

# Package ‘scape’

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**Title** Statistical catch-at-age plotting environment

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**Depends** R (>= 2.1.1), gdata, grid, Hmisc, lattice

**LazyData** yes

**Description** Import and plot results from statistical catch-at-age models, used in fisheries stock assessments.

**License** GPL (>= 2)

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scape-package      *Statistical Catch-at-Age Plotting Environment*

---

## Description

Import and plot results from statistical catch-at-age models, used in fisheries stock assessments.

## Details

*Import model results:*

`importCol`      Coleraine model output

*Plot model fit to data:*

`plotCA`      catch at age  
`plotCL`      catch at length  
`plotIndex`      abundance index  
`plotLA`      length at age

*Plot derived quantities:*

`plotB`      biomass, recruitment, and landings  
`plotN`      numbers at age  
`plotSel`      selectivity and maturity

*Examples:*

`x.cod`, `x.ling`, `x.oreo`, `x.sbw`      cod, ling, oreo, and whiting assessments

## Note

Tutorials can be found in the ‘scape/doc’ directory.

The functions `Args` and `ll` (package **gdata**) can be useful for browsing unwieldy functions and objects.

## Author(s)

Arni Magnusson <arnima@u.washington.edu>.

## References

Magnusson, A. (2005) *R goes fishing: Analyzing fisheries data using AD Model Builder and R*. Proceedings of the 5th International Workshop on Distributed Statistical Computing. Available at <http://students.washington.edu/arnima/s/pdf/dsc.pdf>.

**See Also**

All **scape** graphics are `trellis` plots, rendered with the **lattice** package.

Once the best model(s) have been chosen, the **scapeMCMC** package can be used to diagnose MCMC runs.

---

importCol

*Import Coleraine Model Results*


---

**Description**

Import Coleraine model results from `.res` file, and rearrange into a standard format suitable for plotting.

**Usage**

```
importCol(res.file, info="", Dev=FALSE, CPUE=FALSE, Survey=FALSE,
          CAC=FALSE, CAs=FALSE, CLc=FALSE, CLs=FALSE, LA=FALSE,
          quiet=TRUE)
```

**Arguments**

<code>res.file</code>	name of Coleraine model results file to import.
<code>info</code>	optional string containing information to store with model results.
<code>Dev</code>	whether recruitment deviates were estimated in model.
<code>CPUE</code>	whether model was fitted to catch-per-unit-effort data.
<code>Survey</code>	whether model was fitted to survey abundance index data.
<code>CAC</code>	whether model was fitted to commercial catch-at-age data.
<code>CAs</code>	whether model was fitted to survey catch-at-age data.
<code>CLc</code>	whether model was fitted to commercial catch-at-length data.
<code>CLs</code>	whether model was fitted to survey catch-at-length data.
<code>LA</code>	whether model was fitted to length-at-age data.
<code>quiet</code>	whether to report progress while parsing file.

**Value**

A list of class `scape` containing at least `N`, `B`, and `Sel`. The other elements may or may not be included in the list, depending on how `importCol` was called:

<code>N</code>	predicted numbers at age
<code>B</code>	predicted biomass, recruitment, and observed landings (year things)
<code>Sel</code>	predicted selectivity and observed maturity (age things)
<code>Dev</code>	predicted recruitment deviates from the stock-recruitment curve
<code>CPUE</code> , <code>Survey</code>	commercial and survey abundance index and fit
<code>CAC</code> , <code>CAs</code>	commercial and survey C@A (catch at age) and fit
<code>CLc</code> , <code>CLs</code>	commercial and survey C@L (catch at length) and fit
<code>LA</code>	observed L@A and fit

**Note**

This import function is implemented for the Coleraine statistical catch-at-age software, and can serve as a template for **scape** users who would like to implement import functions for specific stock assessment software.

The example datasets `x.cod`, `x.ling`, `x.oreo`, and `x.sbw` were generated using `importCol`.

The functions `ll` (package **gdata**) and `head` are recommended for browsing model results, e.g. `ll(x.cod)`; `ll(x.cod$N)`; `head(x.cod$N)`.

**Author(s)**

Arni Magnusson <arnima@u.washington.edu>.

**References**

Hilborn, R., M. Maunder, A. Parma, B. Ernst, J. Payne, and P. Starr. 2003. *Coleraine: A generalized age-structured stock assessment model*. User's manual version 2.0. University of Washington Report SAFS-UW-0116. Available at <http://fish.washington.edu/research/coleraine/coleraine.pdf>.

**See Also**

[read.table](#), [readLines](#), [scan](#), [x.cod](#), [x.ling](#), [x.oreo](#), [x.sbw](#).  
[scape-package](#) gives an overview of the package.

**Examples**

```
## Not run:
path <- paste(.find.package("scape"), "/example/cod.res", sep="")
x.cod <- importCol(path, Dev=TRUE, Survey=TRUE, CAC=TRUE, CAS=TRUE)
## End(Not run)
```

---

plotB

*Plot Biomass, Recruitment, and Landings*

---

**Description**

Plot scape model predicted biomass, stock recruitment, and landings.

