EXAM II, 22 October 2003
<u>**Please put your NAME on the backside of the last page.**</u>
Exam is worth 75 points. After you turn in your individual copy, you will work on a different portion of the exam in groups of ~four. The score for your group exam will earn you additional points on your individual exam. (See syllabus for approximate details.)

<u>Very Short Answer</u> (a few words at most, 26 points)

1. At what latitudes do vascular plants tend to have their highest diversity (species richness)? Is this geographic distribution of diversity the same for most taxa? [2 points]

2. What is different about sink and source populations with respect to birth and death rates? [2 points]

3. Where did all mountain lions most likely originate? [2 points]

4. How does reliance on only mitochondrial DNA limit the amount of information that can be gleaned from genetic analyses? [2 points]

5. Explain what it means for the Logistic Growth equation to be density dependent. [2 points]

6. What does lambda mean in population modeling? [2 points]

7. What is a barrier to widespread use of PVA? [2 points]

8. Over the next 75 years or so, what is the key element needed for persistence of the Florida mountain lion population? [2 points]

9. Based on the recent PVA analyses we read about for mountain lion populations in Florida, at what time scale do genetic stochasticity and inbreeding depression begin to take a toll. [2 points]

10. Analysis of a matrix population model shows that survival of adults has a high elasticity value, whereas survival of newborns has very low elasticity. Where should management efforts be focused? [2 points]

11. The following equation is used to calculate the value of invoking a certain conservation strategy. What does delta P_i mean and what does D_i stand for? [2 points]

$$R_i = (D_i + U_i)(deltaP_i/C_i)$$

12. Compute the Shannon Diversity index using the following fictional data collected for the herpetofauna of an island off the coast of New Zealand: [4 points] Please show your thought process, if not your work.

Golden Bell Frog	29 individuals
Tuatara	4 individuals
Common Gecko	49 individuals
Marbled Skink	11 individuals
Otago Skink	7 individuals

Short Answer (Each answer should require about a sentence, 32 points)

13. How have Rob Robichaux and his colleagues used both education and ecosystem restoration to help protect Hawaiian silverswords? [4 points]

14. How are structured population models different than unstructured population models? [3 points]

15. According to Margaret Evans, what are the three major steps in PVAnalysis? [3 points]

16. Even with very small populations, some species of Hawaiian silverswords don't exhibit signs of inbreeding depression or loss of genetic diversity. Why might this be the case? [3 points]

17. Define biodiversity. [3 points]

18. Why do you think alien species on islands are often more detrimental to local biodiversity than the same alien species introduced on a large continent? [4 points]

19. Explain the intermediate disturbance hypothesis. [4 points]

20. Answer A or B. Circle the letter of the one you are answering: [4 points]
    A. How can the presence of a top predator (e.g., *Pisaster* sea star) increase alpha diversity?
    B. In the context of habitat fragmentation, how might an increase in local alpha diversity actually mask a loss of biodiversity.

21. Draw and label a diagram that illustrates the basic hypotheses of Island Biogeography. Hint: rate should be on the y axis and number of species on the x axis. [4 points]

Longer Answer (A few sentences, 17 points total)

22. What are 4 of the 7 factors influencing population size as described by Margaret Evans? Which of these 4 that you listed is most often altered by human activity? [5 points]

23. Explain how two of the following four habitat attributes relate to extinction probability: quality, quantity, isolation, and connectivity. [6 points]

24. Define 'Biological Species Concept' as articulated by Ernst Mayr and quoted in your text. What are two potential problems with this definition of species? [6 points]

NAMES:_____ **Group Questions (Exam II 22 October 2003; 33 points possible)**

1. If beta diversity is high it may have a Whittaker value of 9. If beta diversity is low then the Whittaker value approaches 0. What does a value of 0 tell you about the influence of environmental gradients across different communities and the attributes of species therein. [6 points]

2. In Rosenzweig's 3-step loss of biodiversity via loss of habitat area steps 1 and 2 are loss of endemics and sink populations, respectively. List the third step and describe how and why this step is consistent with the theory of island biogeography (and species-area relationships). [6 points]

3. Do you agree or disagree, and why, with the following statement in the context of preserving biodiversity?: "All species are not equivalent." [6 points]

4. List and describe three of the many uses of genetics identified by Melanie Culver with applications in Conservation Biology. [9 points]

5. What are microsatellites and what do they tell conservation biologists? [6 points]

506R students (15 points):
Typed take home essay due in my office (BSE1D), or via email to kebonine@email.arizona.edu, no later than 9:42pm on Friday 24 October 2003:

The cheetah gets a lot of press (including your VanDyke text, pps. 117-118, 153). Briefly discuss the lessons learned (or not yet learned) from studies of cheetah population genetics as described in your textbook. How might these lessons be relevant to work we learned about from one or more of our guest lecturers (Melanie Culver, Rob Robichaux, and Margaret Evans)? As a somewhat related one-sentence commentary, please assess the value of directing large amounts of money and attention toward relatively few charismatic mammals such as the cheetah and the panda. [15 points; 350 words or fewer]