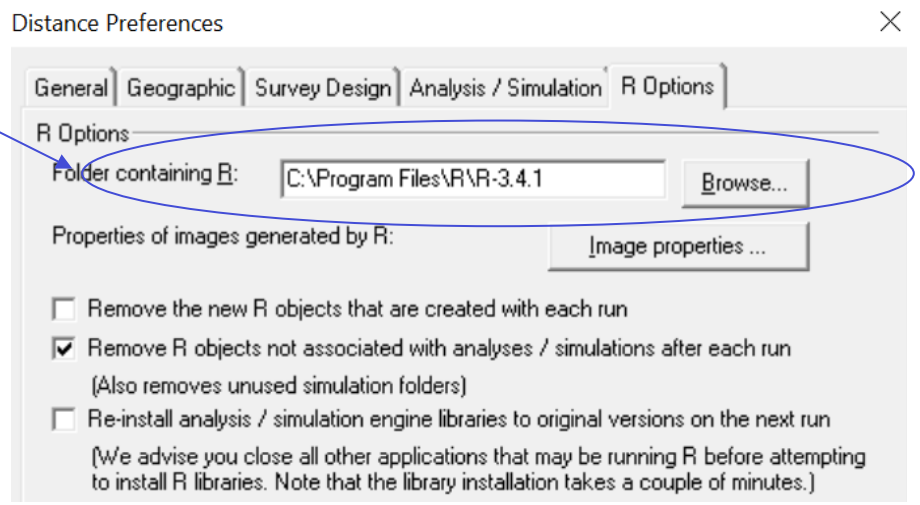
Mark-recapture distance sampling (MRDS) in Distance 7.1

- Setting up Distance for MRDS
- Setting up a Distance project for MRDS
- Data requirements
- MRDS analyses

Setting up Distance

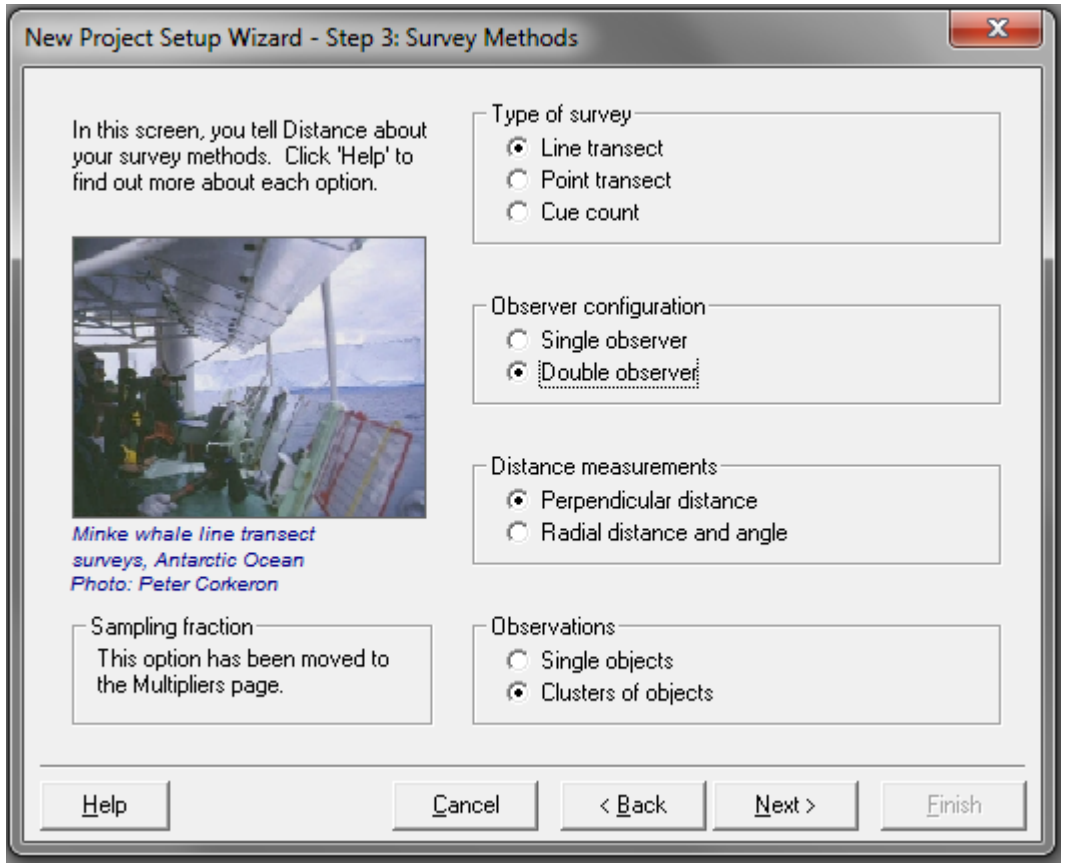
- You need a copy of R installed on your computer http://www.r-project.org/
- Currently, the required version is R 3.4.1
  - Check:



