

# Tutorial for spictapp: The Shiny app for the Stochastic Production model in Continuous Time (SPiCT)

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This totutrial guides you through a SPiCT assessment using the click-based Shiny app “spictapp”.

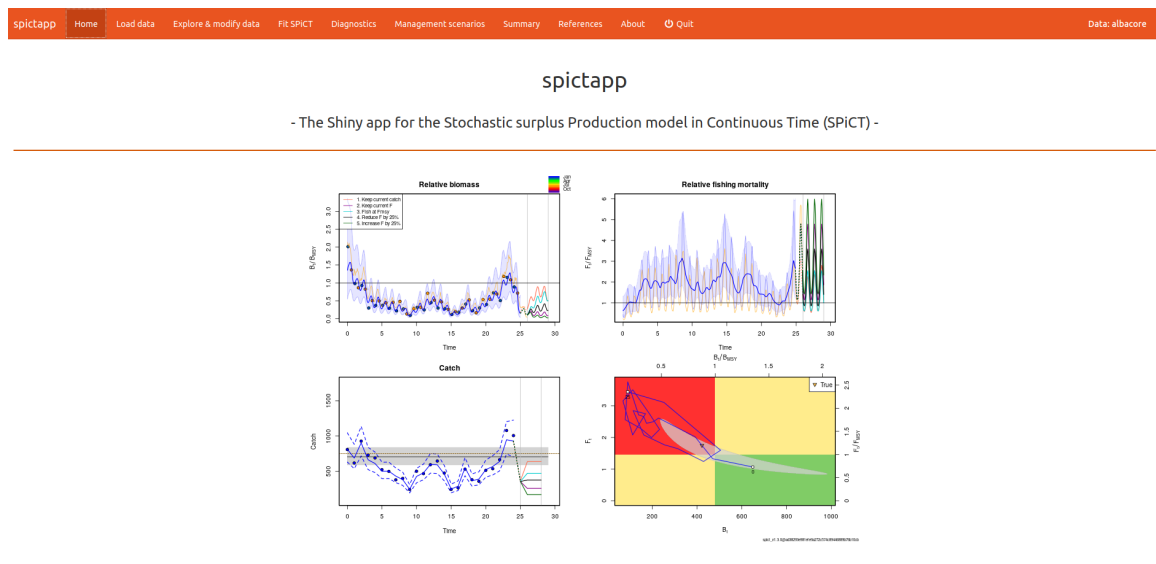


Figure 1: Home screen of spictapp.

## Download

The spictapp is hosted on [GitHub](#) and can be downloaded as a [zip archive](#). Unpack the archive to the destination of your choice.

## Start the App

Before the start of the app, **spictapp** checks if all required R packages are required and installs any missing packages. To assure windows compatibility without requiring Rtools (large software package), the binary version of the spict R package is included in the zip archive and installed upon start of the app.

The app can be started by double-clicking the respective executable in the spictapp directory, i.e. 'spictapp' for linux and mac and 'spictapp\_win' for windows operating systems (the file endings are '.sh' and '.bat', respectively).

Alternatively the script **runapp.R** in the spictapp directory can be executed from within R or with **Rscript runapp.R** from the terminal or command line.

## Home

On start, the app shows the home screen of spictapp (Fig. 1), which shows four important plots of a simulated spict assessment (find more information to the plots below). At the top of the screen is the orange navigation bar of the app, which guides the user through the individual steps of a spict assessment (Fig. 2). The active tab is highlighted in darker tone (tab called 'Load data' in Fig. 2). The tab 'Quit' closes the app and browser window (in any browser other than firefox  $\geq 46.0.1$ ). This tutorial is structured following the steps of a common spict assessment and thus the tabs in the navigation bar.

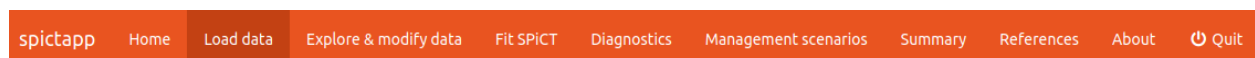


Figure 2: Tabs with assessment steps in the navigation bar.

At the far right of the navigation bar, the name of the uploaded data set is displayed (Fig. 3). In this example, the albacore example data set was selected. The data name is shown independent on the active tab and helps avoid confusion when dealing with different data sets.

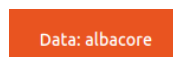


Figure 3: Data label in the navigation bar.

## Load data

Any assessment requires input data. SPiCT requires information about the catches from the commercial fleet with corresponding time intervals and an abundance index or effort data, alternatively. While the catches and effort refer to an interval and the times of the start of these intervals have to be provided, the abundance indices (multiple indices possible) correspond to a specific point in time, which can be specified as 2015.37 for mid May for example. Find more information about the data requirements of **SPiCT** in the two vignettes [SPiCT Guidelines](#) and [SPiCT Handbook](#).

The button 'Browse...' in the 'Load Data' tab allows you to browse through your directories and upload any data set to **spictapp** (Fig. 4). The only requirement for the data file is that it has either the '.txt' or '.csv' file extension. Both file types can be created from Excel or R. The specific properties of the file can be changed within the app with the options given for separators, quotes, and header. After uploading, the app displays the data in its raw format and will try to automatically match the column names with the names

expected by **SPiCT**. If successful in matching expected column names, the data set will also be displayed under ‘Data with assigned columns’.

