Package: ObsCovgTools (via r-universe)

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Type Package

Title Evaluate Fishery Observer Coverage for Bycatch Estimation

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https://github.com/kacurtis/ObsCovgTools

Depends R (>= 3.4.0)

Suggests shiny

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Description Tools for evaluating observer coverage with respect to documenting and estimating rare bycatch, including (1) probabilities of observing a bycatch event and of one occurring in total effort, (2) upper confidence limit for bycatch given none was observed, and (3) bycatch estimation CV (coefficient of variation).

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Repository https://noaa-fisheries-integrated-toolbox.r-universe.dev

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Contents

`plot_cv` *Plot bycatch estimation CV vs. observer coverage*

Description

`plot_cv` plots projected bycatch estimation CVs vs observer coverage, and returns minimum observer coverage needed to achieve user-specified target CV and percentile.

Usage

```
plot_cv(te, bpue, d = 2, targetcv = 0.3, showplot = TRUE,
  silent = FALSE, ...)
```

Arguments

`te`	an integer greater than 1. Total effort in fishery (e.g., trips or sets).
`bpue`	a positive number. Bycatch per unit effort.
`d`	a number greater than or equal to 1. Dispersion index. The dispersion index corresponds to the variance-to-mean ratio of effort-unit-level bycatch, so `d = 1` corresponds to Poisson-distributed bycatch, and `d > 1` to overdispersed bycatch.
`targetcv`	a non-negative number less than 1. Target CV (as a proportion). If set to 0, no corresponding minimum observer coverage will be highlighted or returned.
`showplot`	logical. If `FALSE`, plotting is suppressed.
`silent`	logical. If `TRUE`, print output to terminal is suppressed.
`...`	additional arguments for compatibility with Shiny.

Details

Caveat: `plot_cv` assumes that (1) observer coverage is representative, (2) bycatch (`bpue`) is in terms of individuals (not weight) per unit effort, and (3) the specified dispersion index reflects the highest level of any hierarchical variance (e.g., using dispersion index at trip level if greater than that at set level). Violating these assumptions will likely result in negatively biased projections of the observer coverage needed to meet a specified objective. More conservative (higher) projections can be obtained by using a higher dispersion index `d`. Users may want to explore uncertainty in dispersion index and in bycatch per unit effort by varying those inputs.

Value

If `targetcv` is non-zero, a list with one component:

`targetoc` minimum observer coverage in terms of percentage.

Returned invisibly.

`plot_probposobs` *Plot probability of positive bycatch vs observer coverage*

Description

`plot_probposobs` plots (1) probability of observing at least one bycatch event vs observer coverage and (2) probability of any bycatch occurring in total fishery effort, given total fishery effort, bycatch per unit effort, and dispersion index. The function returns returns minimum observer coverage needed to achieve user-specified probability of observing bycatch if it occurs.

Usage

```
plot_probposobs(te, bpue, d = 2, targetppos = 95, showplot = TRUE,
  silent = FALSE, ...)
```

Arguments

`te`	an integer greater than 1. Total effort in fishery (e.g., trips or sets).
`bpue`	a positive number. Bycatch per unit effort.
`d`	a number greater than or equal to 1. Dispersion index. The dispersion index corresponds to the variance-to-mean ratio of effort-unit-level bycatch, so `d = 1` corresponds to Poisson-distributed bycatch, and `d > 1` to overdispersed bycatch.
`targetppos`	a non-negative number less than or equal to 100. Target probability of positive observed bycatch (as percentage), given positive bycatch in total effort. If set to 0, no corresponding minimum observer coverage will be highlighted or returned.
`showplot`	logical. If `FALSE`, plotting is suppressed.
`silent`	logical. If `TRUE`, print output to terminal is suppressed.
`...`	additional arguments for compatibility with Shiny.

Details

Probabilities are based on the probability density function for the corresponding Poisson or negative binomial distribution.

The conditional probability of observing any bycatch if it occurs (solid black line) is obtained by dividing the absolute probability of observing any bycatch (black dashed line) by the probability that any bycatch occurs in the given total effort (horizontal black dotted line). The minimum observer coverage to achieve the target probability of observing bycatch if it occurs (x-axis value of red star) is where the conditional bycatch detection probability (solid black line) intersects with the target probability (red dash-dot line).

Caveat: `plot_probposobs` assumes that (1) observer coverage is representative, (2) bycatch (`bpue`) is in terms of individuals (not weight) per unit effort, and (3) the specified dispersion index reflects the highest level of any hierarchical variance (e.g., using dispersion index at trip level if greater than that at set level). Violating these assumptions will likely result in negatively biased projections of the observer coverage needed to meet a specified objective. More conservative (higher) projections can be obtained by using a higher dispersion index `d`. Users may want to explore uncertainty in dispersion index and in bycatch per unit effort by varying those inputs.

Value

A list with two components:

`targetoc`	minimum observer coverage in terms of percentage.
`ppos.te`	probability of any bycatch occurring in total effort

Returned invisibly.

