

AN R PACKAGE IMPLEMENTING KNOWN-BIOMASS PRODUCTION MODELS CONSIDERING ENVIRONMENTAL EFFECTS

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Formulation

Known biomass production models (KBPMs; MacCall, 2002) calculated the annual surplus production (SP) as

$$SP_t = B_{t+1} - B_t + C_t$$

being C_t the catch during year t and B_t the biomass at the beginning of year. Then, the SP biomass relationship is fitted as

$$SP_t = \frac{r}{p} \bar{B}_t \left(1 - \left(\frac{\bar{B}_t}{K} \right)^p \right) + \epsilon_t,$$

where r , K and p are model parameters, ϵ_t are model residuals and $\bar{B}_t = (B_{t+1} + B_t)/2$.

Usefulness

KBPMs requires a prior model adjustment that provides **historical biomass series**. Then, if we already have a model that defines the stock status, **what does this alternative provide?**

- ★ Exploration of **SP evolution** and factors affecting it.
- ★ Diagnostic tool for **identifying stock collapse reasons**.
- ★ Simple data-limited **ecosystem** model.
- ★ Analysis of **environmental** factors over the SP.
- ★ MSY (Maximum Sustainable Yield) reference points **without** a stock-recruitment relationship.



knobi package

Go to knobi!



knobi package implements in R the KBPMs. The package is an **open project check next updates!**

knobi fits KBPMs, computes RPs, provides retrospective analysis and analyze the effects of **environmental variability over SP**.

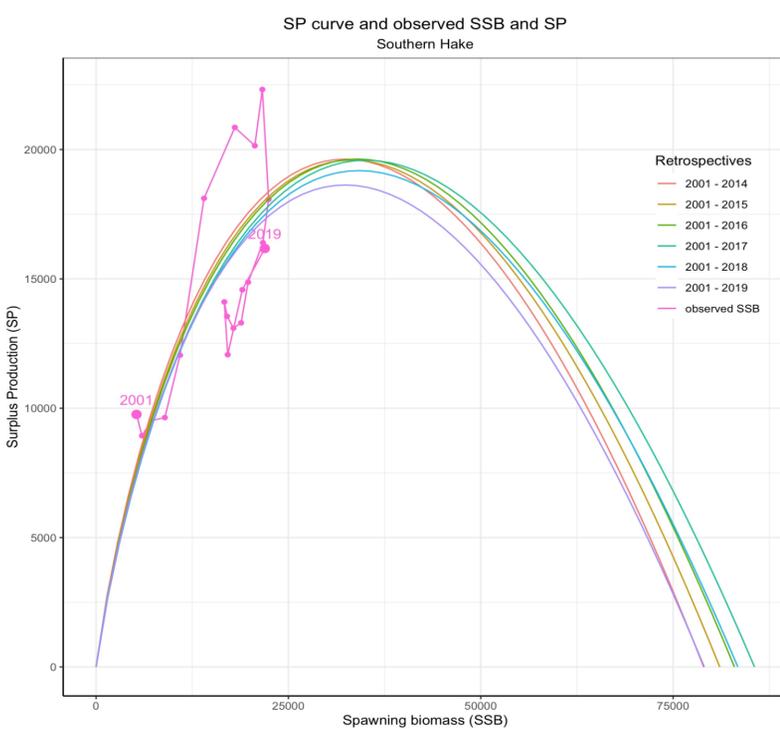


Fig 1: KBPM fit and retrospective analysis for southern hake stock (*Merluccius merluccius* stock in the International Council for the Exploration of the Sea; divisions 27.8.c and 27.9.a).

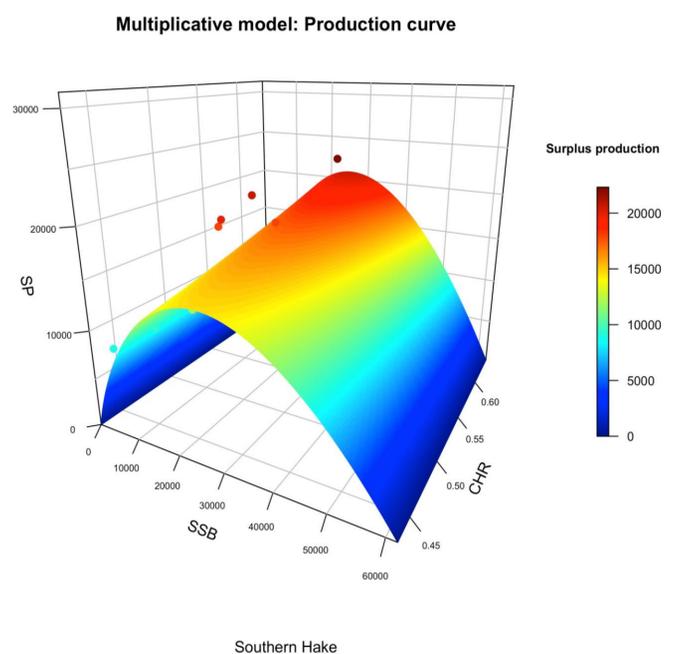


Fig 2: Surplus production curve for southern hake stock depending on the values of the chlorophyll covariable.

Conclusions

knobi package is **user-friendly**, and it is hoped that it will serve the scientific community by providing a **simple and powerful tool for exploring KBPMs** applications.

Clear advices for a correct use of the package and full illustrative examples are given in the **help pages and vignettes**.

References

MacCall, A. 2002. Use of Known-Biomass Production Models to Determine Productivity of West Coast Groundfish Stocks. North American Journal of Fisheries Management, 22, 272–279.