SmartDots Summary Report for the 2023 Plaice SD 22 exchange (ple.27.21-23 stock) (event ID 698)

Coordination and analysis: Julie Coad Davies, National Institute of Aquatic Resources, DTU Aqua, Denmark

1 Executive summary

The 2023 exchange for plaice in ICES SD 22 (stock ple.27.21-23) took place via the SmartDots platform between June and September 2023. The results presented here are based on the advanced readers (those who provide age data for stock assessment purposes) for the ple.27.21-23 stock. Otoliths from 97 fish were included in the exchange (69 were sectioned and sectioned and stained). All otolith processing and imaging was carried out at DTU Aqua, Denmark. As different age reading methods are applied in the age reading labs routinely reading plaice from this area, images of the otoliths prepared following the routine age reading methods were made available to the readers. Denmark and Sweden routinely read whole otoliths, soaked in water and viewed under reflected light. Germany routinely read sectioned otoliths viewed under reflected light. Full report here https://smartdots.ices.dk/ViewEvent?key=698

The results based on advanced readers of whole otoliths are fair, with overall PA at 71%. The most concerning results are the high CV values at modal age 1 (as high as 65%) and the individual reader relative bias values at modal ages 0 and 1 ranging from -0.07 to 0.27, which indicate large variability in what the readers are estimating in comparison to the modal age. The tendency is for readers to overestimate in comparison to modal age. The results based on advanced readers of sectioned otoliths are not as good, with overall PA at 64%. A similar pattern in seen with the sectioned otoliths where overestimation in comparison to modal age is apparent. The overall relative bias value of 2.67 for advanced readers a modal age 0 is incorrect (due to approval mistakes in SmartDots by two age readers). When looking at the results based on all readers, the individual reader relative bias values at modal ages 0 and 1 ranges from -0.60 to 1.17. The approval mistakes are further referred to in the main report.

The results here focus on the youngest ages in this calibration event, the reason being that concerns have been raised on the difficulties in correctly identifying the innermost translucent zones (TZ's) seen in these otoliths. The results show that the age reading of plaice belonging to the ple.27.21-23 stock is highly inconsistent between labs and readers. This has been a concern for plaice in the North Sea and Skagerrak (ple.27.4.20) also and attributed to an extended spawning period of plaice which can lead to huge variability in the distance of the first TZ from the otolith nucleus. Efforts are underway to better understand the patterns seen in the otoliths of the youngest fish from this stock. Samples from a broader area, covering the range of the stock, are required to assess any spatial variation of the growth patterns.

A workshop is recommended to further analyse a larger collection of otoliths, possibly by microchemical and microstructure analysis plus additional length frequency analysis. One of the aims would be to provide updated guidelines for the age readers to correctly estimate the age of these fish.

Age error matrices have not been provided to the stock assessment working group (WGBFAS) given that the resulting data from this exchange does not truly represent the age estimations of the readers who provide age data for the ple.27.21-23 stock. Follow-up work will include communication with the stock assessor on data needs for assessment.

2 Overview of samples and advanced readers

Table 2.1: Overview of samples used for the 2023 Plaice SD 22 exchange. 4 samples from ICES SD24 were include in the analysis. These were captured on the border between ICES SD22 and ICES SD24. For the sake of simplicity these will be included in the analysis of SD22.

Year	ICES area	Quarter	Number of samples	Length range
2019	27.3.d.24	4	1	55 mm
2020	27.3.d.24	1	1	80 mm
2020	27.3.d.24	3	2	70-90 mm
2021	27.3.c.22	1	18	100-380 mm
2021	27.3.c.22	2	15	220-390 mm
2021	27.3.c.22	3	18	130-410 mm
2021	27.3.c.22	4	42	80-390 mm

Table 2.2: Advanced reader overview showing routine preparation method applied when age reading, ALA = whole otolith and SEX = Sectioned otolith

Reader code	Expertise	Routine age reading method
R01 DK	Advanced	ALA
R02 DE	Advanced	SEX
R03 DK	Advanced	ALA
R04 SE	Advanced	ALA
R05 DE	Advanced	SEX
R06 SE	Advanced	ALA
R08 DE	Advanced	SEX
R10 SE	Advanced	ALA

3 Results overview

3.1 Summary Statistics – Whole otoliths

Table 3.1: Summary of statistics based on advanced readers of whole otoliths; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages

NSample	CV	PA	APE
97	24 %	71 %	13 %

Table 3.2: Coefficient of Variation (CV), Percentage agreement (PA), Average Percentage Error (APE) and Relative Bias (Rel. Bias) per modal age based on advanced readers (R01 DK, R03 DK, R04 SE, R06 SE and R10 SE) of whole otoliths.

