

SmartDots Report for the 2022 Western Baltic Cod (cod.27.22-24) age reading exchange (ID 412)

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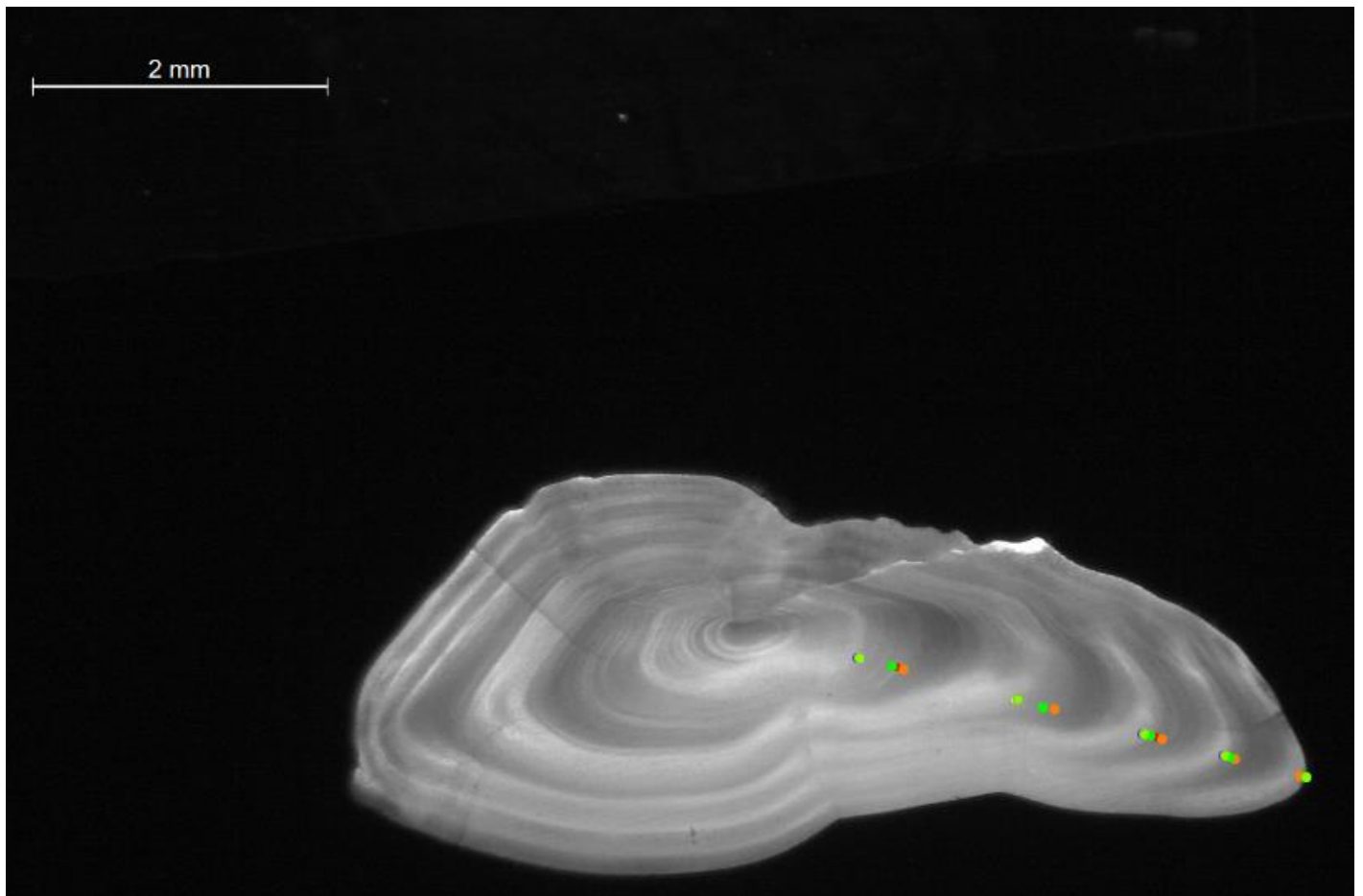


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1 Summary

This small exchange was held in preparation for WGBFAS 2022 to check the level of agreement and bias between age readers providing age data for stock assessment of cod.27.22-24. 100 images of sectioned otoliths from samples collected in ICES SD 22 and 23 across the four quarters of 2021 were taken at DTU Aqua (Denmark) and uploaded to SmartDots. Readers were provided with instructions to annotate all images, provide an age estimate and a quality score for their age estimation. The reporting module in SmartDots was used to run a standardised analysis of age reader comparison and extract a template for a full report and summary report. Results were provided to The ICES Baltic Fisheries Assessment Working Group (WGBFAS) 2022.

Based on the 3 readers providing age data for assessment from Denmark, Germany and Sweden the percentage agreement (PA) was 97% with a coefficient of variation (CV) of 8%. This is an improvement on the 2020 results where PA was 91% for sectioned otoliths and 88% for broken otoliths with a respective CV of 17% and 18%. Age reading issues related to counting a translucent zone (TZ) at the edge in Q3 or Q4 and correct identification of the first winter ring are generally resolved. In contrast to previous exchanges only images of sectioned otoliths were provided for the readers to annotate after results from previous exchanges (2019, 2020) indicated this to be a more reliable age reading method. The material has been made available for training new age readers for this stock.

