# Distance sampling analysis using R

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Centre for Research into Ecological and Environmental Modelling

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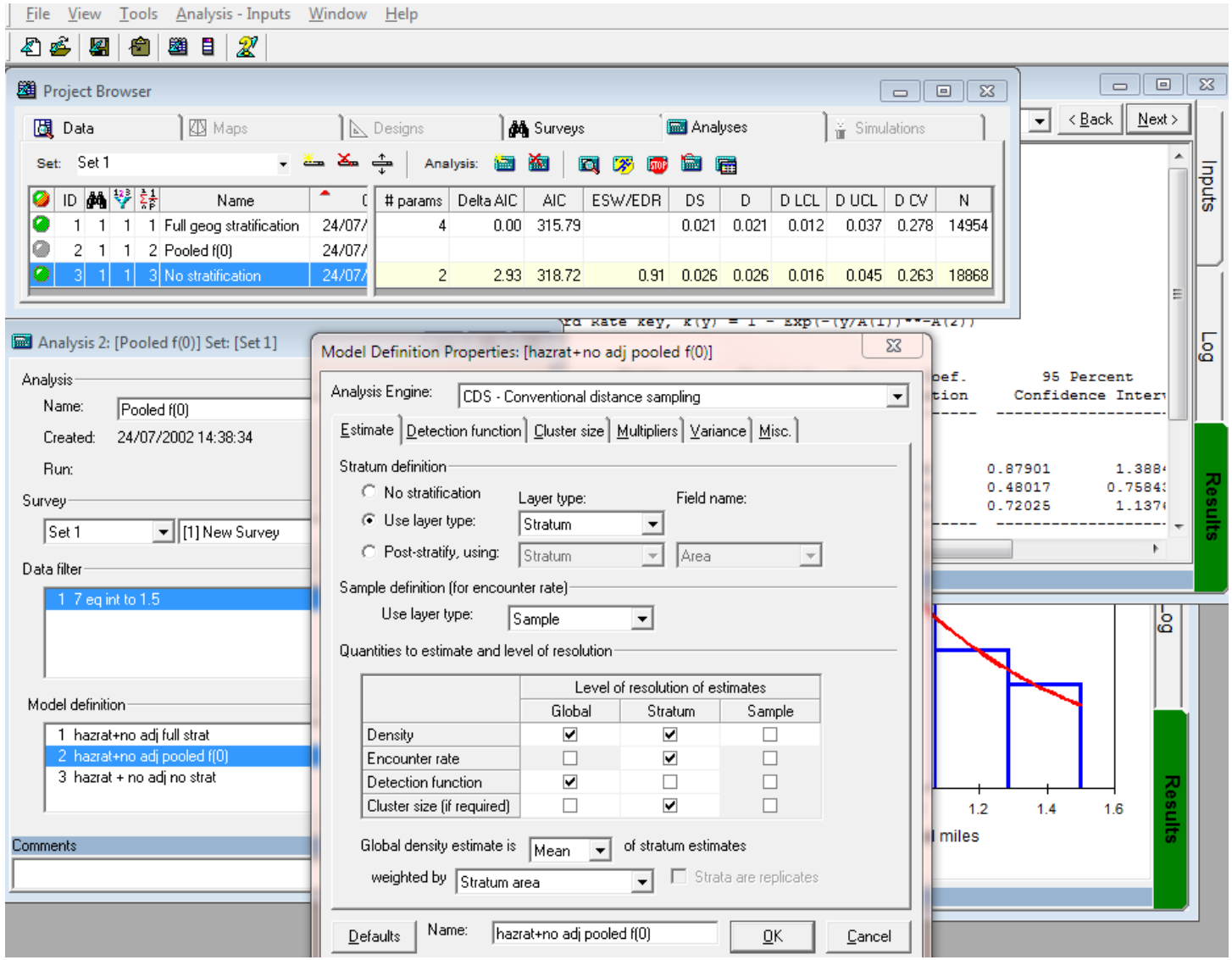


