Package 'GLFC'

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Title Great Lakes Fishery Commission

Version 0.0.0.9006

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 (>= 3.2.2), maps

Imports geosphere, lubridate, plotrix, plyr, rtf, survey, XLConnect

License GPL

LazyData TRUE

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

NeedsCompilation no

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R topics documented:

`AIcheck` *Error Check the Adult Index Data*

Description

Check the adult sea lamprey trapping data (collected for estimation of the Adult Index) for errors.

Usage

```
AIcheck(streamDat, csvDir, outFile = NULL, otherTabs = NULL)
```

Arguments

`streamDat`	A data frame of old and new stream mark-recapture estimates used to estimate the lake-wide Adult Indices, typically the output from `AIprep`. The data frame must include: `year`, `lake`, lake-stream ID `lscode` (see details), population estimate `PEmr`, coefficient of variation `CVmr` (100 identifying the index streams; `maintain` a logical identifying the streams that will continue to have ongoing trapping even if not part of the Adult Index; `indexContrib` a numeric, the stream population estimate that will be used in the Adult Index (NA for new); and `complete` a logical identifying streams and years for which the Adult Index has already been estimated (FALSE for new).
`csvDir`	A character scalar identifying the path where the rtf file will be stored, e.g., `csvDir = "C:\temp\mydir"`.
`outFile`	Name of the ouput rtf file, default NULL, in which case the file will be named "YYYY Adult Index - error checking.doc" where YYYY is the latest year represented in `streamDat`.
`otherTabs`	A list of other tables to be printed in error check report, default NULL. The list names will be used as captions.

Details

Lake-stream IDs are combination of lake ID and stream ID e.g., 1.064 = lake ID + (stream ID)/1000.

Value

An error checking document as an rtf file (with the file type *.doc, so that MS Word will open it automatically).

AIestimate *Estimate Index of Sea Lamprey Adults*

Description

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

Usage

```
AIestimate(streamDat, minNMR = 2)
```

Arguments

streamDat	A data frame of old and new stream mark-recapture estimates used to estimate the lake-wide Adult Indices, typically the output from AIprep. The data frame must include: year, lake, lake-stream ID lscode (see details), population estimate PEmr, coefficient of variation CVmr (100 identifying the index streams; maintain a logical identifying the streams that will continue to have ongoing trapping even if not part of the Adult Index; indexContrib a numeric, the stream population estimate that will be used in the Adult Index (NA for new); and complete a logical identifying streams and years for which the Adult Index has already been estimated (FALSE for new).
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: streamDat, a data frame of stream mark-recapture and Adult Index contributions for the incomplete rows in streamDat, with the same variables as streamDat; and lakeIndex, a data frame of annual lake-wide Adult Indices for the incomplete rows in (streamDat), with 5 columns: lake, year, the Adult Index index, and the lower and upper jackknifed range jlo and jhi.

AIprep *Prepare the Adult Index Data*

Description

Read in the adult sea lamprey trapping data (collected for estimation of the Adult Index) and prepare it for estimation.

Usage

```
AIprep(csvDir, csvNew, csvOld = NULL, streamInfo = trappedStreams,
  indexStreams = lsIndex, keepStreams = lsKeep)
```

Arguments

csvDir	A character scalar identifying the path where the csv files are stored, e.g., csvDir = "C:\temp\mydir
csvNew	A character scalar identifying the name of the csv file with stream mark-recapture estimates for which Adult Indices will be estimated (typically from the current year). The first row of the csv file should be column headers and must include: year, lake, lake-stream ID lscode (see details), population estimate PEmr, coefficient of variation CVmr (100% * sqrt(variance(PEmr)) / PEmr). See details.
csvOld	A character scalar identifying the name of the csv file with stream mark-recapture estimates for which Adult Indices have already been estimated (typically from previous years), with the same variables as in csvNew plus the previously estimated contribution indexContrib, default NULL. See details.
streamInfo	A data frame with stream information to be combined with the estimates data (csvNew and csvOld), default trappedStreams. Set to NULL if you don't want any stream information to be brought in.
indexStreams	Lake-stream IDs identifying index streams, default lsIndex.
keepStreams	Lake-stream IDs identifying streams which will continue to have ongoing trapping even if not part of the Adult Index, default lsKeep.

