Package ‘r4ss’

May 26, 2022

Type Package
Title R Code for Stock Synthesis
Version 1.44.0
Depends R (>= 3.5.0)
Imports coda, corpcor, dplyr, forcats, ggplot2, lifecycle, stringr, kableExtra
Suggests gtools, gplots, knitr, maps, pso, testthat, truncnorm, markdown, shiny, flextable, reshape2, ggpubr
Description A collection of R functions for use with Stock Synthesis, a fisheries stock assessment modeling platform written in ADMB by Dr. Richard D. Methot at the NOAA Northwest Fisheries Science Center. The functions include tools for summarizing and plotting results, manipulating files, visualizing model parameterizations, and various other common stock assessment tasks.
This version of ‘r4ss’ is compatible with Stock Synthesis versions 3.24 through 3.30 (specifically version 3.30.19.01, from April 2022).
License GPL-3
Encoding UTF-8
LazyLoad yes
URL https://github.com/r4ss/r4ss
BugReports https://github.com/r4ss/r4ss/issues
RoxygenNote 7.1.2
NeedsCompilation no
Author Ian G. Taylor [aut, cre],
    Ian J. Stewart [aut],
    Allan C. Hicks [aut],
    Tommy M. Garrison [aut],
    Andre E. Punt [aut],
    John R. Wallace [aut],
    Chantel R. Wetzel [aut],
James T. Thorson [aut],
Yukio Takeuchi [aut],
Kotaro Ono [aut],
Cole C. Monnahan [aut],
Christine C. Stawitz [aut],
Z. Teresa A’mar [aut],
Athol R. Whitten [aut],
Kelli F. Johnson [aut],
Robbie L. Emmet [aut],
Sean C. Anderson [aut],
Gwladys I. Lambert [aut],
Megan M. Stachura [aut],
Andrew B. Cooper [aut],
Andi Stephens [aut],
Neil L. Klaer [aut],
Carey R. McGilliard [aut],
Iago Mosqueira [aut],
Watal M. Iwasaki [aut],
Kathryn L. Doering [aut],
Andrea M. Havron [aut],
Nathan Vaughan [aut],
LaTreese S. Denson [aut],
Ashleigh J. Novak [aut],
Henning Winker [aut],
Lee Qi [aut],
Megumi Oshima [aut],
Eric Fletcher [aut]

Maintainer  Ian G. Taylor <Ian.Taylor@noaa.gov>
Repository  CRAN
Date/Publication  2022-05-26 18:00:02 UTC

R topics documented:

add_legend ................................................................. 5
bubble3 ................................................................. 6
check_inputlist .......................................................... 8
check_model .............................................................. 8
copy_SS_inputs .......................................................... 9
DoProjectPlots .......................................................... 10
file_increment .......................................................... 10
getADMBHessian .......................................................... 13
get_comments ............................................................ 14
get_dat_new_name ........................................................ 14
get_last_phase ........................................................... 15
get_SIS_info ............................................................. 15
get_tuning_table .......................................................... 17
get_tv_parlabs ............................................................ 17
R topics documented:

is.wholenumber .................................................. 18
make_multifig .................................................... 18
make_multifig_sexratio ......................................... 22
mcmc.nuisance .................................................... 25
mcmc.out .......................................................... 26
mountains .......................................................... 29
NegLogInt_Fn ....................................................... 30
PinerPlot .......................................................... 32
plotCI .............................................................. 35
populate_multiple_folders ...................................... 36
r4ss_logo .......................................................... 37
read.admbFit ....................................................... 37
rich.colors.short ................................................. 38
run_SS_models ..................................................... 38
save_png .......................................................... 40
selShapes .......................................................... 41
SSbiologytables ................................................... 42
SStopstrap .......................................................... 43
SSdiagsTime2Year ............................................... 43
SSEXecutivesummary ............................................. 44
SSgetMCMC ........................................................ 45
SSgetoutput ....................................................... 47
SSmakeMmatrix .................................................... 48
SSMethod.Cond.TA1.8 ............................................. 49
SSMethod.TA1.8 ................................................... 51
SSmohnsrho ........................................................ 53
sspar ............................................................... 54
SSplotAgeMatrix .................................................. 55
SSplotBiography .................................................. 56
SSplotCatch ....................................................... 59
SSplotCohortCatch ................................................. 62
SSplotComparisons ............................................... 63
SSplotComps ...................................................... 69
SSplotData ........................................................ 74
SSplotDiscard ..................................................... 76
SSplotDynamicB0 ................................................. 77
SSplotIndices ...................................................... 80
SSplotMCMC_ExtraSelex ......................................... 83
SSplotMnwt ....................................................... 84
SSplotMovementMap ............................................. 85
SSplotMovementRates ........................................... 87
SSplotNumbers .................................................... 88
SSplotPars ........................................................ 90
SSplotProfile ..................................................... 93
SSplotRecdevs ..................................................... 96
SSplotRecdist ..................................................... 98
SSplotRetroRecruits ............................................. 99
SSplotSelex ....................................................... 101
### R topics documented:

<table>
<thead>
<tr>
<th>Function</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSplotSexRatio</td>
<td>104</td>
</tr>
<tr>
<td>SSplotSpawnrecruit</td>
<td>107</td>
</tr>
<tr>
<td>SSplotSPR</td>
<td>109</td>
</tr>
<tr>
<td>SSplotSummaryF</td>
<td>111</td>
</tr>
<tr>
<td>SSplotTags</td>
<td>112</td>
</tr>
<tr>
<td>SSplotTimeseries</td>
<td>114</td>
</tr>
<tr>
<td>SSplotYield</td>
<td>117</td>
</tr>
<tr>
<td>SSsummarize</td>
<td>118</td>
</tr>
<tr>
<td>SSStableComparisons</td>
<td>120</td>
</tr>
<tr>
<td>SSUnavailableSpawningOutput</td>
<td>121</td>
</tr>
<tr>
<td>SS_changepars</td>
<td>122</td>
</tr>
<tr>
<td>SS_decision_table_stuff</td>
<td>124</td>
</tr>
<tr>
<td>SS_doRetro</td>
<td>125</td>
</tr>
<tr>
<td>SS_fitbiasramp</td>
<td>127</td>
</tr>
<tr>
<td>SS_ForeCatch</td>
<td>129</td>
</tr>
<tr>
<td>SS_html</td>
<td>130</td>
</tr>
<tr>
<td>SS_makeHTMLdiagnostictable</td>
<td>132</td>
</tr>
<tr>
<td>SS_output</td>
<td>132</td>
</tr>
<tr>
<td>SS_parlines</td>
<td>135</td>
</tr>
<tr>
<td>SS_plots</td>
<td>136</td>
</tr>
<tr>
<td>SS_profile</td>
<td>143</td>
</tr>
<tr>
<td>SS_read</td>
<td>147</td>
</tr>
<tr>
<td>SS_readctl</td>
<td>148</td>
</tr>
<tr>
<td>SS_readctl_3.24</td>
<td>151</td>
</tr>
<tr>
<td>SS_readctl_3.30</td>
<td>153</td>
</tr>
<tr>
<td>SS_readdat</td>
<td>156</td>
</tr>
<tr>
<td>SS_readdat_2.00</td>
<td>157</td>
</tr>
<tr>
<td>SS_readdat_3.00</td>
<td>157</td>
</tr>
<tr>
<td>SS_readdat_3.24</td>
<td>158</td>
</tr>
<tr>
<td>SS_readdat_3.30</td>
<td>159</td>
</tr>
<tr>
<td>SS_readforecast</td>
<td>160</td>
</tr>
<tr>
<td>SS_readpar_3.24</td>
<td>161</td>
</tr>
<tr>
<td>SS_readpar_3.30</td>
<td>161</td>
</tr>
<tr>
<td>SS_readstarter</td>
<td>162</td>
</tr>
<tr>
<td>SS_readwtatage</td>
<td>163</td>
</tr>
<tr>
<td>SS_read_summary</td>
<td>163</td>
</tr>
<tr>
<td>SS_recdevs</td>
<td>164</td>
</tr>
<tr>
<td>SS_RunJitter</td>
<td>165</td>
</tr>
<tr>
<td>SS_Sensi_plot</td>
<td>167</td>
</tr>
<tr>
<td>SS_splitdat</td>
<td>170</td>
</tr>
<tr>
<td>SS_tune_comps</td>
<td>171</td>
</tr>
<tr>
<td>SS_varadjust</td>
<td>175</td>
</tr>
<tr>
<td>SS_write</td>
<td>177</td>
</tr>
<tr>
<td>SS_writectl</td>
<td>178</td>
</tr>
<tr>
<td>SS_writectl_3.24</td>
<td>179</td>
</tr>
<tr>
<td>SS_writectl_3.30</td>
<td>180</td>
</tr>
<tr>
<td>SS_writedat</td>
<td>180</td>
</tr>
<tr>
<td>SS_writedat_3.24</td>
<td>181</td>
</tr>
</tbody>
</table>
add_legend

SS_writedat_3.30 .................................................. 182
SS_writeforecast .................................................. 183
SS_writepar_3.24 .................................................. 184
SS_writepar_3.30 .................................................. 184
SS_writestarter .................................................. 185
SS_writewtatage .................................................. 186
stackpoly ......................................................... 187
translate_3.30_to_3.24_Q_setup ................................. 188
translate_3.30_to_3.24_var_adjust ............................. 189
TSCplot .......................................................... 189
write_fwf4 ........................................................ 192

Index 194

---

add_legend

Add legend to plots

Description

ss3diags function to add legend to plots

Usage

```r
add_legend(
  legendlabels,
  legendloc = "topleft",
  legendorder = NULL,
  legendncol = 1,
  legendcex = 1,
  legendsp = 0.9,
  col = NULL,
  pch = NULL,
  lty = 1,
  lwd = 2,
  type = "l"
)
```

Arguments

- `legendlabels`: Optional vector of labels to include in legend.
- `legendloc`: Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See `help("legend")` for more info on the string options.
- `legendorder`: Optional vector of model numbers that can be used to have the legend display the model names in an order that is different than that which is represented in the summary input object.
- `legendncol`: Number of columns for the legend.
bubble3

Create a bubble plot.

Description

Bubble plot based on function vaguely based on bubble by Edzer Pebesma in gstat package. By default, positive values have closed bubbles and negative values have open bubbles.

Usage

```r
bubble3(
  x,
  y,
  z,
  col = 1,
  cexZ1 = 5,
  maxsize = NULL,
  do.sqrt = TRUE,
  bg.open = gray(0.95, 0.3),
  legend = TRUE,
  legendloc = "top",
  legend.z = "default",
  legend.yadj = 1.1,
  main = "",
  cex.main = 1,
  xlab = "",
  ylab = "",
  minnbubble = 3,
  xlim = NULL,
  ylim = NULL,
  axis1 = TRUE,
  xlimextra = 1,
  add = FALSE,
  las = 1,
  allopen = TRUE
)
```
Arguments

x Vector of x-values.
y Vector of y-values.
z Vector of bubble sizes, where positive sizes will be plotted as closed bubbles and negative as open unless allopen=TRUE.
col Color for bubbles. Should be either a single value or vector of length equal to x, y, and z vectors.
cexZ1 Character expansion (cex) value for a proportion of 1.0.
maxsize Size of largest bubble. Preferred option is now an expansion factor for a bubble with z=1 (see cexZ1 above).
do.sqrt Should size be based on the area? (Diameter proportional to sqrt(z)). Default=TRUE.
bg.open background color for open bubbles (border will equal 'col')
legend Add a legend to the plot?
legendloc Location for legend (default='top')
legend.z If a legend is added, what z values will be shown. Default is c(-3,-2,-1,.1,1,2,3) for Pearson-like quantities and a smaller range for proportions that are all less than 1.
legend.yadj If a legend is added, how much should the y-axis be expanded to make space for it.
main Title of plot. Default="".
cex.main Character expansion for title. Default=1.
xlab X-axis label.
ylab Y-axis label.
minnbubble Minimum number of unique x values below which extra space is added to horizontal axis (to make plot look better). Default = 8.
xlim Optional limits on x-range.
ylim Optional limits on y-range.
axis1 Show the horizontal axis on plot? Option allows turning off for use in multi-figure plots.
xlimextra Extra space (see minnbubble above). Default = 1.
add Add bubbles to existing plot? Default=FALSE.
las Style of axis labels (see ?par for more info).
allopen Should all bubbles be open (instead of just negative values)?

Author(s)

Ian Stewart and Ian Taylor
check_inputlist  Check input argument inputlist

Description
Check the elements of the inputlist list used as an argument in SS_write() function.

Usage
check_inputlist(inputlist)

Arguments
inputlist List created by the SS_read() function with elements "dat", "ctl", "start", "fore", and (optionally) "wetatage".

Value
Either TRUE if the input list is valid, or FALSE if not, with a warning about which elements are missing.

Author(s)
Kelli F. Johnson, Ian G. Taylor

See Also
SS_write()

check_model  Check input argument model

Description
Check that the executable name provided in model, an input argument to numerous r4ss functions, does not contain the extension and is available.

Usage
check_model(model, mydir = getwd())

Arguments
model Name of the Stock Synthesis model file (which has the .exe for on Windows) in mydir without the extension (if any), e.g., "ss" or "ss_win".
mydir The directory where model is located.
copy_SS_inputs

Value

A cleaned model name based on the input argument.

Author(s)

Kelli F. Johnson

---

**copy_SS_inputs**  
*Copy a the Stock Synthesis input files from one directory to another*

---

**Description**

Reads the starter.ss file to figure out the names of the control and data files, then copies those files along with starter.ss, forecast.ss, and wtatage.ss (if present) to a new directory, as specified.

**Usage**

```r
copy_SS_inputs(
  dir.old = NULL,
  dir.new = NULL,
  create.dir = TRUE,
  overwrite = FALSE,
  recursive = FALSE,
  use_ss_new = FALSE,
  copy_exe = FALSE,
  copy_par = FALSE,
  dir.exe = NULL,
  verbose = TRUE
)
```

**Arguments**

- **dir.old** Location of model files to be copied, either an absolute path or relative to the working directory.
- **dir.new** New location to which the files should be copied, either an absolute path or relative to the working directory.
- **create.dir** Create dir.new directory if it doesn’t exist already?
- **overwrite** Overwrite existing files with matching names?
- **recursive** logical. Should elements of the path other than the last be created?
- **use_ss_new** Use .ss_new files instead of original inputs?
- **copy_exe** Copy any executables found in dir.old to dir.new or dir.exe (if provided)?
- **copy_par** Copy any .par files found in dir.old to dir.new?
- **dir.exe** Path to executable to copy instead of any in dir.old
- **verbose** Return updates of function progress to the R console?
Value

Logical indicating whether all input files were copied successfully.

Author(s)

Ian Taylor

Examples

```r
## Not run:
copy_SS_inputs(
  dir.old = "c:/SS/old_model",
  dir.new = "c:/SS/new_model"
)
## End(Not run)
```

DoProjectPlots  Make plots from Rebuilder program

Description

Make a set of plots based on output from Andre Punt’s Rebuilder program.

Usage

```r
DoProjectPlots(
  dirn = "C:/myfiles/",
  fileN = c("res.csv"),
  Titles = "",
  ncols = 200,
  Plots = list(1:25),
  Options = list(c(1:9)),
  LegLoc = "bottomright",
  yearmax = -1,
  Outlines = c(2, 2),
  OutlineMulti = c(2, 2),
  AllTraj = c(1, 2, 3, 4),
  AllInd = c(1, 2, 3, 4, 5, 6, 7),
  BioType = "Spawning biomass",
  CatchUnit = "(mt)",
  BioUnit = "(mt)",
  BioScalar = 1,
  ColorsUsed = "default",
  Labels = "default",
  pdf = FALSE,
)```
DoProjectPlots

pwidth = 6.5,
pheight = 5,
lwd = 2
)

Arguments

dirn  Directory (or vector of directories) where rebuilder output files are stored.
fileN Vector of filenames containing rebuilder output. Default=c("res.csv").
Titles Titles for plots when using multiple filenames. Default="".
ncols Number of columns to read in output file (fileN). Default=200.
Plots List to get specific plots (currently 1 through 8). Default=list(1:25). If there are
multiple files, supply a list of vectors, e.g. list(c(1,5),c(2:5))
Options List to get specific strategies in the trajectory plots. Default=list(c(1:9)). If there
are multiple files, supply a list of vectors, e.g. list(c(1,5),c(2:5))
LegLoc Location for the legend (for plots with a legend). Default="bottomright".
yearmax Maximum year to show in the plots. Set negative to show all years. Default=-1.
Outlines Number of rows, columns for some of the plots. Default=c(2,2).
OutlineMulti Number of rows, columns for other plots. Default=c(2,2).
AllTraj Vector of trajectories to show. Default=c(1,2,3,4).
AllInd Vector of individual plots to show. Default=c(1,2,3,4,5,6,7).
BioType Label for biomass type. Default="Spawning biomass".
CatchUnit Units of catch. Default="(mt)".
BioUnit Units of biomass. Default="(mt)".
ColorsUsed Optional vector for alternative line colors. Default="default".
Labels Optional vector for alternative legend labels. Default="default".
pdf Option to send figures to pdf file instead of plot window in Rgui. Default=FALSE.
pwidth Width of the plot window or PDF file (in inches). Default=7.
pheight Height of the plot window or PDF file (in inches). Default=7.
lwd Line width for many of the plot elements. Default=2.

Author(s)

Andre Punt, Ian Taylor

Examples

## Not run:
# example with one file
DoProjectPlots(
dirn = "c:/myfiles/", Plots = 1:8,
Options = c(1, 2, 3, 4, 5, 9), LegLoc = "bottomleft"
# example with multiple files
# Plots - set to get specific plots
# Options - set to get specific strategies in the trajectory plots

Titles <- c("Res1", "Res2", "Res3")
Plots <- list(c(1:9), c(6:7))
Options <- list(c(7:9, 3), c(5, 7))
DoProjectPlots(fileN = c("res1.csv", "res2.csv"), Titles = Titles, Plots = Plots, Options = Options, LegLoc = "bottomleft", yearmax = -1, Outlines = c(2, 2), OutlineMulti = c(3, 3), AllTraj = c(1:4), AllInd = c(1:7), BioType = "Spawning numbers", BioUnit = "(lb)", BioScalar = 1000, CatchUnit = "(lb)", ColorsUse = rep(c("red", "blue"), 5), Labels = c("A", "B", "C", "D", "E", "F")

## End(Not run)

---

**file_increment**

*Rename Stock Synthesis files by adding integer value*

**Description**

Rename files found with pattern by adding `i` to their name before the extension.

**Usage**

```r
file_increment(
  i,
  verbose = FALSE,
  pattern = "^[CcPRw][a-zA-Z]+\.sso|summary\.sso|\.par$"
)
```

**Arguments**

- **i**: An integer value to append to the file name before the `.sso` extension.
- **verbose**: A logical value specifying if output should be printed to the screen.
- **pattern**: A character value specifying the file names to search for in `getwd()`.

**Details**

The `.par` file, which is the only file extension searched for with the default entry that does not end in `.sso`, is modified differently. `_i.sso` is added to the file name.
**getADMBHessian**

**Value**

Invisibly returns a vector of logical values specifying whether or not the file was successfully renamed.

**Author(s)**

Kelli F. Johnson

---

**getADMBHessian**

**Read admodel.hes file**

**Description**

This function reads in all of the information contained in the .hes file. Some is needed for relaxing the covariance matrix, while the rest is recorded and rewritten to file as ADMB expects.

**Usage**

```r
getADMBHessian(File = getwd(), FileName = "admodel.hes")
```

**Arguments**

- **File**
  
  Directory in which .hes file is located. Defaults to the working directory.

- **FileName**
  
  Name of .hes file. Defaults to admodel.hes.

**Value**

A list with elements num.pars, hes, hybrid_bounded_flag, and scale.

**Note**


**Author(s)**

Cole Monnahan

**See Also**

`read.admbFit()`, `NegLogInt_Fn()`
get_comments

Collect comments lines starting from "#C" in datfile, ctlfile, starter.ss, forecast.ss etc

Description

This function is used internally by SS_readdat_3.30, SS_readctl_3.30. This will identify 1st numeric data in dat (vector of string). Then this function collects lines starting "#C" from lines above 1st numeric data.

Usage

get_comments(dat, defaultComments = NULL)

Arguments

dat  vector of strings usually outputs of readLines(*). * is filename of datfile, ctlfile etc

defaultComments  vector of strings default : NULL, to read whole comments If this function finds lines containing one of elements of defaultComments, those lines will be ignored e.g. c("^#C file created using the SS_writectl function in the R package r4ss", "^#C file write time:")) is given, comments generated by SS_writectl_3.30 will be ignored.

Author(s)

Yukio Takeuchi

See Also

SS_readdat, SS_readdat_3.30, SS_readctl, SS_readctl_3.30

get_dat_new_name

Get the name of the data .ss_new file in a directory

Description

In previous versions of Stock Synthesis, the file new data file was named data.ss_new. _echo was added to the name when the file was parsed into three separate files.

Usage

get_dat_new_name(dir)
### get_last_phase

**Arguments**

- **dir**
  - Relative or absolute path to a directory

**Value**

A string with the name of the data.ss_new file. If not found, will be NA. Both of strings are searched for using `dir(pattern = )` and if both exist, then `data_echo.ss_new` is returned.

**get_last_phase**

Get the highest phase used in the control file

**Description**

Get the highest phase used in the control file

**Usage**

```r
get_last_phase(ctl)
```

**Arguments**

- **ctl**
  - A control file list read in using `r4ss::SS_readctl`.

**Author(s)**

Kathryn Doering

### get_SIS_info

**Gather information for the NOAA Species Information System (SIS)**

**Description**

Processes model results contained in the list created by `SS_output()` in a format that is more convenient for submission to SIS. Currently the results are returned invisibly as a list of two tables and written to a CSV file from which results could be copied into SIS. In the future some more direct link could be explored to avoid the manual copy step.
get_SIS_info

Usage

get_SIS_info(
  model,
  dir = NULL,
  writecsv = TRUE,
  stock = "StockName",
  final_year = 2019,
  data_year = NULL,
  sciencecenter = "NWFSC",
  Mgt_Council = "NA"
)

Arguments

- **model**: Output from SS_output
- **dir**: Directory where the file will be written
- **writecsv**: Write results to a CSV file (where the name will have the format "[stock]_2019_SIS_info.csv" where stock is an additional input
- **stock**: String to prepend id info to filename for CSV file
- **final_year**: Year of assessment and reference points (typically will be model["endyr"] + 1)
- **data_year**: Last year of timeseries data
- **sciencecenter**: Origin of assessment report
- **Mgt_Council**: Council jurisdiction. Currently the only option outside of the default is Gulf of Mexico ("GM")

Author(s)

Ian G. Taylor, Andi Stephens, LaTreese S. Denson

See Also

SS_output()

Examples

```
## Not run:
# directory with the model output
mydir <- file.path(path.package("r4ss"), "extdata/simple_3.30.13")
# read the model output
model <- SS_output(dir = mydir)
# run get_SIS_info:
info <- get_SIS_info(model, stock = "SimpleExample")

## End(Not run)
```
### get_tuning_table

*Get the tuning table*

**Description**

Get the tuning table

**Usage**

```r
get_tuning_table(
  replist,
  fleets,
  option,
  digits = 6,
  write = TRUE,
  verbose = TRUE
)
```

**Arguments**

- `replist`: A list object created by `SS_output()`.
- `fleets`: A vector of fleet numbers.
- `option`: Which type of tuning: 'none', 'Francis', 'MI', or 'DM'.
- `digits`: Number of digits to round numbers to.
- `write`: Write suggested tunings to a file 'suggested_tunings.ss'.
- `verbose`: A logical value specifying if output should be printed to the screen.

### get_tv_parlabs

*Get time varying parameter labels*

**Description**

Function to add the names of short time varying parameter lines.

**Usage**

```r
get_tv_parlabs(full_parms, block_design)
```

**Arguments**

- `full_parms`: the dataframe with the full parameter lines in the control file as read in by r4ss.
- `block_design`: The block design in the control file as read in by r4ss.
is.wholenumber  
Utility function to test if x is "numerically" integer wrt machine epsilon taken from example section of help of is.integer

Description
Utility function to test if x is "numerically" integer wrt machine epsilon taken from example section of help of is.integer

Usage
is.wholenumber(x, tol = .Machine["double.eps"])^0.5

Arguments
x  value to check if it is "integer"
tol  tolerance

make_multifig  
Create multi-figure plots.

Description
Function created as an alternative to lattice package for multi-figure plots of composition data and fits from Stock Synthesis output.

Usage
make_multifig(
ptsx,
ptsy,
yr,
linesx = 0,
linesy = 0,
ptsSD = 0,
sampsize = 0,
effN = 0,
samplesize = TRUE,
showeffN = TRUE,
sampsize_label = "N=",
effN_label = "effN=",
sampsizeround = 1,
maxrows = 6,
maxcols = 6,
rows = 1,
cols = 1,
fixdims = TRUE,
main = "",
cex.main = 1,
xlab = "",
ylab = "",
size = 1,
cexZ1 = 1.5,
bublegend = TRUE,
maxsize = NULL,
do.sqrt = TRUE,
minnbubble = 8,
allopen = TRUE,
xbuffer = c(0.1, 0.1),
ybuffer = c(0, 0.15),
yupper = NULL,
ymin0 = TRUE,
xlas = 0,
ylas = NULL,
axis1 = NULL,
axis2 = NULL,
axis1labs = NULL,
linepos = 1,
type = "o",
polygons = TRUE,
bars = FALSE,
barwidth = "default",
ptscex = 1,
ptscol = 1,
ptscol2 = 1,
colvec = c(rgb(1, 0, 0, 0.7), rgb(0, 0, 1, 0.7), rgb(0.1, 0.1, 0.1, 0.7)),
linescol = c(rgb(0, 0.8, 0, 0.7), rgb(1, 0, 0, 0.7), rgb(0, 1, 1, 0.7)),
lty = 1,
lwd = 2,
pch = 1,
nlegends = 3,
legtext = list("yr", "sampsiz", "effN"),
legx = "default",
legy = "default",
legadjx = "default",
legadjy = "default",
legsize = c(1.2, 1),
legfont = c(2, 1),
venusmars = TRUE,
sampsizeline = FALSE,
effNline = FALSE,
sampsizemean = NULL,
effNmean = NULL,
Arguments

- **ptsx**: vector of x values for points or bars
- **ptsy**: vector of y values for points or bars of same length as ptsx
- **yr**: vector of category values (years) of same length as ptsx
- **linesx**: optional vector of x values for lines
- **linesy**: optional vector of y values for lines
- **ptsSD**: optional vector of standard deviations used to plot error bars on top of each point
- **sampsize**: optional sample size vector of same length as ptsx
- **effN**: optional effective sample size vector of same length as ptsx
- **showsampsize**: show sample size values on plot?
- **showeffN**: show effective sample size values on plot?
- **sampsize_label**: label on sampsize
- **effN_label**: label on effN
- **sampsizeround**: rounding level for sample size values
- **maxrows**: maximum (or fixed) number or rows of panels in the plot
- **maxcols**: maximum (or fixed) number or columns of panels in the plot
- **rows**: number or rows to return to as default for next plots to come or for single plots
- **cols**: number or cols to return to as default for next plots to come or for single plots
- **fixdims**: fix the dimensions at maxrows by maxcols or resize based on number of elements in yr input.
- **main**: title of plot
- **cex.main**: character expansion for title
- **xlab**: x-axis label
- **ylab**: y-axis label
- **size**: vector of bubbles sizes if making a bubble plot
- **cexZ1**: Character expansion (cex) for point associated with value of 1.
- **bublegend**: Add legend with example bubble sizes to bubble plots.
- **maxsize**: maximum size of bubbles
- **do.sqrt**: scale bubbles based on sqrt of size vector. see ?bubble3 for more info.
- **minnbubble**: number of unique x values before adding buffer. see ?bubble3 for more info.
make_multifig

allopen  should all bubbles be open? see ?bubble3 for more info.
xbuffer  extra space around points on the left and right as fraction of total width of plot
ybuffer  extra space around points on the bottom and top as fraction of total height of plot
yupper  upper limit on ymax (applied before addition of ybuffer)
ymin0  fix minimum y-value at 0?
xlas  label style (las) input for x-axis. Default 0 has horizontal labels, input 2 would provide vertical labels.
ylas  label style (las) input for y-axis. Default NULL has horizontal labels when all labels have fewer than 6 characters and vertical otherwise. Input 0 would force vertical labels, and 1 would force horizontal.
axis1  optional position of bottom axis values
axis2  optional position of left size axis values
axis1labs  optional vector of labels for axis1 (either NULL or needs to match length of axis1)
linepos  should lines be added on top of points (linepos=1) or behind (linepos=2)? A value of linepos = 0 will result in no line.
type  type of line/points used for observed values (see 'type' in ?plot for details) on top of a grey polygon. Default is "o" for overplotting points on lines.
polygons  should polygons be added to the (turning off is required for sex-ratio plot)
bars  should the ptsx/ptsy values be bars instead of points (TRUE/FALSE) NOT CURRENTLY FUNCTIONAL
barwidth  width of bars in barplot, default method chooses based on quick and dirty formula also, current method of plot(...type='h') could be replaced with better approach
ptsces  character expansion factor for points (default=1)
ptscol  color for points/bars
ptscol2  color for negative value points in bubble plots
colvec  Vector of length 3 with colors for females, males, unsexed fish
linescol  color for lines
lty  line type
lwd  line width
pch  point character type
nlegends  number of lines of text to add as legends in each plot
legtext  text in legend, a list of length=nlegends. values may be any of 1. "yr", 2. "samp-size", 3. "effN", or a vector of length = ptsx.
legx  vector of length=nlegends of x-values of legends (default is first one on left, all after on right)
legy  vector of length=nlegends of y-values of legends (default is top for all plots)
legadjx  left/right adjustment of legends around legx
make_multifig_sexratio

Create multi-figure sex ratio plots.

Description

Modified version of make_multifig() for multi-figure plots of sex ratio data with crude confidence intervals (+/- 1 se) and fits from Stock Synthesis output.

legadjy: left/right adjustment of legends around legy
legsize: font size for legends. default=c(1.2,1.0) (larger for year and normal for others)
legfont: font type for legends, same as "font" under ?par
venusmars: Label females and males with venus and mars symbols?
sampsize.line: show line for input sample sizes on top of conditional age-at-length plots (TRUE/FALSE/scalar, still in development)
effNline: show line for effective sample sizes on top of conditional age-at-length plots (TRUE/FALSE/scalar, still in development)
sampsize.mean: mean input sample size value (used when sampsize.line=TRUE)
effN.mean: mean effective sample size value (used when effNline=TRUE)
ipage: which page of plots when covering more than will fit within maxrows by maxcols.
scalebins: Rescale expected and observed proportions by dividing by bin width for models where bins have different widths? Caution!: May not work correctly in all cases.
sexvec: vector of sex codes if more than one present (otherwise NULL)
multifig.colpolygon: vector of polygon fill colors of length 3 (for females, males, and unsexed fish). Can be input to SS_plots and will be passed to this function via the ... argument.
multifig.oma: vector of outer margins. Can be input to SS_plots and will be passed to this function via the ... argument.

Author(s)
Ian Taylor

See Also
SS_plots(), SSplotComps()
Usage

make_multifig_sexratio(
  dbase,
  sexratio.option = 2,
  CI = 0.75,
  maxrows = 6,
  maxcols = 6,
  rows = 1,
  cols = 1,
  fixdims = TRUE,
  main = "",
  cex.main = 1,
  xlab = "",
  ylab = "Fraction female",
  horiz_lab = "default",
  xbuffer = c(0.1, 0.1),
  ybuffer = "default",
  yupper = NULL,
  datonly = FALSE,
  showsampsize = TRUE,
  showeffN = TRUE,
  axis1 = NULL,
  axis2 = NULL,
  ptscex = 1,
  ptscol = gray(0.5),
  linescol = 4,
  lty = 1,
  lwd = 2,
  nlegends = 3,
  legtext = list("yr", "sampsize", "effN"),
  legx = "default",
  legy = "default",
  legadjx = "default",
  legadjy = "default",
  legsize = c(1.2, 1),
  legfont = c(2, 1),
  ipage = 0,
  multifig_oma = c(5, 5, 5, 2) + 0.1,
  ...
)

Arguments

dbase element of list created by \texttt{SS\_output()} passed from \texttt{SSplotSexRatio()}

sexratio.option code to choose among (1) female: male ratio or (2) fraction females out of the total (the default)
CI  confidence interval for uncertainty
sampsizeround  rounding level for sample size values
maxrows  maximum (or fixed) number or rows of panels in the plot
maxcols  maximum (or fixed) number or columns of panels in the plot
rows  number or rows to return to as default for next plots to come or for single plots
cols  number or cols to return to as default for next plots to come or for single plots
fixdims  fix the dimensions at maxrows by maxcols or resize based on number of elements in yr input.
main  title of plot
cex.main  character expansion for title
xlab  x-axis label
ylab  y-axis label
horiz_lab  axis labels set horizontal all the time (TRUE), never (FALSE) or only when relatively short ("default")
xbuffer  extra space around points on the left and right as fraction of total width of plot
ybuffer  extra space around points on the bottom and top as fraction of total height of plot. "default" will cause c(0,.15) for sexratio.option=1 and c(.15, .3) for sexratio.option=2.
yupper  upper limit on ymax (applied before addition of ybuffer)
datonly  make plots of data without fits?
showsampsize  add sample sizes to plot
showeffN  add effective sample sizes to plot
axis1  position of bottom axis values
axis2  position of left size axis values
ptscex  character expansion factor for points (default=1)
ptscol  color for points/bars
linescol  color for fitted model
lty  line type
lwd  line width
nlegends  number of lines of text to add as legends in each plot
legtext  text in legend, a list of length=nlegends. values may be any of 1. "yr", 2. "sampsiz", 3. "effN", or a vector of length = ptsx.
legx  vector of length=nlegends of x-values of legends (default is first one on left, all after on right)
legy  vector of length=nlegends of y-values of legends (default is top for all plots)
legadjx  left/right adjustment of legends around legx
legadjy  left/right adjustment of legends around legy
legsize  font size for legends. default=c(1.2,1.0) (larger for year and normal for others)
legfont  font type for legends, same as "font" under ?par
mcmc.nuisance

ipage which page of plots when covering more than will fit within maxrows by maxcols.
multifig oma vector of outer margins. Can be input to SS_plots and will be passed to this function via the ... argument.
...
additional arguments (NOT YET IMPLEMENTED).

Details
The SE of the sex ratio is crude and calculated as follows. First, assume a multinomial which as MLEs of proportions. Then use the delta method of the ratio F/M, using the MLE as the expected values and analytical variances and covariance between F and M. After some algebra this calculation reduces to: \( SE(F/M) = \sqrt{((f/m)^2 \times (1-f)/(f*N) + (1-m)/(m*N) + 2/N)} \). Confidence intervals created from these should be considered very crude and would not necessarily be appropriate for future alternative compositional likelihoods.
This function was derived from make_multifig and hence has a lot of overlap in functionality and arguments.

Author(s)
Cole Monnahan. Adapted from make_multifig().

See Also
SS_plots(), SSplotSexRatio()

mcmc.nuisance Summarize nuisance MCMC output

Description
Summarize nuisance MCMC output (used in combination with mcmc.out() for key parameters).

Usage
mcmc.nuisance(
directory = "c:/mydirectory/",
run = "mymodel/",
file = "posteriors.sso",
file2 = "derived_posteriors.sso",
bothfiles = FALSE,
printstats = FALSE,
burn = 0,
header = TRUE,
thin = 1,
trace = 0,
labelstrings = "all",
columnnumbers = "all",
)
sep = ""
)

Arguments

directory Directory where all results are located, one level above directory for particular run.
run Directory with files from a particular run.
file Filename either with full path or relative to working directory.
Contents of the file that is referenced here should contain posterior samples for nuisance parameters, e.g., posteriors.sso or something written by SSgetMCMC.
file2 Optional second file containing posterior samples for nuisance parameters. This could be derived_posteriors.sso.
bothfiles TRUE/FALSE indicator on whether to read file2 in addition to file1.
printstats Return all the statistics for a closer look.
burn Optional burn-in value to apply on top of the option in the starter file and SSgetMCMC().
header Data file with header?
thin Optional thinning value to apply on top of the option in the starter file, in the mcsave runtime command, and in SSgetMCMC().
trace Plot trace for param # (to help sort out problem parameters).
labelstrings Vector of strings that partially match the labels of the parameters you want to consider.
columnnumbers Vector of column numbers indicating the columns you want to consider.
sep Separator for data file passed to the read.table function.

Author(s)
Ian Stewart

See Also

mcmc.out(), SSgetMCMC()

---

mcmc.out

*Summarize, analyze and plot key MCMC output.*

Description

Makes four panel plot showing trace plots, moving average, autocorrelations, and densities for chosen parameters from MCMC output.
Usage

mcmc.out(
    directory = "c:/mydirectory/",
    run = "mymodel/",
    file = "keyposteriors.csv",
    namefile = "postplotnames.sso",
    names = FALSE,
    headernames = TRUE,
    numparams = 1,
    closeall = TRUE,
    burn = 0,
    thin = 1,
    scatter = FALSE,
    surface = FALSE,
    surf1 = 1,
    surf2 = 2,
    stats = FALSE,
    plots = TRUE,
    header = TRUE,
    sep = ",",
    print = FALSE,
    new = T,
    colNames = NULL
)

Arguments

directory  Directory where all results are located, one level above directory for particular run.
run         Directory with files from a particular run.
file        Filename either with full path or relative to working directory.
            Contents of the file that is referenced here should contain posterior samples for nuisance parameters, e.g., posteriors.sso or something written by SSgetMCMC.
namefile    The (optional) file name of the dimension and names of posteriors.
names       Read in names file (T) or use generic naming (F).
headernames Use the names in the header of file?
umparams    The number of parameters to analyze.
closeall    By default close all open devices.
burn        Optional burn-in value to apply on top of the option in the starter file and SSgetMCMC().
thin        Optional thinning value to apply on top of the option in the starter file, in the ~mcsave runtime command, and in SSgetMCMC().
scatter     Can add a scatter-plot of all params at end, default is none.
surface     Add a surface plot of 2-way correlations.
surf1  The first parameter for the surface plot.
surf2  The second parameter for the surface plot.
stats  Print stats if desired.
plots  Show plots or not.
header Data file with header?
sep    Separator for data file passed to the \texttt{read.table} function.
print  Send to screen unless asked to print.
new    Logical whether or not to open a new plot window before plotting
colNames Specific names of the file to extract and work with. NULL keeps all columns

Value

directory, because this function is used for its plotting side effects

Author(s)
Ian Stewart, Allan Hicks (modifications)

See Also
\texttt{mcmc.nuisance()}, \texttt{SSgetMCMC()}

Examples

