An exploratory assessment of the cod stock in ICES Division 6a

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Introduction

- An alternative to the current ICES assessment
- Alternative interpretations of the data used in assessment
- Offered as “work in progress”
- Illustrates plausible analyses that show greater consistency with associated 6a demersal stocks
- Aims to stimulate a review of the current ICES approach

Current assessment

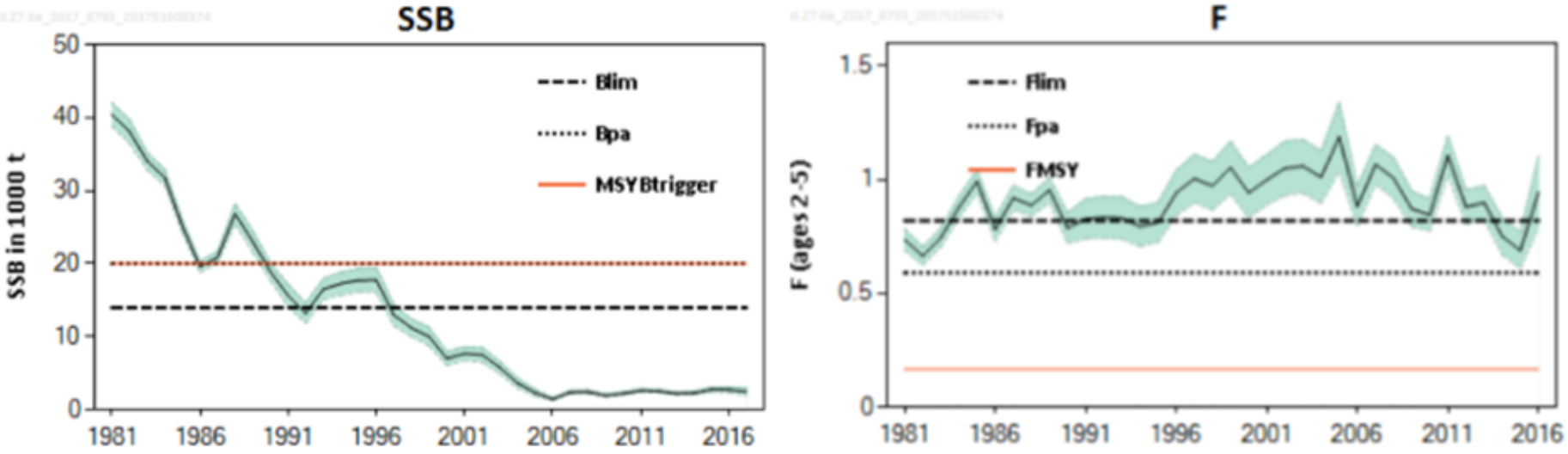


Figure 1 Cod in Division 6.a. Summary of the stock assessment. The shaded areas correspond to one standard error for estimates of mortality and SSB.

- SSB has flatlined at approx. 2800 t in recent years
- F has remained stable, fluctuating around 0.9

Fishing mortality – the problem

- 6a cod trend differs from all other stocks (shown as a dotted line)
- Sudden and large increase in F in the most recent year, looks abnormal and is difficult to explain
- Difficult to explain why the cod stock should be subject to such a different level and trend in fishing mortality given its presence in a mixed fishery.
- Might be expected to show similar rates of fishing to haddock and whiting, at least with regard to trends.