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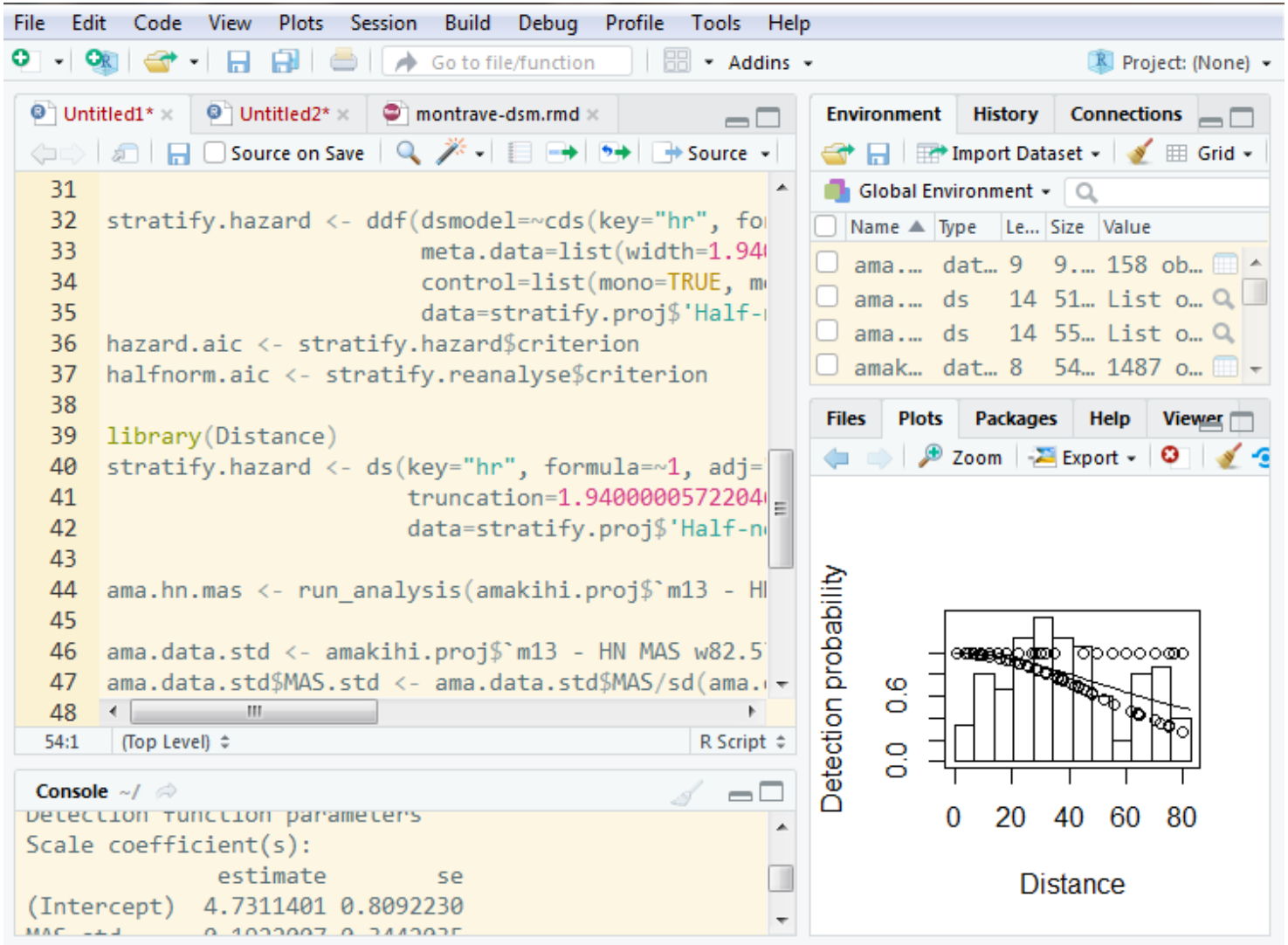


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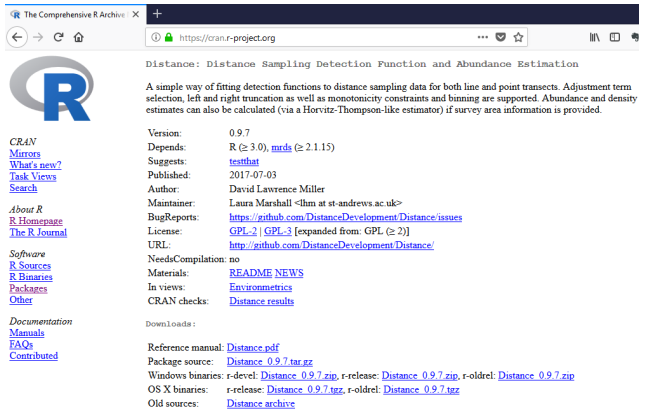
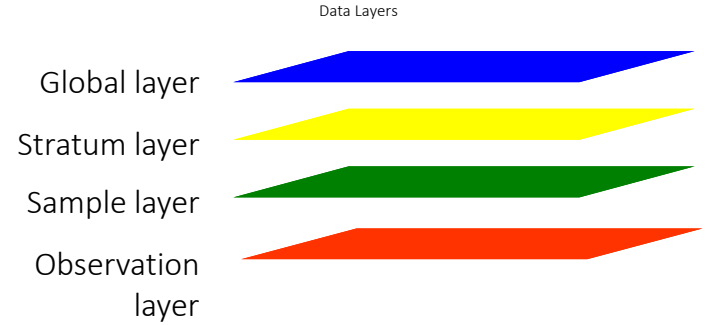
# Three elements needed to begin analysis using R

