Instructor: Brad Griffith, Asst. Leader (Wildlife Ecology) 
Alaska Coop. Fish & Wildl. Research Unit 
216 A, Irving l, UAF; 474-5067, ffdbg@aurora.alaska.edu

Overview:

The course will address patterns of biological diversity with particular reference to the effects of natural resource exploitation by humans. It will examine the theory, cause, and examples of species endangerment and extinction and stress integration of principles into strategies for biological conservation. Intended for graduate students from biological disciplines with a background or abilities in population/community ecology and analysis.

Course format is a weekly discussion session and a weekly computer laboratory exercise. In the discussion, a designated student will abstract a topic then guide a discussion of related assigned readings. Students will be required to read, comprehend, synthesize, and discuss selected historical and current literature concerning population genetics, habitat modification and fragmentation, exploitation, demographic and environmental stochasticity, and population and community ecology as applied to the synthesis of principles and strategies for preserving biological diversity.

In the laboratory exercise, we will use the potential reintroduction of wood bison to Yukon Flats as focal project. The class will function as a mock technical review committee that applies principles of conservation biology to the assessment of the proposed reintroduction. We will review a draft feasibility assessment for the reintroduction and compare it to IUCN Guidelines for Reintroductions and other relevant literature to assess its adequacy. We will identify areas where additional information is required and design studies to obtain and/or incorporate this information into a revised feasibility assessment. We will review the literature to obtain relevant data, integrate this data to into computer simulations that evaluate the effect of founder size, age and sex composition of the founders, and other relevant factors into a quantitative assessment of the feasibility of successfully reintroducing bison.

Course Objectives:

Through critical review and discussion of contemporary literature to:

1) gain an understanding of the theoretical basis of biological diversity and species extinction,

2) become familiar with cases studies that attempt to employ/test theoretical predictions.
Topics:
Current and historical species richness and extinction rates.
Theory, cause, and examples of endangerment and extinction:
    Habitat pattern, modification, and fragmentation;
    Population genetics;
    Demographic and environmental stochasticity;
    Catastrophes;
    Exploitation.
Design of nature reserves.
Design of habitat fragmentation.
Captive propagation and reintroduction.
Management strategies for free-ranging endangered species.
Species orientation vs. diversity orientation.
Deterministic vs. stochastic population models.
Population viability analysis.

Attendance Policy: Students are expected to attend and participate in all class sessions.

Teaching Procedures:

Discussion sessions will meet once each week and the laboratory exercise will meet once per week. All students will read and be prepared to discuss all assigned papers for that week. One student will be assigned to lead an approximately 20-30 minute discussion on each of the assigned papers each week. Discussion leaders will be expected to be familiar with important material in the literature cited section of their paper. The instructor will facilitate discussion and provide a summary that synthesizes the literature discussed during each weekly meeting.

In the laboratory session, we will employ Population Viability Analysis (PVA) procedures to develop an understanding of the factors affecting the persistence of small populations. The goal of the laboratory exercise is to conduct a formal quantitative assessment of the viability of a potential wood bison reintroduction to Alaska and to assess potential causes for extinction and alternative management strategies. Class members will develop a plan for the PVA, identify necessary assumptions, obtain the necessary demographic data, employ this in computer simulations, and write-up the results of the PVA. It is conceivable that this exercise could lead to the submission of a paper for peer-review to Conservation Biology or some other appropriate outlet. As a minimum, the exercise will be submitted to Alaska Department of Fish and Game and the US Fish and Wildlife Service for their review.

Grading Policy: To obtain an A in this course, you must earn it.

1) 30% - Class attendance, participation in seminar discussions led by others, and participation in the laboratory modeling exercise.
2) 30% - Leadership in discussion, laboratory exercises, and the technical review.
3) 40% - Contribution to the formal technical review of the feasibility assessment which will include preparation of a short briefing paper on at least one aspect of the technical review and contribution to the PVA and PVA write-up.

Incompletes will be granted only in exceptional circumstances (e.g. death).
Expanded Topic Outline

I. Topic definition and literature sources - an overview.

II. Status of the world’s biota.
   - Species richness, historical and current.
   - Extinction rates, historical and current.
   - Values of biological diversity.

III. Theory, causes, and examples of endangerment and extinction.
   - Habitat pattern, modification, and fragmentation.
     - Biogeography
     - Diversity, problems of scale and time
     - Insularity
     - Connectivity
     - Edge effects
   - Population genetics.
     - Founder effects
     - Effective population size
     - Heterogeneity
     - Implications for evolution/speciation
   - Demographic and environmental stochasticity.
     - Definitions
     - Relative importance
   - Catastrophes.
     - The value of disjunct populations
   - Exploitation.
     - Managed
     - Unmanaged
   - Integration.
     - Population viability
   - Case studies/applications.
     - Vertebrates
     - Invertebrates
     - Plants

IV. Synthesis of strategies for biological conservation.
   - Design of nature reserves.
   - Design of habitat fragmentation.
   - Captive propagation and reintroduction.
   - Implications of long-term climate change.
   - Management strategies for free-living endangered species.
     - Vertebrates
     - Invertebrates
     - Plants
   - Species oriented vs. diversity oriented approaches