

Package ‘ypr’

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Version 0.3.0

Title Yield Per Recruit

Description An implementation of equilibrium-based yield per recruit methods.
Yield per recruit methods can used to estimate the optimal yield for a fish population.
The yield can be based on the number of fish caught (or harvested) or
biomass caught for all fish or just large (trophy) individuals.

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URL <https://github.com/poissonconsulting/ypr>

BugReports <https://github.com/poissonconsulting/ypr/issues>

Depends R (>= 3.4.0)

Imports checkr, ggplot2, graphics, scales, stats, tools,

Suggests covr, testthat, tibble, knitr, rmarkdown, tidy

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LazyData true

ByteCompile true

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 adams_bt_03

Adams Lake Bull Trout Population Parameters

Description

The population parameters for Bull Trout in Adams Lake from Bison et al (2003)

Usage

```
adams_bt_03
```

Format

An object of class `ypr_population`.

References

Bison, R., O'Brien, D., and Martell, S.J.D. 2003. An Analysis of Sustainable Fishing Options for Adams Lake Bull Trout Using Life History and Telemetry Data. BC Ministry of Water Land and Air Protection, Kamloops, B.C.

Examples

```
adams_bt_03
ypr_plot_yield(adams_bt_03)
```

chilliwack_bt_05	<i>Chilliwack Lake Bull Trout Populations Parameters</i>
------------------	--

Description

The populations parameters for Bull Trout in Chilliwack Lake from Taylor (2005)

Usage

```
chilliwack_bt_05
```

Format

An object of class `ypr_populations`.

References

Taylor, J.L. 2005. Sustainability of the Chilliwack Lake Char Fishery. Ministry of Water, Land and Air Protection, Surrey, B.C.

Examples

```
chilliwack_bt_05
yield <- ypr_tabulate_yield(chilliwack_bt_05, type = "optimal")
yield$pi <- round(yield$pi, 2)
yield <- yield[c("Llo", "Hm", "Rk", "pi")]
yield <- tidyr::spread(yield, Rk, pi)
yield <- yield[order(-yield$Hm),]
yield

## Not run:
```

```
ypr_plot_yield(chilliwack_bt_05, plot_values = FALSE) +  
  ggplot2::facet_grid(Rk~Hm) +  
  ggplot2::aes(group = Llo, linetype = Llo)  
  
## End(Not run)
```

kootenay_bt_13

Kootenay Lake Bull Trout Population Parameters (2013)

Description

The population parameters for Bull Trout in Kootenay Lake from Andrusak and Thorley (2013)

Usage

```
kootenay_bt_13
```

Format

An object of class `ypr_population`.

Details

The estimates should not be used for management.

References

Andrusak, G.F., and Thorley, J.L. 2013. Kootenay Lake Exploitation Study: Fishing and Natural Mortality of Large Rainbow Trout and Bull Trout: 2013 Annual Report. A Poisson Consulting Ltd. and Redfish Consulting Ltd. Report, Habitat Conservation Trust Foundation, Victoria, BC.

Examples

```
kootenay_bt_13  
ypr_plot_yield(kootenay_bt_13)
```

`kootenay_rb`*Kootenay Lake Rainbow Trout Population Parameters*

Description

The population parameters for Rainbow Trout in Kootenay Lake.

Usage

```
kootenay_rb
```

Format

An object of class `ypr_population`.

Details

The estimates are liable to change and should not be used for management.

References

Thorley, J.L., and Andrusak, G.F. 2017. The fishing and natural mortality of large, piscivorous Bull Trout and Rainbow Trout in Kootenay Lake, British Columbia (2008–2013). PeerJ 5: e2874. doi:10.7717/peerj.2874.

Examples

```
kootenay_rb  
ypr_plot_yield(kootenay_rb)
```

`kootenay_rb_13`*Kootenay Lake Rainbow Trout Population Parameters (2013)*

Description

The population parameters for Rainbow Trout in Kootenay Lake from Andrusak and Thorley (2013)

Usage

```
kootenay_rb_13
```

Format

An object of class `ypr_population`.