- Distance automatically installs mrds R library when you run an MRDS analysis

Project setup

- Choose “Double observer” in New project Setup Wizard

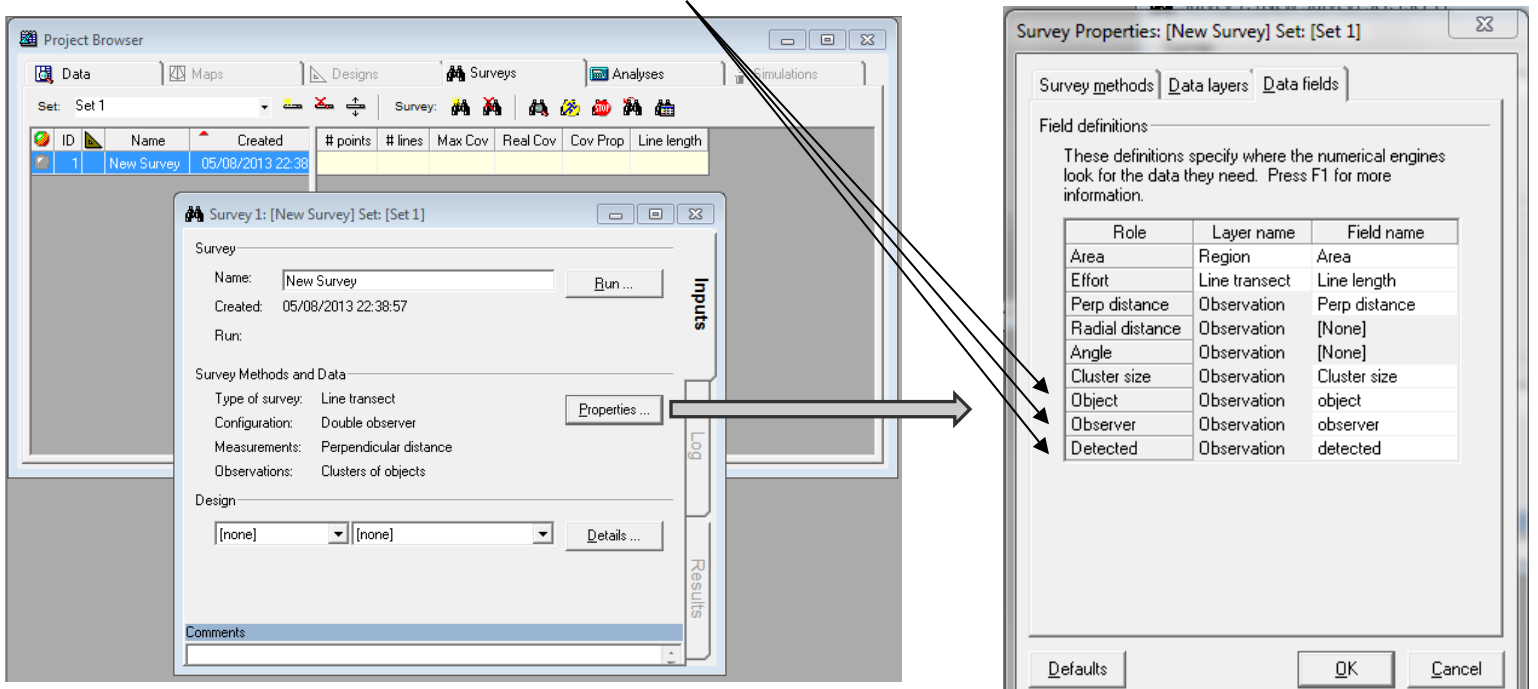


Project setup

- This causes 3 extra fields to be added to the Observation layer

