Summary chilean Hake model in SS (1992-2020)

group members

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General characteristics

Chilean hake (**Merluccius gayi gayi**) sustains an important fishery composed of two fleets, that is, the bottom-trawl industrial fleet (large vessels) and the artisanal fleet (smaller vessels and boats). The hake presents intermediate growth and mean longevity with a maximum age 17 years in females and 11 years in males.

Information available

There are official catch data and estimates of illegal catches between 1992-2020. Furthermore, abundance and biomass from survey in august (spawning period). Additional input is official landing from 1940-1991 but without CAA and abundance index.

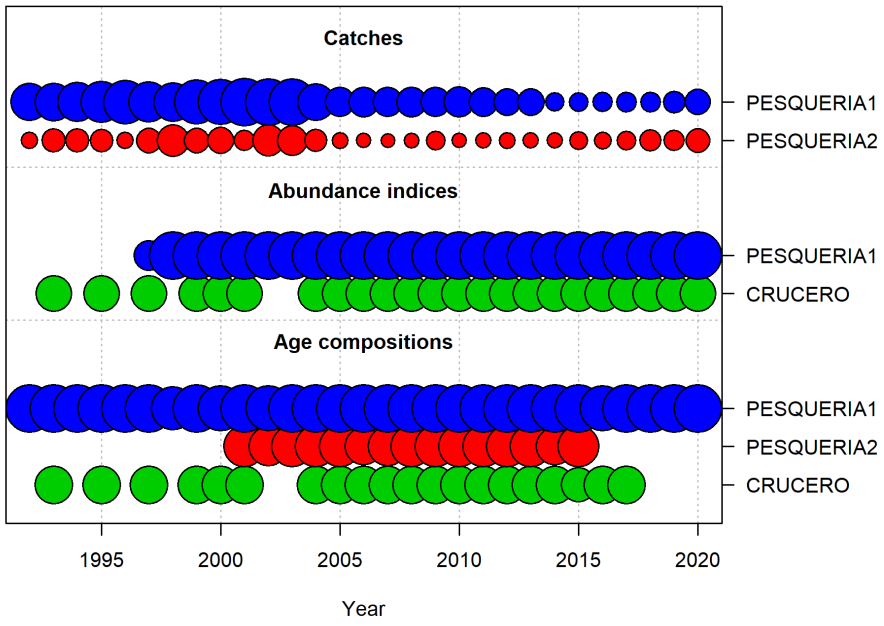


Figure 1: Data chilean hake (1992-2010)

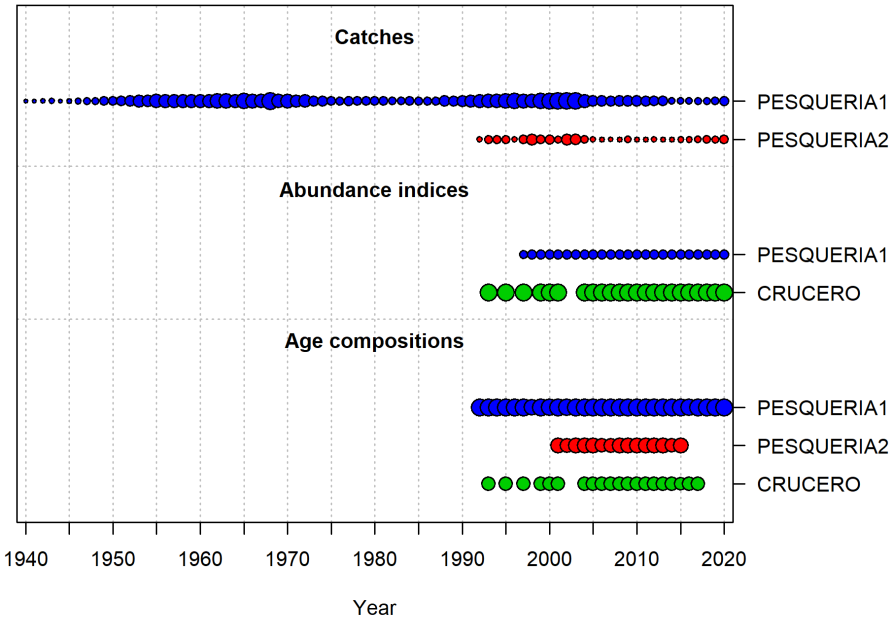


Figure 2: Data chilean hake (1940-2010)

Activities

a. Model construction incorporates two fleets, catches, age-composition (fleets and survey) and biomass acoustic survey.
b. Structure data file to SS.
c. Structure control file.
d. Solve problems following examples, manual_SS, lectures and specially echoinput file.
e. Review different options to recruitment, include blocks to selectivity.
f. Generate output and summary to explore a first base model.
g. Review data weighting options.
h. Include bias correction SR.
i. Explore diagnostic options (i.e. retrospective analysis).

