

Report of the 2021-22 *Trachurus* species (*T. trachurus*, *T. mediterraneus* and *T. picturatus*) age reading exchange

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1 Introduction

Genus *Trachurus* belongs to the Family Carangidae and is composed by numerous medium-pelagic species with commercial interest, sustaining artisanal and industrial fisheries worldwide (Fischer et al., 1981). In the North-, Central-East Atlantic and the Mediterranean Sea, this group is mainly represented by *T. trachurus*, *T. mediterraneus* and *T. picturatus*, with different geographical distribution and abundance, although with quite overlapping among them depending on the area (Fig. 1).

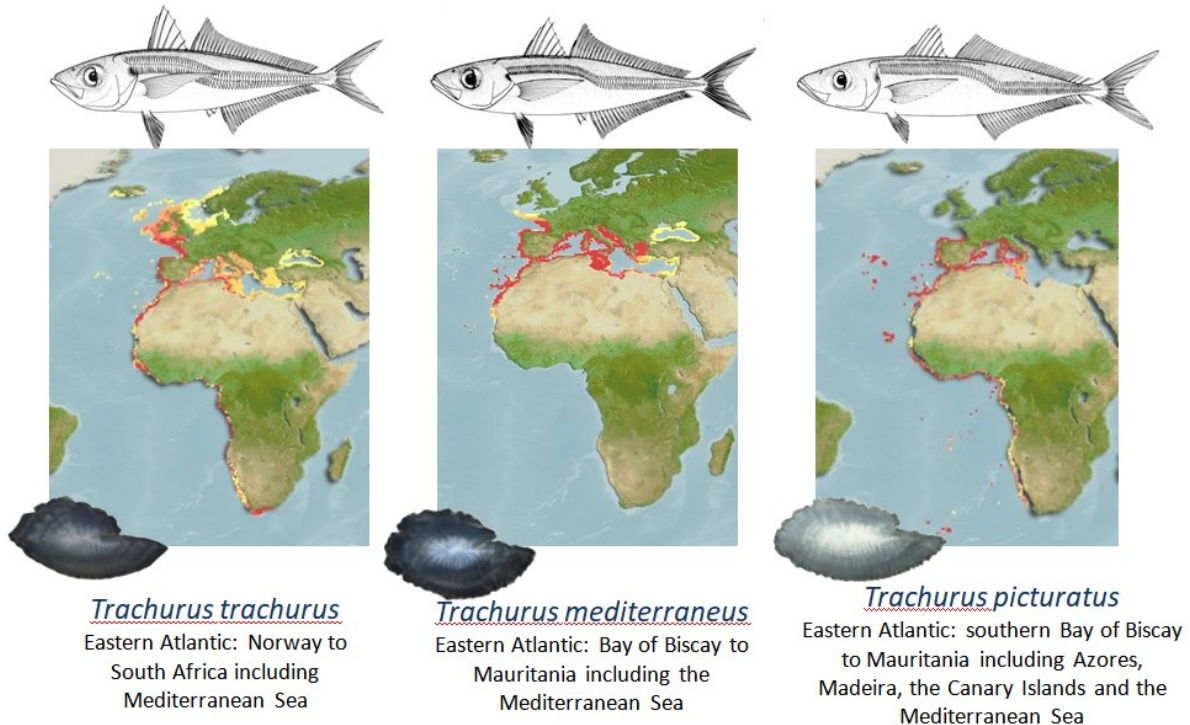


Figure 1. Geographical distribution of the *Trachurus* species addressed in the present otolith exchange (Froese and Pauly, 2022; Fischer et al., 1981)

The biological knowledge of these species is also variable and different among areas (ICES, 2018), but it is widely agreed that readability of the *Trachurus* otoliths is quite difficult and that there are regional differences, being the ageing interpretation more difficult in the southern areas of their distribution limits, where seasonal climate oscillations are lower. Due to age determination is essential in fish stock assessment to estimate the rates of mortalities and growth, in order to provide appropriate management advice, ageing procedures must be reliable. However, otolith preparation and age reading methods might differ considerably between countries, and to organize otolith exchanges on a regular basis and age reading workshops is recommended if serious problems are found, to agree and to update the criteria used among countries. With this aim, an expert group met in 1996 to agree common criteria in the ageing process of horse mackerel. This was the actual origin of the activities which led to the creation of the ICES WKARHOM (Workshop on Age reading of Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (*Trachurus trachurus*, *T. mediterraneus* and *T. picturatus*) in 2012 (Table 1.1). Based on the results of last otolith exchange and the workshop in 2018, the Working Group on Biological Parameters (WGBIOP) identified the need for another exchange and age reading workshop on *Trachurus* species (ICES, 2020).

Table 1.1 Summary of the otolith exchanges and workshops on *Trachurus* species in the ICES framework.

Year	Exchange/ Workshop	Species	References
1996 1999	Exchange Workshop	<i>T. trachurus</i>	- Report of the horse mackerel otolith workshop (ICES, 1999)
2006	Both	<i>T. trachurus</i>	- Report of the Horse Mackerel Exchange and Workshop 2006 (Bolle et al., 2011)
2012	Both	<i>T. trachurus</i> <i>T. mediterraneus</i> <i>T. picturatus</i>	- Report of the WKARHOM1 (ICES, 2016)
2015	Both	<i>T. trachurus</i> <i>T. mediterraneus</i> <i>T. picturatus</i>	- Report of the Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel Otolith Exchange 2015 (Mahé et al., 2015) - Report of the WKARHOM2 (ICES, 2015)
2018	Both	<i>T. trachurus</i> <i>T. mediterraneus</i> <i>T. picturatus</i>	- Report of the WKARHOM3 (ICES, 2018)

The agreed ToR A for the workshop included the performance of previous otolith exchanges for the three species. The overall otolith Exchange was organized during 2021 (which finalized in February 2022), including 38 readers from 12 countries (including samples from the Atlantic Archipelagos of Madeira, Açores and The Canary Islands) interested on evaluating their ageing criteria and to inter-calibrate them with other laboratories/countries involved in ageing procedures along the geographical distribution of these species, both in the Atlantic Ocean and the Mediterranean Sea (Annex 1).

Readers were instructed to follow the WKARHOM3 schemes and protocols when completing the current otolith exchange annotations on SmartDots. Precision measures were analysed by species in order to evaluate the necessity of a 4th WKARHOM meeting, both for the total of the basic readers and the advanced ones.

2 Methods

All the laboratories participating in the Exchange contributed to the exchange with otolith pictures from their areas, following general instructions provided by the coordinators. Reading were carried out without information about individual length and readings were performed marking all the annual translucent rings and in addition edge type (Opaque / Translucent) was annotated.

The statistical analysis was carried out follows traditional methods where the level of accuracy compared to modal age was indicated by percentage agreement (PA) and bias tests, plots and the level of precision (i.e. the reproducibility of age estimates) was indicated by the coefficient of variation (CV). The tables and plots presented are from the Guus Eltink Excel sheet 'Age Reading Comparisons' (Eltink, 2000). Additional analyses as average percentage error (APE) and age error matrices (AEM's) were included; average percentage error (APE) and age error matrices (AEM's).

Percentage Agreement (PA)

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:

$$PA (\%) = \frac{n_{modalage}}{n_{total}} \times 100$$

These values are calculated per reader and modal age and also for all the readers per modal age and a weighted mean of the PA per reader.

Coefficient of Variation (CV)

The CV's were calculated as the ratio between the standard deviation (σ) and mean value (μ) per reader and modal age:

$$CV (\%) = \frac{\sigma}{\mu} \times 100$$

In the tables the CV of all readers combined per modal age and a weighted mean of the CV per reader are also added.

Average Percentage Error (APE)

APE was calculated based on the method outlined by Beamish and 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 (ICES, 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 in that specific area.

2.1 Overview of samples and readers

Table 2.1: Overview of samples used for the otolith exchange of *Trachurus trachurus* (Event-ID 362). Otolith preparation: whole.

Year	ICES area	Strata	Quarter	Number of samples	Modal age range	Length range (mm)
2016	11.1	Whole	1	6	1-4	135-225
2016	11.1	Whole	2	8	1-3	150-205
2016	11.1	Whole	3	3	0	95-115
2017	1	Whole	2	1	1	155
2017	1	Whole	3	1	2	195
2017	11.1	Whole	1	3	1	110-140
2017	7	Whole	4	23	2-7	230-395
2018	1	Whole	1	1	3	180
2018	1	Whole	2	2	5-7	305-330
2018	7	Whole	1	21	2-4	220-265
2019	1	Whole	1	1	5	245
2019	1	Whole	2	3	3-6	210-320
2019	1	Whole	3	3	3-6	200-345
2019	11.1	Whole	1	1	3	240
2019	22	Whole	1	2	5	305-320
2019	22	Whole	3	2	2	170-220
2019	27.9	Whole	1	5	4-5	235-255
2019	27.9	Whole	2	6	4-9	295-365
2019	27.9	Whole	3	3	6-12	365-390
2019	27.9.a	Whole	1	2	1-2	120-200
2019	27.9.a	Whole	2	5	1-5	150-265
2019	27.9.a	Whole	3	4	1-5	165-255
2019	27.9.a	Whole	4	4	3-9	120-265
2019	8	Whole	1	3	4	220-265
2019	8	Whole	2	2	4-5	170-280
2019	8	Whole	3	3	3-4	235-250
2020	11.1	Whole	1	4	2-4	175-215
2020	11.1	Whole	3	3	4-5	270-320
2020	11.1	Whole	4	1	1	160
2020	20	Whole	2	9	1-6	190-305
2020	20	Whole	3	7	0-4	120-260
2020	20	Whole	4	15	0-7	100-325
2020	22	Whole	1	15	2-5	155-330
2020	22	Whole	2	8	0-6	50-315
2020	22	Whole	3	11	0-5	100-320
2020	22	Whole	4	3	0-4	120-270
2020	27.9	Whole	2	1	5	225
2020	27.9	Whole	3	9	1-12	160-430
2020	8	Whole	3	2	4-5	270-305
2020	8	Whole	4	10	1-6	120-320
2021	1	Whole	1	2	3-4	220-265
2021	11.1	Whole	4	1	1	140
2021	22	Whole	1	3	1-3	125-240
2021	22	Whole	2	3	0-5	45-280
2021	22	Whole	3	10	2-5	195-330
2021	27.9	Whole	1	6	5-10	360-445
2021	8	Whole	1	1	5	300
2021	8	Whole	2	8	1-5	135-340

Table 2.2: Reader overview for the otolith exchange of *Trachurus trachurus* (Event-ID 362). Otolith preparation: whole.

Reader code	Expertise
R04 NL	Advanced
R06 ES	Advanced
R08 PT	Advanced
R10 ES	Advanced
R12 IT	Advanced
R16 IE	Advanced
R20 ES	Basic
R22 GR	Basic
R26 IT	Basic
R28 IT	Basic
R34 FR	Basic
R36 NO	Basic
R38 GR	Basic
R40 PT	Basic
R42 MA	Basic
R44 DE	Basic
R48 GR	Basic
R50 ES	Basic
R52 DE	Basic
R56 GR	Basic
R60 IT	Basic
R62 ES	Basic
R64 IT	Basic
R68 FR	Basic
R70 NO	Basic
R72 ES	Basic

Table 2.3: Overview of samples used for the otolith exchange of *Trachurus trachurus* (Event-ID 362). Otolith preparation: sliced.

Year	ICES area	Strata	Quarter	Number of samples	Modal age range	Length range (mm)
2014	4	Sliced	1	2	7-14	265-365
2015	4	Sliced	3	2	10-13	325-335
2015	4	Sliced	4	8	3-14	285-335
2016	4	Sliced	1	1	16	395
2016	4	Sliced	3	15	4-17	275-665
2017	4	Sliced	1	10	3-14	235-375
2017	7	Sliced	4	28	3-16	230-395
2018	7	Sliced	1	21	2-5	220-265
2019	27.4.a	Sliced	1	9	9-19	350-410
2019	27.4.a	Sliced	2	7	11-18	355-395
2019	27.4.a	Sliced	3	10	5-24	290-430
2019	27.4.a	Sliced	4	6	11-20	345-405
2019	27.9.a	Sliced	1	4	7-8	290-340
2019	27.9.a	Sliced	2	4	5-14	275-425
2019	27.9.a	Sliced	3	4	5-11	285-445
2019	27.9.a	Sliced	4	3	7-10	295-380

Table 2.4: Reader overview for the otolith exchange of *Trachurus trachurus* (Event-ID 362). Otolith preparation: sliced.

Reader code	Expertise
R04 NL	Advanced
R06 ES	Advanced
R08 PT	Advanced
R10 ES	Advanced
R12 IT	Advanced
R16 IE	Advanced
R20 ES	Basic
R22 GR	Basic
R26 IT	Basic
R28 IT	Basic
R34 FR	Basic
R36 NO	Basic
R38 GR	Basic
R40 PT	Basic
R42 MA	Basic
R44 DE	Basic
R48 GR	Basic
R50 ES	Basic
R52 DE	Basic
R56 GR	Basic
R60 IT	Basic
R62 ES	Basic
R64 IT	Basic
R68 FR	Basic
R70 NO	Basic

Table 2.5: Overview of samples used for the otolith exchange of *Trachurus mediterraneus* (Event-ID 388).

Year	ICES area/GSA	Quarter	Number of samples	Modal age range	Length range (mm)
2012	27.8.c	2	4	6-9	430-480
2013	27.8.c	3	1	4	245
2014	27.8.c	2	1	7	300
2014	27.8.c	3	2	5	380-410
2014	27.8.c	4	3	4-5	370-380
2015	27.8.c	3	1	6	335
2015	27.8.c	4	1	4	300
2016	27.8.c	2	6	3-7	280-375
2017	27.8.c	1	2	7-8	415-440
2017	27.8.c	2	4	2-7	185-295
2018	27.8.c	2	7	3-5	255-320
2015	11	2	6	1-3	125-175
2015	11	3	9	1-4	185-315
2015	11	4	2	0	110-135
2016	11	1	1	1	140
2019	11	1	4	2-4	165-280
2020	11	2	10	2-5	150-265
2016	1	3	9	4-9	220-345
2017	1	1	1	2	170
2017	1	2	1	2	145
2018	1	1	2	3	190-195
2020	20	2	7	3-4	220-335
2020	20	3	7	0-3	45-255
2020	20	4	12	1-4	145-255
2020	22	1	26	0-6	50-370
2020	22	3	1	1	155
2020	22	4	4	2-4	300-355
2019	22a	2	5	1-7	135-315
2020	22a	3	18	0-4	120-305
2020	22a	4	7	0-5	100-275

Table 2.6: Reader overview for the otolith exchange of *Trachurus mediterraneus* (Event-ID 388).

Reader code	Expertise
R02 ES	Advanced
R06 IT	Advanced
R08 IT	Advanced
R10 GR	Basic
R14 IT	Basic
R28 ES	Basic
R30 PT	Basic
R32 PT	Basic
R40 GR	Basic
R42 ES	Basic
R44 ES	Basic
R54 GR	Basic
R60 IT	Basic
R66 GR	Basic

Table 2.7: Overview of samples used for the otolith exchange of *Trachurus picturatus* (Event-ID 387).

Year	ICES area / GSA	Quarter	Number of samples	Modal age range	Length range (mm)
2018	27.10.a	4	5	2-3	255-295
2019	27.10.a	4	3	1-2	220-240
2020	27.10.a	1	5	3-4	305-375
2020	27.10.a	4	18	1-7	110-400
2021	34.1.2	2	21	0-3	130-210
2021	34.1.2	3	18	0-2	130-195

Table 2.8: Reader overview for the otolith exchange of *Trachurus picturatus* (Event-ID 387).

Reader code	Expertise
R02 ES	Advanced
R04 ES	Basic
R06 GR	Basic
R10 IT	Basic
R16 IT	Basic
R20 PT	Basic
R30 ES	Basic
R32 PT	Basic
R34 PT	Basic
R44 GR	Basic
R46 ES	Basic
R48 ES	Basic
R50 IT	Basic
R60 GR	Basic
R66 IT	Basic
R70 ES	Basic

3 Results

Results are presented separately for each species. Table 3.1 summarizes the most general results by species.

Table 3.1: Overall summary of statistics for the total of the samples and species: Percentage of Agreement (PA, %), Coefficient of Variation (CV, %) and Average Percentage Error (APE, %).

Species - preparation	All readers			Advanced readers		
	CV	PA	APE	CV	PA	APE
<i>Trachurus trachurus</i> -whole	45	47	31	43	54	-
<i>Trachurus trachurus</i> -sliced	26	46	18	28	49	-
<i>Trachurus mediterraneuss</i> -whole	42	51	30	39	65	-
<i>Trachurus picturatus</i> -whole	54	54	36	-	-	-

3.1 *Trachurus trachurus* (Event-ID 362)

3.1.1 Whole otoliths

3.1.1.1 All readers

The weighted average percentage agreement (PA) based on modal ages for all readers is 47%, with a weighted average CV of 45% and an APE of 31% (Tables 3.2 - 3.3)

Table 3.2: Coefficient of Variation (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 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	62	28	59	24	47	56	74	50	51	53	31	71	47	68	-	41	64	33	38	53	63	35	53	47	57	67	65
2	58	67	30	64	38	43	39	20	28	43	25	49	19	48	-	44	28	46	69	25	26	49	28	53	56	24	52
3	31	46	32	41	24	53	47	21	20	27	22	33	34	34	-	41	22	34	67	26	15	35	23	21	35	25	46
4	35	41	27	40	29	22	32	17	20	31	26	27	33	32	-	29	23	38	56	18	26	25	21	17	25	37	40
5	35	34	30	40	24	17	34	18	22	27	23	29	37	33	-	30	28	33	37	16	23	25	11	27	32	28	38
6	36	29	21	42	19	7	17	17	21	38	21	22	22	31	-	21	26	25	20	21	15	25	13	12	17	36	35
7	12	29	22	30	20	-	7	10	34	45	42	16	13	27	-	15	9	12	0	21	42	6	-	39	9	57	33
8	8	22	22	31	9	-	35	0	0	18	0	25	8	6	-	7	0	7	-	0	25	28	-	18	16	28	21
9	22	29	5	14	13	-	10	27	22	6	7	6	16	21	-	22	32	18	-	30	17	25	-	26	17	32	27
10	7	18	7	18	11	-	7	28	9	8	9	0	0	12	-	0	24	0	-	35	9	0	-	20	28	13	23
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	7	6	0	0	28	-	0	25	0	18	7	6	6	0	-	0	0	6	-	25	28	13	-	7	0	16	22
Weighted Mean	40	41	32	40	29	37	40	23	25	33	24	36	32	38	-	34	29	34	51	25	27	31	28	29	36	34	45

Table 3.3: Percentage agreement (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 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	all
0	76	10	43	14	94	0	86	95	95	76	83	86	100	0	-	90	95	14	0	95	85	71	12	81	48	100	67
1	68	89	43	93	82	63	69	79	68	79	86	68	82	43	0	86	71	82	71	75	68	89	30	82	64	68	72
2	39	45	16	58	68	65	41	81	48	61	71	39	87	16	-	52	68	45	38	68	50	71	37	68	48	79	55
3	45	21	21	35	67	59	34	67	75	46	65	29	67	7	-	39	61	56	36	58	77	23	25	77	9	56	47
4	41	20	23	27	57	50	28	75	74	35	46	27	42	9	100	26	27	39	27	73	49	34	43	61	14	33	39
5	36	12	24	20	41	60	41	50	37	31	50	40	33	20	-	29	29	24	27	60	38	27	71	43	14	26	34
6	38	9	9	27	55	80	30	18	36	9	67	27	45	27	-	36	9	27	50	36	40	27	50	64	27	0	31
7	50	40	60	40	0	0	75	0	40	20	25	60	40	0	-	75	0	40	100	20	40	80	0	40	20	0	35
8	50	50	50	0	50	-	0	100	100	0	100	0	50	0	-	0	0	0	-	100	0	0	-	0	50	0	32
9	67	40	25	20	0	-	40	40	40	0	50	50	40	0	-	20	0	40	-	20	40	0	0	60	20	0	27
10	50	50	50	50	0	-	50	0	0	0	0	100	0	0	-	100	0	100	-	50	0	0	-	0	0	0	27
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	0	50	0	100	0	-	0	0	0	0	0	50	50	0	-	100	0	50	-	0	50	50	-	0	100	0	27
Weighted Mean	48	30	26	39	60	58	43	66	62	46	61	42	61	15	50	47	48	44	39	64	57	44	35	65	27	49	47

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 3.4).

Table 3.4: 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	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	all	
0	0.24	0.9	0.57	0.86	0.06	1	0.14	0.05	0.05	0.24	0.17	0.14	0	1.57	-	0.1	0.05	0.86	1	0.05	0.15	0.29	0.88	0.19	0.76	0	-	
1	0.07	0.11	0.71	0.07	-0.11	0.37	-0.12	-0.07	0.11	-0.21	0.14	0.11	-0.18	1.21	2	-0.07	-0.29	0.18	0.29	-0.04	0.29	-0.11	0.65	-0.11	0.46	-0.18	0.2	
2	0.68	1.16	1.39	0.71	0.16	0.65	0	0.13	0.55	-0.13	0.12	1.26	-0.06	1.9	-	0.58	-0.32	0.84	2.31	0.19	0.6	0.39	0.89	0.19	1.35	0	-	
3	0.53	1.84	1.58	1.91	-0.12	0.71	0.39	0.16	0.12	-0.58	-0.14	1.2	0.12	3.07	-	1.18	-0.33	0.37	4.5	0.32	0.12	1.36	0.7	-0.02	2.44	-0.44	-	
4	0.41	2.45	1.91	1.98	-0.18	0.89	0.81	-0.2	-0.07	-0.74	0	1.36	0.19	3.11	0	1.51	-0.75	1.41	4.27	0.02	0.12	0.98	0.14	-0.23	2.44	-0.98	0.8	
5	0.33	2.69	2.22	1.56	-0.41	0.4	1	-0.31	-0.05	-1.1	0.29	1.71	0.36	2.95	-	1.81	-1.07	1.55	2.82	-0.19	-0.22	1.29	-0.14	-0.17	2.74	-1.18	-	
6	0	3.64	1.73	1.64	-0.73	0.2	0.9	-1.09	-0.73	-1.73	-0.67	0.73	0	2.45	-	1.45	-1.82	0.91	0.25	-0.82	-0.8	0.73	-0.5	-0.45	1.91	-2.73	-	
7	0	1.6	1.2	3.2	-2	-2	-0.25	-1.6	-1.8	-2.2	-1.75	-0.2	-0.8	0.75	-	-0.5	-2.2	-0.2	0	-1.6	-1.8	0.2	-1	-1.8	1	-3.6	-	
8	0.5	1.5	1.5	3.5	-0.5	-	0	0	0	0	0	0.5	0.5	3.5	-	2.5	-1	1.5	-	0	0.5	-0.5	-	0	1	-3	-	
9	-1	2.4	0.75	1.6	-1.75	-	-0.8	-2	-1.4	-1.25	-0.5	0.5	0.2	2.5	-	1.2	-2.2	0.4	-	-2.4	-1.2	0.2	-4.5	-1.4	0.6	-4.25	-	
10	-0.5	1.5	0.5	1.5	-3.5	-	-0.5	-2.5	-2.5	-1.5	-2.5	0	-2	2	-	0	-4	0	-	-2	-2.5	-1	-	-3	0	-4.5	-	
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	-1.5	-0.5	-2	0	-4.5	-	-1	-3.5	-4	-4	-1.5	-0.5	-0.5	1	-	0	-5	0.5	-	-3.5	-2	-1	-	-1.5	0	-7.5	-	
Weighted Mean	0.33	1.8	1.48	1.42	-0.29	0.57	0.41	-0.21	-0.06	-0.65	-0.07	1.02	0.06	2.48	1	1.01	-0.7	0.85	2.75	-0.09	0	0.77	0.42	-0.16	1.85	-0.89	0.56	

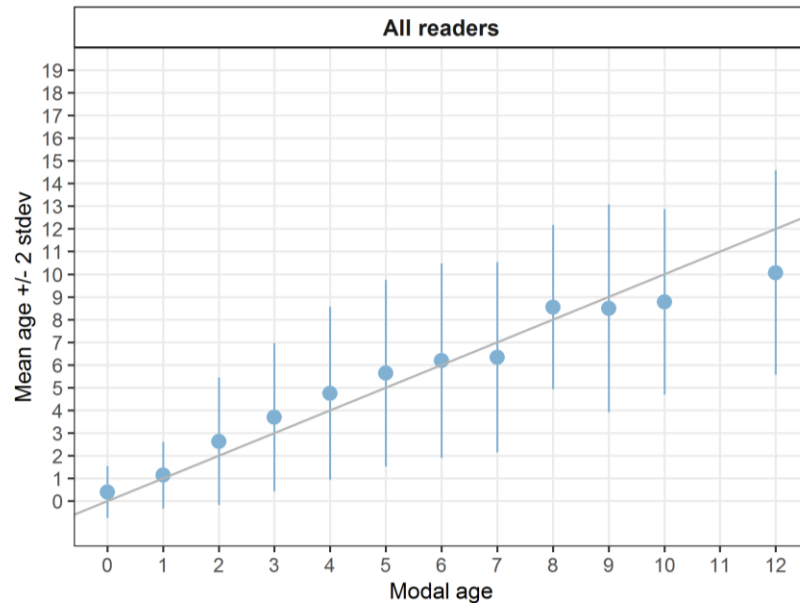


Figure 3.1: Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between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

For each pair that is being compared, the differences between the readings per image are found and the frequency of each occurring difference is obtained. A rank value is calculated for the positive and the negative differences (R+ and R- in the Guus Eltink sheet). The value with the smallest rank is then used to calculate a z-value that determines the level of bias (not clear from Guus Eltink sheet how the equations are defined).

Table 3.5: 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 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES
R04 NL	-	**	**	**	**	-	-	**	**	**	**	**	**	*	-	**	**	*	**	**	*	*	*	**	**	**
R06 ES	**	-	*	**	*	**	**	*	*	*	**	**	*	**	-	**	*	**	-	*	**	**	*	*	-	*
R08 PT	**	*	-	-	*	**	**	*	*	*	**	**	*	**	-	**	*	**	**	*	*	**	**	*	**	*
R10 ES	**	**	-	-	*	**	**	*	**	*	**	**	**	**	-	**	*	**	**	**	**	**	**	*	**	*
R12 IT	**	*	*	*	-	**	**	-	**	**	**	*	**	*	-	*	**	**	**	**	**	**	**	-	*	**
R16 IE	-	**	**	*	**	-	*	**	**	**	**	**	**	**	-	-	**	-	**	**	-	-	-	**	**	**
R20 ES	-	**	**	**	**	*	-	**	**	**	**	**	**	*	-	**	**	**	**	**	**	**	*	**	*	**
R22 GR	**	*	*	*	-	**	**	-	*	**	*	*	**	*	-	*	**	**	**	**	**	**	**	-	*	**
R26 IT	**	*	*	**	**	**	**	*	-	**	-	**	-	*	-	**	**	**	**	-	-	**	**	*	*	**
R28 IT	**	*	*	*	**	**	**	**	**	-	**	*	**	*	-	*	-	*	**	**	**	**	**	**	*	*
R34 FR	**	**	**	**	**	**	**	*	-	**	-	**	-	*	-	**	**	**	**	**	-	**	**	-	**	**
R36 NO	**	**	**	**	*	**	**	*	**	*	**	-	**	**	-	-	*	*	**	**	**	**	*	*	**	*
R38 GR	**	*	*	**	**	**	**	**	-	**	-	**	-	*	-	**	**	**	**	**	-	-	**	**	*	**
R40 PT	*	**	**	**	*	**	*	*	*	*	*	**	*	-	-	**	*	*	**	*	*	*	*	*	**	*
R42 MA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
R44 DE	**	**	**	**	*	-	**	*	**	*	**	-	**	**	-	-	*	*	**	**	**	**	-	-	**	*
R48 GR	**	*	*	*	**	**	**	**	**	-	**	*	**	*	-	*	-	*	**	**	**	**	*	**	*	*
R50 ES	*	**	**	**	**	-	**	**	**	*	**	*	**	*	-	*	*	-	**	**	**	**	-	-	**	*
R52 DE	**	-	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	**	-	**	**	**	*	**	*	**
R56 GR	**	*	*	**	**	**	**	**	-	**	-	**	-	*	-	**	**	**	**	-	-	**	**	-	*	**
R60 IT	*	**	*	**	**	-	**	**	-	**	**	**	-	*	-	**	**	**	**	-	-	**	-	**	*	**
R62 ES	*	**	**	**	**	-	**	**	**	*	**	*	**	*	-	-	*	-	**	**	**	**	-	-	**	*
R64 IT	*	*	**	**	**	-	*	**	**	**	**	*	**	**	-	-	**	-	*	**	-	-	-	**	**	**
R68 FR	**	*	*	*	-	**	**	-	*	**	-	*	**	*	-	**	**	**	**	-	**	**	**	-	*	**
R70 NO	**	-	**	**	*	**	*	*	*	*	**	**	*	**	-	**	*	**	*	*	*	**	**	*	-	*
R72 ES	**	*	*	*	**	**	**	**	**	*	**	*	**	*	-	*	*	*	**	**	**	**	*	**	*	-
Modal age	**	*	*	**	**	**	**	**	-	**	-	**	-	*	-	**	**	**	**	-	-	**	**	**	*	**

Table 3.6: Number of age readings (N), Coefficient of Variation (CV, %), Percentage Agreement (PA, %) and Relative Bias by modal age; (whole otoliths) for all readers.

Modal age	N	CV	PA	Relative Bias
0	467	-	67	0.37
1	654	65	72	0.12
2	716	52	55	0.59
3	1286	46	47	0.73
4	996	40	39	0.75
5	924	38	34	0.74
6	246	35	31	0.21
7	109	33	35	-0.67
8	44	21	32	0.55
9	103	27	27	-0.50
10	44	23	27	-1.23
11	0	-	-	-
12	44	22	27	-1.93
Total	5633			
Weighted Mean		45	47	0.51

3.1.1.2 Advanced readers

All samples included

Table 3.7: Coefficient of Variation (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	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	all
0	-	-	-	-	-	-	-
1	78	16	65	16	74	53	61
2	36	60	48	79	24	33	56
3	32	47	21	41	18	32	39
4	16	41	31	40	25	31	41
5	26	38	26	30	26	16	34
6	31	34	24	39	20	8	35
7	37	23	16	24	29	-	34
8	69	21	11	24	31	-	33
9	67	8	13	8	51	-	34
10	27	24	8	10	16	-	26
11	-	-	-	-	-	-	22
12	-	-	-	-	-	-	12
13	16	0	0	0	0	-	27
14	-	-	-	-	-	-	34
Weighted Mean	39	35	33	35	32	32	43

Table 3.8: Percentage agreement (PA, %) per modal age and advanced reader, the PA of all advanced readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	all
0	100	18	64	18	88	-	56
1	64	97	56	97	65	64	75
2	59	71	12	79	79	67	61
3	64	34	32	61	68	61	52
4	66	42	47	31	56	58	48
5	50	38	47	45	51	56	47
6	44	11	33	33	56	78	39
7	50	60	60	50	10	0	45
8	25	57	71	29	14	100	42
9	50	88	57	62	0	0	51
10	25	50	83	67	0	-	46
11	0	100	100	0	0	-	40
12	0	100	0	100	0	-	40
13	0	100	0	100	0	-	40
14	0	100	100	0	-	-	50
Weighted Mean	58	52	45	55	55	62	54

Table 3.9: 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	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	all
0	0.00	0.82	0.91	1.09	0.38	-	-
1	-0.18	0.03	0.38	-0.03	-0.30	0.36	0.05
2	0.32	0.50	1.42	0.42	-0.12	0.33	0.48
3	0.50	1.53	0.97	0.84	-0.26	0.61	0.70
4	0.00	1.84	1.49	1.84	-0.56	0.50	0.85
5	-0.16	1.62	1.08	0.47	-0.84	0.12	0.38
6	0.31	2.67	1.44	1.00	-0.83	0.00	0.77
7	-1.00	1.20	-0.40	1.50	-2.70	-2.00	-0.57
8	-3.50	0.57	0.14	1.00	-2.43	0.00	-0.70
9	-2.00	-0.25	-0.43	0.50	-4.86	1.00	-1.01
10	-2.25	1.50	-0.33	0.67	-3.50	-	-
11	-2.00	0.00	0.00	3.00	-3.00	-	-
12	-1.00	0.00	-2.00	0.00	-3.00	-	-
13	-4.00	0.00	-2.00	0.00	-7.00	-	-
14	-8.00	0.00	0.00	-3.00	-	-	-
Weighted Mean	-0.18	1.19	0.87	0.81	-0.88	0.33	0.40

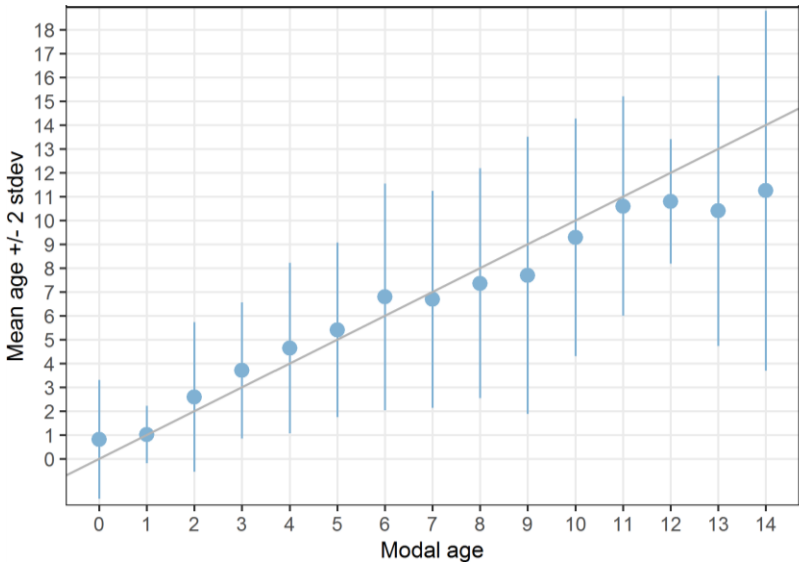


Figure 3.2: Age bias plot for advanced readers.

Age error matrices are calculated per area and only based on the age readings of the advanced readers.

Table 3.10: Age error matrix (AEM) for whole otolith readings. The AEM shows the proportional distribution of age readings for each modal age. Age column should sum to one but due to rounding there might be small deviations in some cases. Only advanced readers are used for calculating the AEM.

Modal age	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Age 0	0.55769	0.13488	-	-	0.00435	-	-	-	-	0.05714	-	-	-	-	-
Age 1	0.36538	0.74884	0.08088	0.00485	0.00435	0.015	-	0.02041	0.0303	-	-	-	-	-	-
Age 2	0.01923	0.07907	0.61029	0.08738	0.02609	0.02	-	-	-	-	-	-	-	-	-
Age 3	0.01923	0.03256	0.19853	0.52427	0.1	0.065	0.02062	0.04082	0.0303	0.02857	-	-	-	-	-
Age 4	0.01923	0.00465	0.07353	0.16505	0.48261	0.1	0.07216	0.14286	0.09091	0.02857	-	-	-	-	-
Age 5	-	-	0.01471	0.12136	0.09565	0.47	0.13402	0.04082	0.0303	0.05714	0.03571	-	-	-	-
Age 6	0.01923	-	-	0.04854	0.10435	0.14	0.39175	0.08163	0.09091	0.05714	0.14286	-	-	0.2	0.25
Age 7	-	-	-	0.01456	0.06957	0.07	0.12371	0.44898	0.09091	0.08571	0.07143	-	-	-	-
Age 8	-	-	-	0.01942	0.04348	0.04	0.07216	0.08163	0.42424	-	0.07143	0.2	-	0.1	-
Age 9	-	-	0.00735	0.00485	0.03044	0.045	0.06186	0.04082	0.06061	0.51429	0.03571	0.2	0.2	-	-
Age 10	-	-	0.00735	0.00971	0.01304	0.015	0.03093	0.04082	0.06061	0.14286	0.46429	-	0.2	0.1	-
Age 11	-	-	0.00735	-	0.02174	0.01	0.03093	0.02041	0.06061	0.02857	0.07143	0.4	0.2	0.2	0.25
Age 12	-	-	-	-	-	0.005	0.02062	0.02041	-	-	0.07143	-	0.4	-	-
Age 13	-	-	-	-	-	0.005	0.01031	0.02041	0.0303	-	-	-	-	0.4	-
Age 14	-	-	-	-	0.00435	-	0.02062	-	-	-	-	0.2	-	-	0.5
Age 15	-	-	-	-	-	-	0.01031	-	-	-	-	-	-	-	-
Age 17	-	-	-	-	-	-	-	-	-	-	0.03571	-	-	-	-

Table 3.11: Number of age readings (N), Coefficient of Variation (CV, %), Percentage Agreement (PA, %) and Relative Bias by modal age; (whole otoliths) for advanced readers.

Modal age	N	CV	PA	Relative bias
0	52	-	56	0.65
1	215	61	75	0.02
2	136	56	61	0.49
3	206	39	52	0.71
4	230	41	48	0.93
5	200	34	47	0.44
6	97	35	39	0.85
7	49	34	45	-0.29
8	33	33	42	-0.58
9	35	34	51	-1.20
10	28	26	46	-0.68
11	5	22	40	-0.40
12	5	12	40	-1.20
13	10	27	40	-2.60
14	4	34	50	-2.75
Total	1305			
Weighted mean		43	54	0.38

3.1.2 Sliced otoliths

3.1.2.1 All readers

The weighted average percentage agreement based on modal ages for all readers is 46 %, with a weighted average CV of 26 % and an APE of 18 % (Tables 3.12 - 3.14).

Table 3.12: Coefficient of Variation (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 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO	all
2	28	16	0	71	0	28	0	0	0	28	47	-	47	0	0	28	0	0	0	0	0	20	0	71	39
3	14	9	25	34	17	22	17	15	12	16	21	0	11	11	16	0	11	21	16	17	22	36	0	34	25
4	6	17	11	16	14	14	15	6	14	11	14	-	14	12	14	12	14	22	15	36	18	11	0	14	18
5	13	20	28	24	21	13	16	23	22	6	16	0	16	17	23	26	12	17	19	62	19	21	14	24	24
6	10	9	9	9	22	13	0	17	22	11	10	0	24	20	17	22	22	10	0	27	9	9	9	17	16
7	9	12	13	19	20	15	10	18	18	12	17	13	6	14	15	15	14	12	14	35	12	18	7	16	18
8	5	9	13	5	19	6	7	11	18	11	24	9	7	11	13	9	11	5	7	25	7	5	11	6	14
9	8	10	11	14	43	10	14	4	18	8	16	10	6	10	8	9	14	12	13	22	8	5	12	8	18
10	9	11	8	8	7	11	22	8	22	7	10	11	6	13	4	10	10	24	0	35	11	4	11	6	16
11	5	13	16	20	20	8	9	8	26	9	12	5	7	0	16	10	16	14	11	31	7	6	6	16	18
12	9	7	7	16	25	7	9	10	13	21	13	9	7	8	6	7	18	19	10	26	13	5	6	6	19
13	6	18	9	9	13	6	16	6	21	4	19	6	3	4	9	6	13	13	4	23	10	4	6	4	20
14	3	9	9	15	28	10	8	9	11	11	7	5	6	4	11	10	25	17	4	25	9	5	9	7	17
15	7	9	11	13	11	7	4	17	12	8	16	9	4	9	7	9	11	9	13	17	15	9	7	4	20
16	3	5	11	6	30	7	10	4	16	7	13	9	4	7	8	5	25	21	6	15	11	4	7	6	20
17	0	8	10	0	13	0	14	0	16	-	88	-	4	47	34	4	35	22	8	8	0	4	4	4	31
18	14	3	12	7	11	7	11	6	7	3	6	3	3	2	5	3	11	17	3	6	5	3	4	2	21
19	10	6	14	8	-	3	6	3	9	6	0	0	3	6	15	3	16	23	3	14	6	6	5	5	19
Weighted Mean	8	12	13	16	20	11	12	11	17	11	16	7	9	10	13	11	15	16	10	29	12	11	7	13	20

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 3.13: Percentage agreement (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 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO	all
2	50	0	0	0	100	50	100	0	100	50	50	-	50	100	0	50	0	100	0	0	100	0	100	0	43
3	75	12	29	12	75	62	75	50	88	57	57	100	88	88	12	100	88	25	17	12	50	38	100	50	56
4	94	61	65	67	56	72	44	94	61	83	65	-	72	76	56	72	72	61	47	11	67	50	100	56	65
5	70	36	27	36	30	33	33	64	64	91	73	100	44	45	45	45	55	55	56	9	82	9	73	55	50
6	67	67	67	67	67	50	0	33	67	33	67	0	0	33	67	67	67	67	100	0	67	33	67	67	52
7	61	56	33	33	33	55	45	39	39	61	22	46	73	44	50	67	39	56	36	17	56	44	78	56	47
8	83	0	67	83	0	40	40	83	50	83	67	50	60	83	67	50	50	83	60	17	67	83	83	67	60
9	44	67	33	44	0	56	44	89	11	78	22	25	44	56	78	56	11	56	33	0	67	78	67	78	48
10	50	33	67	17	0	40	20	33	33	50	17	75	60	50	83	17	0	17	100	0	33	83	50	67	41
11	44	44	22	11	0	38	12	44	11	12	33	67	62	100	33	44	0	33	50	0	44	56	67	44	36
12	67	33	33	33	0	71	12	44	0	33	22	29	71	44	67	56	0	33	50	0	56	67	44	56	38
13	40	50	33	33	0	50	17	83	0	40	17	50	83	67	33	67	0	0	33	0	17	50	83	67	38
14	86	43	0	43	0	33	33	57	0	29	43	0	17	71	57	71	0	57	50	0	57	29	57	43	38
15	33	33	33	33	0	0	67	33	0	67	33	33	67	33	33	33	0	0	33	0	33	33	33	0	28
16	67	50	17	67	0	67	0	67	0	33	50	75	67	50	0	67	0	17	33	0	50	33	83	33	38
17	100	50	0	0	0	0	50	100	0	-	50	-	50	0	0	50	0	0	0	0	0	50	50	50	27
18	40	60	20	60	0	20	20	60	0	33	0	80	60	80	0	0	0	0	40	0	20	60	60	20	31
19	67	67	33	33	-	33	0	33	0	0	0	100	33	0	33	67	0	33	67	0	33	33	33	33	31
Weighted Mean	65	45	35	40	23	49	34	61	32	55	39	56	60	60	46	59	29	42	45	6	54	48	73	53	46

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 3.14).

Table 3.14: 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	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO	all
2	0.5	2.5	1	0	0	0.5	0	2	0	0.5	-0.5	-	1	0	2	0.5	1	0	2	-1	0	1.5	0	0	-
3	0.25	0.88	1	0.75	-0.25	0.5	-0.25	0.5	-0.12	0.43	-0.43	0	0.12	0.12	1.12	0	0.12	-0.75	1	-0.88	0.25	0	0	-0.12	0.18
4	0.06	0.5	0.35	0.28	-0.44	0.33	-0.56	-0.06	-0.39	-0.06	-0.35	-1	0.33	-0.12	0.5	0.17	-0.06	-0.06	0.65	-1.61	-0.06	0.5	0	0.33	-0.03
5	0.4	1.09	1.73	0.91	-0.4	0.89	-0.44	0.82	0	-0.09	-0.18	0	0.44	0.27	1.09	0.55	0.27	0.45	0.78	-1.18	0.18	0.91	0.18	1	0.4
6	-0.33	0.33	0.33	0.33	-0.67	-0.5	-1	0	-0.67	-0.67	-0.33	-1	0	-1	0.67	-0.67	-0.67	-0.33	0	-1.67	0.33	0.67	0.33	0.67	-0.24
7	0.17	0.67	1.11	0.56	-1.28	0.73	-0.36	0.72	0	-0.28	-0.56	0.15	0.27	-0.11	0.83	0.39	-0.56	-0.06	0.18	-0.83	-0.06	1.11	0	0.72	0.15
8	-0.17	0.67	-0.17	0.17	-2.5	0.6	-0.6	-0.33	-1	-0.33	-1	-0.5	0.4	-0.33	-0.17	0.17	-0.67	-0.17	0.4	-2.17	-0.33	0.17	-0.33	0.33	-0.33
9	0.33	0	0.33	0.11	-4.33	0.67	-1	0.11	-1.78	-0.33	-1.11	0.25	0.56	-0.11	-0.33	0.33	-1.56	-0.67	1.11	-2.67	-0.44	0.22	0.33	0.33	-0.4
10	-0.67	-0.5	0.5	0.5	-3.8	0.4	-1	-0.33	-2.17	0.17	-1.5	-0.5	-0.4	-0.83	0.17	-0.17	-2.17	-1.67	0	-3.17	-0.5	-0.17	-0.33	0	-0.76
11	0.56	0.89	0.56	1.33	-4	0.88	-1.25	0.44	-2	-1.25	-0.78	0.33	0.5	0	0.44	0.56	-2.78	-0.44	0.88	-3.22	-0.11	0.56	-0.11	1.22	-0.28
12	0.11	0.56	-0.22	0.44	-5	0.14	-1.62	0.11	-3.78	-1.56	-1.89	0.29	0.14	-0.22	-0.44	0.33	-3.89	-1.78	0.25	-4.56	-1	0.11	-0.33	0.56	-0.97
13	0.2	1.83	-0.17	0.17	-6.5	0.67	-1.5	-0.33	-4.33	-0.6	-2.67	0	-0.17	0.33	-0.17	0.5	-4.17	-2.67	0.67	-5.33	-0.33	0.5	0.33	0.33	-0.97
14	0.14	0.57	-1.86	-0.43	-6.2	1.17	-0.5	0.14	-2.86	-1.29	-0.86	1.5	0.5	-0.29	0	0.71	-4.71	-1.14	0.5	-4.71	-0.86	0.43	0.14	0.86	-0.79
15	0	1.67	-1.33	0.67	-8.5	1.67	0.33	-0.33	-5.33	-0.67	-1.67	1.33	0.33	1.33	-1	1.33	-6	-1.67	0	-5	-0.67	1.33	1.33	1.33	-0.81
16	0.33	0.17	-1.67	0.17	-7.5	0.67	-1.83	0	-6.33	-1	-1.67	0.75	0	0	-1	0.5	-7	-2.83	1	-6.5	-1.17	0.83	0.5	1	-1.36
17	0	1	-3	-2	-11.5	1	-1.5	0	-8	-6	-6.5	-	0.5	-6.5	-2.5	0.5	-9	-7.5	0	-8.5	-2	0.5	0.5	0.5	-
18	0	0.4	-2	1	-9	1.8	-1.2	0.2	-8	-0.67	-2.6	-0.2	0.4	0.2	-0.6	1.4	-8.2	-3.2	0.6	-8.6	-1.2	0.4	0	0.8	-1.59
19	-1	-0.67	-2.67	-0.33	-9	0.67	-2	-0.67	-8	-2	-5	0	-0.67	-2	-2.67	-0.33	-9.67	-3.67	0.33	-8.33	-1	-1	0	1	-2.44
20	-1	0	-2	1	-12	-1	1	0	-9	-2	-4	0	-2	-1	-6	0	-11	-2	-2	-8	-3	-1	0	0	-2.71
21	0	-1	-1	-1	-17	0	3	0	-9	-3	-4	0	0	0	0	0	-10	-7	1	-9	0	-1	0	0	-2.46
22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-3	-1	-10	-5	-15	1	-1	0	-10	-3	-12	1	-1	1	-3	0	-12	-12	0	-11	-3	0	1	0	-4.08
Weighted Mean	0.08	0.6	-0.02	0.37	-3.49	0.66	-0.81	0.21	-2.28	-0.59	-1.29	0.15	0.23	-0.2	0.1	0.36	-2.51	-1.12	0.58	-3.2	-0.39	0.49	0.07	0.58	-0.48

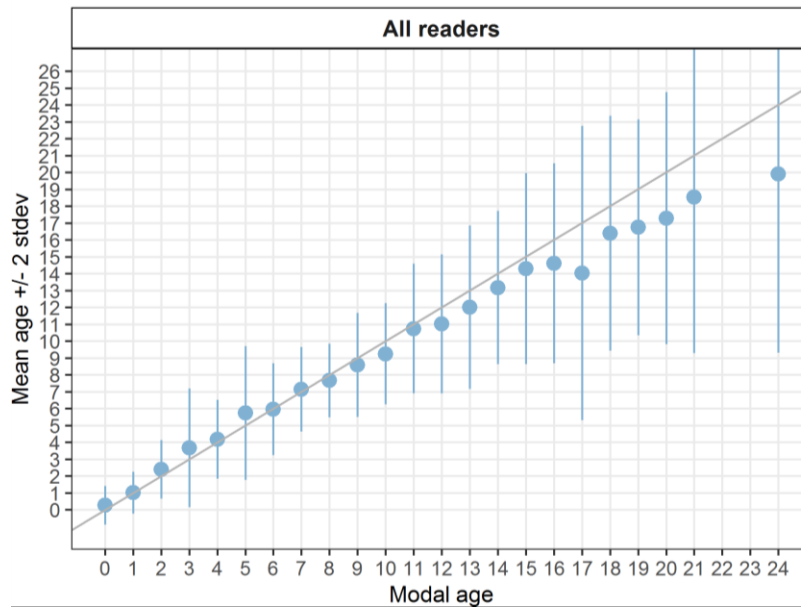


Figure 3.3: Age bias plot for all readers. Mean age recorded ± 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

For each pair that is being compared, the differences between the readings per image are found and the frequency of each occurring difference is obtained. A rank value is calculated for the positive and the negative differences (R+ and R- in the Guus Eltink sheet). The value with the smallest rank is then used to calculate a z-value that determines the level of bias (not clear from Guus Eltink sheet how the equations are defined).

