APPENDIX

The stability/consistency of the model predictions was evaluated using a retrospective pattern analysis (Mohn, 1999, Hurtado-Ferro et al., 2015). This involves comparing predictions for the terminal year between a model fitted to the full dataset, and predictions obtained from models fitted to subsets of the data. More specifically, these subsets involved sequentially removing ("peeling off") the terminal year of the time series, going from 1 to 5 years removed. In addition to the visual examination of the predicted model trajectories, the Mohn's *rho* statistic, as calculated by Hurtado-Ferro et al. (2015), was used to gauge the stability/consistency of the terminal year model predictions. Hurtado-Ferro et al. (2015) explored retrospective patterns using simulations based on age-structured models, and developed a series of rules of thumb to assess if retrospective patterns are likely to be a problem for a given model. In the case of long-lived fishes like cod, their rules of thumb indicates that Mohn's *rho* statistic values outside the -0.15 to 0.2 range are likely indicative of retrospective pattern problems.

In our analyses we fitted different versions of the model, one initial base model configuration assuming fully independent cod stocks, and restricted configurations which assume that some parameter values are common between stocks. From the restricted configurations explored, the one assuming common *e, and a* parameters between stocks showed no statistical differences with the fully independent stocks base model. In this appendix we provide the retrospective pattern analysis fits corresponding to these model configurations.

In all cases, the model fits (Fig. A1) show no obvious indication of retrospective pattern problems, indicating that predictions are reasonably consistent/stable when the model is fitted to subsets of the data. The Mohn's *rho* statistics for predicted biomass were well within the -0.15 to 0.2 range in all cases (see main text). One important factor in driving the observed consistency in model predictions is the process error structure, which provides an effective constrain to the parameter space during the model fitting procedure, and renders more stable parameter estimates.

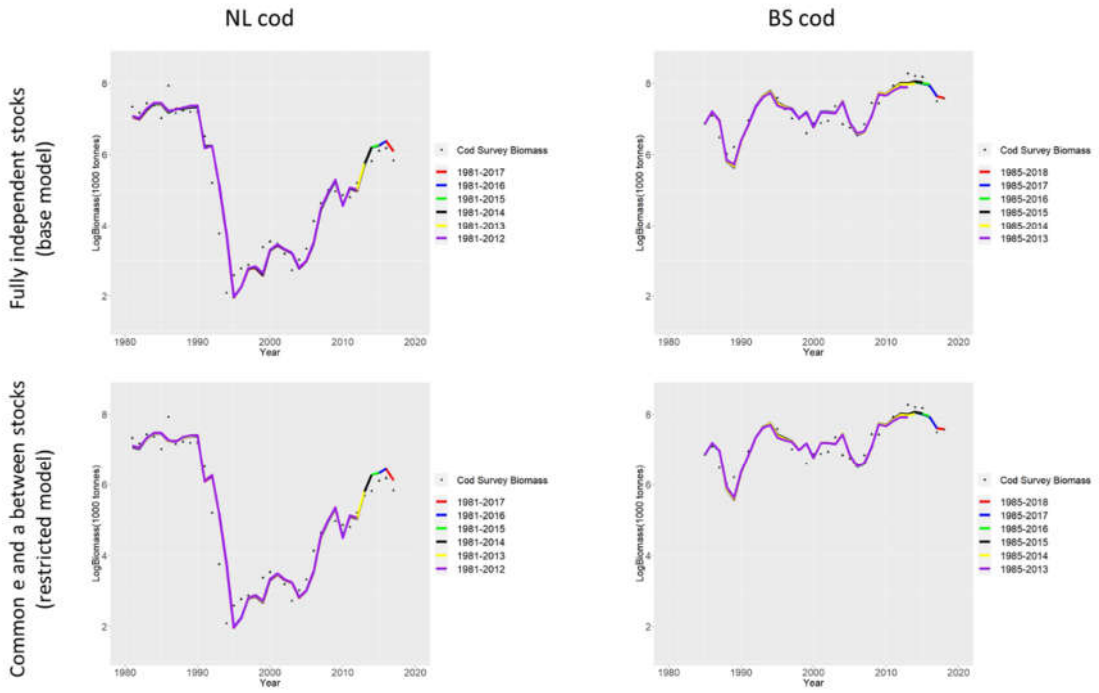

Figure A1. Retrospective pattern analysis for the key model configurations explored. The top row corresponds to the base model configuration which assumes that NL and BS cod stocks are fully independent (no common parameters between stocks), while the bottom row corresponds to the restricted model configuration where parameters *e* and *a* are assumed common between stocks. The colours indicate the different "peels" considered, with the full time series indicated in red in all cases. These plots show the consistency of predictions when the model is fitted to different subsets of data.

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