- Assume you have installed R (www.cran.r-project.org) and also R-Studio (www.rstudio.com)
- Beyond this, you will need the package Distance available from CRAN
- Deeper understanding of distance sampling survey data organisation




## Survey data in Distance

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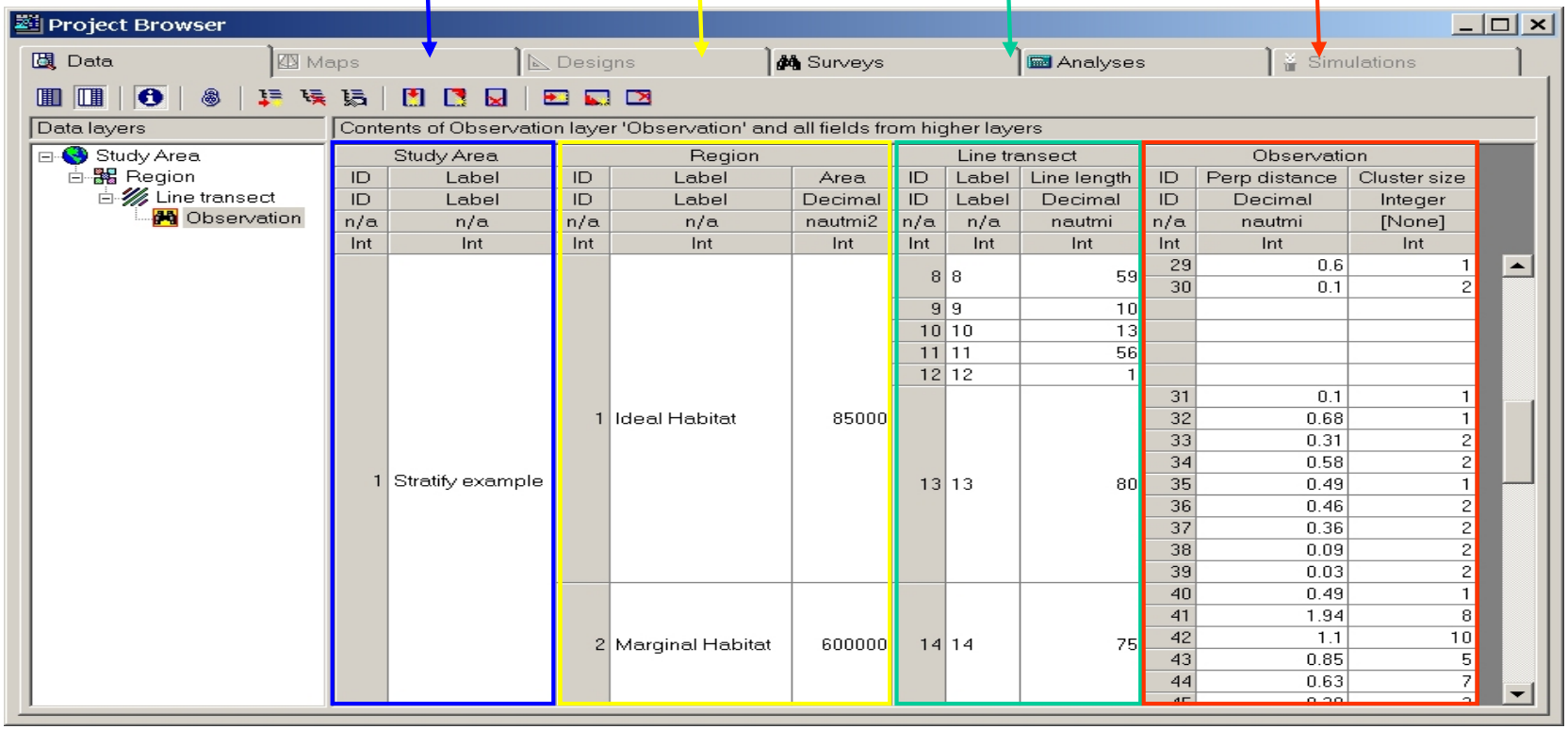
# Survey data in Distance

