		15/jan/13	274.c	5	-	2	4	5	6	6	-	2	5	1	3	6	6	3	6	5	21	41	36	
dab_BE_BYDR01_00037	180		2/jun/15	274.c	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	94	9	4	
dab_BE_BYDR01_00054	240		2/jun/15	274.c	6	6	6	6	7	6	6	7	6	6	6	6	6	6	5	6	6	81	7	4	
dab_BE_BYDR03_47582	150		1/jun/15	274.c	4	3	3	3	3	4	3	2	2	3	2	2	4	4	1	4	3	38	32	24	
dab_BE_BYDR03_47622	240		1/jun/15	274.c	6	6	6	5	6	6	6	5	4	6	6	4	6	7	5	6	6	63	14	11	
dab_BE_BYDR05_00002	170		12/may/14	274.c	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	94	9	4	
dab_BE_BYDR05_00031	260		12/may/14	274.c	6	6	6	6	6	6	6	-	6	6	6	6	6	6	5	6	6	93	4	2	
dab_BE_BYDR06_53071	275	F	14/aug/15	274.c	6	6	5	6	6	6	6	6	6	5	5	5	6	6	6	6	6	75	8	7	
dab_BE_BYDR06_53072	265	F	14/aug/15	274.c	3	4	3	4	3	3	3	4	4	3	3	3	4	3	3	4	3	63	15	14	
dab_BE_BYDR09_00017	260		2/nov/14	274.c	7	6	4	5	6	6	5	5	4	4	6	5	6	8	6	5	6	38	20	16	
dab_BE_BYDR11_00001	180		4/dec/14	274.c	3	4	2	3	3	3	3	2	2	3	2	3	3	2	4	3	56	23	18		
dab_BE_CDDR01_04872	160		19/mar/15	274.c	2	3	2	3	3	3	3	3	3	-	2	3	3	3	3	3	80	15	11		
dab_BE_CDDR01_04897	210		19/mar/15	274.c	6	6	5	5	6	6	5	6	6	5	6	6	6	6	5	6	69	8	8		
dab_BE_CDDR06_57481	180		27/nov/15	274.c	3	4	3	3	3	3	3	4	4	3	3	3	3	3	4	3	75	14	12		
dab_BE_CDDR09_226188	250		22/dec/16	274.c	7	6	5	6	7	7	6	6	6	5	8	5	7	7	5	7	6	31	15	13	
dab_BE_GNKT07_50683	210	F	4/jul/17	274.c	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	75	20	17		
dab_BE_GNKT08_00006	170		25/sep/13	274.c	3	3	2	3	3	3	3	3	3	2	2	3	3	3	3	4	3	75	17	11	
dab_BE_NZ4_00016	245	F	9/jul/13	274.c	6	6	4	5	6	6	6	6	5	5	6	6	6	6	6	6	75	11	8		
dab_BE_NZ6_00003	265	F	1/oct/13	274.c	6	6	5	6	6	6	6	5	-	5	6	6	6	6	6	7	6	73	9	6	
dab_BE_NZ6_00004	250	F	1/oct/13	274.c	3	4	3	3	3	3	3	4	3	3	3	3	3	3	3	4	3	81	13	10	
dab_BE_PTCT03_2017040310369	195	F	3/apr/17	274.c	3	3	3	3	3	3	3	-	2	3	3	3	3	3	3	3	93	9	4		
dab_BE_PTCT03_2017040310370	200	F	3/apr/17	274.c	8	6	5	5	6	6	7	5	2	5	6	6	5	7	7	7	5	31	24	17	
dab_IS_B11_2018_823	280	M	22/aug/18	275.a	7	6	5	6	6	8	8	6	6	7	6	6	9	8	9	6	44	18	15		
dab_IS_B11_2018_824	260	M	22/aug/18	275.a	3	4	2	4	3	3	3	4	3	3	3	3	3	5	5	6	3	56	29	23	
dab_IS_HIJUN_2010_18_4	300		25/jun/10	275.a	7	7	7	7	9	9	7	8	8	-	9	6	8	11	10	9	7	33	17	13	
dab_IS_HIJUN_2010_18_44	280		25/jun/10	275.a	4	5	3	4	4	4	4	5	5	4	4	4	3	5	5	4	4	56	16	12	
dab_IS_OMAI_2015_13_23	280	F	26/may/15	275.a	3	5	3	3	3	3	3	3	4	4	3	3	7	4	3	3	69	31	22		
dab_IS_OMAI_2015_13_3	300	F	26/may/15	275.a	7	7	6	7	7	8	8	-	7	7	7	6	5	8	9	8	7	47	14	10	
dab_IS_R1APR_2018_35_2	300	M	24/apr/18	275.a	4	4	3	4	4	4	6	4	4	4	4	4	3	9	4	5	4	69	32	20	
dab_IS_R1APR_2018_35_22	270	M	24/apr/18	275.a	7	7	5	8	7	7	8	8	8	5	6	7	6	9	10	6	7	31	19	14	
dab_IS_R1DES_2015_33_15	340	F	18/dec/15	275.a	3	4	3	3	3	3	4	3	3	2	3	3	2	7	4	4	3	56	34	23	
dab_IS_R1DES_2015_7_4	350	F	2/dec/15	275.a	6	7	5	6	6	6	6	5	5	6	6	6	7	8	8	7	6	50	15	12	
dab_IS_R1FEB_2018_8_2	330	F	17/feb/18	275.a	4	4	3	4	3	4	4	4	4	3	3	4	4	9	3	3	4	56	36	18	
dab_IS_R1FEB_2018_8_5	370	F	17/feb/18	275.a	7	7	5	7	7	7	6	6	6	6	7	7	6	9	8	6	7	44	14	11	
dab_IS_R1JAN_2010_21_17	340		20/jan/10	275.a	7	7	4	6	7	6	5	-	5	5	5	7	5	12	6	5	7	27	31	21	
dab_IS_R1JAN_2010_21_40	350		20/jan/10	275.a	6	6	4	5	4	4	4	-	5	4	4	5	3	7	7	4	4	47	25	21	
dab_IS_R1JUL_2010_7_17	280	M	1/jul/10	275.a	6	6	5	6	6	6	6	6	6	7	6	6	6	7	8	7	6	63	12	9	
dab_IS_R1JUL_2010_7_18	210	M	1/jul/10	275.a	3	4	2	3	3	3	3	3	2	3	3	2	4	5	4	4	3	50	26	20	
dab_IS_R1MAR_2018_13_2	360	F	5/mar/18	275.a	3	6	3	5	5	5	2	-	4	4	3	4	3	6	4	3	5	20	30	23	
dab_IS_R1MAR_2018_13_7	370	F	5/mar/18	275.a	7	7	5	6	7	7	8	8	8	5	6	7	7	10	7	6	7	44	18	13	
dab_IS_R1NOV_2016_11_2	310	F	10/nov/16	275.a	3	4	3	3	3	3	3	3	2	3	3	2	3	3	4	3	75	17	8		
dab_IS_R1NOV_2016_11_7	280	M	10/nov/16	275.a	7	7	5	6	6	7	6	6	6	7	7	5	7	7	7	6	38	11	10		
dab_IS_R1OCT_2018_10_3	290	M	8/oct/18	275.a	3	4	3	3	3	3	3	3	3	3	3	3	4	3	4	3	81	13	10		
dab_IS_R1SEP_2018_1_11	370	F	3/sep/18	275.a	5	7	6	6	7	6	6	6	5	5	6	6	10	7	7	7	6	50	19	13	
dab_IS_R1SEP_2018_1_13	330	F	3/sep/18	275.a	4	5	3	4	5	4	4	4	4	3	3	4	4	5	4	5	4	56	17	12	
dab_NL_2014_6000602_032	214	F	30/jan/14	274.b	6	7	5	5	8	5	5	5	5	6	7	4	7	6	6	7	5	38	19	15	
dab_NL_2015_0121001_001	233	F	26/jan/15	274.b	7	6	5	6	8	6	5	4	4	6	4	5	6	7	6	7	6	38	21	16	
dab_NL_2015_0121005_004	234	F	13/apr/15	274.b	5	5	5	5	4	5	4	4	4	2	3	3	4	4	4	5	31	21	14		
dab_NL_2015_2100036_291	292	F	1/oct/15	274.b	6	7	6	6	6	6	6	6	6	6	6	6	6	7	6	6	6	81	7	4	
dab_NL_2015_6000521_005	238	F	2/feb/15	274.b	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0	
dab_NL_2015_6000629_018	173	M	10/mar/15	274.b	5	5	4	5	5	5	5	6	4	5	5	5	5	5	5	5	5	81	9	5	
dab_NL_2015_6000629_029	219	F	10/mar/15	274.b	8	9	7	5	6	8	7	6	5	7	6	7	8	8	8	7	7	31	16	13	
dab_NL_2015_6000658_026	206	F	16/apr/15	274.b	6	6	6	4	6	6	6	-	4	5	6	6	6	6	6	6	6	80	13	9	
dab_NL_2015_6000685_024	219	M	19/may/15	274.b	5	5	5	4	5	5	6	5	5	5	5	6	5	8	5	0	8	5	63	34	18
dab_NL_2015_6000695_023	183	F	3/jun/15	274.b	5	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	81	10	7	
dab_NL_2015_6000712_035	253	F	19/jun/15	274.b	8	7	7	6	7	7	7	8	8	6	7	7	8	7	7	7	7	63	9	6	
dab_NL_2015_6000733_022	173	F	15/jul/15	274.b	4	3	3	3	3	3	3	3	3	-	3	3	3	3	3	4	3	87	11	7	
dab_NL_2015_6000733_043	245	M	15/jul/15	274.b	8	6	5	6	8	5	8	-	5	6	8	6	9	8	7	6	8	33	20	18	
dab_NL_2015_6000752_016	184	M	6/aug/15	274.b	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	94	8	4	
dab_NL_2015_6000773_039	221	F	30/aug/15	274.b	7	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	94	4	2	
dab_NL_2015_6000778_028	196	M	10/sep/15	274.b	7	7	6	6	6	6	6	3	0	6	6	6	7	7	6	7	6	56	31	18	
dab_NL_2015_6000827_018	174	M	3/nov/15	274.b	3	4	3	4	2	3	3	3	3	3	3	3	3	3	4	3	69	17	13		
dab_NL_2015_6000827_035	251	F	3/nov/15	274.b	6	6	6	7	6	6	6	6	6	5	7	6	6	6	6	6	6	81	7	4	
dab_NL_2015_6000848_025	184	F	3/dec/15	274.b	7	8	6	5	7	7	7	6	6	6	7	7	7	7	7	8	7	56	11	9	
dab_NL_2016_0121016_006	245	F	9/dec/16	274.b	5	5	5	5	5	5	5	5	5	-	5	5	5	5	6	5	93	5	2		
dab_NL_2016_0121016_007	246	F	9/dec/16	274.b	7	6	5	5	5	5	6</														

Table A4.2. Event 245 whole otoliths: Age composition and total number of age readings by reader and for modal age. Modal age is based on advanced readers only.

