Log-likelihood profiling for R0

Originally from Cookbook/Likelihood\_profile\_R0\_example.R

## Example original application:

* 2017 ICCAT North Atlantic shortfin mako (SMA) Stock Synthesis model run 3
* Stock Synthesis (version 3\_30\_08 Windows)
* r4ss (version 1.35.1)
* R (version 3.3.2 64 bit)

## ImportFrom

* doParallel: registerDoParallel
* r4ss: SS\_output, SSsummarize, SSplotProfile, SSplotComparisons, PinerPlot, SS\_readStarter, SS\_writeStarter
* graphics: par, abline
* grDevices: png

## Procedure

1. Define the base case profile likelihood model directory
2. Define the completed base model run is located. Typically, it is located under the base case subdirectory “Reference\_Run”
3. Create a base case subdirectory called “R0\_Profile”
4. Create a R0\_Profile subdirectory for “Figures & Tables”
5. ~~x~~
6. Copy the following completed base case (“Reference\_Run”) SS profile likelihood files to “R0\_Profile”:
   1. control.ss\_new
   2. data.ss
   3. forecast.ss
   4. ss.exe
   5. starter.ss
7. Edit the R0 Profile control file to estimate at least one parameter in each phase. In this cookbook example, change recdev (recruitment deviation) phase to 1.
   1. Save changes to the control file as “control.ss”
   2. See the Control File section of the SS User Guide.
8. Edit the Initial Parameter Value of the R0 Profile starter file to 1 to read from init values from R0 Profile’s control file
   1. See Starter File Options in the SS User Manual for details
9. Initiate the R0 likelihood profile. See the section *Initiate R0 or any other parameter likelihood profile* for details.
10. Summarize output

## Initiate R0 or any other parameter likelihood profile

* Use SS\_output() to read in the Stock Synthesis output files from the completed base case model run (“Reference\_Run”). Include the option to read in covar.sso (covar=T).
* Create a vector of R0 values to profile over.
* Create a value that holds the R0 value vector length
* Read in the R0 starter file
  + Change control file name in the starter file: “control\_modfied.ss”
  + Set “Full priors” to 1 to make sure the prior likelihood is calculated for non-estimated quantities.
  + Save Changes
* Run SS\_profile(). Target output to the “R0\_Profile” directory
* Use SSgetoutput() to create a list based on SS output files from the “R0\_Profile'' Directory, Do not retrieve the covariance files.

## Summarize R0 likelihood parameter Outputs

sBegin Likelihood profile\_R0\_example.R

* SSummarize the list of R0 SS output files
* Setup likelihood components

| mainlike\_components | mainlike\_components\_labels |
| --- | --- |
| TOTAL | Total Likelihood |
| Survey | Survey Likelihood |
| Discard | Discard |
| Length\_comp | Length Likelihood |
| Age\_Comp | Age Likelihood |
| Recruitment | Recruitment Likelihood |

* Plot R0 Profile (SSPlotprofile) to the plots directory
  + Profile Plot Comparisons
  + timeseries
  + piner plots