

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

---

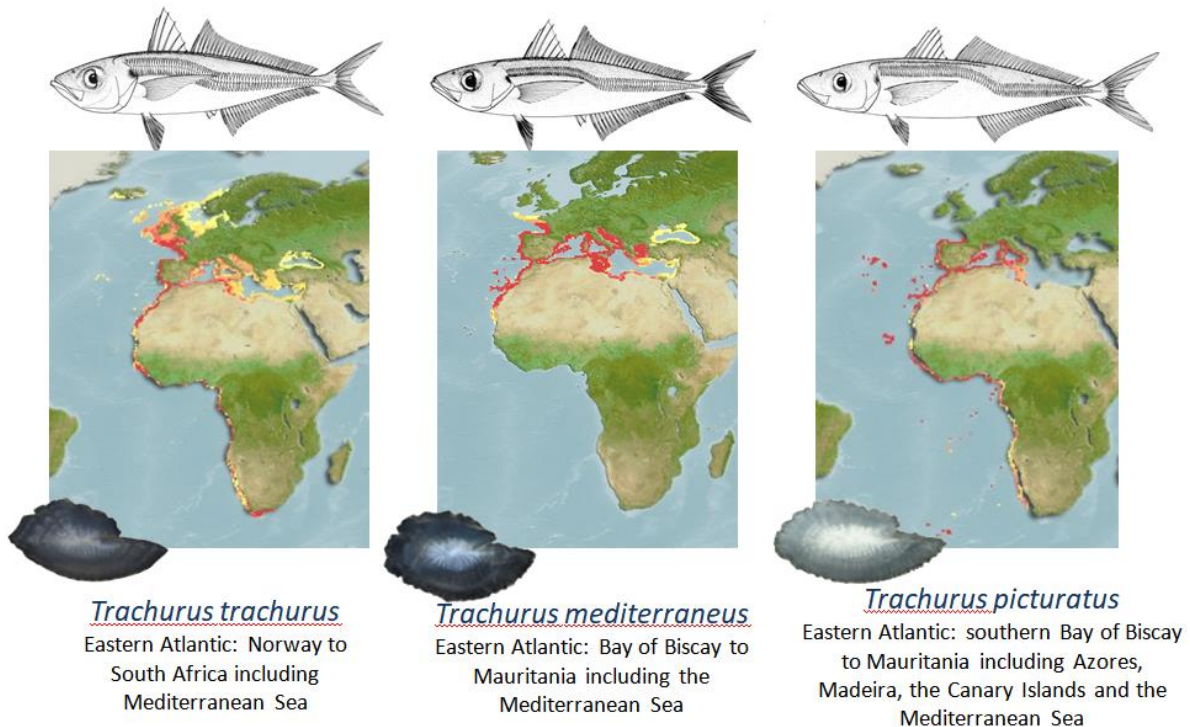
Coordination and results analysis: Andrea Massaro (Aplysia, Italy)  
and Alba Jurado-Ruzafa (IEO-CSIC, Spain)

# Table of Contents

1	Introduction .....	1
2	Methods.....	3
2.1	Overview of samples and readers .....	5
3	Results.....	10
3.1	<i>Trachurus trachurus</i> (Event-ID 362).....	11
3.1.1	Whole otoliths .....	11
3.1.1.1	All readers.....	11
3.1.1.2	Advanced readers .....	16
3.1.2	Sliced otoliths .....	18
3.1.2.1	All readers.....	18
3.1.3	Advanced readers .....	23
3.2	Results <i>Trachurus mediterraneus</i> (Event-ID 388).....	27
3.2.1	All readers.....	27
3.2.2	Advanced readers .....	29
3.3	Results <i>Trachurus picturatus</i> (Event-ID 387) .....	32
3.3.1	All readers.....	32
3.3.2	Advanced readers .....	34
3.4	Discussion .....	35
3.5	Conclusion .....	36
4	References .....	37
5	Annex 1. List of participants .....	38
6	Annex 3. Additional results.....	39
6.1	Results <i>T. trachurus</i> (Event-ID 362) .....	40
6.1.1	Whole otoliths, all readers .....	40
6.1.2	Whole otoliths, advanced readers.....	54
6.1.3	Sliced otoliths, all readers.....	62
6.1.4	Sliced otoliths, advanced readers.....	75
6.2	Results <i>T. mediterraneus</i> (Event-ID 388) .....	82
6.2.1	All readers.....	82
6.2.2	Advanced readers .....	93
6.3	Results <i>T. picturatus</i> (Event-ID 387) .....	100
6.3.1	All readers.....	100
6.3.2	Advanced readers .....	108
7	Annex 5. Recommendations.....	109

# 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. 1.1).



**Figure 1.1.** 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 33 readers from 12 countries (including samples from the Atlantic Archipelagos of Madeira, Azores 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 4<sup>th</sup> 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 ( $\sigma$ ) and mean value ( $\mu$ ) 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	Preparation	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	0-1	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	6-11	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	20	Whole	2	9	1-5	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	2-7	155-330
2020	22	Whole	2	8	0-6	50-315
2020	22	Whole	3	11	0-5	100-320
2020	22	Whole	4	2	0-1	120-200
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	1	3	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	3-6	195-330
2021	27.9	Whole	1	6	5-10	360-445
2021	8	Whole	1	1	5	300
2021	8	Whole	2	8	1-6	135-340
2021	11.1	Whole	4	1	1	160
2021	1	Whole	1	1	4	220

**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
R24 ES	Basic
R26 IT	Basic
R28 IT	Basic
R30 PT	Basic
R34 FR	Basic
R36 NO	Advanced
R38 GR	Basic
R40 PT	Basic
R42 MA	Advanced
R44 DE	Basic
R48 GR	Basic
R50 ES	Basic
R52 DE	Basic
R56 GR	Basic
R60 IT	Basic
R62 ES	Advanced
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	Preparation	Quarter	Number of samples	Modal age range	Length range (mm)
2014	4	Sectioned	1	2	7-14	265-365
2015	4	Sectioned	3	2	10-13	325-335
2015	4	Sectioned	4	8	3-14	285-335
2016	4	Sectioned	1	1	16	395
2016	4	Sectioned	3	15	4-18	275-665
2017	4	Sectioned	1	10	3-14	235-375
2017	7	Sectioned	4	28	3-16	230-395
2018	7	Sectioned	1	21	2-5	220-265
2019	27.4.a	Sectioned	1	9	9-19	350-410
2019	27.4.a	Sectioned	2	7	11-18	355-395
2019	27.4.a	Sectioned	3	10	5-24	290-430
2019	27.4.a	Sectioned	4	6	11-19	345-405
2019	27.9.a	Sectioned	1	4	7	290-340
2019	27.9.a	Sectioned	2	4	5-14	275-425
2019	27.9.a	Sectioned	3	4	7-12	285-445
2019	27.9.a	Sectioned	4	3	7-10	295-380



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

<b>Reader code</b>	<b>Expertise</b>
R04 NL	Advanced
R06 ES	Advanced
R08 PT	Advanced
R10 ES	Advanced
R12 IT	Advanced
R16 IE	Advanced
R18 IE	Basic
R20 ES	Basic
R22 GR	Basic
R24 ES	Basic
R26 IT	Basic
R28 IT	Basic
R30 PT	Basic
R34 FR	Basic
R36 NO	Advanced
R38 GR	Basic
R40 PT	Basic
R42 MA	Advanced
R44 DE	Basic
R48 GR	Basic
R50 ES	Basic
R52 DE	Basic
R56 GR	Basic
R60 IT	Basic
R62 ES	Advanced
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	Advanced
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
R18 PT	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
R72 IT	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	44	46	32	38	52	-
<i>Trachurus trachurus</i> -sliced	22	44	15	18	52	-
<i>Trachurus mediterraneuss</i> -whole	44	49	32	55	54	-
<i>Trachurus picturatus</i> -whole	54	55	35	-	-	-

## **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 46%, with a weighted average CV of 44% and an APE of 32% (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	R24 ES	R26 IT	R28 IT	R30 PT	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	60	28	63	31	50	55	76	59	37	55	56	52	38	74	56	67	56	45	72	38	38	61	66	40	53	50	56	74	68
2	53	67	32	67	32	44	39	21	32	27	45	63	25	49	20	48	37	45	28	47	69	26	27	48	30	38	57	23	52
3	32	45	31	42	24	53	46	22	35	20	25	33	22	33	35	34	29	42	22	32	70	25	14	36	22	21	36	25	43
4	36	43	24	41	29	23	33	17	28	24	33	29	28	27	31	33	27	28	22	38	55	19	26	24	19	16	27	38	40
5	35	37	27	38	24	17	33	21	35	24	29	29	22	33	33	32	27	28	32	31	37	18	23	25	14	29	29	33	37
6	31	29	30	41	22	7	27	11	28	21	29	36	30	21	35	36	34	28	23	34	16	19	16	30	21	14	28	23	36
7	12	28	20	28	26	-	7	15	8	33	42	20	42	19	15	27	14	14	19	11	0	19	44	6	0	38	12	53	33
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19
9	22	29	5	14	13	-	10	27	25	22	6	12	7	6	16	21	21	22	32	18	-	30	17	25	16	26	17	32	26
10	6	13	5	17	14	-	6	20	9	8	7	6	8	0	7	10	13	6	18	0	-	25	18	0	-	20	20	10	21
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21
<b>Weighted Mean</b>	<b>39</b>	<b>41</b>	<b>32</b>	<b>41</b>	<b>29</b>	<b>37</b>	<b>41</b>	<b>25</b>	<b>32</b>	<b>27</b>	<b>34</b>	<b>37</b>	<b>26</b>	<b>37</b>	<b>33</b>	<b>39</b>	<b>32</b>	<b>35</b>	<b>31</b>	<b>35</b>	<b>51</b>	<b>27</b>	<b>28</b>	<b>32</b>	<b>26</b>	<b>27</b>	<b>36</b>	<b>36</b>	<b>44</b>

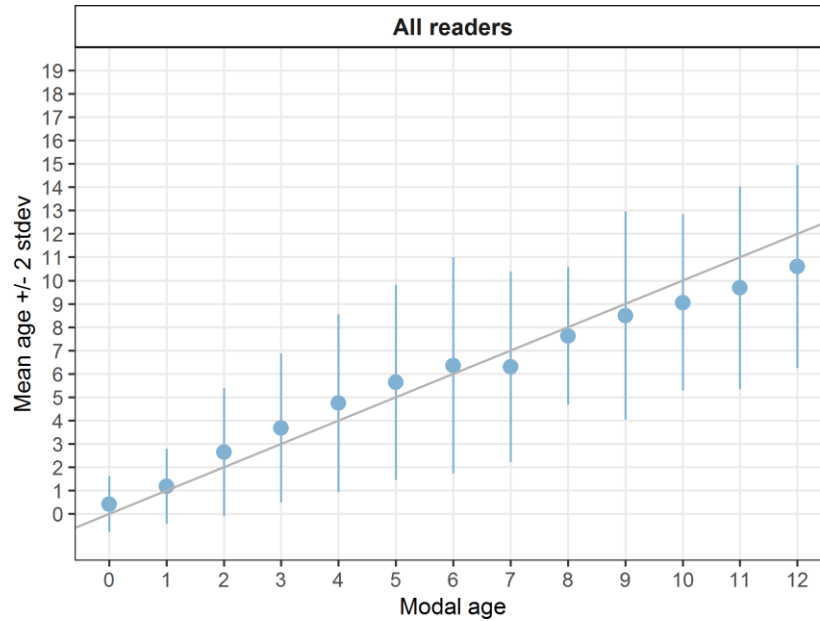
**Table 3.3:** Percentage agreement (PA, %) per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	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	84	11	42	11	100	0	89	95	16	100	79	21	90	89	100	0	79	95	95	11	0	95	89	74	11	84	53	100	64	
1	70	90	43	90	80	65	68	73	17	67	77	46	83	67	77	43	47	83	67	80	71	70	67	87	48	80	63	63	67	
2	44	46	18	61	68	68	38	79	25	54	61	46	74	43	86	18	39	57	68	46	42	64	54	71	41	71	54	80	54	
3	43	24	24	36	65	69	33	67	15	78	47	47	65	31	67	9	40	42	58	56	46	58	80	24	40	78	13	55	46	
4	38	25	27	25	55	53	26	73	14	70	35	44	42	25	47	9	43	26	30	41	25	73	51	30	49	59	14	33	38	
5	38	12	22	24	38	60	39	43	17	41	29	26	54	43	33	17	45	31	29	24	30	57	44	29	69	33	14	18	33	
6	45	14	14	14	38	83	29	14	14	50	7	57	58	29	43	14	43	29	7	36	50	36	54	31	22	43	29	0	31	
7	50	50	50	33	0	0	80	0	67	33	17	33	25	50	33	0	67	60	0	50	100	17	33	83	0	33	17	0	35	
8	100	100	100	0	0	-	0	100	0	100	0	0	100	0	100	0	100	0	0	0	-	100	0	0	0	0	0	100	0	38
9	67	40	25	20	0	-	40	40	0	40	0	50	50	50	40	0	20	20	0	40	-	20	40	0	0	60	20	0	26	
10	33	33	33	33	0	-	67	0	33	0	0	33	0	100	0	0	33	67	0	100	-	33	33	0	-	0	33	0	27	
11	0	100	0	0	0	-	100	0	100	0	0	0	0	100	100	0	0	0	0	0	-	0	0	0	-	0	0	0	20	
12	0	100	0	100	0	-	0	0	0	0	0	0	0	100	100	0	100	100	0	0	-	0	100	0	-	0	100	0	32	
<b>Weighted Mean</b>	<b>49</b>	<b>33</b>	<b>28</b>	<b>38</b>	<b>57</b>	<b>62</b>	<b>43</b>	<b>62</b>	<b>18</b>	<b>63</b>	<b>45</b>	<b>40</b>	<b>61</b>	<b>44</b>	<b>60</b>	<b>15</b>	<b>46</b>	<b>47</b>	<b>46</b>	<b>45</b>	<b>42</b>	<b>62</b>	<b>60</b>	<b>43</b>	<b>42</b>	<b>62</b>	<b>29</b>	<b>45</b>	<b>46</b>	

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	R24 ES	R26 IT	R28 IT	R30 PT	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	0.16	0.89	0.58	0.89	0	1	0.11	0.05	0.95	0	0.21	1.05	0.1	0.11	0	1.53	0.21	0.05	0.05	0.89	1	0.05	0.11	0.26	0.89	0.16	0.68	0	0.43
1	0.07	0.1	0.63	0.03	-0.1	0.35	-0.1	-0.1	1.2	0.07	-0.2	0.86	0.09	0.07	-0.2	1.2	0.87	-0.1	-0.3	0.13	0.29	-0.1	0.23	-0.1	0.48	-0.1	0.47	-0.2	0.19
2	0.52	1.29	1.36	0.64	0.07	0.63	0.04	0.14	1.29	0.57	-0.2	1.5	0.09	1.29	-0.1	1.79	0.96	0.46	-0.3	0.86	2.42	0.21	0.57	0.32	0.85	0	1.25	-0	0.66
3	0.45	1.58	1.47	1.71	-0.2	0.44	0.2	0.07	1.76	0.09	-0.6	0.82	-0.1	1.06	0.02	2.95	1.02	1.07	-0.4	0.27	3.38	0.2	0.09	1.13	0.49	-0.1	2.24	-0.5	0.74
4	0.35	2.36	1.61	1.91	-0.3	0.89	0.6	-0.2	2.09	-0.1	-0.9	0.4	-0.1	1.45	0.12	3.02	1.02	1.35	-0.8	1.11	5.08	0	0.09	1.11	0.19	-0.3	2.44	-1	0.84
5	0.34	2.6	2.07	1.34	-0.3	0.4	0.87	-0.5	1.62	-0.4	-1.2	0.31	0.11	1.36	0.1	2.85	0.93	1.62	-1.2	1.4	3	-0.4	-0.3	1.29	-0.3	-0.1	2.43	-1.5	0.66
6	-0.1	3.21	2.14	1.86	-1	0.17	1	-1	1.79	-0.5	-1.5	0.71	-0.7	1.07	0.43	2.29	0.07	1.93	-1.7	1.21	0.33	-0.8	-0.7	0.23	-1.3	-0.7	2.43	-2.1	0.31
7	0	1.33	1.33	3	-2.3	-2	-0.2	-1.8	-0.3	-2	-2.3	-1.2	-1.8	-0.5	-1	1.4	0.17	-0.6	-2.5	-0.2	0	-1.5	-2.2	0.17	-1	-2	1.33	-3.7	-0.73
8	0	0	0	1	-1	-	-2	0	-1	0	-1	-1	0	-1	0	4	0	2	-1	1	-	0	-1	-2	-2	-1	0	-4	-
9	-1	2.4	0.75	1.6	-1.8	-	-0.8	-2	0.2	-1.4	-1.3	-0.8	-0.5	0.5	0.2	2.5	-1.2	1.2	-2.2	0.4	-	-2.4	-1.2	0.2	-4.5	-1.4	0.6	-4.3	-
10	-0.7	1.33	0.67	2.33	-3	-	-0.3	-2.3	1	-2.3	-1.3	-0.7	-2.3	0	-1.7	1.67	-1.3	0.33	-3.7	0	-	-2	-1.7	-1	-	-2.3	0	-4.3	-
11	-1	0	-1	1	-5	-	0	-4	0	-3	-2	-2	-1	0	0	2	-3	1	-4	1	-	-4	-3	1	-	-1	1	-6	-
12	-1	0	-2	0	-3	-	-1	-2	-1	-4	-5	1	-1	0	0	1	0	0	-5	1	-	-2	0	-2	-	-1	0	-8	-
<b>Weighted Mean</b>	<b>0.26</b>	<b>1.71</b>	<b>1.4</b>	<b>1.33</b>	<b>-0.4</b>	<b>0.51</b>	<b>0.31</b>	<b>-0.3</b>	<b>1.49</b>	<b>-0.1</b>	<b>-0.7</b>	<b>0.64</b>	<b>-0.1</b>	<b>0.94</b>	<b>-0</b>	<b>2.39</b>	<b>0.75</b>	<b>0.93</b>	<b>-0.8</b>	<b>0.76</b>	<b>2.66</b>	<b>-0.2</b>	<b>-0.1</b>	<b>0.7</b>	<b>0.25</b>	<b>-0.2</b>	<b>1.77</b>	<b>-1</b>	<b>0.58</b>



**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	R24 ES	R26 IT	R28 IT	R30 PT	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	**	*	*	**	-	**	**	-	*	-	**	**	*	**	**	*	**	**	**	**	**	**	*	**	**	**	-	*	**
R24 ES	**	-	-	-	*	**	**	*	-	*	**	**	**	**	**	**	**	**	*	**	**	**	*	**	**	**	*	*	
R26 IT	**	**	*	**	**	**	**	-	*	-	**	**	-	**	-	*	**	**	**	**	**	**	-	**	**	**	-	*	**
R28 IT	**	*	*	*	**	**	**	*	**	-	*	**	*	**	*	**	*	*	-	*	**	**	**	*	**	*	**	*	**
R30 PT	**	**	**	**	**	-	**	**	**	**	*	-	**	-	**	**	-	-	*	-	**	**	**	-	**	**	**	*	
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	482	-	64	0.40
1	795	68	67	0.18
2	743	52	54	0.63
3	1431	43	46	0.68
4	1143	40	38	0.74
5	1060	37	33	0.63
6	363	36	31	0.36
7	148	33	35	-0.71
8	26	19	38	-0.38
9	117	26	26	-0.51
10	75	21	27	-0.95
11	25	22	20	-1.32
12	25	21	32	-1.4
<b>Total</b>	<b>6433</b>			
<b>Weighted Mean</b>		<b>44</b>	<b>46</b>	<b>0.48</b>

### 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.

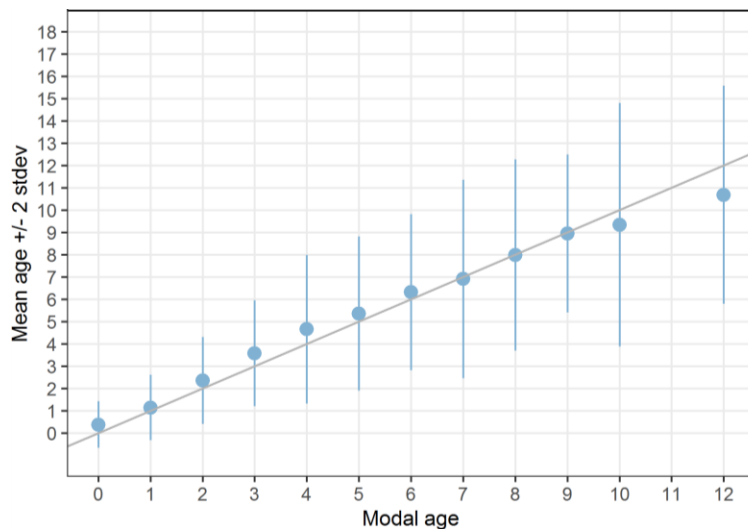
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	all
0	-	-	-	-	-	-	-	-	-	-
1	66	23	64	25	58	53	74	62	53	65
2	37	68	31	42	22	26	35	25	22	42
3	24	48	22	35	22	29	29	23	29	33
4	30	39	28	41	27	29	29	25	26	36
5	27	42	26	33	30	21	23	18	25	32
6	28	25	29	31	22	8	18	10	12	28
7	54	25	19	28	26	19	13	23	16	32
8	40	18	12	18	22	-	13	17	27	27
9	5	10	18	20	24	-	5	14	20	20
10	6	41	5	11	50	-	14	18	14	29
11	-	-	-	-	-	-	-	-	-	-
12	14	11	13	16	28	-	28	0	25	23
<b>Weighted Mean</b>	<b>35</b>	<b>38</b>	<b>30</b>	<b>32</b>	<b>31</b>	<b>30</b>	<b>32</b>	<b>26</b>	<b>28</b>	<b>38</b>

**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	R36 NO	R42 MA	R62 ES	all
0	88	12	50	12	100	-	100	88	69	64
1	70	94	52	94	75	65	64	52	79	72
2	57	68	18	73	82	75	50	45	82	61
3	61	42	30	55	70	77	48	67	33	52
4	60	43	55	27	41	64	49	55	51	48
5	49	30	40	33	30	52	65	61	46	45
6	44	22	28	28	29	78	56	72	65	45
7	33	33	50	17	8	50	75	42	67	41
8	33	30	60	20	0	-	30	60	40	34
9	75	80	50	40	0	-	25	20	20	39
10	67	25	75	38	0	100	50	0	25	33
11	-	-	-	-	-	-	-	-	-	-
12	0	50	50	50	0	-	50	100	0	38
<b>Weighted Mean</b>	<b>58</b>	<b>45</b>	<b>43</b>	<b>44</b>	<b>48</b>	<b>66</b>	<b>58</b>	<b>57</b>	<b>55</b>	<b>52</b>

**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	R36 NO	R42 MA	R62 ES	all
0	0.12	0.88	0.56	0.88	0.00	-	0.00	0.19	0.31	-
1	-0.03	0.06	0.52	0.00	-0.19	0.35	0.06	0.73	-0.21	<b>0.14</b>
2	0.10	0.59	1.09	0.14	-0.18	0.31	0.59	0.64	-0.09	<b>0.35</b>
3	0.29	1.27	1.00	0.70	-0.21	0.23	0.67	0.48	0.52	<b>0.55</b>
4	0.08	1.32	0.98	1.75	-0.73	0.36	0.72	0.66	0.47	<b>0.62</b>
5	-0.19	1.61	1.02	0.31	-0.93	-0.05	0.37	-0.07	0.72	<b>0.31</b>
6	-0.88	2.00	1.50	0.44	-1.06	0.00	0.61	-0.33	0.18	<b>0.27</b>
7	-1.56	2.17	0.58	1.75	-2.33	-1.00	-0.25	-0.58	-0.58	<b>-0.20</b>
8	-1.00	1.90	0.70	1.40	-2.90	-	0.50	0.20	-1.30	-
9	0.25	0.40	0.00	1.60	-3.00	-	0.75	0.20	-1.00	-
10	-0.33	0.38	0.00	1.38	-4.50	0.00	0.12	-2.62	0.38	<b>-0.58</b>
11	-	-	-	-	-	-	-	-	-	-
12	-2.00	1.00	-1.00	1.50	-4.50	-	-2.00	0.00	-3.50	-
<b>Weighted Mean</b>	<b>-0.14</b>	<b>1.17</b>	<b>0.85</b>	<b>0.79</b>	<b>-0.92</b>	<b>0.15</b>	<b>0.40</b>	<b>0.21</b>	<b>0.16</b>	<b>0.33</b>



**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	12
Age 0	0.637	0.1119	0.0052	-	0.0056	-	-	0.0103	-	-	0.0167	-
Age 1	0.3468	0.7168	0.0838	0.0036	0.0056	0.0106	0.0067	0.0103	-	-	-	-
Age 2	0.0161	0.1119	0.6073	0.0836	0.028	0.0186	-	-	-	-	0.0167	-
Age 3	-	0.0454	0.2147	0.52	0.1092	0.06649	0.0201	0.0206	0.0263	-	0.0167	-
Age 4	-	0.0105	0.0576	0.2327	0.479	0.1303	0.0604	0.0722	0.0658	-	-	-
Age 5	-	0.0035	0.0209	0.0982	0.1485	0.4468	0.1544	0.1134	0.0395	0.0556	0.0167	-
Age 6	-	-	0.0052	0.04	0.0868	0.1596	0.449664	0.1134	0.0921	0.0556	0.0667	0.0625
Age 7	-	-	-	0.0073	0.07	0.0665	0.1409	0.4124	0.0658	0.0833	0.0333	0.0625
Age 8	-	-	-	0.0073	0.042	0.0425	0.0805	0.0515	0.3421	0.0556	0.1167	0.0625
Age 9	-	-	0.0052	-	0.0112	0.0266	0.0336	0.1031	0.1579	0.3889	0.1333	0.125
Age 10	-	-	-	0.0073	0.0056	0.0186	0.0268	0.0103	0.1053	0.25	0.3333	0.125
Age 11	-	-	-	-	0.0056	0.008	0.0134	0.0412	0.0658	0.0833	0.0833	0.0625
Age 12	-	-	-	-	-	-	-	0.0206	0.0132	-	0.0833	0.375
Age 13	-	-	-	-	-	0.0027	-	0.0206	0.0263	-	0.0667	-
Age 14	-	-	-	-	0.0028	0.0027	0.0134	-	-	0.0278	-	0.0625
Age 15	-	-	-	-	-	-	-	-	-	-	-	0.0625
Age 17	-	-	-	-	-	-	-	-	-	-	0.0167	-

**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	124	-	64	0.38
1	286	65	72	0.14
2	191	42	61	0.36
3	275	33	52	0.57
4	357	36	48	0.65
5	376	32	45	0.35
6	149	28	45	0.32
7	97	32	41	-0.09
8	76	27	34	-0.01
9	36	20	39	0.06
10	60	29	33	-0.67
11	0	-	-	-
12	16	23	38	-1.31
<b>Total</b>	<b>2043</b>			
<b>Weighted mean</b>		<b>38</b>	<b>52</b>	<b>0.32</b>

## **3.1.2 Sliced otoliths**

### **3.1.2.1 All readers**

The weighted average percentage agreement based on modal ages for all readers is 44 %, with a weighted average CV of 22 % and an APE of 15 % (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	R24 ES	R26 IT	R28 IT	R30 PT	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	all
2	28	16	0	71	0	28	0	0	0	9	28	47	0	-	47	0	0	20	28	0	0	0	0	20	-	0	71	49	
3	14	9	25	34	17	22	17	15	12	29	16	21	12	0	11	11	16	21	0	11	21	16	17	22	36	-	0	34	31
4	6	17	11	16	14	14	15	6	14	24	11	14	17	-	14	12	14	12	12	14	22	15	36	18	11	-	0	14	27
5	13	20	28	22	19	14	15	15	11	19	6	16	14	0	16	19	23	13	19	14	15	18	37	19	21	-	13	23	25
6	0	11	11	11	0	-	-	11	0	20	13	0	13	-	-	13	20	20	0	0	13	-	0	11	11	-	11	20	13
7	9	12	14	19	19	16	11	19	18	23	13	18	12	13	6	14	16	22	16	15	11	12	36	13	18	-	13	15	19
8	5	5	5	5	19	6	7	5	17	13	0	22	18	8	6	11	5	5	9	13	5	6	21	7	5	-	5	9	16
9	8	10	11	14	43	10	14	4	18	15	8	16	18	10	6	10	8	10	9	14	12	13	22	8	5	-	12	8	19
10	9	11	8	8	7	11	22	8	22	14	7	10	18	11	6	13	4	15	10	10	24	0	35	11	4	-	11	6	17
11	5	9	15	20	18	8	9	6	18	13	9	12	20	5	7	0	16	12	9	17	15	11	11	7	5	-	5	6	18
12	8	9	9	16	25	7	9	9	24	13	21	12	17	9	7	8	7	20	9	17	18	10	34	12	5	-	7	12	19
13	6	18	9	9	13	6	16	6	21	13	4	19	26	6	3	4	9	7	6	13	13	4	23	10	4	-	6	4	21
14	3	9	9	15	28	10	8	9	11	7	11	7	21	5	6	4	11	8	10	25	17	4	25	9	5	-	9	7	17
15	7	9	11	13	11	7	4	17	12	7	8	16	33	9	4	9	7	3	9	11	9	13	17	15	9	-	7	4	20
16	3	4	10	3	26	3	4	3	16	13	7	11	23	0	4	4	6	12	3	24	21	3	14	11	3	-	0	3	20
17	0	0	15	13	58	4	0	0	22	0	26	71	67	-	4	62	12	9	0	11	47	12	22	5	4	-	4	4	30
18	12	4	11	11	17	7	15	7	7	13	3	6	20	5	3	10	9	3	6	10	20	3	11	6	3	-	6	5	22
19	10	6	14	8	-	3	6	3	9	14	6	0	8	0	3	6	15	7	3	16	23	3	14	6	6	-	5	5	18
Weighted Mean	8	11	13	17	20	11	12	9	15	17	10	15	18	7	9	11	12	13	10	14	16	10	26	12	11	-	7	13	22

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.

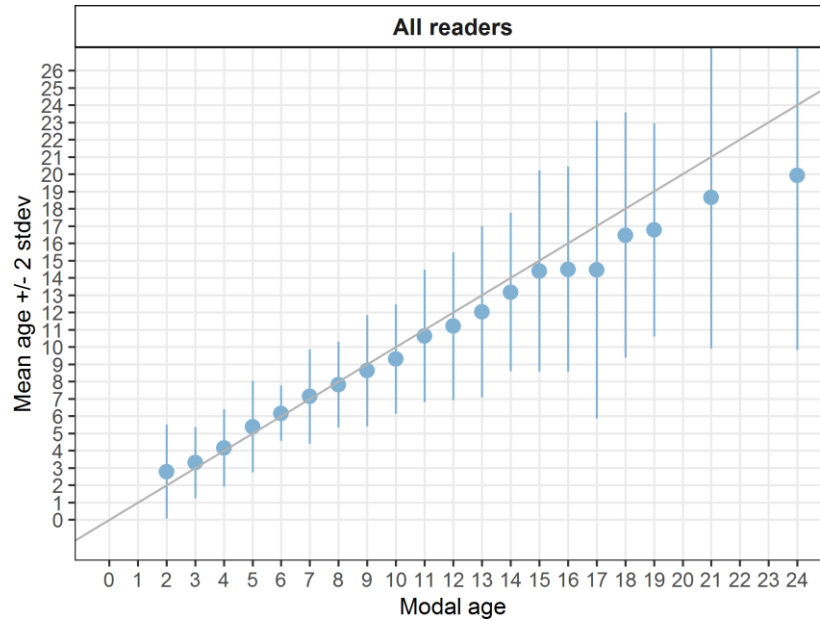
**Table 3.13:** Percentage agreement (PA, %) per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	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	all
2	50	0	0	0	100	50	100	0	100	0	50	50	100	-	50	100	0	0	50	0	100	0	0	100	0	-	100	0	42
3	75	12	29	12	75	62	75	50	88	0	57	57	88	100	88	88	12	50	100	88	25	17	12	50	38	-	100	50	55
4	94	61	65	67	56	72	44	94	61	6	83	65	44	0	72	76	56	78	72	72	61	47	11	67	50	-	100	56	63
5	73	36	27	36	30	40	40	73	64	0	91	73	20	100	50	45	45	60	45	55	55	9	73	9	-	73	55	48	
6	100	50	50	50	100	100	0	50	100	50	50	100	50	0	0	50	50	50	100	100	50	100	0	50	50	-	50	50	59
7	61	63	32	32	32	60	40	37	32	26	58	16	21	50	80	42	47	37	63	37	58	40	11	53	47	-	68	53	44
8	83	17	83	83	0	50	33	83	33	0	100	67	33	50	67	83	83	83	50	33	83	50	0	67	83	-	83	50	57
9	44	67	33	44	0	56	44	89	11	11	78	22	11	25	44	56	78	44	56	11	56	33	0	67	78	-	67	78	45
10	50	33	67	17	0	40	20	33	33	33	50	17	0	75	60	50	83	17	17	0	17	100	0	33	83	-	50	67	38
11	50	50	25	12	0	38	12	50	12	12	12	25	25	60	62	100	38	25	50	0	38	50	0	50	62	-	75	50	36
12	70	30	30	30	0	71	12	40	0	40	33	20	0	25	71	40	60	30	50	0	40	50	0	60	60	-	40	50	35
13	40	50	33	33	0	50	17	83	0	0	40	17	20	50	83	67	33	50	67	0	0	33	0	17	50	-	83	67	36
14	86	43	0	43	0	33	33	57	0	14	29	43	0	0	17	71	57	43	71	0	57	50	0	57	29	-	57	43	36
15	33	33	33	33	0	0	67	33	0	0	67	33	33	33	67	33	33	0	33	0	0	33	0	33	33	-	33	0	26
16	80	60	0	80	0	80	0	80	0	0	20	60	0	100	60	60	0	40	80	0	0	40	0	40	40	-	100	40	38
17	100	100	0	0	0	0	100	100	0	100	0	0	0	0	50	0	0	50	0	0	0	0	0	0	50	-	0	0	25
18	29	43	29	43	0	29	14	43	0	43	50	0	0	67	71	57	14	71	0	0	14	57	0	14	57	-	43	14	30
19	67	67	33	33	0	33	0	33	0	0	0	0	0	100	33	0	33	33	67	0	33	67	0	33	33	-	33	33	29
Weighted Mean	67	46	35	39	23	52	34	61	31	16	55	36	25	55	63	59	46	47	57	28	43	46	4	52	49	-	70	50	44

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	R24 ES	R26 IT	R28 IT	R30 PT	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	all
2	0.5	2.5	1	0	0	0.5	0	2	0	5.5	0.5	-0.5	0	-	1	0	2	1.5	0.5	1	0	2	-1	0	1.5	-	0	0	-
3	0.25	0.88	1	0.75	-0.3	0.5	-0.3	0.5	-0.1	3.38	0.43	-0.4	-0.1	0	0.12	0.12	1.12	0.62	0	0.12	-0.8	1	-0.9	0.25	0	-	0	-0.1	-
4	0.06	0.5	0.35	0.28	-0.4	0.33	-0.6	-0.1	-0.4	4.06	-0.1	-0.4	-0.4	-1	0.33	-0.1	0.5	0	0.17	-0.1	-0.1	0.65	-1.6	-0.1	0.5	-	0	0.33	-
5	0.36	1	1.55	0.73	-0.6	0.8	-0.4	0.45	-0.4	3.45	-0.1	-0.2	-0.9	0	0.4	0.09	1.09	0.5	0.09	0.09	0.36	0.8	-1.8	0.27	0.91	0	0.36	0.91	<b>0.35</b>
6	0	0.5	0.5	0.5	0	0	-1	0.5	0	1	-0.5	0	-0.5	-1	1	-0.5	1	1	0	0	-0.5	0	-1	0.5	0.5	-	0.5	1	-
7	0.17	0.58	1	0.58	-1.3	0.7	-0.4	0.63	0.11	1.79	-0.5	-0.7	-1.1	-0.1	0.2	-0.2	0.63	0.32	0.47	-0.5	-0.1	0	-0.6	-0.2	1.05	-	-0.2	0.74	-
8	-0.2	0.83	0.17	0.17	-2.5	0.5	-0.7	0.17	-1.2	3	0	-0.8	-1.3	0.5	0.33	-0.3	0.17	-0.2	0.17	-1	-0.2	0.5	-2.3	-0.3	0.17	-	-0.2	0.17	-
9	0.33	0	0.33	0.11	-4.3	0.67	-1	0.11	-1.8	2.11	-0.3	-1.1	-1.9	0.25	0.56	-0.1	-0.3	-0.4	0.33	-1.6	-0.7	1.11	-2.7	-0.4	0.22	-	0.33	0.33	-
10	-0.7	-0.5	0.5	0.5	-3.8	0.4	-1	-0.3	-2.2	1.5	0.17	-1.5	-2.4	-0.5	-0.4	-0.8	0.17	-0.2	-0.2	-2.2	-1.7	0	-3.2	-0.5	-0.2	-	-0.3	0	-
11	0.5	0.5	0.25	1	-4.3	0.88	-1.3	0.25	-2.6	2.5	-1.3	-0.9	-2.4	0.4	0.5	0	0.25	0	0.75	-2.9	-0.6	0.88	-4	-0.3	0.38	-	0	0.62	-
12	0.1	0.8	0	0.7	-4.8	0.14	-1.6	0.2	-3.2	1.1	-1.6	-1.8	-2.3	0.12	0.14	-0.3	-0.3	0.3	0.1	-3.8	-1.6	0.25	-3.9	-0.9	0.2	-	-0.5	1	-
13	0.2	1.83	-0.2	0.17	-6.5	0.67	-1.5	-0.3	-4.3	2	-0.6	-2.7	-4	0	-0.2	0.33	-0.2	-0.7	0.5	-4.2	-2.7	0.67	-5.3	-0.3	0.5	-	0.33	0.33	-
14	0.14	0.57	-1.9	-0.4	-6.2	1.17	-0.5	0.14	-2.9	1.43	-1.3	-0.9	-3.7	1.5	0.5	-0.3	0	-0.6	0.71	-4.7	-1.1	0.5	-4.7	-0.9	0.43	-	0.14	0.86	-
15	0	1.67	-1.3	0.67	-8.5	1.67	0.33	-0.3	-5.3	2.67	-0.7	-1.7	-4	1.33	0.33	1.33	-1	1.67	1.33	-6	-1.7	0	-5	-0.7	1.33	-	1.33	1.33	-
16	0.2	0	-2	-0.2	-8.2	0.2	-2.4	-0.2	-6.6	3	-1.2	-1.2	-3.8	0	0	-0.4	-0.6	-0.4	0.2	-6.6	-3.4	0.6	-6.8	-1.4	0.6	-	0	0.6	-
17	0	0	-2.5	-0.5	-8.5	1.5	0	0	-7.5	0	-3.5	-9	-7.5	2	-0.5	-4.5	-5	-1	1	-11	-5	0.5	-7.5	-1.5	0.5	-	1.5	1.5	-
18	0	0.71	-1.9	0.71	-9.6	1.43	-1	0.29	-7.9	2.14	-0.5	-2.3	-4.2	0.17	0.29	-0.3	-1	0	1.14	-8.3	-3.3	0.43	-8.3	-1.4	0.43	-	0.14	0.71	-
19	-1	-0.7	-2.7	-0.3	-9	0.67	-2	-0.7	-8	-0.7	-2	-5	-3.7	0	-0.7	-2	-2.7	-1.3	-0.3	-9.7	-3.7	0.33	-8.3	-1	-1	-	0	1	-
<b>Weighted Mean</b>	<b>0.08</b>	<b>0.59</b>	<b>-0</b>	<b>0.35</b>	<b>-3.5</b>	<b>0.66</b>	<b>-0.8</b>	<b>0.19</b>	<b>-2.3</b>	<b>2.37</b>	<b>-0.6</b>	<b>-1.3</b>	<b>-2</b>	<b>0.14</b>	<b>0.23</b>	<b>-0.2</b>	<b>0.08</b>	<b>0.02</b>	<b>0.34</b>	<b>-2.5</b>	<b>-1.1</b>	<b>0.58</b>	<b>-3.2</b>	<b>-0.4</b>	<b>0.47</b>	<b>0</b>	<b>0.06</b>	<b>0.57</b>	<b>0.35</b>



**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	R24 ES	R26 IT	R28 IT	R30 PT	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	
R04 NL	-	**	-	-	**	**	**	-	**	**	**	**	**	-	-	**	-	-	*	**	**	**	**	**	**	-	**		
R06 ES	**	-	**	-	**	-	**	**	**	**	**	**	**	-	**	**	**	**	-	**	**	**	**	**	**	-	**	**	
R08 PT	-	**	-	*	**	**	**	-	**	**	**	**	**	-	*	-	-	-	-	**	**	**	**	**	**	-	-	**	
R10 ES	-	-	*	-	**	**	**	-	**	**	**	**	**	**	-	**	-	*	-	**	**	*	**	**	-	-	*	-	
R12 IT	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	-	**	**
R16 IE	**	-	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	**	-	**	*
R18 IE	**	**	**	**	**	**	-	**	**	**	**	*	**	**	**	**	**	**	**	**	-	**	**	**	**	-	**	**	
R20 ES	-	**	-	-	**	**	-	**	**	**	**	**	**	-	**	-	-	-	-	**	**	**	**	**	**	-	-	**	
R22 GR	**	**	**	**	**	**	**	-	**	**	**	-	**	**	**	**	**	**	**	-	**	**	**	**	**	-	**	**	
R24 ES	**	**	**	**	**	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	
R26 IT	**	**	**	**	**	**	-	**	**	**	-	**	**	**	**	**	**	**	**	**	**	*	**	**	-	**	-	**	**
R28 IT	**	**	**	**	**	**	*	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	
R30 PT	**	**	**	**	**	**	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**	**	-	**	**	
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	**	-	**	-	**	*	**	**	**	**	**	**	**	**	**	**	**	**	*	**	**	-	**	**	-	-	**	-	
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	52	49	42	0.79
3	207	31	55	0.3
4	465	27	63	0.15
5	284	25	48	0.38
6	49	13	59	0.16
7	466	19	44	0.14
8	158	16	57	-0.18
9	238	19	45	-0.38
10	154	17	38	-0.69
11	211	18	36	-0.37
12	254	19	35	-0.79
13	157	21	36	-0.97
14	177	17	36	-0.82
15	80	20	26	-0.61
16	133	20	38	-1.5
17	53	30	25	-2.53
18	183	22	30	-1.52
19	79	18	29	-2.22
20	0	-	-	-
21	27	23	41	-2.33
22	0	-	-	-
23	0	-	-	-
24	27	25	19	-4.07
<b>Total</b>	<b>3454</b>			
<b>Weighted mean</b>		<b>22</b>	<b>44</b>	<b>-0.42</b>



### 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.

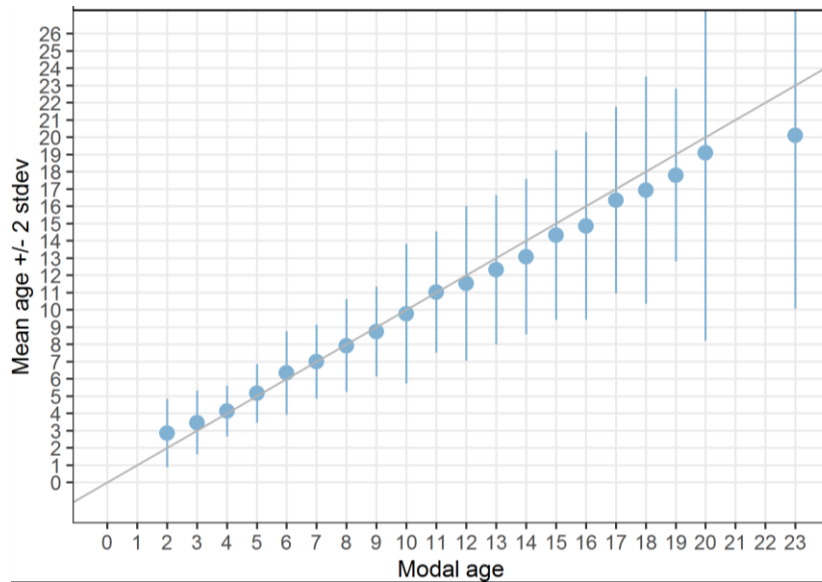
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	all
2	28	16	0	71	0	28	47	20	20	35
3	16	14	27	39	18	26	33	22	28	26
4	16	14	17	15	14	20	12	13	21	18
5	8	13	18	14	22	10	9	9	12	16
6	9	9	22	32	18	0	11	17	9	19
7	8	8	11	20	20	7	0	24	7	15
8	8	8	11	13	19	15	6	4	14	17
9	8	4	8	16	19	5	6	8	5	15
10	15	12	14	12	37	12	8	14	10	21
11	5	9	10	15	15	5	0	11	5	16
12	3	21	10	22	29	3	0	12	7	19
13	10	10	11	9	18	7	3	7	6	18
14	0	4	4	15	9	4	7	8	4	17
15	10	7	7	10	24	8	0	10	9	17
16	4	4	6	3	27	3	3	12	3	18
17	3	0	10	12	58	3	6	7	3	17
18	13	4	12	15	16	8	7	3	3	19
19	3	3	12	9	0	3	3	6	3	14
<b>Weighted Mean</b>	<b>10</b>	<b>10</b>	<b>13</b>	<b>17</b>	<b>20</b>	<b>11</b>	<b>8</b>	<b>12</b>	<b>11</b>	<b>18</b>

**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	R36 NO	R42 MA	R62 ES	all
2	50	0	0	0	100	50	50	0	0	35
3	57	14	33	29	71	57	86	57	43	54
4	75	65	63	65	60	70	75	75	60	66
5	86	43	43	43	33	57	71	71	29	52
6	75	50	25	25	75	100	50	67	50	52
7	69	86	36	29	36	67	100	57	57	56
8	64	45	55	45	0	33	67	91	55	48
9	56	89	56	44	0	75	62	56	78	56
10	60	30	40	50	0	38	71	30	40	38
11	60	40	40	20	0	60	100	40	60	45
12	86	38	25	12	0	83	100	50	50	46
13	25	62	38	38	0	29	86	62	50	41
14	100	75	0	50	0	50	25	25	50	44
15	0	60	0	40	0	25	100	20	60	35
16	60	60	0	80	0	80	80	40	60	48
17	67	100	0	0	0	0	33	67	67	41
18	14	43	29	43	0	43	71	71	71	39
19	67	67	33	0	0	33	67	67	67	41
20	0	100	100	100	0	0	0	100	100	50
21	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-
23	0	100	0	0	0	0	100	0	0	30
<b>Weighted Mean</b>	<b>60</b>	<b>57</b>	<b>37</b>	<b>40</b>	<b>23</b>	<b>54</b>	<b>75</b>	<b>58</b>	<b>54</b>	<b>50</b>

**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	R36 NO	R42 MA	R62 ES	all
2	0.50	2.50	1.00	0.00	0.00	0.50	1.00	1.50	1.50	<b>0.85</b>
3	0.43	1.00	1.00	0.57	-0.29	0.71	0.43	0.57	0.43	<b>0.47</b>
4	0.10	0.40	0.47	0.45	-0.40	0.35	0.15	0.05	0.20	<b>0.12</b>
5	-0.14	0.71	0.43	0.29	-1.00	0.43	0.29	0.29	0.86	<b>0.14</b>
6	-0.25	0.50	1.75	0.50	-0.50	0.00	0.50	0.67	0.50	<b>0.27</b>
7	0.00	0.21	0.64	0.14	-1.29	0.33	0.00	-0.14	0.43	<b>-0.02</b>
8	-0.18	0.64	0.45	0.36	-2.73	0.89	0.33	-0.09	0.64	<b>-0.07</b>
9	0.00	-0.11	0.56	0.00	-3.38	0.25	0.38	-0.22	0.22	<b>-0.29</b>
10	-0.10	0.10	0.50	0.70	-4.20	1.38	0.43	-0.20	0.40	<b>-0.19</b>
11	0.40	1.20	0.40	1.80	-4.50	0.40	0.00	0.00	0.40	<b>-0.07</b>
12	0.14	1.38	-0.50	0.12	-5.00	0.17	0.00	-0.38	0.38	<b>-0.53</b>
13	0.25	0.25	-0.50	0.12	-6.14	0.57	0.14	-0.25	0.00	<b>-0.74</b>
14	0.00	0.25	-1.25	-1.50	-7.67	0.50	0.25	-1.25	0.50	<b>-1.09</b>
15	-1.00	0.80	-2.60	0.60	-6.50	1.25	0.00	1.00	0.00	<b>-0.74</b>
16	0.00	0.00	-1.40	-0.20	-8.40	0.20	0.20	-0.40	0.40	<b>-1.14</b>
17	-0.33	0.00	-2.33	0.33	-8.50	1.67	0.00	-0.67	0.33	<b>-0.92</b>
18	-0.29	0.71	-2.14	-0.14	-9.83	1.29	-0.29	-0.29	0.29	<b>-1.21</b>
19	-0.33	-0.33	-2.33	0.00	-9.00	0.67	-0.33	-0.67	-0.33	<b>-1.47</b>
20	1.00	0.00	0.00	0.00	-16.00	1.00	1.00	0.00	0.00	<b>-0.90</b>
21	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-
23	-2.00	0.00	-9.00	-4.00	-14.00	2.00	0.00	-3.00	1.00	<b>-2.90</b>
<b>Weighted Mean</b>	<b>-0.03</b>	<b>0.49</b>	<b>-0.14</b>	<b>0.25</b>	<b>-3.60</b>	<b>0.63</b>	<b>0.18</b>	<b>-0.08</b>	<b>0.37</b>	<b>-0.30</b>



**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	-	-	-	-	-	-	-	-	0.01075	-	-	-	-	-	-	-	-	-	-	-
Age 1	0.05	-	0.005025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Age 2	0.35	0.08696	0.005025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Age 3	0.35	0.53623	0.115578	0.04348	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Age 4	0.2	0.23188	0.658291	0.11594	0.06061	0.024194	0.02885	0.01163	-	-	-	-	-	-	-	-	-	-	0.1	-
Age 5	0.05	0.11594	0.180905	0.52174	0.09091	0.056452	0.02885	0.03488	-	-	0.02703	-	-	-	-	0.03448	-	-	-	-
Age 6	-	0.02899	0.025126	0.27536	0.51515	0.129032	0.05769	0.03488	0.06452	0.06122	0.02703	0.05263	0.05128	0.02174	0.04	-	0.01449	-	-	-
Age 7	-	-	0.01005	0.04348	0.21212	0.564516	0.14423	0.04651	0.04301	-	-	0.01316	0.02564	-	0.02	-	-	-	-	-
Age 8	-	-	-	-	0.06061	0.185484	0.48077	0.10465	0.09677	0.02041	0.02703	0.01316	-	0.02174	0.02	-	0.04348	-	-	-
Age 9	-	-	-	-	0.0303	0.024194	0.17308	0.55814	0.08602	0.02041	0.06757	0.02632	-	0.02174	-	-	0.01449	-	-	0.1
Age 10	-	-	-	-	0.0303	0.008065	0.04808	0.18605	0.37634	0.10204	0.05405	0.03947	0.02564	-	-	-	0.01449	0.06897	-	-
Age 11	-	-	-	-	-	-	0.03846	0.02326	0.15054	0.44898	0.13514	0.09211	-	0.02174	0.02	-	-	-	-	-
Age 12	-	-	-	-	-	0.008065	-	-	0.12903	0.22449	0.45946	0.09211	0.12821	0.1087	-	0.03448	-	-	-	-
Age 13	-	-	-	-	-	-	-	-	0.03226	0.10204	0.09459	0.40789	0.15385	0.06522	0.06	0.03448	0.01449	-	-	-
Age 14	-	-	-	-	-	-	-	-	0.01075	-	0.08108	0.19737	0.4359	0.13043	0.06	-	0.05797	-	-	0.1
Age 15	-	-	-	-	-	-	-	-	-	-	-	0.06579	0.17949	0.34783	0.16	0.10345	0.08696	0.03448	-	-
Age 16	-	-	-	-	-	-	-	-	-	0.02041	0.01351	-	-	0.1087	0.48	0.10345	0.02899	0.06897	-	-
Age 17	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08696	0.12	0.41379	0.07246	0.10345	-	-
Age 18	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06522	0.02	0.17241	0.3913	0.17241	-	-
Age 19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.10345	0.13043	0.41379	-	0.1
Age 20	-	-	-	-	-	-	-	-	-	-	0.01351	-	-	-	-	-	0.07246	0.13793	0.5	0.1
Age 21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04348	-	0.3	0.1
Age 22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01449	-	-	-
Age 23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
Age 24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1
Age 25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1

**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	20	35	35	0.85
3	69	26	54	0.46
4	199	18	66	0.12
5	69	16	52	0.16
6	33	19	52	0.33
7	124	15	56	-0.02
8	104	17	48	-0.08
9	86	15	56	-0.27
10	93	21	38	-0.23
11	49	16	45	0.02
12	74	19	46	-0.49
13	76	18	41	-0.68
14	39	17	44	-0.92
15	46	17	35	-0.67
16	50	18	48	-1.14
17	29	17	41	-0.66
18	69	19	39	-1.09
19	29	14	41	-1.21
20	10	29	50	-0.9
21	0	-	-	-
22	0	-	-	-
23	10	25	30	-2.9
<b>Total</b>	<b>1278</b>			
<b>Weighted mean</b>		<b>18</b>	<b>50</b>	<b>-0.26</b>

## 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 49 %, with a weighted average CV of 44 % and an APE of 32 % (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	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	76	-	44	63	56	49	50	39	63	53	78	43	69	51	59	86	69
2	30	52	40	41	34	44	44	32	48	40	64	45	38	32	31	59	50
3	51	49	35	29	22	40	43	20	35	24	38	39	35	24	38	39	43
4	42	30	27	30	22	31	36	17	30	21	37	40	31	17	32	33	38
5	53	24	35	12	23	33	17	20	21	20	29	25	14	16	34	24	31
6	36	32	24	6	25	32	31	19	28	25	28	31	6	23	31	16	32
7	26	17	15	7	22	22	11	14	16	13	23	21	10	11	11	11	21
8	20	11	0	9	20	24	7	8	0	0	10	9	9	-	-	9	27
9	0	7	13	7	0	18	9	14	0	0	0	6	14	25	-	-	20
<b>Weighted Mean</b>	<b>44</b>	<b>39</b>	<b>33</b>	<b>33</b>	<b>30</b>	<b>38</b>	<b>38</b>	<b>25</b>	<b>38</b>	<b>30</b>	<b>48</b>	<b>38</b>	<b>35</b>	<b>27</b>	<b>36</b>	<b>45</b>	<b>44</b>

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.