Age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	modal age
0									1						1		
1											1				1		
2	1		7		2	1	2	4	8	4	6	4	2	1	4	1	1
3	20	10	21	19	21	20	20	15	12	18	19	19	22	15	15	10	21
4	6	14	5	12	5	7	7	9	14	9	5	9	6	4	8	16	6
5	7	7	20	13	7	8	7	13	12	16	4	9	7	7	8	7	9
6	14	19	10	18	17	19	20	13	15	13	19	17	17	12	13	15	19
7	15	13	4	5	12	8	6	2	2	6	9	9	8	13	10	14	10
8	4	2	1	1	3	3	5	3	3		2		4	7	5	3	1
9	1	2			1	1					1	1	2	4	1	2	1
10							1							2	2		
11						1								2			
12														1			
Total	68	67	68	68	68	68	68	59	67	66	66	68	68	68	68	68	68

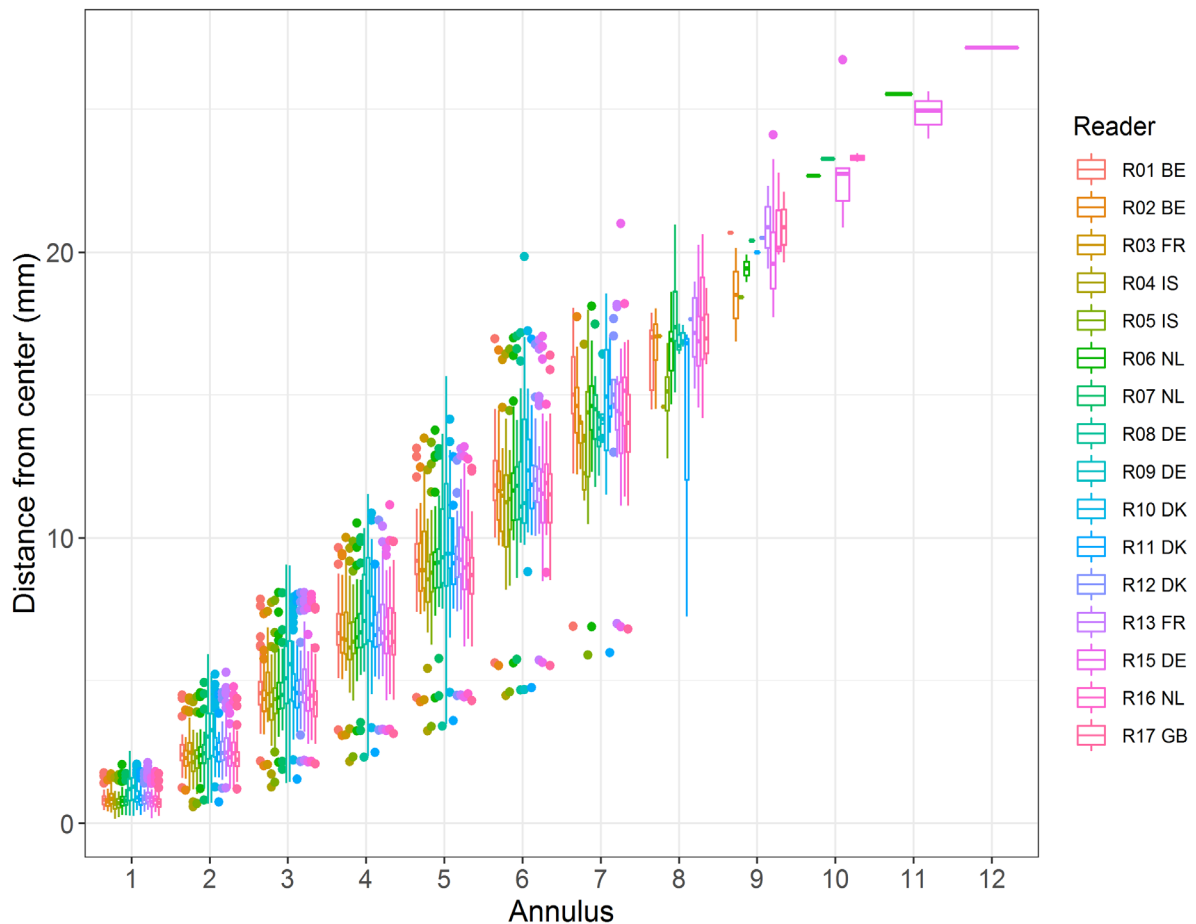


Figure A4.1. Event 245 whole otoliths: Average distance from the nucleus to the start of the new annulus. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

Table A4.3. Event 245 whole otoliths: Coefficient of variation (CV in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	all
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	13	16	16	11	7	7	7	19	23	15	15	15	16	35	28	19	17
4	19	17	15	10	16	0	19	12	12	14	14	10	16	33	31	18	23
5	26	13	25	11	21	8	28	8	33	16	49	23	31	16	47	27	22
6	9	7	13	11	9	9	10	17	30	14	14	11	13	15	16	14	13
7	6	9	19	15	10	11	13	14	18	14	16	6	16	19	17	17	15
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	12	12	16	11	10	7	13	15	23	14	18	13	17	23	24	17	17

Table A4.4. Event 245 whole otoliths: Percentage agreement (PA in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	all
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	0	0	100	0	100	100	100	100	100	100	100	100	0	100	100	100	75
4	86	43	76	86	95	95	95	70	57	80	80	81	76	71	62	38	74
5	67	50	33	83	67	100	83	60	50	67	67	83	50	17	50	50	61
6	56	50	78	67	67	78	33	86	44	44	13	44	44	33	22	11	48
7	63	74	42	68	79	84	79	53	61	37	68	68	74	42	53	42	62
8	80	70	40	40	80	60	50	13	20	33	50	80	40	20	40	30	47
9	100	0	0	0	100	0	100	-	0	0	100	0	0	100	0	0	33
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	72	57	56	68	81	82	74	58	49	53	62	72	60	46	49	35	61

Table A4.5. Event 245 whole otoliths: Relative bias by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	all
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.25
3	0.05	0.62	-0.24	0.14	-0.05	0.05	0.05	0.00	-0.05	-0.10	-0.20	-0.10	0.05	0.67	0.00	0.71	0.10
4	0.50	0.67	-0.67	0.17	0.00	0.00	0.33	0.40	0.50	-0.33	-0.33	0.17	-0.50	2.50	0.50	0.17	0.25
5	0.44	0.63	-0.56	-0.33	0.33	0.22	0.11	-0.14	-0.78	-0.11	-0.50	-0.56	0.22	0.56	-0.56	0.89	-0.01
6	0.26	0.26	-0.68	-0.26	0.26	0.21	-0.05	-0.53	-0.89	-0.47	0.00	-0.26	0.26	0.89	0.21	0.47	-0.01
7	0.20	0.40	-1.10	-0.60	0.10	0.30	0.00	-0.13	-0.40	-1.00	-0.30	-0.20	-0.40	1.90	0.90	-0.10	-0.02
8	0.00	-2.00	-3.00	-2.00	0.00	-3.00	0.00	-	-3.00	-2.00	0.00	-2.00	1.00	0.00	-1.00	-2.00	-1.27
9	0.00	0.00	-1.00	-3.00	-2.00	2.00	1.00	-5.00	-5.00	-2.00	-2.00	0.00	-1.00	2.00	-2.00	-4.00	-1.38
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	0.24	0.45	-0.62	-0.21	0.09	0.13	0.06	-0.24	-0.49	-0.41	-0.23	-0.22	0.03	1.06	0.12	0.38	0.01