Table 3.15: 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 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO
R04 NL	-	**	-	-	**	**	**	-	**	**	**	-	-	**	-	*	**	**	**	**	**	**	-	**
R06 ES	**	-	**	-	**	-	**	**	**	**	**	-	**	**	**	-	**	**	**	-	**	**	-	**
R08 PT	-	**	-	*	**	**	**	-	**	**	**	-	*	-	-	-	**	**	**	**	**	**	-	**
R10 ES	-	-	*	-	**	**	**	-	**	**	**	**	-	**	-	-	**	**	*	**	**	**	*	-
R12 IT	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	**	**
R16 IE	**	-	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	**	*
R18 IE	**	**	**	**	**	**	-	**	**	-	*	**	**	**	**	**	**	-	**	**	**	**	**	**
R20 ES	-	**	-	-	**	**	**	-	**	**	**	-	-	**	-	-	**	**	**	**	**	**	-	**
R22 GR	**	**	**	**	**	**	**	**	-	**	**	**	**	**	**	**	-	**	**	**	**	**	**	**
R26 IT	**	**	**	**	**	**	-	**	**	-	**	**	**	**	**	**	**	*	**	**	-	**	**	**
R28 IT	**	**	**	**	**	**	*	**	**	**	-	**	**	**	**	**	**	-	**	**	**	**	**	**
R34 FR	-	-	-	**	**	**	**	-	**	**	**	-	-	*	-	-	**	**	-	**	*	-	-	**
R36 NO	-	**	*	-	**	**	**	-	**	**	**	-	-	**	-	-	**	**	**	**	**	-	-	**
R38 GR	**	**	-	**	**	**	**	**	**	**	**	*	**	-	*	**	**	**	**	**	-	**	*	**
R40 PT	-	**	-	-	**	**	**	-	**	**	**	-	-	*	-	-	**	**	**	**	**	**	-	**
R44 DE	*	-	-	-	**	**	**	-	**	**	**	-	-	**	-	-	**	**	*	**	**	-	**	*
R48 GR	**	**	**	**	**	**	**	**	-	**	**	**	**	**	**	**	-	**	**	**	**	**	**	**
R50 ES	**	**	**	**	**	**	-	**	**	*	-	**	**	**	**	**	**	-	**	**	**	**	**	**
R52 DE	**	-	**	*	**	-	**	**	**	**	**	-	**	**	**	*	**	**	-	**	**	-	**	-
R56 GR	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	**	**
R60 IT	**	**	**	**	**	**	**	**	**	-	**	*	**	-	**	**	**	**	**	-	**	-	**	**
R62 ES	**	-	**	-	**	**	**	**	**	**	**	-	-	**	**	-	**	**	-	**	**	-	**	-
R68 FR	-	**	-	*	**	**	**	-	**	**	**	-	-	*	-	**	**	**	**	**	**	**	-	**
R70 NO	**	-	**	-	**	*	**	**	**	**	**	**	**	**	**	*	**	**	-	**	**	-	**	-
Modal age	-	**	-	**	**	**	**	*	**	**	**	-	**	-	-	**	**	**	**	**	**	**	-	**

Table 3.16: Number of age readings (N), Coefficient of Variation (CV, %), Percentage Agreement (PA, %) and Relative Bias by modal age, (sliced otoliths) for all readers.

Modal age	N	CV	PA	Relative Bias
2	46	39	43	0.59
3	183	25	56	0.17
4	411	18	65	0.01
5	247	24	50	0.42
6	67	16	52	-0.22
7	399	18	47	0.14
8	136	14	60	-0.34
9	211	18	48	-0.42
10	137	16	41	-0.75
11	206	18	36	-0.26
12	207	19	38	-0.99
13	140	20	38	-1.00
14	157	17	38	-0.83
15	71	20	28	-0.70
16	142	20	38	-1.39
17	45	31	27	-2.98
18	118	21	31	-1.61
19	70	19	31	-2.26
20	24	22	25	-2.71
21	24	25	46	-2.46
22	0	-	-	-
23	0	-	-	-
24	24	27	21	-4.08
Total	3065			
Weighted mean		20	46	-0.49

3.1.3 Advanced readers

All samples included

Table 3.17: Coefficient of Variation (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	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	all
2	22	13	0	50	0	33	0	35
3	16	14	24	31	13	27	13	25
4	14	20	25	13	14	20	17	21
5	7	10	14	10	17	13	17	16
6	43	47	25	54	9	49	55	43
7	8	13	20	23	22	20	12	20
8	46	35	28	43	23	46	49	42
9	8	5	9	14	18	5	14	18
10	15	11	16	15	46	9	11	25
11	13	22	11	20	28	22	21	23
12	3	6	10	20	28	7	13	21
13	14	12	6	13	14	11	15	23
14	6	15	7	11	13	10	10	21
15	12	14	16	0	17	7	11	23
16	0	0	0	0	38	4	0	21
17	7	7	10	9	40	5	0	22
18	14	3	14	5	10	5	9	21
19	10	8	12	5	-	3	14	16
20	-	-	-	-	-	-	-	35
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	30
Weighted Mean	15	16	16	19	20	18	17	24

Table 3.18: Percentage agreement (PA, %) per modal age and advanced reader, the PA of all advanced readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	all
2	33	0	0	33	100	33	100	43
3	57	14	17	29	86	71	86	52
4	79	63	67	74	58	68	47	65
5	88	62	62	50	29	50	38	55
6	67	17	17	50	67	25	25	39
7	62	69	46	46	46	86	29	54
8	56	30	80	80	10	56	22	48
9	50	80	50	60	0	75	38	51
10	71	29	57	57	0	33	33	40
11	50	50	50	38	17	43	25	40
12	88	50	38	25	0	71	14	42
13	17	67	83	50	0	33	33	40
14	75	33	33	78	0	44	33	44
15	40	60	40	100	0	0	0	39
16	100	100	0	100	0	67	0	52
17	67	67	0	33	0	0	100	38
18	50	50	25	75	0	25	25	36
19	67	33	33	33	0	67	0	37
20	0	100	100	100	0	0	0	43
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	0	100	0	0	0	0	100	29
Weighted Mean	63	51	47	57	27	53	37	48

Table 3.19: 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	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	all
2	0.67	2.33	1.00	0.00	0.00	1.00	0.00	0.71
3	0.43	1.00	1.17	0.86	-0.14	0.57	-0.14	0.53
4	0.16	0.58	0.61	0.32	-0.42	0.53	-0.42	0.19
5	-0.12	0.38	0.50	0.50	-0.86	0.25	-0.75	-0.02
6	1.50	2.83	2.67	2.67	-0.33	3.25	2.25	2.12
7	0.23	0.54	1.00	0.46	-1.15	0.57	-0.43	0.17
8	1.00	1.20	0.90	1.40	-2.40	1.89	0.33	0.62
9	-0.10	0.00	0.40	0.10	-3.44	0.25	-0.75	-0.51
10	-0.14	-0.29	0.43	0.71	-4.57	1.17	-1.17	-0.55
11	0.12	1.00	0.25	1.38	-3.83	1.14	-0.25	-0.03
12	0.12	0.25	-1.00	0.00	-5.14	0.14	-2.29	-1.13
13	0.67	1.00	-0.33	0.00	-6.17	0.83	-2.00	-0.86
14	0.12	1.33	-1.00	-0.67	-7.50	0.67	-0.89	-1.13
15	0.00	0.40	-1.80	0.00	-7.20	1.67	-0.67	-1.09
16	0.00	0.00	-1.00	0.00	-8.33	0.33	-2.00	-1.57
17	0.67	0.67	-2.33	-0.33	-8.00	2.00	0.00	-1.05
18	-0.50	0.50	-2.00	0.50	-8.75	1.25	-1.75	-1.54
19	-1.00	-0.33	-1.67	1.00	-11.00	0.33	-0.67	-1.90
20	1.00	0.00	0.00	0.00	-16.00	1.00	4.00	-1.43
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	-2.00	0.00	-9.00	-4.00	-14.00	2.00	0.00	-3.86
Weighted Mean	0.22	0.71	0.09	0.47	-3.40	0.87	-0.59	-0.25

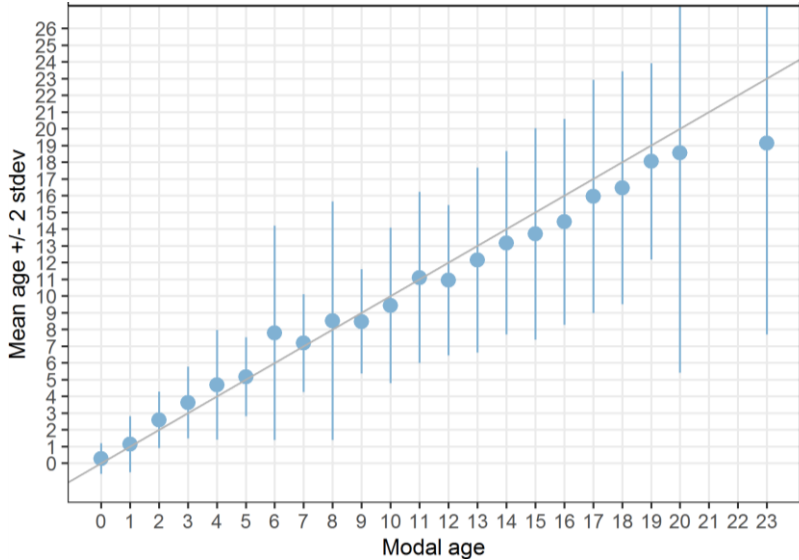


Figure 3.4: Age bias plot for advanced readers.

Age error matrices are calculated per area and only based on the age readings of the advanced readers.

Table 3.20: Age error matrix (AEM) for sliced otoliths. The AEM shows the proportional distribution of age readings for each modal age. Age column should sum to one but due to rounding there might be small deviations in some cases. Only advanced readers are used for calculating the AEM.

Modal age	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	23
Age 0	-	-	-	-	-	-	-	-	0.02128	-	-	-	-	-	-	-	-	-	-	-
Age 1	0.04762	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Age 2	0.42857	0.0625	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Age 3	0.33333	0.52083	0.13636	0.03636	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Age 4	0.14286	0.27083	0.65152	0.18182	-	0.05063	0.02985	0.01538	-	-	-	-	-	-	-	-	-	-	0.1429	-
Age 5	0.04762	0.125	0.13636	0.54545	0.07895	0.02532	0.04478	0.06154	-	-	0.03774	-	-	-	-	0.04762	-	-	-	-
Age 6	-	0.02083	0.04546	0.21818	0.39474	0.11392	0.07463	0.04615	0.10638	0.07547	0.03774	0.07143	0.0678	0.03226	0.09524	-	-	-	-	-
Age 7	-	-	0.02273	0.01818	0.21053	0.5443	0.14925	0.07692	0.02128	0.01887	0.01887	0.02381	0.01695	0.03226	-	-	-	-	-	-
Age 8	-	-	0.00758	-	0.05263	0.1519	0.47761	0.09231	0.12766	0.03774	0.03774	0.04762	0.01695	0.03226	-	-	0.03571	0.05263	-	-
Age 9	-	-	-	-	0.07895	0.03797	0.13433	0.50769	0.08511	0.03774	0.07547	0.02381	-	0.06452	-	-	0.03571	-	-	0.1429
Age 10	-	-	-	-	0.02632	0.03797	-	0.16923	0.40426	0.13208	0.11321	0.04762	0.01695	0.03226	-	0.04762	0.07143	-	-	-
Age 11	-	-	-	-	-	0.02532	-	0.03077	0.06383	0.39623	0.11321	0.07143	0.01695	-	0.04762	-	-	-	-	-
Age 12	-	-	-	-	0.02632	0.01266	-	-	0.10638	0.11321	0.41509	0.09524	0.10169	0.06452	-	0.04762	-	-	-	-
Age 13	-	-	-	-	-	-	-	-	0.06383	0.03774	0.09434	0.40476	0.13559	0.06452	-	0.04762	0.03571	-	-	-
Age 14	-	-	-	-	0.02632	-	-	-	-	0.0566	0.03774	0.07143	0.44068	0.06452	0.14286	-	0.03571	-	-	0.1429
Age 15	-	-	-	-	0.02632	-	-	-	-	0.01887	-	0.04762	0.11864	0.3871	0.14286	0.09524	0.07143	0.05263	-	-
Age 16	-	-	-	-	0.02632	-	0.01493	-	-	0.03774	0.01887	0.04762	0.01695	0.12903	0.52381	0.04762	0.03571	0.10526	-	-
Age 17	-	-	-	-	0.02632	-	-	-	-	0.01887	-	0.04762	-	0.03226	0.04762	0.38095	0.07143	0.05263	-	-
Age 18	-	-	-	-	0.02632	-	0.01493	-	-	0.01887	-	-	0.0339	0.03226	-	0.09524	0.35714	0.10526	-	-
Age 19	-	-	-	-	-	-	0.01493	-	-	-	-	-	-	0.03226	-	0.14286	0.10714	0.36842	-	0.1429
Age 20	-	-	-	-	-	-	0.01493	-	-	-	-	-	0.01695	-	-	0.04762	0.14286	0.15789	0.4286	-
Age 21	-	-	-	-	-	-	0.01493	-	-	-	-	-	-	-	-	-	-	0.10526	0.2857	0.1429
Age 22	-	-	-	-	-	-	0.01493	-	-	-	-	-	-	-	-	-	-	-	-	-
Age 23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2857
Age 24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1429	-
Age 25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1429

Table 3.21: Number of age readings (N), Coefficient of Variation (CV, %), Percentage Agreement (PA, %) and Relative Bias by modal age, (sliced otoliths) for advanced readers.

Modal age	N	CV	PA	Relative Bias
2	21	35	43	0.71
3	48	25	52	0.52
4	132	21	65	0.19
5	55	16	55	0.00
6	38	43	39	2.05
7	79	20	54	0.19
8	67	42	48	0.60
9	65	18	51	-0.48
10	47	25	40	-0.57
11	53	23	40	0.09
12	53	21	42	-1.06
13	42	23	40	-0.86
14	59	21	44	-0.83
15	31	23	39	-1.29
16	21	21	52	-1.57
17	21	22	38	-1.05
18	28	21	36	-1.54
19	19	16	37	-0.95
20	7	35	43	-1.43
21	0	-	-	-
22	0	-	-	-
23	7	30	29	-3.86
Total	893			
Weighted mean		24	48	-0.21

3.2 Results *Trachurus mediterraneus* (Event-ID 388)

3.2.1 All readers

The weighted average percentage agreement based on modal ages for all readers is 51 %, with a weighted average CV of 42 % and an APE of 30 % (Tables 3.22 - 3.23).

Table 3.22: Coefficient of Variation (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 ES	R06 IT	R08 IT	R10 GR	R14 IT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R66 GR	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	74	-	34	22	52	48	38	50	32	35	41	32	52	47	62
2	30	55	40	38	34	46	33	58	39	65	46	34	31	56	51
3	45	43	33	32	20	44	19	35	25	35	33	36	21	38	40
4	48	35	31	30	19	34	18	23	20	30	39	32	18	37	37
5	53	25	31	13	43	32	10	24	21	32	25	14	15	24	33
6	28	46	24	12	31	31	20	28	31	23	26	12	18	16	32
7	25	16	15	7	20	11	15	11	14	23	20	10	11	11	19
8	20	11	0	9	20	7	8	0	0	10	9	9	-	9	26
9	0	7	13	7	0	9	14	0	0	0	6	14	25	-	19
Weighted Mean	44	40	32	27	30	38	24	37	27	39	36	29	26	39	42

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 3.23: Percentage agreement (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 ES	R06 IT	R08 IT	R10 GR	R14 IT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R66 GR	all
0	100	89	100	100	75	12	0	25	100	0	0	100	57	89	62
1	61	48	81	96	30	48	9	43	91	78	61	91	26	41	58
2	63	22	50	65	63	59	24	27	70	65	47	73	61	62	54
3	59	26	55	61	68	26	16	36	61	48	20	58	79	32	46
4	50	38	43	69	77	38	47	25	47	25	29	62	66	34	47
5	20	30	50	80	60	50	50	43	40	30	40	80	44	50	48
6	38	12	50	88	67	38	25	40	50	12	12	88	29	14	40
7	60	20	80	80	70	60	50	67	40	40	60	60	50	40	55
8	50	0	0	50	50	0	50	100	100	0	50	50	0	50	41
9	100	50	0	0	100	0	50	0	100	0	0	50	0	0	33
Weighted Mean	58	33	57	73	63	42	27	36	65	45	36	72	56	45	51

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 3.24).

Table 3.24: 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	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R66 GR	all
0	0.00	0.11	0.00	0.00	0.25	0.88	1.56	0.75	0.00	1.00	1.00	0.00	1.00	0.11	0.48
1	0.00	-0.52	0.19	-0.04	0.61	0.70	1.70	0.79	-0.09	0.22	0.43	-0.09	0.70	0.41	0.36
2	-0.37	-0.62	-0.06	0.30	0.40	0.46	1.30	0.41	-0.11	0.86	1.00	0.30	0.53	0.89	0.38
3	-0.48	-0.77	0.00	0.29	0.39	1.29	1.45	1.00	0.06	1.10	1.43	0.39	0.21	1.65	0.57
4	-0.97	-1.03	-0.40	-0.03	0.07	0.84	0.75	0.33	-0.31	1.88	1.35	0.09	-0.28	0.78	0.22
5	-1.50	-1.10	-0.90	0.30	-0.80	0.60	0.50	0.71	-0.90	2.40	1.30	0.10	0.11	0.60	0.10
6	0.38	-1.50	0.12	-0.25	-0.83	1.75	0.50	2.20	-0.38	3.00	3.00	-0.25	-0.57	1.00	0.58
7	-0.80	-1.20	-0.40	0.00	-0.40	0.60	0.60	0.50	-0.90	1.80	0.90	0.00	-0.60	-0.40	-0.02
8	-1.00	-1.50	1.00	-0.50	-1.00	2.50	0.50	0.00	0.00	6.00	-0.50	-0.50	-3.00	-0.50	0.11
9	0.00	0.50	2.00	1.50	0.00	6.00	1.00	1.00	0.00	4.00	3.50	1.00	-0.50	3.00	1.64
Weighted Mean	-0.50	-0.78	-0.10	0.13	0.16	0.92	1.15	0.69	-0.21	1.38	1.19	0.15	0.17	0.81	0.37

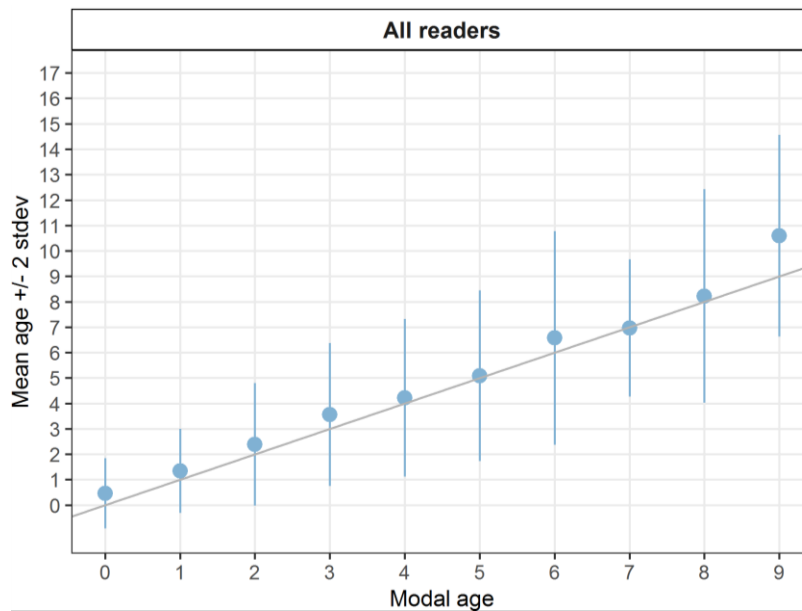


Figure 3.5: Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

For each pair that is being compared, the differences between the readings per image are found and the frequency of each occurring difference is obtained. A rank value is calculated for the positive and the negative differences (R+ and R- in the Guus Eltink sheet). The value with the smallest rank is then used to calculate a z-value that determines the level of bias (not clear from Guus Eltink sheet how the equations are defined).

Table 3.25: 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 ES	R06 IT	R08 IT	R10 GR	R14 IT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R66 GR
R02 ES	-	**	**	**	**	**	**	**	**	**	**	**	**	**
R06 IT	**	-	**	**	**	**	*	**	**	*	**	**	**	**
R08 IT	**	**	-	*	**	**	**	**	-	**	**	*	*	**
R10 GR	**	**	*	-	-	**	**	**	**	**	**	-	-	**
R14 IT	**	**	**	-	-	**	**	-	**	**	**	-	-	**
R28 ES	**	**	**	**	**	-	-	-	**	**	*	**	**	-
R30 PT	**	*	**	**	**	-	-	**	**	-	-	**	**	**
R32 PT	**	**	**	**	-	-	**	-	**	**	-	**	-	-
R40 GR	**	**	-	**	**	**	**	**	-	**	**	**	**	**
R42 ES	**	*	**	**	**	**	-	**	**	-	-	**	**	**
R44 ES	**	**	**	**	**	*	-	-	**	-	-	**	**	*
R54 GR	**	**	*	-	-	**	**	**	**	**	**	-	-	**
R60 IT	**	**	*	-	-	**	**	-	**	**	**	-	-	**
R66 GR	**	**	**	**	**	-	**	-	**	**	*	**	**	-
Modal age	**	**	-	-	**	**	**	**	**	**	**	-	*	**

Table 3.26: Number of age readings for all readers.

Modal age	N
0	115
1	310
2	494
3	407
4	423
5	136
6	105
7	136
8	27
9	27
Total	2180

3.2.2 Advanced readers

Table 3.27: Coefficient of Variation (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 ES	R06 IT	R08 IT	all
0	-	-	-	-
1	43	81	50	60
2	28	55	44	45
3	41	18	23	30
4	28	22	25	26
5	13	11	0	10
6	24	11	16	19
7	5	14	10	13
8	-	-	-	-
9	0	7	13	12
Weighted Mean	32	46	34	39

Table 3.28: Percentage agreement (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 ES	R06 IT	R08 IT	all
0	74	83	39	67
1	73	65	59	66
2	69	61	50	60
3	63	65	79	69
4	64	72	68	68
5	50	75	100	75
6	83	67	33	61
7	88	25	88	67
8	-	-	-	-
9	100	50	0	50
Weighted Mean	71	66	59	65

Table 3.29: Relative bias table 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	R02 ES	R06 IT	R08 IT	all
0	0.65	0.35	1.00	0.67
1	0.24	0.23	0.61	0.36
2	0.31	-0.03	0.77	0.35
3	-0.21	-0.35	0.37	-0.06
4	0.16	-0.32	0.32	0.05
5	-0.50	-0.25	0.00	-0.25
6	0.67	0.00	1.17	0.61
7	0.12	-1.12	0.25	-0.25
8	-	-	-	-
9	0.00	0.50	2.00	0.83
Weighted Mean	0.24	-0.04	0.61	0.27

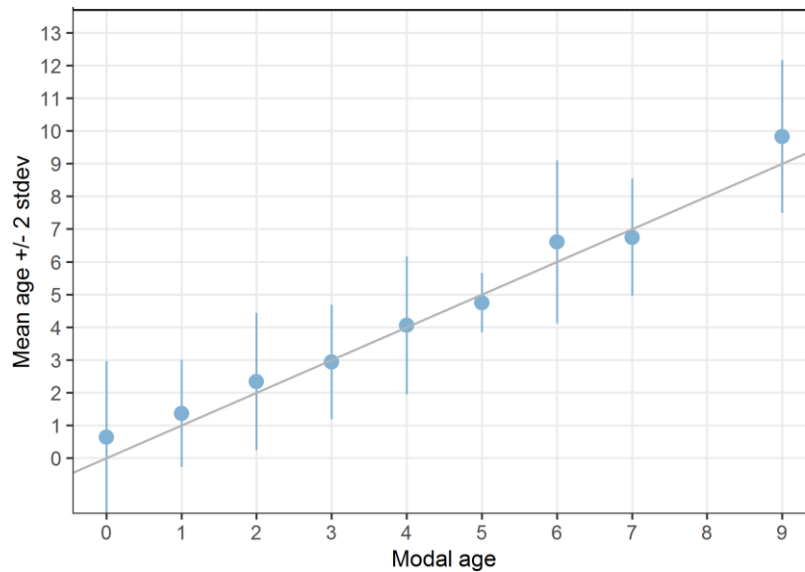


Figure 3.6: Age bias plot for advanced readers.

Age error matrices are calculated per area and only based on the age readings of the advanced readers.

Table 3.30: Age error matrix (AEM) for whole otoliths. The AEM shows the proportional distribution of age readings for each modal age. Age column should sum to one but due to rounding there might be small deviations in some cases. Only advanced readers are used for calculating the AEM.

Modal age	0	1	2	3	4	5	6	7	9
Age 0	0.67188	0.056	-	0.01724	-	-	-	-	-
Age 1	0.15625	0.656	0.12632	0.03448	0.02667	-	-	-	-
Age 2	0.07812	0.184	0.60000	0.13793	0.01333	-	-	-	-
Age 3	0.07812	0.088	0.15789	0.68966	0.13333	-	-	-	-
Age 4	-	0.008	0.07368	0.05172	0.68000	0.25	-	-	-
Age 5	-	0.008	0.02105	0.06897	0.04000	0.75	0.05556	0.12500	-
Age 6	0.01562	-	0.01053	-	0.06667	-	0.61111	0.12500	-
Age 7	-	-	0.01053	-	0.04000	-	0.16667	0.66667	-
Age 8	-	-	-	-	-	-	0.05556	0.04167	-
Age 9	-	-	-	-	-	-	0.05556	0.04167	0.5000
Age 10	-	-	-	-	-	-	0.05556	-	0.3333
Age 12	-	-	-	-	-	-	-	-	0.1667

Table 3.31: Number of age readings for all readers.

Modal age	N
0	64
1	125
2	95
3	58
4	75
5	12
6	18
7	24
8	0
9	6
Total	477

3.3 Results *Trachurus picturatus* (Event-ID 387)

3.3.1 All readers

The weighted average percentage agreement based on modal ages for all readers is 54 %, with a weighted average CV of 54 % and an APE of 36 % (Tables 3.32 - 3.33).

Table 3.32: Coefficient of Variation (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 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	63	49	71	33	-	23	36	39	65	68	53	27	23	86	40	35	61
2	44	34	18	45	-	81	45	34	39	18	41	92	49	31	38	47	58
3	34	29	40	20	41	35	31	20	26	22	36	38	25	21	16	21	40
4	8	34	16	0	47	56	18	0	16	11	13	21	22	16	34	18	36
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	44
Weighted Mean	48	41	48	31	43	42	36	32	48	43	44	44	30	56	35	34	54

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 3.33: Percentage agreement (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 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	all
0	100	100	100	100	100	0	0	0	0	100	0	0	100	100	33	0	53
1	61	81	66	88	6	94	72	39	47	66	75	91	94	56	61	31	64
2	56	19	88	62	6	12	62	56	50	88	50	19	44	62	69	50	50
3	40	40	60	60	50	30	20	22	30	60	40	0	80	50	80	25	43
4	0	20	50	100	60	0	33	0	67	83	17	17	83	50	20	17	39
5	0	0	0	100	0	0	100	100	100	0	0	0	100	0	0	100	38
6	0	0	0	100	0	0	100	100	0	0	0	0	0	0	-	100	27
7	-	0	0	0	0	0	100	100	100	0	0	0	0	0	-	0	21
Weighted Mean	51	54	67	79	20	50	57	39	46	70	53	47	77	56	61	34	54

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 3.34).

Table 3.34: 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	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	all
0	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.67	1.00	0.48
1	0.19	-0.19	-0.22	0.06	-0.94	0.06	0.28	0.74	0.31	-0.16	0.28	0.09	0.06	-0.31	0.42	0.79	0.09
2	0.50	-0.81	-0.12	0.12	-1.69	-1.19	0.12	0.62	0.75	0.00	0.50	-0.25	-0.25	-0.38	0.31	0.93	-0.05
3	1.40	-0.70	-0.60	0.20	-0.70	-0.90	1.20	1.33	0.70	0.00	1.30	1.80	-0.10	-0.50	0.00	1.25	0.36
4	2.50	-1.40	-0.50	0.00	-1.00	-2.50	1.00	1.00	0.00	-0.17	1.00	2.00	-0.33	-0.50	-0.60	1.67	0.14
5	1.00	-1.00	-1.00	0.00	-2.00	-2.00	0.00	0.00	0.00	-1.00	1.00	1.00	0.00	-1.00	-2.00	0.00	-0.44
6	2.00	1.00	-3.00	0.00	-3.00	-4.00	0.00	0.00	-1.00	-2.00	2.00	2.00	-1.00	-4.00	-	0.00	-
7	-	-2.00	-3.00	-3.00	-4.00	-5.00	0.00	0.00	0.00	-2.00	4.00	2.00	-1.00	-4.00	-	1.00	-
Weighted Mean	0.68	-0.51	-0.36	0.04	-1.13	-0.70	0.46	0.79	0.44	-0.16	0.66	0.53	-0.10	-0.47	0.23	0.95	0.11

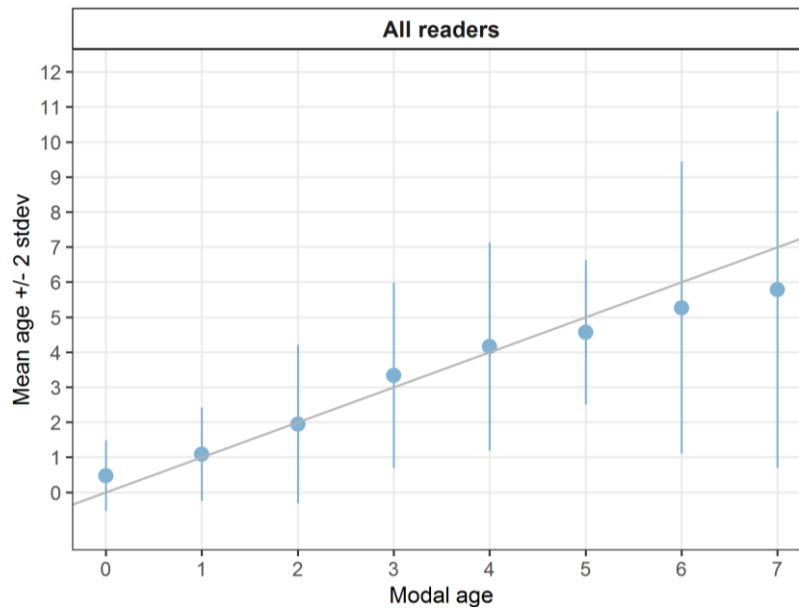


Figure 3.7: Age bias plot for all readers. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is the age difference between estimated mean age and modal age.

For each pair that is being compared, the differences between the readings per image are found and the frequency of each occurring difference is obtained. A rank value is calculated for the positive and the negative differences (R+ and R- in the Guus Eltink sheet). The value with the smallest rank is then used to calculate a z-value that determines the level of bias (not clear from Guus Eltink sheet how the equations are defined).

Table 3.35: 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 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES
R02 ES	-	**	**	**	**	**	-	-	-	**	-	-	**	**	*	-
R04 ES	**	-	-	**	**	-	**	**	**	**	**	**	**	-	**	**
R06 GR	**	-	-	**	**	*	**	**	**	**	**	**	*	*	**	**
R10 IT	**	**	**	-	**	**	**	**	**	*	**	**	-	**	-	**
R16 IT	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**
R20 PT	**	-	*	**	**	-	**	**	**	**	**	**	**	-	**	**
R30 ES	-	**	**	**	**	**	-	**	-	**	-	-	**	**	-	**
R32 PT	-	**	**	**	**	**	**	-	**	**	-	*	**	**	**	-
R34 PT	-	**	**	**	**	**	-	**	-	**	-	-	**	**	*	**
R44 GR	**	**	**	*	**	**	**	**	**	-	**	**	-	**	**	**
R46 ES	-	**	**	**	**	**	-	-	-	**	-	-	**	**	*	-
R48 ES	-	**	**	**	**	**	-	*	-	**	-	-	**	**	-	**
R50 IT	**	**	*	-	**	**	**	**	**	-	**	**	-	**	**	**
R60 GR	**	-	*	**	**	-	**	**	**	**	**	**	**	-	**	**
R66 IT	*	**	**	-	**	**	-	**	*	**	*	-	**	**	-	**
R70 ES	-	**	**	**	**	**	**	-	**	**	-	**	**	**	**	-
Modal age	**	**	**	-	**	**	**	**	**	-	**	**	-	**	*	**

Table 3.36: Number of age readings for all readers.

Modal age	N
0	47
1	506
2	254
3	157
4	92
5	16
6	15
7	14
Total	1101

3.3.2 Advanced readers

These results were not included in the report because only one reader was considered as an expert and comparison inter-readers was not possible.

3.4 Discussion

Based on the recommendations provided in the previous WKARHOM meetings, it was of great importance to use the same magnification when taking photos for the same “otolith set”, to be able to compare size and partial *annuli* radii. It was a source of age determination error (even intra-reader) repeatedly reported. However, the use of different magnitudes for pictures taken for the some “otolith sets” was observed.

The axis selected by coordinators for annotating each annulus was not always the preferred one that readers had chosen to mark them.

The assignment of the edge type constituted a critical point highlighted by some readers, due to its not easy recognition.

Regarding the Otolith Growth Analysis, although clear instructions were provided, some readers did not mark annuli at the end of the translucent ring. Therefore, distance measures and the subsequent analyses obtained using these data were not reliable.

Another problem was the low quality of some images, with low illumination or blurry, what should be carefully awarded when taking the photos.

Coordinators want to notice that some readers asked for the fish length data related to the otolith images, what has been pointed to be avoided during the age interpretation.

Finally, some issues were encountered with SmartDots outputs:

- when we use one strata for all samples for evaluating two preparation methods program does not work.
- plot of average distance from the centre to the winter rings is not divided into the two preparation methods making it unreadable.
- “Figure X: The relative bias by modal age as estimated by all age readers combined” is incorrect .
- Inability to edit files (e.g. image name or completely delete a file without enter all or part of filename) directly in the “Edit Event” page.

3.5 Conclusion

The exchange results showed a low value of percentage of agreement (PA) between 46.0 % and 54.0 % for the three *Trachurus* species. For all readers, the CV for *T. trachurus* was 45.0% for whole otoliths and a much lower value of 26.0% for sliced otoliths; for *T. mediterraneus* CV was 42.0 % and for *T. picturatus* it was 54.0 %.

Recommendations produced in the last workshop do not seem to have been considered by the different laboratories, both the ones related to the species assessment and the ones recently interested on the beginner readers training.

Lower agreement among readers was related to interpretation and ageing difficulties for older species and for the presence of multiple rings, mostly in *T. trachurus*. For age group 0 and 1, disagreement was correlated to the recognition of the first winter ring. In addition, lower agreement was notice in sample with poor quality image.

A workshop to again revise and agree the ageing criteria by the readers in charge is necessary.

4 References

- Beamish, R.J. and D.A. Fournier. 1981. A method for comparing the precision of a set of age determinations. *Canadian Journal of Fisheries and Aquatic Sciences*. Vol. 38: 982-983.
- Bolle, L.J., P. Abaunza, C. Albrecht, A. Dijkman-Dulkes, C. Dueñas, G. Gentschouw, H. Gill, G. Holst, A. Moreira, E. Mullins, I. Rico, S. Rijs, T. Smith, A. Thaarup and J. Ulleweit. 2011. *Report of the Horse Mackerel Exchange and Workshop 2006*. Ijmuiden. Centre for Fisheries Research.
- Eltink, A.T.G.W., A.W. Newton, C. Morgado, M.T.G. Santamaría and J. Modin. 2000. *Guidelines and Tools for Age Reading Comparisons. (PDF document version 1.0 October 2000)*. Online available at: <http://www.efan.no>. 62 pp.
- Fischer, W., G. Bianchi and W.B. Scott (eds.). 1981. *FAO species identification sheets for fishery purposes Eastern Central Atlantic; Fishery Areas 34, 47* (in part). Dep. of Fisheries and Oceans, Canada, by arrangement with the food and Agriculture Organisation of the United Nations. Ottawa, Canada. pag. var. pp.
- ICES. 1999. *Report of the horse mackerel otolith workshop. Lowestoft (UK), 15-19 January 1999*. Copenhagen.
- ICES. 2014. Report of the Workshop on Statistical Analysis of Biological Calibration Studies (WKSABCAL), 13-18 October 2014, Lisbon, Portugal. *ICES CM 2014/ACOM:35*.
- ICES. 2015. Report of the Workshop on Age reading of Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (*Trachurus trachurus*, *T. mediterraneus* and *T. picturatus*) (WKARHOM2), 26-30 October 2015, Santa Cruz de Tenerife, Canary Islands, Spain. *ICES CM SSGIEOM:14*.
- ICES. 2016. Report of the Workshop on Age Reading of horse mackerel (*Trachurus trachurus*), Mediterranean horse mackerel (*Trachurus mediterraneus*) and blue jack mackerel (*Trachurus picturatus*) (WKARHOM), 23-27 April 2012, Lisbon, Portugal. *ICES CM 2012/ACOM:54*.
- ICES. 2018. Workshop on Age reading of Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (*Trachurus trachurus*, *T. mediterraneus* and *T. picturatus*) (WKARHOM3), 5-9 November 2018. Livorno, Italy. *ICES CM 2018/EOSG:28*.
- ICES. 2020. Working Group on Biological Parameters (WGBIOP). *ICES Scientific Reports*. 2:117. 150 pp. <http://doi.org/10.17895/ices.pub.7651>
- Mahé, K., A. Jurado-Ruzafa, A. Garcia Guerreiro, A. Massaro, C. Dueñas, E. López, E. Mullins, L. Lanteri, M.J. Ferreira, R. Elleboode, A. Mannini, A. Antolinez, G. Delfs, L. Casciaro, M. O'Cuaig, P. Torres, A. Dijkman, E. Bellamy, K. Eriksen and P. Carbonara. 2015. *Report of the Horse Mackerel, Mediterranean Horse Mackerel and Blue Jack Mackerel (Trachurus trachurus, T. mediterraneus and T. picturatus) Otolith Exchange 2015*. IFREMER.

5 Annex 1. List of participants

Table 5.1: Participants list. Reader details: Expertise level is defined as *advanced* (Ad) if reader provides age data for assessment purposes, or *basic* (B) if not

Participant Surname, Name	Country	Institution	Expertise		
			<i>T. trachurus</i>	<i>T. mediterraneus</i>	<i>T. picturatus</i>
Acosta, Jesús	Spain	IEO, CSIC-Málaga	B	Ad	B
Anastasopoulou, Karina	Greece	HCMR	B	B	B
Bellodi, Andrea	Italy	UNICA	B	B	B
Casciaro, Loredana	Italy	COISPA	B	Ad	B
Cruz, Renato	Portugal	SGMP, DRP-Açores			B
Defruit, Geoffrey	France	IFREMER	B		
Díaz, Justine	Norway	IMR	B		
Dijkman, André	Netherlands	IMARES	Ad		
Dimitriadis, Giannis	Greece	FRI	B		
Dueñas, Clara	Spain	IEO, CSIC-Santander	Ad	B	B
El Habouz, Haou	Morocco	INRH	B		
Felicio, Maria	Portugal	IPMA	B	B	B
Ferreira, Maria João	Portugal	IPMA	Ad	B	B
Hemken, Gitta	Germany	Thünen Inst. SF	B		
Hernández, Eva	Spain	IEO, CSIC-Canarias			B
Jurado-Ruzafa, Alba	Spain	IEO, CSIC-Canarias			Ad
Legaki, Aglaia	Greece	HCMR	B	B	B
López, Eduardo	Spain	IEO, CSIC-Canarias	Ad	B	B
Maneiro, Iria	Spain	IEO, CSIC-Santander	B	B	B
Massaro, Andrea	Italy	APLYSIA	Ad	Ad	B
Meissner, Timo	Germany	Thünen Inst. SF	B		
Mullins, Eugene	Ireland	Marine Institute	Ad		
Nikiforidou, Vasiliki	Greece	HCMR	B	B	B
Pesci, Paola	Italy	UNICA	B	B	B
Rico, Iñaki	Spain	AZTI	B		
Russo, Loredana	Italy	CIBM	B		
Sioulas, Thanasis	Greece	FRI		B	
Telliez, Solene	France	IFREMER	B		
Tonheim, Susanne	Norway	IMR	B		
Valtierra, Javier	Spain	IEO, CSIC-Vigo	B		

6 Annex 3. Additional results

6.1 Results *T. trachurus* (Event-ID 362)

6.1.1 Whole otoliths, all readers

Data Overview

Table 6.1: Summary of statistics; PA (%), CV (%) and APE (%).

CV	PA	APE
44 %	47 %	31 %

Table 6.2: Data overview including modal age and statistics per sample.

