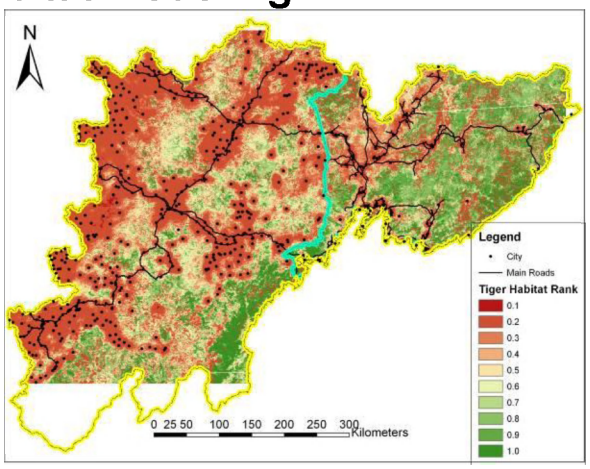
9-2009

WBIO 562.01: Wildlife Habitat Modeling

Mark Hebblewhite
University of Montana - Missoula, mark.hebblewhite@umontana.edu

Syllabus
WBIO 562 - Wildlife Habitat Modeling



Dr. Mark Hebblewhite, Forestry 304, Phone: 243-6675,
Email: mark.hebblewhite@umontana.edu,
Office Hours are 13:00-15:00 on Tuesday, or by appointment.

Lecture times: 11:10 – 12:00 PM Tuesday and Thursday (JOUR 113)

Computer laboratory times: 1:00 – 4:00 pm Thursdays JOUR 106

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), and newer methods such as climatic envelope models, compositional analyses, 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, I do recommend this in your bookshelf:

> 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:
STATA 10.0 see www.stata.com/ **ARCGIS 9.2 see www.esri.com/**
These two software packages will be made available in the JOUR 106 computer lab. 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. You also need Spatial Analyst, and some other tools I will cover in lab. I can also request free student copies of ARCGIS for a 1-year license (including Spatial Analyst) and will submit these in the first week of class pending feedback from students.

STATA will be available in JOUR 106 or JOUR 107. Other advanced stats packages (R, S-Plus, SAS) are compatible with the analyses in this course, but this course will be based on statistical analyses with STATA. See the Stata website for student versions of the software under the STATA 10 GradPlan - http://www.stata.com/order/new/edu/gradplan.html#2
1-year license and manual runs 98$, perpetual license runs $179

Course Website: **http://currents.cfc.umt.edu:8080/dashboard.action**
To be finalized – will be a wiki on CFC currents webpage

Students will need active CFC login accounts to access the computer lab and CFC Wiki webpage. This will be covered in the first orientation lab.

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 September 18th 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 1st.
3. **Research proposal (10) -** students will be expected to submit a formal research proposal including literature review, research question, study area, data collection, and methodology to be used. Proposal due Oct 29th.
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. Following (or during) the presentation, students will lead a class discussion of the methodological and scientific issues encountered in each students project. Starts 24 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 8th.**

POLICIES

The deadline to add/drop by cyberbear is September 17, 4:30 pm. After this date a drop results in W on transcript and no refunds are given. October 8, 4:30pm is the last day to drop by paper form. The last day to petition for a drop or change of grading options is December 7. Note that valid reasons must be given for the instructor to sign a drop form after September 17th. Examples of invalid excuses include poor grades, attendance, etc. Late assignments will be graded at a -5% penalty / day unless a valid excuse is raised before the assignment is due.

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#	Date	Lecture Topic	Lab Topic & Readings	Assignments
1	**1-Sep**	**Introduction, Syllabus, Overview**		
2	3-Sep	What is Habitat	Lab 1; ArcGIS tutorials	
3	8-Sep	What is Habitat II: The Niche		
4	10-Sep	Niche Theory Continued	Lab 2: Vector data	
5	15-Sep	Density Dependent Habitat Selection		**Student meetings**
6	17-Sep	Density Dependent Habitat Selection	Lab 3: Raster data	**Student meetings**
7	22-Sep	**Guest Lecture**		
8	24-Sep	**Guest Lecture**	No Lab	
9	29-Sep	Abundance-Occurrence relationships		
10	1-Oct	Ecological traps	Lab 4: H.S.I. Models	*Lab assignment 4*
11	6-Oct	Scale		*Annotated Bibliography Due*
12	8-Oct	Measuring habitat	Lab 5: Habitat use - RSF models I	*Lab 5*
13	13-Oct	Introduction to Selection		
14	15-Oct	RSF Designs	Lab 6: Habitat selection - RSF's II	*Lab 6*
15	20-Oct	RSF Theory		
16	22-Oct	RSF Theory	Lab 7: RSF III and Model Selection	*Lab 7*
17	27-Oct	**Guest Lecture: Resource Utilization Functions**		
18	29-Oct	Categorical RSF models	Lab 8: Categorical RSF models	*Lab 8 - Proposals due*
19	3-Nov	Interactions in GLM		
20	5-Nov	Evaluating RSF models	Lab 9: Statistical evaluation of RSFs	Lab 9
21	10-Nov	Modeling amount of use		
22	12-Nov	Autocorrelation and other red herrings	Lab 10: Spatial evaluation of RSFs	Lab 10
23	17-Nov	**Guest Lecture**		
24	19-Nov	Mixed-effects models	Lab 11: Mixed-effects RSF models	Open Night Lab Session
25	24-Nov	Functional responses in resource selection		
26	26-Nov	**Thanksgiving Holiday: No Class**	No Lab	
27	1-Dec	Habitat and populations		
28	3-Dec	Habitat and climate change	*Student presentations in Lab*	
29	8-Dec	Student presentations		**Student papers due**
30	10-Dec	Student presentations		
31	14-Dec	**NO FINAL EXAM**		