Package 'fishstat'

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Description The Food and Agriculture Organization of the United Nations (FAO) FishStat database is the leading source of global fishery and aquaculture statistics and provides unique information for sector analysis and monitoring. This package provides the global production data from all fisheries and aquaculture in R format, ready for analysis.

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URL https://www.fao.org/fishery/en/fishstat, https://github.com/sofia-taf/fishstat

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`fishstat-package` *Global Fishery and Aquaculture Statistics*

Description

The Food and Agriculture Organization of the United Nations (FAO) FishStat database is the leading source of global fishery and aquaculture statistics and provides unique information for sector analysis and monitoring.

This package provides the global production data from all fisheries and aquaculture in R format, ready for analysis.

Details

Production tables:

`aquaculture`	aquaculture production
`capture`	capture production
`production`	aquaculture and capture production

Lookup tables:

`area`	fishing areas
`country`	countries and territories
`environment`	aquaculture environments
`measure`	units of measurement
`source`	sources of production
`species`	taxonomic groups
`status`	status of data entries

Note

The data in the package were downloaded from the FAO data server and imported into R. The R package version indicates the version of FishStat data it includes. Column names have been simplified to facilitate quick exploration and plotting in R.

Production tables can be joined with lookup tables using the `merge` function, as demonstrated in the help page examples for production tables. The column names in the R package have been designed

to allow automatic inference of which columns to join, and the resulting table will have unique column names.

To achieve a small memory footprint and fast computations, one can filter or aggregate rows and select columns of interest before joining tables, as demonstrated in the `capture` and `production` examples. On the other hand, for the sake of convenience, one can also construct a full table with all data records and all columns. The resulting table will have many rows and columns, but most computers will handle these without problems:

```
prod.all <- merge(merge(merge(merge(merge(merge(production,
                  area), country), measure), source), species), status)
cap.all <- merge(merge(merge(merge(merge(capture,
                 area), country), measure), species), status)
aqua.all <- merge(merge(merge(merge(merge(merge(aquaculture,
                  area), country), environment), measure), species), status)
```

When aggregating data, simple utility functions can be handy for tasks like rounding the sum of thousands/millions of tonnes:

```
sum3 <- function(x, digits=0) round(sum(x)/1e3, digits=digits)
sum6 <- function(x, digits=0) round(sum(x)/1e6, digits=digits)
aggregate(value~environment, aquaculture, sum6)
aggregate(value~area, capture, sum6, subset=measure=="Q_tlw", digits=1)
```

An effort has been made to describe each table in the corresponding R help page. However, the official and authoritative documentation of the FishStat database is found on the FAO FishStat website.

The example below demonstrates how the FishStat data can be used to produce an overview of global fisheries and aquaculture. The combination of FishStat and the R environment can also be very efficient for analyses that focus on selected areas, countries, species, and/or taxonomic groups.

Author(s)

Arni Magnusson and Rishi Sharma created this R package.

All credit for the FishStat database goes to the Statistics Team of the FAO Fisheries and Aquaculture Division, as well as national data submitters. The database terms of use are based on the CC BY-NC-SA 3.0 IGO license. The R package is released under a similar CC BY-NC-SA 4.0 license.

To cite the use of FishStat data:

FAO. [Year]. FishStat data. Fisheries and Aquaculture Division. Rome. https://www.fao.org/fishery/en/fishstat.

To cite the use of this R package to access the data, cite FishStat (above) as well as:

Magnusson, A. and R. Sharma. [Year]. fishstat: Global Fishery and Aquaculture Statistics. R package version [Version]. https://cran.r-project.org/package=fishstat.

