Package 'GLFC'

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Title Great Lakes Fishery Commission

Version 0.0.0.9001

Description Functions developed for the Great Lakes Fishery Commission's sea lamprey control program, including estimation of the index of adult sea lamprey abundance.

Depends R (>= 3.1.3)

Imports plyr, jvamisc

License GPL

LazyData TRUE

URL https://github.com/JVAdams/GLFC

Author Jean V. Adams [aut, cre]

Maintainer Jean V. Adams <jvadams@usgs.gov>

R topics documented:

`estAIndex` *Estimate Index of Sea Lamprey Adults*

Description

Estimate the Adult Index of sea lampreys in a single Great Lake.

Usage

```
estAIndex(indexStreams, streamPECurr, streamPEPrev = NULL, minNMR = 2)
```

Arguments

indexStreams	A numeric vector of lake-stream IDs identifying streams to be included in the index, e.g., 1.064 = lake ID + (stream ID)/1000.
streamPECurr	A data frame of stream mark-recapture estimates without any previously estimated Adult Indices (typically from the current year), with variables: year, lake, lake-stream ID lscode (see description under indexStreams), population estimate PEmr, coefficient of variation CVmr (100 in year, lake, or lscode. There should be only one value for lake in the data frame. The data frame may include additional variables, but they will be ignored.
streamPEPrev	A data frame of stream mark-recapture estimates with estimated Adult Index contributions (typically from previous years), with the same variables as in streamPECurr plus the previously estimated contribution indexContrib, default NULL. There should be no missing values in year, lake, or lscode. The data frame may include additional variables, but they will be ignored.
minNMR	An integer scalar greater than or equal to 2, the minimum number of mark-recapture estimates needed in a year to generate an index, default 2.

Details

The annual Adult Index is simply the sum of stream population estimates for each year. Missing stream estimates are estimated by a lake-specific ANOVA model relating the log of the stream estimates to the main effects of each stream and each year, weighted by the inverse of the CV squared. The jackknifed range is produced by recalculating the index, leaving out one stream at a time, then scaling up the result to the same scale as the Adult Index based on all streams.

Value

A list with 2 components: streamPE, a data frame of stream mark-recapture and Adult Index contributions for the current data (streamPECurr), with the same variables as streamPEPrev; and lakeIndex, a data frame of annual lake-wide Adult Indices for the current data (streamPECurr), with 5 columns: lake, year, the Adult Index index, and the lower and upper jackknifed range jlo and jhi.

Examples

```
# estimate the index initially for 1998-1999 data
str9899 <- data.frame(
  year=rep(1998:1999, c(3, 3)), lake=1,
  lscode=rep(c(1.1, 1.2, 1.3), 2),
  PEmr=c(15, 20, NA, 12, 22, 30),
  CVmr=c(50, 50, NA, 50, 40, 30))
istr <- c(1.1, 1.2, 1.3)
est9899 <- estAIndex(indexStreams=istr, streamPECurr=str9899)
est9899

# then estimate the index for 2000 data
str00 <- data.frame(
  year=2000, lake=1,
  lscode=c(1.1, 1.2, 1.3),
  PEmr=c(10, NA, 28),
  CVmr=c(50, NA, 32))
estAIndex(indexStreams=istr, streamPECurr=str00,
  streamPEPrev=est9899$streamPE)
```

```
# notice how this is different than
# estimating the index for 1998-2000 altogether
estAIndex(indexStreams=istr, streamPECurr=rbind(str9899, str00))
```

`index2pe` *Factors to Scale Up the Adult Index to a Lake-Wide Population*

Description

Lake-specific conversion factors to scale up indices of adult sea lamprey abundance in the Great Lakes to lake-wide population estimates.

Format

A named vector of length 5 (for the 5 Great Lakes) with factors rounded to the nearest hundredth.

Author(s)

GLFC Trapping Task Force.

Source

Great Lakes Fishery Commission (GLFC) Sea Lamprey Control Board Meeting 14-02, 15-17 Oct 2014, Briefing Item 5 - Attachment 2, Transitioning to the New Adult Index in 2015.

`jackIndex` *Index of Sea Lamprey Adults with Jackknifed Range*

Description

Estimated Adult Index of sea lamprey with the observed range in the index when one stream at a time is excluded from the estimation.

Usage

```
jackIndex(m)
```

Arguments

`m`	A numeric matrix of stream run size estimates with observation years as rows and individual streams as columns.

Details

The annual Adult Index is simply the sum of the columns in `m` for each row. The jackknifed range is produced by recalculating the index, leaving out one stream at a time, then scaling up the result to the same scale as the Adult Index based on all streams.

Value

A numeric matrix with 3 columns, the Adult Index, and the lower and upper jackknifed range.

Examples

```
streampe <- matrix(1:12, nrow=3, dimnames=list(1996:1998, letters[1:4]))
jackIndex(streampe)
```

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lsIndex *Great Lakes Streams used in the Index of Adult Sea Lampreys*

Description

IDs identifying streams to used to generate the Adult Index.

Format

A list of 5 numeric vectors of lake-stream IDs for the 5 Great Lakes, e.g., 1.064 = (lake ID) + (stream ID)/1000.

Author(s)

GLFC Trapping Task Force.

Source

Great Lakes Fishery Commission (GLFC) Sea Lamprey Control Board Meeting 14-02, 15-17 Oct 2014, Briefing Item 5 - Attachment 2, Transitioning to the New Adult Index in 2015.

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lsKeep *Great Lakes Streams with Commitment to Adult Sea Lamprey Trapping*

Description

IDs identifying streams which will continue to have ongoing trapping even if not part of the Adult Index.

Format

A list of 5 numeric vectors of lake-stream IDs for the 5 Great Lakes, e.g., 1.064 = (lake ID) + (stream ID)/1000.

Author(s)

GLFC Trapping Task Force.

Source

Great Lakes Fishery Commission (GLFC) Sea Lamprey Control Board Meeting 14-02, 15-17 Oct 2014, Briefing Item 5 - Attachment 2, Transitioning to the New Adult Index in 2015.

`trappedStreams` *General Information on Great Lakes Streams Trapped for Adult Sea Lampreys*

Description

Location information on trapped streams (past and present).

Format

A data frame with 8 elements: `lake` (lake ID), `lscode` (lake-stream ID, lake + strcode/1000), `country`, `strcode` (stream ID), `estr` (stream ID for Empiric Stream Treatment Ranking), `strname` (stream name), `lat` (latitude), `long` (longitude).

Author(s)

GLFC Trapping Task Force.

Source

Great Lakes Fishery Commission (GLFC) spawner model data base, last updated 12 May 2015.

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