Model and package problem

1. Package 'r4ss' was built under R version 3.6.3
2. SS ADMB safe libraries compiled with Microsoft Visual C++ 2015 14.0(64bit) Copyright (c) 2008-2015 ADMB Foundation and Regents of the University of California Build date: Jun 13 2017.
3. SS ADMB-12.2 safe libraries compiled with GNU C++ 8.3.0 (64bit) Copyright (c) 2008-2020 ADMB Foundation and Regents of the University of California Build date: Jul 31 2020

Interaction problem between r4ss and version SS (jul 2020).

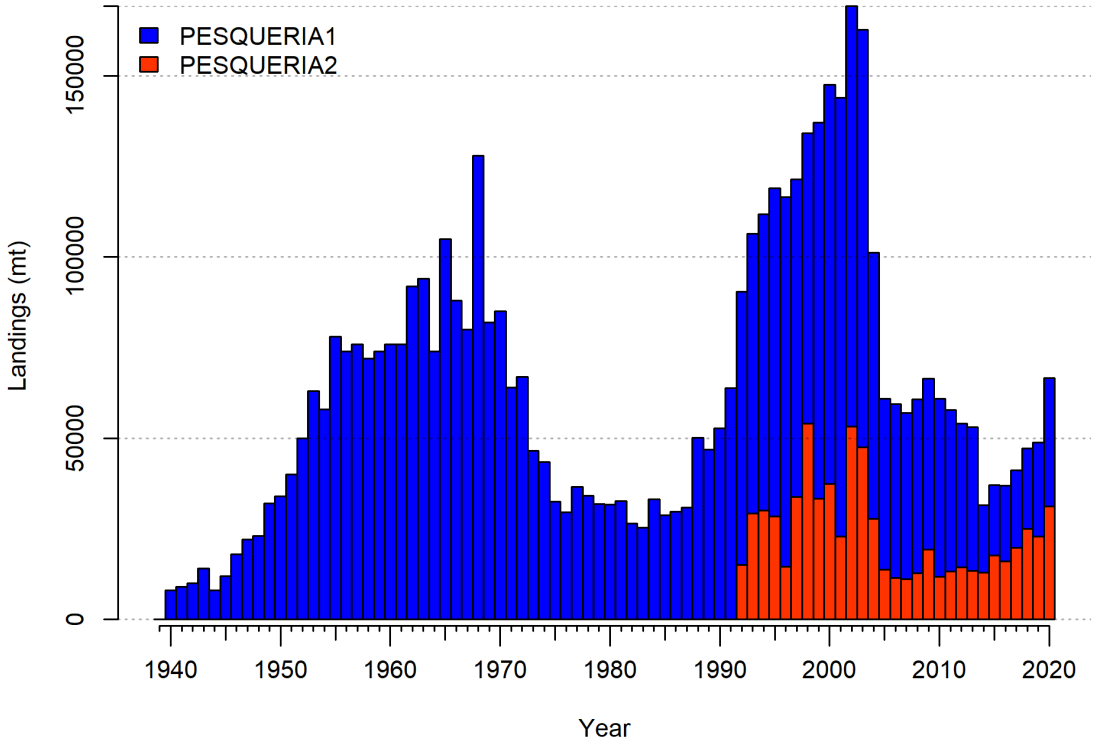
- You are using 3.30.16.0 which SHOULD work with this R code.
- CompReport file separated by this code as follows (rows = Ncomps*Nbins):

Error in 1:ncol(morph_indexing) : argument of length 0 > SS_plots(repfile) Error in SS_plots(repfile) : objeto 'repfile' no encontrado > > SS_tune_comps(repfile, fleets = "all", option = "Francis",+ digits = 6, write = TRUE) Error in SS_tune_comps(repfile, fleets = "all", option = "Francis", digits = 6, : objeto 'repfile' no encontrado