**Usage**

```
plotB(model, what="d", series=NULL, years=NULL, axes=TRUE, div=1,
       legend="bottom", main="", xlab="", ylab="", cex.main=1.2,
       cex.legend=1, cex.lab=1, cex.axis=0.8, las=1,
       tck=c(1,what=="d")/2, tick.number=5, lty.grid=3, col.grid="white",
       pch=16, cex.points=0.8, col.points="black", lty.lines=1:3,
       lwd.lines=2, col.lines="black", ratio.bars=3, col.bars="grey",
       plot=TRUE, ...)
```

**Arguments**

model	fitted <code>scape</code> model.
what	what should be plotted: "d"[efault], "s"[tock recruitment], or "l"[andings].
series	vector of strings indicating which column names in <code>model\$B</code> data frame should be plotted (all by default).
years	vector of numbers indicating which years should be included (all by default).
axes	whether axis values should be plotted.
div	denominator to shorten values on the y axis, or a vector with two elements referring to x and y axis.
legend	legend location: "bottom", "left", "top", "right", or "" to suppress legend.
main	main title.
xlab	x-axis label.
ylab	y-axis label.
cex.main	size of main title.
cex.legend	size of legend text.
cex.lab	size of axis labels.
cex.axis	size of tick labels.
las	orientation of tick labels: 0=parallel, 1=horizontal, 2=perpendicular, 3=vertical.
tck	tick mark length.
tick.number	number of tick marks.
lty.grid	line type of gridlines.
col.grid	colour of gridlines.
pch	symbol for points.
cex.points	size of points.
col.points	colour of points.
lty.lines	line type of main lines, possibly a vector.
lwd.lines	line width of main lines, possibly a vector.
col.lines	colour of main lines, possibly a vector.
ratio.bars	width of bars.
col.bars	colour of bars.
plot	whether to draw plot.
...	passed to <code>xyplot</code> and <code>panel.superpose</code> .

**Details**

The "d"[efault] plot shows spawning biomass and vulnerable biomass as lines, and landings as bars, on the same scale.

**Value**

When `plot=TRUE`, a trellis plot is drawn and a data frame is returned, containing the data used for plotting. When `plot=FALSE`, a trellis object is returned.

**Note**

This function tries to draw the plot on a trellis device with a white background.

The `Args` function from the **gdata** package is recommended for reviewing the arguments, instead of `args`.

**Author(s)**

Arni Magnusson <arnima@u.washington.edu>.

**See Also**

[Lattice](#), [xyplot](#), [panel.barchart](#), [panel.superpose](#).

[scape-package](#) gives an overview of the package.

**Examples**

```
plotB(x.ling, series=c("VB.1", "VB.2", "Y"), div=1000, xlab="Year\n",
      ylab="Biomass and landings (1000 t)")
```

```
plotB(x.ling, "s", div=1000, xlab="Biomass age 4+ (1000 t)",
      ylab="Recruitment (million one-year-olds)")
```

---

plotCA

*Plot Catch at Age*

---

**Description**

Plot scape model fit to catch-at-age data.

**Usage**

```
plotCA(model, what="c", fit=TRUE, series=NULL, sex=NULL, years=NULL,
       ages=NULL, axes=TRUE, same.limits=TRUE, log=FALSE, base=10,
       eps.log=1e-5, main="", xlab="", ylab="", cex.main=1.2, cex.lab=1,
       cex.strip=0.8, cex.axis=0.8, las=!fit, tck=c(1, fit)/2,
       tick.number=5, lty.grid=3, col.grid="grey", pch=16,
       cex.points=0.5, col.points="black", lty.lines=1, lwd.lines=2,
       col.lines=c("red", "blue"), plot=TRUE, ...)
```

**Arguments**

<code>model</code>	fitted <code>scape</code> model containing element <code>CAC</code> and/or <code>CAs</code> .
<code>what</code>	what should be plotted: " <code>c</code> "[ommercial] or " <code>s</code> "[urvey] catch at age.
<code>fit</code>	whether fitted values should be overlaid on observed data.
<code>series</code>	vector of strings indicating which gears or surveys should be plotted (first by default).
<code>sex</code>	string indicating which sex should be plotted (both by default).
<code>years</code>	vector of numbers indicating which years should be plotted (all by default).
<code>ages</code>	vector of numbers indicating which ages should be plotted (all by default).
<code>axes</code>	whether axis values should be plotted.
<code>same.limits</code>	whether panels should have same y-axis limits.
<code>log</code>	whether values should be log-transformed.
<code>base</code>	logarithm base.
<code>eps.log</code>	small number to add before log-transforming to avoid log 0.
<code>main</code>	main title.
<code>xlab</code>	x-axis label.
<code>ylab</code>	y-axis label.
<code>cex.main</code>	size of main title.
<code>cex.lab</code>	size of axis labels.
<code>cex.strip</code>	size of strip labels.
<code>cex.axis</code>	size of tick labels.
<code>las</code>	orientation of tick labels: 0=parallel, 1=horizontal, 2=perpendicular, 3=vertical.
<code>tck</code>	tick mark length.
<code>tick.number</code>	number of tick marks.
<code>lty.grid</code>	line type of gridlines.
<code>col.grid</code>	colour of gridlines.
<code>pch</code>	symbol for points.
<code>cex.points</code>	size of points.
<code>col.points</code>	colour of points.
<code>lty.lines</code>	line type of main lines, possibly a vector where element 2 refers to males.
<code>lwd.lines</code>	line width of main lines, possibly a vector where element 2 refers to males.
<code>col.lines</code>	colour of main lines, possibly a vector where element 2 refers to males.
<code>plot</code>	whether to draw plot.
<code>...</code>	passed to <code>xyplot</code> , <code>panel.xyplot</code> , <code>panel.superpose</code> , and <code>panel.superpose.2</code> .