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	Modal age	PA %	CV %	APE %
001L_122_08-08-20_ST.40 IONIO	122	U	08/08/20	20	0	1	1	1	0	-	1	0	0	0	1	0	0	2	-	1	0	1	-	0	0	1	-	1	1	1	1	50	100	91
001L_158_01-09-20_ST.1-AIGAIO-GSA 22	158	F	09/08/20	22	0	1	2	1	1	-	1	2	2	2	2	2	2	1	-	2	1	1	-	2	2	2	2	2	2	2	2	64	37	33
001L_250_27-07-20_IONIO	250	F	10/08/20	20	0	1	6	4	3	-	0	3	1	3	-	4	3	5	-	5	2	3	-	4	2	-	2	2	5	3	29	56	43	
001L_272_18-10-20_XALKIDA	272	F	11/08/20	22	6	8	7	8	4	-	6	4	5	2	4	6	3	8	-	5	3	7	-	5	3	4	4	7	-	4	27	35	30	
001R_191_16-06-20_IONIO(PATRA)	191	U	12/08/20	20	0	1	3	1	1	-	0	1	1	1	-	1	1	5	-	1	1	1	-	1	1	1	2	1	1	73	81	49		
001R_326_11-08-20_ST.46 IONIO	326	F	13/08/20	20	0	9	7	9	4	-	4	4	4	4	-	7	-	11	-	7	3	8	-	5	4	5	-	3	9	4	35	49	41	
002L_103_29-07-20_SALAMINA	103	F	14/08/20	22	0	1	1	1	0	-	0	0	0	1	-	0	0	1	-	0	0	1	-	0	0	0	1	0	0	0	68	-	-	
002L_154_20-08-20_ST.67 IONIO	154	F	15/08/20	20	1	1	2	1	1	-	1	1	1	1	-	1	1	4	-	1	1	2	-	1	1	1	-	1	5	1	81	75	49	
002L_267_10-11-20_IONIO	267	F	16/08/20	20	3	4	6	5	4	-	6	3	3	3	3	5	3	8	-	6	3	5	-	4	4	5	4	3	6	3	39	32	27	
002R_260_16-06-20_IONIO(PATRA)	260	M	17/08/20	20	1	5	5	5	5	-	5	3	4	4	4	5	4	8	-	4	2	5	-	4	4	6	5	5	6	3	5	39	32	23
002R_293_01-06-20_SARONIKOS	293	F	18/08/20	22	1	6	8	8	4	-	6	4	-	4	3	6	6	8	-	7	3	5	-	5	3	6	4	4	7	0	4	23	44	35
003L_105_12-08-20_ST.53 IONIO	105	U	19/08/20	20	0	1	1	1	0	-	0	0	0	0	0	0	0	1	-	0	0	1	-	0	0	0	-	0	1	0	0	73	-	-
003L_205_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	205	M	20/08/20	22	3	2	4	3	3	-	4	2	3	3	3	2	4	-	3	2	2	-	2	3	3	-	3	4	-	3	52	24	18	
003L_255_16-06-20_IONIO(PATRA)	255	F	21/08/20	20	6	7	6	7	5	-	6	4	4	5	5	5	7	-	5	3	7	-	4	5	6	-	6	7	3	5	32	23	19	
004L_150_12-08-20_ST.57 IONIO	150	F	22/08/20	20	0	1	1	1	0	-	0	0	0	0	-	0	0	3	-	0	0	1	-	1	0	1	1	0	2	0	0	59	-	-
004L_259_27-07-20_IONIO	259	F	23/08/20	20	5	1	6	5	5	-	0	3	1	4	-	5	4	6	-	5	3	4	-	4	4	5	3	4	6	0	4	27	48	37
005L_205_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	205	F	24/08/20	22	4	2	4	3	3	-	4	3	3	3	3	3	2	4	-	3	2	2	-	3	4	3	4	3	4	2	3	48	24	18
005L_291_01-06-20_SARONIKOS	291	M	25/08/20	22	-	7	9	9	3	-	7	4	4	4	-	5	5	11	-	6	3	7	-	6	3	7	-	4	10	3	3	20	42	35
006L_101_29-07-20_SALAMINA	101	F	26/08/20	22	1	1	1	1	-	-	0	0	0	1	-	0	0	1	-	1	0	1	-	0	0	0	-	0	0	0	60	-	-	
006L_141_13-08-20_ST.55 IONIO	141	F	27/08/20	20	1	1	0	1	0	-	1	0	0	1	1	0	0	3	-	1	0	1	-	0	0	1	-	1	2	0	0	45	-	-
006L_154_01-09-20_ST.1-AIGAIO-GSA 22	154	F	28/08/20	22	2	1	1	2	2	-	1	2	2	2	2	2	3	-	2	1	2	-	2	2	2	2	2	2	2	2	2	77	25	17
006L_257_05-10-20_IONIO	257	F	29/08/20	20	3	4	5	4	4	-	5	3	4	4	5	5	4	8	-	5	2	4	-	4	4	4	4	4	5	4	4	57	26	17
006L_257_10-11-20_IONIO	257	M	30/08/20	20	4	6	6	4	4	-	4	3	4	3	3	3	3	9	-	3	3	5	-	4	3	4	4	3	6	3	3	43	36	25
006R_331_01-06-20_SARONIKOS	331	F	31/08/20	22	3	8	8	10	5	-	7	5	4	4	3	7	7	11	-	6	5	8	-	5	3	6	5	7	8	-	5	23	36	29
007L_229_15-06-20_SARONIKOS	229	F	01/09/20	22	3	3	4	3	3	-	3	3	3	3	3	4	3	8	-	3	2	3	-	3	3	4	-	3	4	3	3	73	34	19
007L_266_06-10-20_IONIO	266	U	02/09/20	20	4	8	7	6	4	-	5	4	5	5	5	6	5	9	-	6	3	5	-	5	5	6	-	5	7	4	5	41	26	20
008L_199_05-10-20_IONIO	199	F	03/09/20	20	7	1	4	5	5	-	2	2	1	3	-	1	2	8	-	5	1	3	-	2	-	5	-	7	7	2	2	25	64	55
008L_256_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	256	F	04/09/20	22	3	4	3	5	2	-	5	3	3	2	-	5	3	4	-	4	2	2	-	3	4	4	-	4	5	0	3	29	38	30
008L_259_06-10-20_IONIO	259	F	05/09/20	20	-	9	7	6	5	-	6	5	5	3	-	4	4	10	-	6	3	6	-	5	5	6	-	6	8	1	6	30	38	27
009L_291_01-06-20_SARONIKOS	291	M	06/09/20	22	-	2	10	11	3	-	5	5	4	3	-	10	5	9	-	7	4	7	-	5	3	9	5	4	8	4	5	24	46	39
009L_306_06-10-20_IONIO	306	F	07/09/20	20	-	9	8	10	5	-	7	4	4	4	2	8	6	10	-	8	4	7	-	4	2	6	-	5	6	2	4	24	43	36
009R_203_10-08-20_ST.59 IONIO	203	F	08/09/20	20	-	6	5	6	4	-	3	2	2	5	-	6	2	8	-	3	2	5	-	2	2	5	-	5	7	2	2	35	47	41
010L_106_12-08-20_ST.53 IONIO	106	U	09/09/20	20	0	1	0	1	0	-	0	0	0	0	0	0	1	-	0	0	1	-	0	0	0	-	0	1	0	0	0	77	-	-
010L_306_10-11-20_IONIO	306	F	10/09/20	20	-	7	9	11	4	-	7	5	4	3	-	5	5	10	-	7	4	7	-	5	2	7	-	3	8	0	7	25	48	39
011L_140_13-08-20_ST.55 IONIO	140	F	11/09/20	20	0	1	2	1	0	-	0	1	0	1	1	0	0	3	-	1	1	1	-	0	0	1	1	1	1	0	1	52	102	78
011L_201_10-08-20_ST.59 IONIO	201	F	12/09/20	20	5	8	4	7	3	-	3	2	3	2	2	7	2	5	-	7	2	6	-	2	3	4	4	2	6	2	2	35	51	43
011L_217_06-10-20_IONIO	217	F	13/09/20	20	3	3	4	3	3	-	3	3	3	3	3	3	3	7	-	3	2	3	-	3	3	4	4	3	4	3	74	28	17	
011L_276_01-06-20_SARONIKOS	276	M	14/09/20	22	4	4	8	14	4	-	4	4	4	4	3	4	4	8	-	6	3	4	-	4	3	5	5	4	5	4	4	57	49	30
012L_151_29-08-20_ST.14-ARGOSARWNIKOS	151	M	15/09/20	22	2	2	3	2	1	-	3	1	2	1	-	1	1	6	-	2	1	2	-	1	2	1	3	1	2	1	1	45	63	42
012L_201_10-08-20_ST.59 IONIO	201	F	16/09/20	20	7	7	4	8	3	-	3	2	3	2	-	7	2	9	-	3	2	6	-	2	3	4	-	2	7	-	2	30	55	49
013R_132_13-08-20_ST.55 IONIO	132	F	17/09/20	20	0	1	1	1	0	-	0	1	0	1	0	0	0	3	-	0	1	1	-	0	0	0	1	1	1	0	0	52	-	-
014L_205_10-08-20_ST.59 IONIO	205	M	18/09/20	20	3	3	4	3	2	-	3	3	3	2	2	3	2	6	-	3	2	4	-	3	3	4	3	2	6	-	3	50	36	24
014R_52_05-08-20_ST.2-ARGOSARWNIKOS	52	U	19/09/20	22	1	1	0	1	0	-	0	0	0	0	1	0	0	1	-	0	0	1	-	0	0	1	1	0	0	0	0	65	-	-
015R_272_01-06-20_SARONIKOS	272	F	20/09/20	22	4	4	7	6	4	-	5	4	3	3	4	5	4	8	-	5	3	5	-	4	2	5	5	4	6	3	4	35	31	24
017L_102_29-07-20_SALAMINA	102	F	21/09/20	22	1	1	1	1	0	-	0	0	0	1	-	0	0	1	-	0	0	1	-	0	0	0	1	0	0	-	0	62	-	-
018R_57_05-08-20_ST.2-ARGOSARWNIKOS	57	U	22/09/20	22	0	1	0	1	-	-	0	0	0	0	-	0	0	1	-	0	0	1	-	0	0	1	1	0	0	0	0	71	-	-
019L_100_12-08-20_ST.53 IONIO	100	U	23/09/20	20	0	1	0	1	0	-	0	0	0	0	0	0	0	2	-	0	0	1	-	0	0	0	1	1	1	0	0	70	-	-
019R_203_31-08-20_ST.22-ARGOSARWNIKOS	203	F	24/09/20	22	3	4	4	4	3	-	3	2	3	3	3	3	3	6	-	3	2	3	-	2	3	4	-	3	4	2	3	55	29	20
020L_276_01-06-20_SARONIKOS	276	F	25/09/20	22	5	5	6	9	4	-	6	4	4	4	4	5	4	9	-	6	3	5	-	4	4	6	5	4	6	4	4	43	30	22
020R_52_05-08-20_ST.2-ARGOSARWNIKOS	52	U	26/09/20	22																														

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	Modal age	PA %	CV %	APE %
10_1.5x8	255	F	08/10/20	27.9.a	4	6	-	5	-	5	6	3	3	3	5	5	5	6	-	5	3	3	-	3	5	5	5	4	3	1	5	41	31	26
11	160	F	09/10/20	11.1	2	2	3	2	1	1	2	1	2	1	1	1	1	3	-	1	1	1	2	1	2	1	2	1	2	1	1	56	43	38
11_1.5x8	235	F	10/10/20	27.9.a	5	5	5	5	2	-	3	4	4	4	4	5	3	5	-	5	3	3	-	4	5	6	4	4	2	3	5	35	26	21
12	216	F	11/10/20	11.1	2	2	4	2	2	3	2	2	3	2	3	2	3	-	2	2	5	3	2	3	2	2	2	2	2	2	60	31	25	
12_1.5x8	122	U	12/10/20	27.9.a	4	3	3	3	2	2	3	3	3	2	4	5	1	5	-	2	2	3	-	3	4	3	4	2	3	3	46	33	22	
13	134	F	13/10/20	11.1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	96	21	8	
13_1.5x8	181	M	14/10/20	27.9.a	3	3	4	3	2	3	3	3	3	2	4	5	2	5	-	3	2	3	-	3	4	4	3	2	3	3	54	27	19	
14	217	M	15/10/20	11.1	1	3	4	3	2	4	1	2	4	3	4	3	3	3	-	4	2	3	3	2	3	4	-	3	3	3	50	30	21	
14_1.5x8	213	F	16/10/20	27.9.a	5	5	5	4	3	4	4	3	4	3	4	5	3	5	-	4	3	4	-	3	4	4	5	3	4	3	4	42	20	16
15	207	M	17/10/20	11.1	2	2	3	2	2	2	1	2	4	2	2	2	2	3	-	2	2	2	2	2	3	2	2	2	2	2	76	26	18	
15_1.5x8	265	M	18/10/20	27.9.a	9	9	-	9	-	-	8	9	7	8	-	10	-	-	-	8	8	9	-	9	7	8	-	6	7	-	9	38	13	10
16	207	M	19/10/20	11.1	2	2	4	3	2	2	2	2	2	4	2	3	3	2	3	-	3	2	2	4	2	4	3	2	2	2	56	31	27	
17	136	M	20/10/20	11.1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	-	1	1	1	1	1	1	1	-	1	1	1	96	20	8	
18	189	M	21/10/20	11.1	2	2	2	2	2	2	1	2	2	2	2	2	2	2	-	2	2	2	2	2	2	2	-	1	2	2	92	15	8	
19	150	M	22/10/20	11.1	1	1	2	1	1	2	1	2	2	2	2	2	1	2	-	2	1	1	2	2	2	1	3	1	2	2	56	35	31	
2	213	F	23/10/20	11.1	3	2	3	3	2	3	2	2	3	3	3	2	3	-	3	2	2	3	2	3	2	-	3	2	2	3	54	20	20	
2_1.5x8	155	F	24/10/20	27.9.a	1	1	2	1	1	2	1	1	1	1	2	1	1	2	-	1	1	1	-	1	1	1	2	1	2	1	75	35	30	
20	165	M	25/10/20	11.1	2	1	1	1	1	2	1	1	2	1	2	2	1	2	-	1	1	1	2	1	2	1	3	1	2	2	56	40	36	
21	180	M	26/10/20	11.1	1	2	3	2	2	3	1	2	3	2	3	4	2	3	-	3	2	2	3	2	3	2	3	3	2	2	44	29	25	
22	239	M	27/10/20	11.1	3	3	4	2	3	3	2	2	-	3	3	3	3	4	-	3	2	2	3	2	3	3	2	3	2	3	58	22	18	
23	140	M	28/10/20	11.1	0	1	1	1	1	2	1	0	2	0	1	1	1	2	-	0	0	1	-	0	2	0	0	1	1	0	1	46	91	75
24	152	M	29/10/20	11.1	2	2	3	1	2	2	1	2	3	2	2	2	2	2	-	2	2	2	2	1	3	2	2	2	2	2	76	25	12	
25	318	M	30/10/20	11.1	1	12	7	9	7	5	5	4	7	5	7	7	6	4	-	8	4	8	9	4	5	6	-	4	5	3	4	21	40	31
26	195	M	31/10/20	11.1	3	1	4	4	2	4	2	1	3	2	4	4	1	4	4	3	1	3	4	1	4	3	2	3	4	2	4	38	42	36
27	112	U	01/11/20	11.1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	-	1	0	1	1	1	1	0	1	1	1	1	88	38	24	
28	115	U	02/11/20	11.1	1	1	1	0	1	1	0	0	1	0	0	1	0	1	-	0	0	0	-	0	1	0	1	0	1	0	0	54	-	-
29	105	U	03/11/20	11.1	0	1	1	1	0	1	0	0	0	0	0	1	0	1	-	0	0	0	1	0	1	0	1	0	0	0	0	64	-	-
3	142	F	04/11/20	11.1	1	1	1	1	1	1	0	0	1	0	1	1	1	1	3	1	0	1	1	1	1	1	-	1	1	0	1	76	68	40
3_1.5x8	202	M	05/11/20	27.9.a	2	2	3	2	2	3	2	2	2	2	2	4	3	3	-	3	2	2	-	3	2	3	-	2	2	2	65	24	21	
30	95	U	06/11/20	11.1	0	1	1	1	0	1	0	0	0	0	0	1	0	1	-	0	0	1	0	1	0	0	0	0	0	0	0	68	-	-
4	205	F	07/11/20	11.1	3	3	3	3	3	3	2	3	3	3	3	3	3	3	-	3	3	3	3	2	3	3	-	3	3	3	92	10	5	
4_1.5x8	265	F	08/11/20	27.9.a	4	6	5	5	4	5	5	4	5	4	5	5	6	7	-	6	3	6	-	5	5	6	5	5	4	5	50	18	12	
5	195	F	09/11/20	11.1	2	2	2	2	2	2	2	2	2	2	3	2	2	2	-	2	2	2	2	2	2	-	2	2	2	2	96	10	4	
5_1.5x8	252	F	10/11/20	27.9.a	4	4	4	4	3	4	4	4	3	3	3	4	5	-	5	3	4	-	4	3	5	4	4	4	4	4	58	17	13	
6	162	F	11/11/20	11.1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	1	1	-	1	1	1	1	96	20	8	
6_1.5x8	192	M	12/11/20	27.9.a	1	2	3	2	1	2	-	2	2	1	2	2	2	3	-	2	1	2	-	2	2	2	2	1	1	1	2	61	34	27
7	153	F	13/11/20	11.1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	-	1	1	1	100	0	0	
7_1.5x8	152	U	14/11/20	27.9.a	1	1	2	1	1	1	-	1	1	1	1	1	1	1	2	-	1	1	1	-	2	1	1	2	1	1	83	33	24	
8	312	F	15/11/20	11.1	4	7	8	5	5	5	4	4	5	5	6	5	5	4	-	6	4	8	5	4	5	8	5	4	7	2	5	40	28	21
8_1.5x8	163	M	16/11/20	27.9.a	1	1	3	1	1	1	1	1	1	1	1	1	1	1	3	-	1	1	1	-	1	1	1	1	1	1	1	88	49	30
9	272	F	17/11/20	11.1	-	6	6	4	4	5	2	3	4	3	5	5	5	5	-	5	3	5	5	3	4	6	-	4	5	-	5	41	25	21
9_1.5x8	205	M	18/11/20	27.9.a	3	2	3	2	1	2	-	2	2	1	2	3	2	4	-	2	1	2	-	2	3	2	4	2	3	2	57	36	28	
DESTT020920_11	370	U	19/11/20	27.9	11	12	10	12	9	-	11	10	8	7	11	12	12	13	-	12	7	13	-	10	12	10	-	11	12	4	12	32	22	16
DESTT020920_1b	359	U	20/11/20	27.9	6	11	10	10	7	-	9	5	5	-	8	9	7	8	-	9	5	9	-	4	6	6	-	5	9	4	9	24	30	26
DESTT020920_6	432	U	21/11/20	27.9	6	14	14	11	-	-	12	5	7	4	8	10	13	13	-	14	5	14	-	5	6	6	-	6	15	5	5	19	43	39
DESTT020920_9	370	U	22/11/20	27.9	-	9	10	9	6	-	7	4	4	3	5	7	9	11	-	10	5	11	-	4	6	5	-	6	7	4	4	19	37	32
DESTT090920_7	159	U	23/11/20	27.9	2	2	3	1	1	-	1	2	1	1	1	1	1	6	-	1	1	2	-	2	2	1	2	1	1	1	61	69	46	
GBD_19_B47_C1_O_0003	321	U	24/11/20	7	-	7	6	5	5	6	7	4	4	5	2	4	5	4	-	6	5	6	7	4	5	3	-	4	6	3	4	26	27	22
GBD_19_B47_C1_O_0030	297	U	25/11/20	7	7	9	6	5	5	7	8	4	5	3	4	7	7	6	-	4	5	8	4	6	6	-	4	8	-	4	23	28	24	
GBD_19_B47_C1_O_0031	265	U	26/11/20	7	5	9	5	3	3	4	6	3	4	2	3	5	4	4	-	3	3	4	8	3	4	5	-	4	5	-	3	30	38	27
GBD_19_B47_C1_O_0035	272	U	27/11/20	7	-	11	6	5	4	7	6	3	4	1	3	7	4	6	-	6	3	4	17	3	3	7	-	3	8	2	3	26	64	45
GBD_19_B47_C1_O_0042	234	U	28/11/20	7	3	9	4	4	2	2	3	3	3	1	2	5	2	4	-	3	2	4	7	3	2	2	-	2	5	2	2	38	55	40
GBD_19_B47_C1_O_0043	228	U	29/11/20	7	4	10	3	3	3	3	5	3	3	1	2	4	2	5																

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	Modal age	PA %	CV %	APE %
GBD_19_B47_C1_O_0083	278	U	11/12/20	7	5	7	6	7	4	-	5	5	4	2	3	6	5	5	-	6	5	5	-	4	4	8	-	3	10	3	5	32	36	26
GBD_19_B47_C1_O_0084	269	U	12/12/20	7	4	5	6	6	3	-	4	3	3	1	3	4	3	5	-	4	3	3	-	3	3	4	-	3	5	2	3	45	33	27
GBD_19_B47_C1_O_0085	288	U	13/12/20	7	-	7	8	7	4	-	5	4	4	2	3	6	5	6	-	6	4	4	-	4	3	8	-	3	8	2	4	29	39	33
GBD_19_B47_C1_O_0086	248	U	14/12/20	7	4	7	4	5	4	-	5	4	4	4	3	4	4	6	-	5	4	4	-	4	6	4	-	3	7	4	4	59	24	19
GBD_19_B47_C1_O_0087	264	U	15/12/20	7	4	6	6	4	3	-	4	3	4	2	3	3	4	6	-	4	3	4	-	3	4	4	-	3	5	3	4	41	28	21
GBD_19_B47_C1_O_0088	313	U	16/12/20	7	5	11	10	7	4	-	7	5	4	4	4	7	5	7	-	8	3	6	-	5	4	6	5	3	7	3	4	22	38	30
GBD_19_B48_C1_O_0001	257	U	17/12/20	7	3	10	4	7	3	-	4	3	3	2	3	4	3	7	-	4	3	3	-	3	4	3	4	3	7	2	3	48	48	33
GBD_19_B48_C1_O_0002	255	U	18/12/20	7	3	6	5	5	2	-	2	3	2	1	2	2	2	5	-	3	2	3	-	3	2	2	-	2	6	2	2	50	50	38
GBD_19_B48_C1_O_0005	244	U	19/12/20	7	4	5	4	6	3	-	3	3	3	2	2	4	3	6	-	4	3	3	-	3	3	4	-	3	6	2	3	45	34	27
GBD_19_B48_C1_O_0007	235	U	20/12/20	7	4	5	4	6	3	-	2	3	3	2	2	4	3	5	-	4	3	3	-	3	3	5	4	3	6	2	3	39	34	28
GBD_19_B48_C1_O_0009	237	U	21/12/20	7	3	5	3	5	3	-	2	3	3	2	2	4	3	5	-	4	3	3	-	3	3	4	4	3	4	3	3	52	26	21
GBD_19_B48_C1_O_0015	244	U	22/12/20	7	3	5	3	7	2	-	3	3	3	2	2	4	3	6	-	4	3	3	-	3	3	4	-	3	5	3	3	55	36	27
GBD_19_B48_C1_O_0016	248	U	23/12/20	7	4	6	4	6	3	-	3	3	4	2	3	4	4	5	-	4	3	4	-	4	4	4	5	3	5	3	4	43	25	18
GBD_19_B48_C1_O_0017	257	U	24/12/20	7	4	6	4	5	3	-	3	3	4	2	3	4	3	5	-	4	3	3	-	3	3	4	-	3	5	3	3	50	26	22
GBD_19_B48_C1_O_0020	222	U	25/12/20	7	4	5	5	7	3	-	3	4	3	2	3	4	3	6	-	5	3	3	-	4	3	5	-	3	6	4	3	41	32	25
GBD_19_B48_C1_O_0027	259	U	26/12/20	7	5	5	5	6	3	-	2	4	3	3	3	3	3	6	-	5	3	4	-	4	3	4	-	3	6	3	3	45	30	26
GBD_19_B48_C1_O_0033	221	U	27/12/20	7	3	4	3	6	3	-	2	3	3	2	2	4	3	5	-	3	3	3	-	3	3	6	-	3	5	3	3	59	33	25
GBD_19_B48_C1_O_0036	242	U	28/12/20	7	5	4	4	8	3	-	2	3	3	2	3	3	3	6	-	4	2	4	-	3	3	7	-	3	7	3	3	45	44	33
GBD_19_B48_C1_O_0037	239	U	29/12/20	7	5	4	4	7	3	-	3	4	3	2	3	5	4	6	-	5	3	3	-	4	4	5	-	3	5	3	3	36	30	23
GBD_19_B48_C1_O_0038	239	U	30/12/20	7	3	3	3	6	2	-	2	3	3	2	2	4	3	5	-	4	2	2	-	3	3	4	-	3	4	3	3	45	33	24
GBD_19_B48_C1_O_0039	230	U	31/12/20	7	3	4	4	6	2	-	2	4	3	2	2	5	3	5	-	4	2	3	-	4	4	5	-	3	5	3	3	27	33	28
GBD_19_B48_C1_O_0043	226	U	01/01/21	7	4	4	4	4	2	-	2	3	3	2	2	4	3	5	-	4	2	3	-	4	4	4	4	3	4	3	4	48	26	23
GBD_19_B48_C1_O_0044	231	U	02/01/21	7	3	5	3	4	2	-	2	3	2	2	3	3	3	6	-	3	2	3	-	4	3	3	-	3	4	2	3	50	33	22
GBD_19_B48_C1_O_0045	231	U	03/01/21	7	2	5	5	5	3	-	2	3	2	2	2	3	3	6	-	4	3	2	-	3	3	3	-	3	5	2	3	41	38	30
GBD_19_B48_C1_O_0046	235	U	04/01/21	7	3	5	3	5	3	-	3	4	3	2	2	3	3	6	-	4	3	3	-	4	3	4	-	3	5	3	3	55	27	22
GBD_19_B48_C1_O_0048	237	U	05/01/21	7	4	4	4	6	2	-	2	3	3	2	3	4	3	6	-	4	3	3	-	3	3	4	3	3	4	2	3	43	32	24
GBD_19_B48_C1_O_0049	265	U	06/01/21	7	4	5	6	5	3	-	2	4	2	2	3	5	3	6	-	5	3	3	-	4	3	5	-	3	5	2	3	32	35	30
GSA_22_01	241	F	07/01/21	22	3	3	5	3	3	-	3	3	3	3	-	4	3	3	-	4	3	4	-	3	3	4	4	3	5	3	3	68	20	16
GSA_22_02	188	M	08/01/21	22	2	2	3	2	2	-	2	2	2	2	-	2	2	2	-	2	2	2	-	2	2	2	2	2	2	2	2	91	14	8
GSA_22_03	126	F	09/01/21	22	1	1	1	1	1	-	1	1	1	1	-	1	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	100	0	0
GSA_22_04	46	U	10/01/21	22	0	0	0	0	0	-	0	0	0	0	-	0	0	1	-	0	0	1	-	0	0	0	0	0	0	0	0	91	-	-
GSA_22_05	80	U	11/01/21	22	0	0	1	1	0	-	0	0	0	0	-	0	0	1	-	0	0	1	-	0	0	1	1	0	0	0	0	73	-	-
GSA_22_06	279	F	12/01/21	22	6	5	6	6	4	-	5	4	4	3	-	5	4	5	-	6	3	6	-	5	4	5	-	3	5	3	5	33	23	20
GSA_22_07	257	M	13/01/21	22	-	6	5	5	3	-	4	4	4	3	-	5	4	5	-	6	3	6	-	5	3	5	4	3	5	3	5	33	25	21
GSA_22_08	287	F	14/01/21	22	-	6	7	8	4	-	5	4	4	5	-	6	4	5	-	6	3	7	-	4	4	5	-	4	7	3	4	35	28	23
GSA_22_09	304	M	15/01/21	22	10	9	9	10	5	-	9	5	8	6	-	10	5	-	-	11	4	9	-	5	-	7	-	5	11	3	5	26	35	31
GSA_22_10	312	F	16/01/21	22	-	10	9	7	4	-	7	4	5	3	-	9	4	14	-	12	3	8	-	5	3	8	5	6	10	3	3	19	48	40
GSA_22_11	267	F	17/01/21	22	5	5	6	6	3	-	5	4	4	3	-	5	4	10	-	5	3	6	-	4	4	4	4	3	5	3	4	32	34	24
GSA_22_12	315	F	18/01/21	22	4	9	8	8	4	-	6	5	7	7	-	9	6	11	-	6	3	6	-	6	-	9	-	5	9	3	6	25	34	28
GSA_22_13	304	F	19/01/21	22	-	10	10	12	6	-	9	6	7	5	-	13	7	14	-	10	5	11	-	7	-	12	-	9	13	5	5	16	33	28
GSA_22_14	322	F	20/01/21	22	9	12	10	11	6	-	8	6	6	5	-	10	9	11	-	10	5	7	-	6	5	8	-	8	11	5	5	19	29	25
GSA_22_15	322	F	21/01/21	22	4	6	8	4	5	-	5	4	5	2	-	7	3	8	-	6	3	5	-	5	3	5	-	3	8	4	5	29	36	27
GSA_22_16	98	U	22/01/21	22	1	1	1	1	0	-	1	1	1	0	-	0	0	2	-	1	0	1	-	1	1	0	1	0	1	0	1	59	83	73
GSA_22_17	121	M	23/01/21	22	0	1	0	1	0	-	0	0	0	0	-	0	0	3	-	0	0	1	-	0	-	0	0	0	0	0	0	71	-	-
GSA_22_18	201	M	24/01/21	22	1	1	4	1	1	-	1	1	2	1	-	1	1	3	-	1	1	1	-	1	1	1	2	1	2	1	1	77	58	41
GSA_22_19	222	F	25/01/21	22	3	3	4	2	2	-	-	2	2	2	-	3	2	5	-	3	2	3	-	2	2	2	3	2	3	2	2	57	32	25
GSA_22_20	168	M	26/01/21	22	2	2	3	2	2	-	2	1	2	1	-	2	1	3	-	1	1	2	-	1	2	1	2	1	2	1	2	50	38	33
GSA_22_21	195	F	27/01/21	22	4	3	4	3	2	-	2	2	3	2	-	4	2	4	-	3	2	3	-	2	3	2	3	2	3	3	2	41	27	23
GSA_22_22	320	F	28/01/21	22	5	7	8	6	6	-	5	5	5	5	-	5	7	6	-	8	3	6	-	5	5	6	-	5	8	-	5	45	22	17
GSA_22_23	331	F	29/01/21	22	-	9	10	8	5	-	6	5	6	3	-	6	6	9	-	8	3	6	-	5	4	-	-	5	10	5	5	26	34	28
GSA_22_24	283	F	30/01/21	22	-	8	8	9	4	-	5	5	4	3	-	9	5	9	-	8	3	5	-	5	3	5	-	3	8	4	5	30	39	34
GSA_22_25	280	F	31/01/21	22	-	7	7	10	4	-	5	4	5	3																				

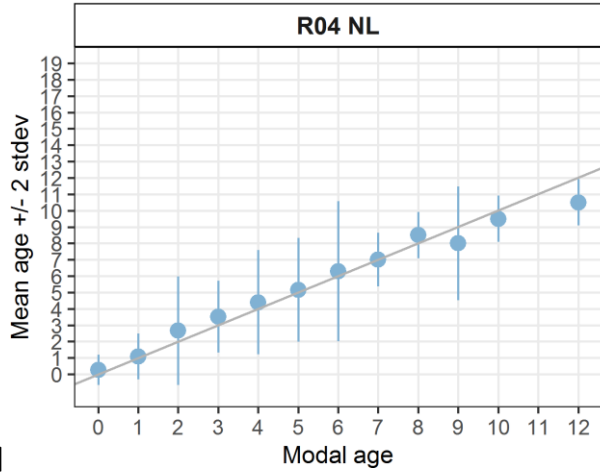
Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	Modal age	PA %	CV %	APE %	
GSA01-210519-21-12.5x	293	M	13/02/21	1	3	8	7	6	6	6	6	5	3	4	4	6	5	6	-	6	4	4	5	5	4	5	-	5	8	3	6	29	27	22	
GSA01-210519-62-12.5x	211	F	14/02/21	1	2	4	4	3	3	4	3	3	3	3	3	2	2	5	-	4	3	4	6	4	3	3	-	3	6	2	3	46	32	25	
GSA01-220817-06-12.5x	193	M	15/02/21	1	3	4	4	2	3	6	2	3	3	2	3	6	2	3	-	2	2	3	8	3	4	2	-	2	6	2	2	38	49	37	
GSA01-260517-17-12.5x	156	F	16/02/21	1	1	1	3	1	1	3	1	2	1	-	2	1	1	1	-	1	1	2	-	2	1	1	2	1	2	2	1	61	45	39	
GSA01-270819-05-12.5x	202	F	17/02/21	1	4	4	4	4	3	2	3	2	3	2	3	4	2	5	-	3	2	4	7	3	3	3	-	2	5	2	3	33	37	29	
GSA01-300719-01-12.5x	310	M	18/02/21	1	6	9	9	5	6	7	7	4	6	5	6	6	6	7	-	7	5	7	6	4	5	7	-	6	6	3	6	38	23	16	
GSA01-300719-38-12.5x	346	M	19/02/21	1	-	14	7	5	6	6	-	3	5	2	6	5	4	6	-	7	3	8	-	4	5	7	-	6	8	2	6	24	46	31	
IBER110920_20	210	U	20/02/21	27.9	5	5	5	-	-	-	-	5	5	4	5	7	6	9	-	5	5	6	-	4	5	5	6	5	8	4	5	55	23	17	
IBER110920_21	217	U	21/02/21	27.9	4	3	4	3	3	-	-	3	3	2	2	2	2	8	-	5	3	3	-	3	3	2	-	2	7	3	3	48	48	32	
jurel_19052021_n93_247mm(2x)	247	F	22/02/21	8	8	6	5	3	3	5	9	5	5	5	5	5	4	8	-	9	5	6	10	5	6	4	-	4	8	5	5	42	33	26	
jurel_19052021_n96_255mm(2x)	255	M	23/02/21	8	5	6	5	3	3	6	4	5	6	4	6	7	3	5	-	7	4	6	6	5	6	6	5	5	8	5	5	32	24	19	
jurel_DEM2020_L100_n7_125mm(2x)	125	M	24/02/21	8	1	1	0	1	1	0	1	1	1	0	1	1	0	1	-	0	0	1	-	1	1	0	-	0	1	0	1	61	82	78	
jurel_DEM2020_L100_n8_146mm(2x)	146	F	25/02/21	8	1	1	2	1	1	3	0	1	1	1	2	4	1	2	-	0	1	1	-	1	4	1	1	0	2	0	1	54	82	60	
jurel_DEM2020_L104_n10_230mm(2x)	230	F	26/02/21	8	5	5	5	4	2	5	5	4	4	4	6	3	7	-	4	3	6	-	4	6	5	4	3	6	3	4	33	27	22		
jurel_DEM2020_L108_n4_122mm(2x)	122	M	27/02/21	8	1	1	1	1	1	1	1	1	1	0	1	0	0	1	-	1	0	1	-	1	1	1	2	0	1	0	1	71	64	50	
jurel_DEM2020_L120_n7_201mm(2x)	201	M	28/02/21	8	3	3	3	2	2	2	3	2	3	2	2	2	4	-	2	1	3	-	2	3	2	3	2	2	2	2	58	27	23		
jurel_DEM2020_L122_n6_148mm(2x)	148	M	01/03/21	8	3	1	2	1	2	1	-	1	2	1	2	2	1	3	-	1	1	2	-	1	3	1	3	1	2	1	1	52	47	41	
jurel_DEM2020_L122_n8_157mm(2x)	157	M	02/03/21	8	3	2	2	1	2	2	2	2	2	1	2	3	1	4	-	1	1	2	-	2	3	2	3	1	2	1	2	50	41	29	
jurel_DEM2020_L61_n6_214mm(2x)	214	M	03/03/21	8	3	4	5	3	2	5	-	2	4	1	2	5	2	6	-	4	2	4	-	3	4	6	-	2	4	3	2	27	41	34	
jurel_DEM2020_L65_n5_196mm(2x)	196	F	04/03/21	8	3	3	4	2	2	2	3	3	3	2	2	3	2	6	-	2	1	3	-	3	3	2	4	2	3	2	2	42	37	27	
jurel_PELACUS0319_L21_n18_169mm(2x)	169	F	05/03/21	8	5	3	4	2	2	4	5	4	4	3	5	5	2	6	-	5	2	3	-	4	5	5	-	4	5	5	35	30	24		
jurel_PELACUS0319_L29_n18_281mm(2x)	281	M	06/03/21	8	-	5	5	5	3	-	4	4	3	3	4	4	3	6	-	6	4	5	5	4	5	5	3	3	6	4	4	30	24	20	
jurel_PELACUS0319_L3_n20_219mm(2x)	219	F	07/03/21	8	4	4	4	3	3	4	4	4	4	4	4	4	5	3	4	-	5	4	4	-	3	5	5	4	4	5	4	62	15	10	
jurel_PELACUS0321_L12G_n13_337	337	F	08/03/21	8	5	8	7	8	5	6	-	5	4	4	5	7	7	9	-	7	5	6	7	5	6	6	5	5	8	5	5	38	23	19	
jurel_PELACUS0321_L19_n1_136mm(2x)	136	F	09/03/21	8	1	1	1	1	1	1	1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	-	2	1	1	1	96	20	8		
jurel_PELACUS0321_L38_n17_322mm(2x)	322	F	10/03/21	8	6	10	8	7	4	6	6	4	4	5	6	6	11	-	8	4	6	18	4	6	8	5	4	8	4	4	28	47	32		
jurel_PELACUS0321_L38_n5_342mm(2x)	342	F	11/03/21	8	6	12	11	9	5	-	6	5	5	5	6	7	7	8	-	7	5	7	-	5	6	7	5	6	11	6	5	30	30	23	
jurel_PELACUS0321_L42_n3_270mm(2x)	270	M	12/03/21	8	5	5	6	3	4	5	5	4	4	4	5	5	4	5	-	6	4	5	5	4	5	5	-	4	6	4	5	46	16	14	
jurel_PELACUS0321G_L12_n34_299mm(2x)	299	M	13/03/21	8	6	7	8	6	4	5	5	4	4	5	6	5	6	-	8	5	6	9	5	6	7	-	4	8	5	5	33	24	19		
jurel03092020_n55_305mm(2x)	305	M	14/03/21	8	5	9	8	5	5	6	-	4	5	4	5	5	6	7	-	5	4	6	-	4	5	8	-	5	8	4	5	41	27	22	
jurel03092020_n58_268mm(2x)	268	F	15/03/21	8	6	7	6	5	4	6	-	4	4	4	4	6	4	7	-	5	4	5	-	4	4	7	-	4	7	4	4	50	24	21	
jurel10072019_n45_244mm(2x)	244	F	16/03/21	8	5	5	5	4	4	5	4	4	4	4	4	5	4	5	-	4	4	5	-	4	4	5	-	4	8	3	4	52	21	15	
jurel10072019_n72_235mm(2x)	235	F	17/03/21	8	3	4	4	3	3	3	3	3	3	3	3	3	3	7	-	3	3	3	-	3	3	5	-	3	6	2	3	74	33	22	
jurel10072019_n97_251mm(2x)	251	M	18/03/21	8	4	4	5	3	3	3	3	3	3	3	3	3	3	8	-	3	3	3	-	3	3	4	-	3	5	3	3	74	33	22	
jurel10112020_n44_318mm(2x)	318	F	19/03/21	8	6	8	7	5	6	6	7	5	6	5	6	7	7	8	-	6	5	7	-	4	6	6	-	6	6	5	6	43	16	12	
jurel13042021_n14_227mm(2x)	227	F	20/03/21	8	7	6	5	4	3	5	3	4	5	4	5	9	3	7	-	4	3	4	-	4	6	6	-	4	9	4	4	35	35	27	
jurel22012019_n18_239mm(2x)	239	M	21/03/21	8	5	4	4	3	0	4	4	4	4	4	4	8	3	6	-	5	4	4	6	4	5	5	-	4	8	5	4	50	36	24	
jurel22012019_n29_267mm(2x)	267	F	22/03/21	8	5	5	5	3	4	4	4	4	4	4	3	4	5	4	5	-	6	4	5	13	4	5	5	-	4	8	4	4	46	41	23
TT020920_2	324	U	23/03/21	27.9	6	7	7	10	3	-	7	5	4	3	5	8	6	10	-	10	3	7	-	6	6	4	6	6	8	4	6	26	35	27	
TT110719_14c	390	U	24/03/21	27.9	9	11	11	14	8	-	10	8	8	9	8	10	9	11	-	11	7	10	-	8	10	9	-	9	10	6	8	23	18	14	
TT110719_29b	376	U	25/03/21	27.9	10	11	10	12	6	-	11	7	8	9	10	11	11	13	-	12	7	12	-	7	8	12	-	10	12	5	12	23	23	19	
TT110719_4	365	U	26/03/21	27.9	9	14	12	15	6	-	9	6	6	6	6	8	8	13	-	10	4	11	-	7	5	7	-	6	9	3	6	27	39	32	
TT130619_15	367	U	27/03/21	27.9	7	8	7	13	6	-	7	6	7	6	6	7	7	9	-	7	5	7	-	7	7	7	6	7	7	4	7	57	24	12	
TT130619_19	352	U	28/03/21	27.9	8	13	11	13	6	-	7	6	7	6	7	8	7	-	-	5	6	-	6	7	8	-	7	9	4	7	30	31	23		
TT130619_34	355	U	29/03/21	27.9	9	13	8	11	6	-	8	6	6	5	6	7	8	11	-	9	5	7	-	6	6	7	5	6	9	5	6	30	29	24	
TT130619_35	296	U	30/03/21	27.9	8	11	7	7	4	-	7	4	4	3	4	5	6	9	-	8	3	8	-	5	4	4	5	4	6	4	4	35	38	32	
TT130619_4	351	U	31/03/21	27.9	6	10	8	10	5	-	6	5	6	5	6	7	5	8	-	7	3	7	-	6	6	5	4	5	8	4	5	26	29	22	
TT130619_7	364	U	01/04/21	27.9	9	9	9	11	6	-	9	6	8	7	8	10	9	12	-	10	5	7	-	6	8	10	5	9	10	4	9	26	26	21	
TT170620_42	225	U	02/04/21	27.9	5	7	6	3	5	-	7	6	5	4	4	5	5	9	-	5	4	5	-	6	6	5	-	5	7	4	5	41	25	19	
TT180321_12	370	U	03/04/21	27.9	-	17	10	10	8	-	7	9	9	8	9	9	11	13	-	10	10	11													

Table 6.3: Number of age readings per reader and modal age.

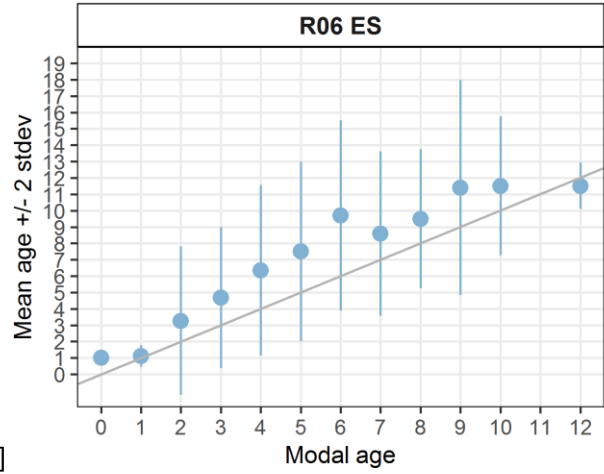
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES	total
0	21	21	21	21	16	3	21	21	21	21	12	21	21	21	0	21	21	21	2	21	20	21	16	21	21	20	467
1	28	28	28	28	28	19	26	28	28	28	21	28	28	28	1	28	28	28	7	28	28	28	20	28	28	28	654
2	28	31	31	31	31	20	27	31	31	31	24	31	31	31	0	31	31	31	13	31	30	31	19	31	31	28	716
3	51	57	57	57	57	17	56	57	56	57	51	56	57	57	0	57	57	57	14	57	57	56	20	57	57	54	1286
4	37	44	44	44	44	18	43	44	43	43	37	44	43	44	1	43	44	44	11	44	43	44	21	44	43	42	996
5	33	42	41	41	39	15	39	42	41	42	28	42	42	41	0	42	42	42	11	42	40	41	14	42	42	38	924
6	8	11	11	11	11	5	10	11	11	11	9	11	11	11	0	11	11	11	4	11	10	11	2	11	11	11	246
7	4	5	5	5	5	1	4	5	5	5	4	5	5	4	0	4	5	5	2	5	5	5	1	5	5	5	109
8	2	2	2	2	2	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	2	0	2	2	2	44
9	3	5	4	5	4	0	5	5	5	4	4	4	5	4	0	5	5	5	0	5	5	5	2	5	5	4	103
10	2	2	2	2	2	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	2	0	2	2	2	44
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	2	2	2	2	2	0	2	2	2	2	2	2	2	2	0	2	2	2	0	2	2	2	0	2	2	2	44
Total	219	250	248	249	241	98	237	250	247	248	196	248	249	247	2	248	250	250	64	250	244	248	115	250	249	236	5633

Table 6.4: Age composition by reader.

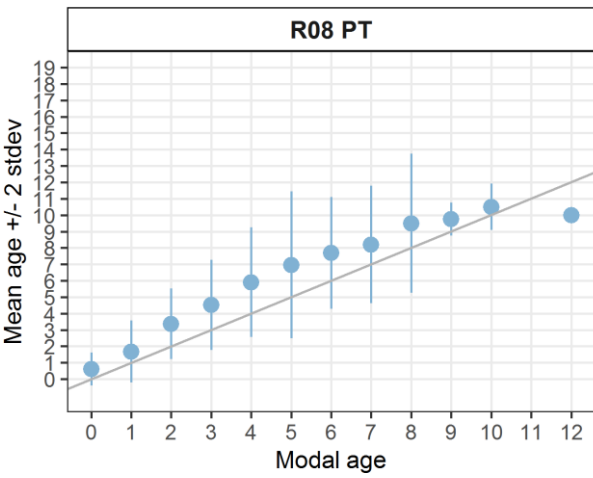
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	R72 ES
0	23	2	11	3	21	1	26	24	23	22	10	22	26	0	0	22	28	3	0	24	19	18	4	21	10	32
1	31	51	25	48	28	15	30	25	23	41	22	23	28	26	0	28	32	43	7	25	22	34	20	32	25	24
2	17	21	12	22	38	19	30	33	24	63	37	18	38	16	0	18	48	27	7	30	28	24	19	30	31	56
3	38	17	28	31	55	16	32	55	63	53	48	26	55	23	1	34	79	46	8	47	69	18	18	69	11	66
4	39	27	46	23	46	14	25	58	60	31	25	39	31	19	1	32	26	32	4	62	46	42	28	42	20	38
5	32	26	33	30	26	15	32	36	26	22	24	45	22	38	0	34	26	24	5	37	25	37	23	25	32	16
6	16	21	27	23	18	12	22	11	10	4	14	20	20	36	0	27	3	24	7	15	22	32	3	16	31	3
7	7	20	21	18	5	4	18	2	9	5	5	24	12	17	0	16	6	21	7	4	6	16	0	6	25	1
8	4	13	18	12	3	1	7	2	7	4	7	10	7	23	0	14	1	11	7	3	3	13	0	2	29	0
9	7	21	8	12	1	0	9	3	2	3	2	8	5	14	0	3	0	4	2	1	2	6	0	5	14	0
10	4	7	13	11	0	1	3	1	0	0	1	10	1	6	0	13	1	4	1	2	1	5	0	1	9	0
11	1	12	4	6	0	0	2	0	0	0	1	1	2	14	0	2	0	8	1	0	0	0	0	1	7	0
12	0	4	1	3	0	0	1	0	0	0	0	1	1	5	0	3	0	1	2	0	1	3	0	0	3	0
13	0	4	0	4	0	0	0	0	0	0	0	1	1	8	0	0	0	1	3	0	0	0	0	0	1	0
14	0	3	1	2	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	0	0	0	0	0	0	0
15	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
17	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Total	219	250	248	249	241	98	237	250	247	248	196	248	249	247	2	248	250	250	64	250	244	248	115	250	249	236



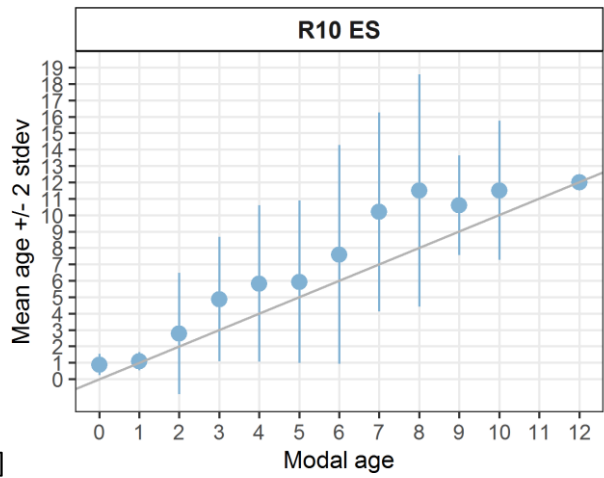
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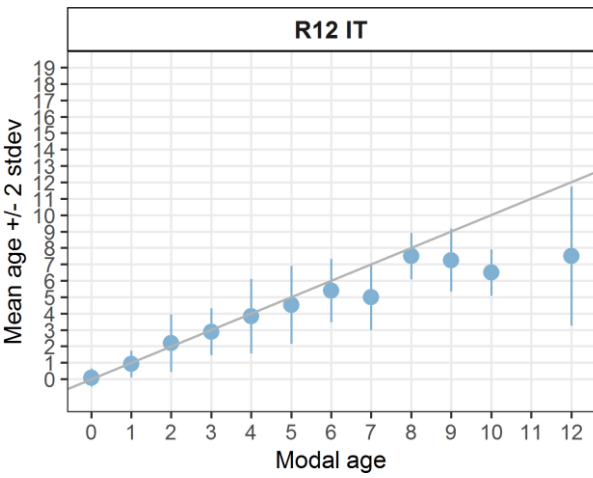
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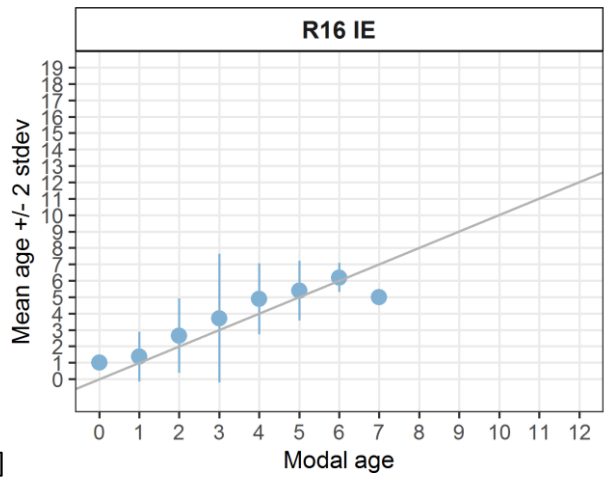
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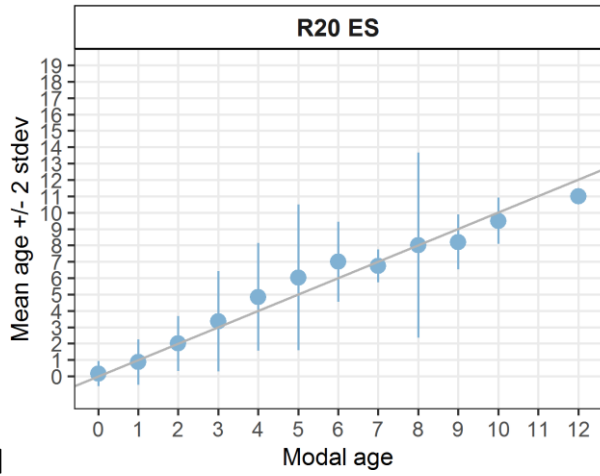
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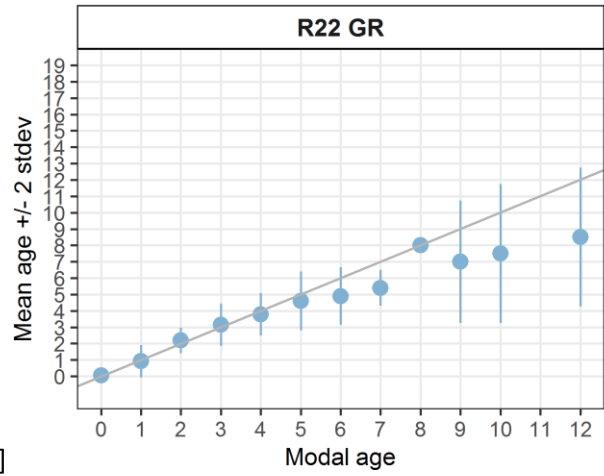
[[5]]



