Age determination of Baltic Cod 2018

Jon Kristjansson
Fisheries Scientist
Reykjavik, Iceland
jonkr@mmedia.is
www.fiski.com

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Material, methods

Scales were collected from 24 Baltic cod, 42-54 cm long. They were caught in gill nets at Tyske Grunn, 55,15,90 N and 13,20,00 E (fig. 1). Water depth was 35 m. Samples were collected in April 2018. Length, weight and sex were recorded.

Scales were pressed in a roller press into soft 0.7 mm thick celluloid plate to obtain a mold of the scale surface. The molds were placed in a micro film reader for age reading. Length at age was back calculated by measuring the distance of the annuli from the centre of the scale, assuming a linear relationship between scale size and fish length.

Results

It was possible to read the age from the scales, but some were difficult to interpret. Mean back calculated lengths of each age group are shown in table 1. A plot of the mean growth of 4, 5, 6 and 7 year old fish is shown in fig. 2. The mean growth of all age groups is shown in fig. 3. Length at age for all fish is shown in fig. 4.

The fish grow to an asymptotic length of around 48 cm. At that size there is a equilibrium of food intake and energy consumption.

Fig. 1. Location of sampling site.

Age	Mean weight	Year class	No.	Mean length	l_1	l_2	l_3	l_4	l_5	l_6	l_7	l_8
Years	kg			cm	cm	cm	cm	cm	cm	cm	cm	cm
4	0.93	2014	4	46	10	26	36	43				
5	0.97	2013	9	47	9	29	36	41	45			
6	0.92	2012	9	45	9	24	33	38	41	44		
7	1.00	2011	1	54	9	18	37	43	45	50	53	
8	0.96	2010	1	48	6	21	31	35	38	42	43	47
				Avg:	9	23	35	40	43	45	48	47

Table 1. Age determination of Baltic cod from Tyske grunn. Length was back calculated from scales, l^1, l^2, show the calculated growth of the year classes. Mean lengths at age of 4-8 year old cod are plotted in fig. 2.

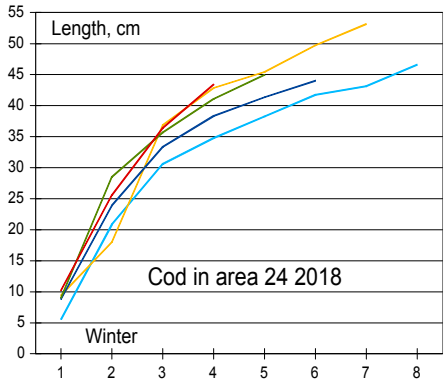

Fig. 2. Plot of the mean growth of 4, 5, 6, 7 and 8 years old cod, back calculated from scales. Data are from table 1.

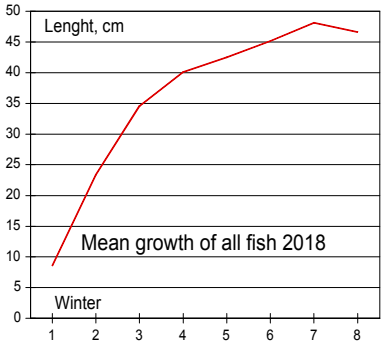

Fig. 3. Average growth of all 24 fish in the sample.

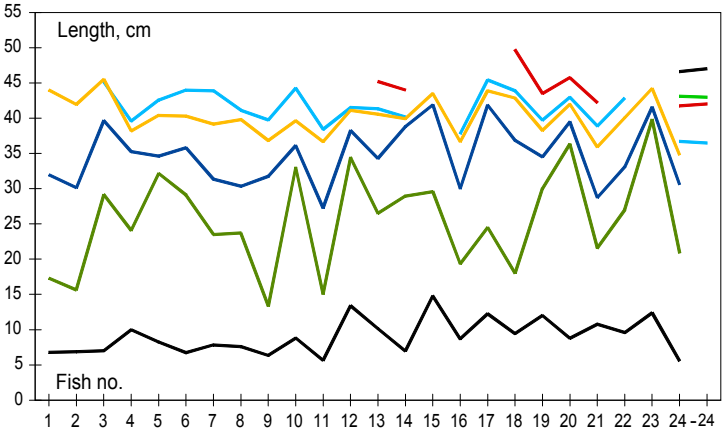

Fig. 4. Length at age for all fish in the sample. First winter is black, second is green, then blue, etc. Fish no. 24: length at 5-8 shown as lines.