**Value**

When `plot=TRUE`, a trellis plot is drawn and a data frame is returned, containing the data used for plotting. When `plot=FALSE`, a trellis object is returned.

**Note**

This function tries to draw the plot on a trellis device with a white background.

The `Args` function from the **gdata** package is recommended for reviewing the arguments, instead of `args`.

**Author(s)**

Arni Magnusson <arnima@u.washington.edu>.

**See Also**

[Lattice](#), [xyplot](#), [panel.xyplot](#), [panel.superpose](#), [balloonplot](#).  
[scape-package](#) gives an overview of the package.

**Examples**

```
plotCA(x.sbw, fit=FALSE, strip=FALSE, xlab="Age", ylab="Year",
       tick.number=10)

plotCA(x.cod, xlab="Age", ylab="Proportion in catch", cex.strip=0.7,
       cex.axis=0.7, col.lines="brown", layout=c(8,4))

plotCA(x.ling, "s", col.points=c("red","blue"), lty.lines=0, xlab="Age",
       ylab="Observed proportion in survey", tck=0.5, cex.strip=0.7,
       cex.axis=0.7)

plotCA(x.ling, "s", xlab="Age", ylab="Observed proportion in survey",
       fit=FALSE, cex.strip=0.7, cex.axis=0.7, tck=0.5, layout=c(5,2))
```

---

plotCL

*Plot Catch at Length*

---

**Description**

Plot scape model fit to catch-at-length data.

**Usage**

```
plotCL(model, what="c", fit=TRUE, series=NULL, sex=NULL, years=NULL,
       lengths=NULL, axes=TRUE, same.limits=TRUE, log=FALSE, base=10,
       eps.log=1e-5, main="", xlab="", ylab="", cex.main=1.2, cex.lab=1,
       cex.strip=0.8, cex.axis=0.8, las=!fit, tck=c(1,fit)/2,
       tick.number=5, lty.grid=3, col.grid="grey", pch=16,
       cex.points=0.5, col.points="black", lty.lines=1, lwd.lines=2,
       col.lines=c("red","blue"), plot=TRUE, ...)
```

**Arguments**

<code>model</code>	fitted <code>scape</code> model containing element <code>CLc</code> and/or <code>CLs</code> .
<code>what</code>	what should be plotted: " <code>c</code> "[ommercial] or " <code>s</code> "[urvey] catch at length.
<code>fit</code>	whether fitted values should be overlaid on observed data.
<code>series</code>	vector of strings indicating which gears or surveys should be plotted (first by default).
<code>sex</code>	string indicating which sex should be plotted (both by default).
<code>years</code>	vector of numbers indicating which years should be plotted (all by default).
<code>lengths</code>	vector of numbers indicating which lengths should be plotted (all by default).
<code>axes</code>	whether axis values should be plotted.
<code>same.limits</code>	whether panels should have same y-axis limits.
<code>log</code>	whether values should be log-transformed.
<code>base</code>	logarithm base.
<code>eps.log</code>	small number to add before log-transforming to avoid log 0.
<code>main</code>	main title.
<code>xlab</code>	x-axis label.
<code>ylab</code>	y-axis label.
<code>cex.main</code>	size of main title.
<code>cex.lab</code>	size of axis labels.
<code>cex.strip</code>	size of strip labels.
<code>cex.axis</code>	size of tick labels.
<code>las</code>	orientation of tick labels: 0=parallel, 1=horizontal, 2=perpendicular, 3=vertical.
<code>tck</code>	tick mark length.
<code>tick.number</code>	number of tick marks.
<code>lty.grid</code>	line type of gridlines.
<code>col.grid</code>	colour of gridlines.
<code>pch</code>	symbol for points.
<code>cex.points</code>	size of points.
<code>col.points</code>	colour of points.
<code>lty.lines</code>	line type of main lines, possibly a vector where element 2 refers to males.
<code>lwd.lines</code>	line width of main lines, possibly a vector where element 2 refers to males.
<code>col.lines</code>	colour of main lines, possibly a vector where element 2 refers to males.
<code>plot</code>	whether to draw plot.
<code>...</code>	passed to <code>xyplot</code> , <code>panel.xyplot</code> , <code>panel.superpose</code> , and <code>panel.superpose.2</code> .

**Value**

When `plot=TRUE`, a trellis plot is drawn and a data frame is returned, containing the data used for plotting. When `plot=FALSE`, a trellis object is returned.

