Shifting spawning time or strategy in North Sea plaice, implication for stock development.

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What is known about plaice spawning and early growth

In the southern North Sea:

- Plaice is a capital determined batch spawner
- Rippening of the adults starts early summer
- Spawning season: December – April
- Settlement in April-May
- Length at end of growth season 9-11 cm

Observations questioning the above

- Mature and running plaice were caught in August-September 2018
- Small (6-7 cm) plaice in the Wadden Sea late October
- Small (6-8 cm) plaice in coastal waters in February

Methods

- Year-round histological maturity staging on fish from the market.
- Otoliths of 0-group plaice were collected at the end of the growing season (Wadden Sea and coastal surveys) and early in the following year (IBTS), also in Belgium and German surveys.
- Back-calculations using "weekly" patterns in the otoliths to estimate week of metamorphosis.

Figure 1. Juvenile plaice

Research question

Was the observation of summer spawning incidental?

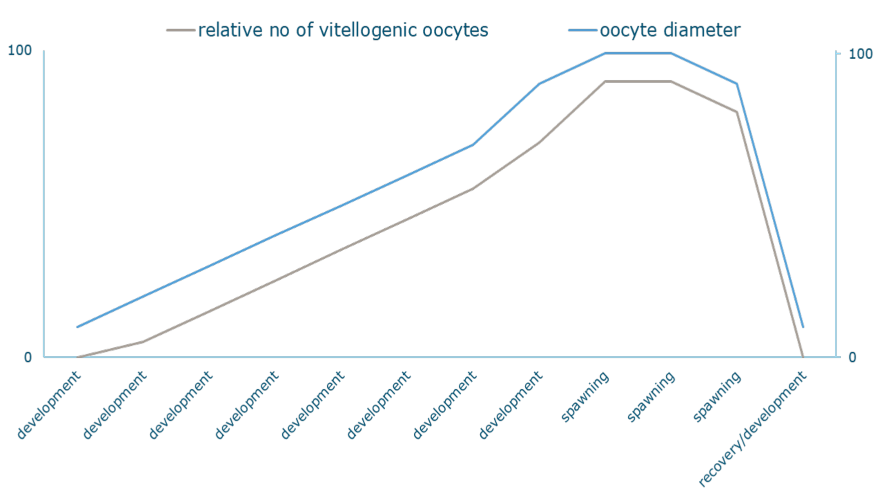

Figure 2. Expected development of vitellogenic oocytes and oocyte diameter in female plaice.

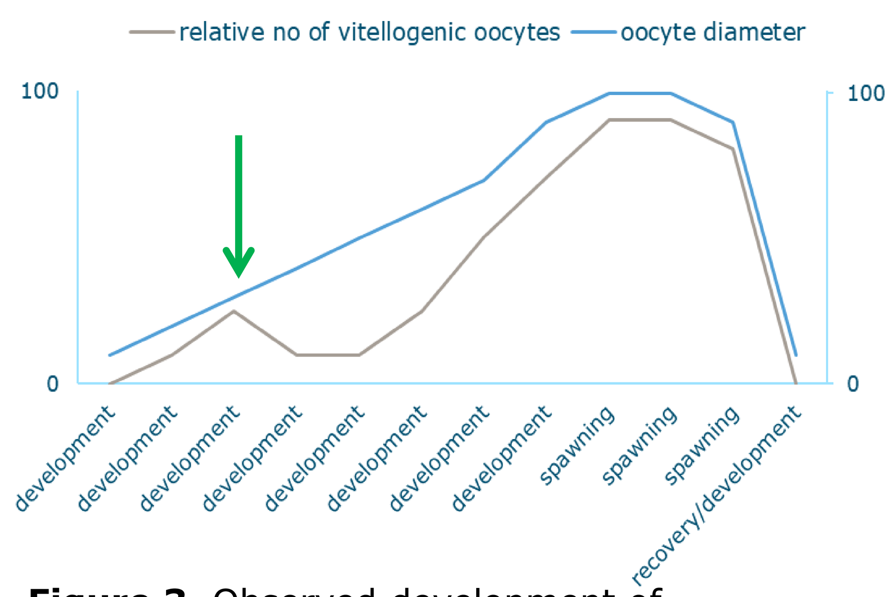

Figure 3. Observed development of vitellogenic oocytes and oocyte diameter in female plaice

A relatively high proportion of vitellogenic oocytes from June till August, followed by a decline and an increase towards December is likely due to spawning activity in summer.

