

# A Simple User's Guide for "Hockey Stick Analysis" with R

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This is an accompanying document for Froese, R., Coro, G., Kleisner, K., Demirel, N. (2014) Revisiting safe biological limits in fisheries. Fish and Fisheries, DOI: [xxxx](#)

This document provides a simple step-by-step guide for researchers who would like to repeat the analyses done in above paper or who want to apply the three hockey stick methods to their own data. The required R-code and the S-R data used in the publication can be downloaded from

<http://oceanrep.geomar.de/xxxxx/>

Steps for implementation:

1) Please make a recent version of R is installed in your computer. As of October 2014, the latest R version is 3.1.1 (2014-07-10), available from

<http://www.r-project.org/>

2) We also suggest using RStudio as development environment for R. RStudio is a free software that is available for several Operating Systems (Windows, OS, Linux, ..) and can be downloaded from:

<http://www.rstudio.com/products/rstudio/download/>

3) In order to run the hockey stick code, a few R-packages are required. In the R Console execute the following commands (e.g. cut & paste into the Console window, then hit Enter and wait):

```
install.packages("R2jags")
require(R2jags)
install.packages("devtools")
install.packages("base64")
require("devtools")
install_github("FLCore", "flr")
```

```
require("base")  
require("FLCore")
```

- 4) In your own data file, the following columns must be present: FishStock (containing the unique stock name or identifier), Year (is what you think it is), SSB (spawning stock biomass e.g. in tonnes), Recruitment (in number of individuals) and RecruitmentAge (in integer years, such as 0, 1, 2, etc). The source file must be saved in "csv" (comma delimited) format. Double-check that indeed a comma (and not a semi-colon) is used as delimiter.
- 5) Make sure that the source file and the downloaded R-code are in the same directory.
- 6) Open the downloaded "S-R\_HS\_13" R file. In RStudio, use the tab "Session" and select "Set working directory" "To source file location", so that the code finds the data.
- 7) If you want to use your own data, go to Line 18 in the code where the default data file name is "S-R\_AllStocks.csv". Change this with the name of your source file.
- 8) The R-code analyzes all stocks from the source file in alphabetic order. If only one stock is to be analyzed, then go to the Line 33, where the current stock name is "cod-iceg", change the name to that of the desired stock and uncomment the line (remove "#"). In RStudio, click on "Source" to execute the code.
- 9) When the analysis is complete, results can be found in the Console window and the S-R graph is shown in the lower-right panel of RStudio.
- 10) An output file in excel format containing the results is also created in the same directory once the analysis is complete. The titles of the columns are in the same order as the results in console.
- 11) The name of output file can be changed in Line 24.