**Note**

This function tries to draw the plot on a trellis device with a white background.

The `Args` function from the **gdata** package is recommended for reviewing the arguments, instead of `args`.

**Author(s)**

Arni Magnusson <arnima@u.washington.edu>.

**See Also**

[Lattice](#), [xyplot](#), [panel.xyplot](#), [panel.superpose](#), [balloonplot](#).  
[scape-package](#) gives an overview of the package.

**Examples**

```
plotCL(x.ling, fit=FALSE, strip=FALSE, series="1", sex="Female",
       xlab="Length (cm)", ylab="Year")

plotCL(x.oreo, xlab="Length (cm)", ylab="Proportion in catch")

plotCL(x.oreo, "s", layout=c(2,1), xlab="Length (cm)",
       ylab="Observed proportion in survey", cex.points=0.8,
       col.points=c("red", "blue"), lty.lines=0)

plotCL(x.ling, fit=FALSE, series="2", xlab="Length (cm)",
       ylab="Observed proportion in trawl catch")
```

---

plotIndex

*Plot Abundance Index*

---

**Description**

Plot scape model fit to abundance index data

**Usage**

```
plotIndex(model, what="c", series=NULL, axes=TRUE, same.limits=FALSE,
          between=list(x=axes,y=axes), ylim=NULL, q=1, bar=1, log=FALSE,
          base=10, main="", xlab="", ylab="", cex.main=1.2, cex.lab=1,
          cex.strip=0.8, cex.axis=0.8, las=1, tck=c(1,0)/2,
          tick.number=5, lty.grid=3, col.grid="white", pch=16,
          cex.points=1.2, col.points="black", lty.lines=1, lwd.lines=4,
          col.lines="dimgrey", lty.bar=1, plot=TRUE, ...)
```

**Arguments**

<code>model</code>	fitted <code>scape</code> model containing element <code>CPUE</code> and/or <code>Survey</code> .
<code>what</code>	what should be plotted: " <code>c</code> "[ommercial] or " <code>s</code> "[urvey] abundance index.
<code>series</code>	vector of strings indicating which gears or surveys should be plotted (first by default).
<code>axes</code>	whether axis values should be plotted.
<code>same.limits</code>	whether panels should have same y-axis limits.
<code>between</code>	list with <code>x</code> and <code>y</code> indicating panel spacing.
<code>ylim</code>	vector with lower and upper y-axis limits.
<code>q</code>	denominator to scale the y axis, e.g. to vulnerable biomass.
<code>bar</code>	extent of error bars relative to standard error.
<code>log</code>	whether values should be log-transformed.
<code>base</code>	logarithm base.
<code>main</code>	main title.
<code>xlab</code>	x-axis label.
<code>ylab</code>	y-axis label.
<code>cex.main</code>	size of main title.
<code>cex.lab</code>	size of axis labels.
<code>cex.strip</code>	size of strip labels.
<code>cex.axis</code>	size of tick labels.
<code>las</code>	orientation of tick labels: 0=parallel, 1=horizontal, 2=perpendicular, 3=vertical.
<code>tck</code>	tick mark length.
<code>tick.number</code>	number of tick marks.
<code>lty.grid</code>	line type of gridlines.
<code>col.grid</code>	colour of gridlines.
<code>pch</code>	symbol for points.
<code>cex.points</code>	size of points.
<code>col.points</code>	colour of points, possibly a vector.
<code>lty.lines</code>	line type of main lines.
<code>lwd.lines</code>	line width of main lines.
<code>col.lines</code>	colour of main lines, possibly a vector.
<code>lty.bar</code>	line type of error bars.
<code>plot</code>	whether to draw plot.
<code>...</code>	passed to <code>xyplot</code> , <code>panel.xyplot</code> , and <code>panel.xYplot</code> .

**Value**

When `plot=TRUE`, a trellis plot is drawn and a data frame is returned, containing the data used for plotting. When `plot=FALSE`, a trellis object is returned.

**Note**

This function tries to draw the plot on a trellis device with a white background.

The `Args` function from the **gdata** package is recommended for reviewing the arguments, instead of `args`.

**Author(s)**

Arni Magnusson (arnima@u.washington.edu).

**See Also**

[Lattice](#), [xyplot](#), [panel.xyplot](#), [panel.xYplot](#), [plotCI](#).  
[scape-package](#) gives an overview of the package.

**Examples**

```
plotIndex(x.cod, "s", xlab="Year", ylab="Survey abundance index",
          strip=FALSE)

plotIndex(x.oreo, xlim=list(c(1981,1990),c(1992,2002)), xlab="Year",
          ylab="Observed CPUE", col.points=c("peru","red"), lty.lines=0)
```

---

plotLA

*Plot Length at Age*

---

**Description**

Plot scape model fit to length-at-age data.