Details

The estimates should not be used for management.

References

Andrusak, G.F., and Thorley, J.L. 2013. Kootenay Lake Exploitation Study: Fishing and Natural Mortality of Large Rainbow Trout and Bull Trout: 2013 Annual Report. A Poisson Consulting Ltd. and Redfish Consulting Ltd. Report, Habitat Conservation Trust Foundation, Victoria, BC.

See Also

[kootenay_rb](#)

Examples

```
kootenay_rb_13
ypr_plot_yield(kootenay_rb_13)
```

plot.ypr_population *Plot Population Schedule*

Description

Plot Population Schedule

Usage

```
## S3 method for class 'ypr_population'
plot(x, type = "b", ...)
```

Arguments

x	The population to plot.
type	1-character string giving the type of plot desired. The following values are possible, for details, see plot : "p" for points, "l" for lines, "b" for both points and lines, "c" for empty points joined by lines, "o" for overplotted points and lines, "s" and "S" for stair steps and "h" for histogram-like vertical lines. Finally, "n" does not produce any points or lines.
...	Additional arguments passed to graphics::plot.formula functions.

Value

An invisible copy of the original object.

See Also

[ypr_population](#) and [ypr_schedule](#)

Examples

```
## Not run:  
plot(ypr_population())  
  
## End(Not run)
```

quesnel_bt

Quesnel Lake Bull Trout Population Parameters

Description

The population parameters for Bull Trout in Quesnel Lake, BC.

Usage

```
quesnel_bt
```

Format

An object of class `ypr_population`.

Details

The estimates are liable to change and should not be used for management.

Examples

```
quesnel_bt  
ypr_plot_yield(quesnel_bt)
```

quesnel_lt

Quesnel Lake Rainbow Trout Population Parameters

Description

The population parameters for Rainbow Trout in Quesnel Lake, BC.

Usage

```
quesnel_lt
```

Format

An object of class `ypr_population`.

Details

The estimates are liable to change and should not be used for management.

Examples

```
quesnel_lt  
ypr_plot_yield(quesnel_lt)
```

quesnel_rb	<i>Quesnel Lake Lake Trout Population Parameters</i>
------------	--

Description

The population parameters for Lake Trout in Quesnel Lake, BC.

Usage

```
quesnel_rb
```

Format

An object of class [ypr_population](#).

Details

The estimates are liable to change and should not be used for management.

Examples

```
quesnel_rb  
ypr_plot_yield(quesnel_rb)
```

ypr_detabulate_parameters	<i>Detabulate Parameters</i>
---------------------------	------------------------------

Description

Detabulate Parameters

Usage

```
ypr_detabulate_parameters(x)
```

Arguments

x A data frame with columns `Parameter` and `Value` specifying one or more parameters and their values.

Value

An object of class `ypr_population`

See Also

[ypr_population](#)

Examples

```
ypr_detabulate_parameters(ypr_tabulate_parameters(ypr_population()))
```

ypr_exploitation	<i>Exploitation Probability</i>
------------------	---------------------------------

Description

Converts capture probabilities into exploitation probabilities based on the release and handling mortality probabilities where the probability of exploitation includes handling mortalities. The calculation assumes that a released fish cannot be recaptured in the same year.

Usage

```
ypr_exploitation(population, pi = population$pi)
```

Arguments

population An object of class `ypr_population`.
 pi A vector of capture probabilities to calculate the exploitation probabilities for.

Details

In the case of no release (or 100 is identical to the capture probability. Otherwise it is less.

Value

A vector of exploitation probabilities.

