

Name: _____

Student Number (optional): _____

EEB 208: INTRODUCTION TO CONSERVATION BIOLOGY - Test 1 answers

1. Which of the following statements about the species that remain to be described by scientists are true? (3 points)

- A. **At least two-thirds of the Earth's species remain to be described.**
- B. Species that remain to be described are all found in the tropics.
- C. **New species continue to be described in the United States.**
- D. **New species of mammals continue to be described.**
- E. Most species that remain to be described are vertebrates.
- F. Most species that remain to be described are plants.

2. Which of the following is an accurate definition of the word "average"? (3 points)

- A. **The middle value when all values are organized from smallest to largest.**
- B. The middle value when all values are organized in the order they are collected.
- C. **The sum of all the values divided by the number of values.**
- D. **The most common value.**
- E. **The mean value.**
- F. The sum of all the values divided by the mean.

3. Which of the following statements about hotspots are correct? (3 points)

- A. A richness hotspot is somewhere that has a lot of very rare species.
- B. **Orme et al. found very low congruence between three types of hotspots for birds.**
- C. Madagascar, Brazil and Siberia are all important hotspots.
- D. All of the world's hot spots are in tropical areas.
- E. Marine hotspots are generally found close to terrestrial hotspots.
- F. Protecting hotspots would ensure the protection of most of the world's biodiversity.

4. In 1989, E. O. Wilson estimated that 34 species go extinct every day. Which of the following assumptions does this estimate make? (3 points)

- A. **All species are specialists.**
- B. **Marine species are not important.**
- C. **There are 5 million species on Earth.**
- D. All species are found in the temperate zone.
- E. The number of species in a habitat patch does not change as the area of habitat increases.
- F. **The number of species in a habitat patch increases quite gradually as the area of habitat increases.**

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5. In a recent study, Brook et al. described extinction patterns on the island of Singapore. Which of the following results came out of that study? (3 points)

- A. Extinction rates were high in all habitats.
- B. Extinction rates are very similar for all types of organisms.
- C. **The majority of the species that occur on Singapore have gone extinct in the last 200 years.**
- D. Small species were especially likely to have gone extinct.
- E. **Many of the remaining species are primarily found in reserves.**
- F. Most remaining species are well protected by reserves and unlikely to go extinct.

6. Which of the following statements about extinction are correct? (3 points)

- A. Since 1500 most extinctions have occurred in mountainous areas.
- B. **Since 1500 birds living on islands are more likely to have gone extinct than those living on the mainland.**
- C. Since 1500 most recorded extinctions have involved amphibians.
- D. **Most species that have ever lived on Earth are extinct.**
- E. Current extinction rates are typical of those that have occurred through geological time.
- F. Current extinction rates are higher than have ever occurred.

7. Which of the following are key results of the study on climate change by Root et al.?

- A. Species at lower latitudes are most affected by climate change.
- B. Atmospheric carbon dioxide has increased substantially in the past century.
- C. Sea-levels are rising, but slower than predicted.
- D. **About 4 in 5 of the species that have been studied show effects consistent with climate change.**
- E. Spring events are shifted later in the year at low latitudes only.
- F. Shifts in phenology are consistent across species.

8. Which of the following is a component of biological diversity? (3 points)

- A. **The migration of the monarch butterfly.**
- B. **Species evenness.**
- C. **Interactions among species.**
- D. **Species richness.**
- E. **The small pox virus.**
- F. **Variation in human DNA.**

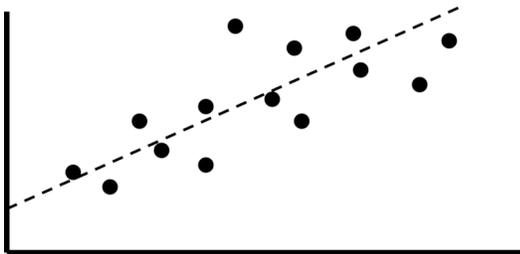
9. Which of the following statements correctly link a species with the factors that threaten it? (3 points)

- A. **Red-cockaded woodpeckers are threatened because their behavior limits their reproductive rate when habitat is limiting.**
- B. **Puritan tiger beetles are threatened because they are highly vulnerable to catastrophic events.**
- C. **Large Blue butterflies are threatened because they have a symbiotic relationship with ants.**
- D. **Many trout populations are threatened by hybridization with other species of trout.**
- E. Flattened musk turtles are threatened because they are naturally rare.
- F. Sea turtles are threatened because their habitat has become fragmented.

10. Which of the following statements about species richness are usually true? (3 points)

- A. Islands have higher richness than the mainland.
- B. **High elevations have lower richness than low elevations.**
- C. Structurally complex habitats have lower richness than simpler habitats.
- D. **Highly productive areas have higher richness than unproductive areas.**
- E. Increasing species richness is an important goal of conservation biology.
- F. Richness patterns in one taxonomic group are a good sign of richness patterns in all groups.

11. The graph below illustrates the relationship described by the equation $S = C \cdot A^z$. Label the graph to indicate how the terms in the equation relate to the figure. Explain (by drawing on the figure if necessary) how you would use this graph to determine how many species would be lost from a patch if it's size were reduced as a result of habitat destruction. (5 points)



The graph should have the following labels: (a) $\log(\text{Area})$ on the x axis, (b) $\log(\text{Species})$ on the y axis, (c) z is slope of the dotted line, (d) $\log C$ is the point of intersection between the dotted line and the y axis. There was half a point for each label, with an extra point for indicating that the data need to be plotted on a log-log scale (note that the equation does not produce a straight line unless you log the numbers – so the scale really is important). The last two points were for showing that you can plot the starting patch size (A_1) on the x axis – go up to the dotted line, then left to the y axis to figure out the expected species richness (S_1). You can repeat this for the reduced patch size (A_2) to get the species richness after habitat loss (S_2). The difference ($S_1 - S_2$) is the amount of species loss due to habitat destruction.

12. Hawaii has far more endangered species than any other state. What are the most likely reasons for this? (4 points)

One point each for any four of the following:

- *Smaller population size*
- *Smaller ranges*
- *Frequently more vulnerable to introduced predators/disease (due to reduced exposure in the past)*
- *Dispersal is hard*
- *More speciation means that there are more inherently vulnerable species that can go extinct*

Other answers would get points if they related to traits that are specific to island species. We did not give points for things that threaten species, but that are true on the mainland too (e.g., high human density, habitat loss, etc.) unless you specifically identified ways in which they would be worse on an island.

13. What is Ehrlich's "rivet-popping" analogy and how does it relate to conservation biology? (2 points)

The analogy is that species in an ecosystem can be likened to the rivets that hold a plane together. The loss of a few might not be so bad, but at some point the whole system will collapse. See lecture notes 1.

14. Define each of the following terms (4 points).

Spurious correlation – refers to a situation when two variables are correlated with each other, but there is no causal link between them, perhaps because they are both affected by some other variable. An example(not needed for the point) is the fact that the number of storks in Germany and the human birth rate both increased after World War II. This is probably not because there were more storks to bring people their babies (or any other casual link), but simply because the end of war proved to benefit both humans and storks.

Extirpation – gone from a particular area (= local extinction).

Ecosystem engineer – a species that plays a disproportionate role in influencing the nature of an ecological community or ecosystem by altering the physical structure of the ecosystems (the underlined part is important and distinguishes these species from other keystone species). Examples (not needed for the point) include beavers (which build dams and create beaver ponds) and earthworms (which alter the structure of the soil through their actions).

Allele – any of the alternate forms of a gene.