

# Introduction

fish517stockpred Prediction of stock and catch

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# Forward prediction of a stock

Given an assessment one can predict the future stock

Need to know future recruitment

Need to determine catches (quotas or  $F$  etc.)

Assumptions on  $M$ , mean weight, etc.

# Simulating initial conditions

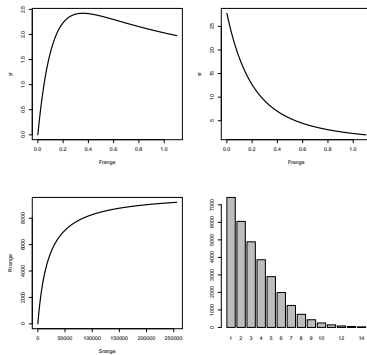


Figure : A simulated stock

## Carrying forward stock numbers from an assessment

An assessment gives stock numbers at the beginning of the last data year.

First project to the end of the data year.

Note that mortalities are also available for the data year.

$$N_{ay} = N_{a-1,y-1} e^{-Z_{a-1,y-1}}$$

# Fishing mortality assumptions

Future predictions can use

$$F_{ay} = F_{a,y-1}$$

or

$$F_{ay} = F_y s_a$$

# Predicting the catch

Catch prediction

$$C_{ay} = \frac{F_{ay}}{Z_{ay}} (1 - e^{-Z_{ay}}) N_{ay}$$

$$Y_y = \sum_a w_{ay} C_{ay}$$

# Short-term predictions: Assumptions

Short-term assumptions:

- Current stock size
- Recruitment
- Mean weights
- Selection pattern
- Annual  $F$

Often take uncertainty into account – mainly in current stock size

# Projecting the stock in numbers and biomass

$$N_{ay} = N_{a-1,y-1} e^{-Z_{a-1,y-1}}$$

$$S_y = \sum_a w_a N_{ay}$$



# Other details in predictions

Predict  $w_{ay}$ ?

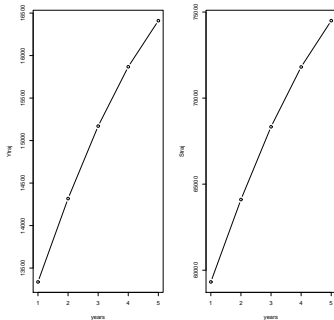
Predict  $p_{ay}$ ?

# Short-term predictions

Short-term assumptions:

- Current stock size
- Recruitment
- Mean weights
- Selection pattern
- Annual  $F$

Often take uncertainty into account – mainly in recruitment and current stock size



# Medium-term predictions

First-year stock size

Recruitment: Use S-R relationship

Mean weights

Selection pattern

Annual  $F$

Uncertainty needs to be incorporated

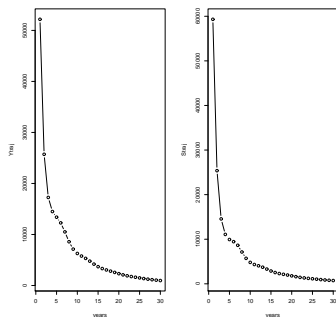


Figure : Predicting the stock and catch using a high  $F$

# Target assumptions - harvest control rule

For medium-term need to assume some target, e.g.

$$F = F_{0.1}$$

$$F = F_{max}$$

or other harvest control rule