**Usage**

```
plotLA(model, together=FALSE, sex=NULL, axes=TRUE, same.limits=TRUE,
        between=list(x=axes,y=axes), ylim=NULL, bands=1, main="",
        xlab="", ylab="", cex.main=1.2, cex.lab=1, cex.strip=0.8,
        cex.axis=0.8, las=1, tck=0, tick.number=5, lty.grid=3,
        col.grid="grey", pch=16, cex.points=0.5, col.points="black",
        lty.lines=1, lwd.lines=4, col.lines=c("red","blue"),
        lty.bands=2*(!together), lwd.bands=1, col.bands="black",
        plot=TRUE, ...)
```

**Arguments**

<code>model</code>	fitted scape model containing element LA.
<code>together</code>	whether both sexes should be plotted in one panel.
<code>sex</code>	string indicating which sex should be plotted (both by default).
<code>axes</code>	whether axis values should be plotted.

<code>same.limits</code>	whether panels should have same y-axis limits.
<code>between</code>	list with <code>x</code> and <code>y</code> indicating panel spacing.
<code>ylim</code>	vector with lower and upper y-axis limits.
<code>bands</code>	extent of error bands relative to standard error.
<code>main</code>	main title.
<code>xlab</code>	x-axis label.
<code>ylab</code>	y-axis label.
<code>cex.main</code>	size of main title.
<code>cex.lab</code>	size of axis labels.
<code>cex.strip</code>	size of strip labels.
<code>cex.axis</code>	size of tick labels.
<code>las</code>	orientation of tick labels: 0=parallel, 1=horizontal, 2=perpendicular, 3=vertical.
<code>tck</code>	tick mark length.
<code>tick.number</code>	number of tick marks.
<code>lty.grid</code>	line type of gridlines.
<code>col.grid</code>	colour of gridlines.
<code>pch</code>	symbol for points, possibly a vector where element 2 refers to males.
<code>cex.points</code>	size of points, possibly a vector where element 2 refers to males.
<code>col.points</code>	colour of points, possibly a vector where element 2 refers to males.
<code>lty.lines</code>	line type of main lines, possibly a vector where element 2 refers to males.
<code>lwd.lines</code>	line width of main lines, possibly a vector where element 2 refers to males.
<code>col.lines</code>	colour of main lines, possibly a vector where element 2 refers to males.
<code>lty.bands</code>	line type of error bands.
<code>lwd.bands</code>	line width of error bands.
<code>col.bands</code>	colour of error bands, possibly a vector where element 2 refers to males.
<code>plot</code>	whether to draw plot.
<code>...</code>	passed to <code>xyplot</code> and <code>panel.superpose.2</code> .

**Value**

When `plot=TRUE`, a trellis plot is drawn and a data frame is returned, containing the data used for plotting. When `plot=FALSE`, a trellis object is returned.

**Note**

This function tries to draw the plot on a trellis device with a white background.

The `Args` function from the **gdata** package is recommended for reviewing the arguments, instead of `args`.

**Author(s)**

Arni Magnusson <arnima@u.washington.edu>.

**See Also**

[Lattice](#), [xyplot](#), [panel.xyplot](#), [panel.superpose](#).  
[scape-package](#) gives an overview of the package.

**Examples**

```
plotLA(x.oreo, xlab="Age", ylab="Length (cm)")

mykey <- list(text=list(lab=c("Female","Male")), space="right",
              lines=list(lwd=4,col=c("red","blue")))
plotLA(x.oreo, together=TRUE, xlab="Age", ylab="Length (cm)", pch=NA,
       key=mykey)

mykey <- list(text=list(lab=c("Female","Male")), space="right",
              points=list(pch=16,cex=0.5,col=c("red","blue")))
plotLA(x.oreo, together=TRUE, xlab="Age", ylab="Length (cm)",
       col.points=c("red","blue"), lty.lines=0, key=mykey)
```

---

plotN

*Plot Numbers at Age*

---

**Description**

Plot scape model predicted numbers at age.

**Usage**

```
plotN(model, what="d", years=NULL, ages=NULL, axes=TRUE,
      same.limits=TRUE, div=1, log=FALSE, base=10, main="", xlab="",
      ylab="", cex.main=1.2, cex.lab=1, cex.strip=0.8, cex.axis=0.8,
      las=(what=="b"), tck=c(1,what=="b")/2, tick.number=10, lty.grid=3,
      col.grid="white", pch=16, cex.points=1, col.points="black",
      ratio.bars=3, col.bars="grey", plot=TRUE, ...)
```

**Arguments**

model	fitted scape model.
what	what should be plotted: "d"[efault], "i"[nitial year], "r"[ecruitment], "y"[ear panels], "b"[ubble plot].
years	vector of numbers indicating which years should be plotted (all by default).
ages	vector of numbers indicating which ages should be plotted (all by default).
axes	whether axis values should be plotted.
same.limits	whether panels should have same y-axis limits.
div	denominator to shorten values on the y axis.
log	whether values should be log-transformed.

