

Conservation Biology, EXAM I (75 points)  
22 September 2005

NAME: KEY

Your exam will take place in two parts. The first will be a typical individual exam which should take you about 50 minutes. The second part will be about 25 minutes in groups of four students on a short set of additional questions. The score for your group exam will earn you additional points on your individual exam. See your syllabus for grading details.

1. Match columns A and B by placing the appropriate letter in the spaces provided. [9 points total]

- |                                 |   |
|---------------------------------|---|
| <u>E</u> 1. Rachel Carson       | A. A measure of beta diversity                  |
| <u>A</u> 2. Whittaker's Measure | B. Endangered Species Act became law            |
| <u>D</u> 3. 1932                | C. Estimated value of global ecosystem services |
| <u>C</u> 4. ~2x global GNP      | D. Aldo Leopold wrote <i>Game Management</i>    |
| <u>B</u> 5. 1973                | E. Author of <i>Silent Spring</i>               |
| <u>I</u> 6. Shannon Index       | F. Yellowstone National Park established        |
| <u>F</u> 7. 1872                | G. National Environmental Policy Act became law |
| <u>G</u> 8. 1970                | H. John Colter visits Yellowstone area          |
| <u>H</u> 9. 1807                | I. A measure of alpha diversity                 |

2. What is currently the greatest threat to biodiversity? [2 points]

- a) hunting and trapping
- b) exotic species
- c) habitat loss
- d) spread of disease and pathogens
- e) asteroids

3. What agency do Paul and Sherry Barrett work for? [2 points]

United States Fish + Wildlife Service (USFWS)

4. What proportion of valley-bottom wetlands are intact in Arizona? [2 points]

~0% (up to 5%)

5. If you were able to have Henry David Thoreau and Teddy Roosevelt over for dinner, what would they disagree on? What would they agree on? Hint: use information presented in class and your readings. [4 points]

disagree: T - romantic transcendentalist (let nature's natural glory persist); get people out of nature  
R - conservationist (use the resources sustainably); resources belong to people

kind of open

agree: need to set aside + provide some measure of protection + management for wilderness

6. List three important contributors to an individual's ecological footprint. Justify your answer. [4.5 points]

- reproduction
- diet
- travel
- housing
- others?

need to justify

7. Your Van Dyke textbook presented a way to value different pieces of biodiversity (usually from a species-specific point of view). Provide an example that helps explain at least two of the 4 variables on the right-side of the equation. [4 points]

$$\text{Rank}_i = (D_i + U_i)(\Delta P_i / C_i)$$

enhanced probability of species survival  
 cost of proposed action  
 utility of species  
 destructiveness of species

open  
need to explain two forms of example

8. How is the SDCP an example of an HCP? Under what section of the ESA do HCPs fall? [define your terms; 4.5 points]

multispp habitat conservation plan under section 10.  
 HCP allows for some "take" as long as overall prognosis for threatened or endangered species is improved.

9. Explain how, at the same time, extinction of species is both an integral part of biodiversity and currently a threat to its (biodiversity's) continued existence? [4 points]

Most species have gone extinct; that is part of the natural evolution of life on earth.  
 Current anthropogenic extinctions are happening @ a faster rate and truncate evolution rather than leading to continued diversification and radiation.

10. Distinguish among, and provide three examples (one for each) of: [6 points]

Umbrella species -- species chosen such that its protection will protect lots of other species and habitat

Indicator species -- species that signals a disruption in the normal ecosystem processes and ecosystem health

Keystone species -- species whose role in ecosystem function is greater than predicted by its numerical abundance +/or biomass

