Package 'pop.wolf'

October 14, 2022

Type Package

Title Models for Simulating Wolf Populations

Version 1.0

Date 2022-04-06

Author Guillaume Chapron [aut, cre],
Camilla Wikenros [ctb],
Olof Liberg [ctb],
Øystein Flagstad [ctb],
Cyril Milleret [ctb],
Johan Månsson [ctb],
Linn Svensson [ctb],
Barbara Zimmermann [ctb],
Mikael Åkesson [ctb],
Petter Wabakken [ctb],
Håkan Sand [ctb]

Maintainer Guillaume Chapron <guillaume.chapron@slu.se>

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>.

License GPL-3

Depends parallel, abind

NeedsCompilation yes

Encoding UTF-8

Repository CRAN

Date/Publication 2022-04-06 16:20:02 UTC

R topics documented:

---

pop.wolf-package   *Population models*

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
Date:	2015-12-23
License:	GPL-3

Author(s)

Guillaume Chapron <guillaume.chapron@slu.se> with contributions from Camilla Wikenros, Olof
Liberg, Øystein Flagstad, Cyril Milleret, Johan Månsson, Linn Svensson, Barbara Zimmermann,
Mikael Åkesson, Petter Wabakken and Håkan Sand.

---

plot_projection   *Plot population projections*

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.

Value

No returned value, plot created

Examples

```
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

```
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

years	A number: number of years to project the population.
runs	A number: number of times (or Monte Carlo runs) to project the population.

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	(optional) A list: with elements packs and vagrants. packs is 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
)
```

Index