

Package: esas (via r-universe)

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Title Read and Process Data from European Seabirds At Sea

Version 0.0.0.9000

Description Read and process data from European Seabirds At Sea ('ESAS').

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<https://inbo.github.io/esas/>

BugReports <https://github.com/inbo/esas/issues>

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Calculate_Detection_P_Ship_Based_Surveys
<i>Execute distance analysis on ship-based survey results</i>

Description

This function calculates detection probabilities for specified species from ship-based survey data using distance sampling methods. It filters the input data for relevant observations, fits half-normal and hazard-rate models, and selects the best model based on AIC values. The output is a data frame containing species names, the selected model function, and the average detection probability.

Usage

```
Calculate_Detection_P_Ship_Based_Surveys(  
  esas_table_2_analyse,  
  species_2_analyse  
)
```

Arguments

- esas_table_2_analyse
- A data frame containing survey data with columns for distance bins, platform class, transect type, observation distance, species code, behavior, and count. As returned by [Create_ESAS_Table\(\)](#).
- species_2_analyse
- A vector of species codes as encoded in the species column of the Observations table in the ESAS Data Model. See the [Species](#) page of the Data Model.

Value

- A data.frame with the following columns:
- Species: The species code.
 - Function: The selected detection function ("HR" for hazard-rate or "HN" for half-normal).
 - Detection_P_AVG: The average detection probability for the species.

See Also

Other analysis functions: [Create_ESAS_Table\(\)](#), [Create_Seabird_Density_Cross_Table\(\)](#)

Examples

```
# Read 4 ESAS tables:
path_to_read <- system.file("extdata", "ESAS_0827343782", package = "esas")
esas_tables_list <- Read_ESAS_Tables(
  path = path_to_read,
  file_encoding = "UTF-8"
)

# Create an ESAS master-table:
esas_table <- Create_ESAS_Table(esas_tables_list = esas_tables_list)

# Execute distance analysis on selection of species:
Calculate_Detection_P_Ship-Based_Surveys(
  esas_table_2_analyse = esas_table,
  species_2_analyse = c(720, 6020)
)
```

Create_ESAS_Table	<i>Combine the tables from the ESAS Data Model into a single data.frame</i>
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Description

The Analysis functions in this R package expect a single data.frame as input. This function combines the tables from the ESAS Data Model into a single data.frame. It performs left joins to ensure that all records from the CAMPAIGNS, SAMPLES, POSITIONS, and OBSERVATIONS tables are included. It also renames the Notes columns from the CAMPAIGNS and SAMPLES tables to avoid naming conflicts.

Usage

```
Create_ESAS_Table(esas_tables_list)
```

Arguments

esas_tables_list

A list containing the ESAS tables as data.frames. The list should include the following named elements: CAMPAIGNS, SAMPLES, POSITIONS, and OBSERVATIONS.

Value

A single data.frame that combines the information from the CAMPAIGNS, SAMPLES, POSITIONS, and OBSERVATIONS tables.

See Also

Other analysis functions: [Calculate_Detection_P_Ship-Based_Surveys\(\)](#), [Create_Seabird_Density_Cross_Table\(\)](#)

Examples

```
# Read 4 ESAS tables:
path_to_read <- system.file("extdata", "ESAS_0827343782", package = "esas")
esas_tables_list <- Read_ESAS_Tables(
  path = path_to_read,
  file_encoding = "UTF-8"
)

# Create an ESAS master-table:
esas_table <- Create_ESAS_Table(esas_tables_list = esas_tables_list)
esas_table
```

Create_Seabird_Density_Cross_Table

Create a cross-table with distance-corrected bird densities

Description

This function processes seabird observation data to create a cross-table of distance-corrected bird densities for selected species. It filters the data based on specific criteria, applies detection probability corrections, and calculates densities per unit area. The resulting table includes relevant metadata such as date, time, area, and location.

Usage

```
Create_Seabird_Density_Cross_Table(
  esas_table,
  probabilities,
  species_selection
)
```

Arguments

esas_table	A data frame containing seabird observation data as resulting from the Create_ESAS_Table() function.
probabilities	A data frame containing detection probabilities for different species as returned by Calculate_Detection_P_Ship-Based_Surveys()
species_selection	A vector of species codes to include in the analysis as encoded in the species column of the Observations table in the ESAS Data Model. See the Species page of the Data Model.

Details

Requirements:

- DistanceBins must be 0|50|100|200|300
- PlatformClass must be 30 (ship-based surveys)
- Area must be greater than 0
- ObservationDistance must be F for flying birds and A, B, C, or D for swimming/diving birds
- Transect must be True
- Behaviour must not be 99
- Species codes must be provided in species_selection and must exist in the esas_table

Value

A data frame containing distance-corrected bird densities for the selected species.