Results

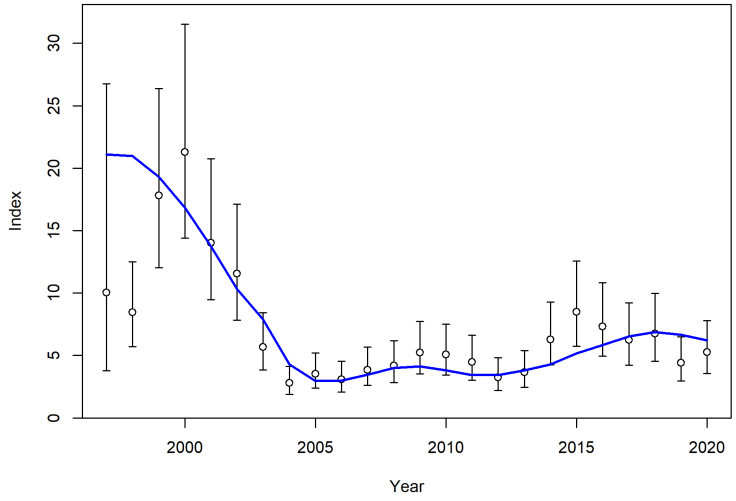
Catches

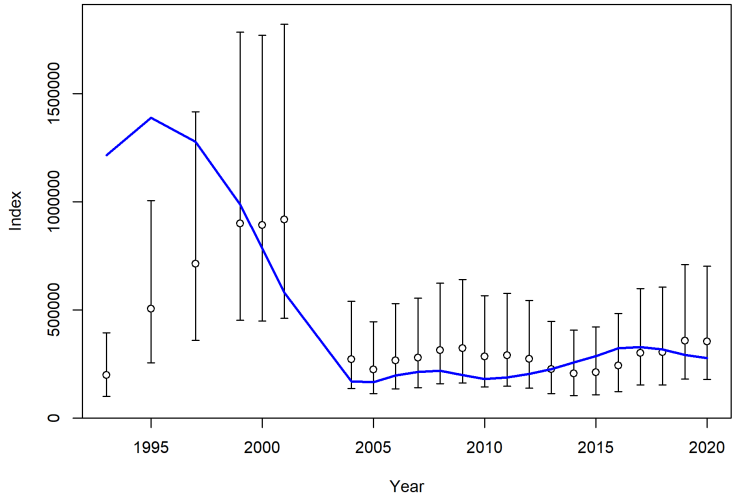
In Chile two Institutes develop assessment regularly in chilean hake. Furthermore, where each one has databases different in some aspect i.e. monitoring program, spacial coverage by fleets, each reading.



Index fit

In the model, we consider the index from the acoustic survey and catch rate index. There is a poor fit at the beginning of the series, this situation is similar to regular stock assessment from the institute. The trend in biomass, abundance and fishing mortality are consistent with the result of assessment developed but with an improvement in the shape to the fit.

