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Assessing turbot (*Scophthalmus maximus*) in the North Sea – a statistical model to handle episodic time series of data

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Background

- Turbot is one of the fastest growing flatfish, widespread in the northeast Atlantic
- Economically valuable bycatch species in mixed demersal fisheries in the North Sea
- Previously classified by ICES as "data-limited" (no analytical assessment)

Figure 1. Turbot management units identified by ICES. The yellow area shows the North Sea stock.

Data and Model

- Abundance indices from surveys targeted at a variety of other demersal species
    - 'Noisy' indices, more indicative of long term trends
- Statistical age-structured population model fit using the ADMB software package (Fournier et al. 2012)
- Uses basis splines to describe annual trend in fishing mortality and selectivity of the fishery (two time blocks) and surveys
    - Assumes changes in mortality have occurred gradually over time.
    - Evaluates trends in mortality over whole time period despite periods with no catch-at-age data
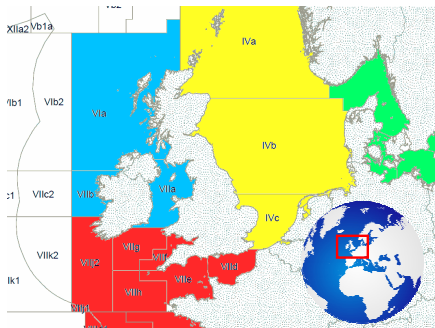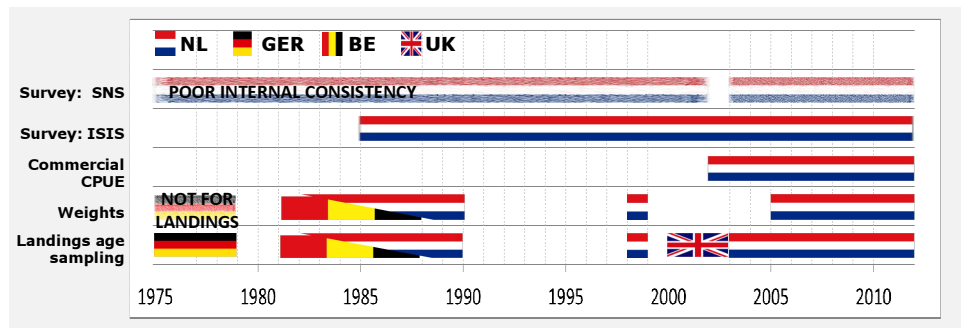

Figure 2. Data availability for the assessment of North Sea turbot. Biological information (age structure, weights at age and maturity) come from a number of episodic research projects from the 1970s to the present.
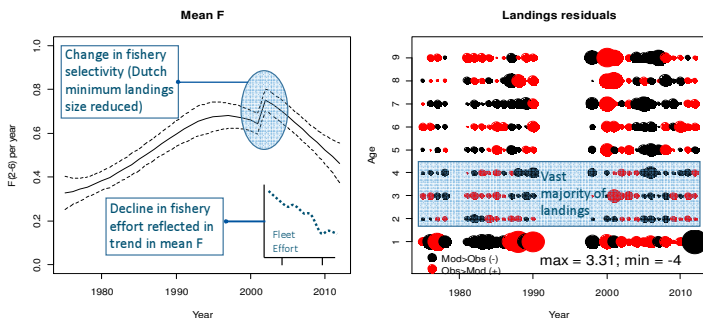
Results and Conclusions

Figure 3. Model predicted mean F (ages 2-6) and resultant landings at age residuals.

- The spline based model smooths over the noise and gaps in the data
    - Number of 'knots' determines degree of smoothness
    - Nevertheless, inputting noisy, patchy data into the assessment will increase uncertainty in the outputs

- Using splines reduces the number of parameters to be estimated
    - Total of 80 parameters for the 38-year time series

- Model results considered to be indicative of trends in exploitation and stock abundance
    - Used in 2013 to provide, for the first time, a basis for quantitative management advice for the North Sea turbot stock
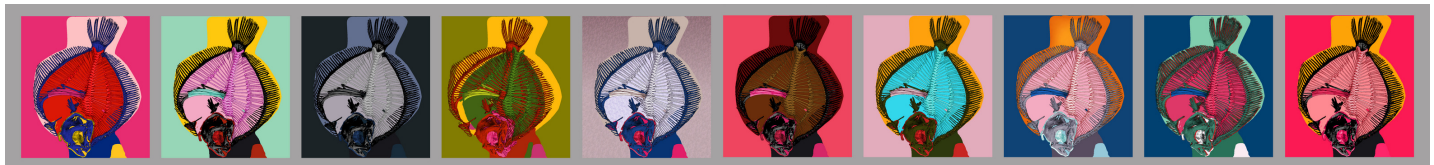
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Acknowledgements

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