<code>base</code>	logarithm base.
<code>main</code>	main title.
<code>xlab</code>	x-axis label.
<code>ylab</code>	y-axis label.
<code>cex.main</code>	size of main title.
<code>cex.lab</code>	size of axis labels.
<code>cex.strip</code>	size of strip labels.
<code>cex.axis</code>	size of tick labels.
<code>las</code>	orientation of tick labels: 0=parallel, 1=horizontal, 2=perpendicular, 3=vertical.
<code>tck</code>	tick mark length.
<code>tick.number</code>	number of tick marks.
<code>lty.grid</code>	line type of gridlines.
<code>col.grid</code>	colour of gridlines.
<code>pch</code>	symbol for points.
<code>cex.points</code>	size of points.
<code>col.points</code>	colour of points.
<code>ratio.bars</code>	width of bars.
<code>col.bars</code>	colour of bars.
<code>plot</code>	whether to draw plot.
<code>...</code>	passed to <code>xyplot</code> , <code>panel.barchart</code> , and <code>panel.xyplot</code> .

### Details

The "d"[efault] plot is a combination of "i"[nitial year] and "r"[ecruitment].

### Value

When `plot=TRUE`, a trellis plot is drawn and a data frame is returned, containing the data used for plotting. When `plot=FALSE`, a trellis object is returned.

### Note

This function tries to draw the plot on a trellis device with a white background.

The `Args` function from the **gdata** package is recommended for reviewing the arguments, instead of `args`.

### Author(s)

Arni Magnusson <arnima@u.washington.edu>.

### See Also

[Lattice](#), [xyplot](#), [panel.xyplot](#), [panel.barchart](#).  
[scape-package](#) gives an overview of the package.

**Examples**

```

plotN(x.cod, div=1000, xlab=c("Age (years)", "Year"),
      ylab=c("Individuals (million)", "One-year-olds (million)"))

plotN(x.cod, "b", xlab="Age (years)", ylab="Year", cex.points=0.7)

plotN(x.cod, "y", div=1000, ages=3:10, xlim=c(2,11), xlab="Age",
      ylab="Individuals (million)", cex.strip=0.7, cex.axis=0.7,
      tck=0.5)

```

---

plotSel

*Plot Selectivity and Maturity*


---

**Description**

Plot scape model predicted selectivity and observed maturity.

**Usage**

```

plotSel(model, together=FALSE, series=NULL, sex=NULL, axes=TRUE,
        legend="bottom", main="", xlab="", ylab="", cex.main=1.2,
        cex.legend=1, cex.lab=1, cex.strip=0.8, cex.axis=0.8, las=1,
        tck=0, tick.number=5, lty.grid=3, col.grid="grey", pch="m",
        cex.points=1, col.points="black", lty.lines=1, lwd.lines=4,
        col.lines=c("red", "blue"), plot=TRUE, ...)

```

**Arguments**

model	fitted scape model.
together	whether gears should be plotted in one panel.
series	vector of strings indicating which gears or surveys should be plotted (all by default).
sex	string indicating which sex should be plotted (both by default).
axes	whether axis values should be plotted.
legend	legend location: "bottom", "left", "top", "right", or "" to suppress legend.
main	main title.
xlab	x-axis label.
ylab	y-axis label.
cex.main	size of main title.
cex.legend	size of legend text.
cex.lab	size of axis labels.
cex.strip	size of strip labels.

<code>cex.axis</code>	size of tick labels.
<code>las</code>	orientation of tick labels: 0=parallel, 1=horizontal, 2=perpendicular, 3=vertical.
<code>tck</code>	tick mark length.
<code>tick.number</code>	number of tick marks.
<code>lty.grid</code>	line type of gridlines.
<code>col.grid</code>	colour of gridlines.
<code>pch</code>	symbol for points.
<code>cex.points</code>	size of points.
<code>col.points</code>	colour of points.
<code>lty.lines</code>	line type of main lines, possibly a vector.
<code>lwd.lines</code>	line width of main lines, possibly a vector.
<code>col.lines</code>	colour of main lines, possibly a vector.
<code>plot</code>	whether to draw plot.
<code>...</code>	passed to <code>xyplot</code> , <code>panel.points</code> , <code>panel.lines</code> , and <code>panel.superpose</code> .

**Value**

When `plot=TRUE`, a trellis plot is drawn and a data frame is returned, containing the data used for plotting. When `plot=FALSE`, a trellis object is returned.

**Note**

This function tries to draw the plot on a trellis device with a white background.

The `Args` function from the **gdata** package is recommended for reviewing the arguments, instead of `args`.

**Author(s)**

Arni Magnusson <arnima@u.washington.edu>.

**See Also**

[Lattice](#), [xyplot](#), [panel.points](#), [panel.lines](#), [panel.superpose](#).  
[scape-package](#) gives an overview of the package.

**Examples**

```
plotSel(x.ling, xlab="Age", ylab="Selectivity and maturity")

plotSel(x.cod, together=TRUE, xlab="Age\n", ylab="Selectivity",
        pch=NA, col.lines=c("seagreen", "salmon"), strip=FALSE)
```

---

 x.cod

*Cod Assessment*


---

**Description**

Stock assessment data and model fit for cod (*Gadus morhua*) in Icelandic waters, using a Coleraine statistical catch-at-age model.

This is a single-sex model with 10 age classes, the catch data starting in 1971 and ending in 2003. The model was fitted to three data components: survey abundance index, commercial catch at age, and survey catch at age.