Follow-up question

What is the fate of the summer spawned eggs?

- To our knowledge no observation of eggs, larvae or settling in late summer.
- Plaice (<4cm) were in recent years last caught in June during surf zone sampling at IJmuiden

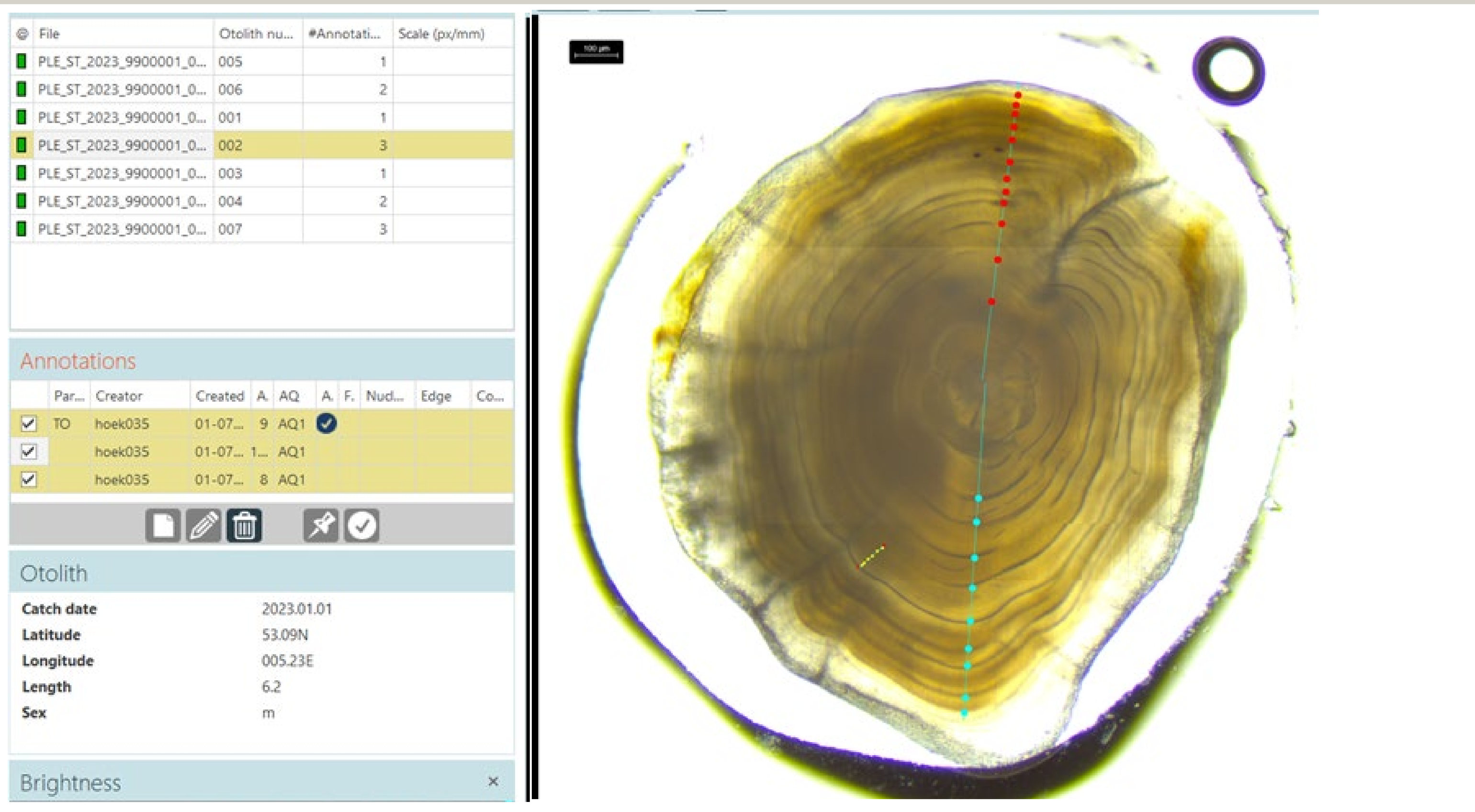

Figure 4. Plaice otolith in smartdots: photos of multiple polishing stages combined. Two test annotations of "week"rings, and in yellow annotation of dayrings between two "week"rings.