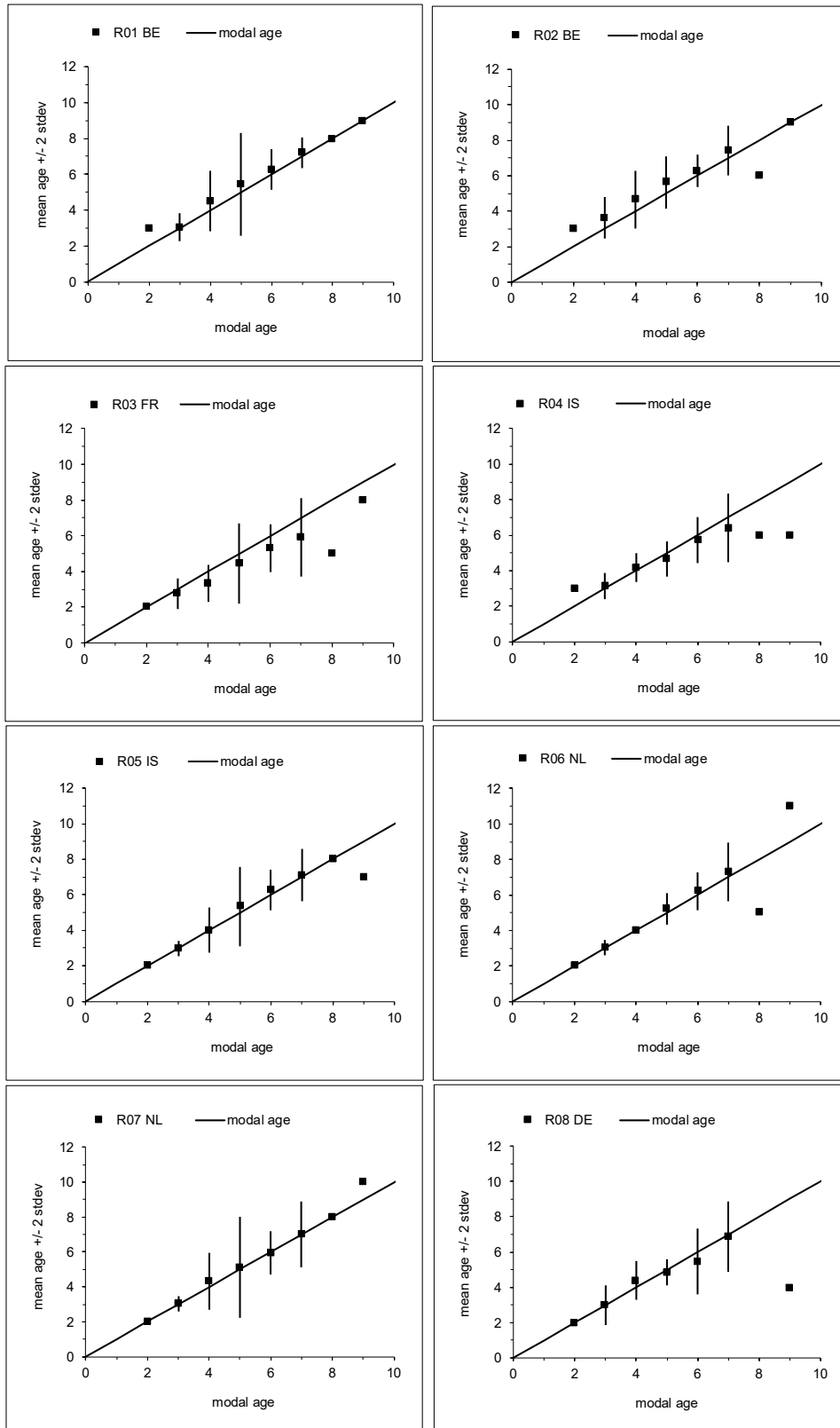


Figure A4.2. Event 245 whole otoliths: Reader bias plots. For each reader the mean age (+/- 2 stdev) as a function of modal age. Modal age is based on advanced readers only.

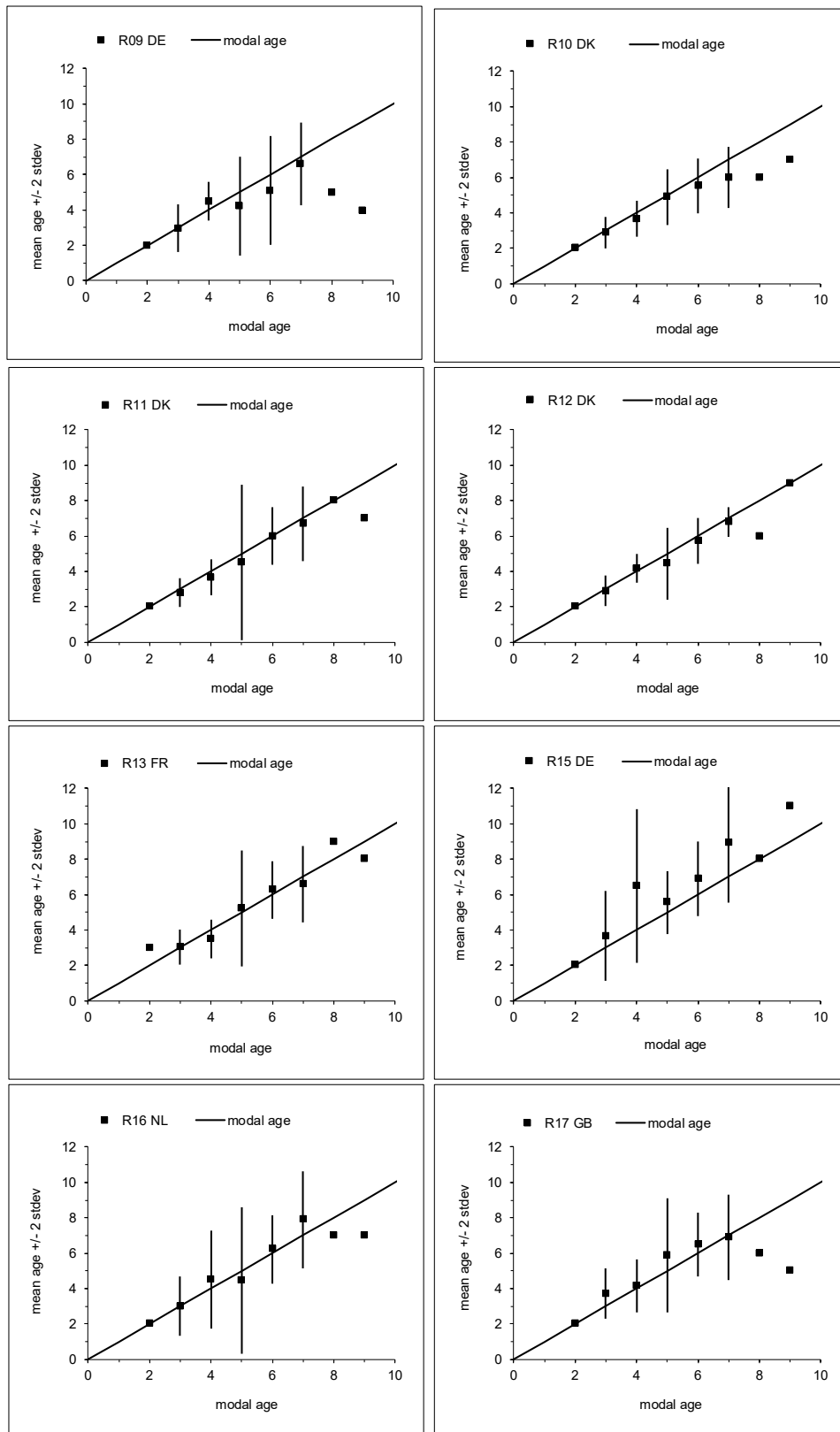


Figure A4.2. Continued.





Table A5.2. Event 245 sectioned-and-stained otoliths: Age composition and total number of age readings by reader and for modal age. Modal age is based on advanced readers only.

Age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	modal age
0			2								1						
1									1		1						
2	1	1	2	6	3		1		1	1		1	2		1	2	1
3	16	17	17	12	17	15	19	11	14	14	12	16	18	17	7	16	18
4	9	9	6	8	5	9	8	14	12	5	10	11	6	8	11	10	9
5	4	2	12	18	8	6	6	8	6	11	5	4	10	4	9	13	5
6	17	17	15	17	15	17	17	15	17	19	15	15	15	17	14	14	19
7	9	12	8	6	9	7	9	7	7	5	7	7	6	8	8	8	8
8	8	5	2	1	7	6	5	6	5	7	6	8	5	5	8	3	5
9	2	2			4	5	1	3	3	2	2	2	4	5	5	1	1
10	1	1	1			1	1			2	2	2	1	2	3		1
11		1	2			1	1	1			1	1	1	1	1		1
12	1																1
13															1		
14												1					
15									1								
16								1									
Total	68	67	67	68	68	67	68	66	67	66	62	68	68	67	68	68	68

Table A5.3. Event 245 sectioned-and-stained otoliths: Coefficient of variation (CV in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	all
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	10	0	27	26	14	42	0	18	14	58	35	12	50	41	40	15	18
4	10	8	40	13	19	10	9	10	13	28	16	19	15	20	9	12	16
5	26	31	0	0	22	24	22	21	21	14	9	20	9	22	23	9	14
6	9	7	9	9	9	9	10	11	9	10	19	16	15	9	11	11	10
7	6	5	8	11	6	6	10	16	13	14	36	10	12	14	6	9	12
8	0	0	15	9	5	6	7	38	34	6	68	14	10	10	6	14	17
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	9	6	17	13	11	18	7	16	14	24	26	14	22	20	18	11	14

Table A5.4. Event 245 sectioned-and-stained otoliths: Percentage agreement (PA in %) by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	all
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	100	100	100	100	100	0	100	-	100	0	0	100	100	0	100	100	73
4	89	100	88	61	83	82	100	61	72	63	71	83	89	83	39	78	78
5	78	89	67	78	44	78	89	78	75	22	56	78	67	67	22	78	66
6	40	20	100	100	60	60	60	60	60	60	0	40	80	60	20	80	57
7	84	74	63	47	74	89	68	67	74	74	69	58	63	83	63	47	69
8	75	88	63	38	75	75	50	25	25	50	50	50	38	75	25	63	54
9	100	100	40	0	80	40	60	40	40	80	0	40	40	40	0	40	47
10	100	100	0	0	100	100	100	0	100	100	0	100	100	100	100	100	75
11	100	100	0	0	0	100	100	0	0	0	0	100	0	0	0	0	31
Weighted Mean	81	84	70	53	71	78	78	58	63	58	52	65	68	73	38	63	66

Table A5.5. Event 245 sectioned-and-stained otoliths: Relative bias by reader and modal age. Modal age is based on advanced readers only.