**Usage**

x.cod

**Format**

List of class `scape` containing:

N	predicted numbers at age
B	predicted biomass, recruitment, and observed landings (year things)
Sel	predicted selectivity and observed maturity (age things)
Dev	predicted recruitment deviates from the stock-recruitment curve
Survey	survey abundance index and fit
CAC	commercial C@A (catch at age) and fit
CAS	survey C@A and fit

**Details**

A maturity vector of zeros and ones was used to predict the biomass of age 4 and older, the quantity of main interest for the management of this stock.

Estimated parameters: R0, Rinit, uinit, Sleft[commercial], Sfull[c], Sleft[survey], Sfull[s], q, and 41 recruitment deviates.

**Note**

The list was imported from the file ‘`scape/example/cod.res`’ using `importCol`.

The functions `ll` (package **gdata**) and `head` are recommended for browsing model results, e.g. `ll(x.cod)`; `ll(x.cod$N)`; `head(x.cod$N)`.

**Source**

Marine Research Institute. 2003. *State of marine stocks in Icelandic waters 2002/2003*. Available at <http://www.hafro.is/Astand/2003/astand-allt-03.pdf>.

## References

Hilborn, R., M. Maunder, A. Parma, B. Ernst, J. Payne, and P. Starr. 2003. *Coleraine: A generalized age-structured stock assessment model*. User's manual version 2.0. University of Washington Report SAFS-UW-0116. Available at <http://fish.washington.edu/research/coleraine/coleraine.pdf>.

Magnusson, A. 2003. *Coleraine assessment of the Icelandic cod stock*. Report for the Icelandic Marine Research Institute. Available from the author.

## See Also

[importCol](#), [x.ling](#), [x.oreo](#), [x.sbw](#).

[scape-package](#) gives an overview of the package.

## Examples

```
plotB(x.cod)
plotCA(x.cod, "c")
plotCA(x.cod, "s")
plotIndex(x.cod, "s")
plotN(x.cod)
plotSel(x.cod)
```

---

x.ling

*Ling Assessment*

---

## Description

Stock assessment data and model fit for ling (*Genypterus blacodes*) in New Zealand waters, using a Coleraine statistical catch-at-age model.

This is a two-sex model with 30 age classes and 29 length classes, the catch data starting in 1973 and ending in 2000. The model was fitted to five data components: longline abundance index, survey abundance index, survey catch at age, longline catch at length, and trawl catch at length.

## Usage

```
x.ling
```

## Format

List of class `scape` containing:

N	predicted numbers at age
B	predicted biomass, recruitment, and observed landings (year things)
Sel	predicted selectivity and observed maturity (age things)
Dev	predicted recruitment deviates from the stock-recruitment curve
CPUE	commercial abundance index and fit
Survey	survey abundance index and fit
CAs	survey C@A (catch at age) and fit
CLc	commercial C@L (catch at length) and fit

## Details

Estimated parameters: R0, Rinit, Sleft[trawl], Sfemal[e][t], Smal[e][t], Sright[t], Sleft[longline], Sfemal[e][l], Smal[e][l], Sright[l], Sleft[survey], Sfemal[e][s], Smal[e][s], Sright[s], q[l], q[s], and 29 recruitment deviates.

## Note

The list was imported from the file ‘scape/example/ling.res’ using `importCol`.

The functions `ll` (package **gdata**) and `head` are recommended for browsing model results, e.g. `ll(x.ling)`; `ll(x.ling$N)`; `head(x.ling$N)`.

## Source

Annala, J.H., K.J. Sullivan, C.J. O’Brien, and N.W.M. Smith. (eds.) 2001. *Report from the Fishery Assessment Plenary: Stock assessments and yield estimates*. Wellington: NIWA. Available from NIWA library, Wellington.

## References

Hilborn, R., M. Maunder, A. Parma, B. Ernst, J. Payne, and P. Starr. 2003. *Coleraine: A generalized age-structured stock assessment model*. User’s manual version 2.0. University of Washington Report SAFS-UW-0116. Available at <http://fish.washington.edu/research/coleraine/coleraine.pdf>.

Magnusson, A. 2001. *SeaFIC assessment of Chatham Rise ling (LIN 3 and 4)*. Middle Depths Working Group Doc. 11. Report for the New Zealand Ministry of Fisheries. Available from the author.

## See Also

[importCol](#), [x.cod](#), [x.oreo](#), [x.sbw](#).

[scape-package](#) gives an overview of the package.

## Examples

```
plotB(x.ling)
plotCA(x.ling, "s")
plotCL(x.ling, "c", series="1")
plotCL(x.ling, "c", series="2")
plotIndex(x.ling, "c")
plotIndex(x.ling, "s")
plotN(x.ling)
plotSel(x.ling)
```

---

x.oreo

*Oreo Assessment*


---

**Description**

Stock assessment data and model fit for smooth oreo (*Pseudocyttus maculatus*) in New Zealand waters, using a Coleraine statistical catch-at-age model.