Modal age	CV	PA	APE	Rel. Bias
0	-	**86 %**	-	**0.14**
1	**42 %**	**85 %**	**18 %**	**0.03**
2	**17 %**	**89 %**	**6 %**	**-0.02**
3	**22 %**	**80 %**	**10 %**	**-0.06**
4	**17 %**	**50 %**	**14 %**	**0.35**
5	**23 %**	**62 %**	**15 %**	**0.36**
6	**30 %**	**52 %**	**19 %**	**0.42**
7	**13 %**	**57 %**	**9 %**	**-0.17**
8	**14 %**	**48 %**	**10 %**	**0.28**
9	**12 %**	**40 %**	**10 %**	**0.87**
10	**39 %**	**40 %**	**26 %**	**-1.80**

11	**14 %**	**40 %**	**10 %**	**0.10**
12	**12 %**	**50 %**	**10 %**	**-1.10**
Weighted Mean	**24 %**	**71 %**	**13 %**	**0.08**

3.2 Summary Statistics – Sectioned otoliths

The following results at modal age 0 should be interpreted with caution as two of the readers mistakenly approved annotations without placing dots and thus an age of 0 was sent to the reporting module. Weighted mean values are influenced by the values at modal age 0 and should also be interpreted with caution.

Table 3.3: Summary of statistics based on advanced readers of sectioned otoliths; Total number of samples (NSample), coefficient of variance (CV), percentage of agreement (PA) and average percentage error (APE) for all ages

NSample	CV	PA	APE
69	19 %	64 %	12 %

Table 3.4: Coefficient of Variation (CV), Percentage agreement (PA), Average Percentage Error (APE) and Relative Bias (Rel. Bias) per modal age based on advanced readers (R02 DE, R05 DE and R08 DE) of sectioned otoliths.

Modal age	CV	PA	APE	Rel. Bias
0	-	**67 %**	-	**2.67**
1	**30 %**	**89 %**	**18 %**	**0.11**
2	**31 %**	**67 %**	**23 %**	**-0.17**
3	**25 %**	**73 %**	**14 %**	**-0.09**
4	**14 %**	**71 %**	**10 %**	**-0.13**
5	**12 %**	**72 %**	**8 %**	**0.18**
6	**15 %**	**73 %**	**8 %**	**0.14**
7	**33 %**	**33 %**	**25 %**	**1.00**
8	**14 %**	**53 %**	**11 %**	**-0.59**
9	**29 %**	**50 %**	**17 %**	**-0.44**
10	**9 %**	**64 %**	**6 %**	**-0.05**
11	**12 %**	**41 %**	**9 %**	**0.29**
12	**6 %**	**67 %**	**5 %**	**0.44**
13	**56 %**	**60 %**	**40 %**	**-4.00**
14	-	-	-	-
15	**17 %**	**33 %**	**12 %**	**-0.33**
16	**9 %**	**50 %**	**7 %**	-
Weighted Mean	**19 %**	**64 %**	**12 %**	**-0.10**

3.3 Bias plot

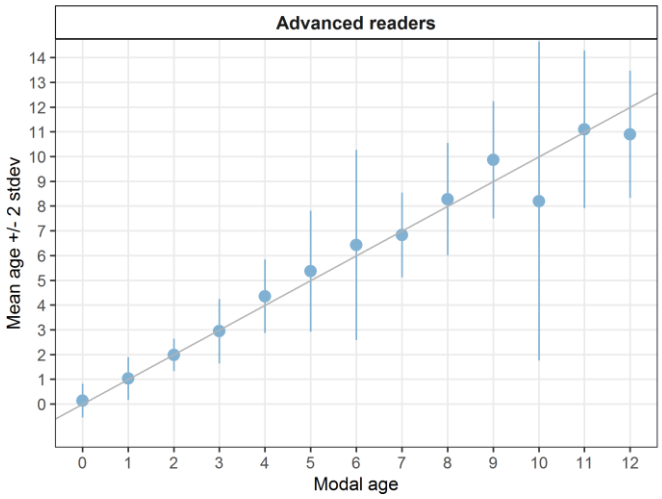

Figure 3.1: Age bias plot for advanced readers of whole otoliths.

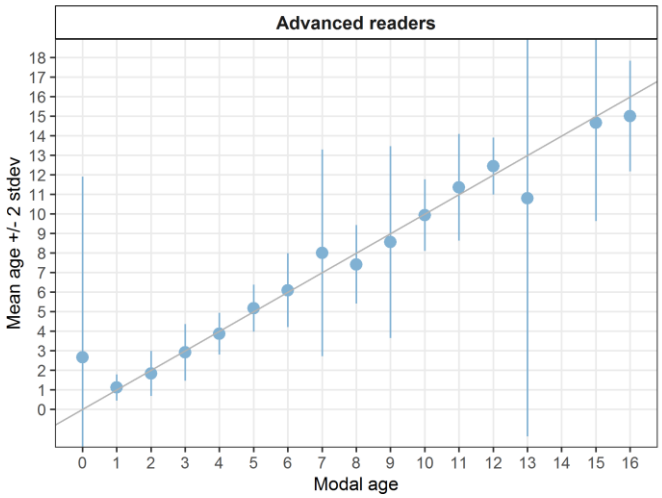

Figure 3.2: Age bias plot for advanced readers of sectioned otoliths. Values shown at modal age 0 are influenced by the incorrect annotations registered in the reporting module.

3.4 Age error matrices AEM

Age error matrices have not been provided to the stock assessment working group (WGBFAS) given that the resulting data from this exchange does not truly represent the age estimations of the readers who provide age data for the ple.27.21-23 stock.