See Also

[ypr_population](#)

Examples

```
ypr_exploitation(ypr_population(pi = 0.4))
ypr_exploitation(ypr_population(pi = 0.4, rho = 0.6, Hm = 0.2))
```

ypr_inst2inter *Instantaneous to Interval Mortality*

Description

Instantaneous to Interval Mortality

Usage

```
ypr_inst2inter(x)
```

Arguments

x A numeric vector of instantaneous mortality rates.

Value

A numeric vector of corresponding interval mortality rates.

Examples

```
ypr_inst2inter(c(0,0.2,3))
```

ypr_inter2inst *Interval to Instantaneous Mortality*

Description

Interval to Instantaneous Mortality

Usage

```
ypr_inter2inst(x)
```

Arguments

x A numeric vector of interval mortality rates.

Value

A numeric vector of corresponding instantaneous mortality rates.

Examples

```
ypr_inter2inst(c(0,0.5,0.99,1))
```

ypr_optimize	<i>Optimize Capture</i>
--------------	-------------------------

Description

Finds the interval annual capture probability (π) that maximises the yield for a given population.

Usage

```
ypr_optimize(population, Ly = 0, harvest = TRUE, biomass = FALSE)
```

Arguments

population	An object of class ypr_population .
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.

Value

The interval annual capture probability (π) that maximises the yield.

See Also

[ypr_population](#) and [ypr_yield](#)

Examples

```
ypr_optimize(ypr_population())
```

ypr_plot_fish	<i>Plot Fish</i>
---------------	------------------

Description

Produces a frequency histogram of the number of fish in the 'Surviving', 'Spawning', 'Caught', 'Harvested' or 'Released' categories by 'Length', 'Age' or 'Weight' class.

Usage

```
ypr_plot_fish(population, x = "Age", y = "Surviving", binwidth = 1L,  
color = NULL)
```

Arguments

population	An object of class ypr_population .
x	A string of the term on the x-axis.
y	A string of the term on the y-axis.
binwidth	A positive integer of the width of the bins for grouping.
color	A string of the color around each bar (or NULL).

Value

A ggplot2 object.

See Also

[ypr_population](#) and [geom_histogram](#)

Examples

```
ypr_plot_fish(ypr_population(), color = "white")
```

ypr_plot_schedule *Plot Population Schedule Terms*

Description

Produces a bivariate line plot of two schedule terms.

Usage

```
ypr_plot_schedule(population, x = "Age", y = "Length")
```

Arguments

population	An object of class ypr_population .
x	A string of the term on the x-axis.
y	A string of the term on the y-axis.

Value

A ggplot2 object.

See Also

[ypr_population](#) and [ypr_schedule](#)

Examples

```
ypr_plot_schedule(ypr_population())
```

ypr_plot_sr *Plot Stock-Recruitment Curve*

Description

Plot Stock-Recruitment Curve

Usage

```
ypr_plot_sr(population, Ly = 0, harvest = TRUE, biomass = FALSE,
             plot_values = TRUE)
```

Arguments

population	An object of class ypr_population .
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
plot_values	A flag indicating whether to plot the actual and optimal values.

Value

A ggplot2 object.

See Also

[ypr_population](#) and [ypr_sr](#)

Examples

```
ypr_plot_sr(ypr_population(Rk = 10))
ypr_plot_sr(ypr_population(Rk = 10, BH = 0L))
```

ypr_plot_yield *Plot Yield by Capture*

Description

Plots the 'Yield', 'Age', 'Length', 'Weight', 'Effort', or 'YPUE' by the annual interval capture probability.

Usage

```
ypr_plot_yield(object, ...)
```

Arguments

object The populations or populations.
 ... Unused parameters.

Value

A ggplot2 object.

See Also

[ypr_population](#) and [ypr_yields](#)

Examples

```
ypr_plot_yield(ypr_population())
```

```
ypr_plot_yield.ypr_population
```

Plot Yield by Exploitation/Capture Probability

Description

Plots the 'Yield', 'Age', 'Length', 'Weight', 'Effort', or 'YPUE' by the annual interval exploitation/capture probability.