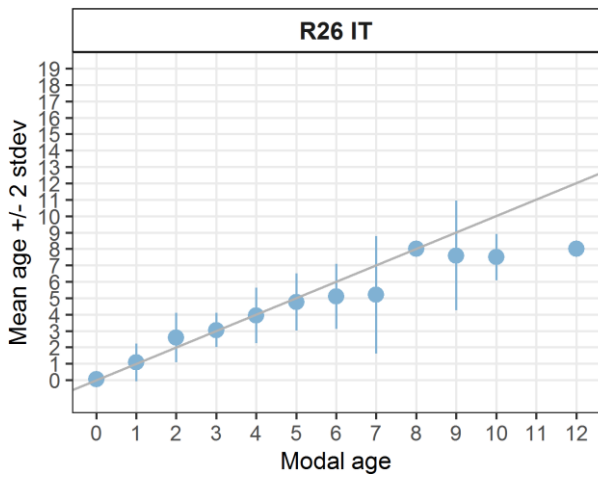
[[6]]



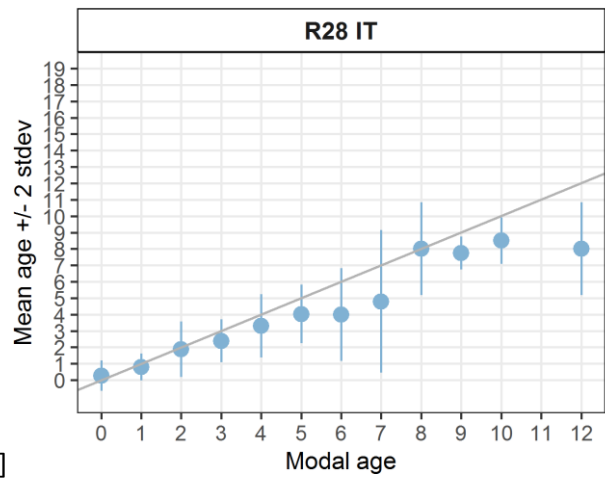
[[7]]



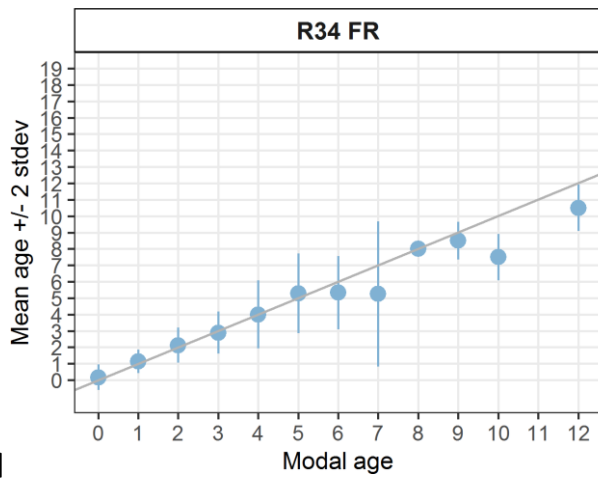
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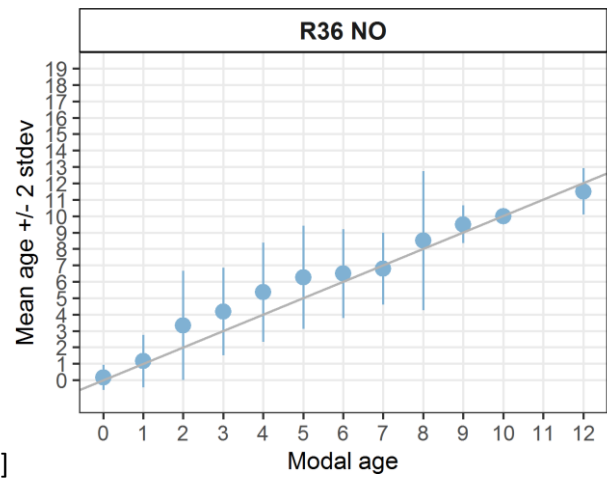
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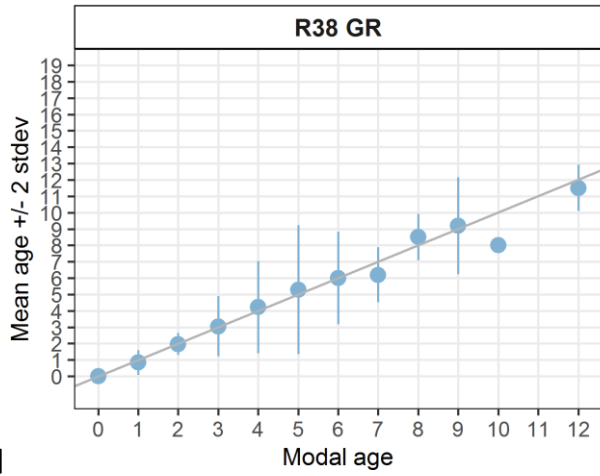
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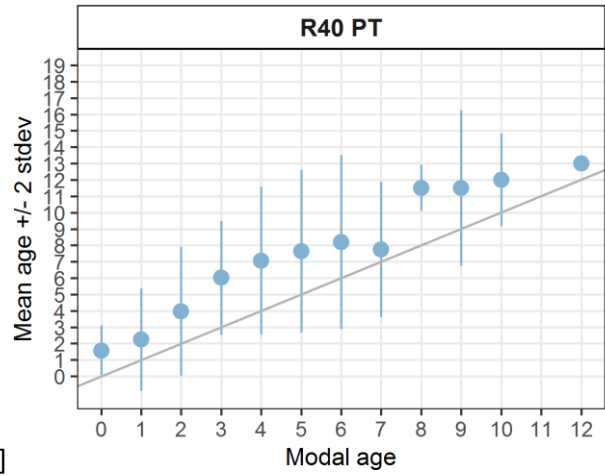
[[11]]



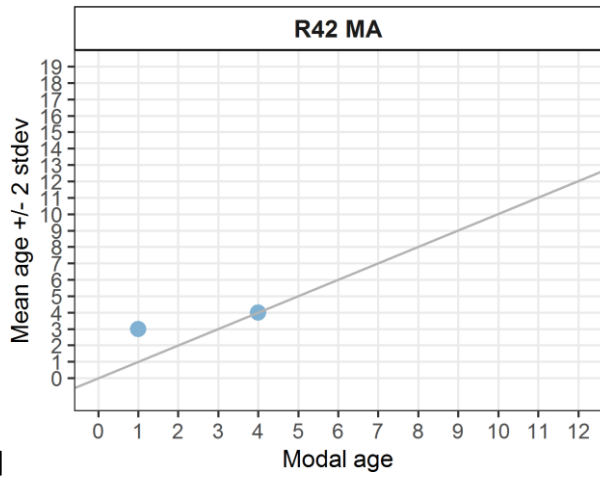
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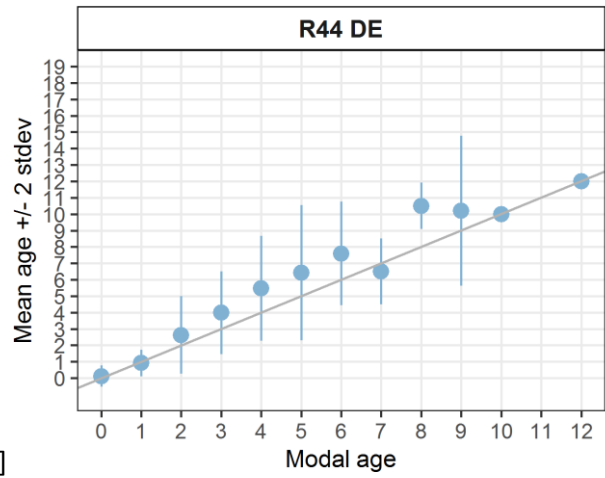
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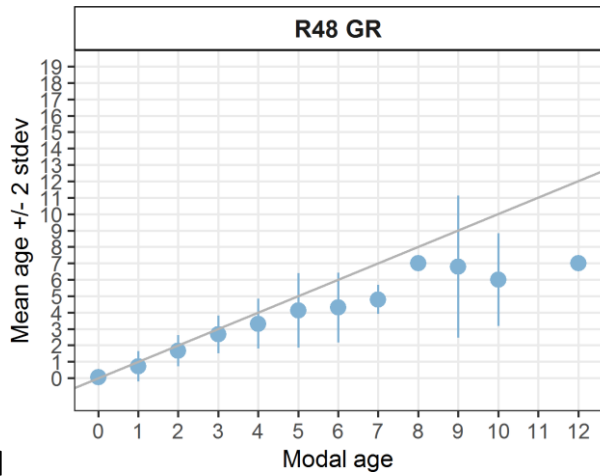
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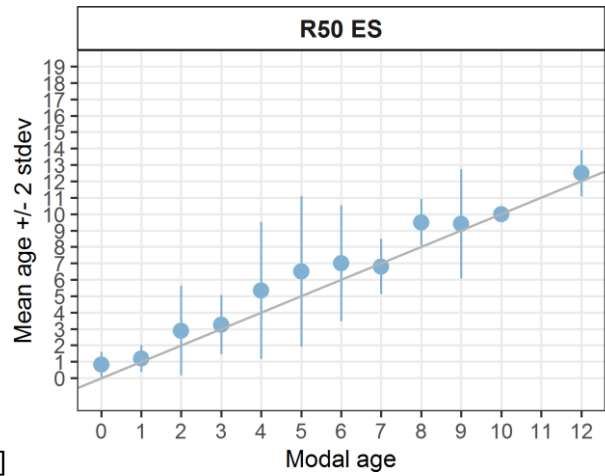
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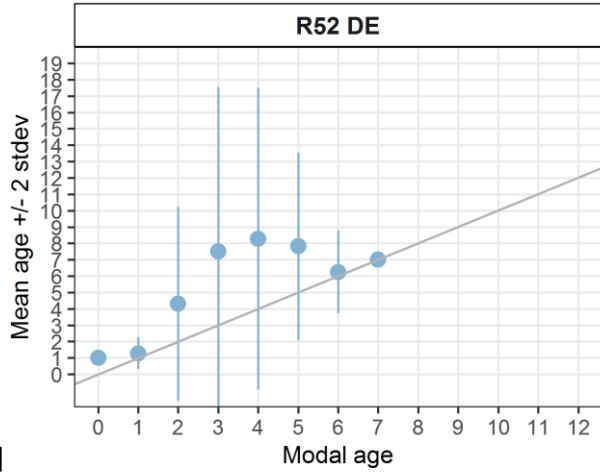
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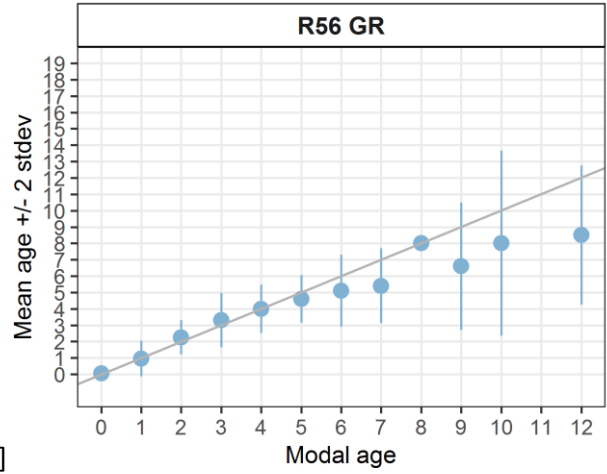
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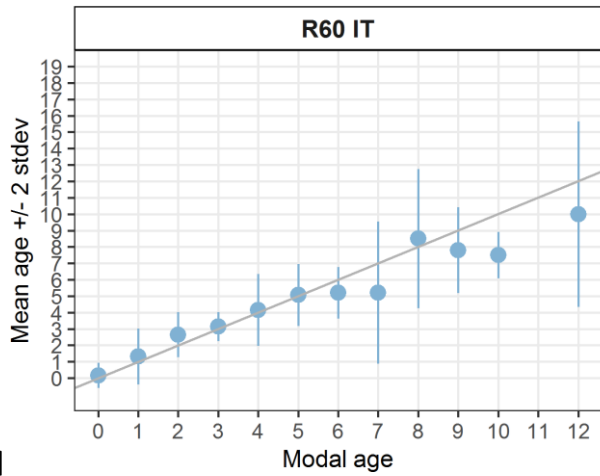
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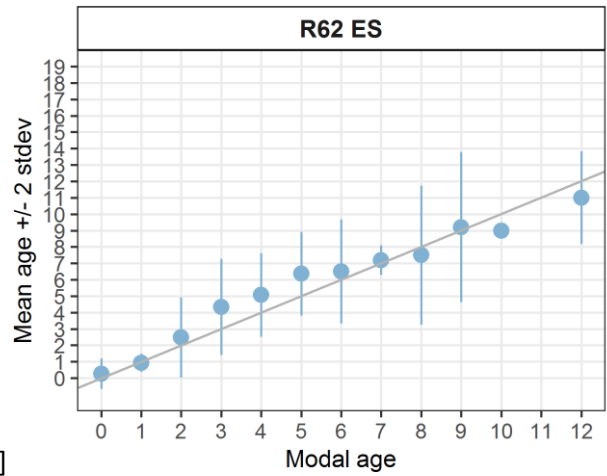
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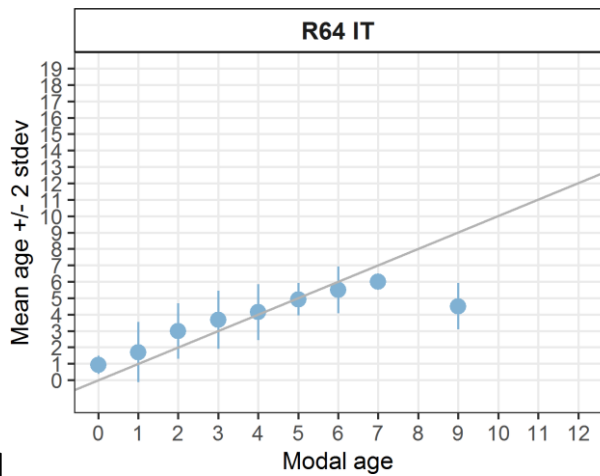
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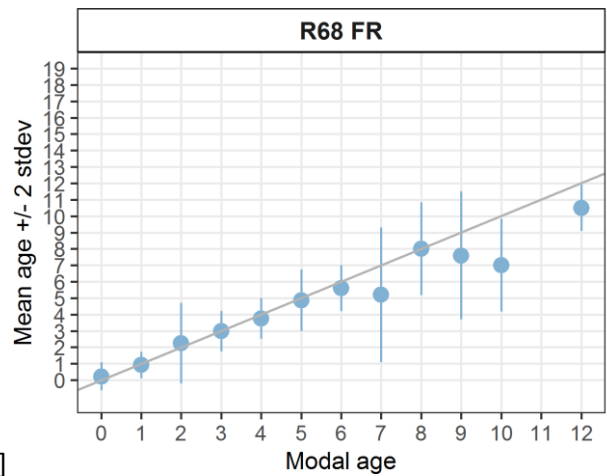
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[[22]]



[[23]]



[[24]]

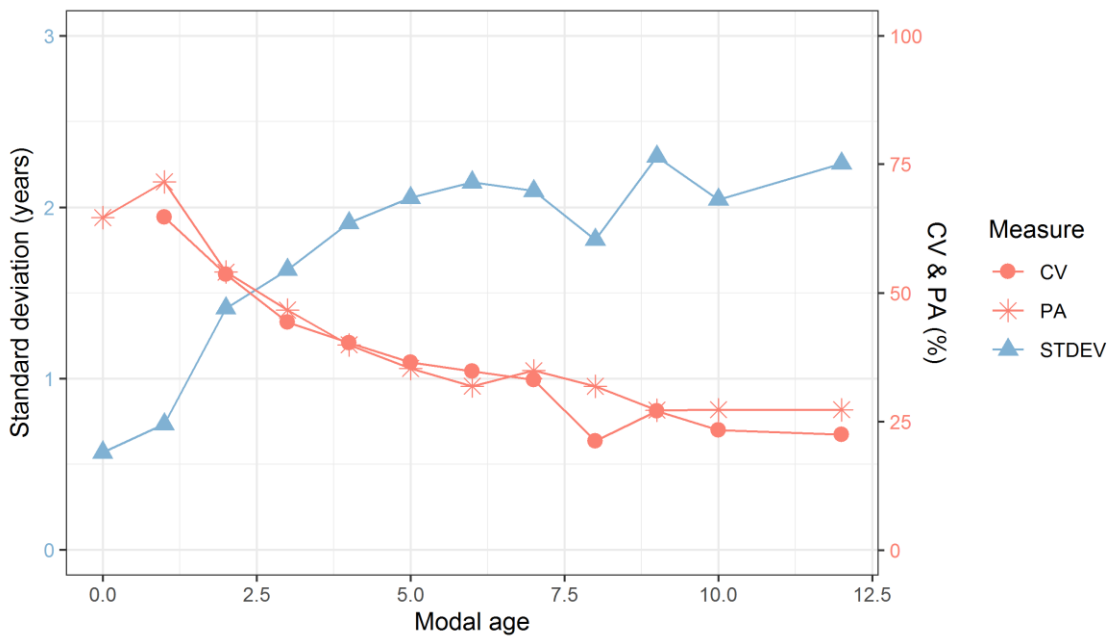
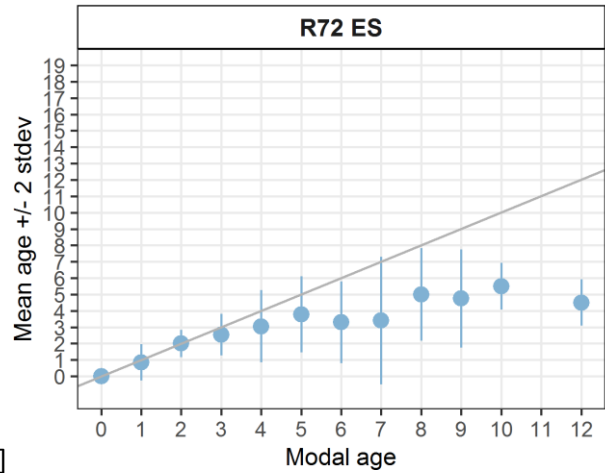
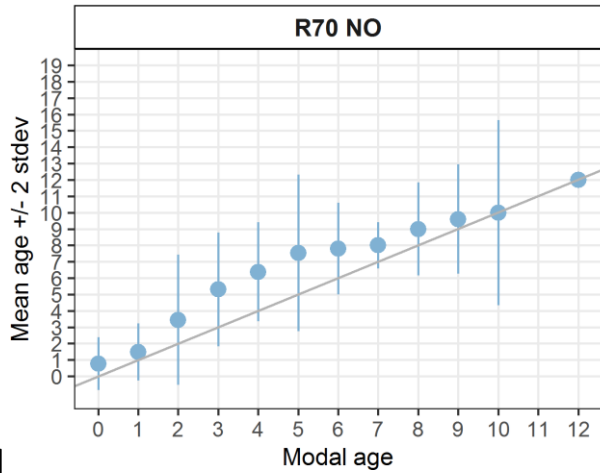


Figure 6.1: CV, PA and STDEV (standard deviation) are plotted against modal age

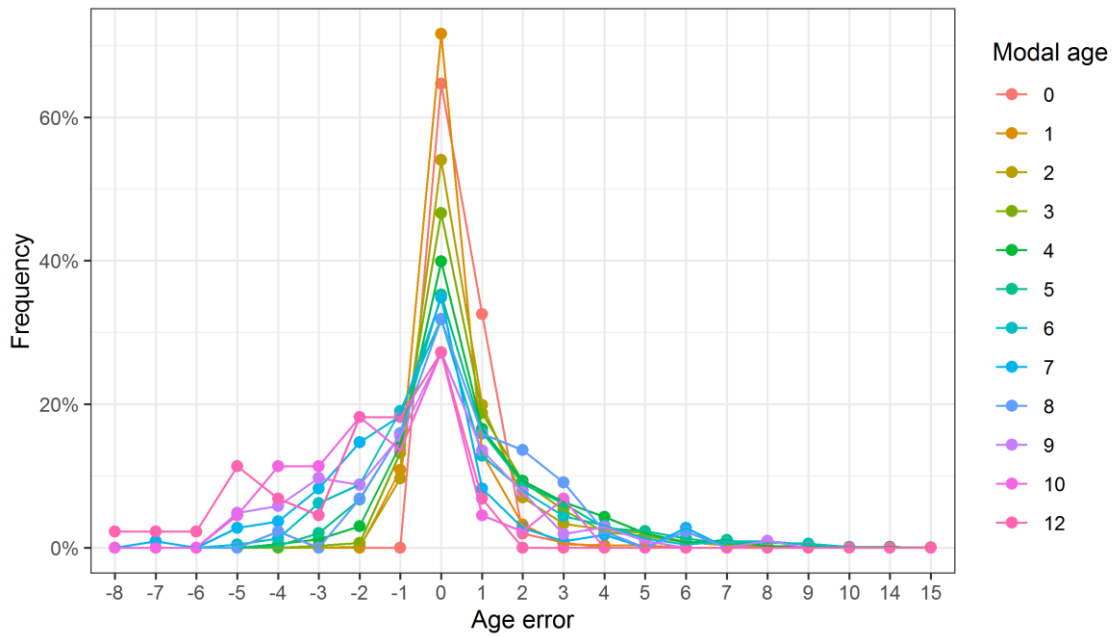


Figure 6.2: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

6.1.2 Whole otoliths, advanced readers

Data Overview

Table 6.5: Data overview including modal age and statistics per sample.

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	Modal age	PA %	CV %	APE %
001L_122_08-08-20_ST.40 IONIO	122	U	08/08/20	20	0	1	1	1	0	-	1	60	91	80
001L_158_01-09-20_ST.1-AIGAIO-GSA 22	158	F	09/08/20	22	0	1	2	1	1	-	1	60	71	40
001L_250_27-07-20_IONIO	250	F	10/08/20	20	0	1	6	4	3	-	0	20	-	-
001L_272_18-10-20_XALKIDA	272	F	11/08/20	22	6	8	7	8	4	-	8	40	25	19
001R_191_16-06-20_IONIO(PATRA)	191	U	12/08/20	20	0	1	3	1	1	-	1	60	91	60
001R_326_11-08-20_ST.46 IONIO	326	F	13/08/20	20	0	9	7	9	4	-	9	40	66	52
002L_103_29-07-20_SALAMINA	103	F	14/08/20	22	0	1	1	1	0	-	1	60	91	80
002L_154_20-08-20_ST.67 IONIO	154	F	15/08/20	20	1	1	2	1	1	-	1	80	37	27
002L_267_10-11-20_IONIO	267	F	16/08/20	20	3	4	6	5	4	-	4	40	26	20
002R_260_16-06-20_IONIO(PATRA)	260	M	17/08/20	20	1	5	5	5	5	-	5	80	43	30
002R_293_01-06-20_SARONIKOS	293	F	18/08/20	22	1	6	8	8	4	-	8	40	55	43
003L_105_12-08-20_ST.53 IONIO	105	U	19/08/20	20	0	1	1	1	0	-	1	60	91	80
003L_205_26-08-20_ST.16 -ARGOSARWNIKOS-GSA 22	205	M	20/08/20	22	3	2	4	3	3	-	3	60	24	13
003L_255_16-06-20_IONIO(PATRA)	255	F	21/08/20	20	6	7	6	7	5	-	6	40	13	10
004L_150_12-08-20_ST.57 IONIO	150	F	22/08/20	20	0	1	1	1	0	-	1	60	91	80
004L_259_27-07-20_IONIO	259	F	23/08/20	20	5	1	6	5	5	-	5	60	44	31
005L_205_26-08-20_ST.16 -ARGOSARWNIKOS-GSA 22	205	F	24/08/20	22	4	2	4	3	3	-	3	40	26	20
005L_291_01-06-20_SARONIKOS	291	M	25/08/20	22	-	7	9	9	3	-	9	50	40	29
006L_101_29-07-20_SALAMINA	101	F	26/08/20	22	1	1	1	1	-	-	1	100	0	0
006L_141_13-08-20_ST.55 IONIO	141	F	27/08/20	20	1	1	0	1	0	-	1	60	91	80
006L_154_01-09-20_ST.1-AIGAIO-GSA 22	154	F	28/08/20	22	2	1	1	2	2	-	2	60	34	30
006L_257_05-10-20_IONIO	257	F	29/08/20	20	3	4	5	4	4	-	4	60	18	10
006L_257_10-11-20_IONIO	257	M	30/08/20	20	4	6	6	4	4	-	4	60	23	20
006R_331_01-06-20_SARONIKOS	331	F	31/08/20	22	3	8	8	10	5	-	8	40	41	33
007L_229_15-06-20_SARONIKOS	229	F	01/09/20	22	3	3	4	3	3	-	3	80	14	10
007L_266_06-10-20_IONIO	266	U	02/09/20	20	4	8	7	6	4	-	4	40	31	25
008L_199_05-10-20_IONIO	199	F	03/09/20	20	7	1	4	5	5	-	5	40	50	35
008L_256_26-08-20_ST.16 -ARGOSARWNIKOS-GSA 22	256	F	04/09/20	22	3	4	3	5	2	-	3	40	34	26
008L_259_06-10-20_IONIO	259	F	05/09/20	20	-	9	7	6	5	-	5	25	25	19
009L_291_01-06-20_SARONIKOS	291	M	06/09/20	22	-	2	10	11	3	-	2	25	72	62
009L_306_06-10-20_IONIO	306	F	07/09/20	20	-	9	8	10	5	-	5	25	27	19
009R_203_10-08-20_ST.59 IONIO	203	F	08/09/20	20	-	6	5	6	4	-	6	50	18	14
010L_106_12-08-20_ST.53 IONIO	106	U	09/09/20	20	0	1	0	1	0	-	0	60	-	-
010L_306_10-11-20_IONIO	306	F	10/09/20	20	-	7	9	11	4	-	4	25	39	29
011L_140_13-08-20_ST.55 IONIO	140	F	11/09/20	20	0	1	2	1	0	-	0	40	-	-
011L_201_10-08-20_ST.59 IONIO	201	F	12/09/20	20	5	8	4	7	3	-	3	20	38	31
011L_217_06-10-20_IONIO	217	F	13/09/20	20	3	3	4	3	3	-	3	80	14	10
011L_276_01-06-20_SARONIKOS	276	M	14/09/20	22	4	4	8	14	4	-	4	60	64	49
012L_151_29-08-20_ST.14 -ARGOSARWNIKOS	151	M	15/09/20	22	2	2	3	2	1	-	2	60	35	20
012L_201_10-08-20_ST.59 IONIO	201	F	16/09/20	20	7	7	4	8	3	-	7	40	37	32
013R_132_13-08-20_ST.55 IONIO	132	F	17/09/20	20	0	1	1	1	0	-	1	60	91	80
014L_205_10-08-20_ST.59 IONIO	205	M	18/09/20	20	3	3	4	3	2	-	3	60	24	13
014R_52_05-08-20_ST.2-ARGOSARWNIKOS	52	U	19/09/20	22	1	1	0	1	0	-	1	60	91	80
015R_272_01-06-20_SARONIKOS	272	F	20/09/20	22	4	4	7	6	4	-	4	60	28	24
017L_102_29-07-20_SALAMINA	102	F	21/09/20	22	1	1	1	1	0	-	1	80	56	40
018R_57_05-08-20_ST.2-ARGOSARWNIKOS	57	U	22/09/20	22	0	1	0	1	-	-	0	50	-	-
019R_100_12-08-20_ST.53 IONIO	100	U	23/09/20	20	0	1	0	1	0	-	0	60	-	-
019R_203_31-08-20_ST.22 -ARGOSARWNIKOS	203	F	24/09/20	22	3	4	4	4	3	-	4	60	15	13
020L_276_01-06-20_SARONIKOS	276	F	25/09/20	22	5	5	6	9	4	-	5	40	33	23
020R_52_05-08-20_ST.2-ARGOSARWNIKOS	52	U	26/09/20	22	0	1	1	0	-	-	0	50	-	-
021R_220_15-06-20_SARONIKOS	220	F	27/09/20	22	-	4	4	3	3	-	3	50	16	14
025L_255_31-08-20_ST.22 -ARGOSARWNIKOS	255	F	28/09/20	22	4	4	6	9	3	-	4	40	46	35
027L_254_01-06-20_SARONIKOS	254	F	29/09/20	22	5	4	4	7	3	-	4	40	33	24
033R_256_01-06-20_SARONIKOS	256	F	30/09/20	22	4	3	5	3	3	-	3	60	25	20
034L_103_12-08-20_ST.53 IONIO	103	U	01/10/20	20	0	1	0	1	0	-	0	60	-	-
036L_100_12-08-20_ST.53 IONIO	100	U	02/10/20	20	0	1	1	1	-	-	1	75	67	50
036L_272_01-06-20_SARONIKOS	272	F	03/10/20	22	4	4	6	7	4	-	4	60	28	24

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	Modal age	PA %	CV %	APE %
038L_106_12-08-20_ST.53 IONIO	106	F	04/10/20	20	0	1	0	1	-	-	0	50	-	-
1	225	F	05/10/20	11.1	4	4	4	4	4	4	4	100	0	0
1_1.5x8	118	U	06/10/20	27.9.a	1	1	0	1	0	1	1	67	77	67
10	175	F	07/10/20	11.1	2	2	3	2	2	4	2	67	33	27
10_1.5x8	255	F	08/10/20	27.9.a	4	6	-	5	-	5	5	50	16	10
11	160	F	09/10/20	11.1	2	2	3	2	1	1	2	50	41	30
11_1.5x8	235	F	10/10/20	27.9.a	5	5	5	5	2	-	5	80	30	22
12	216	F	11/10/20	11.1	2	2	4	2	2	3	2	67	33	27
12_1.5x8	122	U	12/10/20	27.9.a	4	3	3	3	2	2	3	50	27	20
13	134	F	13/10/20	11.1	1	1	1	1	1	1	1	100	0	0
13_1.5x8	181	M	14/10/20	27.9.a	3	3	4	3	2	3	3	67	21	11
14	217	M	15/10/20	11.1	1	3	4	3	2	4	3	33	41	31
14_1.5x8	213	F	16/10/20	27.9.a	5	5	5	4	3	4	5	50	19	15
15	207	M	17/10/20	11.1	2	2	3	2	2	2	2	83	19	13
15_1.5x8	265	M	18/10/20	27.9.a	9	9	-	9	-	-	9	100	0	0
16	207	M	19/10/20	11.1	2	2	4	3	2	2	2	67	33	27
17	136	M	20/10/20	11.1	1	1	1	1	1	2	1	83	35	24
18	189	M	21/10/20	11.1	2	2	2	2	2	2	2	100	0	0
19	150	M	22/10/20	11.1	1	1	2	1	1	2	1	67	39	33
2	213	F	23/10/20	11.1	3	2	3	3	2	3	3	67	19	17
2_1.5x8	155	F	24/10/20	27.9.a	1	1	2	1	1	2	1	67	39	33
20	165	M	25/10/20	11.1	2	1	1	1	1	2	1	67	39	33
21	180	M	26/10/20	11.1	1	2	3	2	2	3	2	50	35	26
22	239	M	27/10/20	11.1	3	3	4	2	3	3	3	67	21	11
23	140	M	28/10/20	11.1	0	1	1	1	1	2	1	67	63	33
24	152	M	29/10/20	11.1	2	2	3	1	2	2	2	67	32	17
25	318	M	30/10/20	11.1	1	12	7	9	7	5	7	33	54	37
26	195	M	31/10/20	11.1	3	1	4	4	2	4	4	50	42	33
27	112	U	01/11/20	11.1	1	1	1	1	1	1	1	100	0	0
28	115	U	02/11/20	11.1	1	1	1	0	1	1	1	83	49	33
29	105	U	03/11/20	11.1	0	1	1	1	0	1	1	67	77	67
3	142	F	04/11/20	11.1	1	1	1	1	1	1	1	100	0	0
3_1.5x8	202	M	05/11/20	27.9.a	2	2	3	2	2	3	2	67	22	19
30	95	U	06/11/20	11.1	0	1	1	1	0	1	1	67	77	67
4	205	F	07/11/20	11.1	3	3	3	3	3	3	3	100	0	0
4_1.5x8	265	F	08/11/20	27.9.a	4	6	5	5	4	5	5	50	16	11
5	195	F	09/11/20	11.1	2	2	2	2	2	2	2	100	0	0
5_1.5x8	252	F	10/11/20	27.9.a	4	4	4	4	3	4	4	83	11	7
6	162	F	11/11/20	11.1	1	1	2	1	1	1	1	83	35	24
6_1.5x8	192	M	12/11/20	27.9.a	1	2	3	2	1	2	2	50	41	30
7	153	F	13/11/20	11.1	1	1	1	1	1	1	1	100	0	0
7_1.5x8	152	U	14/11/20	27.9.a	1	1	2	1	1	1	1	83	35	24
8	312	F	15/11/20	11.1	4	7	8	5	5	5	5	50	27	22
8_1.5x8	163	M	16/11/20	27.9.a	1	1	3	1	1	1	1	83	61	42
9	272	F	17/11/20	11.1	-	6	6	4	4	5	4	40	20	16
9_1.5x8	205	M	18/11/20	27.9.a	3	2	3	2	1	2	2	50	35	26
DESTT020920_11	370	U	19/11/20	27.9	11	12	10	12	9	-	12	40	12	10
DESTT020920_1b	359	U	20/11/20	27.9	6	11	10	10	7	-	10	40	25	21
DESTT020920_6	432	U	21/11/20	27.9	6	14	14	11	-	-	14	50	34	24
DESTT020920_9	370	U	22/11/20	27.9	-	9	10	9	6	-	9	50	20	15
DESTT090920_7	159	U	23/11/20	27.9	2	2	3	1	1	-	1	40	46	36
GBD_19_B47_C1_O_0003	321	U	24/11/20	7	-	7	6	5	5	6	5	40	14	11
GBD_19_B47_C1_O_0030	297	U	25/11/20	7	7	9	6	5	5	7	5	33	23	18
GBD_19_B47_C1_O_0031	265	U	26/11/20	7	5	9	5	3	3	4	3	33	46	31
GBD_19_B47_C1_O_0035	272	U	27/11/20	7	-	11	6	5	4	7	4	20	41	29
GBD_19_B47_C1_O_0042	234	U	28/11/20	7	3	9	4	4	2	2	2	33	65	42
GBD_19_B47_C1_O_0043	228	U	29/11/20	7	4	10	3	3	3	3	3	67	65	44
GBD_19_B47_C1_O_0044	254	U	30/11/20	7	5	8	5	3	3	3	3	50	44	33
GBD_19_B47_C1_O_0045	230	U	01/12/20	7	-	6	4	2	3	3	3	40	42	31
GBD_19_B47_C1_O_0046	235	U	02/12/20	7	-	4	5	2	2	2	2	60	47	40
GBD_19_B47_C1_O_0047	320	U	03/12/20	7	5	7	6	4	6	6	6	50	18	14
GBD_19_B47_C1_O_0048	394	U	04/12/20	7	-	11	8	6	7	8	8	40	23	15
GBD_19_B47_C1_O_0054	316	U	05/12/20	7	5	9	7	4	4	7	4	33	33	28
GBD_19_B47_C1_O_0055	304	U	06/12/20	7	4	7	5	4	4	5	4	50	24	17
GBD_19_B47_C1_O_0056	339	U	07/12/20	7	-	9	9	10	0	10	9	40	56	40

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	Modal age	PA %	CV %	APE %
GBD_19_B47_C1_O_0057	322	U	08/12/20	7	-	9	7	6	5	-	5	25	25	19
GBD_19_B47_C1_O_0081	256	U	09/12/20	7	7	9	6	7	4	-	7	40	28	19
GBD_19_B47_C1_O_0082	277	U	10/12/20	7	7	7	7	7	4	-	7	80	21	15
GBD_19_B47_C1_O_0083	278	U	11/12/20	7	5	7	6	7	4	-	7	40	22	18
GBD_19_B47_C1_O_0084	269	U	12/12/20	7	4	5	6	6	3	-	6	40	27	22
GBD_19_B47_C1_O_0085	288	U	13/12/20	7	-	7	8	7	4	-	7	50	27	19
GBD_19_B47_C1_O_0086	248	U	14/12/20	7	4	7	4	5	4	-	4	60	27	20
GBD_19_B47_C1_O_0087	264	U	15/12/20	7	4	6	6	4	3	-	4	40	29	24
GBD_19_B47_C1_O_0088	313	U	16/12/20	7	5	11	10	7	4	-	4	20	41	34
GBD_19_B48_C1_O_0001	257	U	17/12/20	7	3	10	4	7	3	-	3	40	56	46
GBD_19_B48_C1_O_0002	255	U	18/12/20	7	3	6	5	5	2	-	5	40	39	32
GBD_19_B48_C1_O_0005	244	U	19/12/20	7	4	5	4	6	3	-	4	40	26	20
GBD_19_B48_C1_O_0007	235	U	20/12/20	7	4	5	4	6	3	-	4	40	26	20
GBD_19_B48_C1_O_0009	237	U	21/12/20	7	3	5	3	5	3	-	3	60	29	25
GBD_19_B48_C1_O_0015	244	U	22/12/20	7	3	5	3	7	2	-	3	40	50	40
GBD_19_B48_C1_O_0016	248	U	23/12/20	7	4	6	4	6	3	-	4	40	29	24
GBD_19_B48_C1_O_0017	257	U	24/12/20	7	4	6	4	5	3	-	4	40	26	20
GBD_19_B48_C1_O_0020	222	U	25/12/20	7	4	5	5	7	3	-	5	40	31	22
GBD_19_B48_C1_O_0027	259	U	26/12/20	7	5	5	5	6	3	-	5	60	23	15
GBD_19_B48_C1_O_0033	221	U	27/12/20	7	3	4	3	6	3	-	3	60	34	25
GBD_19_B48_C1_O_0036	242	U	28/12/20	7	5	4	4	8	3	-	4	40	40	28
GBD_19_B48_C1_O_0037	239	U	29/12/20	7	5	4	4	7	3	-	4	40	33	24
GBD_19_B48_C1_O_0038	239	U	30/12/20	7	3	3	3	6	2	-	3	60	45	31
GBD_19_B48_C1_O_0039	230	U	31/12/20	7	3	4	4	6	2	-	4	40	39	27
GBD_19_B48_C1_O_0043	226	U	01/01/21	7	4	4	4	4	2	-	4	80	25	18
GBD_19_B48_C1_O_0044	231	U	02/01/21	7	3	5	3	4	2	-	3	40	34	26
GBD_19_B48_C1_O_0045	231	U	03/01/21	7	2	5	5	5	3	-	5	60	35	30
GBD_19_B48_C1_O_0046	235	U	04/01/21	7	3	5	3	5	3	-	3	60	29	25
GBD_19_B48_C1_O_0048	237	U	05/01/21	7	4	4	4	6	2	-	4	60	35	20
GBD_19_B48_C1_O_0049	265	U	06/01/21	7	4	5	6	5	3	-	5	40	25	19
GSA_22_01	241	F	07/01/21	22	3	3	5	3	3	-	3	80	26	19
GSA_22_02	188	M	08/01/21	22	2	2	3	2	2	-	2	80	20	15
GSA_22_03	126	F	09/01/21	22	1	1	1	1	1	-	1	100	0	0
GSA_22_04	46	U	10/01/21	22	0	0	0	0	0	-	0	100	-	-
GSA_22_05	80	U	11/01/21	22	0	0	1	1	0	-	0	60	-	-
GSA_22_06	279	F	12/01/21	22	6	5	6	6	4	-	6	60	17	13
GSA_22_07	257	M	13/01/21	22	-	6	5	5	3	-	5	50	26	18
GSA_22_08	287	F	14/01/21	22	-	6	7	8	4	-	4	25	27	20
GSA_22_09	304	M	15/01/21	22	10	9	9	10	5	-	9	40	24	17
GSA_22_10	312	F	16/01/21	22	-	10	9	7	4	-	4	25	35	27
GSA_22_11	267	F	17/01/21	22	5	5	6	6	3	-	5	40	24	16
GSA_22_12	315	F	18/01/21	22	4	9	8	8	4	-	4	40	36	32
GSA_22_13	304	F	19/01/21	22	-	10	10	12	6	-	10	50	26	18
GSA_22_14	322	F	20/01/21	22	9	12	10	11	6	-	6	20	24	18
GSA_22_15	322	F	21/01/21	22	4	6	8	4	5	-	4	40	31	24
GSA_22_16	98	U	22/01/21	22	1	1	1	1	0	-	1	80	56	40
GSA_22_17	121	M	23/01/21	22	0	1	0	1	0	-	0	60	-	-
GSA_22_18	201	M	24/01/21	22	1	1	4	1	1	-	1	80	84	60
GSA_22_19	222	F	25/01/21	22	3	3	4	2	2	-	2	40	30	23
GSA_22_20	168	M	26/01/21	22	2	2	3	2	2	-	2	80	20	15
GSA_22_21	195	F	27/01/21	22	4	3	4	3	2	-	3	40	26	20
GSA_22_22	320	F	28/01/21	22	5	7	8	6	6	-	6	40	18	14
GSA_22_23	331	F	29/01/21	22	-	9	10	8	5	-	5	25	27	19
GSA_22_24	283	F	30/01/21	22	-	8	8	9	4	-	8	50	31	22
GSA_22_25	280	F	31/01/21	22	-	7	7	10	4	-	7	50	35	21
GSA_22_26	305	F	01/02/21	22	-	11	8	9	4	-	4	25	37	25
GSA_22_27	299	M	02/02/21	22	-	9	7	9	5	-	9	50	26	20
GSA_22_28	289	F	03/02/21	22	-	11	7	10	4	-	4	25	40	31
GSA_22_29	276	F	04/02/21	22	4	9	6	8	4	-	4	40	37	30
GSA_22_30	251	M	05/02/21	22	3	6	5	8	4	-	3	20	37	28
GSA01-140319-03-12.5x	247	F	06/02/21	1	4	7	5	6	5	5	5	50	19	15
GSA01-150321-23-12.5x	266	F	07/02/21	1	3	5	6	6	3	3	3	50	35	31
GSA01-150321-37-12.5x	222	M	08/02/21	1	4	6	4	8	4	4	4	67	33	27
GSA01-160118-21-12.5x	181	F	09/02/21	1	3	5	3	5	3	3	3	67	28	24
GSA01-180618-11-12.5x	304	F	10/02/21	1	6	8	7	7	5	5	5	33	19	16

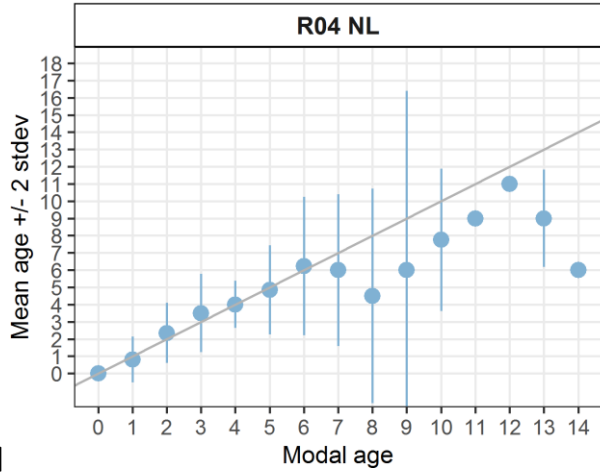
Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	Modal age	PA %	CV %	APE %
GSA01-180618-15-12.5x	331	F	11/02/21	1	6	13	10	6	5	5	5	33	44	36
GSA01-210519-10-12.5x	321	F	12/02/21	1	5	6	6	7	5	6	6	50	13	10
GSA01-210519-21-12.5x	293	M	13/02/21	1	3	8	7	6	6	6	6	50	28	17
GSA01-210519-62-12.5x	211	F	14/02/21	1	2	4	4	3	3	4	4	50	24	20
GSA01-220817-06-12.5x	193	M	15/02/21	1	3	4	4	2	3	6	3	33	37	27
GSA01-260517-17-12.5x	156	F	16/02/21	1	1	1	3	1	1	3	1	67	62	53
GSA01-270819-05-12.5x	202	F	17/02/21	1	4	4	4	4	3	2	4	67	24	19
GSA01-300719-01-12.5x	310	M	18/02/21	1	6	9	9	5	6	7	6	33	24	19
GSA01-300719-38-12.5x	346	M	19/02/21	1	-	14	7	5	6	6	6	40	48	34
IBER110920_20	210	U	20/02/21	27.9	5	5	5	-	-	-	5	100	0	0
IBER110920_21	217	U	21/02/21	27.9	4	3	4	3	3	-	3	60	16	14
jurel_19052021_n93_247mm(2x)	247	F	22/02/21	8	8	6	5	3	3	5	3	33	38	27
jurel_19052021_n96_255mm(2x)	255	M	23/02/21	8	5	6	5	3	3	6	3	33	29	24
jurel_DEM2020_L100_n7_125mm(2x)	125	M	24/02/21	8	1	1	0	1	1	0	1	67	77	67
jurel_DEM2020_L100_n8_146mm(2x)	146	F	25/02/21	8	1	1	2	1	1	3	1	67	56	44
jurel_DEM2020_L104_n10_230mm(2x)	230	F	26/02/21	8	5	5	5	4	2	5	5	67	28	21
jurel_DEM2020_L108_n4_122mm(2x)	122	M	27/02/21	8	1	1	1	1	1	1	1	100	0	0
jurel_DEM2020_L120_n7_201mm(2x)	201	M	28/02/21	8	3	3	3	2	2	2	2	50	22	20
jurel_DEM2020_L122_n6_148mm(2x)	148	M	01/03/21	8	3	1	2	1	2	1	1	50	49	40
jurel_DEM2020_L122_n8_157mm(2x)	157	M	02/03/21	8	3	2	2	1	2	2	2	67	32	17
jurel_DEM2020_L61_n6_214mm(2x)	214	M	03/03/21	8	3	4	5	3	2	5	3	33	33	27
jurel_DEM2020_L65_n5_196mm(2x)	196	F	04/03/21	8	3	3	4	2	2	2	2	50	31	25
jurel_PELACUS0319_L21_n18_169mm(2x)	169	F	05/03/21	8	5	3	4	2	2	4	2	33	36	30
jurel_PELACUS0319_L29_n18_281mm(2x)	281	M	06/03/21	8	-	5	5	5	3	-	5	75	22	17
jurel_PELACUS0319_L3_n20_219mm(2x)	219	F	07/03/21	8	4	4	4	3	3	4	4	67	14	12
jurel_PELACUS0321_L12G_n13_337	337	F	08/03/21	8	5	8	7	8	5	6	5	33	21	18
jurel_PELACUS0321_L19_n1_136mm(2x)	136	F	09/03/21	8	1	1	1	1	1	1	1	100	0	0
jurel_PELACUS0321_L38_n17_322mm(2x)	322	F	10/03/21	8	6	10	8	7	4	6	6	33	30	22
jurel_PELACUS0321_L38_n5_342mm(2x)	342	F	11/03/21	8	6	12	11	9	5	-	5	20	35	29
jurel_PELACUS0321_L42_n3_270mm(2x)	270	M	12/03/21	8	5	5	6	3	4	5	5	50	22	17
jurel_PELACUS0321G_L12_n34_299mm(2x)	299	M	13/03/21	8	6	7	8	6	4	5	6	33	24	17
jurel03092020_n55_305mm(2x)	305	M	14/03/21	8	5	9	8	5	5	6	5	50	28	23
jurel03092020_n58_268mm(2x)	268	F	15/03/21	8	6	7	6	5	4	6	6	50	18	14
jurel10072019_n45_244mm(2x)	244	F	16/03/21	8	5	5	5	5	4	4	5	67	11	10
jurel10072019_n72_235mm(2x)	235	F	17/03/21	8	3	4	4	3	3	3	3	67	15	13
jurel10072019_n97_251mm(2x)	251	M	18/03/21	8	4	4	5	3	3	3	3	50	22	18
jurel10112020_n44_318mm(2x)	318	F	19/03/21	8	6	8	7	5	6	6	6	50	16	12
jurel13042021_n14_227mm(2x)	227	F	20/03/21	8	7	6	5	4	3	5	5	33	28	20
jurel22012019_n18_239mm(2x)	239	M	21/03/21	8	5	4	4	3	0	4	4	50	53	37
jurel22012019_n29_267mm(2x)	267	F	22/03/21	8	5	5	5	3	4	4	5	50	19	15
TT020920_2	324	U	23/03/21	27.9	6	7	7	10	3	-	7	40	38	25
TT110719_14c	390	U	24/03/21	27.9	9	11	11	14	8	-	11	40	22	16
TT110719_29b	376	U	25/03/21	27.9	10	11	10	12	6	-	10	40	23	16
TT110719_4	365	U	26/03/21	27.9	9	14	12	15	6	-	6	20	33	26
TT130619_15	367	U	27/03/21	27.9	7	8	7	13	6	-	7	40	34	23
TT130619_19	352	U	28/03/21	27.9	8	13	11	13	6	-	13	40	31	25
TT130619_34	355	U	29/03/21	27.9	9	13	8	11	6	-	6	20	29	22
TT130619_35	296	U	30/03/21	27.9	8	11	7	7	4	-	7	40	34	23
TT130619_4	351	U	31/03/21	27.9	6	10	8	10	5	-	10	40	29	24
TT130619_7	364	U	01/04/21	27.9	9	9	9	11	6	-	9	60	20	13
TT170620_42	225	U	02/04/21	27.9	5	7	6	3	5	-	5	40	29	20
TT180321_12	370	U	03/04/21	27.9	-	17	10	10	8	-	10	50	35	26
TT180321_1e	397	U	04/04/21	27.9	10	11	9	8	6	-	6	20	22	16
TT180321_2c	358	U	05/04/21	27.9	8	8	8	9	7	-	8	60	9	5
TT180321_3	446	U	06/04/21	27.9	-	11	10	13	8	-	8	25	20	14
TT180321_6e	394	U	07/04/21	27.9	9	10	10	10	7	-	10	60	14	10
TT180321_7	394	U	08/04/21	27.9	10	13	11	13	6	-	13	40	27	20
TT270219_54b	234	U	09/04/21	27.9	4	7	5	3	4	-	4	40	33	24
TT270219_58	249	U	10/04/21	27.9	4	5	4	5	4	-	4	60	12	11
TT270219_71b	254	U	11/04/21	27.9	5	9	5	4	6	-	5	40	33	23
TT270219_86	247	U	12/04/21	27.9	5	11	5	4	5	-	5	60	47	33
TT270219_91	242	U	13/04/21	27.9	6	8	6	5	5	-	5	40	20	13
TT290820_25	242	U	14/04/21	27.9	5	6	5	4	4	-	4	40	17	13

Table 6.6: Number of readings per reader and modal age.