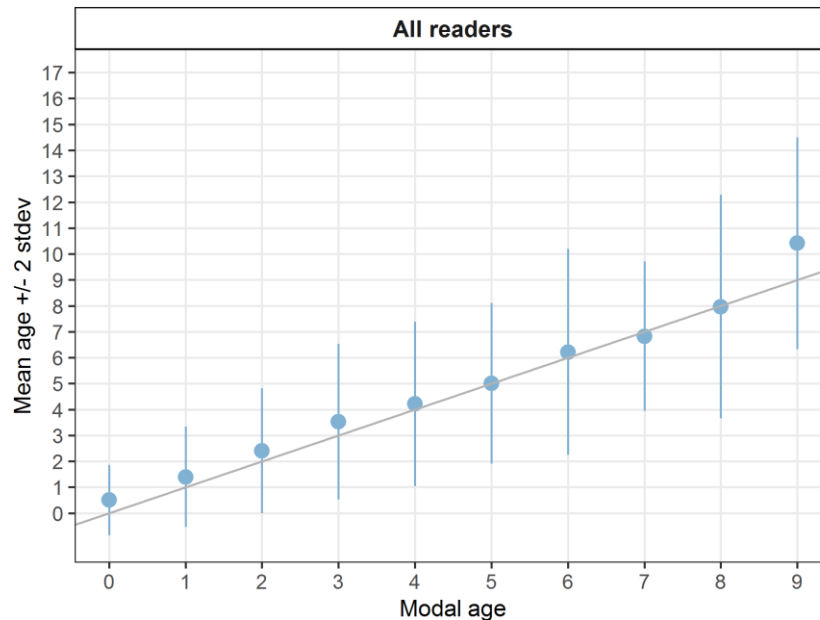
**Table 3.23:** Percentage agreement (PA, %) per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	all
0	100	89	100	100	75	0	12	0	67	100	0	0	100	57	33	89	57
1	64	41	80	91	36	59	50	9	41	86	77	67	86	23	68	43	57
2	62	26	49	60	60	76	62	21	17	62	60	46	67	56	64	60	53
3	56	28	52	66	66	38	21	17	17	62	45	21	62	74	46	39	44
4	57	37	43	70	79	27	37	37	20	47	23	33	63	67	52	37	45
5	18	27	36	82	55	36	55	45	55	36	27	45	73	40	45	45	45
6	38	25	50	88	50	12	38	25	62	50	12	25	88	43	20	25	41
7	67	22	78	78	67	11	56	56	56	44	33	56	56	56	17	44	50
8	50	0	0	50	50	0	0	50	100	100	0	50	50	0	0	50	37
9	100	50	0	0	100	50	0	50	0	100	0	0	50	0	-	0	34
<b>Weighted Mean</b>	<b>59</b>	<b>34</b>	<b>54</b>	<b>72</b>	<b>62</b>	<b>43</b>	<b>42</b>	<b>25</b>	<b>31</b>	<b>62</b>	<b>42</b>	<b>39</b>	<b>70</b>	<b>54</b>	<b>52</b>	<b>47</b>	<b>49</b>

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	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	all
0	0.00	0.11	0.00	0.00	0.25	1.11	0.88	1.56	0.33	0.00	1.00	1.00	0.00	1.00	0.67	0.11	<b>0.50</b>
1	-0.05	-0.59	0.25	0.09	0.55	0.50	0.68	1.68	0.86	0.00	0.41	0.38	0.05	0.73	0.16	0.62	<b>0.39</b>
2	-0.38	-0.60	-0.08	0.31	0.48	0.12	0.45	1.38	0.93	-0.07	0.90	1.02	0.31	0.54	0.13	0.98	<b>0.40</b>
3	-0.44	-0.83	0.00	0.17	0.34	-0.28	1.59	1.45	1.66	0.00	1.31	1.64	0.28	0.30	-0.19	1.36	<b>0.52</b>
4	-0.73	-0.87	-0.21	0.07	-0.04	-1.07	1.07	0.87	0.83	-0.23	1.97	1.47	0.17	-0.23	-0.72	0.90	<b>0.20</b>
5	-1.18	-1.09	-0.73	0.27	-0.09	-1.18	0.18	0.82	0.64	-0.91	2.18	1.18	0.18	0.00	-0.91	0.73	<b>0.01</b>
6	-0.12	-1.12	0.12	0.12	-0.50	-2.12	1.62	-0.12	1.38	-0.12	2.25	2.38	0.12	-0.57	-1.80	0.88	<b>0.15</b>
7	-0.78	-1.22	-0.44	0.00	-0.44	-2.00	0.67	0.78	0.00	-0.78	2.00	1.00	0.00	-0.56	-1.00	-0.33	<b>-0.19</b>
8	-1.00	-1.50	1.00	-0.50	-1.00	-2.00	2.50	0.50	0.00	0.00	6.00	-0.50	-0.50	-3.00	-3.00	-0.50	<b>-0.22</b>
9	0.00	0.50	2.00	1.50	0.00	-1.00	6.00	1.00	1.00	0.00	4.00	3.50	1.00	-0.50	-	3.00	-
<b>Weighted Mean</b>	<b>-0.46</b>	<b>-0.74</b>	<b>-0.06</b>	<b>0.17</b>	<b>0.20</b>	<b>-0.41</b>	<b>0.96</b>	<b>1.19</b>	<b>0.94</b>	<b>-0.17</b>	<b>1.42</b>	<b>1.22</b>	<b>0.19</b>	<b>0.21</b>	<b>-0.26</b>	<b>0.83</b>	<b>0.31</b>



**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	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR
R02 ES	-	**	**	**	**	-	**	**	**	**	**	**	**	**	*	**
R06 IT	**	-	**	**	**	**	**	*	**	**	*	**	**	**	**	**
R08 IT	**	**	-	*	**	**	**	**	**	-	**	**	*	*	-	**
R10 GR	**	**	*	-	-	**	**	**	**	**	**	**	-	-	**	**
R14 IT	**	**	**	-	-	**	**	**	**	**	**	**	-	-	**	**
R16 PT	-	**	**	**	**	-	**	**	**	*	**	**	**	**	-	**
R28 ES	**	**	**	**	**	**	-	-	-	**	**	*	**	**	**	-
R30 PT	**	*	**	**	**	**	-	-	*	**	-	-	**	**	**	**
R32 PT	**	**	**	**	**	**	-	*	-	**	**	*	**	**	**	-
R40 GR	**	**	-	**	**	*	**	**	**	-	**	**	**	**	-	**
R42 ES	**	*	**	**	**	**	**	-	**	**	-	-	**	**	**	**
R44 ES	**	**	**	**	**	**	*	-	*	**	-	-	**	**	**	*
R54 GR	**	**	*	-	-	**	**	**	**	**	**	**	-	-	**	**
R60 IT	**	**	*	-	-	**	**	**	**	**	**	**	-	-	**	**
R64 IT	*	**	-	**	**	-	**	**	**	-	**	**	**	**	-	**
R66 GR	**	**	**	**	**	**	-	**	-	**	**	*	**	**	**	-
Modal age	**	**	-	*	**	**	**	**	**	*	**	**	*	**	**	**

**Table 3.26:** Statistics by modal age for all readers.

Modal age	N	CV (%)	PA (%)	Relative bias
0	138	-	57	0.50
1	345	69	57	0.40
2	660	50	53	0.41
3	453	43	44	0.53
4	471	38	45	0.21
5	175	31	45	0.01
6	122	32	41	0.21
7	141	21	50	-0.18
8	30	27	37	-0.03
9	29	20	34	1.41
<b>Total</b>	<b>2564</b>			
<b>Weighted Mean</b>		<b>44</b>	<b>49</b>	<b>0.33</b>

### 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.

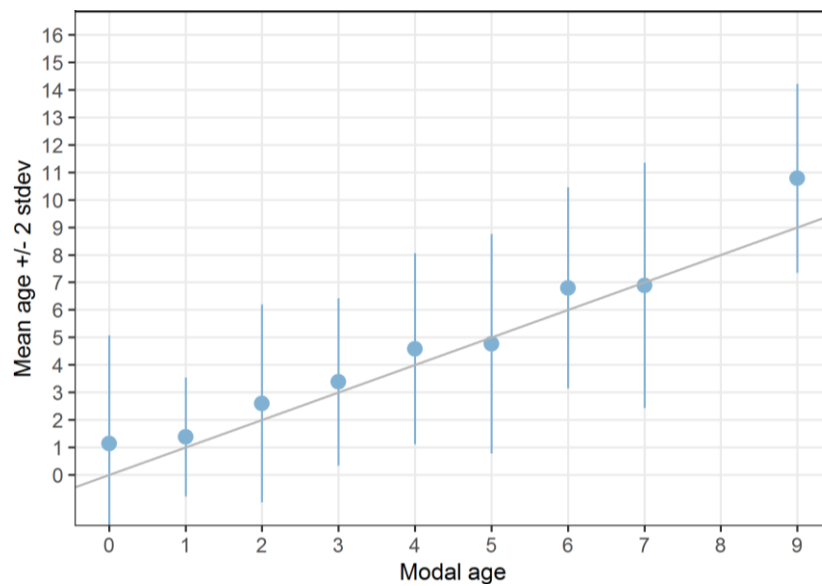
Modal age	R02 ES	R06 IT	R08 IT	R42 ES	R66 GR	all
0	-	-	-	-	-	-
1	51	85	48	75	68	<b>79</b>
2	28	64	52	74	56	<b>69</b>
3	38	33	29	36	43	<b>45</b>
4	23	24	22	36	31	<b>38</b>
5	56	30	32	31	27	<b>42</b>
6	6	21	16	28	16	<b>27</b>
7	45	20	25	28	7	<b>32</b>
8	-	-	-	-	-	-
9	0	7	13	0	-	<b>16</b>
<b>Weighted Mean</b>	<b>35</b>	<b>48</b>	<b>37</b>	<b>52</b>	<b>45</b>	<b>55</b>

**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	R42 ES	R66 GR	all
0	87	80	54	0	62	56
1	77	57	69	53	33	58
2	68	45	51	52	50	53
3	60	52	69	41	48	54
4	76	64	67	20	44	54
5	33	33	67	50	67	50
6	86	43	43	14	57	49
7	67	17	64	42	75	53
8	-	-	-	-	-	-
9	100	50	0	0	0	33
<b>Weighted Mean</b>	<b>71</b>	<b>52</b>	<b>61</b>	<b>38</b>	<b>49</b>	<b>54</b>

**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	R42 ES	R66 GR	all
0	0.47	0.33	0.92	2.33	1.69	1.15
1	-0.03	-0.30	0.41	0.90	0.90	0.38
2	0.00	-0.32	0.26	1.40	1.55	0.58
3	-0.36	-0.63	0.19	1.41	1.22	0.37
4	-0.08	-0.44	0.12	2.44	0.84	0.58
5	-1.67	-1.17	-0.83	1.67	0.83	-0.23
6	-0.14	-0.57	0.86	3.00	0.86	0.80
7	-0.75	-1.50	-0.36	2.08	-0.08	-0.12
8	-	-	-	-	-	-
9	0.00	0.50	2.00	4.00	3.00	1.90
<b>Weighted Mean</b>	<b>-0.16</b>	<b>-0.45</b>	<b>0.27</b>	<b>1.71</b>	<b>1.11</b>	<b>0.50</b>



**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	0.56338	0.114094	0.005181	0.015152	-	-	-	0.01695	-
Age 1	0.23944	0.577181	0.170984	0.045455	0.016129	0.06667	-	0.01695	-
Age 2	0.04225	0.221477	0.533679	0.121212	0.024194	0.06667	-	-	-
Age 3	0.04225	0.046980	0.129534	0.537879	0.104839	0.06667	-	0.03390	-
Age 4	-	0.006711	0.036269	0.106061	0.540323	0.13333	0.05714	0.01695	-
Age 5	0.02817	0.013423	0.036269	0.083333	0.120968	0.50000	0.05714	0.08475	-
Age 6	0.04225	0.020134	0.041451	0.037879	0.088710	0.03333	0.48571	0.10169	-
Age 7	0.04225	-	0.031088	0.030303	0.040323	0.03333	0.17143	0.52542	-
Age 8	-	-	0.005181	0.007576	0.016129	0.03333	0.08571	0.06780	-
Age 9	-	-	-	0.015152	0.016129	0.03333	0.05714	0.05085	0.3333
Age 10	-	-	-	-	0.016129	0.03333	0.02857	0.01695	0.2222
Age 11	-	-	-	-	0.008065	-	0.02857	0.05085	-
Age 12	-	-	0.005181	-	0.008065	-	-	-	0.2222
Age 13	-	-	0.005181	-	-	-	0.02857	-	0.2222
Age 15	-	-	-	-	-	-	-	0.01695	-

**Table 3.31:** Statistics by modal age for advanced readers.

Modal age	N	CV (%)	PA (%)	Relative bias
0	71	-	56	1.14
1	149	79	58	0.38
2	193	69	53	0.59
3	132	45	54	0.38
4	124	38	54	0.58
5	30	42	50	-0.23
6	35	27	49	0.80
7	59	32	53	-0.12
8	0	-	-	-
9	9	16	33	1.78
<b>Total</b>	<b>802</b>			
<b>Weighted Mean</b>		<b>55</b>	<b>54</b>	<b>0.50</b>

# 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 55 %, with the weighted average CV of 54 % and APE of 35 % (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	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT	all
0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	67	57	74	34	-	41	24	34	39	71	76	45	24	27	92	36	37	63	62
2	41	32	23	46	-	28	69	43	32	38	26	41	89	49	31	38	50	26	55
3	35	40	39	20	46	23	35	33	24	33	27	49	40	38	20	14	31	17	44
4	9	35	15	0	29	0	61	17	0	11	12	14	18	12	15	20	20	16	31
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40
Weighted Mean	49	45	48	32	42	31	42	35	32	50	47	42	46	34	55	32	38	40	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.

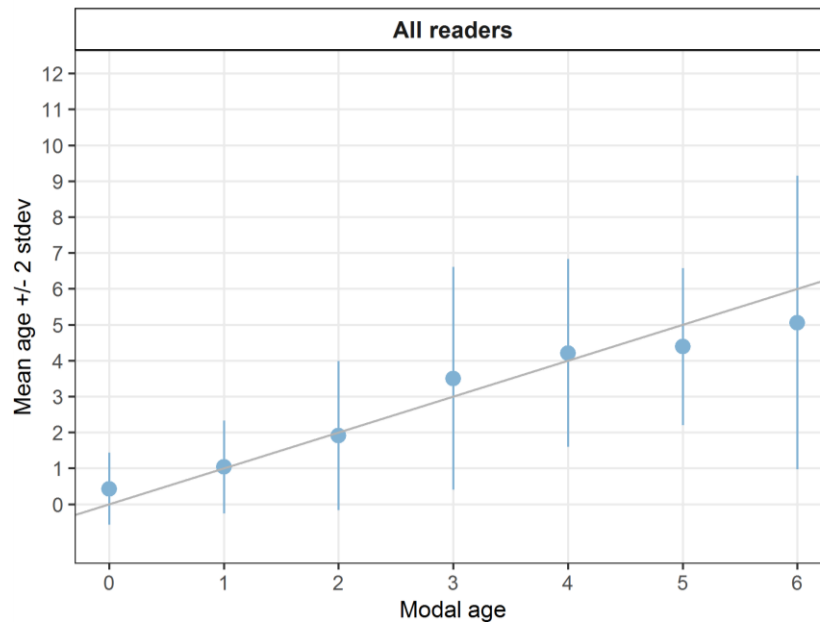
**Table 3.33:** Percentage agreement (PA, %) per modal age and reader, the PA of all readers combined per modal age and a weighted mean of the PA per reader.

Modal age	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT	all
0	100	100	100	100	100	50	0	0	0	0	100	0	0	100	100	50	0	100	57
1	68	76	66	90	3	69	93	79	46	55	62	83	93	93	55	68	35	29	65
2	60	15	80	60	5	70	10	65	55	60	75	45	20	40	60	65	56	85	51
3	36	33	58	50	42	75	17	17	18	33	50	33	0	58	58	82	20	73	42
4	0	25	60	100	50	100	0	40	0	80	80	20	0	80	60	50	20	50	46
5	0	0	0	100	0	0	0	100	100	100	0	0	0	100	0	0	100	0	33
6	0	0	0	100	0	0	0	100	100	0	0	0	0	0	0	-	100	0	24
Weighted Mean	54	46	67	76	16	70	44	60	42	53	64	54	44	70	57	67	39	55	55

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	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT	all
0	0.00	0.00	0.00	0.00	0.00	0.50	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.50	1.00	0.00	0.44
1	0.00	-0.24	-0.34	-0.03	-0.97	0.34	0.07	0.21	0.61	0.21	-0.24	0.14	0.07	0.00	-0.45	0.32	0.77	0.29	0.04
2	0.45	-0.85	-0.20	0.00	-1.70	0.40	-1.15	0.05	0.60	0.60	-0.15	0.45	-0.35	-0.35	-0.40	0.25	0.67	0.10	-0.09
3	1.64	-0.50	-0.42	0.33	-0.67	0.17	-1.08	1.58	1.64	0.92	0.25	1.92	2.17	0.17	-0.42	-0.18	1.80	0.09	0.52
4	2.40	-1.25	-0.40	0.00	-0.75	0.00	-2.20	0.80	1.00	0.20	-0.20	1.00	2.20	-0.20	-0.40	0.00	1.60	-0.50	0.18
5	1.00	-1.00	-1.00	0.00	-2.00	-2.00	-2.00	0.00	0.00	0.00	-1.00	1.00	1.00	0.00	-1.00	-2.00	0.00	-2.00	-0.61
6	2.00	1.00	-3.00	0.00	-3.00	-3.00	-4.00	0.00	0.00	-1.00	-2.00	2.00	2.00	-1.00	-4.00	-	0.00	-2.00	-
Weighted Mean	0.62	-0.51	-0.36	0.04	-1.13	0.23	-0.70	0.46	0.79	0.44	-0.16	0.66	0.53	-0.10	-0.47	0.17	0.95	0.07	0.10



**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	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT
R02 ES	-	**	**	**	**	-	**	-	-	-	**	-	-	**	**	*	-	*
R04 ES	**	-	-	**	**	**	-	**	**	**	**	**	**	**	-	**	**	**
R06 GR	**	-	-	**	**	**	*	**	**	**	**	**	**	*	**	**	**	**
R10 IT	**	**	**	-	**	-	**	**	**	**	*	**	**	-	**	-	**	-
R16 IT	**	**	**	**	-	**	**	**	**	**	**	**	**	**	**	**	**	**
R18 PT	-	**	**	-	**	-	**	-	**	-	**	*	-	**	**	-	**	-
R20 PT	**	-	*	**	**	**	-	**	**	**	**	**	**	**	-	**	**	**
R30 ES	-	**	**	**	**	-	**	-	**	-	**	-	-	**	**	-	**	*
R32 PT	-	**	**	**	**	**	**	**	-	**	**	-	*	**	**	**	-	**
R34 PT	-	**	**	**	**	-	**	-	**	-	**	-	-	**	**	*	**	**
R44 GR	**	**	**	*	**	**	**	**	**	**	-	**	**	-	**	**	**	**
R46 ES	-	**	**	**	**	*	**	-	-	-	**	-	-	**	**	*	-	**
R48 ES	-	**	**	**	**	-	**	-	*	-	**	-	-	**	**	-	**	-
R50 IT	**	**	*	-	**	**	**	**	**	**	-	**	**	-	**	**	**	-
R60 GR	**	-	*	**	**	**	-	**	**	**	**	**	**	**	-	**	**	**
R66 IT	*	**	**	-	**	-	**	-	**	*	**	*	-	**	**	-	**	-
R70 ES	-	**	**	**	**	**	**	**	-	**	**	-	**	**	**	**	-	**
R72 IT	*	**	**	-	**	-	**	*	**	**	**	**	-	-	**	-	**	-
Modal age	**	**	**	-	**	*	**	**	**	**	-	**	*	-	**	-	**	-

**Table 3.36:** Statistics by modal age for all readers.

<b>Modal age</b>	<b>N</b>	<b>CV (%)</b>	<b>PA (%)</b>	<b>Relative bias</b>
0	<b>35</b>	-	57	0.43
1	<b>515</b>	62	65	0.03
2	<b>358</b>	55	51	-0.09
3	<b>210</b>	44	42	0.50
4	<b>85</b>	31	46	0.21
5	<b>18</b>	25	33	-0.61
6	<b>17</b>	40	24	-0.94
<b>Total</b>	<b>1238</b>			
<b>Weighted Mean</b>		<b>54</b>	<b>55</b>	<b>0.08</b>

### **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 stratum for all samples to evaluate 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, Katerina	Greece	HCMR	B	B	B
Arévalo, Ainhoa	Spain	AZTI	B		
Bellodi, Andrea	Italy	UNICA	B	B	B
Casciaro, Loredana	Italy	COISPA	B	Ad	B
Correia, Georgina	Portugal	IPMA	B	B	B
Cruz, Renato	Portugal	SGMP, DRP-Açores			B
Defruit, Geoffrey	France	IFREMER	B		
Diaz, Justine	Norway	IMR	Ad		
Dijkman, André	Netherlands	IMARES	Ad		
Dimitriadis, Giannis	Greece	FRI	B		
Dueñas, Clara	Spain	IEO, CSIC-Santander	Ad	B	B
El Habouz, Hammou	Morocco	INRH	Ad		
Félicio, Mónica	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-Vigo	Ad	Ad	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
O'Connor, Seán	Ireland	Marine Institute	B		
Pesci, Paola	Italy	UNICA	B	B	B
Rico, Iñaki	Spain	AZTI	Ad		
Russo, Loredana	Italy	CIBM	B	B	B
Sioulas, Thanasis	Greece	FRI		Ad	
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	46	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	R24 ES	R26 IT	R28 IT	R30 PT	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	1	0	0	2	1	1	0	0	2	1	1	0	1	-	0	0	1	1	1	1	1	1	1	56	89	80
001L_158_01-09-20_ST.1-AIGAIO-GSA 22	158	F	09/01/20	22	0	1	2	1	1	-	1	2	2	2	2	2	2	2	2	2	1	2	2	1	1	-	2	2	2	2	2	2	-	2	68	35	30	
001L_250_27-07-20_IONIO	250	F	27/07/20	20	0	1	6	4	3	-	0	3	3	1	3	3	-	4	3	5	4	5	2	3	-	4	2	-	2	2	5	3	3	33	52	38		
001R_191_16-06-20_IONIO(PATRA)	191	U	16/06/20	20	0	1	3	1	1	-	0	1	2	1	1	2	-	1	1	5	2	1	1	1	-	1	1	1	2	1	2	1	1	64	73	50		
001R_326_11-08-20_ST.46 IONIO	326	F	08/11/20	20	0	9	7	9	4	-	4	4	5	4	4	5	-	7	-	11	8	7	3	8	-	5	4	5	5	3	9	4	4	29	45	37		
002L_103_29-07-20_SALAMINA	103	F	29/07/20	22	0	1	1	1	0	-	0	0	1	0	1	1	-	0	0	1	0	0	0	1	-	0	0	0	1	0	0	0	0	64	-	-		
002L_154_20-08-20_ST.67 IONIO	154	F	20/08/20	20	1	1	2	1	1	-	1	1	2	1	1	1	-	1	1	4	1	1	1	1	2	-	1	1	1	2	1	5	1	1	76	70	46	
002L_267_10-11-20_IONIO	267	F	11/10/20	20	3	4	6	5	4	-	6	3	4	3	3	4	3	5	3	8	5	6	3	5	-	4	4	5	4	3	6	3	3	35	31	25		
002R_260_16-06-20_IONIO(PATRA)	260	M	16/06/20	20	1	5	5	5	5	-	5	3	3	4	4	4	4	5	4	8	5	4	2	5	-	4	4	6	5	5	6	3	5	38	31	23		
002R_293_01-06-20_SARONIKOS	293	F	06/01/20	22	1	6	8	8	4	-	6	4	9	-	4	4	3	6	6	8	6	7	3	5	-	5	3	6	4	4	7	0	4	24	43	35		
003L_105_12-08-20_ST.53 IONIO	105	U	08/12/20	20	0	1	1	1	0	-	0	0	1	0	0	1	0	0	0	1	0	0	0	1	-	0	0	0	1	0	1	0	1	0	65	-	-	
003L_205_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	205	M	26/08/20	22	3	2	4	3	3	-	4	2	2	3	3	3	3	2	4	3	3	2	2	2	-	2	3	3	-	3	4	-	3	54	24	18		
003L_255_16-06-20_IONIO(PATRA)	255	F	16/06/20	20	6	7	6	7	5	-	6	4	4	4	5	5	5	5	5	7	5	5	3	7	-	4	5	6	-	6	7	3	5	36	23	18		
004L_150_12-08-20_ST.57 IONIO	150	F	08/12/20	20	0	1	1	1	0	-	0	0	1	0	0	1	-	0	0	3	1	0	0	1	-	1	0	1	1	0	2	0	0	52	-	-		
004L_259_27-07-20_IONIO	259	F	27/07/20	20	5	1	6	5	5	-	0	3	4	1	4	4	-	5	4	6	4	5	3	4	-	4	4	5	3	4	6	0	4	36	45	33		
005L_205_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	205	F	26/08/20	22	4	2	4	3	3	-	4	3	2	3	3	3	3	2	4	3	3	2	2	2	-	3	4	3	4	3	4	2	3	50	24	17		
005L_291_01-06-20_SARONIKOS	291	M	06/01/20	22	-	7	9	9	3	-	7	4	7	4	4	6	-	5	5	11	7	6	3	7	-	6	3	7	-	4	10	3	7	26	39	31		
006L_101_29-07-20_SALAMINA	101	F	29/07/20	22	1	1	1	1	-	-	0	0	1	0	1	1	-	0	0	1	0	1	0	1	-	0	0	0	1	0	0	0	0	54	-	-		
006L_141_13-08-20_ST.55 IONIO	141	F	13/08/20	20	1	1	0	1	0	-	1	0	2	0	1	3	2	1	0	0	3	2	1	0	1	-	0	0	1	1	1	2	0	1	42	103	77	
006L_154_01-09-20_ST.1-AIGAIO-GSA 22	154	F	09/01/20	22	2	1	1	2	2	-	1	2	3	2	2	6	2	2	2	2	2	2	2	1	2	-	2	2	2	2	2	2	-	2	72	46	22	
006L_257_05-10-20_IONIO	257	F	10/05/20	20	3	4	5	4	4	-	5	3	4	4	4	4	5	5	4	8	4	5	2	4	-	4	4	4	4	4	5	4	4	62	24	15		
006L_257_10-11-20_IONIO	257	M	11/10/20	20	4	6	6	4	4	-	4	3	5	4	3	5	3	3	9	5	3	3	5	-	4	3	4	4	3	6	3	3	38	34	25			
006R_331_01-06-20_SARONIKOS	331	F	06/01/20	22	3	8	8	10	5	-	7	5	6	4	4	4	3	7	7	11	10	6	5	8	-	5	3	6	5	7	8	-	5	20	36	29		
007L_229_15-06-20_SARONIKOS	229	F	15/06/20	22	3	3	4	3	3	-	3	3	3	3	3	3	4	3	8	3	3	2	3	-	3	3	4	-	3	4	3	3	76	32	18			
007L_266_06-10-20_IONIO	266	U	10/06/20	20	4	8	7	6	4	-	5	4	5	5	5	4	5	6	5	9	5	6	3	5	-	5	5	6	-	5	7	4	5	44	25	19		
008L_199_05-10-20_IONIO	199	F	10/05/20	20	7	1	4	5	5	-	2	2	5	1	3	6	-	1	2	8	5	5	1	3	-	2	-	5	-	7	7	2	5	26	58	51		
008L_256_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	256	F	26/08/20	22	3	4	3	5	2	-	5	3	2	3	2	3	-	5	3	4	5	4	2	2	-	3	4	4	-	4	5	0	3	29	38	31		
008L_259_06-10-20_IONIO	259	F	10/06/20	20	-	9	7	6	5	-	6	5	5	5	3	5	-	4	4	10	5	6	3	6	-	5	5	6	-	6	8	1	5	35	35	25		
009L_291_01-06-20_SARONIKOS	291	M	06/01/20	22	-	2	10	11	3	-	5	5	8	4	3	4	-	10	5	9	5	7	4	7	-	5	3	9	5	4	8	4	5	25	44	38		
009L_306_06-10-20_IONIO	306	F	10/06/20	22	-	9	8	10	5	-	7	4	5	4	4	5	2	8	6	10	8	8	4	7	-	4	2	6	3	5	6	2	4	20	42	35		
009R_203_10-08-20_ST.59 IONIO	203	F	08/10/20	20	-	6	5	6	4	-	3	2	2	2	5	8	-	6	2	8	6	3	2	5	-	2	2	5	2	5	7	2	2	38	50	44		
010L_106_12-08-20_ST.53 IONIO	106	U	08/12/20	20	0	1	0	1	0	-	0	0	0	0	0	0	0	0	0	1	0	0	0	1	-	0	0	0	1	0	1	0	0	77	-	-		
010L_306_10-11-20_IONIO	306	F	11/10/20	20	-	7	9	11	4	-	7	5	6	4	3	4	-	5	5	10	9	7	4	7	-	5	2	7	-	3	8	0	7	22	46	38		
011L_140_13-08-20_ST.55 IONIO	140	F	13/08/20	20	0	1	2	1	0	-	0	1	1	0	1	3	1	0	0	3	2	1	1	1	-	0	0	1	1	1	1	0	1	50	98	69		
011L_201_10-08-20_ST.59 IONIO	201	F	08/10/20	20	5	8	4	7	3	-	3	2	3	3	2	7	2	7	2	5	6	7	2	6	-	2	3	4	4	2	6	2	2	31	49	43		
011L_217_06-10-20_IONIO	217	F	10/06/20	20	3	3	4	3	3	-	3	3	5	3	3	3	3	3	7	3	3	2	3	-	3	3	4	4	3	4	3	3	73	28	18			
011L_276_01-06-20_SARONIKOS	276	M	06/01/20	22	4	4	8	14	4	-	4	4	7	4	4	4	3	4	8	5	6	3	4	-	4	3	5	5	4	5	4	4	54	46	29			
012L_151_29-08-20_ST.14-ARGOSARWNIKOS	151	M	29/08/20	22	2	2	3	2	1	-	3	1	3	2	1	4	-	1	1	6	2	2	1	2	-	1	2	1	3	1	2	1	1	40	60	40		
012L_201_10-08-20_ST.59 IONIO	201	F	08/10/20	20	7	7	4	8	3	-	3	2	2	3	2	10	-	7	2	9	4	3	2	6	-	2	3	4	2	2	7	-	2	33	59	51		
013R_132_13-08-20_ST.55 IONIO	132	F	13/08/20	20	0	1	1	1	0	-	0	1	2	0	1	4	0	0	0	3	1	0	1	1	-	0	0	0	1	1	1	0	0	46	-	-		
014L_205_10-08-20_ST.59 IONIO	205	M	08/10/20	20	3	3	4	3	2	-	3	3	4	3	2	3	2	3	2	6	3	3	2	4	-	3	3	4	3	2	6	-	3	52	34	23		
014R_52_05-08-20_ST.2-ARGOSARWNIKOS	52	U	08/05/20	22	1	1	0	1	0	-	0	0	1	0	0	1	1	0	0	1	0	0	0	1	-	0	0	1	1	0	0	0	0	62	-	-		
015R_272_01-06-20_SARONIKOS	272	F	06/01/20	22	4	4	7	6	4	-	5	4	6	3	3	3	4	5	4	8	5	5	3	5	-	4	2	5	5	4	6	3	4	31	30	24		
017L_102_29-07-20_SALAMINA	102	F	29/07/20	22	1	1	1	1	0	-	0	0	1	0	1	1	-	0	0	1	0	0	0	1	-	0	0	0	1	0	0	0	0	58	-	-		
018R_57_05-08-20_ST.2-ARGOSARWNIKOS	57	U	08/05/20	22	0	1	0	1	-	-	0	0	1	0	0	1	-	0	0	1	0	0	0	1	-	0	0	1	1	0	0	0	0	67	-	-		
019R_100_12-08-20_ST.53 IONIO	100	U	08/12/20	20	0	1	0	1	0	-	0	0	0	0	0	0	0	0	0	2	0	0	0	1	-	0	0	0	1	1	1	0	0	73	-	-		
019R_203_31-08-20_ST.22-ARGOSARWNIKOS	203	F	31/08/20	22	3	4	4	4																														

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	R24 ES	R26 IT	R28 IT	R30 PT	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 %	
034L_103_12-08-20_ST.53 IONIO	103	U	08/12/20	20	0	1	0	1	0	-	1	0	1	0	0	1	0	0	0	2	0	0	0	1	-	0	0	0	1	1	2	0	0	62	-	-	
036L_100_12-08-20_ST.53 IONIO	100	U	08/12/20	20	0	1	1	1	-	-	0	0	1	0	0	1	0	0	0	2	0	0	0	1	-	0	0	0	1	0	2	0	0	64	-	-	
036L_272_01-06-20_SARONIKOS	272	F	06/01/20	22	4	4	6	7	4	-	4	4	5	4	2	4	5	6	4	8	5	5	3	3	-	4	4	4	4	4	3	4	54	29	21		
038L_106_12-08-20_ST.53 IONIO	106	F	08/12/20	20	0	1	0	1	-	-	1	0	1	0	0	1	0	0	0	2	0	0	0	1	-	0	0	0	1	0	1	0	0	64	-	-	
1	225	F	14/02/16	11	4	4	4	4	4	4	3	3	3	4	3	3	4	4	3	5	4	3	3	4	4	3	4	4	3	4	4	3	4	57	15	14	
1_1.5x8	118	U	07/02/19	27.9.a	1	1	0	1	0	1	1	0	2	0	1	1	1	1	1	1	1	1	0	1	-	0	1	1	1	1	1	1	1	74	59	44	
10	175	F	09/03/20	11	2	2	3	2	2	4	1	2	4	3	3	2	3	3	2	3	3	2	2	4	3	2	3	2	4	2	2	2	50	31	27		
10_1.5x8	255	F	24/09/19	27.9.a	4	6	-	5	-	5	6	3	4	3	3	3	5	5	5	6	5	5	3	3	-	3	5	5	5	4	3	1	5	40	30	26	
11	160	F	14/12/20	11	2	2	3	2	1	1	2	1	2	2	1	2	1	1	1	3	5	1	1	1	2	1	2	1	2	1	2	1	1	50	54	40	
11_1.5x8	235	F	23/08/19	27.9.a	5	5	5	5	2	-	3	4	6	4	4	3	4	5	3	5	3	5	3	3	-	4	5	6	4	4	2	3	5	31	28	22	
12	216	F	09/03/20	11	2	2	4	2	2	3	2	2	3	3	2	2	3	2	3	2	3	4	2	2	5	3	2	3	2	2	2	2	57	31	25		
12_1.5x8	122	U	18/11/19	27.9.a	4	3	3	3	2	2	3	3	4	3	2	5	4	5	1	5	3	2	2	3	-	3	4	3	4	2	3	3	3	44	33	24	
13	134	F	11/02/16	11	1	1	1	1	1	1	0	1	2	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	89	43	19	
13_1.5x8	181	M	09/12/19	27.9.a	3	3	4	3	2	3	3	3	5	3	2	3	4	5	2	5	3	3	2	3	-	3	4	4	3	2	3	3	3	56	28	20	
14	217	M	14/02/16	11	1	3	4	3	2	4	1	2	3	4	3	3	4	3	3	3	3	4	2	3	3	2	3	4	2	3	3	3	3	54	29	20	
14_1.5x8	213	F	25/10/19	27.9.a	5	5	5	4	3	4	4	3	7	4	3	4	4	5	3	5	5	4	3	4	-	3	4	4	5	3	4	3	4	41	24	17	
15	207	M	18/05/16	11	2	2	3	2	2	2	1	2	3	4	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	71	26	20	
15_1.5x8	265	M	19/11/19	27.9.a	9	9	-	9	-	-	8	9	6	7	8	-	-	-	10	-	10	8	8	9	-	9	7	8	-	6	7	-	9	33	15	12	
16	207	M	14/02/16	11	2	2	4	3	2	2	2	2	3	4	2	4	3	3	2	3	3	3	2	2	4	2	4	2	4	3	2	2	2	50	30	26	
17	136	M	16/02/17	11	1	1	1	1	1	2	1	1	2	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	86	31	21	
18	189	M	18/05/16	11	2	2	2	2	2	2	1	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	1	2	2	82	21	10	
19	150	M	18/05/16	11	1	1	2	1	1	2	1	2	2	2	2	2	2	2	1	2	2	2	1	1	2	2	2	1	3	1	2	2	2	61	33	29	
2	213	F	14/02/16	11	3	2	3	3	2	3	2	2	2	3	3	3	3	2	3	2	3	3	2	2	3	2	3	2	3	3	2	2	3	57	20	19	
2_1.5x8	155	F	15/05/19	27.9.a	1	1	2	1	1	2	1	1	2	1	1	2	1	2	1	2	1	2	1	1	1	-	1	1	2	1	2	1	1	70	36	32	
20	165	M	18/05/16	11	2	1	1	1	1	2	1	1	2	2	1	2	2	2	1	2	2	1	1	1	2	1	2	1	2	1	2	2	1	50	38	35	
21	180	M	09/03/20	11	1	2	3	2	2	3	1	2	3	3	2	3	3	4	2	3	3	3	2	2	3	2	3	2	3	3	2	3	50	28	24		
22	239	M	09/03/19	11	3	3	4	2	3	3	2	2	3	-	3	5	3	3	4	2	3	3	2	2	3	2	3	2	3	3	2	3	59	25	18		
23	140	M	14/12/21	11	0	1	1	1	1	2	1	0	2	2	0	4	1	1	1	2	4	0	0	1	-	0	2	0	0	1	1	0	1	41	103	72	
24	152	M	11/02/16	11	2	2	3	1	2	2	1	2	3	3	2	2	2	2	2	2	2	3	2	2	2	2	1	3	2	2	2	2	2	71	26	16	
25	318	M	27/07/20	11	1	12	7	9	7	5	5	4	3	7	5	3	7	6	4	6	8	4	8	9	4	5	6	4	4	5	3	4	21	41	32		
26	195	M	09/03/20	11	3	1	4	4	2	4	2	1	3	3	2	6	4	4	1	4	4	3	1	3	4	1	4	3	2	3	4	2	4	36	44	35	
27	112	U	16/02/17	11	1	1	1	1	1	1	0	1	2	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	86	41	21	
28	115	U	19/07/16	11	1	1	1	0	1	1	0	0	1	1	0	1	0	1	0	1	1	0	0	0	-	0	1	0	1	0	1	0	1	52	98	96	
29	105	U	19/07/16	11	0	1	1	1	0	1	0	0	1	0	0	1	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0	0	0	57	-	-	
3	142	F	16/02/17	11	1	1	1	1	1	1	0	0	2	1	0	1	1	1	1	1	3	1	0	1	1	1	1	1	1	1	1	0	1	75	65	36	
3_1.5x8	202	M	13/02/19	27.9.a	2	2	3	2	2	3	2	2	3	2	2	2	2	4	3	3	2	3	2	2	-	3	2	3	3	2	2	2	2	63	24	21	
30	95	U	19/07/16	11	0	1	1	1	0	1	0	0	1	0	0	1	0	1	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	61	-	-	
4	205	F	18/05/16	11	3	3	3	3	3	3	2	3	4	3	3	3	3	3	3	3	3	5	3	3	3	3	3	2	3	3	3	3	82	18	7		
4_1.5x8	265	F	06/05/19	27.9.a	4	6	5	5	4	5	5	4	4	5	4	6	5	5	6	7	5	6	3	6	-	5	5	6	5	5	5	4	5	48	18	12	
5	195	F	18/05/16	11	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	93	13	6	
5_1.5x8	252	F	26/06/19	27.9.a	4	4	4	4	3	4	4	4	3	3	4	3	4	5	4	5	3	4	5	3	4	-	4	3	5	4	4	4	4	63	16	11	
6	162	F	18/05/16	11	1	1	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	89	39	22	
6_1.5x8	192	M	07/05/19	27.9.a	1	2	3	2	1	2	-	2	3	2	1	2	2	2	2	3	2	2	1	2	-	2	2	2	2	1	1	1	1	2	62	33	25
7	153	F	18/05/16	11	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	1	1	1	-	1	1	1	1	1	1	1	1	93	25	13	
7_1.5x8	152	U	13/06/19	27.9.a	1	1	2	1	1	1	-	1	2	1	1	-	1	1	1	2	1	1	1	1	-	2	1	1	2	1	1	1	1	80	34	27	
8	312	F	27/07/20	11	4	7	8	5	5	5	4	4	3	5	5	5	6	5	5	4	7	6	4	8	5	4	5	8	5	4	7	2	5	39	29	21	
8_1.5x8	163	M	29/07/19	27.9.a	1	1	3	1	1	1	1	1	3	1	1	2	1	1	1	3	1	1	1	1	-	1	1	1	2	1	1	1	1	81	52	37	
9	272	F	27/07/20	11	-	6	6	4	4	5	2	3	2	4	3	4	5	5	5	5	5	5	3	5	5	3	4	6	3	4	5	-	5	38	27	23	
9_1.5x8	205	M	24/09/19	27.9.a	3	2	3	2	1	2	-	2	4	2	1	3	2	3	2	4	3	2	1	2	-	2	3	2	4	2	2	3	2	50	36	30	
DESTT020920_11	370	U	02/09/20	28	11	12	10	12	9	-	11	10	11	8	7	13	11	1																			

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	R24 ES	R26 IT	R28 IT	R30 PT	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_0030	297	U	08/10/17	7	7	9	6	5	5	7	8	4	5	5	3	8	4	7	7	6	4	-	4	5	8	4	6	6	-	4	8	-	4	24	29	24
GBD_19_B47_C1_O_0031	265	U	08/10/17	7	5	9	5	3	3	4	6	3	5	4	2	-	3	5	4	4	4	3	3	4	8	3	4	5	-	4	5	-	4	32	36	26
GBD_19_B47_C1_O_0035	272	U	08/10/17	7	-	11	6	5	4	7	6	3	4	4	1	5	3	7	4	6	4	6	3	4	17	3	3	7	4	3	8	2	4	26	61	42
GBD_19_B47_C1_O_0042	234	U	07/10/17	7	3	9	4	4	2	2	3	3	4	3	1	3	2	5	2	4	3	3	2	4	7	3	2	3	2	5	2	2	32	51	36	
GBD_19_B47_C1_O_0043	228	U	07/10/17	7	4	10	3	3	3	3	5	3	4	3	1	3	2	4	2	5	4	3	2	3	8	3	2	3	3	2	6	2	3	43	54	37
GBD_19_B47_C1_O_0044	254	U	07/10/17	7	5	8	5	3	3	3	4	3	4	3	2	4	2	5	3	5	4	4	3	3	6	3	3	3	2	5	2	3	43	37	29	
GBD_19_B47_C1_O_0045	230	U	07/10/17	7	-	6	4	2	3	3	3	3	4	2	1	3	1	4	2	4	3	3	2	3	7	3	2	2	2	4	2	2	33	45	31	
GBD_19_B47_C1_O_0046	235	U	07/10/17	7	-	4	5	2	2	2	3	2	4	3	1	4	1	2	2	4	3	2	2	2	11	3	2	1	3	2	6	2	2	44	68	44
GBD_19_B47_C1_O_0047	320	U	07/10/17	7	5	7	6	4	6	6	5	5	6	5	4	4	5	7	5	5	6	6	5	7	8	4	4	6	-	5	7	2	5	33	24	19
GBD_19_B47_C1_O_0048	394	U	07/10/17	7	-	11	8	6	7	8	9	7	8	-	5	7	-	5	8	6	5	10	7	8	13	5	4	9	-	5	9	3	5	21	32	25
GBD_19_B47_C1_O_0054	316	U	11/10/17	7	5	9	7	4	4	7	6	4	5	4	2	5	5	9	5	7	6	7	3	4	13	4	3	8	4	4	9	2	4	29	45	35
GBD_19_B47_C1_O_0055	304	U	11/10/17	7	4	7	5	4	4	5	6	3	4	4	1	3	-	5	4	5	5	6	3	4	-	4	2	4	-	3	-	2	4	38	34	24
GBD_19_B47_C1_O_0056	339	U	08/10/17	7	-	9	9	10	0	10	8	5	7	4	3	7	3	8	7	7	6	10	5	5	18	4	3	10	-	3	11	3	3	19	55	42
GBD_19_B47_C1_O_0057	322	U	08/10/17	7	-	9	7	6	5	-	8	5	7	5	2	6	3	8	6	6	5	8	6	7	8	4	4	10	-	4	10	3	6	20	35	28
GBD_19_B47_C1_O_0081	256	U	08/10/17	7	7	9	6	7	4	-	5	3	4	3	1	4	2	6	6	7	5	6	3	4	8	3	3	8	-	3	9	3	3	27	45	38
GBD_19_B47_C1_O_0082	277	U	08/10/17	7	7	7	7	7	4	-	6	5	7	3	2	5	2	7	6	6	6	5	5	6	7	4	4	7	-	3	8	5	7	31	31	26
GBD_19_B47_C1_O_0083	278	U	08/10/17	7	5	7	6	7	4	-	5	5	4	2	5	3	6	5	5	6	5	5	-	4	4	8	4	3	10	3	5	38	33	22		
GBD_19_B47_C1_O_0084	269	U	08/10/17	7	4	5	6	6	3	-	4	3	5	3	1	3	3	4	3	5	4	4	3	5	-	3	3	4	3	3	5	2	3	46	32	26
GBD_19_B47_C1_O_0085	288	U	08/10/17	7	-	7	8	7	4	-	5	4	6	4	2	3	3	6	5	6	4	6	4	4	-	4	3	8	-	3	8	2	4	29	38	32
GBD_19_B47_C1_O_0086	248	U	08/10/17	7	4	7	4	5	4	-	5	4	7	4	4	5	3	4	4	6	5	5	4	4	-	4	6	4	-	3	7	4	4	52	25	20
GBD_19_B47_C1_O_0087	264	U	08/10/17	7	4	6	6	4	3	-	4	3	5	4	2	4	3	3	4	6	3	4	3	4	-	3	4	4	3	3	5	3	3	38	27	21
GBD_19_B47_C1_O_0088	313	U	08/10/17	7	5	11	10	7	4	-	7	5	5	4	4	5	4	7	5	7	5	8	3	6	-	5	4	6	5	3	7	3	5	31	36	28
GBD_19_B48_C1_O_0001	257	U	24/01/18	7	3	10	4	7	3	-	4	3	6	3	2	4	3	4	3	7	4	4	3	3	-	3	4	3	4	3	7	2	3	42	45	31
GBD_19_B48_C1_O_0002	255	U	24/01/18	7	3	6	5	5	2	-	2	3	5	2	1	3	2	2	5	2	3	2	3	-	3	2	2	-	2	6	2	2	48	48	37	
GBD_19_B48_C1_O_0005	244	U	24/01/18	7	4	5	4	6	3	-	3	6	3	2	4	2	4	3	6	4	4	3	3	-	3	3	4	3	3	6	2	3	42	33	26	
GBD_19_B48_C1_O_0007	235	U	24/01/18	7	4	5	4	6	3	-	2	3	5	3	2	4	2	4	3	5	4	4	3	3	-	3	3	5	4	3	6	2	3	35	32	26
GBD_19_B48_C1_O_0009	237	U	24/01/18	7	3	5	3	5	3	-	2	3	7	3	2	2	2	4	3	5	4	4	3	3	-	3	3	4	4	3	4	3	3	46	33	25
GBD_19_B48_C1_O_0015	244	U	24/01/18	7	3	5	3	7	2	-	3	3	7	3	2	3	2	4	3	6	4	4	3	3	-	3	3	4	-	3	5	3	3	52	38	29
GBD_19_B48_C1_O_0016	248	U	24/01/18	7	4	6	4	6	3	-	3	3	8	4	2	4	3	4	4	5	4	4	3	4	-	4	4	4	5	3	5	3	4	46	30	20
GBD_19_B48_C1_O_0017	257	U	24/01/18	7	4	6	4	5	3	-	3	3	6	4	2	4	3	4	3	5	4	4	3	3	-	3	3	4	3	3	5	3	3	46	27	22
GBD_19_B48_C1_O_0020	222	U	25/01/18	7	4	5	5	7	3	-	3	4	6	3	2	5	3	4	3	6	4	5	3	3	-	4	3	5	-	3	6	4	3	36	31	25
GBD_19_B48_C1_O_0027	259	U	24/01/18	7	5	5	5	6	3	-	2	4	7	3	3	2	3	3	3	6	3	5	3	4	-	4	3	4	-	3	6	3	3	44	34	28
GBD_19_B48_C1_O_0033	221	U	24/01/18	7	3	4	3	6	3	-	2	3	6	3	2	3	2	4	3	5	3	3	3	3	-	3	3	6	-	3	5	3	3	60	34	27
GBD_19_B48_C1_O_0036	242	U	24/01/18	7	5	4	4	8	3	-	2	3	7	3	2	4	3	3	6	4	4	2	4	-	3	3	7	3	3	7	3	3	42	43	32	
GBD_19_B48_C1_O_0037	239	U	24/01/18	7	5	4	4	7	3	-	3	4	6	3	2	4	3	5	4	6	4	5	3	3	-	4	4	5	4	3	5	3	4	35	29	21
GBD_19_B48_C1_O_0038	239	U	24/01/18	7	3	3	3	6	2	-	2	3	5	3	2	4	2	4	3	5	3	4	2	2	-	3	3	4	4	3	4	3	3	42	32	25
GBD_19_B48_C1_O_0039	230	U	24/01/18	7	3	4	4	6	2	-	2	4	5	3	2	3	2	5	3	5	4	4	2	3	-	4	4	5	4	3	5	3	4	31	31	26
GBD_19_B48_C1_O_0043	226	U	24/01/18	7	4	4	4	4	2	-	2	3	5	3	2	3	2	4	3	5	4	4	2	3	-	4	4	4	4	3	4	3	4	46	26	23
GBD_19_B48_C1_O_0044	231	U	24/01/18	7	3	5	3	4	2	-	2	3	6	2	2	3	3	3	3	6	3	3	2	3	-	4	3	3	4	3	4	2	3	50	34	25
GBD_19_B48_C1_O_0045	231	U	24/01/18	7	2	5	5	5	3	-	2	3	5	2	2	3	2	3	3	6	3	4	3	2	-	3	3	3	-	3	5	2	3	44	37	29
GBD_19_B48_C1_O_0046	235	U	24/01/18	7	3	5	3	5	3	-	3	4	6	3	2	3	3	4	3	6	4	4	3	3	-	4	3	4	3	3	5	3	3	54	28	23
GBD_19_B48_C1_O_0048	237	U	10/02/18	7	4	4	4	6	2	-	2	3	6	3	2	3	3	4	3	6	3	4	3	3	-	3	3	4	3	3	4	2	3	46	33	25
GBD_19_B48_C1_O_0049	265	U	24/01/18	7	4	5	6	5	3	-	2	4	5	2	2	4	3	5	3	6	4	5	3	3	-	4	3	5	3	3	5	2	3	31	32	28
GSA_22_01	241	F	24/02/21	22	3	3	5	3	3	-	3	3	6	3	3	3	-	4	3	3	5	4	3	4	-	3	3	4	4	3	5	3	3	64	24	20
GSA_22_02	188	M	24/02/21	22	2	2	3	2	2	-	2	2	5	2	2	2	-	2	2	2	4	2	2	2	-	2	2	2	2	3	2	2	84	32	21	
GSA_22_03	126	F	24/02/21	22	1	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	19	7
GSA_22_04	46	U	19/04/21	22	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0	1	0	0	0	1	-	0	0	0	0	0	0	0	0	92	-	-
GSA_22_05	80	U	22/04/21	22	0	0	1	1	0	-	0	0	2	0	0	0	-	0	0	1	0	0	0	1	-	0	0	1	1	0	0	0	0	72	-	-
GSA_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	R24 ES	R26 IT	R28 IT	R30 PT	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 %	
GSA_22_13	304	F	27/03/19	22	-	10	10	12	6	-	9	6	12	7	5	8	-	13	7	14	8	10	5	11	-	7	-	12	-	9	13	5	5	14	32	27	
GSA_22_14	322	F	27/03/19	22	9	12	10	11	6	-	8	6	9	6	5	7	-	10	9	11	8	10	5	7	-	6	5	8	-	8	11	5	5	17	28	23	
GSA_22_15	322	F	02/09/20	22	4	6	8	4	5	-	5	4	7	5	2	5	-	7	3	8	8	6	3	5	-	5	3	5	-	3	8	4	5	29	35	28	
GSA_22_16	98	U	22/07/20	22	1	1	1	1	0	-	1	1	1	1	0	1	-	0	0	2	1	1	0	1	-	1	1	0	1	0	1	0	1	64	75	64	
GSA_22_17	121	M	09/12/20	22	0	1	0	1	0	-	0	0	1	0	0	3	-	0	0	3	0	0	0	1	-	0	-	0	1	0	2	0	0	67	-	-	
GSA_22_18	201	M	09/12/20	22	1	1	4	1	1	-	1	1	1	2	1	1	-	1	1	3	2	1	1	1	-	1	1	1	2	1	2	1	1	76	56	40	
GSA_22_19	222	F	23/07/19	22	3	3	4	2	2	-	-	2	2	2	2	3	-	3	2	5	3	3	2	3	-	2	2	2	3	2	3	2	2	54	30	24	
GSA_22_20	168	M	23/07/19	22	2	2	3	2	2	-	2	1	2	2	1	2	-	2	1	3	2	1	1	2	-	1	2	1	2	1	2	1	2	56	36	30	
GSA_22_21	195	F	22/07/21	22	4	3	4	3	2	-	2	2	3	3	2	4	-	4	2	4	3	3	2	3	-	2	3	2	3	2	3	3	3	44	26	21	
GSA_22_22	320	F	22/07/21	22	5	7	8	6	6	-	5	8	5	5	5	5	-	5	7	6	6	8	3	6	-	5	5	6	-	5	8	-	5	43	22	17	
GSA_22_23	331	F	22/07/21	22	-	9	10	8	5	-	6	5	11	6	3	6	-	6	6	9	6	8	3	6	-	5	4	-	-	5	10	5	6	32	35	28	
GSA_22_24	283	F	22/07/21	22	-	8	8	9	4	-	5	5	7	4	3	5	-	9	5	9	6	8	3	5	-	5	3	5	-	3	8	4	5	30	37	32	
GSA_22_25	280	F	22/07/21	22	-	7	7	10	4	-	5	4	8	5	3	3	-	7	11	8	8	3	6	-	5	2	4	4	3	10	3	3	22	46	39		
GSA_22_26	305	F	22/07/21	22	-	11	8	9	4	-	5	5	6	4	2	5	-	8	6	12	11	7	2	7	-	5	2	3	5	3	5	3	5	25	50	40	
GSA_22_27	299	M	22/07/21	22	-	9	7	9	5	-	5	5	8	7	4	4	-	9	8	11	10	8	4	7	-	6	6	6	-	5	9	4	4	17	31	26	
GSA_22_28	289	F	22/07/21	22	-	11	7	10	4	-	6	4	7	4	2	3	-	6	5	11	8	8	3	8	-	5	4	4	-	5	11	0	4	22	51	41	
GSA_22_29	276	F	22/07/21	22	4	9	6	8	4	-	4	5	7	4	2	3	-	5	3	9	6	5	2	5	-	6	3	4	3	4	6	3	4	24	41	32	
GSA_22_30	251	M	22/07/21	22	3	6	5	8	4	-	5	5	8	5	2	3	-	7	2	7	6	5	2	3	5	-	5	4	5	-	5	6	-	5	39	34	24
GSA01-140319-03-12.5x	247	F	14/03/19	1	4	7	5	6	5	5	4	4	7	5	3	4	5	6	3	6	4	5	4	5	6	5	5	7	4	5	7	2	5	36	26	19	
GSA01-150321-23-12.5x	266	F	15/03/21	1	3	5	6	6	3	3	4	4	4	3	3	4	3	5	3	5	5	5	3	3	3	4	3	5	3	4	6	2	3	43	29	24	
GSA01-150321-37-12.5x	222	M	15/03/21	1	4	6	4	8	4	4	4	4	7	3	-	4	4	4	5	5	4	3	4	4	4	4	4	4	6	4	7	2	4	63	29	21	
GSA01-160118-21-12.5x	181	F	16/01/18	1	3	5	3	5	3	3	2	4	4	3	2	9	3	8	3	4	6	3	2	4	12	4	3	6	4	3	9	2	3	36	56	41	
GSA01-180618-11-12.5x	304	F	18/06/18	1	6	8	7	7	5	5	-	5	6	5	7	7	6	7	6	6	7	7	5	8	7	5	6	7	6	6	8	4	7	33	17	14	
GSA01-180618-15-12.5x	331	F	18/06/18	1	6	13	10	6	5	5	9	4	8	5	5	8	6	8	6	7	5	6	4	7	12	5	5	8	-	5	9	4	5	30	35	28	
GSA01-210519-10-12.5x	321	F	21/05/19	1	5	6	6	7	5	6	5	5	7	5	5	5	6	6	6	5	6	7	5	6	6	6	6	6	6	5	6	4	6	50	13	11	
GSA01-210519-21-12.5x	293	M	21/05/19	1	3	8	7	6	6	6	6	5	4	3	4	6	4	6	5	6	4	6	4	4	5	5	4	5	3	5	8	3	6	29	28	22	
GSA01-210519-62-12.5x	211	F	21/05/19	1	2	4	4	3	3	4	3	3	4	3	3	4	3	2	5	4	4	3	4	6	4	3	3	4	3	6	2	3	39	30	23		
GSA01-220817-06-12.5x	193	M	22/08/17	1	3	4	4	2	3	6	2	3	4	3	2	4	3	6	2	3	4	2	2	3	8	3	4	2	3	2	6	2	2	32	45	34	
GSA01-260517-17-12.5x	156	F	26/05/17	1	1	1	3	1	1	3	1	2	3	1	1	3	-	2	1	1	3	1	1	2	-	2	1	1	2	1	2	2	1	54	48	43	
GSA01-270819-05-12.5x	202	F	27/08/19	1	4	4	4	4	3	2	3	2	3	2	5	3	4	2	5	3	2	4	7	3	3	-	2	5	2	3	3	6	37	36	28		
GSA01-300719-01-12.5x	310	M	30/07/19	1	6	9	9	5	6	7	7	4	5	6	5	6	6	6	6	7	5	7	5	7	6	4	5	7	4	6	6	3	6	36	23	17	
GSA01-300719-38-12.5x	346	M	30/07/19	1	-	14	7	5	6	6	-	3	3	5	2	4	6	5	4	6	5	7	3	8	-	4	5	7	-	6	8	2	5	21	46	32	
IBER110920_20	210	U	11/09/20	28	5	5	5	-	-	-	-	5	5	5	4	6	5	7	6	9	5	5	5	6	-	4	5	5	6	5	8	4	5	57	22	16	
IBER110920_21	217	U	11/09/20	28	4	3	4	3	3	-	9	3	7	3	2	7	2	2	2	8	3	5	3	3	-	3	3	2	4	2	7	3	3	44	49	37	
jurel_19052021_n93_247mm(2x)	247	F	01/05/21	8	8	6	5	3	3	5	9	5	8	5	5	6	5	5	4	8	6	9	5	6	10	5	6	4	5	4	8	5	5	39	31	25	
jurel_19052021_n96_255mm(2x)	255	M	01/05/21	8	5	6	5	3	3	6	4	5	7	6	4	4	6	7	3	5	6	7	4	6	6	5	6	6	5	5	8	5	6	32	24	19	
jurel_DEM2020_L100_n7_125mm(2x)	125	M	01/10/20	8	1	1	0	1	1	0	1	1	3	1	0	1	1	1	0	1	1	0	0	1	-	1	1	0	-	0	1	0	1	62	91	69	
jurel_DEM2020_L100_n8_146mm(2x)	146	F	01/10/20	8	1	1	2	1	1	3	0	1	3	1	1	3	2	4	1	2	1	0	0	1	-	1	4	1	1	0	2	0	1	52	78	62	
jurel_DEM2020_L104_n10_230mm(2x)	230	F	01/10/20	8	5	5	5	4	2	5	5	4	6	4	4	7	4	6	3	7	4	4	3	6	-	4	6	5	4	3	6	3	4	33	28	23	
jurel_DEM2020_L108_n4_122mm(2x)	122	M	01/10/20	8	1	1	1	1	1	1	1	1	4	1	0	2	1	0	0	1	1	1	0	1	-	1	1	1	2	0	1	0	1	67	84	44	
jurel_DEM2020_L120_n7_201mm(2x)	201	M	01/10/20	8	3	3	3	2	2	2	3	2	4	3	2	3	2	2	2	4	2	2	1	3	-	2	3	2	3	2	2	2	2	56	29	25	
jurel_DEM2020_L122_n6_148mm(2x)	148	M	01/10/20	8	3	1	2	1	2	1	-	1	3	2	1	2	2	2	1	3	2	1	1	2	-	1	3	1	3	1	2	1	1	46	45	39	
jurel_DEM2020_L122_n8_157mm(2x)	157	M	01/10/20	8	3	2	2	1	2	2	2	2	3	2	1	2	2	3	1	4	2	1	1	2	-	2	3	2	3	1	2	1	2	52	39	26	
jurel_DEM2020_L61_n6_214mm(2x)	214	M	01/10/20	8	3	4	5	3	2	5	-	2	6	4	1	3	2	5	2	6	2	4	2	4	-	3	4	6	5	2	4	3	2	27	41	35	
jurel_DEM2020_L65_n5_196mm(2x)	196	F	01/10/20	8	3	3	4	2	2	2	3	3	4	3	2	8	2	3	2	6	2	2	1	3	-	3	3	2	4	2	3	2	2	41	48	31	
jurel_PELACUS0319_L21_n18_169mm(2x)	169	F	01/04/19	8	5	3	4	2	2	4	5	4	5	4	3	4	5	5	2	6	5	5	2	3	-	4	5	5	-	4	5	4	5	38	28	22	
jurel_PELACUS0319_L29_n18_281mm(2x)	281	M	01/04/19	8	-	5	5	5	3	-	4	4	4	3	3	4	4	4	3	6	4	6	4	5	5	4	5	5	3	3	6	4	4	38	23	19	
jurel_PELACUS0319_L3_n20_219mm(2x)	219	F	01/03/19	8	4	4	4	3	3	4	4	4	6	4	4	4	5	3	4	4	5	4	4	-	3	5	5	4	4	5	4	4					