Modal age	R01 BE	R02 BE	R03 FR	R04 IS	R05 IS	R06 NL	R07 NL	R08 DE	R09 DE	R10 DK	R11 DK	R12 DK	R13 FR	R15 DE	R16 NL	R17 GB	all
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	0.00	0.00	0.00	0.00	0.00	1.00	0.00	-	0.00	1.00	2.00	0.00	0.00	1.00	0.00	0.00	0.33
4	0.11	0.00	-0.24	-0.11	-0.06	0.47	0.00	0.44	0.28	1.25	0.53	0.17	0.33	0.44	1.00	0.11	0.29
5	0.22	0.11	-0.67	0.00	0.11	0.22	-0.11	0.22	0.00	0.33	0.56	0.11	-0.11	0.22	0.78	-0.22	0.11
6	1.40	1.00	0.00	0.00	0.80	1.00	0.80	0.20	0.20	0.00	1.50	1.00	0.20	0.80	1.60	0.20	0.66
7	0.21	0.26	-0.37	-0.53	0.05	0.05	0.00	0.17	0.05	-0.32	0.31	0.16	-0.05	0.22	0.47	-0.42	0.01
8	0.25	-0.13	-0.38	-0.75	0.25	0.25	-0.25	0.13	0.00	-0.38	-0.63	0.25	0.13	0.50	0.75	-0.13	-0.01
9	0.00	0.00	0.00	-1.60	0.20	0.60	-0.40	1.60	1.40	-0.20	-0.75	1.20	0.20	0.80	1.40	-1.00	0.23
10	0.00	0.00	-2.00	-1.00	0.00	0.00	0.00	-1.00	0.00	0.00	-1.00	0.00	0.00	0.00	0.00	0.00	-0.31
11	0.00	0.00	1.00	-4.00	-1.00	0.00	0.00	-1.00	-1.00	-2.00	-2.00	0.00	-3.00	-1.00	1.00	-3.00	-1.00
Weighted Mean	0.26	0.15	-0.31	-0.51	0.07	0.33	-0.01	0.32	0.04	0.17	0.24	0.34	0.06	0.39	0.85	-0.22	0.13

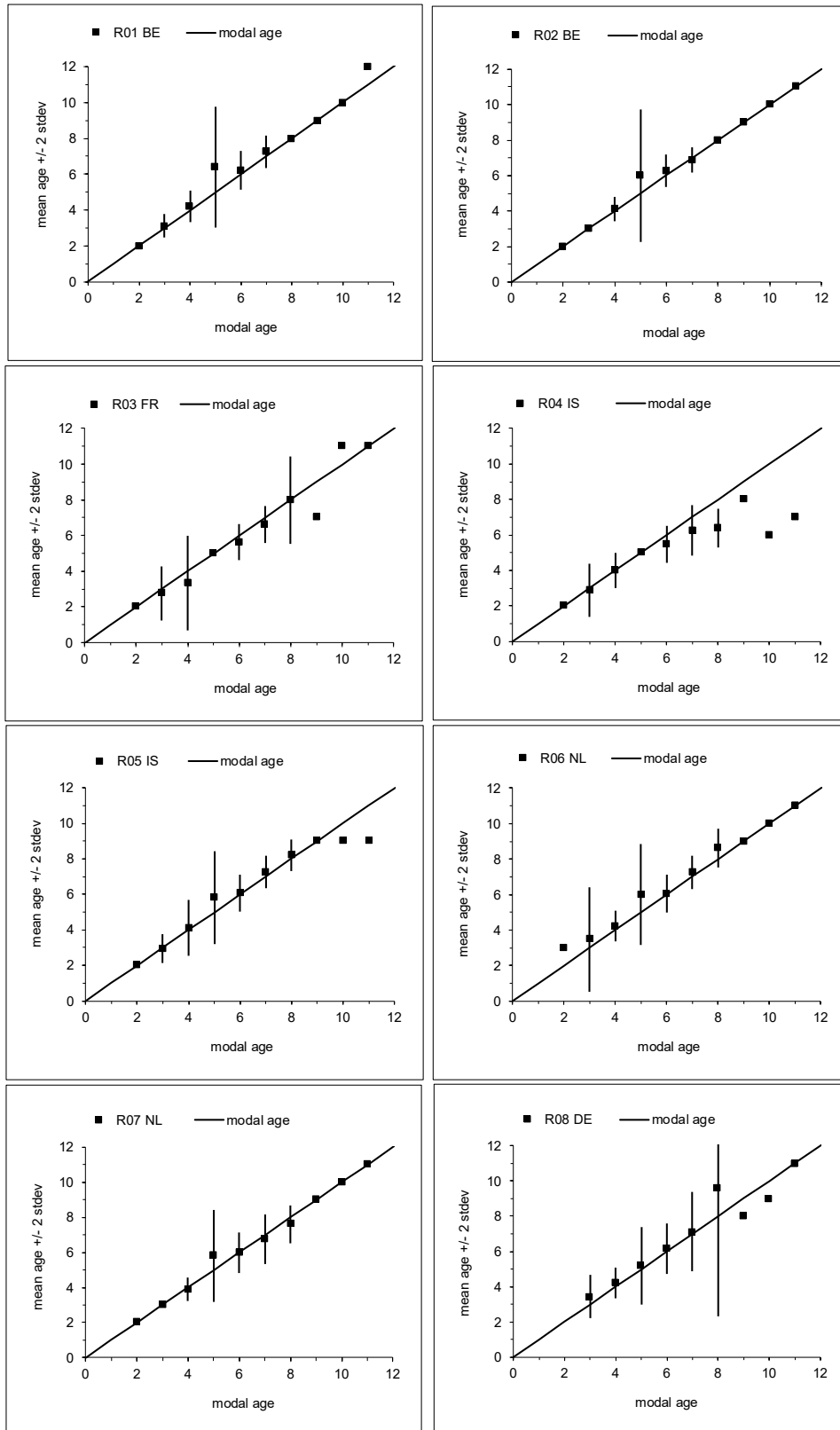


Figure A5.1. Event 245 sectioned-and-stained otoliths: Reader bias plots. For each reader the mean age ( $\pm 2$  stdev) as a function of modal age.

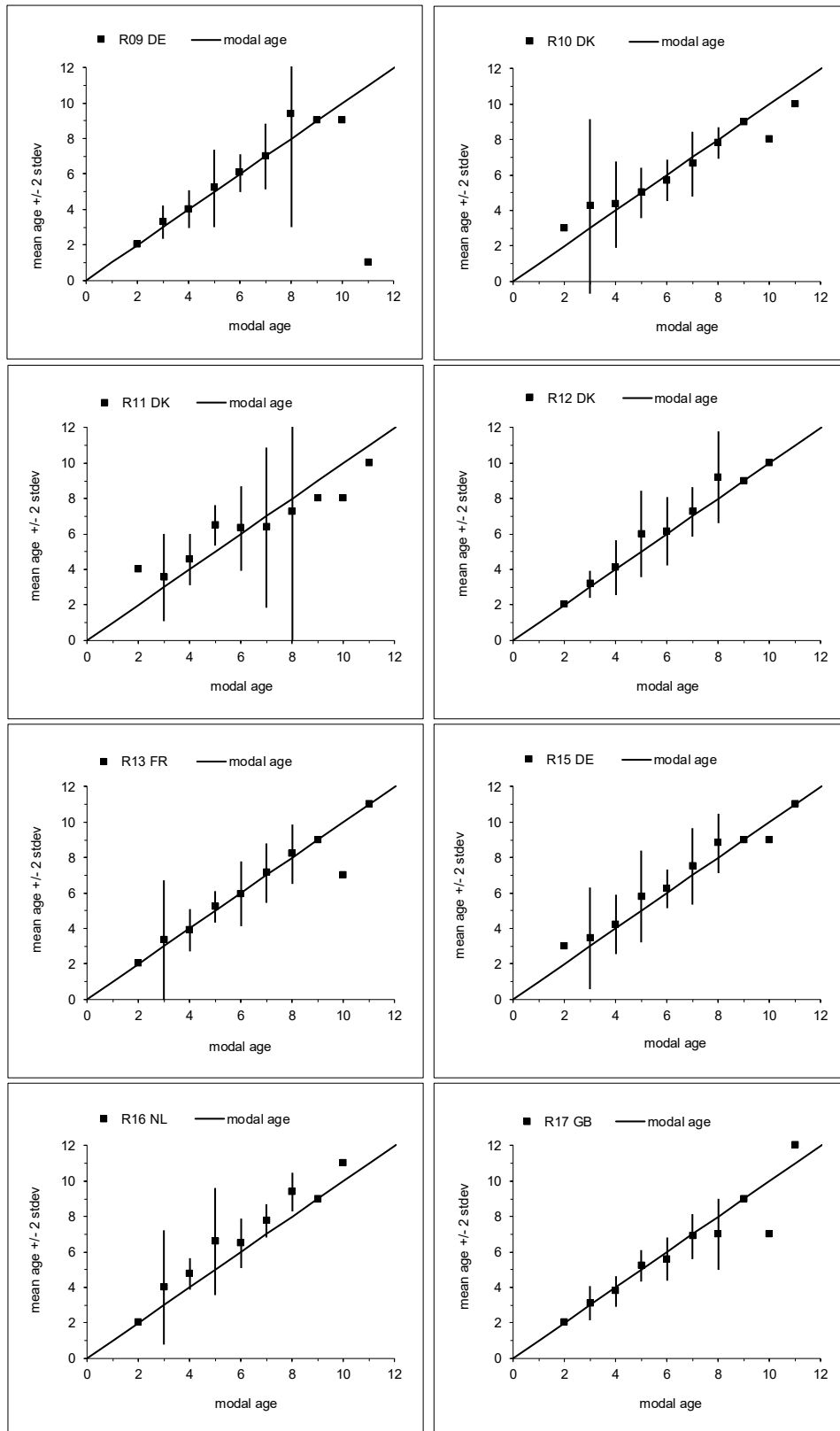


Figure A5.1. Continued.