Details

Lake-stream IDs are combination of lake ID and stream ID e.g., 1.064 = lake ID + (stream ID)/1000. For both estimate files (csvNew and csvOld), there should be no missing values in year, lake, or lscode. Both files may contain variables other than those required. Those with the same name as variables in streamInfo will be replaced. Others will be kept.

Value

A single data frame that contains the information from all of the inputs, including new variables: index, a logical identifying the index streams; maintain a logical identifying the streams that will continue to have ongoing trapping even if not part of the Adult Index; indexContrib a numeric, the stream population estimate that will be used in the Adult Index (NA for csvNew); and complete a logical identifying streams and years for which the Adult Index has already been estimated (FALSE for csvNew).

AIreport *Adult Index Report*

Description

Create a draft template-style report of the Adult Index estimates of sea lamprey in the Great Lakes.

Usage

```
AIreport(streamPEs, lakeIPEs, targets, csvDir, outFile = NULL,
  proptargets = NULL)
```

Arguments

streamPEs	A data frame of "complete" stream mark-recapture estimates (meaning all contributions to the Adult Indices have already been calculated). The data frame must include: year, lake, lake-stream ID lscode (see details), population estimate PEmr, coefficient of variation CVmr (100 identifying the index streams; maintain a logical identifying the streams that will continue to have ongoing trapping even if not part of the Adult Index; indexContrib a numeric, the stream population estimate that will be used in the Adult Index (NA for new); and complete a logical identifying streams and years for which the Adult Index has already been estimated (should be all TRUE).
lakeIPEs	A data frame of annual lake-wide Adult Indices with 8 columns: lake, year, the Adult Index index, its associated lower and upper jackknifed range jlo and jhi, and the corresponding expansion to a supposed population estimate, pe, pelo and pehi. The data frame may contain variables other than those required.
targets	A data frame with the calculated targets for the Adult Index and expanded PE of each Great Lake, with 5 rows (Superior, Michigan, Huron, Erie, Ontario) and 3 columns: lake, targInd, and targPE, typically the output from AItarget.
csvDir	A character scalar identifying the path where the rtf file will be stored, e.g., csvDir = "C:\temp\mydir".
outFile	Name of the ouput rtf file, default NULL, in which case the file will be named "YYYY Adult Index - draft report.doc" where YYYY is the latest year represented in streamDat.
proptargets	A data frame with any proposed targets for the Adult Index, with 2 columns lake and targInd, default NULL. May have from zero to several rows for a single Great Lake.

Details

Lake-stream IDs are combination of lake ID and stream ID e.g., 1.064 = lake ID + (stream ID)/1000.

Value

A draft report document as an rtf file (with the file type *.doc, so that MS Word will open it automatically).

AItarget *Calculate Targets for the Adult Index*

Description

Calculate lake-wide targets for the Adult Index of sea lamprey populations in the Great Lakes from the mean of specified years.

Usage

```
AItarget(lakeIndex, years = list(1994:1998, 1988:1992, 1989:1993, 1991:1995,
  1993:1997), adjust = c(1, 1, 0.25, 1, 1))
```

Arguments

lakeIndex	A data frame of annual lake-wide Adult Indices with 4 columns: lake, year, the Adult Index index, and the corresponding estimates expanded out to a supposed population estimate, pe. The data frame may contain variables other than those required.
years	A list of length 5 (for each Great Lake respectively: Superior, Michigan, Huron, Erie, and Ontario), each element an integer vector of length 5 specifying the 5 years during which there were acceptable sea lamprey wounding rates on lake trout, default list(1994:1998, 1988:1992, 1989:1993, 1991:1995, 1993:1997). These will be used to generate Adult Index targets.
adjust	A numeric vector of length 5 (for each Great Lake), specifying adjustments to be made to the caculated means to generate Adult Index targets, default c(1, 1, 0.25, 1, 1). Since Lake Huron did not have a time period with acceptable sea lamprey wounding rates, the target is set to 25% of the mean for 1989-1993.