See Also

Useful links:

- https://www.fao.org/fishery/en/fishstat
- https://github.com/sofia-taf/fishstat

Examples

```
head(production)

# Analyze production measured in tonnes
prod <- production[production$measure == "Q_tlw" & production$value > 0,]
prod <- merge(prod, species[c("species", "yearbook")])

# Select SOFIA species, excluding mammals, reptiles, and plants
prod <- prod[prod$yearbook ==
             "Aquatic animals (Fish, crustaceans and molluscs, etc.)",]

# Determine origin
prod <- merge(prod, area[c("area", "inlandmarine")])
prod$origin <- ifelse(prod$source == "CAPTURE", "Capture", "Aquaculture")
prod$w <- ifelse(prod$inlandmarine == "Marine areas", "marine", "inland")
prod$origin <- paste0(prod$origin, " (", prod$w, ")")

# World capture fisheries and aquaculture production
x <- xtabs(value~year+origin, aggregate(value~year+origin, prod, sum))
x <- x[,c(2,1,4,3)] / 1e6
library(areaplot)
areaplot(x, legend=TRUE, args.legend=list(x="topleft"), ylab="million tonnes")
```

---

aquaculture *Global Aquaculture Production*

Description

Aquaculture production quantity by species, area, country, and aquatic environment for the years 1950-2023, compiled and published by FAO (2025).

Usage

```
aquaculture
```

Format

Data frame containing eight columns:

species	species code
year	year
area	area code
country	country code
value	quantity in tonnes
measure	measure code
status	status code
environment	environment code

Details

This data frame contains the full set of 104,598 data records from the FishStat *Aquaculture Quantity* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Aquaculture Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/aquaculture

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
head(aquaculture)

# Add species columns
aqua <- merge(aquaculture, species)

# Top 10 aquaculture species in 2023, production in tonnes
x <- aggregate(value~species_name, aqua, sum, subset=year==2023)
x$value <- round(x$value)
head(x[order(-x$value),], 10)

# Total aquaculture production by major taxa since 1950, in million tonnes
aggregate(value~tolower(major), aqua, function(x) round(sum(x/1e6)))

# Annual aquaculture production of all animals
x <- aggregate(value~year, aqua, sum, subset=yearbook != "Aquatic plants")
plot(value/1e6~year, x, ylab="million tonnes", type="l")
title(main="Aquaculture production: All animals")
```

---

area *Areas*

Description

Major inland and marine fishing areas, defined by FAO (2025).

Usage

```
area
```

Format

Data frame containing five columns:

area	area code
area_name	area name
inlandmarine	inland or marine
faregion	northern, central, or southern (marine fishing areas)
ocean	Atlantic, Indian, Pacific, or Southern Ocean (marine fishing areas)

Details

This data frame contains the full set of 29 data records from the FishStat *Water Area Groups* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/global_production

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
head(area)

# Inland waters and marine areas
area[area$inlandmarine == "Inland waters", c("area", "area_name")]
area[area$inlandmarine == "Marine areas", c("area", "area_name")]

# Check if any area has zero production
nonzero <- unique(production$area[production$value > 0])
print(area[!(area$area %in% nonzero),], row.names=FALSE)

# Check which species groups are recorded in areas 98 and 99
species_98_99 <- unique(production$species[production$area %in% 98:99])
cbind(unique(species$isscaap[species$species %in% species_98_99]))

# Marine fishing areas in northern, central, and southern regions
area$area[area$faregion == "Northern regions"]
area$area[area$faregion == "Central regions"]
area$area[area$faregion == "Southern regions"]

# Examine one area
print.simple.list(area[area$area == 71,])
```

capture *Global Capture Production*

Description

Capture production quantity by species, area, and country for the years 1950-2023, compiled and published by FAO (2025).

Usage

```
capture
```

Format

Data frame containing seven columns:

species	species code
year	year
area	area code
country	country code
value	quantity in tonnes or number of individuals
measure	measure code
status	status code

Details

This data frame contains the full set of 1,055,015 data records from the FishStat *Capture Quantity* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Capture Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/capture

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
head(capture)

# Analyze catches measured in tonnes
cap <- aggregate(value~species+year, capture, sum, subset=measure=="Q_tlw")
cap <- merge(cap, species[c("species", "species_name", "major")])
```

```
# Top 10 capture species in 2023
x <- aggregate(value~species_name, cap, sum, subset=year==2023)
x$value <- round(x$value)
head(x[order(-x$value),], 10)

# Total capture production by major taxa since 1950, in million tonnes
x <- aggregate(value~tolower(major), cap, function(x) round(sum(x/1e6)))
x[x$value > 0,]

# Annual capture production of all aquatic animals
x <- aggregate(value~year, cap, sum)
plot(value/1e6~year, x, ylim=c(0,105), ylab="million tonnes", type="l")
title(main="Capture production: All")
```

`country` *Countries*

Description

Countries and various territories, defined by FAO (2025).

Usage

