An evaluation of the methodology for prediction of capelin biomass

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Aim of study

- To evaluate one aspect of the methodology used in capelin assessment, viz. the prediction of capelin biomass one year ahead of time

Background

- Since 1972, the capelin stock in the Barents Sea has been surveyed by an annual acoustic survey in autumn

- The assessment of the stock for management purposes is based solely on this survey, since it is difficult to measure the stock size at other times of the year

Backgroud

- The current methodology for assessment of the Barents Sea capelin stock, using a combination of the multispecies model Bifrost and the spreadsheet model CapTool run in the @RISK add-in to MS Excel, has been applied since 1997

Background

- The models have been steadily enhanced, and from 1999 a one-year prediction of biomass of 1+ capelin from the autumn survey to the time of the next autumn survey was included

Background

- Such predictions include many sources of uncertainty, but might be of value for some purposes, e.g. for giving a first prediction of the amount of capelin available as food for cod and other predators during the coming year
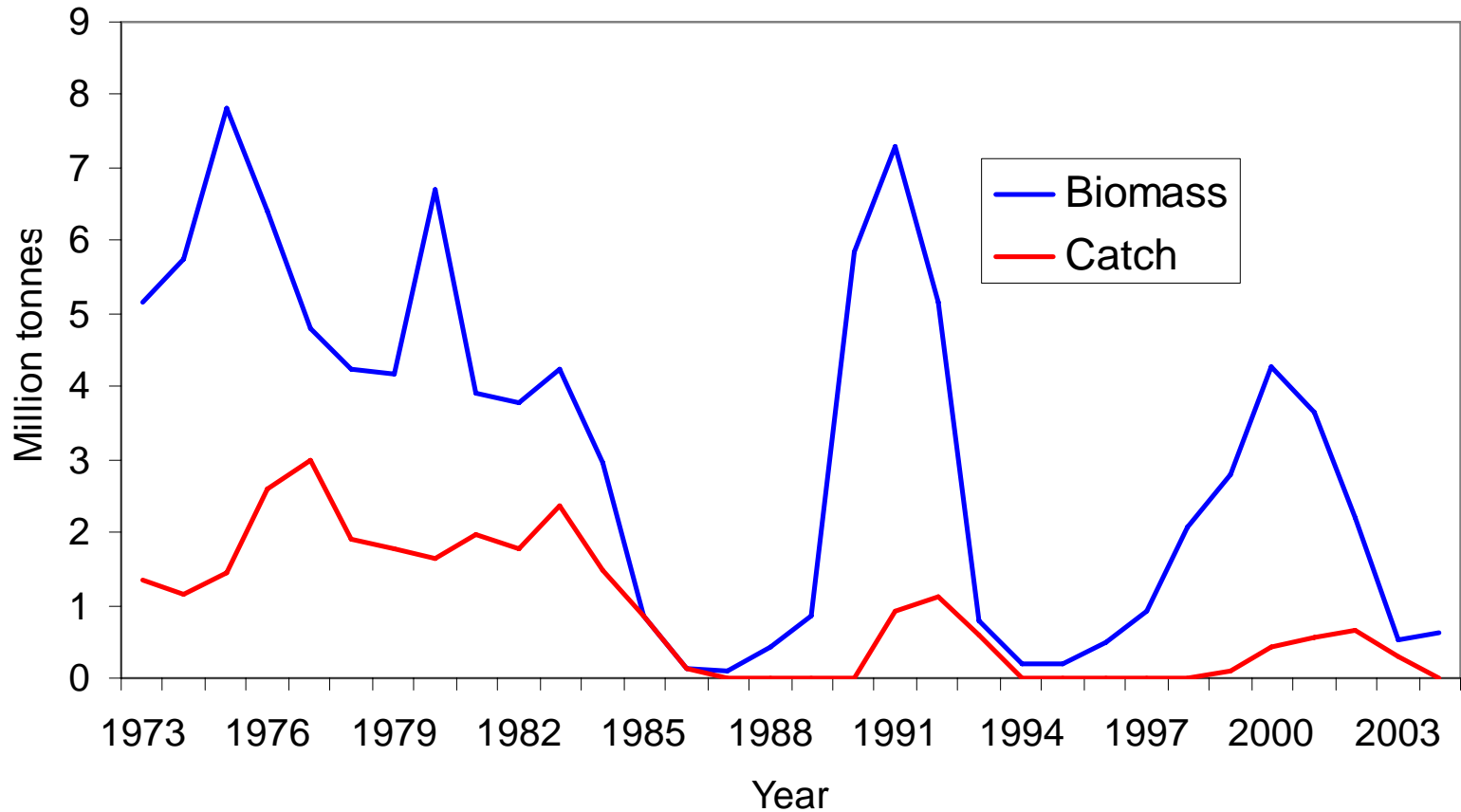
Methods