## Annex 6 – Dab.27.3a4 whole otoliths

Table A6.1. Dab.27.3a4 whole otoliths: Data overview including modal age and statistics per otolith. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	Modal age	PA %	CV %	APE %
dab_BE_BYDR01_00001	160		15/jan/13	27.4.c	3	3	3	3	3	2	3	83	14	10
dab_BE_BYDR01_00007	190		15/jan/13	27.4.c	5	-	2	6	6	5	5	40	34	23
dab_BE_BYDR01_00033	160		6/feb/15	27.4.c	5	4	3	3	3	3	3	67	24	19
dab_BE_BYDR01_00035	170		6/feb/15	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR01_00037	180		2/jun/15	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR01_00042	190		6/feb/15	27.4.c	5	4	4	4	4	3	4	67	16	8
dab_BE_BYDR01_00050	220		6/feb/15	27.4.c	5	5	5	5	5	5	5	100	0	0
dab_BE_BYDR01_00054	240		2/jun/15	27.4.c	6	6	6	6	6	6	6	100	0	0
dab_BE_BYDR01_00058	260		6/feb/15	27.4.c	6	6	6	6	6	6	6	100	0	0
dab_BE_BYDR01_00059	150		6/feb/15	27.4.c	2	2	2	2	2	2	2	100	0	0
dab_BE_BYDR03_47582	150		1/jun/15	27.4.c	4	3	3	4	3	3	3	67	15	13
dab_BE_BYDR03_47622	240		1/jun/15	27.4.c	6	6	6	6	6	6	6	100	0	0
dab_BE_BYDR05_00002	170		12/may/14	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR05_00031	260		12/may/14	27.4.c	6	6	6	6	6	6	6	100	0	0
dab_BE_BYDR06_53071	275	F	14/aug/15	27.4.c	6	6	5	6	6	5	6	67	9	8
dab_BE_BYDR06_53072	265	F	14/aug/15	27.4.c	3	4	3	3	3	3	3	83	13	9
dab_BE_BYDR09_00017	260		2/nov/14	27.4.c	7	6	4	6	5	4	6	33	23	19
dab_BE_BYDR11_00001	180		4/dec/14	27.4.c	3	4	2	3	3	3	3	67	21	11
dab_BE_CDDR01_04872	160		19/mar/15	27.4.c	2	3	2	3	3	-	3	60	21	18
dab_BE_CDDR01_04897	210		19/mar/15	27.4.c	6	6	5	6	5	5	6	50	10	9
dab_BE_CDDR06_57481	180		27/nov/15	27.4.c	3	4	3	3	3	3	3	83	13	9
dab_BE_CDDR09_226188	250		22/dec/16	27.4.c	7	6	5	7	6	5	7	33	15	11
dab_BE_GNKT07_50683	210	F	4/jul/17	27.4.c	3	3	2	2	2	2	2	67	22	19
dab_BE_GNKT07_50684	200	F	4/jul/15	27.4.c	3	2	2	3	2	2	2	67	22	19
dab_BE_GNKT07_50688	170	F	4/jul/15	27.4.c	2	1	1	-	1	1	1	80	37	27
dab_BE_GNKT07_50695	200	F	4/jul/15	27.4.c	5	4	4	6	4	4	4	67	19	15
dab_BE_GNKT07_50718	195	F	4/jul/15	27.4.c	4	3	3	3	3	3	3	83	13	9
dab_BE_GNKT08_00006	170		25/sep/13	27.4.c	3	3	2	3	3	3	3	83	14	10
dab_BE_NZ4_00016	245	F	9/jul/13	27.4.c	6	6	4	6	6	5	6	67	15	12
dab_BE_NZ4_00019	245	F	9/jul/15	27.4.c	6	6	5	6	6	5	6	67	9	8
dab_BE_NZ6_00003	265	F	1/oct/13	27.4.c	6	6	5	6	6	5	6	67	9	8
dab_BE_NZ6_00004	250	F	1/oct/13	27.4.c	3	4	3	3	3	3	3	83	13	9
dab_BE_PTCT03_2017040310369	195	F	3/apr/17	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_PTCT03_2017040310370	200	F	3/apr/17	27.4.c	8	6	5	6	7	5	6	33	19	14
dab_DE_097_20	130	F	31/jan/15	27.4.a	3	3	1	-	3	3	3	80	34	25
dab_DE_098_01	160	F	31/jan/15	27.4.a	4	4	2	3	4	3	4	50	24	20
dab_DE_098_13	180	M	31/jan/15	27.4.a	8	3	3	2	7	4	3	33	54	44
dab_DE_148_02	130	M	6/feb/15	27.4.a	3	3	3	-	3	2	3	80	16	11
dab_DE_148_05	150	M	6/feb/15	27.4.a	4	4	3	4	4	3	4	67	14	12
dab_DE_148_27	210	F	6/feb/15	27.4.a	6	6	4	6	6	5	6	67	15	12
dab_DE_148_28	210	F	6/feb/15	27.4.a	8	7	5	-	8	7	8	40	17	11
dab_DE_148_32	230	F	6/feb/15	27.4.a	5	5	4	5	5	4	5	67	11	10
dab_DE_148_36	250	F	6/feb/15	27.4.a	10	10	4	11	10	7	10	50	31	24
dab_DK_2015_928901_002	130		1/jul/15	27.3.a	4	3	3	2	2	3	3	50	27	20
dab_DK_2015_928901_006	170		1/jul/15	27.3.a	5	4	4	5	4	4	4	67	12	10
dab_DK_2015_928901_007	180		1/jul/15	27.3.a	6	5	4	5	5	4	5	50	16	11
dab_DK_2018_257303_004	190	F	1/feb/18	27.3.a	5	4	2	2	2	2	2	67	47	39
dab_DK_2018_258003_002	230	M	14/feb/18	27.3.a	8	7	6	7	7	7	7	67	9	5
dab_DK_2018_258003_003	230	F	14/feb/18	27.3.a	5	5	5	5	5	5	5	100	0	0
dab_DK_2018_258003_004	200	F	14/feb/18	27.3.a	6	6	6	6	6	6	6	100	0	0

Table A6.1. Continued

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	Modal age	PA %	CV %	APE %
dab_DK_2018_258003_010	180	M	14/feb/18	27.3.a	6	6	6	6	6	5	6	83	7	5
dab_DK_2018_263801_010	210	F	11/jul/18	27.3.a	7	6	6	7	6	5	6	50	12	9
dab_DK_2018_263801_014	130	F	11/jul/18	27.3.a	4	3	3	1	4	3	3	50	37	22
dab_NL_2010_6000634_001	83	M	4/feb/10	27.4.b	1	1	1	1	1	1	1	100	0	0
dab_NL_2010_6000634_004	75	M	4/feb/10	27.4.b	1	1	1	1	0	1	1	83	49	33
dab_NL_2014_0121003_050	309	F	14/feb/14	27.4.c	9	9	8	9	9	6	9	67	15	11
dab_NL_2014_1400025_271	262	F	26/aug/14	27.4.a	9	9	4	4	7	4	4	50	40	35
dab_NL_2014_6000602_032	214	F	30/jan/14	27.4.b	6	7	5	5	5	6	5	50	14	12
dab_NL_2015_0121001_001	233	F	26/jan/15	27.4.b	7	6	5	6	5	6	6	50	13	10
dab_NL_2015_0121003_009	246	F	13/feb/15	27.4.c	-	5	4	5	5	5	5	80	9	7
dab_NL_2015_0121003_015	252	F	13/feb/15	27.4.c	7	8	4	6	6	5	6	33	24	17
dab_NL_2015_0121003_023	262	F	13/feb/15	27.4.c	8	7	6	7	6	6	6	50	12	10
dab_NL_2015_0121005_004	234	F	13/apr/15	27.4.b	5	5	5	5	4	4	5	67	11	10
dab_NL_2015_0121009_033	268	F	10/jul/15	27.4.c	5	4	4	4	4	4	4	83	10	7
dab_NL_2015_0121009_034	264	F	10/jul/15	27.4.c	7	6	-	5	6	5	6	40	14	11
dab_NL_2015_0121010_018	261	F	13/jul/15	27.4.b	7	6	6	5	6	5	6	50	13	10
dab_NL_2015_0121010_039	283	F	13/jul/15	27.4.b	6	5	5	5	7	4	5	50	19	15
dab_NL_2015_1400011_131	144	F	20/aug/15	27.4.a	2	2	2	2	2	2	2	100	0	0
dab_NL_2015_1400016_165	272	F	21/aug/15	27.4.a	7	7	5	6	7	6	7	50	13	11
dab_NL_2015_2100036_291	292	F	1/oct/15	27.4.b	6	7	6	6	6	5	6	67	11	6
dab_NL_2015_6000521_005	238	F	2/feb/15	27.4.b	3	3	3	3	3	3	3	100	0	0
dab_NL_2015_6000521_007	227	F	2/feb/15	27.4.b	3	3	3	3	3	2	3	83	14	10
dab_NL_2015_6000521_012	216	M	2/feb/15	27.4.b	3	3	3	3	3	-	3	100	0	0
dab_NL_2015_6000605_018	155	F	3/feb/15	27.4.b	4	4	4	4	4	4	4	100	0	0
dab_NL_2015_6000605_021	163	F	3/feb/15	27.4.b	4	4	4	4	4	3	4	83	11	7
dab_NL_2015_6000605_036	212	F	3/feb/15	27.4.b	6	6	5	-	5	5	5	60	10	9
dab_NL_2015_6000607_008	143	M	3/feb/15	27.4.b	3	3	3	3	3	3	3	100	0	0
dab_NL_2015_6000629_018	173	M	10/mar/15	27.4.b	5	5	5	5	5	4	5	83	8	6
dab_NL_2015_6000629_029	219	F	10/mar/15	27.4.b	8	9	7	8	7	7	7	50	11	9
dab_NL_2015_6000658_026	206	F	16/apr/15	27.4.b	6	6	6	6	6	5	6	83	7	5
dab_NL_2015_6000685_024	219	M	19/may/15	27.4.b	5	5	5	5	6	5	5	83	8	5
dab_NL_2015_6000695_023	183	F	3/jun/15	27.4.b	5	4	4	4	4	4	4	83	10	7
dab_NL_2015_6000712_035	253	F	19/jun/15	27.4.b	8	7	7	7	7	6	7	67	9	5
dab_NL_2015_6000733_022	173	F	15/jul/15	27.4.b	4	3	3	3	3	3	3	83	13	9
dab_NL_2015_6000733_033	201	M	15/jul/15	27.4.b	7	6	5	6	6	5	6	50	13	10
dab_NL_2015_6000733_039	226	M	15/jul/15	27.4.b	6	5	4	6	5	3	6	33	24	18
dab_NL_2015_6000733_043	245	M	15/jul/15	27.4.b	8	6	5	5	8	6	8	33	22	18
dab_NL_2015_6000752_016	184	M	6/aug/15	27.4.b	3	4	3	3	3	3	3	83	13	9
dab_NL_2015_6000773_039	221	F	30/aug/15	27.4.b	7	8	7	7	7	7	7	83	6	4
dab_NL_2015_6000778_028	196	M	10/sep/15	27.4.b	7	7	6	6	6	6	6	67	8	7
dab_NL_2015_6000827_018	174	M	3/nov/15	27.4.b	3	4	3	3	3	3	3	83	13	9
dab_NL_2015_6000827_035	251	F	3/nov/15	27.4.b	6	6	6	6	6	5	6	83	7	5
dab_NL_2015_6000848_025	184	F	3/dec/15	27.4.b	7	8	6	7	7	6	7	50	11	8
dab_NL_2016_0121003_011	278	F	12/feb/16	27.4.b	7	7	6	6	6	6	6	67	8	7
dab_NL_2016_0121003_018	277	F	12/feb/16	27.4.b	-	9	8	9	8	7	9	40	10	8
dab_NL_2016_0121003_033	292	F	12/feb/16	27.4.b	11	10	9	9	11	8	11	33	13	10
dab_NL_2016_0121012_003	256	F	11/jul/16	27.4.a	8	7	5	3	3	5	5	33	40	30
dab_NL_2016_0121012_005	263	F	11/jul/16	27.4.a	3	4	2	3	3	2	3	50	27	20
dab_NL_2016_0121012_028	302	F	11/jul/16	27.4.a	5	4	4	4	4	-	4	80	11	8
dab_NL_2016_0121012_042	312	F	11/jul/16	27.4.a	9	8	6	6	5	5	6	33	25	21
dab_NL_2016_0121012_047	332	F	11/jul/16	27.4.a	6	7	5	5	4	-	5	40	21	16
dab_NL_2016_0121016_006	245	F	9/dec/16	27.4.b	5	5	5	5	5	5	5	100	0	0
dab_NL_2016_0121016_007	246	F	9/dec/16	27.4.b	7	6	5	5	6	6	6	50	13	10
dab_NL_2016_1400011_127	131	M	25/aug/16	27.4.a	1	1	1	1	1	1	1	100	0	0
dab_NL_2016_6000054_001	124	M	14/jul/16	27.4.c	2	1	1	1	1	1	1	83	35	24
dab_NL_2016_6000602_032	246	M	12/may/16	27.4.b	9	9	8	11	10	7	9	33	16	11