Usage

```
## S3 method for class 'ypr_population'
ypr_plot_yield(object, y = "Yield",
  pi = seq(0, 1, length.out = 100), Ly = 0, harvest = TRUE,
  biomass = FALSE, u = harvest, plot_values = TRUE, ...)
```

Arguments

object The populations or populations.
 y A string of the term on the y-axis.
 pi A vector of probabilities of capture to calculate the yield for.
 Ly The minimum length (trophy) fish to consider when calculating the yield.
 harvest A flag indicating whether to calculate the yield for harvested fish or captures.
 biomass A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
 u A flag indicating whether to plot the exploitation rate as opposed to the capture rate.
 plot_values A flag indicating whether to plot the actual and optimal values.
 ... Unused parameters.

Value

A ggplot2 object.

See Also

[ypr_population](#) and [ypr_yields](#)

Examples

```
ypr_plot_yield(ypr_population())
```

```
ypr_plot_yield.ypr_populations
```

Plot Yield by Exploitation/Capture Probability

Description

Plots the 'Yield', 'Age', 'Length', 'Weight', 'Effort', or 'YPUE' by the annual interval exploitation/capture probability.

Usage

```
## S3 method for class 'ypr_populations'
ypr_plot_yield(object, y = "Yield",
  pi = seq(0, 1, length.out = 100), Ly = 0, harvest = TRUE,
  biomass = FALSE, u = harvest, plot_values = TRUE, ...)
```

Arguments

object	The populations or populations.
y	A string of the term on the y-axis.
pi	A vector of probabilities of capture to calculate the yield for.
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
u	A flag indicating whether to plot the exploitation rate as opposed to the capture rate.
plot_values	A flag indicating whether to plot the actual and optimal values.
...	Unused parameters.

Value

A ggplot2 object.

See Also

[ypr_populations](#) and [ypr_yields](#)

Examples

```
## Not run:
ypr_plot_yield(ypr_populations(Rk = c(2.5, 4.6), Llo = c(0, 60)), plot_values = FALSE) +
  ggplot2::facet_wrap(~Llo) +
  ggplot2::aes_string(group = "Rk", color = "Rk") +
  ggplot2::scale_color_manual(values = c("black", "blue"))

ypr_plot_yield(ypr_populations(Rk = c(2.5, 4.6), Llo = c(0, 60))) +
  ggplot2::facet_grid(Rk~Llo)

## End(Not run)
```

ypr_population	<i>Population Parameters</i>
----------------	------------------------------

Description

Generates an object of class `ypr_population`.

Usage

```
ypr_population(tmax = 20L, k = 0.15, Linf = 100, t0 = 0, Wb = 3,
  Ls = Linf/2, Sp = 100, es = 1, Sm = 0, fb = 1, tR = 1L,
  BH = 1L, Rk = 3, M = 0.2, Mb = 0, Lv = Linf/2, Vp = 100,
  Llo = 0, Lup = Linf, Nc = 0, pi = 0.2, rho = 0, Hm = 0,
  Rmax = 1, A0 = 0, Wa = 0.01, fa = 1, q = 0.1)
```

Arguments

<code>tmax</code>	The maximum age (yr).
<code>k</code>	The VB growth coefficient (per yr).
<code>Linf</code>	The VB mean maximum length (cm).
<code>t0</code>	The (theoretical) age at zero length (yr).
<code>Wb</code>	The weight (as a function of length) scaling exponent.
<code>Ls</code>	The length at which 50% mature (cm).
<code>Sp</code>	The maturity (as a function of length) power.
<code>es</code>	The annual probability of a mature fish spawning.
<code>Sm</code>	The spawning mortality probability.
<code>fb</code>	The fecundity (as a function of weight) scaling exponent.
<code>tR</code>	The age from which survival is density-independent (yr).

