Modelling Patterns and Dynamics of Species Occurrence Workshop
4.5-day Agenda

Monday

Background: inferences about animal populations (DM)
- why estimate stuff
  - science
  - conservation/management
- what to estimate
- how to estimate: basic principles

Occupancy: relevance to ecology and conservation (DM)
- Classes of ecological questions
- Conservation/management

Statistical background (DM)
- concepts and notations
- probability
- Maximum likelihood and Bayesian estimation
- logistic regression, covariate modelling and odds ratios
- hypothesis testing
- model comparison and multi-model inference

MLE Excel exercises (JH)

Single-season model (part I) (DM)
- basic sampling situation (data type)
- model history and development
- missing observations
- covariates

Occupancy MLE Excel exercise (JH)

Introduction to PRESENCE (JH)
- worked single-season example (no covariates)
- examination of the output
- results and interpretation

Introduction to WinBUGS (DM)
- rework PRESENCE example in WinBUGS

Tuesday

Single-season model (part II) (JN)
- model assumptions
- dealing with heterogeneity
- small sample/finite population inference
- modelling spatial correlation in occupancy

Design matrices and fitting custom single-season models in PRESENCE (JH)
- worked single-season example (with covariates)
- examination of the output
- results and interpretation
- using results to develop maps (DM)

Single-season study design (DM)
- site selection
- allocation of effort
- design comparisons
- survey timing
- miscellaneous issues
- covariates
- GENPRES

GENPRES and Excel study design exercises (JH)

Wednesday

Multiple-season model (part I) (DM)
- basic sampling situation (data type)
- model history and development
  - implicit dynamics
  - explicit dynamics
- missing observations
- covariates

Multiple-season models in PRESENCE (JH)
- worked MS examples
- examination of the output
- results and interpretation

Multiple-season model (part II) (JN)
- alternative parameterizations
- characterizing occupancy dynamics
- modelling spatial correlations in occupancy dynamics

Worked multiple-season examples and computer exercises (DM)
- incorporating interesting biology into modelling
- further worked examples
- examination of the output
- results and interpretation

Multiple-season study design (DM)
- relationship with single-season designs
- long-term design
- adding sites over time
- GENPRES

Thursday

Multi-method occupancy (JN)

Multi-state occupancy (JN)
- 3-state occupancy – single season
- 3-state occupancy – dynamics
- worked examples

MS occupancy examples, if time (JH)

Joint habitat-occupancy dynamics (DM)
- simultaneous modelling of habitat and occupancy

Modelling multiple 'species' simultaneously (JN)
- different 'species' (or genders/age classes of same species) may exhibit a similar response to a covariate or environmental changes.
- using PRESENCE to fit such models

Species richness and community dynamics (JN)
- applying single-species methods to address community-level questions

Species co-occurrence (DM)
- do species co-occur independently?
- single-season model (co-occurrence pattern)
- multi-season model (co-occurrence process)
- worked example

Species co-occurrence example, if time (JH)

Other extensions (DM)
- Incorporation of count data and estimates of abundance
- Marked animals
- Combining occupancy and telemetry data

Friday

Summary and Discussion
Consulting session

- analyze own data
- ask specific questions of the instructors
- address design issues