## Data Layers

Global Stratum Sample Observation




| Study Area | | Region | | | Line transect | | | Observation | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ID | Label | ID | Label | Area | ID | Label | Line length | ID | Perp distance | Cluster size |
| ID | Label | ID | Label | Decimal | ID | Label | Decimal | ID | Decimal | Integer |
| n/a | n/a | n/a | n/a | nautmi2 | n/a | n/a | nautmi | n/a | nautmi | [None] |
| Int | Int | Int | Int | Int | Int | Int | Int | Int | Int | Int |
| 1 | Stratify example | 1 | Ideal Habitat | 85000 | 8 | 8 | 59 | 29 | 0.6 | 1 |
| | | | | | | | | 30 | 0.1 | 2 |
| | | | | | 9 | 9 | 10 | | | |
| | | | | | 10 | 10 | 13 | | | |
| | | | | | 11 | 11 | 56 | | | |
| | | | | | 12 | 12 | 1 | | | |
| | | | | | 13 | 13 | 80 | 31 | 0.1 | 1 |
| | | | | | | | | 32 | 0.68 | 1 |
| | | | | | | | | 33 | 0.31 | 2 |
| | | | | | | | | 34 | 0.58 | 2 |
| | | | | | | | | 35 | 0.49 | 1 |
| | | | | | | | | 36 | 0.46 | 2 |
| | | | | | | | | 37 | 0.36 | 2 |
| | | | | | | | | 38 | 0.09 | 2 |
| | | | | | | | | 39 | 0.03 | 2 |
| | | 2 | Marginal Habitat | 600000 | 14 | 14 | 75 | 40 | 0.49 | 1 |
| | | | | | | | | 41 | 1.94 | 8 |
| | | | | | | | | 42 | 1.1 | 10 |
| | | | | | | | | 43 | 0.85 | 5 |
| | | | | | | | | 44 | 0.63 | 7 |