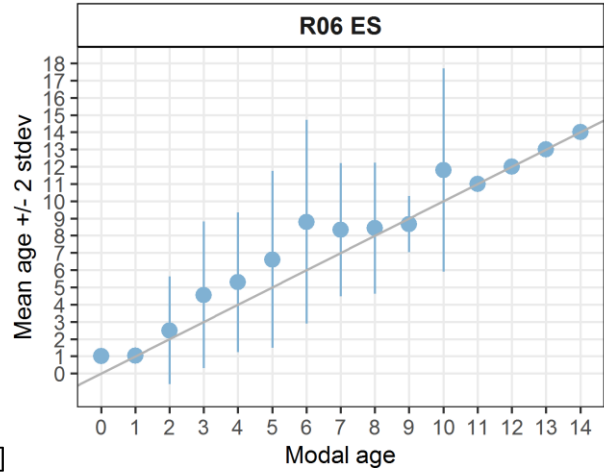
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	total
0	11	11	11	11	8	0	52
1	39	39	39	39	37	22	215
2	22	24	24	24	24	18	136
3	36	38	38	38	38	18	206
4	38	45	45	45	45	12	230
5	32	39	38	38	37	16	200
6	16	18	18	18	18	9	97
7	8	10	10	10	10	1	49
8	4	7	7	7	7	1	33
9	4	8	7	8	7	1	35
10	4	6	6	6	6	0	28
11	1	1	1	1	1	0	5
12	1	1	1	1	1	0	5
13	2	2	2	2	2	0	10
14	1	1	1	1	0	0	4
Total	219	250	248	249	241	98	1305

Table 6.7: Age composition by reader.

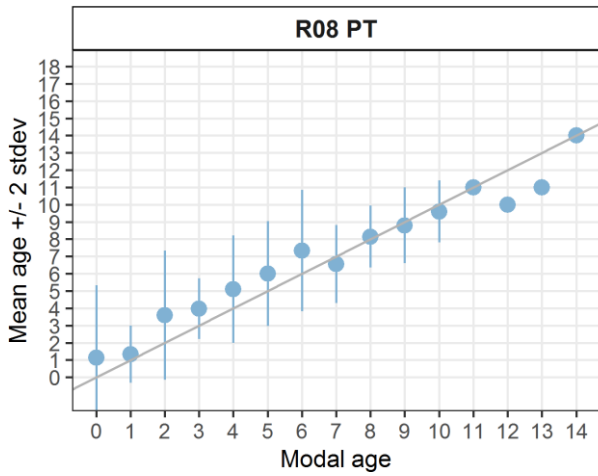
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE
0	23	2	11	3	21	1
1	31	51	25	48	28	15
2	17	21	12	22	38	19
3	38	17	28	31	55	16
4	39	27	46	23	46	14
5	32	26	33	30	26	15
6	16	21	27	23	18	12
7	7	20	21	18	5	4
8	4	13	18	12	3	1
9	7	21	8	12	1	0
10	4	7	13	11	0	1
11	1	12	4	6	0	0
12	0	4	1	3	0	0
13	0	4	0	4	0	0
14	0	3	1	2	0	0
15	0	0	0	1	0	0
17	0	1	0	0	0	0
Total	219	250	248	249	241	98



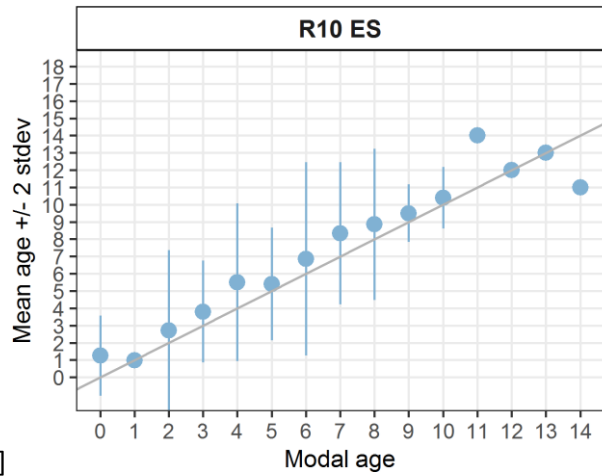
[[1]]



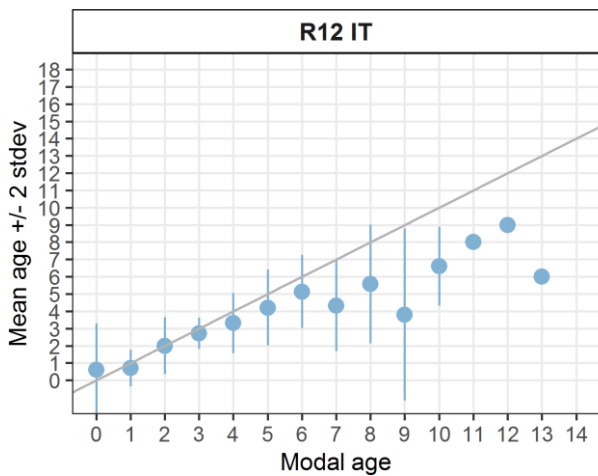
[[2]]



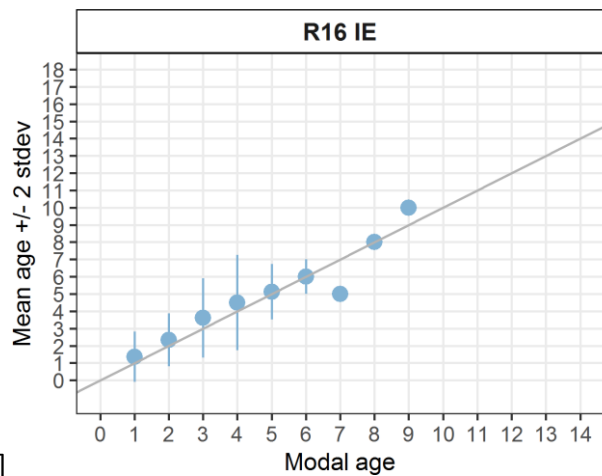
[[3]]



[[4]]



[[5]]



[[6]]

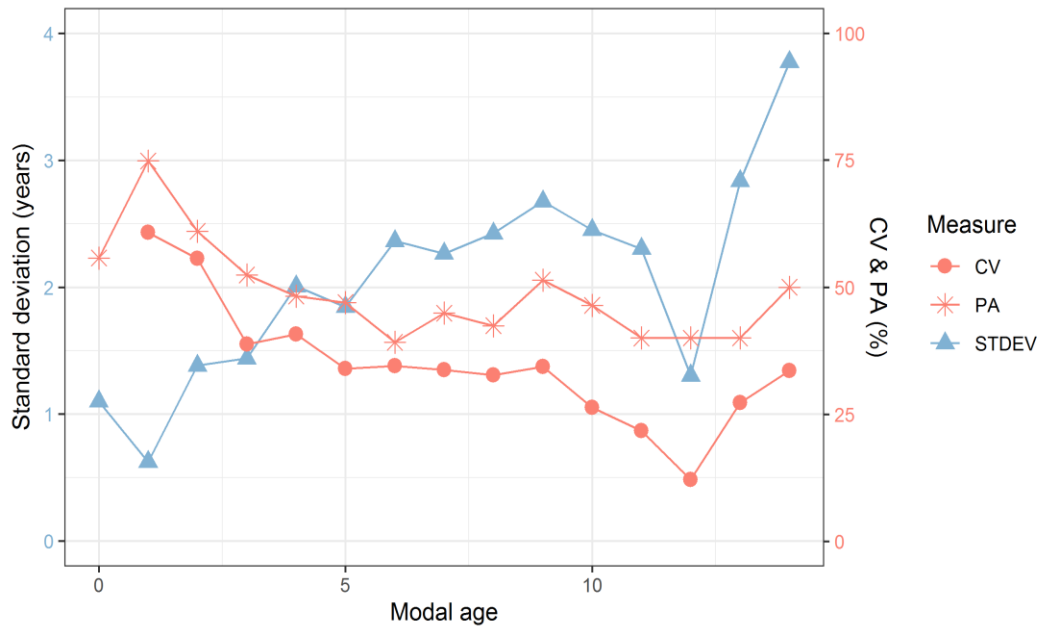


Figure 6.3: CV, PA and (STDEV (standard deviation) are plotted against modal age

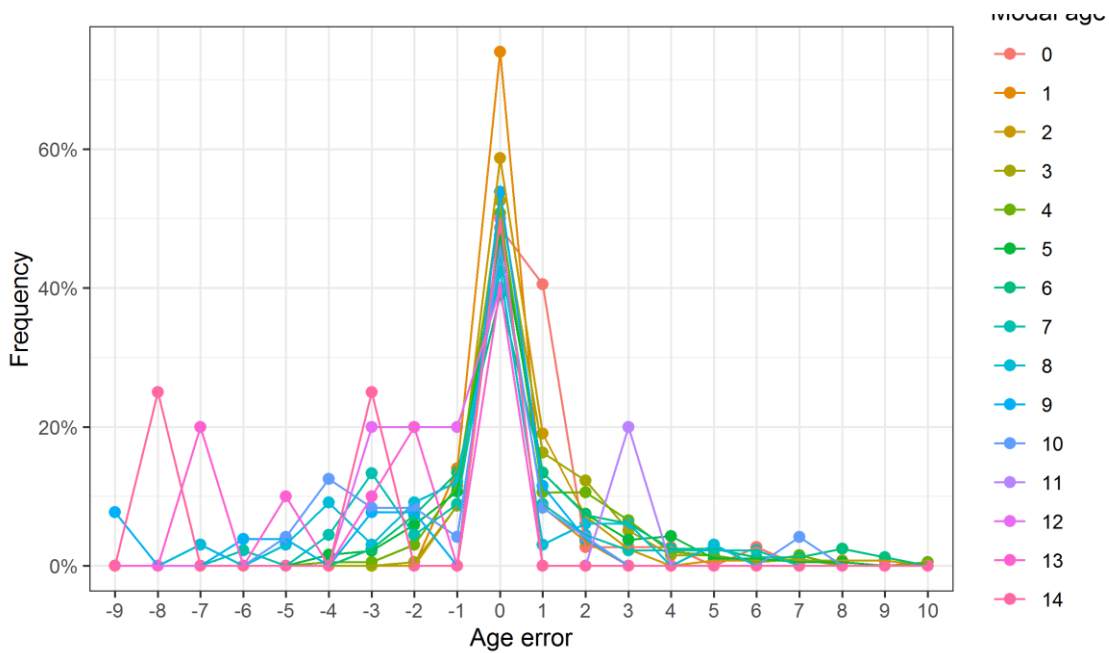


Figure 6.4: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

6.1.3 Sliced otoliths, all readers

Data Overview

Table 6.6: Summary of statistics; PA (%), CV (%) and APE (%).

CV	PA	APE
20 %	46 %	14 %

Table 6.7: Data overview including modal age and statistics per sample.

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO	Modal age	PA %	CV %	APE %
16_1.5x20	289	M	18/03/19	27.9.a	7	7	6	8	7	-	-	6	8	6	6	7	-	8	6	7	8	8	-	8	7	8	6	8	8	40	12	10
17_1.5x20	291	F	19/03/19	27.9.a	8	7	7	6	7	-	-	7	7	6	7	8	-	8	7	7	7	6	-	6	6	8	7	8	7	50	10	7
18_1.5x20	303	M	20/03/19	27.9.a	7	8	7	8	6	-	-	6	8	6	8	7	-	9	7	7	8	8	-	7	7	9	7	8	7	40	12	10
19_1.5x20	340	F	21/03/19	27.9.a	8	10	9	9	6	-	-	9	7	7	8	8	-	8	8	7	7	7	-	7	7	11	8	7	7	40	15	12
20_1.5x20	273	F	22/03/19	27.9.a	6	6	6	7	6	-	-	7	6	5	6	5	-	5	8	6	6	6	-	5	7	7	7	8	6	45	15	12
21_1.5x20	318	M	23/03/19	27.9.a	15	13	10	15	9	-	-	12	12	13	14	15	-	14	14	14	8	13	-	12	12	13	14	14	14	30	15	11
22_1.5x20	346	M	24/03/19	27.9.a	6	7	10	9	6	-	-	7	5	5	5	-	6	8	6	5	6	6	-	4	8	7	7	9	5	25	25	20
23_1.5x20	426	M	25/03/19	27.9.a	12	13	12	14	10	-	-	14	9	11	12	14	-	13	12	12	8	10	-	9	12	13	11	13	12	30	15	12
24_1.5x20	283	M	26/03/19	27.9.a	7	7	7	8	7	-	-	8	9	8	8	7	-	7	10	10	7	7	-	9	8	8	8	8	7	40	12	9
25_1.5x20	308	M	27/03/19	27.9.a	-	7	8	8	6	-	-	9	8	5	5	-	6	6	9	6	7	-	10	5	7	4	7	5	21	24	20	
26_1.5x20	340	M	28/03/19	27.9.a	8	7	9	10	7	-	-	10	10	7	7	7	-	6	8	10	8	7	-	10	8	8	7	8	7	35	16	13
27_1.5x20	447	F	29/03/19	27.9.a	12	15	14	15	9	-	-	13	14	-	11	11	-	11	13	10	9	12	-	14	12	13	10	17	11	16	18	14
28_1.5x20	296	M	30/03/19	27.9.a	8	9	9	9	7	-	-	11	7	7	8	6	-	6	11	8	5	8	-	9	7	10	7	12	7	25	22	18
29_1.5x20	330	M	31/03/19	27.9.a	7	8	10	10	6	-	-	8	9	7	5	6	-	6	9	7	7	7	-	10	9	12	7	8	7	30	22	18
30_1.5x20	380	M	01/04/19	27.9.a	8	10	12	11	7	-	-	9	10	11	8	8	-	7	10	11	8	10	-	11	9	10	11	10	10	30	15	13
GBD_19_B47_C1_O_0003	321	U	02/04/19	7	7	7	7	7	7	7	7	7	6	7	6	8	7	7	7	7	6	7	6	5	6	7	7	7	7	71	9	7
GBD_19_B47_C1_O_0012	338	U	03/04/19	7	9	8	10	11	6	11	7	10	7	9	8	10	9	9	10	9	7	7	10	5	8	10	8	11	10	25	19	15
GBD_19_B47_C1_O_0013	378	U	04/04/19	7	12	10	12	13	8	11	10	11	10	10	10	11	12	11	8	11	10	11	12	7	12	11	11	12	11	33	13	10
GBD_19_B47_C1_O_0014	304	U	05/04/19	7	7	7	8	8	5	8	6	8	6	7	6	6	7	6	7	7	6	7	7	5	7	7	6	7	7	46	13	10
GBD_19_B47_C1_O_0015	339	U	06/04/19	7	10	9	10	10	6	12	8	11	7	10	10	10	10	10	11	8	7	10	5	11	10	10	10	10	54	18	14	
GBD_19_B47_C1_O_0016	368	U	07/04/19	7	16	16	15	16	6	16	14	16	8	15	16	16	16	16	15	16	9	9	16	8	16	16	16	16	16	62	23	18
GBD_19_B47_C1_O_0030	297	U	08/04/19	7	9	8	9	10	5	9	9	9	5	9	8	8	9	8	8	8	8	8	9	9	4	9	9	8	9	50	18	12
GBD_19_B47_C1_O_0031	265	U	09/04/19	7	5	6	6	6	4	5	5	5	4	5	5	5	5	4	6	4	4	6	6	3	6	7	6	6	38	19	15	
GBD_19_B47_C1_O_0035	272	U	10/04/19	7	8	8	8	9	4	9	6	9	7	9	7	9	9	8	9	9	7	9	9	7	9	10	9	9	54	16	12	
GBD_19_B47_C1_O_0042	234	U	11/04/19	7	4	5	5	6	4	5	3	4	3	5	4	3	4	3	5	3	4	3	6	2	6	4	4	4	38	26	20	
GBD_19_B47_C1_O_0043	228	U	12/04/19	7	3	4	4	5	3	5	3	3	3	3	-	3	3	3	3	3	3	2	4	2	4	4	3	3	61	23	18	
GBD_19_B47_C1_O_0044	254	U	13/04/19	7	4	4	6	5	3	3	3	3	3	4	3	3	3	3	5	3	3	2	4	2	4	4	3	4	3	50	27	21
GBD_19_B47_C1_O_0045	230	U	14/04/19	7	3	4	4	5	3	3	3	3	3	4	3	3	3	3	4	3	3	2	4	2	4	4	3	3	62	21	16	
GBD_19_B47_C1_O_0046	235	U	15/04/19	7	3	4	4	4	3	3	2	4	3	3	2	3	4	3	4	3	3	2	-	2	3	1	3	3	52	27	17	
GBD_19_B47_C1_O_0047	320	U	16/04/19	7	7	8	8	8	7	8	7	9	7	8	7	9	8	8	8	7	6	8	9	7	7	8	7	7	42	10	9	
GBD_19_B47_C1_O_0048	394	U	17/04/19	7	12	13	13	13	6	13	9	13	7	12	10	12	13	13	12	13	10	11	13	5	12	13	13	13	50	21	16	
GBD_19_B47_C1_O_0054	316	U	18/04/19	7	12	12	11	11	6	12	10	12	7	12	10	11	12	12	12	12	11	12	12	4	12	12	11	12	58	20	13	
GBD_19_B47_C1_O_0055	304	U	19/04/19	7	7	8	8	8	5	8	7	7	7	5	7	7	7	7	8	7	7	8	7	6	7	7	7	7	62	11	7	
GBD_19_B47_C1_O_0056	339	U	20/04/19	7	10	9	10	9	4	9	7	10	6	9	6	10	9	9	9	10	8	9	10	5	9	9	9	10	46	20	15	
GBD_19_B47_C1_O_0057	322	U	21/04/19	7	14	13	12	14	6	14	11	13	8	13	11	14	13	14	12	13	9	12	14	8	14	13	13	13	33	18	14	
GBD_19_B47_C1_O_0081	256	U	22/04/19	7	8	9	8	8	4	9	7	8	5	8	4	8	8	6	8	9	6	8	9	4	7	8	8	8	50	22	18	
GBD_19_B47_C1_O_0082	277	U	23/04/19	7	7	7	8	7	6	7	6	7	7	6	7	7	7	7	7	7	7	7	7	6	7	7	7	7	7	7	7	4
GBD_19_B47_C1_O_0083	278	U	24/04/19	7	7	7	8	7	4	7	6	7	6	7	6	7	7	7	7	7	6	7	7	4	7	7	7	7	7	71	14	10
GBD_19_B47_C1_O_0084	269	U	25/04/19	7	5	6	7	6	4	7	4	5	4	5	4	5	5	4	5	4	4	6	5	3	5	4	5	5	42	20	15	
GBD_19_B47_C1_O_0085	288	U	26/04/19	7	10	9	8	10	0	10	8	9	8	9	7	-	10	9	9	9	9	9	10	7	9	9	9	9	52	24	13	
GBD_19_B47_C1_O_0086	248	U	27/04/19	7	6	5	4	5	4	5	4	5	4	4	3	-	4	4	5	4	6	5	5	1	5	4	5	5	43	23	17	
GBD_19_B47_C1_O_0087	264	U	28/04/19	7	4	5	5	5	4	4	4	4	3	4	4	-	4	4	4	4	5	5	5	3	4	4	4	5	4	61	14	11
GBD_19_B47_C1_O_0088	313	U	29/04/19	7	8	9	8	9	5	9	7	8	7	8	8	-	9	8	8	8	8	7	8	5	8	8	8	9	8	57	14	9
GBD_19_B48_C1_O_0001	257	U	30/04/19	7	4	4	4	5	4	4	4	4	4	4	3	-	4	4	4	4	4	4	-	3	5	4	4	4	82	11	5	
GBD_19_B48_C1_O_0002	255	U	01/05/19	7	5	5	5	6	5	6	5	5	5	5	5	-	5	5	5	5	5	5	5	3	5	6	5	5	83	11	5	
GBD_19_B48_C1_O_0005	244	U	02/05/19	7	4	4	4	4	4	4	4	4	4	4	3	-	4	4	4	4	4	4	4	2	4	4	4	4	91	12	6	
GBD_19_B48_C1_O_0007	235	U	03/05/19	7	4	4	4	4	4	4	4	4	3	4	3	-	4	-	4	5	3	4	4	3	4	4	4	4	77	12	8	
GBD_19_B48_C1_O_0009	237	U	04/05/19	7	4	4	4	4	3	6	3	4	3	4	4	-	4	3	6	5	4	4	4	1	4	5	4	4	61	26	15	
GBD_19_B48_C1_O_0015	244	U	05/05/19	7	4	4	4	4	4	4	3	4	3	4	4	-	4	3	4	5	3	3	4	2	4	4	4	5	4	65	18	13
GBD_19_B48_C1_O_0016	248	U	06/05/19	7	4	5	5	4	4	4	4	4	4	4	4	-	5	4	4	4	4	4	4	2	4	5	4	5	4	74	15	9
GBD_19_B48_C1_O_0017	257	U	07/05/19	7	4	5	5	5	4	4	4	4	4	4	3	-	4	4	4	4	5	4	6	1	4	5	4	5	4	61	22	14
GBD_19_B48_C1_O_0020	222	U	08/05/19	7	4	4	4	4	4	4	3	4	4	4	4	-	4	4	5	4	4	4	5	2	4	5	4	4	78	15	7	
GBD_19_B48_C1_O_0027	259	U	09/05/19	7	5	5	5	5	4	6	4																					

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO	Modal age	PA %	CV %	APE %
GBD_19_B48_C1_O_0036	242	U	11/05/19	7	4	4	5	4	3	5	3	4	4	3	4	-	5	4	4	5	4	3	5	2	4	5	4	5	4	48	20	14
GBD_19_B48_C1_O_0037	239	U	12/05/19	7	4	7	4	4	3	5	3	4	4	4	-	5	4	4	4	4	4	4	5	3	4	5	4	5	4	59	21	14
GBD_19_B48_C1_O_0038	239	U	13/05/19	7	4	4	4	4	3	4	3	4	4	4	4	-	4	4	5	4	4	4	5	2	4	5	4	4	74	16	9	
GBD_19_B48_C1_O_0039	230	U	14/05/19	7	4	4	4	4	3	4	3	4	3	3	4	-	4	4	5	4	4	4	2	5	2	3	4	4	61	21	16	
GBD_19_B48_C1_O_0043	226	U	15/05/19	7	3	4	3	3	2	2	2	4	2	2	2	-	2	2	4	3	3	2	4	1	2	4	2	3	2	48	33	29
GBD_19_B48_C1_O_0044	231	U	16/05/19	7	2	5	3	1	2	3	2	4	2	3	1	-	4	2	4	2	3	2	4	1	2	3	2	1	2	39	45	37
GBD_19_B48_C1_O_0045	231	U	17/05/19	7	3	4	3	2	2	4	2	4	2	4	2	-	3	3	4	3	4	2	5	2	3	3	3	1	3	35	33	25
GBD_19_B48_C1_O_0046	235	U	18/05/19	7	4	3	3	2	2	3	3	4	3	-	2	-	3	4	4	3	3	3	4	2	2	2	3	2	3	45	26	20
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HOM_4A_3Q_01	335	M	21/05/19	4	8	9	8	8	6	8	7	8	6	8	8	-	8	8	9	8	7	8	8	6	8	8	8	8	8	70	10	8
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HOM_4A_3Q_03	385	F	23/05/19	4	12	13	11	13	5	12	10	12	10	5	12	-	12	12	12	13	7	6	12	6	12	13	12	12	48	26	21	
HOM_4A_3Q_04	355	F	24/05/19	4	12	12	9	10	7	14	8	11	7	8	8	-	11	11	10	14	9	8	15	7	11	11	10	11	26	23	18	
HOM_4A_3Q_05	325	M	25/05/19	4	14	15	13	13	6	15	10	13	7	-	13	-	13	14	13	15	7	8	14	7	13	14	15	14	32	25	21	
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HOM_4A_3Q_07	415	M	27/05/19	4	17	19	15	15	6	18	14	17	10	-	17	-	18	14	18	17	10	11	18	9	15	18	17	17	27	24	19	
HOM_4A_4Q_08	305	F	28/05/19	4	3	4	-	3	3	3	3	3	3	3	3	-	3	3	4	3	3	2	3	2	3	3	3	3	82	15	6	
HOM_4A_4Q_09	285	M	29/05/19	4	5	6	6	5	5	5	4	5	5	5	5	-	6	5	6	5	6	5	8	4	5	5	5	5	65	15	11	
HOM_4A_4Q_10	305	F	30/05/19	4	6	7	7	6	6	6	5	6	6	6	6	-	7	6	6	6	6	5	6	5	6	6	6	6	74	9	4	
HOM_4A_4Q_11	305	F	31/05/19	4	8	8	9	7	4	7	6	7	6	7	7	-	8	7	8	7	7	7	8	4	6	7	7	8	7	48	17	11
HOM_4A_4Q_12	335	M	01/06/19	4	7	9	10	7	5	11	8	9	6	7	6	-	8	6	7	9	6	6	8	4	7	8	7	9	7	26	22	18
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HOM_6A_1Q_06	325	F	10/06/19	4	8	9	9	8	6	9	8	8	8	8	8	-	9	8	8	9	7	8	9	7	8	9	8	9	8	52	10	7
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HOM_6A_1Q_08	325	M	12/06/19	4	9	9	9	9	7	10	9	9	8	8	8	-	9	9	9	10	7	8	11	7	8	9	10	9	48	12	9	
HOM_6A_1Q_09	335	M	13/06/19	4	12	14	11	9	8	-	11	12	9	10	9	-	12	11	11	12	10	10	12	7	8	12	11	13	12	27	17	13
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HOM_6A_1Q_12	375	M	16/06/19	4	14	14	13	12	6	15	14	14	12	13	14	-	15	14	14	15	12	14	15	11	14	15	15	15	14	39	15	10
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HOM_6A_3Q_01	275	M	19/06/19	4	5	5	5	5	4	4	4	4	4	4	-	4	4	5	4	4	6	4	4	4	4	4	4	4	74	13	10	
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HOM_6A_3Q_03	315	F	21/06/19	4	7	9	9	6	5	7	6	6	5	5	5	-	7	7	9	7	6	7	5	5	4	8	6	8	5	26	22	18
HOM_6A_3Q_04	285	M	22/06/19	4	8	9	8	8	5	8	8	8	8	8	8	-	8	8	8	8	8	8	5	8	8	8	8	8	8	87	12	6
HOM_6A_3Q_05	335	F	23/06/19	4	9	9	9	10	5	9	8	9	8	7	7	-	10	8	9	8	8	8	9	5	8	9	9	9	9	48	16	12
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HOM_6A_3Q_07	665	F	25/06/19	4	11	11	14	13	-	12	10	12	11	10	12	-	13	11	13	12	9	13	11	6	11	12	12	13	11	27	15	11
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Norway_38301_04	395	F	28/06/19	27.4.a	19	20	18	21	8	19	21	20	11	18	16	20	18	19	14	20	9	18	18	12	17	19	20	20	25	22	16	
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Norway_38301_16	355	M	01/07/19	27.4.a	14	17	12	18	6	16	15	12	9	15	11	16	15	18	13	15	9	14	13	9	12	15	17	16	15	21	23	19
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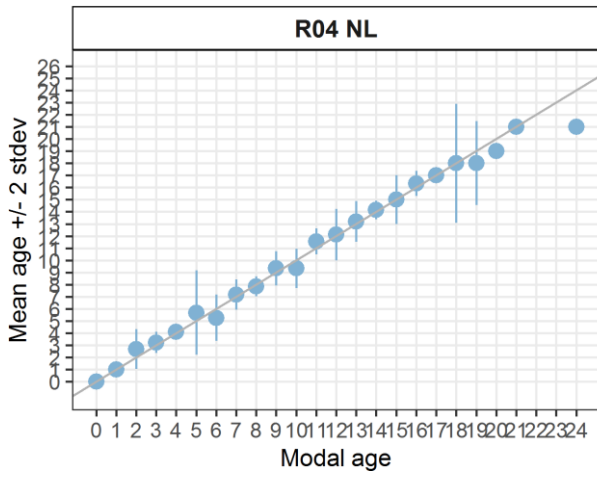
Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO	Modal age	PA %	CV %	APE %
Norway_38307_11	395	M	07/07/19	27.4.a	15	15	15	15	7	16	16	15	9	15	14	15	16	15	14	16	8	14	17	9	15	16	15	16	15	42	20	14
Norway_38307_12	350	M	08/07/19	27.4.a	19	19	15	17	10	20	17	18	11	16	14	19	19	16	16	19	11	15	20	9	19	18	18	20	19	25	20	16
Norway_38307_19	410	F	09/07/19	27.4.a	14	18	18	18	10	20	15	17	10	-	15	17	18	19	17	20	10	17	19	10	16	18	19	18	18	26	20	16
Norway_38307_21	380	M	10/07/19	27.4.a	18	19	17	18	9	20	15	18	10	17	15	18	19	18	17	19	10	17	19	9	17	18	18	19	18	29	21	15
Norway_38307_27	360	M	11/07/19	27.4.a	16	16	15	16	11	16	14	15	11	15	13	16	16	15	15	16	8	15	17	11	15	16	16	16	16	42	15	11
Norway_38307_29	370	F	12/07/19	27.4.a	18	18	16	20	10	19	18	18	11	18	15	18	19	18	19	19	11	12	19	9	17	19	18	19	18	33	20	16
Norway_38308_01	395	M	13/07/19	27.4.a	20	18	16	21	8	22	19	18	9	17	17	18	18	18	17	19	8	16	18	9	18	19	18	19	18	33	24	17
Norway_38308_09	385	F	14/07/19	27.4.a	16	15	12	15	8	16	13	16	9	16	13	16	15	16	15	17	7	11	17	9	12	17	16	17	16	29	22	19
Norway_38308_13	370	M	15/07/19	27.4.a	12	13	12	12	6	11	10	10	8	10	10	11	11	11	12	12	8	9	12	8	10	11	12	12	12	33	16	13
Norway_38308_18	365	M	16/07/19	27.4.a	20	19	13	18	8	18	17	20	10	-	15	18	18	18	17	20	10	12	18	10	16	18	17	19	18	30	23	19
Norway_38308_20	355	F	17/07/19	27.4.a	11	11	11	12	6	11	10	12	7	10	10	12	11	11	14	12	6	10	11	7	11	12	11	11	11	42	19	14
Norway_38308_25	385	M	18/07/19	27.4.a	14	17	12	16	11	18	15	16	11	14	13	16	15	14	14	18	11	13	14	11	13	15	16	17	14	21	15	12
Norway_38308_30	355	M	19/07/19	27.4.a	-	20	14	14	6	13	12	13	9	13	11	13	12	13	15	14	8	10	13	9	12	14	13	13	13	35	22	16
Norway_94205_01	395	F	20/07/19	27.4.a	13	15	14	14	8	14	14	13	9	12	7	13	13	13	13	13	9	11	14	10	14	13	13	13	42	17	14	
Norway_94205_02	370	M	21/07/19	27.4.a	21	23	14	19	9	25	23	24	14	21	12	25	23	25	21	24	12	12	24	13	21	24	25	24	24	21	27	23
Norway_94205_04	430	M	22/07/19	27.4.a	21	20	20	4	21	24	21	12	18	17	21	21	21	21	21	21	11	14	22	12	21	20	21	21	21	46	25	19
Norway_94205_07	355	M	23/07/19	27.4.a	11	11	10	11	6	12	10	12	9	11	9	11	11	11	12	11	9	11	12	7	10	11	11	12	11	46	15	11
Norway_94205_09	390	M	24/07/19	27.4.a	16	18	14	14	-	18	15	17	11	13	15	18	15	16	15	18	10	12	15	12	16	18	17	17	15	22	16	12
Norway_94205_11	375	M	25/07/19	27.4.a	16	17	15	19	-	19	18	19	10	17	14	19	18	17	19	18	9	12	19	11	18	17	19	19	19	35	19	15
Norway_94205_14	360	F	26/07/19	27.4.a	11	13	11	16	-	11	11	11	8	10	11	12	11	11	11	11	8	10	11	8	11	12	11	11	11	61	15	8
Norway_94205_21	325	F	27/07/19	27.4.a	9	9	10	11	-	9	10	9	7	10	8	10	9	10	10	9	7	6	10	7	10	9	10	9	10	39	14	10
Norway_94205_22	355	M	28/07/19	27.4.a	12	12	12	16	-	12	12	13	9	12	9	13	12	13	12	13	8	10	13	11	12	12	12	13	12	48	14	9
Noway_94205_25	290	F	29/07/19	27.4.a	5	6	7	6	-	5	5	7	5	5	5	5	5	5	7	5	5	5	6	4	5	6	5	6	5	61	14	12

Table 6.8: Number of readings per reader and modal age.

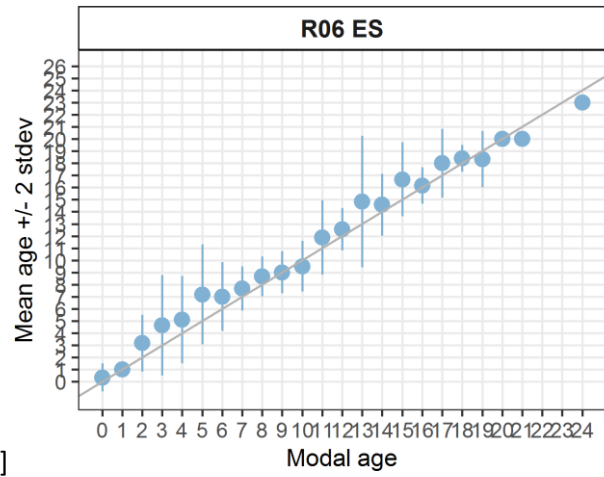
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO	total
2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	46
3	8	8	7	8	8	8	8	8	8	7	7	4	8	8	8	8	8	8	6	8	8	8	8	8	183
4	18	18	17	18	18	18	18	18	18	18	17	1	18	17	18	18	18	18	17	18	18	18	18	18	411
5	10	11	11	11	10	9	9	11	11	11	11	4	9	11	11	11	11	11	9	11	11	11	11	11	247
6	3	3	3	3	3	2	2	3	3	3	3	2	2	3	3	3	3	3	2	3	3	3	3	3	67
7	18	18	18	18	18	11	11	18	18	18	18	13	11	18	18	18	18	18	11	18	18	18	18	18	399
8	6	6	6	6	6	5	5	6	6	6	6	2	5	6	6	6	6	6	5	6	6	6	6	6	136
9	9	9	9	9	9	9	9	9	9	9	9	4	9	9	9	9	9	9	9	9	9	9	9	9	211
10	6	6	6	6	5	5	5	6	6	6	6	4	5	6	6	6	6	6	5	6	6	6	6	6	137
11	9	9	9	9	7	8	8	9	9	8	9	6	8	9	9	9	9	9	8	9	9	9	9	9	206
12	9	9	9	9	8	7	8	9	9	9	9	7	7	9	9	9	9	9	8	9	9	9	9	9	207
13	5	6	6	6	6	6	6	6	6	5	6	4	6	6	6	6	6	6	6	6	6	6	6	6	140
14	7	7	7	7	5	6	6	7	7	7	7	2	6	7	7	7	7	7	6	7	7	7	7	7	157
15	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	71
16	6	6	6	6	6	6	6	6	6	6	6	4	6	6	6	6	6	6	6	6	6	6	6	6	142
17	2	2	2	2	2	2	2	2	2	1	2	0	2	2	2	2	2	2	2	2	2	2	2	2	45
18	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	118
19	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	70
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
Total	132	134	132	134	124	118	119	134	134	128	132	71	118	133	134	134	134	134	116	134	134	134	134	134	3065

Table 6.9: Age composition by reader.

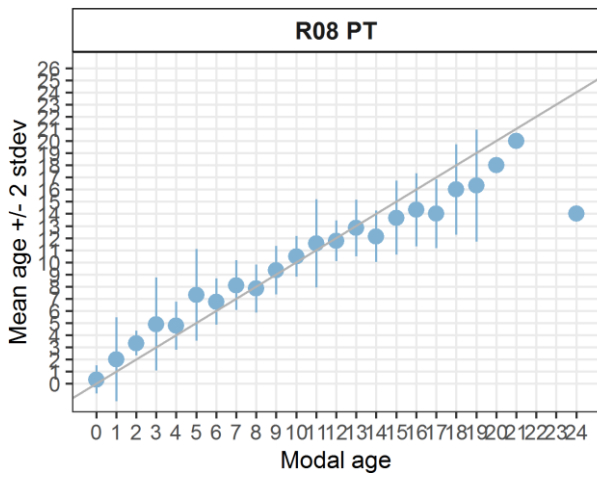
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R26 IT	R28 IT	R34 FR	R36 NO	R38 GR	R40 PT	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R68 FR	R70 NO
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	5	0	1	0	2
2	1	0	0	2	4	1	4	0	3	1	4	0	1	2	0	1	0	9	0	18	3	1	2	1
3	7	1	4	3	15	6	16	5	14	7	11	5	7	10	1	10	12	5	1	10	8	4	8	6
4	19	19	16	16	22	15	13	23	15	19	14	0	16	17	17	16	16	12	14	13	16	15	19	12
5	9	11	9	11	16	9	5	8	10	16	13	6	9	8	14	9	11	10	13	14	10	10	8	13
6	6	6	5	10	32	6	7	6	12	5	11	3	4	10	7	6	18	11	9	9	8	6	6	4
7	13	15	9	7	13	8	11	10	20	12	8	7	10	11	11	14	22	15	5	18	14	12	16	11
8	12	8	14	12	9	6	8	8	17	9	15	6	6	11	14	5	24	16	7	13	11	12	9	12
9	6	16	10	10	5	9	7	15	14	9	8	2	8	8	10	12	12	9	6	12	9	10	7	12
10	8	4	13	9	4	5	11	6	11	11	9	5	8	4	8	6	10	8	9	8	7	8	6	5
11	4	7	9	7	2	6	4	8	9	7	7	6	6	12	9	8	5	9	7	7	8	7	11	6
12	12	4	11	5	1	11	4	9	7	7	7	5	8	4	10	8	3	10	7	5	12	10	7	9
13	3	10	11	7	0	3	5	8	0	7	5	4	7	8	6	6	1	4	5	1	2	7	6	8
14	11	4	6	8	0	6	7	5	2	2	7	2	2	8	8	8	0	7	7	1	7	5	4	6
15	2	7	7	6	0	4	5	3	0	5	5	2	7	3	7	3	0	3	6	0	4	5	3	3
16	6	3	3	7	0	6	2	5	0	3	4	5	5	5	2	5	0	2	3	0	6	3	6	4
17	4	6	1	1	0	1	4	5	0	3	3	1	2	1	5	2	0	2	4	0	4	5	4	7
18	2	4	2	5	0	5	2	5	0	4	0	5	7	7	1	5	0	1	4	0	2	7	5	2
19	3	5	1	2	0	4	1	1	0	0	0	4	3	2	2	5	0	1	6	0	1	4	3	6
20	2	3	1	3	0	4	0	2	0	0	0	1	0	0	0	3	0	0	1	0	0	1	2	2
21	2	0	0	2	0	1	1	1	0	1	0	1	1	1	2	1	0	0	0	0	2	0	1	2
22	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
23	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1
25	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0
Total	132	134	132	134	124	118	119	134	134	128	132	71	118	133	134	134	134	134	116	134	134	134	134	134