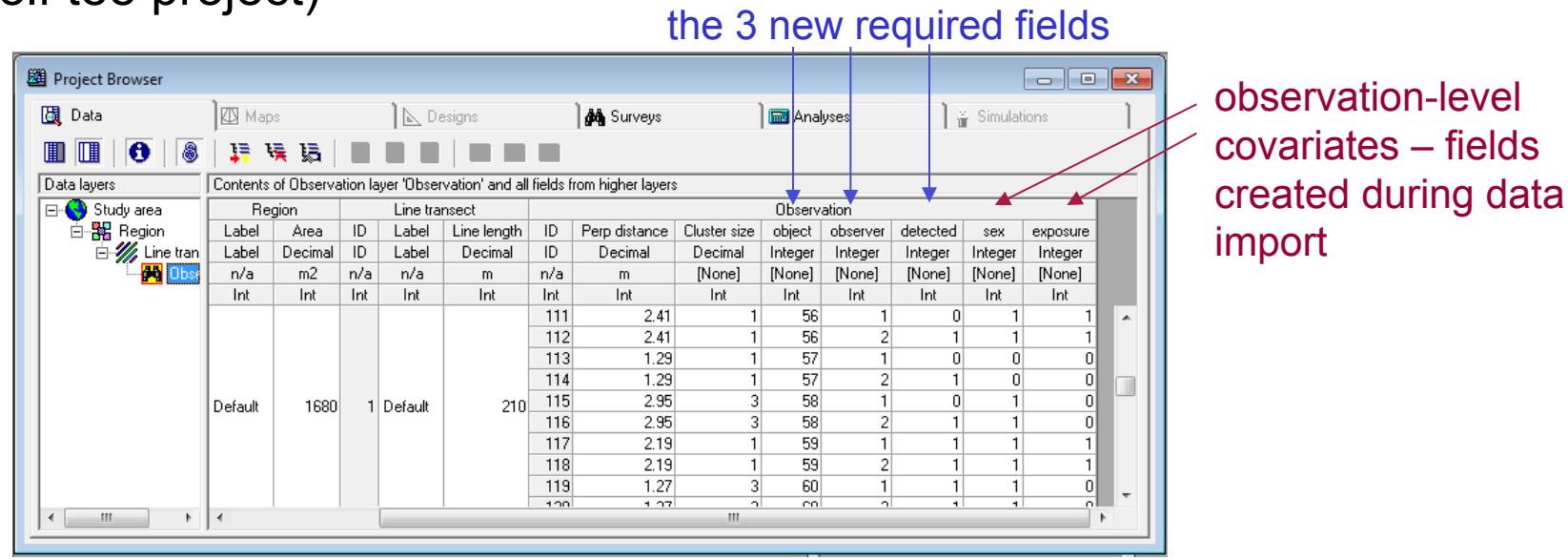
Observation					
ID	Perp distance	Cluster size	object	observer	detected
ID	Decimal	Decimal	Integer	Integer	Integer
n/a	m	[None]	[None]	[None]	[None]
Int	Int	Int	Int	Int	Int

