Introduction to R for distance sampling

Workshop, 26 August 2018

Centre for Research into Ecological and Environmental Modelling

1.6 Exporting 'Distance for Windows' projects to R using `readdst`

The R package `readdst` (Miller, NA) was created to port Distance for Windows projects (Thomas *et al.* (2010) into R to make use of the software developments that continue to be incorporated into R but not always in Distance for Windows.

In this practical, the ducknests project will be used as an example. The detections from this project were used in a previous practical.

Objective of the practical

1. Install the necessary packages

2. Convert a distance project

3. Examine the resulting object

4. Extract information from the resulting object.

Setting up

The package `readdst` is stored on github rather than the CRAN repository, therefore installation is a bit different to that of `Distance` but still straightforward. One wrinkle is that a 32 bit version of R should be used.

The commands below will install the necessary packages:

```
install.packages("devtools")
```

```
devtools::install_github("distancedevelopment/readdst")
```

Once the `readdst` package has been installed, it needs to be loaded into the current work session:

```
library(readdst)
```

Converting a project

Converting a project for analysis in R is straightforward:

```
# Commands used to extract the data (in R 32bit)
#ducknest <- convert_project("C:/workshops/2018/Ducknest exercise")
#temp <- (ducknest$"Half normal with no adjustments"$env$data)
```

```
ducknest <- convert_project("C:/workshops/2018/Ducknest exercise")
```

There are two things to note,

- the path to the Distance for Windows project should be specified (if not in the working directory)

- the '.dst' suffix is not required.

Examining the R object

The resulting object (in this case `ducknest`) is composed of a series, or list, of objects within objects (a bit like the object from the `ds` function). Here the first level of objects are named after the Analyses in the Distance for Windows project. The `names` function can be used to delve into the objects:

```
names(ducknest)
```

There was only one Analysis definition set up for this project and so the command gives:

```
"Half normal with no adjustments"
```

Appling `names` to this object shows that there many further objects (note quotes are required):

```
names(ducknest$"Half normal with no adjustments")
```

```
[1] "call"          "aic.select"    "status"        "env"
[5] "filter"        "group_size"    "detection_by"  "gof_intervals"

[9] "estimation"    "name"          "ID"            "engine"
[13] "project"       "project_file"
```

Here, we highlight the `env` object because this object contains the data tables.

```
names(ducknest$"Half normal with no adjustments"$env)
```

```
[1] "units"        "obs.table"    "sample.table" "region.table" "data"
```

These tables can be extracted from the list (for ease of use) and then analysed using the `ds` function (Miller 2016). For example,

```
duck.detect <- ducknest$"Half normal with no adjustments"$env$data
```

```
ds(duck.detect, key="hn")
```

See practical 2 for an example of including `sample.table` etc as arguments.

Further information

More information and examples are provided at the following links.

A poster outlining the process:

http://converged.yt/posters/RexstadISEC2018poster.pdf

Examples of converting data (Amakihi and golftees):

https://cdn.rawgit.com/DistanceDevelopment/readdst/e308e819/vignettes/Project-migration.html

https://cdn.rawgit.com/DistanceDevelopment/readdst/e308e819/vignettes/golftees.html

References

Miller DL (NA) `readdst`: Convert Distance for Windows projects to R analyses. R package version 0.0.5.

Miller DL (2016). Distance: Distance Sampling Detection Function and Abundance Estimation. R package version 0.9.6. https://CRAN.R-project.org/package=Distance

Thomas L, Buckland ST, Rexstad EA, Laake J, Strindberg S, Hedley SL, Bishop JR, Marques TA and Burnham KP (2010) Distance software: design and analysis of distance sampling surveys for estimating population size. Journal of Applied Ecology: 47(1):5-14