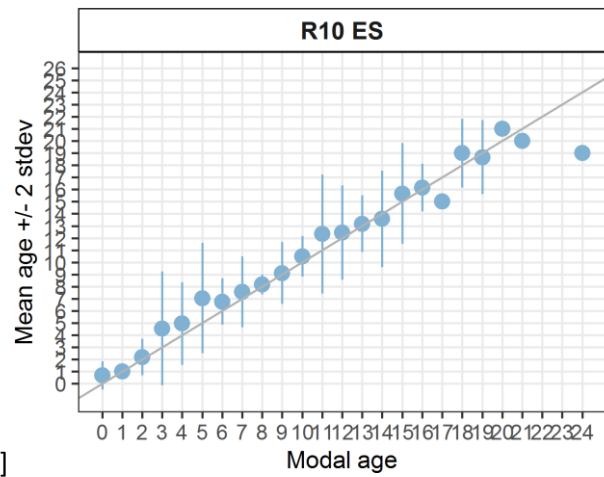
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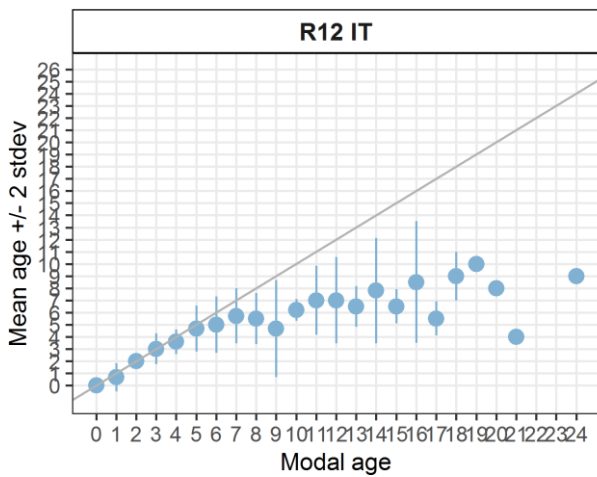
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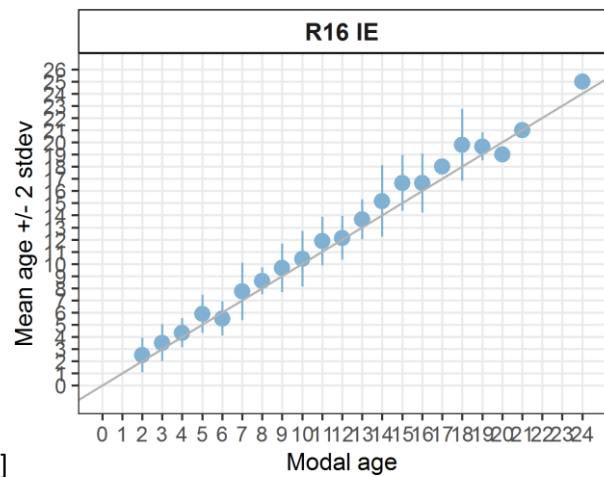
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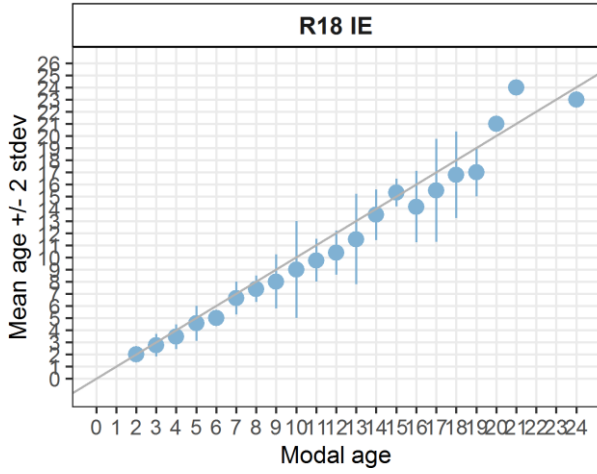
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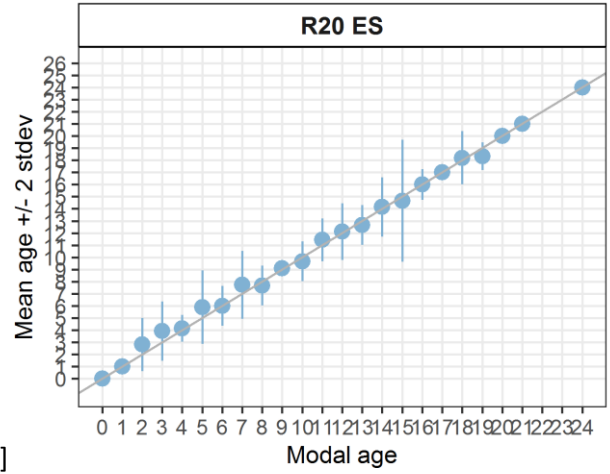
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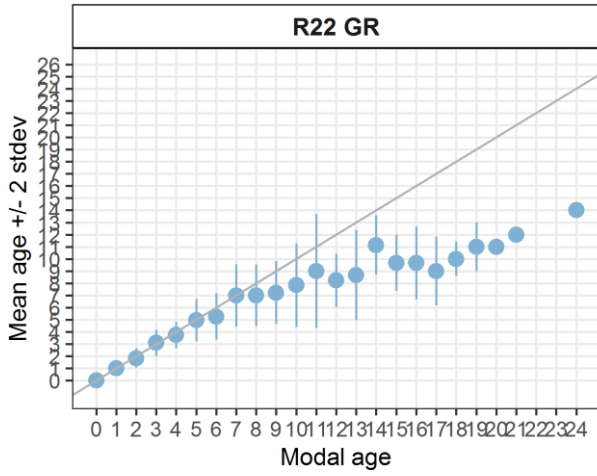
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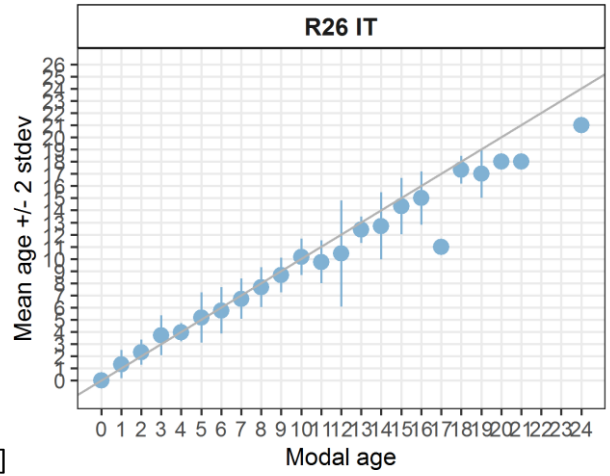
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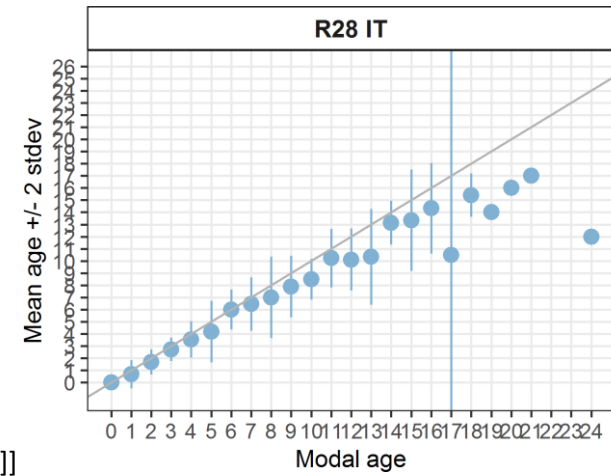
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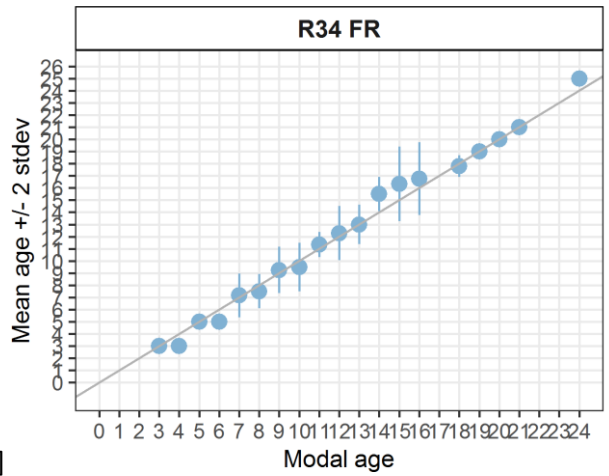
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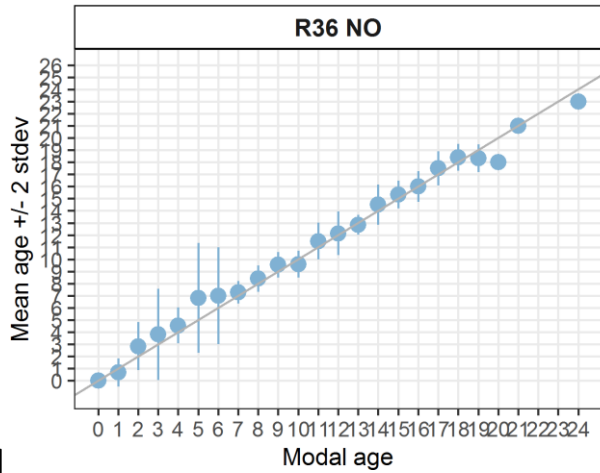
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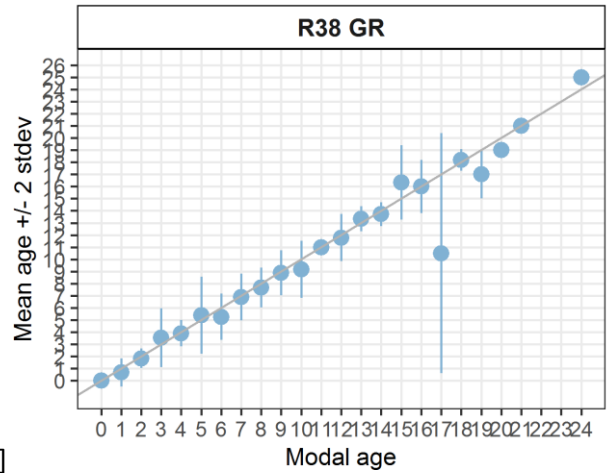
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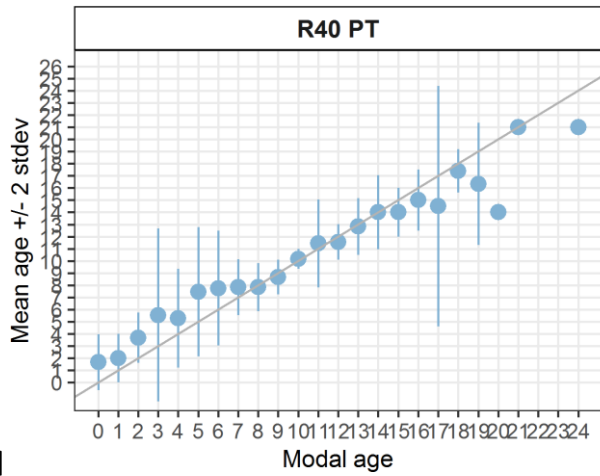
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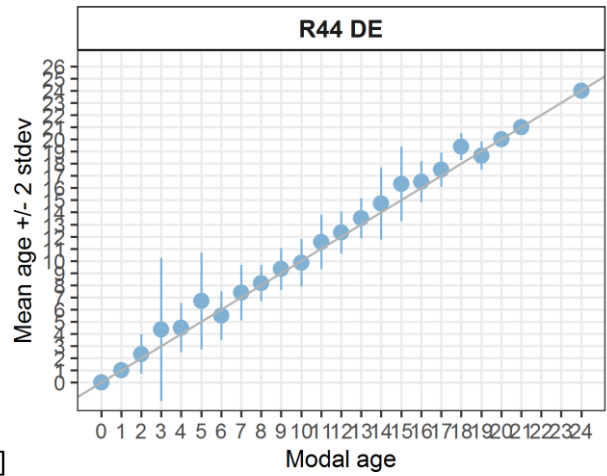
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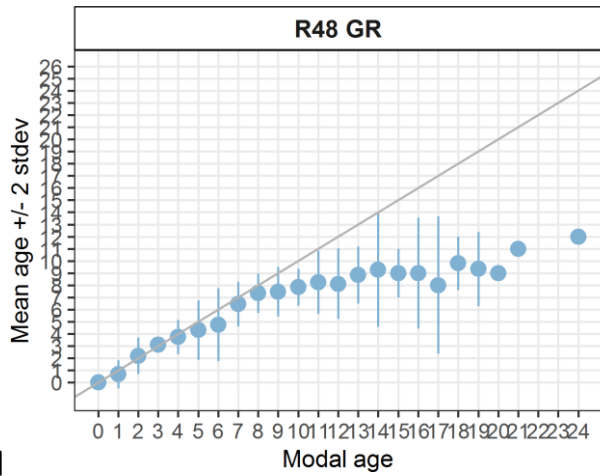
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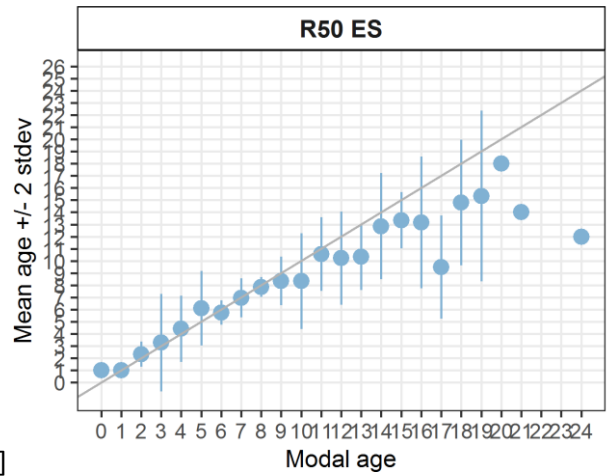
[[15]]



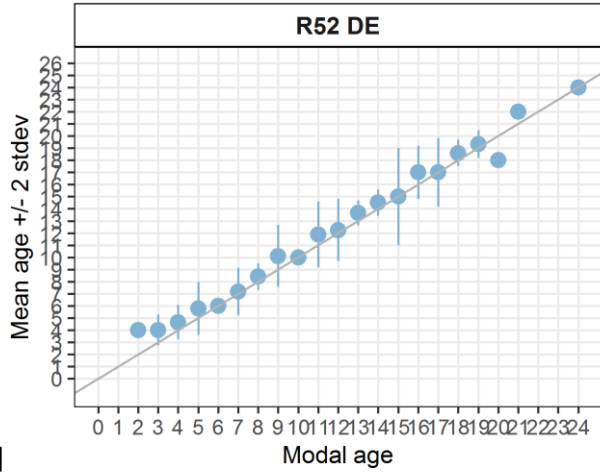
[[16]]



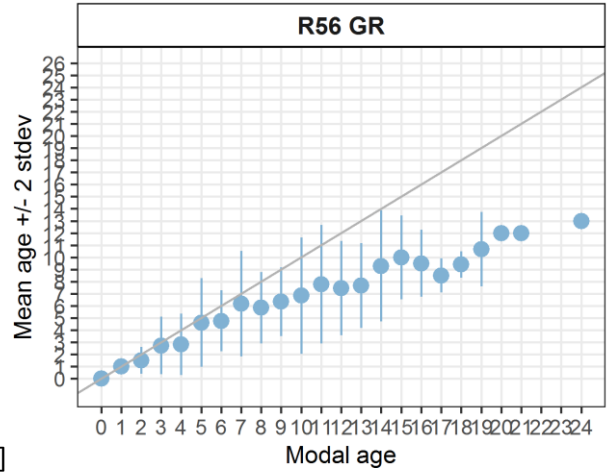
[[17]]



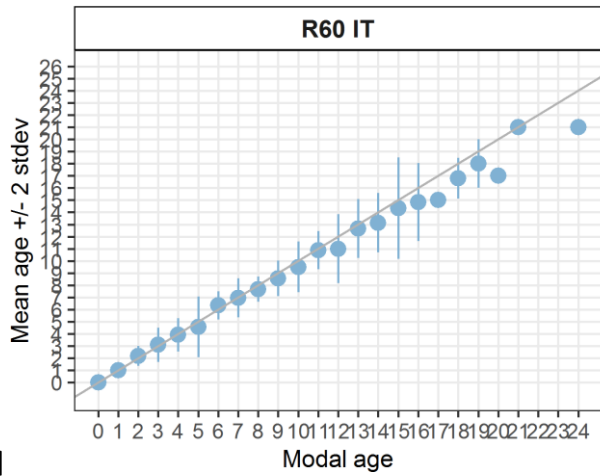
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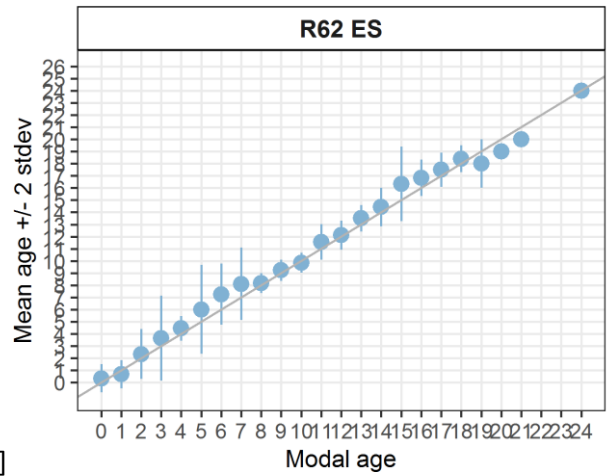
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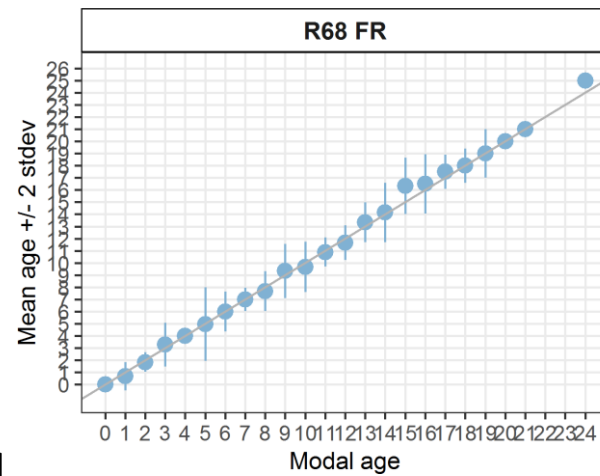
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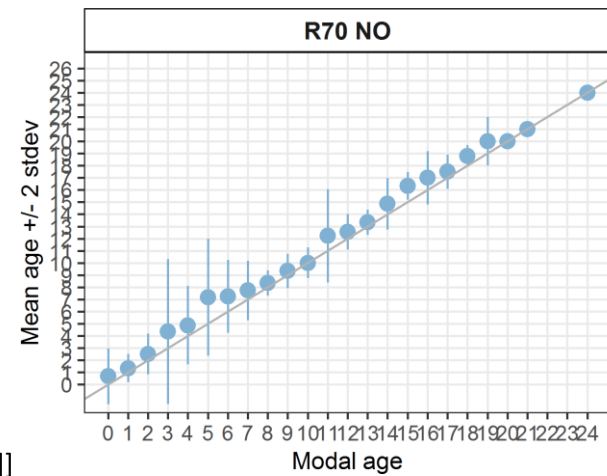
[[21]]



[[22]]



[[23]]



[[25]]

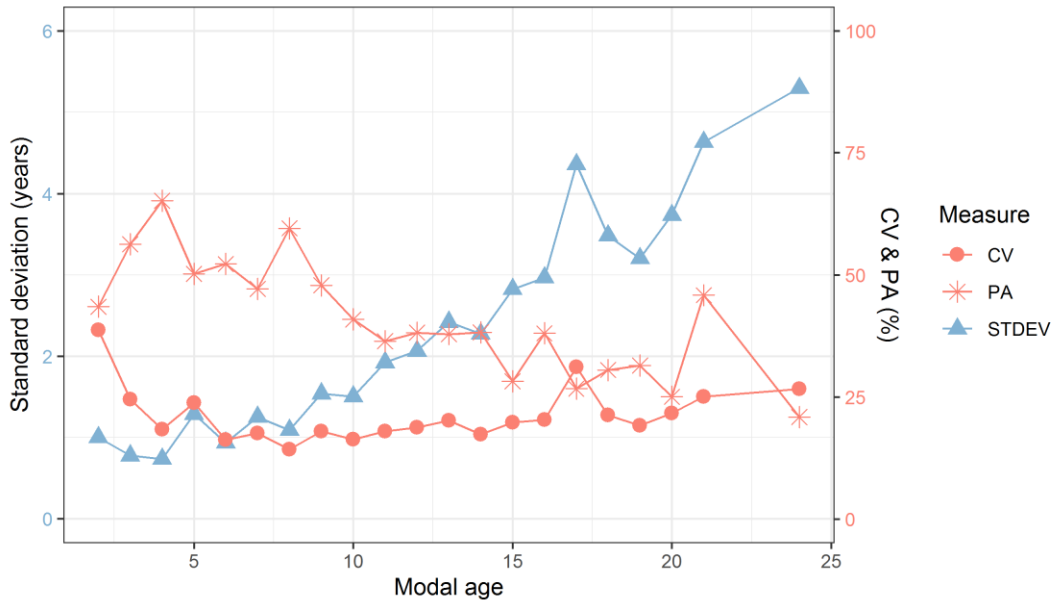


Figure 6.5: CV, PA and STDEV (standard deviation) are plotted against modal age

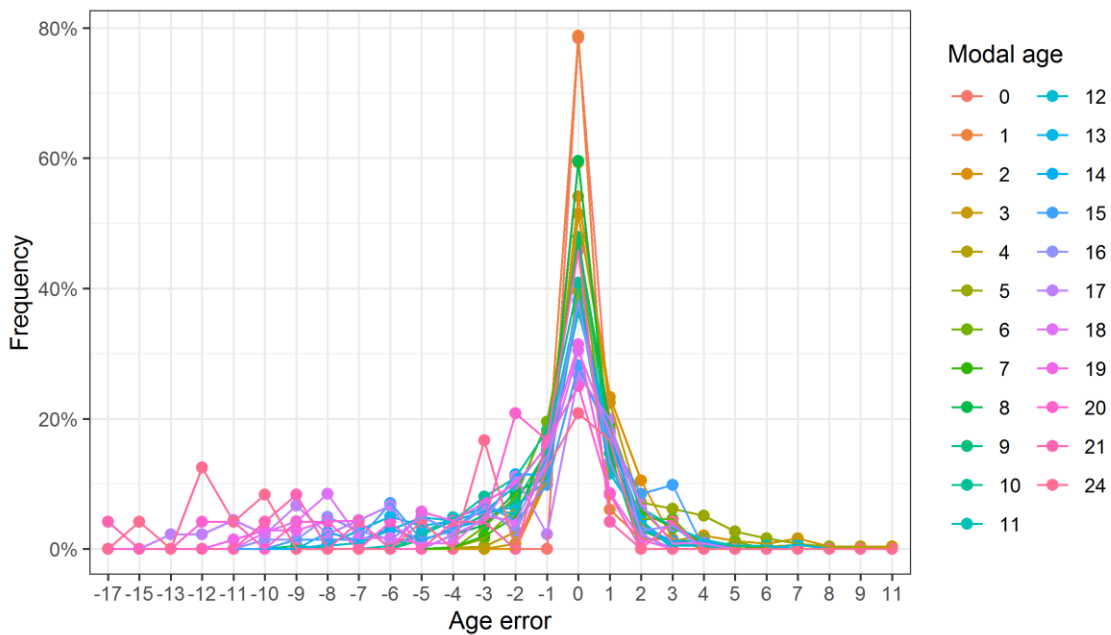


Figure 6.6: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

6.1.4 Sliced otoliths, advanced readers

All samples included

Data Overview

Table 6.10: Data overview including modal age and statistics per sample.

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	Modal age	PA %	CV %	APE %
16_1.5x20	289	M	18/3/19	27.9.a	7	7	6	8	7	-	-	7	60	10	6
17_1.5x20	291	F	19/3/19	27.9.a	8	7	7	6	7	-	-	7	60	10	6
18_1.5x20	303	M	20/3/19	27.9.a	7	8	7	8	6	-	-	7	40	12	9
19_1.5x20	340	F	21/3/19	27.9.a	8	10	9	9	6	-	-	9	40	18	13
20_1.5x20	273	F	22/3/19	27.9.a	6	6	6	7	6	-	-	6	80	7	5
21_1.5x20	318	M	23/3/19	27.9.a	15	13	10	15	9	-	-	15	40	23	19
22_1.5x20	346	M	24/3/19	27.9.a	6	7	10	9	6	-	-	6	40	24	20
23_1.5x20	426	M	25/3/19	27.9.a	12	13	12	14	10	-	-	12	40	12	9
24_1.5x20	283	M	26/3/19	27.9.a	7	7	7	8	7	-	-	7	80	6	4
25_1.5x20	308	M	27/3/19	27.9.a	-	7	8	8	6	-	-	8	50	13	10
26_1.5x20	340	M	28/3/19	27.9.a	8	7	9	10	7	-	-	7	40	16	13
27_1.5x20	447	F	29/3/19	27.9.a	12	15	14	15	9	-	-	15	40	20	15
28_1.5x20	296	M	30/3/19	27.9.a	8	9	9	9	7	-	-	9	60	11	9
29_1.5x20	330	M	31/3/19	27.9.a	7	8	10	10	6	-	-	10	40	22	18
30_1.5x20	380	M	1/4/19	27.9.a	8	10	12	11	7	-	-	7	20	22	18
GBD_19_B47_C1_O_0003	321	U	2/4/19	7	7	7	7	7	7	7	7	7	100	0	0
GBD_19_B47_C1_O_0012	338	U	3/4/19	7	9	8	10	11	6	11	7	11	29	22	18
GBD_19_B47_C1_O_0013	378	U	4/4/19	7	12	10	12	13	8	11	10	10	29	15	12
GBD_19_B47_C1_O_0014	304	U	5/4/19	7	7	7	8	8	5	8	6	8	43	16	12
GBD_19_B47_C1_O_0015	339	U	6/4/19	7	10	9	10	10	6	12	8	10	43	20	15
GBD_19_B47_C1_O_0016	368	U	7/4/19	7	16	16	15	16	6	16	14	16	57	26	17
GBD_19_B47_C1_O_0030	297	U	8/4/19	7	9	8	9	10	5	9	9	9	57	19	13
GBD_19_B47_C1_O_0031	265	U	9/4/19	7	5	6	6	6	4	5	5	5	43	14	12
GBD_19_B47_C1_O_0035	272	U	10/4/19	7	8	8	8	9	4	9	6	8	43	24	19
GBD_19_B47_C1_O_0042	234	U	11/4/19	7	4	5	5	6	4	5	3	5	43	21	17
GBD_19_B47_C1_O_0043	228	U	12/4/19	7	3	4	4	5	3	5	3	3	43	23	19
GBD_19_B47_C1_O_0044	254	U	13/4/19	7	4	4	6	5	3	3	3	3	43	29	21
GBD_19_B47_C1_O_0045	230	U	14/4/19	7	3	4	4	5	3	3	3	3	57	22	18
GBD_19_B47_C1_O_0046	235	U	15/4/19	7	3	4	4	4	3	3	2	3	43	23	19
GBD_19_B47_C1_O_0047	320	U	16/4/19	7	7	8	8	8	7	8	7	8	57	7	6
GBD_19_B47_C1_O_0048	394	U	17/4/19	7	12	13	13	13	6	13	9	13	57	24	19
GBD_19_B47_C1_O_0054	316	U	18/4/19	7	12	12	11	11	6	12	10	12	43	20	14
GBD_19_B47_C1_O_0055	304	U	19/4/19	7	7	8	8	8	5	8	7	8	57	15	11
GBD_19_B47_C1_O_0056	339	U	20/4/19	7	10	9	10	9	4	9	7	9	43	26	19
GBD_19_B47_C1_O_0057	322	U	21/4/19	7	14	13	12	14	6	14	11	14	43	24	17
GBD_19_B47_C1_O_0081	256	U	22/4/19	7	8	9	8	8	4	9	7	8	43	23	16
GBD_19_B47_C1_O_0082	277	U	23/4/19	7	7	7	8	7	6	7	6	7	57	10	7
GBD_19_B47_C1_O_0083	278	U	24/4/19	7	7	7	8	7	4	7	6	7	57	19	14
GBD_19_B47_C1_O_0084	269	U	25/4/19	7	5	6	7	6	4	7	4	4	29	23	19
GBD_19_B47_C1_O_0085	288	U	26/4/19	7	10	9	8	10	0	10	8	10	43	46	29
GBD_19_B47_C1_O_0086	248	U	27/4/19	7	6	5	4	5	4	5	4	4	43	16	13
GBD_19_B47_C1_O_0087	264	U	28/4/19	7	4	5	5	5	4	4	4	4	57	12	11
GBD_19_B47_C1_O_0088	313	U	29/4/19	7	8	9	8	9	5	9	7	9	43	19	14
GBD_19_B48_C1_O_0001	257	U	30/4/19	7	4	4	4	5	4	4	4	4	86	9	6
GBD_19_B48_C1_O_0002	255	U	1/5/19	7	5	5	5	6	5	6	5	5	71	9	8
GBD_19_B48_C1_O_0005	244	U	2/5/19	7	4	4	4	4	4	4	4	4	100	0	0
GBD_19_B48_C1_O_0007	235	U	3/5/19	7	4	4	4	4	4	4	4	4	100	0	0
GBD_19_B48_C1_O_0009	237	U	4/5/19	7	4	4	4	4	3	6	3	4	57	25	14
GBD_19_B48_C1_O_0015	244	U	5/5/19	7	4	4	4	4	4	4	3	4	86	10	6
GBD_19_B48_C1_O_0016	248	U	6/5/19	7	4	5	5	4	4	4	4	4	71	11	10
GBD_19_B48_C1_O_0017	257	U	7/5/19	7	4	5	5	5	4	4	4	4	57	12	11
GBD_19_B48_C1_O_0020	222	U	8/5/19	7	4	4	4	4	4	4	3	4	86	10	6
GBD_19_B48_C1_O_0027	259	U	9/5/19	7	5	5	5	5	4	6	4	5	57	14	10
GBD_19_B48_C1_O_0033	221	U	10/5/19	7	4	4	4	4	3	4	3	4	71	13	11
GBD_19_B48_C1_O_0036	242	U	11/5/19	7	4	4	5	4	3	5	3	4	43	20	14

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	Modal age	PA %	CV %	APE %
GBD_19_B48_C1_O_0037	239	U	12/5/19	7	4	7	4	4	3	5	3	4	43	32	23
GBD_19_B48_C1_O_0038	239	U	13/5/19	7	4	4	4	4	3	4	3	4	71	13	11
GBD_19_B48_C1_O_0039	230	U	14/5/19	7	4	4	4	4	3	4	3	4	71	13	11
GBD_19_B48_C1_O_0043	226	U	15/5/19	7	3	4	3	3	2	2	2	2	43	28	23
GBD_19_B48_C1_O_0044	231	U	16/5/19	7	2	5	3	1	2	3	2	2	43	49	37
GBD_19_B48_C1_O_0045	231	U	17/5/19	7	3	4	3	2	2	4	2	2	43	31	26
GBD_19_B48_C1_O_0046	235	U	18/5/19	7	4	3	3	2	2	3	3	3	57	24	17
GBD_19_B48_C1_O_0048	237	U	19/5/19	7	4	5	4	3	3	5	3	3	43	23	19
GBD_19_B48_C1_O_0049	265	U	20/5/19	7	5	5	5	5	3	6	4	5	57	20	15
HOM_4A_3Q_01	335	M	21/5/19	4	8	9	8	8	6	8	7	8	57	12	9
HOM_4A_3Q_02	335	M	22/5/19	4	10	10	10	9	6	10	8	10	57	17	13
HOM_4A_3Q_03	385	F	23/5/19	4	12	13	11	13	5	12	10	12	29	26	18
HOM_4A_3Q_04	355	F	24/5/19	4	12	12	9	10	7	14	8	12	29	24	20
HOM_4A_3Q_05	325	M	25/5/19	4	14	15	13	13	6	15	10	13	29	26	20
HOM_4A_3Q_06	395	F	26/5/19	4	17	17	13	16	8	16	13	13	29	23	18
HOM_4A_3Q_07	415	M	27/5/19	4	17	19	15	15	6	18	14	15	29	29	19
HOM_4A_4Q_08	305	F	28/5/19	4	3	4	-	3	3	3	3	3	83	13	9
HOM_4A_4Q_09	285	M	29/5/19	4	5	6	6	5	5	5	4	5	57	13	10
HOM_4A_4Q_10	305	F	30/5/19	4	6	7	7	6	6	6	5	6	57	11	8
HOM_4A_4Q_11	305	F	31/5/19	4	8	8	9	7	4	7	6	7	29	23	16
HOM_4A_4Q_12	335	M	1/6/19	4	7	9	10	7	5	11	8	7	29	25	20
HOM_4A_4Q_13	335	F	2/6/19	4	10	9	11	6	5	9	7	9	29	27	23
HOM_4A_4Q_14	305	M	3/6/19	4	12	11	10	8	5	12	9	12	29	26	20
HOM_4A_4Q_15	335	F	4/6/19	4	14	14	12	10	6	14	12	14	43	25	18
HOM_6A_1Q_01	235	F	5/6/19	4	3	4	4	4	3	4	3	4	57	15	14
HOM_6A_1Q_02	265	F	6/6/19	4	4	4	-	4	3	4	4	4	83	11	7
HOM_6A_1Q_03	305	M	7/6/19	4	5	6	8	4	4	6	5	4	29	26	20
HOM_6A_1Q_04	265	M	8/6/19	4	6	7	7	4	5	7	7	7	57	20	16
HOM_6A_1Q_05	285	M	9/6/19	4	6	7	8	6	5	8	7	6	29	17	13
HOM_6A_1Q_06	325	F	10/6/19	4	8	9	9	8	6	9	8	8	43	13	9
HOM_6A_1Q_07	315	M	11/6/19	4	9	9	10	9	6	10	9	9	57	15	9
HOM_6A_1Q_08	325	M	12/6/19	4	9	9	9	9	7	10	9	9	71	10	6
HOM_6A_1Q_09	335	M	13/6/19	4	12	14	11	9	8	-	11	11	33	20	14
HOM_6A_1Q_10	335	F	14/6/19	4	13	13	11	11	7	13	13	13	57	19	14
HOM_6A_1Q_11	365	F	15/6/19	4	14	14	13	14	7	15	14	14	57	21	13
HOM_6A_1Q_12	375	M	16/6/19	4	14	14	13	12	6	15	14	14	43	24	16
HOM_6A_1Q_13	395	M	17/6/19	4	16	16	15	16	6	17	14	16	43	26	17
HOM_6A_1Q_14	365	F	18/6/19	4	17	17	13	15	5	18	17	17	43	31	22
HOM_6A_3Q_01	275	M	19/6/19	4	5	5	5	5	4	4	4	5	57	12	11
HOM_6A_3Q_02	325	M	20/6/19	4	7	7	7	7	4	7	6	7	71	18	13
HOM_6A_3Q_03	315	F	21/6/19	4	7	9	9	6	5	7	6	6	29	22	16
HOM_6A_3Q_04	285	M	22/6/19	4	8	9	8	8	5	8	8	8	71	16	10
HOM_6A_3Q_05	335	F	23/6/19	4	9	9	9	10	5	9	8	9	57	19	13
HOM_6A_3Q_06	315	F	24/6/19	4	10	11	11	11	6	10	12	11	43	19	12
HOM_6A_3Q_07	665	F	25/6/19	4	11	11	14	13	-	12	10	11	33	12	10
HOM_6A_3Q_08	355	F	26/6/19	4	14	15	13	14	-	14	13	14	50	5	4
HOM_6A_3Q_09	345	M	27/6/19	4	14	15	12	14	-	15	13	14	33	8	6
Norway_38301_04	395	F	28/6/19	27.4.a	19	20	18	21	8	19	21	19	29	25	16
Norway_38301_05	405	F	29/6/19	27.4.a	19	19	19	20	-	20	16	19	50	8	5
Norway_38301_06	400	F	30/6/19	27.4.a	10	11	13	13	6	12	10	10	29	23	16
Norway_38301_16	355	M	1/7/19	27.4.a	14	17	12	18	6	16	15	6	14	29	20
Norway_38301_22	345	F	2/7/19	27.4.a	13	12	11	12	9	12	9	12	43	14	11
Norway_38301_27	355	M	3/7/19	27.4.a	12	13	13	13	8	12	10	13	43	16	13
Norway_38307_01	395	M	4/7/19	27.4.a	17	17	16	18	12	19	17	17	43	13	9
Norway_38307_05	360	F	5/7/19	27.4.a	10	11	10	10	6	12	9	10	43	19	13
Norway_38307_08	375	F	6/7/19	27.4.a	14	13	13	12	6	14	11	13	29	24	16
Norway_38307_11	395	M	7/7/19	27.4.a	15	15	15	15	7	16	16	15	57	23	14
Norway_38307_12	350	M	8/7/19	27.4.a	19	19	15	17	10	20	17	17	29	20	14
Norway_38307_19	410	F	9/7/19	27.4.a	14	18	18	18	10	20	15	18	43	21	17
Norway_38307_21	380	M	10/7/19	27.4.a	18	19	17	18	9	20	15	18	29	22	16
Norway_38307_27	360	M	11/7/19	27.4.a	16	16	15	16	11	16	14	16	57	13	9
Norway_38307_29	370	F	12/7/19	27.4.a	18	18	16	20	10	19	18	18	43	20	13
Norway_38308_01	395	M	13/7/19	27.4.a	20	18	16	21	8	22	19	8	14	27	18
Norway_38308_09	385	F	14/7/19	27.4.a	16	15	12	15	8	16	13	15	29	21	16
Norway_38308_13	370	M	15/7/19	27.4.a	12	13	12	12	6	11	10	12	43	22	15

Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	Modal age	PA %	CV %	APE %
Norway_38308_18	365	M	16/7/19	27.4.a	20	19	13	18	8	18	17	18	29	26	20
Norway_38308_20	355	F	17/7/19	27.4.a	11	11	11	12	6	11	10	11	57	19	13
Norway_38308_25	385	M	18/7/19	27.4.a	14	17	12	16	11	18	15	11	14	17	14
Norway_38308_30	355	M	19/7/19	27.4.a	-	20	14	14	6	13	12	14	33	34	22
Norway_94205_01	395	F	20/7/19	27.4.a	13	15	14	14	8	14	14	14	57	18	11
Norway_94205_02	370	M	21/7/19	27.4.a	21	23	14	19	9	25	23	23	29	30	23
Norway_94205_04	430	M	22/7/19	27.4.a	21	20	20	20	4	21	24	20	43	35	22
Norway_94205_07	355	M	23/7/19	27.4.a	11	11	10	11	6	12	10	11	43	19	12
Norway_94205_09	390	M	24/7/19	27.4.a	16	18	14	14	-	18	15	14	33	12	9
Norway_94205_11	375	M	25/7/19	27.4.a	16	17	15	19	-	19	18	19	33	9	8
Norway_94205_14	360	F	26/7/19	27.4.a	11	13	11	16	-	11	11	11	67	17	13
Norway_94205_21	325	F	27/7/19	27.4.a	9	9	10	11	-	9	10	9	50	8	7
Norway_94205_22	355	M	28/7/19	27.4.a	12	12	12	16	-	12	12	12	83	13	9
Noway_94205_25	290	F	29/7/19	27.4.a	5	6	7	6	-	5	5	5	50	14	12

Table 6.11: Number of readings per reader and modal age.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	total
2	3	3	3	3	3	3	3	21
3	7	7	6	7	7	7	7	48
4	19	19	18	19	19	19	19	132
5	8	8	8	8	7	8	8	55
6	6	6	6	6	6	4	4	38
7	13	13	13	13	13	7	7	79
8	9	10	10	10	10	9	9	67
9	10	10	10	10	9	8	8	65
10	7	7	7	7	7	6	6	47
11	8	8	8	8	6	7	8	53
12	8	8	8	8	7	7	7	53
13	6	6	6	6	6	6	6	42
14	8	9	9	9	6	9	9	59
15	5	5	5	5	5	3	3	31
16	3	3	3	3	3	3	3	21
17	3	3	3	3	3	3	3	21
18	4	4	4	4	4	4	4	28
19	3	3	3	3	1	3	3	19
20	1	1	1	1	1	1	1	7
21	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0
23	1	1	1	1	1	1	1	7
Total	132	134	132	134	124	118	119	893

Table 6.12: Age composition by reader.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE
0	0	0	0	0	1	0	0
1	0	0	0	1	0	0	0
2	1	0	0	2	4	1	4
3	7	1	4	3	15	6	16
4	19	19	16	16	22	15	13
5	9	11	9	11	16	9	5
6	6	6	5	10	32	6	7
7	13	15	9	7	13	8	11
8	12	8	14	12	9	6	8
9	6	16	10	10	5	9	7
10	8	4	13	9	4	5	11
11	4	7	9	7	2	6	4
12	12	4	11	5	1	11	4
13	3	10	11	7	0	3	5
14	11	4	6	8	0	6	7
15	2	7	7	6	0	4	5
16	6	3	3	7	0	6	2
17	4	6	1	1	0	1	4
18	2	4	2	5	0	5	2
19	3	5	1	2	0	4	1
20	2	3	1	3	0	4	0
21	2	0	0	2	0	1	1
22	0	0	0	0	0	1	0
23	0	1	0	0	0	0	1
24	0	0	0	0	0	0	1
25	0	0	0	0	0	1	0
Total	132	134	132	134	124	118	119

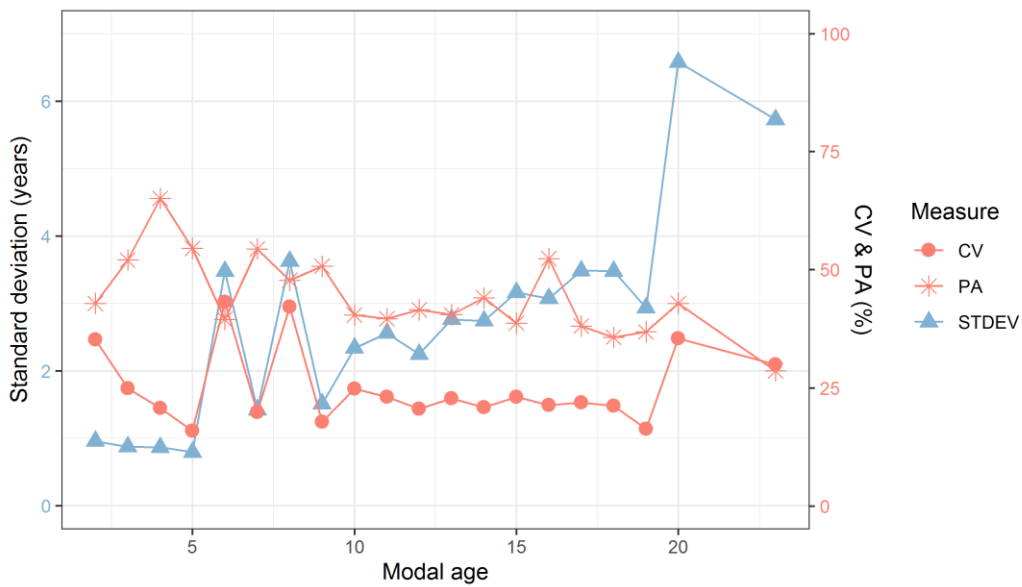


Figure 6.7: CV, PA and STDEV (standard deviation) are plotted against modal age

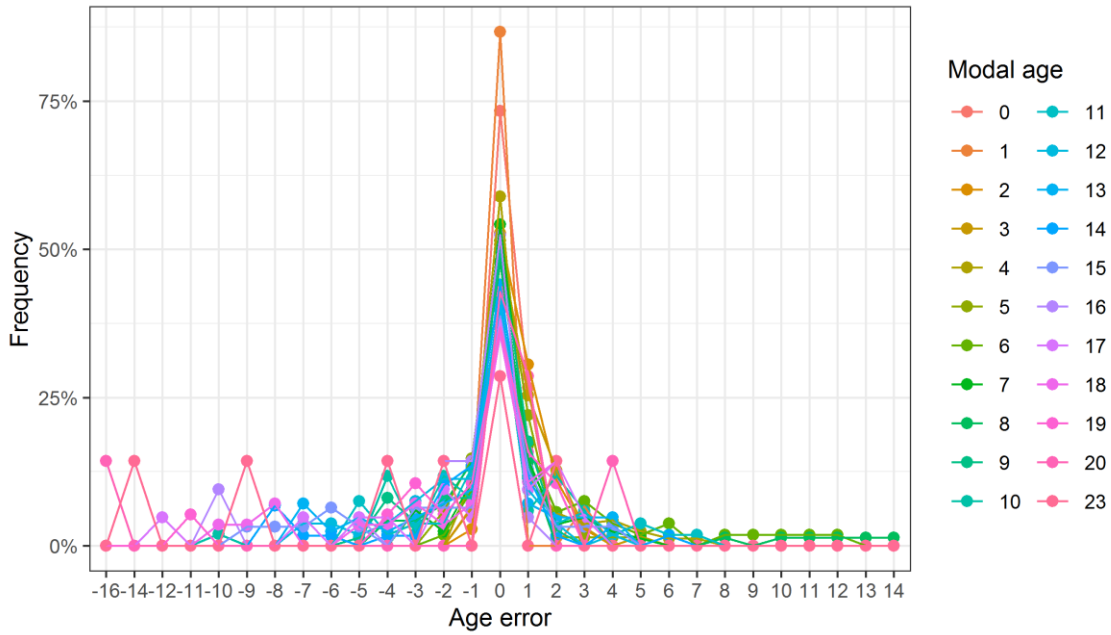
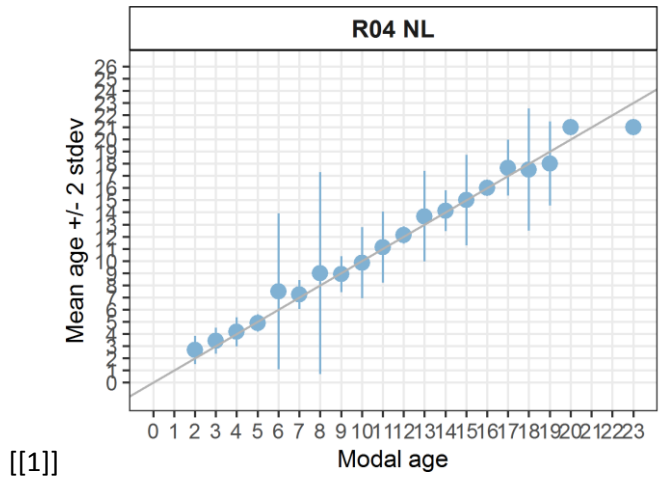
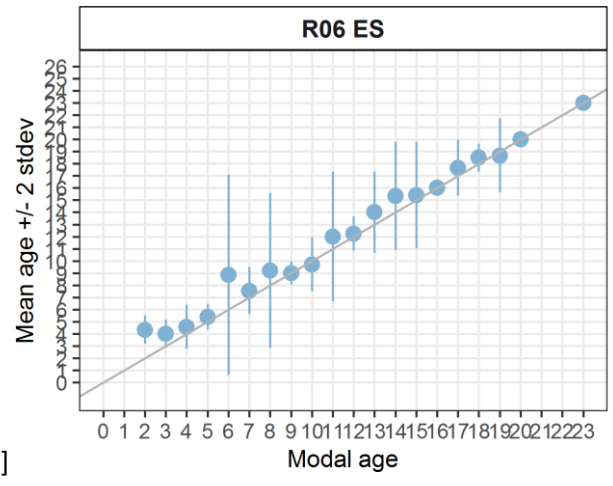


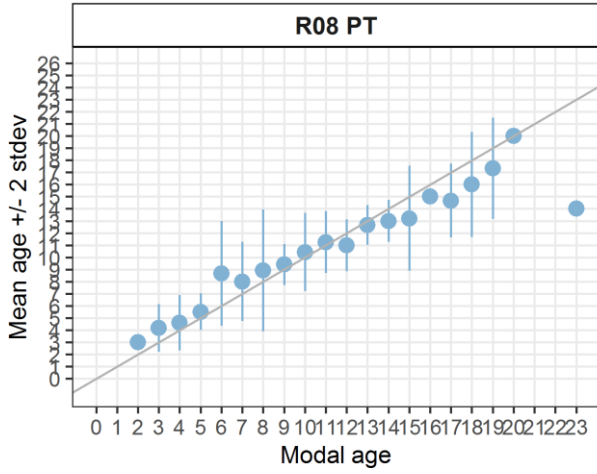
Figure 6.8: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.



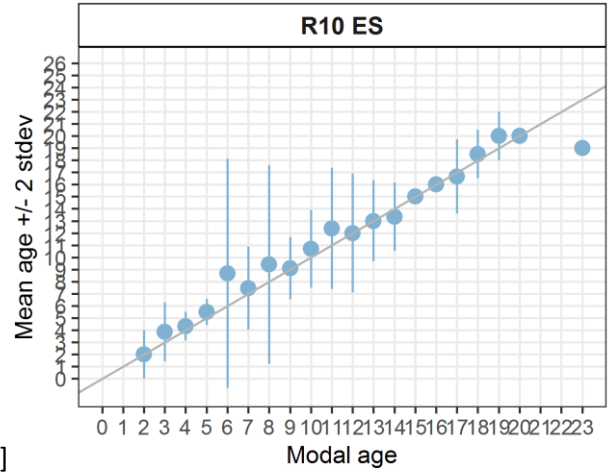
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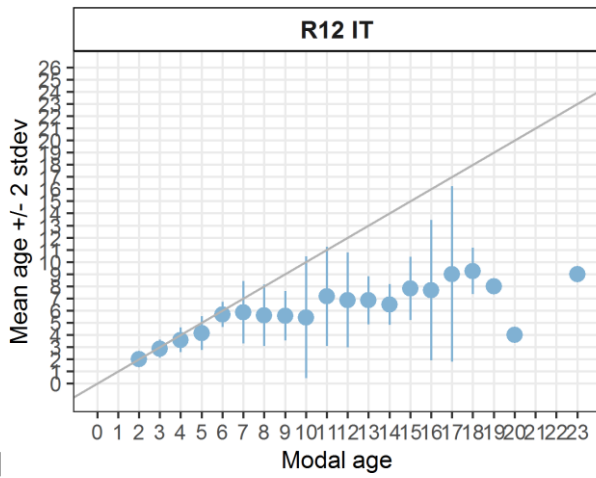
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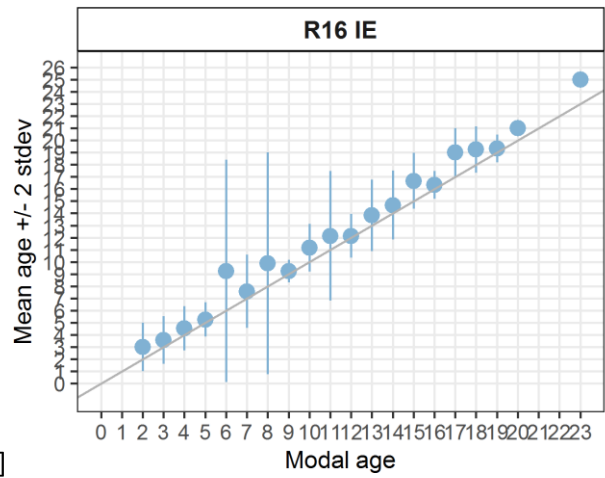
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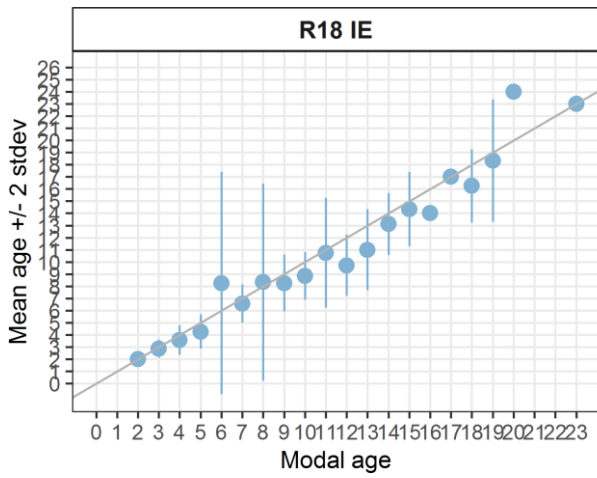
[[4]]



[[5]]



[[6]]



[[7]]

6.2 Results *T. mediterraneus* (Event-ID 388)

6.2.1 All readers

Data Overview

Table 6.13: Summary of statistics; PA (%), CV (%) and APE (%).

CV	PA	APE
42	51	30

Table 6.14: Data overview including modal age and statistics per sample.