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	R24 ES	R26 IT	R28 IT	R30 PT	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 %
jurel03092020_n58_268mm(2x)	268	F	01/09/20	8	6	7	6	5	4	6	-	4	8	4	4	4	4	6	4	7	5	5	4	5	-	4	4	7	6	4	7	4	4	46	25	22
jurel10072019_n45_244mm(2x)	244	F	01/09/19	8	5	5	5	5	4	4	5	4	8	4	4	4	4	5	4	5	5	4	4	5	-	4	4	5	5	4	8	3	4	48	24	16
jurel10072019_n72_235mm(2x)	235	F	01/09/19	8	3	4	4	3	3	3	3	3	6	3	3	3	3	3	7	4	3	3	3	-	3	3	5	4	3	6	2	3	67	32	24	
jurel10072019_n97_251mm(2x)	251	M	01/09/19	8	4	4	5	3	3	3	3	3	5	3	3	3	3	3	8	4	3	3	3	-	3	3	4	4	3	5	3	3	67	31	22	
jurel10112020_n44_318mm(2x)	318	F	01/11/20	8	6	8	7	5	6	6	7	5	8	6	5	6	6	7	7	8	6	6	5	7	-	4	6	6	5	6	6	5	6	44	17	12
jurel13042021_n14_227mm(2x)	227	F	01/04/21	8	7	6	5	4	3	5	3	4	8	5	4	5	5	9	3	7	5	4	3	4	-	4	6	6	5	4	9	4	4	30	34	25
jurel22012019_n18_239mm(2x)	239	M	01/01/19	8	5	4	4	3	0	4	4	4	6	4	4	5	4	8	3	6	4	5	4	4	6	4	5	5	5	4	8	5	4	46	33	23
jurel22012019_n29_267mm(2x)	267	F	01/01/19	8	5	5	5	3	4	4	4	4	6	4	3	4	4	5	4	5	5	6	4	5	13	4	5	5	4	4	8	4	4	46	39	22
TT020920_2	324	U	02/09/20	28	6	7	7	10	3	-	7	5	8	4	3	8	5	8	6	10	7	10	3	7	-	6	6	4	6	6	8	4	6	23	33	26
TT110719_14c	390	U	11/07/19	28	9	11	11	14	8	-	10	8	11	8	9	10	8	10	9	11	10	11	7	10	-	8	10	9	-	9	10	6	10	28	17	13
TT110719_29b	376	U	11/07/19	28	10	11	10	12	6	-	11	7	11	8	9	9	10	11	11	13	8	12	7	12	-	7	8	12	-	10	12	5	11	20	22	19
TT110719_4	365	U	11/07/19	28	9	14	12	15	6	-	9	6	10	6	6	12	6	8	8	13	12	10	4	11	-	7	5	7	-	6	9	3	6	24	37	31
TT130619_15	367	U	13/06/19	28	7	8	7	13	6	-	7	6	7	7	6	6	6	7	9	7	9	7	5	7	-	7	7	7	6	7	4	7	58	22	12	
TT130619_19	352	U	13/06/19	28	8	13	11	13	6	-	7	6	7	7	6	7	7	8	7	-	7	-	5	6	-	6	7	8	-	7	9	4	7	39	30	21
TT130619_34	355	U	13/06/19	28	9	13	8	11	6	-	8	6	11	6	5	6	6	7	8	11	5	9	5	7	-	6	6	7	5	6	9	5	6	31	30	25
TT130619_35	296	U	13/06/19	28	8	11	7	7	4	-	7	4	7	4	3	5	4	5	6	9	6	8	3	8	-	5	4	4	5	4	6	4	4	31	35	29
TT130619_4	351	U	13/06/19	28	6	10	8	10	5	-	6	5	6	6	5	6	6	7	5	8	6	7	3	7	-	6	6	5	4	5	8	4	6	35	27	20
TT130619_7	364	U	13/06/19	28	9	9	9	11	6	-	9	6	8	8	7	7	8	10	9	12	7	10	5	7	-	6	8	10	5	9	10	4	9	23	24	20
TT170620_42	225	U	17/06/20	28	5	7	6	3	5	-	7	6	13	5	4	6	4	5	5	9	6	5	4	5	-	6	6	5	5	5	7	4	5	38	34	22
TT180321_12	370	U	18/03/21	28	-	17	10	10	8	-	7	9	12	9	8	9	9	11	13	9	10	10	11	-	8	9	10	-	9	11	4	9	33	24	16	
TT180321_1e	397	U	18/03/21	28	10	11	9	8	6	-	7	6	9	5	5	8	7	10	6	11	8	10	6	8	-	5	5	8	5	7	9	5	5	23	27	23
TT180321_2c	358	U	18/03/21	28	8	8	8	9	7	-	6	8	7	8	7	7	8	7	8	12	8	10	7	9	-	8	7	6	6	7	8	4	8	38	19	14
TT180321_3	446	U	18/03/21	28	-	11	10	13	8	-	8	6	10	9	8	8	9	10	9	13	7	14	6	11	-	6	9	12	4	9	11	7	9	20	27	21
TT180321_6e	394	U	18/03/21	28	9	10	10	10	7	-	9	9	10	8	9	9	8	10	8	11	8	10	7	10	-	10	8	9	-	8	8	6	10	32	14	11
TT180321_7	394	U	18/03/21	28	10	13	11	13	6	-	10	6	12	7	8	9	7	10	8	13	8	10	5	10	-	6	7	9	-	6	12	5	10	20	29	25
TT270219_54b	234	U	27/02/19	28	4	7	5	3	4	-	5	4	7	4	3	8	5	4	3	10	5	4	3	4	-	4	4	6	5	3	7	3	4	35	37	28
TT270219_58	249	U	27/02/19	28	4	5	4	5	4	-	5	4	7	4	3	5	5	4	4	9	4	4	3	11	-	4	4	4	4	4	8	3	4	54	39	27
TT270219_71b	254	U	27/02/19	28	5	9	5	4	6	-	10	5	7	6	2	7	7	5	4	12	7	5	4	11	-	5	6	6	5	4	7	3	5	27	39	29
TT270219_86	247	U	27/02/19	28	5	11	5	4	5	-	6	4	10	4	3	7	5	4	3	12	5	4	3	11	-	4	-	3	4	4	7	3	4	32	50	38
TT270219_91	242	U	27/02/19	28	6	8	6	5	5	-	7	5	7	6	5	9	8	7	5	13	6	5	5	10	-	5	7	6	5	6	10	5	5	38	31	23
TT290820_25	242	U	29/08/20	28	5	6	5	4	4	-	4	5	8	4	3	6	3	4	4	8	5	3	3	4	-	6	3	3	4	3	5	3	3	31	33	26

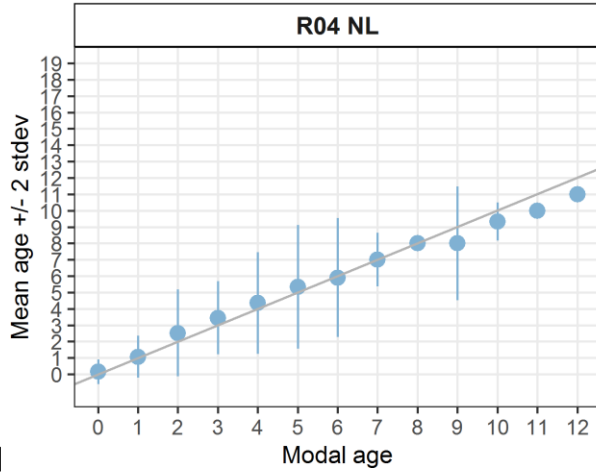
Table 6.3: Number of age readings per reader and modal age.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	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	19	19	19	19	14	2	19	19	19	19	19	19	10	19	19	19	19	19	19	19	2	19	18	19	19	19	19	19	18	482
1	30	30	30	30	30	20	28	30	30	30	30	28	23	30	30	30	30	30	30	30	7	30	30	30	29	30	30	30	30	795
2	25	28	28	28	28	19	24	28	28	28	28	28	23	28	28	28	28	28	28	28	12	28	28	28	27	28	28	28	25	743
3	51	55	55	55	55	16	54	55	55	54	55	55	49	54	55	55	55	55	55	55	13	55	55	54	43	55	55	53	1431	
4	37	44	44	44	44	19	43	44	44	43	43	43	36	44	43	44	44	43	44	44	12	44	43	44	37	44	43	42	1143	
5	32	42	41	41	40	15	38	42	42	41	42	42	28	42	42	41	42	42	42	42	10	42	39	42	26	42	42	38	1060	
6	11	14	14	14	13	6	14	14	14	14	14	14	12	14	14	14	14	14	14	14	6	14	13	13	9	14	14	14	363	
7	4	6	6	6	6	1	5	6	6	6	6	6	4	6	6	5	6	5	6	6	2	6	6	6	2	6	6	6	148	
8	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	26	
9	3	5	4	5	4	0	5	5	5	5	4	4	4	4	5	4	5	5	5	5	0	5	5	5	2	5	5	4	117	
10	3	3	3	3	3	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0	3	3	3	0	3	3	3	75	
11	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	25	
12	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	25	
Total	218	249	247	248	240	98	236	249	249	246	247	245	195	247	248	246	249	247	249	249	64	249	243	247	195	249	248	236	6433	

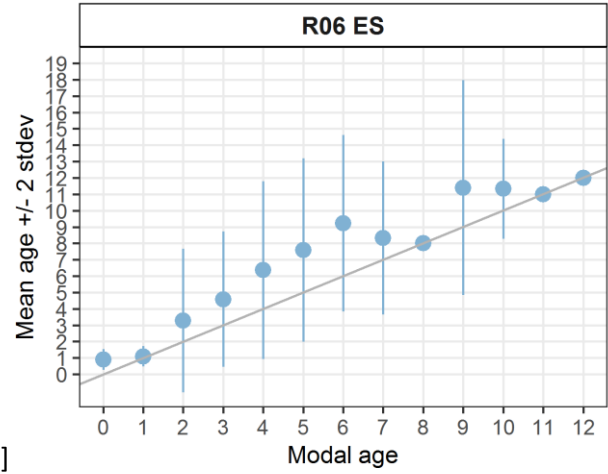
**Table 6.4:** Age composition by reader.

Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	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	3	23	22	4	10	22	26	0	15	22	28	3	0	24	19	18	4	21	10	<b>32</b>	
1	31	51	25	48	28	15	30	25	19	23	41	26	22	23	28	26	18	28	32	43	7	25	22	34	31	32	25	<b>24</b>	
2	17	21	12	22	38	19	30	33	31	24	62	23	37	18	38	16	20	18	48	27	7	30	28	24	26	30	31	<b>56</b>	
3	38	17	28	31	55	16	32	55	31	63	53	51	48	26	54	23	40	34	78	46	8	47	68	18	38	69	11	<b>66</b>	
4	39	27	46	23	45	14	25	57	33	60	31	56	24	39	31	19	45	32	26	32	4	62	46	41	51	41	20	<b>38</b>	
5	32	26	33	30	26	15	32	36	28	25	22	29	24	45	22	38	49	33	26	24	5	36	25	37	38	25	32	<b>16</b>	
6	15	21	27	23	18	12	21	11	27	10	4	21	14	19	20	36	28	27	3	24	7	15	22	32	7	16	31	<b>3</b>	
7	7	20	20	18	5	4	18	2	35	9	5	13	5	24	12	17	10	16	6	20	7	4	6	16	0	6	24	<b>1</b>	
8	4	12	18	11	3	1	7	2	21	7	4	10	7	10	7	22	14	14	1	11	7	3	3	13	0	2	29	<b>0</b>	
9	7	21	8	12	1	0	9	3	5	2	3	7	2	8	5	14	3	3	0	4	2	1	2	6	0	5	14	<b>0</b>	
10	4	7	13	11	0	1	3	1	6	0	0	2	1	10	1	6	4	13	1	4	1	2	1	5	0	1	9	<b>0</b>	
11	1	12	4	6	0	0	2	0	6	0	0	0	1	1	2	14	1	2	0	8	1	0	0	0	0	1	7	<b>0</b>	
12	0	4	1	3	0	0	1	0	3	0	0	2	0	1	1	5	2	3	0	1	2	0	1	3	0	0	3	<b>0</b>	
13	0	4	0	4	0	0	0	0	1	0	0	1	0	1	1	8	0	0	0	1	3	0	0	0	0	0	0	1	<b>0</b>
14	0	3	1	2	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	1	0	0	0	0	0	0	0	0	<b>0</b>
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	0	0	0	1	<b>0</b>
17	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	<b>0</b>
18	0	0	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	<b>0</b>
<b>Total</b>	<b>218</b>	<b>249</b>	<b>247</b>	<b>248</b>	<b>240</b>	<b>98</b>	<b>236</b>	<b>249</b>	<b>249</b>	<b>246</b>	<b>247</b>	<b>245</b>	<b>195</b>	<b>247</b>	<b>248</b>	<b>246</b>	<b>249</b>	<b>247</b>	<b>249</b>	<b>249</b>	<b>64</b>	<b>249</b>	<b>243</b>	<b>247</b>	<b>195</b>	<b>249</b>	<b>248</b>	<b>236</b>	

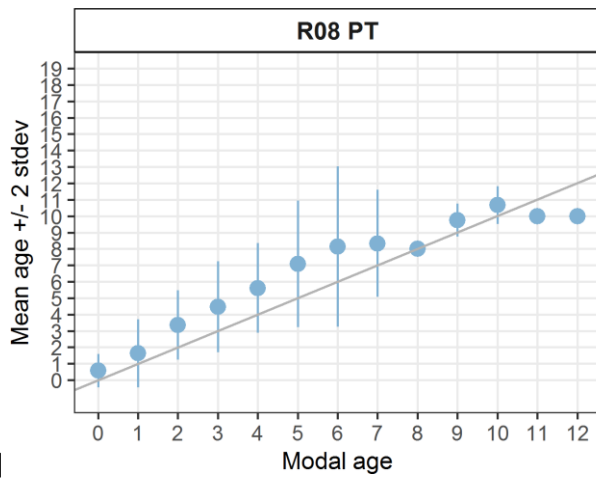




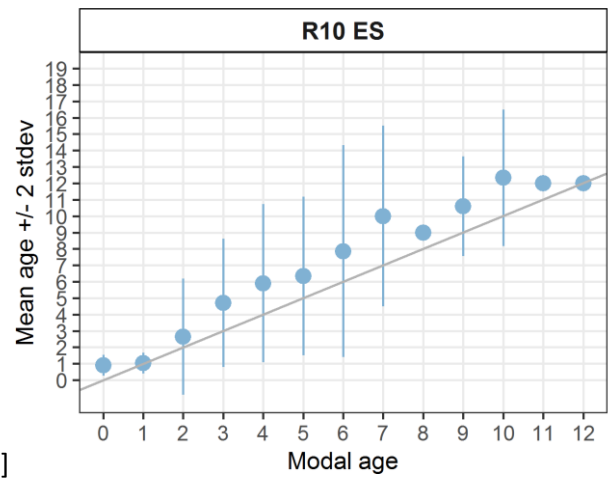
[[1]]



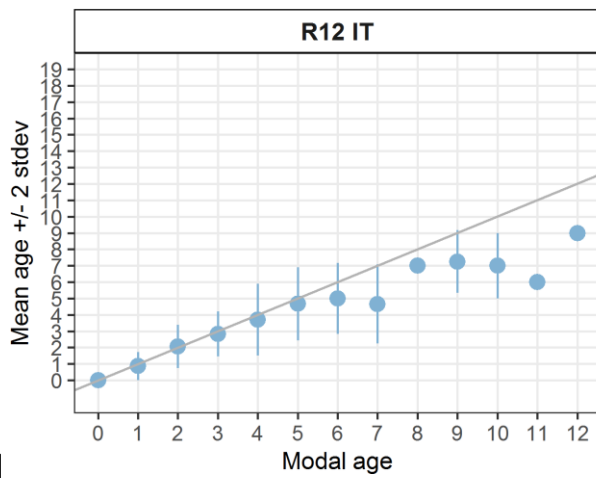
[[2]]



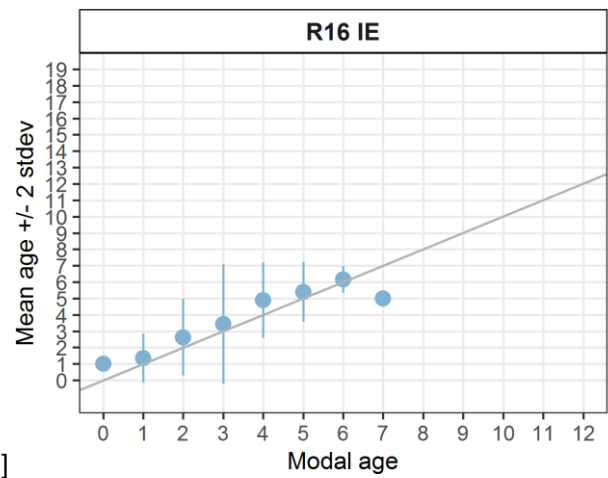
[[3]]



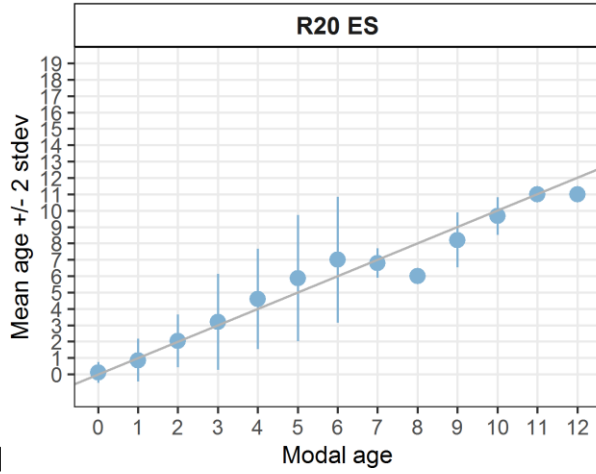
[[4]]



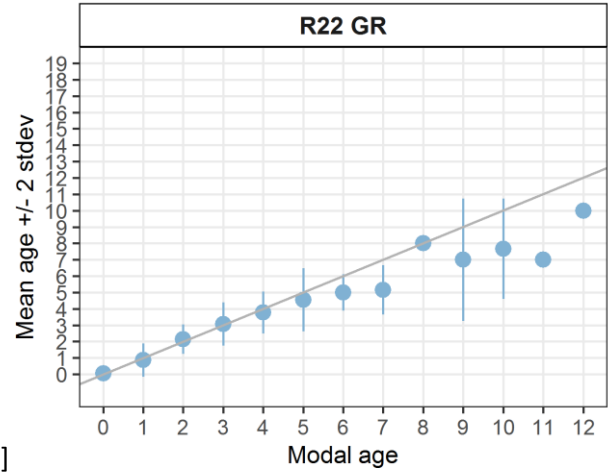
[[5]]



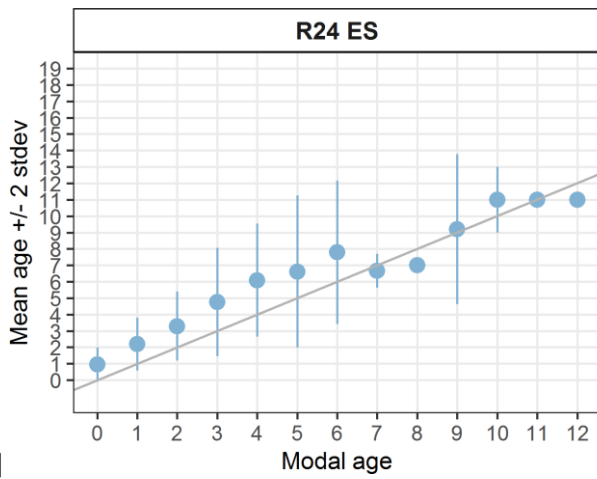
[[6]]



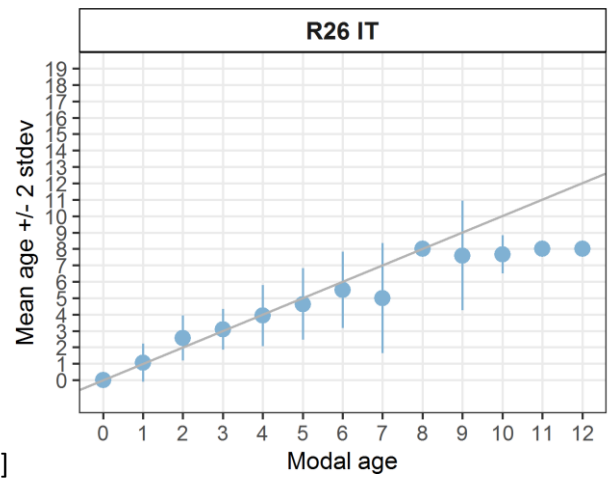
[[7]]



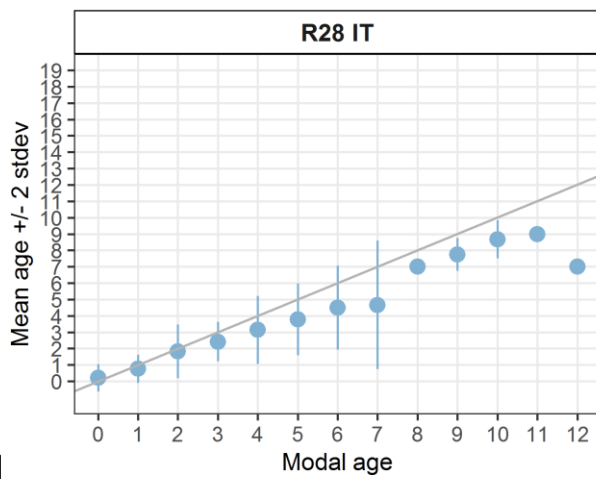
[[8]]



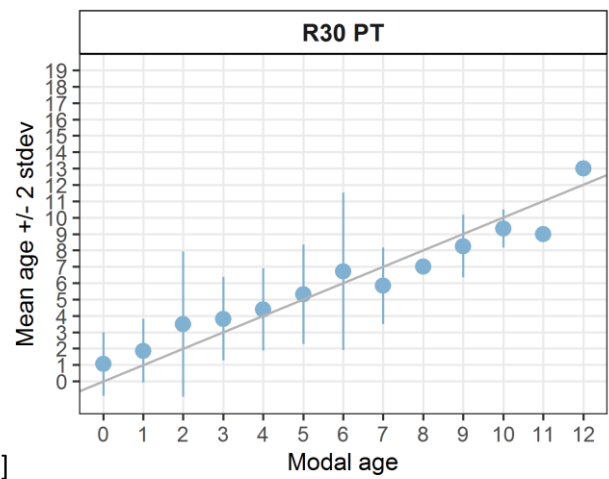
[[9]]



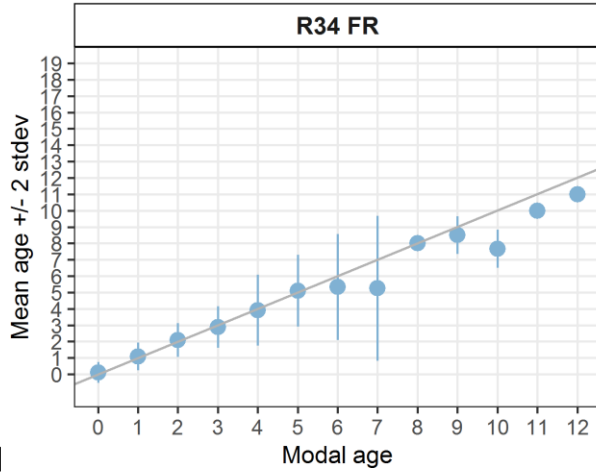
[[10]]



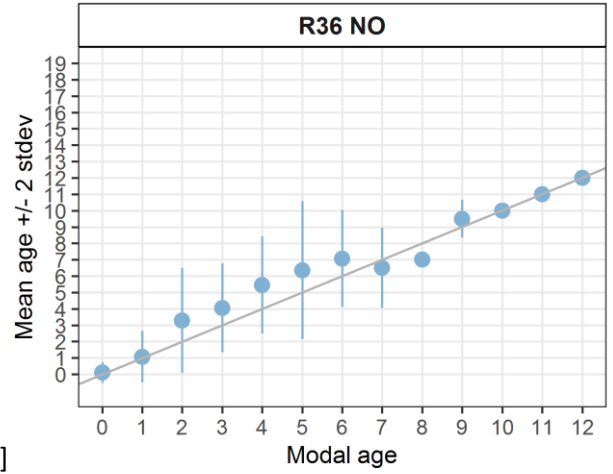
[[11]]



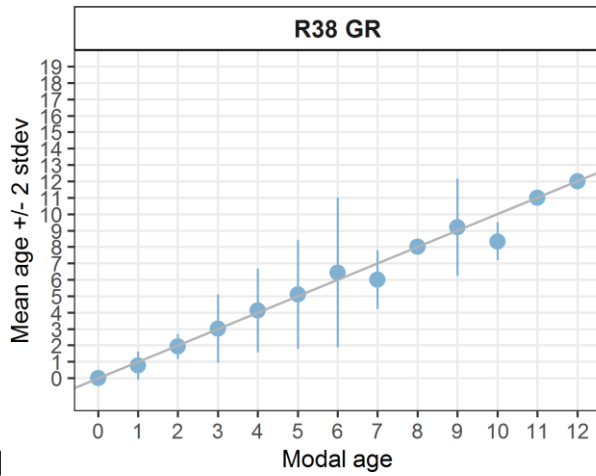
[[12]]



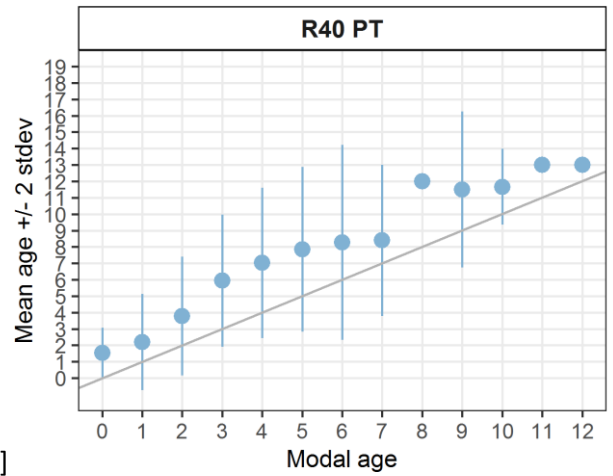
[[13]]



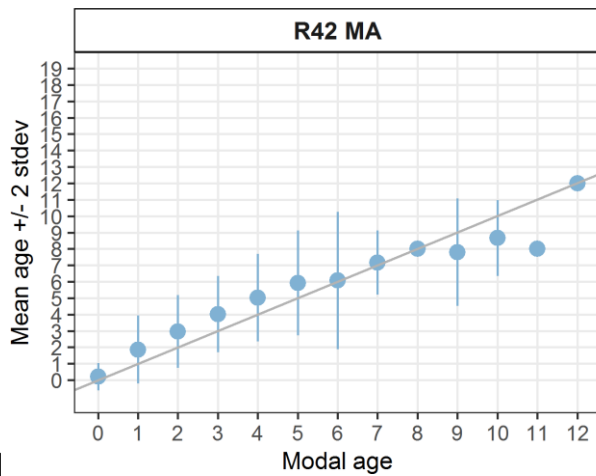
[[14]]



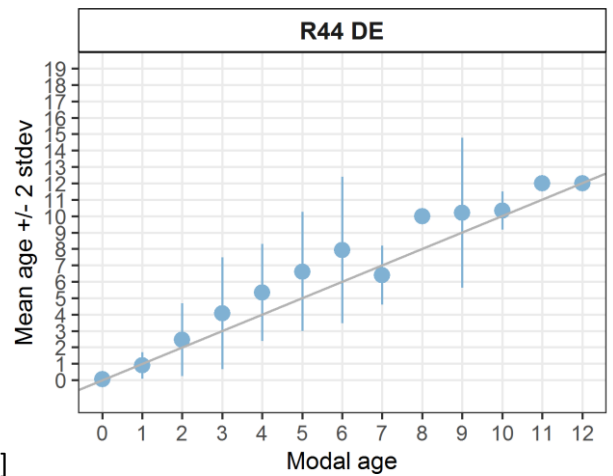
[[15]]



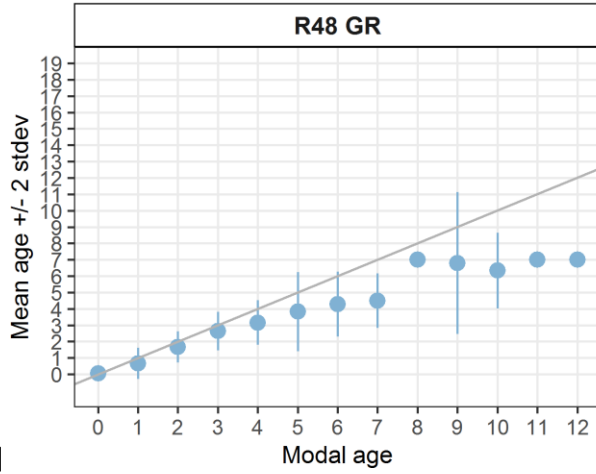
[[16]]



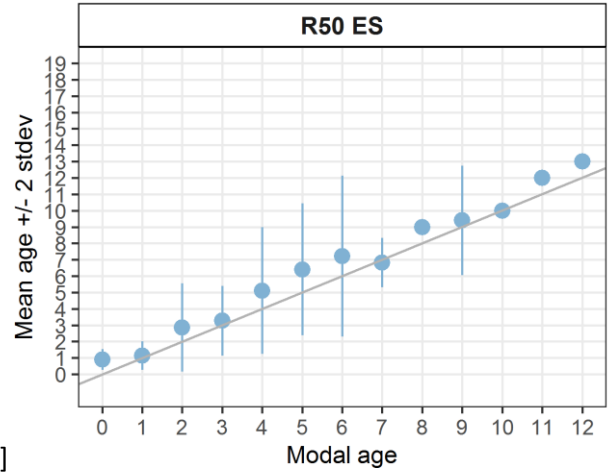
[[17]]



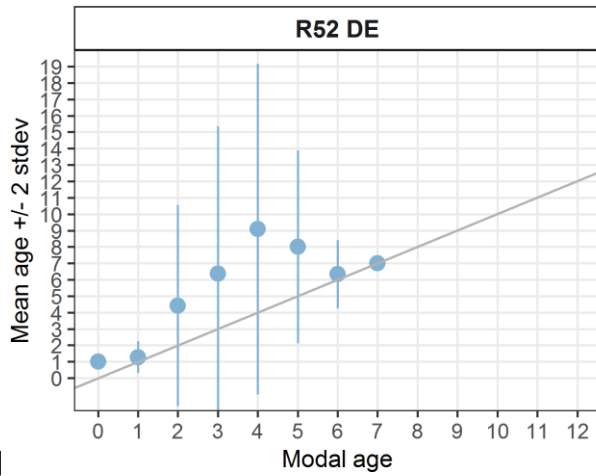
[[18]]



[[19]]



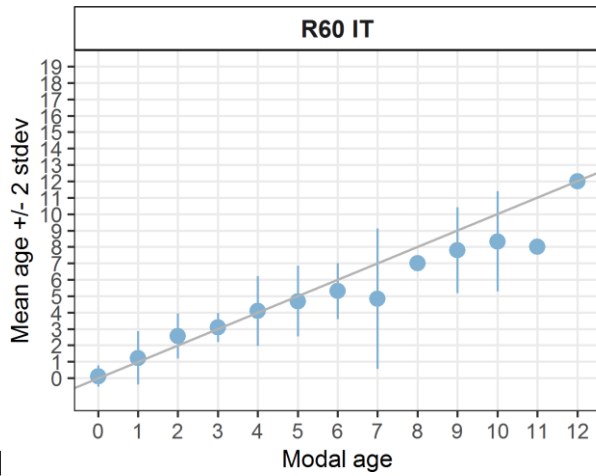
[[20]]



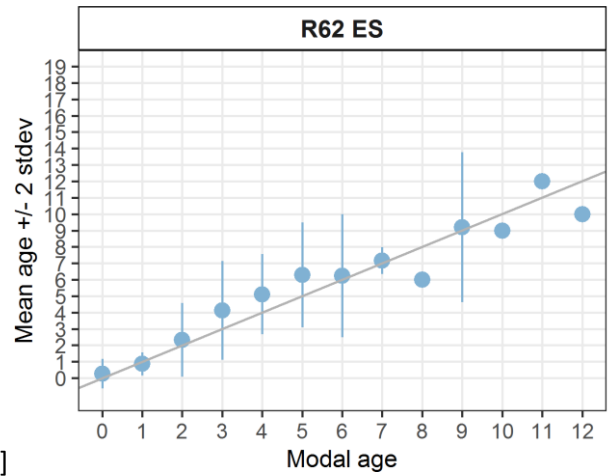
[[21]]



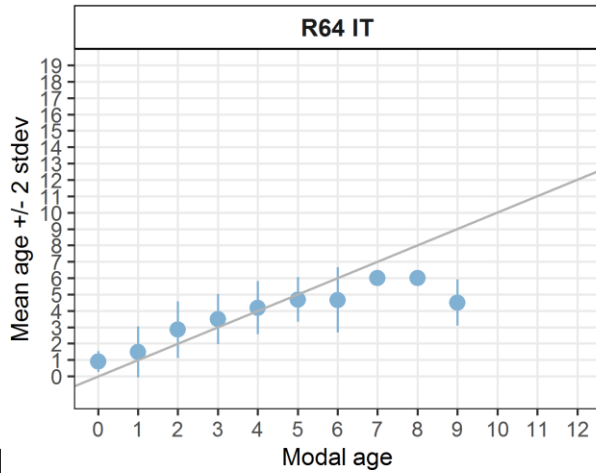
[[22]]



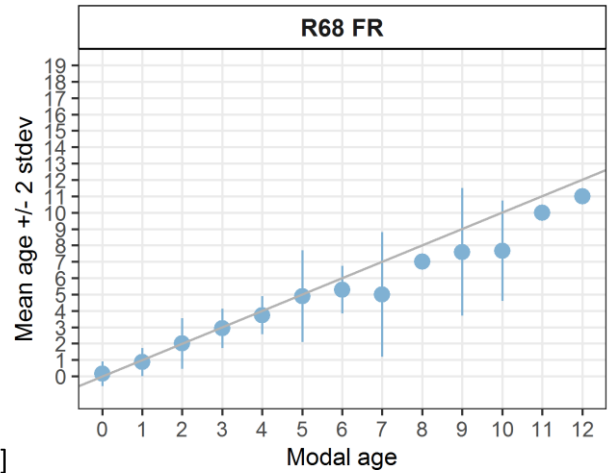
[[23]]



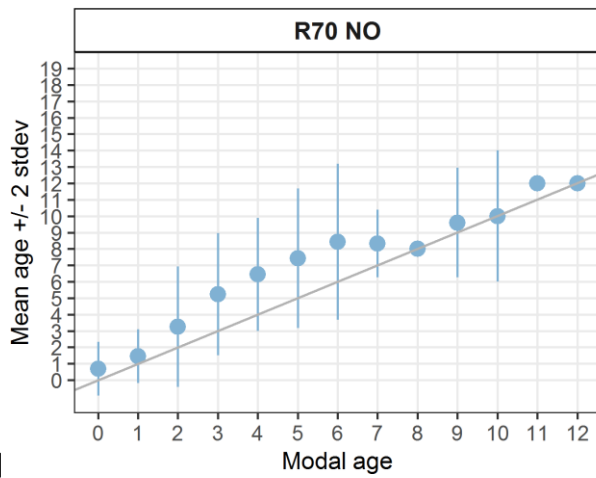
[[24]]



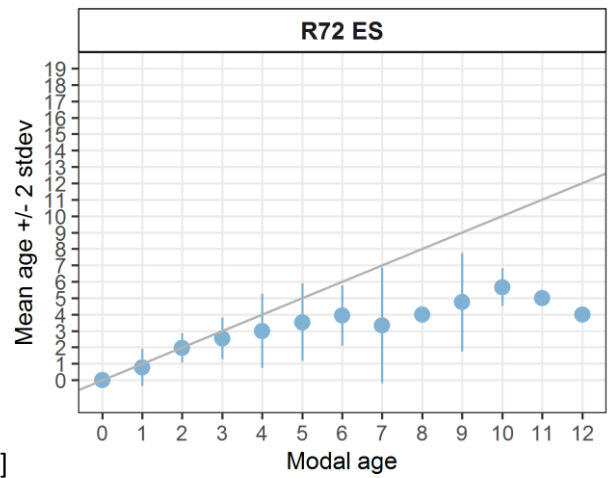
[[25]]



[[26]]



[[27]]



[[28]]

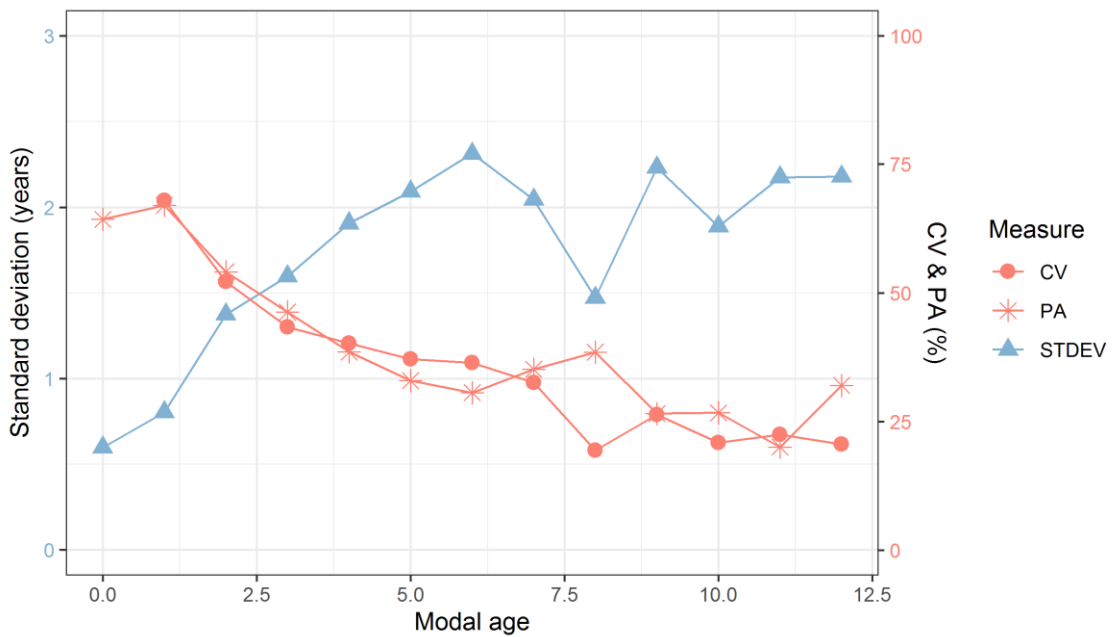
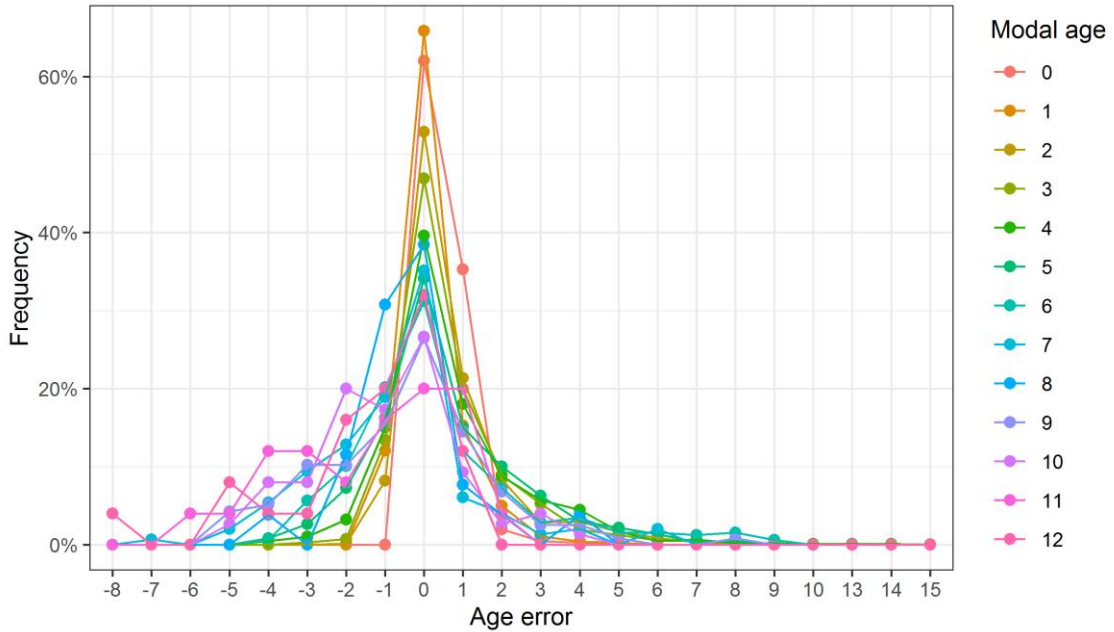
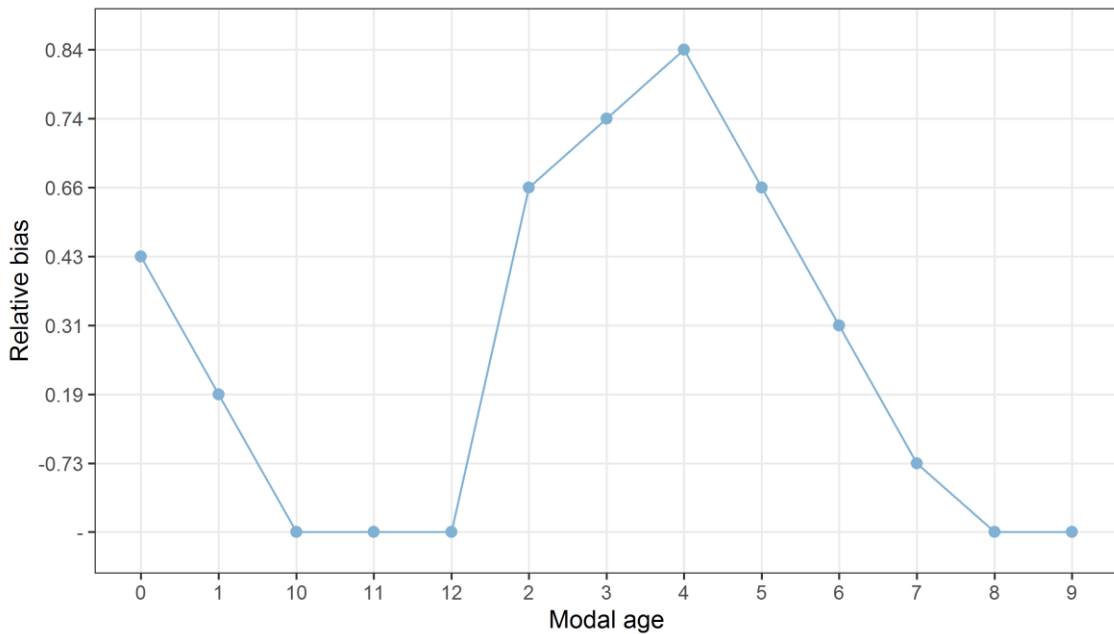


Figure 6.1: CV, PA and STDEV (standard deviation) are plotted against modal age



**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.



**Figure 6.3:** The relative bias by modal age as estimated by all age readers combined.

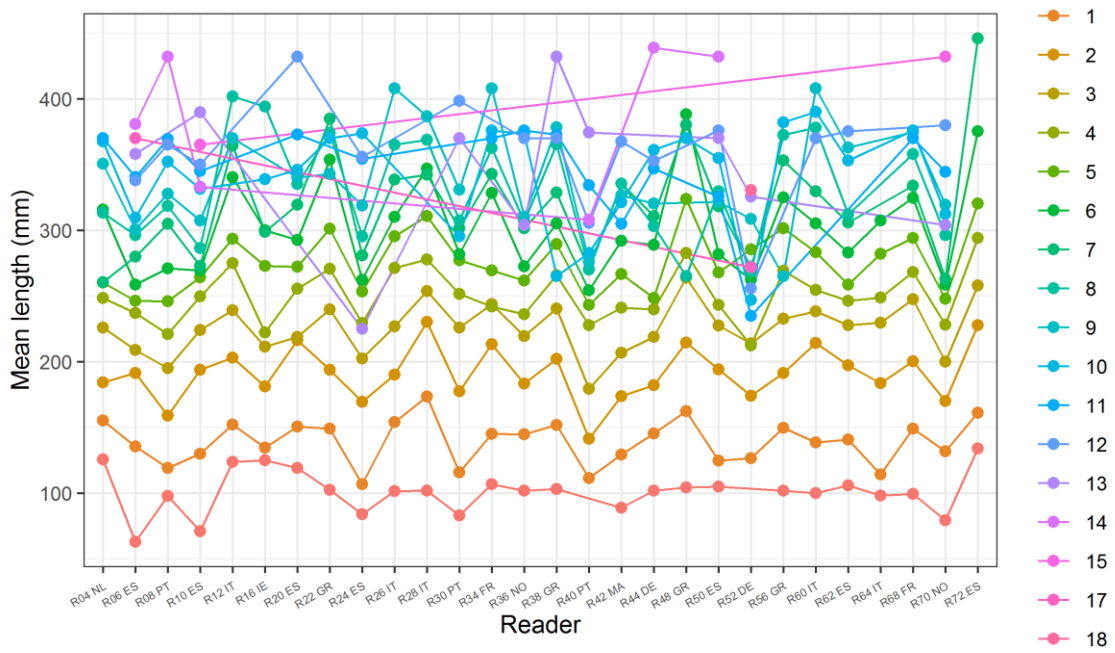


Figure 6.4: The mean length at age as estimated by each age reader.