Value

A data frame with the calculated targets for the Adult Index and expanded PE of each Great Lake, with 3 columns: lake, targInd, and targPE.

DWEFerror *Error Check the Deepwater Electrofishing Data*

Description

Error check the deepwater electofishing data (including information on the lamprey catch, the lamprey lengths, and the identification of plots that were treated) prior to estimation.

Usage

```
DWEFerror(Dir, Catch, Lengths, Continue, Source = NULL)
```

Arguments

Dir	A character scalar identifying the path where output files will be stored. Use forward slashes, e.g., Dir = "C:/temp/mydir".
Catch	A data frame with the catch data, typically the CAT output from DWEFprep.
Lengths	A data frame with the lengths data, typically the LEN output from DWEFprep.
Continue	A logical scalar indicating if you want to continue adding to the rtf document after the function has run (TRUE) or if you want to end the rtf document after the error checking (FALSE).
Source	A named character vector with the names of the source directory and files, c(Dir="", CatchFile="", LengthsFile="", PlotsFile=""), typically the SOURCE output from DWEFprep, default NULL.

Details

If Continue=FALSE, a rich text file will be saved to the DIR directory with error checking text, tables, and figures. If Continue=TRUE, the same rich text file will be started, but left open, typically to add in more text, tables, and figures generated by DWEFreport.

Value

A list with cleaned (errors removed) DWEF catch and lengths in two data frames (CAT2, LEN2), a character vector of the table references for any remaining errors (ERR), a character vector of the SOURCE directory and file names, and a character vector of the output file names (OUT).

`DWEFgec` *Gear Efficiency Correction for Deepwater Electrofisher*

Description

Use the relation between larval lamprey length and probability of catch in the deepwater electrofisher to derive a gear efficiency correction factor.

Usage

```
DWEFgec(llengthmm)
```

Arguments

`llengthmm`	A numeric vector of lengths (in mm) of live larval lampreys.

Details

Lake-stream IDs are combination of lake ID and stream ID e.g., 1.064 = lake ID + (stream ID)/1000. For both estimate files (csvNew and csvOld), there should be no missing values in `year`, `lake`, or `lscode`. Both files may contain variables other than those required. Those with the same name as variables in `streamInfo` will be replaced. Others will be kept.

Value

A numeric vector equivalent to the inverse probability of capture, `p`, at length `llengthmm`., `logit(p) = 1.732 - 0.0229` This correction factor can then be multiplied by the number of lamprey of that size captured to estimate the catch adjusted for gear efficiency.

References

Robinson, JM, MJ Wilberg, JV Adams, and ML Jones. 2014. Comparing methods for estimating larval sea lamprey (Petromyzon marinus) density in the St. Marys River for the purposes of control. Journal of Great Lakes Research 40(3):739-747. [link]

Examples

```
catch <- 1:5
lenmm <- seq(80, 180, 20)
adjcatch <- catch*DWEFgec(lenmm)
cbind(catch, lenmm, adjcatch)
```

DWEFprep *Prepare the Deepwater Electrofishing Data*

Description

Read in the deepwater electofishing data (including information on the lamprey catch, the lamprey lengths, and the identification of plots that were treated) and prepare them for estimation.

Usage

```
DWEFprep(Dir, CatchFile, LengthsFile, PlotsFile, TRTtiming = "AFTER",
  b4plots = NULL)
```