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 FC	R06 IT	R08 IT	R10 GR	R14 IT	R28 FC	R30 PT	R32 PT	R40 GR	R42 FC	R44 FC	R54 GR	R60 IT	R66 GR	Modal age	PA %	CV %	APE %
001L_219_16-06-20	219	M	16/06/2020	20	3	2	3	3	3	4	3	-	3	3	5	3	3	3	3	77	22	13
001L_250_15-10-20	250	F	15/10/2020	20	4	4	4	3	4	6	5	-	3	6	6	3	5	5	4	31	25	21
001L_254_10-11-20	254	F	11/10/2020	20	4	3	4	3	4	3	5	-	3	5	5	3	4	5	3	38	22	18
001L_256_27-07-20	256	M	27/07/2020	20	3	4	4	3	3	3	5	-	3	6	7	3	4	4	3	46	32	23
001L_261_02-06-20	261	F	06/02/2020	22	2	2	3	3	3	1	5	-	2	3	-	3	2	5	3	42	42	30
001L_352_18-10-20	352	M	18/10/2020	22	3	3	5	9	5	4	6	-	4	5	4	9	4	8	4	31	40	31
001L_372_03-06-20	372	M	06/03/2020	22	5	4	5	7	5	5	6	-	5	7	6	7	5	9	5	46	23	18
001R_232_10-08-20	232	F	08/10/2020	20	2	2	4	3	3	5	3	-	3	3	5	3	3	3	3	62	29	21
001R_243_02-09-20	243	F	09/02/2020	22	1	2	-	4	3	2	5	-	2	2	4	3	3	5	2	33	43	33
001R_247_06-10-20	247	M	10/06/2020	20	2	2	-	3	4	4	6	-	3	7	5	3	3	5	3	33	40	32
002L_150_03-09-20	150	M	09/03/2020	22	0	0	1	1	0	1	2	-	1	1	1	1	1	1	1	69	66	46
002L_161_10-08-20	161	F	08/10/2020	20	1	1	2	1	1	2	2	-	1	1	2	1	1	2	1	62	37	34
002L_222_03-09-20	222	M	09/03/2020	22	1	1	2	2	2	2	3	-	2	2	3	2	2	3	2	62	31	21
002L_245_10-11-20	245	F	11/10/2020	20	4	3	4	3	4	4	4	-	3	5	4	3	4	4	4	62	16	13
002L_300_18-10-20	300	M	18/10/2020	22	2	2	4	4	3	2	5	-	3	2	4	4	2	6	2	38	40	33
002L_326_03-06-20	326	F	06/03/2020	22	5	4	6	6	5	5	6	-	6	6	6	6	5	8	6	54	17	12
002L_334_16-06-20	334	M	16/06/2020	20	3	2	3	6	3	6	4	-	5	5	6	6	3	7	3	31	36	31
002R_264_02-06-20	264	F	06/02/2020	22	2	2	2	4	4	2	4	-	3	4	5	4	3	6	4	38	37	30
003L_100_03-09-20	100	F	09/03/2020	22	1	0	1	0	0	1	1	-	1	1	1	0	0	0	1	54	96	92
003L_155_29-08-20	155	M	29/08/2020	22	1	1	1	1	1	1	2	-	1	1	2	1	1	0	1	77	46	26
003L_163_10-08-20	163	F	08/10/2020	20	1	1	2	1	1	2	1	-	1	1	2	1	0	2	1	62	49	38
003L_211_18-11-20	211	F	18/11/2020	20	4	2	3	2	4	4	4	-	2	4	4	2	3	3	4	46	28	25
003R_266_16-06-20	266	M	16/06/2020	20	3	2	4	4	3	5	4	-	3	5	5	4	3	6	3	31	28	22
004L_160_10-08-20	160	F	08/10/2020	20	3	1	-	1	1	3	3	-	1	2	2	1	2	2	1	42	46	38
004L_263_02-06-20	263	M	06/02/2020	22	1	2	1	5	2	3	5	-	3	6	5	4	-	5	5	33	49	43
004L_289_16-06-20	289	M	16/06/2020	20	3	2	5	4	3	8	5	-	3	4	5	4	3	6	3	31	38	29
004R_205_14-08-20	205	F	14/08/2020	20	2	3	-	2	4	4	5	-	2	5	4	2	3	3	2	33	35	29
005L_148_10-08-20	148	F	08/10/2020	20	2	2	3	1	2	1	3	-	1	2	2	1	2	2	2	54	37	28
005L_240_03-09-20	240	M	09/03/2020	22	1	1	2	3	2	4	3	-	2	2	3	3	2	3	2	38	36	30
005L_267_02-06-20	267	F	06/02/2020	22	2	1	2	4	0	1	4	-	2	5	3	4	2	5	2	31	59	51
005L_300_16-06-20	300	F	16/06/2020	20	4	2	4	4	-	7	4	-	4	5	5	4	3	7	4	50	33	24
006L_201_03-09-20	201	F	09/03/2020	22	2	1	2	2	2	1	3	-	2	2	4	2	2	2	2	69	37	21
006L_285_16-06-20	285	F	16/06/2020	20	4	3	4	4	4	5	4	-	4	5	6	4	4	6	4	62	20	16
006R_158_10-08-20	158	M	08/10/2020	20	1	1	2	1	2	2	3	-	1	2	2	1	1	2	1	46	40	35
007R_143_10-08-20	143	M	08/10/2020	20	0	0	1	1	1	1	3	-	1	1	1	1	1	2	1	69	71	41
008L_149_10-08-20	149	F	08/10/2020	20	1	0	2	1	2	1	4	-	1	1	2	1	2	1	1	54	66	49
009L_286_02-06-20	286	M	06/02/2020	22	2	1	3	4	2	1	4	-	2	5	4	4	2	6	2	31	50	43
009L_354_18-10-20	354	M	18/10/2020	22	5	3	4	7	4	6	6	-	5	3	6	7	3	9	3	23	35	28
009R_50_23-08-20	50	U	23/08/2020	20	0	0	0	0	0	1	1	-	0	1	1	0	0	0	0	69	-	-
010L_200_03-09-20	200	F	09/03/2020	22	2	1	2	2	2	2	3	-	2	2	4	2	2	3	2	69	33	23
010L_203_08-08-20	203	F	08/08/2020	20	3	2	3	2	3	2	5	-	2	4	4	2	3	3	3	46	30	21
010L_285_02-06-20	285	F	06/02/2020	22	1	0	3	4	1	2	4	-	3	6	-	4	2	7	4	25	67	52
011L_206_08-08-20	206	F	08/08/2020	20	3	3	3	3	3	3	4	-	3	3	5	3	3	3	3	85	19	12
011L_286_02-06-20	286	F	06/02/2020	22	2	1	2	4	2	3	5	-	4	6	4	4	2	7	2	31	50	40
012L_204_03-09-20	204	M	09/03/2020	22	1	1	2	2	2	2	3	-	2	3	4	2	2	2	2	62	37	25
012L_54_23-08-20	54	U	23/08/2020	20	0	0	0	0	0	1	1	-	0	1	1	0	0	0	0	69	-	-
015L_43_23-08-20	43	U	23/08/2020	20	0	0	0	0	0	1	1	-	0	1	1	0	0	0	0	69	-	-

Fish ID	Length (mm)	sex	Catch date	ICES area	R02	F5	R06 IT	R08 IT	R10	GR	R14 IT	R28	F5	R30	PT	R32	PT	R40	GR	R42	F5	R44	F5	R54	GR	R60 IT	R66	GR	Modal age	PA %	CV %	APE %
016L_287_02-06-20	287	M	06/02/2020	22	3	2	3	4	4	4	2	4	-	4	6	4	4	3	6	4	46	33	24									
019L_354_18-10-20	354	F	18/10/2020	22	4	3	4	6	4	4	6	-	4	4	4	7	3	9	4	54	36	29										
020217-15	170	M	02/02/2017	missing	2	1	2	2	-	4	4	4	4	2	2	2	2	2	2	62	41	35										
025L_300_02-06-20	300	M	06/02/2020	22	3	2	3	4	3	4	3	5	-	4	6	4	4	3	7	38	35	26										
033L_59_03-09-20	59	U	09/03/2020	22	0	0	0	0	0	-	1	-	0	1	1	0	-	0	0	73	-	-										
034R_305_02-06-20	305	F	06/02/2020	22	2	1	2	4	2	2	5	-	4	3	2	4	2	7	2	46	54	43										
035L_302_02-06-20	302	M	06/02/2020	22	3	2	3	4	4	3	5	-	4	3	4	4	3	6	3	38	28	21										
036R_50_03-09-20	50	U	09/03/2020	22	0	0	0	0	0	0	1	-	0	1	1	0	0	0	0	77	-	-										
037L_245_02-06-20	245	F	06/02/2020	22	3	0	1	3	4	3	5	-	3	3	4	3	-	4	3	50	45	28										
048L_260_02-06-20	260	F	06/02/2020	22	3	2	2	3	3	2	4	-	3	2	4	3	3	6	3	46	36	24										
066L_302_02-06-20	302	M	06/02/2020	22	2	2	3	4	3	2	5	-	3	3	4	4	3	7	3	38	40	30										
1_Ti071014_68	373	M	07/10/2014	27.8.c	4	4	4	5	5	5	5	7	4	9	6	5	5	6	5	43	26	19										
10_PelTm0412L26_3	455	M	08/04/2012	27.8.c	8	7	9	7	6	10	8	8	8	15	8	7	5	7	8	36	29	17										
10TM_GSA11	141	F	08/03/2016	missing	2	0	-	1	1	1	3	1	0	1	1	1	1	1	1	69	71	41										
11_PelTm0318L25_2	319	F	10/04/2018	27.8.c	4	5	5	6	0	10	5	-	5	12	9	5	4	4	5	38	54	38										
11TM_GSA11	242	F	22/07/2015	missing	-	3	3	2	3	4	4	5	2	3	3	2	3	4	3	46	28	21										
12_PelTm0316L48_17b	366	F	14/04/2016	27.8.c	6	6	7	7	7	7	7	-	5	7	7	7	6	6	7	62	10	9										
12TM_GSA11	202	F	22/07/2015	missing	1	1	1	1	2	1	4	2	1	2	3	1	3	2	1	50	55	44										
13_PelTm0316L43_7	343	F	13/04/2016	27.8.c	7	5	7	6	6	6	9	-	5	11	9	6	4	7	6	31	28	21										
134_14_Nanakos_PS_07-10-20_1X1	134	M	07/10/2020	missing	1	0	1	1	2	2	2	1	0	1	1	1	2	1	1	57	58	43										
135_01_MANIOS_16-04-19_1x1	135	F	16/04/2019	missing	1	0	1	1	2	2	2	1	1	1	1	1	2	1	1	64	48	37										
138_02_MANIOS_16-04-19_1x1	138	F	16/04/2019	missing	1	0	1	1	4	4	3	1	1	1	1	1	4	1	1	64	81	68										
13TM_GSA11	212	F	22/07/2015	missing	-	3	1	2	3	2	3	3	2	3	2	1	3	3	3	54	32	28										
14_PelTm0316L43_1	374	F	13/04/2016	27.8.c	7	6	7	8	7	7	8	-	7	11	9	8	7	7	54	17	12											
140_12_Nanakos_PS_07-10-20_1X1	140	F	07/10/2020	missing	2	0	-	1	2	2	2	1	0	2	1	2	3	1	2	46	60	50										
140617-15	145	M	16/06/2017	missing	1	1	1	2	2	4	4	5	2	2	8	2	2	2	2	50	71	53										
147_13_Nanakos_PS_07-10-20_1X1_R	147	F	07/10/2020	missing	1	0	1	1	2	2	2	1	1	1	1	1	2	1	1	64	48	37										
14TM_GSA11	183	F	22/07/2015	missing	1	1	1	1	2	1	3	2	1	1	1	0	2	2	1	57	55	44										
15_PelTmL0317_48_12	293	M	07/04/2017	27.8.c	6	6	7	7	7	7	6	-	5	7	7	7	6	6	7	54	10	9										
150_08_Megalochari_OTB_30-06-20_1X1	150	F	30/06/2020	missing	2	1	1	1	2	2	2	0	1	2	2	2	3	2	2	57	45	37										
150119-27	177	F	15/01/2019	missing	2	1	3	2	3	2	3	2	3	2	3	2	2	2	2	50	27	23										
150119-39	164	F	15/01/2019	missing	2	1	2	2	2	2	3	3	2	3	2	2	2	2	2	71	25	17										
15TM_GSA11	170	M	19/05/2015	missing	0	1	1	2	3	4	4	3	3	3	2	2	-	4	3	31	51	42										
16_PelL0316TmL39_2	280	M	10/04/2016	27.8.c	4	2	3	4	4	5	5	-	4	8	5	4	2	4	4	46	37	24										
165_10_Megalochari_OTB_30-06-20_1X1	165	F	30/06/2020	missing	2	1	1	2	2	3	0	1	2	2	2	2	2	2	2	64	42	32										
16TM_GSA11	133	M	19/05/2015	missing	0	0	1	1	2	3	3	2	1	1	1	1	2	1	1	50	68	55										
17_Ti071014_70	370	F	07/10/2014	27.8.c	4	4	4	4	4	6	5	-	4	7	5	4	4	5	4	62	21	16										
175_02_Nanakos_PS_08-09-20_1X1	175	F	08/09/2020	missing	1	1	1	2	2	3	3	1	1	2	2	2	2	2	2	50	39	31										
176_01_Manios_PS_10-04-20_1X1	176	F	10/04/2020	missing	1	0	1	2	4	2	3	1	1	2	2	2	-	2	2	46	57	42										
17TM_GSA11	125	M	19/05/2015	missing	0	0	1	1	1	1	2	2	1	1	1	1	2	1	1	64	57	37										
18_Pel0318TmL25_9b	260	F	10/04/2018	27.8.c	4	4	4	5	6	5	5	-	4	6	5	5	4	4	4	46	16	14										
180_01_Kap.Pantelis_PS_15-07-20_1X1	180	M	15/07/2020	missing	1	2	1	2	3	2	2	2	2	2	3	2	2	2	2	71	28	14										
180_17_Manios_PS_10-04-20_1X1	180	M	10/04/2020	missing	2	1	1	2	2	2	04	2	1	2	2	2	2	2	2	79	24	19										
188_05_Nanakos_PS_08-09-20_1X1	188	M	08/09/2020	missing	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	93	13	6										
18TM_GSA11	265	M	06/08/2015	missing	0	3	2	4	4	4	4	4	4	6	3	4	4	5	4	57	38	26										
19_Pel0318TmL26_6	295	F	10/04/2018	27.8.c	4	3	-	4	4	6	4	-	5	6	5	4	4	4	4	58	20	16										
19TM_GSA11	284	M	06/08/2015	missing	0	3	-	4	-	4	4	5	5	7	3	6	4	7	4	33	44	32										
1TM_GSA11	305	F	05/07/2020	missing	0	3	3	3	4	7	4	5	3	6	3	3	4	4	3	43	44	31										
2_Ti240714_31	410	F	24/07/2014	27.8.c	5	5	5	5	5	5	6	6	8	5	10	9	5	5	5	64	28	21										

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 FS	R06 IT	R08 IT	R10 GR	R14 IT	R28 FS	R30 PT	R32 PT	R40 GR	R42 FS	R44 FS	R54 GR	R60 IT	R66 GR	Modal age	PA %	CV %	APE %
20_Tm030713_31a	245	F	03/07/2013	27.8.c	4	1	4	4	4	8	4	-	4	4	5	4	4	2	4	69	40	19
202_05_Alexandros_PS_19-06-20_1X1	202	F	19/06/2020	missing	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	86	20	13
206_10_Kap.Pantelis_PS_15-07-20_1X1	206	M	15/07/2020	missing	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	86	13	9
20TM_GSA11	190	M	05/07/2020	missing	1	1	1	1	2	1	2	2	1	2	1	1	2	2	1	57	36	34
21_Pel0414TmL49_1a	298	F	06/04/2014	27.8.c	7	5	7	7	6	9	8	-	7	7	12	6	7	7	7	54	23	15
217_04_Kap.Pantelis_PS_15-07-20_1X1	217	M	15/07/2020	missing	4	4	3	3	4	4	4	3	3	4	3	3	4	4	4	57	14	14
21TM_GSA11	215	M	05/07/2020	missing	2	2	1	2	2	2	3	3	2	3	2	2	3	2	2	64	26	20
22_Tm070715_3b	335	M	07/07/2015	27.8.c	4	4	6	6	-	9	5	-	6	10	10	6	-	5	6	36	34	27
220218-02	196	M	22/02/2018	missing	3	2	3	3	3	6	5	4	4	4	5	3	3	3	3	50	30	24
220218-35	191	M	22/02/2018	missing	3	2	2	3	4	4	4	3	3	3	4	3	3	2	3	50	24	17
221_05_Kap.Pantelis_PS_05-11-20_1X1	221	M	15/07/2020	missing	3	4	4	3	4	4	4	3	3	4	4	3	4	4	4	64	14	13
223_02_Alexandros_PS_19-06-20_1X1	223	F	19/06/2020	missing	2	1	2	2	2	2	3	3	2	3	3	2	4	3	2	50	31	26
22TM_GSA11	155	M	09/09/2020	missing	2	1	1	1	2	2	2	1	1	2	1	1	2	2	1	50	35	33
23_TI011215_16b	298	M	01/12/2015	27.8.c	2	3	4	3	4	6	4	-	4	7	7	3	4	3	4	38	38	28
239_24_Kap.Pantelis_PS_15-07-20_1X1	239	M	15/07/2020	missing	3	4	4	4	4	4	5	3	3	7	5	4	5	4	4	50	25	17
23TM_GSA11	290	M	22/07/2015	missing	1	5	3	3	6	7	5	5	4	7	3	6	6	7	3	21	38	30
24_Pel0318TmL25_13	259	F	10/04/2018	27.8.c	3	2	4	4	4	6	5	-	5	7	7	4	4	3	4	38	34	27
242_04_Ag.Anna_PS_19-06-20_1X1	242	F	19/06/2020	missing	2	1	3	3	3	2	4	4	3	3	3	3	3	3	3	64	27	18
24TM_GSA11	315	M	22/07/2015	missing	0	1	2	4	4	6	3	3	2	5	3	5	3	7	3	29	56	43
25_Pel0318TmL25_2a	319	F	10/04/2018	27.8.c	3	3	5	4	5	9	5	-	5	9	7	4	4	4	4	31	39	28
251_02_Kap.Pantelis_PS_15-07-20_1X1	251	M	15/07/2020	missing	1	4	2	4	4	4	5	5	3	5	4	4	4	5	4	50	30	21
254_28_Ag.Anna_PS_19-06-20_1X1	254	M	19/06/2020	missing	1	3	3	4	4	3	6	4	3	4	4	4	4	4	4	57	30	20
255_02_Kyzikos_PS_24-11-20_1X1	255	M	24/11/2020	missing	1	2	3	4	4	4	6	5	3	5	4	4	4	5	4	43	34	24
25TM_GSA11	171	M	09/09/2020	missing	1	1	2	1	-	2	3	2	1	2	2	1	3	2	2	46	41	33
26_Pel0317TmL44_17a	200	F	05/04/2017	27.8.c	2	1	3	3	3	5	5	-	3	3	5	3	3	3	3	62	36	25
260_09_Ag.Anna_PS_19-06-20_1X1	260	F	19/06/2020	missing	1	3	3	5	4	5	6	5	3	5	5	5	6	5	5	50	32	26
262_01_Kyzikos_PS_24-11-20_1X1	262	F	24/11/2020	missing	1	4	4	5	6	6	6	5	3	7	5	5	6	5	5	36	31	22
266_01_Alexandros_PS_19-06-20_1X1	266	M	19/06/2020	missing	4	3	5	5	5	5	5	4	4	5	5	5	6	5	5	64	15	12
26TM_GSA11	278	M	09/03/2019	missing	2	1	2	2	3	2	3	4	2	4	2	2	5	2	2	57	42	34
27_Pel0317TmL44_22	194	F	05/04/2017	27.8.c	1	1	3	2	2	3	3	-	2	2	6	2	3	2	2	46	51	36
270716GR-001	318	F	27/07/2016	missing	9	9	10	11	9	14	9	10	9	13	13	11	10	12	9	36	16	14
270716GR-007	343	M	27/07/2016	missing	10	6	8	6	-	11	7	11	9	7	11	6	6	7	6	31	26	22
270716GR-011	300	M	27/07/2016	missing	7	5	4	6	3	8	7	7	7	7	7	6	6	6	7	43	22	16
270716GR-018	246	M	27/07/2016	missing	6	0	3	4	2	8	6	6	3	7	9	4	5	-	6	23	52	42
270716GR-021	266	M	27/07/2016	missing	6	4	7	4	5	7	7	6	4	10	12	4	3	8	4	29	41	32
270716GR-022	295	M	27/07/2016	missing	7	5	7	6	6	11	7	10	6	11	13	6	6	8	6	36	32	26
270716GR-028	282	M	27/07/2016	missing	6	4	4	5	5	5	5	5	4	5	7	5	4	6	5	50	18	11
270716GR-029	232	M	27/07/2016	missing	4	4	3	4	3	5	5	5	4	5	7	4	3	4	4	43	25	19
270716GR-032	219	M	27/07/2016	missing	4	4	3	4	4	6	5	5	3	4	7	5	4	3	4	43	26	20
273_03_Kyzikos_PS_24-11-20_1X1	273	M	24/11/2020	missing	3	3	3	3	4	4	5	7	3	4	4	3	4	5	3	43	29	20
27TM_GSA11	234	M	22/07/2015	missing	1	2	2	3	3	2	2	2	2	2	2	3	3	3	2	57	27	22
28_Pel0317TmL44_23	186	M	05/04/2017	27.8.c	1	1	3	2	2	5	2	-	2	2	5	2	2	2	62	53	38	
28TM_GSA11	137	M	11/12/2015	missing	0	0	0	0	1	1	2	1	0	1	1	0	2	1	0	43	-	-
29_Pel0318TmL25_8b	255	F	10/04/2018	27.8.c	3	2	5	3	3	7	5	-	3	5	6	3	3	3	3	54	38	33
29TM_GSA11	112	M	11/12/2015	missing	0	0	-	0	-	1	4	1	0	1	1	0	-	0	0	55	-	-
2TM_GSA11	152	F	19/05/2015	missing	0	0	1	1	2	1	5	4	1	1	1	1	2	-	1	54	94	68
3_TI240714_32	380	F	24/07/2014	27.8.c	4	5	5	5	5	6	6	6	5	8	6	5	5	6	5	50	17	13
30_Pel0316TmL39_9c	286	F	10/04/2016	27.8.c	3	2	-	3	3	8	5	-	3	7	9	3	3	4	3	50	52	43
30TM_GSA11	122	M	21/07/2020	missing	0	1	-	0	0	1	2	0	0	1	1	0	3	0	0	54	-	-

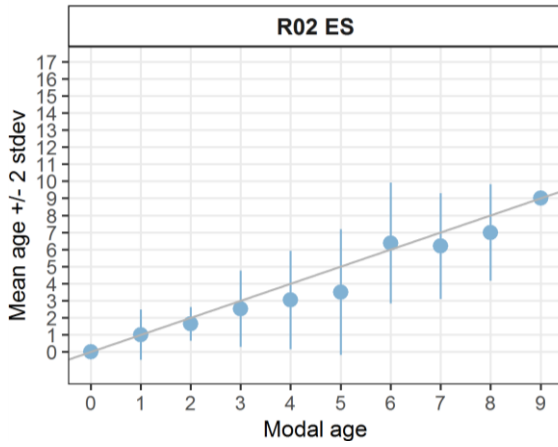
Fish ID	Length (mm)	sex	Catch date	ICES area	R02 FS	R06 IT	R08 IT	R10 GR	R14 IT	R28 FS	R30 PT	R32 PT	R40 GR	R42 FS	R44 FS	R54 GR	R60 IT	R66 GR	Modal age	PA %	CV %	APE %
31_Pel0318TmL25_1	260	F	10/04/2018	27.8.c	4	4	4	4	4	6	6	-	4	6	9	4	4	4	4	69	31	24
312_06_MEGALOCHARI_25-06-19_1x1	312	M	25/06/2019	missing	7	6	7	7	7	7	7	7	6	8	7	7	7	7	7	79	7	4
314_04_MEGALOCHARI_25-06-19_1x1	314	M	25/06/2019	missing	6	7	6	6	6	6	7	8	4	9	7	6	7	8	6	43	18	14
316_10_MEGALOCHARI_25-06-19_1x1	316	M	25/06/2019	missing	2	7	6	7	7	9	10	9	5	13	8	7	7	8	7	36	33	23
32_Tm071014_33	382	M	07/10/2014	27.8.c	4	4	5	4	5	5	5	-	4	11	10	4	4	5	4	46	43	29
3TM_GSA11	255	F	05/07/2020	missing	2	3	3	2	3	2	5	4	2	3	-	2	3	2	2	46	33	26
4_Pel0412TmL26_1	478	M	08/04/2012	27.8.c	6	4	7	7	7	7	9	8	6	10	8	7	5	6	7	36	22	16
4TM_GSA11	175	F	19/05/2015	missing	2	1	1	1	2	2	4	3	1	1	2	1	2	2	1	43	50	38
5_Pel0317TmL30_1	439	M	27/03/2017	27.8.c	7	7	7	7	8	8	7	7	6	9	7	7	6	6	7	57	12	8
5TM_GSA11	162	F	19/05/2015	missing	1	1	1	1	2	2	4	2	1	1	2	1	2	2	1	50	51	39
6_Pel17TmL30_3c	414	F	27/03/2017	27.8.c	6	6	9	8	8	11	9	8	8	13	7	8	-	8	8	46	23	16
6TM_GSA11	231	F	05/07/2020	missing	-	3	1	2	4	4	4	4	2	2	2	2	4	2	2	46	39	35
7_Pel0316TmL43_1	374	F	13/04/2016	27.8.c	7	6	7	7	7	7	7	7	7	9	7	8	7	7	7	79	9	5
7TM_GSA11	226	F	05/07/2020	missing	2	2	1	2	3	2	2	2	1	2	2	2	3	2	2	71	28	14
8_Pel0412TmL52_11b	432	M	18/04/2012	27.8.c	6	5	6	6	6	6	5	6	6	11	7	6	5	6	6	64	24	13
8TM_GSA11	293	F	05/07/2020	missing	-	3	2	3	4	6	6	4	2	12	2	2	4	6	2	31	65	46
9_Pel0412TmL26_2	459	M	08/04/2012	27.8.c	9	10	12	10	9	16	11	10	9	13	12	9	7	-	9	31	22	17
99_02_Taxiarichis_PS_06-10-20_1X1	99	F	06/10/2020	missing	0	0	0	0	1	1	1	1	0	1	1	0	2	0	0	50	-	-
9TM_GSA11	264	F	09/03/2019	missing	1	2	1	2	4	4	4	4	3	6	3	2	4	1	4	36	51	42

Table 6.15: Number of readings per reader and modal age.

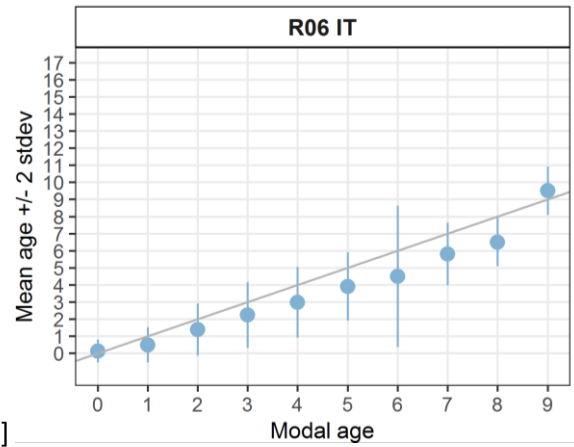
Modal age	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R66 GR	total
0	9	9	7	9	8	8	9	4	9	9	9	9	7	9	115
1	23	23	21	23	23	23	23	14	23	23	23	23	23	22	310
2	35	37	34	37	35	37	37	22	37	37	36	37	36	37	494
3	29	31	29	31	31	31	31	11	31	31	30	31	29	31	407
4	32	32	30	32	30	32	32	12	32	32	31	32	32	32	423
5	10	10	10	10	10	10	10	7	10	10	10	10	9	10	136
6	8	8	8	8	6	8	8	5	8	8	8	8	7	7	105
7	10	10	10	10	10	10	10	6	10	10	10	10	10	10	136
8	2	2	2	2	2	2	2	2	2	2	2	2	1	2	27
9	2	2	2	2	2	2	2	2	2	2	2	2	2	1	27
Total	160	164	153	164	157	163	164	85	164	164	161	164	156	161	2180

Table 6.16: Age composition by reader.

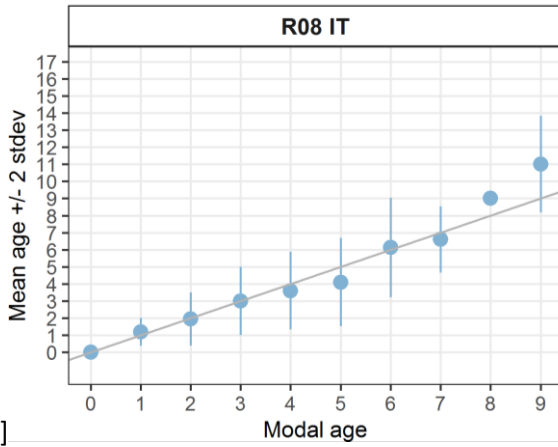
Modal age	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R66 GR
0	19	25	7	10	10	1	0	3	12	0	0	11	6	10
1	36	40	32	26	10	23	8	13	28	27	24	24	6	12
2	34	33	27	30	37	38	20	13	33	30	27	32	40	36
3	24	24	33	27	31	16	28	12	36	22	17	26	42	20
4	22	20	23	35	38	24	34	12	25	13	26	32	32	18
5	4	9	10	9	11	15	40	12	14	18	22	11	12	18
6	9	7	5	11	9	18	16	4	7	14	10	12	10	19
7	8	4	11	11	7	11	9	6	4	16	16	10	7	17
8	1	0	1	2	2	6	3	5	2	3	4	3	0	7
9	2	1	2	1	2	4	4	1	3	5	7	2	0	3
10	1	1	1	1	0	2	1	3	0	4	2	0	1	0
11	0	0	0	1	0	3	1	1	0	5	1	1	0	0
12	0	0	1	0	0	0	0	0	0	2	3	0	0	1
13	0	0	0	0	0	0	0	0	0	4	2	0	0	0
14	0	0	0	0	0	1	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	1	0	0	0	0
16	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Total	160	164	153	164	157	163	164	85	164	164	161	164	156	161



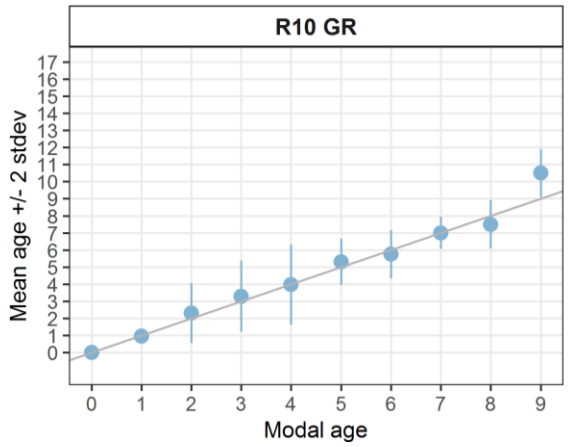
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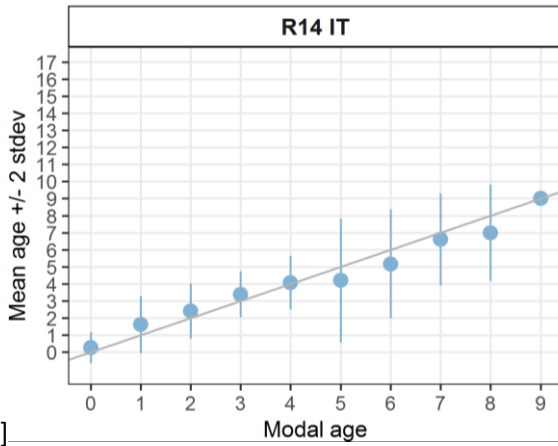
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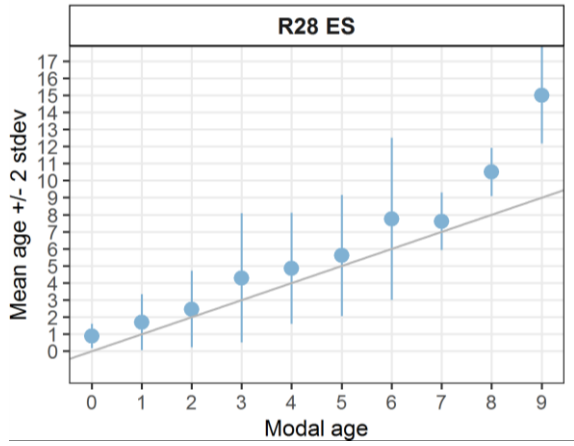
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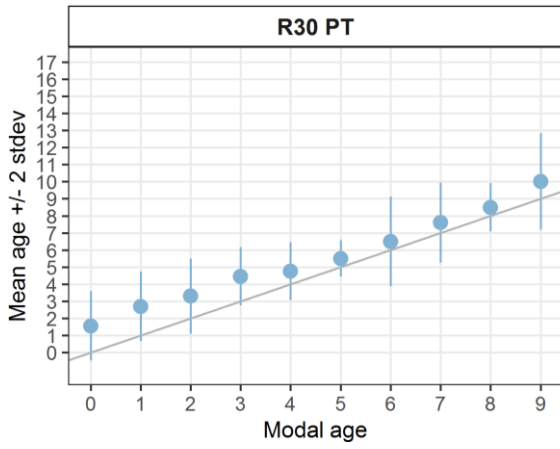
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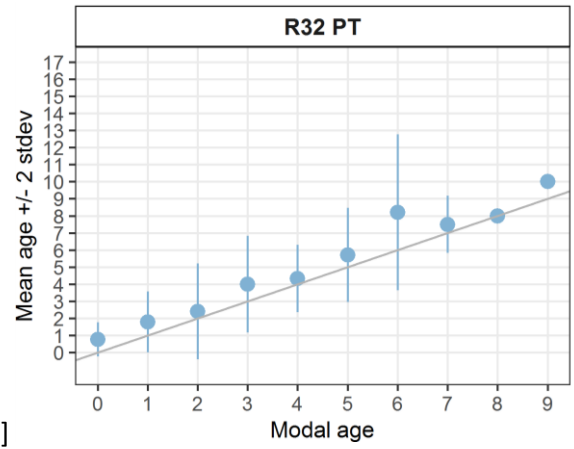
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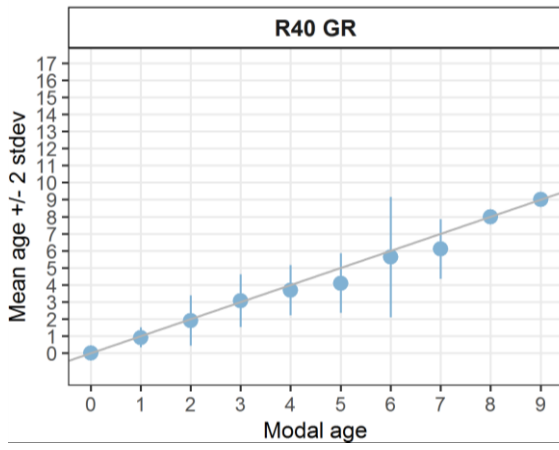
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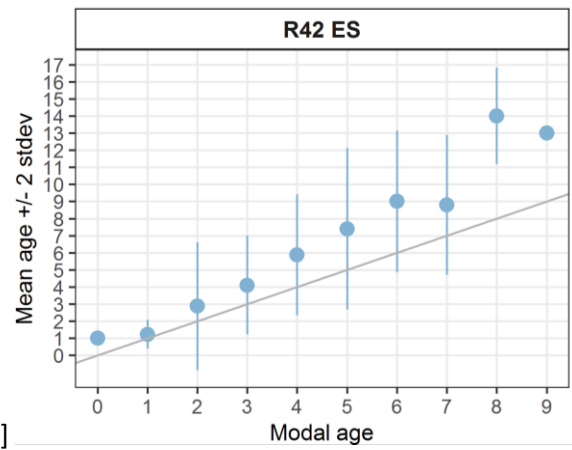
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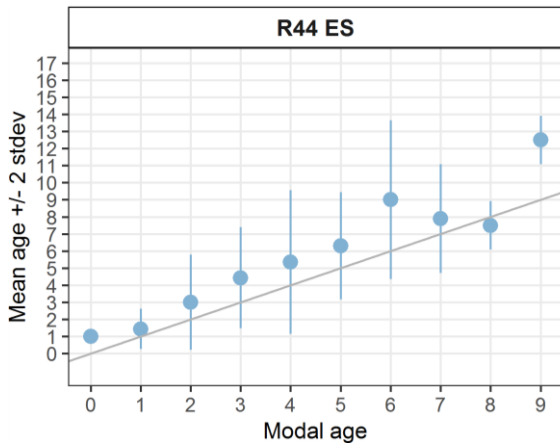
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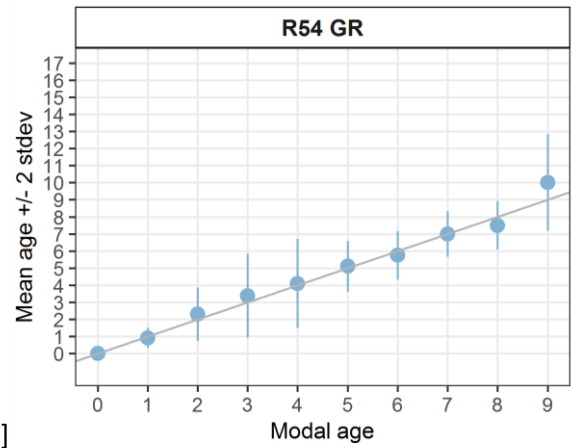
[[9]]



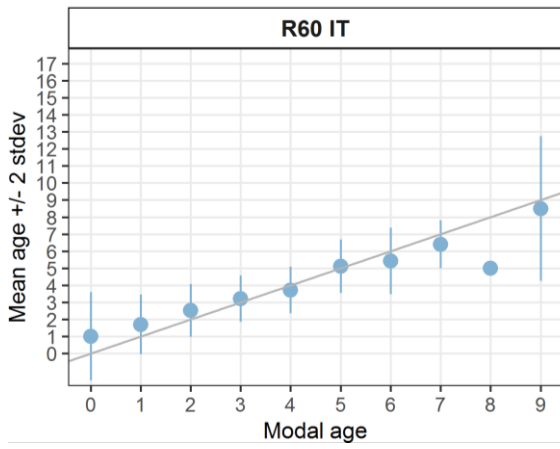
[[10]]



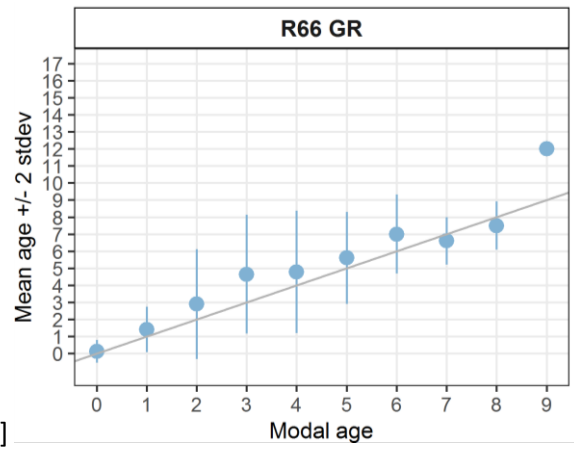
[[11]]



[[12]]



[[13]]



[[14]]

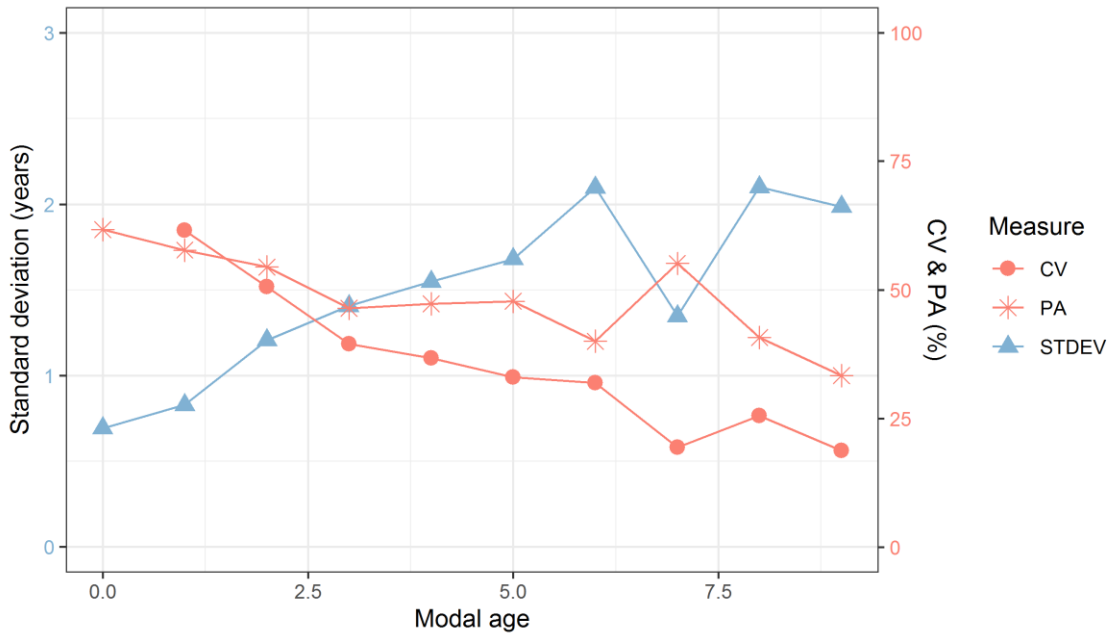


Figure 6.9: CV, PA and (STDEV (standard deviation) are plotted against modal age

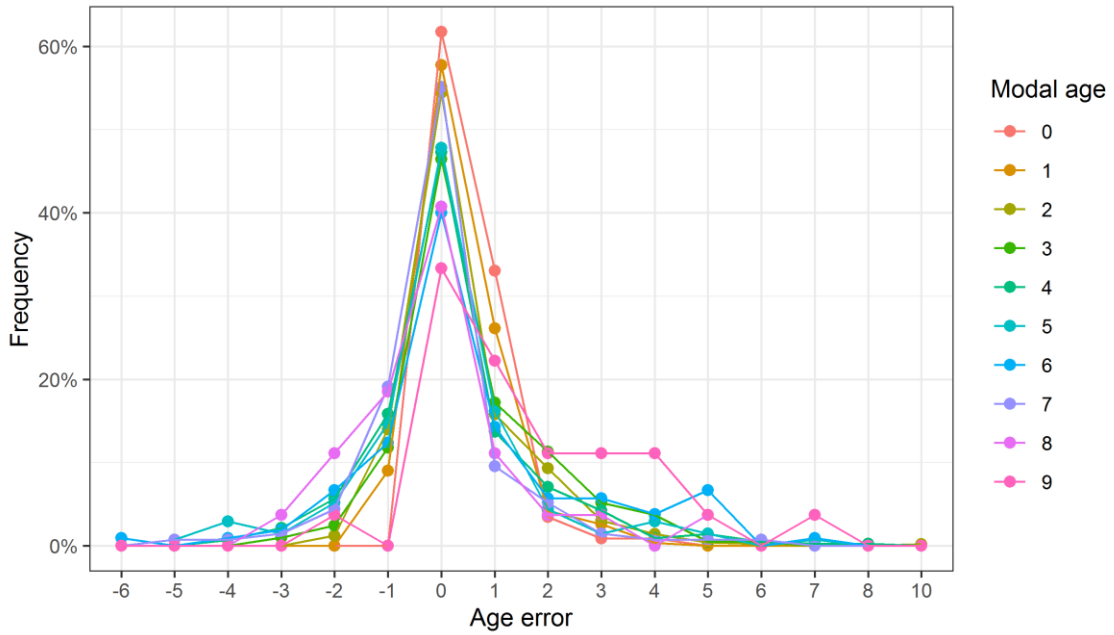


Figure 6.10: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

6.2.2 Advanced readers

All samples included

Data Overview

Table 6.17: Data overview including modal age and statistics per sample.