```r
## Not run:
mcmc.df <- SSgetMCMC(
  dir = "mcmcRun", writecsv = T,
  keystrings = c("NatM", "R0", "steep", "Q_extraSD"),
  nuisancestrings = c("Objective_function", "SSB\_", "InitAge", "RecrDev")
)  
mcmc.out("mcmcRun", run = "", numparams = 4, closeall = F)

# Or for more control
par(mar = c(5, 3.5, 0, 0.5), oma = c(0, 2.5, 0.2, 0))
mcmc.out("mcmcRun",
  run = "",
  numparams = 1,
  closeall = F,
  new = F,
  colNames = c("NatM_p_1_Fem_GP_1")
)
mtext("M (natural mortality)", side = 2, outer = T, line = 1.5, cex = 1.1)

## End(Not run)
```
Description

Designed to replicate like the cool-looking Figure 7 in Butterworth et al. (2003).

Usage

```r
mountains(
  zmat,  # A matrix where the rows represent the heights of each mountain range
  xvec = NULL,  # Optional input for the x variable
  yvec = NULL,  # Optional input for the y variable
  zscale = 3,  # Controls the height of the mountains relative to the y-axis and max(zmat)
  rev = TRUE,  # Reverse the order of the display of yvec values.
  nshades = 100,  # Number of levels of shading
  axes = TRUE,  # Add axes to the plot?
  xaxs = "i",  # X-axis as internal or regular (see ?par for details)
  yaxs = "i",  # Y-axis as internal or regular (see ?par for details)
  xlab = "",  # Optional label for x-axis
  ylab = "",  # Optional label for y-axis
  las = 1,  # Xaxis label style (see ?par for details). Default = 1 = horizontal axis labels.
  addbox = FALSE,  # Puts a box around the whole plot
  ...  # Extra inputs passed to the plot command
)
```

Arguments

- `zmat`: A matrix where the rows represent the heights of each mountain range
- `xvec`: Optional input for the x variable
- `yvec`: Optional input for the y variable
- `zscale`: Controls the height of the mountains relative to the y-axis and max(zmat)
- `rev`: Reverse the order of the display of yvec values.
- `nshades`: Number of levels of shading
- `axes`: Add axes to the plot?
- `xaxs`: X-axis as internal or regular (see ?par for details)
- `yaxs`: Y-axis as internal or regular (see ?par for details)
- `xlab`: Optional label for x-axis
- `ylab`: Optional label for y-axis
- `las`: Xaxis label style (see ?par for details). Default = 1 = horizontal axis labels.
- `addbox`: Puts a box around the whole plot
- `...`: Extra inputs passed to the plot command
Author(s)
Ian Taylor

References

---

**NegLogInt_Fn**

Perform SS implementation of Laplace Approximation

---

Description
(Attempt to) perform the SS implementation of the Laplace Approximation from Thorson, Hicks and Methot (2014) ICES J. Mar. Sci.

Usage
```r
NegLogInt_Fn(
  File = NA,
  Input_SD_Group_Vec,
  CTL_linenum_List,
  ESTPAR_num_List,
  PAR_num_Vec,
  Int_Group_List = list(1),
  StartFromPar = TRUE,
  Intern = TRUE,
  ReDoBiasRamp = FALSE,
  BiasRamp_linenum_Vec = NULL,
  CTL_linenum_Type = NULL,
  systemcmd = FALSE,
  exe = "ss"
)
```

Arguments
- **File**: Directory containing Stock Synthesis files (e.g., "C:/Users/James Thorson/Desktop")
- **Input_SD_Group_Vec**: Vector where each element is the standard deviation for a group of random effects (e.g., a model with a single group of random effects will have Input_SD_Group_Vec be a vector of length one)
- **CTL_linenum_List**: List (same length as Input_SD_Group_Vec), where each element is a vector giving the line number(s) for the random effect standard deviation parameter or penalty in the CTL file (and where each line will correspond to a 7-parameter or 14-parameter line).
ESTPAR_num_List
List (same length as Input_SD_Group_Vec), where each element is a vector giving the parameter number for the random effect coefficients in that group of random effects. These "parameter numbers" correspond to the number of these parameters in the list of parameters in the ".cor" output file.

PAR_num_Vec
Vector giving the number in the ".par" vector for each random effect coefficient.

Int_Group_List
List where each element is a vector, providing a way of grouping different random effect groups into a single category. Although this input is still required, it is no has the former input Version has been hardwired to Version = 1.

StartFromPar
Logical flag (TRUE or FALSE) saying whether to start each round of optimization from a ".par" file (I recommend TRUE)

Intern
Logical flag saying whether to display all ss3 runtime output in the R terminal

ReDoBiasRamp
Logical flag saying whether to re-do the bias ramp (using SS_fitbiasramp()) each time Stock Synthesis is run.

BiasRamp_linenum_Vec
Vector giving the line numbers from the CTL file that contain the information about the bias ramp.

CTL_linenum_Type
Character vector (same length as Input_SD_Group_Vec), where each element is either "Short_Param", "Long_Penalty", "Long_Penalty". Default is NULL, and if not explicitly specified the program will attempt to detect these automatically based on the length of relevant lines from the CTL file.

systemcmd
Should R call SS using "system" function instead of "shell". This may be required when running R in Emacs on Windows. Default = FALSE.

exe
SS executable name (excluding extension), either "ss" or "ss3". This string is used for both calling the executable and also finding the output files like ss.par. For 3.30, it should always be "ss" since the output file names are hardwired in the TPL code.

Author(s)
James Thorson

References

See Also
read.admbFit(), getADMBHessian()

Examples
## Not run:
# need the full path because wd is changed in function
direc <- "C:/Models/LaplaceApprox/base"
if ("Optimization_record.txt" %in% list.files(direc)) {
  file.remove(file.path(direc, "Optimization_record.txt"))
}

Opt <- optimize(
  f = NegLogInt_Fn,
  interval = c(0.001, 0.12),
  maximum = FALSE,
  File = direc,
  Input_SD_Group_Vec = 1,
  CTL_linenum_List = list(127:131),
  ESTPAR_num_LIST = list(86:205),
  Int_Group_LIST = 1,
  PAR_num_Vec = NA,
  Intern = TRUE
)

## End(Not run)

PinerPlot

Make plot of likelihood contributions by fleet

Description

This style of plot was officially named a "Piner Plot" at the CAPAM Selectivity Workshop, La Jolla March 2013. This is in honor of Kevin Piner's contributions to interpreting likelihood profiles. He's surely not the first person to make such a plot but the name seems to have stuck.

Usage

PinerPlot(
  summaryoutput,
  plot = TRUE,
  print = FALSE,
  component = "Length_like",
  main = "Changes in length-composition likelihoods by fleet",
  models = "all",
  fleets = "all",
  fleetnames = "default",
  profile.string = "R0",
  profile.label = expression(log(italic(R)[0])),
  exact = FALSE,
  ylab = "Change in -log-likelihood",
  col = "default",
  pch = "default",
  lty = 1,
  lty.total = 1,
  lwd = 2,
lwd.total = 3,
cex = 1,
cex.total = 1.5,
xlim = "default",
ymax = "default",
xaxs = "r",
yaxs = "r",
type = "o",
legend = TRUE,
legendloc = "topright",
pwidth = 6.5,
pheight = 5,
punits = "in",
res = 300,
ptsize = 10,
cex.main = 1,
plotdir = NULL,
add_cutoff = FALSE,
cutoff_prob = 0.95,
verbose = TRUE,
fleetgroups = NULL,
likelihood_type = "raw_times_lambda",
minfraction = 0.01
)

Arguments

summaryoutput List created by the function SSsummarize().
plot Plot to active plot device?
print Print to PNG files?
component Which likelihood component to plot. Default is "Length_like".
main Title for plot. Should match component.
models Optional subset of the models described in summaryoutput. Either "all" or a vector of numbers indicating columns in summary tables.
fleets Optional vector of fleet numbers to include.
fleetnames Optional character vector of names for each fleet.
profile.string Character string used to find parameter over which the profile was conducted. If exact=FALSE, this can be a substring of one of the SS parameter labels found in the Report.sso file. For instance, the default input 'R0' matches the parameter 'SR_LN(R0)'. If exact=TRUE, then profile.string needs to be an exact match to the parameter label.
profile.label Label for x-axis describing the parameter over which the profile was conducted.
exact Should the profile.string have to match the parameter label exactly, or is a substring OK.
ylab Label for y-axis. Default is "Change in -log-likelihood".
col  Optional vector of colors for each line.
pch  Optional vector of plot characters for the points.
lt   Line total for the likelihood components.
lty.total Line type for the total likelihood.
lwd  Line width for the likelihood components.
lwd.total Line width for the total likelihood.
cex  Character expansion for the points representing the likelihood components.
cex.total Character expansion for the points representing the total likelihood.
xlim  Range for x-axis. Change in likelihood is calculated relative to values within this range.
ymax Maximum y-value. Default is 10 plotted.
xaxs The style of axis interval calculation to be used for the x-axis (see ?par for more info).
yaxs The style of axis interval calculation to be used for the y-axis (see ?par for more info).
type  Line type (see ?plot for more info).
legend Include legend?
legendloc Location of legend (see ?legend for more info).
pwidth Width of plot
pheight Height of plot
punits Units for PNG file
res Resolution of plots printed to files. The default is res = 300.
ptsize Point size for PNG file
cex.main Character expansion for plot titles
plotdir Directory where PNG files will be written. by default it will be the directory where the model was run.
add_cutoff Add dashed line at ~1.92 to indicate 95% confidence interval based on common cutoff of half of chi-squared of p=.95 with 1 degree of freedom: 0.5*qchisq(p=cutoff_prob, df=1). The probability value can be adjusted using the cutoff_prob below.
cutoff_prob Probability associated with add_cutoff above.
verbose Return updates of function progress to the R GUI? (Doesn’t do anything yet.)
fleetgroups Optional character vector, with length equal to the number of declared fleets, where fleets with the same value are aggregated
likelihood_type choice of "raw" or "raw_times_lambda" (the default) determines whether or not likelihoods plotted are adjusted by lambdas (likelihood weights)
minfraction Minimum change in likelihood (over range considered) as a fraction of change in total likelihood for a component to be included in the figure.

Author(s)
Ian Taylor, Kevin Piner, Jim Thorson
References

Kevin Piner says that he’s not the originator of this idea so Athol Whitten is going to add a reference here.

---

**plotCI**

*Plot points with confidence intervals.*

Description

Given a set of x and y values and upper and lower bounds, this function plots the points with error bars. This was Written by Venables and modified to add access to ylim and contents.

Usage

```r
plotCI(
  x,
  y = NULL,
  uiw,
  liw = uiw,
  ylo = NULL,
  yhi = NULL,
  ...,
  sfrac = 0.01,
  ymax = NULL,
  add = FALSE,
  col = "black"
)
```

Arguments

- **x**: The x coordinates of points in the plot.
- **y**: The y coordinates of the points in the plot.
- **uiw**: The width of the upper portion of the confidence region.
- **liw**: The width of the lower portion of the confidence region.
- **ylo**: Lower limit of y range.
- **yhi**: Upper limit of y range.
- **...**: Additional inputs that will be passed to the function `plot(x,y,ylim=ylim,...)`
- **sfrac**: Fraction of width of plot to be used for bar ends.
- **ymax**: Additional input for Upper limit of y range.
- **add**: Add points and intervals to existing plot? Default=FALSE.
- **col**: Color for the points and lines.

Author(s)

Bill Venables, Ian Stewart, Ian Taylor, John Wallace
**populate_multiple_folders**

*Populate multiple Stock Synthesis folders with input files*

**Description**

Creates a set of multiple folders and populate each with SS input files such as for the purpose of running a new version of SS for an existing set of test models.

**Usage**

```r
populate_multiple_folders(
  outerdir.old = NULL,
  outerdir.new = NULL,
  create.dir = TRUE,
  overwrite = FALSE,
  use_ss_new = FALSE,
  exe.dir = NULL,
  exe.file = "ss.exe",
  exe.only = FALSE,
  verbose = TRUE
)
```

**Arguments**

- `outerdir.old`: Location of existing outer directory containing subdirectories for each model.
- `outerdir.new`: New outer directory into which the subfolders should be created.
- `create.dir`: Create new outer directory if it doesn’t exist already?
- `overwrite`: Overwrite existing files with matching names?
- `use_ss_new`: Use .ss_new files instead of original inputs?
- `exe.dir`: Path to executable to copy into all the subfolders.
- `exe.file`: Filename of executable to copy into all the subfolders. A value of NULL will skip copying the executable.
- `exe.only`: Only copy exe files from exe.dir, don’t copy input files
- `verbose`: Return updates of function progress to the R console?

**Value**

Returns table of results indicating which directories were successfully populated with the model input files and/or executables

**Author(s)**

Ian Taylor
r4ss_logo

See Also

    copy_SS_inputs()

Examples

    ## Not run:
    populate_multiple_folders(
        outerdir.old = "c:/SS/old_models",
        outerdir.new = "c:/SS/new_models",
        exe.dir = "c:/SS/SSv3.30.12.00"
    )

    ## End(Not run)

---

r4ss_logo  Make a simple logo for r4ss organization on GitHub

Description

    I was tired of the automatically generated symbol that appeared by default.

Usage

    r4ss_logo()

Author(s)

    Ian Taylor

---

read.admbFit  Read ADMB .par and .cor files.

Description

    This function will parse the .par and .cor files to provide things like parameter estimates, standard
    deviations, and correlations. Required for Jim Thorson’s Laplace Approximation but likely useful
    for other purposes.

Usage

    read.admbFit(file)

Arguments

    file  Name of ADMB executable such that files to read will have format file.par and
         file.cor.
Value
List of various things from these files.

Author(s)
James Thorson

See Also
getADMBHessian(), NegLogInt_Fn()

---

rich.colors.short  Make a vector of colors.

---

Description
A subset of rich.colors by Arni Magnusson from the gplots package, with the addition of alpha transparency (which is now available in the gplots version as well)

Usage
rich.colors.short(n, alpha = 1)

Arguments
n  Number of colors to generate.
alpha  Alpha transparency value for all colors in vector. Value is passed to rgb function.

Author(s)
Arni Magnusson, Ian Taylor

---

run_SS_models  Run multiple Stock Synthesis models

---

Description
Loops over a vector of directories and iteratively runs SS in each one
run_SS_models

Usage

run_SS_models(
  dirvec = NULL,
  model = "ss",
  extras = "-nox",
  systemcmd = FALSE,
  skipfinished = TRUE,
  intern = FALSE,
  verbose = TRUE,
  exe_in_path = FALSE
)

Arguments

dirvec  List of directories containing the model files
model   Executable name or path to executable (absolute path, or relative to the working
directory). First, if exe_in_path is FALSE, The function will look an executable
with the same name in each element of dirvec. Then, if it is not found in each,
the function will assume that model is the path to the executable and there is
only 1 copy of the executable. Note that if there is an exe in your PATH with the
same name, this will be used even if exe_in_path is FALSE.
extras  Additional commands to use when running SS. Default = "-nox" will reduce the
         amount of command-line output.
systemcmd Should R call SS using "system" function instead of "shell". This may be re-
         quired when running R in Emacs. Default = FALSE.
skipfinished Skip any folders that already contain a Report.sso file. This can be helpful if the
            function is interrupted.
intern  Show output in the R console or save to a file?
verbose Return updates of function progress to the R console?
exe_in_path logical. If TRUE, will look for exe in the PATH. If FALSE, will look for exe in
            the model folders. Default = FALSE.

Value

Returns table showing which directories had model run and which had errors like missing exe-
cutable or Report.sso already present

Author(s)

Ian Taylor

See Also

copy_SS_inputs(), populate_multiple_folders()
Examples

```r
## Not run:
extdata_mods <- system.file("extdata", package = "r4ss")
dirvec <- c(
  file.path(extdata_mods, "simple_3.30.12"),
  file.path(extdata_mods, "simple_3.30.13")
)
# if ss or ss.exe is available in both directories:
run_SS_models(dirvec = dirvec)

## End(Not run)
```

Description

This was previously contained within each of the SSplotXXX() functions. It (1) translates the not-quite-matching specifications for the image to the values needed by `png()`, then (2) returns the `plotinfo` data.frame (which exists within each function which calls this) after adding a row with the filename and caption for each new plot. Note: this just opens the png device which needs to be closed via `dev.off()` outside this function.

Usage

```r
save_png(
  plotinfo,  
  file,      
  plotdir,   
  pwidth,    
  pheight,   
  punits,    
  res,       
  ptsize,    
  caption = NA, 
  alt_text = NA, 
  filenameprefix = NA
)
```

Arguments

- `plotinfo`: Table of information about all plots
- `file`: Filename to write to (including .png extension)
- `plotdir`: Directory where plots will be written
- `pwidth`: Default width of plots printed to files in units of `punits`. The default is `pwidth=6.5`.
selShapes

**pheight**

Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with pheight_tall used for plots that work best with a taller format and a single plot per page.

**punits**

Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is punits="in".

**res**

Resolution of plots printed to files. The default is res = 300.

**ptsize**

Point size for plotted text in plots printed to files (see help("png") in R for details).

**caption**

caption for the image

**alt_text**

alternative text for screen readers (if left as NA then will be set based on the caption)

**filenameprefix**

Additional text to append to PNG or PDF file names. It will be separated from default name by an underscore.

**Author(s)**

Ian G. Taylor

---

**Description**

This app is hosted at https://connect.fisheries.noaa.gov/shiny-selex-ss3/

**Usage**

selShapes()

**Author(s)**

Allan Hicks, Andrea Havron, Ian Taylor,

inspired by tcl/tk code written by Tommy Garrison
SSbiologytables

A function to create a table of biology for assessment reporting:
length, weight, % mature, fecundity, and selectivity

Description

Takes the object created by SS_output to create table for reporting for West Coast groundfish. Works
with Stock Synthesis versions 3.30.12 and later.

Usage

SSbiologytables(
  replist = NULL,
  printfolder = "tables",
  dir = "default",
  fleetnames = "default",
  selexyr = "default"
)

Arguments

replist A list object created by SS_output().
printfolder The sub-directory under 'dir' (see below) in which the PNG files will be located. The default sub-directory is "plots". The directory will be created if it doesn not exist. If 'printfolder' is set to "", it is ignored and the PNG files will be located in the directory specified by 'dir'.
dir The directory in which a PDF file (if requested) will be created and within which the printfolder sub-directory (see above) will be created if png=TRUE. By default it will be the same directory that the report file was read from by the SS_output function. Alternatives to the default can be either relative (to the working directory) or absolute paths. The function will attempt to create the directory it does not exist, but it does not do so recursively.
fleetnames Either the string "default", or a vector of characters strings to use for each fleet name. Default="default".
selexyr The year to summarize selectivity, the default is the final model yr strings to use for each fleet name. Default="default".

Value

A csv files containing biology and selectivity tables

Author(s)

Chantel Wetzel
SSbootstrap  
*Fit models to parametric bootstraps*

**Description**

Run a series of models fit to parametric bootstrap data taken from data.ss_new. This is not yet a generalized function, just some example code for how to do a parametric bootstrap such as was done for the Pacific hake model in 2006.

**Usage**

SSbootstrap()

**Note**

Thanks to Nancie Cummings for inspiration.

**Author(s)**

Ian Taylor

---

SSdiagsTime2Year  
*Convert Time-Steps*

**Description**

Function to convert non-annual into annual time-steps for retros and cpue residuals

**Usage**

SSdiagsTime2Year(ss3out, time.steps = 0.25, end.time)

**Arguments**

- `ss3out`: outputs from r4ss::SS_output() or r4ss::SSsummarize()
- `time.steps`: time steps behind yrs e.g. 0.25 for quarterly
- `end.time`: last time step e.g. 2018.75 with a cpue observation

**Value**

Reformatted Rep file outputs
SSexecutivesummary

A function to create a executive summary tables from an SS Report.sso file

Description

Takes the output from SS_output and creates executive summary tables as required by the current Terms of Reference for US West Coast groundfish stock. Additionally, historical catches, time-series and numbers-at-ages tables are created.

Usage

SSexecutivesummary(
  replist,
  plotfolder = "default",
  ci_value = 0.95,
  es_only = FALSE,
  fleetnames = NULL,
  tables = c("a", "b", "c", "d", "e", "f", "g", "h", "i", "catch", "timeseries", "numbers", "biomass", "likes"),
  divide_by_2 = FALSE,
  endyr = NULL,
  adopted_ofl = NULL,
  adopted_abc = NULL,
  adopted_acl = NULL,
  forecast_ofl = NULL,
  forecast_abc = NULL,
  format = TRUE,
  match_digits = FALSE,
  verbose = TRUE
)

Arguments

replist          A list object created by SS_output().
plotfolder       Directory where the 'tables' directory will be created. The default is the dir location where the Report.sso file is located.
ci_value         To calculate confidence intervals, default is set at 0.95
es_only          TRUE/FALSE switch to produce only the executive summary tables will be produced, default is FALSE which will return all executive summary tables, historical catches, and numbers-at-ages
fleetnames       A vector of user-defined names providing a name for each fleet in the model.
tables           Which tables to produce (default is everything). Note: some tables depend on calculations related to previous tables, so will fail if requested on their own (e.g. Table 'i' can't be created without also creating Table 'a')
SSgetMCMC

This will allow the user to calculate single sex values based on the new sex specification (-1) in SS for single sex models. Default value is FALSE. TRUE will divide by 2.

endyr

Optional input to choose a different ending year for tables (could be useful for catch-only updates)

adopted_of1

Vector of adopted of1 values to be printed in the management performance table. This should be a vector of 10 values.

adopted_abc

Vector of adopted abc values to be printed in the management performance table. This should be a vector of 10 values.

adopted_acl

Vector of adopted acl values to be printed in the management performance table. This should be a vector of 10 values.

forecast_of1

Optional input vector for management adopted OF1 values for table g. These values will be overwrite the OF1 values in the projection table, rather than the model estimated OF1 values. Example input: c(1500, 1300)

forecast_abc

Optional input vector for management adopted ABC values for table g. These values will be overwrite the ABC values in the projection table, rather than the model estimated ABC values. Example input: c(1500, 1300)

format

Logical. Option to control whether tables are formatted (e.g. commas added, CIs separated with ","). The formatting is intended to create tables that can be cut and pasted easily into a word document without additional formatting work. If the tables are being used by LaTex/Markdown or other documenting software, having formatting turned on prevents the tables from being formatted further since the objects are no longer numeric.

match_digits

TRUE/FALSE switch on whether the low and high interval values in e_ReferencePoints_ES will be reported with the same number of decimal digits as the estimate.

verbose

Return updates of function progress to the R console?

Value

Individual csv files for each executive summary table and additional tables (catch, timeseries, numbers-at-age).

Author(s)

Chantel Wetzel

SSgetMCMC

Read MCMC output.

Description

Reads the MCMC output (in the posteriors.sso and derived_posteriors.sso files) from a model.
Usage

SSgetMCMC(
  dir = NULL,
  verbose = TRUE,
  writecsv = FALSE,
  postname = "posteriors.sso",
  derpostname = "derived_posteriors.sso",
  csv1 = "keyposteriors.csv",
  csv2 = "nuisanceposteriors.csv",
  keystrings = c("NatM", "R0", "steep", "RecrDev_2008", "Q_extraSD"),
  nuisancestrings = c("Objective_function", "SSB_", "InitAge", "RecrDev"),
  burnin = 0,
  thin = 1
)

Arguments

dir Directory containing MCMC output.
verbose TRUE/FALSE switch to get more or less information about the progress of the function.
writecsv Write key parameters and certainty nuisance quantities to a CSV file.
postname Name of file with parameter posterior (default matches "posteriors.sso" used by SS, but the user could change the name)
derpostname Name of file with parameter posterior (default matches "derived_posteriors.sso" used by SS, but the user could change the name)
csv1 First CSV file for key parameters.
csv2 Second CSV file for nuisance quantities.
keystrings Vector of strings that partially match parameter names to write to the file csv1. This file intended to feed into mcmc.out().
nuisancestrings Vector of strings that partially match derived quantity names to write to the file csv2. This file intended to feed into mcmc.nuisance().
burnin Optional burn-in value to apply on top of the option in the starter file.
thin Optional thinning value to apply on top of the option in the starter file and in the -mcsave runtime command.

Author(s)

Ian Taylor

See Also

mcmc.out(), mcmc.nuisance(), SSplotPars()
**SSgetoutput**

*Get output from multiple Stock Synthesis models.*

**Description**

Apply the function `SS_output()` multiple times and save output as individual objects or a list of lists.

**Usage**

```r
SSgetoutput(
  keyvec = NULL,
  dirvec = NULL,
  getcovar = TRUE,
  getcomp = TRUE,
  forecast = TRUE,
  verbose = TRUE,
  ncols = 210,
  listlists = TRUE,
  underscore = FALSE,
  save.lists = FALSE
)
```

**Arguments**

- **keyvec**: A vector of strings that are appended to the output files from each model if models are all in one directory. Default=NULL.
- **dirvec**: A vector of directories (full path or relative to working directory) in which model output is located. Default=NULL.
- **getcovar**: Choice to read or not read covar.sso output (saves time and memory). Default=TRUE.
- **getcomp**: Choice to read or not read CompReport.sso output (saves time and memory). Default=TRUE.
- **forecast**: Choice to read or not read forecast quantities. Default=FALSE.
- **verbose**: Print various messages to the command line as the function runs? Default=TRUE.
- **ncols**: Maximum number of columns in Report.sso (same input as for `SS_output()`). Default=210.
- **listlists**: Save output from each model as a element of a list (i.e. make a list of lists). Default = TRUE.
- **underscore**: Add an underscore `_` between any file names and any keys in keyvec. Default=FALSE.
- **save.lists**: Save each list of parsed output as a .Rdata file (with default filenaming convention based on iteration and date stamp).
**SSmakeMmatrix**

*Convert a matrix of natural mortality values into inputs for Stock Synthesis*

**Description**

Inspired by Valerio Bartolino and North Sea herring

**Usage**

```r
SSmakeMmatrix(
  mat,
  startyr,
  outfile = NULL,
  overwrite = FALSE,
  yrs.in.columns = TRUE
)
```

**Arguments**

- **mat**: a matrix of natural mortality by year and age, starting with age 0
- **startyr**: the first year of the natural mortality values (no missing years)
- **outfile**: optional file to which the results will be written
- **overwrite**: if ’outfile’ is provided and exists, option to overwrite or not
- **yrs.in.columns**: an indicator of whether the matrix has years in columns or rows

**Value**

Prints inputs with option to write to chosen file

**Author(s)**

Ian Taylor
SSMethod.Cond.TA1.8 | Apply Francis composition weighting method TA1.8 for conditional age-at-length fits

Description

Uses an extension of method TA1.8 (described in Appendix A of Francis, 2011) to do stage-2 weighting of conditional age at length composition data from a Stock Synthesis model.

Usage

SSMethod.Cond.TA1.8(
  fit,
  fleet,
  part = 0:2,
  seas = NULL,
  plotit = TRUE,
  printit = FALSE,
  datonly = FALSE,
  plotadj = !datonly,
  maxpanel = 1000,
  FullDiagOut = FALSE,
  ShowVersionB = FALSE,
  fleetnames = NULL,
  add = FALSE
)

Arguments

- **fit**: Stock Synthesis output as read by r4SS function SS_output
- **fleet**: vector of one or more fleet numbers whose data are to be analysed simultaneously (the output N multiplier applies to all fleets combined)
- **part**: vector of one or more partition values; analysis is restricted to composition data with one of these partition values. Default is to include all partition values (0, 1, 2).
- **seas**: string indicating how to treat data from multiple seasons 'comb' - combine seasonal data for each year and plot against Yr 'sep' - treat seasons separately, plotting against Yr.S If is.null(seas) it is assumed that there is only one season in the selected data (a warning is output if this is not true) and option 'comb' is used.
- **plotit**: if TRUE, make an illustrative plot like one or more panels of Fig. 4 in Francis (2011).
- **printit**: if TRUE, print results to R console.
- **datonly**: if TRUE, don’t show the model expectations
plotadj if TRUE, plot the confidence intervals associated with the adjusted sample sizes (TRUE by default unless datonly = TRUE)
maxpanel maximum number of panels within a plot
FullDiagOut Print full diagnostics?
ShowVersionB Report the Version B value in addition to the default?
fleetnames Vector of alternative fleet names to draw from for plot titles and captions. It should have length equal to the number of fleets in the model, not the number of fleets considered in this function.
add add to existing plot

Details

The function outputs a multiplier, \( w \), (with bootstrap 95% confidence intervals) so that \( N2i = w \times N1i \), where \( N1i \) and \( N2i \) are the stage-1 and stage-2 multinomial sample sizes for the \( i \)th composition. Optionally makes a plot of observed and expected mean ages, with two alternative sets of confidence limits - based on \( N1i \) (thin lines) and \( N2i \) (thick lines) - for the observed values.

This function formerly reported two versions of \( w \) differ according to whether the calculated mean ages are indexed by year (version A) or by year and length bin (version B). However, research by Punt (2015) found Version A to perform better and version B is no longer recommended and is only reported if requested by the user.

CAUTIONARY/EXPLANATORY NOTE. The large number of options available in SS makes it very difficult to be sure that what this function does is appropriate for all combinations of options. The following notes (for version A) might help anyone wanting to check or correct the code.

1. The code first removes unneeded rows from database condbase.
2. The remaining rows of the database are grouped (indexed by vector indx) and relevant statistics (e.g., observed and expected mean age), and ancillary data, are calculated for each group (these are stored in pldat - one row per group).
3. If the data are to be plotted they are further grouped by fleet, with one panel of the plot per fleet.
4. A single multiplier, \( w \), is calculated to apply to all the selected data.

Author(s)

Chris Francis, Andre Punt, Ian Taylor

References


See Also

SSMethod.Cond.TA1.8()
Apply Francis composition weighting method TA1.8

Description

Uses method TA1.8 (described in Appendix A of Francis 2011) to do stage-2 weighting of composition data from a Stock Synthesis model. Outputs a multiplier, \( w \) (with bootstrap 95% confidence interval), so that \( N_2y = w \times N_1y \), where \( N_1y \) and \( N_2y \) are the stage-1 and stage-2 multinomial sample sizes for the data set in year \( y \). Optionally makes a plot of observed (with confidence limits, based on \( N_1y \)) and expected mean lengths (or ages).

CAUTIONARY/EXPLANATORY NOTE. The large number of options available in SS makes it very difficult to be sure that what this function does is appropriate for all combinations of options. The following notes might help anyone wanting to check or correct the code.

1. The code first takes the appropriate database (lendbase, sizedbase, agedbase, or condbase) and removes unneeded rows.

2. The remaining rows of the database are grouped into individual comps (indexed by vector \( \text{indx} \)) and relevant statistics (e.g., observed and expected mean length or age), and ancillary data, are calculated for each comp (these are stored in \( \text{pldat} \) - one row per comp). If the data are to be plotted, the comps are grouped, with each group corresponding to a panel in the plot, and groups are indexed by \( \text{plindx} \).

3. A single multiplier is calculated to apply to all the comps.

Usage

