Department of Ecology, Evolution, and Environmental Biology (E3B)

G6125: Behavioral Ecology and Conservation

Spring Semester 2009
Lectures: Th 10am-11:50 am;
Schermerhorn Extension- Room 1015

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Course Outline

Objective

This is a course for graduate students who have had previously taken a course in animal behavior and who would like to learn in more depth how behavioral ecology can be used in conservation. Much of today's conservation biology literature emphasizes landscape ecology, demographic fluctuations, and population genetics without addressing the behavioral links that enable long-term survival of populations. Understanding the behavior of individuals, for instance contact rates of hosts when faced with disease transmission, or the interplay of environmental stress and hormonally induced alteration of behaviors, can be imperative for efforts to preserve a threatened population.

A variety of issues will be addressed, from the insights of a behavioral perspective, to the relative importance that should be given to behavioral theory, to the limits of behavioral research in conservation. This course will review the significance for conservation biology of various components of behavioral ecology, broadly divided into quantitative natural history, concepts, and methods, and will utilize a number of disparate case studies.

The specific objectives of the course are:

- To become familiar with current and seminal literature in the field of conservation and behavioral ecology
- An understanding of the ways in which behavioral ecology can contribute to the solution of the kinds of conservation and ecological problems now (or soon to be) facing wildlife.
- To develop skills needed to recognize and analyze the relationships among the scientific, technological, societal and economic issues that shape how we use behavioral ecology data in conservation research
- To understand how behavioral ecology can be used to make environmental management decisions and to understand the tools used in the field of behavioral ecology for different species.

Course Structure
Each section of the course includes the examination of key questions and concepts that will be illustrated by lectures, class discussion, required and supplemental readings, and associated websites. I will lecture on the course topic for the first half of the lecture. Course lectures intend to present a broad overview of the issues in behavioral ecology and conservation biology affecting any number of organisms of interest. I encourage individuals in class to contribute to discussions in the lecture period. Students will be expected to do the assigned reading before class and be prepared to discuss the articles in class. Powerpoint presentations of lectures will be posted on Courseworks after class. *For this reason, I discourage students from bringing laptops to class as it may be distracting to other students during both lecture and discussions.*

Each student will be involved in 2 class presentations (30 min in length). Students will lead the class by selecting the week/topic they wish to present, and then by choosing one additional paper for the class to read (papers should be chosen the week before class).

Readings and Text:
Students will be expected to do a significant amount of reading for the course and to contribute to discussions on readings. The principal text for this course is:

-Clemmons and Buchholz. 1997. Behavioral approaches to conservation in the wild. Cambridge University Press. Available in the CU bookstore (limited copies available) and as a reserve in the biology library.

-I will also draw heavily from Caro 1998. Behavioral Ecology and Conservation Biology. Oxford University Press (a CU E-book, you can check out the book online from CLIO)- Also on reserve in the library.

-If your background in behavioral ecology is not up-to-date, I recommend you read Behavioral Ecology (J.R. Krebs and N.B. Davies) before the course begins.

-You will probably want to refer to the following book when you design your zoo project: Measuring Behavior: An Introductory Guide (P. Martin and P. Bateson). Cambridge University Press.

Scientific articles are available either online (if they are not copyright protected) or on the CourseWorks website, or the citation is listed and you may download them individually.

Grades will be based on the following:

Zoo Project- 35%
Presentations- 25%
Participation- 10%
Final Paper- 30%

Zoo Behavioral Project (35%): Students will choose a species to study at the Bronx Zoo; research that species' physical and behavioral characteristics; then learn skills necessary to

select, operationalize, observe, and accurately record animal behavior. After your classroom preparation, students will go on their own to the Bronx zoo to observe the behavior of the animal they chose. You will be given 3 free entry passes into the Bronx zoo to conduct your behavioral observations at the end of January. The goal of this project is two-fold: first to learn basic behavioral observation techniques, and second, to apply issues in behavior to a question in conservation. A final paper, approximately 8-13 double spaced pages in length (including figures and tables), and written in the style of *Animal Behavior*, will be submitted on April 2nd (in class). It should include an analysis of your data and results, as well as putting them into a conservation context. Your project paper should include at least ten journal or book citations. All topics must be approved by the instructor ahead of time to avoid duplication of topics by students in the class, and to avoid topics deemed inappropriate for the class. A single paragraph outlining possible species you are interested in studying, along with the general questions you are interested in examining, is due in class on Feb 5 th. A one page (single spaced) project proposal, outlining the species of interest, the question, and the type of behavioral observations you will employ is due in lecture on Feb 12th. **Final papers are due in lecture on April 2nd- no exceptions.**

