Workshop on the Development of Quantitative Assessment Methodologies based on Life-history traits for stocks in categories 3-6 (WKLIFE VIII)

Evaluation of Biomass Dynamic Stock Assessment

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Outline

- Show the value-of-infomation, i.e. what if we only have
  - catch and cpue
  - catch
  - cpue
- run
  - biomass dyamic simtest and MP
  - stock reduction analysis and MP
  - Emprirical MP

1. Introduction

In this study we use Management Strategy Evaluation (MSE) to test advice rules based on a biomass dynamic production model for category 3 and 4 stocks that are inline with both the Maximum Sustainable Yield (MSY) and Precautionary Approach (PA) frameworks adopted by ICES for category 1 stocks.

The specific aims of the study are to

- Establish whether performance of the advice rules is correlated with life-history characteristics
- If such correlations exist, develop guidelines for use of the advice rules dependent on life-history characteristics

2. Material and Methods

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In a model based MP a stock assessment model is used to derive stock status relative to limit and target reference points and based on this to set a TAC.

A limit requires something to be done before it is reached and a target is a reward for doing something good. The standard fisheries HCR is a hockey stick (**Figure** 2.) where for any biomass a corresponding fishing mortality is given, which is then used to derive a TAC. The hockey stick is defined by two points, the target fishing mortality (F_{target}) and a threshold ($B_{threshold}$) that cause management action to be triggered if it is breached. Above $B_{threshold}$ F_{target} defines a target level of fishing mortality that management seeks to achieve, below $B_{threshold}$ F declines linearly to the limit biomass (B_{lim}).

Setting targets and limits requires deciding upon the values used to define these two points. For example using a stock assessment there are severall potential reference points such as those based on maximum sustainable yield (MSY), i.e. the biomass at which this is achived (B_{MSY} and the fishing mortlaity (F_{MSY}) that will achieve it.

The biomass of a stock next year (B_{t+1}) is equal to the biomass this year B_t, less the catch (C_t) plus the surplus production (P_t) i.e.

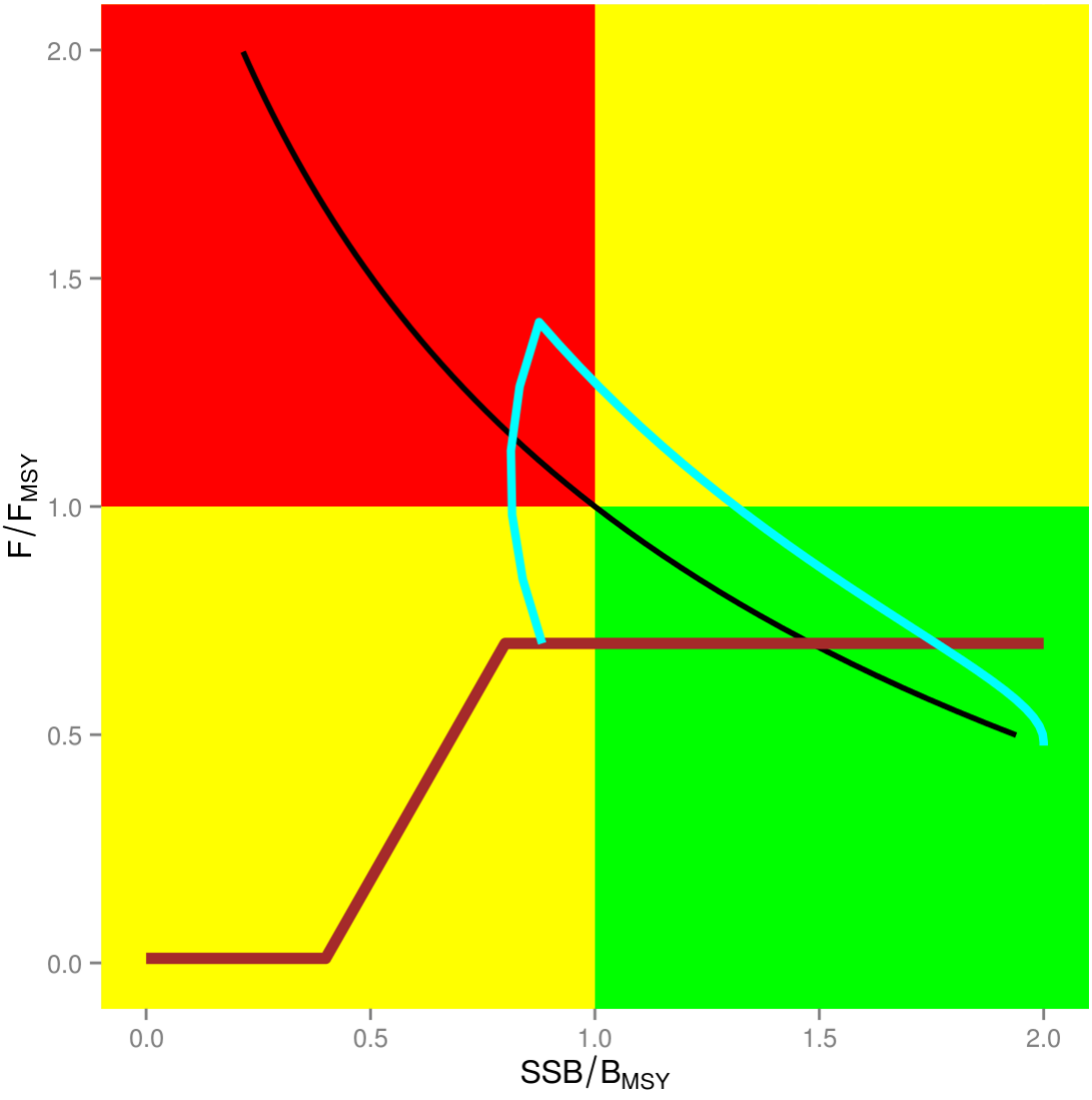

Figure 1: Harvest Control Rule (brown) plotted on a phase plot of harvest rate relative to F_{MSY} and stock biomass relative to B_{MSY}; the light line is the simulated stock and the black line is the replacement line.

$$B_{t+1} = B_t - C_t + P_t \tag{1}$$

P is given by the Pella-Tomlinson surplus production function (**?**)

$$\frac{r}{p} \cdot \ B(1 - (\frac{B}{K})^p) \tag{2}$$

3. Results

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4. Discussion and Conclusions

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5. Acknowledgements

This paper was written under the MyDas project funded by the Irish exchequer and EMFF 2014-2020. The overall aim of MyDas is to develop and test a range of assessment models and methods to establish Maximum Sustainable Yield (MSY) reference points (or proxy MSY reference points) across the spectrum of data-limited stocks.

References

6. Figures