```
country
```

Format

Data frame containing eight columns:

`country`	country code
`country_name`	country name
`iso2`	ISO 2-alpha code
`iso3`	ISO 3-alpha code
`continent`	continent
`georegion`	geographic region
`ecoclass`	economic class
`official`	official country name

Details

This data frame contains the full set of 275 data records from the FishStat *Country Groups* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/global_production

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
head(country)

# Regions within continents
table(country$georegion, country$continent)

# Select 'country' entries that have non-zero production
nonzero <- unique(production$country[production$value > 0])
country.nz <- country[country$country %in% nonzero,]
length(country.nz$country)

# Only 'country' and 'country_name' are always defined
cbind(sapply(country, function(x) all(x != "")))

# Plus 'ecoclass' and 'official' for non-zero production
cbind(sapply(country.nz, function(x) all(x != "")))

# Economic class levels
sort(unique(country$ecoclass))

# Examine individual countries
print.simple.list(country[country$iso2 == "IS",])
print.simple.list(country[country$country_name == "Samoa",])
```

---

environment *Environments*

Description

Aquatic environments for aquaculture, defined by FAO (2025).

Usage

```
environment
```

Format

Data frame containing two columns:

environment	environment code
environment_name	environment name

Details

This data frame contains the full set of 4 data records from the FishStat *Production Environment* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Aquaculture Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/aquaculture

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
environment

# Aquaculture production by environment in 2023, in million tonnes
x <- merge(aquaculture, environment)
x <- aggregate(value~environment_name, x, sum, subset=year==2023)
transform(x, value=round(value/1e6))
```

---

measure *Measures*

Description

Units of measurement, defined by FAO (2025).

Usage

```
measure
```

Format

Data frame containing seven columns:

measure	measure code
measure_name	measure name
short	short name
multiplier	unit multiplier
unit	unit symbol
measure_description	measure description
sws	SWS code

Details

This data frame contains the full set of 11 data records from the FishStat *Units* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/global_production

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
head(measure, 3)

# Aquaculture production is measured in tonnes live weight
table(aquaculture$measure)

# Capture production is measured in tonnes or number of individuals
table(capture$measure)

# When number of individuals is used, it is for mammals and reptiles
x <- merge(capture[capture$measure=="Q_no_1",], species)
aggregate(value~isscaap, x, sum)
aggregate(value~isscaap, x, sum, subset=year==2023)

# Examine one measure
print.simple.list(measure[measure$measure=="Q_tlw",])
```

---

production *Global Aquaculture and Capture Production*

Description

Aquaculture and capture production quantity by species, area, and country for the years 1950-2023, compiled and published by FAO (2025).

Usage

```
production
```

Format

Data frame containing eight columns:

species	species code
year	year
area	area code
country	country code
value	quantity in tonnes or number of individuals
measure	measure code
status	status code
source	source code

Details

This data frame contains the full set of 1,159,613 data records from the FishStat *Production Quantity* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/global_production

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
head(production)

# Analyze production measured in tonnes
prod <- production[production$measure == "Q_tlw" & production$value > 0,]
prod <- merge(prod, species[c("species", "yearbook")])

# Select SOFIA species, excluding mammals, reptiles, and plants
prod <- prod[prod$yearbook ==
             "Aquatic animals (Fish, crustaceans and molluscs, etc.)",]

# Determine origin
prod <- merge(prod, area[c("area", "inlandmarine")])
prod$origin <- ifelse(prod$source == "CAPTURE", "Capture", "Aquaculture")
prod$w <- ifelse(prod$inlandmarine == "Marine areas", "marine", "inland")
prod$origin <- paste0(prod$origin, " (", prod$w, ")")
cbind(sort(unique(prod$origin)))

# World capture fisheries and aquaculture production
```

```
x <- xtabs(value~year+origin, aggregate(value~year+origin, prod, sum))
x <- x[,c(2,1,4,3)] / 1e6
library(areaplot)
areaplot(x, legend=TRUE, args.legend=list(x="topleft"), ylab="million tonnes")
```

---

source *Sources*

Description

Sources of aquaculture and capture production, defined by FAO (2025).

Usage

