2022 Cod (*Gadus morhua*) North Sea, eastern English Channel and Skagerrak age reading exchange report (SmartDots ID 446)

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1 Introduction

In 2021, WGBIOP highlighted the need for a new age reading exchange for the North Sea Cod, eastern English Channel and Skagerrak as the last workshop was carried by IMR (Bergen, Norway) between 2009 and 2010. The results of this age reading calibration were not satisfactory showing an overall percentage agreement of 66% and the overall precision CV of 14.7%, with expert readers scoring 76% agreement and a CV of 9.3%. While the workshop addressed some of the issues highlighted at the previous Workshop on Age Reading of North Sea Cod (WKARNSC, 2008) such as the overestimation of ages, a higher percentage of inter-reader bias was found as well as for each reader compared to modal age. However, two seemed the recurring causes of the general low precision, biases between readers and overestimations: 1) the perception of the first age structure along with the presence of several splits, false checks etc., and 2) the age reader turnover (e.g. old vs new) along with the different method used. With that in mind and the 12 elapsed years, a new exchange was planned for 2022.

The 2022 Cod (*Gadus morhua*) North Sea, eastern English Channel and Skagerrak age reading exchange took place between July and November 2022 on ICES SmartDots platform (event ID 446). Twelve readers with different levels of experience from Belgium, Denmark, Netherland, Norway, Sweden, and UK (England) took part. Otoliths from 248 fish were selected from two different sources: 163 were provided by Cefas from the 2021 independent survey collections, covering 4 quarters and ICES areas 27.4.b and 27.7e-h; 85 samples were provided by SLU (Sweden) for ICES area 3a.20 (Table 1). Unfortunately, due to very low number of fish collected in 27.7d in the last years, samples from this ICES area were not included in the exchange. Two pictures for each otolith section of the North Sea and eastern English Channel were taken to represent both reading light methods used at different labs (i.e. transmitted and reflected light), whereas Skagerrak samples were broken and captured under reflected light. Three countries read broken otoliths (Norway, Sweden and Denmark), while UK, Belgium and the Netherlands read sections with either transmitted light (BE, UK) or reflected light (NL, UK). All the readers were asked to read all the otoliths of this event, given that all the methods used across various labs were represented in the exchange and considering that 9 readers were classified as Advanced (age data for stock assessment) and 4 Basic.

Overall, results from the present exchange for the North Sea, eastern English Channel and Skagerrak show a weighted average percentage agreement based on modal ages for all readers of 75 %, with a weighted average CV of 22 % and APE of 13 %. For advanced readers, the results did not improve significantly (PA 76%, CV 21%, APE 12%).

However, when the data was filtered by method, results for all readers showed higher agreement for sections with transmitted light in North Sea and English Channel (PA 80%, CV 23%) and as well as some lower agreement of 63% (CV 22%) for area 27.3.a.20 (Skagerrak) based on broken otoliths. For reflected light sections, agreement was 76% and CV was 21%.

When only considering the advanced readers for the method they are advanced in, agreement reaches 87% (CV18%) for transmitted light sections, 81% (CV 18%) for reflected light sections, and 70% (CV 21%) for broken otoliths. In all methods, agreement improves when only expert readers are included.

2 Methods

This report contains statistical analysis and comparisons of age readings in the form of tables and graphical plots.

First, an overview of participating age readers and the samples are presented.

Before each table or plot there is a short explanation. This text is thought as a help to understand the tables/plots and can just be deleted in the final output report if deemed unnecessary. The document can be edited just like any other .docx file. New text can be added, additional figures and tables can be included and the existing tables can be edited. If some tables which are presently in the annexes need to be moved to the body of the report this is also possible. Only the plots cannot be changed.

The first part of the results Section includes the tables and plots from the Guus Eltink Excel sheet 'Age Reading Comparisons (Eltink, A.T.G.W. 2000). The order and numbering of tables and plots are the same as in the excel sheet. Tables 6.1 - 6.4 from the 'Age Reading Comparisons' sheet are not outputted since these are merely used to do calculations for the other tables.

Modal age: a multistage approach to define the modal age by sampled fish,

In this event, the multistage approach to calculate the modal age has been used. When summarizing the output and reporting the results of the exchange events developed within the SmartDots framework, the modal age (the most common age decided by the age readers for every fish sample) is the most relevant measurement. It is a key statistic by itself, but it is also fundamental for the estimation of some other relevant statistics to assess the performance of the techniques assessed in the exchange event, like the Percentage Agreement (PA), or input for stock assessments like the Age Error Matrix (AEM) (See below). However, the standard approach of calculating the mode (each reader has the same weight=1) the mode is taken as the lowest age of the multiple modal ages. This way renders multiple cases (fish samples) with multiple modal ages (i.e. different ages got the same highest number of readers). Accordingly, this imply a wrong perception of the age by fish individual and introduction of bias in the calculation of the PA and AEM. As a solution, in this report a multistage approach to select the modal age is used. This multistage approach is based in the different weight given to the age readers according to their experience. Two different weight scores scales were assigned, a weight score decreasing linearly with the experience and another decreasing with a negative exponential shape. The modal age by fish individual is decided following the next approach:

1.-If there is a single mode estimated with the standard approach (equal weight for all readers) this value is used as the modal age, if not

2.-Adding up, for each age category, the score assigned with the linear weighting for all the readers that decided that age for that fish. Next, the modal age is selected as the age category that obtains the highest score sum. If, despite this approach, there were still multiple ages with the same score (and hence multiple modes), the next step is applied:

3.-Adding up, for each age category, the score assigned with the negative exponential weighting for all the readers that decided that age for that fish. Select as the modal age the age with the highest score sum.

During the WGBIOP 2019 meeting it was found that the combination of the modes decided using these three methods (so called 'multistage approach'), allows assigning a single modal age to each fish individual.

It is important checking the table that indicates the percentage of multimodal cases (in the results Section) and the table with the fishID and sampleID that obtained multiple modes (included in annex 3).

Percentage Agreement (PA)

The percentage agreement per reader per modal age tells how large is the part of readings that are equal to the modal age. The percentage agreement is estimated by modal age and reader as the proportion (as percentage) of times that the lectures of that reader agreed with the resulting modal age. This percentage is estimated as the number of times that a reader agreed with the modal age divided by the total number of otoliths read by a reader for each modal age.

$$PA = \frac{number\ of\ readings\ that\ agree\ with\ modal\ age}{total\ number\ of\ readings\ by\ modal\ age} \cdot 100\%$$

Coefficient of Variation (CV)

The table presents the Coefficient of Variation (CV) per modal age and reader. The CV's are calculated as the ratio between the standard deviation (σ) and mean value (μ) per reader and modal age:

$$CV = \frac{\sigma}{\mu} \cdot 100\%$$

To the table is also added the CV of all readers combined per modal age and a weighted mean of the CV per reader.

Relative bias

The relative bias is calculated as the difference between the mean and the modal age. This statistic is presented in first place by modal age and reader, but it is also calculated as an average value by modal age for all readers together (or only advanced readers).

Average Percentage Error (APE)

The Average Percentage Error (APE) was calculated based on the method outlined by Beamish & Fournier (1981). This method is dependent of fish age and thus provides a better estimate of precision than percentage agreement. As the calculations of both CV and APE poSR problems if the mean age is cloSR to 0, all obSRrvations for which modal age was 0 were omitted from the CV and APE calculations.

The average percentage error is calculated per image as:

$$APE = \frac{100\%}{n} \sum_{i=1}^{n} \left| \frac{a_i - \overline{a}}{\overline{a}} \right|$$

where a_i is the age reading of reader i and $\overline{a}$ is the mean of all readings from 1 to n.

Age error matrix (AEM)

Age error matrices (AEM) were produced following procedures outlined by WKSABCAL (2014) where the matrix shows the proportion of each modal age mis-aged as other ages. The sum of each row is 1, which equals 100%. The age data was analysed twice, the first time all readers were included and the SRcond time only the “advanced” readers were included. If a reader is “advanced” then they are considered well trained and they provide ages for

stock assessment or similar purposes. When the AEM is compiled for assessment purposes it uses only those readers who provide age data for the stock assessment in that specific area.

Otolith Growth Analysis

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

3 Overview of Samples and Readers

Table X: Overview of samples used for the exchange event number 446

Year	ICES area	Strata	Quarter	Number of samples	Modal age range	Length range
2021	27.3.a.20	Strata_Br	1	22	2-11	150-1090 mm
2021	27.3.a.20	Strata_Br	2	21	2-9	510-1170 mm
2021	27.3.a.20	Strata_Br	3	23	0-11	90-1180 mm
2021	27.3.a.20	Strata_Br	4	19	0-7	150-980 mm
2021	27.4.b	Strata_SR	1	21	2-7	340-880 mm
2021	27.4.b	Strata_ST	1	21	2-7	340-880 mm
2021	27.4.b	Strata_SR	2	23	1-4	350-710 mm
2021	27.4.b	Strata_ST	2	23	1-4	350-710 mm
2021	27.4.b	Strata_SR	3	23	1-4	350-750 mm
2021	27.4.b	Strata_ST	3	23	1-4	350-750 mm
2021	27.4.b	Strata_SR	4	18	1-3	330-680 mm
2021	27.4.b	Strata_ST	4	18	1-3	330-680 mm
2021	27.7.e	Strata_SR	1	5	3-8	770-990 mm
2021	27.7.e	Strata_ST	1	5	3-8	770-990 mm
2021	27.7.e	Strata_SR	2	1	8	1020 mm
2021	27.7.e	Strata_ST	2	1	8	1020 mm
2021	27.7.e	Strata_SR	3	4	1	350-460 mm
2021	27.7.e	Strata_ST	3	4	1	350-460 mm
2021	27.7.e	Strata_SR	4	2	1-5	490-900 mm
2021	27.7.e	Strata_ST	4	2	1-5	490-900 mm
2021	27.7.f	Strata_SR	1	6	3-4	650-810 mm
2021	27.7.f	Strata_ST	1	6	3-4	650-810 mm
2021	27.7.f	Strata_SR	2	10	2-4	420-870 mm
2021	27.7.f	Strata_ST	2	10	2-4	420-870 mm
2021	27.7.f	Strata_SR	3	4	3-8	630-1060 mm
2021	27.7.f	Strata_ST	3	4	3-8	630-1060 mm
2021	27.7.f	Strata_SR	4	4	1-2	470-690 mm
2021	27.7.f	Strata_ST	4	4	1-2	470-690 mm
2021	27.7.g	Strata_SR	1	3	5-8	980-990 mm
2021	27.7.g	Strata_ST	1	3	5-8	980-990 mm
2021	27.7.g	Strata_SR	2	2	5-6	940-970 mm
2021	27.7.g	Strata_ST	2	2	5-6	940-970 mm
2021	27.7.g	Strata_SR	3	11	2-6	550-1020 mm
2021	27.7.g	Strata_ST	3	11	2-6	550-1020 mm
2021	27.7.g	Strata_SR	4	14	1-5	510-1020 mm
2021	27.7.g	Strata_ST	4	14	1-5	510-1020 mm
2021	27.7.h	Strata_SR	1	4	2	400-530 mm
2021	27.7.h	Strata_ST	1	4	2	400-530 mm
2021	27.7.h	Strata_SR	2	4	4-6	860-1030 mm
2021	27.7.h	Strata_ST	2	4	4-6	860-1030 mm
2021	27.7.h	Strata_SR	3	3	2-7	500-1030 mm
2021	27.7.h	Strata_ST	3	3	2-7	500-1030 mm
2021	27.7.h	Strata_SR	4	1	3	920 mm
2021	27.7.h	Strata_ST	4	1	3	920 mm

Table X: Reader overview.

Reader code	Expertise	Expertise_rank	strata
R02 GB	Advanced	2	Strata_Br
R02 GB	Advanced	2	Strata_ST
R02 GB	Advanced	2	Strata_SR
R04 GB	Advanced	4	Strata_SR
R04 GB	Advanced	4	Strata_ST
R04 GB	Advanced	4	Strata_Br
R08 DK	Advanced	8	Strata_ST
R08 DK	Advanced	8	Strata_SR
R08 DK	Advanced	8	Strata_Br
R10 SE	Advanced	10	Strata_SR
R10 SE	Advanced	10	Strata_ST
R10 SE	Advanced	10	Strata_Br
R12 NO	Advanced	12	Strata_SR
R12 NO	Advanced	12	Strata_ST
R12 NO	Advanced	12	Strata_Br
R14 BE	Advanced	14	Strata_ST
R14 BE	Advanced	14	Strata_Br
R14 BE	Advanced	14	Strata_SR
R16 NO	Advanced	16	Strata_Br
R16 NO	Advanced	16	Strata_SR
R16 NO	Advanced	16	Strata_ST
R20 NL	Advanced	20	Strata_ST
R20 NL	Advanced	20	Strata_SR
R20 NL	Advanced	20	Strata_Br
R22 DK	Advanced	22	Strata_ST
R22 DK	Advanced	22	Strata_SR
R22 DK	Advanced	22	Strata_Br
R24 BE	Basic	24	Strata_SR
R24 BE	Basic	24	Strata_ST
R24 BE	Basic	24	Strata_Br
R26 SE	Basic	26	Strata_Br
R26 SE	Basic	26	Strata_SR
R26 SE	Basic	26	Strata_ST
R28 GB	Basic	28	Strata_SR
R28 GB	Basic	28	Strata_ST
R28 GB	Basic	28	Strata_Br

4 Results

4.1 All readers – All methods

In this section the results for all readers are included for all samples independently of the preparation method. When the reader is set as advanced, he is considered advanced in all methods, even though in reality, this might not be the case.

Multimodal cases

Table X: Total number of samples (NSample) and percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight asigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods Section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
411	2 %	1 %	0 %	0 %

List of multimodal cases

Table X: List of cases for which multiple modes where obtained when all readers are considered. The column NModes_trad shows the number of multiple modes for each FishID or SampleID when all readers are given the same expertiSR weight.

NModes_trad	SampleID
2	COD-172-R
3	COD-176-R
2	COD-182-R
3	COD-188-R
3	COD-198-R
2	COD-200-R
3	COD-209-R
2	COD-221-R
2	**COD-246-R**

Summary statistics

Table X: Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
411	22 %	75 %	13 %

In this exchange event, 411 otolith fish individuals were aged. Of those, 2 % when the traditional approach (all readers equally weighted) is used to define the mode. The percentage of multiple mode cases is reduced to 0 %. The complete list of cases with multiple modes is presented in table X in the annex 3 Section, where the ageing from each of the readers participating in the exchange event is presented. When all the otolith samples are considered (both single and multimodal cases) the weighted average percentage agreement based on modal ages for all readers is 75 %, with the weighted average CV of 22 % and APE of 13 %.

Coefficient of Variation (CV)

Table X: Coefficient of Variation (CV) table presents the CV per modal age and reader, the CV of all readers combined per modal age and a weighted mean of the CV per reader

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
1	13 %	32 %	44 %	15 %	29 %	22 %	0 %	18 %	32 %	53 %	13 %	38 %	**33 %**
2	9 %	34 %	29 %	19 %	21 %	16 %	9 %	18 %	26 %	39 %	16 %	23 %	**26 %**
3	14 %	12 %	26 %	15 %	7 %	15 %	12 %	28 %	17 %	17 %	24 %	17 %	**19 %**
4	14 %	15 %	27 %	21 %	11 %	11 %	13 %	24 %	15 %	13 %	22 %	15 %	**19 %**
5	14 %	17 %	20 %	19 %	9 %	16 %	11 %	25 %	14 %	15 %	21 %	12 %	**18 %**
6	9 %	16 %	14 %	11 %	7 %	11 %	5 %	11 %	25 %	19 %	18 %	40 %	**20 %**
7	16 %	9 %	22 %	7 %	10 %	14 %	12 %	11 %	23 %	14 %	11 %	12 %	**16 %**
8	13 %	9 %	11 %	29 %	4 %	7 %	11 %	13 %	11 %	20 %	11 %	9 %	**14 %**
9	7 %	19 %	17 %	11 %	8 %	14 %	-	8 %	14 %	29 %	6 %	7 %	**17 %**
10	11 %	11 %	10 %	12 %	14 %	14 %	22 %	13 %	15 %	12 %	11 %	5 %	**16 %**
11	16 %	0 %	14 %	5 %	11 %	11 %	0 %	19 %	87 %	14 %	5 %	0 %	**21 %**
Weighted Mean	**12 %**	**21 %**	**28 %**	**17 %**	**15 %**	**15 %**	**9 %**	**21 %**	**22 %**	**27 %**	**18 %**	**21 %**	**22 %**

Percentage of Agreement (PA)

The percentage agreement per reader per modal age tells how large part of the readings that are equal to the modal age. The weighted mean including at the bottom of the table is weighted according to number of age readings.

Table X: Percentage agreement (PA) table represents the PA per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	total
0	100 %	75 %	100 %	100 %	50 %	100 %	67 %	**100 %**	100 %	50 %	100 %	100 %	**87 %**
1	98 %	84 %	75 %	98 %	88 %	95 %	100 %	**97 %**	84 %	83 %	98 %	71 %	**89 %**
2	97 %	86 %	59 %	91 %	89 %	90 %	97 %	**88 %**	64 %	71 %	90 %	81 %	**83 %**
3	88 %	86 %	59 %	83 %	95 %	88 %	88 %	**43 %**	72 %	82 %	71 %	76 %	**77 %**
4	74 %	73 %	41 %	53 %	80 %	80 %	74 %	**48 %**	62 %	70 %	56 %	75 %	**66 %**
5	71 %	60 %	54 %	51 %	81 %	53 %	80 %	**42 %**	67 %	67 %	54 %	72 %	**63 %**
6	62 %	50 %	36 %	55 %	82 %	59 %	91 %	**57 %**	62 %	47 %	53 %	47 %	**58 %**
7	31 %	71 %	36 %	79 %	69 %	44 %	67 %	**12 %**	56 %	50 %	60 %	62 %	**52 %**
8	71 %	65 %	71 %	79 %	88 %	65 %	50 %	**25 %**	71 %	47 %	65 %	62 %	**63 %**
9	67 %	0 %	67 %	33 %	0 %	33 %	-	**0 %**	33 %	33 %	33 %	67 %	**33 %**
10	33 %	75 %	75 %	50 %	25 %	75 %	0 %	**0 %**	50 %	25 %	25 %	50 %	**41 %**
11	33 %	100 %	33 %	67 %	0 %	0 %	100 %	**33 %**	0 %	33 %	33 %	100 %	**43 %**
Weighted Mean	**84 %**	**78 %**	**58 %**	**78 %**	**85 %**	**80 %**	**87 %**	**61 %**	**68 %**	**71 %**	**74 %**	**74 %**	**75 %**

Average Percentage Error (APE)

Table X: Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-
1	3 %	23 %	33 %	4 %	19 %	7 %	0 %	6 %	23 %	34 %	3 %	32 %	**18 %**
2	3 %	16 %	24 %	9 %	12 %	10 %	2 %	11 %	21 %	24 %	6 %	14 %	**14 %**
3	5 %	7 %	19 %	8 %	3 %	8 %	4 %	24 %	14 %	10 %	16 %	11 %	**11 %**
4	11 %	10 %	19 %	18 %	9 %	6 %	10 %	18 %	12 %	8 %	16 %	10 %	**13 %**
5	11 %	14 %	16 %	15 %	7 %	13 %	5 %	19 %	10 %	9 %	16 %	7 %	**13 %**
6	8 %	13 %	11 %	9 %	4 %	9 %	3 %	8 %	20 %	12 %	14 %	26 %	**12 %**
7	12 %	7 %	18 %	4 %	6 %	10 %	10 %	7 %	14 %	11 %	8 %	10 %	**10 %**
8	9 %	6 %	7 %	14 %	1 %	6 %	10 %	11 %	8 %	12 %	6 %	7 %	**8 %**
9	5 %	15 %	13 %	9 %	6 %	10 %	-	6 %	10 %	21 %	5 %	5 %	**13 %**
10	7 %	8 %	7 %	9 %	11 %	10 %	16 %	10 %	13 %	10 %	9 %	5 %	**11 %**
11	11 %	0 %	10 %	4 %	8 %	8 %	0 %	15 %	67 %	10 %	4 %	0 %	**13 %**
Weighted Mean	**6 %**	**13 %**	**21 %**	**10 %**	**9 %**	**9 %**	**4 %**	**15 %**	**17 %**	**17 %**	**10 %**	**14 %**	**13 %**

Relative bias

The relative bias is the difference between the mean age (per modal age per reader) and modal age. As for the previous tables, a combined bias for all readers and weighted means are calculated.

Table X: The relative bias (as the difference between the mean and modal age) per modal age and reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all readers combined.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	0.00	0.50	0.00	0.00	0.50	0.00	0.33	0.00	0.00	1.00	0.00	0.00	**0.19**
1	-0.02	0.16	0.28	0.02	0.12	0.02	0.00	0.03	0.16	0.26	-0.02	0.26	**0.11**
2	-0.03	0.20	0.47	-0.08	0.15	0.11	0.01	-0.11	0.36	0.35	-0.02	0.11	**0.13**
3	-0.01	0.09	0.47	0.09	0.05	0.11	-0.01	-0.35	0.31	0.15	0.18	0.14	**0.10**
4	-0.28	0.22	0.87	0.50	0.23	0.07	-0.21	0.14	0.21	0.07	0.39	0.16	**0.20**
5	-0.31	0.51	0.76	0.86	0.21	0.40	0.06	0.20	0.26	-0.09	0.56	0.07	**0.29**
6	-0.38	0.88	0.64	0.55	-0.06	0.35	-0.09	-0.14	1.12	0.00	0.53	-0.76	**0.22**
7	-0.81	0.36	1.00	0.07	0.12	0.06	-0.50	-1.12	0.25	-0.25	0.20	-0.38	**-0.08**
8	-0.47	-0.18	0.29	-0.43	0.00	0.41	-0.50	-1.19	0.35	-0.29	0.00	-0.31	**-0.19**
9	-0.33	0.00	1.00	1.33	-1.67	1.67	-	-1.33	1.67	-0.33	0.67	-0.33	-
10	-1.00	-0.50	0.50	0.25	-0.50	0.75	-0.33	-2.75	1.50	0.50	1.50	0.50	**0.03**
11	-1.33	0.00	-0.33	-0.33	-0.33	-0.33	0.00	-2.00	-2.33	-0.33	0.67	0.00	**-0.56**
Weighted Mean	**-0.16**	**0.21**	**0.52**	**0.17**	**0.10**	**0.16**	**-0.05**	**-0.22**	**0.32**	**0.15**	**0.19**	**0.07**	**0.12**

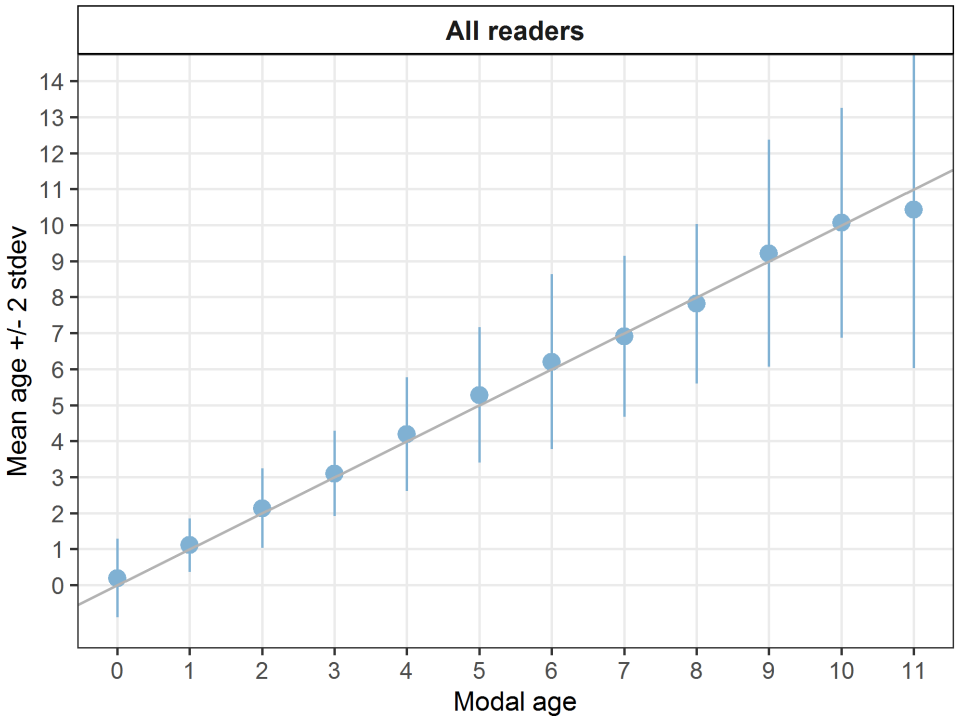


Figure X:: Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Inter-reader bias test

Table X: Inter reader bias test. The Inter-reader bias test gives probability of bias between readers and with modal age. - = no sign of bias (p>0.05), * = possibility of bias (0.01<p<0.05), * * = certainty of bias (p<0.01) , / = diagonal of the table (no bias)

Comparison	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB
R02 GB	/	**	**	**	**	**	*	**	**	*	*	-
R04 GB	**	/	-	**	**	*	**	**	**	*	**	**
R08 DK	**	-	/	-	*	-	**	**	**	-	-	*
R10 SE	**	**	-	/	**	*	-	**	**	**	**	**
R12 NO	**	**	*	**	/	**	-	-	**	*	*	*
R14 BE	**	*	-	*	**	/	-	*	**	*	**	*
R16 NO	*	**	**	-	-	-	/	**	**	**	**	*
R20 NL	**	**	**	**	-	*	**	/	**	-	-	-
R22 DK	**	**	**	**	**	**	**	**	/	**	**	**
R24 BE	*	*	-	**	*	*	**	-	**	/	*	*
R26 SE	*	**	-	**	*	**	**	-	**	*	/	*
R28 GB	-	**	*	**	*	*	*	-	**	*	*	/
Modal age	**	**	**	-	-	-	**	-	**	**	**	**

4.2 All readers – Broken

Multimodal cases

Table X: Strata Br .Total number of samples (NSample) and percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight assigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods Section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
85	6 %	0 %	0 %	0 %

Summary statistics

Table X: Strata_Br .Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
85	22 %	63 %	13 %

In this exchange event 85 otolith fish individuals were aged. Of those, 6 %when the traditional approach (all readers equally weighted) is used to define the mode. The percentage of multiple mode cases is reduced to 0 %. The complete list of cases with multiple modes is presented in table X in the annex 3 Section, where the ageing from each of the readers participating in the exchange event is presented. When all the otolith samples are considered (both single and multimodal cases) the weighted average percentage agreement based on modal ages for all readers is 63 %, with the weighted average CV of 22 % and APE of 13 %.

Coefficient of Variation (CV)

Table X: Strata_Br .Coefficient of Variation (CV) table presents the CV per modal age and reader, the CV of all readers combined per modal age and a weighted mean of the CV per reader

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	47 %	0 %	-	**29 %**
2	30 %	82 %	39 %	26 %	27 %	14 %	0 %	17 %	51 %	78 %	26 %	56 %	**51 %**
3	20 %	14 %	16 %	12 %	0 %	12 %	12 %	22 %	22 %	11 %	12 %	0 %	**17 %**
4	20 %	0 %	52 %	16 %	17 %	16 %	16 %	22 %	19 %	19 %	20 %	9 %	**22 %**
5	18 %	8 %	13 %	16 %	12 %	14 %	6 %	15 %	8 %	18 %	17 %	11 %	**14 %**
6	10 %	15 %	17 %	8 %	6 %	12 %	8 %	12 %	31 %	26 %	15 %	8 %	**18 %**
7	16 %	9 %	21 %	7 %	9 %	11 %	7 %	10 %	24 %	14 %	11 %	7 %	**15 %**
8	18 %	11 %	14 %	38 %	6 %	8 %	10 %	11 %	15 %	27 %	8 %	8 %	**18 %**
9	7 %	19 %	17 %	11 %	8 %	14 %	-	8 %	14 %	29 %	6 %	7 %	**17 %**
10	11 %	11 %	10 %	12 %	14 %	14 %	22 %	13 %	15 %	12 %	11 %	5 %	**16 %**
11	16 %	0 %	14 %	5 %	11 %	11 %	0 %	19 %	87 %	14 %	5 %	0 %	**21 %**
Weighted Mean	**17 %**	**19 %**	**21 %**	**16 %**	**12 %**	**12 %**	**8 %**	**15 %**	**25 %**	**28 %**	**14 %**	**15 %**	**22 %**

Percentage of Agreement (PA)

The percentage agreement per reader per modal age tells how large part of the readings that are equal to the modal age. The weighted mean including at the bottom of the table is weighted according to number of age readings.

Table X: Strata_Br .Percentage agreement (PA) table represents the PA per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	total
0	100 %	75 %	100 %	100 %	50 %	100 %	67 %	100 %	100 %	50 %	100 %	100 %	**87 %**
1	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	50 %	100 %	50 %	**92 %**
2	67 %	90 %	62 %	75 %	42 %	92 %	100 %	90 %	67 %	50 %	73 %	50 %	**71 %**
3	62 %	75 %	50 %	88 %	100 %	88 %	88 %	38 %	62 %	88 %	88 %	100 %	**78 %**
4	86 %	100 %	80 %	62 %	62 %	62 %	67 %	83 %	50 %	50 %	75 %	88 %	**71 %**
5	42 %	77 %	60 %	77 %	77 %	69 %	91 %	55 %	85 %	77 %	55 %	62 %	**69 %**
6	33 %	67 %	33 %	71 %	86 %	29 %	80 %	50 %	50 %	29 %	57 %	57 %	**54 %**
7	42 %	70 %	30 %	75 %	75 %	50 %	78 %	17 %	58 %	42 %	55 %	75 %	**55 %**
8	44 %	67 %	67 %	67 %	78 %	56 %	14 %	12 %	67 %	33 %	67 %	62 %	**53 %**
9	67 %	0 %	67 %	33 %	0 %	33 %	-	0 %	33 %	33 %	33 %	67 %	**33 %**
10	33 %	75 %	75 %	50 %	25 %	75 %	0 %	0 %	50 %	25 %	25 %	50 %	**41 %**
11	33 %	100 %	33 %	67 %	0 %	0 %	100 %	33 %	0 %	33 %	33 %	100 %	**43 %**
Weighted Mean	**55 %**	**76 %**	**59 %**	**73 %**	**65 %**	**65 %**	**75 %**	**47 %**	**63 %**	**51 %**	**64 %**	**70 %**	**63 %**

Average Percentage Error (APE)

Table X: Strata_Br. Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	33 %	0 %	-	**8 %**
2	27 %	47 %	28 %	21 %	23 %	7 %	0 %	9 %	31 %	51 %	16 %	41 %	**26 %**
3	18 %	12 %	14 %	8 %	0 %	8 %	8 %	20 %	18 %	7 %	8 %	0 %	**8 %**
4	13 %	0 %	37 %	11 %	14 %	11 %	8 %	15 %	12 %	12 %	11 %	6 %	**11 %**
5	15 %	7 %	11 %	11 %	9 %	10 %	3 %	13 %	3 %	10 %	12 %	9 %	**9 %**
6	8 %	13 %	11 %	6 %	4 %	10 %	6 %	9 %	23 %	20 %	11 %	8 %	**12 %**
7	12 %	8 %	16 %	4 %	7 %	9 %	5 %	6 %	17 %	11 %	9 %	4 %	**9 %**
8	11 %	7 %	10 %	22 %	3 %	7 %	7 %	9 %	11 %	17 %	5 %	6 %	**11 %**
9	5 %	15 %	13 %	9 %	6 %	10 %	-	6 %	10 %	21 %	5 %	5 %	**13 %**
10	7 %	8 %	7 %	9 %	11 %	10 %	16 %	10 %	13 %	10 %	9 %	5 %	**11 %**
11	11 %	0 %	10 %	4 %	8 %	8 %	0 %	15 %	67 %	10 %	4 %	0 %	**13 %**
Weighted Mean	**14 %**	**13 %**	**16 %**	**11 %**	**9 %**	**9 %**	**5 %**	**11 %**	**17 %**	**19 %**	**10 %**	**11 %**	**13 %**

Relative bias

The relative bias is the difference between the mean age (per modal age per reader) and modal age. As for the previous tables, a combined bias for all readers and weighted means are calculated.

