2025 Baltic Plaice (ple.27.21-32) age reading exchange (Event ID: 2954) SmartDots Summary Report

1 Summary

The 2025 Baltic plaice age reading exchange (ID 2954) took place between September and November 2025 via the SmartDots platform https://www.ices.dk/data/tools/Pages/smartdots.aspx. A total number of 396 images were uploaded to the SmartDots platform for reader annotation. 10 readers from Sweden, Denmark, Poland and Germany took part (5 advanced and 5 basic) (Table 3.1). All institutes who provide age data for the assessment of the Baltic plaice stock ple.27.21-32 participated and provided samples. For each fish included in the event an image of a whole otolith (a pair when available) photographed in water under reflected light and a corresponding image of a sectioned otolith photographed under reflected light was digitised, both with correctly calibrated scale bars. The aim was to apply standard settings with respect to light conditions and magnification, as much as possible. Institutes provided sample data using the SmartDots Sample Upload template to DTU Aqua who coordinated the exchange. Following WGBIOP guidelines the aim was to provide a set of otoliths spatially and temporarily representative of the age data used in the stock assessment. ICES Subdivisions (SD's) 21-26 were covered and, where possible, samples within the range of ages 1-7+ were provided for each quarter (Table 1). Instructions were provided to all readers who were requested to provide one approved annotation per image. For each image a series of dots, placed at the end of each translucent zone (TZ) counted to estimate the age of the fish, plus a readability score based on the ICES standard https://vocab.ices.dk/?codetypeguid=e08ec685-61f6-4ccb-9e93-594047b05797, constituted an annotation.

Functionalities within the SmartDots reporting module allow for separate analyses based on reader expertise, otolith preparation method and area (among other strata). Various report outputs were examined where readers overall level of expertise was considered as either advanced (provides data for stock assessment) or basic (does not provide data for stock assessment) and consideration was also taken as to which ICES SD's and age reading method are routinely analysed. The aim being to reflect routine age reading procedures and readers level of experience as much as possible.

The overall statistics, percentage agreement (PA), co-efficient of variation (CV) and average percentage error (APE) did not vary much depending on the stratification of samples included in each analysis. Based on the different combinations of samples, the overall CV, PA and APE fell between 24-26%, 60-65% and 14-17%, respectively, with no obvious improvement in results depending on readers level of expertise. Reader's expertise was considered solely based on whether they provide age data for stock assessment. In this summary, only results from advanced readers are included. The ages estimated by the readers reach up to 22 years. The high CV and APE and low PA scores at older ages mean that the overall results shown in this report are poorer than if the actual plus group used in the stock assessment (7+) was applied to the results (this feature is not available in SmartDots). The overall positive relative bias seen for each analysis indicates that when readers are not in agreement with modal age, they will overestimate the age.

2 Overview of samples and advanced readers

Table 1: Overview of samples used for the exchange (n=394).

ICES area	Quarter	Number of samples	Modal age range	Length range
27.3.a.21	1	11	1 to 18	80 - 340 mm
27.3.a.21	2	10	3 to 13	110-390 mm
27.3.a.21	3	10	1 to 18	120 - 350 mm
27.3.a.21	4	12	0-15	130-380 mm
27.3.c.22	1	10	1 to 12	110-460 mm
27.3.c.22	2	10	1 to 14	120-430 mm
27.3.c.22	3	10	3 to 10	270-500 mm
27.3.c.22	4	11	1 to 10	110-420 mm
27.3.b.23	1	7	1 to 9	130-380 mm
27.3.b.23	2	4	1 to 12	200-290 mm
27.3.b.23	3	10	2 to 15	200-420 mm
27.3.b.23	4	11	0 to 6	80-350 mm
27.3.d.24	1	10	1 to 12	100-360 mm
27.3.d.24	2	11	2 to 9	130-390 mm
27.3.d.24	3	9	2 to 8	180-390 mm
27.3.d.24	4	11	0 to 10	80-400 mm
27.3.d.25	1	9	2 to 10	130-370 mm
27.3.d.25	4	10	1 to 8	160-350 mm
27.3.d.26	1	10	1 to 8	100-320 mm
27.3.d.26	4	10	1 to 8	120-300 mm

Table 2: Advanced reader overview showing expertise level, routine preparation method applied and expertise rank indicating the level of experience (1 being most experienced and 10 the least).

Reader code	Expertise	method	Rank
R02 DK	Advanced	Whole	2
R03 DE	Advanced	Whole & Sectioned	3
R05 SE	Advanced	Whole	5
R06 SE	Advanced	Whole	6
R08 PL	Advanced	Sectioned and Stained	8

3 Results

3.1 PA, CV, APE and Relative Bias

Table 3: Presents the Coefficient of Variation (CV), Percentage Agreement (PA), Average Percentage Error (APE) and Relative Bias per modal age for all advanced readers combined for sectioned otoliths. Total number of readings by modal age is also shown

Modal age	CV	PA	APE	Relative bias	Total no. of age readings
0	-	96 %	-	0.04	28
1	65 %	74 %	37 %	0.10	87
2	35 %	71 %	20 %	0.07	129
3	26 %	74 %	13 %	0.05	74
4	24 %	61 %	15 %	0.16	94
5	15 %	70 %	8 %	-0.05	98
6	15 %	59 %	10 %	0.11	75
7	17 %	53 %	13 %	0.47	38
8	18 %	55 %	12 %	0.30	87
9	9 %	68 %	5 %	0.03	40
10	16 %	57 %	10 %	0.47	51
11	8 %	58 %	6 %	0.36	33