See Also

Other analysis functions: [Calculate_Detection_P_Ship-Based_Surveys\(\)](#), [Create_ESAS_Table\(\)](#)

Examples

```
path_to_read <- system.file("extdata", "ESAS_0827343782", package = "esas")
esas_table <- Create_ESAS_Table(Read_ESAS_Tables(path = path_to_read))
Create_Seabird_Density_Cross_Table(
  esas_table = esas_table,
  probabilities =
    Calculate_Detection_P_Ship-Based_Surveys(esas_table,
                                              species_2_analyse = c(720,6000)),
  species_selection = c(720, 6020)
)
```

Export_ESAS_Upload_Matrix

Write a tab delimited csv file as expected by the ESAS upload module.

Description

This function exports a data frame to a tab-delimited file without row names, column names, or quotes, using the specified file encoding.

Usage

```
Export_ESAS_Upload_Matrix(table, path, filename)
```

Arguments

table	A data frame or matrix to be exported as returned by Transform_ESAS_Tables_4_Upload()
path	Directory path where the file will be saved.
filename	Character string specifying the name of the output file without the extension.

Value

(invisible) The path to the exported file.

See Also

Other upload functions: [Transform_ESAS_Tables_4_Upload\(\)](#)

Examples

```
#Read 4 ESAS tables:
data_path <- system.file("extdata", "ESAS_INB0_202401", package = "esas")
esas_tables_list <- Read_ESAS_Tables(path = data_path,
                                     file_encoding = "UTF-8")

#Convert tables to upload format:
esas_4_upload <- Transform_ESAS_Tables_4_Upload(campaigns_tbl = esas_tables_list$CAMPAIGNS,
                                                samples_tbl = esas_tables_list$SAMPLES,
                                                positions_tbl = esas_tables_list$POSITIONS,
                                                observations_tbl = esas_tables_list$OBSERVATIONS,
                                                data_provider = "202",
                                                country = "BE")

## Not run:
#Export upload table:
Export_ESAS_Upload_Matrix(table = esas_4_upload,
                           path = tempdir(),
                           filename = "esas_4_upload")

## End(Not run)
```

Read_ESAS_Tables	<i>Read csv files and combine them into a single data.frame</i>
------------------	---

Description

Read 4 csv files (CAMPAIGNS, SAMPLES, POSITIONS, OBSERVATIONS) and combine them into a list of data.frames.

Usage

```
Read_ESAS_Tables(path, file_encoding = "UTF-8")
```

Arguments

path (Character.) Path to the directory containing 4 csv files as returned by the **ESAS Data inventory**. It should contain the files: "Campaigns.csv", "Samples.csv", "Positions.csv" and "Observations.csv".

file_encoding (Character.) File encoding. Default is "UTF-8".

Value

A list of 4 data.frames: CAMPAIGNS, SAMPLES, POSITIONS, OBSERVATIONS.

Examples

```
data_path <- system.file("extdata", "ESAS_0827343782", package = "esas")
Read_ESAS_Tables(data_path)
```

Transform_ESAS_Tables_4_Upload

Combine the 5 tables from the ESAS Data Model to a single data.frame as preparation for uploading

Description

The resulting data.frame has 18 columns, where the first column is "RecordType" which indicates the type of record (FI, EC, ES, EP, EO). The remaining columns are filled with the respective data from the input tables.

Usage

```
Transform_ESAS_Tables_4_Upload(
  campaigns_tbl,
  samples_tbl,
  positions_tbl,
  observations_tbl,
  data_provider,
  country
)
```

Arguments

campaigns_tbl (data.frame) of campaigns table as returned by `Read_ESAS_Tables()`\$CAMPAIGNS

samples_tbl (data.frame) of samples table as returned by `Read_ESAS_Tables()`\$SAMPLES

positions_tbl (data.frame) of positions table as returned by `Read_ESAS_Tables()`\$POSITIONS

observations_tbl (data.frame) of observations table as returned by `Read_ESAS_Tables()`\$OBSERVATIONS

data_provider (integer) code of the data provider as described by the ESAS Data Model **file information** table.

country (character) ISO_3166 country code of the data provider. For example: "BE".

Value

(data.frame) with 18 columns and a number of rows equal to the sum of rows of the input tables plus one (for the file information row).

See Also

Other upload functions: [Export_ESAS_Upload_Matrix\(\)](#)

Examples

```
## Not run:
ESAS_TABLES_LIST <-
  Read_ESAS_Tables(
    path = "local_folder_with_downloaded_files",
    file_encoding = "UTF-8"
  )

Transform_ESAS_Tables_4_Upload(
  campaigns_tbl = ESAS_TABLES_LIST$CAMPAIGNS,
  samples_tbl = ESAS_TABLES_LIST$SAMPLES,
  positions_tbl = ESAS_TABLES_LIST$POSITIONS,
  observations_tbl = ESAS_TABLES_LIST$OBSERVATIONS,
  data_provider = "202",
  country = "BE"
)

## End(Not run)
```

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