```r
SSMethod.TA1.8(
  fit,
  type,
  fleet,
  part = 0:2,
  sexes = 0:3,
  seas = NULL,
  method = NULL,
  plotit = TRUE,
  printit = FALSE,
  datonly = FALSE,
  plotadj = !datonly,
  maxpanel = 1000,
  fleetnames = NULL,
  label.part = TRUE,
  label.sex = TRUE,
  set.pars = TRUE,
  add = FALSE
)
```
Arguments

**fit**
Stock Synthesis output as read by r4SS function SS_output

**type**
either 'len' (for length composition data), 'size' (for generalized size composition data), 'age' (for age composition data), or 'con' (for conditional age at length data)

**fleet**
vector of one or more fleet numbers whose data are to be analysed simultaneously (the output N multiplier applies to all fleets combined)

**part**
vector of one or more partition values; analysis is restricted to composition data with one of these partition values. Default is to include all partition values (0, 1, 2).

**sexes**
vector of one or more values for Sexes; analysis is restricted to composition data with one of these Sexes values. Ignored if type=='con'.

**seas**
string indicating how to treat data from multiple seasons 'comb' - combine seasonal data for each year and plot against Yr 'sep' - treat seasons separately, plotting against Yr.S If is.null(seas) it is assumed that there is only one season in the selected data (a warning is output if this is not true) and option 'comb' is used.

**method**
a vector of one or more size-frequency method numbers (ignored unless type = 'size'). If !is.null(method), analysis is restricted to size-frequency methods in this vector. NB comps are separated by method

**plotit**
if TRUE, make an illustrative plot like one or more panels of Fig. 4 in Francis (2011).

**printit**
if TRUE, print results to R console.

**datonly**
if TRUE, don’t show the model expectations

**plotadj**
if TRUE, plot the confidence intervals associated with the adjusted sample sizes (TRUE by default unless datonly = TRUE)

**maxpanel**
maximum number of panels within a plot

**fleetnames**
Vector of alternative fleet names to draw from for plot titles and captions. It should have length equal to the number of fleets in the model, not the number of fleets considered in this function.

**label.part**
Include labels indicating which partitions are included?

**label.sex**
Include labels indicating which sexes are included?

**set.pars**
Set the graphical parameters such as mar and mdfrow. Can be set to FALSE in order to add plots from multiple calls to this function as separate panels in one larger figure.

**add**
add to existing plot

Author(s)

Chris Francis, Andre Punt, Ian Taylor

References

See Also

SSMethod.Cond.TA1.8()

Examples

```r
## Not run:
Nfleet <- length(myreplist["FleetNames"])
for (Ifleet in 1:Nfleet) {
  SSMethod.TA1.8(myreplist, "len", fleet = Ifleet, maxpanel = maxpanel)
}
for (Ifleet in 1:Nfleet) {
  SSMethod.TA1.8(myreplist, "age", fleet = Ifleet, maxpanel = maxpanel)
}
for (Ifleet in 1:Nfleet) {
  SSMethod.TA1.8(myreplist, "size", fleet = Ifleet, maxpanel = maxpanel)
}
for (Ifleet in 1:Nfleet) {
  SSMethod.TA1.8(myreplist, "con", fleet = Ifleet, maxpanel = maxpanel)
}
for (Ifleet in 1:Nfleet) {
  SSMethod.Cond.TA1.8(myreplist, fleet = Ifleet, maxpanel = maxpanel)
}
## End(Not run)
```

### Description

Function calculates: (1) a rho value for the ending year for each retrospective relative to the reference model as in Mohn (1999), (2) a "Wood’s Hole Mohn’s Rho", which is a rho value averaged across all years for each retrospective relative to the reference model, and (3) an "Alaska Fisheries Science Center and Hurtado-Ferro et al. (2015) Mohn’s rho, which is the average rho per retrospective "peel".

### Usage

```r
SSmohnsrho(summaryoutput, endyrvec, startyr, verbose = TRUE)
```

### Arguments

- `summaryoutput`: List created by `SSsummarize`. The expected order for the models are the full reference model, the retro-1, retro-2, and so forth.
- `endyrvec`: Single year or vector of years representing the final year of values to show for each model.
startyr  Single year used to calculate the start of the Wood's Hole Mohn’s Rho value across all years. Defaults to startyr of reference model.

verbose  Print messages when running the function?

Author(s)

Chantel R. Wetzel and Carey McGilliard

References


---

sspar  Allow Multi-Plots Set the par() to options suitable for ss3diags multi plots.

Description

See par for more details on each parameter.

Usage

```r
sspar(
  mfrow = c(1, 1),
  plot.cex = 1,
  mai = c(0.55, 0.6, 0.1, 0.1),
  omi = c(0, 0, 0) + 0.1,
  labs = TRUE
)
```

Arguments

- `mfrow`  determines plot frame set up
- `plot.cex`  cex graphic option
- `mai`  graphical par for plot margins
- `omi`  Outer margins in lines of text.
- `labs`  if TRUE margins are narrow
SSplotAgeMatrix

Plot matrix of either length or observed age at true age

Description

Distribution of length at age or observed age at true age is represented as a histogram. Values are from the AGE_LENGTH_KEY and AGE_AGE_KEY sections of Report.sso ($ALK and $AAK in the list created by SS_output)

Usage

SSplotAgeMatrix(
  replist,
  option = 1,
  slices = NULL,
  scale = NULL,
  add = FALSE,
  col.grid = "grey90",
  col.bars = grey(0, alpha = 0.5),
  shift_hi = 0,
  shift_lo = 0,
  plot = TRUE,
  print = FALSE,
  labels = c("Age", "Length", "True age", "Observed age", "for ageing error type", "Distribution of", "at"),
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  mainTitle = TRUE,
  plotdir = "default"
)

Arguments

replist A list object created by SS_output().
option Optional set to either 1 for length at true age or 2 for obs. age at true age
slices Optional input to choose which matrix (slice of the 3D-array) within $AAK or $ALK to plot. By default all slices will be shown. For ageing imprecision this should correspond to the ageing error matrix number. Distribution of length at age ($ALK) is ordered by season, sub-season, and then morph. A future version could allow subsetting plots by these dimensions.
scale Multiplier for bars showing distribution. Species with many ages benefit from expanded bars. NULL value causes function to attempt automatic scaling.
add Add to existing plot
col.grid A character value specifying the color of the grid lines
col.bars The color of the filled polygons.
shift_hi A numeric value specifying the amount to shift the top of the polygon up.
shift_lo A numeric value specifying the amount to shift the bottom of the polygon up.
plot Plot to active plot device?
print Print to PNG files?
labels Vector of labels for plots (titles and axis labels)
pwidth Width of plot
pheight Height of plot
punits Units for PNG file
res Resolution of plots printed to files. The default is res = 300.
ptsize Point size for PNG file
cex.main Character expansion for plot titles
mainTitle Logical indicating if a title should be included at the top
plotdir directory where PNG files will be written. by default it will be the directory where the model was run.

Author(s)
Ian G. Taylor

See Also
SSplotNumbers()

SSplotBiology  Plot biology related quantities.

Description
Plot biology related quantities from Stock Synthesis model output, including mean weight, maturity, fecundity, and spawning output.

Usage
SSplotBiology(
  replist,
  plot = TRUE,
  print = FALSE,
  add = FALSE,
  subplots = 1:32,
  seas = 1)
```r
morphs = NULL,
forecast = FALSE,
minyr = -Inf,
maxyr = Inf,
colvec = c("red", "blue", "grey20"),
ltyvec = c(1, 2),
shadealpha = 0.1,
imageplot_text = FALSE,
imageplot_text_round = 0,
legendloc = "topleft",
plotdir = "default",
labels = c("Length (cm)", "Age (yr)", "Maturity", "Mean weight (kg) in last year",
          "Spawning output", "Length (cm, beginning of the year)", "Natural mortality",
          "Female weight (kg)", "Female length (cm)", "Fecundity", "Default fecundity label",
          "Year", "Hermaphroditism transition rate", "Fraction females by age at equilibrium"),
pwidth = 6.5,
pheight = 5,
punits = "in",
res = 300,
ptsize = 10,
cex.main = 1,
mainTitle = TRUE,
verbose = TRUE
)

Arguments

replist              A list object created by `SS_output()`.
plot                 Plot to active plot device?
print                Print to PNG files?
add                  add to existing plot
subplots             vector controlling which subplots to create Numbering of subplots is as follows:
                      • 1 growth curve only
                      • 2 growth curve with CV and SD
                      • 3 growth curve with maturity and weight
                      • 4 distribution of length at age (still in development)
                      • 5 length or wtatage matrix
                      • 6 maturity
                      • 7 fecundity from model parameters
                      • 8 fecundity at weight from BIOLOGY section
                      • 9 fecundity at length from BIOLOGY section
                      • 10 spawning output at length
                      • 11 spawning output at age
                      • 21 Natural mortality (if age-dependent)
                      • 22 Time-varying growth persp
```
• 23 Time-varying growth contour
• 24 plot time-series of any time-varying quantities (created if the MGparm_By_Year_after_adjustments table (report:7) is available in the Report.sso file)
• 31 hermaphroditism transition probability
• 32 hermaphroditism cumulative probability

Additional plots not created by default

• 101 diagram with labels showing female growth curve
• 102 diagram with labels showing female growth curve & male offsets
• 103 diagram with labels showing female CV = f(A) (offset type 2)
• 104 diagram with labels showing female CV = f(A) & male offset (type 2)
• 105 diagram with labels showing female CV = f(A) (offset type 3)
• 106 diagram with labels showing female CV = f(A) & male offset (type 3)

seas which season to plot (values other than 1 only work in seasonal models but maybe not fully implemented)
morphs Which morphs to plot (if more than 1 per sex)? By default this will be replist[["mainmorphs"]]
forecast Include forecast years in plots of time-varying biology?
minyr optional input for minimum year to show in plots
maxyr optional input for maximum year to show in plots
colvec vector of length 3 with colors for various points/lines
ltyvec vector of length 2 with lty for females/males in growth plots values can be applied to other plots in the future
shadealpha Transparency parameter used to make default shadecol values (see ?rgb for more info)
imageplot_text Whether to add numerical text to the image plots when using weight at age. Defaults to FALSE.
imageplot_text_round The number of significant digits to which the image plot text is rounded. Defaults to 0, meaning whole numbers. If all your values are small and there’s no contrast in the text, you might want to make this 1 or 2.
legendloc Location of legend (see ?legend for more info)
plotdir Directory where PNG files will be written. by default it will be the directory where the model was run.
labels Vector of labels for plots (titles and axis labels)
pwidth Width of plot
pheight Height of plot
punits Units for PNG file
res Resolution of plots printed to files. The default is res = 300.
ptsize Point size for PNG file
cex.main Character expansion for plot titles
mainTitle Logical indicating if a title should be included at the top
verbose Return updates of function progress to the R GUI?
SSplotCatch

Author(s)
Ian Stewart, Ian Taylor

See Also
SS_plots(), SS_output()

SSplotCatch

Plot catch related quantities.

Description
Plot catch related quantities from Stock Synthesis output. Plots include harvest rate, continuous F, landings, and discard fraction.

Usage
SSplotCatch(
  replist,
  subplots = 1:16,
  add = FALSE,
  areas = 1,
  plot = TRUE,
  print = FALSE,
  type = "l",
  fleetlty = 1,
  fleetpch = 1,
  fleetcols = "default",
  fleetnames = "default",
  lwd = 3,
  areacols = "default",
  areanames = "default",
  minyr = -Inf,
  maxyr = Inf,
  annualcatch = TRUE,
  forecastplot = FALSE,
  plotdir = "default",
  showlegend = TRUE,
  legendloc = "topleft",
  order = "default",
  xlab = "Year",
  labels = c("Harvest rate/Year", "Continuous F", "Landings", "Total catch",
              "Predicted discards", "Discard fraction", "(mt)", "(numbers x1000)",
              "Observed and expected", "aggregated across seasons"),
  catchasnumbers = NULL,
  catchbars = TRUE,
  addmax = TRUE,
Arguments

replist A list object created by \texttt{SS\_output()}.  
subplots Vector controlling which subplots to create. Numbering of subplots is as follows,

- **Basic plots for all models**
  - 1 landings
  - 2 landings stacked
  - 3 observed and expected landings (if different)
  - 9 harvest rate

- **Plots for models with discards**
  - 4 total catch (including discards)
  - 5 total catch (including discards) stacked
  - 6 discards
  - 7 discards stacked plot (depends on multiple fleets)
  - 8 discard fraction
  - 16 landings + dead discards

- **Plots for seasonal models**
  - 10 landings aggregated across seasons
  - 11 landings aggregated across seasons stacked
  - 12 total catch (if discards present) aggregated across seasons
  - 13 total catch (if discards present) aggregated across seasons stacked
  - 14 discards aggregated across seasons
  - 15 discards aggregated across seasons stacked

add Add to existing plot? (not yet implemented)  
areas Optional subset of areas to plot for spatial models  
plot Plot to active plot device?  
print Print to PNG files?  
type Type parameter passed to plot function. Default "l" is lines only. Other options include "o" for overplotting points on lines.

fleetlty Vector of line type by fleet
fleetpch Vector of plot character by fleet
fleetcols Vector of colors by fleet
fleetnames  Optional replacement for fleenames used in data file, should include all fleets (not just those with catch)

lwd  Line width

areacols  Vector of colors by area. Default uses rich.colors by Arni Magnusson

areanames  Names for areas. Default is to use Area1, Area2,...

minyr  Optional input for minimum year to show in plots

maxyr  Optional input for maximum year to show in plots

annualcatch  Include plot of catch aggregated across seasons within each year

forecastplot  Add points from forecast years

plotdir  Directory where PNG or PDF files will be written. By default it will be the directory where the model was run.

showlegend  Put legend on plot

legendloc  Location of legend (see ?legend for more info)

order  Optional input to change the order of fleets in stacked plots.

xlab  x-label for all plots

labels  Vector of labels for plots (titles and axis labels)

catchasnumbers  Is catch in numbers instead of biomass? Should be set automatically if set to NULL. If fleets include a mix of biomass and numbers, then catch plots should be interpreted carefully.

catchbars  Show catch by fleet as barplot instead of stacked polygons? (default=TRUE)

addmax  Add a point on the y-axis for the maximum catch (default=TRUE)

ymax  Optional input for ymax value (can be used to add or subtract white space at the top of the figure)

pwidth  Width of plot

pheight  Height of plot

punits  Units for PNG file

res  Resolution of plots printed to files. The default is res = 300.

ptsize  point size for PNG file

cex.main  Character expansion for plot titles

verbose  Report progress to R console?

Author(s)

Ian Taylor, Ian Stewart

See Also

SS_plots(), SS_output()
SSplotCohortCatch  Plot cumulative catch by cohort.

Description
Cumulative catch contributions for each cohort are plotted based on estimated catch-at-age matrix and weight-at-age values by fleet. Curves are shown in units of both numbers and biomass.

Usage
SSplotCohortCatch(
  replist,
  subplots = 1:2,
  add = FALSE,
  plot = TRUE,
  print = FALSE,
  cohortcols = "default",
  cohortfrac = 1,
  cohortvec = NULL,
  cohortlabfrac = 0.1,
  cohortlabvec = NULL,
  lwd = 3,
  plotdir = "default",
  xlab = "Year",
  labels = c("Age", "Cumulative catch by cohort (in numbers x1000)",
             "Cumulative catch by cohort (x1000 mt)")
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  verbose = TRUE
)

Arguments
replist  A list object created by SS_output().
subplots  Vector controlling which subplots to create
add  Add to existing plot? (not yet implemented)
plot  Plot to active plot device?
print  Print to PNG files?
cohortcols  Vector of colors to show for each cohort. Default is range of colors shade indicating time period.
cohortfrac  What fraction of the cohorts to include in plot. If value < 1 is used, then cohorts are filtered to only include those with the highest maximum cumulative catch. Value will be overridden by cohortvec.

cohortvec  Optional vector of birth years for cohorts to include in plot. Value overrides cohortfrac.

cohortlabfrac  What fraction of the cohorts to label in plot. By default, top 10% of cohorts are labeled. Value will be overridden by cohortlabvec.

cohortlabvec  Optional vector of birth years for cohorts to label in plot. Value overrides cohortlabfrac.

lwd  Line width

plotdir  Directory where PNG or PDF files will be written. By default it will be the directory where the model was run.

xlab  x-label for all plots

labels  Vector of labels for plots (titles and axis labels)

pwidth  Width of plot

pheight  Height of plot

punits  Units for PNG file

res  Resolution of plots printed to files. The default is res = 300.

ptsize  Point size for PNG file

cex.main  Character expansion for plot titles (no titles in this function yet)

verbose  Report progress to R console?

**Author(s)**

Ian Taylor

**See Also**

`SS_plots()`, `SS_output()`
Usage

SSplotComparisons(
  summaryoutput,
  subplots = 1:20,
  plot = TRUE,
  print = FALSE,
  png = print,
  pdf = FALSE,
  models = "all",
  endyrvec = NULL,
  indexfleets = NULL,
  indexUncertainty = TRUE,
  indexQlabel = TRUE,
  indexQdigits = 4,
  indexSEvec = NULL,
  indexPlotEach = FALSE,
  labels = c("Year", "Spawning biomass (t)", "Fraction of unfished",
    "Age-0 recruits (1,000s)", "Recruitment deviations", "Index", "Log index",
    "SPR-related quantity", "Density", "Management target",
    "Minimum stock size threshold", "Spawning output", "Harvest rate"),
  col = NULL,
  shadecol = NULL,
  pch = NULL,
  lty = 1,
  lwd = 2,
  spacepoints = 10,
  staggerpoints = 1,
  initpoint = 0,
  tickEndYr = TRUE,
  shadeForecast = TRUE,
  xlim = NULL,
  ylimAdj = 1.05,
  xaxs = "i",
  yaxs = "i",
  type = "o",
  uncertainty = TRUE,
  shadealpha = 0.1,
  legend = TRUE,
  legendlabels = NULL,
  legendloc = "topright",
  legendorder = NULL,
  legendncol = 1,
  sprtarg = NULL,
  btarg = NULL,
  minbthresh = NULL,
  pwidth = 6.5,
  pheight = 5,
  punits = "in"),
SSplotComparisons

res = 300,
ptsize = 10,
plotdir = NULL,
filenameprefix = "",
densitynames = c("SSB_Virgin", "R0"),
densityxlabs = NULL,
rescale = TRUE,
densityscalex = 1,
densityscaley = 1,
densityadjust = 1,
densitysymbols = TRUE,
densitytails = TRUE,
densitymiddle = FALSE,
densitylwd = 1,
fix0 = TRUE,
new = TRUE,
add = FALSE,
par = list(mar = c(5, 4, 1, 1) + 0.1),
verbose = TRUE,
mcmcVec = FALSE,
show_equilibrium = TRUE
)

Arguments

summaryoutput List created by SSsummarize
subplots Vector of subplots to be created Numbering of subplots is as follows:
  • 1 spawning biomass
  • 2 spawning biomass with uncertainty intervals
  • 3 biomass ratio (hopefully equal to fraction of unfished)
  • 4 biomass ratio with uncertainty
  • 5 SPR ratio
  • 6 SPR ratio with uncertainty
  • 7 F value
  • 8 F value with uncertainty
  • 9 recruits
  • 10 recruits with uncertainty
  • 11 recruit devs
  • 12 recruit devs with uncertainty
  • 13 index fits
  • 14 index fits on a log scale
  • 15 phase plot
  • 16 densities
  • 17 cumulative densities
plot Plot to active plot device?
print: Send plots to PNG files in directory specified by plotdir?

png: Has same result as print, included for consistency with SS_plots.

pdf: Write output to PDF file? Can’t be used in conjunction with png or print.

models: Optional subset of the models described in summaryoutput. Either "all" or a vector of numbers indicating columns in summary tables.

endyrvec: Optional single year or vector of years representing the final year of values to show for each model. By default it is set to the ending year specified in each model.

indexfleets: Fleet numbers for each model to compare indices of abundance. Can take different forms:
  - NULL: (default) create a separate plot for each index as long as the fleet numbering is the same across all models.
  - integer: create a single comparison plot for the chosen index
  - vector of length equal to number of models: a single fleet number for each model to be compared in a single plot
  - list: list of fleet numbers associated with indices within each model to be compared, where the list elements are each a vector of the same length but the names of the list elements don’t matter and can be absent.

indexUncertainty: Show uncertainty intervals on index data? Default=FALSE because if models have any extra standard deviations added, these intervals may differ across models.

indexQlabel: Add catchability to legend in plot of index fits (TRUE/FALSE)?

indexQdigits: Number of significant digits for catchability in legend (if indexQlabel = TRUE)

indexSEvec: Optional replacement for the SE values in summaryoutput["indices"] to deal with the issue of differing uncertainty by models described above.

indexPlotEach: TRUE plots the observed index for each model with colors, or FALSE just plots observed once in black dots.

labels: Vector of labels for plots (titles and axis labels)

col: Optional vector of colors to be used for lines. Input NULL makes use of rich.colors.short function.

shadecol: Optional vector of colors to be used for shading uncertainty intervals. The default (NULL) is to use the same colors provided by col (either the default or a user-chosen input) and make them more transparent by applying the shadealpha input as an alpha transparency value (using the adjustcolor() function)

pch: Optional vector of plot character values

lty: Optional vector of line types

lwd: Optional vector of line widths

spacepoints: Number of years between points shown on top of lines (for long timeseries, points every year get mashed together)

staggerpoints: Number of years to stagger the first point (if spacepoints > 1) for each line (so that adjacent lines have points in different years)
**initpoint**
Year value for first point to be added to lines. Points added to plots are those that satisfy \((Yr - \text{initpoint}) \times \% \times \text{spacepoints} = (\text{staggerpoints} \times \text{iline}) \times \% \times \text{spacepoints}\).

**tickEndYr**
TRUE/FALSE switch to turn on/off extra axis mark at final year in timeseries plots.

**shadeForecast**
TRUE/FALSE switch to turn on/off shading of years beyond the maximum ending year of the models.

**xlim**
Optional x limits.

**ylimAdj**
Multiplier for ylim parameter. Allows additional white space to fit legend if necessary. Default=1.05.

**xaxs**
Choice of xaxs parameter (see ?par for more info).

**yaxs**
Choice of yaxs parameter (see ?par for more info).

**type**
Type parameter passed to points (default 'o' overplots points on top of lines).

**uncertainty**
Show plots with uncertainty intervals? Either a single TRUE/FALSE value, or a vector of TRUE/FALSE values for each model, or a set of integers corresponding to the choice of models.

**shadealpha**
Transparency adjustment used to make default shadecol values (implemented as \(\text{adjustcolor}(\text{col} = \text{col}, \text{alpha.f} = \text{shadealpha})\)).

**legend**
Add a legend?

**legendlabels**
Optional vector of labels to include in legend. Default is 'model1', 'model2', etc.

**legendloc**
Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.

**legendorder**
Optional vector of model numbers that can be used to have the legend display the model names in an order that is different than that which is represented in the summary input object.

**legendncol**
Number of columns for the legend.

**sprtarg**
Target value for SPR-ratio where line is drawn in the SPR plots and phase plot.

**btarg**
Target biomass value at which to show a line (set to 0 to remove).

**minbthresh**
Minimum biomass threshold at which to show a line (set to 0 to remove).

**pwidth**
Default width of plots printed to files in units of \(\text{punits}\). The default is \(\text{pwidth}=6.5\).

**pheight**
Height of plots printed to png files in units of \(\text{punits}\). Default is designed to allow two plots per page, with \(\text{pheight}\_\text{tall}\) used for plots that work best with a taller format and a single plot per page.

**punits**
Units for \(\text{pwidth}\) and \(\text{pheight}\). Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is \(\text{punits}="\text{in}"\).

**res**
Resolution of plots printed to files. The default is \(\text{res}=300\).

**ptsize**
Point size for plotted text in plots printed to files (see help("png") in R for details).

**plotdir**
Directory where PNG or PDF files will be written. By default it will be the directory where the model was run.

**filenameprefix**
Additional text to append to PNG or PDF file names. It will be separated from default name by an underscore.
densitynames  Vector of names (or subset of names) of parameters or derived quantities contained in summaryoutput[["pars"]] or summaryoutput[["quants"]] for which to make density plots

densityxlabs  Optional vector of x-axis labels to use in the density plots (must be equal in length to the printed vector of quantities that match the densitynames input)

densityscalex  Scalar for upper x-limit in density plots (values below 1 will cut off the right tail to provide better contrast among narrower distributions)

densityscaley  Scalar for upper y-limit in density plots (values below 1 will cut off top of highest peaks to provide better contrast among broader distributions)

densityadjust  Multiplier on bandwidth of kernel in density function used for smoothing MCMC posteriors. See 'adjust' in ?density for details.

densitysymbols  Add symbols along lines in density plots. Quantiles are c(0.025, 0.1, 0.25, 0.5, 0.75, 0.9, 0.975).

densitytails  Shade tails outside of 95% interval darker in density plots?

densitymiddle  Shade middle inside of 95% interval darker in density plots?

densitylwd  Line width for density plots

fix0  Always include 0 in the density plots?

new  Create new empty plot window

add  Allows single plot to be added to existing figure. This needs to be combined with specific 'subplots' input to make sure only one thing gets added.

par  list of graphics parameter values passed to the par function

verbose  Report progress to R GUI?

mcmcVec  Vector of TRUE/FALSE values (or single value) indicating whether input values are from MCMC or to use normal distribution around MLE

show_equilibrium  Whether to show the equilibrium values for SSB. For some model comparisons, these might not be comparable and thus useful to turn off. Defaults to TRUE.

Author(s)

Ian G. Taylor, John R. Wallace

See Also

SS_plots(), SSsummarize(), SS_output(), SSgetoutput()

Examples

## Not run:
# directories where models were run need to be defined
dir1 <- "c:/SS/mod1"
dir2 <- "c:/SS/mod2"

# read two models
mod1 <- SS_output(dir = dir1)
mod2 <- SS_output(dir = dir2)

# create list summarizing model results
mod.sum <- SSsummarize(list(mod1, mod2))

# plot comparisons
SSPlotComparisons(mod.sum, legendlabels = c("First model", "Second model"))

# Example showing comparison of MLE to MCMC results where the mcmc would have
# been run in the subdirectory 'c:/SS/mod1/mcmc'
mod1 <- SS_output(dir = "c:/SS/mod1", dir.mcmc = "mcmc")
# pass the same model twice to SSsummarize in order to plot it twice
mod.sum <- SSsummarize(list(mod1, mod1))
# compare MLE to MCMC
SSPlotComparisons(mod.sum,
  legendlabels = c("MCMC", "MLE"), 
mcmcVec = c(TRUE, FALSE))

## End(Not run)

SSPlotComps

Plot composition data and fits.

Description

Plot composition data and fits from Stock Synthesis output. Multi-figure plots depend on make_multifig.

Usage

SSPlotComps(
  replist,
  subplots = c(1:10, 21, 24),
  kind = "LEN",
  sizemethod = 1,
  aalyear = -1,
  aalbin = -1,
  plot = TRUE,
  print = FALSE,
  fleets = "all",
  fleetnames = "default",
  sexes = "all",
  yupper = 0.4,
  datonly = FALSE,
  samplesizeplots = TRUE,
  comresidplots = TRUE,
  bub = FALSE,
showyears = TRUE,
showsampsize = TRUE,
showeffN = TRUE,
aggregates_by_mkt = FALSE,
sampsizeline = FALSE,
effNline = FALSE,
minnbubble = 3,
pntscalar = NULL,
scalebubbles = FALSE,
cexZ1 = 1.5,
bublegend = TRUE,
colvec = c(rgb(1, 0, 0, 0.7), rgb(0, 0, 1, 0.7), rgb(0.1, 0.1, 0.1, 0.7)),
linescol = c(rgb(0, 0.5, 0, 0.7), rgb(0.8, 0, 0, 0.7), rgb(0, 0, 0.8, 0.7)),
xlas = 0,
ylas = NULL,
axis1 = NULL,
axis2 = NULL,
axis1labs = NULL,
sizebinlabs = NULL,
blue = rgb(0, 0, 1, 0.7),
red = rgb(1, 0, 0, 0.7),
pwidth = 6.5,
pheight = 6.5,
punits = "in",
ptsize = 10,
res = 300,
plotdir = "default",
cex.main = 1,
linepos = 1,
fitbar = FALSE,
do.sqrt = TRUE,
smooth = TRUE,
cohortlines = c(),
labels = c("Length (cm)", "Age (yr)", "Year", "Observed sample size", 
"Effective sample size", "Proportion", "cm", "Frequency", "Weight", "Length", "(mt)", 
"(numbers x1000)", "Stdev (Age)", "Conditional AAL plot", ", "Size bin"),
printmkt = TRUE,
printsex = TRUE,
maxrows = 6,
maxcols = 4,
maxrows2 = 4,
maxcols2 = 4,
rows = 1,
cols = 1,
andre_oma = c(3, 0, 3, 0),
andrerows = 4,
fixdims = TRUE,
fixdims2 = FALSE,
maxneff = 5000,
verbose = TRUE,
scalebins = FALSE,
addMeans = TRUE,
mainTitle = FALSE,
... 
)

Arguments

replist A list object created by `SS_output()`.

subplots vector controlling which subplots to create Numbering of subplots is as follows, where subplots 21 to 24 (aggregated across years) are provided first, and subplots 1 to 10 are all repeated for each fleet

  - 1 index data by fleet
  - 1 multi-panel composition plot
  - 2 single panel bubble plot for numbers at length or age
  - 3 multi-panel bubble plots for conditional age-at-length
  - 4 multi-panel plot of fit to conditional age-at-length for specific years
  - 5 Pearson residuals for A-L key
  - 6 multi-panel plot of point and line fit to conditional age-at-length for specific length bins
  - 7 sample size plot
  - 8 TA1.8 Francis weighting plot
  - 9 TA1.8 Francis weighting plot for conditional data
  - 10 Andre’s mean age and std. dev. in conditional AAL

  - 21 composition by fleet aggregating across years
  - 22 composition by fleet aggregating across years within each season
  - 23 composition by fleet aggregating across seasons within a year
  - 24 bubble plot comparison of length or age residuals

kind indicator of type of plot can be "LEN", "SIZE", "AGE", "cond", "GSTAGE", "GSTLEN", "L@A", or "W@A".

sizemethod if kind = "SIZE" then this switch chooses which of the generalized size bin methods will be plotted.

aalyear Years to plot multi-panel conditional age-at-length fits for all length bins; must be in a "c(YYYY,YYYY)" format. Useful for checking the fit of a dominant year class, critical time period, etc. Default=-1.

aalbin The length bin for which multi-panel plots of the fit to conditional age-at-length data will be produced for all years. Useful to see if growth curves are ok, or to see the information on year classes move through the conditional data. Default=-1.

plot plot to active plot device?

print print to PNG files?

fleets optional vector to subset fleets for which plots will be made
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>fleetnames</td>
<td>optional vector of fleet names to put in the labels</td>
</tr>
<tr>
<td>sexes</td>
<td>which sexes to show plots for. Default=&quot;all&quot; which will include males,</td>
</tr>
<tr>
<td></td>
<td>females, and unsexed. This option is not fully implemented for all plots.</td>
</tr>
<tr>
<td>yupper</td>
<td>upper limit on ymax for polygon/histogram composition plots</td>
</tr>
<tr>
<td>datonly</td>
<td>make plots of data without fits?</td>
</tr>
<tr>
<td>samplesizeplots</td>
<td>make sample size plots?</td>
</tr>
<tr>
<td>compresidplots</td>
<td>make plots of residuals for fit to composition data?</td>
</tr>
<tr>
<td>bub</td>
<td>make bubble plot for numbers at age or size?</td>
</tr>
<tr>
<td>showyears</td>
<td>Add labels for years to sample size plots?</td>
</tr>
<tr>
<td>showsampsize</td>
<td>add sample sizes to plot</td>
</tr>
<tr>
<td>showeffN</td>
<td>add effective sample sizes to plot</td>
</tr>
<tr>
<td>aggregates_by_mkt</td>
<td>separate plots of aggregates across years into different plots for each</td>
</tr>
<tr>
<td></td>
<td>market category (retained, discarded)?</td>
</tr>
<tr>
<td>sampsizeline</td>
<td>show line for input sample sizes on top of conditional age-at-length plots</td>
</tr>
<tr>
<td></td>
<td>(TRUE/FALSE, still in development)</td>
</tr>
<tr>
<td>effNline</td>
<td>show line for effective sample sizes on top of conditional age-at-length</td>
</tr>
<tr>
<td></td>
<td>plots (TRUE/FALSE, still in development)</td>
</tr>
<tr>
<td>minnbubble</td>
<td>number of unique x values before adding buffer. see ?bubble3 for more info.</td>
</tr>
<tr>
<td>pntscalar</td>
<td>This scalar defines the maximum bubble size for bubble plots. This option</td>
</tr>
<tr>
<td></td>
<td>is still available but a better choice is to use cexZ1 which allow the</td>
</tr>
<tr>
<td></td>
<td>same scaling throughout all plots.</td>
</tr>
<tr>
<td>scalebubbles</td>
<td>scale data-only bubbles by sample size, not just proportion within sample?</td>
</tr>
<tr>
<td></td>
<td>Default=FALSE.</td>
</tr>
<tr>
<td>cexZ1</td>
<td>Character expansion (cex) for point associated with value of 1.</td>
</tr>
<tr>
<td>bublegend</td>
<td>Add legend with example bubble sizes to bubble plots.</td>
</tr>
<tr>
<td>colvec</td>
<td>Vector of length 3 with colors for females, males, unsexed fish</td>
</tr>
<tr>
<td>linescol</td>
<td>Color for lines on top of polygons</td>
</tr>
<tr>
<td>xlas</td>
<td>label style (las) input for x-axis. Default 0 has horizontal labels, input</td>
</tr>
<tr>
<td></td>
<td>2 would provide vertical lables.</td>
</tr>
<tr>
<td>ylas</td>
<td>label style (las) input for y-axis. Default NULL has horizontal labels</td>
</tr>
<tr>
<td></td>
<td>when all labels have fewer than 6 characters and vertical otherwise. Input</td>
</tr>
<tr>
<td></td>
<td>0 would force vertical labels, and 1 would force horizontal.</td>
</tr>
<tr>
<td>axis1</td>
<td>optional position of bottom axis values</td>
</tr>
<tr>
<td>axis2</td>
<td>optional position of left size axis values</td>
</tr>
<tr>
<td>axis1labs</td>
<td>optional vector of labels for axis1 (either NULL or needs to match length</td>
</tr>
<tr>
<td></td>
<td>of axis1)</td>
</tr>
<tr>
<td>sizebinlabs</td>
<td>Vector of size bin labels corresponding to the generalized size frequency</td>
</tr>
<tr>
<td>blue</td>
<td>What color to use for males in bubble plots (default is slightly transparent</td>
</tr>
</tbody>
</table>
red
What color to use for females in bubble plots (default is slightly transparent red)
pwidth
Default width of plots printed to files in units of punits. The default is pwidth=6.5
pheight
Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with pheight_tall used for plots that work best with a taller format and a single plot per page.
punits
Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is punits="in".
ptsize
Point size for plotted text in plots printed to files (see help("png") in R for details).
res
Resolution of plots printed to files. The default is res = 300.
plotdir
directory where PNG files will be written. by default it will be the directory where the model was run.
cex.main
character expansion parameter for plot titles
linepos
should lines be added before points (linepos=1) or after (linepos=2)?
fitbar
show fit to bars instead of points
do.sqrt
scale bubbles based on sqrt of size vector. see ?bubble3 for more info.
smooth
add loess smoother to observed vs. expected index plots and input vs. effective sample size?
cohortlines
optional vector of birth years for cohorts for which to add growth curves to numbers at length bubble plots
labels
vector of labels for plots (titles and axis labels)
printmkt
show market categories in plot titles?
printsex
show sex in plot titles?
maxrows
maximum (or fixed) number or rows of panels in the plot
maxcols
maximum (or fixed) number or columns of panels in the plot
maxrows2
maximum number of rows for conditional age at length plots
maxcols2
maximum number of columns for conditional age at length plots
rows
number or rows to return to as default for next plots to come or for single plots
cols
number or cols to return to as default for next plots to come or for single plots
andre_oma
Outer margins passed to Andre's multi-panel conditional age-at-length plots.
andrerows
Number of rows of Andre's conditional age-at-length plots within each page. Default=3.
fixdims
fix the dimensions at maxrows by maxcols or resize based on number of years of data
fixdims2
fix the dimensions at maxrows by maxcols in aggregate plots or resize based on number of fleets
maxneff
the maximum value to include on plots of input and effective sample size. Occasionally a calculation of effective N blows up to very large numbers, rendering it impossible to observe the relationship for other data. Default=5000.
verbose
return updates of function progress to the R GUI?
scalebins  
Rescale expected and observed proportions by dividing by bin width for models where bins have different widths? Caution!: May not work correctly in all cases.

addMeans  
Add parameter means in addition to medians for MCMC posterior distributions in which the median and mean differ.

mainTitle  
Logical indicating if a title for the plot should be produced

...  
additional arguments that will be passed to the par command in the make_multifig() function.

Author(s)
Ian Taylor

See Also
SS_plots(), make_multifig()

SSplotData  
Timeline of presence/absence of data by type, year, and fleet.

Description
Plot shows graphical display of what data is being used in the model. Some data types may not yet be included. Note, this is based on output from the model, not the input data file.

Usage
SSplotData(
  replist,  
  plot = TRUE,  
  print = FALSE,  
  plotdir = "default",  
  subplot = 1:2,  
  fleetcol = "default",  
  datatypes = "all",  
  fleets = "all",  
  fleetnames = "default",  
  ghost = FALSE,  
  pwidth = 6.5,  
  pheight = 5,  
  punits = "in",  
  res = 300,  
  psize = 10,  
  cex.main = 1,  
  margins = c(5.1, 2.1, 2.1, 8.1),  
  cex = 2,  
  lwd = 12,
maxsize = 1,
alphasize = 1,
mainTitle = FALSE,
verbose = TRUE
)

Arguments
replist A list object created by SS_output()
plot plot to active plot device?
print print to PNG files?
plotdir directory where PNG files will be written. By default it will be the directory where the model was run.
subplot vector controlling which subplots to create. Currently there are only 2 subplots:
  • 1 equal size points showing presence/absence of data type by year/fleet
  • 2 points scaled to indicate quantity or precision of data
fleetcol Either the string "default", or a vector of colors to use for each fleet. If tagging data is included, an additional color needs to be added for the tag releases which are not assigned to a fleet.
datatypes Either the string "all", or a vector including some subset of the following: "catch", "cpue", "lendbase", "sizedbase", "agedbase", "condbase", "ghostagedbase", "ghostcondbase", "ghostlendbase", "ladvbase", "wadbase", "mnwgt", "discard", "tagrelease", and "tagdbase1".
fleets Either the string "all", or a vector of numerical values, like c(1,3), listing fleets or surveys to be included in the plot.
fleetnames A vector of alternative names to use in the plot. By default the parameter names in the data file are used.
ghost TRUE/FALSE indicator for whether to show presence of composition data from ghost fleets (data for which the fit is shown, but is not included in the likelihood calculations).
pwidth width of plot
pheight height of plot
punits units for PNG file
res Resolution of plots printed to files. The default is res = 300.
ptsize point size for PNG file
cex.main character expansion for plot titles
margins margins of plot (passed to par() function), which may need to be increased if fleet names run off right-hand margin
cex Character expansion for points showing isolated years of data
lwd Line width for lines showing ranges of years of data
maxsize The size (cex) of the largest bubble in the datasize plot. Default is 1.
alphasize The transparency of the bubbles in the datasize plot. Defaults to 1 (no transparency). Useful for models with lots of overlapping points.
mainTitle TRUE/FALSE switch to turn on/off the title on the plot.
verbose report progress to R GUI?
SSplotDiscard

Author(s)
Ian Taylor, Chantel Wetzel, Cole Monnahan

See Also
SS_plots(), SS_output(), SS_readdat()

SSplotDiscard  Plot fit to discard fraction.

Description
Plot fit to discard fraction from Stock Synthesis output file.

Usage
SSplotDiscard(
  replist,
  subplots = 1:2,
  plot = TRUE,
  print = FALSE,
  plotdir = "default",
  fleets = "all",
  fleetnames = "default",
  datplot = FALSE,
  labels = c("Year", "Discard fraction", "Total discards", "for"),
  yhi = 1,
  ymax = NULL,
  col1 = "blue",
  col2 = "black",
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  verbose = TRUE
)

Arguments
replist  A list object created by SS_output().
subplots  Vector of which plots to make (1 = data only, 2 = with fit). If plotdat = FALSE then subplot 1 is not created, regardless of choice of subplots.
plot  Plot to active plot device?
print  Print to PNG files?
SSplotDynamicB0

plotdir Directory where PNG files will be written. by default it will be the directory where the model was run.

fleets Optional vector to subset fleets for which plots will be made

fleetnames Optional replacement for fleenames used in data file

datplot Make data-only plot of discards? This can override the choice of subplots.

labels Vector of labels for plots (titles and axis labels)

yhi Maximum y-value which will always be included in the plot (all data included regardless). Default = 1 so that discard fractions are always plotted on a 0-1 range, but total discard amounts which are greater than this value will exceed it.

ymax Optional maximum y-value to include (useful if upper tails on discard amounts are very high)

col1 First color to use in plot (for expected values)

col2 Second color to use in plot (for observations and intervals)

width Width of plot

pheight Height of plot

punits Units for PNG file

res Resolution of plots printed to files. The default is res = 300.

ptsize Point size for PNG file

cex.main Character expansion for plot titles

verbose Report progress to R GUI?

Author(s)

Ian G. Taylor, Ian J. Stewart, Robbie L. Emmet

See Also

SS_plots()

SSplotDynamicB0  Plot Dynamic B0

Description

Plots the spawning output with and without fishing mortality
Usage

SSplotDynamicB0(
  replist,
  ylab = "Spawning biomass (mt)",
  equilibrium = TRUE,
  forecast = FALSE,
  yrs = "all",
  plot = TRUE,
  print = FALSE,
  plotdir = "default",
  verbose = TRUE,
  uncertainty = TRUE,
  legend = TRUE,
  legendlabels = c("equilibrium", "without fishing", "with fishing"),
  legendloc = "bottom",
  col = c("blue", "red"),
  lty = 1,
  lwd = 2,
  add = FALSE,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  mainTitle = FALSE,
  mar = NULL
)

Arguments

replist A list object created by SS_output().
ylab Y-axis label. Default is "Spawning biomass (mt)" which is replaced by "Spawning output" for models with replist[["SpawnOutputUnits"]][="numbers"
equilibrium Show equilibrium in plot? Applies whether "yrs" is specified or not.
forecast Show forecast years in plot? Only applies if yrs = "all".
yrs Which years to include. Default "all" will show startyr to endyr + 1 modified by the arguments forecast.
plot Plot to active plot device?
print Print to PNG files?
plotdir Directory where PNG files will be written. By default it will be the directory where the model was run.
verbose A logical value specifying if output should be printed to the screen.
uncertainty Show 95% uncertainty intervals around point estimates? These intervals will only appear when uncertainty in the dynamic B0 estimates is available via the control file settings for "read specs for more stddev reporting".
legend
Add a legend?

legendlabels
Character vector with labels for the unfished equilibrium point (if equilibrium = TRUE) and the two lines showing spawning biomass or output without and with fishing.

legendloc
Location of legend. Either a string like "topleft" or a vector of two numeric values representing the fraction of the maximum in the x and y dimensions, respectively. See help("legend") for more info on the string options.

col
Optional vector of colors to be used for the two lines (single value will apply to both lines).

ty
Optional vector of line types to be used for the two lines (single value will apply to both lines).

dlwd
Optional vector of line widths to be used for the two lines (single value will apply to both lines).

add
add to existing plot

pwidth
Default width of plots printed to files in units of punits. The default is pwidth=6.5.

pheight
Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with pheight_tall used for plots that work best with a taller format and a single plot per page.

punits
Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is punits="in".

res
Resolution of plots printed to files. The default is res = 300.

ptsize
Point size for plotted text in plots printed to files (see help("png") in R for details).

mainTitle
Logical indicating if a title should be included at the top (not yet implemented for all plots)

mar
Either NULL to allow the default (which depends on whether the main title is included or not) or a numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot, which is passed to par().

Author(s)
Ian G. Taylor

See Also
SSplotTimeseries()
SSplotIndices

Plot indices of abundance and associated quantities.

Description

Plot indices of abundance with or without model fit as well as other diagnostic plots such as observed vs. expected index and plots related to time-varying catchability (if present).

Usage

SSplotIndices(
  replist,
  subplots = c(1:10, 12),
  plot = TRUE,
  print = FALSE,
  fleets = "all",
  fleetnames = "default",
  smooth = TRUE,
  add = FALSE,
  datplot = TRUE,
  labels = c("Year", "Index", "Observed index", "Expected index", "Log index", "Log observed index", "Log expected index", "Standardized index", "Catchability (Q)", "Time-varying catchability", "Vulnerable biomass", "Catchability vs. vulnerable biomass", "Residual", "Deviation"),
  fleetcols = NULL,
  col1 = "default",
  col2 = "default",
  col3 = "blue",
  col4 = "red",
  pch1 = 21,
  pch2 = 16,
  cex = 1,
  bg = "white",
  legend = TRUE,
  legendloc = "topright",
  seasnames = NULL,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  mainTitle = FALSE,
  plotdir = "default",
  minyr = NULL,
  maxyr = NULL,
  maximum_ymax_ratio = Inf,
)
show_input_uncertainty = TRUE,
verbose = TRUE,

Arguments

replist A list object created by \texttt{SS_output()}. 

subplots vector controlling which subplots to create Numbering of subplots is as follows, where subplot 9 (comparison of all indices) is provided first:
- 1 index data by fleet
- 2 index data with fit by fleet
- 3 observed vs expected index values with smoother
- 4 index data by fleet on a log scale (lognormal error only)
- 5 index data with fit by fleet on a log scale (lognormal error only)
- 6 log(observed) vs log(expected) with smoother (lognormal error only)
- 7 time series of time-varying catchability (only if actually time-varying)
- 8 catchability vs. vulnerable biomass (if catchability is not constant)
- 9 comparison of all indices
- 10 index residuals based on total uncertainty
- 11 index residuals based on input uncertainty (not currently provided)
- 12 index deviations (independent of index uncertainty)

plot plot to active plot device?

print print to PNG files?
fleets optional vector to subset fleets for which plots will be made
fleetnames optional replacement for fleenames used in data file
smooth add smoothed line to plots of observed vs. expected sample sizes
add add to existing plot (not yet implemented)
datplot make plot of data only?
lables vector of labels for plots (titles and axis labels)
fleetcols vector of colors for all fleets (including those with no index data)
col1 vector of colors for points in each season for time series plot. Default is red for single season models and a rainbow using the \texttt{rich.colors.short} function for multiple seasons.
col2 vector of colors for points in each season for obs. vs. exp. plot. Default is blue for single season models and a rainbow using the \texttt{rich.colors.short} function for multiple seasons.
col3 color of line showing expected index in time series plot. Default is blue.
col4 color of smoother shown in obs. vs. exp. plots. Default is blue.
pch1 single value or vector of plotting characters (pch parameter) for time-series plots of index fit. Default=21.
**SSplotIndices**

- **pch2**
  - single value or vector of plotting characters (pch parameter) for sample size plots of index fit. Default=16.

- **cex**
  - character expansion factor for points showing observed values. Default=1.

- **bg**
  - Background color for points with pch=21.

- **legend**
  - add a legend to seasonal colors (only for seasonal models)

- **legendloc**
  - add a legend to seasonal colors (default is "topright")

- **seasnames**
  - optional vector of names for each season to replace defaults if a legend is used

- **pwidth**
  - width of plot

- **pheight**
  - height of plot

- **punits**
  - units for PNG file

- **res**
  - Resolution of plots printed to files. The default is \( \text{res} = 300 \).

- **ptsize**
  - point size for PNG file

- **cex.main**
  - character expansion for plot titles

- **mainTitle**
  - switch which allows the plot title to be left off

- **plotdir**
  - directory where PNG files will be written. by default it will be the directory where the model was run.

- **minyr**
  - First year to show in plot (for zooming in on a subset of values)

- **maxyr**
  - Last year to show in plot (for zooming in on a subset of values)

- **maximum_ymax_ratio**
  - Maximum allowed value for ymax (specified as ratio of y), which overrides any value of ymax that is greater (default = Inf)

- **show_input_uncertainty**
  - Switch controlling whether to add thicker uncertainty interval lines indicating the input uncertainty relative to the total uncertainty which may result from estimating a parameter for extra standard deviations. This is only added for the plots with index fit included (the data-only plots only show the input uncertainty).

- **verbose**
  - report progress to R GUI?

- **...**
  - Extra arguments to pass to calls to plot

**Author(s)**

Ian Stewart, Ian Taylor, James Thorson

**See Also**

SS_plots(), SS_output()
SSplotMCMC_ExtraSelex  Plot uncertainty around chosen selectivity ogive from MCMC.

Description

Plot uncertainty in selectivity from an MCMC output for whichever fleet/year was chosen in the optional extra "more stddev reporting"

Usage

SSplotMCMC_ExtraSelex(
  post,
  add = FALSE,
  nsexes = 1,
  shift = 0,
  fleetname = "default",
  col = "blue"
)

Arguments

post  A data frame containing either derived_posteriors.sso or a good subset of it. This can be an element of the list created by the the SSgetMCMC() function.
add     TRUE/FALSE option to add results to an existing plot.
nsexes  Number of sexes in the model (should match model values but is only used in the title).
shift   Optional adjustment to the x values to avoid overlap of intervals when overplotting on an existing plot.
fleetname  Optional input to make the title better. Default will be something like "Fleet 1", using the numbering from the model.
col     Color for points and lines.

Author(s)

Ian Taylor
SSplotMnwt  \hspace{2em} \textit{Plot mean weight data and fits.}

Description

Plot mean weight data and fits from Stock Synthesis output. Intervals are based on T-distributions as specified in model.

Usage

SSplotMnwt(
  replist,
  subplots = 1:2,
  ymax = NULL,
  plot = TRUE,
  print = FALSE,
  fleets = "all",
  fleetnames = "default",
  datplot = FALSE,
  labels = c("Year", "discard", "retained catch", "whole catch",
            "Mean individual body weight (kg)", "Mean weight in", "for"),
  col1 = "blue",
  col2 = "black",
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  plotdir = "default",
  verbose = TRUE
)

Arguments

replist   \hspace{1em} A list object created by \texttt{SS_output()}.  
subplots \hspace{1em} Vector of which plots to make (1 = data only, 2 = with fit). If plotdat = FALSE then subplot 1 is not created, regardless of choice of subplots.  
ymax \hspace{1em} Optional input to override default ymax value.  
plot \hspace{1em} plot to active plot device?  
print \hspace{1em} print to PNG files?  
fleets \hspace{1em} optional vector to subset fleets for which plots will be made  
fleetnames \hspace{1em} optional replacement for fleenames used in data file  
datplot \hspace{1em} Make data-only plot of discards? This can override the choice of subplots.  
labels \hspace{1em} vector of labels for plots (titles and axis labels)
SSplotMovementMap

col1     first color to use in plot (for expected values)
col2     second color to use in plot (for observations and intervals)
pwidth   width of plot
pheight  height of plot
punits   units for PNG file
res      Resolution of plots printed to files. The default is \( \text{res} = 300 \).
ptsize   point size for PNG file
cex.main character expansion for plot titles
plotdir  directory where PNG files will be written. by default it will be the directory where the model was run.
verbose  report progress to R GUI?

Author(s)

Ian Taylor, Ian Stewart

See Also

SSplots(), SS_output()

SSplotMovementMap

Show movement rates on a map.

Description

Make a map with colored spatial cells and add arrows representing movement rates between cells.

Usage

SSplotMovementMap(
  replist = NULL,
  xlim, ylim,
  polygonlist, colvec,
  land = "grey",
  xytable = NULL,
  moveage = 5,
  moveseas = 1,
  lwdscale = 5,
  legend = TRUE,
  title = NULL,
  areanames = NULL,
  cex = 1
)
Arguments

replist  A list object created by \texttt{SS_output()}.  
xlim    range of longitude values in the map  
ylim    range of latitude values in the map  
polygonlist  a list of data frames, each with two columns representing the longitude and latitude values of the colored polygons. The order of elements in the list should match the numbering of areas in the SS model.  
colvec vector of colors for each polygon (if replist is provided)  
land    color of landmasses in the map  
xytable data frame of latitude and longitude values which will be connected by the arrows representing movement rates. The order should match the order of areas in polygonlist and in the SS model. Not necessary if no arrows are shown on the map.  
movage age for which movement rates will be represented  
moveseas season for which movement rates will be represented  
lwdscale scaling factor for arrows in the plot. The largest rate of movement shown will be scaled to have a line width equal to this value.  
legend add a legend to show the movement rate associated with the widest arrows  
title   optional title to be added above map  
areanames optional vector of names to be shown on map at coordinates matching xytable values  
cex    character expansion to apply to text shown by areanames (if used)

Note

Inspired by plots of MULTIFAN-CL movement patterns presented by Adam Langley

Author(s)

Ian Taylor

See Also

\texttt{SS_output()}, \texttt{SSplotMovementRates()}
SSplotMovementRates  

Plot movement rates from model output

Description

Plots estimated movement rates in final year for each area/season with movement as reported in Report.sso. If movement is time-varying, an additional figure shows pattern across years (if the MGparm_By_Year_after_adjustments table (report:7) is available in the Report.sso file)

Usage

SSplotMovementRates(
  replist,
  plot = TRUE,
  print = FALSE,
  subplots = 1:2,
  plotdir = "default",
  colvec = "default",
  ylim = "default",
  legend = TRUE,
  legendloc = "topleft",
  moveseas = "all",
  min.move.age = 0.5,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  verbose = TRUE
)

Arguments

replist  A list object created by SS_output().
plot     plot to active plot device?
print    print to PNG files?
subplots which subplots to create.
plotdir  where to put the plots (uses model directory by default)
colvec   vector of colors for each movement rate in the plot
ylim     optional input for y range of the plot. By default plot ranges from 0 to 10% above highest movement rate (not including fish staying in an area).
legend   add a legend designating which color goes with which pair of areas?
legendloc location passed to legend function (if used)
**SSplotNumbers**

Plot numbers-at-age related data and fits.

### Description

Plot numbers-at-age related data and fits from Stock Synthesis output. Plots include bubble plots, mean age, equilibrium age composition, sex-ratio, and ageing imprecision patterns.

### Usage