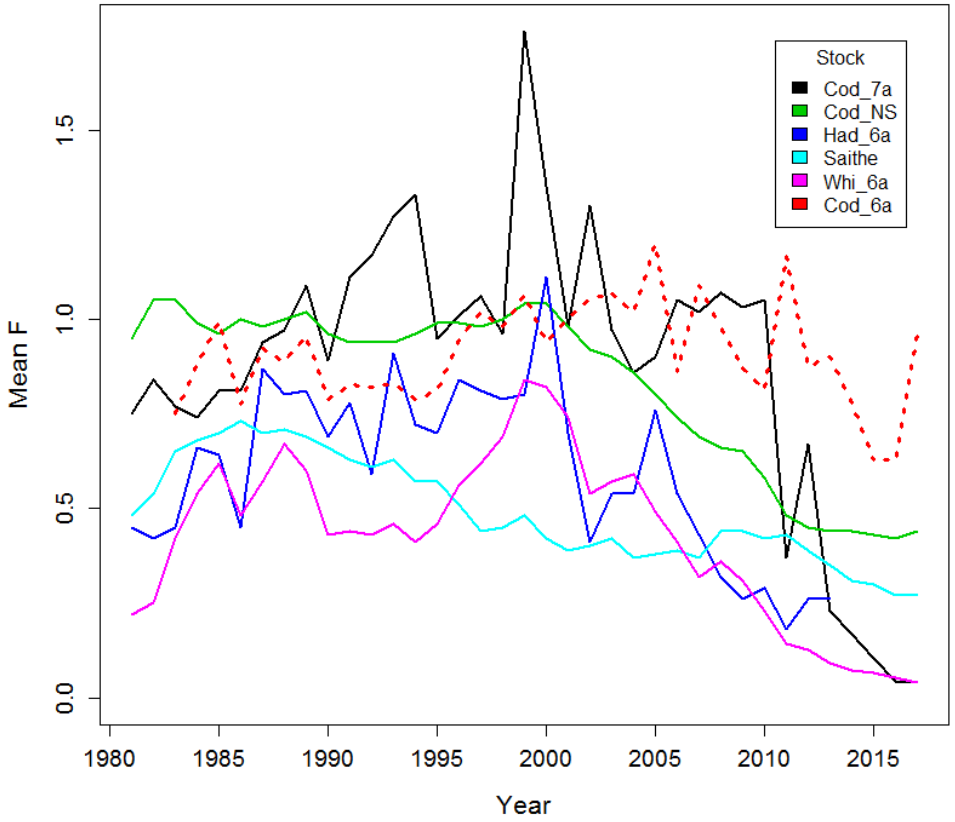
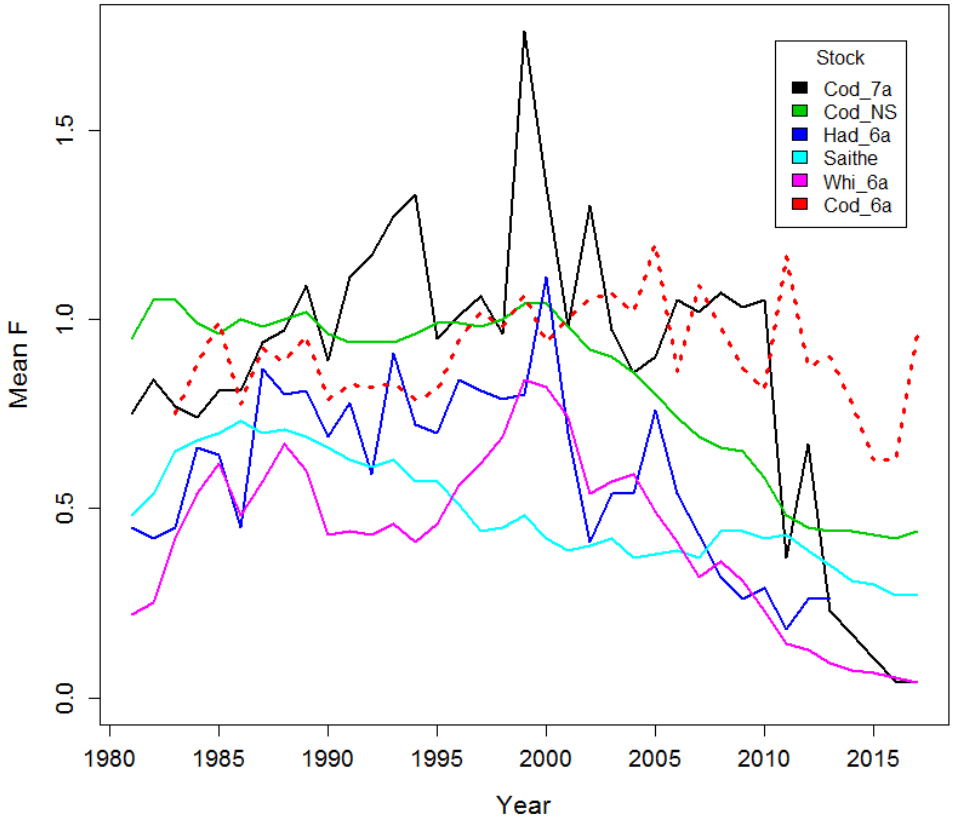