- The prediction model used in recent years, was rerun on materials back to 1981

- The prediction made in year Y was compared with the measurement made in year Y+1

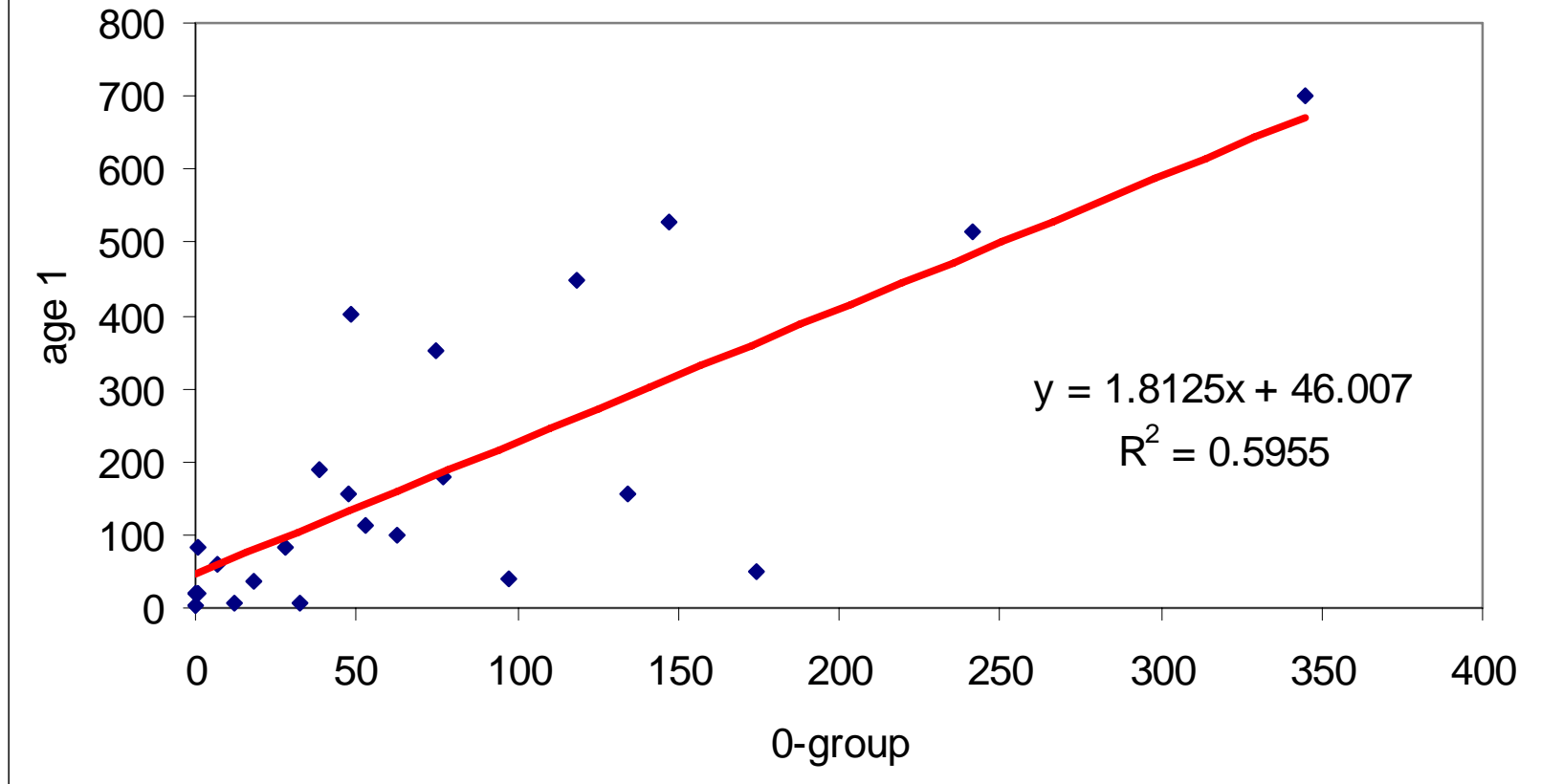- The period prior to 1981 was excluded because the coverage of 1-year-olds was defective

