Package 'StockRecruitSET'

May 23, 2019

Title Stock Recruitment Simulation and Estimation Tools

Version 0.0.0.1

Description This package contains methods for simulating and estimating stock recruitment

Depends TMB,
RcppEigen,
bbmle

Suggests knitr, rmarkdown

License AGPL-3

LazyData true

VignetteBuilder knitr

URL https://github.com/mebrooks/StockRecruitSET

BugReports https://github.com/mebrooks/StockRecruitSET/issues

LinkingTo TMB, RcppEigen

RoxygenNote 6.1.1

R topics documented:

`calcBlim` *Calculate Blim in ways described by ICES Advice Technical Guidelines Table 12.4.3.1.3*

Description

Calculate Blim in ways described by ICES Advice Technical Guidelines Table 12.4.3.1.3

Usage

```
calcBlim(S, R, quant = 0.75, type = 2.1, g = 0.1, by = 1)
```

Arguments

S	vector of spawning stock biomasses
R	vector of recruitment values
quant	quantile above which recruitment is considered to be "large" in a "spasmodic stock" (language from ICES Advice Technical Guidelines)
type	way of calculating Blim. 1 is the minimum S that gives good recruitment. 2 is the estimated S for a breakpoint in a hockey stick model. 2.1 is estimated S for inflection point in a hyperbolic hockey-stick model. 5 is the minimum observed S (Blim=Bloss).
g	is the assumed smoothing parameter in the hyperbolic hockey-stick model.
by	the precision needed for a grid search for breakpoint in a hockey-stick model.

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calcBRP — *Calculate biomass reference points (BRPs) in ways based on maximum recruitment (Myers et al. 1994)*

Description

Calculate biomass reference points (BRPs) in ways based on maximum recruitment (Myers et al. 1994)

Usage

```
calcBRP(S, R, perc = 50, shape = "Ricker", by = 1, maxS = 500)
```

Arguments

S	vector of spawning stock biomasses
R	vector of recruitment values
perc	percent of maximum recruitment (based on S-R curve fit)
shape	"Ricker" or "BevertonHolt" shape of S-R curve to fit
by	the precision needed for a grid search along the S-R curve.

References

- R. A. Myers, A. A. Rosenberg, P. M. Mace, N. Barrowman, V. R. Restrepo, In search of thresholds for recruitment overfishing, ICES Journal of Marine Science, Volume 51, Issue 2, 1994, Pages 191-205, https://doi.org/10.1006/jmsc.1994.1020

fitSRCurve *Fit a stock recruitment curve*

Description

Fit a stock recruitment curve

Usage

```
fitSRCurve(S, R, shape = "contHockey", g = 0.1, start = NULL,
  weights = NULL)
```

Arguments

S	vector of spawning stock biomasses
R	vector of recruitment values
shape	can be "contHockey", "Ricker", or "BevertonHolt"
g	is the smoothing parameter gamma in the bent hyperbola hockey-stick stock-recruitment model
start	(optional) list of parameters
weights	(optional) weights of each data point to reflect uncertainty

Details

- "contHockey" shape has pars=c(beta, delta, log_sd) following the bent hyperbola hockey-stick stock-recruitment model (Mesnil &Rochet 2010)
- "Ricker" shape has pars=c(log_a, log_b, log_sd) where expected recruitment is a*S*exp(-b*S)
- "BevertonHolt" shape has pars=c(log_a, log_b, log_sd) where expected recruitment is a*S/(1+b*S)

simR *Simulate recruitment*

Description

Simulate recruitment

Usage

```
simR(S, shape = "contHockey", pars = c(10, 100), g = 1, var = 0,
  cor = 0, varlog = NULL, tail = NULL)
```

Arguments

shape	can be "hockey", "Ricker", or "Beverton-Holt"
pars	vector of parameters for the specified shape (see details)
g	is only used for the hyperbolic continuous hockey stick model (see details)
var	used to specify variance on the natural scale
varlog	used to specify variance on the log scale
tail	controls bonanzas (i.e. extra good recruitment events) (see details)

Details

- "hockey" shape must have pars=c(a,b) where (a,b) is the inflection point
- "contHockey" shape must have pars=c(beta, S*) following the notation of Mesnil & Rochet 2010 (eqn 4)
- "Ricker shape" must have pars=c(a,b) where expected recruitment is a*S*exp(-b*S)
- "BevertonHolt" shape must have pars=c(a,b) where expected recruitment is a*S/(1+b*S)
- tail is a named list containing a probability ("prob") of observing a bonanza year and a multiplier ("mult") to indicate how a bonanza compares to the expected mean. e.g. tail=list(prob=0.2, mult=1.5)

`simS` *Simulate SSB*

Description

Simulate SSB

Usage

```
simS(n = 20, Sdist = "unif", pars = c(10, 400))
```

Arguments

`Sdist`	the distribution of SSB, can be "unif" or "lognormal"

Details

- unif uses pars=(minS, maxS)
- lognormal uses pars=(mean, sd)

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