Table X: Strata_Br . The relative bias (as the difference between the mean and modal age) per modal age and reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all readers combined.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	0.00	0.50	0.00	0.00	0.50	0.00	0.33	0.00	0.00	1.00	0.00	0.00	**0.19**
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	-0.50	**0.00**
2	-0.33	0.70	0.25	-0.25	0.75	0.08	0.00	-0.10	0.25	0.83	0.09	-0.17	**0.18**
3	-0.38	0.25	0.50	-0.12	0.00	-0.12	-0.12	-0.62	0.50	0.12	-0.12	0.00	**-0.01**
4	-0.29	0.00	1.20	0.12	0.50	0.12	0.00	-0.33	0.00	0.00	0.12	-0.12	**0.11**
5	-0.50	0.23	0.50	0.38	0.31	0.23	-0.09	-0.55	0.00	0.23	0.18	0.23	**0.10**
6	-0.67	0.67	0.00	0.29	0.14	0.43	-0.20	0.17	1.83	0.29	0.29	0.43	**0.30**
7	-0.58	0.40	1.10	0.08	0.33	0.42	-0.22	-1.00	0.50	-0.17	0.36	-0.08	**0.10**
8	-0.89	-0.22	0.67	-0.67	0.00	0.56	-1.14	-1.38	0.44	-0.22	-0.11	-0.12	**-0.26**
9	-0.33	0.00	1.00	1.33	-1.67	1.67	-	-1.33	1.67	-0.33	0.67	-0.33	-
10	-1.00	-0.50	0.50	0.25	-0.50	0.75	-0.33	-2.75	1.50	0.50	1.50	0.50	**0.03**
11	-1.33	0.00	-0.33	-0.33	-0.33	-0.33	0.00	-2.00	-2.33	-0.33	0.67	0.00	**-0.56**
Weighted Mean	**-0.53**	**0.23**	**0.56**	**0.04**	**0.19**	**0.28**	**-0.19**	**-0.74**	**0.38**	**0.20**	**0.22**	**0.01**	**0.05**

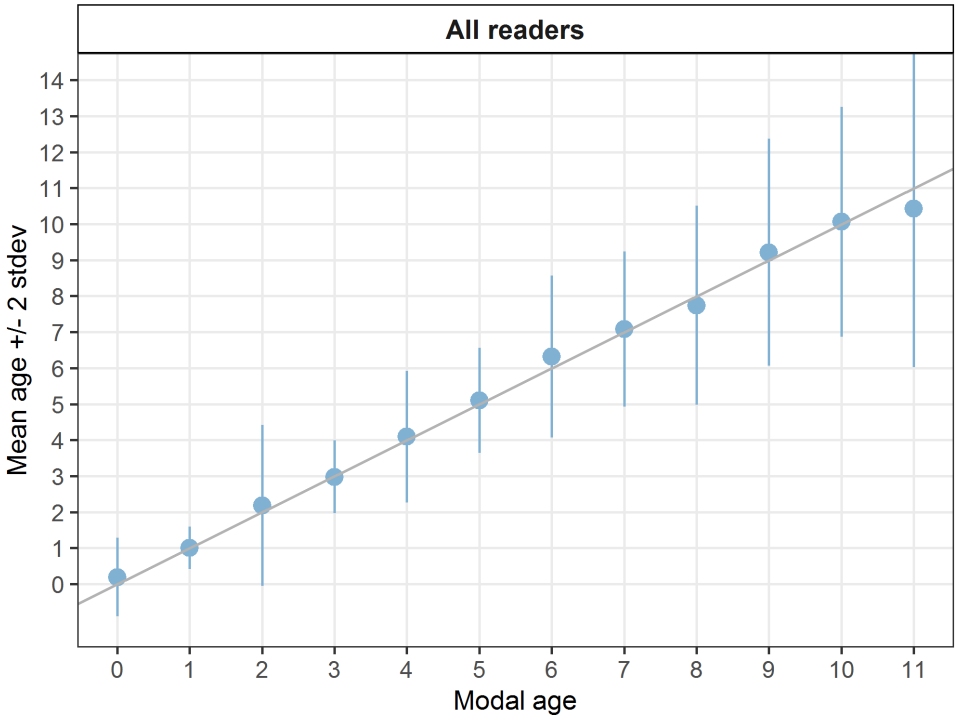


Figure X: Strata_Br .Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Inter-reader bias test

Table X: Strata_Br .Inter reader bias test. The Inter-reader bias test gives probability of bias between readers and with modal age. - = no sign of bias (p>0.05), * = poSTibility of bias (0.01<p<0.05), * * = certainty of bias (p<0.01) , / = diagonal of the table (no bias)

Comparison	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB
R02 GB	/	**	**	**	**	**	*	**	**	*	*	-
R04 GB	**	/	-	**	**	*	**	**	**	*	**	**
R08 DK	**	-	/	-	*	-	**	**	**	-	-	*
R10 SE	**	**	-	/	**	*	-	**	**	**	**	**
R12 NO	**	**	*	**	/	**	-	-	**	*	*	*
R14 BE	**	*	-	*	**	/	-	*	**	*	**	*
R16 NO	*	**	**	-	-	-	/	**	**	**	**	*
R20 NL	**	**	**	**	-	*	**	/	**	-	-	-
R22 DK	**	**	**	**	**	**	**	**	/	**	**	**
R24 BE	*	*	-	**	*	*	**	-	**	/	*	*
R26 SE	*	**	-	**	*	**	**	-	**	*	/	*
R28 GB	-	**	*	**	*	*	*	-	**	*	*	/
Modal age	**	**	**	-	-	-	**	-	**	**	**	**

Growth Analysis

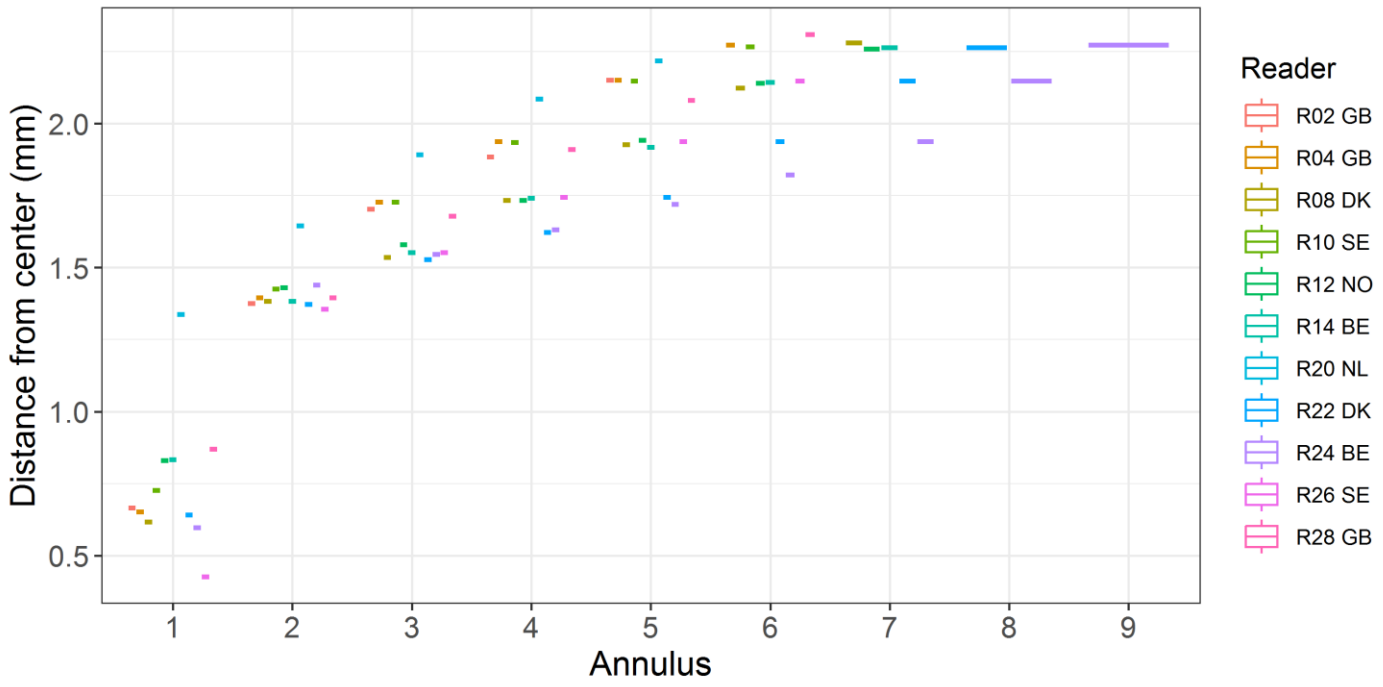


Figure X: Strata_Br .Plot of average distance from the centre to the winter rings for all readers. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

4.3 All readers – Sectioned with Transmitted light

Multimodal cases

Table X: Strata ST .Total number of samples (NSample) and percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight asigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods Section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
163	1 %	0 %	0 %	0 %

Summary statistics

Table X: Strata_ST .Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
163	23 %	80 %	12 %

Coefficient of Variation (CV)

Table X: Strata_ST .Coefficient of Variation (CV) table presents the CV per modal age and reader, the CV of all readers combined per modal age and a weighted mean of the CV per reader

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
1	20 %	33 %	52 %	0 %	28 %	27 %	0 %	18 %	24 %	63 %	0 %	36 %	**38 %**
2	0 %	18 %	34 %	26 %	16 %	16 %	7 %	18 %	18 %	24 %	8 %	17 %	**21 %**
3	13 %	11 %	34 %	17 %	8 %	13 %	10 %	31 %	8 %	13 %	23 %	18 %	**19 %**
4	12 %	15 %	20 %	24 %	9 %	10 %	13 %	28 %	12 %	11 %	27 %	15 %	**19 %**
5	13 %	21 %	25 %	18 %	7 %	20 %	15 %	28 %	12 %	11 %	25 %	9 %	**20 %**
6	8 %	17 %	9 %	-	8 %	14 %	0 %	10 %	19 %	10 %	25 %	57 %	**22 %**
7	13 %	0 %	31 %	-	11 %	13 %	-	0 %	11 %	24 %	0 %	24 %	**21 %**
8	0 %	10 %	10 %	-	0 %	6 %	7 %	13 %	6 %	8 %	6 %	8 %	**8 %**
9	-	-	-	-	-	-	-	-	-	-	-	-	**-**
10	-	-	-	-	-	-	-	-	-	-	-	-	**-**
11	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
Weighted Mean	**10 %**	**18 %**	**34 %**	**17 %**	**14 %**	**16 %**	**8 %**	**23 %**	**15 %**	**24 %**	**15 %**	**21 %**	**23 %**

Percentage of Agreement (PA)

Table X: Strata_ST .Percentage agreement (PA) table represents the PA per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	total
0	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1	96 %	82 %	81 %	100 %	89 %	93 %	100 %	96 %	93 %	79 %	100 %	71 %	**90 %**
2	100 %	83 %	66 %	88 %	96 %	96 %	98 %	87 %	81 %	74 %	98 %	85 %	**88 %**
3	91 %	89 %	60 %	84 %	93 %	91 %	91 %	48 %	93 %	84 %	70 %	75 %	**81 %**
4	72 %	72 %	35 %	50 %	83 %	83 %	69 %	44 %	78 %	78 %	56 %	72 %	**67 %**
5	80 %	60 %	50 %	56 %	87 %	47 %	69 %	33 %	67 %	60 %	53 %	80 %	**62 %**
6	80 %	40 %	67 %	100 %	80 %	80 %	100 %	50 %	60 %	60 %	20 %	40 %	**61 %**
7	0 %	100 %	50 %	-	50 %	0 %	0 %	0 %	50 %	50 %	100 %	50 %	**43 %**
8	100 %	50 %	50 %	100 %	100 %	75 %	67 %	50 %	75 %	50 %	75 %	50 %	**68 %**
9	-	-	-	-	-	-	-	-	-	-	-	-	**-**
10	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
11	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
Weighted Mean	**90 %**	**79 %**	**62 %**	**81 %**	**91 %**	**86 %**	**90 %**	**65 %**	**83 %**	**75 %**	**79 %**	**75 %**	**80 %**

Average Percentage Error (APE)

Table X: Strata_ST .Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
1	7 %	25 %	34 %	0 %	17 %	7 %	0 %	**7 %**	12 %	44 %	0 %	32 %	**19 %**
2	0 %	13 %	25 %	12 %	6 %	6 %	2 %	**10 %**	14 %	19 %	2 %	12 %	**11 %**
3	5 %	6 %	23 %	11 %	4 %	6 %	3 %	**23 %**	4 %	7 %	13 %	11 %	**9 %**
4	11 %	11 %	16 %	18 %	7 %	5 %	12 %	**21 %**	6 %	7 %	19 %	11 %	**12 %**
5	9 %	17 %	20 %	13 %	5 %	14 %	8 %	**23 %**	7 %	10 %	20 %	5 %	**14 %**
6	6 %	11 %	7 %	0 %	6 %	10 %	0 %	**9 %**	14 %	9 %	20 %	40 %	**12 %**
7	9 %	0 %	22 %	-	8 %	9 %	0 %	**0 %**	8 %	17 %	0 %	17 %	**14 %**
8	0 %	6 %	6 %	0 %	0 %	5 %	5 %	**10 %**	5 %	7 %	5 %	7 %	**5 %**
9	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
10	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
11	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
Weighted Mean	**5 %**	**13 %**	**24 %**	**10 %**	**7 %**	**7 %**	**4 %**	**15 %**	**9 %**	**17 %**	**9 %**	**15 %**	**12 %**

Relative bias

Table X: Strata_ST . The relative bias (as the difference between the mean and modal age) per modal age and reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all readers combined.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-
1	-0.04	0.18	0.26	0.00	0.11	0.00	0.00	0.04	0.07	0.39	0.00	0.29	**0.11**
2	0.00	0.17	0.47	-0.08	0.06	0.06	0.02	-0.09	0.19	0.30	-0.02	0.15	**0.10**
3	0.02	0.07	0.50	0.21	0.07	0.07	0.00	-0.27	0.07	0.07	0.05	0.14	**0.08**
4	-0.28	0.22	0.76	0.58	0.17	0.06	-0.31	0.22	0.00	0.11	0.44	0.22	**0.18**
5	-0.27	0.60	0.83	0.67	0.13	0.27	0.08	0.73	0.07	-0.40	0.87	-0.07	**0.29**
6	-0.20	1.00	0.33	0.00	-0.20	0.40	0.00	-0.50	0.80	-0.40	1.20	-1.60	**0.07**
7	-1.50	0.00	2.00	-	-0.50	-1.50	-2.00	-1.00	-0.50	-1.00	0.00	-1.00	-
8	0.00	0.00	0.00	0.00	0.00	0.25	0.33	-0.75	0.25	-0.50	0.25	-0.50	**-0.06**
9	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	**-0.08**	**0.21**	**0.51**	**0.18**	**0.07**	**0.07**	**-0.03**	**-0.04**	**0.12**	**0.11**	**0.18**	**0.07**	**0.12**

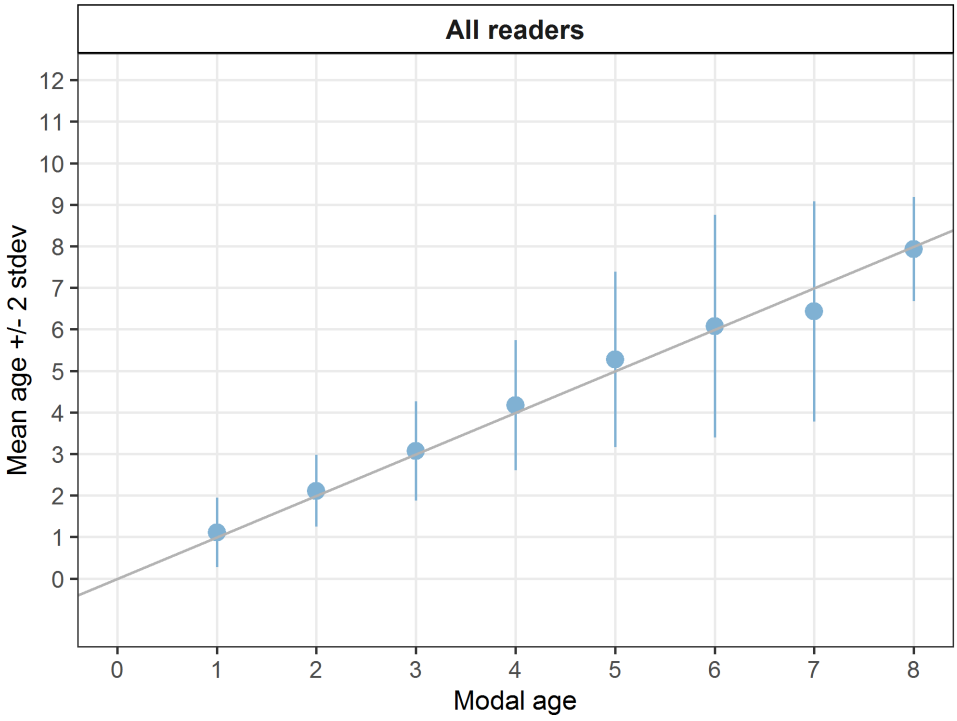


Figure X: Strata_ST .Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Inter-reader bias test

Table X: Strata_ST .Inter reader bias test. The Inter-reader bias test gives probability of bias between readers and with modal age. - = no sign of bias (p>0.05), * = poSTibility of bias (0.01<p<0.05), * * = certainty of bias (p<0.01) , / = diagonal of the table (no bias)

Comparison	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB
R02 GB	/	**	**	**	**	**	*	**	**	*	*	-
R04 GB	**	/	-	**	**	*	**	**	**	*	**	**
R08 DK	**	-	/	-	*	-	**	**	**	-	-	*
R10 SE	**	**	-	/	**	*	-	**	**	**	**	**
R12 NO	**	**	*	**	/	**	-	-	**	*	*	*
R14 BE	**	*	-	*	**	/	-	*	**	*	**	*
R16 NO	*	**	**	-	-	-	/	**	**	**	**	*
R20 NL	**	**	**	**	-	*	**	/	**	-	-	-
R22 DK	**	**	**	**	**	**	**	**	/	**	**	**
R24 BE	*	*	-	**	*	*	**	-	**	/	*	*
R26 SE	*	**	-	**	*	**	**	-	**	*	/	*
R28 GB	-	**	*	**	*	*	*	-	**	*	*	/
Modal age	**	**	**	-	-	-	**	-	**	**	**	**

Growth Analysis

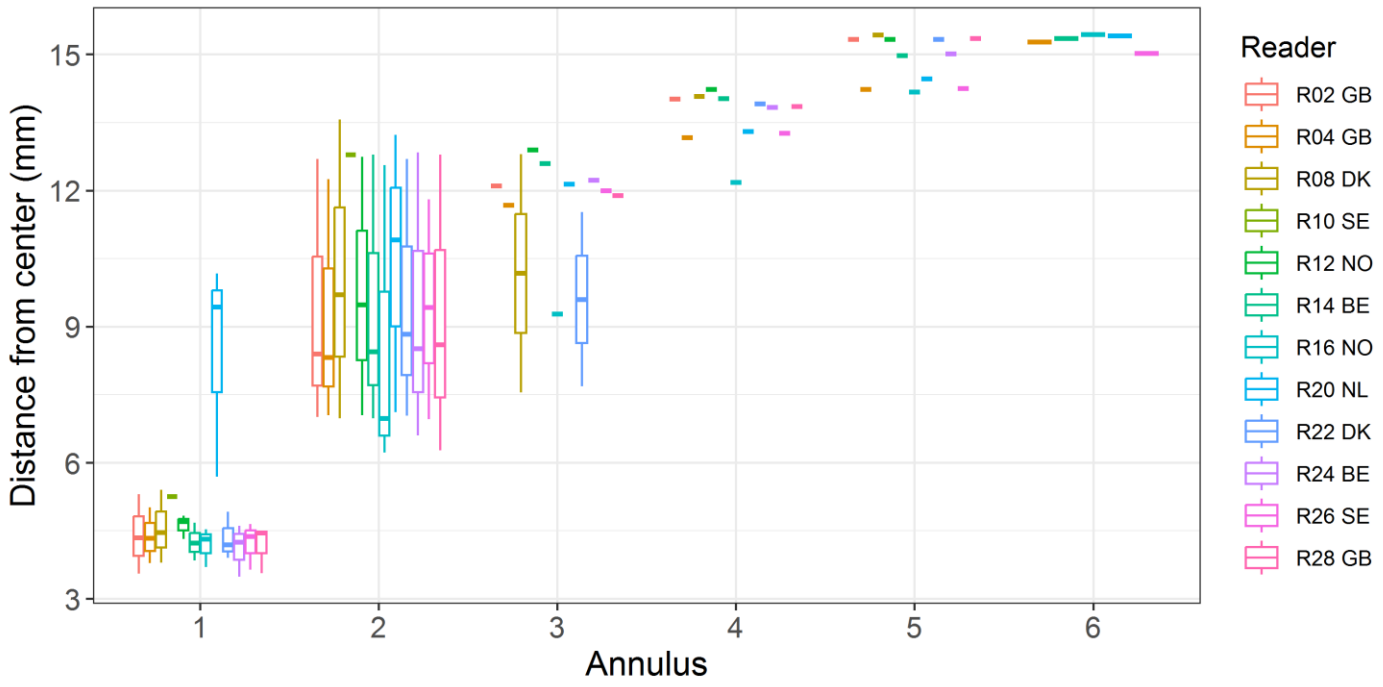


Figure X: Strata_ST .Plot of average distance from the centre to the winter rings for all readers. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

4.4 All readers – Sectioned with Reflected light

Multimodal cases

Table X: Strata SR .Total number of samples (NSample) and percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight asigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods Section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
163	1 %	0 %	0 %	0 %

Summary statistics

Table X: Strata_SR .Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
163	21 %	76 %	14 %

Coefficient of Variation (CV)

Table X: Strata_SR .Coefficient of Variation (CV) table presents the CV per modal age and reader, the CV of all readers combined per modal age and a weighted mean of the CV per reader

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1	0 %	31 %	36 %	19 %	32 %	18 %	0 %	18 %	35 %	28 %	20 %	36 %	**29 %**
2	0 %	16 %	22 %	8 %	17 %	18 %	11 %	18 %	21 %	27 %	19 %	17 %	**20 %**
3	13 %	12 %	17 %	14 %	7 %	16 %	13 %	26 %	19 %	20 %	24 %	18 %	**19 %**
4	12 %	16 %	23 %	22 %	9 %	10 %	11 %	21 %	14 %	13 %	16 %	15 %	**17 %**
5	12 %	18 %	19 %	20 %	8 %	14 %	8 %	22 %	16 %	12 %	18 %	14 %	**18 %**
6	8 %	17 %	12 %	8 %	8 %	7 %	0 %	9 %	20 %	12 %	7 %	57 %	**20 %**
7	13 %	9 %	11 %	0 %	11 %	11 %	24 %	0 %	11 %	0 %	11 %	13 %	**14 %**
8	0 %	6 %	0 %	0 %	0 %	6 %	0 %	19 %	6 %	6 %	20 %	13 %	**9 %**
9	-	-	-	-	-	-	-	-	-	-	-	-	**-**
10	-	-	-	-	-	-	-	-	-	-	-	-	**-**
11	-	-	-	-	-	-	-	**-**	-	-	-	-	**-**
Weighted Mean	**6 %**	**17 %**	**22 %**	**14 %**	**14 %**	**15 %**	**9 %**	**21 %**	**21 %**	**21 %**	**20 %**	**21 %**	**21 %**

Percentage of Agreement (PA)

Table X: Strata_SR .Percentage agreement (PA) table represents the PA per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	total
0	-	-	-	-	-	-	-	-	-	-	-	-	-
1	100 %	86 %	68 %	96 %	85 %	96 %	100 %	96 %	75 %	89 %	96 %	71 %	**88 %**
2	100 %	87 %	51 %	97 %	94 %	83 %	96 %	87 %	47 %	72 %	87 %	85 %	**82 %**
3	91 %	86 %	60 %	81 %	95 %	84 %	85 %	39 %	51 %	80 %	67 %	73 %	**74 %**
4	72 %	65 %	35 %	50 %	83 %	83 %	81 %	39 %	50 %	72 %	47 %	72 %	**63 %**
5	87 %	47 %	53 %	23 %	80 %	47 %	82 %	43 %	50 %	67 %	53 %	73 %	**59 %**
6	80 %	40 %	20 %	0 %	80 %	80 %	100 %	75 %	80 %	60 %	80 %	40 %	**62 %**
7	0 %	50 %	50 %	100 %	50 %	50 %	50 %	0 %	50 %	100 %	50 %	0 %	**46 %**
8	100 %	75 %	100 %	100 %	100 %	75 %	100 %	25 %	75 %	75 %	50 %	75 %	**79 %**
9	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	**91 %**	**78 %**	**55 %**	**79 %**	**90 %**	**82 %**	**90 %**	**63 %**	**55 %**	**77 %**	**74 %**	**74 %**	**76 %**

Average Percentage Error (APE)

Table X: Strata_SR .Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0 %	21 %	33 %	7 %	22 %	7 %	0 %	7 %	30 %	17 %	7 %	32 %	**18 %**
2	0 %	10 %	21 %	3 %	8 %	13 %	2 %	12 %	20 %	20 %	9 %	12 %	**13 %**
3	4 %	7 %	16 %	8 %	3 %	11 %	5 %	23 %	17 %	13 %	19 %	12 %	**12 %**
4	11 %	12 %	17 %	19 %	7 %	5 %	8 %	17 %	12 %	8 %	14 %	11 %	**13 %**
5	7 %	15 %	16 %	16 %	6 %	11 %	6 %	17 %	12 %	8 %	14 %	8 %	**14 %**
6	6 %	11 %	9 %	6 %	6 %	5 %	0 %	7 %	15 %	7 %	5 %	40 %	**11 %**
7	9 %	7 %	8 %	0 %	8 %	8 %	17 %	0 %	8 %	0 %	8 %	9 %	**12 %**
8	0 %	5 %	0 %	0 %	0 %	5 %	0 %	13 %	5 %	5 %	12 %	10 %	**5 %**
9	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	**3 %**	**12 %**	**20 %**	**8 %**	**8 %**	**10 %**	**4 %**	**15 %**	**19 %**	**14 %**	**12 %**	**16 %**	**14 %**

Relative bias

Table X: Strata_SR . The relative bias (as the difference between the mean and modal age) per modal age and reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all readers combined.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-
1	0.00	0.14	0.32	0.04	0.15	0.04	0.00	0.04	0.25	0.11	-0.04	0.29	**0.11**
2	0.00	0.13	0.51	-0.03	0.09	0.17	0.00	-0.13	0.55	0.28	-0.04	0.15	**0.14**
3	0.02	0.09	0.44	0.08	0.05	0.20	0.00	-0.39	0.51	0.23	0.37	0.16	**0.15**
4	-0.28	0.29	0.88	0.64	0.17	0.06	-0.19	0.22	0.56	0.06	0.47	0.22	**0.26**
5	-0.20	0.67	0.87	1.46	0.20	0.67	0.18	0.21	0.71	-0.07	0.53	0.07	**0.44**
6	-0.20	1.00	1.20	1.33	-0.20	0.20	0.00	-0.25	0.60	0.00	0.20	-1.60	**0.19**
7	-1.50	0.50	-0.50	0.00	-0.50	-0.50	-1.00	-2.00	-0.50	0.00	-0.50	-1.50	**-0.67**
8	0.00	-0.25	0.00	0.00	0.00	0.25	0.00	-1.25	0.25	-0.25	0.00	-0.50	**-0.15**
9	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-	-	-
Weighted Mean	**-0.07**	**0.21**	**0.53**	**0.25**	**0.09**	**0.18**	**-0.02**	**-0.16**	**0.48**	**0.15**	**0.18**	**0.09**	**0.16**

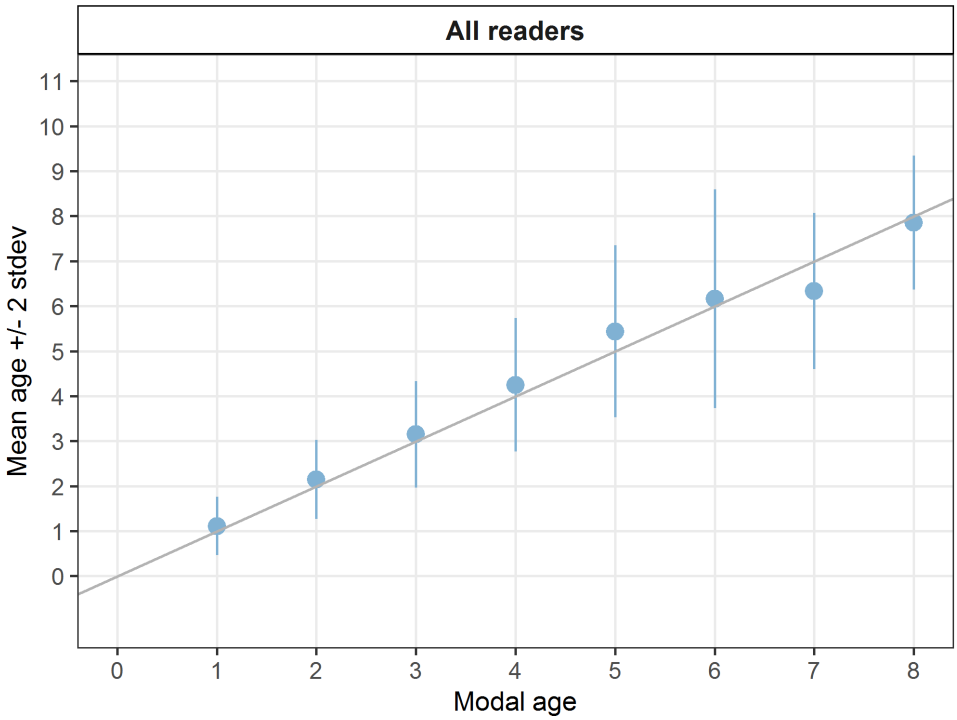


Figure X: Strata_SR .Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Inter-reader bias test

Table X: Strata_SR .Inter reader bias test. The Inter-reader bias test gives probability of bias between readers and with modal age. - = no sign of bias (p>0.05), * = poSTibility of bias (0.01<p<0.05), * * = certainty of bias (p<0.01) , / = diagonal of the table (no bias)

Comparison	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB
R02 GB	/	**	**	**	**	**	*	**	**	*	*	-
R04 GB	**	/	-	**	**	*	**	**	**	*	**	**
R08 DK	**	-	/	-	*	-	**	**	**	-	-	*
R10 SE	**	**	-	/	**	*	-	**	**	**	**	**
R12 NO	**	**	*	**	/	**	-	-	**	*	*	*
R14 BE	**	*	-	*	**	/	-	*	**	*	**	*
R16 NO	*	**	**	-	-	-	/	**	**	**	**	*
R20 NL	**	**	**	**	-	*	**	/	**	-	-	-
R22 DK	**	**	**	**	**	**	**	**	/	**	**	**
R24 BE	*	*	-	**	*	*	**	-	**	/	*	*
R26 SE	*	**	-	**	*	**	**	-	**	*	/	*
R28 GB	-	**	*	**	*	*	*	-	**	*	*	/
Modal age	**	**	**	-	-	-	**	-	**	**	**	**

Overall comparison of results by strata

Table X: Number of age readings per strata and modal age for all advanced readers combined.

Modal age	Strata_Br	Strata_SR	Strata_ST	total
0	46	0	0	**46**
1	24	331	323	**678**
2	132	551	539	**1222**
3	94	514	499	**1107**
4	86	205	205	**496**
5	146	172	169	**487**
6	74	55	51	**180**
7	136	24	21	**181**
8	101	48	44	**193**
9	33	0	0	**33**
10	46	0	0	**46**
11	35	0	0	**35**
Total	**953**	**1900**	**1851**	**4704**

Coefficient of Variation (CV)

Table X: CV per strata and modal age for all advanced readers combined.

Modal age	Strata_Br	Strata_SR	Strata_ST	all
0	-	-	-	-
1	29 %	29 %	38 %	33 %
2	51 %	20 %	21 %	26 %
3	17 %	19 %	19 %	19 %
4	22 %	17 %	19 %	19 %
5	14 %	18 %	20 %	18 %
6	18 %	20 %	22 %	20 %
7	15 %	14 %	21 %	16 %
8	18 %	9 %	8 %	14 %

9	17 %	-	-	17 %
10	16 %	-	-	16 %
11	21 %	-	-	21 %
Weighted Mean	**22 %**	**21 %**	**23 %**	**22 %**

Percentage of Agreement (PA)

Table X: Percentage Agreement per strata and modal age for all advanced readers combined.

Modal age	Strata_Br	Strata_SR	Strata_ST	total
0	87 %	-	-	87 %
1	92 %	88 %	90 %	89 %
2	71 %	82 %	88 %	83 %
3	78 %	74 %	81 %	77 %
4	71 %	63 %	67 %	66 %
5	69 %	59 %	62 %	63 %
6	54 %	62 %	61 %	58 %
7	55 %	46 %	43 %	52 %
8	53 %	79 %	68 %	63 %
9	33 %	-	-	33 %
10	41 %	-	-	41 %
11	43 %	-	-	43 %
Weighted Mean	**63 %**	**76 %**	**80 %**	**75 %**

Average Percentage Error (APE)

Table X: Average Percentage Error per strata and modal age for all advanced readers combined.

Modal age	Strata_Br	Strata_SR	Strata_ST	all
0	-	-	-	-
1	8 %	18 %	19 %	18 %
2	26 %	13 %	11 %	14 %
3	8 %	12 %	9 %	11 %
4	11 %	13 %	12 %	13 %
5	9 %	14 %	14 %	13 %
6	12 %	11 %	12 %	12 %
7	9 %	12 %	14 %	10 %
8	11 %	5 %	5 %	8 %
9	13 %	-	-	13 %
10	11 %	-	-	11 %
11	13 %	-	-	13 %
Weighted Mean	**13 %**	**14 %**	**12 %**	**13 %**

Relative bias

Table X: Relative Bias per strata and modal age for all advanced readers combined.

Modal age	Strata_Br	Strata_SR	Strata_ST	all
0	0.20	-	-	-
1	0.00	0.11	0.11	0.07
2	0.18	0.14	0.11	0.15
3	-0.02	0.15	0.07	0.07
4	0.09	0.25	0.17	0.17
5	0.10	0.44	0.27	0.27
6	0.32	0.16	0.08	0.19
7	0.08	-0.67	-0.57	-0.39

8	-0.26	-0.15	-0.07	-0.16
9	0.21	-	-	-
10	0.07	-	-	-
11	-0.57	-	-	-
Weighted Mean	**0.06**	**0.16**	**0.11**	**0.10**

4.5 Advanced readers – all methods

Multimodal cases

Table X: Summary of statistics; Total number of samples (NSample), a percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight asigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods Section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
411	2 %	0 %	0 %	0 %

Summary statistics

Table X: Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
411	21 %	76 %	12 %

In this exchange event, 411 otolith fish individuals were aged. Of those, 2 %when the traditional approach (all readers equally weighted) is used to define the mode. The percentage of multiple mode cases is reduced to 0 %. The complete list of cases with multiple modes is presented in table X in the annex 3 Section, where the ageing from each of the readers participating in the exchange event is presented. When all the otolith samples are considered (both single and multimodal cases) the weighted average percentage agreement based on modal ages for all readers is 76 %, with the weighted average CV of 21 % and APE of 12 %.

Coefficient of Variation (CV)

Table X: Coefficient of Variation (CV) table presents the CV per modal age and advanced reader, the CV of all advanced readers combined per modal age and a weighted mean of the CV per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	all
0	-	-	-	-	-	-	-	-	-	**-**
1	13 %	30 %	44 %	15 %	28 %	23 %	13 %	13 %	31 %	**28 %**
2	10 %	34 %	29 %	19 %	21 %	17 %	11 %	18 %	26 %	**24 %**
3	14 %	11 %	26 %	15 %	8 %	15 %	12 %	28 %	17 %	**19 %**
4	13 %	10 %	26 %	21 %	11 %	11 %	11 %	24 %	15 %	**19 %**
5	14 %	17 %	17 %	19 %	8 %	16 %	8 %	23 %	14 %	**17 %**
6	17 %	18 %	23 %	12 %	10 %	11 %	14 %	16 %	24 %	**19 %**
7	12 %	8 %	20 %	7 %	8 %	14 %	5 %	11 %	23 %	**16 %**
8	14 %	10 %	11 %	27 %	6 %	12 %	11 %	15 %	13 %	**15 %**
9	0 %	12 %	15 %	11 %	12 %	10 %	-	8 %	15 %	**15 %**
10	12 %	5 %	9 %	10 %	17 %	14 %	20 %	13 %	12 %	**16 %**
11	22 %	0 %	20 %	0 %	0 %	13 %	-	22 %	-	**29 %**
Weighted Mean	**13 %**	**20 %**	**27 %**	**17 %**	**15 %**	**16 %**	**11 %**	**20 %**	**21 %**	**21 %**

Percentage of Agreement (PA)

Table X: Percentage agreement (PA) table represents the PA per modal age and reader, advanced the PA of all advanced readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	total
0	100 %	75 %	100 %	100 %	50 %	100 %	67 %	100 %	100 %	**88 %**
1	98 %	88 %	77 %	98 %	89 %	95 %	98 %	98 %	86 %	**92 %**
2	96 %	86 %	59 %	91 %	89 %	89 %	95 %	88 %	64 %	**84 %**
3	89 %	87 %	58 %	82 %	93 %	86 %	88 %	44 %	71 %	**77 %**
4	82 %	81 %	38 %	59 %	85 %	79 %	79 %	51 %	65 %	**69 %**
5	68 %	67 %	50 %	58 %	87 %	62 %	85 %	46 %	71 %	**66 %**
6	40 %	42 %	26 %	41 %	73 %	69 %	78 %	50 %	60 %	**54 %**
7	38 %	67 %	45 %	75 %	85 %	54 %	89 %	15 %	54 %	**57 %**
8	68 %	58 %	62 %	75 %	79 %	63 %	50 %	28 %	63 %	**61 %**
9	100 %	0 %	33 %	33 %	33 %	33 %	100 %	0 %	33 %	**36 %**
10	67 %	75 %	50 %	75 %	25 %	75 %	0 %	0 %	25 %	**44 %**
11	50 %	100 %	0 %	100 %	0 %	0 %	100 %	50 %	0 %	**41 %**
Weighted Mean	**84 %**	**79 %**	**57 %**	**78 %**	**86 %**	**81 %**	**88 %**	**62 %**	**68 %**	**76 %**

Average Percentage Error (APE)

Table X: Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	all
0	-	-	-	-	-	-	-	-	-	-
1	4 %	19 %	32 %	4 %	17 %	7 %	4 %	3 %	21 %	**14 %**
2	4 %	15 %	24 %	9 %	12 %	10 %	3 %	11 %	21 %	**13 %**
3	5 %	7 %	19 %	9 %	4 %	9 %	4 %	23 %	14 %	**10 %**
4	9 %	7 %	18 %	17 %	7 %	6 %	9 %	17 %	11 %	**12 %**
5	12 %	13 %	14 %	15 %	5 %	11 %	3 %	16 %	8 %	**11 %**
6	13 %	14 %	18 %	10 %	7 %	8 %	9 %	10 %	17 %	**12 %**
7	10 %	6 %	15 %	4 %	5 %	9 %	3 %	7 %	16 %	**9 %**
8	10 %	7 %	9 %	12 %	4 %	9 %	10 %	12 %	10 %	**9 %**
9	0 %	10 %	11 %	9 %	8 %	7 %	0 %	6 %	11 %	**12 %**
10	10 %	4 %	7 %	7 %	12 %	10 %	15 %	10 %	9 %	**12 %**
11	16 %	0 %	14 %	0 %	0 %	9 %	0 %	16 %	-	**17 %**
Weighted Mean	**6 %**	**12 %**	**21 %**	**10 %**	**9 %**	**9 %**	**5 %**	**14 %**	**16 %**	**12 %**

Relative Bias

Table X: The relative bias (as the difference between the mean and modal age) per modal age and advanced reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all advanced readers combined.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	all
0	0.00	0.50	0.00	0.00	0.50	0.00	0.33	0.00	0.00	**0.15**
1	-0.02	0.12	0.27	0.02	0.11	0.02	0.02	0.02	0.14	**0.08**

2	-0.04	0.20	0.47	-0.08	0.15	0.10	-0.01	-0.10	0.36	**0.12**
3	-0.01	0.09	0.48	0.11	0.07	0.13	-0.01	-0.35	0.31	**0.09**
4	-0.21	0.19	0.82	0.48	0.18	0.05	-0.21	0.16	0.22	**0.19**
5	-0.34	0.46	0.62	0.73	0.15	0.15	-0.03	-0.05	0.13	**0.20**
6	-0.84	0.58	0.84	0.59	-0.15	0.31	-0.33	0.05	0.60	**0.18**
7	-0.54	0.17	0.73	-0.08	0.23	0.15	-0.11	-1.08	0.54	**0.00**
8	-0.53	-0.16	0.44	-0.31	-0.11	0.58	-0.50	-1.22	0.42	**-0.15**
9	0.00	0.33	1.33	1.33	-1.00	1.00	0.00	-1.67	1.33	**0.30**
10	-0.67	0.25	0.75	0.50	0.25	0.75	0.33	-2.50	2.25	**0.21**
11	-1.50	0.00	-0.50	0.00	-1.00	0.00	0.00	-1.50	-4.50	**-1.00**
Weighted Mean	**-0.17**	**0.20**	**0.51**	**0.16**	**0.09**	**0.15**	**-0.06**	**-0.23**	**0.30**	**0.10**

