

Class 'MSE'

A Management Strategy Evaluation object that contains information about simulation conditions and performance of data-limited methods

Slots

Name

Name of the MSE object

nyears

The number of years for the historical simulation

proyears

The number of years for the projections - closed loop simulations

nMPs

Number of management procedures simulation tested

MPs

The names of the MPs that were tested

nsim

Number of simulations

OM

A table of nsim rows with a column for each sampled parameter of the operating model

- RefY: reference yield, the highest long-term yield (mean over last five years of projection) obtained from a fixed F strategy. This is a useful reference point for framing performance of MPs because it standardizes for starting point and future productivity.
- M: instantaneous natural mortality rate
- Depletion: stock depletion (biomass / unfished biomass) in the final historical year (prior to projection)
- A: abundance (biomass) updated in each management update of projection
- BMSY_B0: most productive stock size relative to unfished
- FMSY_M: fishing mortality rate divided by natural mortality rate
- Mgrad: mean average percentage gradient in natural mortality rate (percentage per time step)
- Msd: interannual variability in natural mortality rate (lognormal CV)
- procsd: process error - CV in log-normal recruitment deviations
- Esd: interannual variability in historical effort (fishing mortality rate)
- dFfinal: gradient in fishing mortality rate over final five years of the historical simulation
- MSY: Maximum Sustainable Yield
- qinc: mean percentage increase in fishing efficiency (catchability) in projected years (input controls only)
- qcv: interannual variability in future fishing efficiency (catchability) in projected years (input controls only)
- CALcv: variability in lengths at age around the growth curve (normal CV)
- FMSY: Fishing mortality rate at Maximum Sustainable Yield
- Linf: maximum length (von Bertalanffy Linf parameter)
- K: maximum growth rate (von Bertalanffy K parameter)
- t0: theoretical length at age zero (von Bertalanffy t0 parameter)
- hs: steepness of the stock recruitment relationship (the fraction of unfished recruitment at a fifth of unfished stock levels)
- Linfgrad: mean gradient in maximum length (per cent per time step)
- Kgrad: mean gradient in maximum growth rate (per cent per time step)
- Linfsd: interannual variability in maximum length (log normal CV)
- recgrad: gradient in recruitment strength (age 1 population numbers) over last 10 years of historical simulations
- Ksd: interannual variability in maximum growth rate (log normal CV)
- ageM: age at 50 per cent maturity
- LFS: length at full selection (the shortest length class where fishery selectivity is 100 per cent)
- age05: the age at 5 percent selectivity (ascending limb of selectivity curve)

- Vmaxage: the selectivity of the oldest age class (controls dome shape of selectivity curve)
- LFC: length at first capture, the smallest length that can be caught by the gear
- OFLreal: the true simulated Over Fishing Limit (FMSY x biomass) updated in each management update of the projection
- Spat_targ: spatial targetting parameter, fishing mortality rate across areas is proportional to vulnerable biomass raised to the power of this number.
- Frac_area_1: the fraction of unfished biomass inhabiting area 1 (can be seen as fraction of habitat in area 1 or relative size of area 1)
- Prob_staying: the probability that individuals in area 1 remain there between time-steps
- AC: autocorrelation in recruitment

Obs

A table of nsim rows with a column for each sampled parameter of the observation model

- Cbias: bias in observed catches
- Csd: observation error in observed catches (lognormal CV)
- CAA_nsamp: the number of catch-at-age observations per time step
- CAA_ESS: the effective sample size of multinomial catch-at-age observation model (number of independent draws)
- CAL_nsamp: the number of catch-at-length observations per time step
- CAL_ESS: the effective sample size of multinomial catch-at-length observation model (number of independent draws)
- Isd: observation error in relative abundance index (lognormal CV)
- Dbias: bias in observed stock depletion (also applies to depletion Dt for DCAC)
- Mbias: bias in observed natural mortality rate
- FMSY_Mbias: bias in ratio of FMSY to natural mortality rate
- BMSY_B0bias: bias in ratio of most productive stock size relative to unfished
- AMbias: bias in age at 50 per cent maturity
- LFCbias: bias in length at first capture
- LFSbias: bias in length at full selection
- Abias: bias in observed current absolute stock biomass
- Kbias: bias in maximum growth rate (von Bertalanffy K parameter)
- t0bias: bias in theoretical length at age zero (von Bertalanffy t0 parameter)
- Linfbias: bias in maximum length (von Bertalanffy Linf parameter)
- hbias: bias in observed steepness of the stock recruitment relationship
- lrefbias: bias in abundance index corresponding to BMSY stock levels
- Crefbias: bias in MSY prediction (target or reference catch)
- Brefbias: bias in BMSY stock levels (target or reference biomass levels)

B_BMSY

Stored biomass relative to BMSY over the projection (an array with dimensions nsim, nMPs, proyears)

F_FMSY

Stored fishing mortality rate relative to FMSY over the projection (an array with dimensions nsim, nMPs, proyears)

B

Stored stock biomass over the projection (an array with dimensions nsim, nMPs, proyears)

SSB

Stored spawning stock biomass over the projection (an array with dimensions nsim, nMPs, proyears)

VB

Stored vulnerable biomass over the projection (an array with dimensions nsim, nMPs, proyears)

FM

Stored fishing mortality rate over the projection (an array with dimensions nsim, nMPs, proyears)

C

Stored catches (taken) over the projection (an array with dimensions nsim, nMPs, proyears)

TAC

Stored Total Allowable Catch (prescribed) over the projection (an array with dimensions nsim, nMPs, proyears)(note that this is NA for input controls)

SSB_hist

Stored historical spawning stock biomass (historical simulations - an array with dimensions nsim, nages, nyears, nareas)

CB_hist

Stored historical catches in weight (historical simulations - an array with dimensions nsim, nages, nyears, nareas)

FM_hist

Stored historical fishing mortality rate (historical simulations - an array with dimensions nsim, nages, nyears, nareas)

Effort

Stored relative fishing effort in the projection years

PAA

Population at age in last projection year (an array with dimensions nsim, nMPs, nages)

CAA

Catch at age in last projection year (an array with dimensions nsim, nMPs, nages)

CAL

Catch at length in last projection year (an array with dimensions nsim, nMPs, nCALbins)

CALbins

Mid-points of the catch-at-length bins

Objects from the Class

Objects can be created by calls of the form `new('MSE', Name, nyears, proyears, nMPs, MPs, nsim, OMtable, Obs, B_BMSYa, F_FMSYa, Ba, FMa, Ca, OFLa, Effort, PAA, CAA, CAL, CALbins)`

Developed by Tom Carruthers, Adrian Hordyk.

Site built with pkgdown (<http://hadley.github.io/pkgdown/>).