Arguments

`Dir`	A character scalar identifying the path where the data files are stored. Use forward slashes, e.g., `Dir = "C:/temp/mydir"`.
`CatchFile`	A character scalar identifying the name of the *.xl* or *.dbf file with catch data. The file should have at least the following 19 columns, named in the header row: SAMPID, LATITUDE, LONGITUDE, STIME, BOAT, SAMPLE, DEPTH, SUB_MAJOR, SUB_MINOR1, SUB_MINOR2, GPSDATE, HAB_TYPE, SL_TOTAL, AB_TOTAL, I_TOTAL, COMMENT, NEW_NUMB, INBPLOT, REGION (these last 3 columns are added in using ArcInfo). See details.
`LengthsFile`	A character vector identifying the names of the *.xl* or *.dbf files with the lengths data. The files should have at least the following 2 columns, named in the header row: SAMPID, LENGTH. See details.
`PlotsFile`	A character vector identifying the name of the *.xl* or *.dbf file with the treatment plots data. The files should have at least the following 3 columns, named in the header row: AREA, Plot_09, Treat_YYYY, where YYYY is the current year. Treat_YYYY is equal to 1 if the plot was treated that year, equal to 0 otherwise. If a plot was treated twice in one year, it will be listed on two separate rows, each with Treat_YYYY=1. See details.
`TRTtiming`	A character scalar identifying the timing of the assessment survey relative to treatment. "AFTER" if all plots were surveyed AFTER they were treated (the default), "BEFORE" if all plots were survey BEFORE they were treated, "NONE" if no plots were treated, and "MIXED" if some plots were surveyed before and some plots were surveyed after treatment.
`b4plots`	A numeric vector identifying the plots that were surveyed BEFORE they were treated. A value for this should only be provided if `TRTtiming` is set to "MIXED" (default NULL).

Details

The order of the columns and the case of the column names in the `CatchFile`, `LengthsFile`, `PlotsFile` files are unimportant. Additional columns may be also be part of theses files, but they will be ignored.

Value

A list with DWEF catch, length, and plot data in three data frames (CAT, LEN, PLT) and a character vector of the SOURCE directory and file names. The plot data is reorganized to have only one row per plot, with the trtd variable indicating the number of treatments each plot received that year.

`DWEFreport` *Generate Estimates from the Deepwater Electrofishing Data*

Description

Generate Estimates of larval sea lamprey abundance from the deepwater electofishing data.

Usage

```
DWEFreport(Dir, CatchClean, LengthsClean, Plots, Downstream, Errors, Outfiles,
  StratArea = SMRStratArea, bkill = 0.75)
```

Arguments

`Dir`	A character scalar identifying the path where output files will be stored. Use forward slashes, e.g., `Dir = "C:/temp/mydir"`.
`CatchClean`	A data frame with the cleaned catch data, typically the `CAT2` output from `DWEFerror`.
`LengthsClean`	A data frame with the cleaned lengths data, including information from larvae only (no metamorphosing juveniles), typically the `LEN2` output from `DWEFerror`.
`Plots`	A vector data frame with the plot data, typically the `PLT` output from `DWEFerror`.
`Downstream`	Logical scalar indicating whether the downstream portion of the St. Marys River was surveyed (TRUE) or if just the upstream portion of the river was surveyed (FALSE).
`Errors`	A character vector of table numbers corresponding to the document produced by `DWEFerror`, indicating unresolved errors remaining the DWEF data, typically the `ERR` output from `DWEFerror`.
`Outfiles`	A character vector of length three with names for the catch, lengths, and plot output csv files.
`StratArea`	Data frame with three variables: `inbplot` indicating whether the stratum is in (=1) a high larval density area or not (=0), `region` indicating the general location in the river (1 = North Channel, 2 = turning basin, 3 = widening part, 4 = Neebish channels, and 5 = most upstream part), and `haStrat` area of the stratum in hectares. Strata of the St. Marys River larval sea lamprey survey are defined by `region` and `inbplot`. By default the 2013 areas are provided, `SMRStratArea`.
`bkill`	Numeric scalar indicating the assumed effectiveness of Bayluscide in treated plots, expressed as the proportion of larval sea lampreys killed, default 0.75.

Details

It is assumed that this function will be run immediately after the `DWEFerror` function, in which case the rtf file created by `DWEFerror` will be continued and completed by `DWEFreport`.

Value

A single data frame that contains the information from all of the inputs, including new variables: `index`, a logical identifying the index streams; `maintain` a logical identifying the streams that will continue to have ongoing trapping even if not part of the Adult Index; `indexContrib` a numeric, the stream population estimate that will be used in the Adult Index (NA for csvNew); and `complete` a logical identifying streams and years for which the Adult Index has already been estimated (FALSE for csvNew).

Three csv files are written to `Dir`, with the final catch, lengths, and plot data.

`endrtf` *Write and Close an RTF Document*

Description

Write and close an rtf (rich text format) document.