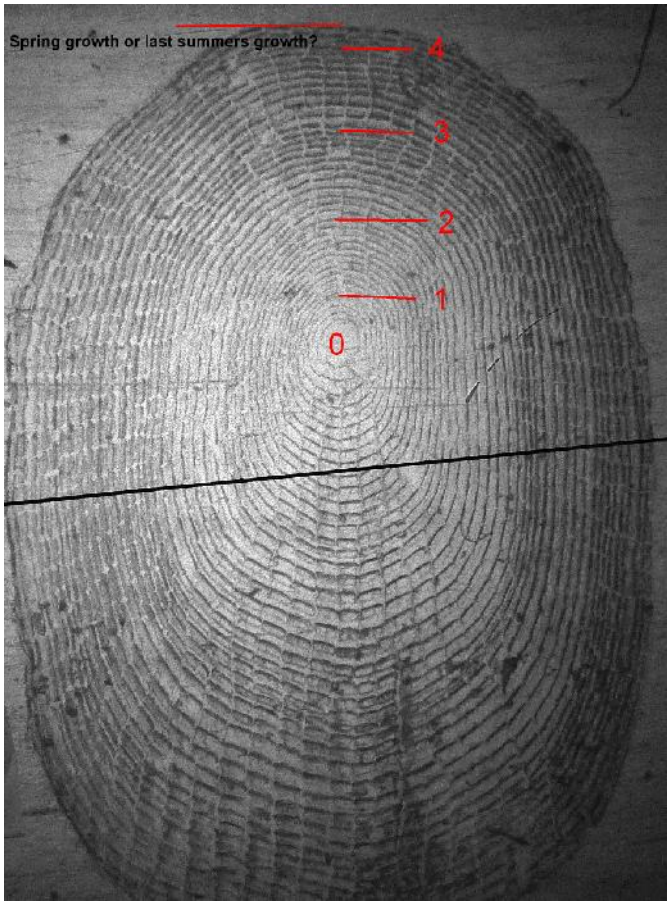

Fig 5. Scale from fish no. 2, classified as 4+. It is not known whether the last zone is spring growth or last years growth.

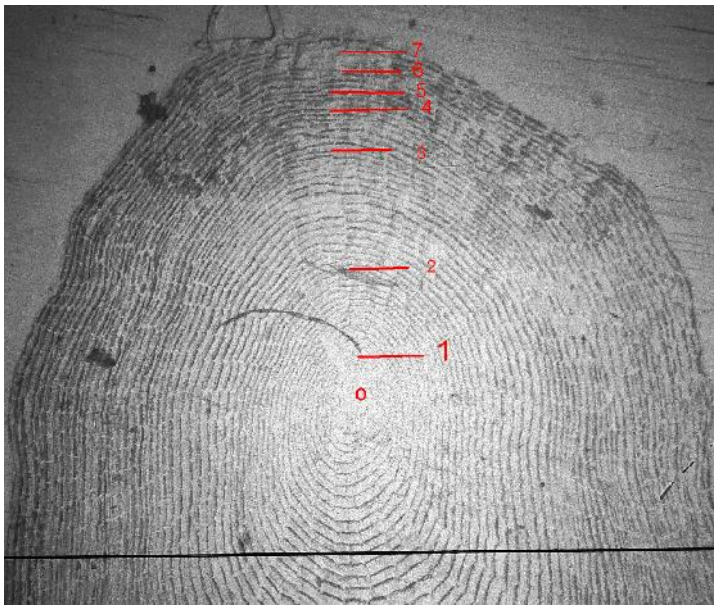

Fig. 6. Scale from fish no. 18 classified as 7+.

Comparison of cod growth in 2014 and 2018

12 fish were aged from area 24 in 2014 (Kristjánsson 2015), the results are shown in fig. 7 and 8. Comparison of the results in 2014 and 2018 is shown in fig. 9. The growth pattern is the same in both years.

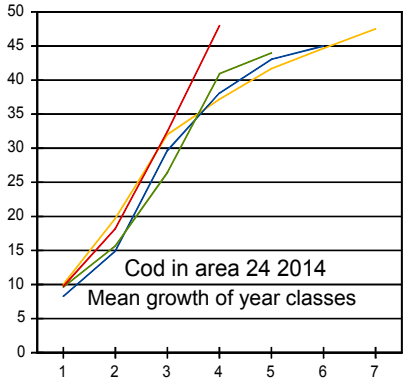

Fig. 7. Plot of the mean growth of 4, 5, 6 and 7 years old cod in area 24 in 2014.

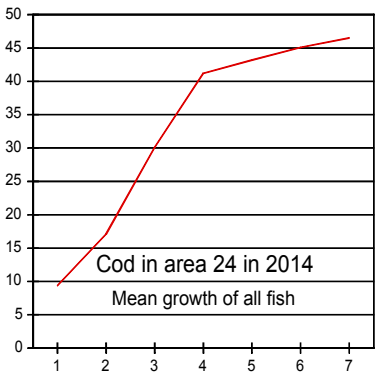

Fig. 8. Mean growth of all age classes in area 24 in 2014.

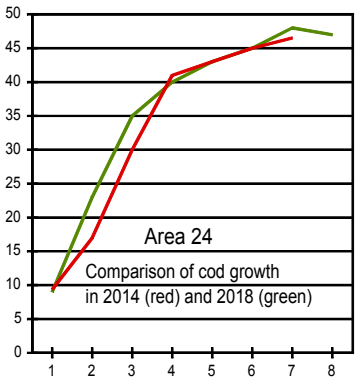

Fig. 9. Comparison of cod growth in area 24 in 2014 (red line) and 2018 (green line).

Discussion

Most of the fish had the last growth ring open and since it is not known when in the spring the winter annulus is formed the fish may be a year older. Also, in older fish there might be many clustered annuli at the edge of the scale impossible to separate. But this does not disturb the main result; growth stagnates at 45-48 cm when the fish weigh around 1 kg. The fact that they were caught with gill net explains their uniform size. Samples should be collected with net links with different meshes, trawl or seine.

The growth rate cheeses with length. **This is a result of selective fishing combined with reduced fishing pressure. Continuing this manage strategy might even reduce the growth further. The stock is obviously over populated and the only remedy is a thin out fishery with small meshes.**

Management that depends on growth should be used instead of the obligatory age-structured modelling. (Kolding and van Zwieten 2011).

References

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