Results – stock history
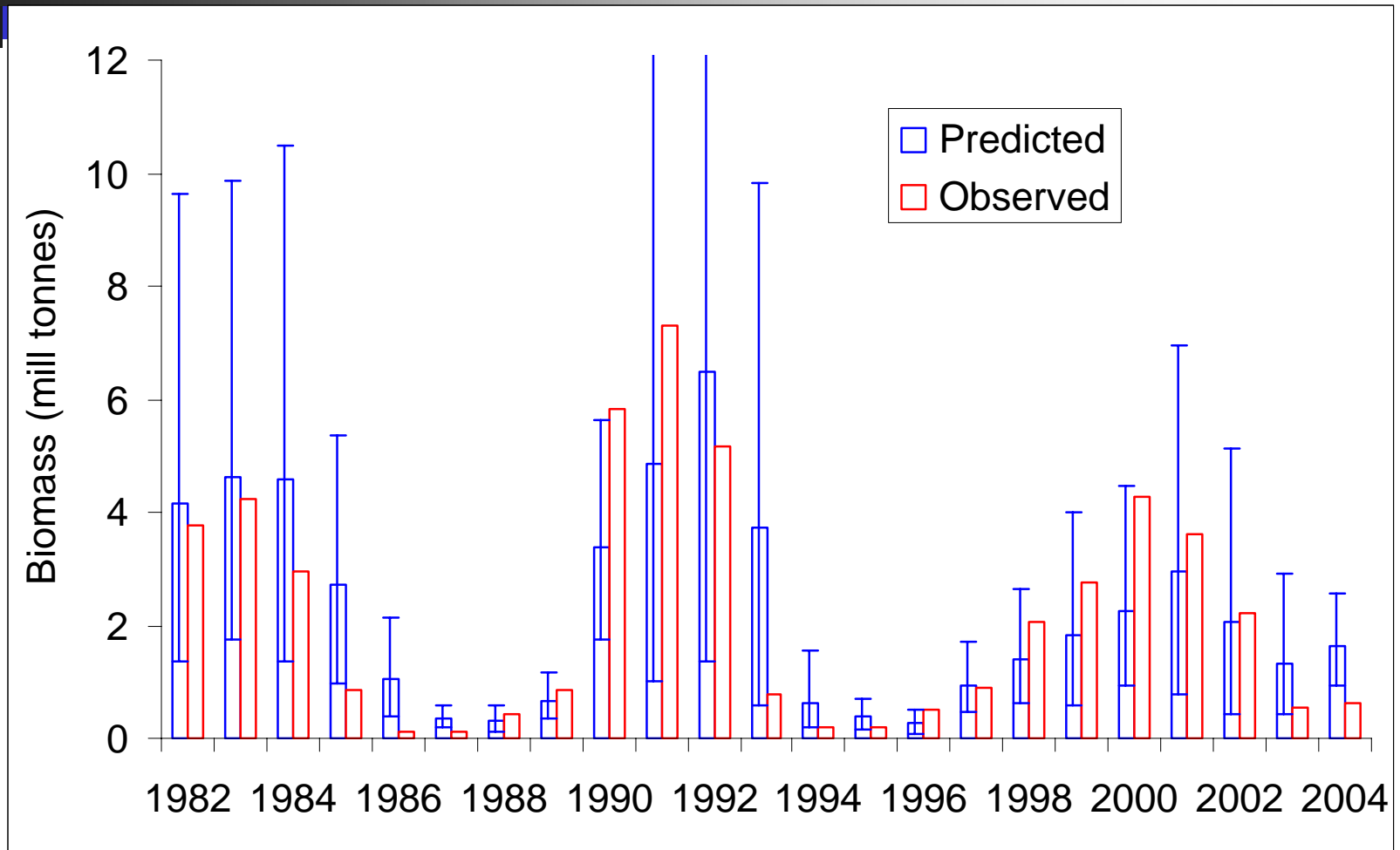