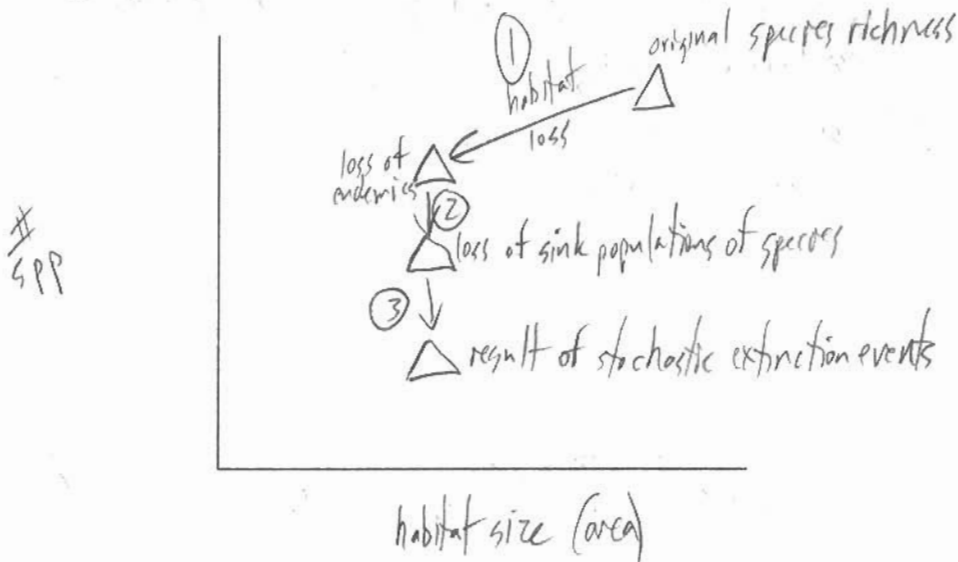
11. During your SDCP role-playing exercise 5 groups were represented (as well as the Pima Co. Board of Supervisors). Please list three of these groups. [3 points]

- miners
- developers
- USFWS
- center for biological diversity

examples rather open

12 (CHOOSE a or b): [6 points]

12a. Diagram and explain Rosenzweig's 3-step loss of biodiversity using the axes below. Be sure to label your axes appropriately.



12b. Create a visual representation of the difference between beta and gamma diversity. Be sure to label your diagrams appropriately.

open, but need to explain that beta has to do w/  $\Delta$  environmental variable and look @ community response

gamma has to do w/ same habitat but in diff geographic locations

13. Explain what happened, and what Leopold professes to have learned, in *Thinking Like a Mountain*. [4 points]

shot & killed wolves for no real reason, thought that  $\leftarrow$  wolves meant  $\rightarrow$  deer and  $\therefore$  better hunting, didn't realize til later that w/o wolves the ecosystem  $\Delta$  and deer wreak havoc on plants + plant recruitment. he concludes that a mountain lives in mortal fear of deer

14. How is 'burden of proof' important in approaches to conservation biology? [4 points]

if go w/ our judicial system idea of innocent until proven guilty, any technology or development from humans is considered benign until enough evidence is amassed to the contrary. If ecosystems and spp are assumed to be harmed by new innovations until proven otherwise, this would have a dramatic effect on overall conservation attitudes and prognoses.

15. How does the Madagascar Periwinkle Argument highlight the difference between intrinsic and instrumental values? [5 points]

valued b/c provides leukemia medicine. Advocates of intrinsic value of biodiversity don't like this line of instrumental reasoning b/c it puts onus on conservationists to "prove" value of a species rather than assuming all species have value.

16. Explain tragedy of the commons in terms of costs and benefits to the individual and to society. Where does the "tragedy" come in? Give an example of a conservation issue directly related to the tragedy of the commons concept. [5 points]

individual  $B > C$ , average citizen in society  $C > B$

examples include pasture, air/water pollution, fisheries.

The tragedy is that if everyone with access to the resource acts in their best interest then the resource will be depleted or polluted.

17. When is an EIS warranted (please also define the acronym)? How is this different than a FONSI? [6 points]

Any time a fed agency (or Federal \$) is proposing development, construction, etc. an environmental assessment must be written up. This short EA document is examined and a determination is made: 1) Finding of no significant impact (FONSI), in which case the project goes forward w/o the much more extensive Environmental Impact Statement (EIS) which outlines how the relevant environmental variables will be altered by the proposed project.