- And their roles defined in the default Survey object



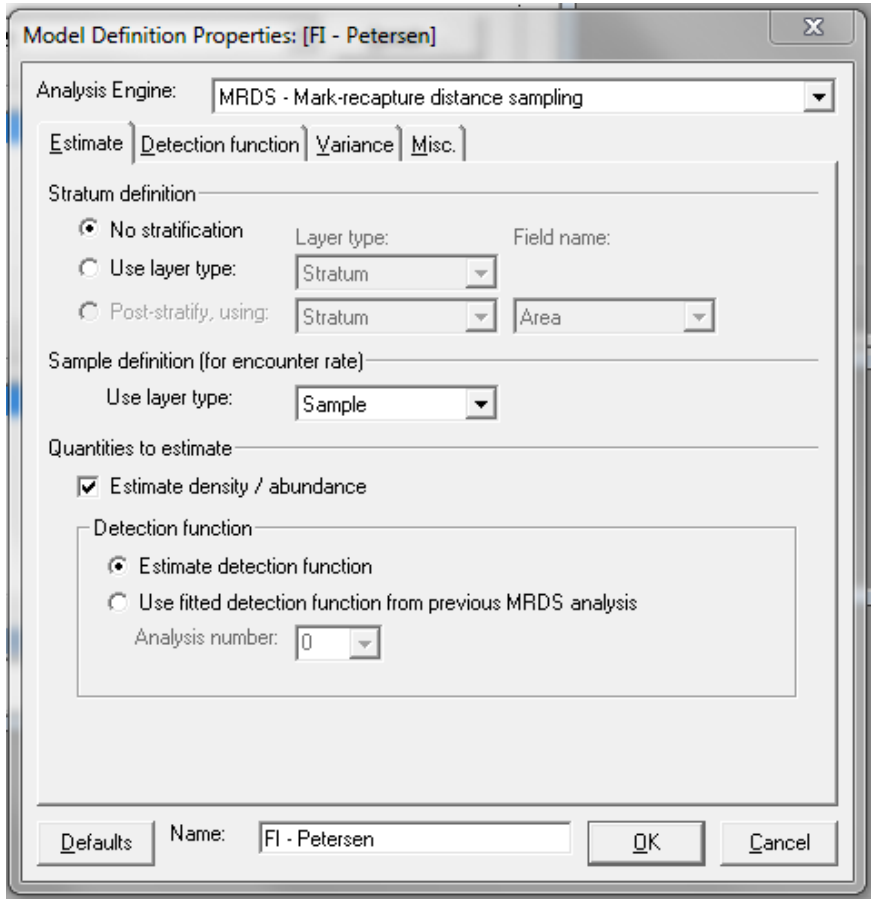
Data requirements

- Observation data must have:
  - 2 rows per object – one for Observer 1 and one for Observer 2
  - Fields for:
    - object ID
    - observer (1 or 2)
    - detected (1=yes, 0=no)
- Additional covariate data can go in fields at the appropriate level
- Example: (golf tee project)



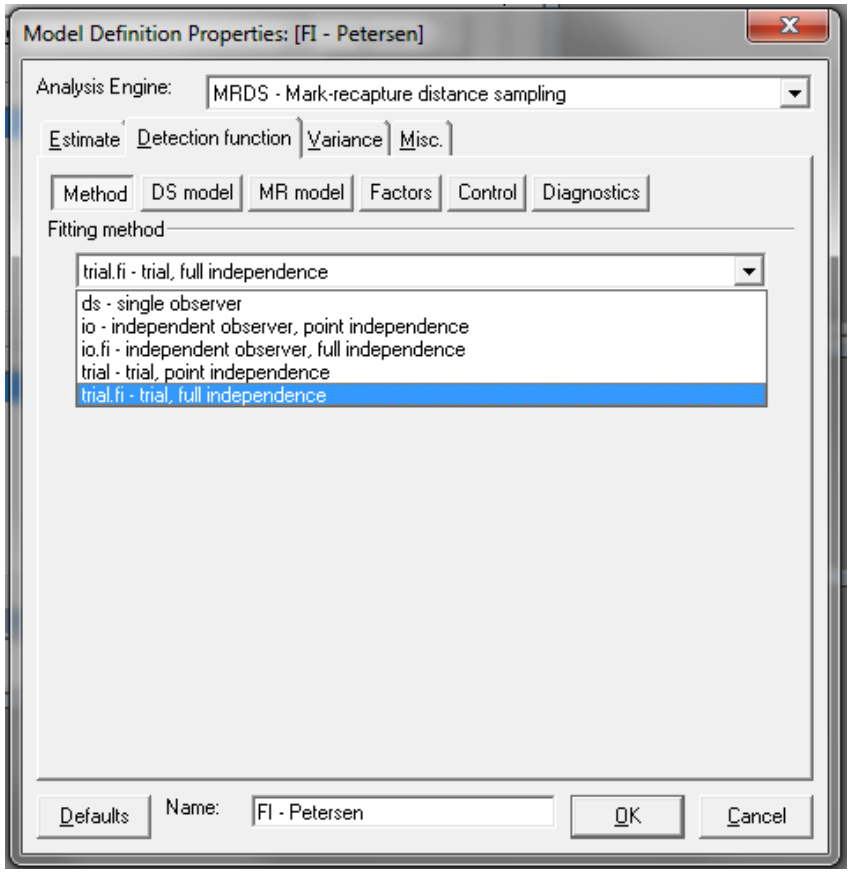
MRDS analyses

- Select MRDS engine in Model Definition
- Estimate tab
  - Stratification options as for CDS/MCDS engines – but no post-stratification for now
  - Quantities to estimate
    - Can choose not to estimate density (saves time during model selection)
    - Can choose to estimate a detection function, or to use a fitted function from a previous analysis.
      - Useful to apply a detection function estimated with all data to a subset of the data
      - See manual for details.