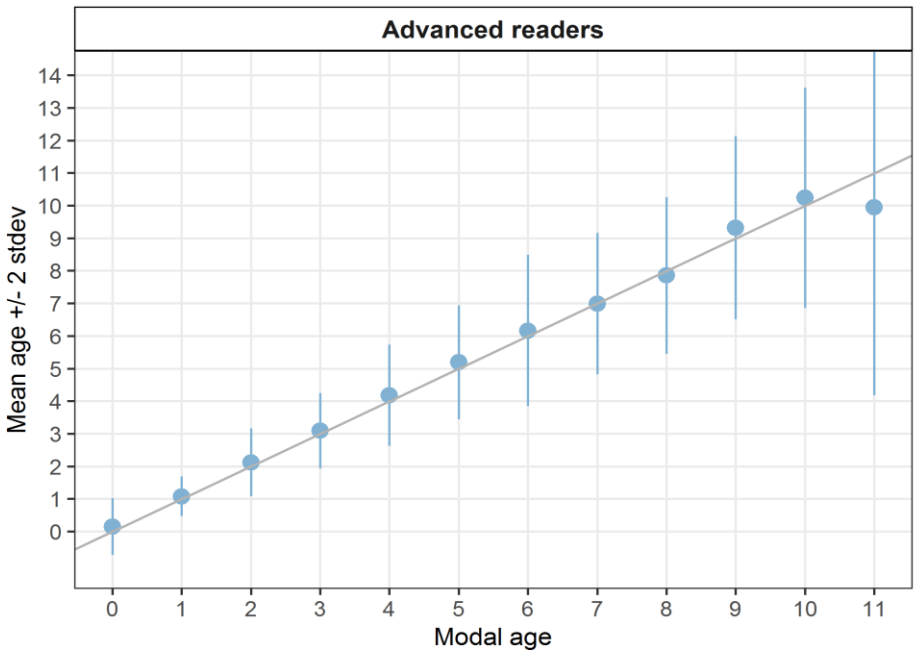


Figure X: Age bias plot for advanced readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Growth analysis

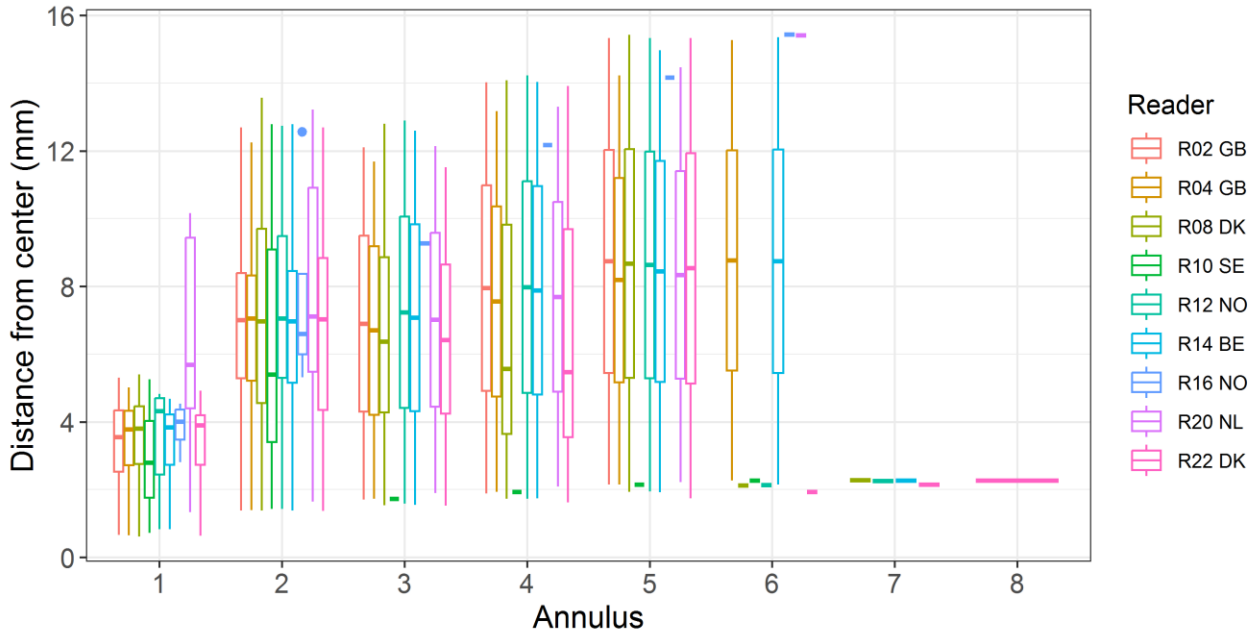


Figure X: Plot of average distance from the centre to the winter rings for advanced readers. The boxes represent the mean, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

General Age Error Matrix (AEM)

Table X: General Age error matrix (AEM). The modal age is in rows and the age classifications by the advanced readers in columns.

modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
0	0.88	0.09	0.03	-	-	-	-	-	-	-	-	-	-	-	1.00
1	0.00	0.92	0.08	-	0.00	-	-	-	-	-	-	-	-	-	1.00
2	0.00	0.03	0.84	0.12	0.01	0.00	0.00	-	-	0.00	-	-	-	-	1.00
3	-	0.00	0.08	0.77	0.12	0.02	0.00	-	-	0.00	-	-	-	-	0.99
4	-	-	0.01	0.09	0.69	0.16	0.04	0.01	-	-	0.00	-	-	-	1.00
5	-	-	-	0.02	0.11	0.66	0.14	0.04	0.03	0.00	-	-	-	-	1.00
6	-	-	-	0.01	0.02	0.17	0.54	0.15	0.05	0.03	-	0.00	0.00	-	0.97
7	-	-	-	-	-	0.06	0.18	0.57	0.12	0.04	0.01	0.01	0.01	-	1.00
8	0.01	-	-	-	0.01	0.01	0.06	0.15	0.61	0.11	0.02	0.02	0.01	-	1.01
9	-	-	-	-	-	-	-	0.12	0.12	0.36	0.20	0.12	0.08	-	1.00
10	-	-	-	-	-	-	0.03	-	0.18	-	0.44	0.12	0.12	0.12	1.01
11	0.06	-	-	-	-	-	-	-	0.12	0.06	0.18	0.41	0.12	0.06	1.01

AEM by ICES area

Table X: Age error matrix (AEM) for ICES area 27.3.a.20.

ices_area	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
27.3.a.20	0	0.88	0.09	0.03	-	-	-	-	-	-	-	-	-	-	-	1.00
27.3.a.20	1	-	0.85	0.15	-	-	-	-	-	-	-	-	-	-	-	1.00
27.3.a.20	2	0.01	0.04	0.79	0.10	0.03	0.01	-	-	-	0.01	-	-	-	-	0.99
27.3.a.20	3	-	-	0.16	0.73	0.10	0.01	-	-	-	-	-	-	-	-	1.00
27.3.a.20	4	-	-	0.04	0.09	0.75	0.08	0.02	-	-	-	0.02	-	-	-	1.00
27.3.a.20	5	-	-	-	0.02	0.13	0.71	0.10	0.03	0.01	-	-	-	-	-	1.00

27.3.a.20	6	-	-	-	-	0.03	0.14	0.58	0.15	0.05	0.02	-	0.02	0.02	-	1.01
27.3.a.20	7	-	-	-	-	-	0.05	0.17	0.58	0.13	0.04	0.01	-	0.01	-	0.99
27.3.a.20	8	0.01	-	-	-	0.01	0.01	0.09	0.20	0.48	0.12	0.03	0.03	0.01	-	0.99
27.3.a.20	9	-	-	-	-	-	-	-	0.12	0.12	0.36	0.20	0.12	0.08	-	1.00
27.3.a.20	10	-	-	-	-	-	-	0.03	-	0.18	-	0.44	0.12	0.12	0.12	1.01
27.3.a.20	11	0.06	-	-	-	-	-	-	-	0.12	0.06	0.18	0.41	0.12	0.06	1.01

Table X: Age error matrix (AEM) for ICES area 27.4.b.

ices_area	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
27.4.b	1	0.01	0.93	0.06	-	-	-	-	-	-	-	-	-	-	-	1.00
27.4.b	2	0.00	0.04	0.83	0.12	0.01	-	0.00	-	-	-	-	-	-	-	1.00
27.4.b	3	-	0.00	0.12	0.79	0.08	0.01	-	-	-	-	-	-	-	-	1.00
27.4.b	4	-	-	-	0.07	0.75	0.18	-	-	-	-	-	-	-	-	1.00
27.4.b	5	-	-	-	-	0.03	0.64	0.21	-	0.12	-	-	-	-	-	1.00
27.4.b	6	-	-	-	0.09	0.06	0.24	0.33	0.18	0.09	-	-	-	-	-	0.99

Table X: Age error matrix (AEM) for ICES area 27.7.e.

ices_area	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
27.7.e	1	-	0.97	0.03	-	-	-	-	-	-	-	-	-	-	-	1
27.7.e	3	-	-	-	0.69	0.31	-	-	-	-	-	-	-	-	-	1
27.7.e	4	-	-	-	0.19	0.55	0.13	0.13	-	-	-	-	-	-	-	1
27.7.e	5	-	-	-	-	-	0.94	0.06	-	-	-	-	-	-	-	1
27.7.e	6	-	-	-	-	-	-	0.82	0.12	0.06	-	-	-	-	-	1
27.7.e	8	-	-	-	-	-	-	-	0.09	0.82	0.09	-	-	-	-	1

Table X: Age error matrix (AEM) for ICES area 27.7.f.

ices_area	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
27.7.f	1	-	0.74	0.23	-	0.03	-	-	-	-	-	-	-	-	-	1.00
27.7.f	2	-	-	0.83	0.17	-	-	-	-	-	-	-	-	-	-	1.00
27.7.f	3	-	-	0.02	0.72	0.21	0.04	0.00	-	-	0.00	-	-	-	-	0.99
27.7.f	4	-	-	-	0.31	0.56	0.12	-	-	-	-	-	-	-	-	0.99
27.7.f	5	-	-	-	-	0.22	0.39	0.11	0.17	0.06	0.06	-	-	-	-	1.01
27.7.f	8	-	-	-	-	-	0.06	0.06	0.18	0.65	0.06	-	-	-	-	1.01

Table X: Age error matrix (AEM) for ICES area 27.7.g.

ices_area	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
27.7.g	1	-	0.88	0.12	-	-	-	-	-	-	-	-	-	-	-	1
27.7.g	2	-	-	0.93	0.06	-	0.01	-	-	-	-	-	-	-	-	1
27.7.g	3	-	-	0.04	0.85	0.10	0.01	-	-	-	-	-	-	-	-	1
27.7.g	4	-	-	-	0.02	0.65	0.19	0.10	0.04	-	-	-	-	-	-	1
27.7.g	5	-	-	-	0.02	0.11	0.63	0.17	0.05	0.02	-	-	-	-	-	1
27.7.g	6	-	-	-	-	-	0.26	0.54	0.15	0.02	0.03	-	-	-	-	1
27.7.g	8	-	-	-	-	-	-	-	-	0.83	0.17	-	-	-	-	1

Table X: Age error matrix (AEM) for ICES area 27.7.h.

ices_area	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
27.7.h	2	-	-	0.91	0.08	0.01	-	-	-	-	-	-	-	-	-	1.00
27.7.h	3	-	-	-	0.81	0.12	-	0.06	-	-	-	-	-	-	-	0.99
27.7.h	4	-	-	-	-	0.83	0.17	-	-	-	-	-	-	-	-	1.00
27.7.h	5	-	-	-	0.06	0.06	0.61	0.17	0.06	0.06	-	-	-	-	-	1.02
27.7.h	6	-	-	-	-	-	0.07	0.54	0.14	0.11	0.14	-	-	-	-	1.00
27.7.h	7	-	-	-	-	-	0.12	0.25	0.50	0.06	-	-	0.06	-	-	0.99

AEM by strata

Table X: Age error matrix (AEM) for Strata_Br.

strata	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Strata_Br	0	0.88	0.09	0.03	-	-	-	-	-	-	-	-	-	-	-	1.00
Strata_Br	1	-	0.85	0.15	-	-	-	-	-	-	-	-	-	-	-	1.00
Strata_Br	2	0.01	0.04	0.79	0.10	0.03	0.01	-	-	-	0.01	-	-	-	-	0.99
Strata_Br	3	-	-	0.16	0.73	0.10	0.01	-	-	-	-	-	-	-	-	1.00
Strata_Br	4	-	-	0.04	0.09	0.75	0.08	0.02	-	-	-	0.02	-	-	-	1.00
Strata_Br	5	-	-	-	0.02	0.13	0.71	0.10	0.03	0.01	-	-	-	-	-	1.00
Strata_Br	6	-	-	-	-	0.03	0.14	0.58	0.15	0.05	0.02	-	0.02	0.02	-	1.01
Strata_Br	7	-	-	-	-	-	0.05	0.17	0.58	0.13	0.04	0.01	-	0.01	-	0.99
Strata_Br	8	0.01	-	-	-	0.01	0.01	0.09	0.20	0.48	0.12	0.03	0.03	0.01	-	0.99
Strata_Br	9	-	-	-	-	-	-	-	0.12	0.12	0.36	0.20	0.12	0.08	-	1.00
Strata_Br	10	-	-	-	-	-	-	0.03	-	0.18	-	0.44	0.12	0.12	0.12	1.01
Strata_Br	11	0.06	-	-	-	-	-	-	-	0.12	0.06	0.18	0.41	0.12	0.06	1.01

Table X: Age error matrix (AEM) for Strata_SR.

strata	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Strata_SR	1	-	0.91	0.09	-	-	-	-	-	-	-	-	-	-	-	1.00
Strata_SR	2	-	0.03	0.82	0.15	0.01	-	-	-	-	-	-	-	-	-	1.01
Strata_SR	3	-	-	0.08	0.74	0.16	0.02	-	-	-	-	-	-	-	-	1.00
Strata_SR	4	-	-	-	0.08	0.66	0.20	0.05	0.01	-	-	-	-	-	-	1.00
Strata_SR	5	-	-	-	0.01	0.06	0.60	0.20	0.06	0.05	0.01	-	-	-	-	0.99
Strata_SR	6	-	-	-	0.01	0.01	0.19	0.51	0.19	0.05	0.03	-	-	-	-	0.99
Strata_SR	7	-	-	-	-	-	0.11	0.22	0.56	0.11	-	-	-	-	-	1.00
Strata_SR	8	-	-	-	-	-	0.03	-	0.08	0.83	0.06	-	-	-	-	1.00

Table X: Age error matrix (AEM) for Strata_ST.

strata	modal_age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Strata_ST	1	0.01	0.93	0.06	-	0.00	-	-	-	-	-	-	-	-	-	1.00
Strata_ST	2	0.00	0.03	0.87	0.09	0.01	0.00	0.00	-	-	-	-	-	-	-	1.00
Strata_ST	3	-	0.00	0.07	0.82	0.09	0.02	0.01	-	-	0.00	-	-	-	-	1.01
Strata_ST	4	-	-	-	0.10	0.70	0.14	0.04	0.01	-	-	-	-	-	-	0.99
Strata_ST	5	-	-	-	0.02	0.12	0.67	0.13	0.04	0.03	-	-	-	-	-	1.01
Strata_ST	6	-	-	-	0.03	0.01	0.19	0.54	0.12	0.06	0.06	-	-	-	-	1.01
Strata_ST	7	-	-	-	-	-	0.14	0.29	0.43	-	-	-	0.14	-	-	1.00
Strata_ST	8	-	-	-	-	-	-	0.03	0.09	0.72	0.16	-	-	-	-	1.00

4.6 Advanced readers – Broken

This section only includes the results from the readers advanced in the broken method on the broken samples, so the method where they have the most expertise.

Comparison results by reader on strata: Strata_Br

Multimodal cases

Table X: Strata_Br .Total number of samples (NSample) and percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight assigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
85	14 %	0 %	0 %	0 %

Summary statistics

Table X: Strata_Br .Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
85	21 %	70 %	12 %

Coefficient of Variation (CV)

Table X: Strata_Br .Coefficient of Variation (CV) table presents the CV per modal age and reader, the CV of all readers combined per modal age and a weighted mean of the CV per reader

Modal age	R04 DK	R06 SE	R08 NO	R10 NO	R14 DK	all
0	-	-	-	-	-	**-**
1	0 %	0 %	87 %	43 %	87 %	**74 %**
2	42 %	23 %	27 %	0 %	40 %	**32 %**
3	16 %	16 %	0 %	16 %	21 %	**18 %**
4	55 %	11 %	19 %	13 %	20 %	**32 %**
5	16 %	5 %	5 %	8 %	8 %	**9 %**
6	10 %	6 %	12 %	11 %	36 %	**21 %**
7	22 %	7 %	6 %	11 %	24 %	**17 %**
8	14 %	5 %	6 %	10 %	18 %	**13 %**
9	5 %	18 %	13 %	-	-	**27 %**
10	-	-	-	-	-	**9 %**
11	6 %	7 %	13 %	0 %	0 %	**9 %**
12	10 %	9 %	24 %	-	5 %	**17 %**
Weighted Mean	**20 %**	**10 %**	**14 %**	**11 %**	**24 %**	**21 %**

Percentage of Agreement (PA)

Table X: Strata_Br .Percentage agreement (PA) table represents the PA per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R04 DK	R06 SE	R08 NO	R10 NO	R14 DK	total
0	100 %	100 %	40 %	67 %	80 %	**76 %**
1	100 %	100 %	67 %	67 %	67 %	**79 %**
2	71 %	80 %	50 %	100 %	80 %	**77 %**
3	57 %	78 %	100 %	78 %	67 %	**77 %**
4	75 %	83 %	83 %	75 %	50 %	**73 %**
5	60 %	92 %	92 %	83 %	85 %	**84 %**
6	67 %	86 %	86 %	67 %	50 %	**72 %**
7	40 %	75 %	83 %	67 %	50 %	**64 %**
8	67 %	78 %	78 %	14 %	56 %	**60 %**
9	80 %	40 %	40 %	100 %	20 %	**48 %**
10	100 %	100 %	100 %	0 %	100 %	**80 %**
11	50 %	50 %	0 %	100 %	0 %	**40 %**
12	67 %	33 %	0 %	100 %	33 %	**38 %**
Weighted Mean	**65 %**	**79 %**	**72 %**	**72 %**	**61 %**	**70 %**

Average Percentage Error (APE)

Table X: Strata_Br .Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R04 DK	R06 SE	R08 NO	R10 NO	R14 DK	all
0	-	-	-	-	-	**-**
1	0 %	0 %	67 %	33 %	67 %	**42 %**
2	25 %	18 %	23 %	0 %	27 %	**20 %**
3	14 %	12 %	0 %	12 %	17 %	**10 %**
4	41 %	7 %	13 %	10 %	14 %	**15 %**
5	12 %	3 %	3 %	6 %	5 %	**4 %**
6	8 %	4 %	8 %	6 %	29 %	**12 %**
7	16 %	4 %	2 %	9 %	17 %	**11 %**
8	10 %	4 %	4 %	7 %	12 %	**8 %**
9	3 %	14 %	10 %	0 %	-	**16 %**
10	0 %	0 %	0 %	0 %	0 %	**7 %**
11	4 %	5 %	9 %	0 %	0 %	**8 %**
12	8 %	6 %	18 %	0 %	4 %	**13 %**
Weighted Mean	**14 %**	**7 %**	**10 %**	**7 %**	**17 %**	**12 %**

Relative bias

Table X: Strata_Br . The relative bias (as the difference between the mean and modal age) per modal age and advanced reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all advanced readers combined.

Modal age	R04 DK	R06 SE	R08 NO	R10 NO	R14 DK	all
0	0.00	0.00	2.20	0.33	1.60	**0.83**
1	0.00	0.00	1.00	0.33	-0.33	**0.20**
2	0.14	-0.20	0.60	0.00	0.40	**0.19**
3	0.43	-0.22	0.00	-0.22	0.44	**0.09**

4	1.50	-0.17	0.33	-0.25	-0.17	**0.25**
5	0.30	0.08	0.08	-0.17	-0.15	**0.03**
6	-0.33	0.14	0.29	0.00	1.33	**0.29**
7	0.90	0.08	0.00	-0.44	0.58	**0.22**
8	0.67	0.22	-0.22	-1.14	0.22	**-0.05**
9	0.20	0.40	-0.40	0.00	-1.60	**-0.28**
10	0.00	0.00	0.00	-2.00	0.00	**-0.40**
11	0.50	-0.50	0.00	0.00	2.00	**0.40**
12	-0.67	-1.00	-3.33	0.00	0.67	**-0.87**
Weighted Mean	**0.40**	**-0.02**	**0.13**	**-0.25**	**0.32**	**0.12**

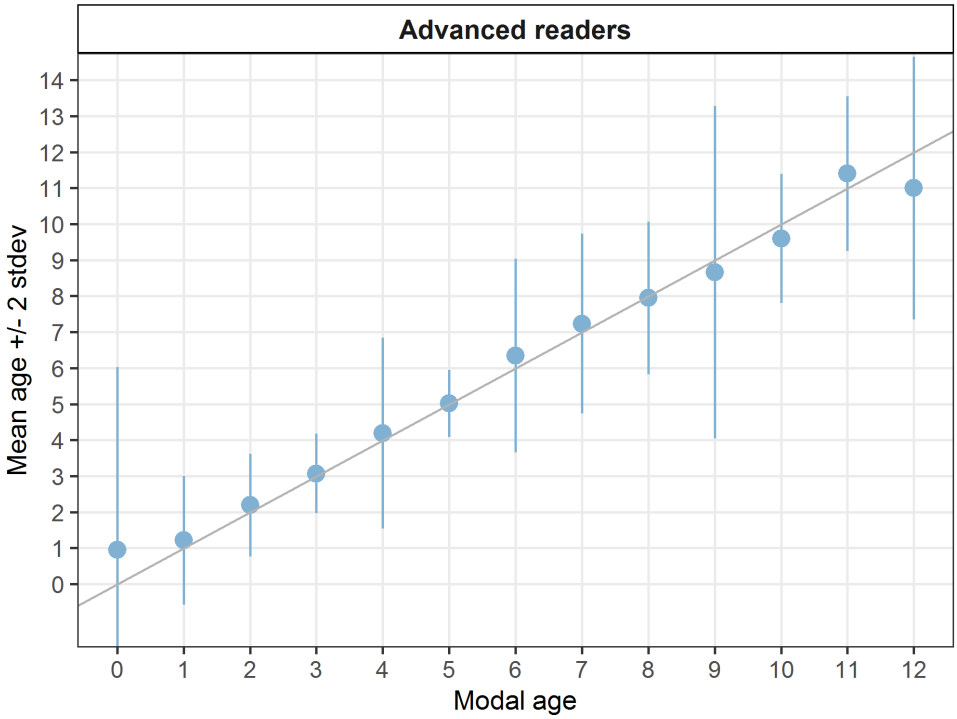


Figure X: Strata_Br .Age bias plot for advance readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Inter-reader bias test

Table X: Strata_Br .Inter reader bias test. The Inter-reader bias test gives probability of bias between readers and with modal age. - = no sign of bias (p>0.05), * = possibility of bias (0.01<p<0.05), * * = certainty of bias (p<0.01)

Comparison	R04 DK	R06 SE	R08 NO	R10 NO	R14 DK
R04 DK	/	-	*	**	**
R06 SE	-	/	**	-	**
R08 NO	*	**	/	-	**
R10 NO	**	-	-	/	**
R14 DK	**	**	**	**	/
Modal age	**	**	**	-	-

Growth Analysis

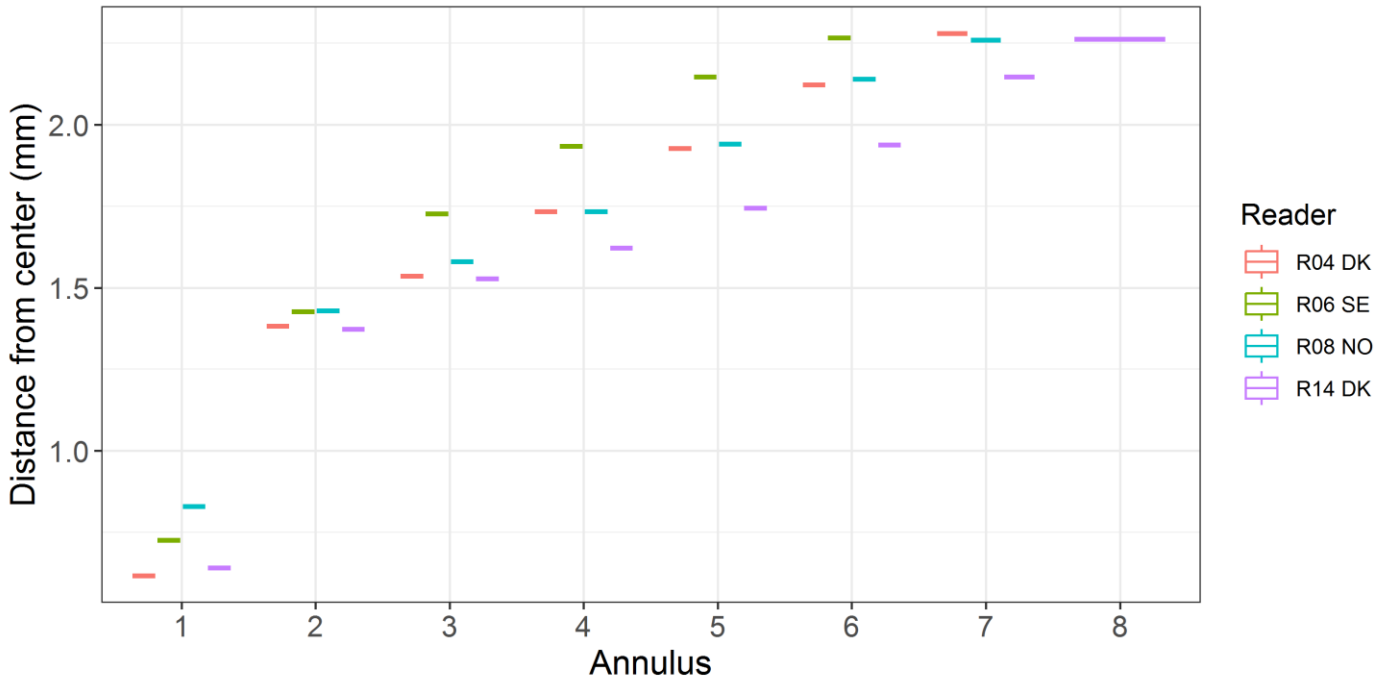


Figure X: Strata_Br .Plot of average distance from the centre to the winter rings for advanced readers. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

4.7 Advanced readers – Sections with transmitted light

This section only includes the results from the readers advanced in reading sections with transmitted light. Therefore, only these samples are included in this section, so the method where they have the most expertise.

Samples split by strata

Comparison results by reader on strata: Strata_ST

Multimodal cases

Table X: Strata_ST .Total number of samples (NSample) and percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight assigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
163	4 %	0 %	0 %	0 %

Summary statistics

Table X: Strata_ST .Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
163	18 %	87 %	9 %

In this exchange event 163 otolith fish individuals were aged. Of those, 4 %when the traditional approach (all readers equally weighted) is used to define the mode. The percentage of multiple mode cases is reduced to 0 %. The complete list of cases with multiple modes is presented in table X in the annex 3 section, where the ageing from each of the readers participating in the exchange event is presented. When all the otolith samples are considered (both single and multimodal cases) the weighted average percentage agreement based on modal ages for all readers is 87 %, with the weighted average CV of 18 % and APE of 9 %.

Coefficient of Variation (CV)

Table X: Strata_ST .Coefficient of Variation (CV) table presents the CV per modal age and reader, the CV of all readers combined per modal age and a weighted mean of the CV per reader

Modal age	R02 GB	R04 GB	R06 BE	all
1	20 %	33 %	27 %	**29 %**
2	0 %	17 %	17 %	**14 %**
3	11 %	17 %	25 %	**19 %**
4	9 %	14 %	8 %	**11 %**
5	7 %	21 %	13 %	**17 %**
6	7 %	17 %	16 %	**15 %**
7	-	-	-	**-**
8	0 %	10 %	6 %	**6 %**
Weighted Mean	**8 %**	**20 %**	**19 %**	**18 %**

Percentage of Agreement (PA)

The percentage agreement per reader per modal age tells how large part of the readings that are equal to the modal age. The weighted mean including at the bottom of the table is weighted according to number of age readings.

Table X: Strata_ST .Percentage agreement (PA) table represents the PA per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 GB	R04 GB	R06 BE	total
1	96 %	82 %	93 %	**90 %**
2	100 %	83 %	94 %	**92 %**
3	96 %	87 %	87 %	**90 %**
4	88 %	81 %	88 %	**85 %**
5	87 %	67 %	53 %	**69 %**
6	83 %	50 %	67 %	**67 %**
7	-	-	-	**-**
8	100 %	50 %	75 %	**75 %**
Weighted Mean	**95 %**	**80 %**	**86 %**	**87 %**

Average Percentage Error (APE)

Table X: Strata_ST .Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R02 GB	R04 GB	R06 BE	all
1	7 %	25 %	7 %	**13 %**
2	0 %	13 %	8 %	**7 %**
3	3 %	10 %	11 %	**8 %**
4	6 %	10 %	5 %	**6 %**
5	5 %	18 %	10 %	**12 %**
6	5 %	12 %	10 %	**10 %**
7	-	-	-	**-**
8	0 %	6 %	5 %	**4 %**
Weighted Mean	**3 %**	**14 %**	**9 %**	**9 %**

Relative bias

The relative bias is the difference between the mean age (per modal age per reader) and modal age. As for the previous tables, a combined bias for all readers and weighted means are calculated.

Table X: Strata_ST . The relative bias (as the difference between the mean and modal age) per modal age and advanced reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all advanced readers combined.

Modal age	R02 GB	R04 GB	R06 BE	all
1	-0.04	0.18	0.00	**0.05**
2	0.00	0.17	0.08	**0.08**
3	0.02	0.17	0.17	**0.12**
4	-0.12	0.25	0.12	**0.08**
5	-0.13	0.80	0.20	**0.29**
6	-0.17	0.83	0.17	**0.28**
7	-	-	-	**-**
8	0.00	0.00	0.25	**0.08**
Weighted Mean	**-0.03**	**0.26**	**0.12**	**0.11**

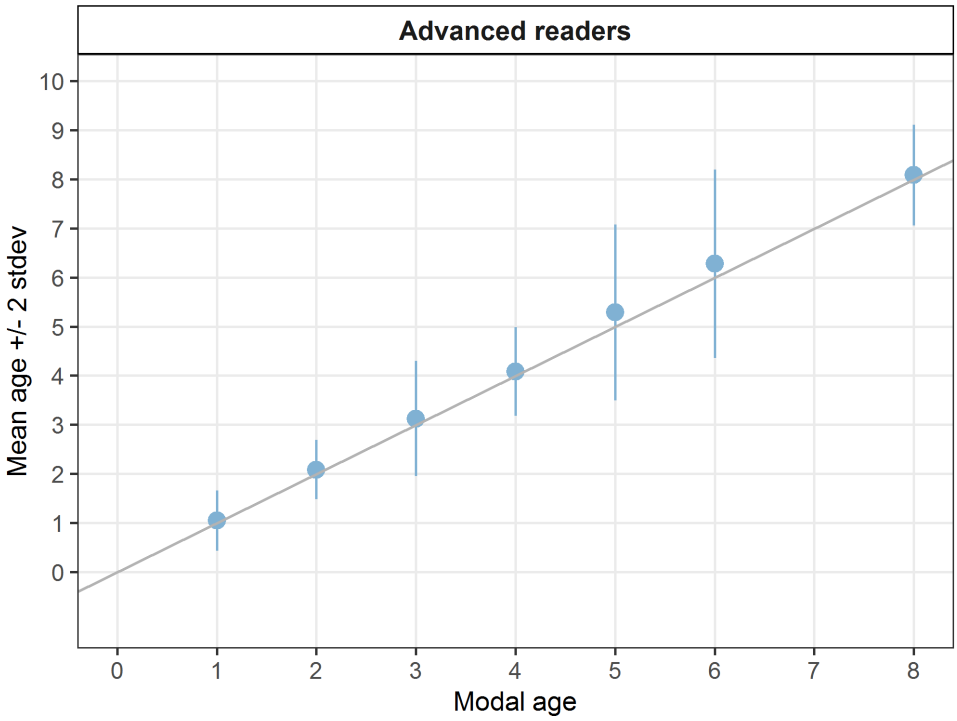


Figure X: Strata_ST .Age bias plot for advance readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Inter-reader bias test

Table X: Strata_ST .Inter reader bias test. The Inter-reader bias test gives probability of bias between readers and with modal age. - = no sign of bias (p>0.05), * = possibility of bias (0.01<p<0.05), * * = certainty of bias (p<0.01)

Comparison	R02 GB	R04 GB	R06 BE
R02 GB	/	**	-
R04 GB	**	/	*
R06 BE	-	*	/
Modal age	-	**	-

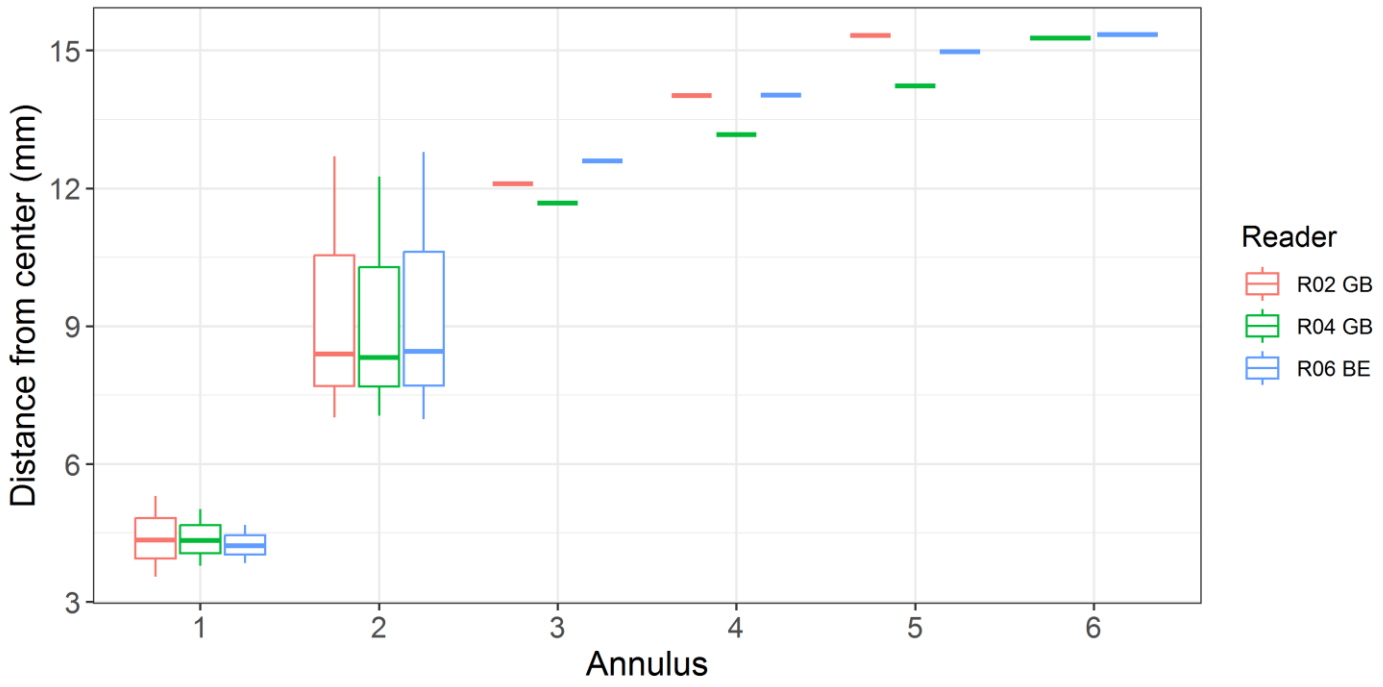


Figure X: Strata_ST .Plot of average distance from the centre to the winter rings for advanced readers. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

4.8 Advanced readers – Sectioned with reflected light

This section only includes the results from the readers advanced in reading sections with reflected light. Therefore, only these samples are included in this section, so the method where they have the most expertise.

Comparison results by reader on strata: Strata_SR

Multimodal cases

Table X: Strata_SR .Total number of samples (NSample) and percentage of cases (fish samples) with multiple modes depending on the approach to weight the experience of the reader which will be considered when defining the fish age mode. PercMM_traditional shows the percentage of the total samples for which multiple modes are obtained when all the readers are equally weighted. PercMM_linear_weight shows the percentage of the total samples for which multiple modes are obtained when the weight assigned to the different readers decreases linearly with the experience, while in the PercMM_negexp the weight applied decreases with a negative exponential shape with the experience. The PercMM_multistage shows the percentage of multiple mode cases when a combination of the different methodologies is used, as explained in the material and methods section

NSample	PercMM_traditional	PercMM_linear_weight	PercMM_negexp_weight	PercMM_multistage
163	9 %	0 %	0 %	0 %

Summary statistics

Table X: Strata_SR .Summary of statistics; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages and readers

NSample	CV	PA	APE
163	18 %	81 %	9 %

In this exchange event 163 otolith fish individuals were aged. Of those, 9 %when the traditional approach (all readers equally weighted) is used to define the mode. The percentage of multiple mode cases is reduced to 0 %. The complete list of cases with multiple modes is presented in table X in the annex 3 section, where the ageing from each of the readers participating in the exchange event is presented. When all the otolith samples are considered (both single and multimodal cases) the weighted average percentage agreement based on modal ages for all readers is 81 %, with the weighted average CV of 18 % and APE of 9 %.

Coefficient of Variation (CV)

Table X: Strata_SR .Coefficient of Variation (CV) table presents the CV per modal age and reader, the CV of all readers combined per modal age and a weighted mean of the CV per reader

Modal age	R18 GB	R20 GB	R26 NL	all
1	0 %	29 %	0 %	**18 %**
2	10 %	17 %	17 %	**16 %**
3	0 %	17 %	31 %	**21 %**
4	7 %	14 %	26 %	**18 %**
5	5 %	21 %	25 %	**20 %**
6	0 %	18 %	9 %	**16 %**
7	-	-	-	**-**
8	0 %	6 %	19 %	**12 %**
Weighted Mean	**4 %**	**19 %**	**20 %**	**18 %**

Percentage of Agreement (PA)

The percentage agreement per reader per modal age tells how large part of the readings that are equal to the modal age. The weighted mean including at the bottom of the table is weighted according to number of age readings.