## 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	R36 NO	R42 MA	R62 ES	Modal age	PA %	CV %	APE %
001L_122_08-08-20_ST.40 IONIO	122	U	08/08/2020	20	0	1	1	1	0	-	0	1	1	1	62	83	75
001L_158_01-09-20_ST.1-AIGAIO-GSA 22	158	F	09/01/2020	22	0	1	2	1	1	-	2	2	2	2	50	54	45
001L_250_27-07-20_IONIO	250	F	27/07/2020	20	0	1	6	4	3	-	4	4	-	4	43	65	49
001R_191_16-06-20_IONIO(PATRA)	191	U	16/06/2020	20	0	1	3	1	1	-	1	2	1	1	62	71	50
001R_326_11-08-20_ST.46 IONIO	326	F	08/11/2020	20	0	9	7	9	4	-	7	8	5	7	25	50	38
002L_103_29-07-20_SALAMINA	103	F	29/07/2020	22	0	1	1	1	0	-	0	0	0	0	62	-	-
002L_154_20-08-20_ST.67 IONIO	154	F	20/08/2020	20	1	1	2	1	1	-	1	1	1	1	88	31	19
002L_267_10-11-20_IONIO	267	F	11/10/2020	20	3	4	6	5	4	-	5	5	5	5	50	20	16
002R_260_16-06-20_IONIO(PATRA)	260	M	16/06/2020	20	1	5	5	5	5	-	5	5	6	5	75	33	20
002R_293_01-06-20_SARONIKOS	293	F	06/01/2020	22	1	6	8	8	4	-	6	6	6	6	50	40	28
003L_105_12-08-20_ST.53 IONIO	105	U	08/12/2020	20	0	1	1	1	0	-	0	0	0	0	62	-	-
003L_205_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	205	M	26/08/2020	22	3	2	4	3	3	-	3	3	3	3	75	18	8
003L_255_16-06-20_IONIO(PATRA)	255	F	16/06/2020	20	6	7	6	7	5	-	5	5	6	5	38	14	11
004L_150_12-08-20_ST.57 IONIO	150	F	08/12/2020	20	0	1	1	1	0	-	0	1	1	1	62	83	75
004L_259_27-07-20_IONIO	259	F	27/07/2020	20	5	1	6	5	5	-	5	4	5	5	62	34	22
005L_205_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	205	F	26/08/2020	22	4	2	4	3	3	-	3	3	3	3	62	21	14
005L_291_01-06-20_SARONIKOS	291	M	06/01/2020	22	-	7	9	9	3	-	5	7	7	7	43	32	23
006L_101_29-07-20_ST.55 IONIO	101	F	29/07/2020	22	1	1	1	1	-	-	0	0	0	1	57	94	86
006L_141_13-08-20_ST.55 IONIO	141	F	13/08/2020	20	1	1	0	1	0	-	0	2	1	1	50	94	75
006L_154_01-09-20_ST.1-AIGAIO-GSA 22	154	F	09/01/2020	22	2	1	1	2	2	-	2	2	2	2	75	26	21
006L_257_05-10-20_IONIO	257	F	10/05/2020	20	3	4	5	4	4	-	5	4	4	4	62	16	11
006L_257_10-11-20_IONIO	257	M	11/10/2020	20	4	6	6	4	4	-	3	5	4	4	50	24	19
006R_331_01-06-20_SARONIKOS	331	F	06/01/2020	22	3	8	8	10	5	-	7	10	6	8	25	34	26
007L_229_15-06-20_SARONIKOS	229	F	15/06/2020	22	3	3	4	3	3	-	4	3	4	3	62	15	14
007L_266_06-10-20_IONIO	266	U	10/06/2020	20	4	8	7	6	4	-	6	5	6	6	38	24	18
008L_199_05-10-20_IONIO	199	F	10/05/2020	20	7	1	4	5	5	-	1	5	5	5	50	51	39
008L_256_26-08-20_ST.16-ARGOSARWNIKOS-GSA 22	256	F	26/08/2020	22	3	4	3	5	2	-	5	5	4	5	38	29	23
008L_259_06-10-20_IONIO	259	F	10/06/2020	20	-	9	7	6	5	-	4	5	6	5	29	27	19
009L_291_01-06-20_SARONIKOS	291	M	06/01/2020	22	-	2	10	11	3	-	10	5	9	10	29	52	46
009L_306_06-10-20_IONIO	306	F	10/06/2020	20	-	9	8	10	5	-	8	8	6	8	43	22	16
009R_203_10-08-20_ST.59 IONIO	203	F	08/10/2020	20	-	6	5	6	4	-	6	6	5	6	57	14	12
010L_106_12-08-20_ST.53 IONIO	106	U	08/12/2020	20	0	1	0	1	0	-	0	0	0	0	75	-	-
010L_306_10-11-20_IONIO	306	F	11/10/2020	20	-	7	9	11	4	-	5	9	7	7	29	33	26
011L_140_13-08-20_ST.55 IONIO	140	F	13/08/2020	20	0	1	2	1	0	-	0	2	1	0	38	-	-
011L_201_10-08-20_ST.59 IONIO	201	F	08/10/2020	20	5	8	4	7	3	-	7	6	4	4	25	32	27
011L_217_06-10-20_IONIO	217	F	10/06/2020	20	3	3	4	3	3	-	3	3	4	3	75	14	12
011L_276_01-06-20_SARONIKOS	276	M	06/01/2020	22	4	4	8	14	4	-	4	5	5	4	50	58	42
012L_151_29-08-20_ST.14-ARGOSARWNIKOS	151	M	29/08/2020	22	2	2	3	2	1	-	1	2	1	2	50	40	32
012L_201_10-08-20_ST.59 IONIO	201	F	08/10/2020	20	7	7	4	8	3	-	7	4	4	4	38	35	32
013R_132_13-08-20_ST.55 IONIO	132	F	13/08/2020	20	0	1	1	1	0	-	0	1	0	0	50	-	-
014L_205_10-08-20_ST.59 IONIO	205	M	08/10/2020	20	3	3	4	3	2	-	3	3	4	3	62	21	14
014R_52_05-08-20_ST.2-ARGOSARWNIKOS	52	U	08/05/2020	22	1	1	0	1	0	-	0	0	1	0	50	-	-
015R_272_01-06-20_SARONIKOS	272	F	06/01/2020	22	4	4	7	6	4	-	5	5	5	4	38	21	15
017L_102_29-07-20_SALAMINA	102	F	29/07/2020	22	1	1	1	1	0	-	0	0	0	0	50	-	-
018R_57_05-08-20_ST.2-ARGOSARWNIKOS	57	U	08/05/2020	22	0	1	0	1	-	-	0	0	1	0	57	-	-
019R_100_12-08-20_ST.53 IONIO	100	U	08/12/2020	20	0	1	0	1	0	-	0	0	0	0	75	-	-
019R_203_31-08-20_ST.22-ARGOSARWNIKOS	203	F	31/08/2020	22	3	4	4	4	3	-	3	3	4	3	50	15	14
020L_276_01-06-20_SARONIKOS	276	F	06/01/2020	22	5	5	6	9	4	-	5	6	6	5	38	26	17
020R_52_05-08-20_ST.2-ARGOSARWNIKOS	52	U	08/05/2020	22	0	1	1	0	-	-	0	0	1	0	57	-	-
021R_220_15-06-20_SARONIKOS	220	F	15/06/2020	22	-	4	4	3	3	-	4	4	4	4	71	13	11
025L_255_31-08-20_ST.22-ARGOSARWNIKOS	255	F	31/08/2020	22	4	4	6	9	3	-	6	5	5	4	25	35	25
027L_254_01-06-20_SARONIKOS	254	F	06/01/2020	22	5	4	4	7	3	-	4	5	4	4	50	27	19
033R_256_01-06-20_SARONIKOS	256	F	06/01/2020	22	4	3	5	3	3	-	4	5	4	3	38	22	17
034L_103_12-08-20_ST.53 IONIO	103	U	08/12/2020	20	0	1	0	1	0	-	0	0	0	0	75	-	-
036L_100_12-08-20_ST.53 IONIO	100	U	08/12/2020	20	0	1	1	1	-	-	0	0	0	0	57	-	-
036L_272_01-06-20_SARONIKOS	272	F	06/01/2020	22	4	4	6	7	4	-	6	5	4	4	50	24	20
038L_106_12-08-20_ST.53 IONIO	106	F	08/12/2020	20	0	1	0	1	-	-	0	0	0	0	71	-	-
1	225	F	14/02/2016	11.1	4	4	4	4	4	4	4	4	4	4	100	0	0
1_1.5x8	118	U	07/02/2019	27.9.a	1	1	0	1	0	1	1	1	1	1	78	57	44
10	175	F	09/03/2020	11.1	2	2	3	2	2	4	3	3	2	2	56	28	24
10_1.5x8	255	F	24/09/2019	27.9.a	4	6	-	5	-	5	5	5	5	5	71	12	6
11	160	F	14/12/2024	11.1	2	2	3	2	1	1	1	5	1	1	44	66	44
11_1.5x8	235	F	23/08/2019	27.9.a	5	5	5	5	2	-	5	3	6	5	62	29	22
12	216	F	09/03/2020	11.1	2	2	4	2	2	3	3	4	2	2	56	32	28
12_1.5x8	122	U	18/11/2019	27.9.a	4	3	3	3	2	2	5	3	3	3	56	30	20
13	134	F	11/02/2016	11.1	1	1	1	1	1	1	1	3	1	1	89	55	32
13_1.5x8	181	M	09/12/2019	27.9.a	3	3	4	3	2	3	5	3	4	3	56	26	20
14	217	M	14/02/2016	11.1	1	3	4	3	2	4	3	3	4	3	44	33	22
14_1.5x8	213	F	25/10/2019	27.9.a	5	5	5	4	3	4	5	5	4	5	56	16	14
15	207	M	18/05/2016	11.1	2	2	3	2	2	2	2	3	2	2	78	20	16
15_1.5x8	265	M	19/11/2019	27.9.a	9	9	-	9	-	-	10	8	9	9	60	8	4
16	207	M	14/02/2016	11.1	2	2	4	3	2	2	3	3	2	2	56	28	24
17	136	M	16/02/2017	11.1	1	1	1	1	1	2	1	2	1	1	78	36	28
18	189	M	18/05/2016	11.1	2	2	2	2	2	2	3	2	2	2	89	16	9
19	150	M	18/05/2016	11.1	1	1	2	1	1	2	2	2	1	1	56	36	34
2	213	F	14/02/2016	11.1	3	2	3	3	2	3	3	3	2	3	67	19	17
2_1.5x8	155	F	15/05/2019	27.9.a	1	1	2	1	1	2	2	1	1	1	67	38	33



Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	Modal age	PA %	CV %	APE %
20	165	M	18/05/2016	11.1	2	1	1	1	1	2	2	2	1	1	56	36	34
21	180	M	09/03/2020	11.1	1	2	3	2	2	3	4	3	2	2	44	36	29
22	239	M	09/03/2019	11.1	3	3	4	2	3	3	3	3	3	3	78	17	7
23	140	M	14/12/2021	11.1	0	1	1	1	1	2	1	4	0	1	56	98	65
24	152	M	11/02/2016	11.1	2	2	3	1	2	2	2	3	2	2	67	28	19
25	318	M	27/07/2020	11.1	1	12	7	9	7	5	7	6	6	7	33	44	29
26	195	M	09/03/2020	11.1	3	1	4	4	2	4	4	4	3	4	56	34	27
27	112	U	16/02/2017	11.1	1	1	1	1	1	1	1	1	1	1	100	0	0
28	115	U	19/07/2016	11.1	1	1	1	0	1	1	1	1	0	1	78	57	44
29	105	U	19/07/2016	11.1	0	1	1	1	0	1	1	1	0	1	67	75	67
3	142	F	16/02/2017	11.1	1	1	1	1	1	1	1	3	1	1	89	55	32
3_1.5x8	202	M	13/02/2019	27.9.a	2	2	3	2	3	4	2	3	2	2	56	28	24
30	95	U	19/07/2016	11.1	0	1	1	1	0	1	1	1	0	1	67	75	67
4	205	F	18/05/2016	11.1	3	3	3	3	3	3	5	3	3	3	89	21	12
4_1.5x8	265	F	06/05/2019	27.9.a	4	6	5	5	4	5	5	5	6	5	56	14	9
5	195	F	18/05/2016	11.1	2	2	2	2	2	2	3	3	2	2	78	20	16
5_1.5x8	252	F	26/06/2019	27.9.a	4	4	4	4	3	4	3	4	5	4	67	15	10
6	162	F	18/05/2016	11.1	1	1	2	1	1	1	1	3	1	1	78	53	39
6_1.5x8	192	M	07/05/2019	27.9.a	1	2	3	2	1	2	2	2	2	2	67	32	21
7	153	F	18/05/2016	11.1	1	1	1	1	1	1	1	2	1	1	89	30	18
7_1.5x8	152	U	13/06/2019	27.9.a	1	1	2	1	1	1	1	1	1	1	89	30	18
8	312	F	27/07/2020	11.1	4	7	8	5	5	5	5	7	8	5	44	25	22
8_1.5x8	163	M	29/07/2019	27.9.a	1	1	3	1	1	1	1	1	1	1	89	55	32
9	272	F	27/07/2020	11.1	-	6	6	4	4	5	5	6	5	5	38	16	13
9_1.5x8	205	M	24/09/2019	27.9.a	3	2	3	2	1	2	3	3	2	2	44	30	25
DESTT020920_11	370	U	02/09/2020	27.9	11	12	10	12	9	-	12	12	10	12	50	11	9
DESTT020920_1b	432	U	02/09/2020	27.9	6	11	10	10	7	-	9	6	6	6	38	26	23
DESTT020920_6	432	U	02/09/2020	27.9	6	14	14	11	-	-	10	6	6	6	43	38	32
DESTT020920_9	370	U	02/09/2020	27.9	-	9	10	9	6	-	7	5	5	5	29	28	24
DESTT090920_7	159	U	09/09/2020	27.9	2	2	3	1	1	-	1	3	1	1	50	51	43
GBD_19_B47_C1_O_0003	321	U	09/10/2017	7	-	7	6	5	5	6	4	3	3	3	25	30	24
GBD_19_B47_C1_O_0030	297	U	08/10/2017	7	7	9	6	5	5	7	7	4	6	7	33	24	18
GBD_19_B47_C1_O_0031	265	U	08/10/2017	7	5	9	5	3	3	4	5	4	5	5	44	37	24
GBD_19_B47_C1_O_0035	272	U	08/10/2017	7	-	11	6	5	4	7	7	4	7	7	38	36	25
GBD_19_B47_C1_O_0042	234	U	07/10/2017	7	3	9	4	4	2	2	5	3	2	2	33	59	41
GBD_19_B47_C1_O_0043	228	U	07/10/2017	7	4	10	3	3	3	3	4	4	3	3	56	55	32
GBD_19_B47_C1_O_0044	254	U	07/10/2017	7	5	8	5	3	3	5	4	3	3	3	44	38	29
GBD_19_B47_C1_O_0045	230	U	07/10/2017	7	-	6	4	2	3	3	4	3	2	3	38	39	29
GBD_19_B47_C1_O_0046	235	U	07/10/2017	7	-	4	5	2	2	2	2	3	1	2	50	50	39
GBD_19_B47_C1_O_0047	320	U	07/10/2017	7	5	7	6	4	6	6	7	6	6	6	56	16	10
GBD_19_B47_C1_O_0048	394	U	07/10/2017	7	-	11	8	6	7	8	5	5	9	5	25	28	22
GBD_19_B47_C1_O_0054	316	U	11/10/2017	7	5	9	7	4	4	7	9	6	8	4	22	30	24
GBD_19_B47_C1_O_0055	304	U	11/10/2017	7	4	7	5	4	4	5	5	5	4	4	44	20	14
GBD_19_B47_C1_O_0056	339	U	08/10/2017	7	-	9	9	10	0	10	8	6	10	10	38	44	31
GBD_19_B47_C1_O_0057	322	U	08/10/2017	7	-	9	7	6	5	-	8	5	10	5	29	27	22
GBD_19_B47_C1_O_0081	256	U	08/10/2017	7	7	9	6	7	4	-	6	5	8	6	25	25	19
GBD_19_B47_C1_O_0082	277	U	08/10/2017	7	7	7	7	7	4	-	7	6	7	7	75	16	12
GBD_19_B47_C1_O_0083	278	U	08/10/2017	7	5	7	6	7	4	-	6	5	8	5	25	22	17
GBD_19_B47_C1_O_0084	269	U	08/10/2017	7	4	5	6	6	3	-	4	4	4	4	50	24	19
GBD_19_B47_C1_O_0085	288	U	08/10/2017	7	-	7	8	7	4	-	6	4	8	4	29	27	22
GBD_19_B47_C1_O_0086	248	U	08/10/2017	7	4	7	4	5	4	-	4	5	4	4	62	23	17
GBD_19_B47_C1_O_0087	264	U	08/10/2017	7	4	6	6	4	3	-	3	3	4	3	38	30	23
GBD_19_B47_C1_O_0088	313	U	08/10/2017	7	5	11	10	7	4	-	7	5	6	5	25	36	27
GBD_19_B48_C1_O_0001	257	U	24/01/2018	7	3	10	4	7	3	-	4	4	3	3	38	52	39
GBD_19_B48_C1_O_0002	255	U	24/01/2018	7	3	6	5	5	2	-	2	2	2	2	50	50	44
GBD_19_B48_C1_O_0005	244	U	24/01/2018	7	4	5	4	6	3	-	4	4	4	4	62	21	15
GBD_19_B48_C1_O_0007	235	U	24/01/2018	7	4	5	4	6	3	-	4	4	5	4	50	21	16
GBD_19_B48_C1_O_0009	237	U	24/01/2018	7	3	5	3	5	3	-	4	4	4	3	38	22	17
GBD_19_B48_C1_O_0015	244	U	24/01/2018	7	3	5	3	7	2	-	4	4	4	4	38	38	25
GBD_19_B48_C1_O_0016	248	U	24/01/2018	7	4	6	4	6	3	-	4	4	4	4	62	24	19
GBD_19_B48_C1_O_0017	257	U	24/01/2018	7	4	6	4	5	3	-	4	4	4	4	62	21	15
GBD_19_B48_C1_O_0020	222	U	25/01/2018	7	4	5	5	7	3	-	4	4	5	4	38	26	19
GBD_19_B48_C1_O_0027	259	U	24/01/2018	7	5	5	5	6	3	-	3	3	4	3	38	27	24
GBD_19_B48_C1_O_0033	221	U	24/01/2018	7	3	4	3	6	3	-	4	3	6	3	50	33	25
GBD_19_B48_C1_O_0036	242	U	24/01/2018	7	5	4	4	8	3	-	3	4	7	4	38	39	30
GBD_19_B48_C1_O_0037	239	U	24/01/2018	7	5	4	4	7	3	-	5	4	5	4	38	26	19
GBD_19_B48_C1_O_0038	239	U	24/01/2018	7	3	3	3	6	2	-	4	3	4	3	50	34	25
GBD_19_B48_C1_O_0039	230	U	24/01/2018	7	3	4	4	6	2	-	5	4	5	4	38	30	22
GBD_19_B48_C1_O_0043	226	U	24/01/2018	7	4	4	4	4	2	-	4	4	4	4	88	19	12
GBD_19_B48_C1_O_0044	231	U	24/01/2018	7	3	5	3	4	2	-	3	3	3	3	62	27	19
GBD_19_B48_C1_O_0045	231	U	24/01/2018	7	2	5	5	5	3	-	3	3	3	3	50	33	28
GBD_19_B48_C1_O_0046	235	U	24/01/2018	7	3	5	3	5	3	-	4	4	4	3	38	22	17
GBD_19_B48_C1_O_0048	237	U	10/02/2018	7	4	4	4	6	2	-	4	3	4	4	62	29	18
GBD_19_B48_C1_O_0049	265	U	24/01/2018	7	4	5	6	5	3	-	5	4	5	5	50	20	16
GSA_22_01	241	F	24/02/2021	22	3	3	5	3	3	-	4	5	4	3	50	24	20
GSA_22_02	188	M	24/02/2021	22	2	2	3	2	2	-	2	4	2	2	75	31	24
GSA_22_03	126	F	24/02/2021	22	1	1	1	1	1	-	1	1	1	1	100	0	0
GSA_22_04	46	U	19/04/2021	22	0	0	0	0	0	-	0	0	0	0	100	-	-
GSA_22_05	80	U	22/04/2021	22	0	0	1	1	0	-	0	0	1	0	62	-	-
GSA_22_06	279	F	22/04/2021	22	6	5	6	6	4	-	5	4	5	5	38	16	13
GSA_22_07	257	M	20/03/2020	22	-	6	5	5	3	-	5	5	5	5	71	19	11
GSA_22_08	287	F	20/03/2020	22	-	6	7	8	4	-	6	5	5	5	29	23	17
GSA_22_09	304	M	20/03/2020	22	10	9	9	10	5	-	10	9	7	9	38	20	15
GSA_22_10	312	F	01/04/2020	22	-	10	9	7	4	-	9	8	8	8	29	25	17
GSA_22_11	267	F	01/04/2020	22	5	5	6	6	3	-	5	4	4	5	38	22	17
GSA_22_12	315	F	01/04/2020	22	4	9	8	8	4	-	9	8	9	8	38	29	23
GSA_22_13	304	F	27/03/2019	22	-	10	10	12	6	-	13	8	12	10	29	24	19

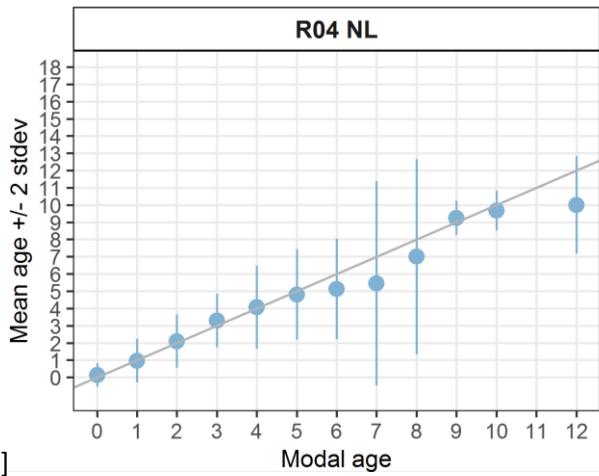
Fish ID	Length (mm)	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	Modal age	PA %	CV %	APE %
GSA_22_14	322	F	27/03/2019	22	9	12	10	11	6	-	10	8	8	8	25	21	16
GSA_22_15	322	F	02/09/2020	22	4	6	8	4	5	-	7	8	5	4	25	28	23
GSA_22_16	98	U	22/07/2020	22	1	1	1	1	0	-	0	1	0	1	62	83	75
GSA_22_17	121	M	09/12/2020	22	0	1	0	1	0	-	0	0	0	0	75	-	-
GSA_22_18	201	M	09/12/2020	22	1	1	4	1	1	-	1	2	1	1	75	71	50
GSA_22_19	222	F	23/07/2019	22	3	3	4	2	2	-	3	3	2	3	50	26	20
GSA_22_20	168	M	23/07/2019	22	2	2	3	2	2	-	2	2	1	2	75	27	12
GSA_22_21	195	F	22/07/2021	22	4	3	4	3	2	-	4	3	2	3	38	27	21
GSA_22_22	320	F	22/07/2021	22	5	7	8	6	6	-	5	6	6	6	50	16	11
GSA_22_23	331	F	22/07/2021	22	-	9	10	8	5	-	6	6	-	6	33	27	23
GSA_22_24	283	F	22/07/2021	22	-	8	8	9	4	-	9	6	5	8	29	29	24
GSA_22_25	280	F	22/07/2021	22	-	7	7	10	4	-	8	4	4	4	33	35	27
GSA_22_26	305	F	22/07/2021	22	-	11	8	9	4	-	8	11	3	8	29	41	31
GSA_22_27	299	M	22/07/2021	22	-	9	7	9	5	-	9	10	6	9	43	24	20
GSA_22_28	289	F	22/07/2021	22	-	11	7	10	4	-	6	8	4	4	29	38	30
GSA_22_29	276	F	22/07/2021	22	4	9	6	8	4	-	5	6	4	4	38	33	26
GSA_22_30	251	M	22/07/2021	22	3	6	5	8	4	-	7	6	5	5	25	29	23
GSA01-140319-03-12.5x	247	F	14/03/2019	1	4	7	5	6	5	5	6	4	7	5	33	21	17
GSA01-150321-23-12.5x	266	F	15/03/2021	1	3	5	6	6	3	3	5	5	5	5	44	27	23
GSA01-150321-37-12.5x	222	M	15/03/2021	1	4	6	4	8	4	4	4	5	6	4	56	28	22
GSA01-160118-21-12.5x	181	F	16/01/2018	1	3	5	3	5	3	3	8	6	6	3	44	39	32
GSA01-180618-11-12.5x	304	F	18/06/2018	1	6	8	7	7	5	5	7	7	7	7	56	15	12
GSA01-180618-15-12.5x	331	F	18/06/2018	1	6	13	10	6	5	5	8	5	8	5	33	37	29
GSA01-210519-10-12.5x	321	F	21/05/2019	1	5	6	6	7	5	6	6	6	6	6	67	10	7
GSA01-210519-21-12.5x	293	M	21/05/2019	1	3	8	7	6	6	6	6	4	5	6	44	26	20
GSA01-210519-62-12.5x	211	F	21/05/2019	1	2	4	4	3	3	4	2	4	3	4	44	26	21
GSA01-220817-06-12.5x	193	M	22/08/2017	1	3	4	4	2	3	6	6	4	2	4	33	39	30
GSA01-260517-17-12.5x	156	F	26/05/2017	1	1	1	3	1	1	3	2	3	1	1	56	55	49
GSA01-270819-05-12.5x	202	F	27/08/2019	1	4	4	4	4	3	2	4	3	3	4	56	21	18
GSA01-300719-01-12.5x	310	M	30/07/2019	1	6	9	9	5	6	7	6	5	7	6	33	22	18
GSA01-300719-38-12.5x	346	M	30/07/2019	1	-	14	7	5	6	6	5	5	7	5	38	44	27
IBER110920_20	210	U	11/09/2020	27.9	5	5	5	-	-	-	7	5	5	5	83	15	10
IBER110920_21	217	U	11/09/2020	27.9	4	3	4	3	3	-	2	3	2	3	50	25	17
jurel_19052021_n93_247mm(2x)	247	F	01/05/2021	8	8	6	5	3	3	5	5	6	4	5	33	32	22
jurel_19052021_n96_255mm(2x)	255	M	01/05/2021	8	5	6	5	3	3	6	7	6	6	6	44	27	21
jurel_DEM2020_L100_n7_125mm(2x)	125	M	01/10/2020	8	1	1	0	1	1	0	1	1	0	1	67	75	67
jurel_DEM2020_L100_n8_146mm(2x)	146	F	01/10/2020	8	1	1	2	1	1	3	4	1	1	1	67	67	53
jurel_DEM2020_L104_n10_230mm(2x)	230	F	01/10/2020	8	5	5	5	4	2	5	6	4	5	5	56	25	18
jurel_DEM2020_L108_n4_122mm(2x)	122	M	01/10/2020	8	1	1	1	1	1	1	0	1	1	1	89	38	22
jurel_DEM2020_L120_n7_201mm(2x)	201	M	01/10/2020	8	3	3	3	2	2	2	2	2	2	2	67	21	19
jurel_DEM2020_L122_n6_148mm(2x)	148	M	01/10/2020	8	3	1	2	1	2	1	2	2	1	1	44	42	36
jurel_DEM2020_L122_n8_157mm(2x)	157	M	01/10/2020	8	3	2	2	1	2	2	3	2	2	2	67	28	19
jurel_DEM2020_L61_n6_214mm(2x)	214	M	01/10/2020	8	3	4	5	3	2	5	5	2	6	5	33	37	32
jurel_DEM2020_L65_n5_196mm(2x)	196	F	01/10/2020	8	3	3	4	2	2	2	3	2	2	2	56	28	24
jurel_PELACUS0319_L21_n18_169mm(2x)	169	F	01/04/2019	8	5	3	4	2	2	4	5	5	5	5	44	33	27
jurel_PELACUS0319_L29_n18_281mm(2x)	281	M	01/04/2019	8	-	5	5	5	3	-	4	4	5	5	57	18	15
jurel_PELACUS0319_L3_n20_219mm(2x)	219	F	01/03/2019	8	4	4	4	3	3	4	5	4	5	4	56	18	11
jurel_PELACUS0321_L12G_n13_337	337	F	01/04/2021	8	5	8	7	8	5	6	7	6	6	6	33	18	15
jurel_PELACUS0321_L19_n1_136mm(2x)	136	F	01/04/2021	8	1	1	1	1	1	1	1	1	1	1	100	0	0
jurel_PELACUS0321_L38_n17_322mm(2x)	322	F	01/04/2021	8	6	10	8	7	4	6	5	5	8	5	22	29	23
jurel_PELACUS0321_L38_n5_342mm(2x)	342	F	01/04/2021	8	6	12	11	9	5	-	7	7	7	7	38	31	25
jurel_PELACUS0321_L42_n3_270mm(2x)	270	M	01/04/2021	8	5	5	6	3	4	5	5	5	5	5	67	17	12
jurel_PELACUS0321G_L12_n34_299mm(2x)	299	M	01/03/2021	8	6	7	8	6	4	5	6	6	7	6	44	19	13
jurel03092020_n55_305mm(2x)	305	M	01/09/2020	8	5	9	8	5	5	6	5	6	8	5	44	25	21
jurel03092020_n58_268mm(2x)	268	F	01/09/2020	8	6	7	6	5	4	6	6	5	7	6	44	17	13
jurel10072019_n45_244mm(2x)	244	F	01/09/2019	8	5	5	5	5	4	4	5	5	5	5	78	9	7
jurel10072019_n72_235mm(2x)	235	F	01/09/2019	8	3	4	4	3	3	3	3	4	5	3	56	20	17
jurel10072019_n97_251mm(2x)	251	M	01/09/2019	8	4	4	5	3	3	3	3	4	4	3	44	19	16
jurel10112020_n44_318mm(2x)	318	F	01/11/2020	8	6	8	7	5	6	6	7	6	6	6	56	14	11
jurel13042021_n14_227mm(2x)	227	F	01/04/2021	8	7	6	5	4	3	5	9	5	6	5	33	31	23
jurel22012019_n18_239mm(2x)	239	M	01/01/2019	8	5	4	4	3	0	4	8	4	5	4	44	51	31
jurel22012019_n29_267mm(2x)	267	F	01/01/2019	8	5	5	5	3	4	4	5	5	5	5	67	16	13
TT020920_2	324	U	02/09/2020	27.9	6	7	7	10	3	-	8	7	4	7	38	34	25
TT110719_14c	390	U	11/07/2019	27.9	9	11	11	14	8	-	10	10	9	9	25	18	13
TT110719_29b	376	U	11/07/2019	27.9	10	11	10	12	6	-	11	8	12	10	25	21	15
TT110719_4	365	U	11/07/2019	27.9	9	14	12	15	6	-	8	12	7	12	25	32	28
TT130619_15	367	U	13/06/2019	27.9	7	8	7	13	6	-	7	7	7	7	62	28	18
TT130619_19	352	U	13/06/2019	27.9	8	13	11	13	6	-	8	7	8	8	38	29	25
TT130619_34	355	U	13/06/2019	27.9	9	13	8	11	6	-	7	5	7	7	25	32	25
TT130619_35	296	U	13/06/2019	27.9	8	11	7	7	4	-	5	6	4	4	25	36	27
TT130619_4	351	U	13/06/2019	27.9	6	10	8	10	5	-	7	6	5	5	25	29	23
TT130619_7	364	U	13/06/2019	27.9	9	9	9	11	6	-	10	7	10	9	38	19	13
TT170620_42	225	U	17/06/2020	27.9	5	7	6	3	5	-	5	6	5	5	50	22	15
TT180321_12	370	U	18/03/2021	27.9	-	17	10	10	8	-	9	9	10	10	43	29	18
TT180321_1e	397	U	18/03/2021	27.9	10	11	9	8	6	-	10	8	8	8	38	18	14
TT180321_2c	358	U	18/03/2021	27.9	8	8	8	9	7	-	7	8	6	8	50	12	9
TT180321_3	446	U	18/03/2021	27.9	-	11	10	13	8	-	10	7	12	10	29	21	16
TT180321_6e	394	U	18/03/2021	27.9	9	10	10	10	7	-	10	8	9	10	50	12	10
TT180321_7	394	U	18/03/2021	27.9	10	13	11	13	6	-	10	8	9	10	25	24	18
TT270219_54b	234	U	27/02/2019	27.9	4	7	5	3	4	-	4	5	6	4	38	27	21
TT270219_58	249	U	27/02/2019	27.9	4	5	4	5	4	-	4	4	4	4	75	11	9
TT270219_71b	254	U	27/02/2019	27.9	5	9	5	4	6	-	5	7	6	5	38	26	19
TT270219_86	247	U	27/02/2019	27.9	5	11	5	4	5	-	4	5	3	5	50	46	27
TT270219_91	242	U	27/02/2019	27.9	6	8	6	5	5	-	7	6	6	6	50	16	11
TT290820_25	242	U	29/08/2020	27.9	5	6	5	4	4	-	4	5	3	4	38	21	17

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

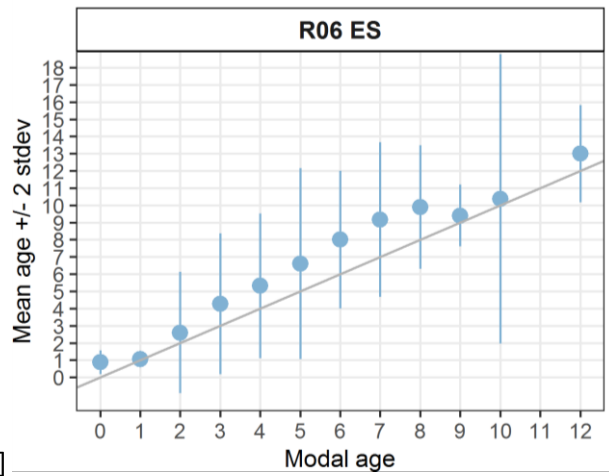
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	total
0	16	16	16	16	12	0	16	16	16	124
1	33	33	33	33	32	23	33	33	33	286
2	21	22	22	22	22	16	22	22	22	191
3	31	33	33	33	33	13	33	33	33	275
4	41	45	45	45	45	11	44	45	44	365
5	37	46	45	45	44	21	46	46	46	376
6	16	18	18	18	17	9	18	18	17	149
7	9	12	12	12	12	4	12	12	12	97
8	6	10	10	10	10	0	10	10	10	76
9	4	5	4	5	4	0	4	5	5	36
10	3	8	8	8	8	1	8	8	8	60
11	0	0	0	0	0	0	0	0	0	0
12	2	2	2	2	2	0	2	2	2	16
<b>Total</b>	<b>219</b>	<b>250</b>	<b>248</b>	<b>249</b>	<b>241</b>	<b>98</b>	<b>248</b>	<b>250</b>	<b>248</b>	<b>2051</b>

**Table 6.7:** Age composition by reader.

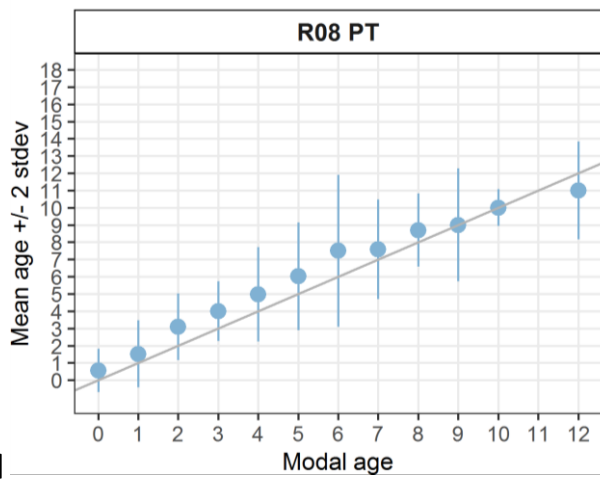
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES
0	23	2	11	3	21	1	22	15	18
1	31	51	25	48	28	15	23	18	34
2	17	21	12	22	38	19	18	20	24
3	38	17	28	31	55	16	26	40	18
4	39	27	46	23	46	14	39	46	42
5	32	26	33	30	26	15	45	49	37
6	16	21	27	23	18	12	20	28	32
7	7	20	21	18	5	4	24	10	16
8	4	13	18	12	3	1	10	14	13
9	7	21	8	12	1	0	8	3	6
10	4	7	13	11	0	1	10	4	5
11	1	12	4	6	0	0	1	1	0
12	0	4	1	3	0	0	1	2	3
13	0	4	0	4	0	0	1	0	0
14	0	3	1	2	0	0	0	0	0
15	0	0	0	1	0	0	0	0	0
17	0	1	0	0	0	0	0	0	0
<b>Total</b>	<b>219</b>	<b>250</b>	<b>248</b>	<b>249</b>	<b>241</b>	<b>98</b>	<b>248</b>	<b>250</b>	<b>248</b>



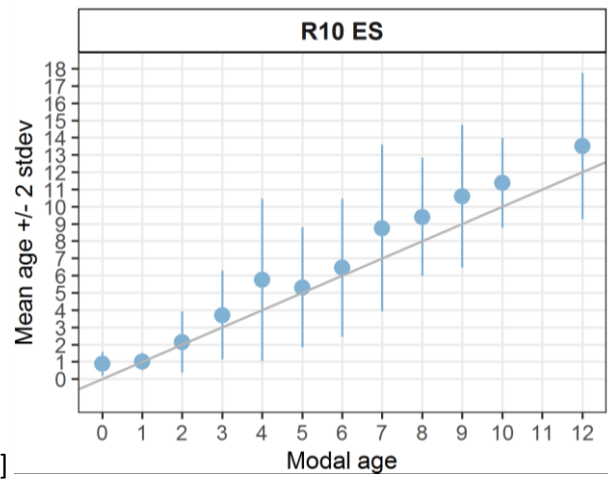
[[1]]



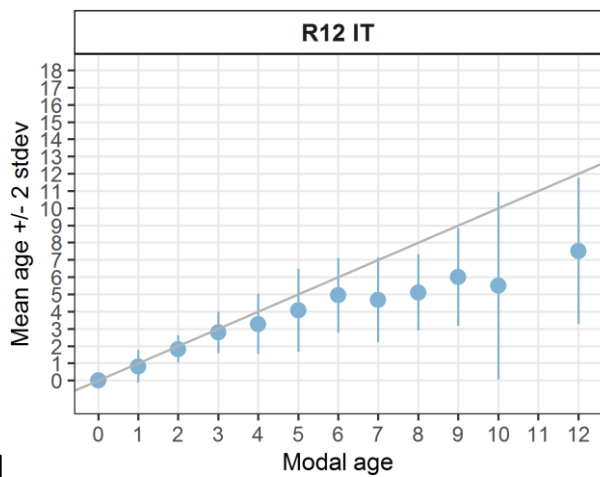
[[2]]



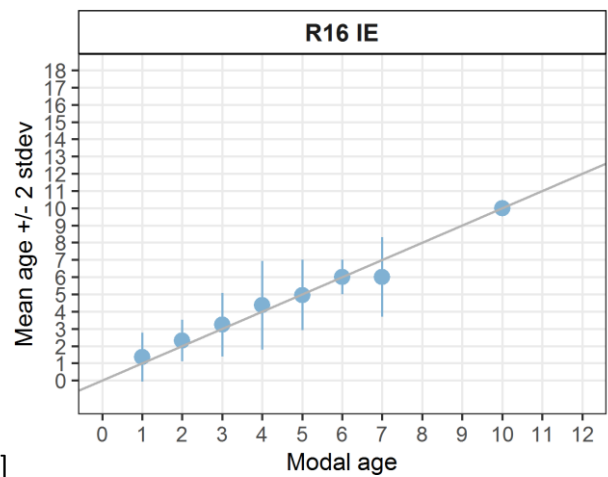
[[3]]



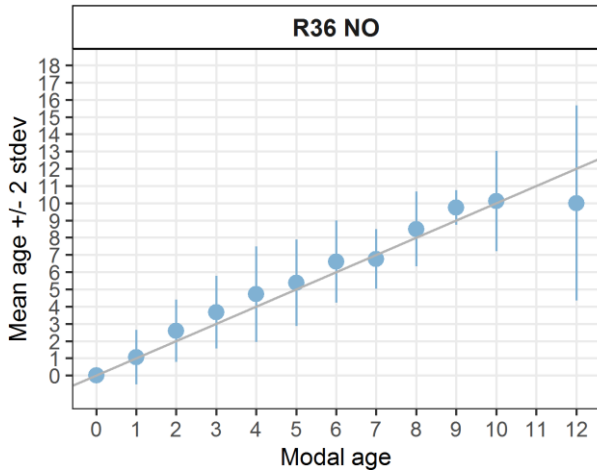
[[4]]



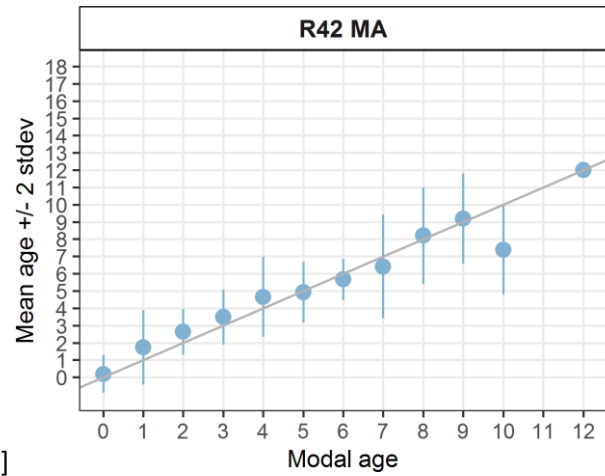
[[5]]



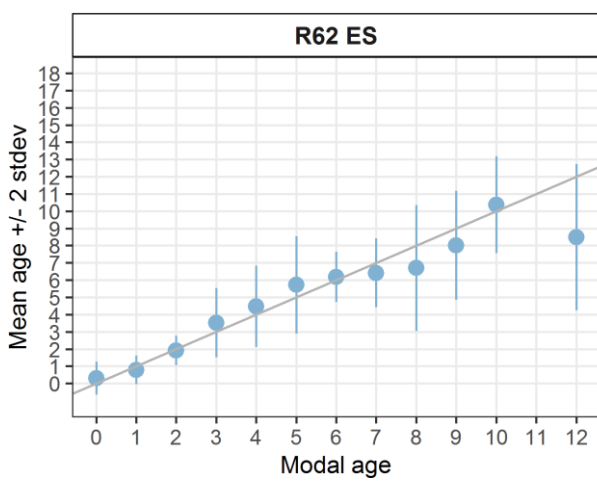
[[6]]



[[7]]



[[8]]



[[9]]

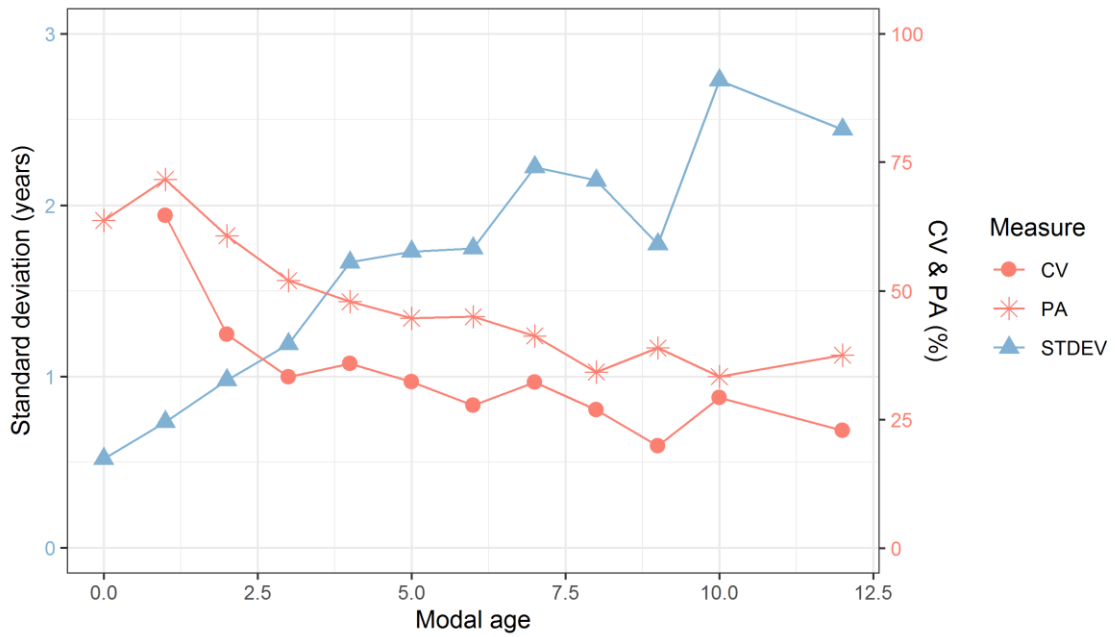


Figure 6.5: CV, PA and (STDEV (standard deviation) are plotted against modal age

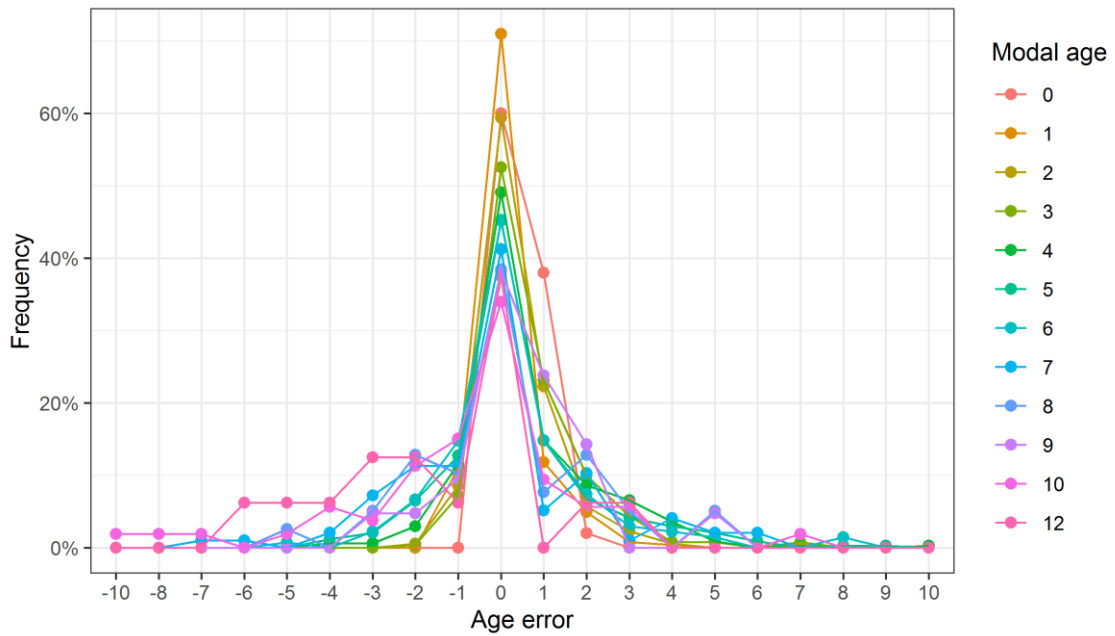


Figure 6.6: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be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

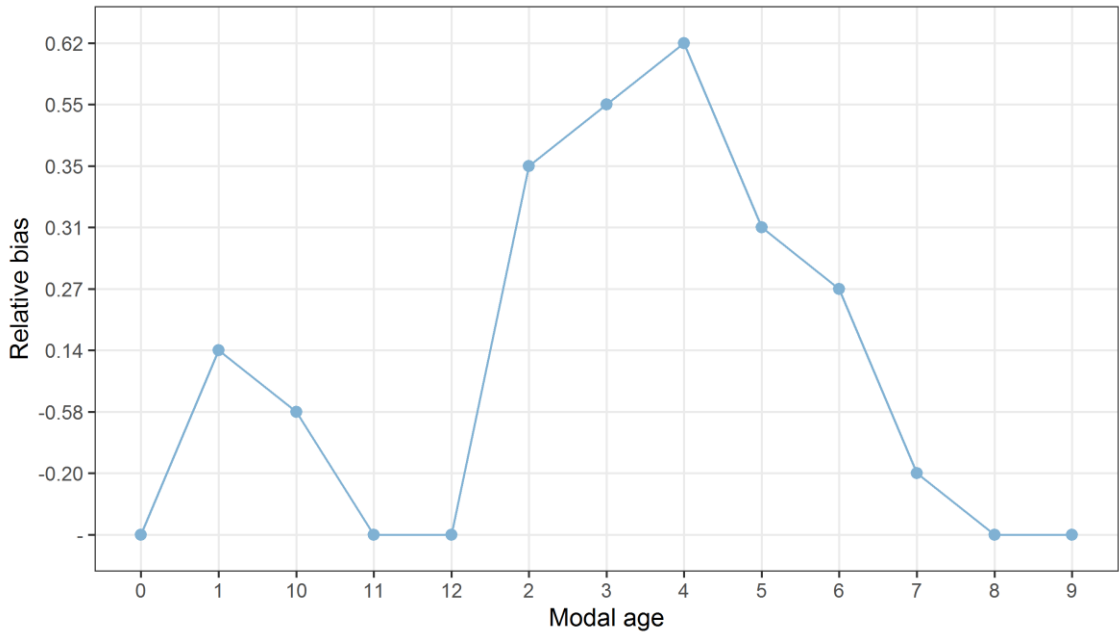


Figure 6.7: The relative bias by modal age as estimated by all age readers combined.

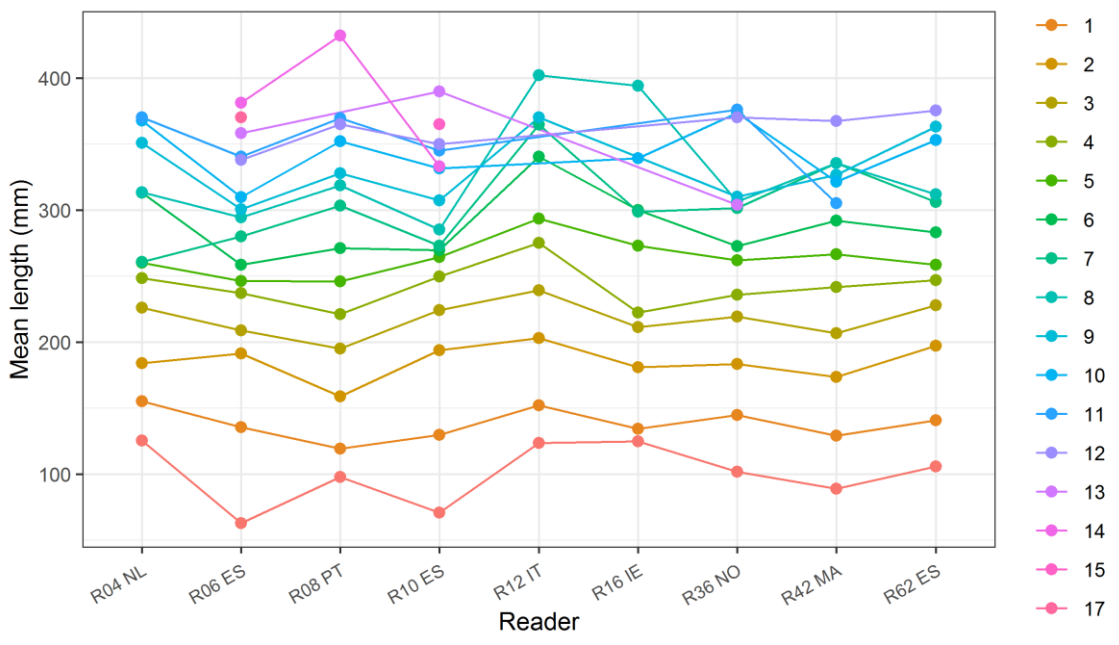


Figure 6.8: The mean length at age as estimated by each age reader.