Figure 1. Fishing mortality rates in a number of stocks in Division 6a and adjacent areas. Cod_7a=Irish sea cod, Cod_NS=North sea cod, Had_6a=West of Scotland haddock, Whi_6a=West of Scotland whiting, Saithe= Saithe in Subarea 4,6 and Division3a. For haddock ICES assessments for a separate 6a stock are only available up to 2013. All stocks show declines in fishing mortality beginning in the years 2000-2005, except cod in 6a where mortality remains high with an increase in 2017.

Fishing mortality – the problem

- Explaining this difference requires that the remaining cod are highly available to the fleet either through fish concentrating in fishable areas and/or they are being specifically targeted.
- This is not evident in the adjacent cod stocks which have shown very similar historical declines.
- The stock is not being targeted given the restrictive management measures in place.
- In view of this it is worth reviewing the assessment in order to see if a simpler explanation is possible.



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Alternative assessment model

- Development of model, with similarities to the ICES assessment model, to analyse the cod data.
- The model integrates both commercial catch data and survey data.
- Spawning stock shows a degree of recovery to a level similar to 1992
- Fishing mortality shows a marked decline from around 2003
- Sharp contrast to current ICES assessment

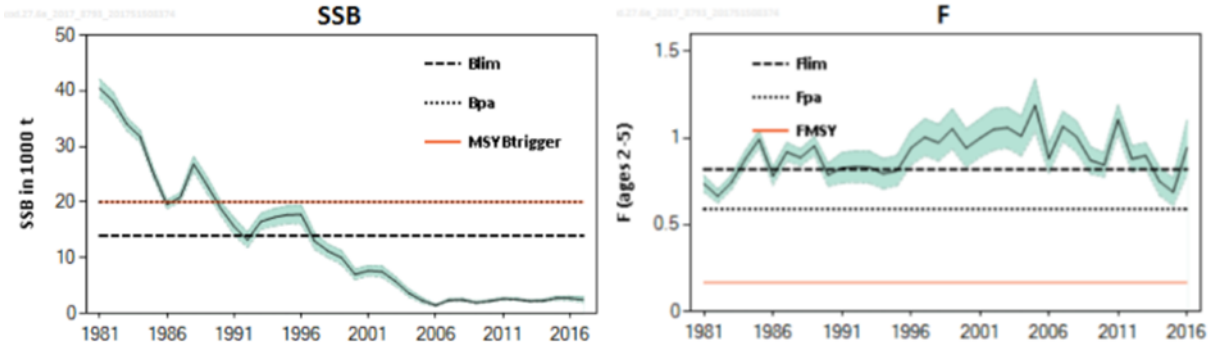


Figure 1 Cod in Division 6.a. Summary of the stock assessment. The shaded areas in the bottom panels correspond to one standard error for estimates of mortality and SSB.