Table A6.2. Dab.27.3a4 whole otoliths: Age composition and total number of age readings by reader and for modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	modal age
0					1		
1	3	5	6	5	4	5	5
2	5	3	11	6	6	9	5
3	21	20	23	24	25	25	27
4	9	19	18	9	13	13	11
5	16	11	23	17	14	26	15
6	21	25	17	27	26	16	29
7	14	11	3	7	10	7	7
8	9	4	3	1	3	1	2
9	4	5	1	3	1		3
10	1	2			2		1
11	1			2	1		1
Total	104	105	105	101	106	102	106

Table A6.3. Dab.27.3a4 whole otoliths: Age error matrix (AEM). The AEM shows the proportional distribution of age readings for each modal age. Age column should sum to one but due to rounding there might be small deviations in some cases. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	1	2	3	4	5	6	7	8	9	10	11
Age 0	0.034										
Age 1	0.897		0.013								
Age 2	0.069	0.800	0.076	0.015	0.012						
Age 3		0.133	0.791	0.092	0.023	0.006					
Age 4		0.033	0.101	0.723	0.116	0.035				0.167	
Age 5		0.033	0.006	0.108	0.674	0.197	0.071	0.273			
Age 6				0.015	0.116	0.636	0.190	0.182	0.059		
Age 7			0.006	0.015	0.047	0.098	0.571	0.182	0.118	0.167	
Age 8			0.006		0.012	0.023	0.143	0.364	0.235		0.167
Age 9				0.031		0.006	0.024		0.471		0.333
Age 10									0.059	0.500	0.167
Age 11									0.059	0.167	0.333

Table A6.4. Dab.27.3a4 whole otoliths: Coefficient of variation (CV in %) by reader and modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	all
1	39	0	0	0	56	0	24
2	41	34	0	20	0	0	18
3	32	14	18	18	26	15	15
4	28	34	17	18	21	14	15
5	15	16	18	12	19	13	13
6	12	10	15	7	8	13	11
7	7	13	15	8	6	12	10
8	0	11	0	-	0	11	20
9	0	0	0	12	11	9	13
10	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-
Weighted Mean	21	15	14	12	17	12	14

Table A6.5. Dab.27.3a4 whole otoliths: Percentage agreement (PA in %) by reader and modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	all
1	60	100	100	100	80	100	90
2	40	60	100	80	100	100	80
3	70	70	81	84	89	80	79
4	36	91	82	73	91	60	72
5	57	71	73	86	60	57	67
6	55	76	54	83	79	34	64
7	57	43	43	71	86	43	57
8	100	0	0	0	100	0	36
9	100	100	0	67	33	0	47
10	100	100	0	0	100	0	50
11	100	0	0	0	100	0	33
Weighted Mean	60	72	67	79	81	56	69

Table A6.6. Dab.27.3a4 whole otoliths: Relative bias by reader and modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	all
1	0.40	0.00	0.00	0.00	-0.20	0.00	0.03
2	1.00	0.60	0.00	0.20	0.00	0.00	0.30
3	0.41	0.30	-0.22	-0.12	0.15	-0.12	0.07
4	1.00	0.45	-0.27	0.18	0.27	-0.40	0.22
5	0.57	0.50	-0.40	-0.07	0.00	-0.29	0.05
6	0.59	0.24	-0.64	-0.03	-0.14	-0.76	-0.12
7	0.43	0.43	-0.86	0.00	-0.14	-0.71	-0.14
8	0.00	-1.50	-3.00	-3.00	0.00	-1.50	-1.36
9	0.00	0.00	-1.00	0.67	0.00	-2.33	-0.47
10	0.00	0.00	-6.00	1.00	0.00	-3.00	-1.33
11	0.00	-1.00	-2.00	-2.00	0.00	-3.00	-1.33
Weighted Mean	0.55	0.28	-0.53	-0.04	0.01	-0.53	-0.04



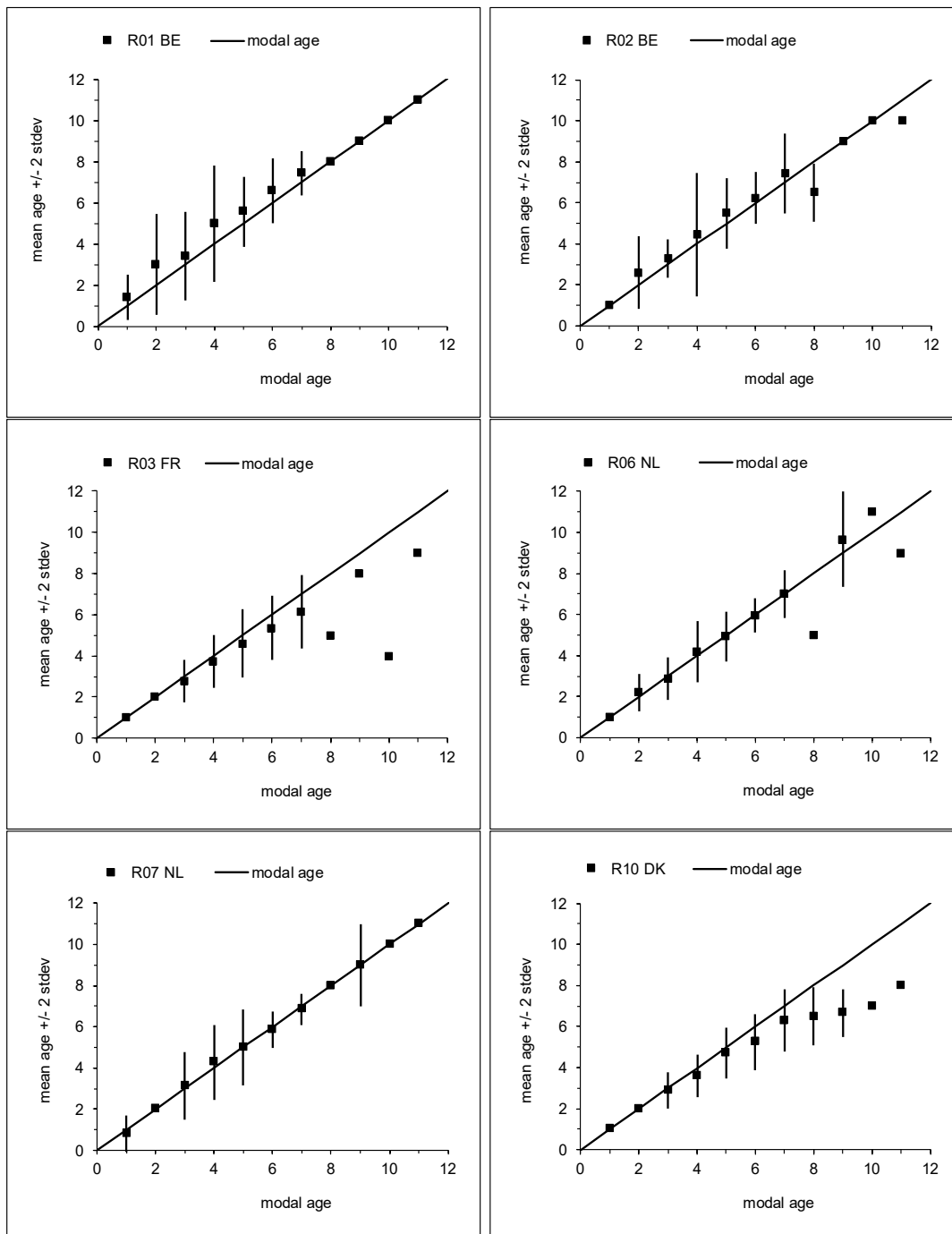


Figure A6.1. Dab.27.3a4 whole otoliths: Reader bias plots. For each reader the mean age ( $\pm 2$  stdev) as a function of modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