A series of age reading exchanges (2019, 2020 and 2022) and cooperation between the age reading labs providing age data for stock assessment, the stock assessor and stock coordinator for cod.27.22-24 has resulted in improved reader calibration and consequently data quality for cod.27.22-24.

2 Methods

Results presented here are based on output from SmartDots and a standardised r-script. The analysis follows traditional methods where the level of accuracy compared to modal age is indicated by percentage agreement (PA), bias tests and plots, and the level of precision, i.e. the reproducibility of age estimates is indicated by the coefficient of variation (CV). The tables and plots presented are from the Guus Eltink Excel sheet 'Age Reading Comparisons' (Eltink, A.T.G.W. 2000). Additional analyses of age data were included in the form of age error matrices (AEM's).

Percentage Agreement

The table presents the percentage agreement (PA) per modal age and reader. The PA's are calculated as the ratio between the total number of age readings in agreement with modal age and the total number of age readings for that sample per reader and modal age:

$$PA = \frac{n_{modalage}}{n_{total}} * 100$$

Co-efficient of Variation (CV)

The table presents the 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. Finally a rank value is added per reader, where the reader with the lowest weighted mean is assigned with a rank and so forth (in the situation of ties between two weighted means will every tied element be assigned to the lowest rank. This is the procedure for all ties methods when assigning ranks).

Average Percentage Error (APE)

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

The average percentage error is calculated per image as:

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

where a_i is the age reading of reader i and \bar{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 second 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 for that specific stock.

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 fish and for each reader.

2.1 Overview of samples and readers

Table 2.1: Overview of samples used for the 2022 Western Baltic Cod (cod.27.22-24) age reading exchange.

Year	ICES area	Strata	Quarter	Number of samples	Modal age range	Length range
2021	27.3.b.23	cod.27.22-24	1	10	2-5	270-670 mm
2021	27.3.b.23	cod.27.22-24	3	2	5	730-750 mm
2021	27.3.b.23	cod.27.22-24	4	34	1-5	260-740 mm
2021	27.3.c.22	cod.27.22-24	1	26	1-6	150-830 mm
2021	27.3.c.22	cod.27.22-24	2	8	3-6	680-940 mm
2021	27.3.c.22	cod.27.22-24	3	6	2-5	390-820 mm
2021	27.3.c.22	cod.27.22-24	4	14	0-5	150-810 mm

Table 2.2: Reader overview for the 2022 Western Baltic Cod (cod.27.22-24) age reading exchange

Reader code	Expertise
R01 DE	Advanced
R02 DK	Advanced
R03 SE	Advanced
R04 DK	Basic
R05 SE	Basic

3 Results

3.1.1 All readers

The weighted average percentage agreement based on modal ages for all readers is 95 %, with the weighted average CV of 9 % and APE of 3 %.

Table 3.1: 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	R01 DE	R02 DK	R03 SE	R04 DK	R05 SE	all
0	-	-	-	-	-	-
1	0 %	27 %	20 %	0 %	0 %	16 %
2	0 %	12 %	0 %	15 %	9 %	9 %
3	9 %	0 %	0 %	9 %	9 %	7 %
4	-	-	-	-	-	11 %
5	4 %	0 %	6 %	8 %	4 %	5 %
6	0 %	0 %	0 %	0 %	0 %	0 %
Weighted Mean	2 %	10 %	6 %	9 %	5 %	9 %

Table 3.2: 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	R01 DE	R02 DK	R03 SE	R04 DK	R05 SE	all
0	100 %	67 %	100 %	100 %	100 %	93 %
1	100 %	90 %	95 %	100 %	100 %	97 %
2	100 %	94 %	100 %	91 %	97 %	96 %
3	93 %	100 %	100 %	93 %	93 %	96 %
4	100 %	100 %	100 %	0 %	100 %	80 %
5	96 %	100 %	92 %	79 %	96 %	92 %
6	100 %	100 %	100 %	100 %	100 %	100 %
Weighted Mean	98 %	95 %	97 %	90 %	97 %	95 %

Table 3.3: Relative bias table represents the relative bias per modal age per reader, the relative bias of all readers combined per modal age and a weighted mean of the relative bias per reader.