Presentations (25%): Students will lead the class by selecting the week/topic they wish to present, and then by choosing one additional paper for the class to read (papers should be chosen the week before class). Papers should be posted by students on Courseworks under the appropriate lecture folder (shared folders). Student presentations will be approximately 30 minutes; with 15 min reviewing the main scientific paper (supporting papers can be addressed in your presentation, but will not be the main focus). The remainder of time (10-15 min) will be used to lead a discussion and guiding the ensuing discussion, bringing the discussion back on course when it becomes side-tracked, and re-energizing the topic when interest wanes. Intrinsic to this presentation will be the formulation of a 2 page double spaced summary of the topic along with a one page bibliography of relevant literature. Given the short length of your summary paper, you will need to be as succinct as possible in describing the relevant history of the topic along with a brief description of how the paper you presented supports or refutes the presiding theory on this topic. The main goal should be to show me that you have learned this topic to a level that you could actually teach this topic to an undergraduate audience in the future. No web resources are allowed in your bibliography or summary.

Final Paper (30%): A paper of approximately 7-10 double-spaced pages (1.0 inch margins, 12 point font) giving a detailed review of some aspect of behavioral ecology and its relevance to conservation biology. The paper should be in the format (including the reference style) of the journal *Animal Behaviour*. All topics must be approved by the instructor ahead of time to avoid duplication of topics by students in the class, and to avoid topics deemed inappropriate for the class. Paper topics should be proposed to the instructor by mid semester. **Papers are due in lecture on April 23rd. Absolutely no exceptions will be made!**

Class Participation (10%): Each week we will discuss the assigned reading articles in class. You should come to class every Tuesday having read the material to be discussed or having done the assignment and be prepared to contribute to the discussion of it. This grade is an easy 10 points toward your final score. If you read the papers and diligently participate, you'll get the full 10 points. If you only sometimes read and participate, you'll get 5 points. If I never

hear from you in class and you clearly aren't doing the reading, zero points (the difference between and A and a B). I also reserve the right to use exceptionally strong/weak participation as a means to make decisions on borderline final grades (i.e. decide between a B+ and A-).

Attendance Policy: Attendance of lectures is strongly encouraged since complementary material, in addition to required readings, will be presented in lectures. Discussion periods will also require in-class participation from all students.

Late Policy: Ten percent (10%) of the grade will be deducted per day if the zoo project reports or papers are submitted past the due date. Materials that are submitted more than one week late will not be accepted.

Plagiarism or Cheating: Don't do it. Columbia has always believed that learning to write effectively and think critically are some of the most important goals a college student can achieve. Your assignments and papers play a major role in course performance, but more important, they play a major role in intellectual development. Every year there are instances in which students attempt to submit the work of other people as their own. Because intellectual integrity is the hallmark of educational institutions, academic dishonesty is one of the most serious offenses that a student can commit at Columbia. It is punishable by suspension or dismissal from the University.

Other:

Courseworks: Assigned reading in the form of pdf's are available under the shared file folder of Class Files under Courseworks. If you choose to view the pdf version of the material on courseworks, please be aware that at times, Courseworks will give you an error indicating that the file you are trying to open either does not exist, or is corrupt. This often happens during heavy computer usage times and is a known bug in Courseworks. I recommend logging out of Courseworks and trying again at another time. 99% of the time, the file is actually fine and will properly open if you attempt to open it at another time.