Usage

```
endrtf(rtf = doc, details = FALSE, ...)
```

Arguments

`rtf`	An rtf object, default `doc`.
`details`	Logical scalar indicating if session details should be added to the end of the document, default FALSE.
`...`	Additional parameters to `addPageBreak`.

See Also

`startrtf` for an example, `heading`, `para`, `tabl`, `figu`, `figbig`, `RTF`, `addPageBreak`.

`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, varKeep = 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 unless listed in varKeep.
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 unless listed in varKeep.
varKeep	A character vector naming additional variables (present in both streamPECurr and streamPEPrev) to keep in the output data frame (streamPE), default NULL.
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))
```

---

figbig *Add a Big Figure to an RTF Document*

Description

Add a big figure to an rtf (rich text format) document.

Usage

```
figbig(..., FIG = fig, rtf = doc, figc = GLFCenv$figcount, boldt = TRUE,
  w = NULL, h = NULL, rf = 300, newpage = "none", omi = c(1, 1, 1, 1))
```

Arguments

...	One or more character scalars (separated by commas) of text to use for the figure caption.
FIG	A function to create a figure which will be added to the document, default fig.
rtf	An rtf object, default doc.
figc	Numeric scalar figure number to use in caption, default GLFCenv$figcount.
boldt	Logical scalar indicating if figure number should use bold font, default TRUE.
w	Numeric scalar width of figure in inches, default 6.5.
h	Numeric scalar height of figure in inches, default 8.
rf	Numeric scalar resolution of figure, default 300.
newpage	Character scalar indicating if the figure should start on a new page in the document "port" for a new portrait page, "land" for a new landscape page, and "none" for no new page (the default).
omi	Numeric vector, length 4, width of document page margins in inches (bottom, left, top, right), default c(1, 1, 1, 1).

Details

The figure and caption are written to the rtf file. The size of a new page is assumed to be 11 by 17 inches.

Value

A 1 is added to the numeric vector of length 1, GLFCenv$figcount, stored in the working directory to keep track of the number of figures written to the rtf document, and label the captions accordingly.

See Also

startrtf for an example, heading, para, tabl, endrtf, RTF.

figu *Add a Figure to an RTF Document*

Description

Add a figure to an rtf (rich text format) document.

Usage

```
figu(..., FIG = fig, rtf = doc, figid = "Figure ",
  fign = GLFCenv$figcount, boldt = TRUE, capunder = TRUE, w = NULL,
  h = NULL, rf = 300, newpage = "none", omi = c(1, 1, 1, 1))
```

Arguments

...	One or more character scalars (separated by commas) of text to use for the figure caption.
FIG	A function to create a figure which will be added to the document, default fig.
rtf	An rtf object, default doc.
figid	Character scalar of caption identifier, default "Figure ".
fign	Numeric scalar of figure number to use in caption, default GLFCenv$figcount.
boldt	Logical scalar indicating if figure number should use bold font, default TRUE.
capunder	Logical scalar indicating if caption should appear under the figure (TRUE, the default) or on top of the figure (FALSE).
w	Numeric scalar width of figure in inches, default 6.5.
h	Numeric scalar height of figure in inches, default 8.
rf	Numeric scalar resolution of figure, default 300.
newpage	Character scalar indicating if the figure should start on a new page in the document "port" for a new portrait page, "land" for a new landscape page, and "none" for no new page (the default).
omi	Numeric vector, length 4, width of document page margins in inches (bottom, left, top, right), default c(1, 1, 1, 1).

Details

The figure and caption are written to the rtf file. The size of a new page is assumed to be 8.5 by 11 inches.

Value

A 1 is added to the numeric vector of length 1, GLFCenv$figcount, stored in the working directory to keep track of the number of figures written to the rtf document, and label the captions accordingly.

See Also

startrtf for an example, heading, para, tabl, figbig, endrtf, RTF.

GLFCenv *GLFC Package Local Environment*

Description

An environment local to the GLFC package, used to hold objects outside of the individual package functions

Format

An environment.

Source

Post from Hadley Wickham to r-help on 2 Dec 2014 [link].

heading *Add a Heading to an RTF Document*

Description

Add a text heading to an rtf (rich text format) document.

Usage