**Load input data**

**Upload data file**

Choose a csv/txt file

Browse... hake.txt

Upload complete

Please use reset before uploading a new data set:

**Reset**

Your file must contain at least 3 columns: One vector with the times corresponding to the observations, one with the commercial catch observations, and one with either index or effort observations. The app tries to interpret the column names of your data automatically, but might not be successful in assigning all columns. If the 'Data with assigned columns' is empty or did not assign the columns correctly, please refer to the 'Assign columns' section below and press 'Update data' when done.

**File properties**

Separator: ☒ Comma, ☐ Semicolon, ☐ Tab, ☐ White space

Quote: ☐ None, ☒ Double Quote, ☐ Single Quote

Display: ☒ Head, ☐ All

☒ Header

**Uploaded file in raw format:**

Time	Catch.commercial.fleet	Survey.time	Catch.survey.fleet
1965	93.51	1965	1.78
1966	212.44	1966	1.31
1967	195.03	1967	0.91
1968	382.71	1968	0.96
1969	320.43	1969	0.88
1970	402.47	1970	0.90

**Data with assigned columns:**

Figure 4: Upload data to spictapp.

If not all columns expected by **SPiCT** could be matched, the user can select the columns corresponding to the commercial catch observations (‘obsC’), with corresponding times (‘timeC’) and index (‘obsI’) or effort (‘obsE’) observations with corresponding times (‘timeI’) or (‘timeE’), respectively, where the names in brackets reflect the corresponding standard **SPiCT** variable names (Fig. 5). Note, that the app allows to input several columns for the index observations and times, but only one column for the catch and effort observations and times.

With pressing ‘Update data’, the columns are assigned to the corresponding **SPiCT** variables and the resulting data is displayed under ‘Data with assigned columns’ (Fig. 6).

**SPiCT** also allows you to specify the uncertainty around input data as a factor to multiply estimated observation noise with. For example, the uncertainty of the catch observations might have changed over time due to an improved data monitoring system. The three input fields below the ‘Update data’ button, let you assign corresponding columns in your data to these variables (called ‘stdevfacC’, ‘stdevfacI’, and ‘stdevfacE’ in **SPiCT**, respectively).

One of the three original example data sets included in the spict package can be chosen by pressing ‘Use example data set?’ at the bottom of the page (Fig. 5). Note that many more example data sets are included in the data directory of the spictapp zip archive.

## Explore & modify data

Blabla sPiCT timeline and data plot

## Assign columns

Please assign the columns of your data to the required SPiCT input data. SPiCT requires a vector with catch observations and their times, as well as either index observations and their times or effort observations and their times. Press 'Update data' when all columns are assigned.

Commercial catch:

Times of catch observations

Time

Catch observations

Catch.commercial.fleet

Indices from scientific surveys:

Times of index observations

Survey.time

It is possible to select multiple columns representing different indices (e.g. different fleets) and their times.

Index observations

Choose one

Time  
Catch.commercial.fleet  
Survey.time  
Catch.survey.fleet

Effort information (optional):

Times of effort observations

Choose one

Effort observations

Choose one

Effort observations are optional if indices are available and required otherwise.

Update data

If information about the uncertainty of the observations is available, it can be provided as a factor scaling the uncertainty of the observations. This variable is called `stdevfac` for the different observations in SPiCT, e.g. `stdevfacC` for catches. Several columns can be selected if several indices are available.

Catch observations

Choose one

Index observations

Choose one

Effort observations

Choose one

## Use example data

☐ Use example data set?

Figure 5: Assign columns.

spictapp

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Browse...

hake.txt

Upload complete

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Comma

Semicolon

Tab

White space

Header

Quote

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Double Quote

Single Quote

Display

Head

All

Uploaded file in raw format:

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1968	382.71	1968	0.96
1969	320.43	1969	0.88
1970	402.47	1970	0.90

Data with assigned columns:

timeC	obsC	timeI	obsI
1965.00	93.51	1965.00	1.78
1966.00	212.44	1966.00	1.31
1967.00	195.03	1967.00	0.91
1968.00	382.71	1968.00	0.96
1969.00	320.43	1969.00	0.88
1970.00	402.47	1970.00	0.90

Figure 6: Assign columns.

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Data with assigned columns:

timeC	obsC	timeI	obsI
1965.00	93.51	1965.00	1.78
1966.00	212.44	1966.00	1.31
1967.00	195.03	1967.00	0.91
1968.00	382.71	1968.00	0.96
1969.00	320.43	1969.00	0.88
1970.00	402.47	1970.00	0.90

Figure 7: Assign columns.

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changing dteuler, timing of index catch unit

change time range of all data, robust estimation for catches (several for indices possible / required if several indices)

seasonal spict if seasonal catches, number of seasons, by default dependent on input data 4 for quarterly catches and 1 for annual catches, season type and splieorder for season type 1 and 3

management interval, management evaluation time, ffac or fcon

default priors

additional priors

display options (advance data plot)

## **SPiCT assessment**

fit spict by click on button,

convergence message

set seed value for reproducible results and assessments

optimiser (expert see handbook)

## **Diagnostics**

run retrospective analysis

run sensitivity analysis to initial values

## **Management with SPiCT**

run different management scenarios, intermediate period, catch during intermediate period, fractile of catch dist

## **Summary**

all results summarised and options to download (assessment report), all tables as zip archive, all figures as zip archive or all data as RData (includes a R list object called 'rv') which includes all used data and estimations allowing to reproduce the whole functionality of the app in R. The description of all individual elements of that list would exceed the scope of this vignette. see the names of all elements with `names(rv)`.

## **Other**

### **References**

references relevant for this app.

### **About**

more information about the app, version, developers. question/issues links to user forum on RG

### **References**