Sources: I do not allow web resources to be used as sources in your zoo project paper or final paper. I prefer that you use scientific, peer-reviewed literature for your papers. You may use some limited amounts of gray literature (ex. government reports), but I prefer that you draw from the primary literature. Here is a list of journals you might consider searching as you develop your papers and projects:

1) Animal Behaviour
2) Ecological Applications
3) Conservation Biology
4) Animal Conservation
5) Ecology
6) Behavioral Ecology
7) Behavioral ecology and sociobiology
8) Behavior
9) Biodiversity and Conservation
10) Biological Conservation
11) Biological Conservation
12) Conservation Ecology

Class Outline:

Date	Topic and readings
1. Jan. 22	Introduction, review of syllabus, sign up for papers to present, develop project idea for zoo project
2. Jan. 29	Why integrate behavior and conservation; Individual level variation. The papers listed below are important background reviews. Caro, T. 1999. The behavior-conservation interface. Trends in Ecology and Evolution 14:366-369 Harcourt 1999. Response to: The behavior-conservation interface. Trends in Ecology and Evolution 14:490 Arcese et al. Why hire a behaviorist into a conservation or management team? Pp. 48-71 in Clemmons and Buchholz Beissinger, S.R. Integrating behavior into conservation biology: potentials and limitations. Pp 23-47 in Clemmons and Buchholz Bucholz and Clemmons. Behavioral variation: a neglected biodiversity. Pp 181-208 in Clemmons and Buchholz
3. Feb 5	Environmental Stress and Ecotoxicology. The first three papers are background, the later two are for presentation and discussion. Lafferty, K. and L. Gerber. 2002. Good medicine for conservation biology: the intersection of epidemiology and conservation theory. Conservation Biology 16:593-604. Wingfield et al. Environmental stress, field endocrinology, and conservation biology. Pp. 95-131 in Clemmons and Buchholz Smith and Logan. Linking environmental toxicology, ethology and conservation. Pp. 277-302 in Clemmons and Buchholz Waser et al. 1997. Noninvasive physiological measures of disturbance in the northern spotted owl. Conservation Biology 11:1019-1022. Nocera and Taylor 1998. In situ behavioral response of common loons associated with elevated mercury (Hg) exposure. Conservation Ecology 2:10
4. Feb. 12	The greenhouse effect and changes in animal behavior: effects on social structure and life-history strategies- two papers for background, two for presentation and discussion

	Visser, M. and C. Both. 2005. Shifts in phenology due to global climate change: the need for a yardstick. Proceedings of the Royal Society of London B 272: 2561-2569. Thomas, C., A. Franco, and J. Hill. 2006. Range retractions and extinction in the face of climate warming. Trends in Ecology and Evolution 21: 415-416. Visser, M., L. Holleman, P. Gienapp. 2006. Shifts in caterpillar biomass phenology due to climate change and its impact on the breeding biology of an insectivorous bird. Oecologia 147: 164-172. Derocher, A., N. Lunn, and I. Stirling. 2004. Polar bears in a warming climate. Integrated Comp. Biol. 44:163-176.
5. Feb. 19	Dominance and sexual selection – two papers for background, two for presentation and discussion Milner, J. E. Nilsen, and H. Andreassen. 2006. Demographic side effects of selective hunting in ungulates and carnivores. Conservation Biology Endler J.A. 1991. Variation in the appearance of guppy color patterns to guppies and their predators under different visual conditions. Vision Research 31:587-608. Seehausen et al. 1997. Cichlid fish diversity threatened by eutrophication that curbs sexual selection. Science 277:1808-1811. Berger, J. and C. Cunningham 1998. Natural variation in horn size and social dominance and their importance to the conservation of black rhinoceros. Conservation Biology 12: 708-711
6. Feb. 26	Predator-prey interactions – the first chapter is background, latter two papers for presentation and discussion Berger, J. Future prey: some consequences of the loss and restoration of large carnivores. Pp 80-100 in Caro- (E-Book). Shier, D. 2006. Effect of family support on the success of translocated black-tailed prairie dogs. Conservation Biology 20:1780-1790. Berger and Cunningham 1995. Predation, sensitivity, and sex: why female black rhinoceroses outlive males. Behavioral Ecology 6:57-64.
7. Mar 5	Human intervention strategies: artificial brood reduction, and learning and retaining skills. The first 2 papers are background, the latter three are for