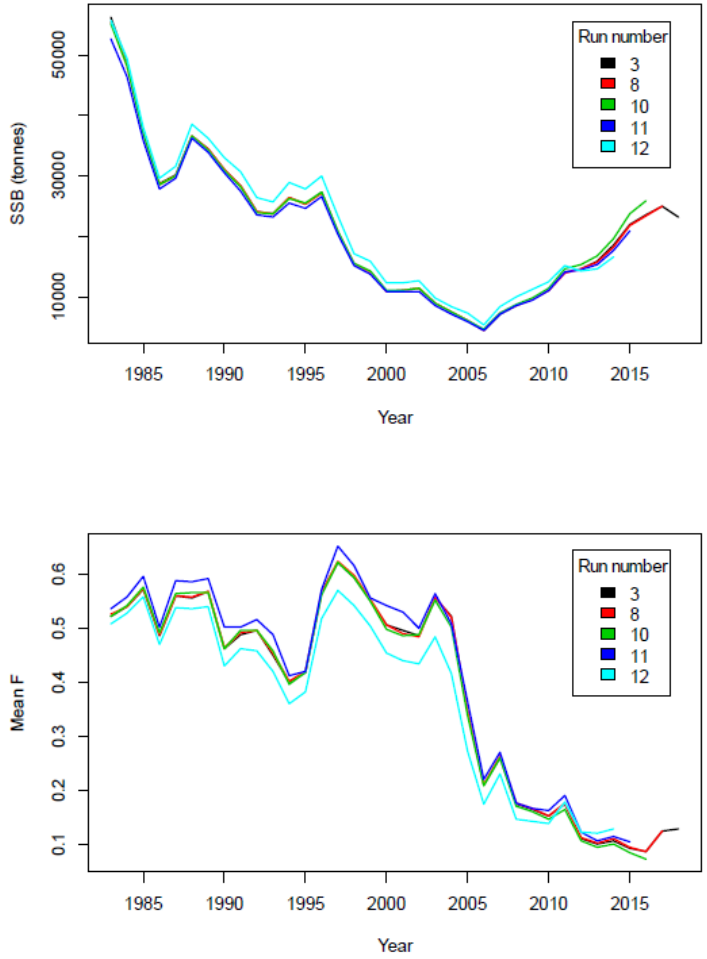
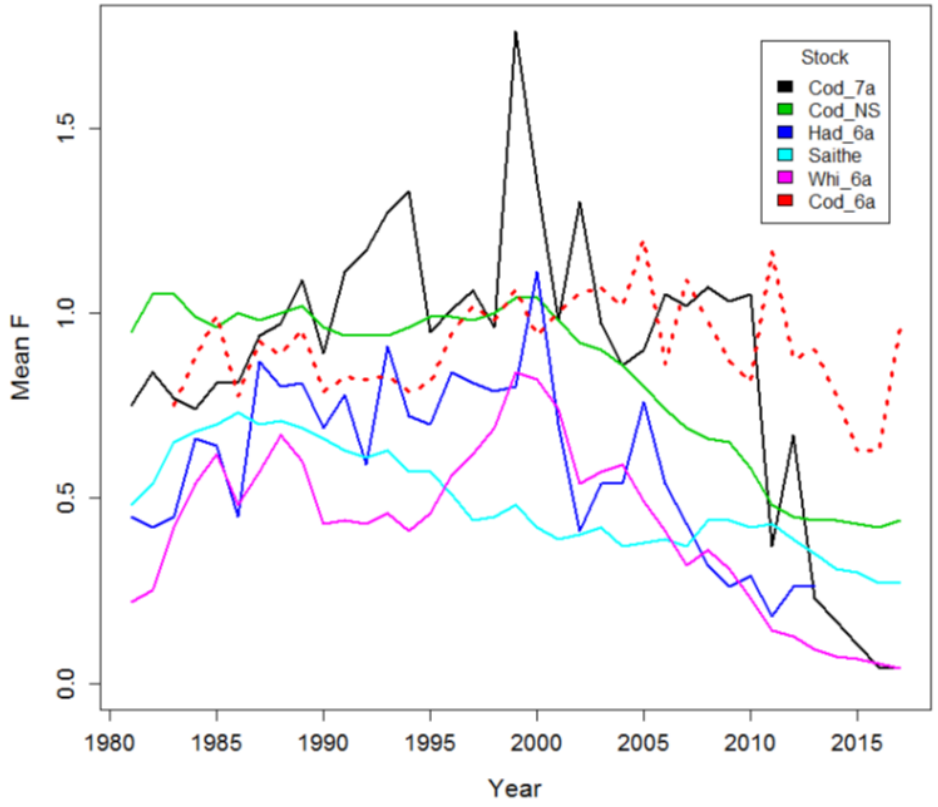
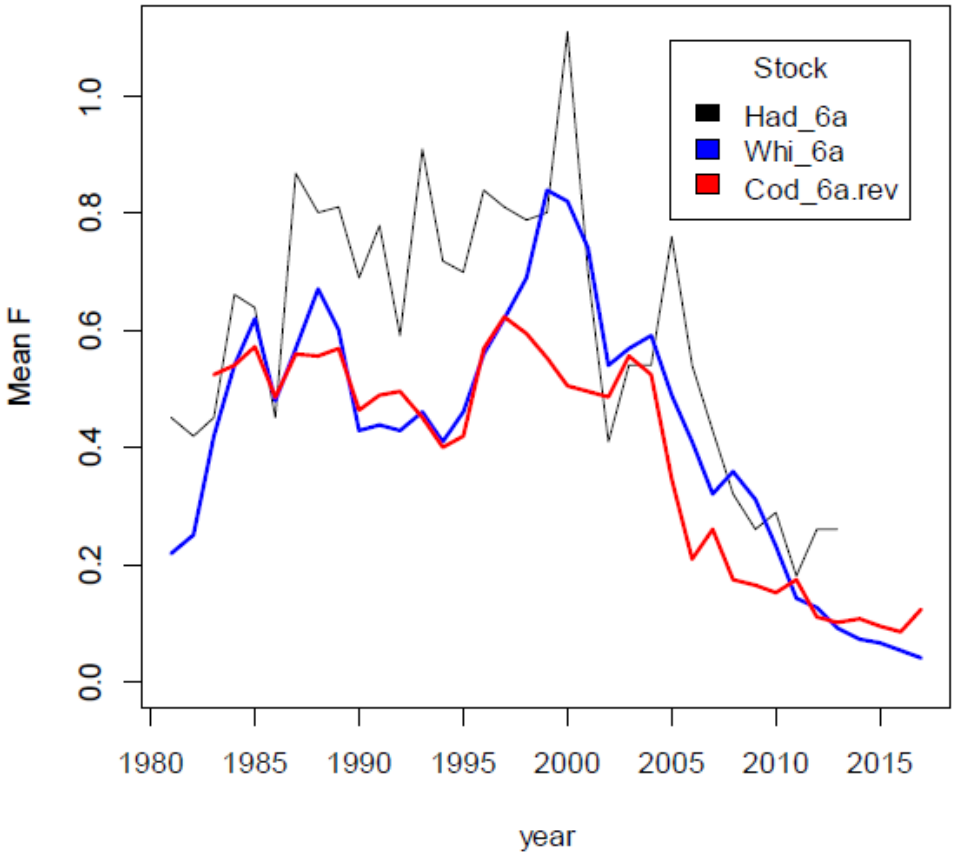


Figure 2 Summary of F and SSB from the Cook stock assessment for WoS cod. The model makes slightly different assumptions about the selectivity of the commercial and survey fleets.

Alternative assessment model

Fishing mortality





Considerations & conclusions

- The principal cause of the difference between the ICES assessment and the analysis presented here appears to be due to the assumption about the selectivity pattern of the commercial fleet.
- The ICES model assumes the fish are equally selected for all ages from 4 upwards, and that this is the age range of maximum selection. The model presented here allows the selection pattern to be dome shape (similar to cod assessments in IVa and VIIa) where older and younger fish have lower selectivity than intermediate ages.
- It is unclear which assumption about selectivity is correct. The results from the revised model are more consistent with external observations and may, therefore, offer some support for this interpretation.
- The fact that the model is highly sensitive to the selectivity assumption is a cause for concern. This does not invalidate the ICES assessment but does raise questions about the robustness of the results.
- Further work is required to establish the most appropriate approach to configuring the model.