Package ‘pop.wolf’

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Type Package
Title Models for Simulating Wolf Populations
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Description Simulate the dynamic of wolf populations using a specific Individual-Based Model (IBM) compiled in C, see Chapron et al. (2016) <doi:10.1016/j.ecolmodel.2016.08.012>.
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R topics documented:

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Description

A package to run simulations of wolf populations using an Individual-Based Model compiled in C. The model is parameterized with data from the Scandinavian wolf population.

Details

Package: pop.wolf
Type: Package
Version: 0.1
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Author(s)

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plot_projection

Description

Plot population projections

Usage

plot_projection(projection, title)

Arguments

projection A list obtained after running the function project.
title A string indicating which variable should be plotted ("Packs", "Pairs", "Reproductions", "Population").

Details

Plot average projections with 95% confidence interval.
project

Value

No returned value, plot created

Examples

```r
oldpar <- par(mfrow = c(1,1))
projection <- project(
  years = 12,
  runs = 100,
  surv_pup = c(0.65, 0.1),
  surv_sub = c(0.74, 0.13),
  surv_vag = c(0.42, 0.1),
  surv_adt = c(0.82, 0.03),
  dispers_weib_shape = c(1.419, 0.154),
  dispers_weib_scale = c(4.687, 0.528),
  settl_weib_shape = c(1.353, 0.210),
  settl_weib_scale = c(4.606, 0.772),
  pair1breed = c(0.79, 0.05),
  litter_size = c(5, 0.52))

par(mfrow=c(2,2))
plot_projection(projection, "Packs")
plot_projection(projection, "Pairs")
plot_projection(projection, "Reproductions")
plot_projection(projection, "Population")
par(oldpar)
```

---

project  Wolf population projections

Description

Run stochastic wolf population projections.

Usage

```r
project(years, runs,
  surv_pup, surv_sub, surv_vag, surv_adt,
  dispers_weib_shape, dispers_weib_scale,
  settl_weib_shape, settl_weib_scale,
  pair1breed, litter_size,
  pop_initial, pop_quota, seed)
```

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
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<tbody>
<tr>
<td>years</td>
<td>A number: number of years to project the population.</td>
</tr>
<tr>
<td>runs</td>
<td>A number: number of times (or Monte Carlo runs) to project the population.</td>
</tr>
</tbody>
</table>
surv_pup  A vector: average and standard deviation of annual survival of pups from 0 to 5 months.
surv_sub  A vector: average and standard deviation of annual survival of subadults (>5 month-old non breeding animals in packs).
surv_vag  A vector: average and standard deviation of annual survival of vagrants.
surv_adt  A vector: average and standard deviation of survival of resident adults.
dispers_weib_shape  A vector: average and standard deviation of the shape of a Weibul distributed variable describing the time in months until dispersal.
dispers_weib_scale  A vector: average and standard deviation of the scale of a Weibul distributed variable describing the time in months until dispersal.
settl_weib_shape  A vector: average and standard deviation of the shape of a Weibul distributed variable describing the time in months from dispersal until settlement.
settl_weib_scale  A vector: average and standard deviation of the scale of a Weibul distributed variable describing the time in months from dispersal until settlement.
pair1breed  Number of times (or Monte Carlo runs) to project the population.
litter_size  A vector: average and standard deviation of number of pups in litter.

(pop) Initial population: An array representing the composition of the initial population, rows are packs, columns indicate the age of the breeding male, the age of the breeding female, and the pack size. 

vagrants is a number representing the number of vagrants in the initial population.

pop_quota  (optional) An array: number of animals killed every month (rows) from the following categories (columns): pairs, alphas, vagrants, subadults, unknown. Removing a pair kills 2 animals but is coded as 1.

seed  (optional) A number: seed of the random number generator.

Details

Run stochastic wolf population projections with an Individual-Based Model (IBM) compiled in C.

Value

runs  a 3-dimensional array of numbers of individuals with dimension c(years, statistics, runs)

individuals  a 2-dimensional array of individuals events

parameters  a list of parameters of the projection
Examples

# Number of years to project
years <- 15

# Initial population
pop_initial <- list()
# 10 packs of size 5 with alpha male aged 2 and alpha female aged 3
pop_initial$packs <- matrix(rep(c(2,3,5),10), ncol=3, nrow=10, byrow=TRUE)
# 5 vagrants
pop_initial$vagrants <- 5

# Hunting quota
pop_quota <- matrix(0, nrow=12*years+1, ncol=5)
# Hunt 4 alphas every March
pop_quota[1+seq(3,years*12,12),2] <- 4

projection <- project(
  years = years,
  runs = 100,
  surv_pup = c(0.65, 0.1),
  surv_sub = c(0.74, 0.13),
  surv_vag = c(0.42, 0.1),
  surv_adt = c(0.82, 0.03),
  dispers_weib_shape = c(1.419, 0.154),
  dispers_weib_scale = c(4.687, 0.528),
  settl_weib_shape = c(1.353, 0.210),
  settl_weib_scale = c(4.606, 0.772),
  pair1breed = c(0.79, 0.05),
  litter_size = c(5, 0.52),
  pop_initial = pop_initial,
  pop_quota = pop_quota,
  seed = 1
)
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