```r
SSplotNumbers(
  replist,
  subplots = c(1:10),
  plot = TRUE,
  print = FALSE,
  numbers.unit = 1000,
  areas = "all",
  areanames = "default",
  areacols = "default",
  pntscalar = 2.6,
)```

### Parameters

- `moveses`: choice of season for which movement rates are shown
- `min.move.age`: Minimum age of movement (in future will come from Report file)
- `pwidth`: width of plot
- `pheight`: height of plot
- `punits`: units for PNG file
- `res`: Resolution of plots printed to files. The default is `res = 300`.
- `ptsize`: point size for PNG file
- `cex.main`: Character expansion parameter for plot titles
- `verbose`: Print information on function progress.

### Author(s)

Ian Taylor

### See Also

`SS_output()`, `SSplotMovementRates()`.

### Examples

```r
## Not run:
SSplotMovementRates(myreplist)
## End(Not run)
```
SSplotNumbers

bub.bg = gray(0.5, alpha = 0.5),
bublegend = TRUE,
period = c("B", "M"),
meanlines = TRUE,
add = FALSE,
labels = c("Year", "Age", "True age (yr)", "SD of observed age (yr)",
"Mean observed age (yr)", "Mean age (yr)", "mean age in the population",
"Ageing imprecision", "Numbers at age at equilibrium",
"Equilibrium age distribution", "Fraction female in numbers at age", "Length",
"Mean length (cm)", "mean length (cm) in the population", "expected numbers at age",
"Beginning of year", "Middle of year", "expected numbers at length",
"Fraction female in numbers at length"),
pwidth = 6.5,
pheight = 6.5,
punits = "in",
res = 300,
ptsize = 10,
cex.main = 1,
plotdir = "default",
mainTitle = FALSE,
verbose = TRUE
)

Arguments

replist A list object created by SS_output().

subplots vector controlling which subplots to create Numbering of subplots is as follows,

- 1: Expected numbers at age
- 2: Mean age in the population
- 3: Fraction female in numbers at age
- 4: Equilibrium age distribution
- 5: Ageing imprecision: SD of observed age (plot using image() formerly included in this group but now replaced by better distribution plots)
- 6: Expected numbers at length
- 7: Mean length in the population
- 8: Fraction female in numbers at length
- 9: no plot yet
- 10: Distribution of observed age at true age by ageing error type

plot plot to active plot device?

print print to PNG files?

numbers.unit Units for numbers. Default (based on typical Stock Synthesis setup) is thousands (numbers.unit=1000).

areas optional subset of areas to plot for spatial models

areanames names for areas. Default is to use Area1, Area2,...

areacols vector of colors by area
SSplotPars

pntscalar  maximum bubble size for bubble plots; each plot scaled independently based on this maximum size and the values plotted. Often some plots look better with one value and others with a larger or smaller value. Default=2.6

bub.bg  background color for bubbles (no control over black border at this time)
bublegend  Add legend with example bubble sizes?
period  indicator of whether to make plots using numbers at age just from the beginning ("B") or middle of the year ("M") (new option starting with SSv3.11)
meanlines  add lines for mean age or length on top of bubble plots
add  add to existing plot? (not yet implemented)
labels  vector of labels for plots (titles and axis labels)
pwidth  Default width of plots printed to files in units of punits. The default is pwidth=6.5.
pheight  Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with pheight_tall used for plots that work best with a taller format and a single plot per page.
punits  Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is punits="in".
res  Resolution of plots printed to files. The default is res = 300.
ptsize  Point size for plotted text in plots printed to files (see help("png") in R for details).
cex.main  character expansion for plot titles
plotdir  directory where PNG files will be written. by default it will be the directory where the model was run.
mainTitle  Logical indicating if a title should be included at the top
verbose  report progress to R GUI?

Author(s)

Ian Stewart, Ian Taylor

See Also

SS_output(), SS_plots()

SSplotPars  
Plot distributions of priors, posteriors, and estimates.

Description

Make multi-figure plots of prior, posterior, and estimated asymptotic parameter distributions. MCMC not required to make function work.
SSplotPars

Usage

SSplotPars(
  replist,
  plotdir = NULL,
  xlab = "Parameter value",
  ylab = "Density",
  showmle = TRUE,
  showpost = TRUE,
  showprior = TRUE,
  showinit = TRUE,
  showdev = FALSE,
  showlegend = TRUE,
  fitrange = FALSE,
  xaxis = "i",
  xlim = NULL,
  ylim = NULL,
  verbose = TRUE,
  debug = FALSE,
  nrows = 4,
  ncols = 2,
  ltyvec = c(1, 1, 3, 4),
  colvec = c("blue", "red", "black", "gray60", rgb(0, 0, 0, 0.5)),
  add = FALSE,
  plot = TRUE,
  print = FALSE,
  pwidth = 6.5,
  pheight = 6.5,
  punits = "in",
  ptsize = 10,
  res = 300,
  strings = NULL,
  exact = FALSE,
  newheaders = NULL
)

Arguments

replist A list object created by \texttt{SS_output}().
plotdir A path to the folder where the plots will be saved. The default is \texttt{NULL}, which leads to the plots being created in the folder that contains the results.
xlab Label on horizontal axis.
ylab Label on vertical axis.
showmle Show MLE estimate and asymptotic variance estimate with blue lines?
showpost Show posterior distribution as bar graph if MCMC results are available in \texttt{replist}?
showprior Show prior distribution as black line?
showinit Show initial value as red triangle?
showdev  Include devs in the plot?
showlegend Show the legend?
fitrange  Fit range tightly around MLE & posterior distributions, instead of full parameter range?
xaxs Parameter input for x-axis. See ?par for more info.
xlim Optional x-axis limits to be applied to all plots. Otherwise, limits are based on the model results.
ylim Optional y-axis limits to be applied to all plots. Otherwise, limits are based on the model results.
verbose Controls amount of text output (maybe).
debug Provide additional messages to help with debugging when the function fails.
nrows How many rows in multi-figure plot.
ncols How many columns in multi-figure plot.
ltyvec Vector of line types used for lines showing MLE and prior distributions and the median of the posterior distribution.
colvec Vector of colors used for lines and polygons showing MLE, initial value, prior, posterior, and median of the posterior.
add Add to existing plot?
plot Plot to active plot device?
print Print to PNG files?
pwidth Default width of plots printed to files in units of punits. Default=7.
pheight Default height width of plots printed to files in units of punits. Default=7.
punits Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" or "mm". Default="in".
ptsize Point size for plotted text in plots printed to files (see help("png") in R for details). Default=12.
res Resolution of plots printed to files. The default is res = 300.
strings Subset parameters included in the plot using substring from parameter names (i.e. "SR" will get "SR_LN(R0)" and "SR_steep" if they are both estimated quantities in this model).
exact Should strings input match parameter names exactly? Otherwise substrings are allowed.
newheaders Optional vector of headers for each panel to replace the parameter names.

Author(s)

Ian G. Taylor, Cole C. Monnahan
SSplotProfile

### Examples

```r
## Not run:
# read model results
model <- SS_output(dir = "c:/SS/Simple/")
# make default plots where parameter distribution plots will appear
# in the "pars" tab
SS_plots(model)

# create just the "pars" tab with control of the inputs that are
# passed to SSplotPars
SS_plots(model,
        plot = 25, showmle = TRUE, showpost = TRUE,
        showprior = TRUE, showinit = TRUE, showdev = FALSE, fitrange = FALSE)

# call SSplotPars directly
SSplotPars(replist = model)

# Create plot in custom location. Note that strings can be partial match.
# File name will be "parameter_distributions.png"
# or "parameter_distributions_pageX.png" when they don't all fit on one page
SSplotPars(
    replist = model, strings = c("steep", "R0"),
    nrows = 2, ncols = 1, plot = FALSE, print = TRUE,
    plotdir = file.path(model[['inputs']][["dir"]], "distribution_plots")
)

## End(Not run)
```

---

**SSplotProfile**  
*Plot likelihood profile results*

---

**Description**

Makes a plot of change in negative-log-likelihood for each likelihood component that contributes more than some minimum fraction of change in total.

**Usage**

```r
SSplotProfile(
    summaryoutput,  
    plot = TRUE,  
    print = FALSE,  
    models = "all",  
    profile.string = "steep",  
    profile.label = "Spawner-recruit steepness (h)",  
    exact = FALSE,  
    ylab = "Change in -log-likelihood",
```
minfraction = 0.01,
sort.by.max.change = TRUE,
col = "default",
pch = "default",
lty = 1,
lty.total = 1,
lwd = 2,
lwd.total = 3,
cex = 1,
cex.total = 1.5,
xlim = "default",
ymax = "default",
xaxs = "r",
yaxs = "r",
type = "o",
legend = TRUE,
legendloc = "topright",
pwidth = 6.5,
pheight = 5,
punits = "in",
res = 300,
ptsize = 10,
cex.main = 1,
plotdir = NULL,
add_cutoff = FALSE,
cutoff_prob = 0.95,
verbose = TRUE,
...)
profile.string  Character string used to find parameter over which the profile was conducted. If
exact=FALSE, this can be a substring of one of the SS parameter labels found in
the Report.sso file. For instance, the default input 'steep' matches the parameter
'SR_BH_steep'. If exact=TRUE, then profile.string needs to be an exact match
to the parameter label.

profile.label  Label for x-axis describing the parameter over which the profile was conducted.
exact  Should the profile.string have to match the parameter label exactly, or is a
substring OK.
ylab  Label for y-axis. Default is "Change in -log-likelihood".
components  Vector of likelihood components that may be included in plot. List is further
refined by any components that are not present in model or have little change
over range of profile (based on limit minfraction). Hopefully this doesn’t need
to be changed.

component.labels  Vector of labels for use in the legend that matches the vector in components.
minfraction  Minimum change in likelihood (over range considered) as a fraction of change
in total likelihood for a component to be included in the figure.

sort.by.max.change  Switch giving option to sort components in legend in order of maximum amount
of change in likelihood (over range considered). Default=TRUE.

col  Optional vector of colors for each line.
pch  Optional vector of plot characters for the points.
lty  Line type for the likelihood components.
lty.total  Line type for the total likelihood.
lwd  Line width for the likelihood components.
lwd.total  Line width for the total likelihood.
cex  Character expansion for the points representing the likelihood components.
cex.total  Character expansion for the points representing the total likelihood.
xlim  Range for x-axis. Change in likelihood is calculated relative to values within
this range.
ymax  Maximum y-value. Default is 10% greater than largest value plotted.
xaxs  The style of axis interval calculation to be used for the x-axis (see ?par for more
info)
yaxs  The style of axis interval calculation to be used for the y-axis (see ?par for more
info).
type  Line type (see ?plot for more info).
legend  Include legend?
legendloc  Location of legend (see ?legend for more info).
pwidth  Width of plot
pheight  Height of plot
punits  Units for PNG file
**SSplotRecdevs**

**Description**

Plot recruitment deviations and associated quantities including derived measures related to bias adjustment.

**Usage**

```r
SSplotRecdevs(
  replist,
  subplots = 1:3,
  plot = TRUE,
  print = FALSE,
  add = FALSE,
  uncertainty = TRUE,
  minyr = -Inf,
  maxyr = Inf,
```

**Arguments**

- `res`: Resolution of plots printed to files. The default is `res = 300`.
- `ptsize`: Point size for PNG file
- `cex.main`: Character expansion for plot titles
- `plotdir`: Directory where PNG files will be written. By default it will be the directory where the model was run.
- `add_cutoff`: Add dashed line at ~1.92 to indicate 95% confidence interval based on common cutoff of half of chi-squared of `p=.95` with 1 degree of freedom: `0.5*qchisq(p=cutoff_prob, df=1)`. The probability value can be adjusted using the `cutoff_prob` below.
- `cutoff_prob`: Probability associated with `add_cutoff` above.
- `verbose`: Return updates of function progress to the R GUI? (Doesn’t do anything yet.)
- `...`: Additional arguments passed to the `plot` command.