Modal age	R01 DE	R02 DK	R03 SE	R04 DK	R05 SE	all
0	0.00	0.33	0.00	0.00	0.00	0.07
1	0.00	0.10	0.05	0.00	0.00	0.03
2	0.00	0.06	0.00	0.03	-0.03	0.01
3	-0.07	0.00	0.00	-0.07	-0.07	-0.04
4	0.00	0.00	0.00	1.00	0.00	0.20
5	-0.04	0.00	0.08	0.21	-0.04	0.04
6	0.00	0.00	0.00	0.00	0.00	0.00
Weighted Mean	-0.02	0.05	0.03	0.06	-0.03	0.02

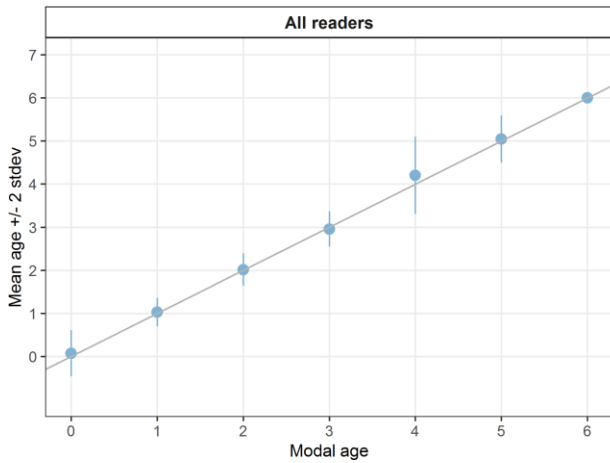


Figure 3.1: Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated man age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

Table 3.4: 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	R01 DE	R02 DK	R03 SE	R04 DK	R05 SE
R01 DE	-	*	*	*	-
R02 DK	*	-	-	-	*
R03 SE	*	-	-	-	*
R04 DK	*	-	-	-	*
R05 SE	-	*	*	*	-
Modal age	-	*	-	-	-

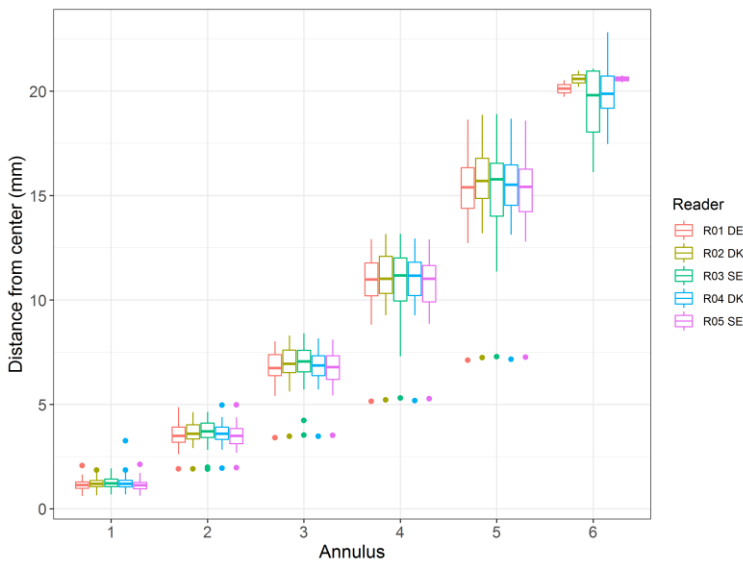


Figure 3.2: Plot of average distance from the centre to the winter rings for all readers by preparation method. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

3.1.2 Advanced readers

The weighted average percentage agreement based on modal ages for all readers is 97 %, with the weighted average CV of 8 % and APE of 2 %.

Table 3.5: 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	R01 DE	R02 DK	R03 SE	all
0	-	-	-	-
1	0 %	21 %	0 %	12 %
2	9 %	12 %	0 %	9 %
3	9 %	0 %	0 %	5 %
4	-	-	-	0 %
5	4 %	0 %	6 %	4 %
6	0 %	0 %	0 %	0 %
Weighted Mean	6 %	9 %	1 %	8 %

Table 3.6: 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	R01 DE	R02 DK	R03 SE	all
0	100 %	67 %	100 %	88 %
1	100 %	95 %	100 %	98 %
2	97 %	94 %	100 %	97 %
3	93 %	100 %	100 %	98 %
4	100 %	100 %	100 %	100 %
5	96 %	100 %	92 %	96 %
6	100 %	100 %	100 %	100 %
Weighted Mean	97 %	96 %	98 %	97 %

Table 3.7: Relative bias table represents the relative bias per modal age and advanced reader, the relative bias of all advanced readers combined per modal age and a weighted mean of the relative bias per reader.

Modal age	R01 DE	R02 DK	R03 SE	all
0	0.00	0.33	0.00	0.11
1	0.00	0.05	0.00	0.02
2	-0.03	0.06	0.00	0.01
3	-0.07	0.00	0.00	-0.02
4	0.00	0.00	0.00	0.00
5	-0.04	0.00	0.08	0.01
6	0.00	0.00	0.00	0.00
Weighted Mean	-0.03	0.04	0.02	0.01

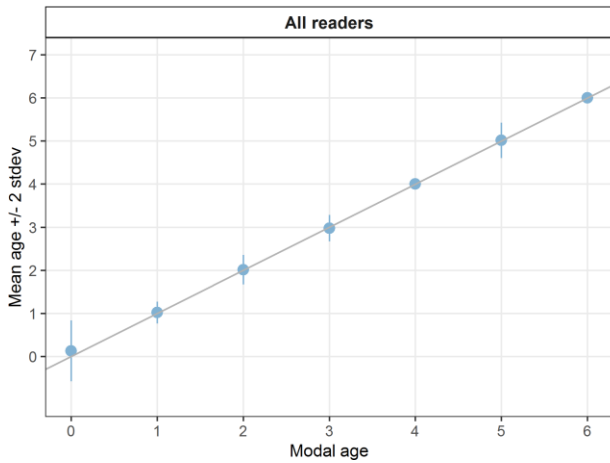


Figure 3.3: Age bias plot for advanced readers.