Table X: Strata_SR .Percentage agreement (PA) table represents the PA per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R18 GB	R20 GB	R26 NL	total
1	100 %	89 %	100 %	**96 %**
2	96 %	84 %	88 %	**90 %**
3	100 %	84 %	41 %	**75 %**
4	93 %	73 %	47 %	**71 %**
5	94 %	47 %	50 %	**64 %**
6	100 %	40 %	75 %	**71 %**
7	-	-	-	**-**
8	100 %	75 %	25 %	**67 %**
Weighted Mean	**98 %**	**78 %**	**68 %**	**81 %**

Average Percentage Error (APE)

Table X: Strata_SR .Average Percentage Error (APE) table represents the APE per modal age and reader, the APE of all advanced readers combined per modal age and a weighted mean of the APE per reader.

Modal age	R18 GB	R20 GB	R26 NL	all
1	0 %	18 %	0 %	**7 %**
2	2 %	12 %	11 %	**6 %**
3	0 %	11 %	24 %	**10 %**
4	3 %	11 %	19 %	**12 %**
5	2 %	17 %	16 %	**13 %**
6	0 %	14 %	7 %	**11 %**
7	-	-	-	**-**
8	0 %	5 %	13 %	**9 %**
Weighted Mean	**1 %**	**13 %**	**14 %**	**9 %**

Relative bias

The relative bias is the difference between the mean age (per modal age per reader) and modal age. As for the previous tables, a combined bias for all readers and weighted means are calculated.

Table X: Strata_SR . The relative bias (as the difference between the mean and modal age) per modal age and advanced reader is presented, as well as the weighted mean relative bias per reader and the relative bias per modal age for all advanced readers combined.

Modal age	R18 GB	R20 GB	R26 NL	all
1	0.00	0.11	0.00	**0.04**
2	0.00	0.16	-0.12	**0.01**
3	0.00	0.21	-0.16	**0.02**
4	-0.07	0.33	0.33	**0.20**
5	-0.06	0.71	-0.12	**0.17**
6	0.00	1.20	-0.25	**0.32**
7	-	-	-	**-**
8	0.00	-0.25	-1.25	**-0.50**
Weighted Mean	**-0.01**	**0.26**	**-0.10**	**0.05**

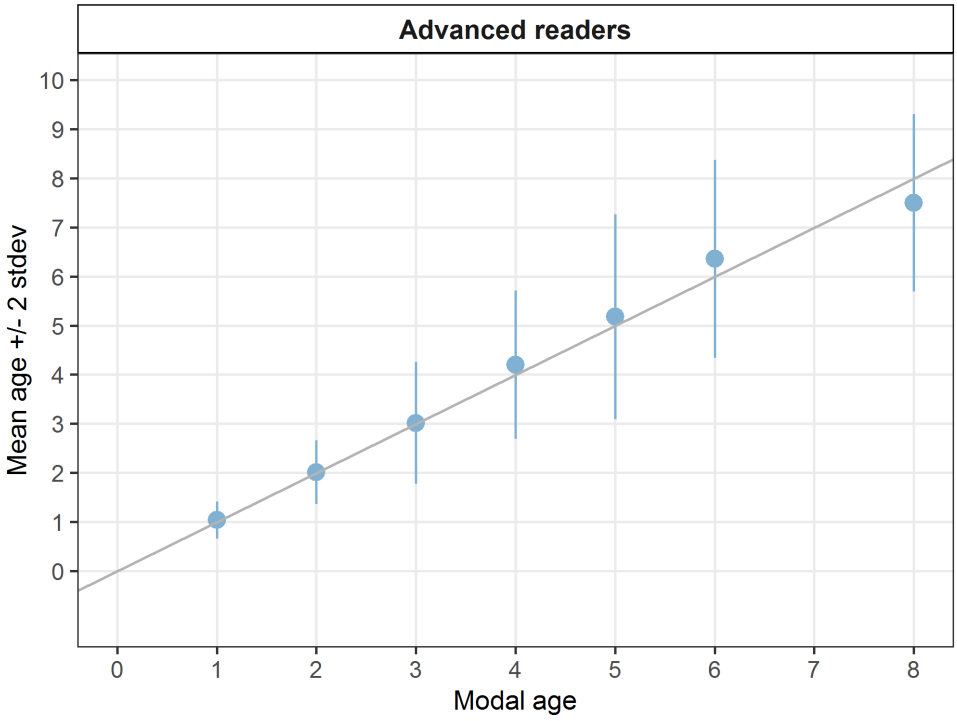


Figure X: Strata_SR .Age bias plot for advance readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Inter-reader bias test

Table X: Strata_SR .Inter reader bias test. The Inter-reader bias test gives probability of bias between readers and with modal age. - = no sign of bias ($p>0.05$), * = possibility of bias ($0.01<p<0.05$), * * = certainty of bias ($p<0.01$)

Comparison	R18 GB	R20 GB	R26 NL
R18 GB	/	**	**
R20 GB	**	/	-
R26 NL	**	-	/
Modal age	-	**	*

4.9 Overview results by methods

Method	Readers	PA (%)	CV (%)
Section Reflected light	all	76	21
	advanced	81	18
Section Transmitted light	all	80	23
	advanced	87	18
Broken	all	63	22
	advanced	70	21

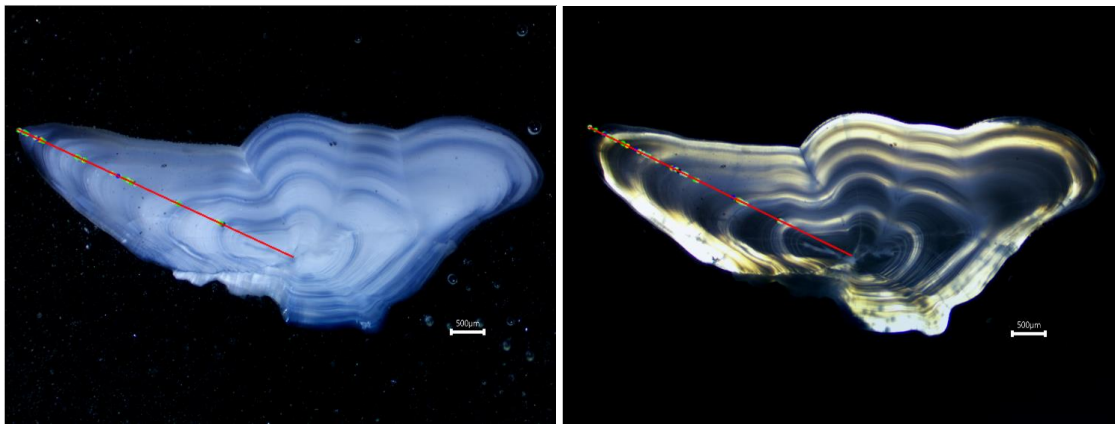


Figure 1 Cod #21 (Area 27.4.b) with annotated age on reflected light (left) and transmitted light (right) – this sample scored 100% PA across readers.

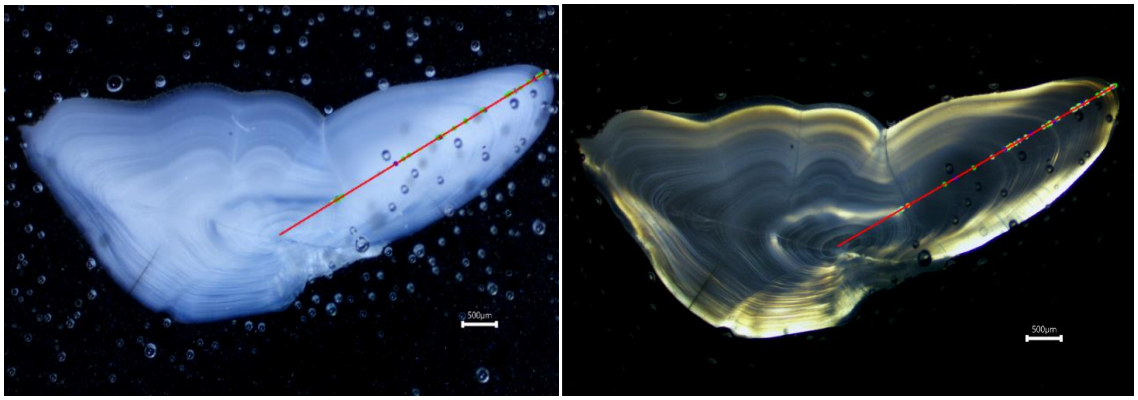


Figure 2 Cod #15 (Area 27.4.b) with annotated age on reflected light (left) and transmitted light (right) – this sample scored 27% PA across readers.

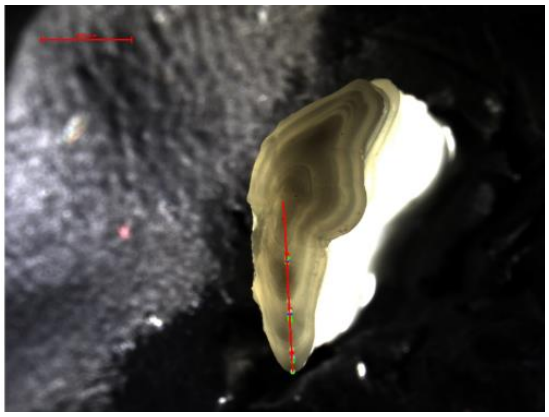


Figure 3 Cod #196 (Area 27.3.a.20) with annotated age on broken otoliths and reflected light -this sample scored 83% agreement across readers.

5 Conclusion

The present exchange for the North Sea, eastern English Channel and Skagerrak Cod showed some marginal improvement in the overall level of agreement in comparison with previous exchanges and workshops.

However, even when the agreement score was at its highest, for example, transmitted light (PA=87%), the precision resulted in being low (CV=18%). This seems to be a common trend across all the areas and methods tested in this exchange. On the other hand, the Skagerrak (27.3.a.20) reading exercise resulted to be that with the lowest agreement (63%) of the whole exchange with a CV of 22%. Overall, both the agreement and precision varied wildly across all readers with PA ranging between 61% and 87%, and CV between 9% and 28%. Surprisingly, advanced readers results did not show improvements in the overall agreement score with a weighted agreement of 76%. This is due to Danish and Dutch advanced readers (R08DK, R22DK, R20NL) contributing to the lower PA. Conversely, when the transmitted light method was used, the weighted mean agreement reached 87% for the advanced readers. Also advanced readers unfamiliar with this method reached peaks of 90% (R12NO, and R16NO).

The fact that all readers read all samples, also if they were unfamiliar with the preparation method may have contributed to bias in the results. However, even though readers from Sweden, Denmark and Norway are not used to reading sectioned otoliths, the results of most of some of their advanced readers were good, especially for the transmitted light samples. In general, the transmitted light method on sectioned otoliths seems most suited for reading cod otoliths and gives better results for PA and CV than the sectioned reflected light samples. Regarding the broken samples, it is harder to draw conclusions as this preparation method was only applied to samples from Skagerrak. Therefore, the poor results can be related to the fact that Skagerrak cod is harder to interpret or due to the fact that breaking otoliths is not the best preparation technique.

Although the sectioned pictures were not always into focus (or air bubbles were present), this did not seem to bother the advanced readers to read the otoliths. However, it is advised to follow the guidelines for image quality in SmartDots events https://www.ices.dk/data/Documents/SmartdotsDownload/WGSMART-Draft-Guidelines-for-image-quality-SmartDots-events.pdf

In the light of the results, it is advisable to plan a workshop to address two of the main issues emerged in this exchange to: a) increase agreement and precision or readings carried on broken otoliths only and b) upskill basic readers with low PA with the aim to reduce the bias.

6 - References

Beamish R. J. and Fournier D. A. (1981) A method for comparing the precision of a SRt of age determination. Canadian Journal of Fisheries and Aquatic Sciences, 38, 982–983

GUIDELINES AND TOOLS FOR AGE READING. Eltink, A.T.G.W., Newton A.W., Morgado C., Santamaria M.T.G and Modin J. (2000) Guidelines and tools for age Reading. (PDF document version 1.0 October 2000) Internet: http://www.efan.no

Eltink, A.T.G.W. (2000) Age reading comparisons. (MS Excel workbook version 1.0 October 2000) Internet: http://www.efan.no

ICES. 2008. Report of the Workshop on Age Reading of North Sea Cod (WKARNSC), 5-7 August 2008, Hirsthals, Denmark. ICES CM 2008/ACOM:39. 71 pp.

ICES (2014) Report of the Workshop on Statistical Analysis of Biological Calibration Studies (WKSABCAL). ICES CM 2014/ACOM: 35

ICES SmartDots, 2023. ICES, Copenhagen, Denmark. https://smartdots.ices.dk

Mehl Sigbjorn and Mjanger Hildegunn. 2010. Report of the North Sea cod (*Gadus morhua* L.) otolith exchange 2009-2010 (version 2- with analyses for assessment readers). Institute of Marine Research, Norway, Bergen. 35p

7 Annex 2. List of participants

Table X: Participants list.

Reader code	ExpertiSR	ExpertiSR_rank	strata
R02 GB	Advanced	2	Strata_Br
R02 GB	Advanced	2	Strata_ST
R02 GB	Advanced	2	Strata_SR
R04 GB	Advanced	4	Strata_SR
R04 GB	Advanced	4	Strata_ST
R04 GB	Advanced	4	Strata_Br
R08 DK	Advanced	8	Strata_ST
R08 DK	Advanced	8	Strata_SR
R08 DK	Advanced	8	Strata_Br
R10 SE	Advanced	10	Strata_SR
R10 SE	Advanced	10	Strata_ST
R10 SE	Advanced	10	Strata_Br
R12 NO	Advanced	12	Strata_SR
R12 NO	Advanced	12	Strata_ST
R12 NO	Advanced	12	Strata_Br
R14 BE	Advanced	14	Strata_ST
R14 BE	Advanced	14	Strata_Br
R14 BE	Advanced	14	Strata_SR
R16 NO	Advanced	16	Strata_Br
R16 NO	Advanced	16	Strata_SR
R16 NO	Advanced	16	Strata_ST
R20 NL	Advanced	20	Strata_ST
R20 NL	Advanced	20	Strata_SR
R20 NL	Advanced	20	Strata_Br
R22 DK	Advanced	22	Strata_ST
R22 DK	Advanced	22	Strata_SR
R22 DK	Advanced	22	Strata_Br
R24 BE	Basic	24	Strata_SR
R24 BE	Basic	24	Strata_ST
R24 BE	Basic	24	Strata_Br
R26 SE	Basic	26	Strata_Br
R26 SE	Basic	26	Strata_SR
R26 SE	Basic	26	Strata_ST
R28 GB	Basic	28	Strata_SR
R28 GB	Basic	28	Strata_ST
R28 GB	Basic	28	Strata_Br

8 Annex 3. Additional results

8.1 Results all readers

Summary statistics

Table X: Summary of statistics; PA (%), CV (%) and APE (%).

NSample	CV	PA	APE
163	21 %	76 %	14 %

Data Overview

Table X: Data overview including modal age and statistics per sample.

Fish ID	Sample ID	Event ID	Image ID	length	SRx	Catch date	ICES area	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	Modal age	PA %	CV %	APE %
COD-01	COD-01-R	446	-	440	-	19/01/2021 00:00:00	27.4.b	2	2	4	2	2	2	2	2	4	3	2	-	2	73	33	27
COD-01	COD-01-T	446	-	440	-	19/01/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	2	2	2	2	82	19	14
COD-02	COD-02-R	446	-	400	-	19/01/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	3	2	2	2	2	92	14	7
COD-02	COD-02-T	446	-	400	-	19/01/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	2	2	2	83	18	13
COD-03	COD-03-R	446	-	360	-	19/01/2021 00:00:00	27.4.b	2	2	3	2	2	3	2	2	3	3	2	2	2	67	21	19
COD-03	COD-03-T	446	-	360	-	19/01/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	3	2	2	2	91	14	8
COD-04	COD-04-R	446	-	340	-	19/01/2021 00:00:00	27.4.b	2	2	3	2	2	3	2	2	3	3	2	2	2	67	21	19
COD-04	COD-04-T	446	-	340	-	19/01/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	3	3	2	2	2	82	19	14
COD-05	COD-05-R	446	-	370	-	18/02/2021 00:00:00	27.4.b	2	3	2	1	3	3	2	2	3	5	2	2	2	50	40	30
COD-05	COD-05-T	446	-	370	-	18/02/2021	27.4.b	2	3	2	2	3	2	2	2	2	3	2	2	2	75	20	17

						00:00:00																		
COD-06	COD-06-R	446	-	380	-	18/02/2021 00:00:00	27.4.b	2	2	3	-	2	3	2	2	3	3	2	2	2	64	21	20	
COD-06	COD-06-T	446	-	380	-	18/02/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0	
COD-07	COD-07-R	446	-	670	-	17/02/2021 00:00:00	27.4.b	2	3	3	3	3	3	2	2	3	3	3	2	3	67	18	17	
COD-07	COD-07-T	446	-	670	-	17/02/2021 00:00:00	27.4.b	2	2	3	3	3	3	2	2	3	3	3	2	3	58	20	19	
COD-08	COD-08-R	446	-	460	-	18/02/2021 00:00:00	27.4.b	3	3	3	3	3	4	3	3	4	3	3	3	3	83	12	9	
COD-08	COD-08-T	446	-	460	-	18/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	3	3	3	3	3	3	100	0	0	
COD-09	COD-09-R	446	-	470	-	18/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	4	3	3	3	3	83	14	6	
COD-09	COD-09-T	446	-	470	-	18/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	1	3	3	2	3	3	83	23	15	
COD-10	COD-10-R	446	-	520	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	3	4	3	3	3	3	91	10	5	
COD-10	COD-10-T	446	-	520	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	3	3	3	3	3	3	100	0	0	
COD-100	COD-100-R	446	-	980	-	10/02/2021 00:00:00	27.7.g	5	6	5	6	5	6	-	7	6	5	7	5	5	45	14	12	
COD-100	COD-100-T	446	-	980	-	10/02/2021 00:00:00	27.7.g	5	6	5	-	5	6	6	6	5	5	6	5	5	55	10	9	
COD-101	COD-101-R	446	-	990	-	10/02/2021 00:00:00	27.7.g	5	5	5	6	5	6	5	5	6	5	5	5	5	75	9	7	
COD-101	COD-101-T	446	-	990	-	10/02/2021 00:00:00	27.7.g	5	5	5	6	5	6	5	5	5	5	5	5	5	83	8	5	

COD-102	COD-102-R	446	-	980	-	10/02/2021 00:00:00	27.7.g	8	8	8	8	8	9	8	8	9	8	8	8	8	83	5	3
COD-102	COD-102-T	446	-	980	-	10/02/2021 00:00:00	27.7.g	8	8	8	8	8	9	8	8	8	7	8	8	8	83	5	2
COD-103	COD-103-R	446	-	990	-	22/02/2021 00:00:00	27.7.e	8	8	8	8	8	8	8	7	8	8	8	8	8	92	4	2
COD-103	COD-103-T	446	-	990	-	22/02/2021 00:00:00	27.7.e	8	8	8	-	8	8	8	8	8	8	8	8	8	100	0	0
COD-104	COD-104-R	446	-	470	-	09/04/2021 00:00:00	27.7.f	2	2	3	2	2	3	2	2	3	2	2	2	2	75	20	17
COD-104	COD-104-T	446	-	470	-	09/04/2021 00:00:00	27.7.f	2	2	3	-	2	2	2	2	3	3	2	2	2	73	21	17
COD-105	COD-105-R	446	-	560	-	09/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	2	2	2	2	83	18	13
COD-105	COD-105-T	446	-	560	-	09/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	3	2	2	2	75	20	17
COD-106	COD-106-R	446	-	420	-	12/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	3	2	2	2	75	20	17
COD-106	COD-106-T	446	-	420	-	12/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	2	2	2	2	2	92	14	7
COD-107	COD-107-R	446	-	510	-	12/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	2	-	2	2	82	19	14
COD-107	COD-107-T	446	-	510	-	12/04/2021 00:00:00	27.7.f	2	2	2	3	2	2	2	2	3	3	2	2	2	75	20	17
COD-108	COD-108-R	446	-	550	-	03/05/2021 00:00:00	27.7.f	3	3	4	3	3	4	3	2	4	4	3	3	3	58	19	15
COD-108	COD-108-T	446	-	550	-	03/05/2021 00:00:00	27.7.f	3	3	3	-	3	4	3	2	3	3	3	3	3	82	15	6
COD-	COD-	446	-	710	-	03/05/2021	27.7.f	3	3	4	3	3	3	3	2	5	3	3	3	3	75	23	14

109	109-R					00:00:00																	
COD-109	COD-109-T	446	-	710	-	03/05/2021 00:00:00	27.7.f	3	3	4	-	3	3	3	2	4	3	3	3	3	73	17	11
COD-11	COD-11-R	446	-	560	-	17/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	4	3	83	14	6
COD-11	COD-11-T	446	-	560	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	2	3	3	3	4	3	82	15	6
COD-110	COD-110-R	446	-	650	-	03/04/2021 00:00:00	27.7.f	4	4	3	4	3	5	3	3	5	5	3	3	3	50	23	20
COD-110	COD-110-T	446	-	650	-	03/04/2021 00:00:00	27.7.f	4	4	6	-	3	5	3	3	3	4	3	3	3	55	27	21
COD-111	COD-111-R	446	-	790	-	03/04/2021 00:00:00	27.7.f	3	4	4	-	3	5	4	3	5	3	5	3	3	45	23	19
COD-111	COD-111-T	446	-	790	-	03/04/2021 00:00:00	27.7.f	3	4	9	-	3	3	4	3	3	3	3	3	3	73	48	28
COD-112	COD-112-R	446	-	740	-	05/05/2021 00:00:00	27.7.f	3	4	3	-	4	4	3	3	4	3	-	4	4	50	15	14
COD-112	COD-112-T	446	-	740	-	05/05/2021 00:00:00	27.7.f	3	4	5	-	4	4	3	3	4	4	4	4	4	64	16	12
COD-113	COD-113-R	446	-	870	-	05/05/2021 00:00:00	27.7.f	4	5	4	4	4	4	-	3	-	4	4	4	4	80	12	5
COD-113	COD-113-T	446	-	870	-	05/05/2021 00:00:00	27.7.f	4	5	5	4	4	4	3	3	4	4	4	4	4	67	15	8
COD-114	COD-114-R	446	-	860	-	12/05/2021 00:00:00	27.7.h	6	7	7	-	5	6	-	-	9	7	6	0	6	33	42	26
COD-114	COD-114-T	446	-	860	-	12/05/2021 00:00:00	27.7.h	6	7	-	-	5	6	-	-	9	6	9	0	6	38	47	29
COD-115	COD-115-R	446	-	930	-	12/05/2021 00:00:00	27.7.h	4	4	5	4	4	4	4	4	5	4	4	4	4	83	9	7

COD-115	COD-115-T	446	-	930	-	12/05/2021 00:00:00	27.7.h	4	4	5	4	4	4	4	4	4	4	-	4	4	91	7	4
COD-116	COD-116-R	446	-	1010	-	12/05/2021 00:00:00	27.7.h	5	7	5	5	5	5	6	4	5	5	5	5	5	75	14	9
COD-116	COD-116-T	446	-	1010	-	12/05/2021 00:00:00	27.7.h	5	8	6	5	5	5	6	3	5	5	5	5	5	67	22	13
COD-117	COD-117-R	446	-	940	-	15/06/2021 00:00:00	27.7.g	5	8	7	8	5	6	5	4	6	5	6	4	5	33	24	19
COD-117	COD-117-T	446	-	940	-	15/06/2021 00:00:00	27.7.g	5	8	5	5	5	5	-	4	6	4	8	4	5	45	27	20
COD-118	COD-118-R	446	-	970	-	15/06/2021 00:00:00	27.7.g	5	7	6	7	6	6	-	5	6	6	6	5	6	55	12	8
COD-118	COD-118-T	446	-	970	-	15/06/2021 00:00:00	27.7.g	5	7	6	-	6	6	-	5	6	5	5	5	6	40	12	11
COD-119	COD-119-R	446	-	1030	-	19/05/2021 00:00:00	27.7.h	6	9	8	8	6	7	6	6	6	5	6	6	6	58	18	14
COD-119	COD-119-T	446	-	1030	-	19/05/2021 00:00:00	27.7.h	6	9	6	-	6	8	6	6	6	6	9	6	6	73	19	16
COD-12	COD-12-R	446	-	620	-	17/02/2021 00:00:00	27.4.b	3	3	4	3	4	3	3	2	4	4	4	3	3	50	20	17
COD-12	COD-12-T	446	-	620	-	17/02/2021 00:00:00	27.4.b	3	3	5	3	4	3	3	2	3	4	3	3	3	67	23	17
COD-121	COD-121-R	446	-	1020	-	29/04/2021 00:00:00	27.7.e	8	8	8	8	8	8	8	7	8	8	10	8	8	83	8	4
COD-121	COD-121-T	446	-	1020	-	29/04/2021 00:00:00	27.7.e	8	9	9	-	8	8	-	7	9	8	9	7	8	40	10	8
COD-122	COD-122-R	446	-	380	-	14/09/2021 00:00:00	27.7.e	1	1	1	-	1	1	1	1	1	1	1	2	1	91	28	15
COD-	COD-	446	-	380	-	14/09/2021	27.7.e	1	1	1	1	1	1	1	1	1	1	1	2	1	92	27	14

122	122-T					00:00:00																	
COD-123	COD-123-R	446	-	460	-	14/09/2021 00:00:00	27.7.e	1	2	1	1	1	1	1	1	2	1	1	2	1	75	36	30
COD-123	COD-123-T	446	-	460	-	14/09/2021 00:00:00	27.7.e	1	2	1	1	1	1	1	1	1	2	1	2	1	75	36	30
COD-124	COD-124-R	446	-	350	-	06/09/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	1	2	1	92	27	14
COD-124	COD-124-T	446	-	350	-	06/09/2021 00:00:00	27.7.e	1	1	1	-	1	1	1	1	1	1	1	2	1	91	28	15
COD-125	COD-125-R	446	-	400	-	06/09/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	1	2	1	92	27	14
COD-125	COD-125-T	446	-	400	-	06/09/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	1	2	1	92	27	14
COD-126	COD-126-R	446	-	600	-	03/07/2021 00:00:00	27.7.h	2	3	2	2	2	2	2	2	2	2	2	2	2	92	14	7
COD-126	COD-126-T	446	-	600	-	03/07/2021 00:00:00	27.7.h	2	3	4	2	2	2	2	2	2	2	2	2	2	83	28	19
COD-127	COD-127-R	446	-	500	-	03/07/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	3	2	-	2	2	91	14	8
COD-127	COD-127-T	446	-	500	-	03/07/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	2	4	2	2	2	92	27	14
COD-128	COD-128-R	446	-	550	-	20/09/2021 00:00:00	27.7.g	2	2	3	2	2	2	2	2	2	2	2	2	2	92	14	7
COD-128	COD-128-T	446	-	550	-	20/09/2021 00:00:00	27.7.g	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0
COD-129	COD-129-R	446	-	570	-	20/09/2021 00:00:00	27.7.g	2	2	2	-	2	2	-	2	2	2	2	2	2	100	0	0
COD-129	COD-129-T	446	-	570	-	20/09/2021 00:00:00	27.7.g	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0

COD-13	COD-13-R	446	-	530	-	17/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-13	COD-13-T	446	-	530	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	2	3	3	3	3	3	91	10	6
COD-130	COD-130-R	446	-	740	-	01/07/2021 00:00:00	27.7.f	3	3	4	3	3	3	3	3	3	3	3	3	3	92	9	5
COD-130	COD-130-T	446	-	740	-	01/07/2021 00:00:00	27.7.f	3	3	5	3	3	3	3	3	3	3	3	3	3	92	18	10
COD-131	COD-131-R	446	-	630	-	01/07/2021 00:00:00	27.7.f	3	3	3	3	3	3	4	3	-	3	4	3	3	82	13	9
COD-131	COD-131-T	446	-	630	-	01/07/2021 00:00:00	27.7.f	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-132	COD-132-R	446	-	680	-	13/09/2021 00:00:00	27.7.g	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-132	COD-132-T	446	-	680	-	13/09/2021 00:00:00	27.7.g	2	3	4	-	3	3	3	2	3	2	3	3	3	64	21	16
COD-133	COD-133-R	446	-	850	-	13/09/2021 00:00:00	27.7.g	3	3	4	-	3	3	3	3	4	3	3	4	3	73	14	12
COD-133	COD-133-T	446	-	850	-	13/09/2021 00:00:00	27.7.g	3	3	3	4	3	3	3	4	3	3	5	4	3	67	20	16
COD-134	COD-134-R	446	-	900	-	01/09/2021 00:00:00	27.7.g	4	5	4	6	4	4	4	5	5	4	4	5	4	58	15	13
COD-134	COD-134-T	446	-	900	-	01/09/2021 00:00:00	27.7.g	4	5	5	-	4	4	-	5	4	4	4	5	4	60	12	11
COD-135	COD-135-R	446	-	820	-	01/09/2021 00:00:00	27.7.g	4	4	6	6	5	5	4	4	4	5	4	5	4	50	17	14
COD-135	COD-135-T	446	-	820	-	01/09/2021 00:00:00	27.7.g	4	4	4	6	5	5	4	4	5	5	5	6	4	42	16	13
COD-	COD-	446	-	780	-	20/09/2021	27.7.g	3	3	3	4	3	3	3	3	3	3	3	5	3	83	19	13

136	136-R					00:00:00																	
COD-136	COD-136-T	446	-	780	-	20/09/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	3	3	3	3	5	3	91	19	10
COD-137	COD-137-R	446	-	840	-	20/09/2021 00:00:00	27.7.g	3	6	7	6	5	4	4	5	5	4	5	4	4	33	23	18
COD-137	COD-137-T	446	-	840	-	20/09/2021 00:00:00	27.7.g	3	6	7	5	5	4	4	5	4	4	4	4	4	50	24	18
COD-138	COD-138-R	446	-	990	-	05/09/2021 00:00:00	27.7.f	4	6	7	9	5	5	5	7	5	5	4	7	5	42	26	21
COD-138	COD-138-T	446	-	990	-	05/09/2021 00:00:00	27.7.f	4	6	7	5	5	4	5	8	4	4	5	5	5	42	25	18
COD-139	COD-139-R	446	-	900	-	13/09/2021 00:00:00	27.7.g	5	5	5	5	5	6	-	4	-	4	5	5	5	70	12	7
COD-139	COD-139-T	446	-	900	-	13/09/2021 00:00:00	27.7.g	5	5	4	-	5	4	5	4	4	4	4	5	5	45	12	11
COD-14	COD-14-R	446	-	580	-	17/02/2021 00:00:00	27.4.b	3	2	3	3	3	3	3	2	4	3	3	3	3	75	18	10
COD-14	COD-14-T	446	-	580	-	17/02/2021 00:00:00	27.4.b	-	3	3	3	3	3	3	2	3	3	3	3	3	91	10	6
COD-140	COD-140-R	446	-	1020	-	13/09/2021 00:00:00	27.7.g	6	6	7	7	6	6	6	6	6	6	6	5	6	75	8	5
COD-140	COD-140-T	446	-	1020	-	13/09/2021 00:00:00	27.7.g	6	6	-	-	6	6	6	5	6	5	7	5	6	60	11	8
COD-141	COD-141-R	446	-	990	-	20/09/2021 00:00:00	27.7.g	5	5	5	-	5	5	5	-	5	4	5	5	5	90	6	4
COD-141	COD-141-T	446	-	990	-	20/09/2021 00:00:00	27.7.g	5	5	5	-	5	6	-	5	5	5	5	5	5	90	6	4
COD-142	COD-142-R	446	-	1030	-	03/07/2021 00:00:00	27.7.h	6	8	7	7	7	6	7	5	7	7	7	6	7	58	12	9

COD-142	COD-142-T	446	-	1030	-	03/07/2021 00:00:00	27.7.h	6	7	11	-	7	5	-	6	7	5	7	7	7	50	25	15
COD-143	COD-143-R	446	-	1060	-	02/09/2021 00:00:00	27.7.f	8	7	8	8	8	8	8	5	8	7	6	6	8	58	15	12
COD-143	COD-143-T	446	-	1060	-	02/09/2021 00:00:00	27.7.f	8	7	7	-	8	8	9	6	8	7	8	7	8	45	11	9
COD-144	COD-144-R	446	-	470	-	13/10/2021 00:00:00	27.7.f	1	1	2	1	1	1	1	1	1	1	1	2	1	83	33	24
COD-144	COD-144-T	446	-	470	-	13/10/2021 00:00:00	27.7.f	1	1	1	-	1	1	1	1	1	1	1	2	1	91	28	15
COD-145	COD-145-R	446	-	500	-	13/10/2021 00:00:00	27.7.f	1	2	2	1	2	1	1	1	2	1	1	2	1	58	36	34
COD-145	COD-145-T	446	-	500	-	13/10/2021 00:00:00	27.7.f	1	2	4	1	2	1	1	2	1	1	1	2	1	58	57	43
COD-146	COD-146-R	446	-	490	-	20/10/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	1	2	1	92	27	14
COD-146	COD-146-T	446	-	490	-	20/10/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	1	2	1	92	27	14
COD-147	COD-147-R	446	-	510	-	20/10/2021 00:00:00	27.7.g	1	2	1	1	1	1	1	1	1	1	1	2	1	83	33	24
COD-147	COD-147-T	446	-	510	-	20/10/2021 00:00:00	27.7.g	1	2	1	-	1	1	1	1	1	1	1	2	1	82	34	25
COD-148	COD-148-R	446	-	540	-	03/10/2021 00:00:00	27.7.g	2	2	2	2	2	2	2	2	2	3	2	3	2	83	18	13
COD-148	COD-148-T	446	-	540	-	03/10/2021 00:00:00	27.7.g	2	2	3	-	2	2	2	2	2	2	2	3	2	82	19	14
COD-149	COD-149-R	446	-	620	-	03/10/2021 00:00:00	27.7.g	2	3	2	2	2	2	2	2	2	2	2	3	2	83	18	13
COD-	COD-	446	-	620	-	03/10/2021	27.7.g	2	3	5	2	2	2	2	2	2	2	-	3	2	73	38	27

149	149-T					00:00:00																		
COD-15	COD-15-R	446	-	820	-	17/03/2021 00:00:00	27.4.b	3	4	8	6	5	6	-	5	6	4	5	5	5	36	26	19	
COD-15	COD-15-T	446	-	820	-	17/03/2021 00:00:00	27.4.b	3	4	8	-	5	8	3	7	6	4	5	4	5	18	35	29	
COD-150	COD-150-R	446	-	640	-	13/10/2021 00:00:00	27.7.f	2	2	2	-	2	2	2	2	2	2	2	3	2	91	14	8	
COD-150	COD-150-T	446	-	640	-	13/10/2021 00:00:00	27.7.f	2	3	3	2	2	2	2	2	2	2	2	3	2	75	20	17	
COD-151	COD-151-R	446	-	690	-	13/10/2021 00:00:00	27.7.f	2	2	2	2	2	2	2	2	2	2	2	3	2	92	14	7	
COD-151	COD-151-T	446	-	690	-	13/10/2021 00:00:00	27.7.f	2	2	2	-	2	2	2	2	2	2	2	3	2	91	14	8	
COD-152	COD-152-R	446	-	720	-	05/10/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	3	3	3	-	4	3	90	10	6	
COD-152	COD-152-T	446	-	720	-	05/10/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	4	3	4	4	4	3	64	15	14	
COD-153	COD-153-R	446	-	820	-	05/10/2021 00:00:00	27.7.g	3	3	3	3	3	3	-	4	3	3	3	4	3	82	13	9	
COD-153	COD-153-T	446	-	820	-	05/10/2021 00:00:00	27.7.g	3	3	3	4	3	3	4	4	3	3	5	4	3	58	19	17	
COD-154	COD-154-R	446	-	690	-	03/10/2021 00:00:00	27.7.g	3	3	3	3	3	3	3	2	3	3	3	4	3	83	14	6	
COD-154	COD-154-T	446	-	690	-	03/10/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	3	3	3	3	4	3	91	10	5	
COD-155	COD-155-R	446	-	610	-	03/10/2021 00:00:00	27.7.g	3	3	4	-	3	3	2	3	3	3	3	4	3	73	17	11	
COD-155	COD-155-T	446	-	610	-	03/10/2021 00:00:00	27.7.g	3	3	5	-	3	3	3	3	3	3	3	4	3	82	20	14	