**Note**

Someday the function `SS_profile()` will be improved and made to work directly with this plotting function, but they don’t yet work well together. Thus, even if `SS_profile()` is used, the output should be read using `SSgetoutput()` or by multiple calls to `SS_output()`.

**Author(s)**

Ian Taylor, Ian Stewart

**See Also**

`SSsummarize()`, `SS_profile()`, `SS_output()`, `SSgetoutput()`
forecastplot = FALSE,
col1 = "black",
col2 = "blue",
col3 = "green3",
col4 = "red",
legendloc = "topleft",
labels = c("Year", "Asymptotic standard error estimate", "Log recruitment deviation",
          "Bias adjustment fraction, 1 - stddev^2 / sigmaR^2"),
pwidth = 6.5,
pheight = 5,
punits = "in",
res = 300,
ptsize = 10,
cex.main = 1,
plotdir = "default",
verbose = TRUE)

Arguments

replist A list object created by \texttt{SS\_output()}.  
subplots vector controlling which subplots to create  
plot plot to active plot device?  
print print to PNG files?  
add add to existing plot (not yet implemented)  
uncertainty include plots showing uncertainty?  
minyr optional input for minimum year to show in plots  
maxyr optional input for maximum year to show in plots  
forecastplot include points from forecast years?  
col1 first color used  
col2 second color used  
col3 third color used  
col4 fourth color used  
legendloc location of legend. see \texttt{?legend} for more info  
labels vector of labels for plots (titles and axis labels)  
pwidth width of plot  
pheight height of plot  
punits units for PNG file  
res Resolution of plots printed to files. The default is \texttt{res = 300}.  
ptsize point size for PNG file  
cex.main character expansion for plot titles  
plotdir directory where PNG files will be written. by default it will be the directory where the model was run.  
verbose report progress to R GUI?
SSplotRecdist

Plot of recruitment distribution among areas and seasons

Description

Image plot shows fraction of recruitment in each combination of area and season. This is based on the RECRUITMENT_DIST section of the Report.sso file.

Usage

SSplotRecdist(
  replist,
  plot = TRUE,
  print = FALSE,
  areanames = NULL,
  seasnames = NULL,
  xlab = "",
  ylab = "",
  main = "Distribution of recruitment by area and season",
  plotdir = "default",
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1,
  verbose = TRUE
)

Arguments

replist  A list object created by SS_output().
plot     plot to active plot device?
print    print to PNG files?
areanames optional vector to replace c("Area1","Area2",...)
seasnames optional vector to replace c("Season1","Season2",...)
xlab     optional x-axis label (if the area names aren\'t informative enough)
ylab     optional y-axis label (if the area names aren\'t informative enough)
**SSplotRetroRecruits**

Make squid plot of retrospectives of recruitment deviations.

### Description

Inspired by Jim Ianelli and named by Sean Cox, the squid plot is a way to examine retrospective patterns in estimation of recruitment deviations.

### Usage

```r
SSplotRetroRecruits(
  retroSummary, endyrvec, cohorts, ylim = NULL, uncertainty = FALSE, labels = c("Recruitment deviation", "Recruitment (billions)", "relative to recent estimate", "Age"), main = "Retrospective analysis of recruitment deviations", mcmcVec = FALSE, devs = TRUE, relative = FALSE, labelyears = TRUE, legend = FALSE, leg.ncols = 4
)
```

---

**Author(s)**

Ian Taylor

**See Also**

`SS_plots()`, `SSplotRecdevs()`
Arguments

retroSummary  List object created by `SSsummarize()` that summarizes the results of a set of retrospective analysis models.
endyrvec  Vector of years representing the final year of values to show for each model.
cohorts  Which cohorts to show in plot.
ylim  Limits of y-axis.
uncertainty  Show uncertainty intervals around lines? (This can get a bit busy.)
labels  Vector of plot labels.
main  Title for plot.
mcmcVec  Either vector of TRUE/FALSE values indicating which models use MCMC. Or single value applied to all models.
devs  Plot deviations instead of absolute recruitment values?
relative  Show deviations relative to most recent estimate or relative to 0.
labelyears  Label cohorts with text at the end of each line?
legend  Add a legend showing which color goes with which line (as alternative to labelyears).
leg.ncols  Number of columns for the legend.

Author(s)

Ian Taylor

References

Ianelli et al. (2011) Assessment of the walleye pollock stock in the Eastern Bering Sea. (Figure 1.31, which is on an absolute, rather than log scale.)

See Also

`SSsummarize()`

Examples

```r
## Not run:
# run retrospective analysis
SS_doRetro(olddir = "2013hake_12", years = 0:-10)
# read in output
retroModels <- SSgetoutput(dirvec = paste("retrospectives/retro", -10:0, sep = ""))
# summarize output
retroSummary <- SSsummarize(retroModels)

# set the ending year of each model in the set
endyrvec <- retroModels[[1]][["endyr"]]-10:0
# make comparison plot
pdf("retrospectives/retrospective_comparison_plots.pdf")
SSPlotComparisons(retroSummary, endyrvec = endyrvec, new = FALSE)
dev.off()
```
SSplotSelex

Plot selectivity

Description

Plot selectivity, including retention and other quantities, with additional plots for time-varying selectivity.

Usage

SSplotSelex(
  replist,
  infotable = NULL,
  fleets = "all",
  fleetnames = "default",
  sizefactors = c("Lsel"),
  agefactors = c("Asel", "Asel2"),
  years = "endyr",
  minyr = -Inf,
  maxyr = Inf,
  sexes = "all",
  selexlines = 1:6,
  subplot = 1:25,
  skipAgeSelex10 = TRUE,
  plot = TRUE,
  print = FALSE,
  add = FALSE,
  labels = c("Length (cm)", "Age (yr)", "Year", "Selectivity", "Retention",}
Arguments

replist A list object created by \textbf{SS\_output}().

infotable Optional table of information controlling appearance of plot and legend. Is produced as output and can be modified and entered as input.

fleets Optional vector to subset fleets for which to make plots

fleetnames Optional replacement for fleenames used in data file

sizefactors Which elements of the factors column of SIZE\_SELEX should be included in plot of selectivity across multiple fleets?

agefactors Which elements of the factors column of AGE\_SELEX should be included in plot of selectivity across multiple fleets?

years Which years for selectivity are shown in multi-line plot (default = last year of model).

minyr optional input for minimum year to show in plots

maxyr optional input for maximum year to show in plots

season Which season (if seasonal model) for selectivity shown in multi-line plot (default = 1).

sexes Optional vector to subset genders for which to make plots (1=females, 2=males)


subplot Vector controlling which subplots to create. Numbering of subplots is as follows,

\textit{Plots with all fleets grouped together}

- 1 selectivity at length in end year for all fleets shown together
2 selectivity at age in end year for all fleets shown together (this includes both age-based selectivity "Asel" and age values derived from length-based, "Asel2". You can choose only one using "agefactors" if needed.)

Plots of time-varying length-based selectivity
- 3 selectivity at length time-varying surface
- 4 selectivity at length time-varying contour
- 5 retention at length time-varying surface
- 6 retention at length time-varying surface
- 7 discard mortality time-varying surface
- 8 discard mortality time-varying contour

Selectivity at length in end year by fleet
- 9 selectivity, retention, and discard mortality at length in ending year

Plots of time-varying age-based selectivity
- 11 selectivity at age time-varying surface
- 12 selectivity at age time-varying contour

Selectivity at age in end year by fleet
- 13 selectivity at age in ending year if time-varying
- 14 selectivity at age in ending year if NOT time-varying
- 15 matrix of selectivity deviations for semi-parametric selectivity

Selectivity for both/either age or length
- 21 selectivity at age and length contour with overlaid growth curve
- 22 selectivity with uncertainty if requested at end of control file

skipAgeSelex10 Exclude plots for age selectivity type 10 (selectivity = 1.0 for all ages beginning at age 1)?
plot Plot to active plot device?
print Print to PNG files?
add Add to existing plot (not yet implemented)
labels vector of labels for plots (titles and axis labels)
col1 color for female growth curve
col2 color for male growth curve
lwd Line widths for plots
spacepoints number of years between points shown on top of lines (for long timeseries, points every year get mashed together)
staggerpoints number of years to stagger the first point (if spacepoints > 1) for each line (so that adjacent lines have points in different years)
legendloc location of legend. See ?legend for more info.
pwidth Default width of plots printed to files in units of punits. The default is pwidth=6.5.
pheight Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with pheight_tall used for plots that work best with a taller format and a single plot per page.
punits Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is punits="in".

res Resolution of plots printed to files. The default is res = 300.

ptsize Point size for plotted text in plots printed to files (see help("png") in R for details).

cex.main character expansion for plot titles

mainTitle Logical indicating if a title should be included at the top (not yet implemented for all plots)

showmain Deprecated, use mainTitle instead.

mar Either NULL to allow the default (which depends on whether the main title is included or not) or a numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot, which is passed to par().

plotdir Directory where PNG files will be written. By default it will be the directory where the model was run.

verbose A logical value specifying if output should be printed to the screen.

Author(s)
Ian Stewart, Ian Taylor

See Also
SS_plots(), SS_output()

SSplotSexRatio  Plot sex-ratio data and fits for two sex models

Description
Plot sex-ratio data and fits from Stock Synthesis output. Multi-figure plots depend on make_multifig. The confidence intervals around the observed points are based on a Jeffreys interval calculated from the adjusted input sample size (with a floor of 1).

Usage
SSplotSexRatio(
  replist,
  kind = "AGE",
  sexratio.option = 2,
  CI = 0.75,
  plot = TRUE,
  print = FALSE,
  fleets = "all",
  fleetnames = "default",
)
yupper = 4,
datonly = FALSE,
linescol = rgb(0.6, 0, 0.9, 0.7),
lwd = 2,
showsampsize = TRUE,
showeffN = TRUE,
axis1 = NULL,
axis2 = NULL,
pwidth = 6.5,
pheight = 5,
punits = "in",
ptsize = 10,
res = 300,
plotdir = "default",
cex.main = 1,
lables = c("Length (cm)", "Age (yr)", "Sex ratio (females:males)", "Fraction female"),
maxrows = 6,
maxcols = 6,
rows = 1,
cols = 1,
fixdims = TRUE,
verbose = TRUE,
mainTitle = FALSE,
...}

Arguments

replist A list object created by \texttt{SS_output()}.  
kind indicator of type of plot can be "LEN", "SIZE", "AGE", "cond", "GSTAGE", 
"L@A", or "W@A".  
sexratio.option code to choose among (1) female:male ratio or (2) fraction females out of the 
total  
CI confidence interval for uncertainty  
plot plot to active plot device?  
print print to PNG files?  
fleets optional vector to subset fleets for which plots will be made  
fleetnames optional vector of fleet names to put in the labels  
yupper upper limit on ymax (only applies for sexratio.option == 1)  
datonly make plots of data without fits?  
linescol Color for line showing expected value (default is purple).  
lwd line width  
showsampsize add sample sizes to plot  
showeffN add effective sample sizes to plot
SSplotSexRatio

axis1  position of bottom axis values
axis2  position of left size axis values
pwidth  default width of plots printed to files in units of punits. Default=7.
pheight  default height width of plots printed to files in units of punits. Default=7.
punits  units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" or "mm". Default="in".
ptsize  point size for plotted text in plots printed to files (see help("png") in R for details). Default=12.
res  Resolution of plots printed to files. The default is res = 300.
plotdir  directory where PNG files will be written. by default it will be the directory where the model was run.
cex.main  character expansion parameter for plot titles
labels  vector of labels for plots (titles and axis labels)
maxrows  maximum (or fixed) number or rows of panels in the plot
maxcols  maximum (or fixed) number or columns of panels in the plot
rows  number or rows to return to as default for next plots to come or for single plots
cols  number or cols to return to as default for next plots to come or for single plots
fixdims  fix the dimensions at maxrows by maxcols or resize based on number of years of data
verbose  return updates of function progress to the R GUI?
mainTitle  Logical indicating if a title for the plot should be produced
...  additional arguments that will be passed to the plotting.

Author(s)
Cole Monnahan, Ian Taylor

References

See Also
SS_plots(), make_multifig_sexratio()
Plot spawner-recruit curve based on output from Stock Synthesis model.

**Usage**

```r
SSplotSpawnrecruit(
  replist,
  subplot = 1:3,
  add = FALSE,
  plot = TRUE,
  print = FALSE,
  xlim = NULL,
  ylim = NULL,
  labels = c("Spawning biomass (mt)", "Recruitment (1,000s)", "Spawning output",
            expression(paste("Spawning output (relative to ", italic(B)[0], ")")),
            expression(paste("Recruitment (relative to ", italic(R)[0], ")")),
            "Log recruitment deviation"),
  bioscale = "default",
  plotdir = "default",
  pwidth = 6.5,
  pheight = 6.5,
  punits = "in",
  res = 300,
  ptsize = 10,
  verbose = TRUE,
  colvec = c("blue", "black", "black", gray(0, 0.7)),
  ltyvec = c(1, 2, 1, NA),
  ptcol = "default",
  legend = TRUE,
  legendloc = NULL,
  minyr = "default",
  textmindev = 0.5,
  relative = FALSE,
  expected = TRUE,
  estimated = TRUE,
  bias_adjusted = TRUE,
  show_env = TRUE,
  virg = TRUE,
  init = TRUE,
  forecast = FALSE
)
```
Arguments

- **replist**: A list object created by `SS_output()`.
- **subplot**: vector of which subplots to show. 1=plot without labels, 2=plot with year labels.
- **add**: add to existing plot?
- **plot**: plot to active plot device?
- **print**: print to PNG files?
- **xlim**: optional control of x range
- **ylim**: optional control of y range
- **labels**: vector containing x-axis label for models with spawning biomass in metric tons, y-axis label, and alternative x-axis for models with a fecundity relationship making spawning output not equal to spawning biomass.
- **bioscale**: multiplier on spawning biomass, set to 0.5 for single-sex models
- **plotdir**: directory where PNG files will be written. by default it will be the directory where the model was run.
- **pwidth**: Default width of plots printed to files in units of *punits*. The default is `pwidth=6.5`.
- **pheight**: Height of plots printed to png files in units of *punits*. Default is designed to allow two plots per page, with `pheight_tall` used for plots that work best with a taller format and a single plot per page.
- **punits**: Units for `pwidth` and `pheight`. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is `punits="in"`.
- **res**: Resolution of plots printed to files. The default is `res = 300`.
- **ptsize**: Point size for plotted text in plots printed to files (see `help("png")` in R for details).
- **verbose**: report progress to R GUI?
- **colvec**: vector of length 4 with colors for 3 lines and 1 set of points (where the 4th value for the points is the color of the circle around the background color provided by `ptcol`).
- **ltyvec**: vector of length 4 with line types for the 3 lines and 1 set of points, where the points are disconnected (lty=NA) by default.
- **ptcol**: vector or single value for the color of the points, "default" will by replaced by a vector of colors of length equal to `nrow(replist["recruit")]
- **legend**: add a legend to the figure?
- **legendloc**: location of legend. By default it is chosen as the first value in the set of "topleft", "topright", "bottomright" that results in no overlap with the points in the plot, but the user can override this with their choice of location. See `?legend` for more info on the options.
- **minyr**: minimum year of recruitment deviation to show in plot
- **textmindev**: minimum recruitment deviation for label to be added so only extreme devs are labeled (labels are added to first and last years as well). Default=0.7.
- **relative**: scale both axes so that B0 and R0 are at 1 to show spawning output and recruitment relative to the equilibrium.
SSplotSPR

Plot Spawning Potential Ratio (SPR) quantities.

Description

Plot time series of SPR, 1-SPR, the chosen SPR ratio and the phase plot.

Usage

SSplotSPR(
  replist,
  add = FALSE,
  plot = TRUE,
  print = FALSE,
  uncertainty = TRUE,
  subplots = 1:4,
  forecastplot = FALSE,
  col1 = "black",
  col2 = "blue",
  col3 = "green3",
  col4 = "red",
  sprtarg = "default",
  btarg = "default",
  labels = c("Year", "SPR", "1-SPR", "Relative fishing intensity",
             "Relative spawning output"),
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
)

expected  show line for expected recruitment (stock-recruit curve)
estimated  show points for estimated recruitment values (including deviations)
bias_adjusted  show lines for bias adjusted expected recruitment
show_env    add line for expected recruitment with environmental variability
virg        add point for equilibrium conditions (x=B0,y=R0)
init        add point for initial conditions (x=B1,y=R1), only appears if this point differs
            from virgin values
forecast    include forecast years in the curve?

Author(s)

Ian Stewart, Ian Taylor

See Also

SS_plots(), SS_output()
res = 300,
ptsiz = 10,
cex.main = 1,
plotdir = "default",
verbose = TRUE
)

Arguments

replist A list object created by \texttt{SS_output()}. 
add add to existing plot (not yet implemented) 
plot plot to active plot device? 
print print to PNG files? 
uncertainty include plots showing uncertainty? 
subplots vector controlling which subplots to create Numbering of subplots is as follows: 
  1. timeseries of SPR, 
  2. timeseries of 1 - SPR, 
  3. timeseries of SPR ratio (as specified in the starter file), and 
  4. phase plot of Biomass ratio vs SPR ratio (as specified in the starter file). 
forecastplot Include forecast years in plot? 
co1 first color used 
co2 second color used 
co3 third color used 
co4 fourth color used 
sprtarget F/SPR proxy target. "default" chooses based on model output, where models which have SPR_report_basis = 0 or 1 specified in the starter file will use the SPR target specified in the forecast file. Models which have SPR_report_basis = 2 will use SPR at MSY for the SPR target and models which have the SPR_report_basis = 3 will use SPR at Btarget for the SPR target in these plots. Zero or negative values of sprtarget input here will cause no horizontal line to be plotted. 
btarg target depletion to be used in plots showing depletion. May be omitted by setting to NA. "default" chooses based on model output. 
labels vector of labels for plots (titles and axis labels) 
pwidth width of plot 
height height of plot 
units units for PNG file 
res Resolution of plots printed to files. The default is res = 300. 
ptsize point size for PNG file 
cex.main character expansion for plot titles 
plotdir directory where PNG files will be written. by default it will be the directory where the model was run. 
verbose report progress to R GUI?
SSplotSummaryF

Author(s)
Ian Stewart, Ian Taylor

See Also
SS_plots(), SS_output()

SSplotSummaryF  Plot the summary F (or harvest rate).

Description
Plots the summary F (or harvest rate) as set up in the starter file. Needs a lot of work to be generalized.

Usage
SSplotSummaryF(
  replist,
  yrs = "all",
  Ftgt = NA,
  ylab = "Summary Fishing Mortality",
  plot = TRUE,
  print = FALSE,
  plotdir = "default",
  verbose = TRUE,
  uncertainty = TRUE,
  add = FALSE,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  mar = NULL
)

Arguments
replist  A list object created by SS_output().
yrs  Which years to include.
Ftgt  Target F where horizontal line is shown.
ylab  Y-axis label.
plot  Plot to active plot device?
print  Print to PNG files?
plotdir  Directory where PNG files will be written. By default it will be the directory where the model was run.
**SSplotTags**

Plot observed and expected tag recaptures in aggregate and by tag group.

### Description

Plot observed and expected tag recaptures in aggregate and by tag group.

### Usage

```r
SSplotTags(
  replist = replist,
  subplots = 1:10,
  latency = NULL,
  taggroups = NULL,
  rows = 1,
  cols = 1,
  tagrows = 3,
  tagcols = 3,
  plot = TRUE,
  print = FALSE,
)```

### Arguments

- **verbose**
  - Verbose output to R console?

- **uncertainty**
  - Show 95% uncertainty intervals around point estimates?

- **add**
  - add to existing plot

- **pwidth**
  - Default width of plots printed to files in units of punits. The default is `pwidth=6.5`.

- **pheight**
  - Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with `pheight_tall` used for plots that work best with a taller format and a single plot per page.

- **punits**
  - Units for `pwidth` and `pheight`. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is `punits="in"`.

- **res**
  - Resolution of plots printed to files. The default is `res = 300`.

- **ptsize**
  - Point size for plotted text in plots printed to files (see `help("png")` in R for details).

- **mar**
  - Either NULL to allow the default (which depends on whether the main title is included or not) or a numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot, which is passed to `par()`.

### Author(s)

Allan Hicks

### See Also

- `SSplotTimeseries()`
SSplotTags

pntscalar = 2.6,
minnbubble = 8,
pwidth = 6.5,
pheight = 5,
punits = “in”,
ptsize = 10,
res = 300,
cex.main = 1,
col1 = rgb(0, 0, 1, 0.7),
col2 = “red”,
col3 = “grey95”,
col4 = “grey70”,
labels = c(“Year”, “Frequency”, “Tag Group”, “Fit to tag recaptures by tag group”,
“Post-latency tag recaptures aggregated across tag groups”,
“Observed tag recaptures by year and tag group”,
“Residuals for post-latency tag recaptures: (obs-exp)/sqrt(exp)”,
“Observed and expected post-latency tag recaptures by year and tag group”,
“Summarized observed and expected numbers of recaptures by fleet”,
“Pearson residuals by tag group”),
plotdir = “default”,
verbose = TRUE
)

Arguments

replist A list object created by SS_output().
subplots vector controlling which subplots to create
latency period of tag mixing to exclude from plots (in future could be included in SS output)
taggroups which tag groups to include in the plots. Default=NULL causes all groups to be included.
rows number or rows of panels for regular plots
cols number or columns of panels for regular plots
tagrows number or rows of panels for multi-panel plots
tagcols number or columns of panels for multi-panel plots
plot plot to active plot device?
print print to PNG files?
pntscalar maximum bubble size for balloon plots; each plot scaled independently based on this maximum size and the values plotted. Often some plots look better with one value and others with a larger or smaller value. Default=2.6
minnbubble minimum number of years below which blank years will be added to bubble plots to avoid cropping
pwidth default width of plots printed to files in units of punits. Default=7.
pheight default height width of plots printed to files in units of punits. Default=7.
SSplotTimeseries

SSplotTimeseries units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" or "mm". Default="in".

ptsize point size for plotted text in plots printed to files (see help("png") in R for details). Default=12.

res Resolution of plots printed to files. The default is res = 300.

cex.main character expansion parameter for plot titles

col1 color for bubbles

col2 color for lines with expected values

col3 shading color for observations within latency period

col4 shading color for observations after latency period

labels vector of labels for plots (titles and axis labels)

plotdir directory where PNG files will be written. by default it will be the directory where the model was run.

verbose return updates of function progress to the R GUI?

Author(s)
Andre E. Punt, Ian G. Taylor, Ashleigh J. Novak

See Also
SS_plots(), SS_output()

SSplotTimeseries  Plot timeseries data

Description
Plot timeseries data contained in TIME_SERIES output from Stock Synthesis report file. Some values have optional uncertainty intervals.

Usage
SSplotTimeseries(
  replist,
  subplot,
  add = FALSE,
  areas = "all",
  areacols = "default",
  areanames = "default",
  forecastplot = TRUE,
  uncertainty = TRUE,
  bioscale = 1,
  minyr = -Inf,
maxyr = Inf,
plot = TRUE,
print = FALSE,
plotdir = "default",
verbose = TRUE,
btarget = "default",
minbthresh = "default",
xlab = "Year",
labels = NULL,
pwidth = 6.5,
pheight = 5,
punits = "in",
res = 300,
ptsize = 10,
cex.main = 1,
mainTitle = FALSE,
mar = NULL
)

Arguments
replist A list object created by `SS_output()`.
subplot number controlling which subplot to create Numbering of subplots is as follows, where the spawning biomass plots (7 to 10) are provided first when this function is called by `SS_plots()`:
  • 1 Total biomass (mt) with forecast
  • 2 Total biomass by area (spatial models only)
  • 3 Total biomass (mt) at beginning of spawning season with forecast
  • 4 Summary biomass (mt) with forecast
  • 5 Summary biomass (mt) by area (spatial models only)
  • 6 Summary biomass (mt) at beginning of season 1 with forecast
  • 7 Spawning output with forecast with ~95% asymptotic intervals
  • 8 Spawning output by area (spatial models only)
  • 9 Relative spawning output with forecast with ~95% asymptotic intervals
  • 10 Relative spawning output by area (spatial models only)
  • 11 Age-0 recruits (1,000s) with forecast with ~95% asymptotic intervals
  • 12 Age-0 recruits by area (spatial models only)
  • 13 Fraction of recruits by area (spatial models only)
  • 14 Age-0 recruits (1,000s) by birth season with forecast
  • 15 Fraction of total Age-0 recruits by birth season with forecast
add add to existing plot? (not yet implemented)
areas optional subset of areas to plot for spatial models
areacols vector of colors by area. Default uses rich.colors by Arni Magnusson
areanames names for areas. Default is to use Area1, Area2,...
forecastplot add points from forecast years
uncertainty add intervals around quantities for which uncertainty is available
bioscale scaling for spawning biomass. Default = 1. Previously this was set to 0.5 for single-sex models, and 1.0 for all others, but now single-sex models are assumed to use the -1 option for Nsexes in the data file so the scaling is done automatically by SS.
minyr optional input for minimum year to show in plots
maxyr optional input for maximum year to show in plots
plot plot to active plot device?
print print to PNG files?
plotdir directory where PNG or PDF files will be written. by default it will be the directory where the model was run.
verbose report progress to R GUI?
btarg Target depletion to be used in plots showing depletion. May be omitted by setting to 0. "default" chooses value based on model output.
minbthresh Threshold depletion to be used in plots showing depletion. May be omitted by setting to 0. "default" assumes 0.25 unless btarg in model output is 0.25 in which case minbthresh = 0.125 (U.S. west coast flatfish).
xlab x axis label for all plots
labels vector of labels for plots (titles and axis labels)
pwidth width of plot
pheight height of plot
punits units for PNG file
res Resolution of plots printed to files. The default is res = 300.
ptsize point size for PNG file
cex.main character expansion for plot titles
mainTitle Logical indicating if a title should be included at the top (not yet implemented for all plots)
mar Either NULL to allow the default (which depends on whether the main title is included or not) or a numerical vector of the form c(bottom, left, top, right) which gives the number of lines of margin to be specified on the four sides of the plot, which is passed to par().

Author(s)
Ian Taylor, Ian Stewart

See Also
SS_plots(), SS_output()
SSplotYield

Plot yield and surplus production.

Description
Plot yield and surplus production from Stock Synthesis output. Surplus production is based on Walters et al. (2008).

Usage
SSplotYield(
  replist,
  subplots = 1:4,
  refpoints = c("MSY", "Btgt", "SPR", "Current"),
  add = FALSE,
  plot = TRUE,
  print = FALSE,
  labels = c("Fraction unfished", "Equilibrium yield (mt)", "Total biomass (mt)",
            "Surplus production (mt)", "Yield per recruit (kg)"),
  col = "blue",
  col2 = "black",
  lty = 1,
  lwd = 2,
  cex.main = 1,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  plotdir = "default",
  verbose = TRUE
)

Arguments
replist A list object created by SS_output().
subplots vector controlling which subplots to create Numbering of subplots is as follows:
  • 1 yield curve
  • 2 yield curve with reference points
  • 3 surplus production vs. biomass plots (Walters et al. 2008)
refpoints character vector of which reference points to display in subplot 2, from the options 'MSY', 'Btgt', and 'SPR'.
add add to existing plot? (not yet implemented)
plot plot to active plot device?
print print to PNG files?
SSsummarize

SSsummarize is a function that summarizes the output from multiple Stock Synthesis models. It takes various arguments to customize the appearance of the plots and output:

- `labels`: vector of labels for plots (titles and axis labels)
- `col`: line color for equilibrium plot
- `col2`: line color for dynamic surplus production plot
- `lty`: line type (only applied to equilibrium yield plot at this time)
- `lwd`: line width (only applied to equilibrium yield plot at this time)
- `cex.main`: character expansion for plot titles
- `pwidth`: width of plot
- `pheight`: height of plot
- `punits`: units for PNG file
- `res`: Resolution of plots printed to files. The default is `res = 300`.
- `ptsize`: point size for PNG file
- `plotdir`: directory where PNG files will be written. By default, it will be the directory where the model was run.
- `verbose`: report progress to R GUI?

**Author(s)**

Ian Stewart, Ian Taylor

**References**


**See Also**

`SS_plots()`, `SS_output()`
SSsummarize

Usage

SSsummarize(
  biglist,
  sizeselfactor = "Lsel",
  ageselfactor = "Asel",
  selfleet = NULL,
  selyr = "startyr",
  selgender = 1,
  SpawnOutputUnits = NULL,
  lowerCI = 0.025,
  upperCI = 0.975,
  verbose = TRUE
)

Arguments

biglist A list of lists, one for each model. The individual lists can be created by SS_output() or the list of lists can be created by SSgetoutput() (which iteratively calls SS_output()).
sizeselfactor A string or vector of strings indicating which elements of the selectivity at length output to summarize. Default=c("Lsel").
ageselfactor A string or vector of strings indicating which elements of the selectivity at age output to summarize. Default=c("Asel").
selfleet Vector of fleets for which selectivity will be summarized. NULL=all fleets. Default=NULL.
selyr String or vector of years for which selectivity will be summarized. NOTE: NOT CURRENTLY WORKING. Options: NULL=all years, "startyr" = first year.
selegender Vector of genders (1 and/or 2) for which selectivity will be summarized. NULL=all genders. Default=NULL.
SpawnOutputUnits Optional single value or vector of "biomass" or "numbers" giving units of spawning for each model.
lowerCI Quantile for lower bound on calculated intervals. Default = 0.025 for 95% intervals.
upperCI Quantile for upper bound on calculated intervals. Default = 0.975 for 95% intervals.
verbose A logical value specifying if output should be printed to the screen.

Author(s)

Ian Taylor

See Also

SSgetoutput()
SStableComparisons  
make table comparing quantities across models

Description

Creates a table comparing key quantities from multiple models, which is a reduction of the full information in various parts of the list created using the SSSummarize function.

Usage

SStableComparisons(
  summaryoutput, 
  models = "all", 
  likenames = c("TOTAL", "Survey", "Length_comp", "Age_comp", "priors", "Size_at_age"), 
  names = c("Recr_Virgin", "R0", "steep", "NatM", "L_at_Amax", "VonBert_K", "SSB_Virg", 
    "Bratio_2021", "SPRratio_2020"), 
  digits = NULL, 
  modelnames = "default", 
  csv = FALSE, 
  csvdir = "workingdirectory", 
  csvfile = "parameter_comparison_table.csv", 
  verbose = TRUE, 
  mcmc = FALSE 
)

Arguments

summaryoutput  list created by SSSummarize
models  optional subset of the models described in summaryoutput. Either "all" or a vector of numbers indicating columns in summary tables.
likenames  Labels for likelihood values to include, should match substring of labels in summaryoutput[["likelihoods"]].
names  Labels for parameters or derived quantities to include, should match substring of labels in summaryoutput[["pars"] or summaryoutput[["quants"]].
digits  Optional vector of the number of decimal digits to use in reporting each quantity.
modelnames  optional vector of labels to use as column names. Default is 'model1','model2',etc.
csv  write resulting table to CSV file?
csvdir  directory for optional CSV file
csvfile  filename for CSV file
verbose  report progress to R GUI?
mcmc  summarize MCMC output in table?

Author(s)

Ian Taylor
See Also

SSsummarize(), SSplotComparisons(), SS_output()

SSunavailableSpawningOutput

Plot unavailable spawning output

Description

Calculate and plot the unavailable spawning output—separating out ones that are unavailable because they’re too small to be selected from ones that are too big to be selected.

Usage

SSunavailableSpawningOutput(
  replist,
  plot = TRUE,
  print = FALSE,
  plotdir = "default",
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  res = 300,
  ptsize = 10,
  cex.main = 1
)

Arguments

replist A list object created by SS_output().
plot Plot to active plot device?
print Print to PNG files?
plotdir Directory where PNG files will be written. by default it will be the directory where the model was run.
pwidth Width of plot
pheight Height of plot
punits Units for PNG file
res Resolution of plots printed to files. The default is res = 300.
ptsize Point size for PNG file
cex.main Character expansion for plot titles

Author(s)

Megan Stachura, Andrew Cooper, Andi Stephens, Neil Klaer, Ian G. Taylor
**SS_changepars**

*Change parameters, bounds, or phases in the control file.*

**Description**

Loops over a subset of control file to change parameter lines. Current initial value, lower and upper bounds, and phase can be modified, but function could be expanded to control other columns. Depends on `SS_parlines()`. Used by `SS_profile()` and the `ss3sim` package.

**Usage**