	presentation and discussion. Eadie et al. Conspecific brood parasitism, population dynamics, and the conservation of cavity-nesting birds. Pp. 306-340 in Caro. - (E-Book). McLean 1994. Conservation and the ontogeny of behavior. Pp 132-156 in Clemmons and Buchholz Efford and Edge 1998. Can artificial brood reduction assist the conservation of yellow-eyed penguins? Animal Conservation 1:263-271. Bunin and Jamieson. 1996. Responses of a model predator of New Zealand's endangered takahae and its closest relative, the pukeko. Conservation Biology 10:1463-1466. Van Heezik et al. 1999. Helping reintroduced houbara bustards avoid predation: effective anti-predator training and the predictive value of pre-release behaviour. Animal Conservation 2:155-163.
8. Mar. 12	Allee effects. The first two papers are background, the latter two are for presentation and discussion. Phillips and Sutherland. 1999. Consequences of the Allee effect for behavior, ecology and conservation. Trends in Ecology and Evolution 14:401-405. Clutton-Brock et al. 1999. Costs of cooperative breeding in suricates (*Suricata suricatta*). Proc. Royal Soc. Lond., B. 265:185-195. Clutton-Brock et al. 1999. Predation, group size and mortality in a cooperative mongoose. Journal of Animal Ecology 68:672-683. Courchamp et al. 1999. Population dynamics of obligate cooperators. Proc. Royal Soc. Lond., B. 266:557-564.
9. Mar. 26	Foraging behavior. The first two papers are background, the later two are for presentation and discussion. Thiollay, JM 1997 Disturbance, selective logging and bird diversity: A Neotropical forest study. Biodiversity and Conservation 6: 1155-1173 Johns. 1986. Effects of selective logging on the behavioral ecology of West Malaysian primates. Ecology 67:684-694. Funston et al. 1998. Hunting by male lions: ecological influences and socioecological implications. Animal Behaviour 56:1333-1345 Pulido, F. J., Diaz, M. 1997. Linking individual foraging behavior and

	population spatial distribution in patchy environments: A field example with Mediterranean blue tits. Oecologia 111:434-442.
10. Apr 2	Mating systems – effective population size. Two are background, two for presentation and discussion. Parker and Waite. Mating systems, effective population size, and conservation of natural populations. Pp 243-261 in Clemmons and Buchholz Creel. Social organization and effective population size in carnivores. Pp246-270 in Caro- (E-Book). Hoglund, J. 1996. Can mating systems affect local extinction risks? Two examples of lek-breeding waders. Oikos 77: 184-188. Berger, J. 1996. Animal behaviour and plundered mammals: is the study o mating systems a scientific luxury or a conservation necessity? Oikos 77:207-216.
11. Apr. 9	Guest Lecture- TBA
12. Apr. 16	Dispersal and inbreeding avoidance. The first two papers are background, the later two are for presentation and discussion. Van Vuren. Mammalian dispersal and reserve design. Pp 369-393 in Caro (E-book) Reed and Dobson 1993. Behavioral constraints and conservation biology: conspecific attraction and recruitment. Trends in Ecol. Evol. 8:253-256. Cassinello, et al. 2000. Relationship between coefficient of inbreeding and parasite burden in endangered gazelles. Conservation Biology 15:1171-1174. Schultz, C. 1998. Dispersal behavior and its implications for reserve design in a rare Oregon butterfly. Conservation Biology 12: 282-292. Sutcliffe and Thomas. 1996. Open corridors appear to facilitate dispersal by ringlet butterflies between woodland clearings. Conservation Biology 10:1359-1365.

13. Apr. 23	Responses to habitat fragmentation. The first two papers are background, the later two are for presentation and discussion. Hagan, J. M.; Vander Haegen, W. M.; McKinley, P. S. 1996. The early development of forest fragmentation effects on birds. Conservation Biology 10: 188-202. Hobson, K. A.; Villard, M-A. 1998. Forest fragmentation affects the behavioral response of American redstarts to the threat of cowbird parasitism. Condor 100: 389-394. Wolff, J. O.; Schauber, E. M.; Edge, W. D. 1997. Effects of habitat loss and fragmentation on the behavior and demography of gray-tailed voles. Conservation Biology 11: 945-956. Lima, S. L.; Zollner, P. A.1996. Towards a behavioral ecology of ecological landscapes. Trends in Ecology & Evolution11: 131-135.
14. Apr. 30	Behavioral ecology and conservation policy. Both papers for discussion. Rubenstein, D. 1998. Behavioral ecology and conservation policy: on balancing science, applications, and advocacy. Pp. 527-556 in Caro - (E-Book). Ralls, K. 1997. On becoming a conservation biologist: autobiography and advice. Pp 356-372 in Clemmons and Buchholz (eds) Behavioral approaches in the wild.