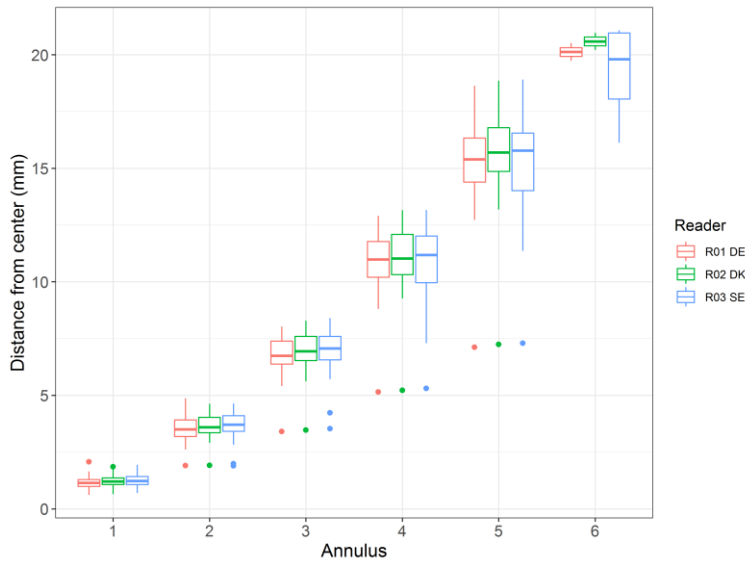


Figure 3.3: Plot of average distance from the centre to the winter rings for advanced readers by preparation method. The boxes represent the median, upper and lower box boundaries of the interquartile range, whiskers represent the minimum and maximum values and the dots represent the outliers.

Table 3.8: Age error matrix (AEM) for cod.27.22-24. The AEM shows the proportional distribution of age readings for each modal age.

Modal age	Read age							Total
	0	1	2	3	4	5	6	
0	0.88	0.12	-	-	-	-	-	1
1	-	0.98	0.02	-	-	-	-	1
2	-	0.01	0.97	0.02	-	-	-	1
3	-	-	0.02	0.98	-	-	-	1
4	-	-	-	-	1.00	-	-	1
5	-	-	-	-	0.01	0.96	0.03	1
6	-	-	-	-	-	-	1.00	1

4 References

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

CEFAS ATAQCS (Age Training And Quality Control System). Developed by Mark Etherton. email: Mark.Etherton@cefas.co.uk

Eltink G. W. (2000) Age reading comparisons. (MS Excel workbook version 1.0 October 2000)

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

5 Annex 3. Additional results

5.1 Results all readers

Table 5.1: Summary of statistics; PA (%), CV (%) and APE (%).

CV	PA	APE
9 %	95 %	3 %

Table 5.2: Data overview including modal age and statistics per sample.

Fish ID	Event ID	Image ID	length	sex	Catch date	ICES area	R01 DE	R02 DK	R03 SE	R04 DK	R05 SE	Modal age	PA %	CV %	APE %
8270777	412	-	670	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	6	5	5	80	9	6
8270778	412	-	610	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	6	5	5	80	9	6
8270779	412	-	620	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	5	5	5	100	0	0
8270787	412	-	560	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	5	5	5	100	0	0
8270790	412	-	470	-	05/01/2021 00:00:00	27.3.c.22	-	5	5	5	5	5	100	0	0
8270797	412	-	550	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	6	5	5	80	9	6
8302469	412	-	670	-	27/02/2021 13:33:19	27.3.b.23	4	4	4	5	4	4	80	11	8
8302472	412	-	520	-	27/02/2021 13:33:19	27.3.b.23	5	5	5	6	5	5	80	9	6
8302478	412	-	480	-	27/02/2021 13:33:19	27.3.b.23	3	3	3	3	3	3	100	0	0
8302480	412	-	440	-	27/02/2021 13:33:19	27.3.b.23	3	3	3	3	3	3	100	0	0
8302481	412	-	460	-	27/02/2021 13:33:19	27.3.b.23	3	3	3	3	3	3	100	0	0
8302484	412	-	410	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	2	2	100	0	0
8302487	412	-	270	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	2	2	100	0	0
8302489	412	-	310	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	2	2	100	0	0
8302494	412	-	340	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	2	2	100	0	0
8302496	412	-	370	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	2	2	100	0	0
8304843	412	-	280	-	03/03/2021 12:20:56	27.3.c.22	2	2	2	2	2	2	100	0	0
8304847	412	-	150	-	03/03/2021 12:20:56	27.3.c.22	1	1	1	1	1	1	100	0	0
8304947	412	-	360	-	04/03/2021 06:19:47	27.3.c.22	3	3	3	3	3	3	100	0	0
8304954	412	-	190	-	04/03/2021 06:19:47	27.3.c.22	1	1	1	1	1	1	100	0	0
8304956	412	-	170	-	04/03/2021 06:19:47	27.3.c.22	1	-	1	1	1	1	100	0	0
8305552	412	-	830	-	05/03/2021 07:31:24	27.3.c.22	5	5	5	5	5	5	100	0	0
8305553	412	-	660	-	05/03/2021	27.3.c.22	5	5	5	5	5	5	100	0	0