```
source
```

Format

Data frame containing two columns:

source	source code
source_name	source name

Details

This data frame contains the full set of 4 data records from the FishStat *Production Source* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/global_production

See Also

aquaculture and capture data are also available in a combined production format.

area, country, environment, measure, source, species, and status are lookup tables.

fishstat-package gives an overview of the package.

Examples

```
source

# Analyze production measured in tonnes
prod <- production[production$measure == "Q_tlw" & production$value > 0,]
prod <- merge(prod, source)

# Production by source in 2023, in million tonnes
x <- aggregate(value~source_name, prod, sum, subset=year==2023)
transform(x, value=round(value/1e6))
```

`species` *Species*

Description

Aquatic species and taxonomic groups, defined by FAO (2025).

Usage

```
species
```

Format

Data frame containing ten columns:

`species`	species code
`species_name`	species name
`scientific`	scientific name
`isscaap`	ISSCAAP group
`major`	major taxa
`cpc_class`	CPC class
`cpc_group`	CPC group
`yearbook`	yearbook category
`author`	author of scientific name
`taxonomic`	taxonomic code

Details

This data frame contains the full set of 13,596 data records from the FishStat *Species Groups* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/global_production

See Also

`aquaculture` and `capture` data are also available in a combined `production` format.

`area`, `country`, `environment`, `measure`, `source`, `species`, and `status` are lookup tables.

`fishstat-package` gives an overview of the package.

Examples

```
head(species, 3)

# Select 'species' entries that have non-zero production
nonzero <- unique(production$species[production$value > 0])
species.nz <- species[species$species %in% nonzero,]
length(species.nz$species)

# Only 'species', 'scientific', 'major', and 'taxonomic' are always defined
cbind(sapply(species, function(x) all(x != "")))

# Plus 'isscaap' and 'yearbook' for non-zero production
cbind(sapply(species.nz, function(x) all(x != "")))

# A variety of species are missing 'species_name', 'cpc_class', 'cpc_group'
cbind(table(species.nz$major[species.nz$species_name == ""]))
cbind(table(species.nz$major[species.nz$cpc_class == ""]))
cbind(table(species.nz$major[species.nz$cpc_group == ""]))

# Number of 'species' entries that have non-zero production by major taxa
cbind(table(species.nz$major))

# 7 major taxa, 50 isscaap groups, and 3 yearbook categories
cbind(sapply(species.nz, function(x) length(unique(x))))

# 'scientific' and 'species_name' entries are not unique
table(species.nz$scientific)[table(species.nz$scientific) > 1]
table(species.nz$species_name)[table(species.nz$species_name) > 1]

# A closer look at the yearbook categories
cbind(table(species.nz$yearbook))  # now inspect the "other" species
other <-
  species.nz[species.nz$yearbook == "Other aquatic animals & products",]
cbind(table(other$major))  # majority is mammals, what about the rest
other <- other[other$major != "MAMMALIA",]
cbind(table(other$isscaap))  # reptiles and inedible ornamental animals

# Examine one species
print.simple.list(species[species$species_name == "Atlantic cod",])
print.simple.list(species[species$species == "YFT",])
```

`status` *Status*

Description

Status of data entries, defined by FAO (2025).

Usage

```
status
```

Format

Data frame containing four columns:

`status`	status code
`status_name`	status name
`status_description`	short name
`alternate`	unit multiplier

Details

This data frame contains the full set of 16 data records from the FishStat *Symbols* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2025). Global Production. Fisheries and Aquaculture Division. Rome.

https://www.fao.org/fishery/en/collection/global_production

See Also

`aquaculture` and `capture` data are also available in a combined `production` format.

`area`, `country`, `environment`, `measure`, `source`, `species`, and `status` are lookup tables.

`fishstat-package` gives an overview of the package.

Examples

```
head(status, 3)

# Aquaculture data entries
# Percentage that have official status, estimated, and negligible
100 * proportions(table(aquaculture$status))

# Capture data entries
# Percentage that have official status, estimated, and negligible
100 * proportions(table(capture$status))

# Examine one status definition
print.simple.list(status[status$status=="N",])
```

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