BH	Recruitment follows a Beverton-Holt (1) or Ricker (0) relationship.
RK	The spawners per spawner or if less than 1 the egg to age tR survival at low density.
M	The instantaneous mortality rate (per yr).
Mb	The instantaneous mortality rate (as a function of length) scaling exponent.
Lv	The length at which 50% vulnerable to harvest (cm).
Vp	The vulnerability to harvest (as a function of length) power.
Llo	The lower harvest slot length (cm).
Lup	The upper harvest slot length (cm).
Nc	The slot limits non-compliance probability.
pi	The annual capture probability.
rho	The release probability.
Hm	The hooking mortality probability.
Rmax	The number of recruits at the carrying capacity (ind).
A0	The initial post age tR density independent mortality probability.
Wa	The (extrapolated) weight of a 1 cm individual (g).
fa	The (theoretical) fecundity of a 1 g female (eggs).
q	The catchability (annual probability of capture) for a unit of effort.

Value

An object of class `ypr_population`.

See Also

[ypr_population_update](#), [ypr_schedule](#), [ypr_yield](#) and [ypr_optimize](#).

Examples

```
ypr_population(k = 0.1, Linf = 90)
```

`ypr_populations`

Populations

Description

Populations

Usage

```
ypr_populations(...)
```

Arguments

... One or more of the arguments from `ypr_population()`.

Value

A list of `ypr_population` objects

See Also

[ypr_population](#)

Examples

```
ypr_populations(Rk = c(2.5, 4.6), Hm = c(0.2, 0.05))
```

`ypr_population_update` *Update Population Parameters*

Description

Updates an object of class `ypr_population`.

Usage

```
ypr_population_update(population, ...)
```

Arguments

`population` An object of class `ypr_population`
... One or more of the arguments from `ypr_population()`.

Value

An object of class `ypr_population`.

See Also

[ypr_population](#)

Examples

```
ypr_population_update(ypr_population(), Rk = 2.5)
```

ypr_report	<i>Report</i>
------------	---------------

Description

Creates an Rmd file that can be used to generate a report.

Usage

```
ypr_report(population, title = "Population Report", date = Sys.Date(),  
           file = "report.Rmd")
```

Arguments

population	An object of class ypr_population .
title	A string of the report title.
date	A date of the report date.
file	A string of the file name.

Value

An invisible character vector of the contents of the file.

Examples

```
## Not run:  
cat(ypr_report(ypr_population(), file = tempfile()), sep = "\n")  
  
## End(Not run)
```

ypr_schedule	<i>Life-History Schedule</i>
--------------	------------------------------

Description

Generates the life-history schedule by age for a population.

Usage

```
ypr_schedule(population)
```

Arguments

population	An object of class ypr_population .
------------	---

Details

If the tibble package is available it returns a tibble.

Value

A data frame (or tibble) of the life-history schedule by age.

See Also

[ypr_population](#)

Examples

```
ypr_schedule(ypr_population())
```

ypr_sr	<i>Stock-Recruitment Parameters</i>
--------	-------------------------------------

Description

Returns a single rowed data frame of the SR parameters:

alpha Survival from egg to age tR at low density

beta Density-dependence

Rk Spawners per spawner at low density

phi Eggs deposited at unfished equilibrium

phiF Eggs deposited at the fished equilibrium

R0 Age tR recruits at the unfished equilibrium

R0F Age tR recruits at the fished equilibrium

S0 Spawners at the unfished equilibrium

S0F spawners at the fished equilibrium

Usage

```
ypr_sr(population)
```

Arguments

population An object of class [ypr_population](#).

Value

A data frame of the SR parameters.

Examples

```
ypr_sr(ypr_population()) # Beverton-Holt
ypr_sr(ypr_population(BH = 0L)) # Ricker
```

ypr_tabulate_fish *Table Fish*

Description

Produces a data frame of the number of fish in the 'Surviving', 'Spawning', 'Caught', 'Harvested', 'Released' and 'HandlingMortality' categories by 'Length', 'Age' or 'Weight' class.

