

23 students

Conservation Biology, EXAM III (75 points)  
17 November 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. All five of the hottest years on record (mean global air temperature) have occurred since: [1.5 points]  
a) 1852      b) 1902      c) 1952      **d) 1982**      e) 2002

2. A one inch increase in mean global sea level is predicted to lead to how much beach erosion? [1.5 points]  
a) none      b) 1 inch      c) 5 inches      d) 8 inches      **e) 8 feet**

3. How much water, on average, goes into making a pound of beef? [1.5 points]  
a) none, just grass      b) 40 gallons      c) 400 gals      **d) 4,000 gals**      e) 40,000 gals

4. What was the fifth spike that Guy McPherson would add to the four he discussed? [1.5 points]  
a) human population growth  
**b) infectious disease**  
c) nuclear proliferation  
d) space debris  
e) none of the above

5. How does the total number of non-human great apes compare to the number of humans born every day? [1 point]

6. Distinguish between point and non-point pollution sources. [3 points]

easy to identify + control (smokestack)      diffuse + harder to regulate (lawn fertilizers)

7. Describe the process of eutrophication and give examples of both natural and anthropogenic contributions to the process. [5 points]

nutrient enrichment of aquatic environments (can lead to algal blooms, low O<sub>2</sub>, fish kills)  
anthropogenic inputs dominated by fertilizers (provide limiting N, P)  
natural succession of area following retreat of glaciers

8. Describe three impacts of loss of wetlands that affect humans directly. [4.5 points]

flood control  
water storage  
water purification  
areas for fish + wildlife recruitment

9. List the four spikes presented by Guy McPherson and explain WHY they are called "spikes". [5 points]

1 | extinction  
2 | consumption  
3 | human population growth  
4 | greenhouse gases

exponential growth  
(not pop anymore)

10. How would you expect leaf stomatal density within a species to change from the year 1850 to 2000? Why? [4 points]

↓ b/c  $PCO_2$  in environment ↑ ∴  
need to have fewer stomata, lose less water,  
but still get enough  $CO_2$  for photosynthesis

11. How have carbon isotope ratios changed between 1850 and 2000? Why? [2 points]

burning fossil fuels ↑  $C^{12}$  relative to  $C^{13}$   
 $C^{13}:C^{12}$  ↓ over 150 years

12. What two gases contribute most to the natural greenhouse effect? [3 points]

$H_2O$ ,  $CO_2$

13. How is the international Ramsar Wetlands convention/treaty of 1971 different in approach as compared to the ESA passed in the U.S. at about the same time? [2 points]

ecosystem (Ramsar) vs. species (ESA)

14. Of what value are common (abundant and widely distributed) species and rare species (small, localized populations) in helping scientists decide whether or not to include a specific piece of land in a conservation proposal? Why? [3 points]

Not much b/c don't let you determine which areas are important for lots of species.

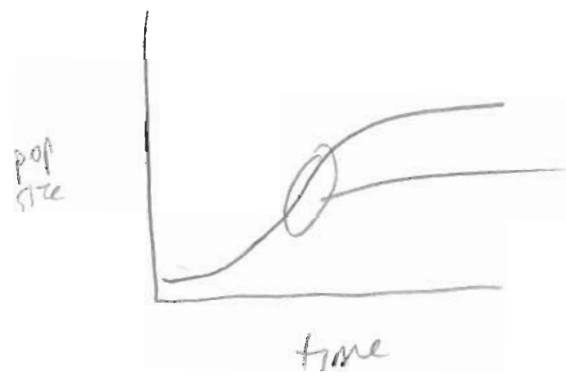
15. Provide an example of a phenological change that is correlated with global climate change. [3 points]

open - timing of nesting, migration, flowering, etc

16. 'Global warming' and 'global climate change' are two terms used to describe the same phenomenon. Why are there two terms? Which term do you prefer and why? [4 points]

Although global climate is, on average, increasing that is not the case everywhere. Moreover, by increasing temperature other things like drought, flooding, and hurricanes are changing across the planet. 2nd part is open, but needs to be justified.

17. Draw a graph of the logistic growth curve (label your axes) and explain the concept of MSY (maximum sustainable yield) using your graph. [4 points]



MSY focuses here where pop growth rate is highest, theoretically allowing ↑ harvest (harvest before intraspecific competition limits pop size)

18. Name one benefit and one concern associated with mariculture. Give an example of a successful case of mariculture. [4 points]

open (1.5) (1.5)

19. Explain what is meant by 'bycatch' in the shrimping industry. [2 points]

Non shrimp animals caught and usually discarded dead + dying. Mean bycatch for entire shrimping industry ~ 10x shrimp mass.

20. What section of the ESA is the SDCP addressing? [1.5 points]

section 10 (HCPs, multiple spp conservation plan)

21. According to Guy McPherson, how does a positive inflation rate make conservation more difficult? [3 points]

Far enough into the future everything is worthless, Makes it difficult to argue that we should set things aside for future generations of people or other biotic organisms.

22. In general, how were the species distribution maps generated by the SDCP Science Advisory Team? [3 points]

The team modelled the habitat parameters for each species, ran the maps by experts to gauge the maps' utility, then revised the map. Maps were rarely based entirely on known distributions of organisms. Rather, maps are estimate of probable habitat for each species

23. Define limnology. [2 points]

study of inland waters

24. Explain how albedo and albedo feedback contribute to retreat and loss of glaciers. [3 points]

how color (and texture) influence reflectivity of light + energy. White ice + snow reflects light + energy. Once melting has started and water or soil is exposed then more energy is absorbed, leading to more melting

25. What is the main point of the Hayhoe et al. (2004) article? [3 points]

Assessing the effects of different models of future global climate change on the ecosystems + people of California

26. How is IBI (please define the term) different than some other approaches to measuring the health of aquatic ecosystems? [3 points]

Rather than measuring abiotic variables like temp, pH, salinity, turbidity etc., the focus of IBI (index of biotic integrity) is on ecosystem fxn and assesses things like # of fish, # of fish spp per trophic level, etc

27. How many gallons in a liter? How many centimeters in an inch? [1 point]

$0.264$   
 $\sim 0.25$   
1 liter = 1.057 quarts  
4 quarts in a gallon

$1\text{cm} = 0.39\text{inch}$   
 $\sim 2.54$