```
heading(words, htype = 1, rtf = doc)
```

Arguments

words	Character scalar text of heading to add to document.
htype	Integer scalar heading type, 1=bold and font size 12, 2=bold and font size 10, 3=italics and font size 10, default 1.
rtf	An rtf object, default doc.

Details

The specified heading is written to the rtf file.

See Also

startrtf for an example, para, tabl, figu, figbig, endrtf, RTF.

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 with Jackknifed Range*

Description

Given a collection of estimates contributing to an index, this function provides the estimated index (sum) of observations (across a row) and the jackknifed range of the index, the result of leaving out an entire column (e.g., a location) one at a time.

Usage

```
jackIndex(m)
```

Arguments

`m`	A numeric matrix of estimates contributing to the index. Rows are observations (e.g., years). Columns are individuals (e.g., locations).

Details

The 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 column at a time, then scaling up the result to the same scale as the index based on all columns.

Value

A numeric matrix with 3 columns, the index, and the lower and upper jackknifed range of the index.

Examples

```
# 3 years of population estimates from four streams
streampe <- matrix(1:12, nrow=3, dimnames=list(1996:1998, letters[1:4]))
jackIndex(streampe)
```

`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.

`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.

para *Add a Paragraph to an RTF Document*

Description

Add a paragraph to an rtf (rich text format) document.

Usage

```
para(..., rtf = doc, bold = FALSE, italic = FALSE)
```

Arguments

...	One or more character scalars (separated by commas) of text to add to document as a single paragraph.
rtf	An rtf object, default doc.
bold	Logical scalar indicating if paragraph should use bold font, default FALSE.
italic	Logical scalar indicating if paragraph should use italic font, default FALSE.

Details

The specified heading is written to the rtf file.

See Also

startrtf for an example, heading, tabl, figu, figbig, endrtf, RTF.

predAntilog *Unbiased Prediction of Log Transformed Response on Original Scale*

Description

Provide unbiased estimates on the original scale from an analysis of variance model with a log transformed response.

Usage

```
predAntilog(aovfit, xdata, logbase = exp(1), k = 0)
```

Arguments

aovfit	An object of class c("aov", "lm").
xdata	A data frame with predictor variables corresponding to those in model for which predictions should be made.
logbase	A numeric scalar, the base of the log transformation used in the transformed response of model, default exp(1).
k	A numeric scalar, the constant added to the response prior to transformation, default 0.

Value

A numeric vector of predicted values on the original scale of the response.

References

This is a copy of the `predAntilog` function from the [jvamisc] package.

Examples

```
fit <- aov(log(yield) ~ block + N * P + K, npk)
predAntilog(fit, npk)
```

`prettytable` *Prettify the Numeric Columns of a Table*

Description

Prettify the numeric columns of a table, by formating them and converting them to character columns for printing.

Usage

```
prettytable(df, digits = 2, rounds = TRUE, bigseps = ",")
```

Arguments

`df`	A data frame to be prettified.
`digits`	Integer vector of either length 1 or the number of columns in `df`, number of digits to be used, default 2. See `round`.
`rounds`	Logical vector of either length 1 or the number of columns in `df`, indicating whether numbers should be rounded to `digits` decimal places (TRUE, the default), rounded to `digits` significant digits (FALSE), or not rounded at all (NULL).
`bigseps`	Character vector of either length 1 or the number of columns in `df`, giving the character to be used as a mark between every three digits before the decimal, default ",".

Value

A data frame the same dimensions as `df` with the numeric columns converted to character columns, formated as specified.

References

This is a copy of the `prettytable` function from the [jvamisc] package.

Examples

```
head(mtcars)
prettytable(head(mtcars))
```

SMRStratArea *St. Marys River Strata Areas*

Description

Data frame with three variables: `inbplot` indicating whether the stratum is in (=1) a high larval density area or not (=0), `region` indicating the general location in the river (1 = North Channel, 2 = turning basin, 3 = widening part, 4 = Neebish channels, and 5 = most upstream part), and `haStrat` area of the stratum in hectares. Strata of the St. Marys River larval sea lamprey survey are defined by `region` and `inbplot`.

Format

A data frame with 9 rows and 3 columns. Areas are rounded to the nearest hundredth hectare.

Author(s)

GLFC Larval Assessment Task Force.

Source

Great Lakes Fishery Commission (GLFC) Sea Lamprey Control Board Meeting 14-02, 15-17 Oct 2014, Briefing Item 6 - Attachment 2, Larval Assessment Task Force Minutes, item (3c) Follow up on changes to St. Marys River area used for estimation calculations (page 6-15).

startrtf *Create an RTF Document*

Description

Create an rtf (rich text format) document.

Usage

