9-2011

WILD 562.01: Wildlife Habitat Modeling

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Syllabus
WILD 562 - Wildlife Habitat Modeling

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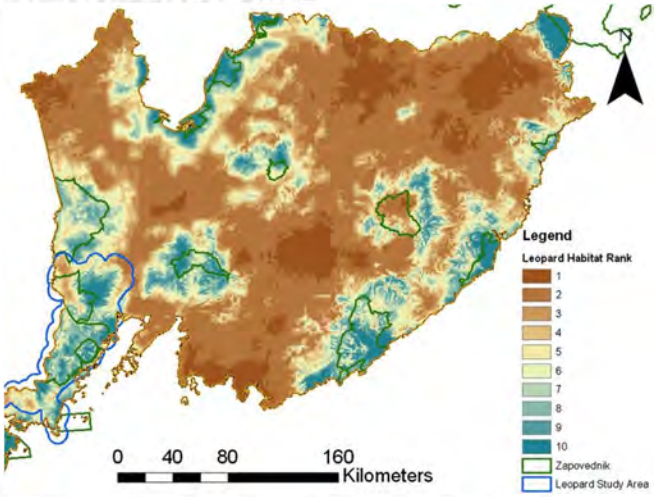

Lectures: 10:10 – 11:00 AM Tuesday and Thursday CHCB 452

Computer labs: 1:00 – 4:00 pm Tuesdays JOUR 107

Course objectives: To complete a comprehensive survey of recent advances and approaches in the study of wildlife-habitat relationships. Students will learn the importance of definitions of habitat, and learn the pivotal theories of habitat selection. Building on these definitions and theories, students will be exposed in class and computer laboratories to: 1) approaches to measure habitat including field, classification/ordination methods, GIS, and remote sensing techniques; 2) approaches to measure wildlife use of habitat including telemetry (VHF, GPS), surveys, Mark-Recapture, etc.; 3) approaches to the analysis of wildlife-habitat data including common designs such as habitat suitability index (HSI) models, resource selection functions (RSF), occupancy modeling, and newer methods such as climatic niche envelope models, GARP models, and Mahalanoibis distance-methods. We will focus on the use of RSF models but evaluate them with respect to these other methods. A large part of the class will involve student-lead analysis projects and presentations.

Required Readings: Will be assigned from current scientific literature and made available on the course website. Readings assigned will often form the basis of discussion in class and especially for the laboratories – it's expected they will have been read before class! However, for those interested especially in RSF methods, I recommend this in your bookshelf:

1) Manly, B. F. J., McDonald, L. L., Thomas, D. L., McDonald, T. L. & Erickson, W. P. 2002. Resource selection by animals: statistical analysis and design for field studies. Kluwer, Boston, USA.

Software:
The computer laboratory portion of the class will depend on use ARCGIS as the GIS platform, and the open-source statistical program R. Both of these two software packages will be made available in the JOUR computer labs.
R-project http://www.r-project.org/
R is free and available for download from the website above. We will be using an open-source GUI (graphical user interface) called Tinn-R available for download here: http://cran.r-project.org/web/packages/TinnR/. Through the semester we will download and install other R-packages. STATA 10.0 will be also available in JOUR 106 or JOUR 107. Other advanced stats packages (STATA, S-Plus, SAS) are compatible with the analyses in this course, but this course will be based on statistical analyses with R. This is the first time this class has been offered in R, and students new to R are encouraged to consider taking FOR 595 *Introduction to Ecological Analysis* in R offered by Solomon Dobrowski and David Affleck, and/or working through some of these excellent introductory R books.

2) Dalgaard, P. 2008. Introductory statistics with R. Springer.
3) Zurr, A.F., et al. 2009. A beginners guide to R. Springer.
4) Crawley, M.J. 2005. Statistics: an introduction using R. Wiley.

ARCGIS 10.0 see www.esri.com/

We will be using ARCGIS 10.0 despite the fact that ARCGIS 10.0 has some backwards compatibility issues with ARCGIS 9.3.1 and earlier editions, and Hawthtools and other extensions (Home Range Tools) no longer work with 10. The university has a site license for ARCGIS for the entire campus, therefore, your advisors can install ARCGIS on university desktop computers free of charge within your own labs. I will also be providing free 1-year student license versions of ARCGIS 10.0. In addition to ARCGIS 10.0, you also need to make sure the extension Spatial Analyst is installed, and Geospatial Modeling Environment (GME, http://www.spatialecology.com/gme/) some other tools I will cover in lab. Note that GME replaces Hawthtools.