```r
SS_changepars(
  dir = NULL,
  ctlfile = "control.ss_new",
  newctlfile = "control_modified.ss",
  linenums = NULL,
  strings = NULL,
  newvals = NULL,
  repeat.vals = FALSE,
  newlos = NULL,
  newhis = NULL,
  newprior = NULL,
  newprsd = NULL,
  newprtype = NULL,
  estimate = NULL,
  verbose = TRUE,
  newphs = NULL
)
```

**Arguments**

- `dir` Directory with control file to change.
- `ctlfile` Control file name. Default="control.ss_new".
- `newctlfile` Name of new control file to be written. Default="control_modified.ss".
- `linenums` Line numbers of control file to be modified. Either this or the `strings` argument are needed. Default=NULL.
- `strings` Strings (with optional partial matching) indicating which parameters to be modified. This is an alternative to `linenums`. Strings correspond to the commented parameter names included in control.ss_new, or whatever is written as comment at the end of the 14 number parameter lines. Default=NULL.
- `newvals` Vector of new parameter values. Default=NULL. The vector can contain NA values, which will assign the original value to the given parameter but change the remainder parameters, where the vector of values needs to be in the same order as either `linenums` or `strings`.
- `repeat.vals` If multiple parameter lines match criteria, repeat the `newvals` input for each line.
newlos Vector of new lower bounds. Default=NULL. The vector can contain NA values, which will assign the original value to the given parameter but change the remainder parameters, where the vector of values needs to be in the same order as either linenums or strings.

newhis Vector of new high bounds. Must be the same length as newhis. Default=NULL. The vector can contain NA values, which will assign the original value to the given parameter but change the remainder parameters, where the vector of values needs to be in the same order as either linenums or strings.

newprior Vector of new prior values. Default=NULL. The vector can contain NA values, which will assign the original value to the given parameter but change the remainder parameters, where the vector of values needs to be in the same order as either linenums or strings.

newprsd Vector of new prior sd values. Default=NULL. The vector can contain NA values, which will assign the original value to the given parameter but change the remainder parameters, where the vector of values needs to be in the same order as either linenums or strings.

newprtype Vector of new prior type. Default=NULL. The vector can contain NA values, which will assign the original value to the given parameter but change the remainder parameters, where the vector of values needs to be in the same order as either linenums or strings.

estimate Optional vector or single value of TRUE/FALSE for which parameters are to be estimated. Changes sign of phase to be positive or negative. Default NULL causes no change to phase.

verbose More detailed output to command line. Default=TRUE.

newphs Vector of new phases. Can be a single value, which will be repeated for each parameter, the same length as newvals, where each value corresponds to a single parameter, or NULL, where the phases will not be changed. If one wants to strictly turn parameters on or off and not change the phase in which they are estimated use estimate = TRUE or estimate = FALSE, respectively. The vector can contain NA values, which will assign the original value to the given parameter but change the remaining parameters, where the vector of values needs to be in the same order as either linenums or strings.

Author(s)
Ian Taylor, Christine Stawitz, Chantel Wetzel

See Also
SS_parlines(), SS_profile()

Examples
## Not run:
SS_changepars(
dir = "C:/ss/SSv3.30.03.05_May11/Simple - Copy",
strings = c("steep", "sigmaR"), newvals = c(.4, .6)
The parameter names in control file matching input vector 'strings' (n=2):

- SR_BH_steep
- SR_sigmaR

These are the ctl file lines as they currently exist:

```
LO HI INIT PRIOR PR_type SD PHASE env_var&link dev_link dev_minyr dev_maxyr
95 0.2 1 0.613717 0.7 0.05 1 4 0 0 0 0
96 0.0 2 0.600000 0.8 0.80 0 -4 0 0 0 0
```

The line numbers in control file (n=2):

- 95
- 96

```
# wrote new file to control_modified.ss with the following changes:
oldvals newvals oldphase newphase oldlos newlos oldhis newhis comment
1 0.613717 0.4 4 -4 0.2 0.2 1 1 # SR_BH_steep
2 0.600000 0.6 -4 -4 0.0 0.0 2 2 # SR_sigmaR
```

End(Not run)

---

### SS_decision_table_stuff

*Extract total catch, spawning output, and fraction unfished from forecast years*

#### Description

Values of total catch, spawning output, and fraction unfished are extracted from the forecast years of a time series table for inclusion in a decision table.

#### Usage

```r
SS_decision_table_stuff(replist, yrs = 2021:2032, digits = c(0, 0, 3))
```

#### Arguments

- **replist**: A list object created by `SS_output()`.  
- **yrs**: Range of years from which to extract values  
- **digits**: Vector of number of digits to round to in table for  
  - 1 catch  
  - 2 spawning output  
  - 3 fraction unfished (column is called "depl")

#### Author(s)

Ian G. Taylor
SS_doRetro

Run retrospective analyses

Description
Do retrospective analyses by creating new directories, copying model files, and iteratively changing the starter file to set the number of years of data to exclude. Note that there was a bug for retrospectives in 3.30.01; the user should update their model to a newer version of Stock Synthesis to run retrospectives.

Usage
SS_doRetro(
  masterdir,
  oldsubdir,
  newsubdir = "retrospectives",
  subdirstart = "retro",
  years = 0:-5,
  overwrite = TRUE,
  exefile = "ss",
  extras = "-nox",
  intern = FALSE,
  CallType = "system",
  RemoveBlocks = FALSE
)

Arguments
masterdir Directory where everything takes place.
oldsubdir Subdirectory within masterdir with existing model files.
newsubdir Subdirectory within masterdir where retrospectives will be run. Default is 'retrospectives'.
subdirstart First part of the pattern of names for the directories in which the models will actually be run.
years Vector of values to iteratively enter into the starter file for retrospective year. Should be zero or negative values.
overwrite Overwrite any input files with matching names in the subdirectories where models will be run.
exefile Executable file found in directory with model files. On Windows systems, this value will be automatically updated if a single executable exists in the directory of model files. Input exefile=NULL if the executable is in your path and doesn’t need copying.

See Also
SS.ForeCatch()
SS_doRetro

extras Additional commands to use when running SS. Default = "-nox" will reduce the amount of command-line output.

intern Display runtime information from SS in the R console (vs. saving to a file).

CallType Either "system" or "shell" (choice depends on how you’re running R. Default is "system".

RemoveBlocks Logical switch determining whether specifications of blocks is removed from top of control file. Blocks can cause problems for retrospective analyses, but the method for removing them is overly simplistic and probably won’t work in most cases. Default=FALSE.

Author(s)

Ian Taylor, Jim Thorson

See Also

SSgetoutput()

Examples

## Not run:
# note: don't run this in your main directory--make a copy in case something
goes wrong
mydir <- "C:/Simple"

## retrospective analyses
SS_doRetro(
  masterdir = mydir,
  oldsubdir = "",
  newsubdir = "retrospectives",
  years = 0:-5
)

retroModels <- SSgetoutput(
  dirvec = file.path(mydir, "retrospectives", paste("retro", 0:-5, sep = ""))
)

retroSummary <- SSsummarize(retroModels)
endyrvec <- retroSummary["endyrs"] + 0:-5
SSplotComparisons(retroSummary,
  endyrvec = endyrvec,
  legendlabels = paste("Data", 0:-5, "years")
)

## End(Not run)
SS_fitbiasramp

Estimate bias adjustment for recruitment deviates

Description

Uses standard error of estimated recruitment deviates to estimate the 5 controls (Method and Taylor, 2011) for bias adjustment in Stock Synthesis.

Usage

```r
SS_fitbiasramp(
  replist,
  verbose = FALSE,
  startvalues = NULL,
  method = "BFGS",
  twoplots = TRUE,
  transform = FALSE,
  plot = TRUE,
  print = FALSE,
  plotdir = "default",
  shownew = TRUE,
  oldctl = NULL,
  newctl = NULL,
  altmethod = "nlminb",
  exclude_forecast = FALSE,
  pwidth = 6.5,
  pheight = 5,
  punits = "in",
  ptsize = 10,
  res = 300,
  cex.main = 1
)
```

Arguments

- `replist` A list object created by `SS_output()`.
- `verbose` Controls the amount of output to the screen. Default=FALSE.
- `startvalues` A vector of 5 values for the starting points in the minimization. Default=NULL.
- `method` A method to apply to the ‘optim’ function. See ?optim for options. Default="BFGS". By default, optim is not used, and the optimization is based on the input altmethod.
- `twoplots` Make a two-panel plot showing devs as well as transformed uncertainty, or just the second panel in the set? Default=TRUE.
- `transform` An experimental option to treat the transform the 5 quantities to improve minimization. Doesn’t work well. Default=FALSE.
- `plot` Plot to active plot device?
print

Directory where PNG files will be written. By default it will be the directory where the model was run.

shownew

Include new estimated bias adjustment values on top of values used in the model? (TRUE/FALSE)

oldctl

Optional name of existing control file to modify. Default=NULL.

newctl

Optional name of new control file to create from old file with estimated bias adjustment values. Default=NULL.

altmethod

Optimization tool to use in place of optim, either "nlminb" or "psoptim". If not equal to either of these, then optim is used.

exclude_forecast

Exclude forecast values in the estimation of alternative bias adjustment inputs?

pwidth

Default width of plots printed to files in units of punits. The default is pwidth=6.5.

pheight

Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with pheight_tall used for plots that work best with a taller format and a single plot per page.

punits

Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is punits="in".

ptsize

Point size for plotted text in plots printed to files (see help("png") in R for details).

res

Resolution of plots printed to files. The default is res = 300.

cex.main

Character expansion for plot titles. The default is cex.main=1.

Details

Implementation of the bias adjustment ramp within Stock Synthesis increases the likelihood that the estimated recruitment events, which are log-normally distributed, are mean unbiased and comparable to results from Markov chain Monte Carlo estimation routines (Methot and Taylor, 2011). Options to account for the fact that data typically do not equally represent all modelled time periods are as follows:

1. fix the bias adjustment parameters at best-guess values informed by a previous assessment or model run;
2. fix values based on data availability, such that the start of the ramp aligns with the availability of composition data, the ramp down begins the last year those data are informative about recruitment, and the adjustment level is informed by life history;
3. set the adjustment level to 1.0 for all years to mimic how it was handled it Stock Synthesis prior to 2009;
4. set the adjustment level to 0.0 for all years, but this last option is not recommended because it will lead to biased results.

Author(s)

Ian Taylor
References


See Also

SS_output()

SS_ForeCatch

Create table of fixed forecast catches

Description

Processing values of dead or retained biomass from timeseries output to fit the format required at the bottom of the forecast file. This can be used to map the catches resulting from forecasting with a particular harvest control rule into a model representing a different state of nature. This is a common task for US west coast groundfish but might be useful elsewhere.

Usage

SS_ForeCatch(
  replist,
  yrs = 2021:2032,
  average = FALSE,
  avg.yrs = 2016:2020,
  total = NULL,
  digits = 2,
  dead = TRUE,
  zeros = FALSE
)

Arguments

replist A list object created by SS_output().
yrs Range of years in which to fill in forecast catches from timeseries
average Use average catch over a range of years for forecast (as opposed to using forecast based on control rule)
avg.yrs Range of years to average over
total Either single value or vector of annual total forecast catch used to scale values (especially if values are from average catches). For west coast groundfish, total might be ACL for next 2 forecast years
digits Number of digits to round to in table
dead TRUE/FALSE switch to choose dead catch instead of retained catch.
zeros Include entries with zero catch (TRUE/FALSE)
Author(s)

Ian G. Taylor

See Also

SS_readforecast(), SS_readforecast()

Examples

## Not run:

# create table based on average over past 5 years
SS_ForeCatch(base, yrs = 2021:2022, average = TRUE, avg.yrs = 2014:2018) # use average of catches over past 5 years

# create table with pre-defined totals where the first 2 years
# are based on current harvest specifications and the next 10 are set to some
# new value (with ratio among fleets based on average over past 5 years)
SS_ForeCatch(base, yrs = 2021:2022, average = TRUE, avg.yrs = 2016:2020, total = c(rep(241.3, 2), rep(300, 10))) # total

# create table based on harvest control rule projection in SS
# that can be mapped into an alternative state of nature
SS_ForeCatch(low_state, yrs=2021:2032, average=FALSE) # use values forecast in SS, not historic catch

## End(Not run)

---

SS_html

Create HTML files to view figures in browser.

Description

Writes a set of HTML files with tabbed navigation between them. Depends on SS_plots() with settings in place to write figures to PNG files. Should open main file in default browser automatically.
Usage

```r
SS_html(
    replist = NULL,
    plotdir = NULL,
    plotInfoTable = NULL,
    title = "SS Output",
    width = 500,
    openfile = TRUE,
    multimodel = FALSE,
    filenotes = NULL,
    verbose = TRUE
)
```

Arguments

- **replist**: A list object created by `SS_output()`.
- **plotdir**: Directory where PNG files are located.
- **plotInfoTable**: CSV file with info on PNG files. By default, the `plotdir` directory will be searched for files with name beginning 'plotInfoTable*'
- **title**: Title for HTML page.
- **width**: Width of plots (in pixels).
- **openfile**: Automatically open index.html in default browser?
- **multimodel**: Override errors associated with plots from multiple model runs. Only do this if you know what you’re doing.
- **filenotes**: Add additional notes to home page.
- **verbose**: Display more info while running this function?

Note

By default, this function will look in the directory where PNG files were created for CSV files with the name ‘plotInfoTable..’ written by ‘SS_plots. HTML files are written to link to these plots and put in the same directory. Please provide feedback on any bugs, annoyances, or suggestions for improvement.

Author(s)

Ian Taylor

See Also

`SS_plots()`, `SS_output()`
SS_makeHTMLdiagnostictable

Make html diagnostic tables

Description

Creates html tables that show diagnostic outputs, including status checks, gradients, and correlations.

Usage

SS_makeHTMLdiagnostictable(replist, plotdir = NULL, gradmax = 0.001)

Arguments

replist A list object created by SS_output().
plotdir Directory where the text files containing the tables will be written. By default it will be the directory where the model was run.
gradmax the largest gradient value for estimated parameter; the default is 1E-3

Value

a three-element vector; the first element is the name of the html table file, the second is the table caption, and the third is the category of output type

Author(s)

Christine Stawitz

See Also

SS_plots(), SS_output(), SS_html()
SS_output

Usage

SS_output(
  dir = "C:/myfiles/mymodels/myrun/",
  dir.mcmc = NULL,
  repfile = "Report.sso",
  compfile = "CompReport.sso",
  covarfile = "covar.sso",
  forefile = "Forecast-report.sso",
  wtfile = "wtatage.ss_new",
  warnfile = "warning.sso",
  ncols = NULL,
  forecast = TRUE,
  warn = TRUE,
  covar = TRUE,
  readwt = TRUE,
  checkcor = TRUE,
  cormax = 0.95,
  cormin = 0.01,
  printhighcor = 10,
  printlowcor = 10,
  verbose = TRUE,
  printstats = TRUE,
  hidewarn = FALSE,
  NoCompOK = TRUE,
  aalmaxbinrange = 4
)

Arguments

dir Directory containing the Stock Synthesis model output. Forward slashes or double backslashes and quotes are necessary. This can also either be an absolute path or relative to the working directory.

dir.mcmc Optional directory containing MCMC output. This can either be relative to dir, such that file.path(dir, dir.mcmc) will end up in the right place, or an absolute path.

repfile Name of the big report file (could be renamed by user).

compfile Name of the composition report file.

covarfile Name of the covariance output file.

forefile Name of the forecast file.

wtfile Name of the file containing weight at age data.

warnfile Name of the file containing warnings.

ncols The maximum number of columns in files being read in. If this value is too big the function runs more slowly, too small and errors will occur. A warning will be output to the R command line if the value is too small. It should be bigger than the maximum age + 10 and the number of years + 10. The default value is NULL, which finds the optimum width.
forecast  Read the forecast-report file?
warn  Read the Warning.sso file?
covar  Read covar.sso to get variance information and identify bad correlations?
readwt  Read the weight-at-age file?
cHECKcor  Check for bad correlations?
cormax  The specified threshold for defining high correlations. A quantity with any correlation above this value is identified.
cormin  The specified threshold for defining low correlations. Only quantities with all correlations below this value are identified (to find variables that appear too independent from the model results).
printhighcor  The maximum number of high correlations to print to the R GUI.
printlowcor  The maximum number of low correlations to print to the R GUI.
verbose  A logical value specifying if output should be printed to the screen.
printstats  Print summary statistics about the output to the R GUI?
hidewarn  Hides some warnings output from the R GUI.
NoCompOK  Allow the function to work without a CompReport file.
aalmaxbinrange  The largest length bin range allowed for composition data to be considered as conditional age-at-length data.

Value

Many values are returned. Complete list would be quite long, but should probably be created at some point in the future.

Author(s)

Ian Stewart, Ian Taylor

See Also

SS_plots()

Examples

```r
## Not run:
# read model output
myreplist <- SS_output(dir = "c:/SS/Simple/")
# make a bunch of plots
SS_plots(myreplist)

# read model output and also read MCMC results (if run), which in # this case would be stored in c:/SS/Simple/mcmc/
myreplist <- SS_output(dir = "c:/SS/Simple/", dir.mcmc = "mcmc")

## End(Not run)
```
SS_parlines

Get parameter lines from Stock Synthesis control file

Description

A simple function which takes as input the full path and filename of a control file for input to Stock Synthesis. Ideally, a Control.SS_New file will be used, so that it represents what SS thinks the inputs are, and not what the user thinks the inputs are.

Usage

SS_parlines(
  ctlfile = "control.ss_new",
  dir = NULL,
  version = "3.30",
  verbose = TRUE,
  active = FALSE
)

Arguments

cctlfile
  File name of control file including path.

edir
  Alternative input of path, where file is assumed to be "control.ss_new". Default=NULL.

vversion
  SS version number. Currently only "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3).

verbose
  TRUE/FALSE switch for amount of detail produced by function. Default=TRUE.

active
  Should only active parameters (those with positive phase) be output? Default=FALSE.

Details

It returns a table which should contain one line for each parameter in the model. Currently, only the first 7 values are returned, because all parameters have those values. In the future, extended parameter lines could be returned.

Parameter lines are identified as those which have 7 or 14 numeric elements followed by a non-numeric element. It’s possible that this system could break down under certain circumstances

Author(s)

Ian Taylor

See Also

SS_changepars(), SS_readctl(), SS_readctl_3.24()
SS_plots

plot many quantities related to output from Stock Synthesis

Description

Creates a user-chosen set of plots, including biological quantities, time series, and fits to data. Plots are sent to R GUI, single PDF file, or multiple PNG files. This is now just a wrapper which calls on separate functions to make all the plots.

Usage

SS_plots(
  replist = NULL,
  plot = 1:26,
  print = NULL,
  pdf = FALSE,
  png = TRUE,
  html = png,
  printfolder = "plots",
  dir = "default",
  fleets = "all",
  areas = "all",
  fleetnames = "default",
  fleetcols = "default",
  fleetlty = 1,
  fleetpch = 1,
  lwd = 1,
  areacols = "default",
  areanames = "default",
  verbose = TRUE,
  uncertainty = TRUE,
  forecastplot = FALSE,
datplot = TRUE,
Natageplot = TRUE,
samplesizeplots = TRUE,
compreisidplots = TRUE,
comp.yupper = 0.4,
sprtarg = "default",
bttarg = "default",
minbthresh = "default",
pntscalar = NULL,
bub.scale.pearson = 1.5,
bub.scale.dat = 3,
pntscalar.nums = 2.6,
pntscalar.tags = 2.6,
minnbubble = 8,
aalyear = -1,
aalbin = -1,
aalresids = TRUE,
maxneff = 5000,
cohortlines = c(),
smooth = TRUE,
showsampsize = TRUE,
showeffN = TRUE,
sampsizeline = FALSE,
effNline = FALSE,
showlegend = TRUE,
pwidth = 6.5,
pheight = 4,
pheight_tall = 6.5,
punits = "in",
ptsize = 10,
res = 300,
mainTitle = FALSE,
cex.main = 1,
selexlines = 1:6,
rows = 1,
cols = 1,
maxrows = 6,
maxcols = 4,
maxrows2 = 4,
maxcols2 = 4,
andrerows = 4,
tagrows = 3,
tagcols = 3,
parrows = 4,
parcols = 2,
fixdims = TRUE,
new = TRUE,
SSplotDatMargin = 8,
fileNotes = NULL,
catchasnumbers = NULL,
catchbars = TRUE,
legendloc = "topleft",
minyr = -Inf,
maxyr = Inf,
sexes = "all",
scalebins = FALSE,
scalebubbles = FALSE,
tslables = NULL,
catlabels = NULL,
maxsize = 1,
showmle = TRUE,
showpost = TRUE,
showprior = TRUE,
showinit = TRUE,
showdev = FALSE,
fitrange = FALSE,
...)

Arguments

replist  A list object created by \texttt{SS_output()}. 
plot  Plot sets to be created, see list of plots below. Use to specify only those plot sets of interest, e.g., c(1,2,5,10). Plots for data not available in the model run will automatically be skipped, whether called or not. Current grouping of plots is as follows: 
1. Biology 
2. Selectivity and retention 
3. Timeseries 
4. Recruitment deviations 
5. Recruitment bias adjustment 
6. Spawner-recruit 
7. Catch 
8. SPR 
9. Discards 
10. Mean weight 
11. Indices 
12. Numbers at age 
13. Length comp data 
14. Age comp data 
15. Conditional age-at-length data 
16. Length comp fits 
17. Age comp fits 
18. Conditional age-at-length fits
SS_plots

19. Francis and Punt conditional age-at-length comp fits
20. Mean length-at-age and mean weight-at-age
21. Tags
22. Yield
23. Movement
24. Data range
25. Parameter distributions
26. Diagnostic tables

print
   Deprecated input for backward compatibility, now replaced by png = TRUE/FALSE.

pdf
   Send plots to PDF file instead of R GUI?

png
   Send plots to PNG files instead of R GUI?

html
   Run SS_html() on completion? By default has same value as png.

printfolder
   The sub-directory under 'dir' (see below) in which the PNG files will be located. 
   The default sub-directory is "plots". The directory will be created if it doesn't exist. If 'printfolder' is set to ", it is ignored and the PNG files will be located in the directory specified by 'dir'.

dir
   The directory in which a PDF file (if requested) will be created and within which the printfolder sub-directory (see above) will be created if png=TRUE. By default it will be the same directory that the report file was read from by the SS_output function. Alternatives to the default can be either relative (to the working directory) or absolute paths. The function will attempt to create the directory it doesn't exist, but it does not do so recursively.

fleets
   Either the string "all", or a vector of numerical values, like c(1,3), listing fleets or surveys for which plots should be made. By default, plots will be made for all fleets and surveys. Default="all".

areas
   Either the string "all", or a vector of numerical values, like c(1,3), listing areas for which plots should be made in a multi-area model. By default, plots will be made for all areas (excepting cases where the function has not yet been updated for multi-area models). Default="all".

fleetnames
   Either the string "default", or a vector of characters strings to use for each fleet name. Default="default".

fleetcols
   Either the string "default", or a vector of colors to use for each fleet. Default="default".

fleetlty
   Vector of line types used for each fleet in some plots. Default=1.

fleetpch
   Vector of point types used for each fleet in some plots. Default=1.

lwd
   Line width for some plots. Default=1.

areacols
   Either the string "default", or a vector of colors to use for each area. Default="default".

areanames
   Optional vector of names for each area used in titles. Default="default".

verbose
   Return updates of function progress to the R GUI? Default=TRUE.

uncertainty
   Include values in plots showing estimates of uncertainty (requires positive definite hessian in model? Default=TRUE.
forecastplot  Include forecast years in the timeseries plots and plots of time-varying quantities?
datplot Plot the data by itself? This is useful in document preparation, but doesn’t change across alternative model runs with the same data, so can be committed to save time once the plots have been created once. Setting datplot=FALSE is equivalent to leaving off plots 15 and 16. Default=TRUE.
Natageplot Plot the expected numbers at age bubble plots and mean-age time series? Default=TRUE.
samplesizeplots Show sample size plots? Default=TRUE.
compresidplots Show residuals for composition plots?
comp.yupper Upper limit on ymax for polygon/histogram composition plots. This avoids scaling all plots to have max=1 if there is a vector with only a single observed fish in it. Default=0.4.
sprtarg Specify the F/SPR proxy target. Default=0.4.
btarg Target %unfished to be used in plots showing %unfished. May be omitted by setting to NA.
minbthresh Threshold depletion to be used in plots showing depletion. May be omitted by setting to NA.
pntscalar This scalar defines the maximum bubble size for bubble plots. This option is still available but a better choice is to use bub.scale.pearson and bub.scale.dat, which are allow the same scaling throughout all plots.
bub.scale.pearson Character expansion (cex) value for a proportion of 1.0 in bubble plot of Pearson residuals. Default=1.5.
bub.scale.dat Character expansion (cex) value for a proportion of 1.0 in bubble plot of composition data. Default=3.
pntscalar.nums This scalar defines the maximum bubble size for numbers-at-age and numbers-at-length plots.
pntscalar.tags This scalar defines the maximum bubble size for tagging plots.
minnbubble This defines the minimum number of years below which blank years will be added to bubble plots to avoid cropping. Default=8.
aalyear Years to plot multi-panel conditional age-at-length fits for all length bins; must be in a "c(YYYY,YYYY)" format. Useful for checking the fit of a dominant year class, critical time period, etc. Default=-1.
aalbin The length bin for which multi-panel plots of the fit to conditional age-at-length data will be produced for all years. Useful to see if growth curves are ok, or to see the information on year classes move through the conditional data. Default=-1.
aalresids Plot the full set of conditional age-at-length Pearson residuals? Turn to FALSE if plots are taking too long and you don’t want them.
maxneff The maximum value to include on plots of input and effective sample size. Occasionally a calculation of effective N blows up to very large numbers, rendering it impossible to observe the relationship for other data. Default=5000.
cohortlines  Optional vector of birth years for cohorts for which to add growth curves to numbers at length bubble plots. Default=c().

smooth  Add loess smoother to observed vs. expected index plots and input vs. effective sample size? Default=TRUE.

showsampsizeline  show line for input sample sizes on top of conditional age-at-length plots (TRUE/FALSE, still in development)

effNline  show line for effective sample sizes on top of conditional age-at-length plots (TRUE/FALSE, still in development)

showlegend  Display legends in various plots?

pwidth  Default width of plots printed to files in units of punits. The default is pwidth=6.5.

pheight  Height of plots printed to png files in units of punits. Default is designed to allow two plots per page, with pheight_tall used for plots that work best with a taller format and a single plot per page.

pheight_tall  Height of tall plots printed to png files in units of punits, where the tall plots are a subset of the plots which typically work best in a taller format.

punits  Units for pwidth and pheight. Can be "px" (pixels), "in" (inches), "cm" (centimeters), or "mm" (millimeters). The default is punits="in".

ptsize  Point size for plotted text in plots printed to files (see help("png") in R for details).

res  Resolution of plots printed to files. The default is res = 300.

mainTitle  Logical indicating if a title should be included at the top (not yet implemented for all plots)

cex.main  Character expansion parameter for plot titles (not yet implemented for all plots). Default=1.

selexlines  Vector controlling which lines should be shown on selectivity plots if the model includes retention. Default=1:5.

rows  Number of rows to use for single panel plots. Default=1.

cols  Number of columns to use for single panel plots. Default=1.

maxrows  Maximum number of rows to for multi-panel plots.

maxcols  Maximum number of columns for multi-panel plots.

maxrows2  Maximum number of rows for conditional age-at-length multi-panel plots.

maxcols2  Maximum number of rows for conditional age-at-length multi-panel plots.

andererows  Number of rows of Andre’s conditional age-at-length plots within each page.

tagrows  Number of rows for tagging-related plots.

tagcols  Number of columns for tagging-related plots.

parrows  Number of rows for parameter distribution plots.

parcols  Number of columns for parameter distribution plots.

fixdims  Control whether multi-panel plots all have dimensions equal to maxrows by maxcols, or resized within those limits to fit number of plots. Default=TRUE.
new
SSplotDatMargin
filenotes
catchasnumbers
catchbars
legendloc
minyr
maxyr
sexes
scalebins
scalebubbles
tslables
catlabels
maxsize
showmle
showpost
showprior
showinit
showdev
fitrange

... Additional arguments that will be passed to some subfunctions.

Author(s)

Ian Stewart, Ian Taylor

References

SS_profile

Run a likelihood profile in Stock Synthesis.

Description

Iteratively changes the control file using SS_changepars.

Usage

SS_profile(
  dir = "C:/myfiles/mymodels/myrun/",
  masterctlfile = "control.ss_new",
  newctlfile = "control_modified.ss",
  linenum = NULL,
  string = NULL,
  profilevec = NULL,
  usepar = FALSE,
  globalpar = FALSE,
  parfile = "ss.par",
  parlinenum = NULL,
  parstring = NULL,
  dircopy = TRUE,
  exe.delete = FALSE,
  model = "ss",
  extras = "-nox",
  systemcmd = FALSE,
  saveoutput = TRUE,
  overwrite = TRUE,
  whichruns = NULL,
  version = "3.30",
  prior_check = TRUE,
  read_like = TRUE,
  verbose = TRUE
)

Arguments

dir
  Directory where input files and executable are located.
masterctlfile
  Source control file. Default = "control.ss_new"
newctlfile
  Destination for new control files (must match entry in starter file). Default = "control_modified.ss".

See Also

SS_output(), SSplotBiology(), SSplotCatch(), SSplotComps(), SSplotDiscard(), SSplotIndices(),
SSplotMnwt(), SSplotNumbers(), SSplotRecdevs(), SSplotSelex(), SSplotSpawnrecruit(),
SSplotSPR(), SSplotTags(), SSplotTimeseries(), SSplotYield()
linenum
Line number of parameter to be changed. Can be used instead of string or left as NULL. Can be a vector if you are profiling multiple parameters at the same time.

string
String partially matching name of parameter to be changed. Can be used instead of linenum or left as NULL. Can be a vector if you are profiling multiple parameters at the same time.

profilevec
Vector of values to profile over. If you are profiling over multiple parameters at the same time this should be a data.frame or matrix with a column for each parameter.

usepar
Use PAR file from previous profile step for starting values?

globalpar
Use global par file ("parfile_original_backup.sso", which is automatically copied from original parfile) for all runs instead of the par file from each successive run.

parfile
Name of par file to use (for 3.30 models, this needs to remain 'ss.par'). When globalpar=TRUE, the backup copy of this is used for all runs.

parlinenum
Line number in par file to change (if usepar = TRUE). Can be a vector if you are profiling multiple parameters at the same time.

parstring
String in par file preceding line number to change as an alternative to parlinenum (only needed if usepar = TRUE). Can be a vector if you are profiling multiple parameters at the same time.

dircopy
Copy directories for each run? NOT IMPLEMENTED YET.

exe.delete
Delete exe files in each directory? NOT IMPLEMENTED YET.

model
Name of executable. Default = "ss".

extras
Additional commands to use when running SS. Default = "-nox" will reduce the amount of command-line output.

systemcmd
Should R call SS using "system" function instead of "shell". This may be required when running R in Emacs. Default = FALSE.

saveoutput
Copy output .SSO files to unique names. Default = TRUE.

overwrite
Overwrite any existing .SSO files. Default = TRUE. If FALSE, then some runs may be skipped.

whichruns
Optional vector of run indices to do. This can be used to re-run a subset of the cases in situations where the function was interrupted or some runs fail to converge. Must be a subset of 1:n, where n is the length of profilevec.

version
SS version number. Currently "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3). version = NULL is no longer the default or an allowed entry. The default is version = "3.30".

prior_check
Check to make sure the starter file is set to include the prior likelihood contribution in the total likelihood. Default = TRUE.

read_like
Read the table of likelihoods from each model as it finishes. Default = TRUE. Changing to FALSE should allow the function to play through even if something is wrong with reading the table.

verbose
Controls amount of info output to command line. Default = TRUE.
Note

The starting values used in this profile are not ideal and some models may not converge. Care should be taken in using an automated tool like this, and some models are likely to require rerunning with alternate starting values.

Also, someday this function will be improved to work directly with the plotting function SSplotProfile(), but they don’t yet work well together. Thus, even if SS_profile() is used, the output should be read using SSgetoutput() or by multiple calls to SS_output() before sending to SSplotProfile().

Author(s)

Ian Taylor

See Also

SSplotProfile(), SSgetoutput(), SS_changepars(), SS_parlines()

Examples

## Not run:
# note: don't run this in your main directory
# make a copy in case something goes wrong
mydir <- "C:/ss/Simple - Copy"

# the following commands related to starter.ss could be done by hand
# read starter file
starter <- SS_readstarter(file.path(mydir, "starter.ss"))
# change control file name in the starter file
starter[["ctlfile"]]
<- "control_modified.ss"
# make sure the prior likelihood is calculated
# for non-estimated quantities
starter[["prior_like"]]
<- 1
# write modified starter file
SS_writestarter(starter, dir = mydir, overwrite = TRUE)

# vector of values to profile over
h.vec <- seq(0.3, 0.9, .1)
Nprofile <- length(h.vec)

# run SS_profile command
profile <- SS_profile(
  dir = mydir, # directory
  # "NatM" is a subset of one of the
  # parameter labels in control.ss_new
  model = "ss",
  masterctlfile = "control.ss_new",
  newctlfile = "control_modified.ss",
  string = "steep",
  profilevec = h.vec
)
# read the output files (with names like Report1.sso, Report2.sso, etc.)
profilemodels <- SSgetoutput(dirvec = mydir, keyvec = 1:Nprofile)
# summarize output
profilessummary <- SSsummarize(profilemodels)

# OPTIONAL COMMANDS TO ADD MODEL WITH PROFILE PARAMETER ESTIMATED
MLEmodel <- SS_output("C:/ss/SSv3.24l_Dec5/Simple")
profilemodels[['MLE']] <- MLEmodel
profilessummary <- SSsummarize(profilemodels)
# END OPTIONAL COMMANDS

# plot profile using summary created above
SSplotProfile(profilesummary, # summary object
             profile.string = "steep", # substring of profile parameter
             profile.label = "Stock-recruit steepness (h)" ) # axis label

# make timeseries plots comparing models in profile
SSplotComparisons(profilesummary, legendlabels = paste("h =", h.vec))

###########################################################################
# example two-dimensional profile
# (e.g. over 2 of the parameters in the low-fecundity stock-recruit function)
# base_dir <- "c:/mymodel"

dir_profile_SR <- file.path(base_dir, "Profiles/Zfrac_and_Beta")

# make a grid of values in both dimensions Zfrac and Beta
# vector of values to profile over
Zfrac_vec <- seq(from = 0.2, to = 0.6, by = 0.1)
Beta_vec <- c(0.5, 0.75, 1.0, 1.5, 2.0)
par_table <- expand.grid(Zfrac = Zfrac_vec, Beta = Beta_vec)
nrow(par_table)
## [1] 25
head(par_table)
## Zfrac Beta
## 1 0.2 0.50
## 2 0.3 0.50
## 3 0.4 0.50
## 4 0.5 0.50
## 5 0.6 0.50
## 6 0.2 0.75

# run SS_profile command
# requires modified version of SS_profile available via
# remotes::install_github("r4ss/r4ss@profile_issue_224")
profile <- SS_profile(
    dir = dir_profile_SR, # directory
    masterctlfile = "control.ss_new",
    newctlfile = "control_modified.ss",
    string = c("Zfrac", "Beta"),
)
profilevec = par_table,
extras = "-nohess"
)

# get model output
profilemodels <- SSgetoutput(
  dirvec = dir_profile_SR,
  keyvec = 1:nrow(par_table), getcovar = FALSE
)
n <- length(profilemodels)
profilesummary <- SSsummarize(profilemodels)

# add total likelihood (row 1) to table created above
par_table[["like"]][1, 1:n] <- as.numeric(profilesummary[["likelihoods"]][1, 1:n])

# reshape data frame into a matrix for use with contour
like_matrix <- reshape2::acast(par_table, Zfrac ~ Beta, value.var = "like")

# make contour plot
contour(
  x = as.numeric(rownames(like_matrix)),
  y = as.numeric(colnames(like_matrix)),
  z = like_matrix
)

## End(Not run)

---

**SS_read**

*Read all Stock Synthesis input files for a model*

**Description**

Read all the input files for a Stock Synthesis model into R as a list object. These files will be in a single directory on your machine, i.e., dir. Functionality comes from the r4ss::SS_read*() functions. This function simplifies the number of lines of code you need to write by using all of the read functions to read in the starter, control, data, and forecast files. The starter file is helpful because it provides names for the control and data files.

**Usage**