Usage

```
ypr_tabulate_fish(population, x = "Age", binwidth = 1L)
```

Arguments

population	An object of class ypr_population .
x	A string of the term on the x-axis.
binwidth	A positive integer of the width of the bins for grouping.

Value

A data frame

See Also

[ypr_population](#) and [ypr_plot_fish](#)

Examples

```
ypr_tabulate_fish(ypr_population())
```

ypr_tabulate_parameters
Population Parameters

Description

Population Parameters

Usage

```
ypr_tabulate_parameters(population)
```

Arguments

population	An object of class ypr_population .
------------	---

Value

A table of population parameters

See Also

[ypr_population](#)

Examples

```
ypr_tabulate_parameters(ypr_population())
```

ypr_tabulate_sr	<i>Stock-Recruitment Parameters</i>
-----------------	-------------------------------------

Description

Stock-Recruitment Parameters

Usage

```
ypr_tabulate_sr(object, ...)
```

Arguments

object	The populations or populations.
...	Unused parameters.

Value

A table of stock-recruitment parameters.

Examples

```
ypr_tabulate_sr(ypr_population()) # Beverton-Holt  
ypr_tabulate_sr(ypr_population(BH = 0L)) # Ricker
```

```
ypr_tabulate_sr.ypr_population
      Stock-Recruitment Parameters
```

Description

Stock-Recruitment Parameters

Usage

```
## S3 method for class 'ypr_population'
ypr_tabulate_sr(object, Ly = 0,
  harvest = TRUE, biomass = FALSE, all = FALSE, ...)
```

Arguments

object	The populations or populations.
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
all	A flag indicating whether to include all parameter values.
...	Unused parameters.

Value

A data frame of stock-recruitment parameters.

Examples

```
ypr_tabulate_sr(ypr_population()) # Beverton-Holt
ypr_tabulate_sr(ypr_population(BH = 0L)) # Ricker
```

```
ypr_tabulate_sr.ypr_populations
      Stock-Recruitment Parameters
```

Description

Stock-Recruitment Parameters

Usage

```
## S3 method for class 'ypr_populations'
ypr_tabulate_sr(object, Ly = 0,
  harvest = TRUE, biomass = FALSE, all = FALSE, ...)
```

Arguments

object	The populations or populations.
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
all	A flag indicating whether to include all parameter values.
...	Unused parameters.

Value

A table of stock-recruitment parameters.

Examples

```
ypr_tabulate_sr(ypr_populations(Rk = c(2.5, 4.6)))
```

`ypr_tabulate_yield` *Tabulate Yield*

Description

Tabulate Yield

Usage

```
ypr_tabulate_yield(object, ...)
```

Arguments

object	The populations or populations.
...	Unused parameters.

Value

A data frame.

See Also

[ypr_population](#), [ypr_populations](#) and [ypr_yield](#)

Examples

```
ypr_tabulate_yield(ypr_population())
```

ypr_tabulate_yield.ypr_population
Tabulate Yield

Description

Tabulate Yield

Usage

```
## S3 method for class 'ypr_population'  
ypr_tabulate_yield(object, Ly = 0,  
  harvest = TRUE, biomass = FALSE, type = "both", all = FALSE, ...)
```

Arguments

object	The populations or populations.
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
type	A string indicating whether to include 'both' or just the 'actual' or 'optimal' yield.
all	A flag indicating whether to include all parameter values.
...	Unused parameters.

Value

A data frame.

See Also

[ypr_population](#) and [ypr_yield](#)

Examples

```
ypr_tabulate_yield(ypr_population())
```

ypr_tabulate_yield.ypr_populations
Tabulate Yield

Description

Tabulate Yield

Usage

```
## S3 method for class 'ypr_populations'  
ypr_tabulate_yield(object, Ly = 0,  
  harvest = TRUE, biomass = FALSE, type = "both", all = FALSE, ...)
```

Arguments

object	The populations or populations.
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
type	A string indicating whether to include 'both' or just the 'actual' or 'optimal' yield.
all	A flag indicating whether to include all parameter values.
...	Unused parameters.