Modal age	CV	PA	APE	Relative bias	Total no. of age readings
12	18 %	50 %	16 %	1.14	14
13	11 %	50 %	8 %	0.80	10
14	11 %	40 %	8 %	-0.20	5
15	14 %	40 %	12 %	-1.80	15
16	6 %	44 %	5 %	0.22	9
17	18 %	50 %	13 %	-0.75	4
18	16 %	40 %	13 %	1.40	5
19	9 %	40 %	7 %	0.40	5
20	61 %	50 %	43 %	-6.00	2
21	26 %	33 %	20 %	-2.33	3
22	7 %	40 %	5 %	-0.60	5
Weighted Mean	**25 %**	**64 %**	**15 %**	**0.11**	**911**

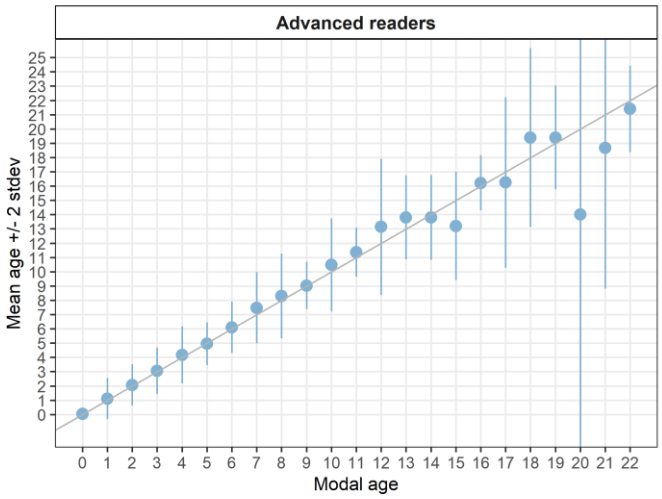

Figure 1: Age bias plot for advance readers for sectioned otoliths. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias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

Table 4: Presents the Coefficient of Variation (CV), Percentage Agreement (PA), Average Percentage Error (APE) and Relative Bias per modal age for all advanced readers combined for whole otoliths. Total number of readings by modal age is also shown.

Modal age	CV	PA	APE	Relative bias	Total no. of age readings
0	-	**85 %**	-	0.27	33
1	**60 %**	**75 %**	**41 %**	0.25	88
2	**38 %**	**65 %**	**26 %**	0.25	130
3	**28 %**	**64 %**	**20 %**	0.31	127
4	**22 %**	**60 %**	**15 %**	0.21	97
5	**17 %**	**64 %**	**10 %**	0.07	113
6	**15 %**	**63 %**	**10 %**	0.24	59
7	**15 %**	**46 %**	**11 %**	0.10	39
8	**15 %**	**52 %**	**10 %**	0.16	95
9	**9 %**	**60 %**	**5 %**	0.00	30
10	**15 %**	**52 %**	**11 %**	0.44	54
11	**16 %**	**54 %**	**9 %**	0.03	37
12	**21 %**	**47 %**	**15 %**	-0.80	15
13	**16 %**	**20 %**	**13 %**	1.60	5
14	-	-	-	-	0
15	-	-	-	-	0

Modal age	CV	PA	APE	Relative bias	Total no. of age readings
16	-	-	-	-	0
17	**4 %**	**50 %**	**3 %**	-0.50	2
18	**14 %**	**50 %**	**12 %**	-2.00	4
19	-	-	-	-	0
20	-	-	-	-	0
21	-	-	-	-	0
22	**22 %**	**50 %**	**19 %**	-3.50	4
Weighted Mean	**25 %**	**61 %**	**17 %**	**0.17**	**932**

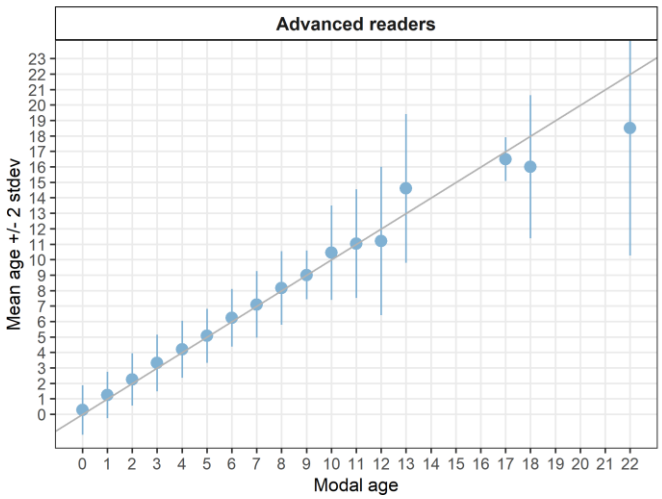

Figure 2: Age bias plot for advance readers for whole otoliths. Mean age recorded +/- 2 stdev of each reader and all readers combined are plotted against modal age. The estimated mean age corresponds to modal age, if the estimated mean age is on the 1:1 equilibrium line (solid line). Relative bias is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

4 Conclusion

The overall results are poor with overall CV, PA and APE values between 24-26%, 60-65% and 14-17%, respectively. No marked improvement was observed when only the advanced readers age estimations were included in the analysis. Ages are generally overestimated compared to modal age up to 10-year-old fish. Above 10 years old there are large variations between age readers.

When looking at the different age reading methods, whole versus sectioned, no method proved better than the other. However, only one country routinely age sectioned otoliths and the other readers are not used to this method.

Irregular growth patterns do exist in the samples which are considered representative of the samples read for the Baltic Plaice stock assessment. The full report from the workshop (WKARBP) that followed this SmartDots event should be consulted for a more in-depth explanation of the results and image examples.

Results were presented at the ICES Baltic Fisheries Assessment Working group (WGBFAS) 2026.