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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NeedsCompilation no

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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

Joining Tables

Production tables can be joined with lookup tables using the `merge` function, as demonstrated in the help page examples for `aquaculture` and `capture` production. The column names in this package have been designed to allow automatic inference of which columns to join, and the resulting table will have unique column names.

The `merge` function is generally useful for joining tables, but other join methods are available in R that can be faster but require either additional packages or more coding. The `production` example

uses square brackets and the `match` function to add one lookup column at a time to the production table. Compared to the slower `merge` function, this saves time, both for users and CRAN servers running maintenance tests.

Rather than optimizing speed or memory footprint, one can optimize convenience by constructing a full table with all data records and all columns:

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

Popular paradigms for joining tables include:

- Base R, where `merge` returns a `data.frame`.
- The `dplyr` package, where `inner_join` returns a `tibble`.
- The `data.table` package, where `merge` returns a `data.table`.

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.

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.

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

The package on CRAN provides the latest FishStat data, within a few weeks after an official FAO data release. For research and reference purposes, packages containing older data releases are available on GitHub with descriptive names. For example, the **fishstat21** and **fishstat22** packages contain the FAO FishStat data releases from 2021 and 2022:

```
install_github("https://github.com/sofia-taf/fishstat21")
install_github("https://github.com/sofia-taf/fishstat22")
```

Examples

```
head(production)

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

# Fast merge yearbook and inlandmarine columns
prod$yearbook <- species$yearbook[match(prod$species, species$species)]
prod$inlandmarine <- area$inlandmarine[match(prod$area, area$area)]

# Select SOFIA species, excluding mammals, reptiles, and plants
prod <- prod[grep("Fish, crustaceans and molluscs", prod$yearbook, fixed=TRUE),]

# Determine origin
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 / 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 1950-2024, compiled and published by FAO (2026).

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 107,419 data records from the FishStat *Aquaculture Quantity* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2026). 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 2024, production in tonnes
x <- aggregate(value~species_name, aqua, sum, subset=year==2024)
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=major!="PLANTAE AQUATICAE")
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 (2026).

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 (2026). 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 1950-2024, compiled and published by FAO (2026).

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 1,052,197 data records from the FishStat *Capture Quantity* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2026). 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 2024
x <- aggregate(value~species_name, cap, sum, subset=year==2024)
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 animals
x <- aggregate(value~year, cap, sum, subset=major!="PLANTAE AQUATICAE")
plot(value/1e6~year, x, ylim=c(0,105), ylab="million tonnes", type="l")
title(main="Capture production: All animals")
```

---

country *Countries*

Description

Countries and various territories, defined by FAO (2026).

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 (2026). 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 != "")))

# Columns defined 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 (2026).

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 (2026). 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 2024, in million tonnes
x <- merge(aquaculture, environment)
x <- aggregate(value~environment_name, x, sum, subset=year==2024)
transform(x, value=round(value/1e6))
```

`measure` *Measures*

Description

Units of measurement, defined by FAO (2026).

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 (2026). 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==2024)

# 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 1950-2024, compiled and published by FAO (2026).

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 1,159,616 data records from the FishStat *Production Quantity* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2026). 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,]

# Fast merge yearbook and inlandmarine columns
prod$yearbook <- species$yearbook[match(prod$species, species$species)]
prod$inlandmarine <- area$inlandmarine[match(prod$area, area$area)]

# Select SOFIA species, excluding mammals, reptiles, and plants
prod <- prod[grep("Fish, crustaceans and molluscs", prod$yearbook, fixed=TRUE),]

# Determine origin
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 / 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 (2026).

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 (2026). 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 2024, in million tonnes
x <- aggregate(value~source_name, prod, sum, subset=year==2024)
transform(x, value=round(value/1e6))
```

---

species *Species*

Description

Aquatic species and taxonomic groups, defined by FAO (2026).

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 13,772 data records from the FishStat *Species Groups* data table. Column names have been simplified to facilitate quick exploration and plotting in R.

Source

FAO (2026). 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))

# By yearbook categories and major taxa
table(species.nz$major, species.nz$yearbook)

# Number of unique yearbook categories, major taxa, isscaap groups, etc.
cbind(sapply(species.nz, function(x) length(unique(x))))
```

```
# The 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]

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

# English name when available, otherwise scientific name (FishStatJ style)
species$species_alt <- ifelse(species$species_name != "",
                              species$species_name,
                              paste0("[", species$scientific, "]"))
species[grep("Hoplias", species$scientific),
        c("species_name", "scientific", "species_alt")]
```

`status` *Status*

Description

Status of data entries, defined by FAO (2026).

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 (2026). 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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