Course Website:

Students will need active CFC login accounts to access the computer lab and UM NetID to access the Moodle class webpage. Students will need to become familiar with MOODLE, the new online course software. See http://umonline.umt.edu/ for details and UM Online 101.

WBIO 595 Grades		
Lab Assignments	40	
Class Participation	10	
Student Research Project	50	
Annotated Bibliography		5
Research Proposal		10
Proposal Presentation		15
Final Research Paper		20
	100	

Lab Assignments: Students will have a **choice of 5 of 7 lab assignments** to choose from to prepare and submit by the next lab (next week) during the first 2/3 of the course. Lab assignments will build on lecture materials and labs and thus will be comprehensive in scope.

Student Project: The student project will form the bulk of the course grade and will be comprehensive in scope covering materials from class and lecture. It is expected that students will use their own spatial data to develop a student project. Steps in the student project are as follows:

1. **Meeting** & scheduling presentations - Students will schedule a brief meeting with Dr. Hebblewhite no later than October 1st to discuss the potential project and to schedule presentations.
2. **Annotated bibliography** (5) – this will include a review of no less than 10 habitat-related papers relevant to each student's particular research topic. Students will provide a brief 1-paragraph review of the salient points of each paper with respect to their question. An example annotated bibliography will be provided. Due October 11th.
3. **Research proposal (10) -** students will be expected to submit a brief research proposal including literature review, research question, study area, data collection, and methodology to be used. Proposal due Nov 1st.
4. **Proposal presentation (15) –** Students will lead the class (during lecture times) through a powerpoint presentation of their particular research question and proposal for ~20-30 minutes. Students will assign 1 relevant paper for the class to read before the presentation related to either the biology or preferably the methods detailed in the paper. Students will lead a class discussion of the methodological and scientific issues encountered in each student's project. Starts 29 November.
5. **Final research paper (20)** – Students will prepare a 10-20 page scientific manuscript reporting the results of analyses focusing on methodological and habitat related issues relevant to the class objectives. Details of the research paper will be given later. **The Final paper will be due by December 12th.**

WILD 562 Wildlife Habitat Modeling – Draft Schedule

Lec#	Date	Lecture Topic	Lab Topic & Readings	Assignments
1	**30-Aug**	**Introduction, Syllabus, Overview**	Lab 1; Computer Lab Orientation, Vector & Raster Data	
2	1-Sep	What is Habitat		
3	6-Sep	What is Habitat II: The Niche	Lab 2: Introduction to R	
4	8-Sep	Niche Theory Continued		
5	13-Sep	Density Dependent Habitat Selection	Lab 3: H.S.I. Models	
6	15-Sep	Habitat Selection Theory		
7	20-Sep	Introduction to Selection	Lab 4: Habitat use - RSF models I	*Lab assignment 4*
8	22-Sep	Scale		
9	27-Sep	RSF Designs	Lab 5: Habitat selection - RSF's II	*Lab 5*
10	29-Sep	RSF Theory		
11	4-Oct	Guest Lecture	Open R Lab	*Lab 6*
12	6-Oct	Guest Lecture		
13	11-Oct	RSF Theory	Lab 6: RSF III and Model Selection	*Annotated Bibliography Due*
14	13-Oct	Model Selection		
15	18-Oct	Categorical RSF models	Lab 7: Categorical RSF models	*Lab 7*
16	20-Oct	Interactions in GLM		
17	25-Oct	Evaluating RSF models	Lab 8: Evaluating RSFs	*Lab 8 - Proposals due*
18	27-Oct	Evaluating RSF models		
19	1-Nov	Matched-case control designs	Lab 9: Conditional logistic RSF models	Lab 9
20	3-Nov	Poisson models: Modeling amount of use		
21	8-Nov	Mixed-effects models	Lab 10: Mixed-effects RSF models	Lab 10
22	10-Nov	Functional responses in resource selection		
23	15-Nov	Occupancy Models	Lab 11: Occupancy Modeling	Open Night Lab Session
24	17-Nov	Occupancy Models		
25	22-Nov	Applications: Critical Habitat	Open Lab	
26	24-Nov	**Thanksgiving Holiday: No Class**		
27	29-Nov	Linking habitat to populations	Lab 12: Occupancy Modeling	
28	1-Dec	Habitat and climate change		
29	6-Dec	Student presentations	*Student presentations in Lab*	
30	8-Dec	Student presentations		
31	12-Dec	**NO FINAL EXAM**		**Student papers due**