Applied Population Dynamics: Parameter Estimation - FiW 6984

Tu/Th 3:30-5:30
317A Cheatham
Fall 2012

Instructors:

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There are no required textbook for this course. We will rely on primary literature and book chapters provided by course. Highly recommended books from which this course will draw extensively and which are suggested as excellent sources for the topics covered are:

Anderson, D.R. 2008. Model based inference in the life sciences. Spinger; New York, NY

Buckland et al. 2001. Introduction to distance sampling: Estimating the abundance of biological populations. Oxford University Press.

Burnham and Anderson. 2002. Model Selection and multimodel inference: a practical information-theoretic approach; second edition. Springer.

MacKenzie et al. 2006. Occupancy estimation and modeling: Inferring patterns and dynamics of species occurrence. Academic Press.

Williams et al. 2002. Analysis and management of animal populations. Academic Press.

Topics:
This class will focus on parameter estimation for wildlife populations. The primary themes will be the effects of detectability on parameter estimates, estimating detectability, and incorporating detectability into parameter estimates. Estimated parameters of interest will include animal abundance, density, occupancy, survival, and recruitment. We will primarily use readily available, downloadable, software. Lectures and practical hands-on computer work will be taught in an integrated fashion and will focus on background and theories. We will use real data sets implemented in available software programs to gain hands on experience analyzing and modeling raw data sets. Parameter estimation will begin with DISTANCE estimation techniques, followed by mark-recapture techniques for estimating abundance/density using programs such as CAPTURE, MARK, and spatially explicit capture-mark-recapture techniques such as programs DENSITY, and SPACECAP. Occupancy estimation will be implemented in Program PRESENCE and finally, survival and recruitment addressed through Program MARK.

This course uses problem based learning. All homework assignments given are real data sets that student must analyze and interpret. A computer is a must and laptop computers with wireless capability, are required for the course. Unfortunately, PCs are preferred over MACs because downloadable software is often incompatible with MACs unless you are running Parallels.

Final projects should apply at least one of the concepts and techniques to a real world data set, preferably the student's own data, or data related to the student's graduate project.

DISABILITY STATEMENT: Any student who feels that s/he may need an accommodation because of a disability (learning disability, attention deficit disorder, psychological, physical, etc.), please see the instructor.

Method of Evaluation:

Assignments (Order and points subject to change)	pts
Frequentist versus Information Theoretic approaches. The importance of detectability in wildlife studies; Background on AIC and multi-model inference; Bayesian approaches.	
Analysis of Point count and/or transect data through Program DISTANCE	50
Analysis of mark-recapture data for abundance using programs CAPTURE and MARK. Determination of animal density and using ad hoc approaches	50
Continued Density estimation using spatially explicit capture mark recapture techniques: Programs DENSITY and SPACECAP	50
Logistic Regression and Survival analysis in Program MARK	50
Analysis of presence/non-detection data in program PRESENCE estimating detectability and occupancy	50
Robust Design and recruitment in Program MARK	
Final Papers and Presentations	100
Participation	50
TOTAL	**400**