```
startrtf(file = NULL, dir = getwd(), width = 8.5, height = 11,
  omi = c(1, 1, 1, 1), quiet = FALSE)
```

Arguments

`file`	Character scalar name of document, default "RGeneratedDocument" with `Sys.Date()` suffix.
`dir`	Character scalar name of directory where document should be stored, default `getwd()`.
`width`	Numeric scalar width of document page in inches, default 8.5.
`height`	Numeric scalar height of document page in inches, default 11.
`omi`	Numeric vector, length 4, width of document page margins in inches (bottom, left, top, right), default c(1, 1, 1, 1).
`quiet`	Logical scalar indicating if name of new rtf document should be printed to command line, default FALSE.

Details

The rtf file may be written to until the `endrtf()` function is run. If you assign your rtf file to an object called doc, you can use the default settings in other **GLFC** rtf functions.

Value

An rtf file is created in the specified directory. An object of class rtf is created. This object is referred to in other functions to write to the file. In addition, two numeric vectors of length 1, `tabcount` and `figcount`, are written to the working directory to keep track of the number of tables and figures written to the rtf document, and label the captions accordingly.

See Also

`heading`, `para`, `tabl`, `figu`, `figbig`, `endrtf`, `RTF`.

Examples

```
## Not run:
# open a Word-friendly rtf file
today <- Sys.Date()
doc <- startrtf(file=paste("Example", today))
# add headings
heading("Title")
heading(paste("Author", today, sep=" - "), 2)
# add a paragraph
para("This is how write a paragraph.")
# reference a table
para("This is how you reference a table (Table ", GLFCenv$tabcount, ").")
# add the table
tab <- matrix(sample(20), ncol=5,
 dimnames=list(paste("Row", 1:4), paste("Column", 1:5)))
tabl("A silly table.")
# reference a figure
para("And this is how you reference a figure (Figure ",
 GLFCenv$figcount, ").")
# add the figure
fig <- function() {
par(mar=c(4, 4, 1, 1))
plot(1:10, 1:10, xlab="X", ylab="Y")
}
figu("A silly plot.", h=4, w=4)
# save the rtf file
endrtf()

## End(Not run)
```

`tabl` *Add a Table to an RTF Document*

Description

Add a table to an rtf (rich text format) document.

Usage

```
tabl(..., TAB = tab, rtf = doc, fontt = 8, row.names = TRUE,
  tabc = GLFCenv$tabcount, boldt = TRUE, newpage = "none", omi = c(1, 1,
  1, 1))
```

Arguments

...	One or more character scalars (separated by commas) of text to use for the table caption.
TAB	A matrix, data frame, or table to be added to the document as a table, default tab.
rtf	An rtf object, default doc.
fontt	Numeric scalar font size for table caption, default 8.
row.names	Logical scalar whether to include the row.names of TAB in the table, default TRUE.
tabc	Numeric scalar table number to use in caption, default GLFCenv$tabcount.
boldt	Logical scalar indicating if table number should use bold font, default TRUE.
newpage	Character scalar indicating if the table should start on a new page in the document "port" for a new portrait page, "land" for a new landscape page, and "none" for no new page (the default).
omi	Numeric vector, length 4, width of document page margins in inches (bottom, left, top, right), default c(1, 1, 1, 1).

Details

The table and caption are written to the rtf file. The size of a new page is assumed to be 8.5 by 11 inches.

Value

A 1 is added to the numeric vector of length 1, GLFCenv$tabcount, stored in the working directory to keep track of the number of tables written to the rtf document, and label the captions accordingly.

See Also

startrtf for an example, heading, para, figu, figbig, endrtf, RTF.

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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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