Preliminary analysis of a small subset indicates that most fish had as expected their metamorphosis in March-May. A small number of plaice caught late January 2023 (IBTS) had their metamorphosis later. This later data of metamorphosis is not a match with spawning activity in August-September

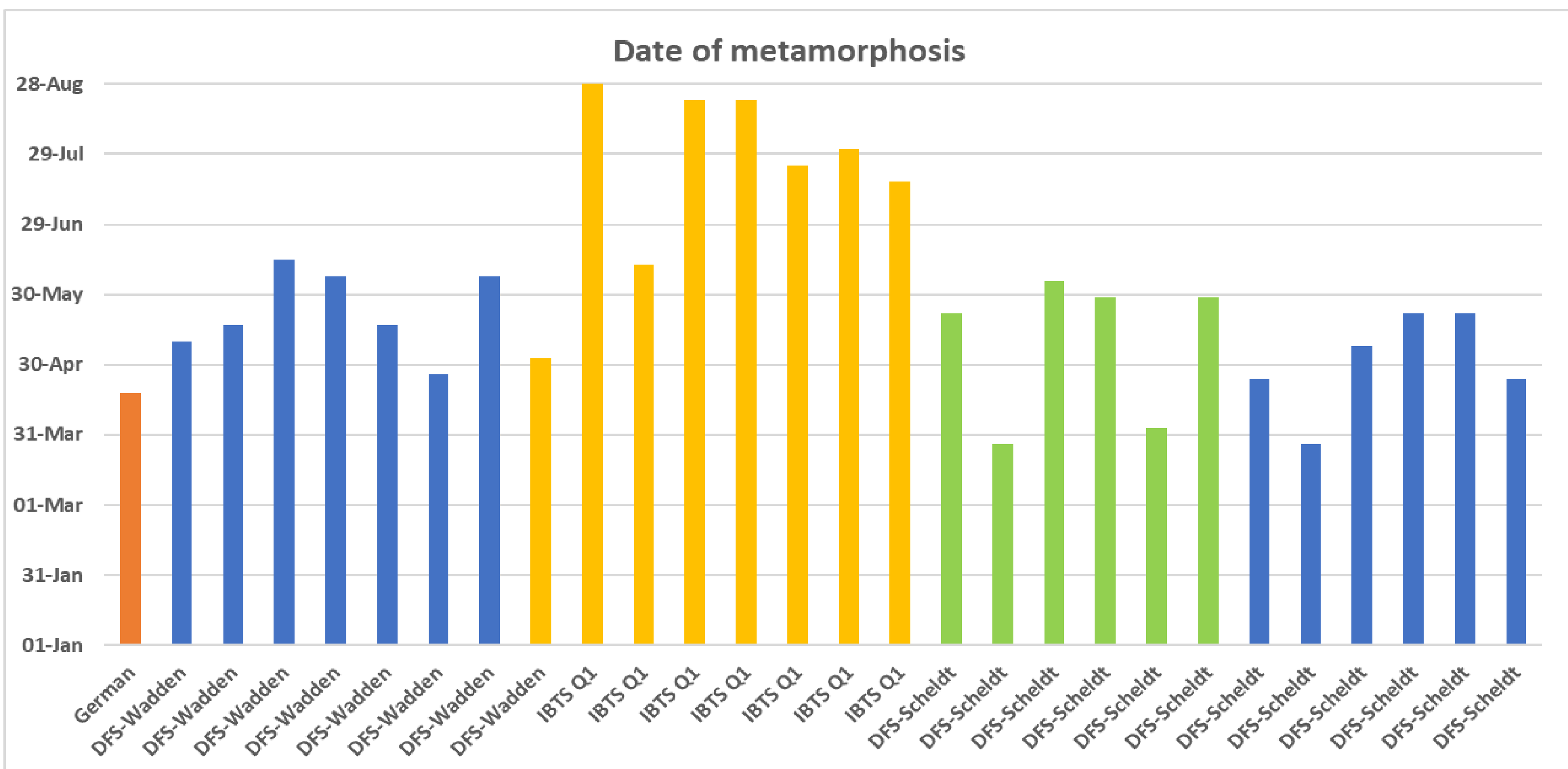

Figure 5. Date of metamorphosis base on back-calculations using "weekly" rings.

Conclusions

- Plaice spawning occurs outside the known season.
- Despite observations of later than expected metamorphosis, no match found with the late summer spawning.
- Remaining question:
  - what causes the summer spawning?
  - what is the fate of the spawned eggs?
  - Is there any impact on stock development?

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