COD-156	COD-156-R	446	-	900	-	28/10/2021 00:00:00	27.7.g	4	4	7	-	5	4	4	5	4	5	5	4	4	55	20	15
COD-156	COD-156-T	446	-	900	-	28/10/2021 00:00:00	27.7.g	4	4	6	7	5	4	4	6	4	5	8	4	4	50	27	22
COD-157	COD-157-R	446	-	810	-	28/10/2021 00:00:00	27.7.g	4	4	4	4	4	4	4	6	4	4	5	6	4	75	18	14
COD-157	COD-157-T	446	-	810	-	28/10/2021 00:00:00	27.7.g	4	4	-	-	4	4	4	7	4	5	6	5	4	60	23	18
COD-158	COD-158-R	446	-	850	-	28/10/2021 00:00:00	27.7.g	3	4	4	5	4	4	4	5	4	3	4	4	4	67	15	8
COD-158	COD-158-T	446	-	850	-	28/10/2021 00:00:00	27.7.g	3	4	4	4	4	4	-	6	4	3	5	4	4	64	20	13
COD-159	COD-159-R	446	-	920	-	02/11/2021 00:00:00	27.7.h	3	3	3	3	3	3	-	4	3	3	3	4	3	82	13	9
COD-159	COD-159-T	446	-	920	-	02/11/2021 00:00:00	27.7.h	3	3	4	-	3	3	3	6	3	3	3	3	3	82	27	18
COD-16	COD-16-R	446	-	750	-	17/02/2021 00:00:00	27.4.b	4	4	5	-	4	4	4	5	-	4	4	4	4	80	10	8
COD-16	COD-16-T	446	-	750	-	17/02/2021 00:00:00	27.4.b	4	4	4	4	4	4	4	4	4	4	3	4	4	92	7	4
COD-160	COD-160-R	446	-	1020	-	28/10/2021 00:00:00	27.7.g	5	5	5	7	5	5	5	5	5	5	5	5	5	92	11	6
COD-160	COD-160-T	446	-	1020	-	28/10/2021 00:00:00	27.7.g	5	5	-	6	5	5	5	6	5	4	7	5	5	64	15	11
COD-161	COD-161-R	446	-	980	-	18/11/2021 00:00:00	27.7.g	5	5	5	6	5	5	5	6	5	6	5	5	5	75	9	7
COD-161	COD-161-T	446	-	980	-	18/11/2021 00:00:00	27.7.g	4	5	-	-	5	5	5	7	5	4	6	5	5	60	17	11
COD-	COD-	446	-	900	-	25/11/2021	27.7.e	5	5	6	-	5	5	5	5	5	5	5	6	5	82	8	6

162	162-R					00:00:00																		
COD-162	COD-162-T	446	-	900	-	25/11/2021 00:00:00	27.7.e	5	5	5	5	5	5	5	5	5	5	5	6	5	92	6	3
COD-163	COD-163-R	446	-	1000	-	01/12/2021 00:00:00	27.7.g	5	5	6	5	6	5	5	7	5	5	6	5	5	67	12	10
COD-163	COD-163-T	446	-	1000	-	01/12/2021 00:00:00	27.7.g	5	5	6	6	6	4	5	7	6	5	8	5	5	42	19	15
COD-164	COD-164-R	446	-	1010	-	18/11/2021 00:00:00	27.7.g	5	7	5	7	6	6	6	5	7	5	8	5	5	42	17	14
COD-164	COD-164-T	446	-	1010	-	18/11/2021 00:00:00	27.7.g	5	7	9	8	6	6	6	9	5	5	9	5	5	33	25	22
COD-165	COD-165-R	446	-	150	-	29/08/2021 00:00:00	27.3.a.20	0	0	-	0	1	0	-	0	0	2	0	0	0	80	-	-
COD-166	COD-166-R	446	-	90	-	29/08/2021 00:00:00	27.3.a.20	0	0	0	0	0	0	0	0	0	0	0	0	0	100	-	-
COD-167	COD-167-R	446	-	100	-	24/08/2021 00:00:00	27.3.a.20	0	0	0	0	0	0	0	0	0	0	0	0	0	100	-	-
COD-168	COD-168-R	446	-	790	-	06/01/2021 00:00:00	27.3.a.20	4	-	-	4	4	4	3	4	4	3	4	4	4	80	11	8
COD-169	COD-169-R	446	-	960	-	06/01/2021 00:00:00	27.3.a.20	5	8	-	7	6	6	5	6	12	5	6	6	6	45	31	20
COD-17	COD-17-R	446	-	570	-	07/03/2021 00:00:00	27.4.b	4	4	4	3	4	4	4	5	4	4	5	4	4	75	13	7
COD-17	COD-17-T	446	-	570	-	07/03/2021 00:00:00	27.4.b	4	4	5	-	4	4	4	3	4	4	4	4	4	82	11	5
COD-170	COD-170-R	446	-	620	-	08/01/2021 00:00:00	27.3.a.20	3	4	3	3	3	3	3	2	5	3	3	3	3	75	23	14
COD-171	COD-171-R	446	-	820	-	11/01/2021 00:00:00	27.3.a.20	5	5	5	5	5	5	5	5	5	5	5	5	5	100	0	0

COD-172	COD-172-R	446	-	920	-	14/01/2021 00:00:00	27.3.a.20	10	11	11	10	12	10	11	8	13	11	11	11	11	50	11	8
COD-173	COD-173-R	446	-	1030	-	15/01/2021 00:00:00	27.3.a.20	11	11	12	11	10	12	11	11	13	12	12	11	11	50	7	6
COD-174	COD-174-R	446	-	500	-	18/01/2021 00:00:00	27.3.a.20	2	2	-	2	3	2	2	2	3	9	2	2	2	73	74	42
COD-175	COD-175-R	446	-	150	-	21/01/2021 00:00:00	27.3.a.20	5	6	6	6	6	7	6	6	-	6	7	6	6	73	9	5
COD-176	COD-176-R	446	-	910	-	21/01/2021 00:00:00	27.3.a.20	5	6	-	8	7	7	-	5	6	8	7	6	5	20	17	14
COD-177	COD-177-R	446	-	570	-	21/01/2021 00:00:00	27.3.a.20	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-178	COD-178-R	446	-	470	-	21/01/2021 00:00:00	27.3.a.20	2	2	3	2	3	3	2	2	3	3	2	2	2	58	21	20
COD-179	COD-179-R	446	-	970	-	28/01/2021 00:00:00	27.3.a.20	7	8	11	8	8	9	6	6	10	13	8	8	8	42	24	18
COD-18	COD-18-R	446	-	740	-	17/03/2021 00:00:00	27.4.b	4	4	5	4	4	4	4	4	5	4	4	4	4	83	9	7
COD-18	COD-18-T	446	-	740	-	17/03/2021 00:00:00	27.4.b	4	4	4	4	4	4	4	4	4	4	4	4	4	100	0	0
COD-180	COD-180-R	446	-	1050	-	04/02/2021 00:00:00	27.3.a.20	7	8	8	8	7	8	7	8	8	7	8	8	8	67	6	6
COD-181	COD-181-R	446	-	800	-	24/02/2021 00:00:00	27.3.a.20	4	4	4	5	5	5	5	4	5	4	4	4	4	58	12	11
COD-182	COD-182-R	446	-	530	-	06/05/2021 00:00:00	27.3.a.20	2	3	4	3	3	2	2	2	3	3	2	3	3	50	24	21
COD-183	COD-183-R	446	-	1070	-	08/03/2021 00:00:00	27.3.a.20	10	10	10	12	11	13	12	8	13	11	12	11	10	25	13	10
COD-	COD-	446	-	940	-	10/03/2021	27.3.a.20	7	8	-	8	8	10	7	-	11	8	8	8	8	60	15	11

184	184-R					00:00:00																			
COD-185	COD-185-R	446	-	920	-	10/03/2021 00:00:00	27.3.a.20	4	6	8	8	8	8	6	7	7	7	8	9	8	42	19	14
COD-186	COD-186-R	446	-	960	-	10/03/2021 00:00:00	27.3.a.20	4	-	11	7	8	6	6	6	7	8	7	7	7	36	25	16
COD-187	COD-187-R	446	-	990	-	25/03/2021 00:00:00	27.3.a.20	9	8	10	9	9	10	9	7	10	10	10	10	10	50	10	8
COD-188	COD-188-R	446	-	1090	-	25/03/2021 00:00:00	27.3.a.20	8	7	9	9	7	12	-	8	11	6	9	8	9	27	21	15
COD-189	COD-189-R	446	-	1030	-	25/03/2021 00:00:00	27.3.a.20	-	10	12	10	8	10	-	6	13	12	13	11	10	30	21	16
COD-19	COD-19-R	446	-	880	-	17/03/2021 00:00:00	27.4.b	5	6	8	8	5	8	-	4	8	5	6	4	5	27	27	23
COD-19	COD-19-T	446	-	880	-	17/03/2021 00:00:00	27.4.b	5	5	-	-	5	5	5	5	5	5	5	5	5	100	0	0
COD-190	COD-190-R	446	-	890	-	24/03/2021 00:00:00	27.3.a.20	4	5	6	6	6	5	5	4	5	5	6	5	5	50	14	11
COD-191	COD-191-R	446	-	630	-	01/04/2021 00:00:00	27.3.a.20	2	4	-	3	3	3	3	2	3	3	3	3	3	73	19	11
COD-192	COD-192-R	446	-	750	-	05/04/2021 00:00:00	27.3.a.20	3	5	5	5	5	4	4	3	5	5	5	4	5	58	18	15
COD-193	COD-193-R	446	-	760	-	05/04/2021 00:00:00	27.3.a.20	5	5	6	5	5	6	5	5	5	5	5	5	5	83	8	5
COD-194	COD-194-R	446	-	940	-	05/04/2021 00:00:00	27.3.a.20	-	-	-	6	6	7	6	7	9	5	6	7	6	44	17	13
COD-195	COD-195-R	446	-	930	-	07/04/2021 00:00:00	27.3.a.20	7	7	8	8	8	8	7	7	8	8	7	7	8	50	7	7
COD-196	COD-196-R	446	-	610	-	07/04/2021 00:00:00	27.3.a.20	3	3	4	3	3	3	3	2	3	3	3	3	3	83	14	6

COD-197	COD-197-R	446	-	8900	-	07/04/2021 00:00:00	27.3.a.20	8	8	-	0	9	9	-	6	8	8	9	-	8	44	40	26
COD-198	COD-198-R	446	-	1020	-	08/04/2021 00:00:00	27.3.a.20	7	-	-	6	8	8	7	6	12	7	6	7	7	40	24	16
COD-199	COD-199-R	446	-	510	-	08/04/2021 00:00:00	27.3.a.20	2	2	4	2	2	2	2	2	2	2	2	0	2	83	43	17
COD-20	COD-20-R	446	-	850	-	09/03/2021 00:00:00	27.4.b	5	7	6	7	6	7	5	5	6	7	6	5	7	33	14	11
COD-20	COD-20-T	446	-	850	-	09/03/2021 00:00:00	27.4.b	5	7	7	-	6	6	5	6	6	7	7	5	7	36	14	11
COD-200	COD-200-R	446	-	930	-	14/04/2021 00:00:00	27.3.a.20	9	10	12	11	7	9	-	8	12	11	10	9	9	27	16	13
COD-201	COD-201-R	446	-	870	-	14/04/2021 00:00:00	27.3.a.20	7	7	-	7	7	9	-	6	7	7	8	6	7	60	12	8
COD-202	COD-202-R	446	-	1170	-	19/04/2021 00:00:00	27.3.a.20	9	10	9	11	8	11	-	7	9	9	10	9	9	45	13	10
COD-203	COD-203-R	446	-	770	-	19/04/2021 00:00:00	27.3.a.20	4	4	-	5	5	5	4	4	4	5	4	4	4	64	12	11
COD-204	COD-204-R	446	-	750	-	26/04/2021 00:00:00	27.3.a.20	4	4	10	4	4	4	4	-	3	4	3	3	4	64	46	24
COD-205	COD-205-R	446	-	760	-	30/04/2021 00:00:00	27.3.a.20	5	5	6	5	5	5	5	5	5	5	-	5	5	91	6	3
COD-206	COD-206-R	446	-	1040	-	10/06/2021 00:00:00	27.3.a.20	7	8	8	7	7	7	7	6	10	5	7	7	7	58	17	10
COD-207	COD-207-R	446	-	1110	-	22/06/2021 00:00:00	27.3.a.20	8	9	8	9	8	8	7	6	8	6	7	7	8	42	13	11
COD-208	COD-208-R	446	-	1140	-	22/06/2021 00:00:00	27.3.a.20	8	8	-	8	8	8	-	6	8	6	8	8	8	80	11	8
COD-	COD-	446	-	1090	-	01/07/2021	27.3.a.20	8	11	9	11	10	10	-	8	0	9	12	11	11	27	36	22

209	209-R					00:00:00																		
COD-21	COD-21-R	446	-	760	-	09/03/2021 00:00:00	27.4.b	5	6	6	6	6	6	5	5	6	6	6	5	5	33	9	8	
COD-21	COD-21-T	446	-	760	-	09/03/2021 00:00:00	27.4.b	5	5	5	5	5	5	5	5	5	5	5	5	5	100	0	0	
COD-210	COD-210-R	446	-	980	-	01/07/2021 00:00:00	27.3.a.20	6	6	-	7	6	6	-	-	6	5	8	7	6	56	14	11	
COD-211	COD-211-R	446	-	510	-	30/06/2021 00:00:00	27.3.a.20	1	2	2	1	3	2	2	2	2	1	1	3	2	50	39	30	
COD-212	COD-212-R	446	-	890	-	30/06/2021 00:00:00	27.3.a.20	-	6	7	6	5	5	5	5	5	6	6	5	5	55	12	11	
COD-213	COD-213-R	446	-	830	-	08/07/2021 00:00:00	27.3.a.20	6	7	7	8	7	7	7	5	8	7	8	6	7	50	13	9	
COD-214	COD-214-R	446	-	880	-	01/07/2021 00:00:00	27.3.a.20	6	7	7	7	7	7	7	6	7	7	7	8	7	75	7	4	
COD-215	COD-215-R	446	-	1040	-	01/07/2021 00:00:00	27.3.a.20	-	-	-	1	4	2	2	-	0	3	3	0	2	25	-	-	
COD-216	COD-216-R	446	-	960	-	07/07/2021 00:00:00	27.3.a.20	-	9	-	2	4	2	2	-	5	1	3	3	2	33	70	49	
COD-217	COD-217-R	446	-	550	-	07/07/2021 00:00:00	27.3.a.20	6	6	5	6	6	7	6	6	6	6	6	6	6	83	7	3	
COD-218	COD-218-R	446	-	480	-	07/07/2021 00:00:00	27.3.a.20	4	5	5	5	5	5	5	4	5	4	5	6	5	67	12	9	
COD-219	COD-219-R	446	-	960	-	08/07/2021 00:00:00	27.3.a.20	6	7	5	7	7	7	7	6	5	6	7	7	7	58	12	11	
COD-22	COD-22-R	446	-	370	-	19/05/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	2	1	1	1	1	83	33	24	
COD-22	COD-22-T	446	-	370	-	19/05/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	1	1	1	1	1	91	28	15	

COD-220	COD-220-R	446	-	930	-	21/07/2021 00:00:00	27.3.a.20	8	8	9	9	8	9	8	7	8	7	8	8	8	58	8	6
COD-221	COD-221-R	446	-	440	-	21/07/2021 00:00:00	27.3.a.20	1	-	1	1	2	2	2	1	2	2	2	2	2	64	31	28
COD-222	COD-222-R	446	-	740	-	22/07/2021 00:00:00	27.3.a.20	5	6	7	6	7	7	-	5	8	9	6	6	6	36	19	15
COD-223	COD-223-R	446	-	480	-	05/08/2021 00:00:00	27.3.a.20	1	2	2	2	3	2	2	2	2	5	2	2	2	75	43	26
COD-224	COD-224-R	446	-	850	-	05/08/2021 00:00:00	27.3.a.20	-	-	-	4	6	4	-	-	5	3	6	4	4	43	25	21
COD-225	COD-225-R	446	-	520	-	05/08/2021 00:00:00	27.3.a.20	2	2	2	2	3	2	2	2	2	2	-	2	2	91	14	8
COD-226	COD-226-R	446	-	1180	-	10/08/2021 00:00:00	27.3.a.20	8	10	10	10	10	10	8	8	10	9	11	10	10	58	11	9
COD-227	COD-227-R	446	-	700	-	10/08/2021 00:00:00	27.3.a.20	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-228	COD-228-R	446	-	750	-	16/08/2021 00:00:00	27.3.a.20	4	4	4	4	4	4	-	4	4	5	4	4	4	91	7	4
COD-229	COD-229-R	446	-	860	-	31/08/2021 00:00:00	27.3.a.20	4	5	5	5	5	5	5	4	5	5	5	5	5	83	8	6
COD-23	COD-23-R	446	-	370	-	15/06/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	2	1	1	1	1	82	34	25
COD-23	COD-23-T	446	-	370	-	15/06/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	1	1	1	1	1	91	28	15
COD-230	COD-230-R	446	-	960	-	06/09/2021 00:00:00	27.3.a.20	7	8	9	7	9	8	-	6	7	7	9	7	7	45	13	11
COD-231	COD-231-R	446	-	520	-	01/10/2021 00:00:00	27.3.a.20	2	2	2	2	2	2	2	2	2	2	2	3	2	92	14	7
COD-	COD-	446	-	730	-	01/11/2021	27.3.a.20	5	5	5	5	5	5	5	5	5	5	5	6	5	92	6	3

232	232-R					00:00:00																			
COD-233	COD-233-R	446	-	800	-	03/11/2021 00:00:00	27.3.a.20	6	5	-	5	5	5	5	-	5	5	4	5	5	80	9	4
COD-234	COD-234-R	446	-	690	-	22/11/2021 00:00:00	27.3.a.20	2	3	4	3	3	3	3	3	4	3	3	3	3	75	17	10
COD-235	COD-235-R	446	-	830	-	25/11/2021 00:00:00	27.3.a.20	4	6	-	5	6	6	-	-	5	5	4	5	5	44	15	12
COD-236	COD-236-R	446	-	750	-	29/11/2021 00:00:00	27.3.a.20	4	4	4	4	4	4	4	4	4	4	4	4	4	100	0	0
COD-237	COD-237-R	446	-	810	-	02/12/2021 00:00:00	27.3.a.20	7	7	7	7	7	7	7	7	7	8	7	7	7	92	4	2
COD-238	COD-238-R	446	-	640	-	02/12/2021 00:00:00	27.3.a.20	2	4	4	3	4	3	4	2	3	4	4	4	4	58	23	20
COD-239	COD-239-R	446	-	530	-	02/12/2021 00:00:00	27.3.a.20	-	2	-	2	2	2	2	2	2	2	2	1	2	90	17	9
COD-24	COD-24-R	446	-	350	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	2	1	1	1	1	83	33	24
COD-24	COD-24-T	446	-	350	-	08/06/2021 00:00:00	27.4.b	1	1	1	-	1	1	1	1	1	1	1	1	1	100	0	0
COD-240	COD-240-R	446	-	370	-	06/12/2021 00:00:00	27.3.a.20	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-241	COD-241-R	446	-	850	-	06/10/2021 00:00:00	27.3.a.20	4	5	5	5	5	5	5	4	4	5	-	6	5	64	13	9
COD-242	COD-242-R	446	-	720	-	13/10/2021 00:00:00	27.3.a.20	3	3	-	2	3	3	3	3	4	4	3	3	3	73	17	11
COD-243	COD-243-R	446	-	370	-	22/12/2021 00:00:00	27.3.a.20	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-244	COD-244-R	446	-	980	-	29/12/2021 00:00:00	27.3.a.20	6	7	9	7	7	7	6	7	6	6	7	7	7	58	12	8

COD-245	COD-245-R	446	-	950	-	29/12/2021 00:00:00	27.3.a.20	8	7	8	7	7	8	7	6	7	8	8	7	7	50	9	8
COD-246	COD-246-R	446	-	900	-	29/12/2021 00:00:00	27.3.a.20	6	9	10	8	7	8	-	5	7	6	-	7	7	30	20	16
COD-247	COD-247-R	446	-	960	-	30/12/2021 00:00:00	27.3.a.20	5	8	-	6	6	5	6	7	6	8	5	7	6	36	18	14
COD-248	COD-248-R	446	-	150	-	04/10/2021 00:00:00	27.3.a.20	0	2	0	0	1	0	1	0	0	2	0	0	0	67	-	-
COD-249	COD-249-R	446	-	260	-	04/10/2021 00:00:00	27.3.a.20	1	1	1	1	1	1	1	1	1	2	1	0	1	83	43	17
COD-25	COD-25-R	446	-	380	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	1	1	1	1	1	92	27	14
COD-25	COD-25-T	446	-	380	-	08/06/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	1	1	1	1	1	91	28	15
COD-26	COD-26-R	446	-	390	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	1	1	1	1	1	92	27	14
COD-26	COD-26-T	446	-	390	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	2	1	1	1	1	83	33	24
COD-27	COD-27-R	446	-	410	-	08/06/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	2	2	2	2	82	19	14
COD-27	COD-27-T	446	-	410	-	08/06/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-28	COD-28-R	446	-	350	-	14/06/2021 00:00:00	27.4.b	1	1	2	2	1	1	1	1	1	1	0	1	1	75	48	28
COD-28	COD-28-T	446	-	350	-	14/06/2021 00:00:00	27.4.b	1	1	1	-	1	2	1	1	1	1	1	1	1	91	28	15
COD-29	COD-29-R	446	-	400	-	27/04/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	2	2	2	83	18	13
COD-29	COD-29-T	446	-	400	-	27/04/2021	27.4.b	2	2	3	-	2	2	-	2	2	2	2	2	2	90	15	9

						00:00:00																	
COD-30	COD-30-R	446	-	380	-	27/04/2021 00:00:00	27.4.b	2	2	3	2	2	3	2	1	3	3	2	2	2	58	28	22
COD-30	COD-30-T	446	-	380	-	27/04/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	3	2	2	2	83	21	8
COD-31	COD-31-R	446	-	540	-	21/04/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	2	2	2	83	18	13
COD-31	COD-31-T	446	-	540	-	21/04/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	3	2	2	2	73	21	17
COD-32	COD-32-R	446	-	640	-	21/04/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	2	2	2	83	18	13
COD-32	COD-32-T	446	-	640	-	21/04/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	2	2	2	2	82	19	14
COD-33	COD-33-R	446	-	530	-	18/05/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	2	2	2	83	18	13
COD-33	COD-33-T	446	-	530	-	18/05/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0
COD-34	COD-34-R	446	-	430	-	18/05/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	1	3	2	2	2	2	75	25	15
COD-34	COD-34-T	446	-	430	-	18/05/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	3	2	2	2	2	83	21	8
COD-35	COD-35-R	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	1	3	2	2	2	2	75	25	15
COD-35	COD-35-T	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	2	2	2	92	15	8
COD-36	COD-36-R	446	-	600	-	19/05/2021 00:00:00	27.4.b	3	3	5	4	3	3	3	3	4	3	5	2	3	58	26	21
COD-36	COD-36-T	446	-	600	-	19/05/2021 00:00:00	27.4.b	3	3	4	-	3	3	3	3	3	3	2	2	3	73	19	11

COD-37	COD-37-R	446	-	590	-	19/05/2021 00:00:00	27.4.b	5	3	4	3	3	4	-	2	4	6	6	3	3	36	33	26
COD-37	COD-37-T	446	-	590	-	19/05/2021 00:00:00	27.4.b	5	3	4	3	4	3	-	3	3	4	3	3	3	64	20	17
COD-38	COD-38-R	446	-	530	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	4	3	3	3	3	83	14	6
COD-38	COD-38-T	446	-	530	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	3	4	3	3	3	92	9	5
COD-39	COD-39-R	446	-	490	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	2	3	3	3	83	14	10
COD-39	COD-39-T	446	-	490	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-40	COD-40-R	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	3	-	2	3	2	2	3	2	2	3	2	64	21	20
COD-40	COD-40-T	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	2	2	2	3	2	2	2	2	2	3	2	83	18	13
COD-41	COD-41-R	446	-	400	-	18/05/2021 00:00:00	27.4.b	2	3	4	2	3	3	3	2	4	3	2	2	3	42	27	23
COD-41	COD-41-T	446	-	400	-	18/05/2021 00:00:00	27.4.b	3	3	4	-	3	3	3	2	3	3	2	2	3	64	21	16
COD-42	COD-42-R	446	-	590	-	15/06/2021 00:00:00	27.4.b	3	3	4	3	3	3	3	2	4	3	2	3	3	67	20	11
COD-42	COD-42-T	446	-	590	-	15/06/2021 00:00:00	27.4.b	3	3	4	-	3	3	3	2	4	3	3	3	3	73	17	11
COD-43	COD-43-R	446	-	450	-	07/06/2021 00:00:00	27.4.b	4	4	5	4	4	4	3	3	5	4	4	4	4	67	15	8
COD-43	COD-43-T	446	-	450	-	07/06/2021 00:00:00	27.4.b	4	4	4	-	4	4	3	3	3	4	3	4	4	64	14	13
COD-44	COD-44-R	446	-	710	-	24/06/2021	27.4.b	4	4	5	4	4	5	4	4	5	4	3	4	4	67	14	10

						00:00:00																	
COD-44	COD-44-T	446	-	710	-	24/06/2021 00:00:00	27.4.b	4	4	5	5	4	4	4	4	5	4	4	4	4	75	11	9
COD-45	COD-45-R	446	-	380	-	08/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-45	COD-45-T	446	-	380	-	08/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-46	COD-46-R	446	-	350	-	09/08/2021 00:00:00	27.4.b	1	1	1	1	2	1	1	1	1	1	1	1	1	92	27	14
COD-46	COD-46-T	446	-	350	-	09/08/2021 00:00:00	27.4.b	1	1	-	1	1	1	1	1	1	4	1	1	1	91	71	39
COD-47	COD-47-R	446	-	360	-	09/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-47	COD-47-T	446	-	360	-	09/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	3	1	1	1	92	49	26
COD-48	COD-48-R	446	-	360	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-48	COD-48-T	446	-	360	-	24/08/2021 00:00:00	27.4.b	1	1	1	-	1	1	1	1	1	1	1	1	1	100	0	0
COD-49	COD-49-R	446	-	370	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	-	1	1	2	1	1	1	91	28	15
COD-49	COD-49-T	446	-	370	-	24/08/2021 00:00:00	27.4.b	1	1	1	-	1	1	1	1	1	1	1	1	1	100	0	0
COD-50	COD-50-R	446	-	400	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-50	COD-50-T	446	-	400	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-51	COD-51-R	446	-	410	-	23/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	2	2	1	1	1	83	33	24

COD-51	COD-51-T	446	-	410	-	23/08/2021 00:00:00	27.4.b	1	2	1	1	1	1	1	1	1	1	1	1	1	92	27	14
COD-52	COD-52-R	446	-	380	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	3	2	2	2	83	21	8
COD-52	COD-52-T	446	-	380	-	08/08/2021 00:00:00	27.4.b	2	2	2	1	2	2	2	1	2	2	1	2	2	75	26	21
COD-53	COD-53-R	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-53	COD-53-T	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	2	2	0	2	2	2	2	2	2	2	2	2	92	31	17
COD-54	COD-54-R	446	-	390	-	08/08/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	2	2	2	2	2	92	14	7
COD-54	COD-54-T	446	-	390	-	08/08/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	3	2	2	2	91	14	8
COD-55	COD-55-R	446	-	410	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	2	2	2	92	15	8
COD-55	COD-55-T	446	-	410	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	2	2	2	92	15	8
COD-56	COD-56-R	446	-	430	-	08/08/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	1	2	2	2	2	2	91	16	9
COD-56	COD-56-T	446	-	430	-	08/08/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	3	2	2	2	2	2	91	14	8
COD-57	COD-57-R	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-57	COD-57-T	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	3	3	2	2	2	2	2	2	2	2	2	2	83	18	13
COD-58	COD-58-R	446	-	490	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-58	COD-58-T	446	-	490	-	08/08/2021	27.4.b	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0

						00:00:00																
COD-59	COD-59-R	446	-	430	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-59	COD-59-T	446	-	430	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-60	COD-60-R	446	-	520	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	4	3	3	3	83	14	6
COD-60	COD-60-T	446	-	520	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	4	3	3	4	3	4	3	3	75	14	12
COD-61	COD-61-R	446	-	500	-	09/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-61	COD-61-T	446	-	500	-	09/08/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	2	3	3	2	3	3	82	14	11
COD-62	COD-62-R	446	-	510	-	09/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	2	3	3	3	3	92	10	5
COD-62	COD-62-T	446	-	510	-	09/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-63	COD-63-R	446	-	640	-	23/08/2021 00:00:00	27.4.b	2	3	3	2	2	2	2	2	2	2	3	3	2	67	21	19
COD-63	COD-63-T	446	-	640	-	23/08/2021 00:00:00	27.4.b	2	3	3	-	2	2	2	2	2	2	2	3	2	73	21	17
COD-64	COD-64-R	446	-	530	-	23/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	4	3	3	83	14	6
COD-64	COD-64-T	446	-	530	-	23/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-65	COD-65-R	446	-	470	-	23/08/2021 00:00:00	27.4.b	3	3	5	2	3	3	3	2	3	4	5	3	3	58	30	22
COD-65	COD-65-T	446	-	470	-	23/08/2021 00:00:00	27.4.b	3	3	2	-	3	3	3	2	3	3	2	3	3	73	17	15

COD-66	COD-66-R	446	-	520	-	14/09/2021 00:00:00	27.4.b	3	4	4	-	3	4	3	3	4	4	4	4	3	36	14	13
COD-66	COD-66-T	446	-	520	-	14/09/2021 00:00:00	27.4.b	3	4	4	-	3	3	3	3	3	3	4	4	3	64	15	14
COD-67	COD-67-R	446	-	750	-	15/09/2021 00:00:00	27.4.b	4	5	5	5	4	4	4	4	4	4	6	4	4	67	15	13
COD-67	COD-67-T	446	-	750	-	15/09/2021 00:00:00	27.4.b	4	4	5	5	4	4	4	4	4	4	4	4	4	83	9	7
COD-68	COD-68-R	446	-	380	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-68	COD-68-T	446	-	380	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-69	COD-69-R	446	-	330	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	-	1	1	1	1	1	1	100	0	0
COD-69	COD-69-T	446	-	330	-	11/10/2021 00:00:00	27.4.b	0	1	1	-	1	1	1	1	1	2	1	1	1	82	45	18
COD-70	COD-70-R	446	-	410	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	2	1	1	1	1	1	1	1	1	92	27	14
COD-70	COD-70-T	446	-	410	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	2	0	1	1	1	4	1	1	1	75	77	47
COD-71	COD-71-R	446	-	430	-	12/10/2021 00:00:00	27.4.b	1	2	2	1	2	2	1	2	2	2	1	1	1	42	33	31
COD-71	COD-71-T	446	-	430	-	12/10/2021 00:00:00	27.4.b	1	2	1	-	2	1	1	1	2	2	1	1	1	64	37	34
COD-72	COD-72-R	446	-	450	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-72	COD-72-T	446	-	450	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-73	COD-73-R	446	-	410	-	11/10/2021	27.4.b	1	1	1	1	-	1	1	1	1	1	1	1	1	100	0	0

						00:00:00																	
COD-73	COD-73-T	446	-	410	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-74	COD-74-R	446	-	370	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-74	COD-74-T	446	-	370	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-75	COD-75-R	446	-	480	-	11/10/2021 00:00:00	27.4.b	2	3	3	2	2	2	2	2	2	3	2	2	2	75	20	17
COD-75	COD-75-T	446	-	480	-	11/10/2021 00:00:00	27.4.b	2	3	2	2	2	2	2	2	2	2	2	2	2	92	14	7
COD-76	COD-76-R	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	1	2	2	91	16	9
COD-76	COD-76-T	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0
COD-77	COD-77-R	446	-	510	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	1	2	2	2	2	2	2	91	16	9
COD-77	COD-77-T	446	-	510	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0
COD-78	COD-78-R	446	-	550	-	11/10/2021 00:00:00	27.4.b	2	3	2	2	2	2	2	2	2	2	2	2	2	92	14	7
COD-78	COD-78-T	446	-	550	-	11/10/2021 00:00:00	27.4.b	2	3	3	-	2	2	2	2	2	2	2	2	2	82	19	14
COD-79	COD-79-R	446	-	440	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	3	2	2	2	92	14	7
COD-79	COD-79-T	446	-	440	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	3	2	2	2	91	14	8
COD-80	COD-80-R	446	-	470	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0

COD-80	COD-80-T	446	-	470	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0
COD-81	COD-81-R	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	1	2	2	92	15	8
COD-81	COD-81-T	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-82	COD-82-R	446	-	480	-	11/10/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	3	3	3	92	10	5
COD-82	COD-82-T	446	-	480	-	11/10/2021 00:00:00	27.4.b	3	3	2	-	3	3	3	2	3	3	2	3	3	73	17	15
COD-83	COD-83-R	446	-	680	-	09/12/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	4	3	3	4	3	3	82	13	9
COD-83	COD-83-T	446	-	680	-	09/12/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-84	COD-84-R	446	-	500	-	11/10/2021 00:00:00	27.4.b	2	2	3	2	4	3	3	2	3	2	3	3	2	42	24	21
COD-84	COD-84-T	446	-	500	-	11/10/2021 00:00:00	27.4.b	2	2	6	2	4	4	3	2	2	4	2	3	2	50	43	33
COD-85	COD-85-R	446	-	460	-	11/10/2021 00:00:00	27.4.b	3	3	3	3	3	3	2	2	3	3	3	3	3	83	14	10
COD-85	COD-85-T	446	-	460	-	11/10/2021 00:00:00	27.4.b	3	3	2	-	3	2	2	2	3	2	2	3	3	45	21	20
COD-86	COD-86-R	446	-	400	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	3	2	1	2	2	83	21	8
COD-86	COD-86-T	446	-	400	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	2	2	-	2	2	100	0	0
COD-87	COD-87-R	446	-	460	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	3	2	2	2	3	3	2	2	2	75	20	17
COD-87	COD-87-T	446	-	460	-	12/01/2021	27.7.h	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0

						00:00:00																	
COD-88	COD-88-R	446	-	530	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	3	1	1	2	2	75	27	16
COD-88	COD-88-T	446	-	530	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-89	COD-89-R	446	-	490	-	12/01/2021 00:00:00	27.7.h	2	2	3	2	2	2	2	2	3	2	2	2	2	83	18	13
COD-89	COD-89-T	446	-	490	-	12/01/2021 00:00:00	27.7.h	2	2	2	-	2	2	2	2	2	2	2	2	2	100	0	0
COD-90	COD-90-R	446	-	660	-	05/02/2021 00:00:00	27.7.f	3	3	-	3	3	3	3	3	3	3	4	3	3	91	10	5
COD-90	COD-90-T	446	-	660	-	05/02/2021 00:00:00	27.7.f	3	3	3	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-91	COD-91-R	446	-	650	-	05/02/2021 00:00:00	27.7.f	3	4	4	3	3	4	3	3	4	4	3	3	3	58	15	14
COD-91	COD-91-T	446	-	650	-	05/02/2021 00:00:00	27.7.f	3	4	3	-	3	3	3	3	3	3	3	3	3	91	10	5
COD-92	COD-92-R	446	-	720	-	05/02/2021 00:00:00	27.7.f	3	3	4	3	3	3	-	3	3	3	3	3	3	91	10	5
COD-92	COD-92-T	446	-	720	-	05/02/2021 00:00:00	27.7.f	3	3	4	3	3	3	3	3	3	3	3	3	3	92	9	5
COD-93	COD-93-R	446	-	770	-	08/02/2021 00:00:00	27.7.f	3	3	4	3	3	3	3	3	4	3	3	3	3	83	12	9
COD-93	COD-93-T	446	-	770	-	08/02/2021 00:00:00	27.7.f	3	3	3	-	3	3	3	3	3	3	3	3	3	100	0	0
COD-94	COD-94-R	446	-	710	-	08/02/2021 00:00:00	27.7.f	3	3	4	4	4	4	3	3	4	4	5	4	4	58	17	13
COD-94	COD-94-T	446	-	710	-	08/02/2021 00:00:00	27.7.f	3	3	4	3	4	4	3	3	3	4	4	4	4	50	15	14

COD-95	COD-95-R	446	-	810	-	08/02/2021 00:00:00	27.7.f	3	4	3	4	4	3	3	4	4	3	5	3	3	50	19	16
COD-95	COD-95-T	446	-	810	-	08/02/2021 00:00:00	27.7.f	3	3	-	5	4	3	3	4	3	3	3	3	3	73	20	16
COD-96	COD-96-R	446	-	770	-	04/03/2021 00:00:00	27.7.e	3	3	4	4	3	3	4	4	4	3	4	3	3	50	15	14
COD-96	COD-96-T	446	-	770	-	04/03/2021 00:00:00	27.7.e	3	3	-	-	3	3	3	3	3	3	5	3	3	90	20	11
COD-97	COD-97-R	446	-	800	-	04/03/2021 00:00:00	27.7.e	3	-	-	-	4	3	-	4	6	4	5	3	4	38	27	19
COD-97	COD-97-T	446	-	800	-	04/03/2021 00:00:00	27.7.e	3	4	3	4	4	3	3	4	4	4	5	3	4	50	18	15
COD-98	COD-98-R	446	-	850	-	04/03/2021 00:00:00	27.7.e	4	5	6	6	4	4	4	4	5	5	5	5	4	42	16	13
COD-98	COD-98-T	446	-	850	-	04/03/2021 00:00:00	27.7.e	4	5	6	-	4	5	4	4	4	4	-	5	4	60	16	13
COD-99	COD-99-R	446	-	890	-	04/03/2021 00:00:00	27.7.e	6	6	8	-	6	6	6	6	6	6	7	6	6	82	10	7
COD-99	COD-99-T	446	-	890	-	04/03/2021 00:00:00	27.7.e	6	6	7	6	6	6	6	6	7	6	6	6	6	83	6	5

Number of age readings by modal age

Table X: Number of age readings table gives an overview of number of readings per reader and modal age. The total numbers of readings by modal age and by reader are also presented.

Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	total
0	4	4	3	4	4	4	3	4	4	4	4	4	46
1	58	58	57	44	57	58	56	58	58	58	58	58	678
2	103	104	102	76	106	106	103	104	106	106	101	105	1222
3	95	96	91	64	96	96	91	96	95	96	95	96	1107
4	43	41	39	34	44	44	38	42	42	44	41	44	496
5	42	43	37	35	43	43	35	40	42	43	41	43	487
6	16	16	11	11	17	17	11	14	16	17	17	17	180
7	16	14	14	14	16	16	12	16	16	16	15	16	181
8	17	17	14	14	17	17	14	16	17	17	17	16	193
9	3	3	3	3	3	3	0	3	3	3	3	3	33
10	3	4	4	4	4	4	3	4	4	4	4	4	46
11	3	3	3	3	3	3	2	3	3	3	3	3	35

Total	**403**	**403**	**378**	**306**	**410**	**411**	**368**	**400**	**406**	**411**	**399**	**409**	**4704**

Number of age readings by age

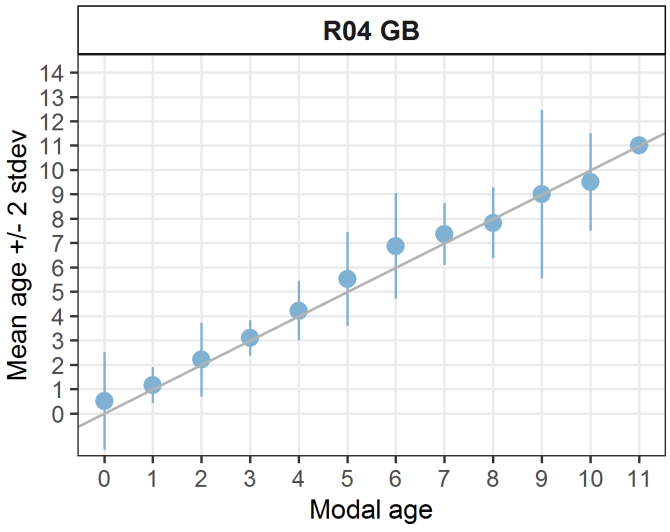
Table X: Age composition by reader gives a summary of number of readings per reader and age. The total numbers of readings by age and by reader are also presented.

Age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB	total
0	5	3	3	6	2	5	2	4	6	2	5	9	52
1	60	49	44	48	52	55	58	69	49	51	63	42	640
2	108	101	76	73	101	99	106	138	78	87	101	107	1175
3	97	99	92	57	99	97	92	53	107	108	75	93	1069
4	44	43	48	25	44	47	34	39	52	57	37	53	523
5	40	33	41	26	45	34	32	34	45	48	41	45	464
6	18	20	19	22	24	26	19	31	23	18	24	20	264
7	9	21	17	18	16	13	12	19	12	15	17	18	187
8	16	20	17	18	19	18	8	11	15	13	19	12	186
9	3	6	9	5	3	7	2	1	6	5	7	3	57
10	2	5	5	3	3	6	0	0	4	1	4	2	35
11	1	3	4	4	1	1	2	1	2	3	2	5	29
12	0	0	3	1	1	2	1	0	3	2	3	0	16
13	0	0	0	0	0	1	0	0	4	1	1	0	7
Total	**403**	**403**	**378**	**306**	**410**	**411**	**368**	**400**	**406**	**411**	**399**	**409**	**4704**

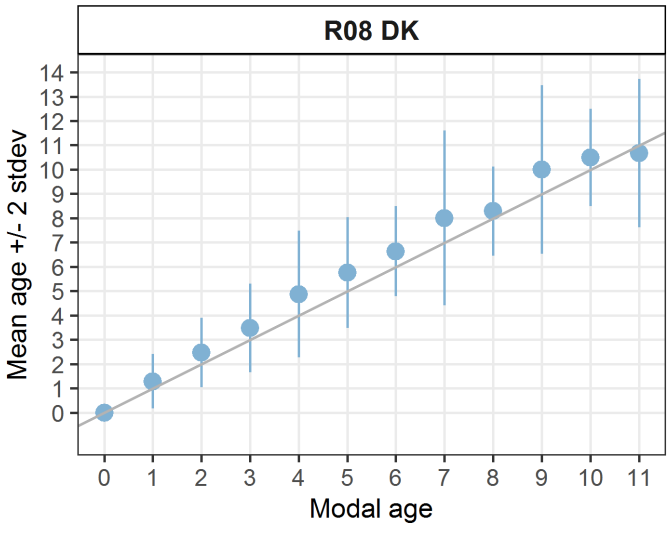
SRparate age bias plots by reader


R02 GB
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

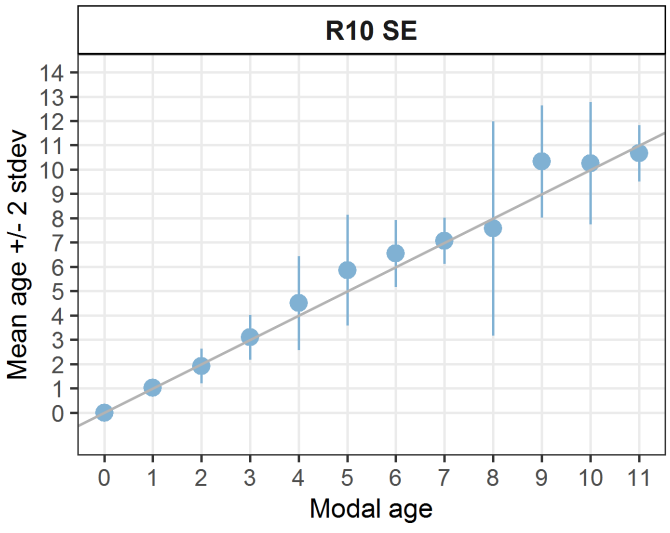
[[1]] [[2]]


R04 GB
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

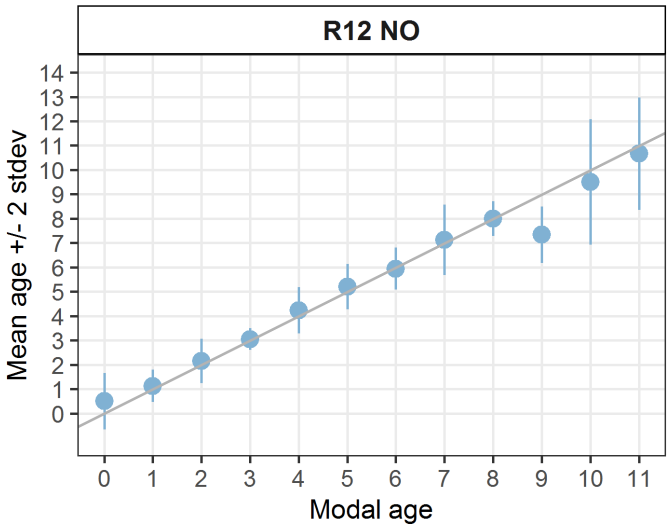
[[3]]


R08 DK
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

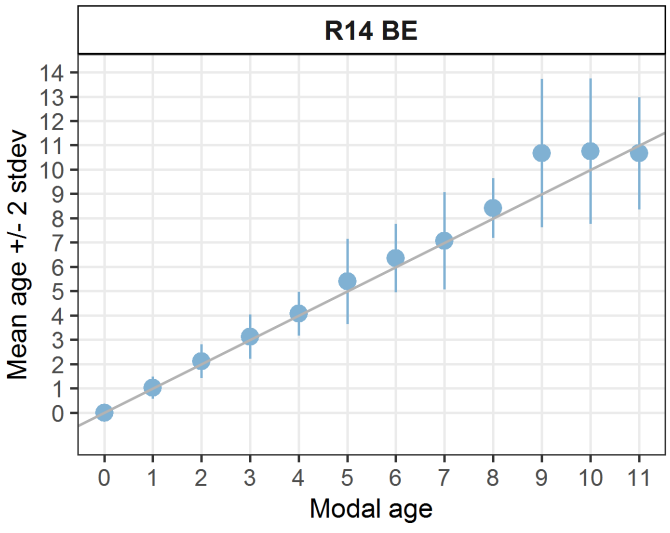
[[4]]


R10 SE
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

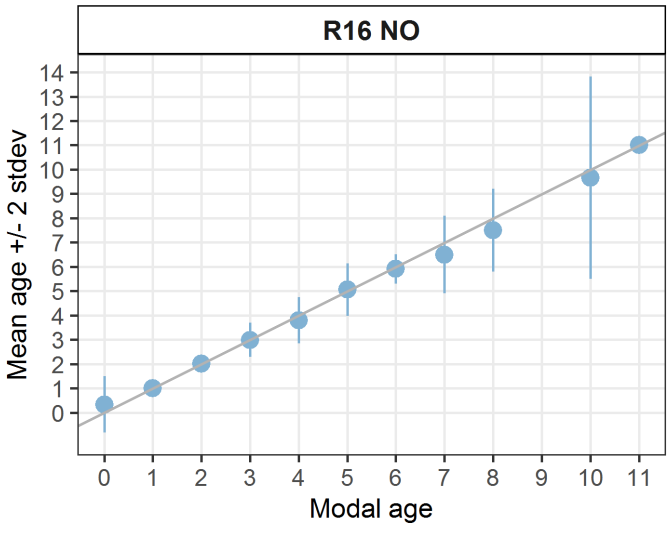
[[5]]


R12 NO
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

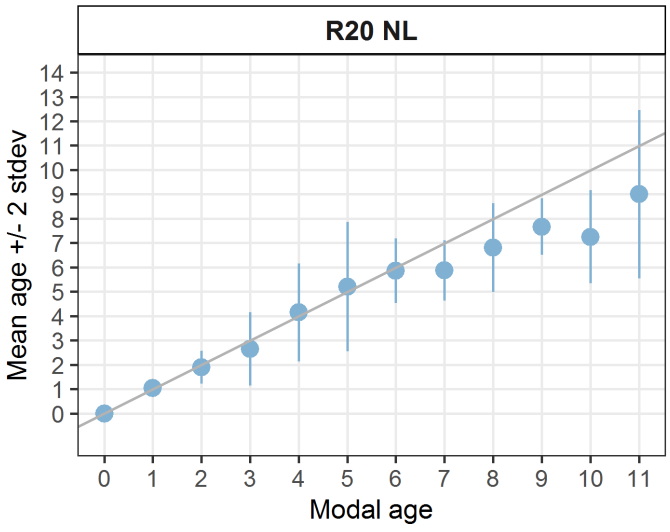
[[6]]


R14 BE
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

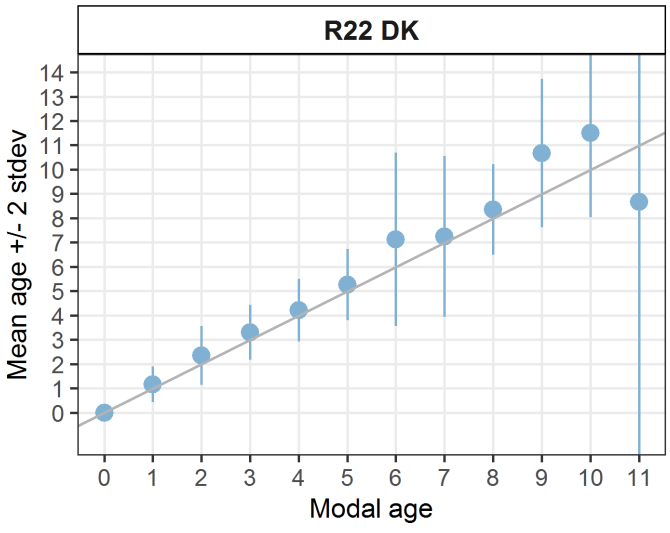
[[7]]


R16 NO
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

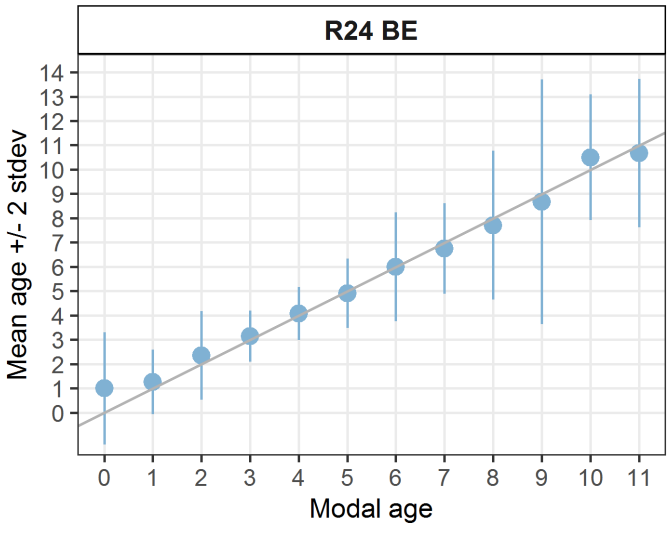
[[8]]


R20 NL
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

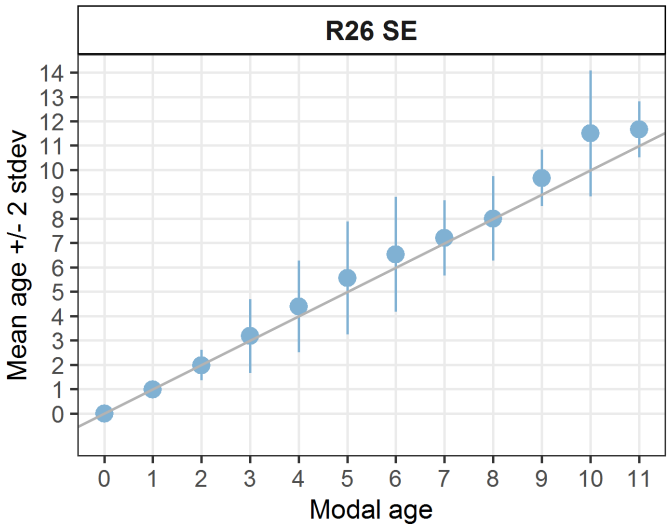
[[9]]


R22 DK
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

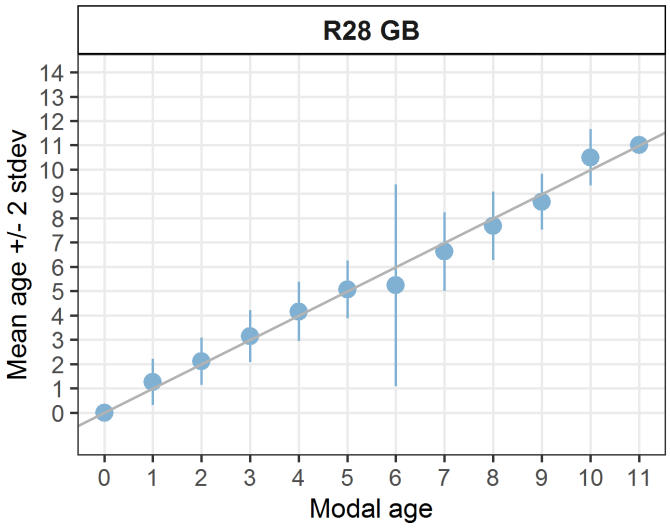
[[10]]


R24 BE
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

[[11]]


R26 SE
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

[[12]]


R28 GB
Mean age +/- 2 stdev
Modal age
0 1 2 3 4 5 6 7 8 9 10 11
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Statistics by modal age plot (STDEV, CV and PA)

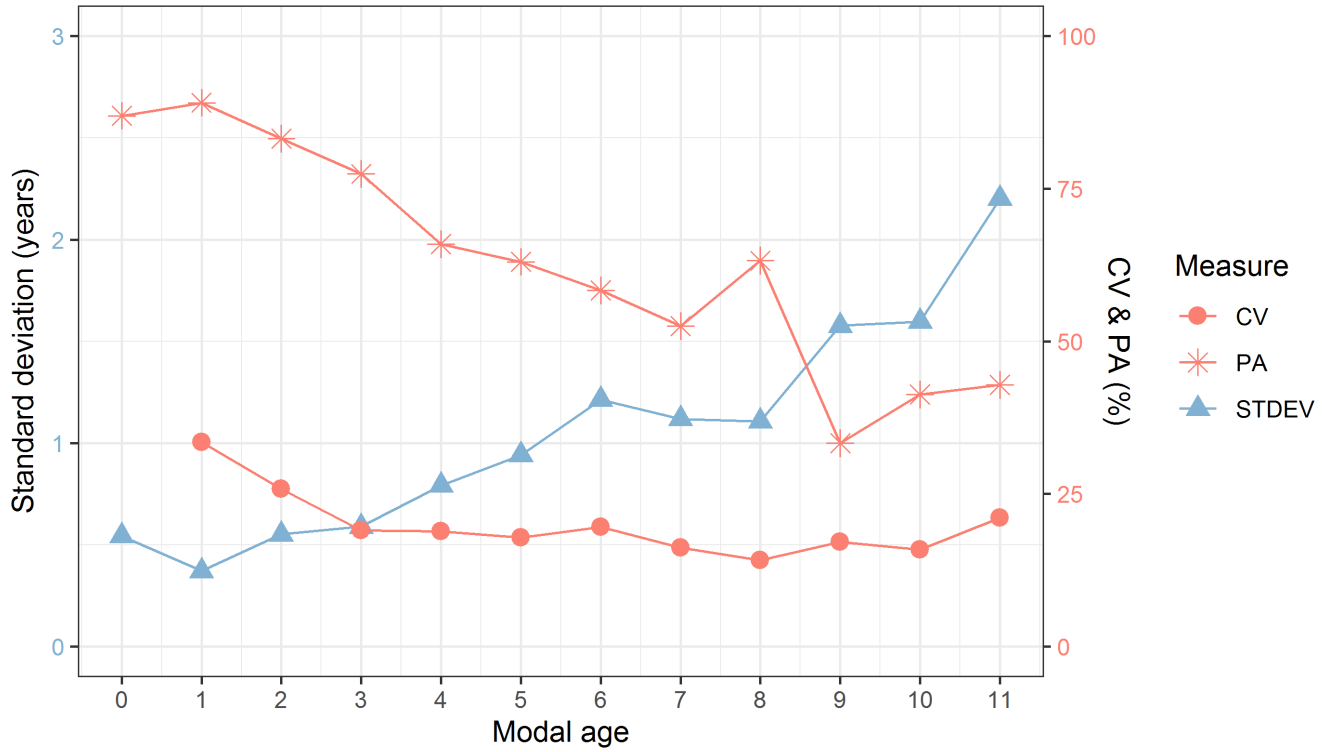


Figure X: CV, PA and (STDEV (standard deviation) are plotted against modal age

Distribution of age reading errors

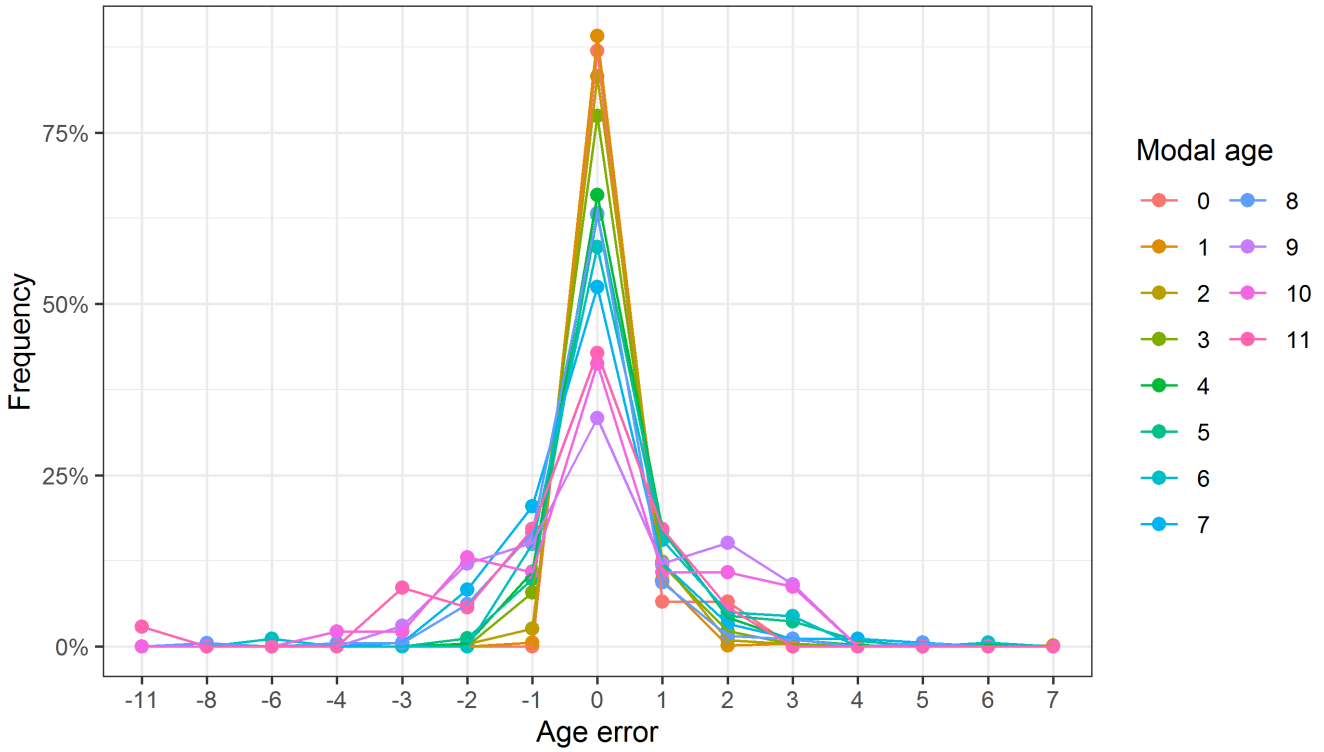


Figure X: The distribution of the age reading errors in percentage by modal age as obSRrved from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

Relative bias for all readers

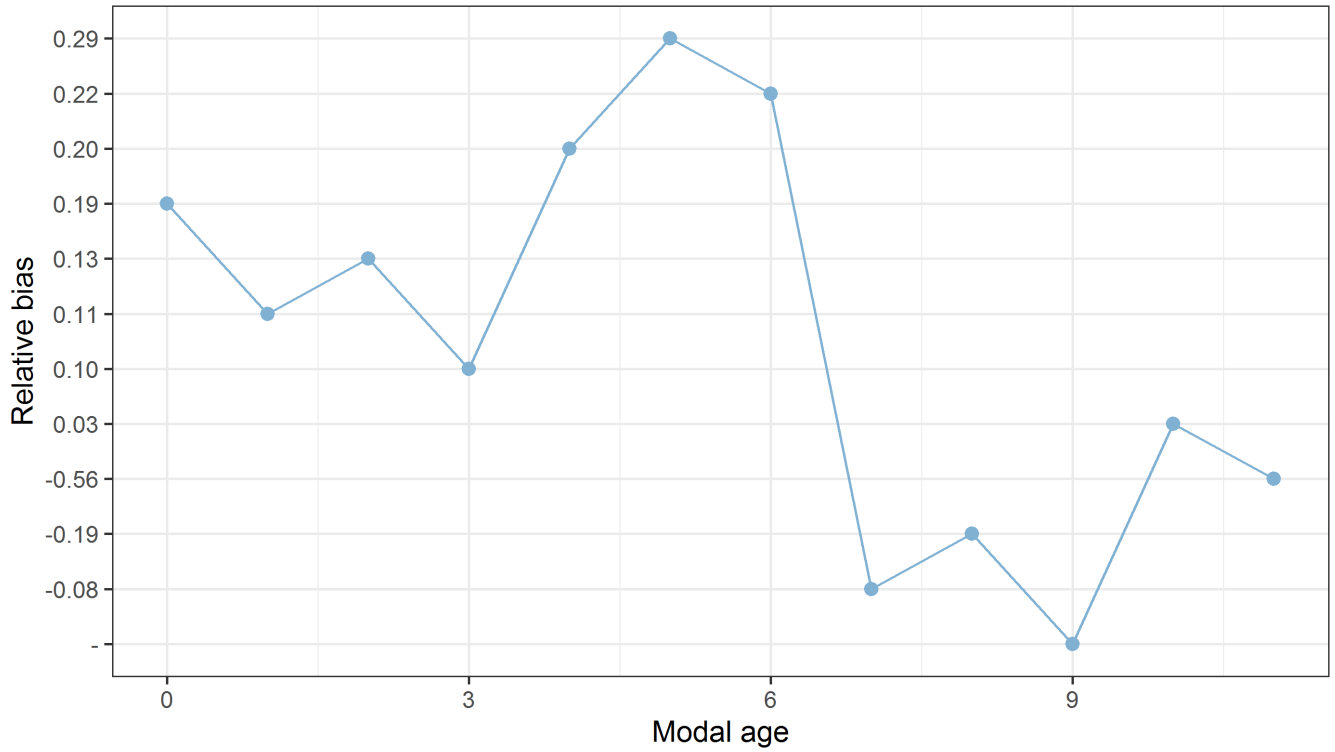


Figure X: The relative bias by modal age as estimated by all age readers combined.

Mean length at age by reader

Table X: Mean fish length at age per reader is calculated per reader and age (not modal age) and for all readers combined per age. A weighted mean is also given.

Age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	R24 BE	R26 SE	R28 GB
0	164 mm	113 mm	113 mm	305 mm	95 mm	180 mm	95 mm	122 mm	437 mm	95 mm	168 mm	447 mm
1	402 mm	383 mm	397 mm	416 mm	382 mm	396 mm	396 mm	399 mm	393 mm	415 mm	401 mm	384 mm
2	488 mm	469 mm	456 mm	486 mm	476 mm	493 mm	492 mm	509 mm	478 mm	478 mm	479 mm	463 mm
3	644 mm	606 mm	561 mm	600 mm	604 mm	609 mm	617 mm	660 mm	569 mm	597 mm	638 mm	610 mm
4	790 mm	732 mm	674 mm	773 mm	750 mm	746 mm	781 mm	812 mm	715 mm	722 mm	739 mm	750 mm
5	884 mm	875 mm	802 mm	824 mm	882 mm	862 mm	884 mm	877 mm	850 mm	883 mm	838 mm	910 mm
6	919 mm	852 mm	822 mm	855 mm	892 mm	932 mm	912 mm	926 mm	916 mm	876 mm	884 mm	822 mm
7	954 mm	945 mm	904 mm	953 mm	938 mm	821 mm	962 mm	960 mm	934 mm	943 mm	915 mm	978 mm
8	1030 mm	986 mm	968 mm	971 mm	1012 mm	992 mm	1016 mm	1025 mm	973 mm	950 mm	970 mm	997 mm
9	1030 mm	1008 mm	1004 mm	1022 mm	947 mm	936 mm	1025 mm	1010 mm	972 mm	936 mm	980 mm	1007 mm
10	995 mm	1076 mm	978 mm	1043 mm	1100 mm	1025 mm	-	-	1045 mm	990 mm	1028 mm	1085 mm
11	1030 mm	1013 mm	970 mm	1055 mm	1070 mm	1170 mm	975 mm	1030 mm	1015 mm	973 mm	1050 mm	1028 mm
12	-	-	997 mm	1070 mm	920 mm	1060 mm	1070 mm	-	970 mm	1030 mm	1063 mm	-
13	-	-	-	-	-	1070 mm	-	-	1012 mm	970 mm	1030 mm	-
Weighted Mean	**640 mm**	**640 mm**	**629 mm**	**651 mm**	**645 mm**	**644 mm**	**622 mm**	**637 mm**	**644 mm**	**644 mm**	**643 mm**	**644 mm**

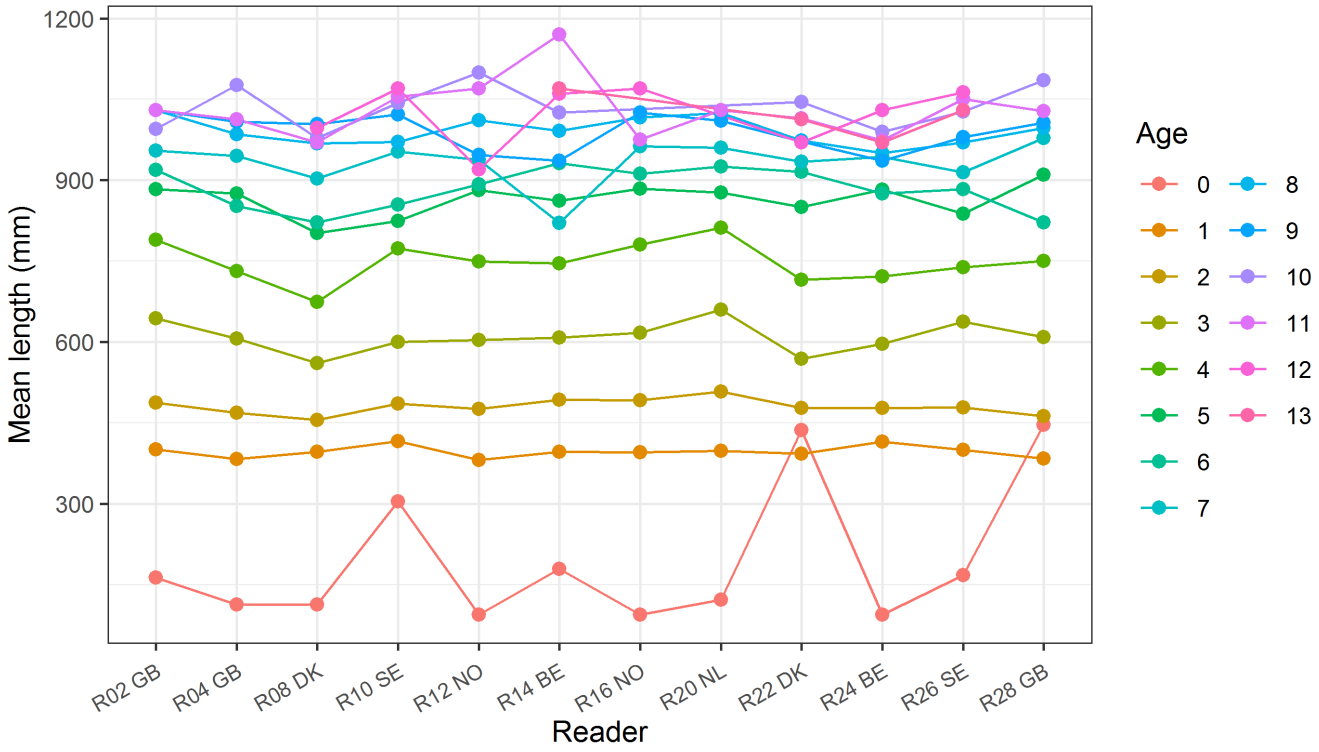


Figure X: The mean fish length at age as estimated by each age reader.

8.2 Results Advanced readers

All samples included

Summary statistics

Table X: Summary of statistics; PA (%), CV (%) and APE (%).

NSample	CV	PA	APE
163	19 %	76 %	13 %

Data overview

Table X: Data overview including modal age and statistics per sample.

Fish ID	Sample ID	Event ID	Image ID	length	SRx	Catch date	ICES area	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	Modal age	PA %	CV %	APE %
COD-01	COD-01-R	446	-	440	-	19/01/2021 00:00:00	27.4.b	2	2	4	2	2	2	2	2	4	2	78	36	28
COD-01	COD-01-T	446	-	440	-	19/01/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	2	75	21	17
COD-02	COD-02-R	446	-	400	-	19/01/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	3	2	89	16	9
COD-02	COD-02-T	446	-	400	-	19/01/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-03	COD-03-R	446	-	360	-	19/01/2021 00:00:00	27.4.b	2	2	3	2	2	3	2	2	3	2	67	21	19
COD-03	COD-03-T	446	-	360	-	19/01/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-04	COD-04-R	446	-	340	-	19/01/2021 00:00:00	27.4.b	2	2	3	2	2	3	2	2	3	2	67	21	19
COD-04	COD-04-T	446	-	340	-	19/01/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	3	2	88	17	10
COD-05	COD-05-R	446	-	370	-	18/02/2021 00:00:00	27.4.b	2	3	2	1	3	3	2	2	3	2	44	30	25
COD-05	COD-05-T	446	-	370	-	18/02/2021 00:00:00	27.4.b	2	3	2	2	3	2	2	2	2	2	78	20	16
COD-06	COD-06-R	446	-	380	-	18/02/2021 00:00:00	27.4.b	2	2	3	-	2	3	2	2	3	2	62	22	20
COD-06	COD-06-T	446	-	380	-	18/02/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0

COD-07	COD-07-R	446	-	670	-	17/02/2021 00:00:00	27.4.b	2	3	3	3	3	3	2	2	3	3	67	19	17
COD-07	COD-07-T	446	-	670	-	17/02/2021 00:00:00	27.4.b	2	2	3	3	3	3	2	2	3	3	56	21	19
COD-08	COD-08-R	446	-	460	-	18/02/2021 00:00:00	27.4.b	3	3	3	3	3	4	3	3	4	3	78	14	11
COD-08	COD-08-T	446	-	460	-	18/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	3	3	3	100	0	0
COD-09	COD-09-R	446	-	470	-	18/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	4	3	78	17	7
COD-09	COD-09-T	446	-	470	-	18/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	1	3	3	89	24	14
COD-10	COD-10-R	446	-	520	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	3	4	3	88	11	7
COD-10	COD-10-T	446	-	520	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	3	3	3	100	0	0
COD-100	COD-100-R	446	-	980	-	10/02/2021 00:00:00	27.7.g	5	6	5	6	5	6	-	7	6	6	50	12	10
COD-100	COD-100-T	446	-	980	-	10/02/2021 00:00:00	27.7.g	5	6	5	-	5	6	6	6	5	6	50	10	9
COD-101	COD-101-R	446	-	990	-	10/02/2021 00:00:00	27.7.g	5	5	5	6	5	6	5	5	6	5	67	9	8
COD-101	COD-101-T	446	-	990	-	10/02/2021 00:00:00	27.7.g	5	5	5	6	5	6	5	5	5	5	78	8	7
COD-102	COD-102-R	446	-	980	-	10/02/2021 00:00:00	27.7.g	8	8	8	8	8	9	8	8	9	8	78	5	4
COD-102	COD-102-T	446	-	980	-	10/02/2021 00:00:00	27.7.g	8	8	8	8	8	9	8	8	8	8	89	4	2
COD-103	COD-103-R	446	-	990	-	22/02/2021 00:00:00	27.7.e	8	8	8	8	8	8	8	7	8	8	89	4	3
COD-103	COD-103-T	446	-	990	-	22/02/2021 00:00:00	27.7.e	8	8	8	-	8	8	8	8	8	8	100	0	0
COD-104	COD-104-R	446	-	470	-	09/04/2021 00:00:00	27.7.f	2	2	3	2	2	3	2	2	3	2	67	21	19
COD-104	COD-104-T	446	-	470	-	09/04/2021 00:00:00	27.7.f	2	2	3	-	2	2	2	2	3	2	75	21	17
COD-105	COD-105-R	446	-	560	-	09/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	2	78	20	16

COD-105	COD-105-T	446	-	560	-	09/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-106	COD-106-R	446	-	420	-	12/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-106	COD-106-T	446	-	420	-	12/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	2	2	89	16	9
COD-107	COD-107-R	446	-	510	-	12/04/2021 00:00:00	27.7.f	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-107	COD-107-T	446	-	510	-	12/04/2021 00:00:00	27.7.f	2	2	2	3	2	2	2	2	3	2	78	20	16
COD-108	COD-108-R	446	-	550	-	03/05/2021 00:00:00	27.7.f	3	3	4	3	3	4	3	2	4	3	56	21	16
COD-108	COD-108-T	446	-	550	-	03/05/2021 00:00:00	27.7.f	3	3	3	-	3	4	3	2	3	3	75	18	8
COD-109	COD-109-R	446	-	710	-	03/05/2021 00:00:00	27.7.f	3	3	4	3	3	3	3	2	5	3	67	26	18
COD-109	COD-109-T	446	-	710	-	03/05/2021 00:00:00	27.7.f	3	3	4	-	3	3	3	2	4	3	62	21	14
COD-11	COD-11-R	446	-	560	-	17/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-11	COD-11-T	446	-	560	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	2	3	3	88	12	8
COD-110	COD-110-R	446	-	650	-	03/04/2021 00:00:00	27.7.f	4	4	3	4	3	5	3	3	5	3	44	22	18
COD-110	COD-110-T	446	-	650	-	03/04/2021 00:00:00	27.7.f	4	4	6	-	3	5	3	3	3	3	50	29	23
COD-111	COD-111-R	446	-	790	-	03/04/2021 00:00:00	27.7.f	3	4	4	-	3	5	4	3	5	3	38	22	17
COD-111	COD-111-T	446	-	790	-	03/04/2021 00:00:00	27.7.f	3	4	9	-	3	3	4	3	3	3	62	52	31
COD-112	COD-112-R	446	-	740	-	05/05/2021 00:00:00	27.7.f	3	4	3	-	4	4	3	3	4	4	50	15	14
COD-112	COD-112-T	446	-	740	-	05/05/2021 00:00:00	27.7.f	3	4	5	-	4	4	3	3	4	4	50	19	15
COD-113	COD-113-R	446	-	870	-	05/05/2021 00:00:00	27.7.f	4	5	4	4	4	4	-	3	-	4	71	14	7
COD-113	COD-113-T	446	-	870	-	05/05/2021 00:00:00	27.7.f	4	5	5	4	4	4	3	3	4	4	56	18	11