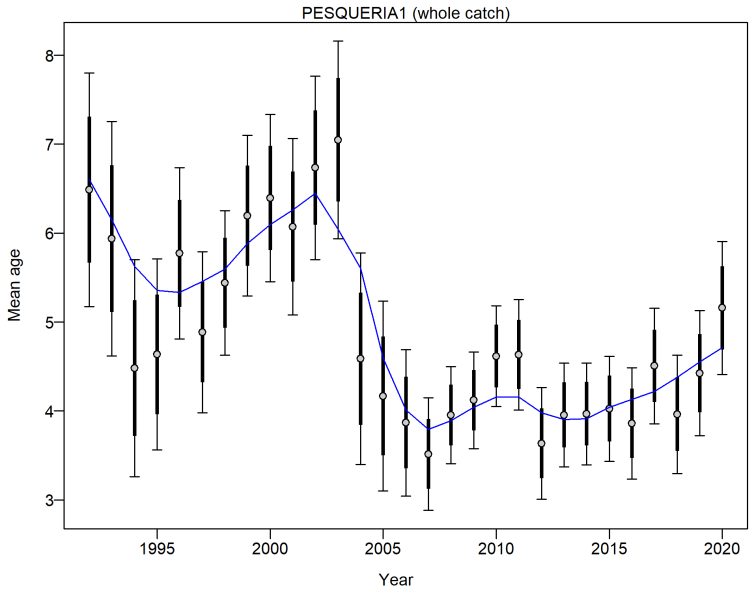




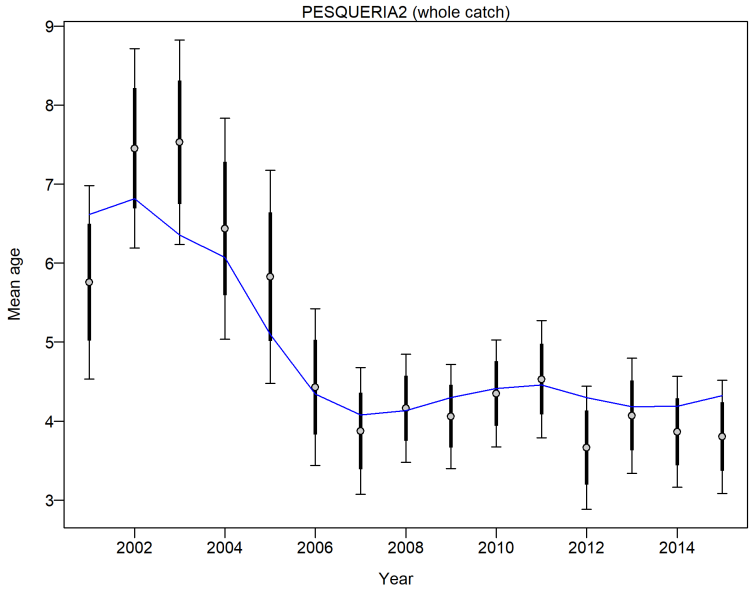
Age composition

The age composition fit to different fleets and survey shows acceptable performance with the exception in period 2002-2004 when the composition of age in the population present changes with low presence of adults.

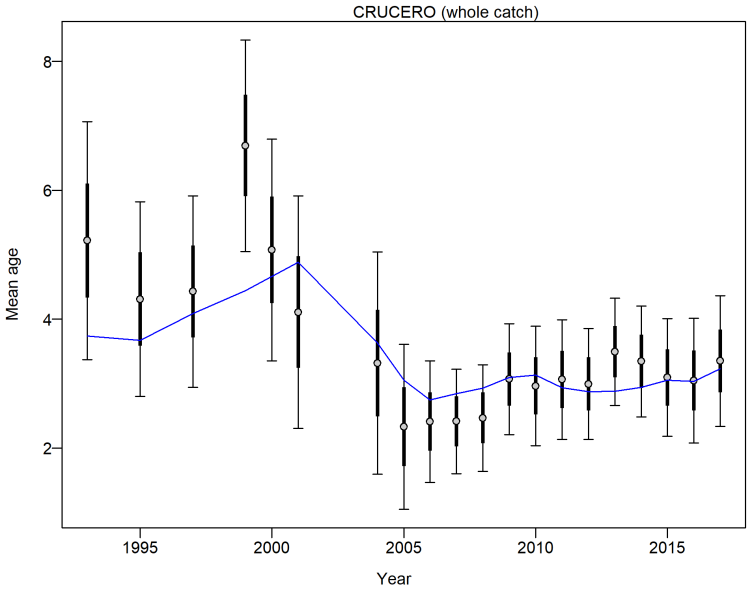
Fleet 1 (official)



Fleet 2 (not reported)