### 6.1.3 Sliced otoliths, all readers

#### Data Overview

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

CV	PA	APE
22 %	40 %	15%



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

Fish ID	length	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	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	Modal age	PA %	CV %	APE %	
16_1.5x20	289	M	18/03/19	27.9.a	7	7	6	8	7	-	-	6	8	7	6	6	6	7	-	8	6	7	7	8	8	-	8	7	8	-	6	8	7	35	12	9	
17_1.5x20	291	F	18/02/19	27.9.a	8	7	7	6	7	-	-	7	7	7	6	7	6	8	-	8	7	7	7	7	6	-	6	6	8	-	7	8	7	52	10	7	
18_1.5x20	303	M	05/02/19	27.9.a	7	8	7	8	6	-	-	6	8	9	6	8	5	7	-	9	7	8	7	8	8	-	7	7	9	-	7	8	7	35	14	11	
19_1.5x20	340	F	18/02/19	27.9.a	8	10	9	9	6	-	-	9	7	10	7	8	6	8	-	8	8	8	7	7	7	-	7	7	11	-	8	7	7	35	16	12	
20_1.5x20	273	F	03/06/19	27.9.a	6	6	6	7	6	-	-	7	6	8	5	6	5	5	-	5	8	8	6	6	6	-	5	7	7	-	7	8	6	39	16	14	
21_1.5x20	318	M	17/04/19	27.9.a	15	13	10	15	9	-	-	12	12	15	13	14	-	15	-	14	14	14	14	8	13	-	12	12	13	-	14	14	14	32	15	11	
22_1.5x20	346	M	13/05/19	27.9.a	6	7	10	9	6	-	-	7	5	8	5	5	-	5	-	6	8	-	6	5	6	-	4	8	7	-	7	9	5	24	24	20	
23_1.5x20	426	M	06/05/19	27.9.a	12	13	12	14	10	-	-	14	9	12	11	12	-	14	-	13	12	12	12	8	10	-	9	12	13	-	11	13	12	36	14	11	
24_1.5x20	283	M	20/08/19	27.9.a	7	7	7	8	7	-	-	8	9	9	8	8	-	7	-	7	10	7	10	7	7	-	9	8	8	-	8	8	7	41	12	9	
25_1.5x20	308	M	18/09/19	27.9.a	-	7	8	8	6	-	-	9	8	8	5	5	-	5	-	6	6	7	9	6	7	-	10	5	7	-	4	7	7	24	23	19	
26_1.5x20	340	M	25/09/19	27.9.a	8	7	9	10	7	-	-	10	10	7	7	7	-	7	-	6	8	12	10	8	7	-	10	8	8	-	7	8	7	36	18	15	
27_1.5x20	447	F	16/07/19	27.9.a	12	15	14	15	9	-	-	13	14	12	-	11	-	11	-	11	13	18	10	9	12	-	14	12	13	-	10	17	12	19	15		
28_1.5x20	296	M	29/10/19	27.9.a	8	9	9	9	7	-	-	11	7	5	7	8	-	6	-	6	11	9	8	5	8	-	9	7	10	-	7	12	7	23	23	18	
29_1.5x20	330	M	09/12/19	27.9.a	7	8	10	10	6	-	-	8	9	7	7	5	-	6	-	6	9	9	7	7	7	-	10	9	12	-	7	8	7	32	21	17	
30_1.5x20	380	M	14/10/19	27.9.a	8	10	12	11	7	-	-	9	10	10	11	8	-	8	-	7	10	11	11	8	10	-	11	9	10	-	11	10	10	32	15	12	
GBD_19_B47_C1_O_0003	321	U	09/10/17	7	7	7	7	7	7	7	7	7	6	9	7	6	6	8	7	7	7	6	7	6	7	6	5	6	7	-	7	7	7	63	11	8	
GBD_19_B47_C1_O_0012	338	U	11/10/17	7	9	8	10	11	6	11	7	10	7	11	9	8	6	10	9	9	10	8	9	7	7	10	5	8	10	-	8	11	10	22	19	16	
GBD_19_B47_C1_O_0013	378	U	11/10/17	7	12	10	12	13	8	11	10	11	10	12	10	10	9	11	12	11	8	10	11	10	11	12	7	12	11	-	11	12	11	30	13	10	
GBD_19_B47_C1_O_0014	304	U	11/10/17	7	7	7	8	8	5	8	6	8	6	12	7	6	6	6	7	6	7	6	7	6	7	5	7	7	-	6	7	7	41	19	12		
GBD_19_B47_C1_O_0015	339	U	11/10/17	7	10	9	10	10	6	12	8	11	7	14	10	10	7	10	10	10	10	8	11	8	7	10	5	11	10	-	10	10	10	48	20	15	
GBD_19_B47_C1_O_0016	368	U	19/10/17	7	16	16	15	16	6	16	14	16	8	19	15	16	15	16	16	15	13	16	9	9	16	8	16	16	-	16	16	16	56	23	17		
GBD_19_B47_C1_O_0030	297	U	08/10/17	7	9	8	9	10	5	9	9	9	5	14	9	8	7	8	9	8	8	8	8	9	9	4	9	9	-	8	9	9	48	22	14		
GBD_19_B47_C1_O_0031	265	U	08/10/17	7	5	6	6	6	4	5	5	5	4	7	5	5	4	5	5	4	6	5	4	4	6	6	3	6	7	-	6	6	5	33	19	16	
GBD_19_B47_C1_O_0035	272	U	08/10/17	7	8	8	8	9	4	9	6	9	7	13	9	7	6	9	9	8	9	8	9	7	9	9	7	9	10	-	9	9	9	48	19	14	
GBD_19_B47_C1_O_0042	234	U	07/10/17	7	4	5	5	6	4	5	3	4	3	7	5	4	5	3	4	3	5	4	3	4	3	6	2	6	4	-	4	4	4	37	27	22	
GBD_19_B47_C1_O_0043	228	U	07/10/17	7	3	4	4	5	3	5	3	3	3	5	3	-	3	3	3	3	3	3	3	3	2	4	2	4	4	-	3	3	3	58	24	19	
GBD_19_B47_C1_O_0044	254	U	07/10/17	7	4	4	6	5	3	3	3	3	3	5	4	3	3	3	3	3	5	5	3	3	2	4	2	4	4	-	3	4	3	48	27	22	
GBD_19_B47_C1_O_0045	230	U	07/10/17	7	3	4	4	5	3	3	3	3	8	4	3	3	3	3	3	4	3	3	3	2	4	3	2	4	3	-	3	3	3	63	33	21	
GBD_19_B47_C1_O_0046	235	U	07/10/17	7	3	4	4	4	3	3	2	4	3	7	3	2	3	3	4	3	4	3	4	3	3	2	-	2	3	1	-	3	3	3	50	34	23
GBD_19_B47_C1_O_0047	320	U	07/10/17	7	7	8	8	8	7	8	7	9	7	13	8	7	6	9	8	8	8	8	7	6	8	9	7	7	8	-	7	7	8	41	17	11	
GBD_19_B47_C1_O_0048	394	U	07/10/17	7	12	13	13	13	6	13	9	13	7	14	12	10	8	12	13	13	12	13	13	10	11	13	5	12	13	-	13	13	13	48	21	17	
GBD_19_B47_C1_O_0054	316	U	11/10/17	7	12	12	11	11	6	12	10	12	7	15	12	10	10	11	12	12	12	11	12	11	12	12	4	12	12	-	11	12	12	52	20	13	
GBD_19_B47_C1_O_0055	304	U	11/10/17	7	7	8	8	8	5	8	7	7	7	10	7	5	7	7	7	8	7	7	8	7	8	7	6	7	7	-	7	7	7	63	13	8	
GBD_19_B47_C1_O_0056	339	U	08/10/17	7	10	9	10	9	4	9	7	10	6	10	9	6	6	10	9	9	9	9	10	8	9	10	5	9	9	-	9	10	9	44	20	15	
GBD_19_B47_C1_O_0057	322	U	08/10/17	7	14	13	12	14	6	14	11	13	8	17	13	11	8	14	13	14	12	11	13	9	12	14	8	14	13	-	13	13	13	30	20	15	
GBD_19_B47_C1_O_0081	256	U	08/10/17	7	8	9	8	8	4	9	7	8	5	12	8	4	5	8	8	6	8	7	9	6	8	9	4	7	8	-	8	8	8	44	25	19	
GBD_19_B47_C1_O_0082	277	U	08/10/17	7	7	7	8	7	6	7	6	7	7	9	7	6	7	7	7	7	7	7	7	7	7	6	7	7	-	7	7	7	78	8	4		
GBD_19_B47_C1_O_0083	278	U	08/10/17	7	7	7	8	7	4	7	6	7	6	13	7	6	7	7	7	7	7	5	7	6	7	4	7	7	-	7	7	7	67	23	12		
GBD_19_B47_C1_O_0084	269	U	08/10/17	7	5	6	7	6	4	7	4	5	4	7	5	4	4	5	5	4	5	5	4	4	6	5	3	5	4	-	5	5	5	41	21	15	
GBD_19_B47_C1_O_0085	288	U	08/10/17	7	10	9	8	10	0	10	8	9	8	11	9	7	9	-	10	9	9	7	9	9	10	7	9	9	-	9	9	9	50	23	13		
GBD_19_B47_C1_O_0086	248	U	08/10/17	7	6	5	4	5	4	5	4	5	4	9	4	3	4	-	4	4	5	5	4	6	5	5	1	5	4	-	5	5	5	42	29	19	
GBD_19_B47_C1_O_0087	264	U	08/10/17	7	4	5	5	5	4	4	4	4	3	5	4	4	4	-	4	4	4	5	4	5	5	5	3	4	4	-	4	5	4	58	14	12	
GBD_19_B47_C1_O_0088	313	U	08/10/17	7	8	9	8	9	5	9	7	8	7	11	8	8	8	-	9	8	8	8	8	8	7	8	5	8	8	-	8	9	8	58	15	9	
GBD_19_B48_C1_O_0001	257	U	24/01/18	7	4	4	4	5	4	4	4	4	4	8	4	3	3	-	4	4	4	4	4	4	4	-	3	5	4	-	4	4	4	76	23	11	
GBD_19_B48_C1_O_0002	255	U	24/01/18	7	5	5	5	6	5	6	5	5	5	9	5	5	4	-	5	5	5	5	5	5	5	5	3	5	6	-	5	5	5	77	19	10	
GBD_19_B48_C1_O_0005	244	U	24/01/18	7	4	4	4	4	4	4	4	4	4	10	4	3	3	-	4	4	4	4	4	4	4	2	4	4	-	4	4	4	85	32	11		
GBD_19_B48_C1_O_0007	235	U	24/01/18	7	4	4	4	4	4	4	4	4	3	8	4	3	4	-	4	-	4	4	5	3	4	4	3	4	4	-	4	4	4	76	23		

Fish ID	length	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	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	Modal age	PA %	CV %	APE %
GBD_19_B48_C1_O_0027	259	U	24/01/18	7	5	5	5	5	4	6	4	5	4	10	5	6	3	-	6	5	5	5	5	5	5	6	2	5	6	-	5	6	5	54	27	15
GBD_19_B48_C1_O_0033	221	U	24/01/18	7	4	4	4	4	3	4	3	4	3	9	4	3	3	-	5	4	5	4	4	4	5	5	2	3	5	-	4	5	4	46	31	19
GBD_19_B48_C1_O_0036	242	U	24/01/18	7	4	4	5	4	3	5	3	4	4	7	3	4	4	-	5	4	4	4	5	4	3	5	2	4	5	-	4	5	4	50	23	16
GBD_19_B48_C1_O_0037	239	U	24/01/18	7	4	7	4	4	3	5	3	4	4	6	4	-	4	-	5	4	4	4	5	4	4	5	3	4	5	-	4	5	4	56	21	16
GBD_19_B48_C1_O_0038	239	U	24/01/18	7	4	4	4	4	3	4	3	4	4	8	4	4	3	-	4	4	5	4	4	4	4	5	2	4	5	-	4	4	4	69	25	13
GBD_19_B48_C1_O_0039	230	U	24/01/18	7	4	4	4	4	3	4	3	4	3	7	3	4	3	-	4	4	5	3	4	4	2	5	2	3	4	-	4	4	4	54	26	18
GBD_19_B48_C1_O_0043	226	U	24/01/18	7	3	4	3	3	2	2	2	4	2	8	2	2	2	-	2	2	4	3	3	3	2	4	1	2	4	-	2	3	2	46	47	32
GBD_19_B48_C1_O_0044	231	U	24/01/18	7	2	5	3	1	2	3	2	4	2	7	3	1	2	-	4	2	4	4	2	3	2	4	1	2	3	-	2	1	2	38	51	40
GBD_19_B48_C1_O_0045	231	U	24/01/18	7	3	4	3	2	2	4	2	4	2	8	4	2	3	-	3	3	4	3	3	4	2	5	2	3	3	-	3	1	3	38	43	29
GBD_19_B48_C1_O_0046	235	U	24/01/18	7	4	3	3	2	2	3	4	3	9	-	2	2	-	3	4	4	3	3	3	3	4	2	2	2	-	3	2	3	44	46	26	
GBD_19_B48_C1_O_0048	237	U	10/02/18	7	4	5	4	3	3	5	3	4	4	10	4	3	4	-	6	5	5	4	4	4	4	4	4	3	5	-	4	3	4	50	33	20
GBD_19_B48_C1_O_0049	265	U	24/01/18	7	5	5	5	5	3	6	4	5	5	11	5	5	4	-	5	6	5	5	6	5	4	5	2	5	6	-	5	5	5	62	29	15
HOM_4A_3Q_01	335	M	12/07/16	4	8	9	8	8	6	8	7	8	6	10	8	8	6	-	8	8	9	8	8	7	8	8	6	8	8	-	8	8	8	65	12	9
HOM_4A_3Q_02	335	M	10/08/15	4	10	10	10	9	6	10	8	9	6	11	10	9	7	-	10	10	10	11	9	8	9	10	5	9	10	-	9	10	10	42	17	12
HOM_4A_3Q_03	385	F	13/07/16	4	12	13	11	13	5	12	10	12	10	15	5	12	11	-	12	12	12	13	7	6	12	6	12	13	-	12	12	10	46	25	19	
HOM_4A_3Q_04	355	F	12/07/16	4	12	12	9	10	7	14	8	11	7	15	8	8	8	-	11	11	10	10	14	9	8	15	7	11	11	-	10	11	11	23	23	19
HOM_4A_3Q_05	325	M	10/08/15	4	14	15	13	13	6	15	10	13	7	17	-	13	7	-	13	14	13	13	15	7	8	14	7	13	14	-	15	14	13	32	26	22
HOM_4A_3Q_06	395	F	13/07/16	4	17	17	13	16	8	16	13	16	8	19	15	16	13	-	16	16	17	15	16	10	13	16	8	16	17	-	16	17	16	38	21	16
HOM_4A_3Q_07	415	M	12/07/16	4	17	19	15	15	6	18	14	17	10	18	-	17	9	-	18	14	18	18	17	10	11	18	9	15	18	-	17	17	18	28	24	20
HOM_4A_4Q_08	305	F	16/10/15	4	3	4	-	3	3	3	3	3	4	3	3	3	3	-	3	3	4	3	3	3	2	3	2	3	3	-	3	3	3	80	15	8
HOM_4A_4Q_09	285	M	16/10/15	4	5	6	6	5	5	5	4	5	5	6	5	5	4	-	6	5	6	6	5	6	5	8	4	5	5	-	5	5	5	58	16	11
HOM_4A_4Q_10	305	F	16/10/15	4	6	7	7	6	6	6	5	6	6	6	6	6	6	-	7	6	6	6	6	6	5	6	5	6	6	-	6	6	6	77	8	4
HOM_4A_4Q_11	305	F	16/10/15	4	8	8	9	7	4	7	6	7	6	8	7	7	6	-	8	7	8	8	7	7	7	8	4	6	7	-	7	8	7	42	17	11
HOM_4A_4Q_12	335	M	16/10/15	4	7	9	10	7	5	11	8	9	6	12	7	6	5	-	8	6	7	8	9	6	6	8	4	7	8	-	7	9	7	23	25	19
HOM_4A_4Q_13	335	F	16/10/15	4	10	9	11	6	5	9	7	9	6	10	9	5	-	10	9	7	8	9	6	6	10	6	7	9	-	9	9	9	38	22	19	
HOM_4A_4Q_14	305	M	16/10/15	4	12	11	10	8	5	12	9	11	7	12	9	10	6	-	12	11	11	9	11	7	9	12	6	10	11	-	11	11	11	31	21	18
HOM_4A_4Q_15	335	F	16/10/15	4	14	14	12	10	6	14	12	14	9	15	10	12	7	-	13	13	11	12	14	6	8	14	8	11	14	-	12	14	14	31	24	19
HOM_6A_1Q_01	235	F	02/02/17	4	3	4	4	4	3	4	3	4	3	5	3	3	3	-	3	3	5	4	3	3	3	-	3	3	4	-	3	4	3	60	19	17
HOM_6A_1Q_02	265	F	02/02/17	4	4	4	-	4	3	4	4	3	4	4	4	4	3	-	4	4	4	3	4	3	4	4	3	3	4	-	4	4	4	72	12	11
HOM_6A_1Q_03	305	M	02/02/17	4	5	6	8	4	4	6	5	5	5	9	5	5	4	-	6	5	6	6	5	5	5	7	4	5	6	-	5	5	5	50	22	16
HOM_6A_1Q_04	265	M	06/01/14	4	6	7	7	4	5	7	7	6	6	8	5	5	6	-	7	7	7	6	6	5	6	4	6	7	-	7	7	7	38	17	13	
HOM_6A_1Q_05	285	M	02/02/17	4	6	7	8	6	5	8	7	7	7	10	6	6	5	-	7	7	7	7	7	6	6	8	5	6	8	-	7	7	7	42	16	12
HOM_6A_1Q_06	325	F	02/02/17	4	8	9	9	8	6	9	8	8	8	9	8	8	7	-	9	8	8	8	9	7	8	9	7	8	9	-	8	9	8	50	10	7
HOM_6A_1Q_07	315	M	02/02/17	4	9	9	10	9	6	10	9	9	9	10	9	9	8	-	10	9	9	9	9	8	8	10	8	9	10	-	9	9	9	58	10	6
HOM_6A_1Q_08	325	M	03/02/17	4	9	9	9	9	7	10	9	9	8	11	8	8	7	-	9	9	9	8	10	7	8	11	7	8	9	-	10	9	9	42	13	10
HOM_6A_1Q_09	335	M	03/02/17	4	12	14	11	9	8	-	11	12	9	13	10	9	8	-	12	11	11	12	12	10	10	12	7	8	12	-	11	13	12	28	17	14
HOM_6A_1Q_10	335	F	03/02/17	4	13	13	11	11	7	13	13	11	12	15	12	10	9	-	13	13	12	12	13	10	10	14	7	11	14	-	13	14	13	31	17	14
HOM_6A_1Q_11	365	F	09/01/14	4	14	14	13	14	7	15	14	14	10	17	13	12	11	-	15	14	15	13	14	12	14	15	10	14	15	-	14	15	14	38	15	11
HOM_6A_1Q_12	375	M	02/02/17	4	14	14	13	12	6	15	14	14	12	15	13	14	10	-	15	14	14	14	15	12	14	15	11	14	15	-	15	15	14	38	15	11
HOM_6A_1Q_13	395	M	14/01/16	4	16	16	15	16	6	17	14	16	11	17	13	16	11	-	17	15	15	16	16	13	15	17	10	14	17	-	16	17	16	31	18	13
HOM_6A_1Q_14	365	F	25/08/16	4	17	17	13	15	5	18	17	17	8	17	11	4	5	-	17	7	11	15	18	6	8	16	8	15	17	-	18	18	17	27	38	34
HOM_6A_3Q_01	275	M	25/08/16	4	5	5	5	4	4	4	4	4	4	4	4	4	-	4	4	5	4	4	6	4	4	4	4	4	-	4	4	4	73	20	14	
HOM_6A_3Q_02	325	M	25/08/16	4	7	7	7	7	4	7	6	6	5	7	5	5	5	-	7	5	8	5	6	5	7	6	3	7	7	-	6	7	7	42	20	16
HOM_6A_3Q_03	315	F	25/08/16	4	7	9	9	6	5	7	6	6	5	10	5	5	5	-	7	7	9	7	7	6	7	5	5	4	8	-	6	8	5	27	24	19
HOM_6A_3Q_04	285	M	25/08/16	4	8	9	8	8	5	8	8	8	11	8	8	8	-	8	8	8	8	8	8	8	8	5	8	8	-	8	8	8	85	13	6	
HOM_6A_3Q_05	335	F	25/08/16	4	9	9	9	10	5	9	8	9	8	9	7	8	-	10	8	9	9	8	8	8	9	5	8	9	-	9	9	9	50	15	11	
HOM_6A_3Q_06	315	F	25/08/16	4	10	11	11	11	6	10	12	10	10	10	11	8	9	-	10	9	11	11	10	9	11	10	8	10	10	-	10	10	10	46	12	8
HOM_6A_3Q_07	665	F	25/08/16	4	11	11	14	13	-	12	10	12	11	14	10																					

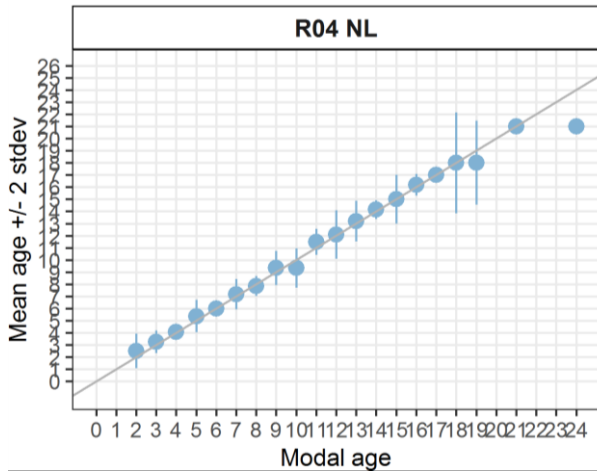
Fish ID	length	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	Modal age	PA %	CV %	APE %
Norway_38301_27	355	M	19/11/19	27.4.a	12	13	13	13	8	12	10	10	8	14	10	11	8	11	11	11	11	11	12	7	11	11	8	10	11	-	11	12	11	37	16	12
Norway_38307_01	395	M	22/02/19	27.4.a	17	17	16	18	12	19	17	17	11	17	16	12	14	19	16	18	13	17	18	7	16	19	11	16	18	-	19	19	17	22	19	15
Norway_38307_05	360	F	22/02/19	27.4.a	10	11	10	10	6	12	9	9	8	12	9	10	8	10	10	11	9	10	11	6	9	13	8	9	9	-	12	11	9	26	17	13
Norway_38307_08	375	F	22/02/19	27.4.a	14	13	13	12	6	14	11	12	8	12	12	11	9	13	14	12	12	13	14	7	12	15	8	12	12	-	13	14	12	33	19	14
Norway_38307_11	395	M	22/02/19	27.4.a	15	15	15	15	7	16	16	15	9	17	15	14	8	15	16	15	14	16	16	8	14	17	9	15	16	-	15	16	15	37	21	15
Norway_38307_12	350	M	22/02/19	27.4.a	19	19	15	17	10	20	17	18	11	16	16	14	14	19	19	16	16	19	19	11	15	20	9	19	18	-	18	20	19	26	19	15
Norway_38307_19	410	F	22/02/19	27.4.a	14	18	18	10	20	15	17	10	18	-	15	15	17	18	19	17	17	20	10	17	19	10	16	18	-	19	18	18	27	19	15	
Norway_38307_21	380	M	22/02/19	27.4.a	18	19	17	18	9	20	15	18	10	19	17	15	-	18	19	18	17	18	19	10	17	19	9	17	18	-	18	19	18	31	20	15
Norway_38307_27	360	M	22/02/19	27.4.a	16	16	15	16	11	16	14	15	11	17	15	13	14	16	16	15	15	18	16	8	15	17	11	15	16	-	16	16	16	37	15	11
Norway_38307_29	370	F	22/02/19	27.4.a	18	18	16	20	10	19	18	18	11	18	18	15	16	18	19	18	19	19	19	11	12	19	9	17	19	-	18	19	18	33	19	15
Norway_38308_01	395	M	23/05/19	27.4.a	20	18	16	21	8	22	19	18	9	25	17	17	15	18	18	17	18	18	19	8	16	18	9	18	19	-	18	19	18	33	24	16
Norway_38308_09	385	F	23/05/19	27.4.a	16	15	12	15	8	16	13	16	9	23	16	13	8	16	15	16	15	16	17	7	11	17	9	12	17	-	16	17	16	30	26	21
Norway_38308_13	370	M	23/05/19	27.4.a	12	13	12	12	6	11	10	10	8	11	10	10	9	11	11	11	12	9	12	8	9	12	8	10	11	-	12	12	12	30	16	13
Norway_38308_18	365	M	23/05/19	27.4.a	20	19	13	18	8	18	17	20	10	21	-	15	-	18	18	18	17	18	20	10	12	18	10	16	18	-	17	19	18	32	22	18
Norway_38308_20	355	F	23/05/19	27.4.a	11	11	11	12	6	11	10	12	7	16	10	10	8	12	11	11	14	11	12	6	10	11	7	11	12	-	11	11	11	41	21	15
Norway_38308_25	385	M	23/05/19	27.4.a	14	17	12	16	11	18	15	16	11	17	14	13	13	16	15	14	14	15	18	11	13	14	11	13	15	-	16	17	14	19	15	12
Norway_38308_30	355	M	23/05/19	27.4.a	-	20	14	14	6	13	12	13	9	15	13	11	-	13	12	13	15	12	14	8	10	13	9	12	14	-	13	13	13	32	22	15
Norway_94205_01	395	F	06/08/19	27.4.a	13	15	14	14	8	14	14	13	9	12	12	7	13	13	13	13	13	13	13	9	11	14	10	14	13	-	13	13	13	44	16	12
Norway_94205_02	370	M	06/08/19	27.4.a	21	23	14	19	9	25	23	24	14	23	21	12	17	25	23	25	21	20	24	12	12	24	13	21	24	-	25	24	24	19	25	21
Norway_94205_04	430	M	06/08/19	27.4.a	21	20	20	20	4	21	24	21	12	20	18	17	19	21	21	21	21	20	21	11	14	22	12	21	20	-	21	21	21	41	23	17
Norway_94205_07	355	M	06/08/19	27.4.a	11	11	10	11	6	12	10	12	9	11	11	9	11	11	11	11	12	12	11	9	11	12	7	10	11	-	11	12	11	48	14	10
Norway_94205_09	390	M	06/08/19	27.4.a	16	18	14	14	-	18	15	17	11	19	13	15	15	18	15	16	15	17	18	10	12	15	12	16	18	-	17	17	15	23	15	12
Norway_94205_11	375	M	06/08/19	27.4.a	16	17	15	19	-	19	18	19	10	18	17	14	16	19	18	17	19	17	18	9	12	19	11	18	17	-	19	19	19	31	18	14
Norway_94205_14	360	F	06/08/19	27.4.a	11	13	11	16	-	11	11	11	8	14	10	11	11	12	11	11	11	12	11	8	10	11	8	11	12	-	11	11	11	58	15	9
Norway_94205_21	325	F	06/08/19	27.4.a	9	9	10	11	-	9	10	9	7	13	10	8	9	10	9	10	10	10	9	7	6	10	7	10	9	-	10	9	10	38	15	11
Norway_94205_22	355	M	06/08/19	27.4.a	12	12	12	16	-	12	12	13	9	16	12	9	13	13	12	13	12	14	13	8	10	13	11	12	12	-	12	13	12	42	15	10
Noway_94205_25	290	F	06/08/19	27.4.a	5	6	7	6	-	5	5	7	5	7	5	5	5	5	5	5	5	7	6	5	5	5	6	4	5	6	5	5	6	59	15	12

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

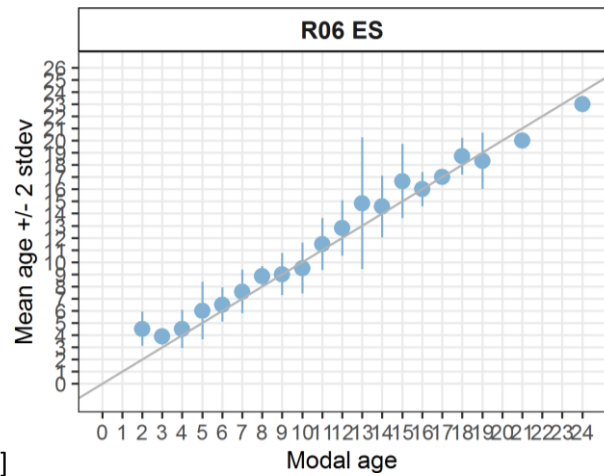
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	total
2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2	2	0	2	2	52
3	8	8	7	8	8	8	8	8	8	8	7	7	8	4	8	8	8	8	8	8	8	6	8	8	8	0	8	8	207
4	18	18	17	18	18	18	18	18	18	18	18	17	18	1	18	17	18	18	18	18	18	17	18	18	18	0	18	18	465
5	11	11	11	11	10	10	10	11	11	11	11	11	10	4	10	11	11	10	11	11	11	10	11	11	11	0	11	11	284
6	2	2	2	2	2	1	1	2	2	2	2	2	2	1	1	2	2	2	2	2	2	1	2	2	2	0	2	2	49
7	18	19	19	19	19	10	10	19	19	19	19	19	14	14	10	19	19	19	19	19	19	10	19	19	19	0	19	19	466
8	6	6	6	6	6	6	6	6	6	6	6	6	6	2	6	6	6	6	6	6	6	6	6	6	6	0	6	6	158
9	9	9	9	9	9	9	9	9	9	9	9	9	9	4	9	9	9	9	9	9	9	9	9	9	9	0	9	9	238
10	6	6	6	6	5	5	5	6	6	6	6	6	5	4	5	6	6	6	6	6	6	5	6	6	6	0	6	6	154
11	8	8	8	8	6	8	8	8	8	8	8	8	8	5	8	8	8	8	8	8	8	8	8	8	8	0	8	8	211
12	10	10	10	10	9	7	8	10	10	10	9	10	8	8	7	10	10	10	10	10	10	8	10	10	10	0	10	10	254
13	5	6	6	6	6	6	6	6	6	6	5	6	5	4	6	6	6	6	6	6	6	6	6	6	6	0	6	6	157
14	7	7	7	7	5	6	6	7	7	7	7	7	6	2	6	7	7	7	7	7	7	6	7	7	7	0	7	7	177
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	3	0	3	3	80
16	5	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	5	5	5	0	5	5	133
17	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	0	2	2	53
18	7	7	7	7	7	7	7	7	7	7	4	7	5	6	7	7	7	7	7	7	7	7	7	7	7	0	7	7	183
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	3	0	3	3	79
20	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	0	0
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	1	0	1	1	27
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	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	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	1	0	1	1	27
<b>Total</b>	<b>132</b>	<b>134</b>	<b>132</b>	<b>134</b>	<b>124</b>	<b>118</b>	<b>119</b>	<b>134</b>	<b>134</b>	<b>134</b>	<b>128</b>	<b>132</b>	<b>121</b>	<b>71</b>	<b>118</b>	<b>133</b>	<b>134</b>	<b>133</b>	<b>134</b>	<b>134</b>	<b>134</b>	<b>116</b>	<b>134</b>	<b>134</b>	<b>134</b>	<b>0</b>	<b>134</b>	<b>134</b>	<b>3454</b>

**Table 6.9:** Age composition by reader.

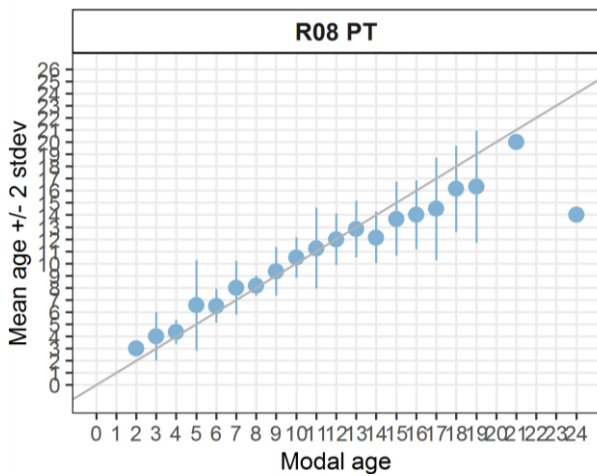
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R18 IE	R20 ES	R22 GR	R24 ES	R26 IT	R28 IT	R30 PT	R34 FR	R36 NO	R38 GR	R40 PT	R42 MA	R44 DE	R48 GR	R50 ES	R52 DE	R56 GR	R60 IT	R62 ES	R64 IT	R68 FR	R70 NO	
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	5	0	1	0	0	2	
2	1	0	0	2	4	1	4	0	3	0	1	4	3	0	1	2	0	0	1	0	9	0	18	3	1	0	2	1	
3	7	1	4	3	15	6	16	5	14	0	7	11	17	5	7	10	1	7	10	12	5	1	10	8	4	0	8	6	
4	19	19	16	16	22	15	13	23	15	2	19	14	15	0	16	17	17	18	16	16	12	14	13	16	15	0	19	12	
5	9	11	9	11	16	9	5	8	10	5	16	13	11	6	9	8	14	11	9	11	10	13	14	10	10	0	8	13	
6	6	6	5	10	32	6	7	6	12	3	5	11	14	3	4	10	7	7	6	18	11	9	9	8	6	0	6	4	
7	13	15	9	7	13	8	11	10	20	13	12	8	10	7	10	11	11	10	14	22	15	5	18	14	12	0	16	11	
8	12	8	14	12	9	6	8	8	17	13	9	15	15	6	6	11	14	15	5	24	16	7	13	11	12	0	9	12	
9	6	16	10	10	5	9	7	15	14	13	9	8	9	2	8	8	10	8	12	12	9	6	12	9	10	0	7	12	
10	8	4	13	9	4	5	11	6	11	14	11	9	4	5	8	4	8	4	6	10	8	9	8	7	8	0	6	5	
11	4	7	9	7	2	6	4	8	9	9	7	7	5	6	6	12	9	9	8	5	9	7	7	8	7	0	11	6	
12	12	4	11	5	1	11	4	9	7	12	7	7	1	5	8	4	10	10	8	3	10	7	5	12	10	0	7	9	
13	3	10	11	7	0	3	5	8	0	6	7	5	4	4	7	8	6	7	6	1	4	5	1	2	7	0	6	8	
14	11	4	6	8	0	6	7	5	2	7	2	7	4	2	2	8	8	4	8	0	7	7	1	7	5	0	4	6	
15	2	7	7	6	0	4	5	3	0	9	5	5	4	2	7	3	7	3	3	0	3	6	0	4	5	0	3	3	
16	6	3	3	7	0	6	2	5	0	3	3	4	3	5	5	5	2	3	5	0	2	3	0	6	3	0	6	4	
17	4	6	1	1	0	1	4	5	0	10	3	3	1	1	2	1	5	6	2	0	2	4	0	4	5	0	4	7	
18	2	4	2	5	0	5	2	5	0	4	4	0	0	5	7	7	1	7	5	0	1	4	0	2	7	0	5	2	
19	3	5	1	2	0	4	1	1	0	4	0	0	1	4	3	2	2	2	5	0	1	6	0	1	4	0	3	6	
20	2	3	1	3	0	4	0	2	0	1	0	0	0	1	0	0	0	2	3	0	0	1	0	0	1	0	2	2	
21	2	0	0	2	0	1	1	1	0	2	1	0	0	1	1	1	2	0	1	0	0	0	0	2	0	0	1	2	
22	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
23	0	1	0	0	0	0	1	0	0	2	0	0	0	0	1	0	0	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	0	0	1	0	0	1	0	0	1	0	0	0	1	
25	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
<b>Total</b>	<b>132</b>	<b>134</b>	<b>132</b>	<b>134</b>	<b>124</b>	<b>118</b>	<b>119</b>	<b>134</b>	<b>134</b>	<b>134</b>	<b>128</b>	<b>132</b>	<b>121</b>	<b>71</b>	<b>118</b>	<b>133</b>	<b>134</b>	<b>133</b>	<b>134</b>	<b>134</b>	<b>134</b>	<b>116</b>	<b>134</b>	<b>134</b>	<b>134</b>	<b>0</b>	<b>134</b>	<b>134</b>	



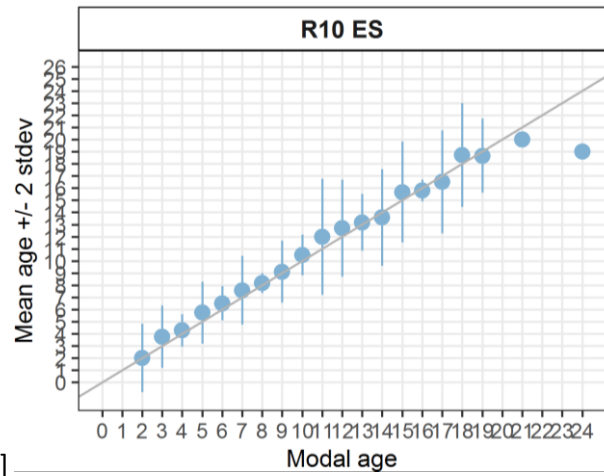
[[1]]



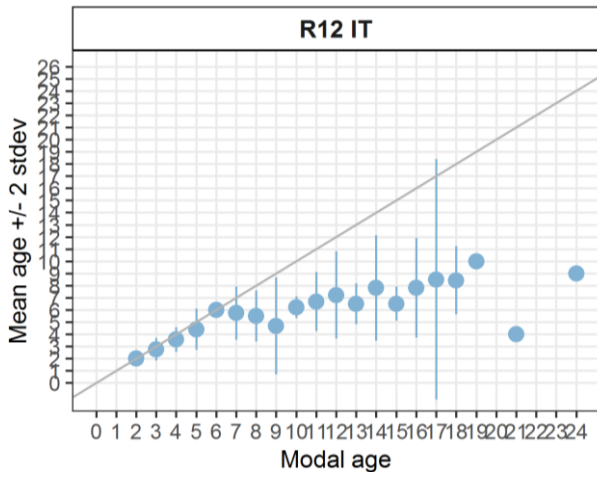
[[2]]



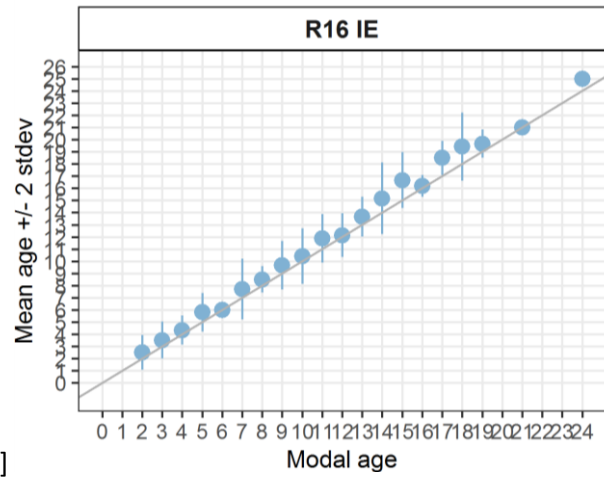
[[3]]



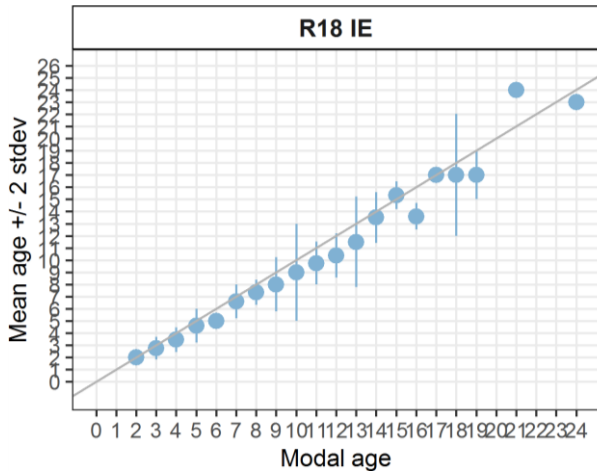
[[4]]



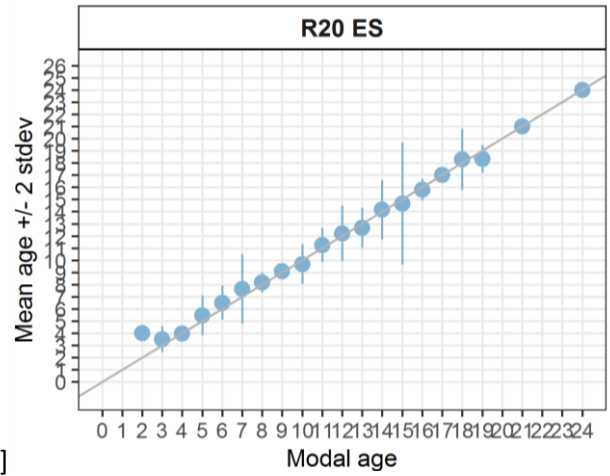
[[5]]



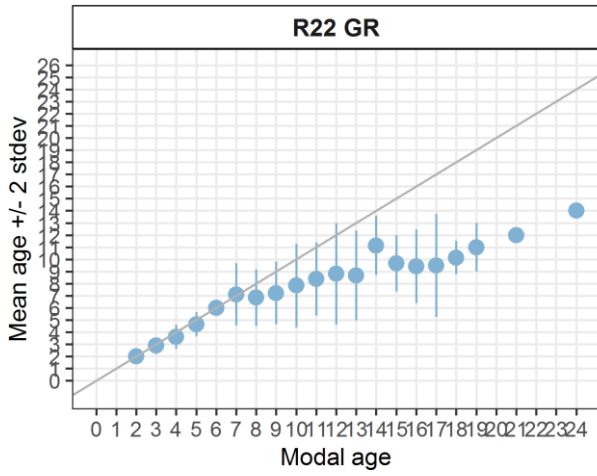
[[6]]



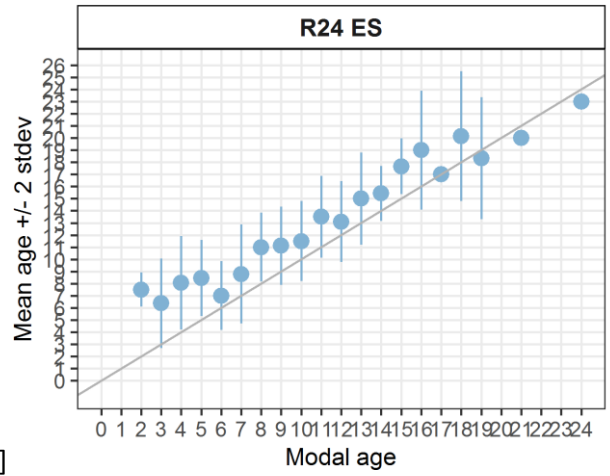
[[7]]



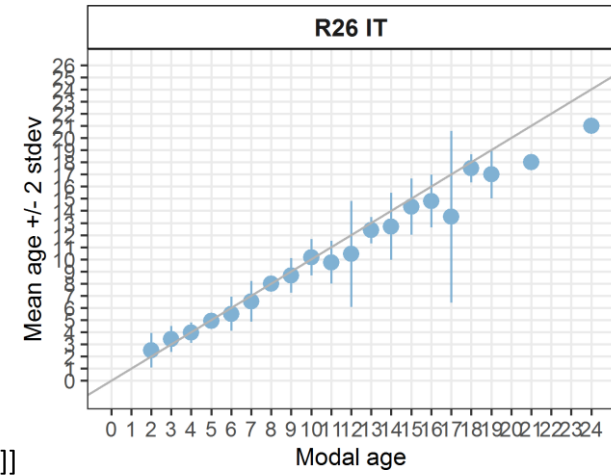
[[8]]



[[9]]



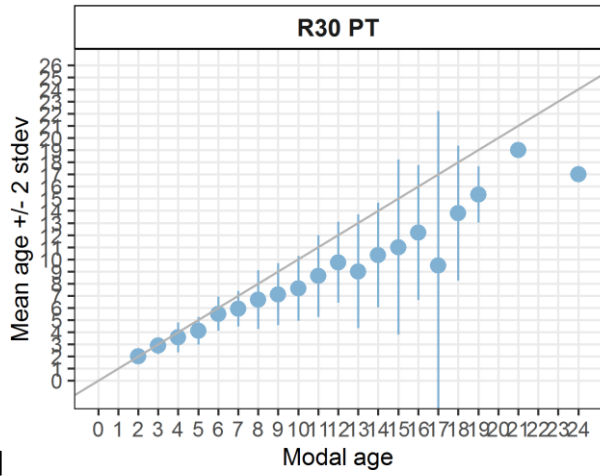
[[10]]



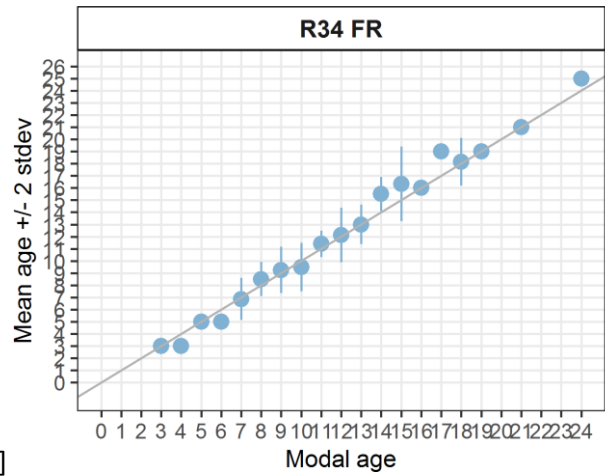
[[11]]



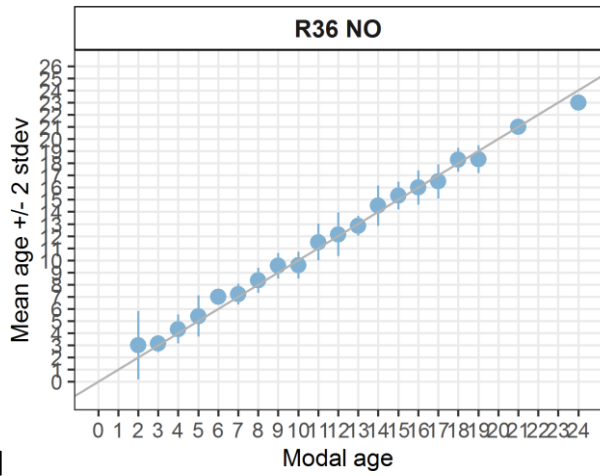
[[12]]



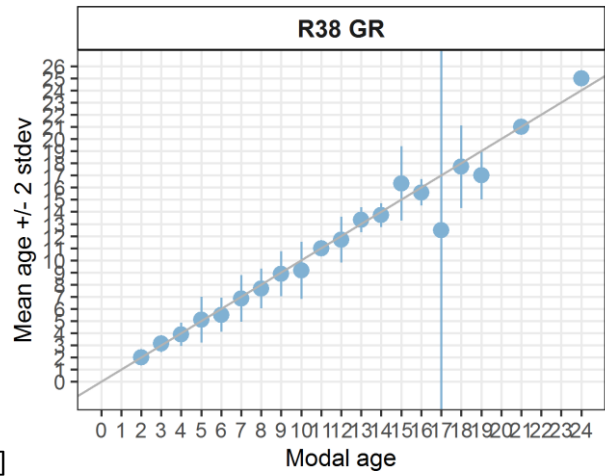
[[13]]



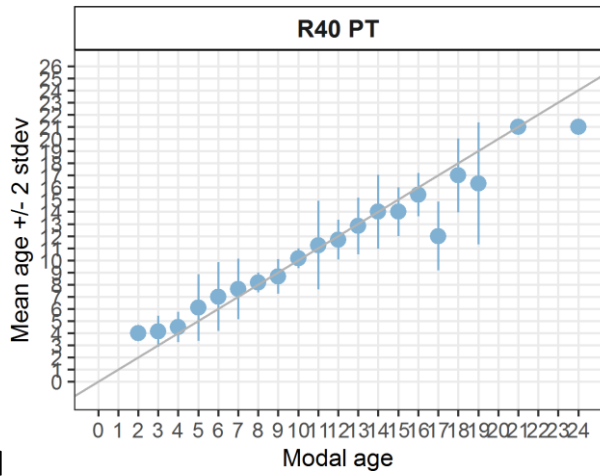
[[14]]



[[15]]



[[16]]

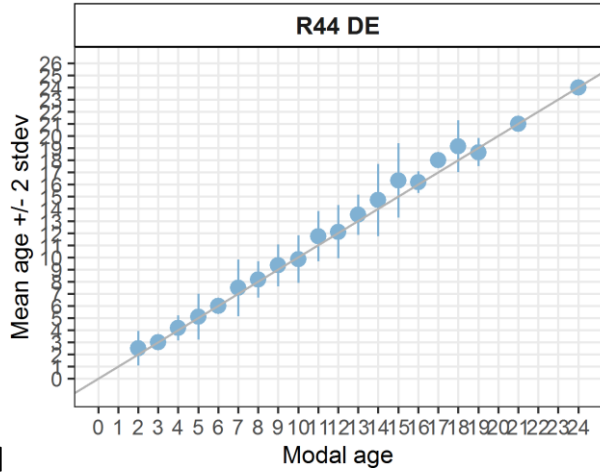


[[17]]

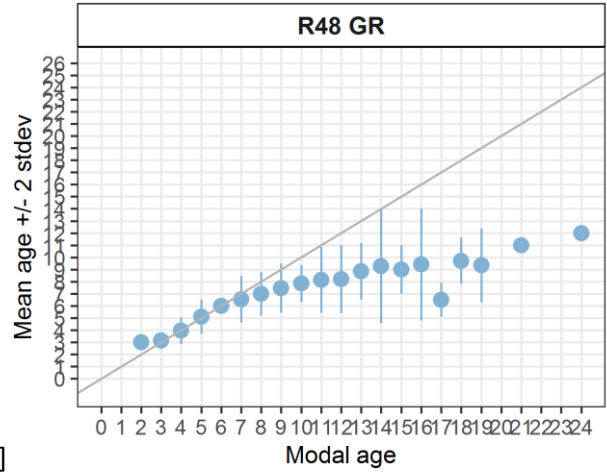


[[18]]

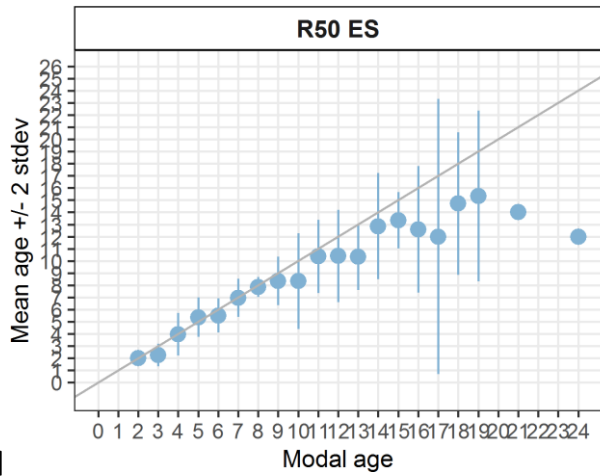




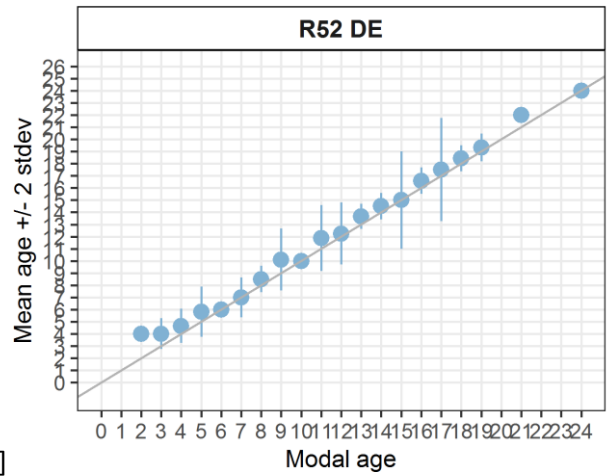
[[19]]



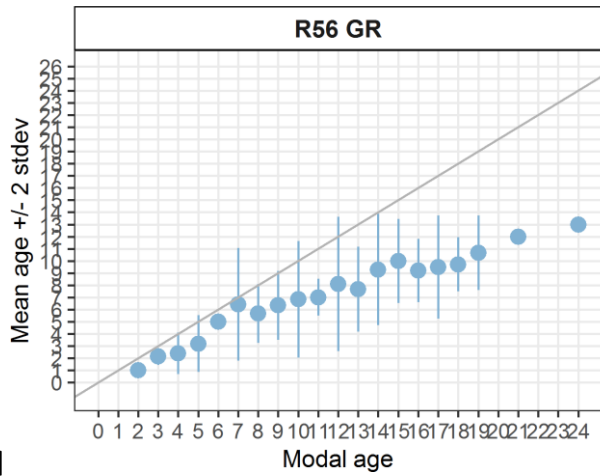
[[20]]



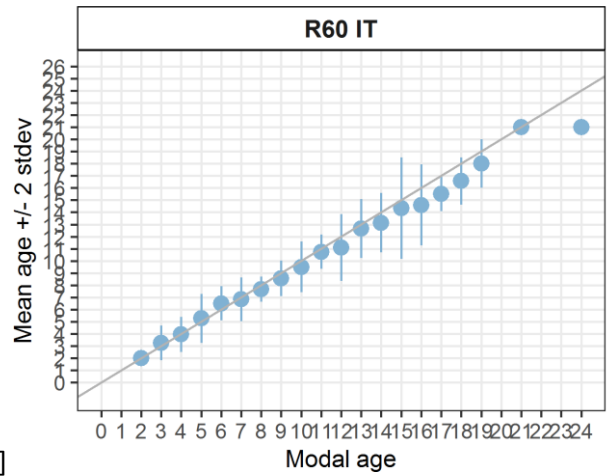
[[21]]



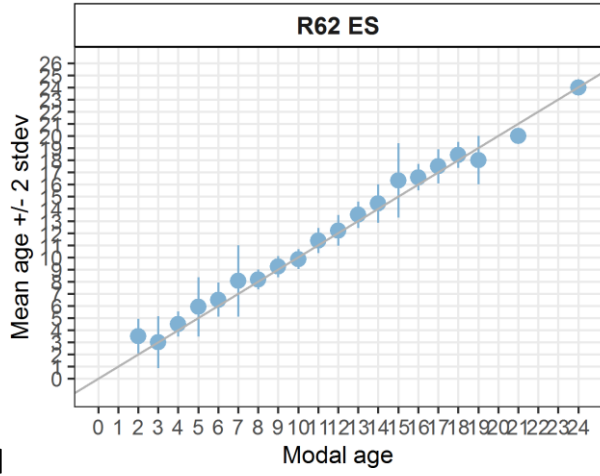
[[22]]



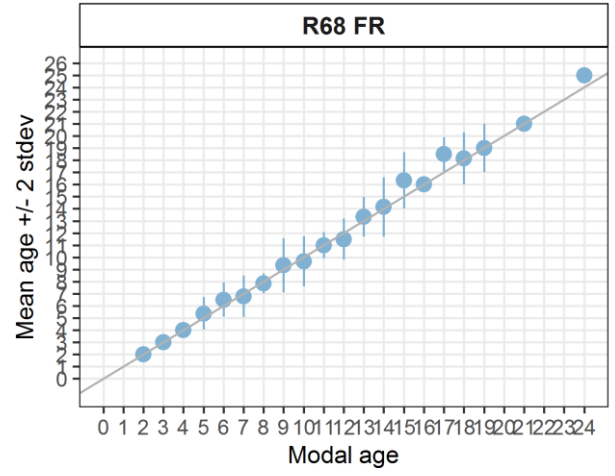
[[23]]



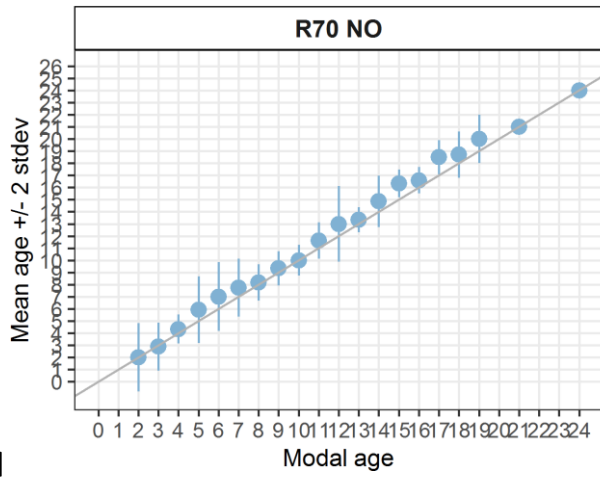
[[24]]



[[25]]



[[26]]



[[28]]

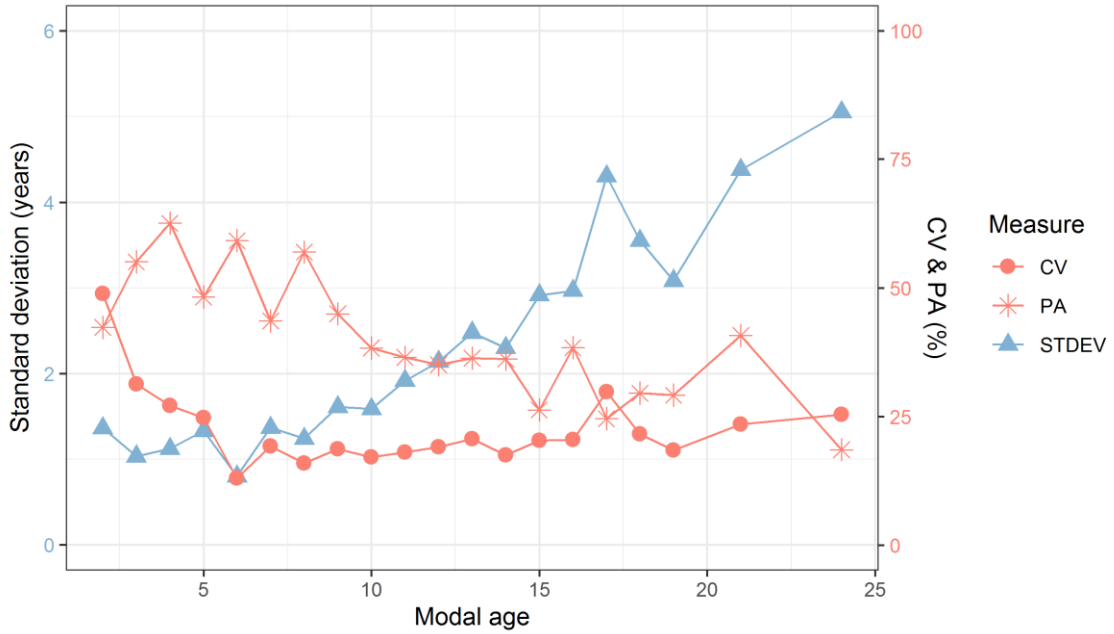


Figure 6.9: CV, PA and STDEV (standard deviation) are plotted against modal age

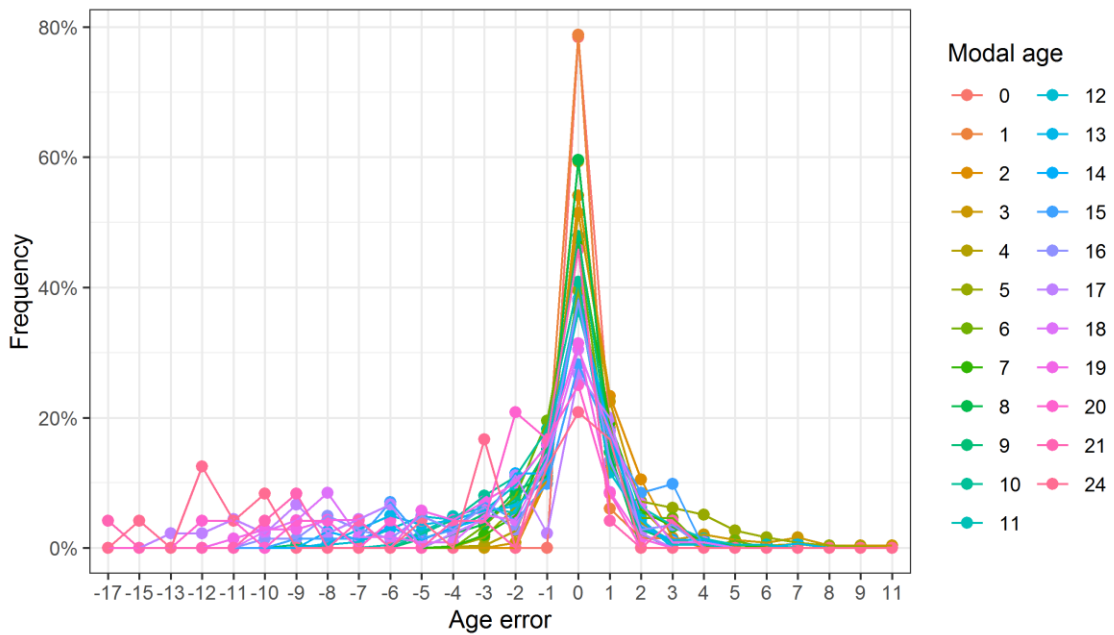


Figure 6.10: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be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

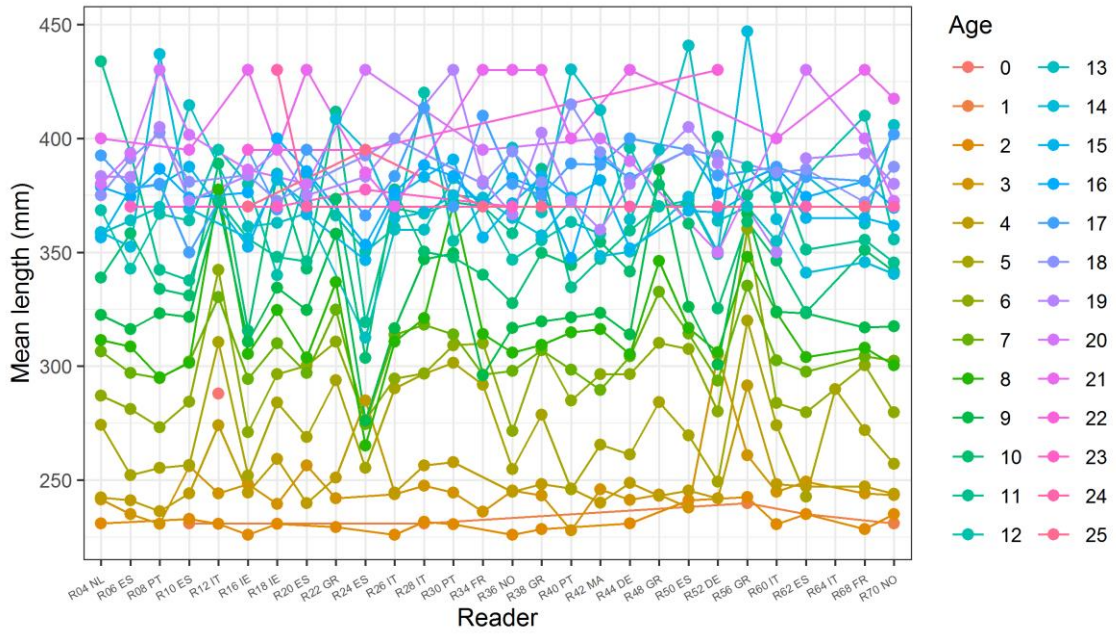


Figure 11: The mean length at age as estimated by each age reader.