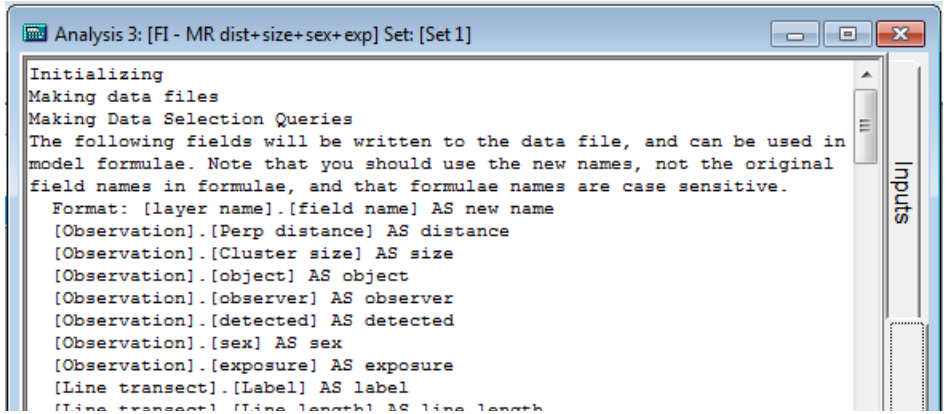
Detection function tab

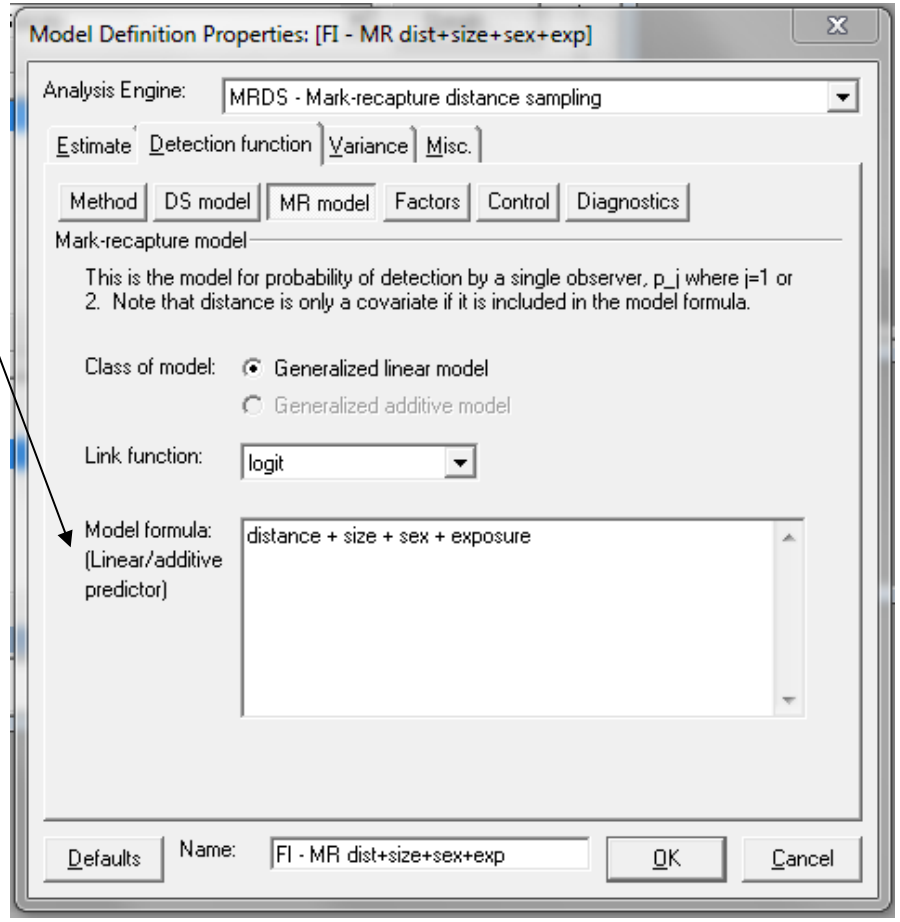
- 5 methods at present
  - ds – CDS and MCDS (but no adjustment terms)
  - IO (independent observer) – both point and full independence
  - Trial – both point and full independence
- Choice of method determines which model you need
  - DS model = distance sampling model.
    - half-normal or hazard rate, optionally with covariates in the scale parameter
  - MR model = mark recapture model
    - GLM with logit link