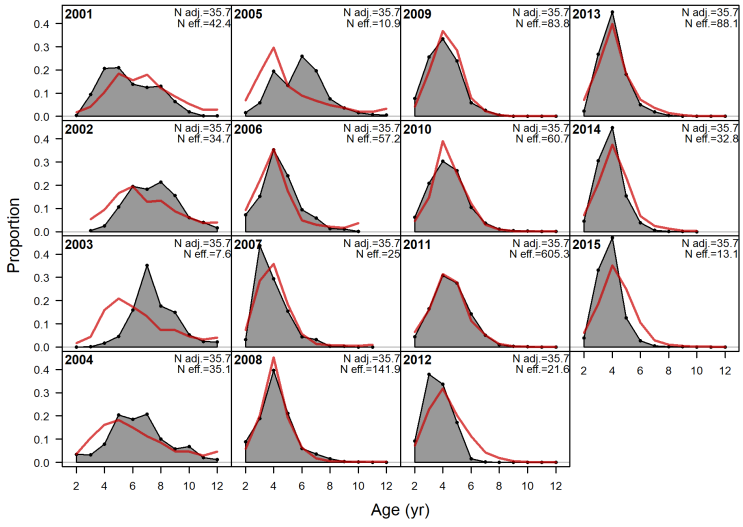


Survey

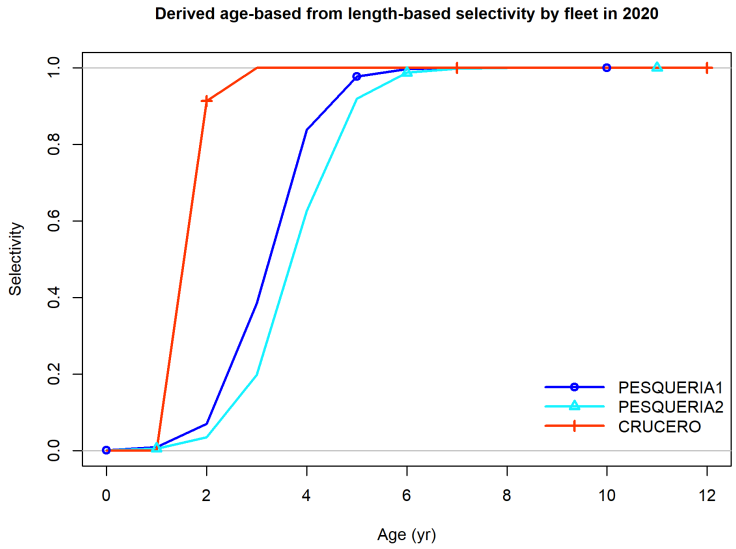


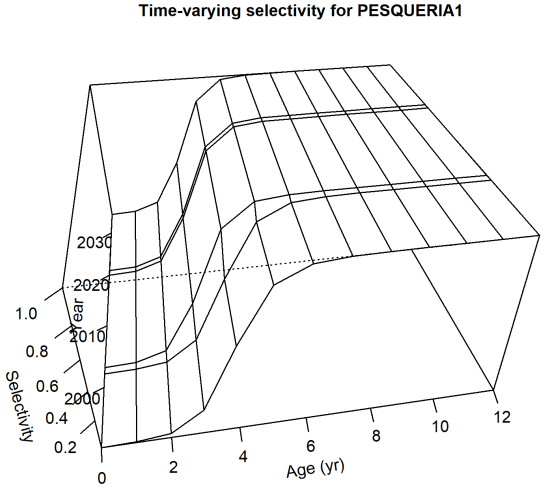
CAA

Fishery 2 fit

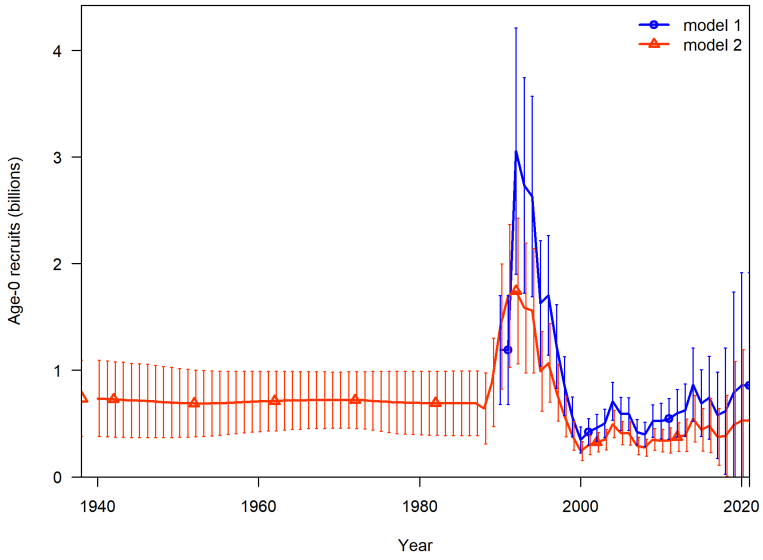


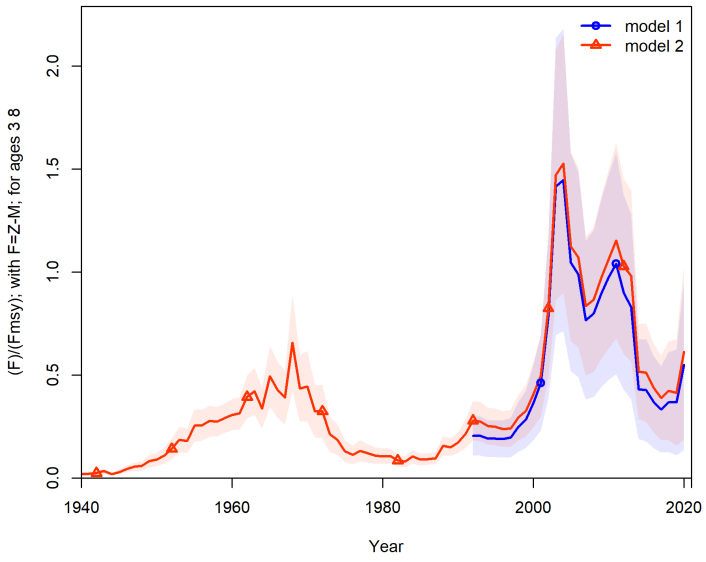
Selectivity by fleets and block



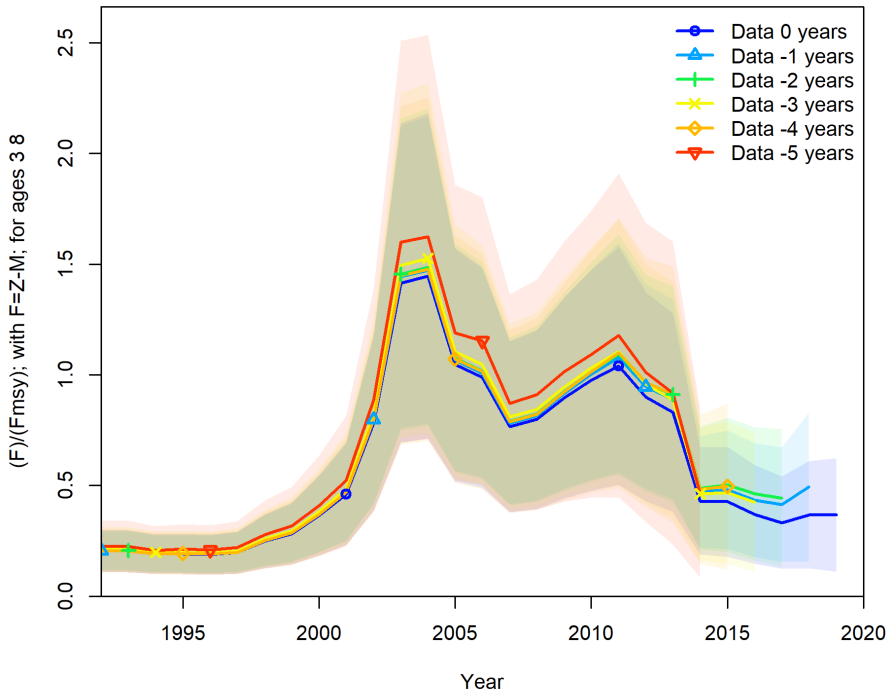


Time series comparisons model 1 and 2





Retrospective analysis



Learned lesson

1. SS presents extensive capabilities to build different stock assessment.
2. Develop much necessary analysis of diagnostic in a friendly environment.i.e. data weighting, retrospective.
3. Excellent tools to review output by plots and tables with the use of r4ss.
4. Is necessary the use of control version program i.e. github.
5. We need to continue learning about SS and methods incorporating. i.e. read Manual, view examples, training.

Tables

	Label	model1	model2
1	TOTAL_like	342.90	301.78
2	Survey_like	53.98	24.86
3	Age_comp_like	273.39	262.42
4	Parm_priors_like	1.42	1.56
5	Recr_Virgin_billions	1.36	0.74
6	SR_LN(R0)	14.13	13.51
7	SR_RkrPower_steep	0.63	0.82
8	NatM_p_1_Fem_GP_1	0.30	0.21
9	L_at_Amax_Fem_GP_1	65.00	65.00
10	VonBert_K_Fem_GP_1	0.15	0.15
11	SSB_Virgin_thousand_mt	1772.99	1793.26
12	Bratio_2017	0.87	0.58
13	SPRratio_2016	0.56	0.90