This is a two-sex model with 80 age classes and 44 length classes, the catch data starting in 1979 and ending in 2001. The model was fitted to seven data components: pre-GPS commercial abundance index, post-GPS commercial abundance index, survey abundance index, commercial catch at length, survey catch at length, female length at age, and male length at age.

**Usage**

```
x.oreo
```

**Format**

List of class `scape` containing:

N	predicted numbers at age
B	predicted biomass, recruitment, and observed landings (year things)
Sel	predicted selectivity and observed maturity (age things)
CPUE	commercial abundance index and fit
Survey	survey abundance index and fit
CLc	commercial C@L (catch at length) and fit
CLs	survey C@L and fit
LA	observed L@A (length at age)

**Details**

Since relatively few smooth oreo individuals have been aged, this assessment admits uncertainty about the von Bertalanffy growth curve, which is estimated for each sex. The acoustic survey abundance estimate is considered absolute, so `q[survey]` is fixed at 1.

Estimated parameters: `R0`, `Sfull[commercial]`, `Sfull[survey]`, `q[pre-GPS]`, `q[post-GPS]`, `L80female`, `L80male`, `Kfemale`, `Kmale`, `CVfemale`, and `CVmale`.

**Note**

The list was imported from the files `'scape/example/oreo.res'`, `'oreo.txt'`, and `'l_at_age.dat'` using `importCol`.

The functions `ll` (package **gdata**) and `head` are recommended for browsing model results, e.g. `ll(x.oreo)`; `ll(x.oreo$N)`; `head(x.oreo$N)`.

## Source

Annala, J.H., K.J. Sullivan, C.J. O'Brien, N.W.M. Smith, and S.M. Grayling (eds.) 2003. *Report from the Fishery Assessment Plenary: Stock assessments and yield estimates*. Wellington: Ministry of Fisheries. Available from NIWA library, Wellington.

## References

Hilborn, R., M. Maunder, A. Parma, B. Ernst, J. Payne, and P. Starr. 2003. *Coleraine: A generalized age-structured stock assessment model*. User's manual version 2.0. University of Washington Report SAFS-UW-0116. Available at <http://fish.washington.edu/research/coleraine/coleraine.pdf>.

Magnusson, A. 2003. *Stock assessment of Chatham Rise smooth oreo (SSO4)*. Deepwater Working Group Doc. 16. Report for the New Zealand Ministry of Fisheries. Available from the author.

## See Also

[importCol](#), [x.cod](#), [x.ling](#), [x.sbw](#).

[scape-package](#) gives an overview of the package.

## Examples

```
plotB(x.oreo)
plotCL(x.oreo, "c")
plotCL(x.oreo, "s")
plotIndex(x.oreo, "c")
plotIndex(x.oreo, "s")
plotLA(x.oreo)
plotN(x.oreo)
plotSel(x.oreo)
```

---

x.sbw

*Whiting Assessment*

---

## Description

Stock assessment data and model fit for southern blue whiting (*Micromesistius australis*) in New Zealand waters, using a Coleraine statistical catch-at-age model.

This is a single-sex model with 11 age classes, the catch data starting in 1979 and ending in 2002. The model was fitted to two data components: survey abundance index and commercial catch at age.

## Usage

```
x.sbw
```

## Format

List of class `scape` containing:

N	predicted numbers at age
B	predicted biomass, recruitment, and observed landings (year things)
Sel	predicted selectivity and observed maturity (age things)
Dev	predicted recruitment deviates from the stock-recruitment curve
Survey	survey abundance index and fit
CAC	commercial C@A (catch at age) and fit

### Details

The survey abundance index was preprocessed so that it contains only age 4 and older.

Estimated parameters: R0, Rinit, Rplus, Sleft[commercial], Sfull[c], q, and 33 recruitment deviates.

### Note

The list was imported from the file 'scape/example/sbw.res' using `importCol`.

The functions `ll` (package **gdata**) and `head` are recommended for browsing model results, e.g. `ll(x.sbw)`; `ll(x.sbw$N)`; `head(x.sbw$N)`.

### Source

Annala, J.H., K.J. Sullivan, C.J. O'Brien, N.W.M. Smith, and S.M. Grayling (eds.) 2003. *Report from the Fishery Assessment Plenary: Stock assessments and yield estimates*. Wellington: Ministry of Fisheries. Available from NIWA library, Wellington.

### References

Hilborn, R., M. Maunder, A. Parma, B. Ernst, J. Payne, and P. Starr. 2003. *Coleraine: A generalized age-structured stock assessment model*. User's manual version 2.0. University of Washington Report SAFS-UW-0116. Available at <http://fish.washington.edu/research/coleraine/coleraine.pdf>.

Magnusson, A. and R. Hilborn. 2004. *What is it in fisheries data that tells us about population abundance?* Poster presented at the 4th World Fisheries Congress, Vancouver, BC. Available from the author.

### See Also

[importCol](#), [x.cod](#), [x.ling](#), [x.oreo](#).

[scape-package](#) gives an overview of the package.

### Examples

```
plotB(x.sbw)
plotCA(x.sbw, "c")
plotIndex(x.sbw, "s")
plotN(x.sbw)
plotSel(x.sbw)
```

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