```r
SS_read(dir = NULL, ss_new = FALSE, verbose = FALSE)
```

**Arguments**

- **dir**
  - A file path to the directory of interest. Typically used with file, an additional input argument, to specify input and output file paths. The default value is `dir = NULL`, which leads to using the current working directory, and thus, full file paths should not be specified for other arguments as they will be appended to `dir`. 
ss_new  A logical that controls if the .ss_new files or the original input files are read in. The default is to read the original files.

verbose  A logical value specifying if output should be printed to the screen.

Value

An invisible list is returned. The first element is the directory that was provided in the argument dir. The second element is the result of normalizePath(dir), which gives the full path. The remaining four elements are list objects from reading in the following input files:

- data
- control
- starter
- forecast
- wtatage (will be NULL if not required by the model)

Author(s)

Ian G. Taylor, Kelli F. Johnson

See Also

- SS_write() can be used to write the input files using the list created by this function.
- SS_readstarter(), SS_readdat(), SS_readctl(), SS_readforecast(), and SS_readwtatage() are used by this function to read in the input files.
- SS_output() to read in equivalent SS3 output files.

Examples

# Read in the 'simple' example model stored in r4ss
inputs <- SS_read(
  dir = system.file("extdata", "simple.3.30.13", package = "r4ss")
)

SS_readctl

Read control file from SS

Description

Read control file from Stock Synthesis (SS) into R as a list object. This function acts as a wrapper for version-specific SS_readctl_ functions. For example, if the control file was written using SS 3.24, then SS_readctl will call SS_readctl_3.24. Input arguments that do not pertain to the version of your control file can be left at their default values.
Usage

SS_readctl(
  file,
  version = "3.30",
  verbose = FALSE,
  echoall = lifecycle::deprecated(),
  use_datlist = TRUE,
  datlist = "data.ss_new",
  nseas = NULL,
  N_areas = NULL,
  Nages = NULL,
  Ngenders = lifecycle::deprecated(),
  Nsexes = NULL,
  Npopenbins = NA,
  Nfleets = NULL,
  Nfleets = NULL,
  Do_AgeKey = NULL,
  Nsurveys = NULL,
  N_tag_groups = NULL,
  N_CPUE_obs = NULL,
  catch_mult_fleets = NULL,
  predM_fleets = NULL,
  Ntag_fleets = NULL,
  N_rows_equil_catch = NULL,
  N_dirichlet parms = NULL,
  ptype = FALSE
)

Arguments

  file            Filename either with full path or relative to working directory.     
                  See the formal arguments for a possible default filename.
  version         SS version number. Currently "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3). version = NULL is no longer the default or an allowed entry. The default is version = "3.30".
  verbose         Should there be verbose output while running the file? Defaults to FALSE.
  echoall         Deprecated. Debugging tool (not fully implemented) of echoing blocks of values as it is being read.
  use_datlist     LOGICAL. If TRUE, use datlist to derive parameters which can not be determined from control file. Defaults to TRUE.
  datlist         list or character. If list, should be a list produced from SS_writedat(). If character, should be the file name of an SS data file.
  nseas           number of seasons in the model. This information is not explicitly available in control file and used only if use_datlist = FALSE.
  N_areas         number of spatial areas in the model. Default = 1. This information is not explicitly available in control file and used only if use_datlist = FALSE.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nages</td>
<td>Oldest age in the model. This information is also not explicitly available in control file and used only if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>Ngenders</td>
<td>Deprecated. Number of sexes in the model. This information is also not explicitly available in control file and used only if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>Nsexes</td>
<td>Number of sexes in the model. This information is also not explicitly available in control file and used only if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>Npopbins</td>
<td>Number of population bins in the model. This information is also not explicitly available in control file and this information is only required if length based maturity vector is directly supplied (Maturity option of 6). and used only if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>Nfleets</td>
<td>Number of fishing fleets and surveys, for 3.30 models.</td>
<td></td>
</tr>
<tr>
<td>Nfleets</td>
<td>Number of fishing fleets, for 3.24 and lower version models.</td>
<td></td>
</tr>
<tr>
<td>Do_AgeKey</td>
<td>Flag to indicate if 7 additional ageing error parameters to be read set 1 (but in fact any non zero numeric in R) or TRUE to enable to read them 0 or FALSE to disable them. This information is not explicitly available in control file and used only if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>Nsurveys</td>
<td>Number of surveys, for 3.24 and lower version models.</td>
<td></td>
</tr>
<tr>
<td>N_tag_groups</td>
<td>Number of tag release group. Default =NA. This information is not explicitly available control file and used only if use_datlist = FALSE. This information is only required if custom tag parameters is enabled (TG_custom=1)</td>
<td></td>
</tr>
<tr>
<td>N_CPUE_obs</td>
<td>Number of CPUE observations. Used only in control file 3.24 syntax if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>catch_mult_fleets</td>
<td>Integer vector of fleets using the catch multiplier option. Defaults to NULL and should be left as such if 1) the catch multiplier option is not used for any fleet or 2) use_datlist = TRUE and datlist is specified. Used only in control file 3.30 syntax if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>predM_fleets</td>
<td>Integer vector of fleets with predator mortality included. Predator mortality fleets are only available in v3.30.18 and higher. Defaults to NULL and should be left as such if 1) predation mortality is not used for any fleets; 2) use_datlist = TRUE and datlist is specified; or 3) if comments in the control file should be used instead to determine the the predM_fleets. Used only in control file 3.30 syntax if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>Ntag_fleets</td>
<td>The number of catch fleets in the model (fleets of ) type 1 or 2; not surveys). Used to set the number of survey parameters. Only used in control file 3.30 reading if tagging data is in the model and use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>N_rows_equil_catch</td>
<td>Integer value of the number of parameter lines to read for equilibrium catch. Defaults to NULL, which means the function will attempt to figure out how many lines of equilibrium catch to read from the control file comments. Used only in control file 3.30 syntax if use_datlist = FALSE.</td>
<td></td>
</tr>
<tr>
<td>N_dirichlet_parms</td>
<td>Integer value of the number of Dirichlet-Multinomial parameters. Defaults to 0. Used only in control file 3.30 syntax if use_datlist = FALSE.</td>
<td></td>
</tr>
</tbody>
</table>
SS_readctl_3.24

ptype
LOGICAL if TRUE, which is the default, a column will be included in the output indicating parameter type. Using TRUE can be useful, but causes problems for SS_writectl, and therefore is not recommended if you intend to write the list back out into a file. Used only in control file 3.24 syntax.

Value
A list structure where each element is a section of the control file.

Author(s)
Ian G. Taylor, Yukio Takeuchi, Neil L. Klaer

See Also
See the following for version-specific SS_readctl functions: SS_readctl_3.24 SS_readctl_3.30. The returned list structure can be written back to the disk using SS_writectl.
See the following for other SS_read functions: SS_readctl SS_readdat SS_readforecast SS_readstarter SS_readwtatage.

Examples

# Read in the 'simple' example SS model stored in r4ss
# Find the directory
dirsimple <- system.file("extdata", "simple_3.30.13", package = "r4ss")
# Read in the dat file to define the structure of the control file so that
# you don't have to specify things in the function call such as 'Nfleet'
datfilename <- dir(dirsimple, pattern = "data\.ss", full.names = TRUE)
dat <- r4ss::SS_readdat(file = datfilename, verbose = FALSE)
# Read in the control file using a list object for datlist
tctl <- r4ss::SS_readctl(
  file = dir(dirsimple, pattern = "control\.ss", full.names = TRUE),
  verbose = FALSE,
  datlist = dat, use_datlist = TRUE
)
# Read in the control file using a file name for datlist
tctl <- r4ss::SS_readctl(
  file = dir(dirsimple, pattern = "control\.ss", full.names = TRUE),
  verbose = FALSE,
  datlist = datfilename, use_datlist = TRUE
)

SS_readctl_3.24  read control file from SS version 3.24
Description

Read Stock Synthesis (version 3.24) control file into list object in R. This function comes with its wrapper function SS_readctl that calls SS_readctl_3.24 (this function) or SS_readctl_3.30 (to be available in future).

Usage

SS_readctl_3.24(
  file,
  verbose = FALSE,
  echoall = lifecycle::deprecated(),
  version = lifecycle::deprecated(),
  use_datlist = TRUE,
  datlist = "data.ss_new",
  nseas = NULL,
  N_areas = NULL,
  Nages = NULL,
  Ngenders = lifecycle::deprecated(),
  Nsexes = NULL,
  Npopbins = NA,
  Nfleet = NULL,
  Nsurveys = NULL,
  Do_AgeKey = NULL,
  N_tag_groups = NULL,
  N_CPUE_obs = NULL,
  ptype = FALSE
)

Arguments

file Filename either with full path or relative to working directory.
See the formal arguments for a possible default filename.

verbose Should there be verbose output while running the file? Defaults to FALSE.

echoall Deprecated. Debugging tool (not fully implemented) of echoing blocks of values as it is being read.

version Deprecated. SS version number. Currently only "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3).

use_datlist LOGICAL if TRUE, use datlist to derive parameters which can not be determined from control file. Defaults to TRUE

datlist list or character. if list : produced from SS_writedat or character : file name of dat file.

nseas number of seasons in the model. This information is not explicitly available in control file and used only if use_datlist = FALSE.

N_areas number of spatial areas in the model. Default = 1. This information is not explicitly available in control file and used only if use_datlist = FALSE.
Nages: oldest age in the model. This information is also not explicitly available in control file and used only if use_datlist = FALSE.

Ngenders: Deprecated. Number of sexes in the model. This information is also not explicitly available in control file and used only if use_datlist = FALSE.

Nsexes: number of sexes in the model. This information is also not explicitly available in control file and used only if use_datlist = FALSE.

Npopbins: number of population bins in the model. This information is also not explicitly available in control file and this information is only required if length based maturity vector is directly supplied (Maturity option of 6) and used only if use_datlist = FALSE.

Nfleet: number of fisheries in the model. This information is also not explicitly available in control file.

Nsurveys: number of survey fleets in the model. This information is also not explicitly available in control file.

Do_AgeKey: Flag to indicate if 7 additional ageing error parameters to be read set 1 (but in fact any non zero numeric in R) or TRUE to enable to read them 0 or FALSE to disable them. This information is not explicitly available in control file and used only if use_datlist = FALSE.

N_tag_groups: number of tag release group. Default =NA. This information is not explicitly available control file and used only if use_datlist = FALSE. This information is only required if custom tag parameters is enabled (TG_custom=1)

N_CPUE_obs: numeric vector of length=Nfleet+Nsurveys containing number of data points of each CPUE time series

ptype: include a column in the output indicating parameter type? (Can be useful, but causes problems for SS_writectl.) Defaults to FALSE.

Author(s)
Yukio Takeuchi, Neil Klaer, Iago Mosqueira, and Kathryn Doering

See Also
SS_readctl(), SS_readdat() SS_readdat_3.24(), SS_readdat_3.30() SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()
Usage

```r
SS_readctl_3.30(
  file,
  verbose = FALSE,
  echoall = lifecycle::deprecated(),
  version = lifecycle::deprecated(),
  use_datlist = TRUE,
  datlist = "data.ss_new",
  nseas = NULL,
  N_areas = NULL,
  Nages = NULL,
  Ngenders = lifecycle::deprecated(),
  Nsexes = NULL,
  Npopbins = NULL,
  Nfleets = NULL,
  Ntag_fleets = NULL,
  Do_AgeKey = NULL,
  N_tag_groups = NULL,
  catch_mult_fleets = NULL,
  predM_fleets = NULL,
  N_rows_equil_catch = NULL,
  N_dirichletParms = NULL
)
```

Arguments

- **file**: Filename either with full path or relative to working directory. See the formal arguments for a possible default filename.
- **verbose**: Should there be verbose output while running the file? Defaults to FALSE.
- **echoall**: Deprecated. Debugging tool (not fully implemented) of echoing blocks of values as it is being read.
- **version**: Deprecated. SS version number. Currently only "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3).
- **use_datlist**: LOGICAL. If TRUE, use datlist to derive parameters which can not be determined from control file. Defaults to TRUE.
- **datlist**: list or character. If list, should be a list produced from `SS_writedat()`. If character, should be the file name of an SS data file.
- **nseas**: number of seasons in the model. This information is not explicitly available in control file and used only if `use_datlist = FALSE`.
- **N_areas**: number of spatial areas in the model. Default = 1. This information is not explicitly available in control file and used only if `use_datlist = FALSE`.
- **Nages**: oldest age in the model. This information is also not explicitly available in control file and used only if `use_datlist = FALSE`.
- **Ngenders**: Deprecated. Number of sexes in the model. This information is also not explicitly available in control file and used only if `use_datlist = FALSE`. 
SS_readctl_3.30

Nsexes
number of sexes in the model. This information is also not explicitly available in control file and used only if use_datlist = FALSE.

Npopbins
number of population bins in the model. This information is also not explicitly available in control file and this information is only required if length based maturity vector is directly supplied (Maturity option of 6) and used only if use_datlist = FALSE.

Nfleets
number of fishery and survey fleets in the model. This information is also not explicitly available in control file

Ntag_fleets
The number of catch fleets in the model (fleets of type 1 or 2; not surveys). Used to set the number of survey parameters. Only used if tagging data is in the model and use_datlist is FALSE.

Do_AgeKey
Flag to indicate if 7 additional ageing error parameters to be read set 1 (but in fact any non zero numeric in R) or TRUE to enable to read them 0 or FALSE to disable them. This information is not explicitly available in control file and used only if use_datlist = FALSE.

N_tag_groups
number of tag release group. Default =NA. This information is not explicitly available in control file and used only if use_datlist = FALSE. This information is only required if custom tag parameters is enabled (TG_custom=1)

catch_mult_fleets
integer vector of fleets using the catch multiplier option. Defaults to NULL and should be left as such if 1) the catch multiplier option is not used for any fleets or 2) use_datlist = TRUE and datlist is specified.

predM_fleets
integer vector of fleets with predator mortality included. Predator mortality fleets are only available in v3.30.18 and higher. Defaults to NULL and should be left as such if 1) predation mortality is not used for any fleets; 2) use_datlist = TRUE and datlist is specified; or 3) if comments in the control file should be used instead to determine the the predM_fleets.

N_rows_equil_catch
Integer value of the number of parameter lines to read for equilibrium catch. Defaults to NULL, which means the function will attempt to figure out how many lines of equilibrium catch to read from the control file comments.

N_dirichlet_parms
Integer value of the number of Dirichlet multinomial parameters. Defaults to 0.

Author(s)
Neil Klaer, Yukio Takeuchi, Watal M. Iwasaki, and Kathryn Doering

See Also
SS_readctl(), SS_readdat() SS_readdat_3.24(), SS_readdat_3.30() SS_readctl_3.24(), SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()
SS_readdat

read Stock Synthesis data file

Description

Read Stock Synthesis data file into list object in R. This function is a wrapper which calls SS_readdat_2.00, SS_readdat_3.00, SS_readdat_3.24, or SS_readdat_3.30 (and potentially additional functions in the future). This setup allows those functions to be cleaner (if somewhat redundant) than a single function that attempts to do everything. Returned datlist is mostly consistent across versions.

Usage

SS_readdat(
  file,
  version = "3.30",
  verbose = TRUE,
  echoall = FALSE,
  section = NULL
)

Arguments

file Filename either with full path or relative to working directory. See the formal arguments for a possible default filename.

version SS version number. Currently "2.00", "3.00", "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3). If version is NULL, the version (3.24 or 3.30) will be looked for on the first line of the file.

verbose Should there be verbose output while running the file? Default=TRUE.

echoall Debugging tool (not fully implemented) of echoing blocks of data as it is being read.

section Which data set to read. Only applies for a data.ss_new file created by Stock Synthesis. Allows the choice of either expected values (section=2) or bootstrap data (section=3+). Leaving default of section=NULL will read input data, (equivalent to section=1).

Author(s)

Ian G. Taylor, Allan C. Hicks, Neil L. Klaer, Kelli F. Johnson, Chantel R. Wetzel

See Also

SS_readdat_2.00(), SS_readdat_3.00(), SS_readdat_3.24(), SS_readdat_3.30(), SS_readctl(), SS_readctl_3.24() SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()
SS_readdat_2.00

**read data file from SS version 2.00**

**Description**

Read Stock Synthesis (version 2.00) data file into list object in R. This function was formerly called SS_readdat. That name is now used for a wrapper function that calls either SS_readdat_2.00 SS_readdat_3.00 SS_readdat_3.24 or SS_readdat_3.30 (and potentially additional functions in the future).

**Usage**

SS_readdat_2.00(file, verbose = TRUE, echoall = FALSE, section = NULL)

**Arguments**

- **file**: Filename either with full path or relative to working directory. See the formal arguments for a possible default filename.
- **verbose**: Should there be verbose output while running the file? Default=TRUE.
- **echoall**: Debugging tool (not fully implemented) of echoing blocks of data as it is being read.
- **section**: Which data set to read. Only applies for a data.ss_new file created by Stock Synthesis. Allows the choice of either expected values (section=2) or bootstrap data (section=3+). Leaving default of section=NULL will read input data, (equivalent to section=1). ## needs to be added

**Author(s)**

Ian G. Taylor, Yukio Takeuchi, Z. Teresa A’mar, Neil L. Klaer

**See Also**

SS_readdat(), SS_readdat_3.30(), SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()

SS_readdat_3.00

**read data file from SS version 3.00**

**Description**

Read Stock Synthesis (version 3.00) data file into list object in R. This function was formerly called SS_readdat. That name is now used for a wrapper function that calls either SS_readdat_3.24 or SS_readdat_3.30 (and potentially additional functions in the future).
Usage

SS_readdat_3.24(file, verbose = TRUE, echoall = FALSE, section = NULL)

Arguments

file Filename either with full path or relative to working directory.
See the formal arguments for a possible default filename.
verbose Should there be verbose output while running the file? Default=TRUE.
echoall Debugging tool (not fully implemented) of echoing blocks of data as it is being read.
section Which data set to read. Only applies for a data.ss_new file created by Stock Synthesis. Allows the choice of either expected values (section=2) or bootstrap data (section=3+). Leaving default of section=NULL will read input data, (equivalent to section=1).

Author(s)

Ian G. Taylor, Yukio Takeuchi, Z. Teresa A’mar

See Also

SS_readdat(), SS_readdat_3.30(), SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()

SS_readdat_3.24 read data file from SS version 3.24

Description

Read Stock Synthesis (version 3.24) data file into list object in R. This function was formerly called SS_readdat. That name is now used for a wrapper function that calls either SS_readdat_3.24 or SS_readdat_3.30 (and potentially additional functions in the future).

Usage

SS_readdat_3.24(file, verbose = TRUE, echoall = FALSE, section = NULL)

Arguments

file Filename either with full path or relative to working directory.
See the formal arguments for a possible default filename.
verbose Should there be verbose output while running the file? Default=TRUE.
echoall Debugging tool (not fully implemented) of echoing blocks of data as it is being read.
section Which data set to read. Only applies for a data.ss_new file created by Stock Synthesis. Allows the choice of either expected values (section=2) or bootstrap data (section=3+). Leaving default of section=NULL will read input data, (equivalent to section=1).
**SS_readdat_3.30**

**Author(s)**

Ian G. Taylor, Yukio Takeuchi, Z. Teresa A’mar, Kelli F. Johnson, Chantel R. Wetzel

**See Also**

SS_readdat(), SS_readdat_3.30(), SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()

---

**SS_readdat_3.30**

*read data file from SS version 3.30*

**Description**

Read Stock Synthesis (version 3.30) data file into list object in R. This function was formerly called SS_readdat. That name is now used for a wrapper function that calls either SS_readdat_3.24 or SS_readdat_3.30 (and potentially additional functions in the future).

**Usage**

SS_readdat_3.30(file, verbose = TRUE, echoall = FALSE, section = NULL)

**Arguments**

- `file` Filename either with full path or relative to working directory. See the formal arguments for a possible default filename.
- `verbose` Should there be verbose output while running the file? Default=TRUE.
- `echoall` Debugging tool (not fully implemented) of echoing blocks of data as it is being read.
- `section` Which data set to read. Only applies for a data.ss_new file created by Stock Synthesis. Allows the choice of either expected values (section=2) or bootstrap data (section=3+). Leaving default of section=NULL will read input data, (equivalent to section=1).

**Author(s)**

Ian G. Taylor, Yukio Takeuchi, Z. Teresa A’mar, Chris J. Grandin, Kelli F. Johnson, Chantel R. Wetzel

**See Also**

SS_readdat(), SS_readdat_3.30(), SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()
SS_readforecast  

read forecast file

**Description**

read Stock Synthesis forecast file into list object in R

**Usage**

```r
SS_readforecast(
  file = "forecast.ss",
  Nfleets = NULL,
  Nareas = NULL,
  nseas = NULL,
  version = "3.30",
  readAll = FALSE,
  verbose = TRUE
)
```

**Arguments**

- **file**  
  Filename either with full path or relative to working directory.  
  See the formal arguments for a possible default filename.
- **Nfleets**  
  Number of fleets (not required in 3.30).
- **Nareas**  
  Number of areas (not required in 3.30).
- **nseas**  
  number of seasons (not required in 3.30).
- **version**  
  SS version number. Currently "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3). `version = NULL` is no longer the default or an allowed entry. The default is `version = "3.30"`.
- **readAll**  
  Should the function continue even if Forecast = 0 or -1 (at which point SS stops reading)?
- **verbose**  
  Should there be verbose output while running the file?

**Author(s)**

Ian Taylor + Nathan Vaughan

**See Also**

`SS_readstarter()`, `SS_readdat()`, `SS_writestarter()`, `SS_writeforecast()`, `SS_writedat()`,
**SS_readpar_3.24**

**read ss.par file from SS version 3.24**

---

**Description**

Read Stock Synthesis (version 3.24) parameter file into list object in R.

**Usage**

```r
SS_readpar_3.24(parfile, datasource, ctlsource, verbose = TRUE)
```

**Arguments**

- `parfile`: Filename either with full path or relative to working directory.
- `datasource`: list or character. If list, should be a list produced from `SS_writedat()`. If character, should be the full file location of an SS data file.
- `ctlsource`: list or character. If list, should be a list produced from `SS_writectl()`. If character, should be the full file location of an SS control file.
- `verbose`: Should there be verbose output while running the file? Default=TRUE.

**Author(s)**

Nathan R. Vaughan

**See Also**

`SS_readctl()`, `SS_readdat()` `SS_readdat_3.24()`, `SS_readctl_3.24()`, `SS_readstarter()`, `SS_readforecast()`, `SS_writestarter()`, `SS_writeforecast()`, `SS_writedat()`

---

**SS_readpar_3.30**

**read ss.par file from SS version 3.30**

---

**Description**

Read Stock Synthesis (version 3.30) parameter file into list object in R.

**Usage**

```r
SS_readpar_3.30(parfile, datasource, ctlsource, verbose = TRUE)
```
**Arguments**

- **parfile**: Filename either with full path or relative to working directory.
- **datasource**: list or character. If list, should be a list produced from `SS_writedat()`. If character, should be the full file location of an SS data file.
- **ctlsource**: list or character. If list, should be a list produced from `SS_writectl()`. If character, should be the full file location of an SS control file.
- **verbose**: Should there be verbose output while running the file? Default=TRUE.

**Author(s)**

Nathan R. Vaughan

**See Also**

`SS_readctl()`, `SS_readdat()`, `SS_readstarter()`, `SS_readforecast()`, `SS_writestarter()`, `SS_writeforecast()`, `SS_writedat()`

---

**SS_readstarter**

*read starter file*

**Description**

read Stock Synthesis starter file into list object in R

**Usage**

```r
SS_readstarter(file = "starter.ss", verbose = TRUE)
```

**Arguments**

- **file**: Filename either with full path or relative to working directory. See the formal arguments for a possible default filename.
- **verbose**: Should there be verbose output while running the file?

**Author(s)**

Ian Taylor

**See Also**

`SS_readforecast()`, `SS_readdat()`, `SS_writestarter()`, `SS_writeforecast()`, `SS_writedat()`
**SS_readwtatage**  
*Read weight-at-age data file*

**Description**
Read in a weight-at-age data file into a data frame in R.

**Usage**
```r
SS_readwtatage(file = "wtatage.ss", verbose = TRUE)
```

**Arguments**
- `file`  
  Filename either with full path or relative to working directory.  
  See the formal arguments for a possible default filename.
- `verbose`  
  A logical value specifying if output should be printed to the screen.

**Value**
Returns a data frame with a variable number of columns based on the number of ages that are included in the file. Though, the first columns will always be Yr, Seas, Sex, Bio_Pattern, BirthSeas, and Fleet. The seventh column will be age zero. The last or next to last column will be the maximum age included in the weight-at-age data. For SS version 3.30 and greater, the last column will be a column of comments.

**Author(s)**
Kelli F. Johnson, Ian G. Taylor

---

**SS_read_summary**  
*read ss_summary file*

**Description**
read Stock Synthesis ss_summary.sso file into list object in R

**Usage**
```r
SS_read_summary(file = "ss_summary.sso", verbose = FALSE)
```

**Arguments**
- `file`  
  Filename either with full path or relative to working directory.
- `verbose`  
  A logical value specifying if output should be printed to the screen.
**SS_recdevs**

**Value**

Output will be a list with four elements, `header`, `likelihoods`, `parameters`, and `derived_quants`. Each is a data frame with rownames indicating the quantity shown in each row.

**Author(s)**

Ian Taylor

**See Also**

`SS_output()`, `SS_readforecast()`, `SS_readdat()`, `SS_readstarter()`

**Examples**

```r
## Not run:
summary <- SS_read_summary(file = "c:/mymodel/ss_summary.sso")

## End(Not run)
```

---

**SS_recdevs**

*Insert a vector of recruitment deviations into the control file.*

**Description**

A function to insert a vector of recruitment deviations into the control file for simulation studies. This can also be achieved by using the .par file, but Ian Taylor prefers this approach for no good reason.

**Usage**

```r
SS_recdevs(
  fyr,
  lyr,
  ctl = NULL,
  recdevs = NULL,
  rescale = TRUE,
  scaleyrs = NULL,
  dir = "working_directory",
  ctlfile = "control.ss_new",
  newctlfile = "control_modified.ss",
  verbose = TRUE,
  writectl = TRUE,
  returnctl = FALSE,
  newmaxbias = NULL
)
```
SS_RunJitter

Arguments

- **fyr**: First year of the recdev vector.
- **lyr**: Last year of the recdev vector.
- **ctl**: Either NULL to read anew or an already read control file. Default=NULL.
- **recdevs**: Either NULL to generate anew or an already generated vector of recdevs. Default=NULL.
- **rescale**: Should the recdevs be rescaled to have mean = 0 and std. deviation = sigmaR? Default=TRUE.
- **scaleyrs**: Vector of years over which rescaling (if chosen) should occur.
- **dir**: Directory where files are located. Default is to use the working directory in use by R. Default="working_directory".
- **ctlfile**: Name of control file to modify. Default="control.ss_new".
- **newctlfile**: Name of new file to output modified control file. Default="control_modified.ss".
- **verbose**: Verbose output to R command line? Default=TRUE.
- **writectl**: Write new file? Default=TRUE.
- **returnctl**: Return contents ctl file as an object in the R workspace. Default=FALSE.
- **newmaxbias**: Replace the maximum bias adjustment fraction with any non-NULL value. Default=NULL.

Author(s)

Ian Taylor

---

**SS_RunJitter**

*Iteratively apply the jitter option in SS*

Description

Iteratively run a Stock Synthesis model with different jittered starting parameter values based on the jitter fraction. Output files are renamed in the format Report1.sso, Report2.sso, etc.

Usage

```r
SS_RunJitter(
  mydir,
  model = "ss",
  extras = "-nohess",
  Njitter,
  Intern = TRUE,
  systemcmd = FALSE,
  printlikes = TRUE,
  verbose = FALSE,
  jitter_fraction = NULL,
  init_values_src = NULL
)
```
SS_RunJitter

Arguments

mydir Directory where model files are located.
model Name of the Stock Synthesis model file (which has the .exe for on Windows) in mydir without the extension (if any), e.g., "ss" or "ss_win".
extras Additional command line arguments passed to the executable. The default, "-nohess", runs each jittered model without the hessian.
Njitter Number of jitters, or a vector of jitter iterations. If length(Njitter) > 1 only the iterations specified will be ran, else 1:Njitter will be executed.
Intern Show command line info in R console or keep hidden. The default, TRUE, keeps the executable hidden.
systemcmd Option to switch between 'shell' and 'system'. The default, FALSE, facilitates using the shell command on Windows.
printlikes A logical value specifying if the likelihood values should be printed to the console.
verbose A logical value specifying if output should be printed to the screen.
jitter_fraction The value, typically 0.1, used to define a uniform distribution in cumulative normal space to generate new initial parameter values. The default of NULL forces the user to specify the jitter_fraction in the starter file, and this value must be greater than zero and will not be overwritten.
init_values_src Either zero or one, specifying if the initial values to jitter should be read from the control file or from the par file, respectively. The default is NULL, which will leave the starter file unchanged.

Value

A vector of likelihoods for each jitter iteration.

Author(s)

James T. Thorson, Kelli F. Johnson, Ian G. Taylor

Examples

```r
## Not run:
#### Run jitter from par file with arbitrary, but common, choice of 0.1
modeldir <- tail(dir(system.file("extdata", package = "r4ss"), full.names = TRUE), 1)
umjitter <- 25
jit.likes <- SS_RunJitter(
  mydir = modeldir, Njitter = numjitter,
  jitter_fraction = 0.1, init_value_src = 1)

#### Read in results using other r4ss functions
# (note that un-jittered model can be read using keyvec=0:numjitter)
profilemodels <- SSgetoutput(dirvec = modeldir, keyvec = 1:numjitter, getcovar = FALSE)
```
# summarize output
profilesummary <- SSsummarize(profilemodels)
# Likelihoods
profilesummary[["likelihoods"]][1, ]
# Parameters
profilesummary[["pars"]]

## End(Not run)

SS_Sensi_plot  

Create relative sensitivity plots as described in Cope and Gertseva (2020)

Description

Uses output from SSsummarize() to make a figure showing sensitivity of various quantities of interest.

Usage

SS_Sensi_plot(
  model.summaries,
  dir = "",
  current.year,
  mod.names,
  Sensi.RE.out = "Sensi_RE_out.DMP",
  CI = 0.95,
  TRP.in = 0.4,
  LRP.in = 0.25,
  sensi.xlab = "Sensitivity scenarios",
  ylims.in = c(-1, 2, -1, 2, -1, 2, -1, 2, -1, 2, -1, 2),
  plot.figs = c(1, 1, 1, 1, 1, 1),
  sensi.type.breaks = NA,
  anno.x = NA,
  anno.y = NA,
  anno.lab = NA,
  spawn.lab = NA,
  yield.lab = NA,
  F.lab = NA
)

Arguments

model.summaries  
Output from SSsummarize() summarizing results of models to be included

dir  
Directory where plots will be created, either relative to working directory or an absolute path
current.year  Year to report output
mod.names  List the names of the sensitivity runs
Sensi.RE.out  Saved file of relative changes
CI  Confidence interval box based on the reference model
TRP.in  Target relative abundance value
LRP.in  Limit relative abundance value
sensi_xlab  X-axis label
ylims.in  Y-axis label
plot.figs  Which plots to make/save?
sensi.type.breaks  vertical breaks that can separate out types of sensitivities
anno.x  Horizontal positioning of the sensitivity types labels
anno.y  Vertical positioning of the sensitivity types labels
anno.lab  Sensitivity types labels
spawn.lab  Label for spawning output or spawning biomass. By default it will be set to "SO" if any model has spawning output in numbers and "SB" if all models have spawning output in biomass. Subscripts will be added for 0 or current year.
yield.lab  Label for yield reference point. By default it will be set to something like "Yield(SPR=0.3)" where the SPR value is the SPR target. If the models have different SPR targets, it will be set to "Yield(tgt SPR)".
F.lab  Label for F reference point. By default it will be set to something like "F(SPR=0.3)" where the SPR value is the SPR target. If the models have different SPR targets, it will be set to "F(tgt SPR)".

Author(s)

Jason Cope

References


See Also

SSsummarize()

Examples

```r
## Not run:
# Set directory and extract output from models
# Model 1 needs to be the Reference model, with sensitivity runs following
# from run 2 on.
```
# Note: models are available in Jason Cope's github repository:
# https://github.com/shcaba/Stock-Assessment-Sensitivity-Plots/

```
dir <-
  "C:/Users/.../GitHub/Stock-Assessment-Sensitivity-Plots/Sensitivity_runs/
models.dirs <- paste0("Cab_SCS_MS_", 1:19)
zz <- SSgetoutput(dirvec = file.path(dir, models.dirs))
```

# Use the summarize function in r4ss to get model summaries
```
model.summaries <- SSsummarize(zz)
```

# Define the names of each model. This will be used to label runs in the
# table and in the figures.
```
mod.names <- c(
  "Reference",
  "M: Fix to 2009",
  "M: Fix to prior",
  "M: Fix to Hamel",
  "M: Fix to VBGF",
  "M: Fix to OR",
  "VBGF 2009",
  "VBGF Grebel",
  "OR maturity",
  "Est. h",
  "All rec devs",
  "No rec devs",
  "High bias adj.",
  "Harmonic mean",
  "Dirichlet",
  "Wts = 1",
  "No blocks",
  "First blocks in 2000",
  "Alt rec catches"
)
```

# Run the sensitivity plot function
```
SS_Sensi_plot(
  model.summaries = model.summaries,
  dir = dir,
  current.year = 2019,
  mod.names = mod.names, # List the names of the sensitivity runs
  likelihood.out = c(1, 1, 0),
  Sensi.RE.out = "Sensi_RE_out.DMP", # Saved file of relative errors
  CI = 0.95, # Confidence interval box based on the reference model
  TRP.in = 0.4, # Target relative abundance value
  LRP.in = 0.25, # Limit relative abundance value
  sensi_xlab = "Sensitivity scenarios", # X-axis label
  ylims.in = c(-1, 1, -1, 1, -1, 1, -1, 1, -1, 1, -1, 1), # Y-axis label
  plot.figs = c(1, 1, 1, 1, 1), # Which plots to make/save?
  sensi.type.breaks = c(6.5, 9.5, 13.5, 16.5), # vertical breaks
  anno.x = c(3.75, 8, 11.5, 15, 18), # positioning of types labels
  anno.y = c(1, 1, 1, 1, 1), # positioning of types labels
  anno.lab = c(
    "Natural mortality", "VBGF/Mat.", "Recruitment", "Data Wts.",
  )
)`
SS_splitdat

**Split apart bootstrap data to make input file.**

**Description**

A function to split apart bootstrap data files created in data.ss_new. To get bootstraps, the input "N bootstrap file to produce" in starter.ss needs to be 3 or greater. The function can either create a file for just the input data (if inputs=TRUE), a file for just the MLE values (if MLE = TRUE), or separate files for each of the bootstraps (if inputs=FALSE and MLE=FALSE).