## 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	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	Modal age	PA %	CV %	APE %
16_1.5x20	289	M	18/03/2019	27.9.a	7	7	6	8	7	-	-	7	8	7	57	10	7
17_1.5x20	291	F	18/02/2019	27.9.a	8	7	7	6	7	-	-	7	8	7	57	10	7
18_1.5x20	303	M	05/02/2019	27.9.a	7	8	7	8	6	-	-	8	9	8	43	13	10
19_1.5x20	340	F	18/02/2019	27.9.a	8	10	9	9	6	-	-	8	11	8	29	18	14
20_1.5x20	273	F	03/06/2019	27.9.a	6	6	6	7	6	-	-	8	7	6	57	12	10
21_1.5x20	318	M	17/04/2019	27.9.a	15	13	10	15	9	-	-	14	13	13	29	19	14
22_1.5x20	346	M	13/05/2019	27.9.a	6	7	10	9	6	-	-	-	7	6	33	22	18
23_1.5x20	426	M	06/05/2019	27.9.a	12	13	12	14	10	-	-	12	13	12	43	10	7
24_1.5x20	283	M	20/08/2019	27.9.a	7	7	7	8	7	-	-	7	8	7	71	7	6
25_1.5x20	308	M	18/09/2019	27.9.a	-	7	8	8	6	-	-	7	7	7	50	11	8
26_1.5x20	340	M	25/09/2019	27.9.a	8	7	9	10	7	-	-	12	8	7	29	21	16
27_1.5x20	447	F	16/07/2019	27.9.a	12	15	14	15	9	-	-	18	13	15	29	21	15
28_1.5x20	296	M	29/10/2019	27.9.a	8	9	9	9	7	-	-	9	10	9	57	11	8
29_1.5x20	330	M	09/12/2019	27.9.a	7	8	10	10	6	-	-	9	12	10	29	23	18
30_1.5x20	380	M	14/10/2019	27.9.a	8	10	12	11	7	-	-	11	10	10	29	18	14
GBD_19_B47_C1_O_0003	321	U	09/10/2017	7	7	7	7	7	7	7	7	6	7	7	90	5	3
GBD_19_B47_C1_O_0012	338	U	11/10/2017	7	9	8	10	11	6	11	9	8	10	8	20	19	15
GBD_19_B47_C1_O_0013	378	U	11/10/2017	7	12	10	12	13	8	11	12	10	11	10	30	13	10
GBD_19_B47_C1_O_0014	304	U	11/10/2017	7	7	7	8	8	5	8	7	6	7	7	40	14	11
GBD_19_B47_C1_O_0015	339	U	11/10/2017	7	10	9	10	10	6	12	10	8	10	10	50	18	13
GBD_19_B47_C1_O_0016	368	U	19/10/2017	7	16	16	15	16	6	16	16	13	16	16	60	22	14
GBD_19_B47_C1_O_0030	297	U	08/10/2017	7	9	8	9	10	5	9	9	9	9	9	70	16	10
GBD_19_B47_C1_O_0031	265	U	08/10/2017	7	5	6	6	6	4	5	5	5	5	5	50	16	13
GBD_19_B47_C1_O_0035	272	U	08/10/2017	7	8	8	8	9	4	9	9	8	10	8	40	22	15
GBD_19_B47_C1_O_0042	234	U	07/10/2017	7	4	5	5	6	4	5	4	4	4	4	50	19	15
GBD_19_B47_C1_O_0043	228	U	07/10/2017	7	3	4	4	5	3	5	3	4	4	3	40	21	17
GBD_19_B47_C1_O_0044	254	U	07/10/2017	7	4	4	6	5	3	3	3	5	4	3	40	26	20
GBD_19_B47_C1_O_0045	230	U	07/10/2017	7	3	4	4	5	3	3	3	3	3	3	70	21	16
GBD_19_B47_C1_O_0046	235	U	07/10/2017	7	3	4	4	4	3	3	4	4	1	4	50	32	25
GBD_19_B47_C1_O_0047	320	U	07/10/2017	7	7	8	8	8	7	8	8	8	8	8	70	6	5
GBD_19_B47_C1_O_0048	394	U	07/10/2017	7	12	13	13	13	6	13	13	13	13	13	70	20	15
GBD_19_B47_C1_O_0054	316	U	11/10/2017	7	12	12	11	11	6	12	12	11	12	12	50	17	11
GBD_19_B47_C1_O_0055	304	U	11/10/2017	7	7	8	8	8	5	8	7	7	7	7	50	13	9
GBD_19_B47_C1_O_0056	339	U	08/10/2017	7	10	9	10	9	4	9	9	9	9	9	60	21	14
GBD_19_B47_C1_O_0057	322	U	08/10/2017	7	14	13	12	14	6	14	13	11	13	13	30	20	14
GBD_19_B47_C1_O_0081	256	U	08/10/2017	7	8	9	8	8	4	9	8	7	8	8	50	19	13
GBD_19_B47_C1_O_0082	277	U	08/10/2017	7	7	7	8	7	6	7	7	7	7	7	70	8	5
GBD_19_B47_C1_O_0083	278	U	08/10/2017	7	7	7	8	7	4	7	7	5	7	7	60	18	14
GBD_19_B47_C1_O_0084	269	U	08/10/2017	7	5	6	7	6	4	7	5	5	4	4	30	22	18
GBD_19_B47_C1_O_0085	288	U	08/10/2017	7	10	9	8	10	0	10	10	7	9	10	40	37	23
GBD_19_B47_C1_O_0086	248	U	08/10/2017	7	6	5	4	5	4	5	4	5	4	4	50	15	13
GBD_19_B47_C1_O_0087	264	U	08/10/2017	7	4	5	5	5	4	4	4	5	4	4	60	12	11
GBD_19_B47_C1_O_0088	313	U	08/10/2017	7	8	9	8	9	5	9	9	8	8	8	40	16	10
GBD_19_B48_C1_O_0001	257	U	24/01/2018	7	4	4	4	5	4	4	4	4	4	4	90	8	4
GBD_19_B48_C1_O_0002	255	U	24/01/2018	7	5	5	5	6	5	6	5	5	6	5	70	9	8
GBD_19_B48_C1_O_0005	244	U	24/01/2018	7	4	4	4	4	4	4	4	4	4	4	100	0	0
GBD_19_B48_C1_O_0007	235	U	24/01/2018	7	4	4	4	4	4	4	4	4	4	4	100	0	0
GBD_19_B48_C1_O_0009	237	U	24/01/2018	7	4	4	4	4	3	6	4	4	5	4	60	21	14
GBD_19_B48_C1_O_0015	244	U	24/01/2018	7	4	4	4	4	4	4	4	4	4	4	90	8	5
GBD_19_B48_C1_O_0016	248	U	24/01/2018	7	4	5	5	4	4	4	5	4	5	4	60	12	11
GBD_19_B48_C1_O_0017	257	U	24/01/2018	7	4	5	5	5	4	4	4	4	5	4	60	12	11
GBD_19_B48_C1_O_0020	222	U	25/01/2018	7	4	4	4	4	4	4	4	4	5	4	80	12	5
GBD_19_B48_C1_O_0027	259	U	24/01/2018	7	5	5	5	5	4	6	6	5	6	5	50	14	11
GBD_19_B48_C1_O_0033	221	U	24/01/2018	7	4	4	4	4	3	4	5	4	5	4	60	17	10
GBD_19_B48_C1_O_0036	242	U	24/01/2018	7	4	4	5	4	3	5	5	4	5	4	40	19	15
GBD_19_B48_C1_O_0037	239	U	24/01/2018	7	4	7	4	4	3	5	5	5	5	5	40	26	20
GBD_19_B48_C1_O_0038	239	U	24/01/2018	7	4	4	4	4	3	4	4	4	5	4	70	15	9
GBD_19_B48_C1_O_0039	230	U	24/01/2018	7	4	4	4	4	3	4	4	3	4	4	70	13	11
GBD_19_B48_C1_O_0043	226	U	24/01/2018	7	3	4	3	3	2	2	2	3	4	2	40	28	23
GBD_19_B48_C1_O_0044	231	U	24/01/2018	7	2	5	3	1	2	3	4	4	3	2	30	41	32
GBD_19_B48_C1_O_0045	231	U	24/01/2018	7	3	4	3	2	2	4	3	3	3	3	50	25	19
GBD_19_B48_C1_O_0046	235	U	24/01/2018	7	4	3	3	2	2	3	3	3	2	3	60	23	17
GBD_19_B48_C1_O_0048	237	U	10/02/2018	7	4	5	4	3	3	5	6	4	5	3	30	25	20
GBD_19_B48_C1_O_0049	265	U	24/01/2018	7	5	5	5	5	3	6	5	5	6	5	60	18	11
HOM_4A_3Q_01	335	M	12/07/2016	4	8	9	8	8	6	8	8	8	8	8	70	10	7

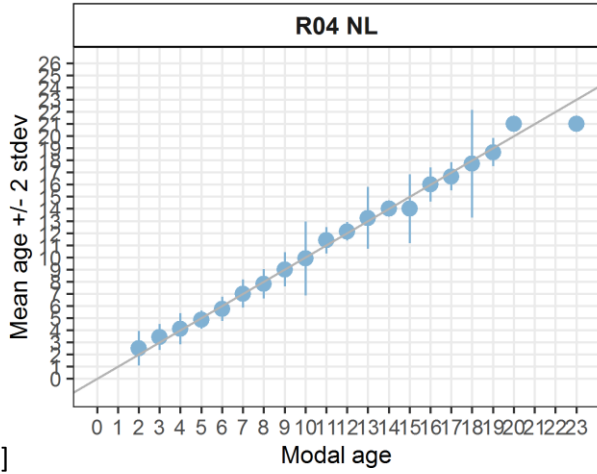
Fish ID	length	sex	Catch date	ICES area	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	Modal age	PA %	CV %	APE %
HOM_4A_3Q_02	335	M	10/08/2015	4	10	10	10	9	6	10	10	11	10	10	60	15	11
HOM_4A_3Q_03	385	F	13/07/2016	4	12	13	11	13	5	12	12	12	13	12	40	21	14
HOM_4A_3Q_04	355	F	12/07/2016	4	12	12	9	10	7	14	11	10	11	10	20	20	15
HOM_4A_3Q_05	325	M	10/08/2015	4	14	15	13	13	6	15	13	13	14	13	40	22	15
HOM_4A_3Q_06	395	F	13/07/2016	4	17	17	13	16	8	16	16	15	17	16	30	19	14
HOM_4A_3Q_07	415	M	12/07/2016	4	17	19	15	15	6	18	18	18	18	18	40	24	17
HOM_4A_4Q_08	305	F	16/10/2015	4	3	4	-	3	3	3	3	3	3	3	89	11	6
HOM_4A_4Q_09	285	M	16/10/2015	4	5	6	6	5	5	5	6	6	5	5	50	13	11
HOM_4A_4Q_10	305	F	16/10/2015	4	6	7	7	6	6	6	7	6	6	6	60	10	8
HOM_4A_4Q_11	305	F	16/10/2015	4	8	8	9	7	4	7	8	8	7	8	40	19	14
HOM_4A_4Q_12	335	M	16/10/2015	4	7	9	10	7	5	11	8	8	8	8	40	21	14
HOM_4A_4Q_13	335	F	16/10/2015	4	10	9	11	6	5	9	10	8	9	9	30	23	18
HOM_4A_4Q_14	305	M	16/10/2015	4	12	11	10	8	5	12	12	9	11	12	30	23	17
HOM_4A_4Q_15	335	F	16/10/2015	4	14	14	12	10	6	14	13	12	14	14	40	21	14
HOM_6A_1Q_01	235	F	02/02/2017	4	3	4	4	4	3	4	3	4	4	4	60	14	13
HOM_6A_1Q_02	265	F	02/02/2017	4	4	4	-	4	3	4	4	3	4	4	78	12	9
HOM_6A_1Q_03	305	M	02/02/2017	4	5	6	8	4	4	6	6	6	6	6	50	21	16
HOM_6A_1Q_04	265	M	06/01/2014	4	6	7	7	4	5	7	7	6	7	7	60	17	13
HOM_6A_1Q_05	285	M	02/02/2017	4	6	7	8	6	5	8	7	7	8	7	40	14	11
HOM_6A_1Q_06	325	F	02/02/2017	4	8	9	9	8	6	9	9	8	9	9	50	11	8
HOM_6A_1Q_07	315	M	02/02/2017	4	9	9	10	9	6	10	10	9	10	9	50	13	8
HOM_6A_1Q_08	325	M	03/02/2017	4	9	9	9	9	7	10	9	8	9	9	70	9	6
HOM_6A_1Q_09	335	M	03/02/2017	4	12	14	11	9	8	-	12	12	12	12	44	16	12
HOM_6A_1Q_10	335	F	03/02/2017	4	13	13	11	11	7	13	13	12	14	13	50	17	12
HOM_6A_1Q_11	365	F	09/01/2014	4	14	14	13	14	7	15	15	13	15	14	40	18	11
HOM_6A_1Q_12	375	M	02/02/2017	4	14	14	13	12	6	15	15	14	15	14	40	20	13
HOM_6A_1Q_13	395	M	14/01/2016	4	16	16	15	16	6	17	17	16	17	16	40	22	13
HOM_6A_1Q_14	365	F	25/08/2016	4	17	17	13	15	5	18	17	15	17	17	50	25	16
HOM_6A_3Q_01	275	M	25/08/2016	4	5	5	5	5	4	4	4	4	4	4	60	12	11
HOM_6A_3Q_02	325	M	25/08/2016	4	7	7	7	7	4	7	7	5	7	7	70	17	13
HOM_6A_3Q_03	315	F	25/08/2016	4	7	9	9	6	5	7	7	7	8	7	40	18	13
HOM_6A_3Q_04	285	M	25/08/2016	4	8	9	8	8	5	8	8	8	8	8	80	13	7
HOM_6A_3Q_05	335	F	25/08/2016	4	9	9	9	10	5	9	10	9	9	9	60	16	10
HOM_6A_3Q_06	315	F	25/08/2016	4	10	11	11	11	6	10	10	11	10	10	40	16	10
HOM_6A_3Q_07	665	F	25/08/2016	4	11	11	14	13	-	12	13	13	12	13	33	10	8
HOM_6A_3Q_08	355	F	25/08/2016	4	14	15	13	14	-	14	14	12	14	14	56	6	5
HOM_6A_3Q_09	345	M	25/08/2016	4	14	15	12	14	-	15	15	14	15	15	44	7	6
Norway_38301_04	395	F	19/11/2019	27.4.a	19	20	18	21	8	19	18	18	19	18	30	21	11
Norway_38301_05	405	F	18/11/2019	27.4.a	19	19	19	20	-	20	18	17	19	19	44	7	6
Norway_38301_06	400	F	19/11/2019	27.4.a	10	11	13	13	6	12	-	11	12	10	22	20	14
Norway_38301_16	355	M	19/11/2019	27.4.a	14	17	12	18	6	16	15	17	15	15	30	24	16
Norway_38301_22	345	F	19/11/2019	27.4.a	13	12	11	12	9	12	12	11	12	12	50	12	9
Norway_38301_27	355	M	19/11/2019	27.4.a	12	13	13	13	8	12	11	11	11	11	30	14	11
Norway_38307_01	395	M	22/02/2019	27.4.a	17	17	16	18	12	19	16	17	18	17	40	11	7
Norway_38307_05	360	F	22/02/2019	27.4.a	10	11	10	10	6	12	10	10	9	10	50	16	11
Norway_38307_08	375	F	22/02/2019	27.4.a	14	13	13	12	6	14	14	13	12	13	30	20	13
Norway_38307_11	395	M	22/02/2019	27.4.a	15	15	15	15	7	16	16	16	16	16	50	19	10
Norway_38307_12	350	M	22/02/2019	27.4.a	19	19	15	17	10	20	19	19	18	19	40	17	12
Norway_38307_19	410	F	22/02/2019	27.4.a	14	18	18	18	10	20	18	17	18	18	50	17	13
Norway_38307_21	380	M	22/02/2019	27.4.a	18	19	17	18	9	20	19	18	18	18	40	18	12
Norway_38307_27	360	M	22/02/2019	27.4.a	16	16	15	16	11	16	16	18	16	16	60	12	8
Norway_38307_29	370	F	22/02/2019	27.4.a	18	18	16	20	10	19	19	19	19	19	40	16	10
Norway_38308_01	395	M	23/05/2019	27.4.a	20	18	16	21	8	22	18	18	19	18	30	22	13
Norway_38308_09	385	F	23/05/2019	27.4.a	16	15	12	15	8	16	15	16	17	15	30	19	14
Norway_38308_13	370	M	23/05/2019	27.4.a	12	13	12	12	6	11	11	9	11	11	30	19	13
Norway_38308_18	365	M	23/05/2019	27.4.a	20	19	13	18	8	18	18	18	18	18	50	21	15
Norway_38308_20	355	F	23/05/2019	27.4.a	11	11	11	12	6	11	11	11	12	11	60	16	10
Norway_38308_25	385	M	23/05/2019	27.4.a	14	17	12	16	11	18	15	15	15	15	40	14	10
Norway_38308_30	355	M	23/05/2019	27.4.a	-	20	14	14	6	13	12	12	14	12	33	28	17
Norway_94205_01	395	F	06/08/2019	27.4.a	13	15	14	14	8	14	13	13	13	13	40	15	8
Norway_94205_02	370	M	06/08/2019	27.4.a	21	23	14	19	9	25	23	20	24	23	30	25	18
Norway_94205_04	430	M	06/08/2019	27.4.a	21	20	20	20	4	21	21	20	20	20	50	29	16
Norway_94205_07	355	M	06/08/2019	27.4.a	11	11	10	11	6	12	11	12	11	11	50	16	10
Norway_94205_09	390	M	06/08/2019	27.4.a	16	18	14	14	-	18	15	17	18	18	33	10	9
Norway_94205_11	375	M	06/08/2019	27.4.a	16	17	15	19	-	19	18	17	17	17	33	8	6
Norway_94205_14	360	F	06/08/2019	27.4.a	11	13	11	16	-	11	11	12	12	11	56	14	9
Norway_94205_21	325	F	06/08/2019	27.4.a	9	9	10	11	-	9	9	10	9	9	56	8	6
Norway_94205_22	355	M	06/08/2019	27.4.a	12	12	12	16	-	12	12	14	12	12	78	11	8
Norway_94205_25	290	F	06/08/2019	27.4.a	5	6	7	6	-	5	5	6	6	5	44	12	10

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

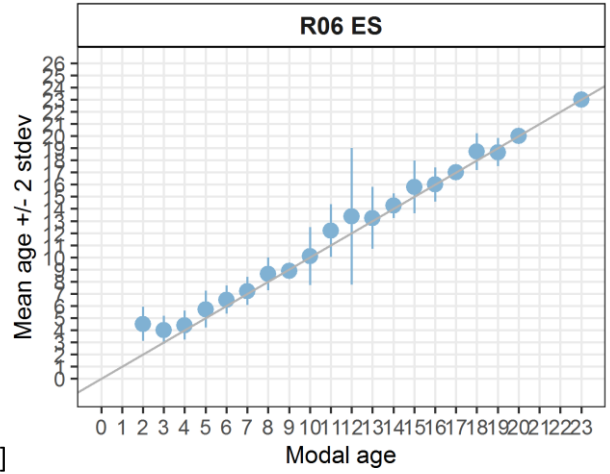
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES	total
3	7	7	6	7	7	7	7	7	7	62
4	21	21	20	21	21	21	21	21	21	188
5	7	7	7	7	7	7	7	7	7	63
6	5	5	5	5	4	3	3	4	5	39
7	13	14	14	14	14	9	9	14	14	115
8	11	11	11	11	11	9	9	11	11	95
9	9	9	9	9	8	8	8	9	9	78
10	8	8	8	8	8	6	6	8	8	68
11	6	6	6	6	5	6	5	6	6	52
12	8	8	8	8	7	6	7	8	8	68
13	8	8	8	8	7	7	7	8	8	69
14	4	5	5	5	4	5	5	5	5	43
15	6	6	6	6	5	5	5	6	6	51
16	4	4	4	4	4	4	4	4	4	36
17	3	3	3	3	2	3	3	3	3	26
18	7	7	7	7	6	7	7	7	7	62
19	3	3	3	3	2	3	3	3	3	26
20	1	1	1	1	1	1	1	1	1	9
21	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0
23	1	1	1	1	1	1	1	1	1	9
<b>Total</b>	<b>132</b>	<b>134</b>	<b>132</b>	<b>134</b>	<b>124</b>	<b>118</b>	<b>118</b>	<b>133</b>	<b>134</b>	<b>1159</b>

**Table 6.12:** Age composition by reader gives a summary of number of readings per reader.

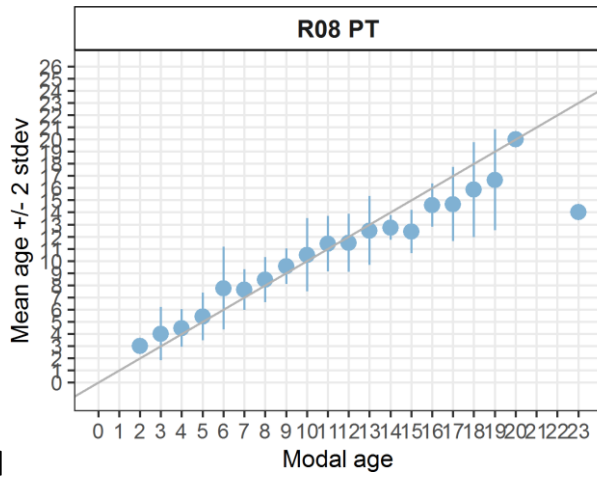
Modal age	R04 NL	R06 ES	R08 PT	R10 ES	R12 IT	R16 IE	R36 NO	R42 MA	R62 ES
0	0	0	0	0	1	0	0	0	0
1	0	0	0	1	0	0	0	0	1
2	1	0	0	2	4	1	1	0	1
3	7	1	4	3	15	6	7	7	4
4	19	19	16	16	22	15	16	18	15
5	9	11	9	11	16	9	9	11	10
6	6	6	5	10	32	6	4	7	6
7	13	15	9	7	13	8	10	10	12
8	12	8	14	12	9	6	6	15	12
9	6	16	10	10	5	9	8	8	10
10	8	4	13	9	4	5	8	4	8
11	4	7	9	7	2	6	6	9	7
12	12	4	11	5	1	11	8	10	10
13	3	10	11	7	0	3	7	7	7
14	11	4	6	8	0	6	2	4	5
15	2	7	7	6	0	4	7	3	5
16	6	3	3	7	0	6	5	3	3
17	4	6	1	1	0	1	2	6	5
18	2	4	2	5	0	5	7	7	7
19	3	5	1	2	0	4	3	2	4
20	2	3	1	3	0	4	0	2	1
21	2	0	0	2	0	1	1	0	0
22	0	0	0	0	0	1	0	0	0
23	0	1	0	0	0	0	1	0	0
24	0	0	0	0	0	0	0	0	1
25	0	0	0	0	0	1	0	0	0
<b>Total</b>	<b>132</b>	<b>134</b>	<b>132</b>	<b>134</b>	<b>124</b>	<b>118</b>	<b>118</b>	<b>133</b>	<b>134</b>



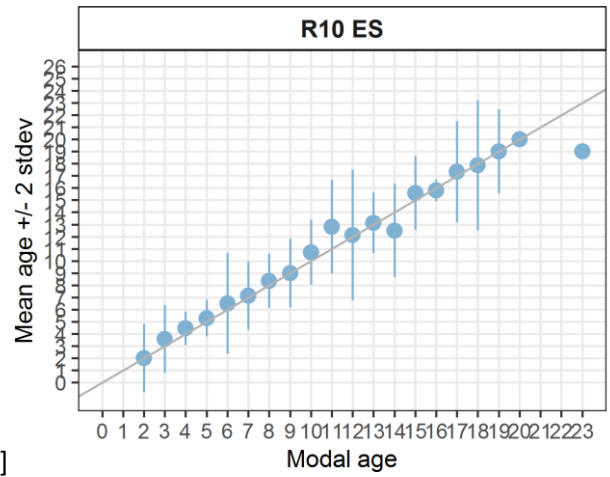
[[1]]



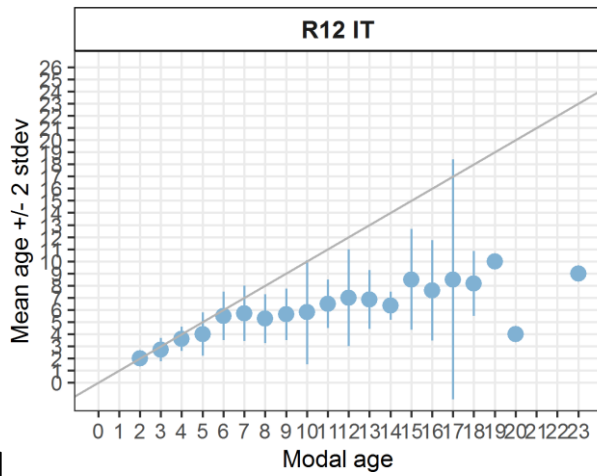
[[2]]



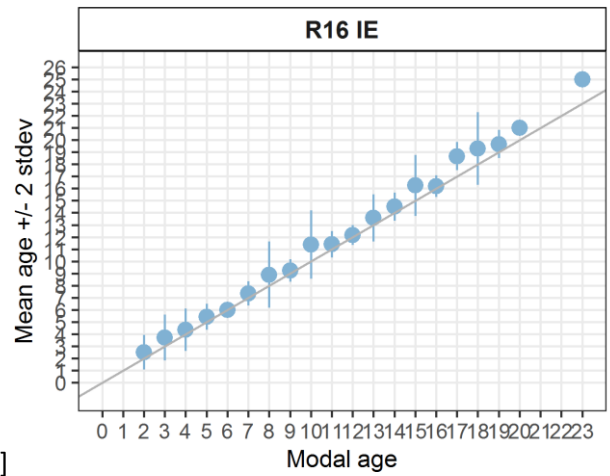
[[3]]



[[4]]

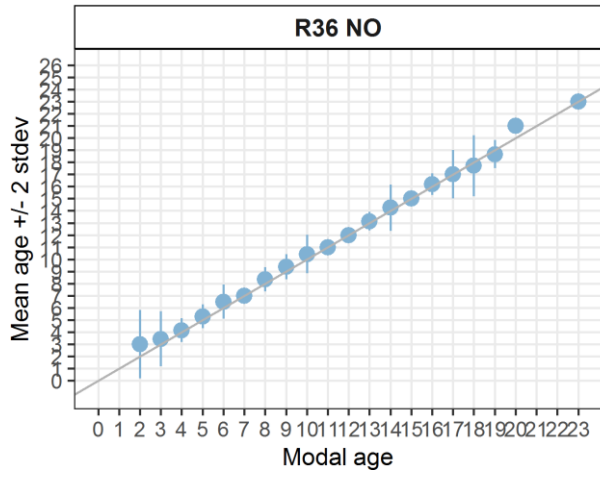


[[5]]

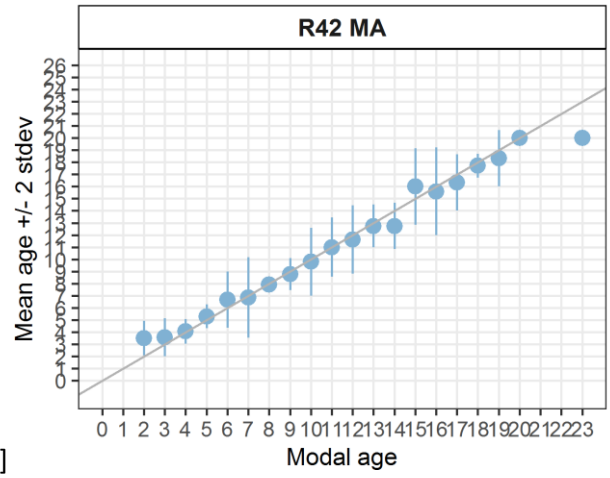


[[6]]

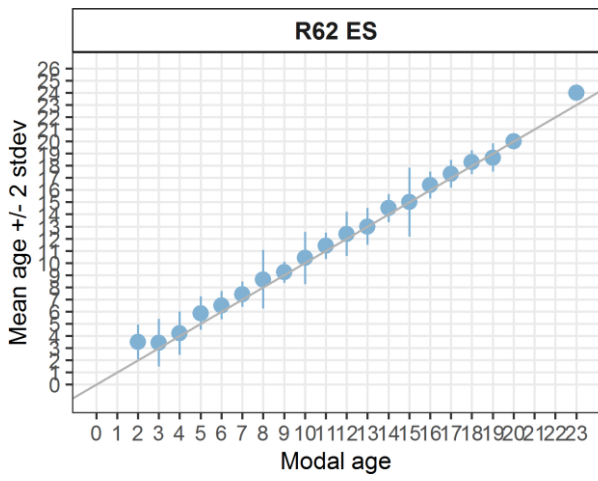




[[7]]



[[8]]



[[9]]

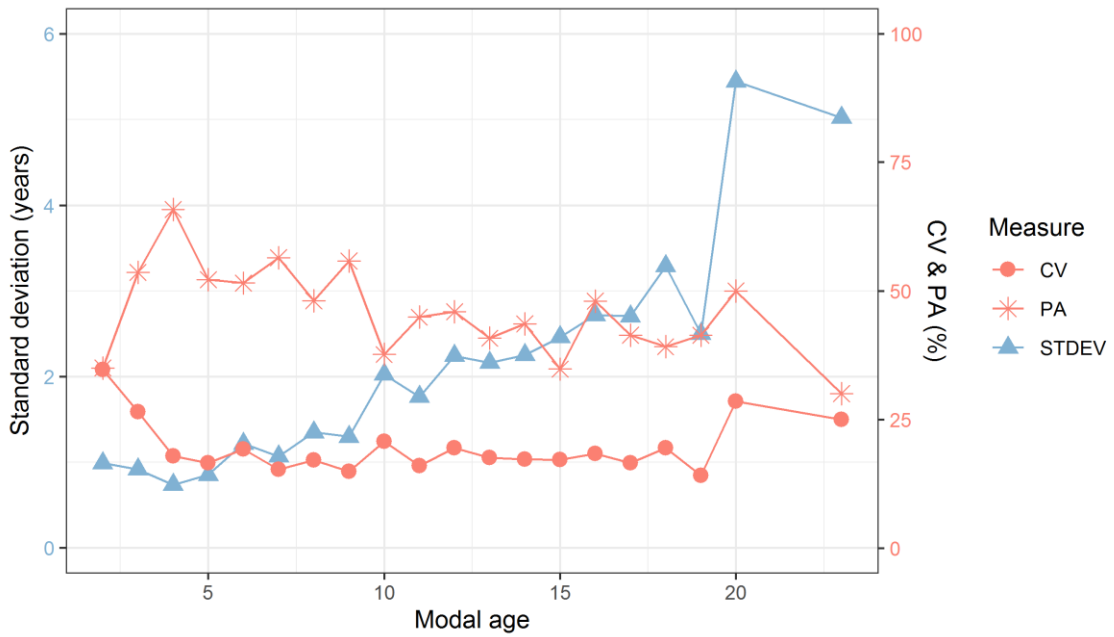


Figure 6.12: CV, PA and STDEV (standard deviation) are plotted against modal age

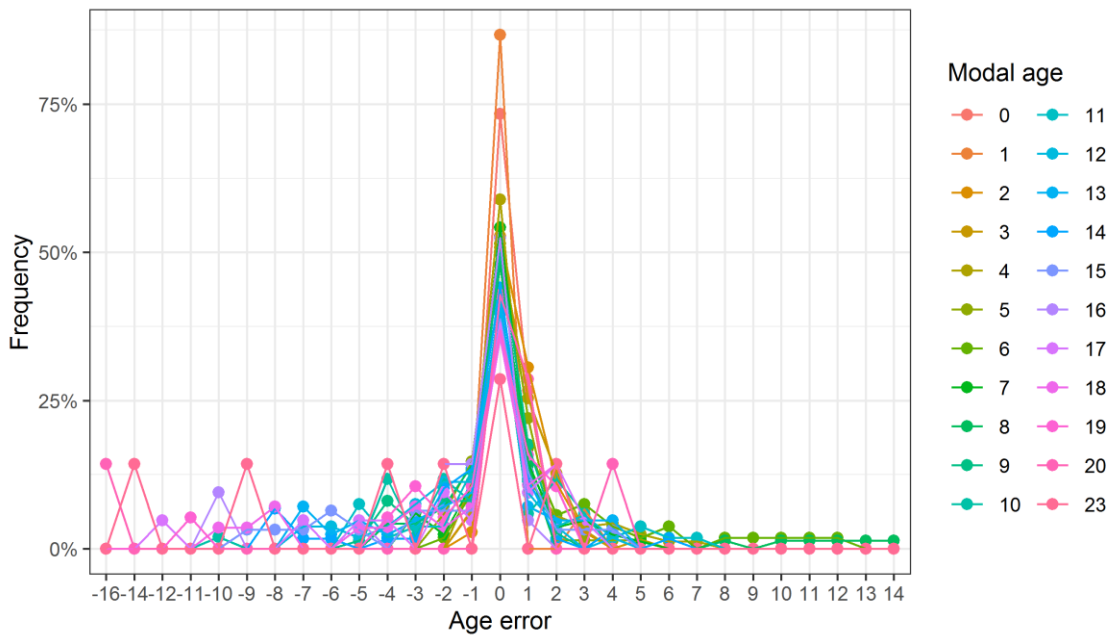


Figure 6.13: The distribution of the age reading errors in percentage by modal age as observed from the whole group of age readers in an age reading comparison to modal age. The achieved precision in age reading by MODAL age group is shown by the spread of the age readings errors. There appears to be no relative bias, if the age reading errors are normally distributed. The distributions are skewed, if relative bias occurs.

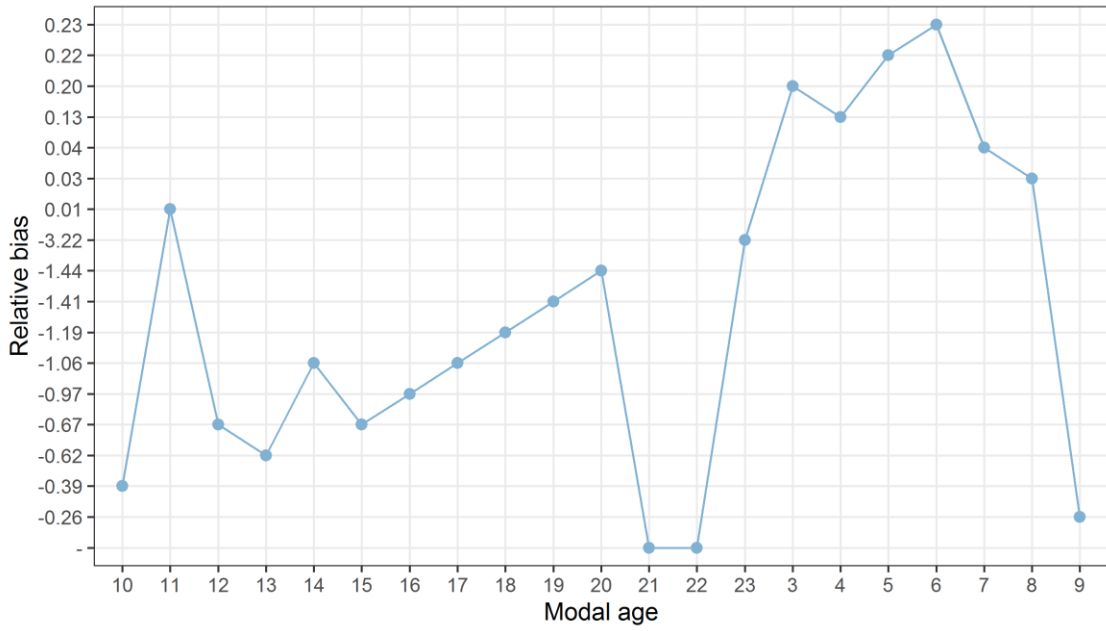


Figure 6.14: The relative bias by modal age as estimated by all age readers combined.

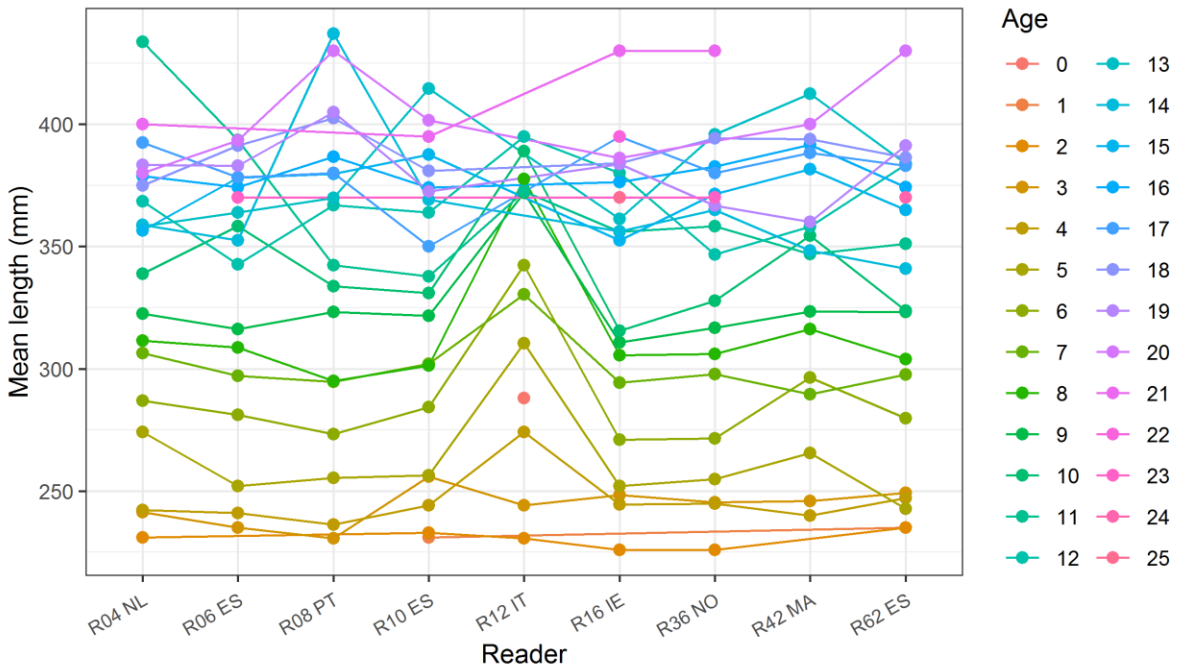


Figure 6.15: The mean length at age as estimated by each age reader.

## 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
44	49	32

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

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	Modal age	PA %	CV %	APE %		
001L_219_16-06-20	219	M	16/06/2020	20	3	2	3	3	3	3	4	3	4	3	3	5	3	3	3	3	3	3	75	21	13	
001L_250_15-10-20	250	F	15/10/2020	20	4	4	4	3	4	2	6	5	5	3	6	6	3	5	-	5	4	4	27	28	24	
001L_254_10-11-20	254	F	11/10/2020	20	4	3	4	3	4	2	3	5	4	3	5	5	3	4	4	5	4	4	38	24	19	
001L_256_27-07-20	256	M	27/07/2020	20	3	4	4	3	3	1	3	5	4	3	6	7	3	4	3	4	3	4	44	37	27	
001L_261_02-06-20	261	F	06/02/2020	22	2	2	3	3	3	1	1	5	5	2	3	-	3	2	3	5	3	3	40	45	33	
001L_352_18-10-20	352	M	18/10/2020	22	3	3	5	9	5	2	4	6	6	4	5	4	9	4	4	8	4	4	31	41	31	
001L_372_03-06-20	372	M	06/03/2020	22	5	4	5	7	5	3	5	6	5	5	7	6	7	5	5	9	5	5	50	25	19	
001R_232_10-08-20	232	F	08/10/2020	20	2	2	4	3	3	2	5	3	4	3	3	5	3	3	2	3	3	3	50	31	22	
001R_243_02-09-20	243	F	09/02/2020	22	1	2	-	4	3	2	2	5	5	2	2	4	3	3	3	5	2	2	33	42	33	
001R_247_06-10-20	247	M	10/06/2020	20	2	2	-	3	4	2	4	6	5	3	7	5	3	3	3	5	3	3	33	40	33	
002L_150_03-09-20	150	M	09/03/2020	22	0	0	1	1	0	2	1	2	1	1	1	1	1	1	1	1	1	1	69	61	38	
002L_161_10-08-20	161	F	08/10/2020	20	1	1	2	1	1	2	2	2	2	3	1	1	2	1	1	-	2	1	53	42	37	
002L_222_03-09-20	222	M	09/03/2020	22	1	1	2	2	2	2	2	3	3	2	2	3	2	2	2	3	2	2	62	29	21	
002L_245_10-11-20	245	F	11/10/2020	20	4	3	4	3	4	2	4	4	4	3	5	4	3	4	4	4	4	4	62	19	15	
002L_300_18-10-20	300	M	18/10/2020	22	2	2	4	4	3	1	2	5	4	3	2	4	4	2	-	6	2	2	33	43	36	
002L_326_03-06-20	326	F	06/03/2020	22	5	4	6	6	5	3	5	6	6	6	6	6	6	5	3	8	6	6	50	23	18	
002L_334_16-06-20	334	M	16/06/2020	20	3	2	3	6	3	2	6	4	6	5	5	6	6	3	4	7	6	6	31	37	32	
002R_264_02-06-20	264	F	06/02/2020	22	2	2	2	4	4	2	2	4	4	3	4	5	4	3	2	6	2	2	38	38	32	
003L_100_03-09-20	100	F	09/03/2020	22	1	0	1	0	0	1	1	1	0	1	1	1	0	0	1	0	1	0	1	56	91	88
003L_155_29-08-20	155	M	29/08/2020	22	1	1	1	1	1	1	1	2	2	1	1	2	1	1	1	0	1	0	1	75	44	29
003L_163_10-08-20	163	F	08/10/2020	20	1	1	2	1	1	2	2	1	3	1	1	2	1	0	1	2	1	1	56	52	43	
003L_211_18-11-20	211	F	18/11/2020	20	4	2	3	2	4	2	4	4	4	2	4	4	2	3	2	3	4	4	44	30	27	
003R_266_16-06-20	266	M	16/06/2020	20	3	2	4	4	3	3	5	4	6	3	5	5	4	3	3	6	3	3	38	30	24	
004L_160_10-08-20	160	F	08/10/2020	20	3	1	-	1	1	1	3	3	3	1	2	2	1	2	-	2	1	1	43	47	40	
004L_263_02-06-20	263	M	06/02/2020	22	1	2	1	5	2	1	3	5	5	3	6	5	4	-	2	5	5	3	33	53	47	
004L_289_16-06-20	289	M	16/06/2020	20	3	2	5	4	3	2	8	5	6	3	4	5	4	3	-	6	3	2	27	39	31	
004R_205_14-08-20	205	F	14/08/2020	20	2	3	-	2	4	2	4	5	4	2	5	4	2	3	-	3	2	2	36	35	30	
005L_148_10-08-20	148	F	08/10/2020	20	2	2	3	1	2	3	1	3	3	1	2	2	1	2	3	2	2	2	44	37	28	
005L_240_03-09-20	240	M	09/03/2020	22	1	1	2	3	2	1	4	3	4	2	2	3	3	2	2	3	2	2	38	40	34	
005L_267_02-06-20	267	F	06/02/2020	22	2	1	2	4	0	1	1	4	4	2	5	3	4	2	3	5	2	2	25	57	49	
005L_300_16-06-20	300	F	16/06/2020	20	4	2	4	4	-	3	7	4	7	4	5	5	4	3	3	7	4	4	40	35	27	
006L_201_03-09-20	201	F	09/03/2020	22	2	1	2	2	2	1	1	3	3	2	2	4	2	2	2	2	2	2	62	37	23	
006L_285_16-06-20	285	F	16/06/2020	20	4	3	4	4	4	4	5	4	0	4	5	6	4	4	4	6	4	4	62	33	18	
006R_158_10-08-20	158	M	08/10/2020	20	1	1	2	1	2	2	2	3	2	1	2	2	1	1	2	2	2	2	56	36	31	
007R_143_10-08-20	143	M	08/10/2020	20	0	0	1	1	1	1	1	3	1	1	1	1	1	1	1	2	1	1	75	64	34	
008L_149_10-08-20	149	F	08/10/2020	20	1	0	2	1	2	1	1	4	1	1	1	2	1	2	1	1	1	1	62	64	47	
009L_286_02-06-20	286	M	06/02/2020	22	2	1	3	4	2	2	1	4	4	2	5	4	4	2	2	6	2	2	38	49	42	
009L_354_18-10-20	354	M	18/10/2020	22	5	3	4	7	4	3	6	6	7	5	3	6	7	3	4	9	3	3	25	36	30	
009R_50_23-08-20	50	U	23/08/2020	20	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	0	0	0	62	-	-	
010L_200_03-09-20	200	F	09/03/2020	22	2	1	2	2	2	2	2	3	3	2	2	4	2	2	2	3	2	2	69	30	22	
010L_203_08-08-20	203	F	08/08/2020	20	3	2	3	2	3	3	3	5	3	2	4	4	2	3	2	3	3	3	50	29	20	
010L_285_02-06-20	285	F	06/02/2020	22	1	0	3	4	1	1	2	4	5	3	6	-	4	2	-	7	1	2	21	67	54	
011L_206_08-08-20	206	F	08/08/2020	20	3	3	3	3	3	3	3	4	2	3	3	5	3	3	3	3	3	3	81	20	11	
011L_286_02-06-20	286	F	06/02/2020	22	2	1	2	4	2	2	3	5	4	4	6	4	4	2	3	7	2	2	31	47	38	
012L_204_03-09-20	204	M	09/03/2020	22	1	1	2	2	2	2	2	3	3	2	3	4	2	2	2	2	2	2	62	34	24	
012L_54_23-08-20	54	U	23/08/2020	20	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	0	0	0	62	-	-	
015L_43_23-08-20	43	U	23/08/2020	20	0	0	0	0	0	1	1	1	0	0	1	1	0	0	1	0	0	0	62	-	-	
016L_287_02-06-20	287	M	06/02/2020	22	3	2	3	4	4	2	2	4	5	4	6	4	4	3	4	6	4	4	44	33	25	

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	Modal age	PA %	CV %	APE %
019L_354_18-10-20	354	F	18/10/2020	22	4	3	4	6	4	2	4	6	6	4	4	4	7	3	3	9	4	44	39	31
020217-15	170	M	02/02/2017	missing	2	1	2	2	-	3	4	4	4	2	2	4	2	2	2	2	2	60	39	33
025L_300_02-06-20	300	M	06/02/2020	22	3	2	3	4	3	2	3	5	9	4	6	4	4	3	3	7	3	38	46	33
033L_59_03-09-20	59	U	09/03/2020	22	0	0	0	0	0	1	-	1	0	0	1	1	0	-	0	0	0	71	-	-
034R_305_02-06-20	305	F	06/02/2020	22	2	1	2	4	2	2	2	5	6	4	3	2	4	2	2	7	2	50	55	45
035L_302_02-06-20	302	M	06/02/2020	22	3	2	3	4	4	2	3	5	7	4	3	4	4	3	4	6	4	38	35	25
036R_50_03-09-20	50	U	09/03/2020	22	0	0	0	0	0	1	0	1	0	0	1	1	0	0	1	0	0	69	-	-
037L_245_02-06-20	245	F	06/02/2020	22	3	0	1	3	4	1	3	5	5	3	3	4	3	-	2	4	3	40	49	35
048L_260_02-06-20	260	F	06/02/2020	22	3	2	2	3	3	1	2	4	5	3	2	4	3	3	2	6	3	38	42	29
066L_302_02-06-20	302	M	06/02/2020	22	2	2	3	4	3	2	2	5	0	3	3	4	4	3	2	7	2	31	51	35
1_TmMl071014_68	373	M	07/10/2014	27.8.c	4	4	4	5	5	5	5	5	7	4	9	6	5	5	6	6	5	44	25	18
10_PelTm0412L26_3	455	M	08/04/2012	27.8.c	8	7	9	7	6	5	10	8	8	8	15	8	7	5	5	7	8	31	31	20
10TM_GSA11	141	F	08/03/2016	missing	2	0	-	1	1	2	1	3	1	0	1	1	1	1	0	1	1	60	75	48
11_PelTm0318L25_2	319	F	10/04/2018	27.8.c	4	5	5	6	0	4	10	5	6	5	12	9	5	4	4	4	4	31	51	35
11TM_GSA11	242	F	22/07/2015	missing	-	3	3	2	3	2	4	4	5	2	3	3	2	3	2	4	3	40	31	22
12_PelTm0316L48_17b	366	F	14/04/2016	27.8.c	6	6	7	7	7	4	7	7	5	5	7	7	7	6	6	6	7	50	15	12
12TM_GSA11	202	F	22/07/2015	missing	1	1	1	1	2	2	1	4	2	1	2	3	1	3	2	2	1	44	50	39
13_PelTm0316L43_7	343	F	13/04/2016	27.8.c	7	5	7	6	6	5	6	9	7	5	11	9	6	4	5	7	5	25	28	21
134_14_Nanakos_PS_07-10-20_1X1	134	M	07/10/2020	missing	1	0	1	1	2	1	2	2	1	0	1	1	1	2	0	1	1	56	64	44
135_01_MANIOS_16-04-19_1x1	135	F	16/04/2019	missing	1	0	1	1	2	1	2	2	1	1	1	1	1	2	1	1	1	69	46	34
138_02_MANIOS_16-04-19_1x1	138	F	16/04/2019	missing	1	0	1	1	4	1	4	3	1	1	1	1	1	4	1	1	1	69	81	65
13TM_GSA11	212	F	22/07/2015	missing	-	3	1	2	3	3	2	3	3	2	3	2	1	3	3	3	3	60	30	26
14_PelTm0316L43_1	374	F	13/04/2016	27.8.c	7	6	7	8	7	7	7	8	7	7	11	9	8	7	6	7	7	56	16	11
140_12_Nanakos_PS_07-10-20_1X1	140	F	07/10/2020	missing	2	0	-	1	2	2	2	2	1	0	2	1	2	3	1	1	2	47	57	48
140617-15	145	M	16/06/2017	missing	1	1	1	2	2	4	4	4	5	2	2	8	2	2	4	2	2	44	65	51
147_13_Nanakos_PS_07-10-20_1X1_R	147	F	07/10/2020	missing	1	0	1	1	2	1	2	2	1	1	1	1	1	2	1	1	1	69	46	34
14TM_GSA11	183	F	22/07/2015	missing	1	1	1	1	2	1	1	3	2	1	1	1	0	2	1	2	1	62	54	42
15_PelTmL0317_48_12	293	M	07/04/2017	27.8.c	6	6	7	7	7	4	7	6	6	5	7	7	7	6	6	6	6	44	14	10
150_08_Megalochari_OTB_30-06-20_1X1	150	F	30/06/2020	missing	2	1	1	1	2	2	2	2	0	1	2	2	2	3	2	2	2	62	42	33
150119-27	177	F	15/01/2019	missing	2	1	3	2	3	2	3	2	3	2	3	3	2	2	2	2	2	56	26	22
150119-39	164	F	15/01/2019	missing	2	1	2	2	2	2	2	3	3	2	3	2	2	2	2	2	2	75	24	15
15TM_GSA11	170	M	19/05/2015	missing	0	1	1	2	3	3	4	4	3	3	3	2	2	-	1	4	3	33	52	43
16_PelL0316TmL39_2	280	M	10/04/2016	27.8.c	4	2	3	4	4	3	5	5	5	4	8	5	4	2	3	4	4	38	35	24
165_10_Megalochari_OTB_30-06-20_1X1	165	F	30/06/2020	missing	2	1	1	2	2	2	2	3	0	1	2	2	2	2	2	2	2	69	39	29
16TM_GSA11	133	M	19/05/2015	missing	0	0	1	1	2	1	3	3	2	1	1	1	1	2	1	1	1	56	67	52
17_TmMl071014_70	370	F	07/10/2014	27.8.c	4	4	4	4	4	3	6	5	5	4	7	5	4	4	5	5	4	50	21	17
175_02_Nanakos_PS_08-09-20_1X1	175	F	08/09/2020	missing	1	1	1	2	2	2	3	3	1	1	2	2	2	2	1	2	2	50	39	32
176_01_Manios_PS_10-04-20_1X1	176	F	10/04/2020	missing	1	0	1	2	4	1	2	3	1	1	2	2	2	-	2	2	2	47	55	42
17TM_GSA11	125	M	19/05/2015	missing	0	0	1	1	1	4	1	2	2	1	1	1	1	2	1	1	1	62	74	50
18_Pel0318TmL25_9b	260	F	10/04/2018	27.8.c	4	4	4	5	6	3	5	5	5	4	6	5	5	4	5	4	5	44	17	15
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	2	3	2	2	2	2	2	75	26	12
180_17_Manios_PS_10-04-20_1X1	180	M	10/04/2020	missing	2	1	1	2	2	2	2	2	1	2	2	2	2	2	1	2	2	75	26	21
188_05_Nanakos_PS_08-09-20_1X1	188	M	08/09/2020	missing	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	94	12	6
18TM_GSA11	265	M	06/08/2015	missing	0	3	2	4	4	3	4	4	4	4	6	3	4	4	1	5	4	50	42	31
19_Pel0318TmL26_6	295	F	10/04/2018	27.8.c	4	3	-	4	4	3	6	4	5	5	6	5	4	4	4	4	4	53	21	16
19TM_GSA11	284	M	06/08/2015	missing	0	3	-	4	-	2	4	4	5	5	7	3	6	4	1	7	4	29	52	39
1TM_GSA11	305	F	05/07/2020	missing	0	3	3	3	4	5	7	4	5	3	6	3	3	4	2	4	3	38	44	32
2_TmMl240714_31	410	F	24/07/2014	27.8.c	5	5	5	5	5	5	6	6	8	5	10	9	5	5	5	5	5	69	28	20
20_Tm030713_31a	245	F	03/07/2013	27.8.c	4	1	4	4	4	2	8	4	4	4	4	5	4	4	-	2	4	67	40	23
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	1	2	2	81	22	17