8391724	412	-	270	-	21/10/2021 09:59:16	27.3.c.22	1	1	1	1	1	1	100	0	0
8391890	412	-	230	-	21/10/2021 12:01:48	27.3.c.22	1	2	1	1	1	1	80	37	27
8391893	412	-	160	-	21/10/2021 12:01:48	27.3.c.22	0	1	-	0	0	0	75	-	-
8391894	412	-	150	-	21/10/2021 12:01:48	27.3.c.22	0	0	0	0	0	0	100	-	-
8392096	412	-	290	-	22/10/2021 06:10:01	27.3.c.22	1	1	1	1	1	1	100	0	0
8392097	412	-	280	-	22/10/2021 06:10:01	27.3.c.22	1	1	1	1	1	1	100	0	0
8392098	412	-	260	-	22/10/2021 06:10:01	27.3.c.22	1	1	1	1	1	1	100	0	0
8392099	412	-	150	-	22/10/2021 06:10:01	27.3.c.22	0	0	0	0	0	0	100	-	-
8402880	412	-	440	-	02/11/2021 06:40:25	27.3.b.23	2	2	2	2	2	2	100	0	0
8402881	412	-	380	-	02/11/2021 06:40:25	27.3.b.23	2	2	2	2	2	2	100	0	0
8402882	412	-	360	-	02/11/2021 06:40:25	27.3.b.23	1	2	2	1	1	1	60	39	34
8402883	412	-	310	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	1	1	100	0	0
8402884	412	-	300	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	1	1	100	0	0
8402886	412	-	290	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	1	1	100	0	0
8402887	412	-	280	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	1	1	100	0	0
8402888	412	-	260	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	1	1	100	0	0
8403030	412	-	520	-	02/11/2021 10:24:02	27.3.b.23	2	3	2	3	2	2	60	23	20
8403031	412	-	460	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403032	412	-	390	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403035	412	-	540	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403036	412	-	510	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403040	412	-	500	-	02/11/2021 10:24:02	27.3.b.23	3	3	3	3	3	3	100	0	0
8403042	412	-	430	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403043	412	-	410	-	02/11/2021 10:24:02	27.3.b.23	1	1	1	1	1	1	100	0	0
8403044	412	-	360	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403046	412	-	390	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403048	412	-	480	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	1	2	2	80	25	18
8403050	412	-	490	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	2	2	100	0	0
8403051	412	-	370	-	02/11/2021 10:24:02	27.3.b.23	2	3	2	2	2	2	80	20	15
8403052	412	-	450	-	02/11/2021	27.3.b.23	2	3	3	3	2	3	60	21	18

