

Modelling Patterns and Dynamics of Species Occurrence Workshop
21-25 April 2008
NCTC

Day 1

Background: inferences about animal populations

- why estimate stuff
 - o science
 - o conservation/management
- what to estimate
- how to estimate: basic principles

Occupancy: relevance to ecology and conservation

- Classes of ecological questions
- Conservation/management

Statistical background

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

Single-season model (part I)

- basic sampling situation (data type)
- model history and development
- missing observations
- covariates

Introduction to PRESENCE

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

Introduction to WinBUGS

- rework PRESENCE example in WinBUGS

Single-season model (part II)

- model assumptions
- dealing with heterogeneity
- small sample/finite population inference
- modelling spatial correlation in occupancy

Day 2

Design matrices and fitting custom single-season models in PRESENCE

- worked single-season example (with covariates)
- examination of the output
- results and interpretation
- using results to develop maps

Advanced modelling using WinBUGS

- including covariates
- spatial correlation

Single-season study design

- site selection
- allocation of effort
- design comparisons
- survey timing
- miscellaneous issues
- covariates
- GENPRES

GENPRES exercises

Multiple-season model (part I)

- basic sampling situation (data type)
- model history and development
 - implicit dynamics
 - explicit dynamics
- missing observations
- covariates

Day 3

Multiple-season models in PRESENCE

- worked MS examples
- examination of the output
- results and interpretation

Multiple-season model (part II)

- alternative parameterizations
- characterizing occupancy dynamics
- modelling spatial correlations in occupancy dynamics

Worked multiple-season examples and computer exercises

- incorporating interesting biology into modelling
- further worked examples
- examination of the output
- results and interpretation

Using WinBUGS to fit multi-season models

Multiple-season study design

- relationship with single-season designs
- long-term design
- adding sites over time
- GENPRES

Multiple Detection Methods: Single-season Models

- Multiple device parameters
- Multiple device data
- worked examples

Multi-state occupancy

- 3-state occupancy – single season
- 3-state occupancy – dynamics
- worked examples

Joint habitat-occupancy dynamics

- simultaneous modelling of habitat and occupancy
- worked examples

Day 4

Modelling multiple 'species' simultaneously

- 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
- worked examples

Species richness and community dynamics

- applying single-species methods to address community-level questions
- worked examples

Species co-occurrence

- do species co-occur independently?
- single-season model (co-occurrence pattern)
- multi-season model (co-occurrence process)
- worked examples of each

Other extensions

- Incorporation of count data and estimates of abundance
- Marked animals
- Combining occupancy and telemetry data

Summary, discussion and consulting session

- analyze own data
- ask specific questions of the instructors