Biomass and Catch of Barents Sea capelin
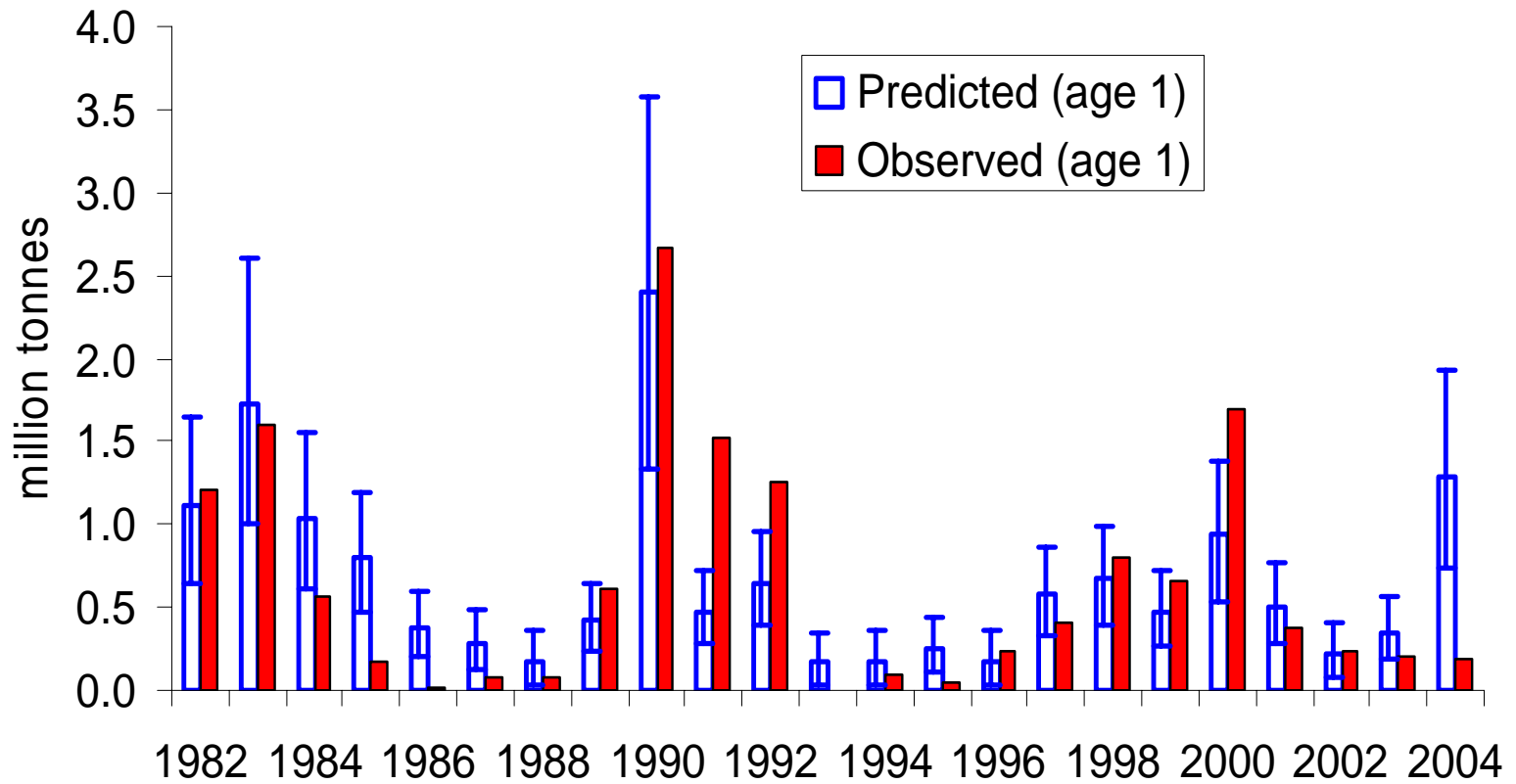