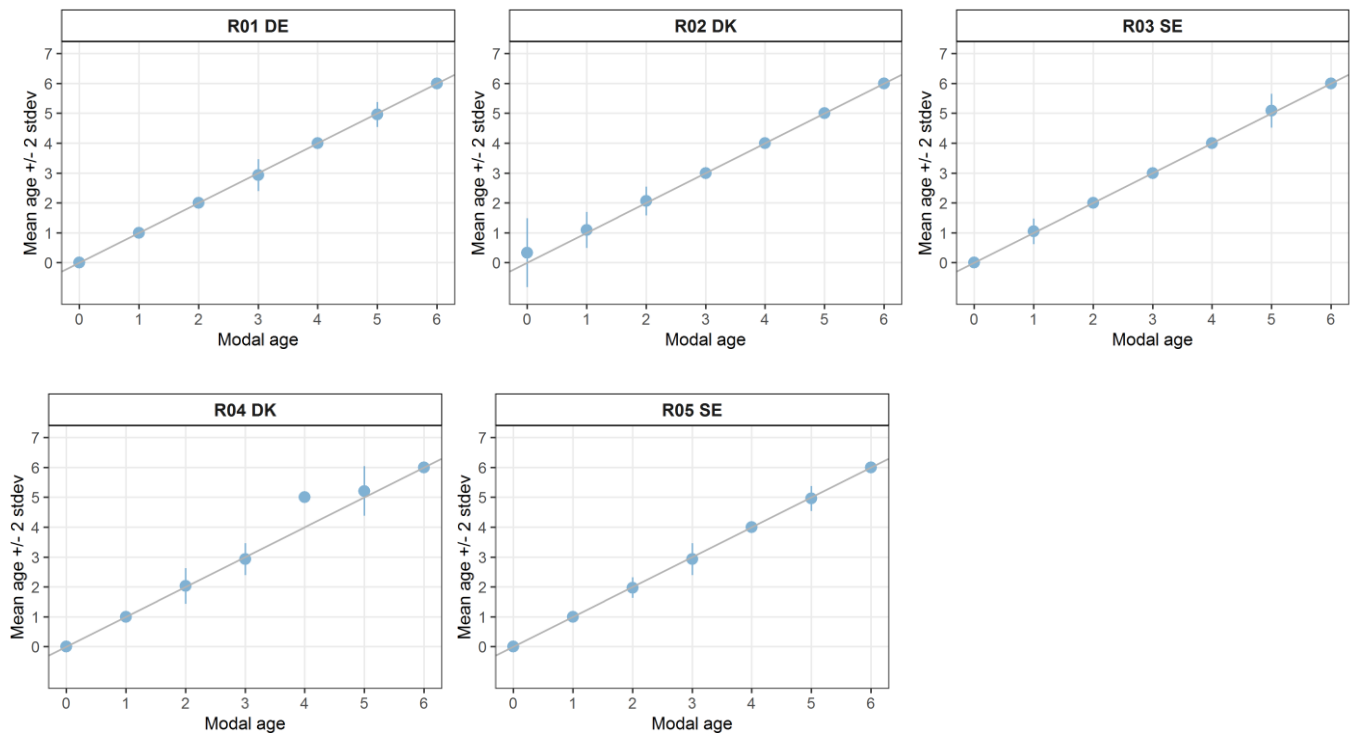
8403054	412	-	550	-	10:24:02 02/11/2021	27.3.b.23	3	3	3	2	3	3	80	16	11
8403055	412	-	660	-	10:24:02 02/11/2021	27.3.b.23	5	5	5	5	5	5	100	0	0
8403056	412	-	380	-	10:24:02 02/11/2021	27.3.b.23	-	2	2	2	1	2	75	29	21
8403057	412	-	610	-	10:24:02 02/11/2021	27.3.b.23	3	3	3	3	3	3	100	0	0
8403058	412	-	340	-	10:24:02 02/11/2021	27.3.b.23	1	1	1	1	1	1	100	0	0
8403059	412	-	640	-	10:24:02 02/11/2021	27.3.b.23	3	3	3	3	3	3	100	0	0
8403060	412	-	590	-	10:24:02 02/11/2021	27.3.b.23	4	5	5	5	4	5	60	12	10
8403061	412	-	320	-	10:24:02 02/11/2021	27.3.b.23	1	1	1	1	1	1	100	0	0
8403062	412	-	350	-	10:24:02 02/11/2021	27.3.b.23	1	1	1	1	1	1	100	0	0
8403063	412	-	330	-	10:24:02 02/11/2021	27.3.b.23	1	1	1	1	1	1	100	0	0
8403064	412	-	740	-	10:24:02 02/11/2021	27.3.b.23	5	5	5	5	-	5	100	0	0
8403065	412	-	530	-	10:24:02 02/11/2021	27.3.b.23	2	2	2	2	2	2	100	0	0
8432309	412	-	540	-	00:00:00 13/12/2021	27.3.c.22	2	2	2	2	2	2	100	0	0
8432310	412	-	780	-	00:00:00 13/12/2021	27.3.c.22	5	5	5	5	5	5	100	0	0
8432311	412	-	810	-	00:00:00 13/12/2021	27.3.c.22	5	5	6	5	5	5	80	9	6
8432314	412	-	660	-	00:00:00 13/12/2021	27.3.c.22	3	3	3	3	3	3	100	0	0
8432315	412	-	700	-	00:00:00 13/12/2021	27.3.c.22	2	2	2	2	2	2	100	0	0
8432318	412	-	640	-	00:00:00 13/12/2021	27.3.c.22	3	3	3	3	3	3	100	0	0

Table 5.3: Number of age readings table gives an overview of number of readings per reader and modal age. The total numbers of readings per reader and per modal age are summarized at the end of the table.

Modal age	R01 DE	R02 DK	R03 SE	R04 DK	R05 SE	total
0	3	3	2	3	3	14
1	22	21	22	22	22	109
2	33	33	34	34	34	168
3	14	14	14	14	14	70
4	1	1	1	1	1	5
5	23	24	24	24	23	118
6	2	2	2	2	2	10
Total	98	98	99	100	99	494

Table 5.4: Age composition by reader gives a summary of number of readings per reader.

Modal age	R01 DE	R02 DK	R03 SE	R04 DK	R05 SE
0	3	2	2	3	3
1	22	20	21	23	23
2	34	33	35	32	34
3	13	16	14	15	13
4	2	1	1	0	2
5	22	24	22	20	22
6	2	2	4	7	2
Total	98	98	99	100	99



5.2 Results Advanced readers

Table 5.5: Summary of statistics; PA (%), CV (%) and APE (%).

CV	PA	APE
8 %	97 %	2 %

Table 5.6: Data overview including modal age and statistics per sample.