Model formulae

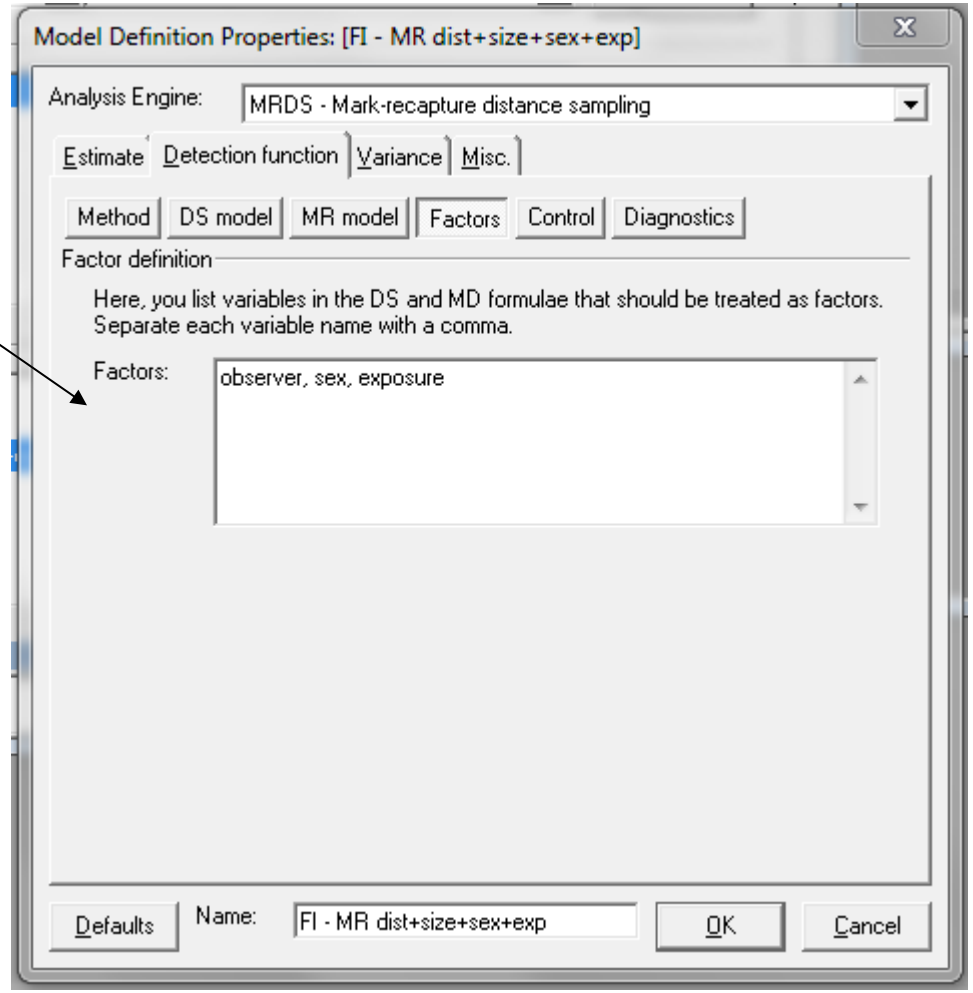
- Type in variable names joined by “+” (main effect), “:” (interaction), “*” (main effect + interaction)
- Note that some fields get renamed:
  - distance, size, object, observer, detected
  - fields from layers above the observation layer
- Tip – look in Analysis Details log to see new names





Factors

- Need to specify which variables in the formulae are factors
  - Tip: type in all possible factors in the first Model Definition and this will be used as the basis of all subsequent definitions



Results

- Produces
  - diagnostics (qq plots, detection function plots, goodness-of-fit tests)
  - parameter estimates, and estimated density and abundance
- Can customize plots (in Preferences)
- Plots stored as graphics files in a folder “R” within project data folder
- Results optionally stored in an .Rdata file in the “R” folder, so if you know R software you can access them (Preferences)