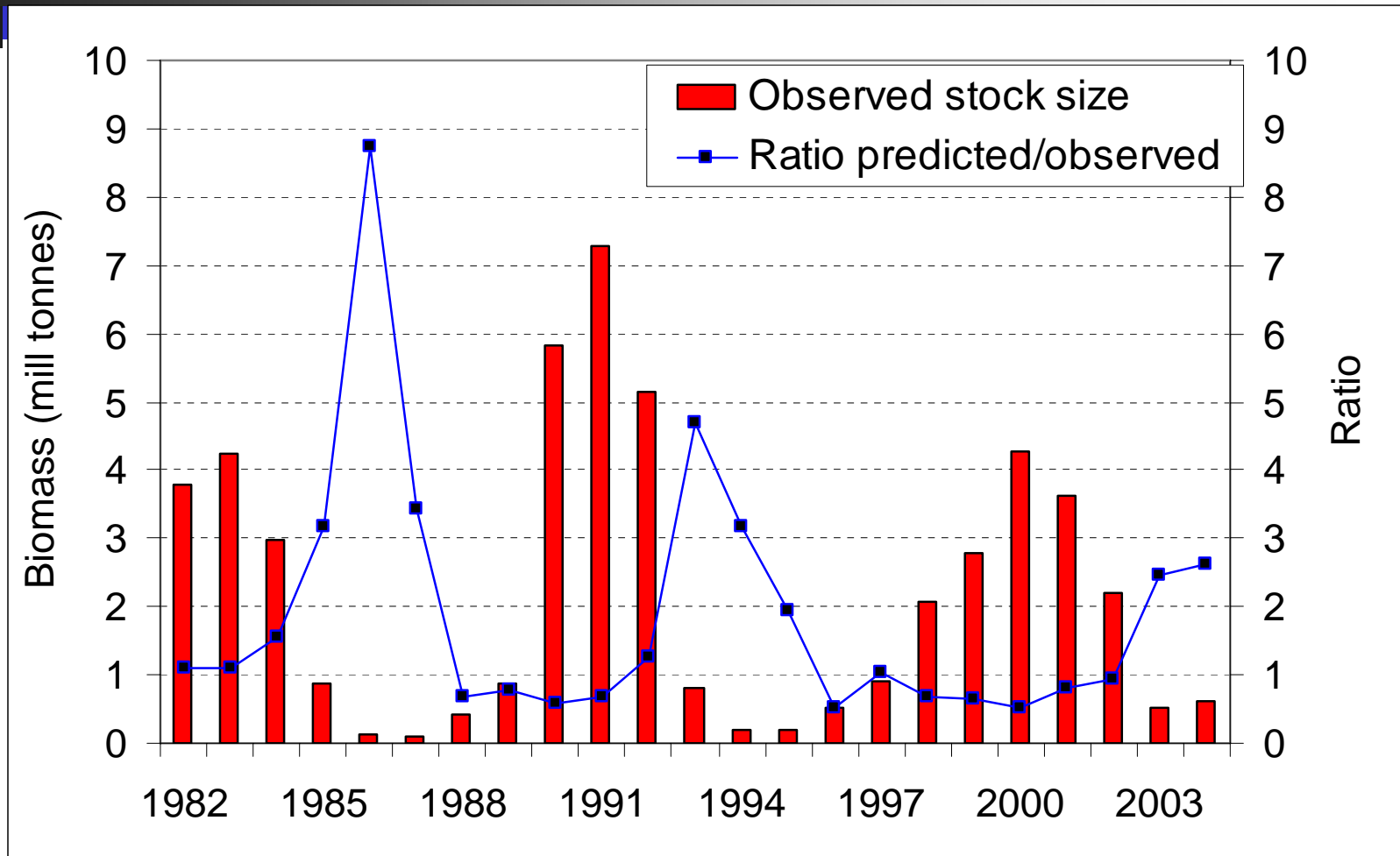# Results – age 0 vs age 1