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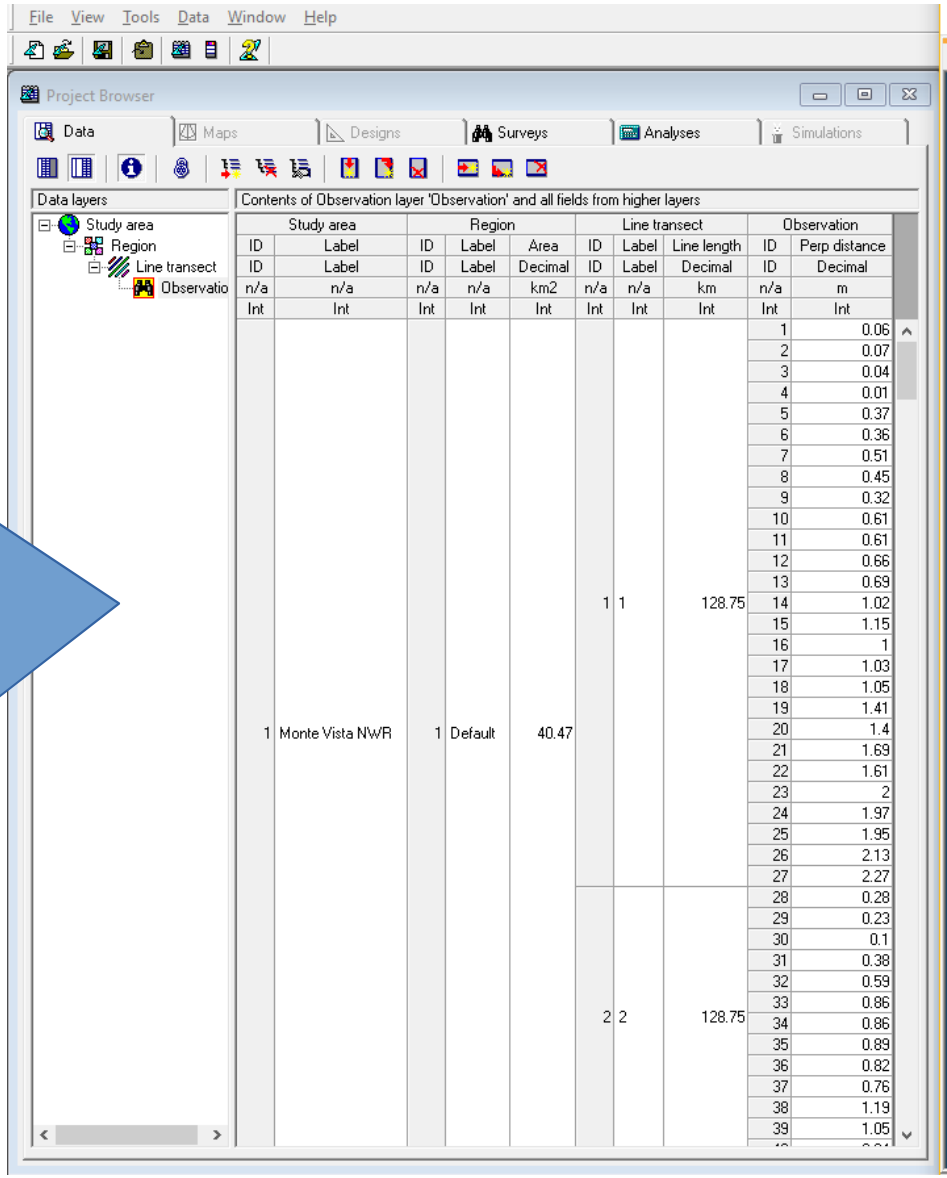
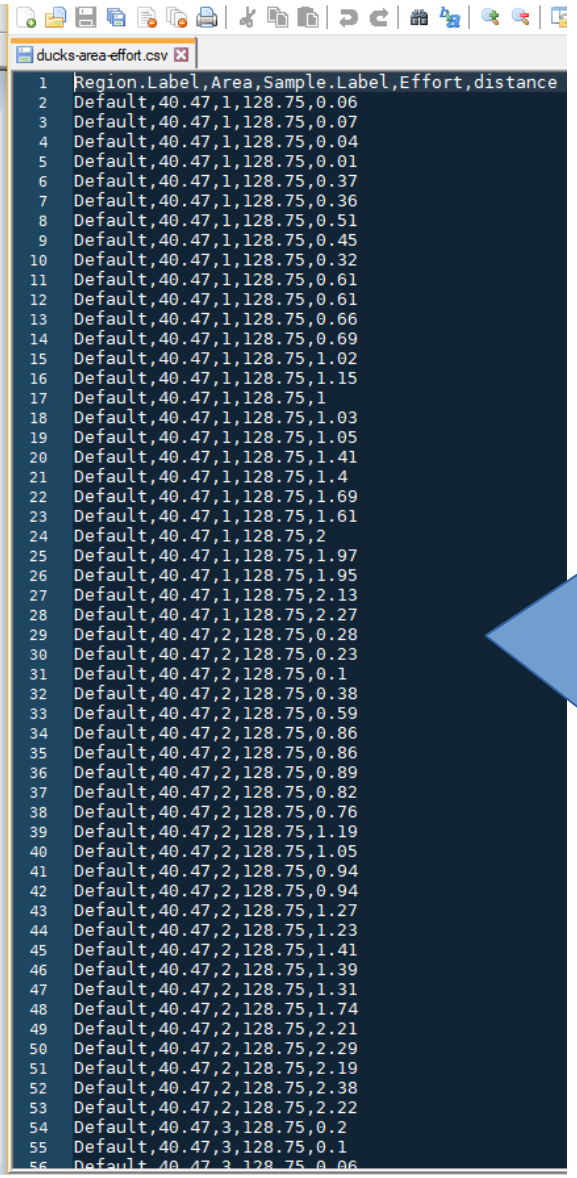



Distance for windows data tab




Comma separated values file of same data

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# Exercises accompanying analysis using R

- Duck nests
  - Conventional distance sampling analysis
  - Also used in Chapter 1 of online workshop
- Amakihi songbirds
  - Point transects
  - Multiple covariate distance sampling analysis
  - Also used in Chapter 5 of online workshops
- Scottish Crossbills
  - Detection function derived from a separate survey
  - Detection probability applied to data from main survey
  - Uncertainty derived using bootstrapping technique
- Multi-species songbird survey
  - Techniques for filtering species-specific data from multi-species data
  - Challenge is to ensure survey effort is correctly recorded
  - Introducing programming to modularise analyses