Value

A data frame.

See Also

[ypr_population](#) and [ypr_yield](#)

Examples

```
ypr_tabulate_yield(ypr_populations(Rk = c(3,5)))
```

ypr_tabulate_yields *Tabulate Yields*

Description

Tabulate Yields

Usage

```
ypr_tabulate_yields(object, ...)
```

Arguments

object	The populations or populations.
...	Unused parameters.

Value

A data frame.

See Also

[ypr_population](#), [ypr_populations](#) and [ypr_yields](#)

Examples

```
ypr_tabulate_yields(ypr_population())
```

ypr_tabulate_yields.ypr_population
Tabulate Yields

Description

Tabulate Yields

Usage

```
## S3 method for class 'ypr_population'  
ypr_tabulate_yields(object, pi = seq(0, 1,  
  length.out = 100), Ly = 0, harvest = TRUE, biomass = FALSE,  
  all = FALSE, ...)
```

Arguments

object	The populations or populations.
pi	A vector of probabilities of capture to calculate the yield for.
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
all	A flag indicating whether to include all parameter values.
...	Unused parameters.

Value

A data frame.

See Also

[ypr_population](#) and [ypr_yields](#)

Examples

```
ypr_tabulate_yields(ypr_population())
```

```
ypr_tabulate_yields.ypr_populations
```

Tabulate Yields

Description

Tabulate Yields

Usage

```
## S3 method for class 'ypr_populations'
ypr_tabulate_yields(object, pi = seq(0, 1,
  length.out = 100), Ly = 0, harvest = TRUE, biomass = FALSE,
  all = FALSE, ...)
```

Arguments

object	The populations or populations.
pi	A vector of probabilities of capture to calculate the yield for.
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.
all	A flag indicating whether to include all parameter values.
...	Unused parameters.

Value

A data frame.

See Also

[ypr_population](#) and [ypr_yield](#)

Examples

```
ypr_tabulate_yields(ypr_populations(Rk = c(3,5)), pi = seq(0, 1, length.out = 10))
```

ypr_yield	<i>Yield</i>
-----------	--------------

Description

Calculates the yield for a population.

Usage

```
ypr_yield(population, Ly = 0, harvest = TRUE, biomass = FALSE)
```

Arguments

population	An object of class ypr_population .
Ly	The minimum length (trophy) fish to consider when calculating the yield.
harvest	A flag indicating whether to calculate the yield for harvested fish or captures.
biomass	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.

Details

By default, with $R_{max} = 1$ the number of individuals is the proportion of the recruits at the carrying capacity. If the yield is given in terms of the biomass (kg) then the scaling also depends on the value of W_a (g).

Value

The yield as number of fish or biomass.

See Also

[ypr_population](#) and [ypr_optimize](#)

Examples

```
ypr_yield(ypr_population())
```

`ypr_yields`*Yields*

Description

Calculates the yield(s) for a population based on one or more capture rates.

Usage

```
ypr_yields(population, pi = seq(0, 1, length.out = 100), Ly = 0,  
           harvest = TRUE, biomass = FALSE)
```

Arguments

<code>population</code>	An object of class <code>ypr_population</code> .
<code>pi</code>	A vector of probabilities of capture to calculate the yield for.
<code>Ly</code>	The minimum length (trophy) fish to consider when calculating the yield.
<code>harvest</code>	A flag indicating whether to calculate the yield for harvested fish or captures.
<code>biomass</code>	A flag indicating whether to calculate the yield in terms of the biomass versus number of individuals.

Value

A numeric vector of the yields.

See Also

[ypr_yield](#)

Examples

```
pi <- seq(0, 1, length.out = 30)  
plot(pi, ypr_yields(ypr_population(), pi), type = "l")
```

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