`plot_uclnegobs` *Plot upper confidence limit of total bycatch given none observed*

Description

`plot_uclnegobs` plots upper confidence limit of total bycatch vs observer coverage when no bycatch is observed, given total fishery effort, dispersion index, and confidence level. The function returns (1) minimum observer coverage needed to fall within user-specified upper confidence limit for bycatch when none was observed, and/or (2) the upper confidence limit for bycatch given specified observer coverage and no observed bycatch.

Usage

```
plot_uclnegobs(te, d = 2, cl = 95, targetucl = 0, fixedoc = 0,
  ymax = 100, showplot = TRUE, silent = FALSE, ...)
```

Arguments

`te`	an integer greater than 1. Total effort in fishery (e.g., trips or sets).
`d`	a number greater than or equal to 1. Dispersion index. The dispersion index corresponds to the variance-to-mean ratio of effort-unit-level bycatch, so `d = 1` corresponds to Poisson-distributed bycatch, and `d > 1` to overdispersed bycatch.
`cl`	a non-negative number less than or equal to 100. Confidence level for upper confidence limit of total bycatch (as percentage), given no bycatch observed.
`targetucl`	a non-negative number. Target maximum upper confidence limit for total bycatch given zero bycatch observed. If set to 0, no corresponding minimum observer coverage will be highlighted or returned.
`fixedoc`	a non-negative number between 0 and 100. Percent observer coverage for which to return ucl value.

ymax	a positive number. Upper limit for y-axis of plot.
showplot	logical. If FALSE, plotting is suppressed.
silent	logical. If TRUE, print output to terminal is suppressed.
...	additional arguments for compatibility with Shiny.

Details

Upper confidence limits are based on the probability density function for the corresponding Poisson or negative binomial distribution. Upper confidence limits based on d+/-1 (as allowed by specification of d) are also plotted. If fixedoc specified, corresponding upper confidence limit is provided in printed output and returned object, but not in plot.

Caveat: plot_uclnegobs assumes that (1) observer coverage is representative, (2) bycatch is in terms of individuals (not weight) per unit effort,and (3) the specified dispersion index reflects the highest level of any hierarchical variance (e.g., using dispersion index at trip level if greater than that at set level). Violating these assumptions will likely result in negatively biased projections of the observer coverage needed to meet a specified objective. More conservative (higher) projections can be obtained by using a higher dispersion index d. Users may want to explore uncertainty in dispersion index and in bycatch per unit effort by varying those inputs.

Value

A list with components:

ucldat	a data frame with the following fields for each coverage level included: number of observed effort units (nobs), proportion observer coverage (pobs), upper confidence limit of total bycatch given none observed (ucl), and finite population correction (fpc) used in calculating ucl.
targetucl	specified target maximum upper confidence limit of bycatch.
targetoc	minimum observer coverage (as percentage) for which upper confidence limit of bycatch is targetucl when none observed.
fixedoc	specified percentage observer coverage for which upper confidence limit of bycatch is returned.
fixednoc	observer coverage (as effort) corresponding to fixedoc.
fixedoc.ucl	upper confidence limit of total bycatch corresponding to zero bycatch observed in fixedoc coverage.
te	specified total effort.
d	specified dispersion index.
cl	specified confidence level.

Returned invisibly.

probnzeros *Get probability of zero bycatch given effort*

Description

probnzeros returns probability of zero bycatch in a specified number of effort units, given bycatch per unit effort and dispersion index.

Usage

```
probnzeros(n, bpue, d)
```

Arguments

n	a vector of positive integers. Observed effort levels (in terms of effort units, e.g., trips or sets) for which to calculate probability of zero bycatch.
bpue	a positive number. Bycatch per unit effort.
d	a number greater than or equal to 1. Dispersion index. The dispersion index corresponds to the variance-to-mean ratio of effort-unit-level bycatch, so d = 1 corresponds to Poisson- distributed bycatch, and d > 1 corresponds to overdispersed bycatch.

Details

Calculated from the probability density at zero of the corresponding Poisson (d = 1) or negative binomial (d > 1) distribution.

Caveat: probnzeros assumes that (1) observer coverage is representative, (2) bycatch (bpue) is in terms of individuals (not weight) per unit effort, and (3) the specified dispersion index reflects the highest level of any hierarchical variance (e.g., using dispersion index at trip level if greater than that at set level). Violating these assumptions will likely result in negatively biased projections of the probability of observing zero bycatch at a given level of observer coverage. More conservative projections can be obtained by using a higher dispersion index d. Users may want to explore uncertainty in dispersion index and in bycatch per unit effort by varying those inputs.

Value

Vector of same length as n with probabilities of zero bycatch.

Returned invisibly

run_shiny *Run Shiny interface with ObsCovgTools*

Description

run_shiny runs a shiny application for the main functions in ObsCovgTools.

Usage

```
run_shiny()
```

Details

Note: Estimated run times in Bycatch Estimation CV tab only apply to execution on shinyapps.io server (see README)

Value

None

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