Fish ID	Event ID	Image ID	length	sex	Catch date	ICES area	R01 DE	R02 DK	R03 SE	Modal age	PA %	CV %	APE %
8270777	412	-	670	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8270778	412	-	610	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8270779	412	-	620	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8270787	412	-	560	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8270790	412	-	470	-	05/01/2021 00:00:00	27.3.c.22	-	5	5	5	100	0	0
8270797	412	-	550	-	05/01/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8302469	412	-	670	-	27/02/2021 13:33:19	27.3.b.23	4	4	4	4	100	0	0
8302472	412	-	520	-	27/02/2021 13:33:19	27.3.b.23	5	5	5	5	100	0	0
8302478	412	-	480	-	27/02/2021 13:33:19	27.3.b.23	3	3	3	3	100	0	0
8302480	412	-	440	-	27/02/2021 13:33:19	27.3.b.23	3	3	3	3	100	0	0
8302481	412	-	460	-	27/02/2021 13:33:19	27.3.b.23	3	3	3	3	100	0	0
8302484	412	-	410	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	100	0	0
8302487	412	-	270	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	100	0	0
8302489	412	-	310	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	100	0	0
8302494	412	-	340	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	100	0	0
8302496	412	-	370	-	27/02/2021 13:33:19	27.3.b.23	2	2	2	2	100	0	0
8304843	412	-	280	-	03/03/2021 12:20:56	27.3.c.22	2	2	2	2	100	0	0
8304847	412	-	150	-	03/03/2021 12:20:56	27.3.c.22	1	1	1	1	100	0	0
8304947	412	-	360	-	04/03/2021 06:19:47	27.3.c.22	3	3	3	3	100	0	0
8304954	412	-	190	-	04/03/2021 06:19:47	27.3.c.22	1	1	1	1	100	0	0
8304956	412	-	170	-	04/03/2021 06:19:47	27.3.c.22	1	-	1	1	100	0	0
8305552	412	-	830	-	05/03/2021 07:31:24	27.3.c.22	5	5	5	5	100	0	0
8305553	412	-	660	-	05/03/2021 07:31:24	27.3.c.22	5	5	5	5	100	0	0
8311737	412	-	780	-	06/03/2021 06:33:41	27.3.c.22	6	6	6	6	100	0	0
8311876	412	-	150	-	06/03/2021 08:54:38	27.3.c.22	1	1	1	1	100	0	0
8312503	412	-	210	-	07/03/2021 08:23:06	27.3.c.22	1	1	1	1	100	0	0
8313576	412	-	270	-	09/03/2021 06:02:21	27.3.c.22	2	2	2	2	100	0	0
8313577	412	-	310	-	09/03/2021 06:02:21	27.3.c.22	2	2	2	2	100	0	0
8314295	412	-	170	-	10/03/2021 10:42:02	27.3.c.22	1	1	1	1	100	0	0
8314297	412	-	200	-	10/03/2021 10:42:02	27.3.c.22	2	2	2	2	100	0	0
8314300	412	-	230	-	10/03/2021 10:42:02	27.3.c.22	2	2	2	2	100	0	0
8314304	412	-	300	-	10/03/2021 10:42:02	27.3.c.22	2	2	2	2	100	0	0
8314306	412	-	350	-	10/03/2021 10:42:02	27.3.c.22	2	2	2	2	100	0	0
8314493	412	-	320	-	10/03/2021 13:13:50	27.3.c.22	2	2	2	2	100	0	0
8314694	412	-	210	-	11/03/2021 10:47:09	27.3.c.22	2	-	2	2	100	0	0
8314697	412	-	240	-	11/03/2021 10:47:09	27.3.c.22	2	2	2	2	100	0	0
8335926	412	-	940	-	09/05/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8335927	412	-	900	-	09/05/2021 00:00:00	27.3.c.22	6	6	6	6	100	0	0
8336904	412	-	760	-	24/05/2021 00:00:00	27.3.c.22	5	5	6	5	67	11	8
8336906	412	-	700	-	24/05/2021 00:00:00	27.3.c.22	3	3	3	3	100	0	0
8336920	412	-	740	-	24/05/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8337009	412	-	870	-	27/05/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8343646	412	-	680	-	23/06/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8343649	412	-	780	-	23/06/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8347954	412	-	820	-	06/07/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8358174	412	-	550	-	23/08/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8358175	412	-	500	-	23/08/2021 00:00:00	27.3.c.22	3	3	3	3	100	0	0