Fish ID	length	sex	Catch date	$\sum_{i=1}^n$	$\sum_{i=2}^n$	$\sum_{i=3}^n$	Modal age	PA %	CV %	APE %
001L_219_16-06-20	219	M	16/06/2020	3	2	3	3	67	22	17
001L_250_15-10-20	250	F	15/10/2020	4	4	4	4	100	0	0
001L_254_10-11-20	254	F	11/10/2020	4	3	4	4	67	16	12
001L_256_27-07-20	256	M	27/07/2020	3	4	4	4	67	16	12
001L_261_02-06-20	261	F	06/02/2020	2	2	3	2	67	25	19
001L_352_18-10-20	352	M	18/10/2020	3	3	5	3	67	31	24
001L_372_03-06-20	372	M	06/03/2020	5	4	5	5	67	12	10
001R_232_10-08-20	232	F	08/10/2020	2	2	4	2	67	43	33
001R_243_02-09-20	243	F	09/02/2020	1	2	-	1	50	47	33
001R_247_06-10-20	247	M	10/06/2020	2	2	-	2	100	0	0
002L_150_03-09-20	150	M	09/03/2020	0	0	1	0	67	-	-
002L_161_10-08-20	161	F	08/10/2020	1	1	2	1	67	43	33
002L_222_03-09-20	222	M	09/03/2020	1	1	2	1	67	43	33
002L_245_10-11-20	245	F	11/10/2020	4	3	4	4	67	16	12
002L_300_18-10-20	300	M	18/10/2020	2	2	4	2	67	43	33
002L_326_03-06-20	326	F	06/03/2020	5	4	6	4	33	20	13
002L_334_16-06-20	334	M	16/06/2020	3	2	3	3	67	22	17
002R_264_02-06-20	264	F	06/02/2020	2	2	2	2	100	0	0
003L_100_03-09-20	100	F	09/03/2020	1	0	1	1	67	87	67
003L_155_29-08-20	155	M	29/08/2020	1	1	1	1	100	0	0
003L_163_10-08-20	163	F	08/10/2020	1	1	2	1	67	43	33
003L_211_18-11-20	211	F	18/11/2020	4	2	3	2	33	33	22
003R_266_16-06-20	266	M	16/06/2020	3	2	4	2	33	33	22
004L_160_10-08-20	160	F	08/10/2020	3	1	-	1	50	71	50
004L_263_02-06-20	263	M	06/02/2020	1	2	1	1	67	43	33
004L_289_16-06-20	289	M	16/06/2020	3	2	5	2	33	46	33
004R_205_14-08-20	205	F	14/08/2020	2	3	-	2	50	28	20
005L_148_10-08-20	148	F	08/10/2020	2	2	3	2	67	25	19
005L_240_03-09-20	240	M	09/03/2020	1	1	2	1	67	43	33
005L_267_02-06-20	267	F	06/02/2020	2	1	2	2	67	35	27
005L_300_16-06-20	300	F	16/06/2020	4	2	4	4	67	35	27
006L_201_03-09-20	201	F	09/03/2020	2	1	2	2	67	35	27
006L_285_16-06-20	285	F	16/06/2020	4	3	4	4	67	16	12
006R_158_10-08-20	158	M	08/10/2020	1	1	2	1	67	43	33
007R_143_10-08-20	143	M	08/10/2020	0	0	1	0	67	-	-
008L_149_10-08-20	149	F	08/10/2020	1	0	2	0	33	-	-
009L_286_02-06-20	286	M	06/02/2020	2	1	3	1	33	50	33
009L_354_18-10-20	354	M	18/10/2020	5	3	4	3	33	25	17
009R_50_23-08-20	50	U	23/08/2020	0	0	0	0	100	-	-
010L_200_03-09-20	200	F	09/03/2020	2	1	2	2	67	35	27
010L_203_08-08-20	203	F	08/08/2020	3	2	3	3	67	22	17
010L_285_02-06-20	285	F	06/02/2020	1	0	3	0	33	-	-
011L_206_08-08-20	206	F	08/08/2020	3	3	3	3	100	0	0
011L_286_02-06-20	286	F	06/02/2020	2	1	2	2	67	35	27
012L_204_03-09-20	204	M	09/03/2020	1	1	2	1	67	43	33
012L_54_23-08-20	54	U	23/08/2020	0	0	0	0	100	-	-
015L_43_23-08-20	43	U	23/08/2020	0	0	0	0	100	-	-
016L_287_02-06-20	287	M	06/02/2020	3	2	3	3	67	22	17
019L_354_18-10-20	354	F	18/10/2020	4	3	4	4	67	16	12

Fish ID	length	sex	Catch date	RO 2	RO 6	RO 8	Modal age	PA %	CV %	APE %
020217-15	170	M	02/02/2017	2	1	2	2	67	35	27
025L_300_02-06-20	300	M	06/02/2020	3	2	3	3	67	22	17
033L_59_03-09-20	59	U	09/03/2020	0	0	0	0	100	-	-
034R_305_02-06-20	305	F	06/02/2020	2	1	2	2	67	35	27
035L_302_02-06-20	302	M	06/02/2020	3	2	3	3	67	22	17
036R_50_03-09-20	50	U	09/03/2020	0	0	0	0	100	-	-
037L_245_02-06-20	245	F	06/02/2020	3	0	1	0	33	-	-
048L_260_02-06-20	260	F	06/02/2020	3	2	2	2	67	25	19
066L_302_02-06-20	302	M	06/02/2020	2	2	3	2	67	25	19
1_Ti071014_68	373	M	07/10/2014	4	4	4	4	100	0	0
10_PelTm0412L26_3	455	M	08/04/2012	8	7	9	7	33	12	8
10TM_GSA11	141	F	08/03/2016	2	0	-	0	50	-	-
11_PelTm0318L25_2	319	F	10/04/2018	4	5	5	5	67	12	10
11TM_GSA11	242	F	22/07/2015	-	3	3	3	100	0	0
12_PelTm0316L48_17b	366	F	14/04/2016	6	6	7	6	67	9	7
12TM_GSA11	202	F	22/07/2015	1	1	1	1	100	0	0
13_PelTm0316L43_7	343	F	13/04/2016	7	5	7	7	67	18	14
134_14_Nanakos_PS_07-10-20_1X1	134	M	07/10/2020	1	0	1	1	67	87	67
135_01_MANIOS_16-04-19_1x1	135	F	16/04/2019	1	0	1	1	67	87	67
138_02_MANIOS_16-04-19_1x1	138	F	16/04/2019	1	0	1	1	67	87	67
13TM_GSA11	212	F	22/07/2015	-	3	1	1	50	71	50
14_PelTm0316L43_1	374	F	13/04/2016	7	6	7	7	67	9	7
140_12_Nanakos_PS_07-10-20_1X1	140	F	07/10/2020	2	0	-	0	50	-	-
140617-15	145	M	16/06/2017	1	1	1	1	100	0	0
147_13_Nanakos_PS_07-10-20_1X1_R	147	F	07/10/2020	1	0	1	1	67	87	67
14TM_GSA11	183	F	22/07/2015	1	1	1	1	100	0	0
15_PelTmL0317_48_12	293	M	07/04/2017	6	6	7	6	67	9	7
150_08_Megalochari_OTB_30-06-20_1X1	150	F	30/06/2020	2	1	1	1	67	43	33
150119-27	177	F	15/01/2019	2	1	3	1	33	50	33
150119-39	164	F	15/01/2019	2	1	2	2	67	35	27
15TM_GSA11	170	M	19/05/2015	0	1	1	1	67	87	67
16_PelL0316TmL39_2	280	M	10/04/2016	4	2	3	2	33	33	22
165_10_Megalochari_OTB_30-06-20_1X1	165	F	30/06/2020	2	1	1	1	67	43	33
16TM_GSA11	133	M	19/05/2015	0	0	1	0	67	-	-
17_Ti071014_70	370	F	07/10/2014	4	4	4	4	100	0	0
175_02_Nanakos_PS_08-09-20_1X1	175	F	08/09/2020	1	1	1	1	100	0	0
176_01_Manios_PS_10-04-20_1X1	176	F	10/04/2020	1	0	1	1	67	87	67
17TM_GSA11	125	M	19/05/2015	0	0	1	0	67	-	-
18_Pel0318TmL25_9b	260	F	10/04/2018	4	4	4	4	100	0	0
180_01_Kap.Pantelis_PS_15-07-20_1X1	180	M	15/07/2020	1	2	1	1	67	43	33
180_17_Manios_PS_10-04-20_1X1	180	M	10/04/2020	2	1	1	1	67	43	33
188_05_Nanakos_PS_08-09-20_1X1	188	M	08/09/2020	2	2	2	2	100	0	0
18TM_GSA11	265	M	06/08/2015	0	3	2	0	33	-	-
19_Pel0318TmL26_6	295	F	10/04/2018	4	3	-	3	50	20	14
19TM_GSA11	284	M	06/08/2015	0	3	-	0	50	-	-
1TM_GSA11	305	F	05/07/2020	0	3	3	3	67	87	67
2_Ti240714_31	410	F	24/07/2014	5	5	5	5	100	0	0
20_Tm030713_31a	245	F	03/07/2013	4	1	4	4	67	58	44
202_05_Alexandros_PS_19-06-20_1X1	202	F	19/06/2020	1	1	2	1	67	43	33
206_10_Kap.Pantelis_PS_15-07-20_1X1	206	M	15/07/2020	3	3	3	3	100	0	0
20TM_GSA11	190	M	05/07/2020	1	1	1	1	100	0	0
21_Pel0414TmL49_1a	298	F	06/04/2014	7	5	7	7	67	18	14
217_04_Kap.Pantelis_PS_15-07-20_1X1	217	M	15/07/2020	4	4	3	4	67	16	12
21TM_GSA11	215	M	05/07/2020	2	2	1	2	67	35	27
22_Tm070715_3b	335	M	07/07/2015	4	4	6	4	67	25	19
220218-02	196	M	22/02/2018	3	2	3	3	67	22	17
220218-35	191	M	22/02/2018	3	2	2	2	67	25	19
221_05_Kap.Pantelis_PS_05-11-20_1X1	221	M	15/07/2020	3	4	4	4	67	16	12

Fish ID	length	sex	Catch date	RO 2	RO 6	RO 8	Modal age	PA %	CV %	APE %
223_02_Alexandros_PS_19-06-20_1X1	223	F	19/06/2020	2	1	2	2	67	35	27
22TM_GSA11	155	M	09/09/2020	2	1	1	1	67	43	33
23_TI011215_16b	298	M	01/12/2015	2	3	4	2	33	33	22
239_24_Kap.Pantelis_PS_15-07-20_1X1	239	M	15/07/2020	3	4	4	4	67	16	12
23TM_GSA11	290	M	22/07/2015	1	5	3	1	33	67	44
24_Pel0318TmL25_13	259	F	10/04/2018	3	2	4	2	33	33	22
242_04_Ag.Anna_PS_19-06-20_1X1	242	F	19/06/2020	2	1	3	1	33	50	33
24TM_GSA11	315	M	22/07/2015	0	1	2	0	33	-	-
25_Pel0318TmL25_2a	319	F	10/04/2018	3	3	5	3	67	31	24
251_02_Kap.Pantelis_PS_15-07-20_1X1	251	M	15/07/2020	1	4	2	1	33	65	48
254_28_Ag.Anna_PS_19-06-20_1X1	254	M	19/06/2020	1	3	3	3	67	49	38
255_02_Kyzikos_PS_24-11-20_1X1	255	M	24/11/2020	1	2	3	1	33	50	33
25TM_GSA11	171	M	09/09/2020	1	1	2	1	67	43	33
26_Pel0317TmL44_17a	200	F	05/04/2017	2	1	3	1	33	50	33
260_09_Ag.Anna_PS_19-06-20_1X1	260	F	19/06/2020	1	3	3	3	67	49	38
262_01_Kyzikos_PS_24-11-20_1X1	262	F	24/11/2020	1	4	4	4	67	58	44
266_01_Alexandros_PS_19-06-20_1X1	266	M	19/06/2020	4	3	5	3	33	25	17
26TM_GSA11	278	M	09/03/2019	2	1	2	2	67	35	27
27_Pel0317TmL44_22	194	F	05/04/2017	1	1	3	1	67	69	53
270716GR-001	318	F	27/07/2016	9	9	10	9	67	6	5
270716GR-007	343	M	27/07/2016	10	6	8	6	33	25	17
270716GR-011	300	M	27/07/2016	7	5	4	4	33	29	21
270716GR-018	246	M	27/07/2016	6	0	3	0	33	-	-
270716GR-021	266	M	27/07/2016	6	4	7	4	33	27	20
270716GR-022	295	M	27/07/2016	7	5	7	7	67	18	14
270716GR-028	282	M	27/07/2016	6	4	4	4	67	25	19
270716GR-029	232	M	27/07/2016	4	4	3	4	67	16	12
270716GR-032	219	M	27/07/2016	4	4	3	4	67	16	12
273_03_Kyzikos_PS_24-11-20_1X1	273	M	24/11/2020	3	3	3	3	100	0	0
27TM_GSA11	234	M	22/07/2015	1	2	2	2	67	35	27
28_Pel0317TmL44_23	186	M	05/04/2017	1	1	3	1	67	69	53
28TM_GSA11	137	M	11/12/2015	0	0	0	0	100	-	-
29_Pel0318TmL25_8b	255	F	10/04/2018	3	2	5	2	33	46	33
29TM_GSA11	112	M	11/12/2015	0	0	-	0	100	-	-
2TM_GSA11	152	F	19/05/2015	0	0	1	0	67	-	-
3_TI240714_32	380	F	24/07/2014	4	5	5	5	67	12	10
30_Pel0316TmL39_9c	286	F	10/04/2016	3	2	-	2	50	28	20
30TM_GSA11	122	M	21/07/2020	0	1	-	0	50	-	-
31_Pel0318TmL25_1	260	F	10/04/2018	4	4	4	4	100	0	0
312_06_MEGALOCHARI_25-06-19_1x1	312	M	25/06/2019	7	6	7	7	67	9	7
314_04_MEGALOCHARI_25-06-19_1x1	314	M	25/06/2019	6	7	6	6	67	9	7
316_10_MEGALOCHARI_25-06-19_1x1	316	M	25/06/2019	2	7	6	2	33	53	40
32_Tm071014_33	382	M	07/10/2014	4	4	5	4	67	13	10
3TM_GSA11	255	F	05/07/2020	2	3	3	3	67	22	17
4_Pel0412TmL26_1	478	M	08/04/2012	6	4	7	4	33	27	20
4TM_GSA11	175	F	19/05/2015	2	1	1	1	67	43	33
5_Pel0317TmL30_1	439	M	27/03/2017	7	7	7	7	100	0	0
5TM_GSA11	162	F	19/05/2015	1	1	1	1	100	0	0
6_Pel17TmL30_3c	414	F	27/03/2017	6	6	9	6	67	25	19
6TM_GSA11	231	F	05/07/2020	-	3	1	1	50	71	50
7_Pel0316TmL43_1	374	F	13/04/2016	7	6	7	7	67	9	7
7TM_GSA11	226	F	05/07/2020	2	2	1	2	67	35	27
8_Pel0412TmL52_11b	432	M	18/04/2012	6	5	6	6	67	10	8
8TM_GSA11	293	F	05/07/2020	-	3	2	2	50	28	20
9_Pel0412TmL26_2	459	M	08/04/2012	9	10	12	9	33	15	11
99_02_Taxiarchis_PS_06-10-20_1X1	99	F	06/10/2020	0	0	0	0	100	-	-
9TM_GSA11	264	F	09/03/2019	1	2	1	1	67	43	33

Table 6.18: Number of readings per reader and modal age.

Modal age	R02 ES	R06 IT	R08 IT	total
0	23	23	18	64
1	41	43	41	125
2	32	33	30	95
3	19	20	19	58
4	25	25	25	75
5	4	4	4	12
6	6	6	6	18
7	8	8	8	24
8	0	0	0	0
9	2	2	2	6
Total	160	164	153	477

Table 6.19: Age composition by reader.

Modal age	R02 ES	R06 IT	R08 IT
0	19	25	7
1	36	40	32
2	34	33	27
3	24	24	33
4	22	20	23
5	4	9	10
6	9	7	5
7	8	4	11
8	1	0	1
9	2	1	2
10	1	1	1
12	0	0	1
Total	160	164	153

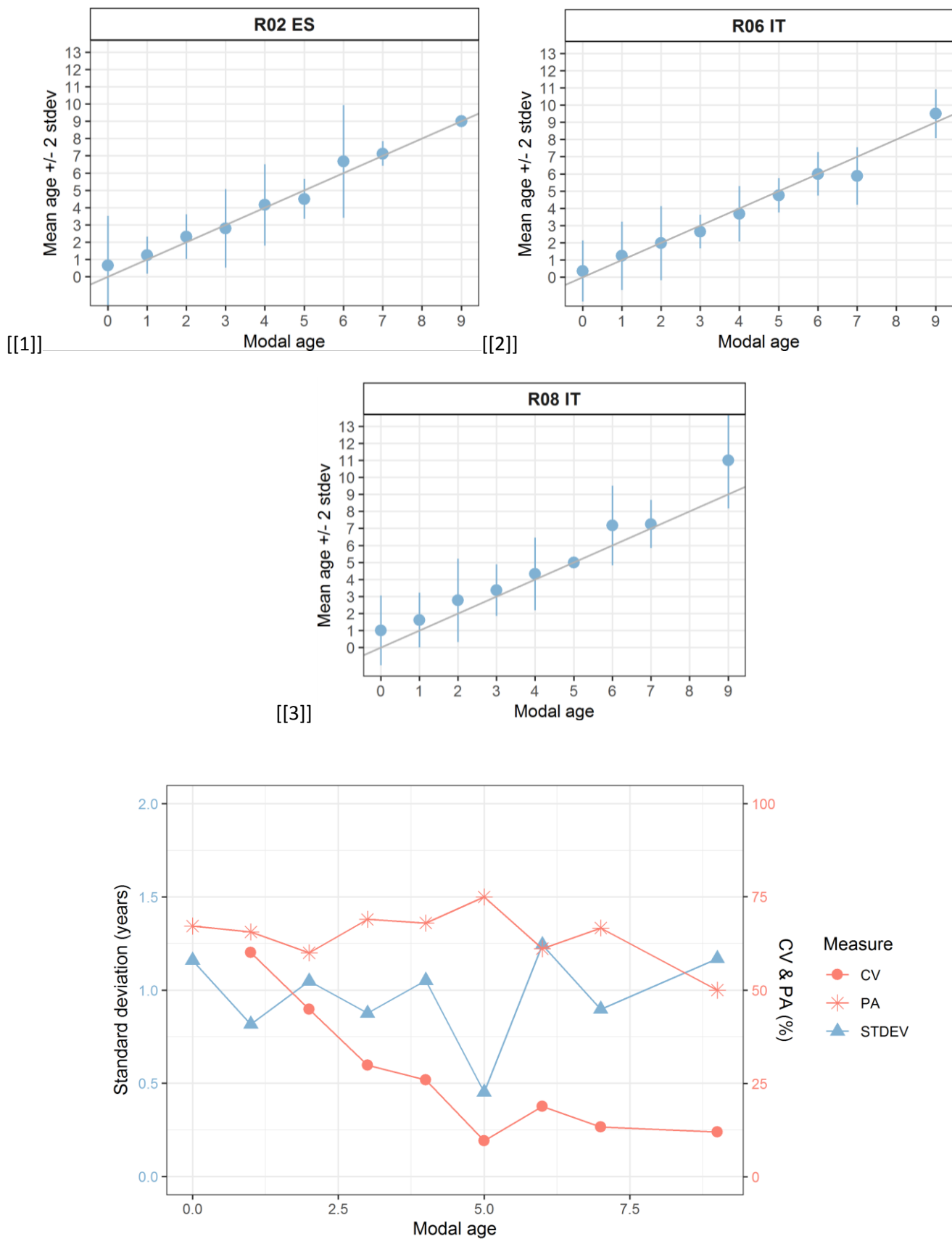


Figure 6.11: CV, PA and (STDEV (standard deviation) are plotted against modal age

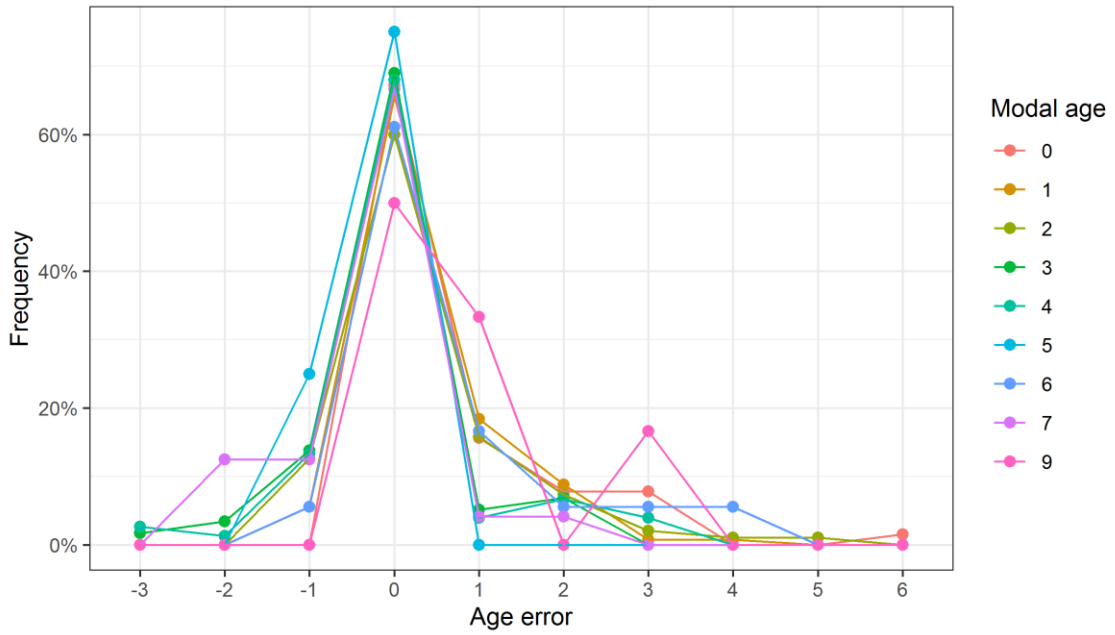


Figure 6.12: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

6.3 Results *T. picturatus* (Event-ID 387)

6.3.1 All readers

Data Overview

Table 6.20: Summary of statistics; PA (%), CV (%) and APE (%).

CV	PA	APE
54	54	36

Table 6.21: Data overview including modal age and statistics per sample.

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	Modal age	PA %	CV %	APE %
1_TRAPIC_10_2S	280	F	17/12/2018	27.10.a	3	2	0	3	2	1	3	-	5	2	3	4	3	2	3	3	3	47	46	34
10_TRAPIC_10_1S	330	M	08/03/2020	27.10.a	6	4	3	4	4	2	5	5	4	4	5	6	4	3	5	6	4	38	26	21
11_TRAPIC_10_1S	375	F	08/03/2020	27.10.a	6	2	3	4	4	2	4	5	3	3	4	4	2	3	2	5	4	31	35	29
12_TRAPIC_10_1S	345	F	08/03/2020	27.10.a	5	2	3	3	3	2	5	5	4	3	4	4	3	3	3	5	3	44	29	25
13_TRAPIC_10_1S	335	F	08/03/2020	27.10.a	7	2	4	4	2	0	6	5	4	4	5	6	4	4	3	6	4	38	43	31
14_TRAPIC_10_2S	355	F	21/11/2020	27.10.a	6	2	3	4	3	3	4	5	4	3	4	5	3	3	4	5	3	38	27	22
15_TRAPIC_10_2S	395	M	21/11/2020	27.10.a	7	2	3	4	1	1	6	5	4	4	5	6	4	3	3	6	4	25	45	34
16_TRAPIC_10_2S	400	F	21/11/2020	27.10.a	7	2	3	4	2	3	6	5	5	4	5	6	4	3	3	-	3	27	36	30
17_TRAPIC_10_2S	380	F	21/11/2020	27.10.a	4	3	3	4	3	2	6	5	4	4	8	6	3	3	3	5	3	38	37	28
18_TRAPIC_10_2S	370	F	21/11/2020	27.10.a	-	5	4	4	3	2	7	7	7	5	11	9	6	3	-	8	7	21	44	36
19_TRAPIC_10_2S	330	M	21/11/2020	27.10.a	6	3	4	4	4	2	5	5	5	4	6	6	4	4	4	7	4	44	28	22
2_TRAPIC_10_2S	275	M	17/12/2018	27.10.a	6	2	2	5	3	1	5	5	6	2	4	7	4	2	5	6	2	25	45	38
20_TRAPIC_10_2S	360	F	21/11/2020	27.10.a	7	-	4	4	-	2	4	-	4	4	5	8	4	4	-	4	4	67	35	24
21_TRAPIC_10_2S	340	M	21/11/2020	27.10.a	6	4	4	5	3	3	5	5	5	4	6	6	5	4	3	5	5	38	23	19
22_TRAPIC_10_2S	320	F	21/11/2020	27.10.a	6	3	3	3	2	3	5	5	4	3	5	7	3	2	3	4	3	44	37	31
23_TRAPIC_10_2S	315	M	21/11/2020	27.10.a	8	7	3	6	3	2	6	6	5	4	8	8	5	2	-	6	6	27	40	33
24_TRAPIC_10_2S	135	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	0	0	1	1	1	0	1	1	1	69	70	62
25_TRAPIC_10_2S	140	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	1	0	1	1	1	0	1	1	1	75	60	50
26_TRAPIC_10_2S	125	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	0	0	1	1	1	0	-	1	1	67	73	67
27_TRAPIC_10_2S	110	U	23/11/2020	27.10.a	1	0	0	1	0	1	1	1	0	0	1	1	1	0	1	2	1	56	88	75
28_TRAPIC_10_2S	130	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	0	0	1	1	1	0	1	1	1	69	70	62
29_TRAPIC_10_2S	150	U	23/11/2020	27.10.a	2	0	1	1	0	2	1	2	1	1	1	2	1	0	1	2	1	50	64	49
3_TRAPIC_10_2S	260	F	17/12/2018	27.10.a	3	2	2	3	2	1	3	4	4	2	4	4	3	2	2	6	2	38	42	32
30_TRAPIC_10_2S	120	U	23/11/2020	27.10.a	1	0	0	1	0	1	1	1	0	0	1	1	1	0	1	1	1	56	91	88
31_TRAPIC_10_2S	145	U	23/11/2020	27.10.a	-	0	0	1	0	2	1	1	1	1	1	1	1	0	1	2	1	60	74	53
4_TRAPIC_10_2S	255	F	17/12/2018	27.10.a	3	2	2	3	3	2	3	4	3	2	3	4	3	2	3	-	3	53	24	19
5_TRAPIC_10_2S	295	F	17/12/2018	27.10.a	3	3	2	3	2	2	4	3	3	3	5	4	3	2	3	4	3	50	28	19
6_TRAPIC_10_2S	240	F	24/11/2019	27.10.a	3	2	1	2	0	0	2	3	2	2	4	2	2	1	1	2	2	50	58	42
7_TRAPIC_10_2S	220	F	24/11/2019	27.10.a	2	1	1	2	1	1	2	3	2	1	3	2	2	1	1	2	1	44	42	36
8_TRAPIC_10_2S	230	F	24/11/2019	27.10.a	2	1	1	1	1	1	2	3	2	1	2	2	1	1	2	2	1	50	40	36
9_TRAPIC_10_1S	305	F	08/03/2020	27.10.a	4	3	3	3	3	2	4	4	2	3	3	7	3	3	3	5	3	56	35	25
JAA-2021-1	152	U	07/04/2021	34	1	1	1	1	0	1	1	1	1	1	1	1	1	1	3	1	88	54	23	
JAA-2021-10	202	F	07/04/2021	34	3	1	2	1	0	1	2	2	3	2	2	1	1	2	2	2	2	50	47	38
JAA-2021-11	166	F	07/04/2021	34	1	1	2	2	0	1	2	3	2	1	2	1	1	2	2	2	2	50	47	40
JAA-2021-12	207	M	07/04/2021	34	3	1	2	2	0	1	2	3	3	3	3	1	1	2	2	3	3	38	48	38
JAA-2021-13	173	M	07/04/2021	34	3	1	2	2	0	1	2	3	2	2	1	1	1	2	3	1	1	38	52	43
JAA-2021-14	130	U	07/04/2021	34	0	0	0	0	0	1	1	1	1	0	1	1	0	0	1	1	0	50	-	-
JAA-2021-15	169	M	07/04/2021	34	1	1	1	1	0	1	1	2	1	1	1	1	1	1	2	1	1	81	42	22
JAA-2021-16	209	M	07/04/2021	34	3	1	1	1	0	1	1	2	3	1	1	1	1	1	2	2	1	62	59	47
JAA-2021-17	209	F	07/04/2021	34	3	1	2	2	0	0	3	3	3	2	2	1	2	2	2	3	2	44	52	37
JAA-2021-18	209	F	07/04/2021	34	3	1	2	2	0	0	2	3	2	2	2	1	1	1	3	2	3	38	57	46
JAA-2021-19	164	M	07/04/2021	34	1	1	1	1	0	1	1	2	3	1	2	1	1	1	2	2	1	62	54	42
JAA-2021-2	183	M	07/04/2021	34	2	1	1	2	0	1	2	3	2	2	3	1	1	1	2	3	1	38	52	43
JAA-2021-20	169	F	07/04/2021	34	2	1	1	1	0	1	2	2	2	1	2	1	1	1	2	2	1	50	45	40
JAA-2021-21	197	F	07/04/2021	34	2	1	2	2	0	0	2	2	3	2	3	1	2	1	2	3	2	50	53	41

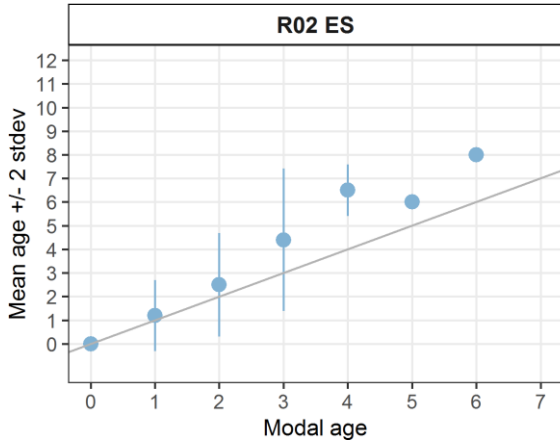
Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	Modal age	PA %	CV %	APE %	
JAA-2021-22	150	U	12/07/2021	34	1	1	1	1	0	1	2	-	3	1	1	1	2	1	2	2	1	60	54	43	
JAA-2021-23	132	U	12/07/2021	34	0	1	0	1	0	1	1	1	1	1	1	1	1	0	1	1	1	75	60	50	
JAA-2021-24	144	U	12/07/2021	34	0	0	0	0	0	1	1	1	1	0	1	1	0	0	0	-	0	60	-	-	
JAA-2021-25	145	U	12/07/2021	34	0	0	0	0	0	1	1	1	1	0	1	1	0	0	1	1	0	50	-	-	
JAA-2021-26	149	U	12/07/2021	34	0	0	1	1	0	1	2	1	2	1	1	1	1	0	2	2	2	1	50	73	50
JAA-2021-27	181	M	12/07/2021	34	1	1	1	1	0	1	2	2	2	2	2	1	1	1	2	3	1	50	51	43	
JAA-2021-28	186	F	12/07/2021	34	2	1	1	2	0	2	2	2	2	2	2	2	2	1	2	2	2	75	36	28	
JAA-2021-29	190	F	12/07/2021	34	1	1	1	1	0	1	1	2	2	1	1	1	1	1	1	1	1	81	42	22	
JAA-2021-3	183	F	07/04/2021	34	2	1	2	2	0	0	1	2	2	2	3	1	1	1	2	2	2	50	54	46	
JAA-2021-30	183	F	12/07/2021	34	1	1	1	1	0	1	2	2	1	1	1	1	1	1	2	2	1	69	46	34	
JAA-2021-31	148	U	12/07/2021	34	0	0	0	0	0	1	1	1	1	0	1	1	1	0	1	-	1	53	97	93	
JAA-2021-32	142	U	12/07/2021	34	0	1	1	1	0	1	1	1	1	0	1	1	1	0	1	2	1	69	67	50	
JAA-2021-33	195	M	12/07/2021	34	2	1	2	1	0	1	2	2	3	2	0	1	2	1	2	-	2	47	57	48	
JAA-2021-35	164	F	12/07/2021	34	1	1	1	1	0	1	1	2	1	1	1	1	1	1	2	2	1	75	44	29	
JAA-2021-36	175	F	12/07/2021	34	1	1	1	1	0	1	1	2	1	1	1	1	1	1	1	-	1	87	38	13	
JAA-2021-37	164	M	12/07/2021	34	1	1	1	1	0	1	1	2	1	1	1	1	1	1	1	-	1	87	38	13	
JAA-2021-38	165	M	12/07/2021	34	1	1	1	1	0	1	1	2	1	1	1	1	1	1	1	2	1	81	42	22	
JAA-2021-39	153	F	12/07/2021	34	1	1	1	1	0	1	1	2	1	1	1	1	1	1	1	1	1	88	37	12	
JAA-2021-4	206	F	07/04/2021	34	2	1	2	2	0	1	2	2	2	2	2	2	1	2	2	2	2	75	36	28	
JAA-2021-40	156	F	12/07/2021	34	1	1	1	1	0	1	1	2	1	1	1	1	1	1	1	2	1	81	42	22	
JAA-2021-5	203	M	07/04/2021	34	2	1	2	2	0	1	2	3	3	2	3	1	2	2	3	3	2	44	45	31	
JAA-2021-6	196	M	07/04/2021	34	2	1	2	3	0	2	2	2	3	3	3	1	2	2	3	3	2	44	42	31	
JAA-2021-7	186	F	07/04/2021	34	2	1	2	1	0	1	1	2	2	1	3	1	1	2	2	2	1	44	49	42	
JAA-2021-8	180	F	07/04/2021	34	2	1	2	2	0	1	1	2	2	2	2	1	1	2	2	-	2	60	42	37	
JAA-2021-9	190	F	07/04/2021	34	2	1	2	1	0	1	1	2	2	2	2	1	1	2	2	2	2	56	42	38	

Table 6.22: Number of readings per reader and modal age.

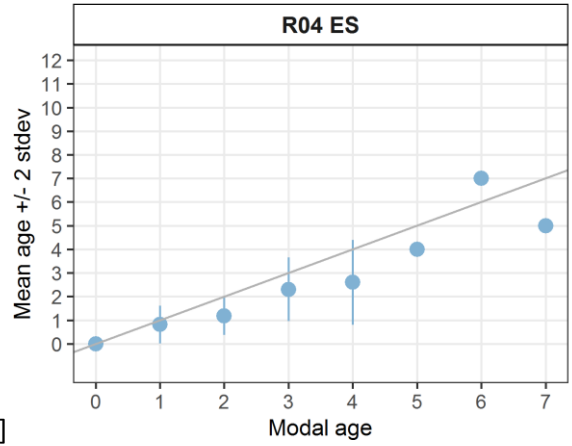
Modal age	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	total
0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	47
1	31	32	32	32	32	32	32	31	32	32	32	32	32	32	31	29	506
2	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	14	254
3	10	10	10	10	10	10	10	9	10	10	10	10	10	10	10	8	157
4	6	5	6	6	5	6	6	5	6	6	6	6	6	6	5	6	92
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	15
7	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	14
Total	68	69	70	70	69	70	70	67	70	70	70	70	70	70	66	62	1101

Table 6.23: Age composition by reader.

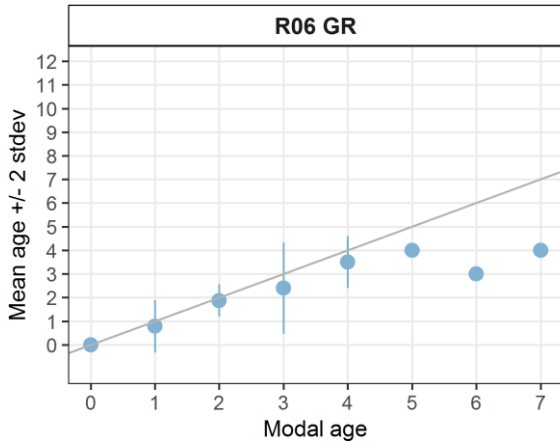
Modal age	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES
0	7	9	13	4	48	6	0	0	5	11	2	0	3	15	1	0
1	20	40	23	31	3	45	29	15	18	22	27	44	38	24	22	11
2	15	11	19	14	6	15	20	24	18	19	12	6	10	18	24	24
3	11	5	10	8	9	4	4	11	13	8	11	0	9	9	15	10
4	2	2	5	10	3	0	5	3	9	9	6	6	7	4	2	3
5	1	1	0	2	0	0	6	12	5	1	7	1	2	0	2	6
6	7	0	0	1	0	0	5	1	1	0	2	7	1	0	0	6
7	4	1	0	0	0	0	1	1	1	0	0	3	0	0	0	1
8	1	0	0	0	0	0	0	0	0	0	2	2	0	0	0	1
9	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total	68	69	70	70	69	70	70	67	70	70	70	70	70	70	66	62



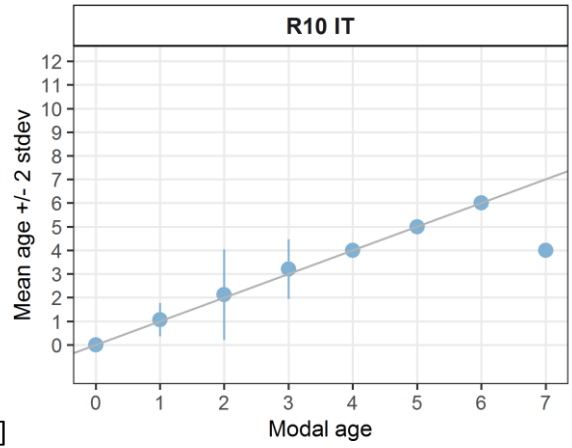
[[1]]



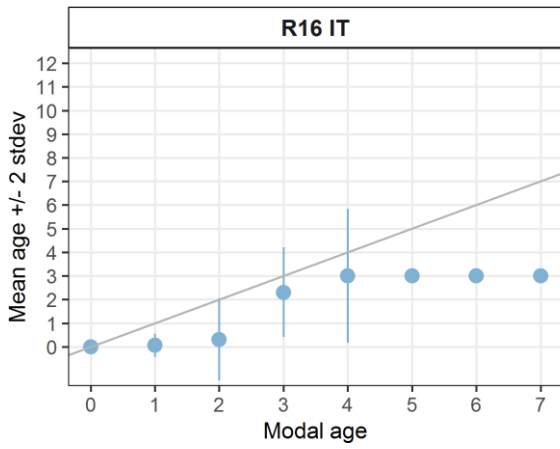
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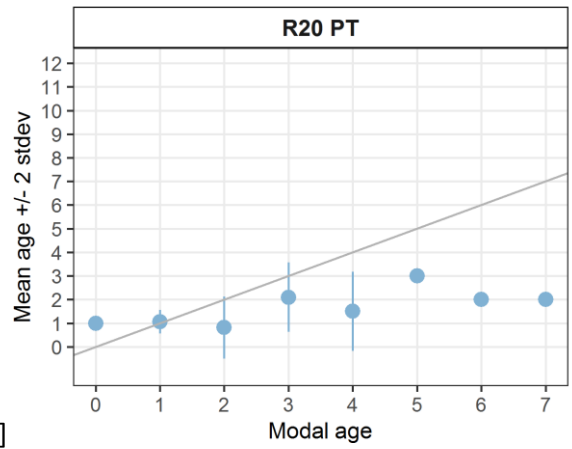
[[3]]



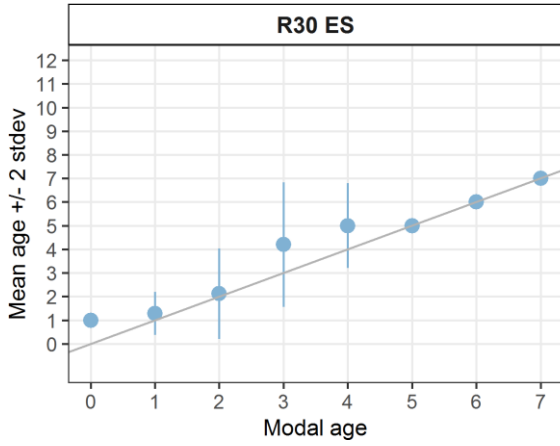
[[4]]



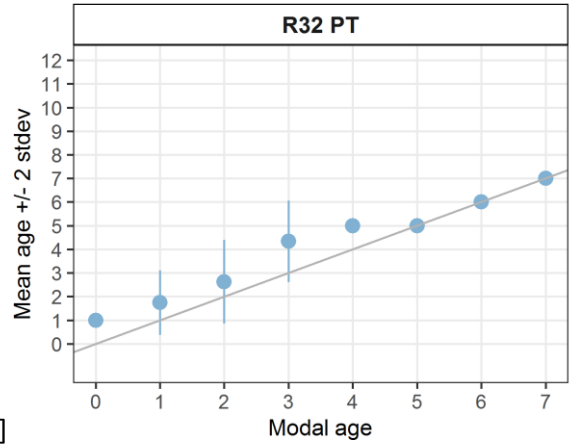
[[5]]



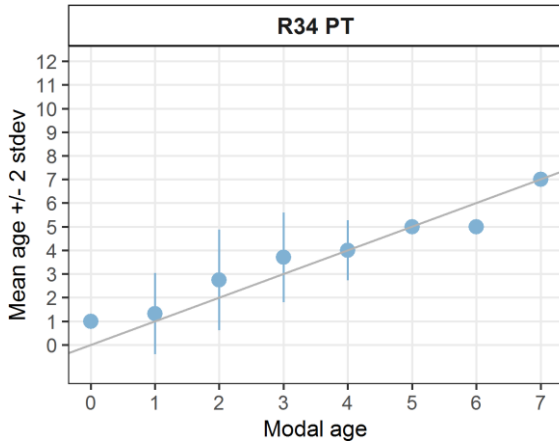
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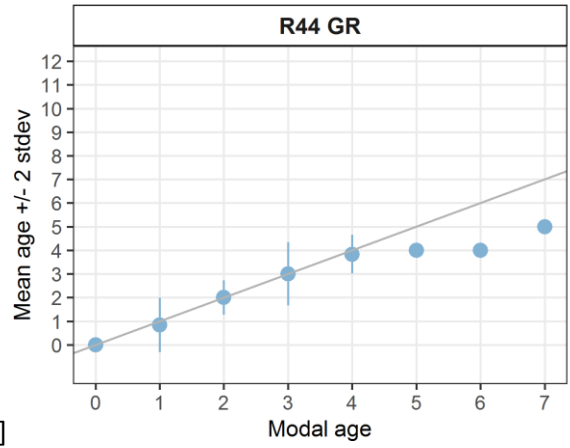
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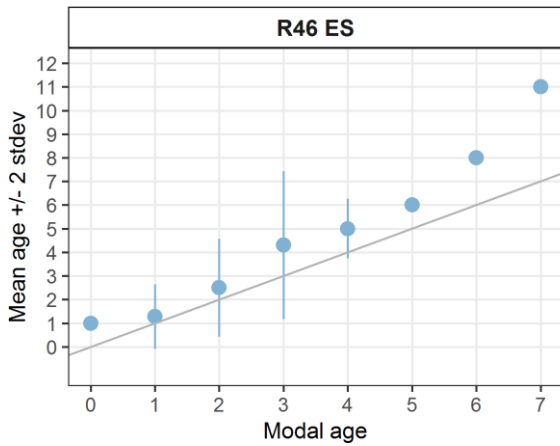
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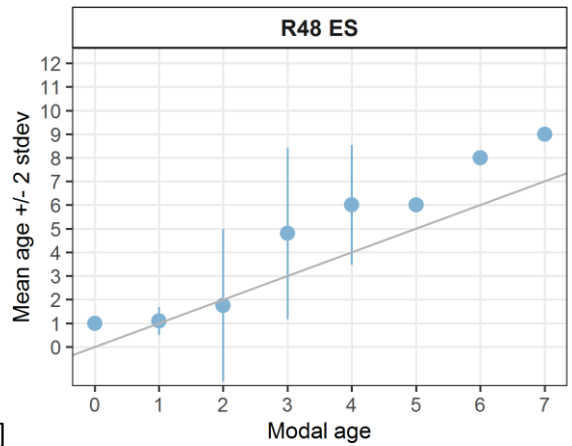
[[9]]



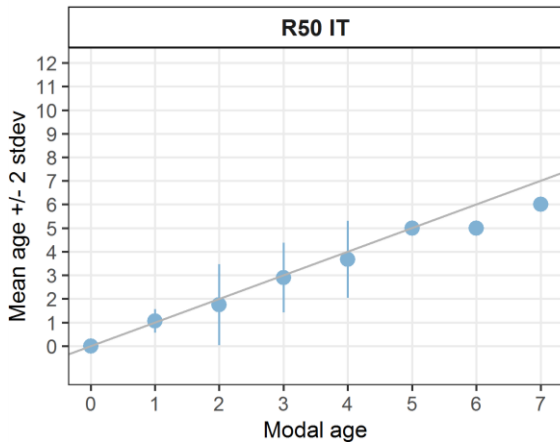
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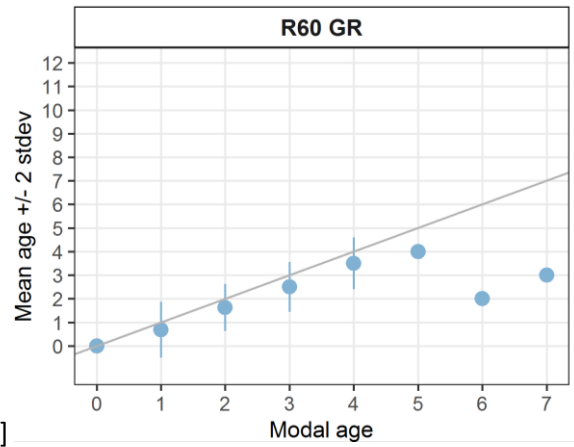
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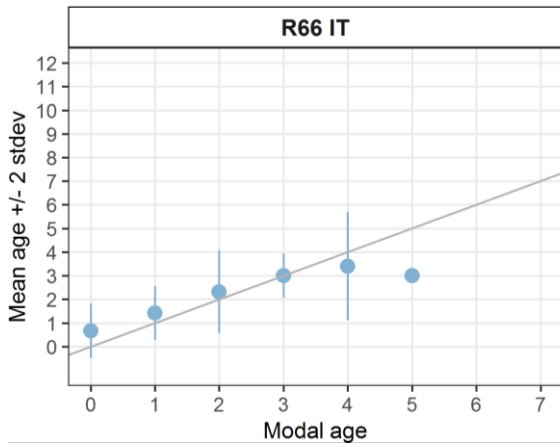
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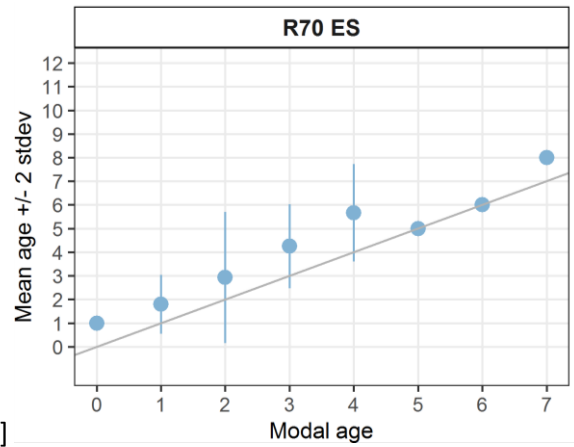
[[13]]



[[14]]



[[15]]



[[16]]

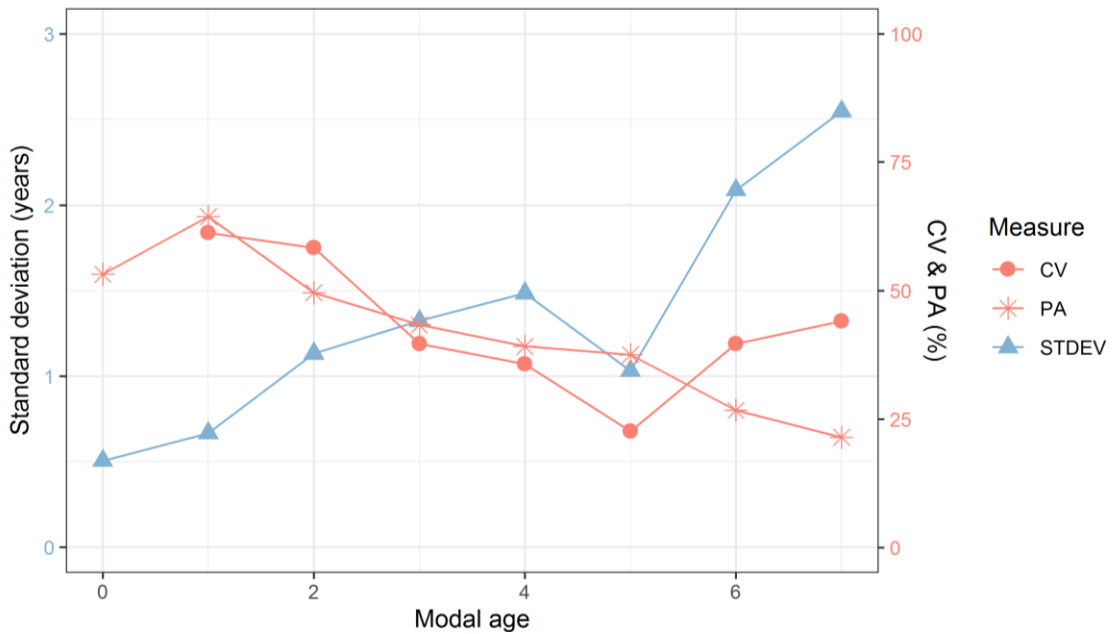


Figure 6.13: CV, PA and STDEV (standard deviation) are plotted against modal age

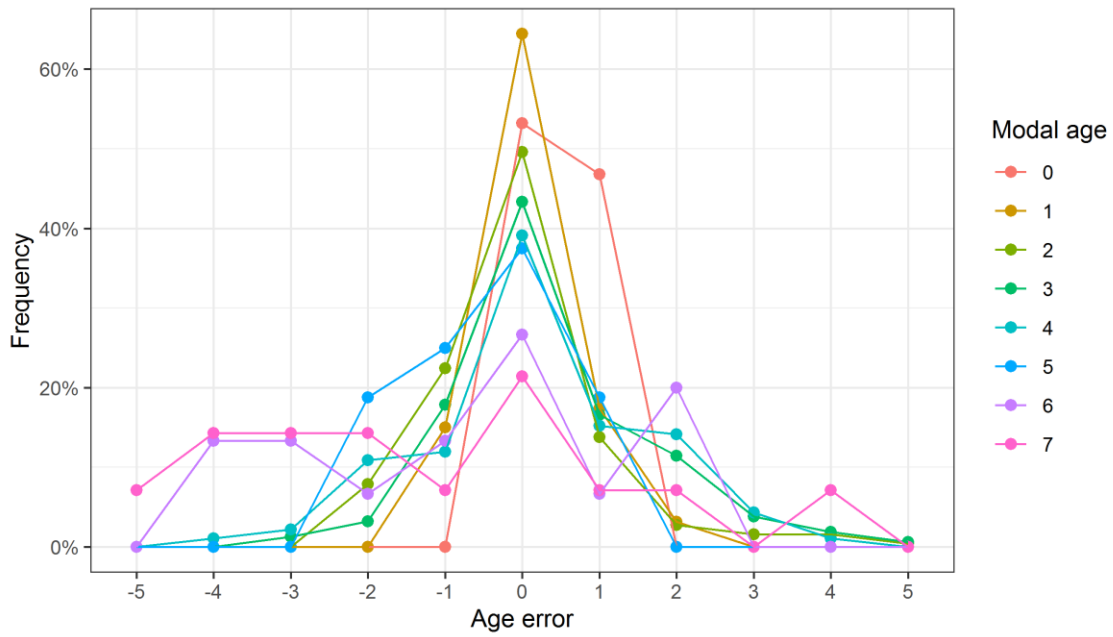


Figure 6.14: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

6.3.2 Advanced readers

These results were not included in the report because only one reader was considered as an expert and comparison inter-readers was not possible.

7 Annex 5. Recommendations

A new workshop including the readers involved in the age interpretation of these *Trachurus* species using otoliths is necessary.