**EEB 2208 (Introduction to Conservation Biology)**

**Sample Test Questions: Lectures 18-21**

In each case, the letter A indicates that the statement is correct, and a B indicates that it is not. I have included some notes (in red) to explain my thinking when designing each question.

**The CT DEEP plans to restore an area of grassland on an old landfill in Hartford. The goal is to restore all of the ecological functions of the historic grasslands, but only some of the species that occurred there historically because the site is too small to support area-sensitive species. Which of the following statements about the project apply?**

1. This project is an example of site rehabilitation. **A**
2. This project meets the Society of Ecological Restoration's definition of ecological restoration. **B**
3. Doing nothing more than putting topsoil on the landfill is one option for restoration. **A**
4. A good reference site for this project would be a natural grassland with the full complement of functions and species that the DEEP hopes to see at the restored site. **A**
5. Controls should be set up to determine whether active restoration was necessary. **A**

Q2 tests whether you understand that strict adherence to the formal definition of restoration excludes most restoration projects. Q3 tests whether you know that sometimes restoration can occur with minimal intervention. Q4 and Q5 test whether you understand the principles of clear goal setting and experimental design that I have talked about in several lectures.

**Which of the following statements about habitat corridors are true?**

6. Corridors facilitate gene flow. **A**
7. Corridors help to prevent population fragmentation. **A**
8. Corridors can act as sink habitat. **A**
9. Corridors can help invasive species to spread. **A**
10. Corridors can help endangered species to persist. **A**

This straightforward set of questions simply tests your understanding of the pros and cons of corridors. It also tests whether you know the meaning of terms such as "gene flow" and "sink habitat".

**The town of Mansfield is conducting a study of the effects of clearing invasive plants in town parks. They want to know whether using pesticides is more effective than removing plants by mechanical means. To study this question, they plan to use pesticides throughout one of their parks and mechanical methods at another. They will then measure the number of invasive plants in fifty 1-$m^2$ plots at each park and compare the two sets of numbers. Which of the following statements are accurate?**

11. The management treatments in this study are well replicated. **B**
12. Ideally the investigators would determine which park gets which type of management, randomly. **A**
13. A strength of this study is the use of controls. **B**
14. A strength of this study is the absence of confounding factors. **B**
15. With this study design the investigators cannot answer their question very well. **A**

These questions were designed to test your understanding of basic experimental design principles. Q11 is incorrect because there is no replication of management treatments (each is applied only once), though there is pseudoreplication. Consequently, there is a good chance that confounding factors (other things that differ between the two parks) will influence the results (Q14). Another problem with the design is that there is no control treatment (Q13), so it will be hard to tell if any changes are actually caused by the management (Q15). The study is better than not doing a comparison, and much better than not collecting any data, but overall clear conclusions will be hard to draw.

**In 2001, Rodrigues and Gaston published a survey of studies designed to estimate the amount of land that needs to be protected within given areas to provide protection for a target group of organisms. Which of the following statements accurately describe the findings of this survey?**

16. The mean amount of land that needed protection was close to the IUCN recommendation for the proportion of land area a country should strive to protect for conservation. **A**
17. The mean amount of land that needed protection was about half of the total area. **B**
18. In some cases about two-thirds of the total land area needed to be protected. **A**
19. In some cases less than 1% of the total land area needed to be protected. **A**
20. One important factor in determining how much land needed protection was the average range size of the target species. **A**

This set focuses on the results of a single paper, but it is a very important paper because it synthesizes information from many (>100) studies on how much land needs to be protected to achieve conservation goals. Consequently, one goal of the questions was to test your familiarity with the main results of the paper (Q17-Q19). In addition, I wanted to test whether you could place that study in the context of other information presented in the class (i.e., are you making connections between lectures); that was the goal of Q16. Q18 and Q19 also tested whether you understand how much variation there is in the amount of land that needs protection from place to place. Finally Q20 was designed to test you knowledge of the reasons behind that variation.

**Which of the following statements about the design of reserve networks are true?**

21. Large reserves are generally better than small reserves. **A**
22. All other things being equal, the best shape for a reserve is generally a circle. **A**
23. Several small reserves can sometimes be better than one large reserve of equal area. **A**
24. Small reserves are always more effective when they are widely spaced. **B**
25. Maximizing the amount of edge habitat in a reserve network is important. **B**

This question tests whether you (a) know the general "rules" about reserve design (Q21, Q22, Q25), and also (b) know that reserve design is complex and that those rules all have exceptions (Q23, Q24).

**Large nest boxes are commonly used to help manage for wood ducks. Which of the following recommendations would reduce the effectiveness of using nest boxes to manage this species? (3 points)**

26. Clumping boxes in groups of ten. **A**
27. Hiding boxes deep in the woods. **B**
28. Building boxes with two compartments. **A**
29. Placing boxes in a dense tangle of vegetation. **B**
30. Placing boxes on tall poles in the middle of a pond. **A**

Anything that increases the chance of brood parasitism will reduce the effectiveness of nest boxes. Q26, Q28, and Q30 are correct because they will all make boxes more conspicuous to female wood ducks. The other responses will make boxes less conspicuous and so would increase effectiveness.

**31. In recent years, Starbucks has started selling "shade-coffee" and claiming that this decision has environmental benefits. What is shade-coffee and what benefits does it provide? (3 points)**

Shade-coffee is coffee grown in the forest understory (i.e., with at least a partial canopy of large trees). Compared to "sun-coffee", shade-coffee is used by many forest species, results in less soil erosion, requires less agricultural chemical use, and provides benefits in terms of both pollinator and (pest) insectivore activity.

**32. Define the following terms and give an example of each. (6 points)**

Ecological mitigation: An activity conducted to provide conservation value in lieu of some harm done elsewhere. For example, when wetland habitat is destroyed, developers are often required to create or restore wetland habitat elsewhere to make up for the losses.

Mesopredator: A predator at a mid-level in a food chain (not a top-predator). Examples include coyotes, skunks, crows, etc.). These are relevant in the course, because many have increased in numbers as a result of top predators being wiped out by humans – with resulting effects lower on the food chain.

Adaptive management: A system whereby management methods are systematically evaluated (via careful data collection and analysis, ideally in an experimental framework) and modified ("adapted") to increase their effectiveness. Either the wood duck or rhino examples given in class could be used as examples. I would also have accepted a hypothetical example if it was well explained and plausible.

**33. For each of the following pairs of reserve design, explain which option is best and why. In each case you can assume that the total area of protected land is the same for both choices. For each example also give a reason why the option that you selected as best might not be the better choice. (6 points)**

i) The complete circle is probably the best because it minimizes the impact of edges, but the elongate shape might be better if it allowed one to protect particular habitat features of interest (i.e., a more complete watershed), or if edge species were the target organisms.

ii) The string of reserves near to one another is probably the best as they reduce the chance of any site being demographically isolated. But, proximity also facilitates movement of things like disease and invasive species, and increases the chance of a catastrophe affecting all populations.

iii) The scenario with the corridor connecting patches is probably best, but corridors have many of the problems discussed in the previous example.