COD-114	COD-114-R	446	-	860	-	12/05/2021 00:00:00	27.7.h	6	7	7	-	5	6	-	-	9	6	33	20	15
COD-114	COD-114-T	446	-	860	-	12/05/2021 00:00:00	27.7.h	6	7	-	-	5	6	-	-	9	6	40	23	17
COD-115	COD-115-R	446	-	930	-	12/05/2021 00:00:00	27.7.h	4	4	5	4	4	4	4	4	5	4	78	10	8
COD-115	COD-115-T	446	-	930	-	12/05/2021 00:00:00	27.7.h	4	4	5	4	4	4	4	4	4	4	89	8	5
COD-116	COD-116-R	446	-	1010	-	12/05/2021 00:00:00	27.7.h	5	7	5	5	5	5	6	4	5	5	67	16	11
COD-116	COD-116-T	446	-	1010	-	12/05/2021 00:00:00	27.7.h	5	8	6	5	5	5	6	3	5	5	56	25	17
COD-117	COD-117-R	446	-	940	-	15/06/2021 00:00:00	27.7.g	5	8	7	8	5	6	5	4	6	5	33	24	19
COD-117	COD-117-T	446	-	940	-	15/06/2021 00:00:00	27.7.g	5	8	5	5	5	5	-	4	6	5	62	22	15
COD-118	COD-118-R	446	-	970	-	15/06/2021 00:00:00	27.7.g	5	7	6	7	6	6	-	5	6	6	50	13	8
COD-118	COD-118-T	446	-	970	-	15/06/2021 00:00:00	27.7.g	5	7	6	-	6	6	-	5	6	6	57	12	8
COD-119	COD-119-R	446	-	1030	-	19/05/2021 00:00:00	27.7.h	6	9	8	8	6	7	6	6	6	6	56	17	14
COD-119	COD-119-T	446	-	1030	-	19/05/2021 00:00:00	27.7.h	6	9	6	-	6	8	6	6	6	6	75	18	14
COD-12	COD-12-R	446	-	620	-	17/02/2021 00:00:00	27.4.b	3	3	4	3	4	3	3	2	4	3	56	21	16
COD-12	COD-12-T	446	-	620	-	17/02/2021 00:00:00	27.4.b	3	3	5	3	4	3	3	2	3	3	67	26	18
COD-121	COD-121-R	446	-	1020	-	29/04/2021 00:00:00	27.7.e	8	8	8	8	8	8	8	7	8	8	89	4	3
COD-121	COD-121-T	446	-	1020	-	29/04/2021 00:00:00	27.7.e	8	9	9	-	8	8	-	7	9	8	43	9	7
COD-122	COD-122-R	446	-	380	-	14/09/2021 00:00:00	27.7.e	1	1	1	-	1	1	1	1	1	1	100	0	0
COD-122	COD-122-T	446	-	380	-	14/09/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-123	COD-123-R	446	-	460	-	14/09/2021 00:00:00	27.7.e	1	2	1	1	1	1	1	1	2	1	78	36	28

COD-123	COD-123-T	446	-	460	-	14/09/2021 00:00:00	27.7.e	1	2	1	1	1	1	1	1	1	1	89	30	18
COD-124	COD-124-R	446	-	350	-	06/09/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-124	COD-124-T	446	-	350	-	06/09/2021 00:00:00	27.7.e	1	1	1	-	1	1	1	1	1	1	100	0	0
COD-125	COD-125-R	446	-	400	-	06/09/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-125	COD-125-T	446	-	400	-	06/09/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-126	COD-126-R	446	-	600	-	03/07/2021 00:00:00	27.7.h	2	3	2	2	2	2	2	2	2	2	89	16	9
COD-126	COD-126-T	446	-	600	-	03/07/2021 00:00:00	27.7.h	2	3	4	2	2	2	2	2	2	2	78	30	22
COD-127	COD-127-R	446	-	500	-	03/07/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	3	2	89	16	9
COD-127	COD-127-T	446	-	500	-	03/07/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-128	COD-128-R	446	-	550	-	20/09/2021 00:00:00	27.7.g	2	2	3	2	2	2	2	2	2	2	89	16	9
COD-128	COD-128-T	446	-	550	-	20/09/2021 00:00:00	27.7.g	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-129	COD-129-R	446	-	570	-	20/09/2021 00:00:00	27.7.g	2	2	2	-	2	2	-	2	2	2	100	0	0
COD-129	COD-129-T	446	-	570	-	20/09/2021 00:00:00	27.7.g	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-13	COD-13-R	446	-	530	-	17/02/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-13	COD-13-T	446	-	530	-	17/02/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	2	3	3	88	12	8
COD-130	COD-130-R	446	-	740	-	01/07/2021 00:00:00	27.7.f	3	3	4	3	3	3	3	3	3	3	89	11	6
COD-130	COD-130-T	446	-	740	-	01/07/2021 00:00:00	27.7.f	3	3	5	3	3	3	3	3	3	3	89	21	12
COD-131	COD-131-R	446	-	630	-	01/07/2021 00:00:00	27.7.f	3	3	3	3	3	3	4	3	-	3	88	11	7
COD-131	COD-131-T	446	-	630	-	01/07/2021 00:00:00	27.7.f	3	3	3	3	3	3	3	3	3	3	100	0	0

COD-132	COD-132-R	446	-	680	-	13/09/2021 00:00:00	27.7.g	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-132	COD-132-T	446	-	680	-	13/09/2021 00:00:00	27.7.g	2	3	4	-	3	3	3	2	3	3	62	22	15
COD-133	COD-133-R	446	-	850	-	13/09/2021 00:00:00	27.7.g	3	3	4	-	3	3	3	3	4	3	75	14	12
COD-133	COD-133-T	446	-	850	-	13/09/2021 00:00:00	27.7.g	3	3	3	4	3	3	3	4	3	3	78	14	11
COD-134	COD-134-R	446	-	900	-	01/09/2021 00:00:00	27.7.g	4	5	4	6	4	4	4	5	5	4	56	16	14
COD-134	COD-134-T	446	-	900	-	01/09/2021 00:00:00	27.7.g	4	5	5	-	4	4	-	5	4	4	57	12	11
COD-135	COD-135-R	446	-	820	-	01/09/2021 00:00:00	27.7.g	4	4	6	6	5	5	4	4	4	4	56	19	16
COD-135	COD-135-T	446	-	820	-	01/09/2021 00:00:00	27.7.g	4	4	4	6	5	5	4	4	5	4	56	16	14
COD-136	COD-136-R	446	-	780	-	20/09/2021 00:00:00	27.7.g	3	3	3	4	3	3	3	3	3	3	89	11	6
COD-136	COD-136-T	446	-	780	-	20/09/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	3	3	3	100	0	0
COD-137	COD-137-R	446	-	840	-	20/09/2021 00:00:00	27.7.g	3	6	7	6	5	4	4	5	5	5	33	24	18
COD-137	COD-137-T	446	-	840	-	20/09/2021 00:00:00	27.7.g	3	6	7	5	5	4	4	5	4	5	33	25	19
COD-138	COD-138-R	446	-	990	-	05/09/2021 00:00:00	27.7.f	4	6	7	9	5	5	5	7	5	5	44	26	21
COD-138	COD-138-T	446	-	990	-	05/09/2021 00:00:00	27.7.f	4	6	7	5	5	4	5	8	4	5	33	27	21
COD-139	COD-139-R	446	-	900	-	13/09/2021 00:00:00	27.7.g	5	5	5	5	5	6	-	4	-	5	71	12	6
COD-139	COD-139-T	446	-	900	-	13/09/2021 00:00:00	27.7.g	5	5	4	-	5	4	5	4	4	5	50	12	11
COD-14	COD-14-R	446	-	580	-	17/02/2021 00:00:00	27.4.b	3	2	3	3	3	3	3	2	4	3	67	21	14
COD-14	COD-14-T	446	-	580	-	17/02/2021 00:00:00	27.4.b	-	3	3	3	3	3	3	2	3	3	88	12	8
COD-140	COD-140-R	446	-	1020	-	13/09/2021 00:00:00	27.7.g	6	6	7	7	6	6	6	6	6	6	78	7	6

COD-140	COD-140-T	446	-	1020	-	13/09/2021 00:00:00	27.7.g	6	6	-	-	6	6	6	5	6	6	86	6	4
COD-141	COD-141-R	446	-	990	-	20/09/2021 00:00:00	27.7.g	5	5	5	-	5	5	5	-	5	5	100	0	0
COD-141	COD-141-T	446	-	990	-	20/09/2021 00:00:00	27.7.g	5	5	5	-	5	6	-	5	5	5	86	7	5
COD-142	COD-142-R	446	-	1030	-	03/07/2021 00:00:00	27.7.h	6	8	7	7	7	6	7	5	7	7	56	13	10
COD-142	COD-142-T	446	-	1030	-	03/07/2021 00:00:00	27.7.h	6	7	11	-	7	5	-	6	7	7	43	27	16
COD-143	COD-143-R	446	-	1060	-	02/09/2021 00:00:00	27.7.f	8	7	8	8	8	8	8	5	8	8	78	13	9
COD-143	COD-143-T	446	-	1060	-	02/09/2021 00:00:00	27.7.f	8	7	7	-	8	8	9	6	8	8	50	12	9
COD-144	COD-144-R	446	-	470	-	13/10/2021 00:00:00	27.7.f	1	1	2	1	1	1	1	1	1	1	89	30	18
COD-144	COD-144-T	446	-	470	-	13/10/2021 00:00:00	27.7.f	1	1	1	-	1	1	1	1	1	1	100	0	0
COD-145	COD-145-R	446	-	500	-	13/10/2021 00:00:00	27.7.f	1	2	2	1	2	1	1	1	2	1	56	36	34
COD-145	COD-145-T	446	-	500	-	13/10/2021 00:00:00	27.7.f	1	2	4	1	2	1	1	2	1	1	56	60	44
COD-146	COD-146-R	446	-	490	-	20/10/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-146	COD-146-T	446	-	490	-	20/10/2021 00:00:00	27.7.e	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-147	COD-147-R	446	-	510	-	20/10/2021 00:00:00	27.7.g	1	2	1	1	1	1	1	1	1	1	89	30	18
COD-147	COD-147-T	446	-	510	-	20/10/2021 00:00:00	27.7.g	1	2	1	-	1	1	1	1	1	1	88	31	19
COD-148	COD-148-R	446	-	540	-	03/10/2021 00:00:00	27.7.g	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-148	COD-148-T	446	-	540	-	03/10/2021 00:00:00	27.7.g	2	2	3	-	2	2	2	2	2	2	88	17	10
COD-149	COD-149-R	446	-	620	-	03/10/2021 00:00:00	27.7.g	2	3	2	2	2	2	2	2	2	2	89	16	9
COD-149	COD-149-T	446	-	620	-	03/10/2021 00:00:00	27.7.g	2	3	5	2	2	2	2	2	2	2	78	41	28

COD-15	COD-15-R	446	-	820	-	17/03/2021 00:00:00	27.4.b	3	4	8	6	5	6	-	5	6	6	38	28	21
COD-15	COD-15-T	446	-	820	-	17/03/2021 00:00:00	27.4.b	3	4	8	-	5	8	3	7	6	6	12	38	32
COD-150	COD-150-R	446	-	640	-	13/10/2021 00:00:00	27.7.f	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-150	COD-150-T	446	-	640	-	13/10/2021 00:00:00	27.7.f	2	3	3	2	2	2	2	2	2	2	78	20	16
COD-151	COD-151-R	446	-	690	-	13/10/2021 00:00:00	27.7.f	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-151	COD-151-T	446	-	690	-	13/10/2021 00:00:00	27.7.f	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-152	COD-152-R	446	-	720	-	05/10/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	3	3	3	100	0	0
COD-152	COD-152-T	446	-	720	-	05/10/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	4	3	3	88	11	7
COD-153	COD-153-R	446	-	820	-	05/10/2021 00:00:00	27.7.g	3	3	3	3	3	3	-	4	3	3	88	11	7
COD-153	COD-153-T	446	-	820	-	05/10/2021 00:00:00	27.7.g	3	3	3	4	3	3	4	4	3	3	67	15	13
COD-154	COD-154-R	446	-	690	-	03/10/2021 00:00:00	27.7.g	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-154	COD-154-T	446	-	690	-	03/10/2021 00:00:00	27.7.g	3	3	3	-	3	3	3	3	3	3	100	0	0
COD-155	COD-155-R	446	-	610	-	03/10/2021 00:00:00	27.7.g	3	3	4	-	3	3	2	3	3	3	75	18	8
COD-155	COD-155-T	446	-	610	-	03/10/2021 00:00:00	27.7.g	3	3	5	-	3	3	3	3	3	3	88	22	13
COD-156	COD-156-R	446	-	900	-	28/10/2021 00:00:00	27.7.g	4	4	7	-	5	4	4	5	4	4	62	23	17
COD-156	COD-156-T	446	-	900	-	28/10/2021 00:00:00	27.7.g	4	4	6	7	5	4	4	6	4	4	56	24	20
COD-157	COD-157-R	446	-	810	-	28/10/2021 00:00:00	27.7.g	4	4	4	4	4	4	4	6	4	4	89	16	9
COD-157	COD-157-T	446	-	810	-	28/10/2021 00:00:00	27.7.g	4	4	-	-	4	4	4	7	4	4	86	26	17
COD-158	COD-158-R	446	-	850	-	28/10/2021 00:00:00	27.7.g	3	4	4	5	4	4	4	5	4	4	67	15	10

COD-158	COD-158-T	446	-	850	-	28/10/2021 00:00:00	27.7.g	3	4	4	4	4	4	-	6	4	4	75	20	11
COD-159	COD-159-R	446	-	920	-	02/11/2021 00:00:00	27.7.h	3	3	3	3	3	3	-	4	3	3	88	11	7
COD-159	COD-159-T	446	-	920	-	02/11/2021 00:00:00	27.7.h	3	3	4	-	3	3	3	6	3	3	75	31	21
COD-16	COD-16-R	446	-	750	-	17/02/2021 00:00:00	27.4.b	4	4	5	-	4	4	4	5	-	4	71	11	10
COD-16	COD-16-T	446	-	750	-	17/02/2021 00:00:00	27.4.b	4	4	4	4	4	4	4	4	4	4	100	0	0
COD-160	COD-160-R	446	-	1020	-	28/10/2021 00:00:00	27.7.g	5	5	5	7	5	5	5	5	5	5	89	13	8
COD-160	COD-160-T	446	-	1020	-	28/10/2021 00:00:00	27.7.g	5	5	-	6	5	5	5	6	5	5	75	9	7
COD-161	COD-161-R	446	-	980	-	18/11/2021 00:00:00	27.7.g	5	5	5	6	5	5	5	6	5	5	78	8	7
COD-161	COD-161-T	446	-	980	-	18/11/2021 00:00:00	27.7.g	4	5	-	-	5	5	5	7	5	5	71	17	10
COD-162	COD-162-R	446	-	900	-	25/11/2021 00:00:00	27.7.e	5	5	6	-	5	5	5	5	5	5	88	7	4
COD-162	COD-162-T	446	-	900	-	25/11/2021 00:00:00	27.7.e	5	5	5	5	5	5	5	5	5	5	100	0	0
COD-163	COD-163-R	446	-	1000	-	01/12/2021 00:00:00	27.7.g	5	5	6	5	6	5	5	7	5	5	67	13	11
COD-163	COD-163-T	446	-	1000	-	01/12/2021 00:00:00	27.7.g	5	5	6	6	6	4	5	7	6	5	33	16	13
COD-164	COD-164-R	446	-	1010	-	18/11/2021 00:00:00	27.7.g	5	7	5	7	6	6	6	5	7	6	33	14	11
COD-164	COD-164-T	446	-	1010	-	18/11/2021 00:00:00	27.7.g	5	7	9	8	6	6	6	9	5	6	33	23	19
COD-165	COD-165-R	446	-	150	-	29/08/2021 00:00:00	27.3.a.20	0	0	-	0	1	0	-	0	0	0	86	-	-
COD-166	COD-166-R	446	-	90	-	29/08/2021 00:00:00	27.3.a.20	0	0	0	0	0	0	0	0	0	0	100	-	-
COD-167	COD-167-R	446	-	100	-	24/08/2021 00:00:00	27.3.a.20	0	0	0	0	0	0	0	0	0	0	100	-	-
COD-168	COD-168-R	446	-	790	-	06/01/2021 00:00:00	27.3.a.20	4	-	-	4	4	4	3	4	4	4	86	10	6

COD-169	COD-169-R	446	-	960	-	06/01/2021 00:00:00	27.3.a.20	5	8	-	7	6	6	5	6	12	6	38	33	23
COD-17	COD-17-R	446	-	570	-	07/03/2021 00:00:00	27.4.b	4	4	4	3	4	4	4	5	4	4	78	12	6
COD-17	COD-17-T	446	-	570	-	07/03/2021 00:00:00	27.4.b	4	4	5	-	4	4	4	3	4	4	75	13	6
COD-170	COD-170-R	446	-	620	-	08/01/2021 00:00:00	27.3.a.20	3	4	3	3	3	3	3	2	5	3	67	26	18
COD-171	COD-171-R	446	-	820	-	11/01/2021 00:00:00	27.3.a.20	5	5	5	5	5	5	5	5	5	5	100	0	0
COD-172	COD-172-R	446	-	920	-	14/01/2021 00:00:00	27.3.a.20	10	11	11	10	12	10	11	8	13	10	33	13	10
COD-173	COD-173-R	446	-	1030	-	15/01/2021 00:00:00	27.3.a.20	11	11	12	11	10	12	11	11	13	11	56	8	6
COD-174	COD-174-R	446	-	500	-	18/01/2021 00:00:00	27.3.a.20	2	2	-	2	3	2	2	2	3	2	75	21	17
COD-175	COD-175-R	446	-	150	-	21/01/2021 00:00:00	27.3.a.20	5	6	6	6	6	7	6	6	-	6	75	9	4
COD-176	COD-176-R	446	-	910	-	21/01/2021 00:00:00	27.3.a.20	5	6	-	8	7	7	-	5	6	5	29	18	14
COD-177	COD-177-R	446	-	570	-	21/01/2021 00:00:00	27.3.a.20	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-178	COD-178-R	446	-	470	-	21/01/2021 00:00:00	27.3.a.20	2	2	3	2	3	3	2	2	3	2	56	22	20
COD-179	COD-179-R	446	-	970	-	28/01/2021 00:00:00	27.3.a.20	7	8	11	8	8	9	6	6	10	8	33	21	16
COD-18	COD-18-R	446	-	740	-	17/03/2021 00:00:00	27.4.b	4	4	5	4	4	4	4	4	5	4	78	10	8
COD-18	COD-18-T	446	-	740	-	17/03/2021 00:00:00	27.4.b	4	4	4	4	4	4	4	4	4	4	100	0	0
COD-180	COD-180-R	446	-	1050	-	04/02/2021 00:00:00	27.3.a.20	7	8	8	8	7	8	7	8	8	8	67	7	6
COD-181	COD-181-R	446	-	800	-	24/02/2021 00:00:00	27.3.a.20	4	4	4	5	5	5	5	4	5	5	56	12	11
COD-182	COD-182-R	446	-	530	-	06/05/2021 00:00:00	27.3.a.20	2	3	4	3	3	2	2	2	3	3	44	27	22
COD-183	COD-183-R	446	-	1070	-	08/03/2021 00:00:00	27.3.a.20	10	10	10	12	11	13	12	8	13	10	33	15	12

COD-184	COD-184-R	446	-	940	-	10/03/2021 00:00:00	27.3.a.20	7	8	-	8	8	10	7	-	11	8	43	18	14
COD-185	COD-185-R	446	-	920	-	10/03/2021 00:00:00	27.3.a.20	4	6	8	8	8	8	6	7	7	8	44	20	15
COD-186	COD-186-R	446	-	960	-	10/03/2021 00:00:00	27.3.a.20	4	-	11	7	8	6	6	6	7	6	38	30	20
COD-187	COD-187-R	446	-	990	-	25/03/2021 00:00:00	27.3.a.20	9	8	10	9	9	10	9	7	10	9	44	11	7
COD-188	COD-188-R	446	-	1090	-	25/03/2021 00:00:00	27.3.a.20	8	7	9	9	7	12	-	8	11	8	25	20	15
COD-189	COD-189-R	446	-	1030	-	25/03/2021 00:00:00	27.3.a.20	-	10	12	10	8	10	-	6	13	10	43	24	17
COD-19	COD-19-R	446	-	880	-	17/03/2021 00:00:00	27.4.b	5	6	8	8	5	8	-	4	8	5	25	26	23
COD-19	COD-19-T	446	-	880	-	17/03/2021 00:00:00	27.4.b	5	5	-	-	5	5	5	5	5	5	100	0	0
COD-190	COD-190-R	446	-	890	-	24/03/2021 00:00:00	27.3.a.20	4	5	6	6	6	5	5	4	5	5	44	15	12
COD-191	COD-191-R	446	-	630	-	01/04/2021 00:00:00	27.3.a.20	2	4	-	3	3	3	3	2	3	3	62	22	15
COD-192	COD-192-R	446	-	750	-	05/04/2021 00:00:00	27.3.a.20	3	5	5	5	5	4	4	3	5	5	56	20	17
COD-193	COD-193-R	446	-	760	-	05/04/2021 00:00:00	27.3.a.20	5	5	6	5	5	6	5	5	5	5	78	8	7
COD-194	COD-194-R	446	-	940	-	05/04/2021 00:00:00	27.3.a.20	-	-	-	6	6	7	6	7	9	6	50	17	12
COD-195	COD-195-R	446	-	930	-	07/04/2021 00:00:00	27.3.a.20	7	7	8	8	8	8	7	7	8	8	56	7	7
COD-196	COD-196-R	446	-	610	-	07/04/2021 00:00:00	27.3.a.20	3	3	4	3	3	3	3	2	3	3	78	17	7
COD-197	COD-197-R	446	-	890	-	07/04/2021 00:00:00	27.3.a.20	8	8	-	0	9	9	-	6	8	8	43	46	32
COD-198	COD-198-R	446	-	1020	-	08/04/2021 00:00:00	27.3.a.20	7	-	-	6	8	8	7	6	12	7	29	27	18
COD-199	COD-199-R	446	-	510	-	08/04/2021 00:00:00	27.3.a.20	2	2	4	2	2	2	2	2	2	2	89	30	18
COD-20	COD-20-R	446	-	850	-	09/03/2021 00:00:00	27.4.b	5	7	6	7	6	7	5	5	6	6	33	14	11

COD-20	COD-20-T	446	-	850	-	09/03/2021 00:00:00	27.4.b	5	7	7	-	6	6	5	6	6	6	50	13	8
COD-200	COD-200-R	446	-	930	-	14/04/2021 00:00:00	27.3.a.20	9	10	12	11	7	9	-	8	12	9	25	19	15
COD-201	COD-201-R	446	-	870	-	14/04/2021 00:00:00	27.3.a.20	7	7	-	7	7	9	-	6	7	7	71	13	7
COD-202	COD-202-R	446	-	1170	-	19/04/2021 00:00:00	27.3.a.20	9	10	9	11	8	11	-	7	9	9	38	15	11
COD-203	COD-203-R	446	-	770	-	19/04/2021 00:00:00	27.3.a.20	4	4	-	5	5	5	4	4	4	4	62	12	11
COD-204	COD-204-R	446	-	750	-	26/04/2021 00:00:00	27.3.a.20	4	4	10	4	4	4	4	-	3	4	75	48	29
COD-205	COD-205-R	446	-	760	-	30/04/2021 00:00:00	27.3.a.20	5	5	6	5	5	5	5	5	5	5	89	7	4
COD-206	COD-206-R	446	-	1040	-	10/06/2021 00:00:00	27.3.a.20	7	8	8	7	7	7	7	6	10	7	56	15	11
COD-207	COD-207-R	446	-	1110	-	22/06/2021 00:00:00	27.3.a.20	8	9	8	9	8	8	7	6	8	8	56	12	8
COD-208	COD-208-R	446	-	1140	-	22/06/2021 00:00:00	27.3.a.20	8	8	-	8	8	8	-	6	8	8	86	10	6
COD-209	COD-209-R	446	-	1090	-	01/07/2021 00:00:00	27.3.a.20	8	11	9	11	10	10	-	8	0	11	25	43	27
COD-21	COD-21-R	446	-	760	-	09/03/2021 00:00:00	27.4.b	5	6	6	6	6	6	5	5	6	5	33	9	8
COD-21	COD-21-T	446	-	760	-	09/03/2021 00:00:00	27.4.b	5	5	5	5	5	5	5	5	5	5	100	0	0
COD-210	COD-210-R	446	-	980	-	01/07/2021 00:00:00	27.3.a.20	6	6	-	7	6	6	-	-	6	6	83	7	5
COD-211	COD-211-R	446	-	510	-	30/06/2021 00:00:00	27.3.a.20	1	2	2	1	3	2	2	2	2	2	67	32	21
COD-212	COD-212-R	446	-	890	-	30/06/2021 00:00:00	27.3.a.20	-	6	7	6	5	5	5	5	5	5	62	14	11
COD-213	COD-213-R	446	-	830	-	08/07/2021 00:00:00	27.3.a.20	6	7	7	8	7	7	7	5	8	7	56	13	9
COD-214	COD-214-R	446	-	880	-	01/07/2021 00:00:00	27.3.a.20	6	7	7	7	7	7	7	6	7	7	78	7	5
COD-215	COD-215-R	446	-	1040	-	01/07/2021 00:00:00	27.3.a.20	-	-	-	1	4	2	2	-	0	2	40	82	58

COD-216	COD-216-R	446	-	960	-	07/07/2021 00:00:00	27.3.a.20	-	9	-	2	4	2	2	-	5	2	50	69	50
COD-217	COD-217-R	446	-	550	-	07/07/2021 00:00:00	27.3.a.20	6	6	5	6	6	7	6	6	6	6	78	8	4
COD-218	COD-218-R	446	-	480	-	07/07/2021 00:00:00	27.3.a.20	4	5	5	5	5	5	5	4	5	5	78	9	7
COD-219	COD-219-R	446	-	960	-	08/07/2021 00:00:00	27.3.a.20	6	7	5	7	7	7	7	6	5	7	56	14	12
COD-22	COD-22-R	446	-	370	-	19/05/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	2	1	78	36	28
COD-22	COD-22-T	446	-	370	-	19/05/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	1	1	88	31	19
COD-220	COD-220-R	446	-	930	-	21/07/2021 00:00:00	27.3.a.20	8	8	9	9	8	9	8	7	8	8	56	8	6
COD-221	COD-221-R	446	-	440	-	21/07/2021 00:00:00	27.3.a.20	1	-	1	1	2	2	2	1	2	1	50	36	33
COD-222	COD-222-R	446	-	740	-	22/07/2021 00:00:00	27.3.a.20	5	6	7	6	7	7	-	5	8	7	38	17	14
COD-223	COD-223-R	446	-	480	-	05/08/2021 00:00:00	27.3.a.20	1	2	2	2	3	2	2	2	2	2	78	25	11
COD-224	COD-224-R	446	-	850	-	05/08/2021 00:00:00	27.3.a.20	-	-	-	4	6	4	-	-	5	4	50	20	16
COD-225	COD-225-R	446	-	520	-	05/08/2021 00:00:00	27.3.a.20	2	2	2	2	3	2	2	2	2	2	89	16	9
COD-226	COD-226-R	446	-	1180	-	10/08/2021 00:00:00	27.3.a.20	8	10	10	10	10	10	8	8	10	10	67	11	10
COD-227	COD-227-R	446	-	700	-	10/08/2021 00:00:00	27.3.a.20	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-228	COD-228-R	446	-	750	-	16/08/2021 00:00:00	27.3.a.20	4	4	4	4	4	4	-	4	4	4	100	0	0
COD-229	COD-229-R	446	-	860	-	31/08/2021 00:00:00	27.3.a.20	4	5	5	5	5	5	5	4	5	5	78	9	7
COD-23	COD-23-R	446	-	370	-	15/06/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	2	1	75	37	30
COD-23	COD-23-T	446	-	370	-	15/06/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	1	1	88	31	19
COD-230	COD-230-R	446	-	960	-	06/09/2021 00:00:00	27.3.a.20	7	8	9	7	9	8	-	6	7	7	38	14	11

COD-231	COD-231-R	446	-	520	-	01/10/2021 00:00:00	27.3.a.20	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-232	COD-232-R	446	-	730	-	01/11/2021 00:00:00	27.3.a.20	5	5	5	5	5	5	5	5	5	5	100	0	0
COD-233	COD-233-R	446	-	800	-	03/11/2021 00:00:00	27.3.a.20	6	5	-	5	5	5	5	-	5	5	86	7	5
COD-234	COD-234-R	446	-	690	-	22/11/2021 00:00:00	27.3.a.20	2	3	4	3	3	3	3	3	4	3	67	19	13
COD-235	COD-235-R	446	-	830	-	25/11/2021 00:00:00	27.3.a.20	4	6	-	5	6	6	-	-	5	6	50	15	12
COD-236	COD-236-R	446	-	750	-	29/11/2021 00:00:00	27.3.a.20	4	4	4	4	4	4	4	4	4	4	100	0	0
COD-237	COD-237-R	446	-	810	-	02/12/2021 00:00:00	27.3.a.20	7	7	7	7	7	7	7	7	7	7	100	0	0
COD-238	COD-238-R	446	-	640	-	02/12/2021 00:00:00	27.3.a.20	2	4	4	3	4	3	4	2	3	4	44	26	21
COD-239	COD-239-R	446	-	530	-	02/12/2021 00:00:00	27.3.a.20	-	2	-	2	2	2	2	2	2	2	100	0	0
COD-24	COD-24-R	446	-	350	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	2	1	78	36	28
COD-24	COD-24-T	446	-	350	-	08/06/2021 00:00:00	27.4.b	1	1	1	-	1	1	1	1	1	1	100	0	0
COD-240	COD-240-R	446	-	370	-	06/12/2021 00:00:00	27.3.a.20	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-241	COD-241-R	446	-	850	-	06/10/2021 00:00:00	27.3.a.20	4	5	5	5	5	5	5	4	4	5	67	11	10
COD-242	COD-242-R	446	-	720	-	13/10/2021 00:00:00	27.3.a.20	3	3	-	2	3	3	3	3	4	3	75	18	8
COD-243	COD-243-R	446	-	370	-	22/12/2021 00:00:00	27.3.a.20	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-244	COD-244-R	446	-	980	-	29/12/2021 00:00:00	27.3.a.20	6	7	9	7	7	7	6	7	6	7	56	13	9
COD-245	COD-245-R	446	-	950	-	29/12/2021 00:00:00	27.3.a.20	8	7	8	7	7	8	7	6	7	7	56	9	7
COD-246	COD-246-R	446	-	900	-	29/12/2021 00:00:00	27.3.a.20	6	9	10	8	7	8	-	5	7	8	25	21	17
COD-247	COD-247-R	446	-	960	-	30/12/2021 00:00:00	27.3.a.20	5	8	-	6	6	5	6	7	6	6	50	16	11

COD-248	COD-248-R	446	-	150	-	04/10/2021 00:00:00	27.3.a.20	0	2	0	0	1	0	1	0	0	0	67	-	-
COD-249	COD-249-R	446	-	260	-	04/10/2021 00:00:00	27.3.a.20	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-25	COD-25-R	446	-	380	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	1	1	89	30	18
COD-25	COD-25-T	446	-	380	-	08/06/2021 00:00:00	27.4.b	1	1	2	-	1	1	1	1	1	1	88	31	19
COD-26	COD-26-R	446	-	390	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	1	1	89	30	18
COD-26	COD-26-T	446	-	390	-	08/06/2021 00:00:00	27.4.b	1	1	2	1	1	1	1	1	2	1	78	36	28
COD-27	COD-27-R	446	-	410	-	08/06/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	2	75	21	17
COD-27	COD-27-T	446	-	410	-	08/06/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-28	COD-28-R	446	-	350	-	14/06/2021 00:00:00	27.4.b	1	1	2	2	1	1	1	1	1	1	78	36	28
COD-28	COD-28-T	446	-	350	-	14/06/2021 00:00:00	27.4.b	1	1	1	-	1	2	1	1	1	1	88	31	19
COD-29	COD-29-R	446	-	400	-	27/04/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-29	COD-29-T	446	-	400	-	27/04/2021 00:00:00	27.4.b	2	2	3	-	2	2	-	2	2	2	86	18	11
COD-30	COD-30-R	446	-	380	-	27/04/2021 00:00:00	27.4.b	2	2	3	2	2	3	2	1	3	2	56	30	23
COD-30	COD-30-T	446	-	380	-	27/04/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	89	18	10
COD-31	COD-31-R	446	-	540	-	21/04/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-31	COD-31-T	446	-	540	-	21/04/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	2	75	21	17
COD-32	COD-32-R	446	-	640	-	21/04/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-32	COD-32-T	446	-	640	-	21/04/2021 00:00:00	27.4.b	2	2	3	-	2	2	2	2	3	2	75	21	17
COD-33	COD-33-R	446	-	530	-	18/05/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	3	2	78	20	16

COD-33	COD-33-T	446	-	530	-	18/05/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-34	COD-34-R	446	-	430	-	18/05/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	1	3	2	67	28	19
COD-34	COD-34-T	446	-	430	-	18/05/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	3	2	78	25	11
COD-35	COD-35-R	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	1	3	2	67	28	19
COD-35	COD-35-T	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	89	18	10
COD-36	COD-36-R	446	-	600	-	19/05/2021 00:00:00	27.4.b	3	3	5	4	3	3	3	3	4	3	67	21	17
COD-36	COD-36-T	446	-	600	-	19/05/2021 00:00:00	27.4.b	3	3	4	-	3	3	3	3	3	3	88	11	7
COD-37	COD-37-R	446	-	590	-	19/05/2021 00:00:00	27.4.b	5	3	4	3	3	4	-	2	4	3	38	26	21
COD-37	COD-37-T	446	-	590	-	19/05/2021 00:00:00	27.4.b	5	3	4	3	4	3	-	3	3	3	62	22	18
COD-38	COD-38-R	446	-	530	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	4	3	78	17	7
COD-38	COD-38-T	446	-	530	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-39	COD-39-R	446	-	490	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-39	COD-39-T	446	-	490	-	19/05/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-40	COD-40-R	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	3	-	2	3	2	2	3	2	62	22	20
COD-40	COD-40-T	446	-	460	-	18/05/2021 00:00:00	27.4.b	2	2	2	2	2	3	2	2	2	2	89	16	9
COD-41	COD-41-R	446	-	400	-	18/05/2021 00:00:00	27.4.b	2	3	4	2	3	3	3	2	4	3	44	27	21
COD-41	COD-41-T	446	-	400	-	18/05/2021 00:00:00	27.4.b	3	3	4	-	3	3	3	2	3	3	75	18	8
COD-42	COD-42-R	446	-	590	-	15/06/2021 00:00:00	27.4.b	3	3	4	3	3	3	3	2	4	3	67	19	13
COD-42	COD-42-T	446	-	590	-	15/06/2021 00:00:00	27.4.b	3	3	4	-	3	3	3	2	4	3	62	21	14

COD-43	COD-43-R	446	-	450	-	07/06/2021 00:00:00	27.4.b	4	4	5	4	4	4	3	3	5	4	56	18	11
COD-43	COD-43-T	446	-	450	-	07/06/2021 00:00:00	27.4.b	4	4	4	-	4	4	3	3	3	4	62	14	13
COD-44	COD-44-R	446	-	710	-	24/06/2021 00:00:00	27.4.b	4	4	5	4	4	5	4	4	5	4	67	12	10
COD-44	COD-44-T	446	-	710	-	24/06/2021 00:00:00	27.4.b	4	4	5	5	4	4	4	4	5	4	67	12	10
COD-45	COD-45-R	446	-	380	-	08/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-45	COD-45-T	446	-	380	-	08/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-46	COD-46-R	446	-	350	-	09/08/2021 00:00:00	27.4.b	1	1	1	1	2	1	1	1	1	1	89	30	18
COD-46	COD-46-T	446	-	350	-	09/08/2021 00:00:00	27.4.b	1	1	-	1	1	1	1	1	1	1	100	0	0
COD-47	COD-47-R	446	-	360	-	09/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-47	COD-47-T	446	-	360	-	09/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-48	COD-48-R	446	-	360	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-48	COD-48-T	446	-	360	-	24/08/2021 00:00:00	27.4.b	1	1	1	-	1	1	1	1	1	1	100	0	0
COD-49	COD-49-R	446	-	370	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	-	1	1	1	100	0	0
COD-49	COD-49-T	446	-	370	-	24/08/2021 00:00:00	27.4.b	1	1	1	-	1	1	1	1	1	1	100	0	0
COD-50	COD-50-R	446	-	400	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-50	COD-50-T	446	-	400	-	24/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-51	COD-51-R	446	-	410	-	23/08/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	2	1	89	30	18
COD-51	COD-51-T	446	-	410	-	23/08/2021 00:00:00	27.4.b	1	2	1	1	1	1	1	1	1	1	89	30	18
COD-52	COD-52-R	446	-	380	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	89	18	10