Capelin age 0 vs age 1 abundance

$y = 1.8125x + 46.007$

$R^2 = 0.5955$

Results – total stock

Results – one-year-olds

Results – ratio time series

Results – ratio vs stock size

Above 1 mill tonnes, no relationship between ratio predicted/observed and stock stize
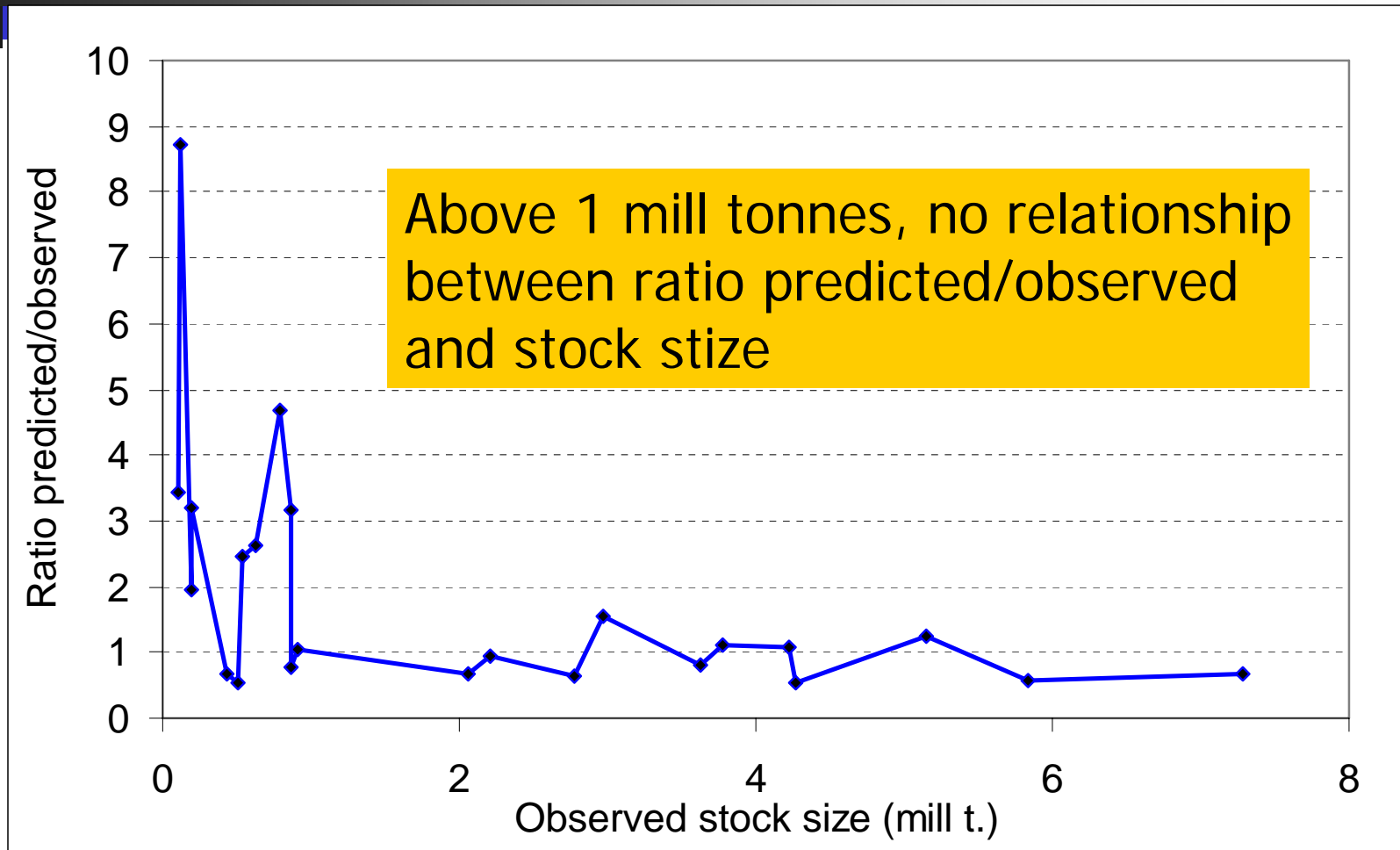
Discussion

- In this evaluation, we have not been able to compensate our predictions for catches of juveniles. This leads to overestimation in such cases. The predictions are in fact better than they seem to be based on this study

Conclusions

- The average residual per year is 96 thousand tonnes, out of which 21 thousand tonnes stem from the prediction of 1-year-olds from 0-group

- The predictions lags behind the development of the stock: We overestimate when stock is declining and vice versa

Future work

- The models will be enhanced as soon as new knowledge is available
  - If, for instance, the mortality can be related to environmental factors predictable one year ahead of time, this could be implemented in the model