Package 'FESta'

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Type Package

Title Fishing Effort Standardisation

Version 1.0.0

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Imports graphics, stats

Description Original idea was presented in the reference paper. Varghese et al. (2020, 74(1):35-42) ``Bayesian State-space Implementation of Schaefer Production Model for Assessment of Stock Status for Multi-gear Fishery''. Marine fisheries governance and management practices are very essential to ensure the sustainability of the marine resources. A widely accepted resource management strategy towards this is to derive sustainable fish harvest levels based on the status of marine fish stock. Various fish stock assessment models that describe the biomass dynamics using time series data on fish catch and fishing effort are generally used for this purpose. In the scenario of complex multi-species marine fishery in which different species are caught by a number of fishing gears and each gear harvests a number of species make it difficult to obtain the fishing effort corresponding to each fish species. Since the capacity of the gears varies, the effort made to catch a resource cannot be considered as the sum of efforts expended by different fishing gears. This necessitates standardisation of fishing effort in unit base.

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Contents

Example	*Time series of commercial fish landings and fishing effort along Andhra Pradesh coastline (1997-2018)*

Description

A list named "Example" has been taken for illustration. It contains three data frames named sp_catch (Quantity of the fish species, in tonnes), tot_catch (Quantity of total catch, in tonnes) and effort (Fishing duration, in hours) with the same dimension. Data was collected from the commercial fish landing centres along the coast of A.P. through a scientifically and systematically planned sampling design, employing the stratified multi-stage random sampling technique. The time series (1997-2018) of catch of Indian Mackerel, the total catch and fishing effort expended by 8 different fishing gears viz., mechanized trawl net including multiday trawl net (MTN), mechanized gill net (MGN), non-mechanized gears (NM), outboard gill net (OBGN), outboard ring seine (OBRS), outboard trawl net (OBTN), some minor mechanized gears (MOTHERS) and some minor outboard gears (OBOTHS) have been used.

Usage

```
Example
```

Format

Each data frame is having 22 rows and 9 variables

Source

Time series of catch (in tonnes) and effort (in hours of operation) from 1997 to 2018 was taken from National Marine Fishery Resources Data Centre (NMFDC) of CMFRI, Kochi

References

http://www.cmfri.org.in/fish-catch-estimates

StdEffort   *Standardisation of Fishing Effort (StdEffort)*

Description

This package provides a function named "StdEffort" for standardisation of fishing effort expended by various fishing gears in order to obtain the Catch Per Unit Effort (CPUE) for a particular fish species using the time series of total catch (landings) by each fishing gears, catch (landings) of a particular species (for which the CPUE is required) by each gears and total effort expended by each gears.

Usage

```
StdEffort(sp_catch,tot_catch,effort,meg)
```

Arguments

sp_catch, tot_catch, effort, meg

> 1) sp_catch = Time series of catch/landings of a particular species (for which the CPUE is required) by each gear
>
> 2) tot_catch = Time series of total catch/landings by each fishing gear
>
> 3) effort = Time series of total effort expended by each gear
>
> 4) meg = Most efficient gear (it takes value either FALSE (for least efficient gear) or TRUE (for most efficient gear))

Details

Marine fisheries governance and management practices are very essential to ensure the sustainability of the marine resources. A widely accepted resource management strategy towards this is to derive sustainable fish harvest levels based on the status of marine fish stock. Various fish stock assessment models that describe the biomass dynamics using time series data on fish catch and fishing effort are generally used for this purpose. In the scenario of complex multi-species marine fishery in which different species are caught by a number of fishing gears and each gear harvests a number of species make it difficult to obtain the fishing effort corresponding to each fish species. Since the capacity of the gears varies, the effort made to catch a resource cannot be considered as the sum of efforts expended by different fishing gears. This necessitates standardisation of fishing effort in unit base. This package provides a function named "StdEffort" for standardisation of fishing effort expended by various gears and obtain Catch Per Unit Effort (CPUE) for a particular fish species using the time series data of each; total catch by each fishing gear, a particular species (for which the CPUE is required) and total effort expended by each gear.

Value

Standardised fishing effort with a plot of the same along with time series of fish catch/landings. Also gives the unit of standardised effort.

Note

The stadardised effort can be obtained either in terms of the least efficient or most efficient gear unit (Say for example, in OBGN hours) for that species.

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References

Eldho Varghese, T. V. Sathianandan, J. Jayasankar, Somy Kuriakose, K.G. Mini and M. Muktha (2020).Bayesian State-space Implementation of Schaefer Production Model for Assessment of Stock Status for Multi-gear Fishery, Journal of the Indian Society of Agricultural Statistics, 74(1), 35–42.

Examples

```
library (FESta)
data("Example")
StdEffort(sp_catch=Example$sp_catch,tot_catch=Example$tot_catch,effort=Example$effort,meg=FALSE)
```

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