8358176	412	-	450	-	23/08/2021 00:00:00	27.3.c.22	2	2	2	2	100	0	0
8358177	412	-	510	-	23/08/2021 00:00:00	27.3.c.22	3	3	3	3	100	0	0
8358178	412	-	390	-	23/08/2021 00:00:00	27.3.c.22	2	2	2	2	100	0	0
8375828	412	-	730	-	14/09/2021 00:00:00	27.3.b.23	5	5	5	5	100	0	0
8375830	412	-	750	-	14/09/2021 00:00:00	27.3.b.23	5	5	5	5	100	0	0
8391724	412	-	270	-	21/10/2021 09:59:16	27.3.c.22	1	1	1	1	100	0	0
8391890	412	-	230	-	21/10/2021 12:01:48	27.3.c.22	1	2	1	1	67	43	33
8391893	412	-	160	-	21/10/2021 12:01:48	27.3.c.22	0	1	-	0	50	-	-
8391894	412	-	150	-	21/10/2021 12:01:48	27.3.c.22	0	0	0	0	100	-	-
8392096	412	-	290	-	22/10/2021 06:10:01	27.3.c.22	1	1	1	1	100	0	0
8392097	412	-	280	-	22/10/2021 06:10:01	27.3.c.22	1	1	1	1	100	0	0
8392098	412	-	260	-	22/10/2021 06:10:01	27.3.c.22	1	1	1	1	100	0	0
8392099	412	-	150	-	22/10/2021 06:10:01	27.3.c.22	0	0	0	0	100	-	-
8402880	412	-	440	-	02/11/2021 06:40:25	27.3.b.23	2	2	2	2	100	0	0
8402881	412	-	380	-	02/11/2021 06:40:25	27.3.b.23	2	2	2	2	100	0	0
8402882	412	-	360	-	02/11/2021 06:40:25	27.3.b.23	1	2	2	2	67	35	27
8402883	412	-	310	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	100	0	0
8402884	412	-	300	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	100	0	0
8402886	412	-	290	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	100	0	0
8402887	412	-	280	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	100	0	0
8402888	412	-	260	-	02/11/2021 06:40:25	27.3.b.23	1	1	1	1	100	0	0
8403030	412	-	520	-	02/11/2021 10:24:02	27.3.b.23	2	3	2	2	67	25	19
8403031	412	-	460	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403032	412	-	390	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403035	412	-	540	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403036	412	-	510	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403040	412	-	500	-	02/11/2021 10:24:02	27.3.b.23	3	3	3	3	100	0	0
8403042	412	-	430	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403043	412	-	410	-	02/11/2021 10:24:02	27.3.b.23	1	1	1	1	100	0	0
8403044	412	-	360	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403046	412	-	390	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403048	412	-	480	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403050	412	-	490	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8403051	412	-	370	-	02/11/2021 10:24:02	27.3.b.23	2	3	2	2	67	25	19
8403052	412	-	450	-	02/11/2021 10:24:02	27.3.b.23	2	3	3	3	67	22	17
8403054	412	-	550	-	02/11/2021 10:24:02	27.3.b.23	3	3	3	3	100	0	0
8403055	412	-	660	-	02/11/2021 10:24:02	27.3.b.23	5	5	5	5	100	0	0
8403056	412	-	380	-	02/11/2021 10:24:02	27.3.b.23	-	2	2	2	100	0	0
8403057	412	-	610	-	02/11/2021 10:24:02	27.3.b.23	3	3	3	3	100	0	0
8403058	412	-	340	-	02/11/2021 10:24:02	27.3.b.23	1	1	1	1	100	0	0
8403059	412	-	640	-	02/11/2021 10:24:02	27.3.b.23	3	3	3	3	100	0	0
8403060	412	-	590	-	02/11/2021 10:24:02	27.3.b.23	4	5	5	5	67	12	10
8403061	412	-	320	-	02/11/2021 10:24:02	27.3.b.23	1	1	1	1	100	0	0
8403062	412	-	350	-	02/11/2021 10:24:02	27.3.b.23	1	1	1	1	100	0	0
8403063	412	-	330	-	02/11/2021 10:24:02	27.3.b.23	1	1	1	1	100	0	0
8403064	412	-	740	-	02/11/2021 10:24:02	27.3.b.23	5	5	5	5	100	0	0
8403065	412	-	530	-	02/11/2021 10:24:02	27.3.b.23	2	2	2	2	100	0	0
8432309	412	-	540	-	13/12/2021 00:00:00	27.3.c.22	2	2	2	2	100	0	0
8432310	412	-	780	-	13/12/2021 00:00:00	27.3.c.22	5	5	5	5	100	0	0
8432311	412	-	810	-	13/12/2021 00:00:00	27.3.c.22	5	5	6	5	67	11	8
8432314	412	-	660	-	13/12/2021 00:00:00	27.3.c.22	3	3	3	3	100	0	0
8432315	412	-	700	-	13/12/2021 00:00:00	27.3.c.22	2	2	2	2	100	0	0
8432318	412	-	640	-	13/12/2021 00:00:00	27.3.c.22	3	3	3	3	100	0	0

Table 5.7: Number of age readings table gives an overview of number of readings per reader and modal age. The total numbers of readings per reader and per modal age are summarized at the end of the table.

Modal age	R01 DE	R02 DK	R03 SE	total
0	3	3	2	8
1	21	20	21	62

2	34	34	35	103
3	14	14	14	42
4	1	1	1	3
5	23	24	24	71
6	2	2	2	6
Total	98	98	99	295

Table 5.8: Age composition by reader gives a summary of number of readings per reader.

Modal age	R01 DE	R02 DK	R03 SE
0	3	2	2
1	22	20	21
2	34	33	35
3	13	16	14
4	2	1	1
5	22	24	22
6	2	2	4
Total	98	98	99