COD-52	COD-52-T	446	-	380	-	08/08/2021 00:00:00	27.4.b	2	2	2	1	2	2	2	1	2	2	78	25	19
COD-53	COD-53-R	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-53	COD-53-T	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	2	2	0	2	2	2	2	2	2	89	38	22
COD-54	COD-54-R	446	-	390	-	08/08/2021 00:00:00	27.4.b	2	2	3	2	2	2	2	2	2	2	89	16	9
COD-54	COD-54-T	446	-	390	-	08/08/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-55	COD-55-R	446	-	410	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	89	18	10
COD-55	COD-55-T	446	-	410	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	1	2	2	89	18	10
COD-56	COD-56-R	446	-	430	-	08/08/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	1	2	2	88	19	12
COD-56	COD-56-T	446	-	430	-	08/08/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	3	2	2	88	17	10
COD-57	COD-57-R	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-57	COD-57-T	446	-	450	-	08/08/2021 00:00:00	27.4.b	2	3	3	2	2	2	2	2	2	2	78	20	16
COD-58	COD-58-R	446	-	490	-	08/08/2021 00:00:00	27.4.b	2	2	2	2	2	2	-	2	2	2	100	0	0
COD-58	COD-58-T	446	-	490	-	08/08/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-59	COD-59-R	446	-	430	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-59	COD-59-T	446	-	430	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-60	COD-60-R	446	-	520	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-60	COD-60-T	446	-	520	-	11/08/2021 00:00:00	27.4.b	3	3	3	3	3	4	3	3	4	3	78	14	11
COD-61	COD-61-R	446	-	500	-	09/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-61	COD-61-T	446	-	500	-	09/08/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	2	3	3	88	12	8

COD-62	COD-62-R	446	-	510	-	09/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	2	3	89	12	7
COD-62	COD-62-T	446	-	510	-	09/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-63	COD-63-R	446	-	640	-	23/08/2021 00:00:00	27.4.b	2	3	3	2	2	2	2	2	2	2	78	20	16
COD-63	COD-63-T	446	-	640	-	23/08/2021 00:00:00	27.4.b	2	3	3	-	2	2	2	2	2	2	75	21	17
COD-64	COD-64-R	446	-	530	-	23/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-64	COD-64-T	446	-	530	-	23/08/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-65	COD-65-R	446	-	470	-	23/08/2021 00:00:00	27.4.b	3	3	5	2	3	3	3	2	3	3	67	29	15
COD-65	COD-65-T	446	-	470	-	23/08/2021 00:00:00	27.4.b	3	3	2	-	3	3	3	2	3	3	75	17	14
COD-66	COD-66-R	446	-	520	-	14/09/2021 00:00:00	27.4.b	3	4	4	-	3	4	3	3	4	3	50	15	14
COD-66	COD-66-T	446	-	520	-	14/09/2021 00:00:00	27.4.b	3	4	4	-	3	3	3	3	3	3	75	14	12
COD-67	COD-67-R	446	-	750	-	15/09/2021 00:00:00	27.4.b	4	5	5	5	4	4	4	4	4	4	67	12	10
COD-67	COD-67-T	446	-	750	-	15/09/2021 00:00:00	27.4.b	4	4	5	5	4	4	4	4	4	4	78	10	8
COD-68	COD-68-R	446	-	380	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-68	COD-68-T	446	-	380	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-69	COD-69-R	446	-	330	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	-	1	1	1	100	0	0
COD-69	COD-69-T	446	-	330	-	11/10/2021 00:00:00	27.4.b	0	1	1	-	1	1	1	1	1	1	88	40	25
COD-70	COD-70-R	446	-	410	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	2	1	1	1	1	1	89	30	18
COD-70	COD-70-T	446	-	410	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	2	0	1	1	1	1	78	50	22
COD-71	COD-71-R	446	-	430	-	12/10/2021 00:00:00	27.4.b	1	2	2	1	2	2	1	2	2	2	67	30	27

COD-71	COD-71-T	446	-	430	-	12/10/2021 00:00:00	27.4.b	1	2	1	-	2	1	1	1	2	2	38	38	34
COD-72	COD-72-R	446	-	450	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-72	COD-72-T	446	-	450	-	12/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-73	COD-73-R	446	-	410	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	-	1	1	1	1	1	100	0	0
COD-73	COD-73-T	446	-	410	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-74	COD-74-R	446	-	370	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-74	COD-74-T	446	-	370	-	11/10/2021 00:00:00	27.4.b	1	1	1	1	1	1	1	1	1	1	100	0	0
COD-75	COD-75-R	446	-	480	-	11/10/2021 00:00:00	27.4.b	2	3	3	2	2	2	2	2	2	2	78	20	16
COD-75	COD-75-T	446	-	480	-	11/10/2021 00:00:00	27.4.b	2	3	2	2	2	2	2	2	2	2	89	16	9
COD-76	COD-76-R	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-76	COD-76-T	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-77	COD-77-R	446	-	510	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	1	2	2	2	88	19	12
COD-77	COD-77-T	446	-	510	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-78	COD-78-R	446	-	550	-	11/10/2021 00:00:00	27.4.b	2	3	2	2	2	2	2	2	2	2	89	16	9
COD-78	COD-78-T	446	-	550	-	11/10/2021 00:00:00	27.4.b	2	3	3	-	2	2	2	2	2	2	75	21	17
COD-79	COD-79-R	446	-	440	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-79	COD-79-T	446	-	440	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-80	COD-80-R	446	-	470	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-80	COD-80-T	446	-	470	-	11/10/2021 00:00:00	27.4.b	2	2	2	-	2	2	2	2	2	2	100	0	0

COD-81	COD-81-R	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-81	COD-81-T	446	-	390	-	11/10/2021 00:00:00	27.4.b	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-82	COD-82-R	446	-	480	-	11/10/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	2	3	3	89	12	7
COD-82	COD-82-T	446	-	480	-	11/10/2021 00:00:00	27.4.b	3	3	2	-	3	3	3	2	3	3	75	17	14
COD-83	COD-83-R	446	-	680	-	09/12/2021 00:00:00	27.4.b	3	3	3	-	3	3	3	4	3	3	88	11	7
COD-83	COD-83-T	446	-	680	-	09/12/2021 00:00:00	27.4.b	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-84	COD-84-R	446	-	500	-	11/10/2021 00:00:00	27.4.b	2	2	3	2	4	3	3	2	3	2	44	27	22
COD-84	COD-84-T	446	-	500	-	11/10/2021 00:00:00	27.4.b	2	2	6	2	4	4	3	2	2	2	56	47	37
COD-85	COD-85-R	446	-	460	-	11/10/2021 00:00:00	27.4.b	3	3	3	3	3	3	2	2	3	3	78	16	12
COD-85	COD-85-T	446	-	460	-	11/10/2021 00:00:00	27.4.b	3	3	2	-	3	2	2	2	3	3	50	21	20
COD-86	COD-86-R	446	-	400	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	3	2	89	16	9
COD-86	COD-86-T	446	-	400	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-87	COD-87-R	446	-	460	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	3	2	2	2	3	2	78	20	16
COD-87	COD-87-T	446	-	460	-	12/01/2021 00:00:00	27.7.h	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-88	COD-88-R	446	-	530	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	3	2	89	16	9
COD-88	COD-88-T	446	-	530	-	12/01/2021 00:00:00	27.7.h	2	2	2	2	2	2	2	2	2	2	100	0	0
COD-89	COD-89-R	446	-	490	-	12/01/2021 00:00:00	27.7.h	2	2	3	2	2	2	2	2	3	2	78	20	16
COD-89	COD-89-T	446	-	490	-	12/01/2021 00:00:00	27.7.h	2	2	2	-	2	2	2	2	2	2	100	0	0
COD-90	COD-90-R	446	-	660	-	05/02/2021 00:00:00	27.7.f	3	3	-	3	3	3	3	3	3	3	100	0	0

COD-90	COD-90-T	446	-	660	-	05/02/2021 00:00:00	27.7.f	3	3	3	3	3	3	3	3	3	3	100	0	0
COD-91	COD-91-R	446	-	650	-	05/02/2021 00:00:00	27.7.f	3	4	4	3	3	4	3	3	4	3	56	15	14
COD-91	COD-91-T	446	-	650	-	05/02/2021 00:00:00	27.7.f	3	4	3	-	3	3	3	3	3	3	88	11	7
COD-92	COD-92-R	446	-	720	-	05/02/2021 00:00:00	27.7.f	3	3	4	3	3	3	-	3	3	3	88	11	7
COD-92	COD-92-T	446	-	720	-	05/02/2021 00:00:00	27.7.f	3	3	4	3	3	3	3	3	3	3	89	11	6
COD-93	COD-93-R	446	-	770	-	08/02/2021 00:00:00	27.7.f	3	3	4	3	3	3	3	3	4	3	78	14	11
COD-93	COD-93-T	446	-	770	-	08/02/2021 00:00:00	27.7.f	3	3	3	-	3	3	3	3	3	3	100	0	0
COD-94	COD-94-R	446	-	710	-	08/02/2021 00:00:00	27.7.f	3	3	4	4	4	4	3	3	4	3	44	15	14
COD-94	COD-94-T	446	-	710	-	08/02/2021 00:00:00	27.7.f	3	3	4	3	4	4	3	3	3	3	67	15	13
COD-95	COD-95-R	446	-	810	-	08/02/2021 00:00:00	27.7.f	3	4	3	4	4	3	3	4	4	3	44	15	14
COD-95	COD-95-T	446	-	810	-	08/02/2021 00:00:00	27.7.f	3	3	-	5	4	3	3	4	3	3	62	22	18
COD-96	COD-96-R	446	-	770	-	04/03/2021 00:00:00	27.7.e	3	3	4	4	3	3	4	4	4	3	44	15	14
COD-96	COD-96-T	446	-	770	-	04/03/2021 00:00:00	27.7.e	3	3	-	-	3	3	3	3	3	3	100	0	0
COD-97	COD-97-R	446	-	800	-	04/03/2021 00:00:00	27.7.e	3	-	-	-	4	3	-	4	6	4	40	31	20
COD-97	COD-97-T	446	-	800	-	04/03/2021 00:00:00	27.7.e	3	4	3	4	4	3	3	4	4	4	56	15	14
COD-98	COD-98-R	446	-	850	-	04/03/2021 00:00:00	27.7.e	4	5	6	6	4	4	4	4	5	4	56	19	16
COD-98	COD-98-T	446	-	850	-	04/03/2021 00:00:00	27.7.e	4	5	6	-	4	5	4	4	4	4	62	17	14
COD-99	COD-99-R	446	-	890	-	04/03/2021 00:00:00	27.7.e	6	6	8	-	6	6	6	6	6	6	88	11	7
COD-99	COD-99-T	446	-	890	-	04/03/2021 00:00:00	27.7.e	6	6	7	6	6	6	6	6	7	6	78	7	6

List of multimodal cases

Table X: List of cases for which multiple modes where obtained when all readers are considered. The column NModes_trad shows the number of multiple modes for each FishID or SampleID when all readers are given the same expertiSR weight.

NModes_trad	SampleID
2	COD-172-R
3	COD-176-R
2	COD-182-R
3	COD-188-R
3	COD-198-R
2	COD-200-R
3	COD-209-R
2	COD-221-R
2	**COD-246-R**

Number of age readings by modal age

Table X: Number of age readings table gives an overview of number of readings per reader and modal age. The total numbers of readings by modal age and by reader are also presented.

Number of age readings by age

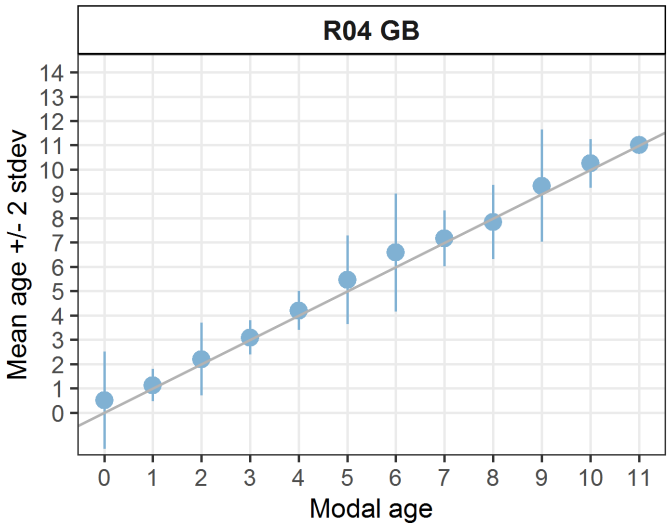
Modal age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	total
0	4	4	3	4	4	4	3	4	4	34
1	57	56	56	44	56	57	55	57	57	495
2	104	106	103	76	107	107	104	105	107	919
3	97	98	93	66	98	98	93	98	97	838
4	38	36	34	29	39	39	33	37	37	322
5	38	39	34	33	39	39	34	37	38	331
6	25	24	19	17	26	26	18	22	25	202
7	13	12	11	12	13	13	9	13	13	109
8	19	19	16	16	19	19	14	18	19	159
9	3	3	3	3	3	3	1	3	3	25
10	3	4	4	4	4	4	3	4	4	34
11	2	2	2	2	2	2	1	2	2	17
Total	**403**	**403**	**378**	**306**	**410**	**411**	**368**	**400**	**406**	**3485**

Table X: Age composition by reader gives a summary of number of readings per reader and age. The total numbers of readings by age and by reader are also presented.

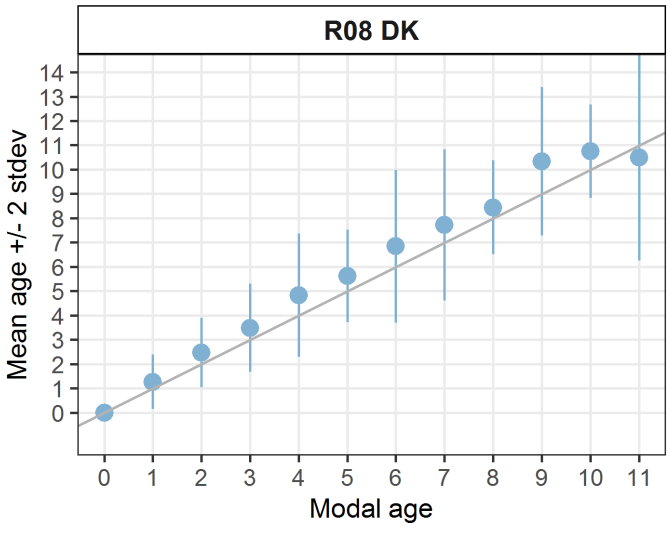
Age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK	total
0	5	3	3	6	2	5	2	4	6	36
1	60	49	44	48	52	55	58	69	49	484
2	108	101	76	73	101	99	106	138	78	880
3	97	99	92	57	99	97	92	53	107	793
4	44	43	48	25	44	47	34	39	52	376
5	40	33	41	26	45	34	32	34	45	330
6	18	20	19	22	24	26	19	31	23	202
7	9	21	17	18	16	13	12	19	12	137
8	16	20	17	18	19	18	8	11	15	142
9	3	6	9	5	3	7	2	1	6	42
10	2	5	5	3	3	6	0	0	4	28
11	1	3	4	4	1	1	2	1	2	19
12	0	0	3	1	1	2	1	0	3	11
13	0	0	0	0	0	1	0	0	4	5
Total	**403**	**403**	**378**	**306**	**410**	**411**	**368**	**400**	**406**	**3485**

SRparate age bias plots by reader

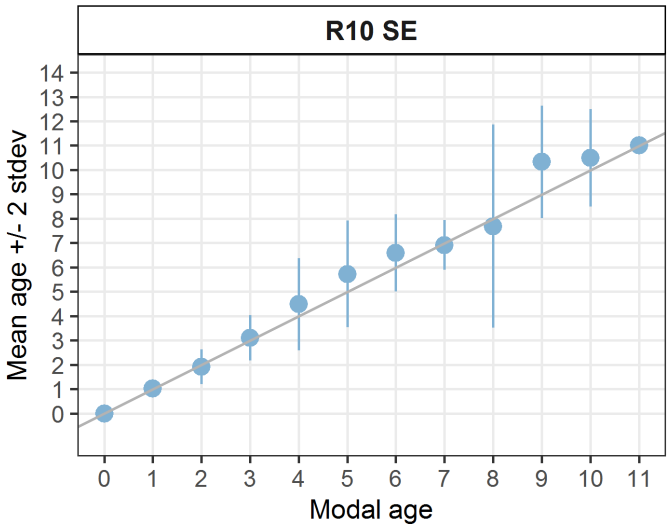
[[1]] [[2]]



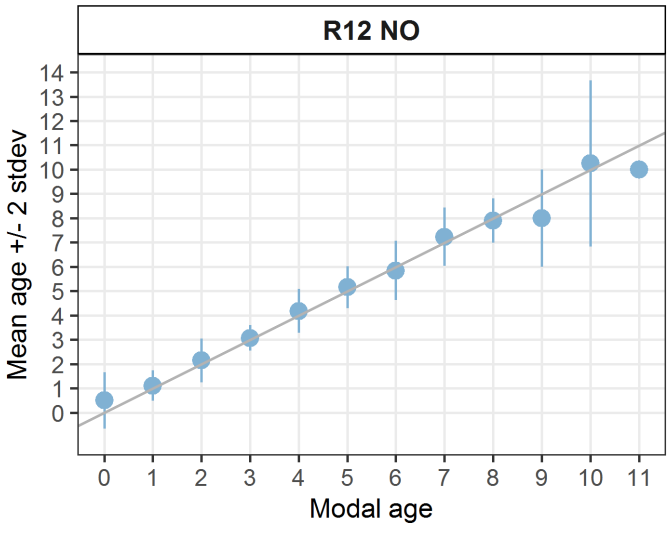
[[3]]


R08 DK
Mean age +/- 2 stdev
Modal age

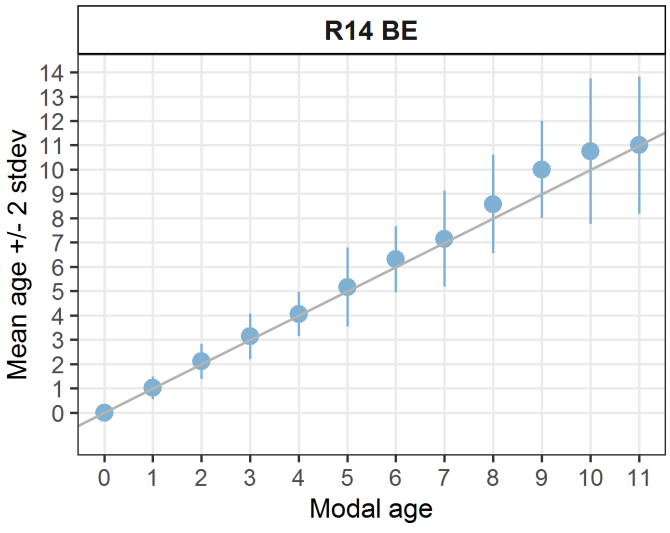
[[4]]


R10 SE
Mean age +/- 2 stdev
Modal age

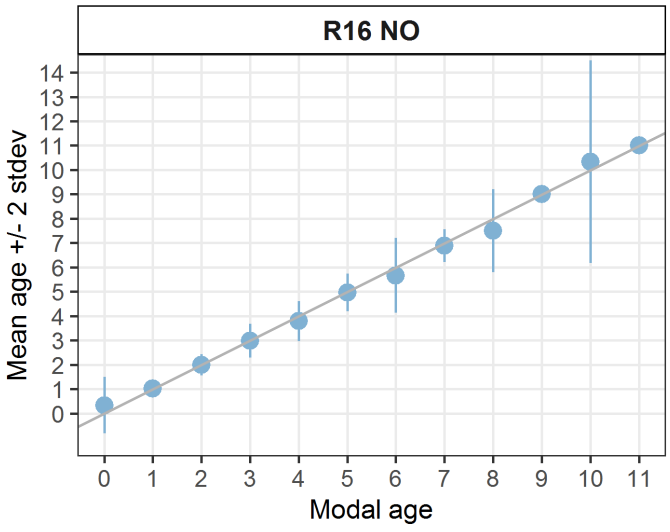
[[5]]


R12 NO
Mean age +/- 2 stdev
Modal age

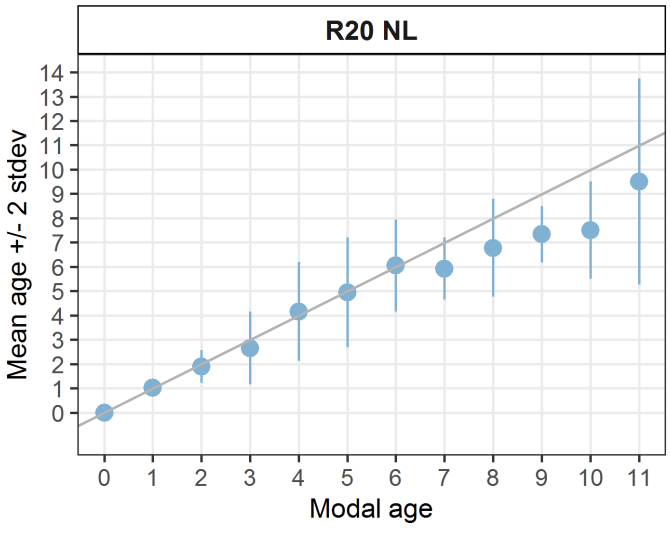
[[6]]


R14 BE
Mean age +/- 2 stdev
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Modal age
0 1 2 3 4 5 6 7 8 9 10 11

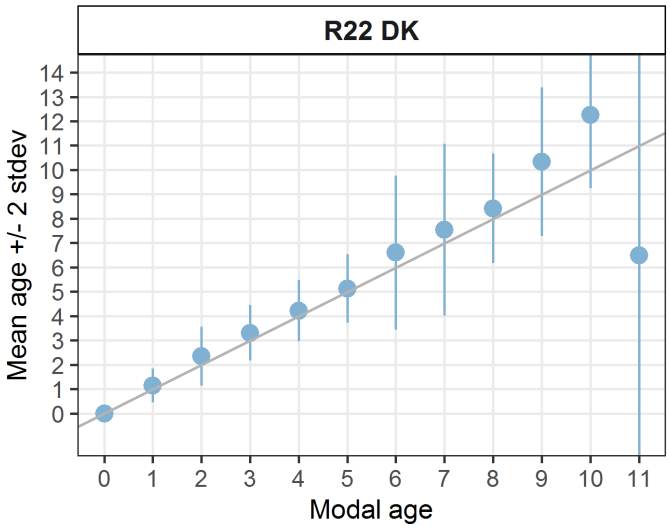
[[7]]


R16 NO
Mean age +/- 2 stdev
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Modal age
0 1 2 3 4 5 6 7 8 9 10 11

[[8]]



[[9]]



Statistics by modal age plot (STDEV, CV and PA)

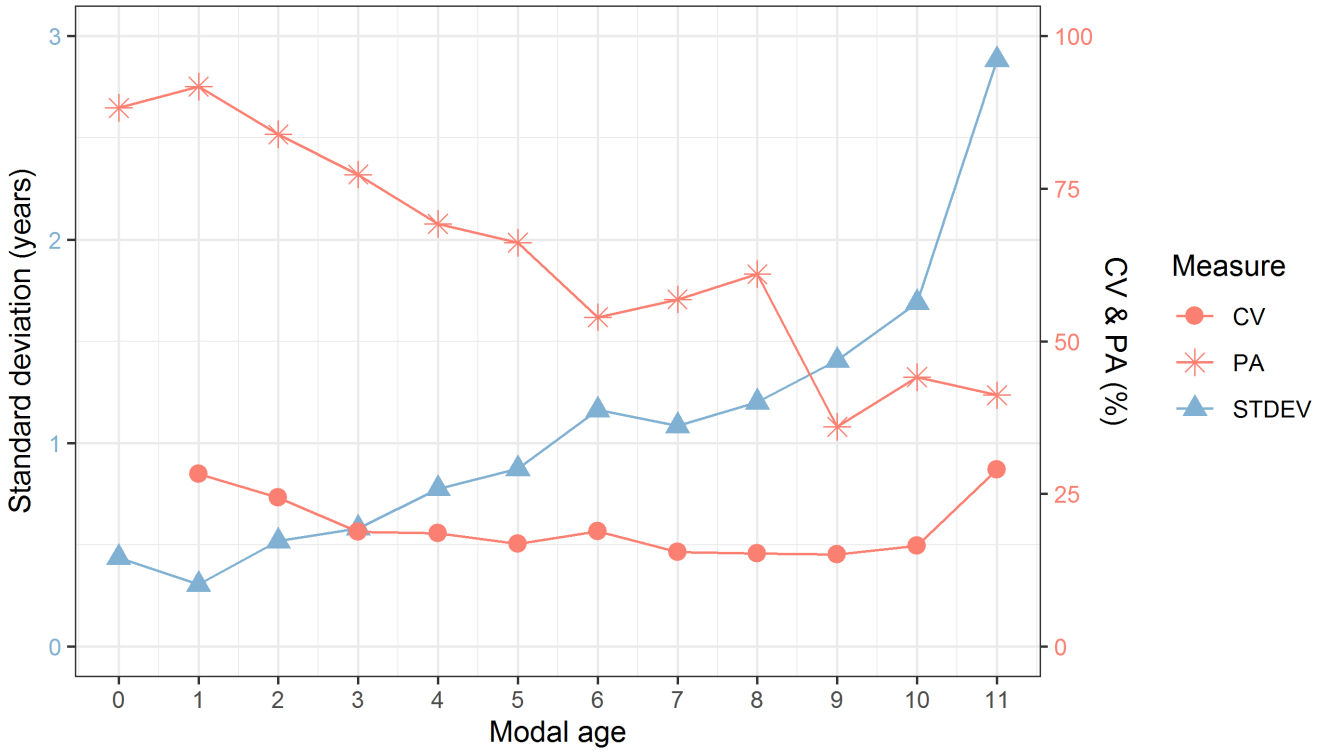


Figure X: CV, PA and (STDEV (standard deviation) are plotted against modal age

Distribution of age reading errors

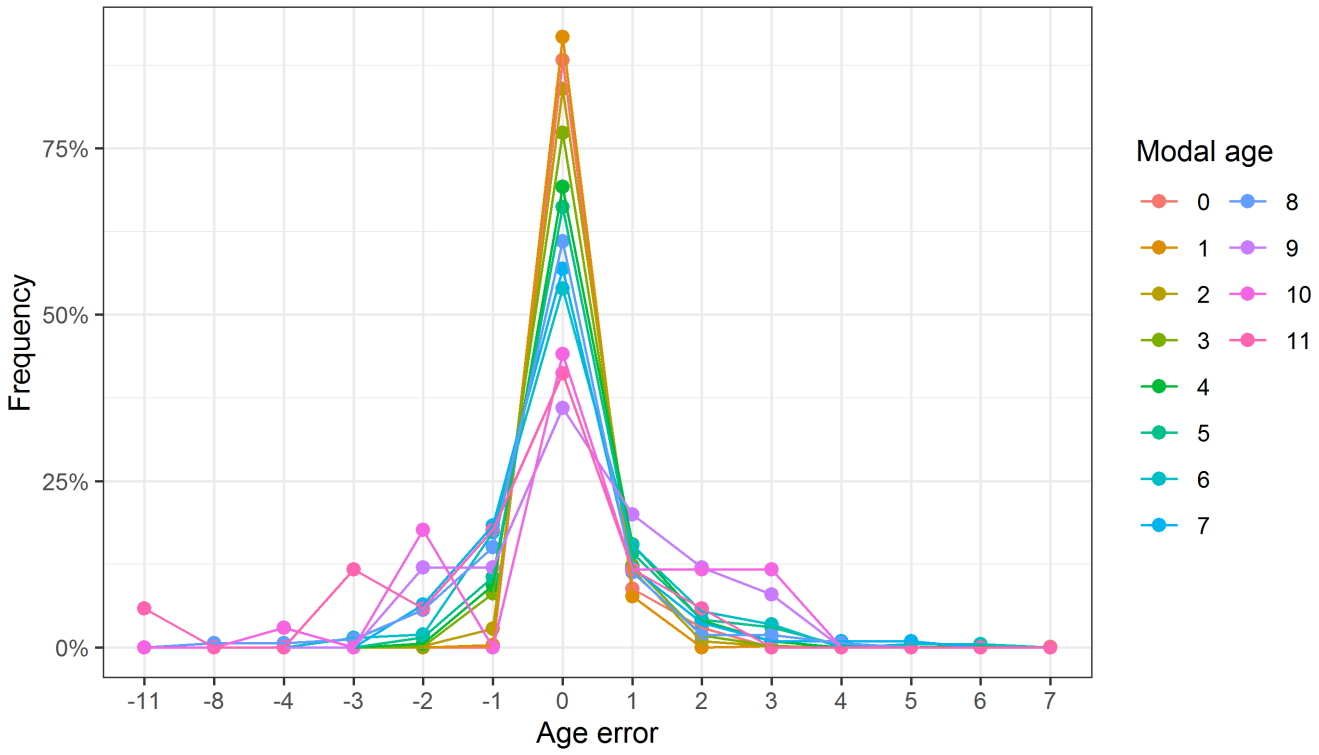


Figure X: The distribution of the age reading errors in percentage by modal age as obSRrved from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

Relative bias for all readers

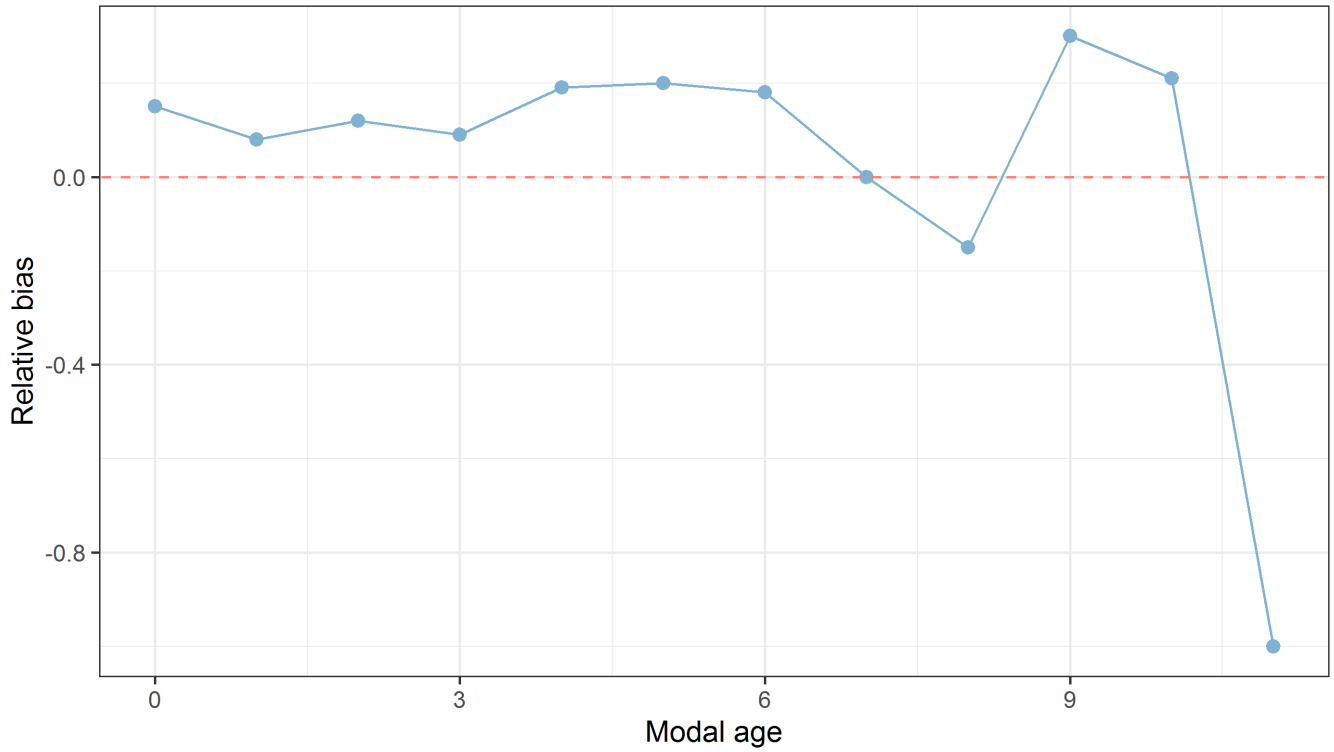


Figure X: The relative bias by modal age as estimated by all age readers combined.

Mean length at age by reader

Table X: Mean fish length at age per reader is calculated per reader and age (not modal age) and for all readers combined per age. A weighted mean is also given.

Age	R02 GB	R04 GB	R08 DK	R10 SE	R12 NO	R14 BE	R16 NO	R20 NL	R22 DK
0	164 mm	113 mm	113 mm	305 mm	95 mm	180 mm	95 mm	122 mm	437 mm
1	402 mm	383 mm	397 mm	416 mm	382 mm	396 mm	396 mm	399 mm	393 mm
2	488 mm	469 mm	456 mm	486 mm	476 mm	493 mm	492 mm	509 mm	478 mm
3	644 mm	606 mm	561 mm	600 mm	604 mm	609 mm	617 mm	660 mm	569 mm
4	790 mm	732 mm	674 mm	773 mm	750 mm	746 mm	781 mm	812 mm	715 mm
5	884 mm	875 mm	802 mm	824 mm	882 mm	862 mm	884 mm	877 mm	850 mm
6	919 mm	852 mm	822 mm	855 mm	892 mm	932 mm	912 mm	926 mm	916 mm
7	954 mm	945 mm	904 mm	953 mm	938 mm	821 mm	962 mm	960 mm	934 mm
8	1030 mm	986 mm	968 mm	971 mm	1012 mm	992 mm	1016 mm	1025 mm	973 mm
9	1030 mm	1008 mm	1004 mm	1022 mm	947 mm	936 mm	1025 mm	1010 mm	972 mm
10	995 mm	1076 mm	978 mm	1043 mm	1100 mm	1025 mm	-	-	1045 mm
11	1030 mm	1013 mm	970 mm	1055 mm	1070 mm	1170 mm	975 mm	1030 mm	1015 mm
12	-	-	997 mm	1070 mm	920 mm	1060 mm	1070 mm	-	970 mm
13	-	-	-	-	-	1070 mm	-	-	1012 mm

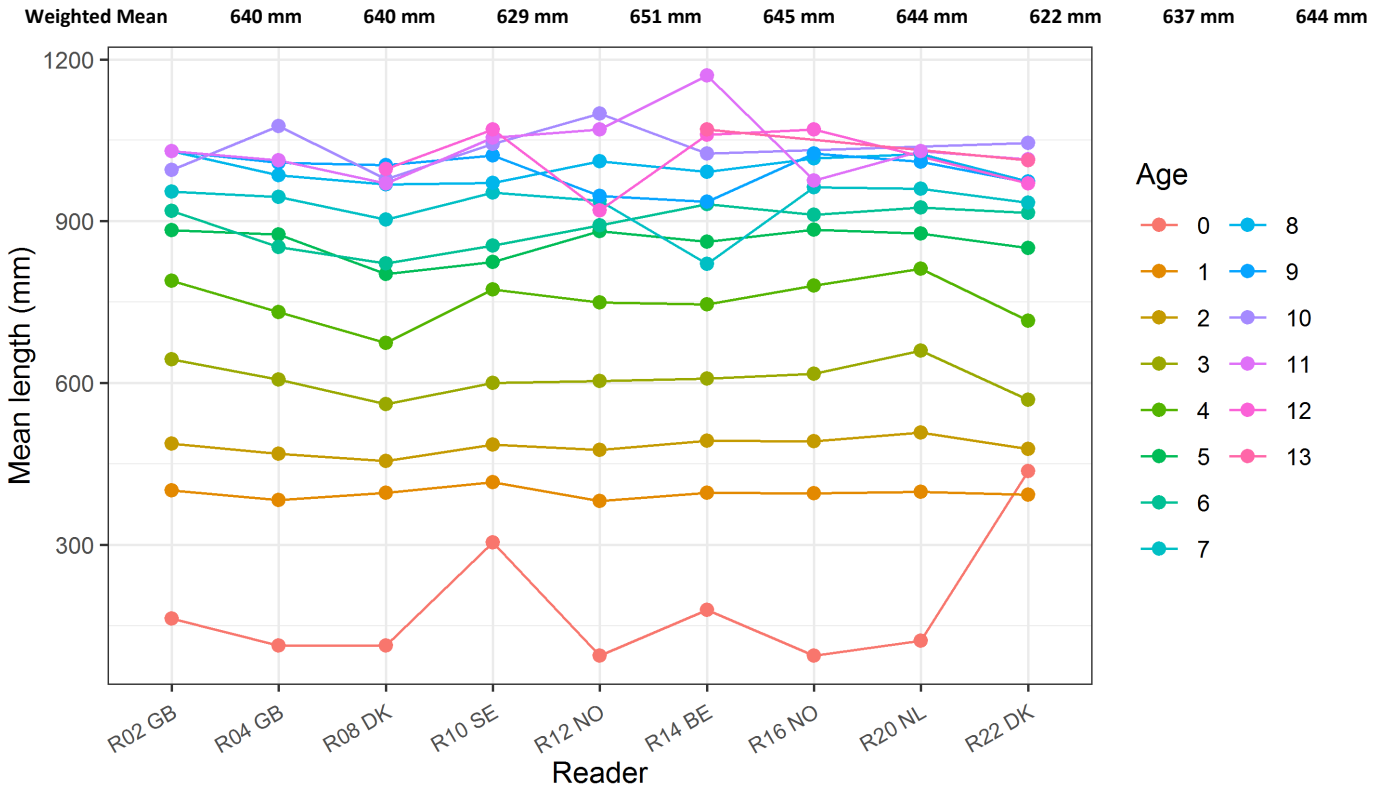


Figure X: The mean fish length at age as estimated by each age reader.