**Usage**

```r
SS_splitdat(
    inpath = "working_directory",
    outpath = "working_directory",
    inname = "data.ss_new",
    outpattern = "BootData",
    number = FALSE,
    verbose = TRUE,
    fillblank = TRUE,
    MLE = TRUE,
    inputs = FALSE,
    notes = ""
)
```

**Arguments**

- `inpath`: Directory containing the input file. By default the working directory given by `getwd()` is used. Default="working_directory".
- `outpath`: Directory into which the output file will be written. Default="working_directory".
- `inname`: File name of input data file to be split. Default="Data.SS_New".
- `outpattern`: File name of output data file. Default="BootData".
- `number`: Append bootstrap number to the file name chosen in `outpattern`? Default=F.
- `verbose`: Provide richer command line info of function progress? Default=TRUE.
- `fillblank`: Replace blank lines with "#". Helps with running on linux. Default=TRUE.
- `MLE`: Grab the maximum likelihood values from the second block in Data.SS_New (instead of bootstrap values or copies of inputs)? Default=TRUE.
- `inputs`: Grab the copy of the input values values from the first block in Data.SS_New (instead of MLE or bootstrap values)? Default=F.
SS_tune_comps

Notes to the top of the new file (comment indicator "#C" will be added). Default="".

Author(s)

Ian Taylor

SS_tune_comps

Calculate new tunings for length and age compositions and (re)run models

Description

Creates a table of values that can be copied into the SS control file for SS 3.30 models to adjust the input sample sizes for length and age compositions based on either the Francis or McAllister-Ianelli tuning or adds the Dirichlet-Multinomial parameters to the necessary files to tune the model using an integrated method. Optionally, this function can automatically add these tunings to the appropriate files and rerun the model for the desired number of iterations.

Usage

SS_tune_comps(
  replist = NULL,
  fleets = "all",
  option = c("Francis", "MI", "none", "DM"),
  digits = 6,
  write = TRUE,
  niters_tuning = 0,
  init_run = FALSE,
  dir = getwd(),
  model = "ss",
  exe_in_path = FALSE,
  extras = "-nox",
  allow_up_tuning = FALSE,
  verbose = TRUE,
  ...
)

Arguments

replist A list object created by SS_output().

fleets Either the string 'all', or a vector of fleet numbers

option Which type of tuning: 'none', 'Francis', 'MI', or 'DM'. The first option, none, will only return information about the Francis and MI weights that are suggested.

digits Number of digits to round numbers to.
write  Write suggested tunings to a file saved to the disk called suggested_tunings.ss. This file name is currently hard coded and will be saved in dir.

niters_tuning  The number of times to retune models. Defaults to 0, where only the tunings should be calculated and the model is not rerun. Note that for DM, it will be assumed that 0 means not to run the model and specifying 1 or greater will only run the model once (because DM is not an iterative retuning method).

init_run  Should the model be run before calculating the tunings? Defaults to FALSE. This run is not counted as an iteration for niters_tuning and will not be used if option = "DM".

dir  The path to the model directory.

model  The name of the stock synthesis executable. This model is assumed to be either in the same folder as the model files (specified in dir), or in the PATH if exe_in_path = TRUE. This will not be used if init_run = FALSE and niters_tuning = 0.

exe_in_path  logical. If TRUE, will look for exe in the PATH. If FALSE, will look for exe in the model folders. Default = FALSE.

extras  Additional commands to use when running SS. Default = "-nox" will reduce the amount of command-line output. A commonly used option is "-nohess" to skip calculating the hessian (and asymptotic uncertainty).

allow_up_tuning  Allow tuning values for Francis or MI > 1? Defaults to FALSE, which caps tuning values at 1.

verbose  A logical value specifying if output should be printed to the screen.

Value

Returns a table that can be copied into the control file. If write=TRUE then will write the values to a file (currently hardwired to go in the directory where the model was run and called "suggested_tunings.ss").

option

Francis:
The Francis approach to data weighting adjusts the input sample sizes using a scalar such that the fit of the expected value is within the uncertainty intervals based on the expected fit given adjusted sample sizes.

McAllister-Ianelli (MI):
Also known as the Harmonic-Mean approach to data weighting, the McAllister-Ianelli weighting approach uses a scalar to adjust the input sample size of composition data based matching the arithmetic mean of the input sample size to the harmonic mean of the effective sample size.

Dirichlet-Multinomial (DM):
The Dirichlet-Multinomial likelihood is an alternative approach that allows the tuning factor to be estimated rather than iteratively tuned. Note that for option = "DM" a table of tunings is not created as the DM is not an iterative reweighting option. Instead, each of the fleets with length- and age-composition data will be assigned a DM parameter and the model will be rerun.
SS versions

3.30.00-3.30.11:
Recommended_var_adj and other columns were named differently in these early version of SS. Calculations are thus done internally based on finding the correct column name.

3.30.12-3.30.16:
Starting with SS version 3.30.12, the "Length_Comp_Fit_Summary" table in Report.sso is already in the format required to paste into the control file to apply the McAllister-Ianelli tuning. However, this function provides the additional option of the Francis tuning and the ability to compare the two approaches, as well as the functionality to add tunings and rerun the model. The "Age_Comp_Fit_Summary" table in Report.sso is formatted similarly though, though the Recommended_var_adj was wrongly set to 1 for all fleets in SS versions 3.30.12 to 3.30.16. Thus, the MI approach is not taken from this recommended column, instead, it is calculated from the harmonic mean and input sample sizes.

Author(s)
Ian G. Taylor, Kathryn Doering

References

See Also
SSMethod.TA1.8()

Examples

```r
## Not run:
# Set up the folders ----
# Create a temporary directory, feel free to change this location
mod_path <- file.path(tempdir(), "simple_mod")
# Path to simple model in r4ss and copy files to mod_path
example_path <- system.file("exdata", "simple_3.30.13", package = "r4ss")
# copy model input files
copy_SS_inputs(dir.old = example_path, dir.new = mod_path, verbose = FALSE)
# copy over the Report file
file.copy(
  from = file.path(example_path, "Report.sso"),
  to = file.path(mod_path, "Report.sso")
)
# copy comp report file
file.copy(
  from = file.path(example_path, "CompReport.sso"),
  to = file.path(mod_path, "CompReport.sso")
)
# Use the SS_tune_comps function----
```
# Examples where a model is not run ----

# Just get the Francis and MI tables, without running the model. Note that the
# model in mod_path needs to already have been run with Stock Synthesis, so
# that a report file is available.

weight_table <- SS_tune_comps(
  dir = mod_path,
  option = "none",
  verbose = FALSE
)

# view the weights. Note that the columns New_Francis and New_MI show the
# weights, but neither were added to the New_Var_adj column
weight_table

# Get the Francis and MI tables, but with the Francis weights in the
# New_Var_adj column. Note if option = "MI" were used, the output would be
# the same except that the New_Var_adj column would contain the MI weights.
weight_table_fran <- SS_tune_comps(
  dir = mod_path,
  option = "Francis",
  verbose = FALSE
)
weight_table_fran

# Add Dirichlet multinomial tuning parameters to the model, without running it.

DM_parm_info <- SS_tune_comps(
  option = "DM",
  niters_tuning = 0, # 0 means the model will not be run.
  dir = mod_path,
  model = "ss",
  extras = "-nohess",
  verbose = FALSE
)

# See the Dirichlet parameters added to the model.
DM_parm_info["tuning_table_list"]

# can also look in the data file to see which fleets of comp data now have
# DM parameters. The "ParmSelect" column of the len_info and age_info
# contains the dirichlet multinomial parameter numbers.
dat <- SS_readdat(file.path(mod_path, "simple_data.ss"), verbose = FALSE)
dat["len_info"]
dat["age_info"]

# Examples where models are run ----

# Run MI weighting and allow upweighting for 1 iteration. Assume that an ss
# executable called "ss or ss.exe" is available in the mod_path folder.
# If the executable is not available, then the call will exit on error.
# Note that the Dirichlet multinomial parameters will be removed, but any
# previous tunings will be retained.
tune_info <- SS_tune_comps(
  option = "MI",

SS_varadjust

Modify variance and sample size adjustments in the control file

Description

Function has not been fully tested yet

Usage

SS_varadjust(
  dir = "C:/myfiles/mymodels/myrun/",
  ctlfile = "control.ss_new",
  newctlfile = "control_modified.ss",
  keyword = "variance adjustments",
  newtable = NULL,
  newrow = NULL,
  rownumber = NULL,
  maxcols = 100,
  maxrows = 100,
  overwrite = FALSE,
  version = "3.30",
)
verbatim {

verbose = TRUE
)

Arguments

dir Directory with control file to change.
ctlfile Control file name. Default="control.ss_new".
newctlfile Name of new control file to be written. Default="control_modified.ss".
keyword Keyword to use as reference for start of section on variance adjustments
newtable Optional table of new variance adjustment values
newrow Optional vector of new variance adjustment values for a particular row
rownumber Which of the 6 rows to replace with 'newrow' if present?
maxcols Maximum number of columns to search among in 3.24 models (may need to increase from default if you have a huge number of fleets)
maxrows Maximum number of rows to search among in 3.30 models (may need to increase from default if you have a huge number of fleets)
overwrite Overwrite file if it exists?
version SS version number. Currently "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3). version = NULL is no longer the default or an allowed entry. The default is version = "3.30".
verbose TRUE/FALSE switch for amount of detail produced by function. Default=TRUE.

Author(s)

Ian G. Taylor, Gwladys I. Lambert

See Also

SS_tune_comps(), SS_parlines(), SS_changepars()

Examples

## Not run:
# load model output into R
replist <- SS_output(dir = "c:/model/")

# get new variance adjustments (  
varadjust <- SS_tune_comps(replist, option = "Francis")
print(varadjust)

# write new table to file
SS_varadjust(  
dir = replist["inputs"]["dir"], newctlfile = "new_control.ss",  
newtable = varadjust, overwrite = FALSE  
)

## End(Not run)
SS_write  Write all Stock Synthesis input files for a model

Description

Writes all the input files for a Stock Synthesis model using the list created by \texttt{SS_read()} (presumably after modification of one or more elements) using the \texttt{SS_write*()} functions for the four or five model input files.

Usage

\texttt{SS_write(inputlist, dir = \textasciitilde, overwrite = FALSE, verbose = FALSE)}

Arguments

- \texttt{inputlist} list created by \texttt{SS_read()}
- \texttt{dir} A file path to the directory of interest. Typically used with file, an additional input argument, to specify input and output file paths. The default value is \texttt{dir = NULL}, which leads to using the current working directory, and thus, full file paths should not be specified for other arguments as they will be appended to \texttt{dir}.
- \texttt{overwrite} A logical value specifying if the existing file(s) should be overwritten. The default value is \texttt{overwrite = FALSE}.
- \texttt{verbose} A logical value specifying if output should be printed to the screen.

Author(s)

Ian G. Taylor

See Also

- \texttt{SS_read()} creates the list that is used by this function.
- \texttt{SS_writestarter()}, \texttt{SS_writedat()}, \texttt{SS_writectl()}, \texttt{SS_writeforecast()}, and \texttt{SS_writewtatage()} are used to write the input files.

Examples

```r
# Not run:
# read inputlist to modify the data file
inputlist <- SS_read(
  dir = system.file("extdata", "simple_3.30.13", package = "r4ss")
)

# modify the starter file (use the par file)
inputlist["start"][["init_values_src"]]<- 1

# modify the data file (remove age comps from years prior to 1990)
inputlist["dat"][["agecomp"]]<- inputlist["dat"][["agecomp"]] %>%
```
dplyr::filter(Yr >= 1990)

# modify the control file (turn off early recdevs and change range of yrs)
inputlist["ctl"][["recdev_early_phase"]]<-
-abs(inputlist["ctl"][["recdev_early_phase"]])
inputlist["ctl"][["MainRdevYrFirst"]]<- 1980

# write the files to a new folder within the source directory
SS_write(
  inputlist = inputlist,
  dir = file.path(inputlist["dir"], "modified_inputs")
)

## End(Not run)

---

SS_writectl

**Write Stock Synthesis control file**

**Description**

Write Stock Synthesis control file from list object in R which was probably created using `SS_readctl()`. This function is a wrapper which calls either `SS_writectl_3.24` or `SS_writectl_3.30` (and potentially additional functions in the future).

**Usage**

```r
SS_writectl(
  cttlist,
  outfile,
  version = "3.30",
  overwrite = FALSE,
  verbose = FALSE
)
```

**Arguments**

- **ctttlist**: List object created by `SS_readdat()`.
- **outfile**: Filename for where to write new control file.
- **version**: SS version number. Currently "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3). `version = NULL` is no longer the default or an allowed entry. The default is `version = "3.30"`.
- **overwrite**: Should existing files be overwritten? Defaults to `FALSE`.
- **verbose**: Should there be verbose output while running the file? Defaults to `FALSE`.

**Author(s)**

Ian G. Taylor, Yukio Takeuchi, Gwladys I. Lambert, Kathryn Doering
SS_writectl_3.24  write control file

Description
write Stock Synthesis control file from list object in R which was probably created using SS_readctl()

Usage
SS_writectl_3.24(
  ctllist,
  outfile,
  overwrite = FALSE,
  verbose = FALSE,
  nseas = lifecycle::deprecated(),
  N_areas = lifecycle::deprecated(),
  Do_AgeKey = lifecycle::deprecated()
)

Arguments
ctllist     List object created by SS_readctl().
outfile     Filename for where to write new data file.
overwrite   Should existing files be overwritten? Default=FALSE.
verbose     Should there be verbose output while running the file? Defaults to FALSE.
nseas       Deprecated. number of season in the model. This information is not explicitly available in control file
N_areas     Deprecated. number of spatial areas in the model. This information is also not explicitly available in control file
Do_AgeKey   Deprecated. Flag to indicate if 7 additional ageing error parameters to be read set 1 (but in fact any non zero numeric in R) or TRUE to enable to read them 0 or FALSE (default) to disable them. This information is not explicitly available in control file, too.

Author(s)
Yukio Takeuchi

See Also
SS_readctl(), SS_readctl_3.24(), SS_readstarter()
SS_writectl_3.30  write control file for SS version 3.30

Description
write Stock Synthesis control file from list object in R which was created using SS_readctl(). This function is designed to be called using SS_writectl() and should not be called directly.

Usage
SS_writectl_3.30(ctllist, outfile, overwrite = FALSE, verbose = FALSE)

Arguments
ctllist  List object created by SS_readctl().
outfile  Filename for where to write new data file.
overwrite  Should existing files be overwritten? Default=FALSE.
verbose  Should there be verbose output while running the file? Defaults to FALSE.

Author(s)
Kathryn Doering, Yukio Takeuchi, Neil Klaer, Watal M. Iwasaki

See Also
SS_readctl(), SS_readctl_3.30(), SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()

SS_writedat  write Stock Synthesis data file

Description
Write Stock Synthesis data file from list object in R which was probably created using SS_readdat(). This function is a wrapper which calls either SS_writedat_3.24 or SS_writedat_3.30 (and potentially additional functions in the future). This setup allows those functions to be cleaner (if somewhat redundant) than a single function that attempts to do everything.
Usage

```r
SS_writedat(
  datlist,
  outfile,
  version = "3.30",
  overwrite = FALSE,
  faster = FALSE,
  verbose = TRUE
)
```

Arguments

datlist  List object created by `SS_readdat()` (or by `SS_readdat_3.24()` or `SS_readdat_3.30()`)
outfile  Filename for where to write new data file.
version  SS version number. Currently only "3.24" or "3.30" are supported, either as character or numeric values (noting that numeric 3.30 = 3.3).
overwrite  Should existing files be overwritten? Default=FALSE.
faster  Speed up writing by writing length and age comps without aligning the columns (by using write.table instead of print.data.frame)
verbose  Should there be verbose output while running the file?

Author(s)

Ian G. Taylor, Yukio Takeuchi, Gwladys I. Lambert

See Also

`SS_writedat_3.24()`, `SS_writedat_3.30()`, `SS_readdat()`, `SS_readstarter()`, `SS_writestarter()`, `SS_readforecast()`, `SS_writeforecast()`

Description

Write Stock Synthesis data file from list object in R which was probably created using `SS_readdat()` (which would have called on `SS_readdat_3.24()`).
Arguments

**datlist**
List object created by `SS_readdat()`.

**outfile**
Filename for where to write new data file.

**overwrite**
Should existing files be overwritten? Default=FALSE.

**faster**
Speed up writing by writing length and age comps without aligning the columns (by using `write.table` instead of `print.data.frame`)

**verbose**
Should there be verbose output while running the file?

Author(s)

Ian G. Taylor, Yukio Takeuchi, Gwladys I. Lambert, Kelli F. Johnson, Chantel R. Wetzel

See Also

`SS_writedat()`, `SS_writedat_3.30()`, `SS_readdat()`, `SS_readstarter()`, `SS_writestarter()`, `SS_readforecast()`, `SS_writeforecast()`

---

**SS_writedat_3.30**
write data file for SS version 3.30

Description

Write Stock Synthesis data file from list object in R which was probably created using `SS_readdat()` (which would have called on `SS_readdat_3.30()`).

Usage

```r
SS_writedat_3.30(
  datlist,
  outfile,
  overwrite = FALSE,
  faster = FALSE,
  verbose = TRUE
)
```

Arguments

**datlist**
List object created by `SS_readdat()`.

**outfile**
Filename for where to write new data file.

**overwrite**
Should existing files be overwritten? Default=FALSE.

**faster**
Speed up writing by writing length and age comps without aligning the columns (by using `write.table` instead of `print.data.frame`)

**verbose**
Should there be verbose output while running the file?
SS_writeforecast

Author(s)
Ian G. Taylor, Yukio Takeuchi, Gwladys I. Lambert, Kelli F. Johnson, Chantel R. Wetzel

See Also
SS_writedat(), SS_writedat_3.24(), SS_readdat(), SS_readstarter(), SS_writestarter(), SS_readforecast(), SS_writeforecast()

SS_writeforecast write forecast file

Description
write Stock Synthesis forecast file from list object in R which was probably created using SS_readforecast()

Usage
SS_writeforecast(
  mylist,
  dir = NULL,
  file = "forecast.ss",
  writeAll = FALSE,
  overwrite = FALSE,
  verbose = TRUE
)

Arguments
mylist List object created by SS_readforecast().
file Filename for new forecast file. Default=forecast.ss'.
writeAll Should the function continue even if Forecast=0 (at which point SS stops reading, and remaining elements in list may not be available, depending on settings used in SS_readforecast)
overwrite Should existing files be overwritten? Default=FALSE.
verbose Should there be verbose output while running the file? Default=TRUE.

Author(s)
Ian Taylor

See Also
SS_readstarter(), SS_readforecast(), SS_readdat(), SS_writestarter(), SS_writedat()
SS_writepar_3.24  
write ss.par file from SS version 3.24

Description
Write Stock Synthesis (version 3.24) parameter file from list object in R to file.

Usage
SS_writepar_3.24(parlist, outfile, overwrite = TRUE, verbose = FALSE)

Arguments
parlist  List object created by SS_readpar_3.24().
outfile  Filename for where to write new parameter file.
overwrite Should existing files be overwritten? Default=TRUE.
verbose  Should there be verbose output while running the file?

Author(s)
Nathan R. Vaughan

See Also
SS_readctl(), SS_readdat() SS_readdat_3.24() SS_readdat_3.24() SS_readctl_3.24(),
SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()

SS_writepar_3.30  
write ss.par file from SS version 3.30

Description
Write Stock Synthesis (version 3.30) parameter file from list object in R to file.

Usage
SS_writepar_3.30(parlist, outfile, overwrite = TRUE, verbose = FALSE)

Arguments
parlist  List object created by SS_readpar_3.30().
outfile  Filename for where to write new parameter file.
overwrite Should existing files be overwritten? Default=TRUE.
verbose  Should there be verbose output while running the file?
**SS_writestarter**

**Author(s)**
Nathan R. Vaughan

**See Also**
SS_readctl(), SS_readdat() SS_readdat_3.24(), SS_readdat_3.30() SS_readctl_3.24(), SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()

---

**SS_writestarter**

*write starter file*

**Description**
write Stock Synthesis starter file from list object in R which was probably created using *SS_readstarter()*

**Usage**

SS_writestarter(
  mylist,
  dir = NULL,
  file = "starter.ss",
  overwrite = FALSE,
  verbose = TRUE,
  warn = TRUE
)

**Arguments**
- **mylist** List object created by *SS_readstarter()*.  
- **dir** Directory for new starter file. Default=NULL (working directory).  
- **file** Filename for new starter file. Default="starter.ss".  
- **overwrite** Should existing files be overwritten? Default=FALSE.  
- **verbose** Should there be verbose output while running the file? Default=TRUE.  
- **warn** Print warning if overwriting file?

**Author(s)**
Ian Taylor

**See Also**
SS_readstarter(), SS_readforecast(), SS_writestarter(), SS_writeforecast(), SS_writedat()
SS_writewtatage  Write weight-at-age file

Description

Write Stock Synthesis weight-at-age file from R object that was probably created using SS_readwtatage()

Usage

SS_writewtatage(
  mylist,
  dir = NULL,
  file = "wtatage.ss",
  overwrite = FALSE,
  verbose = TRUE,
  warn = TRUE
)

Arguments

mylist Object created by SS_readwtatage().

dir A file path to the directory of interest. Typically used with file, an additional input argument, to specify input and output file paths. The default value is dir = NULL, which leads to using the current working directory, and thus, full file paths should not be specified for other arguments as they will be appended to dir.

file Filename for new weight-at-age file, which will be appended to dir to create a full file path. Default="wtatage.ss".

overwrite A logical value specifying if the existing file(s) should be overwritten. The default value is overwrite = FALSE.

verbose A logical value specifying if output should be printed to the screen.

warn A logical value specifying if a warning should be generated if overwriting file. The default value is warn = TRUE.

Author(s)

Kelli F. Johnson

See Also

SS_readwtatage()
**Description**

Plot one or more columns of numeric values as the top edges of polygons instead of lines.

**Usage**

```r
stackpoly(
  x,
  y,
  main = "",
  xlab = "",
  ylab = "",
  xat = NA,
  xaxlab = NA,
  xlim = NA,
  ylim = NA,
  lty = 1,
  border = NA,
  col = NA,
  axis4 = F,
  x.hash = NULL,
  density = 20,
  ...
)
```

**Arguments**

- `x` A numeric data frame or matrix with the 'x' values. If 'y' is NULL, these will become the 'y' values and the 'x' positions will be the integers from 1 to `dim(x)[1]`.
- `y` The 'y' values.
- `main` The title for the plot.
- `xlab` x axis labels for the plot.
- `ylab` y axis labels for the plot.
- `xat` Where to put the optional xaxlabs.
- `xaxlab` Optional labels for the x positions.
- `xlim` Optional x limits.
- `ylim` Optional y limits.
- `lty` Line type for the polygon borders.
- `border` Color for the polygon borders.
col
Color to fill the polygons. If NULL, 'rainbow' will be called to generate the colors. If NA, the polygons will not be filled.

axis4
option to add an axis on the right hand side.

x.hash
values from x for which the bars have hash marks instead of solid fill

density
density value for hashed areas

... Additional arguments passed to 'plot'.

Author(s)
Jim Lemon, Ian Taylor

References
https://cran.r-project.org/package=plotrix

translate_3.30_to_3.24_Q_setup
Use 3.30 q options to create the 3.24 q setup

Description
Use 3.30 q options to create the 3.24 q setup

Usage
translate_3.30_to_3.24_Q_setup(
  Q_options,
  Nfleets,
  fleetnames = seq_len(Nfleets)
)

Arguments
Q_options The Q options list element in the 3.30 control file r4ss list output generated from SS_readctl.
Nfleets Number of fleets in the model
fleetnames Name of the fleets. Defaults to fleet numbers, in the order

Value
A dataframe containing the 3.24 Q setup.
translate_3.30_to_3.24_var_adjust

Use 3.30 variance adjustments to create the 3.24 formatting

Description
This functionality used to be in SS_readctl_3.30, but were removed to avoid confusion.

Usage

translate_3.30_to_3.24_var_adjust(
  Variance_adjustment_list = NULL,
  Nfleets,
  fleetnames = seq_len(Nfleets)
)

Arguments

Variance_adjustment_list
The Variance_adjustments_list element in the control file r4ss list output generated from SS_readctl. Defaults to NULL, which can be the case if no variance adjustments were included in the model.

Nfleets
Number of fleets in the model

fleetnames
Name of the fleets. Defaults to fleet numbers, in the order defined in the model.

Value
A dataframe of 3.24 variance adjustments.

TSCplot

Create a plot for the TSC report

Description
Creates a plot of catch and spawning biomass from the output of SS_output() for the NOAA TSC report.

Usage

TSCplot(
  SSout,
  yrs = "default",
  ylimBar = "default",
  ylimDepl = c(0, 1.025),
  colBar = "yellow",
)
cexBarLabels = 1.1,  
cex.axis = 1.1,     
space = 0,        
pchDep1 = 19,     
colDep1 = "red",  
lwdDep1 = 3,       
shiftDep1 = 0.25, 
pchSpace = 5,      
ht = 4,           
wd = 7,           
labellines = 2.8, 
makePDF = NULL,   
makePNG = NULL,   
MCMC = FALSE
)

Arguments

SSout       The output from SS_output()

yrs         The vector of years to plot

ylimBar     y-axis limits for catch barplot

ylimDepl    y-axis limits for depletion line

colBar      colors of the bars

cexBarLabels character expansion for the labels underneath the bars (years)
cex.axis    character expansion for the axis labels

space       space between bars (see space argument of barplot)
pchDep1     character type for points on the depletion line

colDep1     color of the points on the depletion line

lwdDep1     width of the depletion line

shiftDep1   shift from beginning of the year for the points on the depletion line. Helps to
            guide the eye for exactly which year it corresponds to.

pchSpace    number of years between points on the depletion line. Higher numbers help tidy
            up the plot when plotting many years.

ht           Height of the plot in inches

wd           Width of the plot in inches

labellines  line argument for mtext to move the axis labels

makePDF     filename for a pdf file. If NULL it does not make a pdf. Can specify a pdf
            filename or a png filename. Not both at the same time.

makePNG     filename for a png image. If NULL it does not make a png. Can specify a pdf
            filename or a png filename. Not both at the same time.

MCMC        If TRUE, will use mcmc results. It needs a list element called 'mcmc' on SSout.
Details

It creates a plot on the current graphics device, in a pdf file, or as a png image of the figure used in the TSC report produced by the NWFSC. It expects the SS results read in by SS_output(). If MCMC results are to be plotted, a 'mcmc' list element should be added using the SSgetMCMC() function. See the examples below.

Value

Returns a data frame with the years, spawning biomass, depletion, and total dead catch.

Author(s)

Allan Hicks

See Also

SS_output() SSgetMCMC()

Examples

```r
## Not run:
# define directory
directory <- "C:\NOAA2011\Dover\Models\base_20110701"
# read model output
base <- SS_output(dir = directory, covar = FALSE, verbose = FALSE)

# show the plot in R
TSCplot(base)
TSCplot(base, yrs = 2000:2011, pchSpace = 1)

# Create the plot as a PNG file
TSCplot(base, makePNG = "C:\NOAA2012\Assessments\TSCdover.png")
# Create the plot as a PDF file
TSCplot(base, makePDF = "C:\NOAA2012\Assessment\TSCdover.pdf")

# Model with MCMC results
directory <- "C:/Models"
base <- SS_output(dir = directory, dir.mcmc = "mcmc")
TSCplot(base, ylimDepl = c(0, 1.25), pchSpace = 1, MCMC = TRUE)

## End(Not run)
```
write_fwf4

Function to write formatted table similar to table written by gdata::write.fwf from data.frame or matrix This function does not accept columns or logical with factor

Description

Function to write formatted table similar to table written by gdata::write.fwf from data.frame or matrix This function does not accept columns or logical with factor

Usage

write_fwf4(
  x,
  file = "",
  append = FALSE,
  quote = FALSE,
  sep = " ",
  na = "NA",
  rownames = FALSE,
  colnames = TRUE,
  rowCol = NULL,
  justify = "left",
  width = NULL,
  eol = "\n",
  qmethod = c("escape", "double"),
  digits = 6,
  checkNA = TRUE,
  checkInfty = TRUE,
  checkError = TRUE
)

Arguments

x  data.frame or matrix the object to be written
file either a character string naming a file or a connection open for writing. "" indicates output to the console.
append logical, append to existing data in file
quote logical, quote data in output
sep character, separator between columns in output
na character, the string to use for missing values i.e. NA in the output
rownames logical, print row names
colnames logical, print column names
rowCol character, rownames column name
write_fwf4

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>justify</td>
<td>character, alignment of character columns; see format()</td>
</tr>
<tr>
<td>width</td>
<td>numeric, width of the columns in the output</td>
</tr>
<tr>
<td>eol</td>
<td>the character(s) to print at the end of each line (row). For example, 'eol=&quot;\n&quot;' will produce Windows’ line endings on a Unix-alike OS, and 'eol=&quot;\n&quot;' will produce files as expected by Mac OS Excel 2004.</td>
</tr>
<tr>
<td>qmethod</td>
<td>a character string specifying how to deal with embedded double quote characters when quoting strings. Must be one of &quot;escape&quot; (default), in which case the quote character is escaped in C style by a backslash, or &quot;double&quot;, in which case it is doubled. You can specify just the initial letter.</td>
</tr>
<tr>
<td>digits</td>
<td>Used for signif</td>
</tr>
<tr>
<td>checkNA</td>
<td>logical if TRUE, function will stop when NA is found</td>
</tr>
<tr>
<td>checkInfty</td>
<td>logical if TRUE, function will stop when Infinity is found</td>
</tr>
<tr>
<td>checkError</td>
<td>logical if TRUE both, set checkNA and checkInfty TRUE</td>
</tr>
</tbody>
</table>

Author(s)

Yukio Takeuchi
Index

* rep
  SSdiagsTime2Year, 43
* retrocomps
  SSdiagsTime2Year, 43
* retro
  SSdiagsTime2Year, 43
* ssplot
  sspar, 54
* utils
  SSdiagsTime2Year, 43
  sspar, 54
add_legend, 5
bubble3, 6
check_inputlist, 8
check_model, 8
copy_SS_inputs, 9
copy_SS_inputs(), 37, 39
DoProjectPlots, 10
file_increment, 12
format(), 193
get_comments, 14
get_dat_new_name, 14
get_last_phase, 15
get_SIS_info, 15
get_tuning_table, 17
get_tv_parlabs, 17
getADMBHessian, 13
getADMBHessian(), 31, 38
is.wholenumber, 18
make_multifig, 18
make_multifig(), 22, 25, 74
make_multifig_sexratio, 22
make_multifig_sexratio(), 106
mcmc.nuisance, 25
mcmc.nuisance(), 28, 46
mcmc.out, 26
mcmc.out(), 25, 26, 46
mountains, 29
NegLogInt_Fn, 30
NegLogInt_Fn(), 13, 38
par, 54
PinerPlot, 32
plotCI, 35
populate_multiple_folders, 36
populate_multiple_folders(), 39
r4ss_logo, 37
read.admbFit, 37
read.admbFit(), 13, 31
rich.colors.short, 38
run_SS_models, 38, 172
save_png, 40
selShapes, 41
SS_changepars, 122
SS_changepars(), 135, 145, 176
SS_decision_table_stuff, 124
SS_doRetro, 125
SS_fitbiasramp, 127
SS_fitbiasramp(), 31, 98
SS_ForeCatch, 129
SS_ForeCatch(), 125
SS_html, 130
SS_html(), 132, 139
SS_makeHTMLdiagnostictable, 132
SS_output, 17, 42, 44, 55, 57, 60, 62, 71, 75,
  76, 78, 81, 84, 86, 87, 89, 91, 97, 98,
  102, 105, 108, 110, 111, 113, 115,
  117, 121, 124, 127, 129, 131, 132,
  132, 138, 171
SS_output(), 15, 16, 23, 47, 48, 59, 61, 63,
  68, 76, 82, 85, 86, 88, 90, 96, 104,