## Annex 7 – Dab.27.3a4 sectioned-and-stained otoliths

Table A7.1. Dab.27.3a4 sectioned-and-stained otoliths: Data overview including modal age and statistics per otolith. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	Modal age	PA %	CV %	APE %
dab_BE_BYDR01_00001	160		15/jan/13	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR01_00007	190		15/jan/13	27.4.c	6	6	5	6	6	6	6	83	7	5
dab_BE_BYDR01_00033	160		6/feb/15	27.4.c	-	3	3	2	3	3	3	80	16	11
dab_BE_BYDR01_00035	170		6/feb/15	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR01_00037	180		2/jun/15	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR01_00042	190		6/feb/15	27.4.c	4	4	4	4	4	4	4	100	0	0
dab_BE_BYDR01_00050	220		6/feb/15	27.4.c	5	5	5	5	5	5	5	100	0	0
dab_BE_BYDR01_00054	240		2/jun/15	27.4.c	6	6	6	6	7	6	6	83	7	5
dab_BE_BYDR01_00058	260		6/feb/15	27.4.c	6	6	6	6	6	5	6	83	7	5
dab_BE_BYDR01_00059	150		6/feb/15	27.4.c	-	2	2	2	2	2	2	100	0	0
dab_BE_BYDR03_47582	150		1/jun/15	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR03_47622	240		1/jun/15	27.4.c	6	6	6	6	6	6	6	100	0	0
dab_BE_BYDR05_00002	170		12/may/14	27.4.c	3	3	3	4	3	3	3	83	13	9
dab_BE_BYDR05_00031	260		12/may/14	27.4.c	6	6	6	6	6	6	6	100	0	0
dab_BE_BYDR06_53071	275	F	14/aug/15	27.4.c	6	6	5	6	6	6	6	83	7	5
dab_BE_BYDR06_53072	265	F	14/aug/15	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_BYDR09_00017	260		2/nov/14	27.4.c	6	6	5	5	5	5	5	67	10	8
dab_BE_BYDR11_00001	180		4/dec/14	27.4.c	3	3	3	3	3	-	3	100	0	0
dab_BE_CDDR01_04872	160		19/mar/15	27.4.c	3	3	3	3	3	2	3	83	14	10
dab_BE_CDDR01_04897	210		19/mar/15	27.4.c	6	6	5	6	5	6	6	67	9	8
dab_BE_CDDR06_57481	180		27/nov/15	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_CDDR09_226188	250		22/dec/16	27.4.c	6	7	5	6	6	4	6	50	18	14
dab_BE_GNKT07_50683	210	F	4/jul/17	27.4.c	2	2	2	3	2	3	2	67	22	19
dab_BE_GNKT07_50684	200	F	4/jul/15	27.4.c	2	2	2	3	2	-	2	80	20	15
dab_BE_GNKT07_50688	170	F	4/jul/15	27.4.c	2	2	2	2	1	-	2	80	25	18
dab_BE_GNKT07_50695	200	F	4/jul/15	27.4.c	4	4	4	4	4	5	4	83	10	7
dab_BE_GNKT07_50718	195	F	4/jul/15	27.4.c	3	3	3	3	3	4	3	83	13	9
dab_BE_GNKT08_00006	170		25/sep/13	27.4.c	3	3	2	3	3	3	3	83	14	10
dab_BE_NZ4_00016	245	F	9/jul/13	27.4.c	6	6	5	6	6	5	6	67	9	8
dab_BE_NZ4_00019	245	F	9/jul/15	27.4.c	6	6	5	6	6	6	6	83	7	5
dab_BE_NZ6_00003	265	F	1/oct/13	27.4.c	6	6	6	6	6	6	6	100	0	0
dab_BE_NZ6_00004	250	F	1/oct/13	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_PTCT03_2017040310369	195	F	3/apr/17	27.4.c	3	3	3	3	3	3	3	100	0	0
dab_BE_PTCT03_2017040310370	200	F	3/apr/17	27.4.c	6	6	6	6	7	5	6	67	11	6
dab_DE_097_20	130	F	31/jan/15	27.4.a	2	2	-	0	2	0	2	60	91	80
dab_DE_098_01	160	F	31/jan/15	27.4.a	3	3	3	3	5	3	3	83	24	17
dab_DE_098_13	180	M	31/jan/15	27.4.a	-	4	3	5	7	4	4	40	33	24
dab_DE_148_02	130	M	6/feb/15	27.4.a	-	3	2	2	3	2	2	60	23	20
dab_DE_148_05	150	M	6/feb/15	27.4.a	3	3	3	2	4	-	3	60	24	13
dab_DE_148_27	210	F	6/feb/15	27.4.a	5	5	-	5	5	3	5	80	19	14
dab_DE_148_28	210	F	6/feb/15	27.4.a	9	9	6	8	7	5	9	33	22	18
dab_DE_148_32	230	F	6/feb/15	27.4.a	5	5	4	4	5	3	5	50	19	15
dab_DE_148_36	250	F	6/feb/15	27.4.a	9	11	9	9	8	8	9	50	12	7
dab_DK_2015_928901_002	130		1/jul/15	27.3.a	4	4	3	3	2	-	4	40	26	20
dab_DK_2015_928901_006	170		1/jul/15	27.3.a	4	4	4	4	4	3	4	83	11	7
dab_DK_2015_928901_007	180		1/jul/15	27.3.a	7	6	5	7	8	4	7	33	24	19
dab_DK_2018_257303_004	190	F	1/feb/18	27.3.a	5	4	5	3	2	-	5	40	34	27
dab_DK_2018_258003_002	230	M	14/feb/18	27.3.a	8	8	8	7	7	4	8	50	22	14
dab_DK_2018_258003_003	230	F	14/feb/18	27.3.a	5	5	5	4	5	3	5	67	19	15
dab_DK_2018_258003_004	200	F	14/feb/18	27.3.a	6	6	6	6	6	6	6	100	0	0

Table A7.1. Continued

Fish ID	length (mm)	sex	catch date	ICES area	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	Modal age	PA %	CV %	APE %
dab_DK_2018_258003_010	180	M	14/feb/18	27.3.a	6	6	6	5	6	5	6	67	9	8
dab_DK_2018_263801_010	210	F	11/jul/18	27.3.a	7	9	7	8	9	6	7	33	16	13
dab_DK_2018_263801_014	130	F	11/jul/18	27.3.a	4	4	4	3	4	3	4	67	14	12
dab_NL_2010_6000634_001	83	M	4/feb/10	27.4.b	1	2	1	1	1	0	1	67	63	33
dab_NL_2010_6000634_004	75	M	4/feb/10	27.4.b	1	2	1	1	0	5	1	50	105	73
dab_NL_2014_0121003_050	309	F	14/feb/14	27.4.c	9	8	9	9	9	-	9	80	5	4
dab_NL_2014_1400025_271	262	F	26/aug/14	27.4.a	11	10	6	10	7	7	10	33	24	22
dab_NL_2014_6000602_032	214	F	30/jan/14	27.4.b	8	7	7	8	7	7	7	67	7	6
dab_NL_2015_0121001_001	233	F	26/jan/15	27.4.b	6	7	6	6	5	6	6	67	11	6
dab_NL_2015_0121003_009	246	F	13/feb/15	27.4.c	4	5	5	5	5	4	5	67	11	10
dab_NL_2015_0121003_015	252	F	13/feb/15	27.4.c	6	6	6	6	6	-	6	100	0	0
dab_NL_2015_0121003_023	262	F	13/feb/15	27.4.c	7	6	6	7	6	7	7	50	8	8
dab_NL_2015_0121005_004	234	F	13/apr/15	27.4.b	5	5	0	4	4	4	4	50	51	33
dab_NL_2015_0121009_033	268	F	10/jul/15	27.4.c	4	5	4	5	4	5	4	50	12	11
dab_NL_2015_0121009_034	264	F	10/jul/15	27.4.c	6	6	5	6	6	6	6	83	7	5
dab_NL_2015_0121010_018	261	F	13/jul/15	27.4.b	6	6	7	5	7	6	6	50	12	9
dab_NL_2015_0121010_039	283	F	13/jul/15	27.4.b	9	9	8	9	9	8	9	67	6	5
dab_NL_2015_1400011_131	144	F	20/aug/15	27.4.a	2	2	2	3	2	3	2	67	22	19
dab_NL_2015_1400016_165	272	F	21/aug/15	27.4.a	8	8	8	-	8	6	8	80	12	8
dab_NL_2015_2100036_291	292	F	1/oct/15	27.4.b	8	8	8	8	8	7	8	83	5	4
dab_NL_2015_6000521_005	238	F	2/feb/15	27.4.b	4	4	3	4	3	5	4	50	20	14
dab_NL_2015_6000521_007	227	F	2/feb/15	27.4.b	3	3	3	-	3	3	3	100	0	0
dab_NL_2015_6000521_012	216	M	2/feb/15	27.4.b	3	3	3	-	3	3	3	100	0	0
dab_NL_2015_6000605_018	155	F	3/feb/15	27.4.b	4	4	4	4	4	4	4	100	0	0
dab_NL_2015_6000605_021	163	F	3/feb/15	27.4.b	5	4	4	5	4	5	5	50	12	11
dab_NL_2015_6000605_036	212	F	3/feb/15	27.4.b	6	6	6	6	5	5	6	67	9	8
dab_NL_2015_6000607_008	143	M	3/feb/15	27.4.b	3	3	3	3	3	3	3	100	0	0
dab_NL_2015_6000629_018	173	M	10/mar/15	27.4.b	7	7	5	6	5	6	7	33	15	11
dab_NL_2015_6000629_029	219	F	10/mar/15	27.4.b	8	7	7	7	7	7	7	83	6	4
dab_NL_2015_6000658_026	206	F	16/apr/15	27.4.b	7	7	7	7	6	6	7	67	8	7
dab_NL_2015_6000685_024	219	M	19/may/15	27.4.b	7	7	6	7	6	7	7	67	8	7
dab_NL_2015_6000695_023	183	F	3/jun/15	27.4.b	4	4	4	4	4	3	4	83	11	7
dab_NL_2015_6000712_035	253	F	19/jun/15	27.4.b	8	8	7	9	7	8	8	50	10	7
dab_NL_2015_6000733_022	173	F	15/jul/15	27.4.b	3	3	3	3	3	3	3	100	0	0
dab_NL_2015_6000733_033	201	M	15/jul/15	27.4.b	6	6	5	6	6	-	6	80	8	6
dab_NL_2015_6000733_039	226	M	15/jul/15	27.4.b	5	5	4	5	5	5	5	83	8	6
dab_NL_2015_6000733_043	245	M	15/jul/15	27.4.b	9	9	7	9	9	9	9	83	9	6
dab_NL_2015_6000752_016	184	M	6/aug/15	27.4.b	3	3	0	3	3	4	3	67	51	33
dab_NL_2015_6000773_039	221	F	30/aug/15	27.4.b	7	7	6	7	7	8	7	67	9	5
dab_NL_2015_6000778_028	196	M	10/sep/15	27.4.b	7	7	6	8	7	6	7	50	11	8
dab_NL_2015_6000827_018	174	M	3/nov/15	27.4.b	4	4	4	4	4	4	4	100	0	0
dab_NL_2015_6000827_035	251	F	3/nov/15	27.4.b	6	6	6	6	6	6	6	100	0	0
dab_NL_2015_6000848_025	184	F	3/dec/15	27.4.b	8	8	8	8	8	8	8	100	0	0
dab_NL_2016_0121003_011	278	F	12/feb/16	27.4.b	7	7	7	8	7	7	7	83	6	4
dab_NL_2016_0121003_018	277	F	12/feb/16	27.4.b	9	8	8	9	8	8	8	67	6	5
dab_NL_2016_0121003_033	292	F	12/feb/16	27.4.b	10	9	8	11	10	7	10	33	16	13
dab_NL_2016_0121012_003	256	F	11/jul/16	27.4.a	4	4	3	5	3	4	4	50	20	14
dab_NL_2016_0121012_005	263	F	11/jul/16	27.4.a	3	3	3	4	3	2	3	67	21	11
dab_NL_2016_0121012_028	302	F	11/jul/16	27.4.a	6	6	5	6	4	4	6	50	19	16
dab_NL_2016_0121012_042	312	F	11/jul/16	27.4.a	6	5	6	9	5	4	6	33	30	20
dab_NL_2016_0121012_047	332	F	11/jul/16	27.4.a	6	5	6	-	5	6	6	60	10	9
dab_NL_2016_0121016_006	245	F	9/dec/16	27.4.b	6	6	6	6	6	6	6	100	0	0
dab_NL_2016_0121016_007	246	F	9/dec/16	27.4.b	7	6	5	7	6	5	7	33	15	11
dab_NL_2016_1400011_127	131	M	25/aug/16	27.4.a	1	1	1	1	1	1	1	100	0	0
dab_NL_2016_6000054_001	124	M	14/jul/16	27.4.c	1	1	1	2	1	2	1	67	39	33
dab_NL_2016_6000602_032	246	M	12/may/16	27.4.b	12	11	11	11	11	10	11	67	6	3