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	Modal age	PA %	CV %	APE %	
206_10_Kap.Pantelis_PS_15-07-20_1X1	206	M	15/07/2020	missing	3	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3	3	3	88	12	8
20TM_GSA11	190	M	05/07/2020	missing	1	1	1	1	2	2	1	2	2	1	2	1	1	2	2	2	1	1	50	34	33
21_Pel0414TmL49_1a	298	F	06/04/2014	27.8.c	7	5	7	7	6	6	9	8	6	7	7	12	6	7	-	7	7	7	47	23	14
217_04_Kap.Pantelis_PS_15-07-20_1X1	217	M	15/07/2020	missing	4	4	3	3	4	2	4	4	3	3	4	3	4	3	4	3	4	4	50	18	16
21TM_GSA11	215	M	05/07/2020	missing	2	2	1	2	2	2	2	3	3	2	3	2	2	3	2	2	2	2	69	25	19
22_Tm070715_3b	335	M	07/07/2015	27.8.c	4	4	6	6	-	3	9	5	6	6	10	10	6	-	-	5	6	6	38	36	26
220218-02	196	M	22/02/2018	missing	3	2	3	3	3	4	6	5	4	4	4	5	3	3	5	3	3	3	44	28	23
220218-35	191	M	22/02/2018	missing	3	2	2	3	4	4	4	4	3	3	3	4	3	3	2	2	3	3	44	25	19
221_05_Kap.Pantelis_PS_05-11-20_1X1	221	M	15/07/2020	missing	3	4	4	3	4	3	4	4	3	3	4	4	3	4	4	4	4	4	62	14	13
223_02_Alexandros_PS_19-06-20_1X1	223	F	19/06/2020	missing	2	1	2	2	2	3	2	3	2	3	2	3	2	4	2	3	2	2	50	30	25
22TM_GSA11	155	M	09/09/2020	missing	2	1	1	1	2	2	2	2	1	1	2	1	1	2	1	2	1	1	50	34	33
23_TmM1011215_16b	298	M	01/12/2015	27.8.c	2	3	4	3	4	3	6	4	5	4	7	7	3	4	5	3	3	3	31	35	27
239_24_Kap.Pantelis_PS_15-07-20_1X1	239	M	15/07/2020	missing	3	4	4	4	4	4	4	4	5	3	3	7	5	4	5	3	4	4	50	25	17
23TM_GSA11	290	M	22/07/2015	missing	1	5	3	3	6	4	7	5	5	4	7	3	6	6	3	7	3	3	25	38	32
24_Pel0318TmL25_13	259	F	10/04/2018	27.8.c	3	2	4	4	4	4	6	5	5	5	7	7	4	4	4	3	4	4	44	31	24
242_04_Ag.Anna_PS_19-06-20_1X1	242	F	19/06/2020	missing	2	1	3	3	3	2	6	2	4	4	3	3	3	3	2	3	3	3	56	28	22
24TM_GSA11	315	M	22/07/2015	missing	0	1	2	4	4	3	6	3	3	2	5	3	5	3	1	7	3	3	31	58	44
25_Pel0318TmL25_2a	319	F	10/04/2018	27.8.c	3	3	5	4	5	4	9	5	7	5	9	7	4	4	-	4	4	4	33	37	29
251_02_Kap.Pantelis_PS_15-07-20_1X1	251	M	15/07/2020	missing	1	4	2	4	4	4	4	5	5	3	5	4	4	4	2	5	4	4	50	32	23
254_28_Ag.Anna_PS_19-06-20_1X1	254	M	19/06/2020	missing	1	3	3	4	4	3	3	6	4	3	4	4	4	4	2	4	4	4	50	31	23
255_02_Kyzikos_PS_24-11-20_1X1	255	M	24/11/2020	missing	1	2	3	4	4	3	4	6	5	3	5	4	4	4	2	5	4	4	38	35	28
25TM_GSA11	171	M	09/09/2020	missing	1	1	2	1	-	2	2	3	2	1	2	2	1	3	2	2	2	2	53	38	30
26_Pel0317TmL44_17a	200	F	05/04/2017	27.8.c	2	1	3	3	3	5	5	5	4	3	3	5	3	3	-	3	3	3	53	35	27
260_09_Ag.Anna_PS_19-06-20_1X1	260	F	19/06/2020	missing	1	3	3	5	4	4	5	6	5	3	5	5	5	6	2	5	5	5	44	34	28
262_01_Kyzikos_PS_24-11-20_1X1	262	F	24/11/2020	missing	1	4	4	5	6	5	6	6	5	3	7	5	5	6	3	5	5	5	38	31	23
266_01_Alexandros_PS_19-06-20_1X1	266	M	19/06/2020	missing	4	3	5	5	5	4	5	5	4	4	5	5	6	3	5	5	5	5	56	18	15
26TM_GSA11	278	M	09/03/2019	missing	2	1	2	2	3	2	3	4	2	4	2	2	5	1	2	2	2	2	56	45	35
27_Pel0317TmL44_22	194	F	05/04/2017	27.8.c	1	1	3	2	2	7	3	3	4	2	2	6	2	3	3	2	2	2	38	57	39
270716GR-001	318	F	27/07/2016	missing	9	9	10	11	9	7	14	9	10	9	13	13	11	10	-	12	9	9	33	18	15
270716GR-007	343	M	27/07/2016	missing	10	6	8	6	-	6	11	7	11	9	7	11	6	6	-	7	6	6	36	26	22
270716GR-011	300	M	27/07/2016	missing	7	5	4	6	3	5	8	7	7	7	7	6	6	-	6	7	40	22	17		
270716GR-018	246	M	27/07/2016	missing	6	0	3	4	2	4	8	6	6	3	7	9	4	5	3	-	3	20	51	41	
270716GR-021	266	M	27/07/2016	missing	6	4	7	4	5	3	7	7	6	4	10	12	4	3	4	8	4	31	43	34	
270716GR-022	295	M	27/07/2016	missing	7	5	7	6	6	4	11	7	10	6	11	13	6	6	-	8	6	33	34	27	
270716GR-028	282	M	27/07/2016	missing	6	4	4	5	5	3	5	5	5	4	5	7	5	4	4	6	5	44	20	15	
270716GR-029	232	M	27/07/2016	missing	4	4	3	4	3	4	5	5	5	4	5	7	4	3	-	4	4	47	24	18	
270716GR-032	219	M	27/07/2016	missing	4	4	3	4	4	5	6	5	5	3	4	7	5	4	4	3	4	44	25	19	
273_03_Kyzikos_PS_24-11-20_1X1	273	M	24/11/2020	missing	3	3	3	3	4	2	4	5	7	3	4	4	3	4	3	5	3	44	32	23	
27TM_GSA11	234	M	22/07/2015	missing	1	2	2	3	3	2	2	2	2	2	2	2	3	3	3	3	2	56	26	22	
28_Pel0317TmL44_23	186	M	05/04/2017	27.8.c	1	1	3	2	2	2	5	2	3	2	2	5	2	2	-	2	2	60	49	36	
28TM_GSA11	137	M	11/12/2015	missing	0	0	0	0	1	1	1	2	1	0	1	1	0	2	0	1	0	44	-	-	
29_Pel0318TmL25_8b	255	F	10/04/2018	27.8.c	3	2	5	3	3	2	7	5	4	3	5	6	3	3	-	3	3	47	39	32	
29TM_GSA11	112	M	11/12/2015	missing	0	0	-	0	-	2	1	4	1	0	1	1	0	-	1	0	0	46	-	-	
2TM_GSA11	152	F	19/05/2015	missing	0	0	1	1	2	1	1	5	4	1	1	1	1	2	2	-	1	53	88	64	
3_TmM1240714_32	380	F	24/07/2014	27.8.c	4	5	5	5	5	4	6	6	6	5	8	6	5	5	5	6	5	50	18	13	
30_Pel0316TmL39_9c	286	F	10/04/2016	27.8.c	3	2	-	3	3	3	8	5	7	3	7	9	3	3	5	4	3	47	49	41	
30TM_GSA11	122	M	21/07/2020	missing	0	1	-	0	0	1	1	2	0	0	1	1	0	3	1	0	0	47	-	-	
31_Pel0318TmL25_1	260	F	10/04/2018	27.8.c	4	4	4	4	4	4	6	6	6	4	6	9	4	4	4	4	4	69	30	23	
312_06_MEGALOCHARI_25-06-19_1x1	312	M	25/06/2019	missing	7	6	7	7	7	5	7	7	7	6	8	7	7	7	6	7	7	69	10	7	
314_04_MEGALOCHARI_25-06-19_1x1	314	M	25/06/2019	missing	6	7	6	6	6	5	6	7	8	4	9	7	6	7	3	8	6	38	24	17	

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	Modal age	PA %	CV %	APE %
316_10_MEGALOCHARI_25-06-19_1x1	316	M	25/06/2019	missing	2	7	6	7	7	3	9	10	9	5	13	8	7	7	7	8	7	38	36	24
32_Tm071014_33	382	M	07/10/2014	27.8.c	4	4	5	4	5	2	5	5	6	4	11	10	4	4	-	5	4	40	45	29
3TM_GSA11	255	F	05/07/2020	missing	2	3	3	2	3	2	2	5	4	2	3	-	2	3	3	2	2	47	32	25
4_Pel0412TmL26_1	478	M	08/04/2012	27.8.c	6	4	7	7	7	5	7	9	8	6	10	8	7	5	5	6	7	31	24	18
4TM_GSA11	175	F	19/05/2015	missing	2	1	1	1	2	2	2	4	3	1	1	2	1	2	3	2	2	44	47	35
5_Pel0317TmL30_1	439	M	27/03/2017	27.8.c	7	7	7	7	8	5	8	7	7	6	9	7	7	6	6	6	7	50	14	10
5TM_GSA11	162	F	19/05/2015	missing	1	1	1	1	2	2	2	4	2	1	1	2	1	2	3	2	1	44	49	38
6_Pel17TmL30_3c	414	F	27/03/2017	27.8.c	6	6	9	8	8	7	11	9	8	8	13	7	8	-	-	8	8	43	22	15
6TM_GSA11	231	F	05/07/2020	missing	-	3	1	2	4	2	4	4	4	2	2	2	2	4	2	2	2	53	39	35
7_Pel0316TmL43_1	374	F	13/04/2016	27.8.c	7	6	7	7	7	5	7	7	7	7	9	7	8	7	-	7	7	73	12	6
7TM_GSA11	226	F	05/07/2020	missing	2	2	1	2	3	2	2	2	2	1	2	2	2	3	2	2	2	75	26	12
8_Pel0412TmL52_11b	432	M	18/04/2012	27.8.c	6	5	6	6	6	4	6	5	6	6	11	7	6	5	5	6	6	56	25	12
8TM_GSA11	293	F	05/07/2020	missing	-	3	2	3	4	2	6	6	4	2	12	2	2	4	2	6	2	40	67	47
9_Pel0412TmL26_2	459	M	08/04/2012	27.8.c	9	10	12	10	9	9	16	11	10	9	13	12	9	7	-	-	9	36	22	16
99_02_Taxiarchis_PS_06-10-20_1X1	99	F	06/10/2020	missing	0	0	0	0	1	1	1	1	1	0	1	1	0	2	0	0	0	50	-	-
9TM_GSA11	264	F	09/03/2019	missing	1	2	1	2	4	2	4	4	4	3	6	3	2	4	2	1	2	31	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	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR	total
0	9	9	7	9	8	9	8	9	9	9	9	9	9	7	9	9	<b>138</b>
1	22	22	20	22	22	22	22	22	22	22	22	21	22	22	19	21	<b>345</b>
2	40	42	39	42	40	42	42	42	42	42	42	41	42	41	39	42	<b>660</b>
3	27	29	27	29	29	29	29	29	29	29	29	28	29	27	26	28	<b>453</b>
4	30	30	28	30	28	30	30	30	30	30	30	30	30	30	25	30	<b>471</b>
5	11	11	11	11	11	11	11	11	11	11	11	11	11	10	11	11	<b>175</b>
6	8	8	8	8	6	8	8	8	8	8	8	8	8	7	5	8	<b>122</b>
7	9	9	9	9	9	9	9	9	9	9	9	9	9	9	6	9	<b>141</b>
8	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	<b>30</b>
9	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	1	<b>29</b>
<b>Total</b>	<b>160</b>	<b>164</b>	<b>153</b>	<b>164</b>	<b>157</b>	<b>164</b>	<b>163</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>161</b>	<b>164</b>	<b>156</b>	<b>141</b>	<b>161</b>	<b>2564</b>

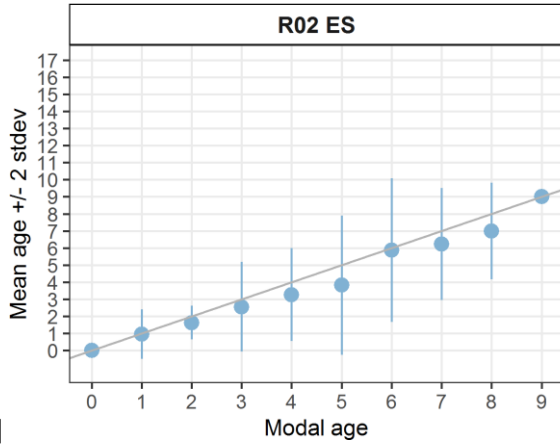


**Table 6.16:** Age composition by reader.

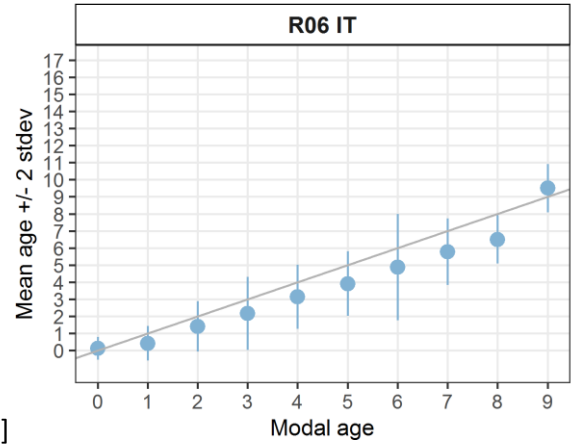
Modal age	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR
0	19	25	7	10	10	0	1	0	11	12	0	0	11	6	5	10
1	36	40	32	26	10	31	23	8	16	28	27	24	24	6	28	12
2	34	33	27	30	37	62	38	20	16	33	30	27	32	40	42	36
3	24	24	33	27	31	29	16	28	22	36	22	17	26	42	30	20
4	22	20	23	35	38	21	24	34	29	25	13	26	32	32	17	18
5	4	9	10	9	11	14	15	40	29	14	18	22	11	12	12	18
6	9	7	5	11	9	2	18	16	17	7	14	10	12	10	6	19
7	8	4	11	11	7	4	11	9	13	4	16	16	10	7	1	17
8	1	0	1	2	2	0	6	3	5	2	3	4	3	0	0	7
9	2	1	2	1	2	1	4	4	2	3	5	7	2	0	0	3
10	1	1	1	1	0	0	2	1	3	0	4	2	0	1	0	0
11	0	0	0	1	0	0	3	1	1	0	5	1	1	0	0	0
12	0	0	1	0	0	0	0	0	0	0	2	3	0	0	0	1
13	0	0	0	0	0	0	0	0	0	0	4	2	0	0	0	0
14	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
16	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>160</b>	<b>164</b>	<b>153</b>	<b>164</b>	<b>157</b>	<b>164</b>	<b>163</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>164</b>	<b>161</b>	<b>164</b>	<b>156</b>	<b>141</b>	<b>161</b>

**Table 6.17:** Mean length (mm) at age per reader is calculated per reader and age (not modal age) and for all readers combined per age. A weighted mean is also given.

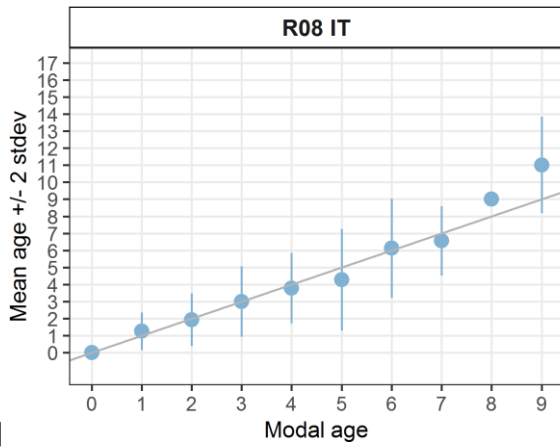
Age	R02 ES	R06 IT	R08 IT	R10 GR	R14 IT	R16 PT	R28 ES	R30 PT	R32 PT	R40 GR	R42 ES	R44 ES	R54 GR	R60 IT	R64 IT	R66 GR
0	146	134	70	83	121	-	50	-	125	95	-	-	92	77	114	84
1	198	199	174	155	157	164	151	77	144	159	125	120	157	151	154	149
2	222	250	223	202	189	228	207	164	183	219	193	191	201	191	222	185
3	255	271	245	245	244	265	226	193	198	250	233	244	242	241	250	224
4	288	293	281	280	260	269	235	238	242	294	248	254	281	272	275	258
5	366	341	334	306	339	342	280	275	271	332	273	254	304	353	357	284
6	343	354	345	336	328	320	310	307	320	374	279	312	324	311	360	325
7	342	381	349	369	359	325	328	334	335	336	297	319	374	350	316	324
8	455	-	343	394	426	-	301	376	414	434	324	348	387	-	-	326
9	388	318	434	352	388	459	317	388	308	373	364	320	406	-	-	360
10	343	459	318	459	-	-	387	316	357	-	372	358	-	318	-	-
11	-	-	-	318	-	-	351	459	343	-	365	343	318	-	-	-
12	-	-	459	-	-	-	-	-	-	-	306	341	-	-	-	318
13	-	-	-	-	-	-	-	-	-	-	377	306	-	-	-	-
14	-	-	-	-	-	-	318	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	455	-	-	-	-	-
16	-	-	-	-	-	-	459	-	-	-	-	-	-	-	-	-
<b>Weighted Mean</b>	<b>242</b>	<b>242</b>	<b>245</b>	<b>242</b>	<b>242</b>	<b>242</b>	<b>244</b>	<b>242</b>	<b>242</b>	<b>242</b>	<b>242</b>	<b>242</b>	<b>242</b>	<b>244</b>	<b>235</b>	<b>242</b>



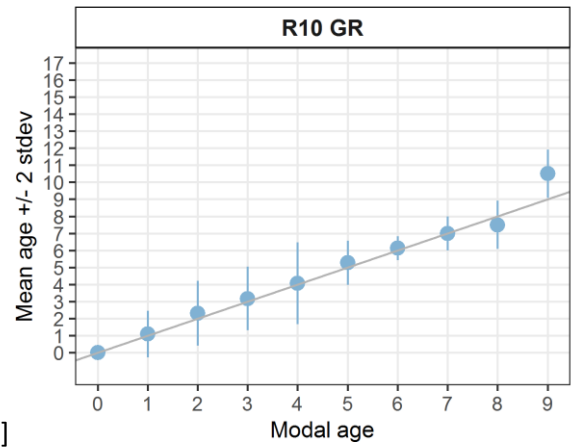
[[1]]



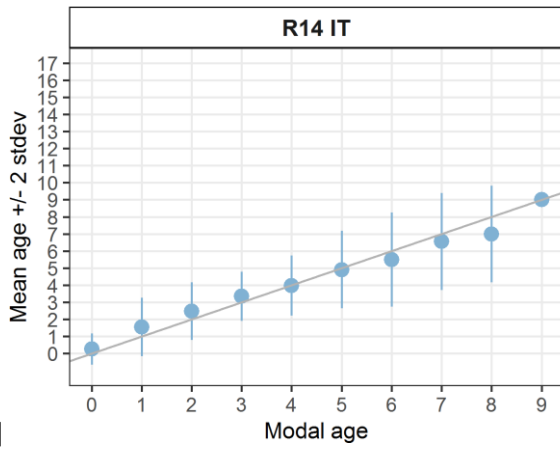
[[2]]



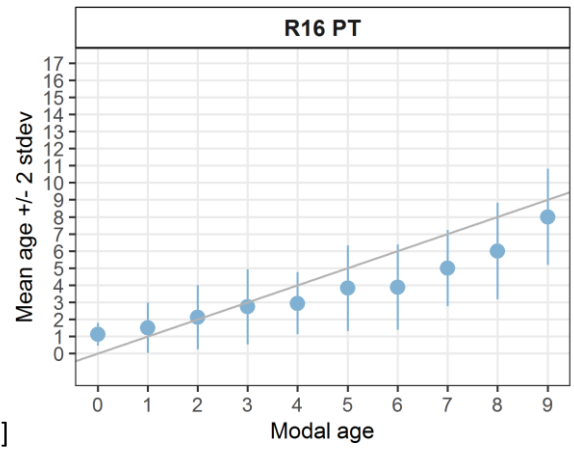
[[3]]



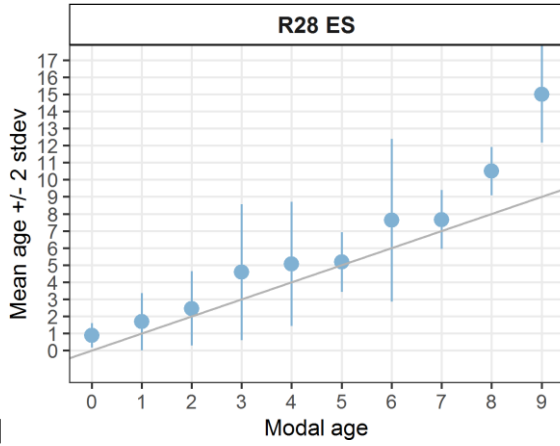
[[4]]



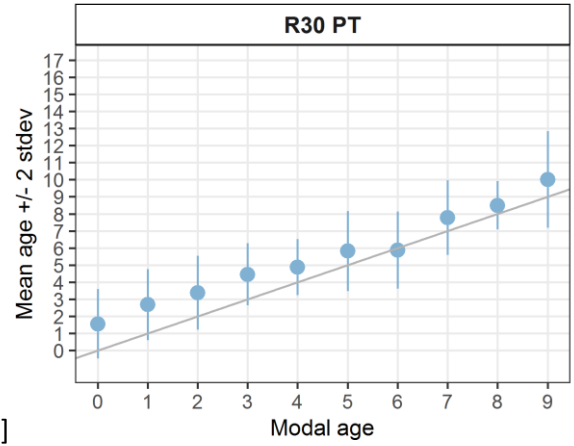
[[5]]



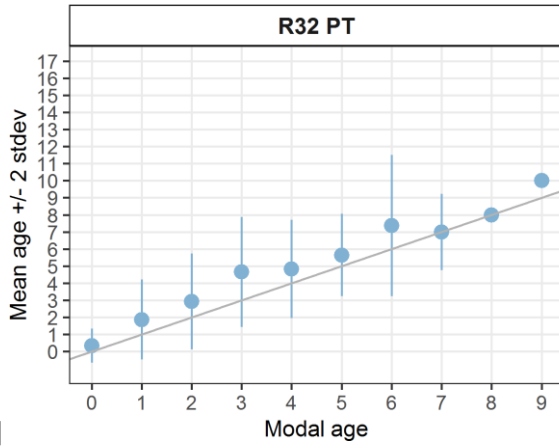
[[6]]



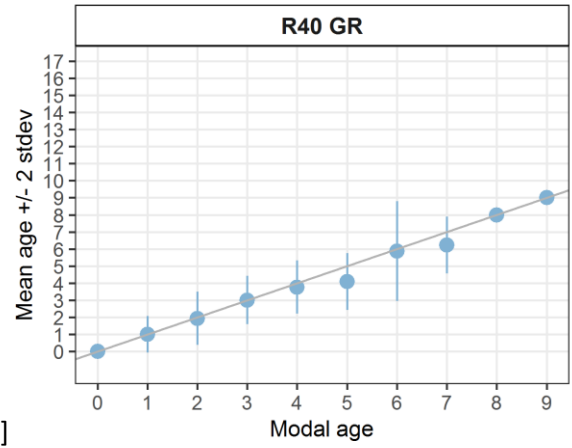
[[7]]



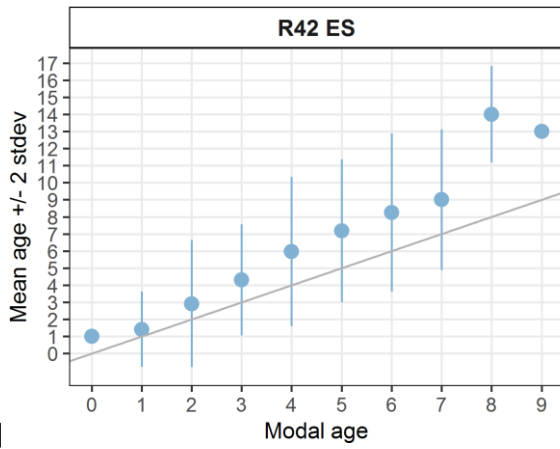
[[8]]



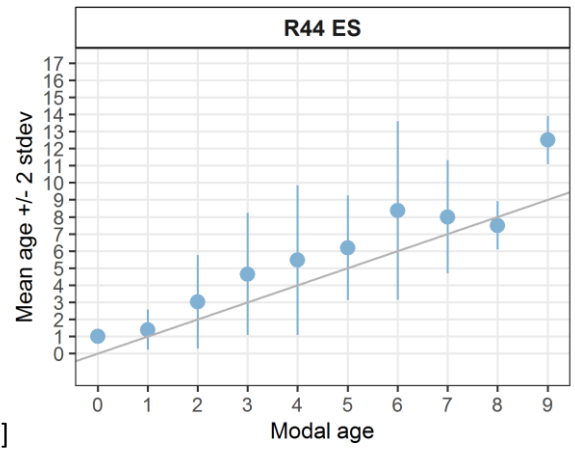
[[9]]



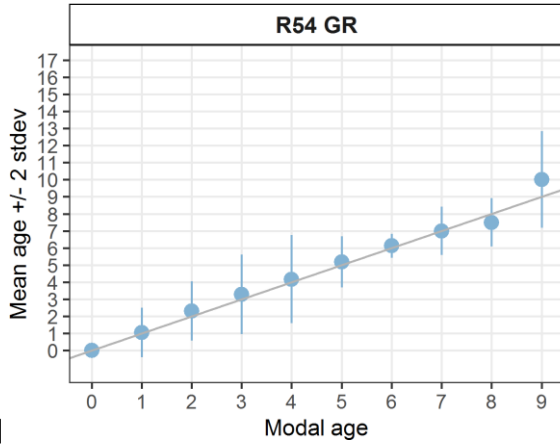
[[10]]



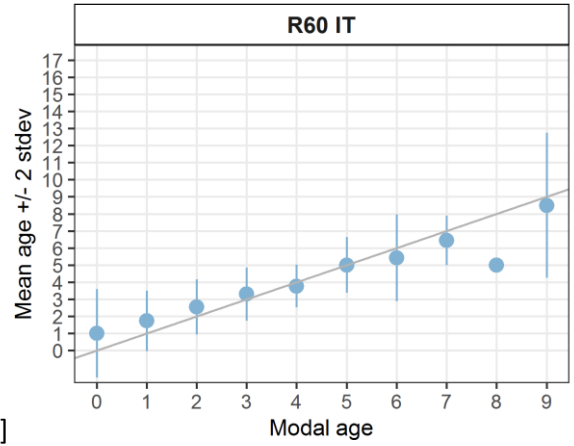
[[11]]



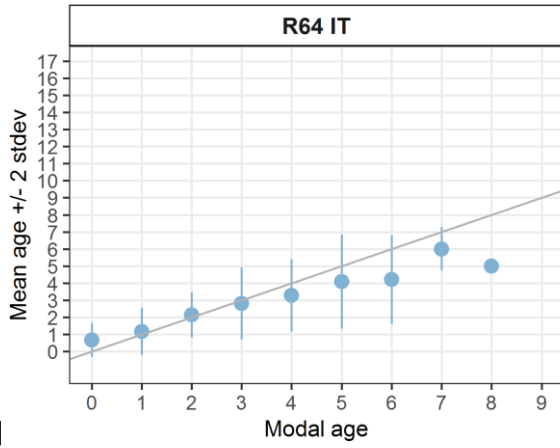
[[12]]



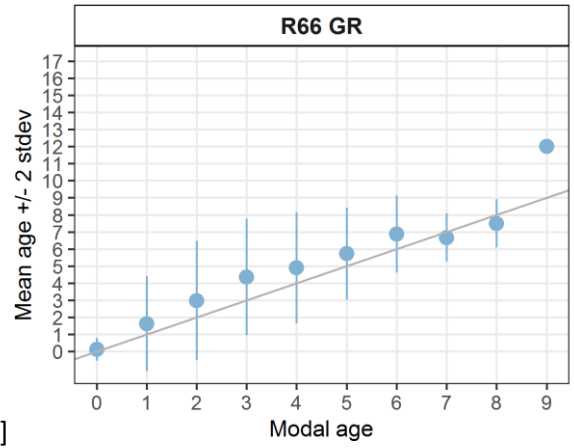
[[13]]



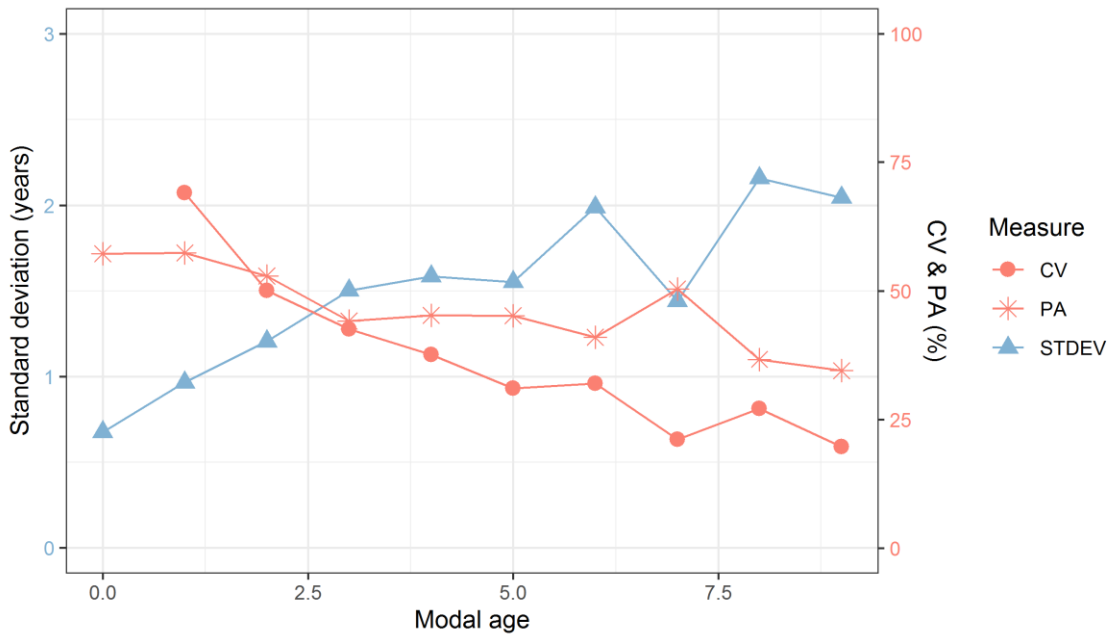
[[14]]



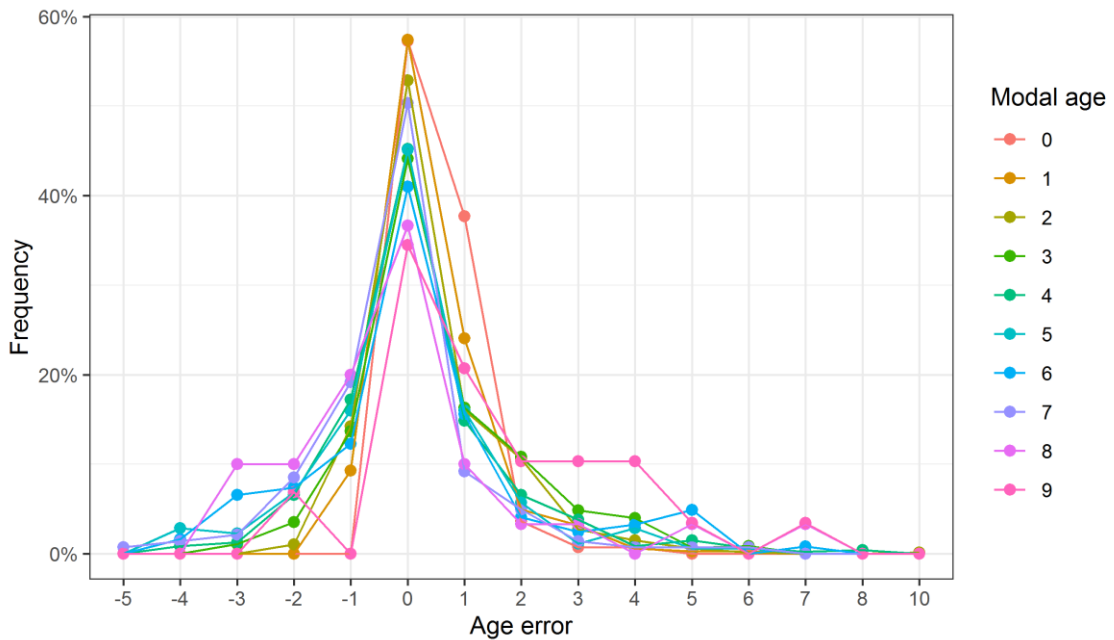
[[15]]



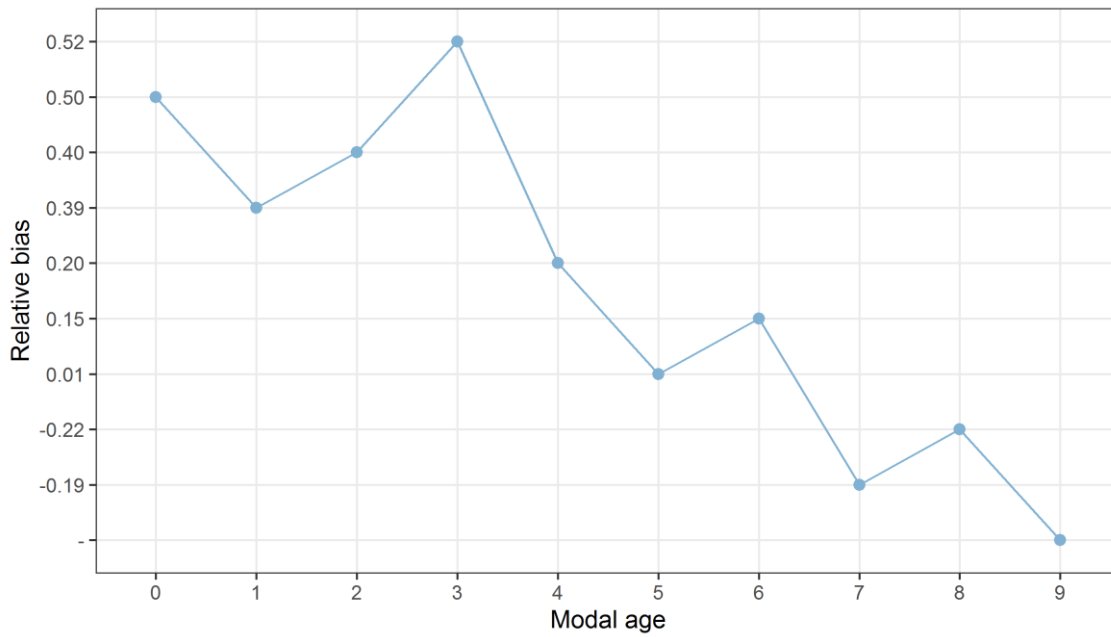
[[16]]



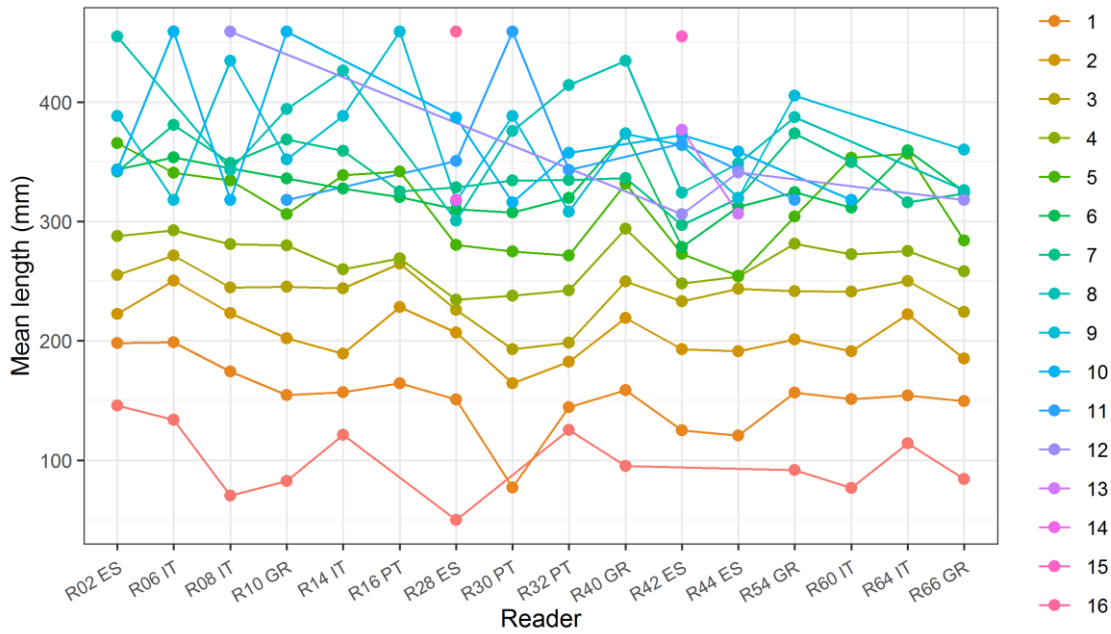
**Figure 6.16:** CV, PA and (STDEV (standard deviation) are plotted against modal age



**Figure 6.17:** 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.



**Figure 6.18:** The relative bias by modal age as estimated by all age readers combined.



**Figure 6.19:** The mean length at age as estimated by each age reader.

## 6.2.2 Advanced readers

### All samples included

#### Data Overview

**Table 6.18:** Data overview including modal age and statistics per sample.

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R06 IT	R08 IT	R42 ES	R66 GR	Modal age	PA %	CV %	APE %
001L_219_16-06-20	219	M	16/06/2020	20	3	2	3	3	3	3	80	16	11
001L_250_15-10-20	250	F	15/10/2020	20	4	4	4	6	5	4	60	19	16
001L_254_10-11-20	254	F	11/10/2020	20	4	3	4	5	5	4	40	20	15
001L_256_27-07-20	256	M	27/07/2020	20	3	4	4	6	4	4	60	26	17
001L_261_02-06-20	261	F	06/02/2020	22	2	2	3	3	5	2	40	41	27
001L_352_18-10-20	352	M	18/10/2020	22	3	3	5	5	8	3	40	43	30
001L_372_03-06-20	372	M	06/03/2020	22	5	4	5	7	9	5	40	33	27
001R_232_10-08-20	232	F	08/10/2020	20	2	2	4	3	3	2	40	30	23
001R_243_02-09-20	243	F	09/02/2020	22	1	2	-	2	5	2	50	69	50
001R_247_06-10-20	247	M	10/06/2020	20	2	2	-	7	5	2	50	61	50
002L_150_03-09-20	150	M	09/03/2020	22	0	0	1	1	1	1	60	91	80
002L_161_10-08-20	161	F	08/10/2020	20	1	1	2	1	2	1	60	39	34
002L_222_03-09-20	222	M	09/03/2020	22	1	1	2	2	3	1	40	46	36
002L_245_10-11-20	245	F	11/10/2020	20	4	3	4	5	4	4	60	18	10
002L_300_18-10-20	300	M	18/10/2020	22	2	2	4	2	6	2	60	56	45
002L_326_03-06-20	326	F	06/03/2020	22	5	4	6	6	8	6	40	26	18
002L_334_16-06-20	334	M	16/06/2020	20	3	2	3	5	7	3	40	50	40
002R_264_02-06-20	264	F	06/02/2020	22	2	2	2	4	6	2	60	56	45
003L_100_03-09-20	100	F	09/03/2020	22	1	0	1	1	0	1	60	91	80
003L_155_29-08-20	155	M	29/08/2020	22	1	1	1	1	0	1	80	56	40
003L_163_10-08-20	163	F	08/10/2020	20	1	1	2	1	2	1	60	39	34
003L_211_18-11-20	211	F	18/11/2020	20	4	2	3	4	3	3	40	26	20
003R_266_16-06-20	266	M	16/06/2020	20	3	2	4	5	6	2	20	40	30
004L_160_10-08-20	160	F	08/10/2020	20	3	1	-	2	2	2	50	41	25
004L_263_02-06-20	263	M	06/02/2020	22	1	2	1	6	5	1	40	78	67
004L_289_16-06-20	289	M	16/06/2020	20	3	2	5	4	6	2	20	40	30
004R_205_14-08-20	205	F	14/08/2020	20	2	3	-	5	3	3	50	39	27
005L_148_10-08-20	148	F	08/10/2020	20	2	2	3	2	2	2	80	20	15
005L_240_03-09-20	240	M	09/03/2020	22	1	1	2	2	3	1	40	46	36
005L_267_02-06-20	267	F	06/02/2020	22	2	1	2	5	5	2	40	62	53
005L_300_16-06-20	300	F	16/06/2020	20	4	2	4	5	7	4	40	41	29
006L_201_03-09-20	201	F	09/03/2020	22	2	1	2	2	2	2	80	25	18
006L_285_16-06-20	285	F	16/06/2020	20	4	3	4	5	6	4	40	26	20
006R_158_10-08-20	158	M	08/10/2020	20	1	1	2	2	2	2	60	34	30
007R_143_10-08-20	143	M	08/10/2020	20	0	0	1	1	2	0	40	-	-
008L_149_10-08-20	149	F	08/10/2020	20	1	0	2	1	1	1	60	71	40
009L_286_02-06-20	286	M	06/02/2020	22	2	1	3	5	6	1	20	61	49
009L_354_18-10-20	354	M	18/10/2020	22	5	3	4	3	9	3	40	52	37
009R_50_23-08-20	50	U	23/08/2020	20	0	0	0	1	0	0	80	-	-
010L_200_03-09-20	200	F	09/03/2020	22	2	1	2	2	3	2	60	35	20
010L_203_08-08-20	203	F	08/08/2020	20	3	2	3	4	3	3	60	24	13
010L_285_02-06-20	285	F	06/02/2020	22	1	0	3	6	7	0	20	-	-
011L_206_08-08-20	206	F	08/08/2020	20	3	3	3	3	3	3	100	0	0
011L_286_02-06-20	286	F	06/02/2020	22	2	1	2	6	7	2	40	75	64
012L_204_03-09-20	204	M	09/03/2020	22	1	1	2	3	2	1	40	46	36
012L_54_23-08-20	54	U	23/08/2020	20	0	0	0	1	0	0	80	-	-
015L_43_23-08-20	43	U	23/08/2020	20	0	0	0	1	0	0	80	-	-
016L_287_02-06-20	287	M	06/02/2020	22	3	2	3	6	6	3	40	47	40
019L_354_18-10-20	354	F	18/10/2020	22	4	3	4	4	9	4	60	50	35
020217-15	170	M	02/02/2017	missing	2	1	2	2	2	2	80	25	18

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R06 IT	R08 IT	R42 ES	R66 GR	Modal age	PA %	CV %	APE %
025L_300_02-06-20	300	M	06/02/2020	22	3	2	3	6	7	3	40	52	44
033L_59_03-09-20	59	U	09/03/2020	22	0	0	0	1	0	0	80	-	-
034R_305_02-06-20	305	F	06/02/2020	22	2	1	2	3	7	2	40	78	53
035L_302_02-06-20	302	M	06/02/2020	22	3	2	3	3	6	3	60	45	31
036R_50_03-09-20	50	U	09/03/2020	22	0	0	0	1	0	0	80	-	-
037L_245_02-06-20	245	F	06/02/2020	22	3	0	1	3	4	3	40	75	62
048L_260_02-06-20	260	F	06/02/2020	22	3	2	2	2	6	2	60	58	40
066L_302_02-06-20	302	M	06/02/2020	22	2	2	3	3	7	2	40	61	42
1_TmMl071014_68	373	M	07/10/2014	27.8.c	4	4	4	9	6	4	60	41	31
10_PelTm0412L26_3	455	M	08/04/2012	27.8.c	8	7	9	15	7	7	40	36	25
10TM_GSA11	141	F	08/03/2016	missing	2	0	-	1	1	1	50	82	50
11_PelTm0318L25_2	319	F	10/04/2018	27.8.c	4	5	5	12	4	4	40	57	40
11TM_GSA11	242	F	22/07/2015	missing	-	3	3	3	4	3	75	15	12
12_PelTm0316L48_17b	366	F	14/04/2016	27.8.c	6	6	7	7	6	6	60	9	8
12TM_GSA11	202	F	22/07/2015	missing	1	1	1	2	2	1	60	39	34
13_PelTm0316L43_7	343	F	13/04/2016	27.8.c	7	5	7	11	7	7	60	30	19
134_14_Nanakos_PS_07-10-20_1X1	134	M	07/10/2020	missing	1	0	1	1	1	1	80	56	40
135_01_MANIOS_16-04-19_1x1	135	F	16/04/2019	missing	1	0	1	1	1	1	80	56	40
138_02_MANIOS_16-04-19_1x1	138	F	16/04/2019	missing	1	0	1	1	1	1	80	56	40
13TM_GSA11	212	F	22/07/2015	missing	-	3	1	3	3	3	75	40	30
14_PelTm0316L43_1	374	F	13/04/2016	27.8.c	7	6	7	11	7	7	60	26	18
140_12_Nanakos_PS_07-10-20_1X1	140	F	07/10/2020	missing	2	0	-	2	1	2	50	77	60
140617-15	145	M	16/06/2017	missing	1	1	1	2	2	1	60	39	34
147_13_Nanakos_PS_07-10-20_1X1_R	147	F	07/10/2020	missing	1	0	1	1	1	1	80	56	40
14TM_GSA11	183	F	22/07/2015	missing	1	1	1	1	2	1	80	37	27
15_PelTmL0317_48_12	293	M	07/04/2017	27.8.c	6	6	7	7	6	6	60	9	8
150_08_Megalochari_OTB_30-06-20_1X1	150	F	30/06/2020	missing	2	1	1	2	2	2	60	34	30
150119-27	177	F	15/01/2019	missing	2	1	3	3	2	2	40	38	29
150119-39	164	F	15/01/2019	missing	2	1	2	3	2	2	60	35	20
15TM_GSA11	170	M	19/05/2015	missing	0	1	1	3	4	1	40	91	76
16_PelL0316TmL39_2	280	M	10/04/2016	27.8.c	4	2	3	8	4	4	40	54	36
165_10_Megalochari_OTB_30-06-20_1X1	165	F	30/06/2020	missing	2	1	1	2	2	2	60	34	30
16TM_GSA11	133	M	19/05/2015	missing	0	0	1	1	1	1	60	91	80
17_TmMl071014_70	370	F	07/10/2014	27.8.c	4	4	4	7	5	4	60	27	20
175_02_Nanakos_PS_08-09-20_1X1	175	F	08/09/2020	missing	1	1	1	2	2	1	60	39	34
176_01_Manios_PS_10-04-20_1X1	176	F	10/04/2020	missing	1	0	1	2	2	1	40	70	53
17TM_GSA11	125	M	19/05/2015	missing	0	0	1	1	1	1	60	91	80
18_Pel0318TmL25_9b	260	F	10/04/2018	27.8.c	4	4	4	6	4	4	80	20	15
180_01_Kap.Pantelis_PS_15-07-20_1X1	180	M	15/07/2020	missing	1	2	1	2	2	2	60	34	30
180_17_Manios_PS_10-04-20_1X1	180	M	10/04/2020	missing	2	1	1	2	2	2	60	34	30
188_05_Nanakos_PS_08-09-20_1X1	188	M	08/09/2020	missing	2	2	2	2	2	2	100	0	0
18TM_GSA11	265	M	06/08/2015	missing	0	3	2	6	5	0	20	-	-
19_Pel0318TmL26_6	295	F	10/04/2018	27.8.c	4	3	-	6	4	4	50	30	21
19TM_GSA11	284	M	06/08/2015	missing	0	3	-	7	7	7	50	80	65
1TM_GSA11	305	F	05/07/2020	missing	0	3	3	6	4	3	40	68	45
2_TmMl240714_31	410	F	24/07/2014	27.8.c	5	5	5	10	5	5	80	37	27
20_Tm030713_31a	245	F	03/07/2013	27.8.c	4	1	4	4	2	4	60	47	40
202_05_Alexandros_PS_19-06-20_1X1	202	F	19/06/2020	missing	1	1	2	2	2	2	60	34	30
206_10_Kap.Pantelis_PS_15-07-20_1X1	206	M	15/07/2020	missing	3	3	3	3	3	3	100	0	0
20TM_GSA11	190	M	05/07/2020	missing	1	1	1	2	2	1	60	39	34
21_Pel0414TmL49_1a	298	F	06/04/2014	27.8.c	7	5	7	7	7	7	80	14	10
217_04_Kap.Pantelis_PS_15-07-20_1X1	217	M	15/07/2020	missing	4	4	3	4	4	4	80	12	8
21TM_GSA11	215	M	05/07/2020	missing	2	2	1	3	2	2	60	35	20
22_Tm070715_3b	335	M	07/07/2015	27.8.c	4	4	6	10	5	4	40	43	30
220218-02	196	M	22/02/2018	missing	3	2	3	4	3	3	60	24	13
220218-35	191	M	22/02/2018	missing	3	2	2	3	2	2	60	23	20
221_05_Kap.Pantelis_PS_05-11-20_1X1	221	M	15/07/2020	missing	3	4	4	4	4	4	80	12	8
223_02_Alexandros_PS_19-06-20_1X1	223	F	19/06/2020	missing	2	1	2	3	3	2	40	38	29



Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R06 IT	R08 IT	R42 ES	R66 GR	Modal age	PA %	CV %	APE %
22TM_GSA11	155	M	09/09/2020	missing	2	1	1	2	2	2	60	34	30
23_TmMI011215_16b	298	M	01/12/2015	27.8.c	2	3	4	7	3	3	40	51	36
239_24_Kap.Pantelis_PS_15-07-20_1X1	239	M	15/07/2020	missing	3	4	4	7	4	4	60	34	24
23TM_GSA11	290	M	22/07/2015	missing	1	5	3	7	7	7	40	57	45
24_Pel0318TmL25_13	259	F	10/04/2018	27.8.c	3	2	4	7	3	3	40	51	36
242_04_Ag.Anna_PS_19-06-20_1X1	242	F	19/06/2020	missing	2	1	3	3	3	3	60	37	30
24TM_GSA11	315	M	22/07/2015	missing	0	1	2	5	7	0	20	-	-
25_Pel0318TmL25_2a	319	F	10/04/2018	27.8.c	3	3	5	9	4	3	40	52	37
251_02_Kap.Pantelis_PS_15-07-20_1X1	251	M	15/07/2020	missing	1	4	2	5	5	5	40	53	45
254_28_Ag.Anna_PS_19-06-20_1X1	254	M	19/06/2020	missing	1	3	3	4	4	3	40	41	27
255_02_Kyzikos_PS_24-11-20_1X1	255	M	24/11/2020	missing	1	2	3	5	5	5	40	56	45
25TM_GSA11	171	M	09/09/2020	missing	1	1	2	2	2	2	60	34	30
26_Pel0317TmL44_17a	200	F	05/04/2017	27.8.c	2	1	3	3	3	3	60	37	30
260_09_Ag.Anna_PS_19-06-20_1X1	260	F	19/06/2020	missing	1	3	3	5	5	3	40	49	38
262_01_Kyzikos_PS_24-11-20_1X1	262	F	24/11/2020	missing	1	4	4	7	5	4	40	52	34
266_01_Alexandros_PS_19-06-20_1X1	266	M	19/06/2020	missing	4	3	5	5	5	5	60	20	16
26TM_GSA11	278	M	09/03/2019	missing	2	1	2	4	2	2	60	50	33
27_Pel0317TmL44_22	194	F	05/04/2017	27.8.c	1	1	3	2	2	1	40	46	36
270716GR-001	318	F	27/07/2016	missing	9	9	10	13	12	9	40	17	14
270716GR-007	343	M	27/07/2016	missing	10	6	8	7	7	7	40	20	15
270716GR-011	300	M	27/07/2016	missing	7	5	4	7	6	7	40	22	18
270716GR-018	246	M	27/07/2016	missing	6	0	3	7	-	0	25	-	-
270716GR-021	266	M	27/07/2016	missing	6	4	7	10	8	4	20	32	23
270716GR-022	295	M	27/07/2016	missing	7	5	7	11	8	7	40	29	20
270716GR-028	282	M	27/07/2016	missing	6	4	4	5	6	4	40	20	16
270716GR-029	232	M	27/07/2016	missing	4	4	3	5	4	4	60	18	10
270716GR-032	219	M	27/07/2016	missing	4	4	3	4	3	4	60	15	13
273_03_Kyzikos_PS_24-11-20_1X1	273	M	24/11/2020	missing	3	3	3	4	5	3	60	25	20
27TM_GSA11	234	M	22/07/2015	missing	1	2	2	2	3	2	60	35	20
28_Pel0317TmL44_23	186	M	05/04/2017	27.8.c	1	1	3	2	2	1	40	46	36
28TM_GSA11	137	M	11/12/2015	missing	0	0	0	1	1	0	60	-	-
29_Pel0318TmL25_8b	255	F	10/04/2018	27.8.c	3	2	5	5	3	3	40	37	31
29TM_GSA11	112	M	11/12/2015	missing	0	0	-	1	0	0	75	-	-
2TM_GSA11	152	F	19/05/2015	missing	0	0	1	1	-	0	50	-	-
3_TmMI240714_32	380	F	24/07/2014	27.8.c	4	5	5	8	6	5	40	27	20
30_Pel0316TmL39_9c	286	F	10/04/2016	27.8.c	3	2	-	7	4	2	25	54	38
30TM_GSA11	122	M	21/07/2020	missing	0	1	-	1	0	0	50	-	-
31_Pel0318TmL25_1	260	F	10/04/2018	27.8.c	4	4	4	6	4	4	80	20	15
312_06_MEGALOCHARI_25-06-19_1x1	312	M	25/06/2019	missing	7	6	7	8	7	7	60	10	6
314_04_MEGALOCHARI_25-06-19_1x1	314	M	25/06/2019	missing	6	7	6	9	8	6	40	18	14
316_10_MEGALOCHARI_25-06-19_1x1	316	M	25/06/2019	missing	2	7	6	13	8	2	20	55	37
32_Tm071014_33	382	M	07/10/2014	27.8.c	4	4	5	11	5	4	40	51	36
3TM_GSA11	255	F	05/07/2020	missing	2	3	3	3	2	3	60	21	18
4_Pel0412TmL26_1	478	M	08/04/2012	27.8.c	6	4	7	10	6	6	40	33	23
4TM_GSA11	175	F	19/05/2015	missing	2	1	1	1	2	1	60	39	34
5_Pel0317TmL30_1	439	M	27/03/2017	27.8.c	7	7	7	9	6	7	60	15	10
5TM_GSA11	162	F	19/05/2015	missing	1	1	1	1	2	1	80	37	27
6_Pel17TmL30_3c	414	F	27/03/2017	27.8.c	6	6	9	13	8	6	40	34	25
6TM_GSA11	231	F	05/07/2020	missing	-	3	1	2	2	2	50	41	25
7_Pel0316TmL43_1	374	F	13/04/2016	27.8.c	7	6	7	9	7	7	60	15	10
7TM_GSA11	226	F	05/07/2020	missing	2	2	1	2	2	2	80	25	18
8_Pel0412TmL52_11b	432	M	18/04/2012	27.8.c	6	5	6	11	6	6	60	35	25
8TM_GSA11	293	F	05/07/2020	missing	-	3	2	12	6	2	25	78	57
9_Pel0412TmL26_2	459	M	08/04/2012	27.8.c	9	10	12	13	-	9	25	17	14
99_02_Taxiarchis_PS_06-10-20_1X1	99	F	06/10/2020	missing	0	0	0	1	0	0	80	-	-
9TM_GSA11	264	F	09/03/2019	missing	1	2	1	6	1	1	60	99	69

**Table 6.19:** Number of readings per reader and modal age.

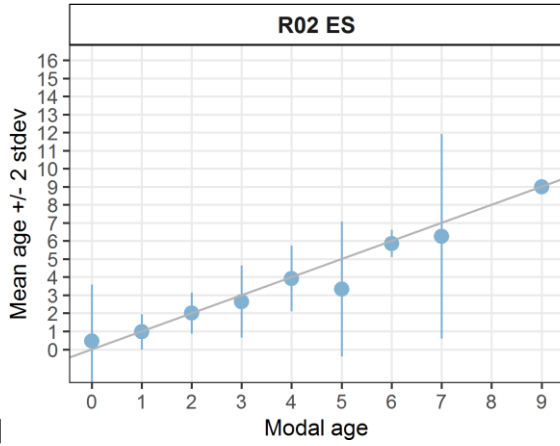
Modal age	R02 ES	R06 IT	R08 IT	R42 ES	R66 GR	total
0	15	15	13	15	13	71
1	30	30	29	30	30	149
2	38	40	35	40	40	193
3	25	27	26	27	27	132
4	25	25	24	25	25	124
5	6	6	6	6	6	30
6	7	7	7	7	7	35
7	12	12	11	12	12	59
8	0	0	0	0	0	0
9	2	2	2	2	1	9
<b>Total</b>	<b>160</b>	<b>164</b>	<b>153</b>	<b>164</b>	<b>161</b>	<b>802</b>

**Table 6.20:** Age composition by reader.

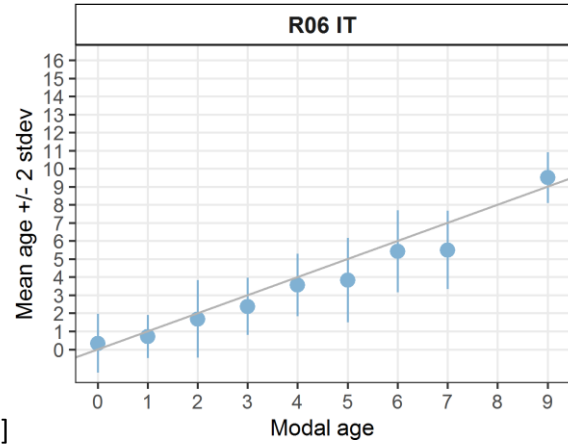
Modal age	R02 ES	R06 IT	R08 IT	R42 ES	R66 GR
0	19	25	7	0	10
1	36	40	32	27	12
2	34	33	27	30	36
3	24	24	33	22	20
4	22	20	23	13	18
5	4	9	10	18	18
6	9	7	5	14	19
7	8	4	11	16	17
8	1	0	1	3	7
9	2	1	2	5	3
10	1	1	1	4	0
11	0	0	0	5	0
12	0	0	1	2	1
13	0	0	0	4	0
15	0	0	0	1	0
<b>Total</b>	<b>160</b>	<b>164</b>	<b>153</b>	<b>164</b>	<b>161</b>

**Table 6.21:** Mean length (mm) at age per reader is calculated per reader and age (not modal age) and for all readers combined per age. A weighted mean is also given.

