Workshop

Hierarchical models for abundance, distribution and species richness in spatially structured populations using unmarked and WinBUGS/JAGS

USGS Patuxent Wildlife Research Center, Laurel/MD

2–5 April 2012

Instructors: Marc Kéry, Richard Chandler, Andy Royle

Syllabus

(AM is ~9-13 and PM is ~14-17.30, with 30 min coffee break in each)

Time	Module	Duration (min)	Presenter	Content
Monday	**Various intros and first HM in practice: Nmix**			
AM	0. General and Administrative introduction	20	All	-Welcome to Patuxent -why workshop, features of workshop -introduce everybody -what, how, when (Syllabus) -Acknowledgements (Kimberly Gazenski, Elise Zipkin) -This is going to be a book, so comments welcome !
	1. Workshop introduction	45	Marc	-Ecological assessment in ecology and management -Abundance/occurrence/species richness -Hierarchical genesis of ecological data / importance of the observation process -Hierarchical models -Canonical cases: Nmix and site-occ model
	2. Analysis of hierarchical models	45	Andy, Marc	- likelihood and Bayesian analysis of a hierarchical models - Structure of workshop (and book): show both where possible, with perhaps more emphasis on unmarked for simpler cases and BUGS for non-standard analyses
	3. Introduction to the likelihood analysis of HMs using **unmarked**	50	Richard	- R and unmarked
	4. Introduction to the Bayesian analysis of HMs using MCMC engines with the BUGS language	50	Marc	-Blackboxes for getting samples from joint posterior distribution: WinBUGS, OpenBUGS, JAGS -running them from within R -comments on writing own MCMC algorithms

PM	5. Modeling abundance with unmarked individuals: Poisson/binomial N-mixture models	180	Marc	-Intro Nmix model, incl. different state models -producing maps -include illustrations of some general intro stuff -analyses in unmarked and in BUGS/JAGS
Tuesday	**Closed population models for abundance: Multinomial mix & distance sampling**			
AM	6. Modeling abundance with "marked" individuals: Poisson/multinomial N-mixture models, including capture-recapture	210	Andy, Richard	-double-observer, removal, etc. -analyses in unmarked and BUGS
PM	7. Distance sampling models	180	Andy	-Continuous space -binned data -analyses in unmarked and BUGS
Wednesday	**Static occupancy models and dynamic models for abundance and occurrence**			
AM	8. Modeling static occurrence and species distributions using site-occ models	120	Marc	-Occurrence is a summary of abundance (e.g., Nmix model IS also a species distribution model) -concepts, progression from logistic regression to MAXLIKE presence-absence models and single-season occupancy model -producing maps -finite sample quantities -two-species model with interaction (Waddle et al. 2011) -analysis in unmarked and BUGS
	9. Abundance in open populations: temporary emigration and demographic rates	90	Richard	-"implicit" dynamics model: treating seasons as groups, e.g., Dutch lizards -"classical" popdyn models with DD, e.g., Gompertz, Ricker -temporary emigration (Chandler et al., Ecology, 2011) -"explicit" dynamics model: Dail and Madsen -analyses in unmarked and BUGS
PM	10. More open models of abundance	60	Richard	-ditto
	11. Dynamic distribution models	120	Marc	-dynamic site-occupancy model -producing maps of all components

				-unmarked and BUGS
Thursday	**Community models**			
AM	12. Multi-species occupancy models	210	Marc, Richard	-species richness as sum of occurrences of individual species -two kinds of unobserved species -static models -simply mention dynamic model ? -analysis in BUGS/JAGS only -likelihood analysis possible (code from Richard)
PM	13. Buffer	60	All	-ditto
	14. Wrapping up	60	All	-end around 3-4 pm