Table A7.2. Dab.27.3a4 sectioned-and-stained otoliths: Age composition and total number of age readings by reader and for modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	modal age
0			2	1	1	2	
1	4	2	4	3	4	1	4
2	5	8	7	6	7	5	7
3	21	23	24	22	23	24	22
4	12	13	11	12	12	14	13
5	8	10	17	11	14	15	9
6	26	25	21	22	20	20	25
7	10	10	8	8	13	8	12
8	7	7	7	7	6	6	6
9	6	5	2	7	4	1	5
10	1	1		1	1	1	2
11	1	2	1	2	1		1
12	1						
Total	102	106	104	102	106	97	106

Table A7.3. Dab.27.3a4 sectioned-and-stained otoliths: Age error matrix (AEM). The AEM shows the proportional distribution of age readings for each modal age. Age column should sum to one but due to rounding there might be small deviations in some cases. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	1	2	3	4	5	6	7	8	9	10	11
Age 0	0.083	0.054	0.008	0.013							
Age 1	0.708	0.027									
Age 2	0.167	0.730	0.039	0.013	0.019						
Age 3		0.189	0.906	0.145	0.077	0.000					
Age 4			0.039	0.697	0.192	0.027	0.014	0.029			
Age 5	0.042		0.008	0.118	0.673	0.156	0.069		0.034		
Age 6					0.038	0.769	0.222	0.029	0.034	0.083	
Age 7				0.013		0.041	0.556	0.143	0.069	0.250	
Age 8							0.111	0.714	0.207	0.083	
Age 9						0.007	0.028	0.086	0.621	0.083	
Age 10										0.333	0.167
Age 11									0.034	0.167	0.667
Age 12											0.167

Table A7.4. Dab.27.3a4 sectioned-and-stained otoliths: Coefficient of variation (CV in %) by reader and modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	all
1	0	38	0	40	67	108	52
2	0	18	0	50	29	61	29
3	0	0	24	15	15	15	9
4	7	9	33	16	28	18	16
5	10	12	11	16	22	24	15
6	0	7	10	11	12	13	8
7	5	11	14	9	16	17	11
8	5	0	5	10	7	23	9
9	0	12	17	5	11	23	11
10	7	7	20	7	25	0	20
11							
Weighted Mean	3	8	15	16	19	23	13

Table A7.5. Dab.27.3a4 sectioned-and-stained otoliths: Percentage agreement (PA in %) by reader and modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	all
1	100	50	100	75	75	25	71
2	100	86	100	43	71	40	73
3	100	100	91	80	91	80	91
4	92	85	62	62	69	50	70
5	78	67	63	67	78	50	67
6	100	84	60	88	64	65	77
7	83	67	42	58	42	42	56
8	83	100	83	40	67	50	71
9	100	60	40	80	60	25	62
10	50	50	0	50	50	0	33
11	0	100	100	100	100	0	67
Weighted Mean	92	82	68	71	70	55	73

Table A7.6. Dab.27.3a4 sectioned-and-stained otoliths: Relative bias by reader and modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

Modal age	R01 BE	R02 BE	R03 FR	R06 NL	R07 NL	R10 DK	all
1	0.00	0.50	0.00	0.25	-0.25	1.00	0.25
2	0.00	0.14	0.00	0.14	0.00	0.00	0.05
3	0.00	0.00	-0.18	0.00	0.14	0.00	-0.01
4	0.08	0.15	-0.62	0.08	-0.08	0.00	-0.07
5	0.00	-0.11	-0.38	-0.44	-0.44	-0.88	-0.37
6	0.00	0.00	-0.32	0.04	-0.16	-0.48	-0.15
7	0.17	-0.08	-0.83	0.25	-0.25	-0.67	-0.24
8	0.17	0.00	-0.17	0.20	-0.33	-1.17	-0.23
9	0.00	0.20	-1.20	-0.20	-0.60	-1.50	-0.52
10	0.50	-0.50	-3.00	0.50	-1.50	-3.00	-1.17
11	1.00	0.00	0.00	0.00	0.00	-1.00	0.00
Weighted Mean	0.06	0.03	-0.44	0.04	-0.17	-0.43	-0.15

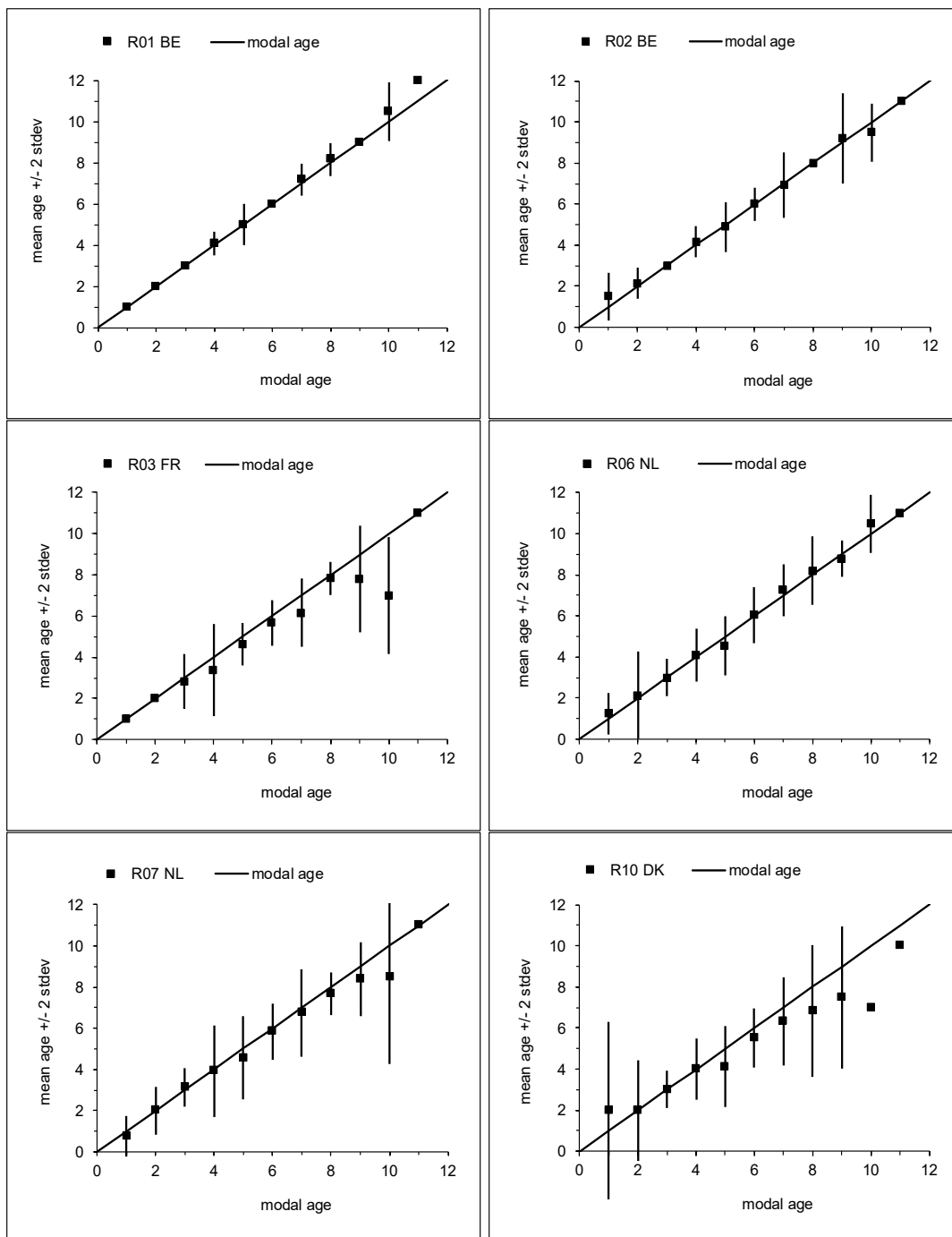


Figure A7.1. Dab.27.3a4 whole otoliths: Reader bias plots. For each reader the mean age ( $\pm 2$  stdev) as a function of modal age. Only advanced readers supplying data for the assessment of the dab.27.3a4 stock are included.

## Justification

CVO Report: 20.013

Project number: 4311215027 WOT05 19-20 Kwaliteit Bepalingen

The quality of this report has been peer reviewed by a colleague scientist and the head of CVO.

Approved by: Dr. Ulrika Beier  
Scientist

Signature:

Date: 2 December 2020

Approved by: Ing. S.W. Verver  
Head Centre for Fisheries Research

Signature:



Date: 2 December 2020