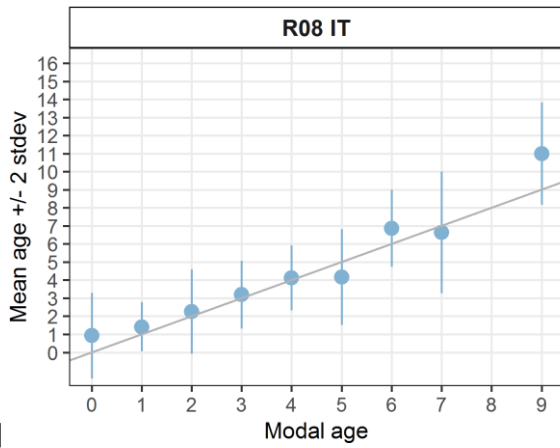
Age	R02 ES	R06 IT	R08 IT	R42 ES	R66 GR
0	146	134	70	-	84
1	198	199	174	125	149
2	222	250	223	193	185
3	255	271	245	233	224
4	288	293	281	248	258
5	366	341	334	273	284
6	343	354	345	279	325
7	342	381	349	297	324
8	455	-	343	324	326
9	388	318	434	364	360
10	343	459	318	372	-
11	-	-	-	365	-
12	-	-	459	306	318
13	-	-	-	377	-
15	-	-	-	455	-
<b>Weighted Mean</b>	<b>242</b>	<b>242</b>	<b>245</b>	<b>242</b>	<b>242</b>



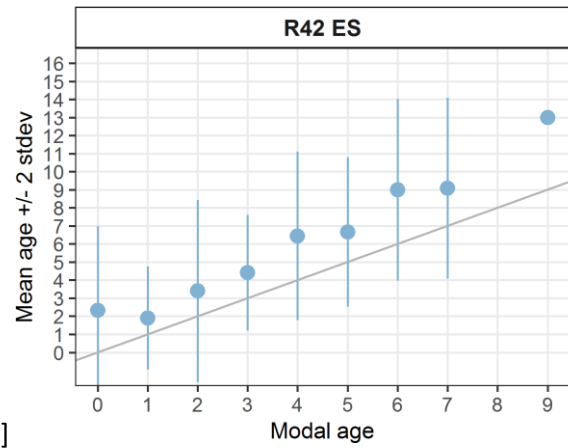
[[1]]



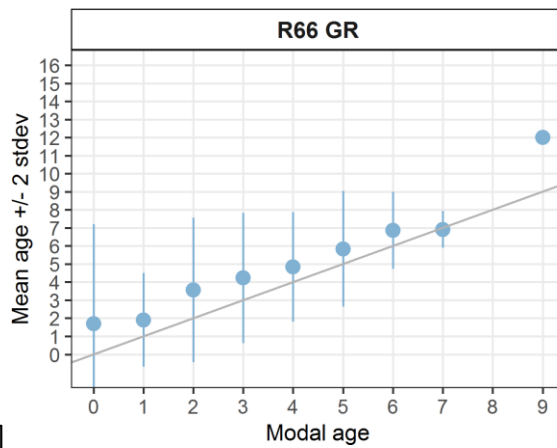
[[2]]



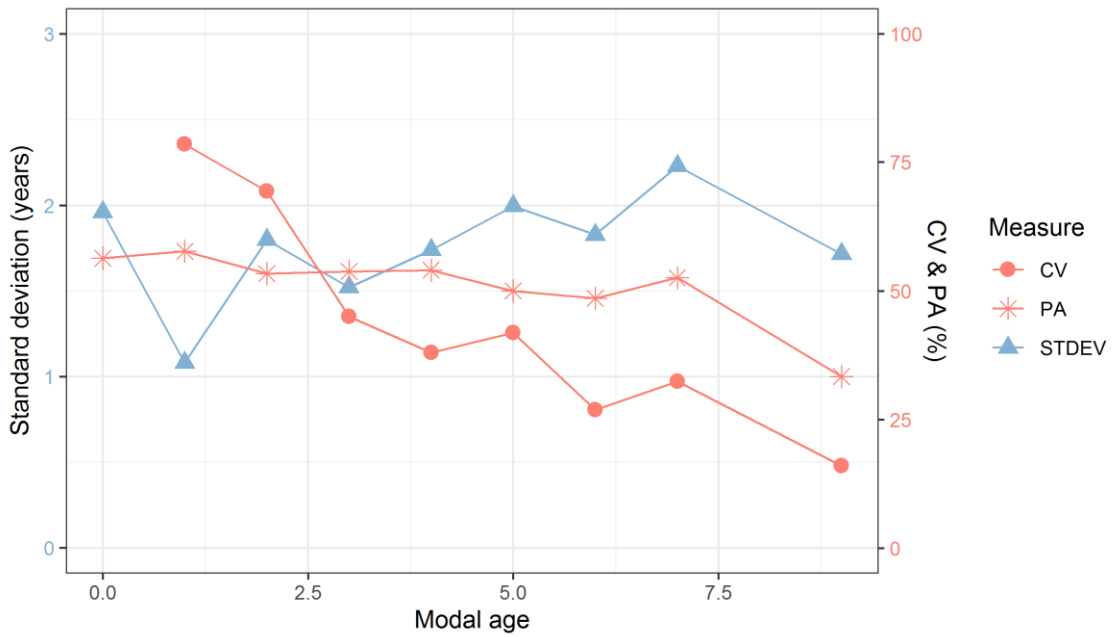
[[3]]



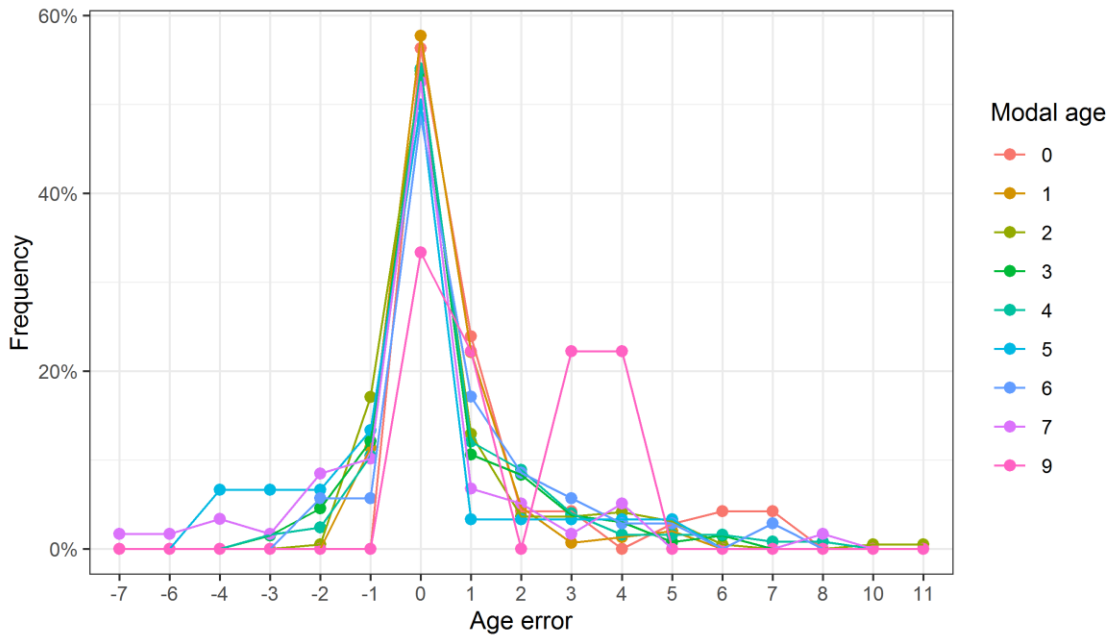
[[4]]



[[5]]



**Figure 6.20:** CV, PA and (STDEV (standard deviation) are plotted against modal age



**Figure 6.21:** 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.

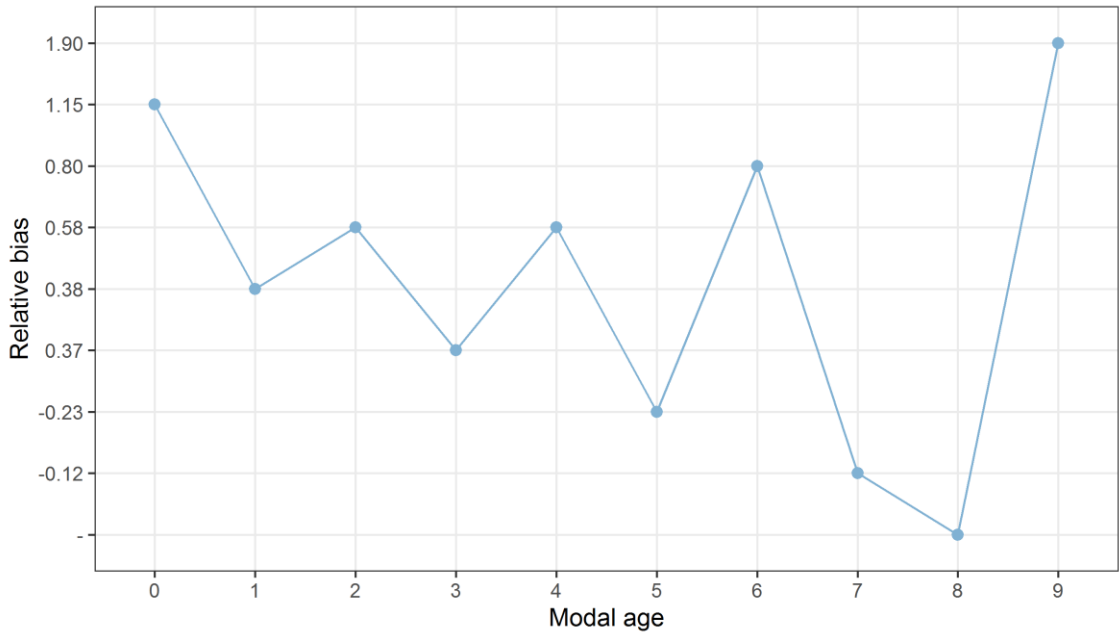


Figure 6.22: The relative bias by modal age as estimated by all age readers combined.

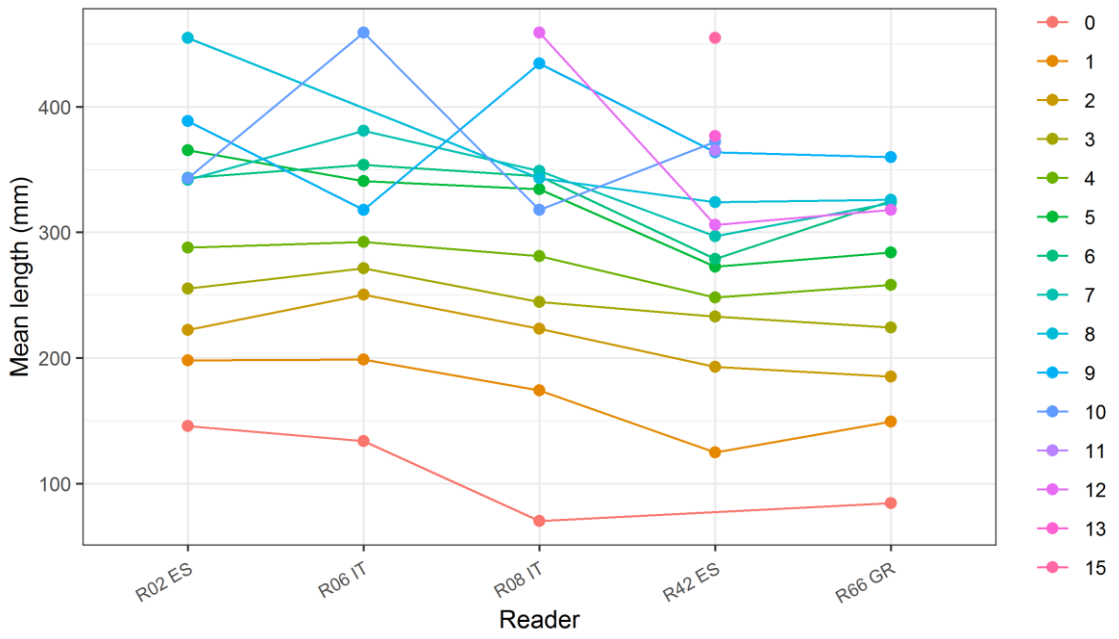


Figure 6.23: The mean length at age as estimated by each age reader.

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

### 6.3.1 All readers

#### Data Overview

**Table 6.22:** Summary of statistics; PA (%), CV (%) and APE (%).

CV	PA	APE
54	55	35

**Table 6.23:** 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	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT	Modal app	PA %	CV %	APE %
1_TRAPIC_10_2S	280	F	17/12/2018	27.10.a	3	2	0	3	2	4	1	3	-	5	2	3	4	3	2	3	3	2	3	41	44	33
10_TRAPIC_10_1S	330	M	08/03/2020	27.10.a	6	4	3	4	4	4	2	5	5	4	4	5	6	4	3	5	6	3	4	39	26	21
11_TRAPIC_10_1S	375	F	08/03/2020	27.10.a	6	2	3	4	4	3	2	4	5	3	3	4	4	2	3	2	5	3	3	33	33	27
12_TRAPIC_10_1S	345	F	08/03/2020	27.10.a	5	2	3	3	3	3	2	5	5	4	3	4	4	3	3	3	5	3	3	50	28	24
13_TRAPIC_10_1S	335	F	08/03/2020	27.10.a	7	2	4	4	2	4	0	6	5	4	4	5	6	4	4	3	6	4	4	44	41	28
14_TRAPIC_10_2S	355	F	21/11/2020	27.10.a	6	2	3	4	3	4	3	4	5	4	3	4	5	3	3	4	5	4	4	39	26	20
15_TRAPIC_10_2S	395	M	21/11/2020	27.10.a	7	2	3	4	1	5	1	6	5	4	4	5	6	4	3	3	6	3	3	22	43	33
16_TRAPIC_10_2S	400	F	21/11/2020	27.10.a	7	2	3	4	2	2	3	6	5	5	4	5	6	4	3	3	-	3	3	29	39	31
17_TRAPIC_10_2S	380	F	21/11/2020	27.10.a	4	3	3	4	3	3	2	6	5	4	4	8	6	3	3	3	5	3	3	44	37	28
18_TRAPIC_10_2S	370	F	21/11/2020	27.10.a	-	5	4	4	3	3	2	7	7	7	5	11	9	6	3	-	8	-	3	20	46	38
19_TRAPIC_10_2S	330	M	21/11/2020	27.10.a	6	3	4	4	4	4	2	5	5	5	4	6	6	4	4	4	7	3	4	44	28	22
2_TRAPIC_10_2S	275	M	17/12/2018	27.10.a	6	2	2	5	3	4	1	5	5	6	2	4	7	4	2	5	6	4	2	22	43	34
20_TRAPIC_10_2S	360	F	21/11/2020	27.10.a	7	-	4	4	-	4	2	4	-	4	4	5	8	4	4	-	4	-	4	69	34	23
21_TRAPIC_10_2S	340	M	21/11/2020	27.10.a	6	4	4	5	3	3	3	5	5	5	4	6	6	5	4	3	5	3	5	33	25	22
22_TRAPIC_10_2S	320	F	21/11/2020	27.10.a	6	3	3	3	2	3	3	5	5	4	3	5	7	3	2	3	4	4	3	44	36	29
23_TRAPIC_10_2S	315	M	21/11/2020	27.10.a	8	7	3	6	3	3	2	6	6	5	4	8	8	5	2	-	6	4	6	24	40	34
24_TRAPIC_10_2S	135	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	1	0	0	1	1	1	0	1	1	0	1	67	73	67
25_TRAPIC_10_2S	140	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	1	1	0	1	1	1	0	1	1	0	1	72	64	56
26_TRAPIC_10_2S	125	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	1	0	0	1	1	1	0	-	1	0	1	65	76	71
27_TRAPIC_10_2S	110	U	23/11/2020	27.10.a	1	0	0	1	0	1	1	1	1	0	0	1	1	1	0	1	2	0	1	56	89	78
28_TRAPIC_10_2S	130	U	23/11/2020	27.10.a	1	1	0	1	0	1	1	1	1	0	0	1	1	1	0	1	1	0	1	67	73	67
29_TRAPIC_10_2S	150	U	23/11/2020	27.10.a	2	0	1	1	0	2	2	1	2	1	1	1	2	1	0	1	2	1	1	50	61	48
3_TRAPIC_10_2S	260	F	17/12/2018	27.10.a	3	2	2	3	2	3	1	3	4	4	2	4	4	3	2	2	6	3	2	33	39	29
30_TRAPIC_10_2S	120	U	23/11/2020	27.10.a	1	0	0	1	0	1	1	1	1	0	0	0	1	1	0	1	1	0	1	56	92	89
31_TRAPIC_10_2S	145	U	23/11/2020	27.10.a	-	0	0	1	0	1	2	1	1	1	1	1	1	1	0	1	2	1	1	65	68	47
4_TRAPIC_10_2S	255	F	17/12/2018	27.10.a	3	2	2	3	3	3	2	3	4	3	2	3	4	3	2	3	-	3	3	59	23	17
5_TRAPIC_10_2S	295	F	17/12/2018	27.10.a	3	3	2	3	2	3	2	4	3	3	3	5	4	3	2	3	4	4	3	50	27	19
6_TRAPIC_10_2S	240	F	24/11/2019	27.10.a	3	2	1	2	0	2	0	2	3	2	2	4	2	2	1	1	2	2	2	56	54	37
7_TRAPIC_10_2S	220	F	24/11/2019	27.10.a	2	1	1	2	1	2	1	2	3	2	1	3	2	2	1	1	2	2	2	50	39	33
8_TRAPIC_10_2S	230	F	24/11/2019	27.10.a	2	1	1	1	1	1	1	2	3	2	1	2	2	1	1	2	2	2	1	50	40	36
9_TRAPIC_10_1S	305	F	08/03/2020	27.10.a	4	3	3	3	3	3	2	4	4	2	3	3	7	3	3	3	5	3	3	61	34	23
JAA-2021-1	152	U	07/04/2021	34	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	3	1	1	89	51	20
JAA-2021-10	202	F	07/04/2021	34	3	1	2	1	0	2	1	2	2	3	2	2	1	1	2	2	2	2	2	56	44	34
JAA-2021-11	166	F	07/04/2021	34	1	1	2	2	0	2	1	2	3	2	1	2	1	1	2	2	2	1	2	50	45	39
JAA-2021-12	207	M	07/04/2021	34	3	1	2	2	0	3	1	2	3	3	3	3	1	1	2	2	3	3	3	44	46	37
JAA-2021-13	173	M	07/04/2021	34	3	1	2	2	0	2	1	2	3	2	2	1	1	1	2	3	1	2	2	44	48	39
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	0	50	-	-	-
JAA-2021-15	169	M	07/04/2021	34	1	1	1	1	0	1	1	1	2	1	1	1	1	1	1	1	2	2	1	78	42	27
JAA-2021-16	209	M	07/04/2021	34	3	1	1	1	0	2	1	1	2	3	1	1	1	1	1	2	2	2	1	56	54	45
JAA-2021-17	209	F	07/04/2021	34	3	1	2	2	0	2	0	3	3	3	2	2	1	2	2	2	3	2	2	50	48	33
JAA-2021-18	209	F	07/04/2021	34	3	1	2	2	0	3	0	2	3	2	2	2	1	1	1	3	3	2	2	39	54	42
JAA-2021-19	164	M	07/04/2021	34	1	1	1	1	0	2	1	1	2	3	1	2	1	1	1	2	2	2	1	56	50	42
JAA-2021-2	183	M	07/04/2021	34	2	1	1	2	0	3	1	2	3	2	2	3	1	1	1	2	3	-	1	35	51	42
JAA-2021-20	169	F	07/04/2021	34	2	1	1	1	0	2	1	2	2	2	1	2	1	1	1	2	2	2	2	50	43	38
JAA-2021-21	197	F	07/04/2021	34	2	1	2	2	0	3	0	2	2	3	2	3	1	2	1	2	3	2	2	50	50	37
JAA-2021-22	150	U	12/07/2021	34	1	1	1	1	0	2	1	2	-	3	1	1	1	2	1	2	2	2	1	53	50	43
JAA-2021-23	132	U	12/07/2021	34	0	1	0	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	1	78	55	44

Fish ID	Length (mm)	sex	Catch date	ICES area	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT	Modal app	PA %	CV %	APE %	
JAA-2021-24	144	U	12/07/2021	34	0	0	0	0	0	0	1	1	1	1	0	1	1	0	0	0	-	0	0	65	-	-	
JAA-2021-25	145	U	12/07/2021	34	0	0	0	0	0	1	1	1	1	1	0	1	1	0	0	1	1	1	1	56	92	89	
JAA-2021-26	149	U	12/07/2021	34	0	0	1	1	0	1	1	2	1	2	1	1	1	1	0	2	2	1	1	56	69	44	
JAA-2021-27	181	M	12/07/2021	34	1	1	1	1	0	2	1	2	2	2	2	2	1	1	1	2	3	2	1	44	47	41	
JAA-2021-28	186	F	12/07/2021	34	2	1	1	2	0	2	2	2	2	2	2	2	2	2	1	2	2	2	2	78	33	25	
JAA-2021-29	190	F	12/07/2021	34	1	1	1	1	0	2	1	1	2	2	1	1	1	1	1	1	1	1	2	1	72	44	32
JAA-2021-3	183	F	07/04/2021	34	2	1	2	2	0	2	0	1	2	2	2	3	1	1	1	2	2	2	2	56	50	42	
JAA-2021-30	183	F	12/07/2021	34	1	1	1	1	0	2	1	2	2	1	1	1	1	1	1	2	2	2	1	61	45	38	
JAA-2021-31	148	U	12/07/2021	34	0	0	0	0	0	1	1	1	1	1	0	1	1	1	0	1	-	1	1	59	86	82	
JAA-2021-32	142	U	12/07/2021	34	0	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	2	1	1	72	62	44	
JAA-2021-33	195	M	12/07/2021	34	2	1	2	1	0	2	1	2	2	3	2	0	1	2	1	2	-	2	2	53	52	44	
JAA-2021-35	164	F	12/07/2021	34	1	1	1	1	0	1	1	1	2	1	1	1	1	1	1	2	2	2	1	72	44	32	
JAA-2021-36	175	F	12/07/2021	34	1	1	1	1	0	1	1	1	2	1	1	1	1	1	1	1	-	2	1	82	40	21	
JAA-2021-37	164	M	12/07/2021	34	1	1	1	1	0	1	1	1	2	1	1	1	1	1	1	1	-	2	1	82	40	21	
JAA-2021-38	165	M	12/07/2021	34	1	1	1	1	0	1	1	1	2	1	1	1	1	1	1	1	2	2	1	78	42	27	
JAA-2021-39	153	F	12/07/2021	34	1	1	1	1	0	1	1	1	2	1	1	1	1	1	1	1	1	2	1	83	39	20	
JAA-2021-4	206	F	07/04/2021	34	2	1	2	2	0	2	1	2	2	2	2	2	2	1	2	2	2	2	2	78	33	25	
JAA-2021-40	156	F	12/07/2021	34	1	1	1	1	0	2	1	1	2	1	1	1	1	1	1	1	2	2	1	72	44	32	
JAA-2021-5	203	M	07/04/2021	34	2	1	2	2	0	4	1	2	3	3	2	3	1	2	2	3	3	2	2	44	46	33	
JAA-2021-6	196	M	07/04/2021	34	2	1	2	3	0	3	2	2	2	3	3	3	1	2	2	3	3	2	2	44	40	30	
JAA-2021-7	186	F	07/04/2021	34	2	1	2	1	0	2	1	1	2	2	1	3	1	1	2	2	2	2	2	50	45	39	
JAA-2021-8	180	F	07/04/2021	34	2	1	2	2	0	2	1	1	2	2	2	2	1	1	2	2	-	2	2	65	39	34	
JAA-2021-9	190	F	07/04/2021	34	2	1	2	1	0	2	1	1	2	2	2	2	1	1	2	2	2	2	2	61	40	35	

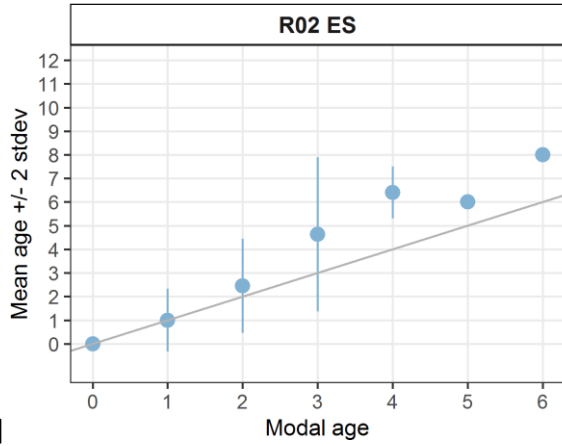


**Table 6.24:** Number of readings per reader and modal age.

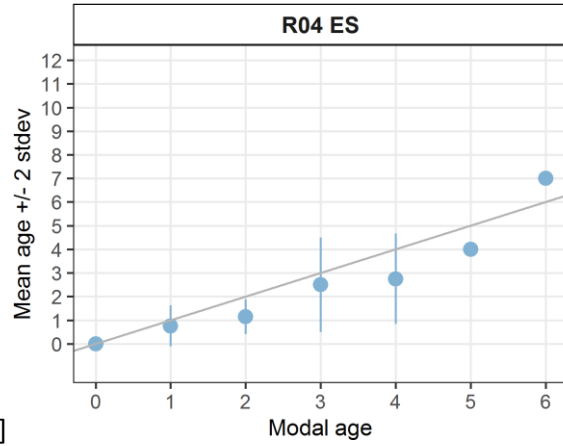
Modal age	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT	total
0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	35
1	28	29	29	29	29	29	29	29	28	29	29	29	29	29	29	28	26	28	515
2	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	18	20	358
3	11	12	12	12	12	12	12	12	11	12	12	12	12	12	12	11	10	11	210
4	5	4	5	5	4	5	5	5	4	5	5	5	5	5	5	4	5	4	85
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	17
<b>Total</b>	<b>68</b>	<b>69</b>	<b>70</b>	<b>70</b>	<b>69</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>67</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>66</b>	<b>62</b>	<b>67</b>	<b>1238</b>

**Table 6.25:** Age composition by reader.

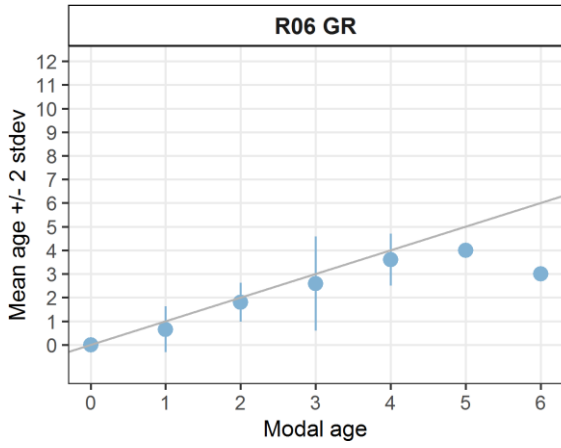
Modal age	R02 ES	R04 ES	R06 GR	R10 IT	R16 IT	R18 PT	R20 PT	R30 ES	R32 PT	R34 PT	R44 GR	R46 ES	R48 ES	R50 IT	R60 GR	R66 IT	R70 ES	R72 IT
0	7	9	13	4	48	1	6	0	0	5	11	2	0	3	15	1	0	8
1	20	40	23	31	3	21	45	29	15	18	22	27	44	38	24	22	11	9
2	15	11	19	14	6	23	15	20	24	18	19	12	6	10	18	24	24	32
3	11	5	10	8	9	16	4	4	11	13	8	11	0	9	9	15	10	12
4	2	2	5	10	3	8	0	5	3	9	9	6	6	7	4	2	3	6
5	1	1	0	2	0	1	0	6	12	5	1	7	1	2	0	2	6	0
6	7	0	0	1	0	0	0	5	1	1	0	2	7	1	0	0	6	0
7	4	1	0	0	0	0	0	1	1	1	0	0	3	0	0	0	1	0
8	1	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	1	0
9	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
<b>Total</b>	<b>68</b>	<b>69</b>	<b>70</b>	<b>70</b>	<b>69</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>67</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>66</b>	<b>62</b>	<b>67</b>



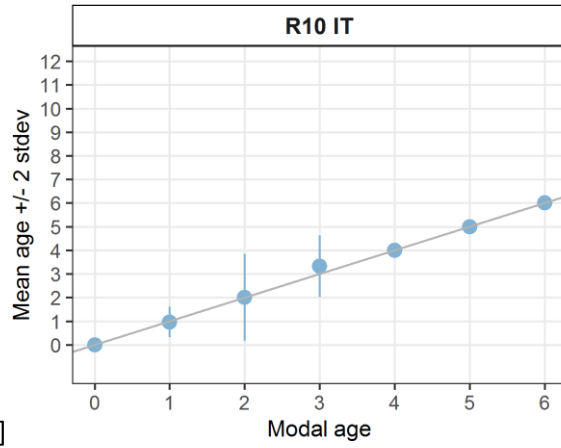
[[1]]



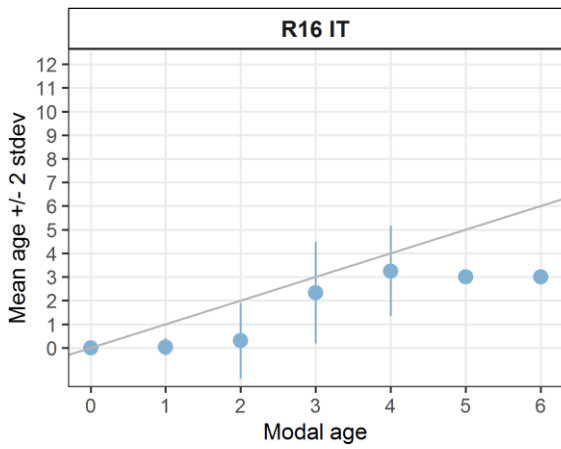
[[2]]



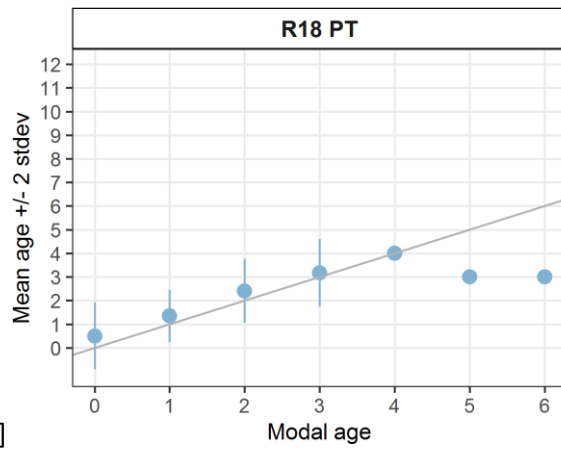
[[3]]



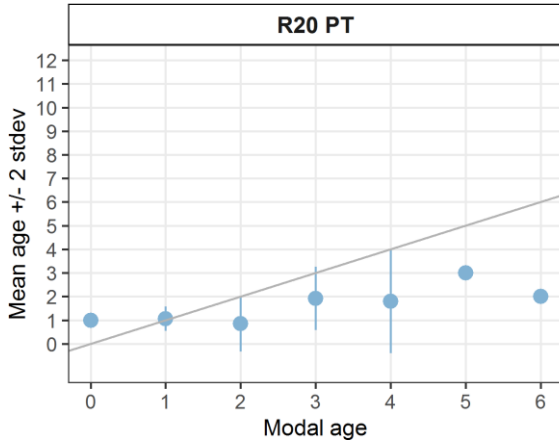
[[4]]



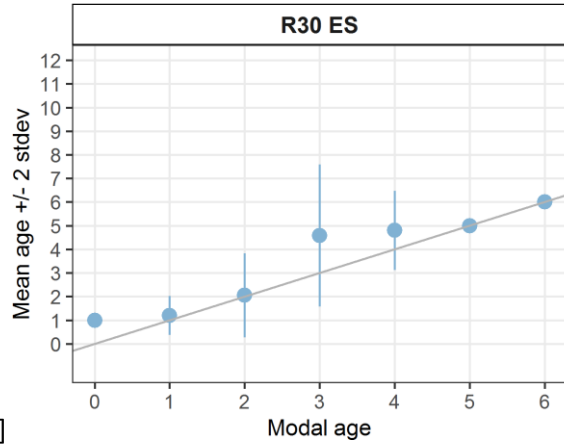
[[5]]



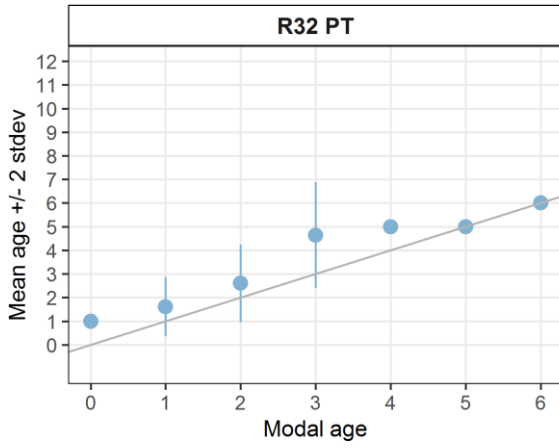
[[6]]



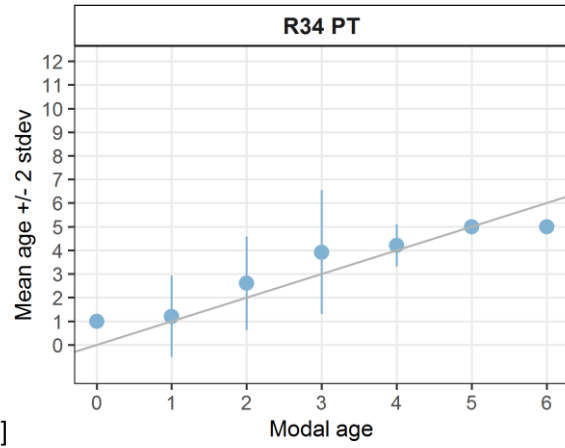
[[7]]



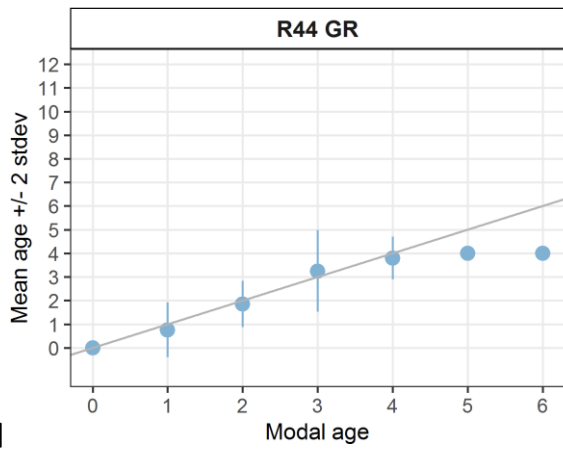
[[8]]



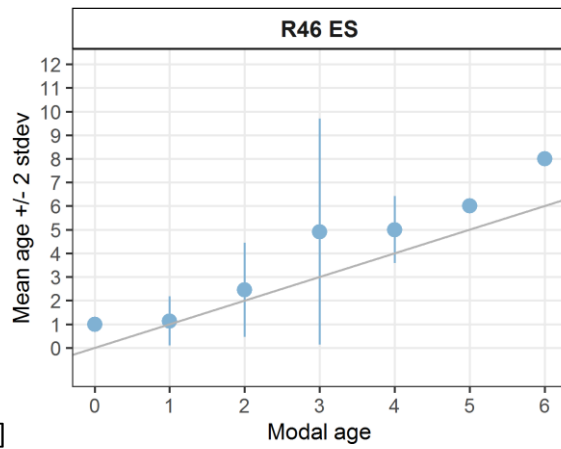
[[9]]



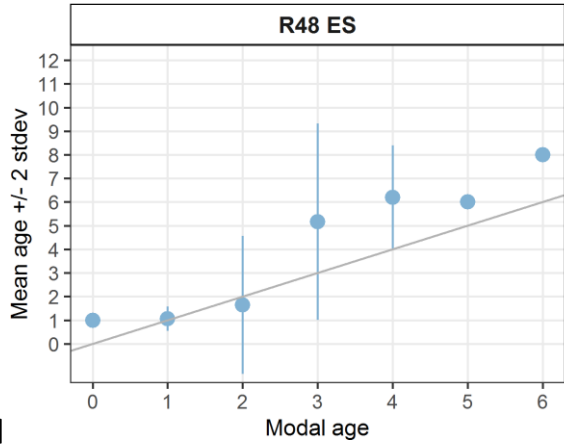
[[10]]



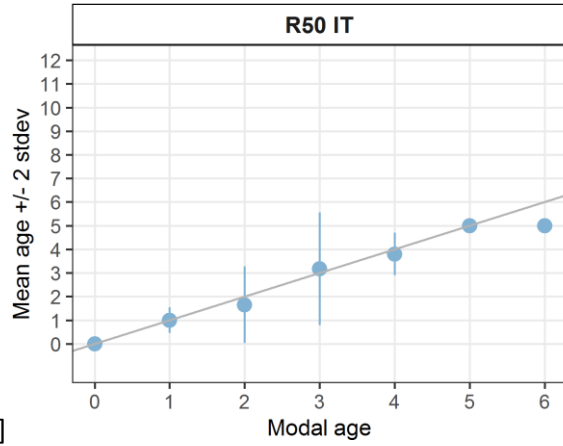
[[11]]



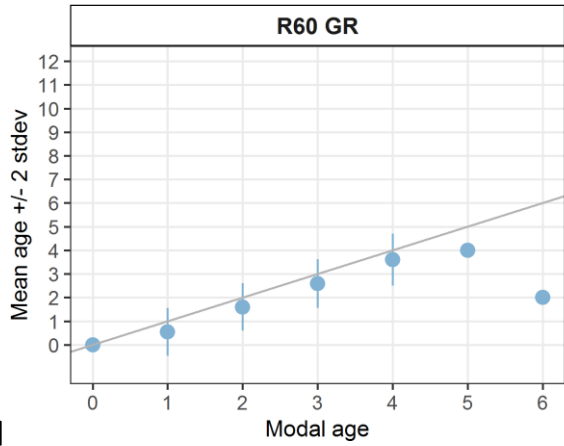
[[12]]



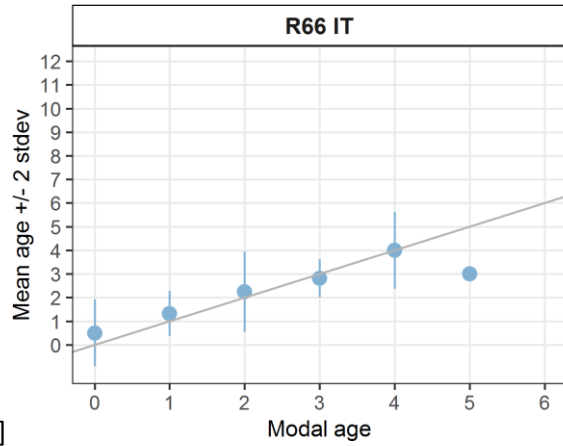
[[13]]



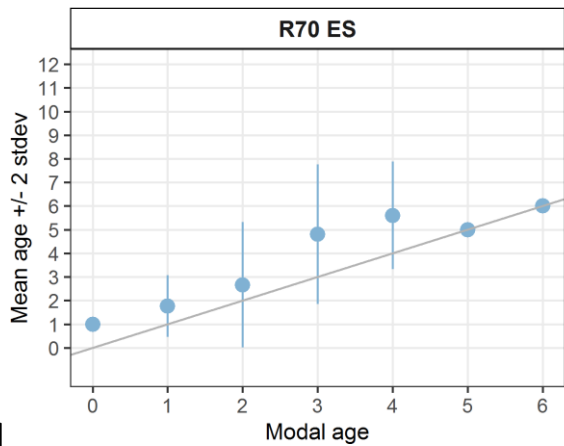
[[14]]



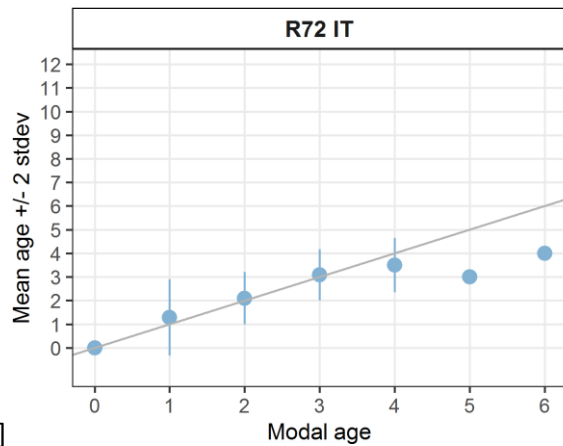
[[15]]



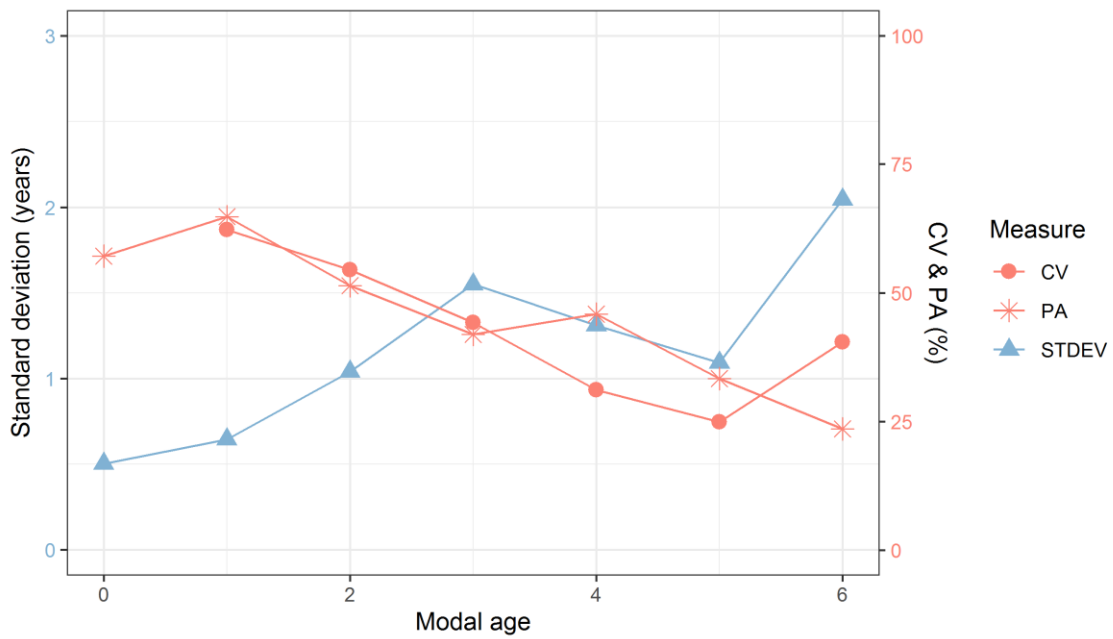
[[16]]



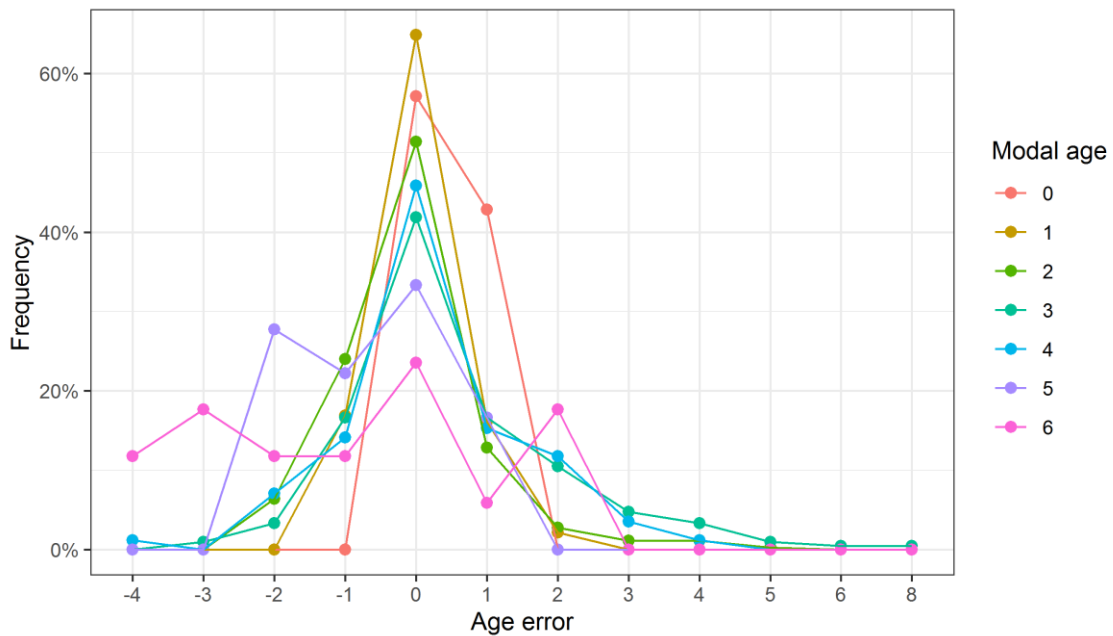
[[17]]



[[18]]



**Figure 6.24:** CV, PA and (STDEV (standard deviation) are plotted against modal age



**Figure 6.25:** 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.

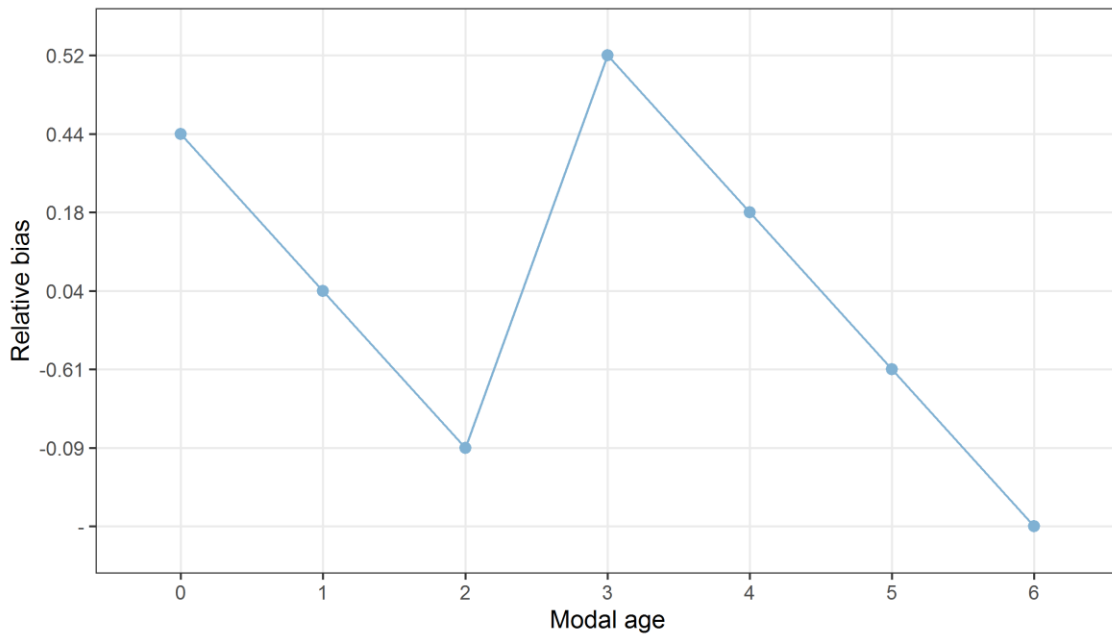


Figure 6.26: The relative bias by modal age as estimated by all age readers combined.

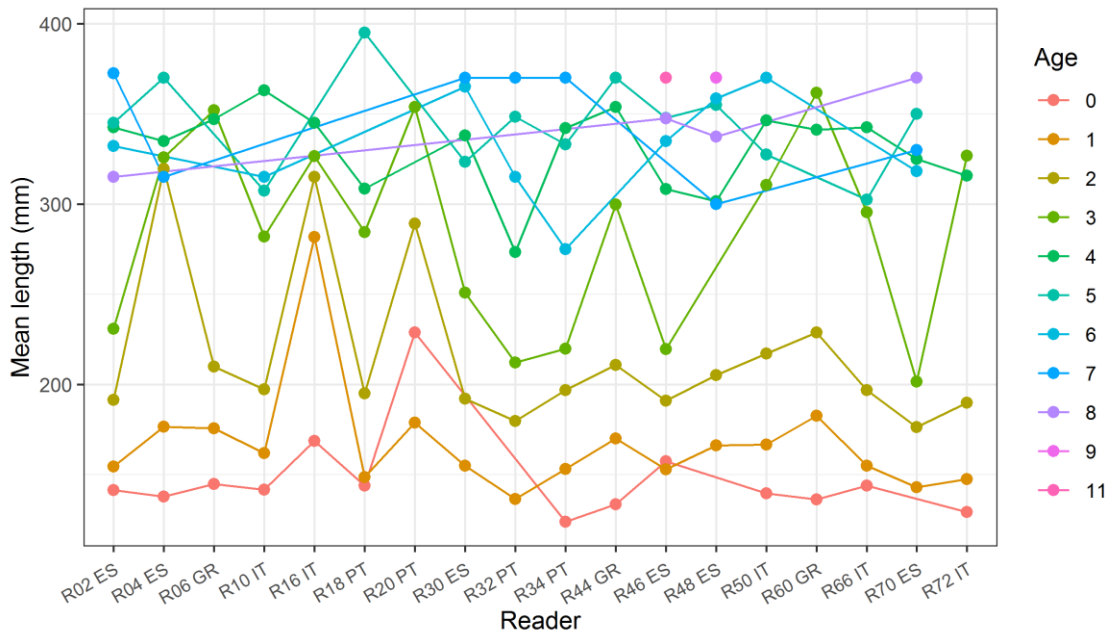


Figure 6.27: The mean length at age as estimated by each age reader.

### 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.