BI328

CONSERVATION BIOLOGY

Fall 2020

REVIEW QUESTIONS: THE BIODIVERSITY CRISIS

1. Define what a species extinction and its consequences are.

2. Describe the difference between a species being globally extinct, extinct in the wild, extirpated, and functionally extinct.

3. List the two mechanisms resulting in global change in species diversity. Contrast these with the two mechanisms resulting in local/regional change in species diversity.

4. Define what a mass extinction event and what the background extinction rate are.

5. Give a testable hypothesis for a mass extinction rate and use that to argue whether or not we are currently experiencing the "6th mass extinction".

6. Give a brief description of the current accelerated loss of biodiversity and contrast that to the five mass extinctions our planet experienced in geological history.

7. List the five major categories of drivers of biodiversity loss. Contrast them in terms of their contributions to biodiversity loss across broad categories of vertebrates and habitats.

8. Compare and contrast spatial and temporal designs to monitor biodiversity. Argue which one you think is more informative.

9. Compare and contrast the observed global pattern of biodiversity loss with the local/regional change in species diversity.

10. Define what intrinsic vulnerability is and list the four major factors that contribute to the intrinsic vulnerability of a species.

11. Compare and contrast demographic and environmental stochasticity and explain how they can contribute to species extinction.

12. Population size, density and growth rates are important parameters determining the demographics of a population. For each briefly assess how they can increase vulnerability to extinction.

13. Habitat, range, and connectivity among populations are important ecological characteristics that may contribute to the likelihood of a species going extinct. Explain.

14. Argue whether having migration and/or a dispersal stage as part of the life history of a species increase or decreases the extinction risk of a species?

15. The triangular life history model groups individuals into opportunistic, periodic, and equilibrium species based on the optimization of three demographic parameters, generation time, juvenile

survivorship, and fecundity. Opportunistic species are characterized by short generation times, low juvenile survivorship, and low fecundity. Equilibrium species are characterized by high juvenile survivorship, long generation times, and low juvenile survivorship. Finally, periodic species are characterized by high fecundity, low juvenile survivorship, and long generation times. Argue how you would rank these life history strategies by level intrinsic vulnerability of the species.

16. List important life history parameters to consider when assessing the intrinsic vulnerability of a species, indicate how they increase/decrease intrinsic vulnerability. You can create a table where you list the parameter and then use arrows to indicate if intrinsic vulnerability increases/decreases as that parameter increases/decreases.

    e.g.

parameter	**intrinsic vulnerability**
age-at-maturity ↑	↑

    17a Elephants generally have small population and their life history is characterized by a late-age-at maturity, high parental care, and long generation time. By contrast, squirrels are abundant throughout their wide geographic range. Their life history is characterized by a short generation time, and high fecundity. Argue which species has the higher intrinsic vulnerability.

    17b Plot twist: The British red squirrel has a geographic range extending from Siberia to Ireland and despite its overall abundance decreasing it is categorized as a species of least concern by the IUCN. Since the introduction of gray squirrels from North America this invasive species frequently outcompetes native red squirrels and (ironically) transmits a squirrelpox virus lethal to native red squirrels which are now only found in a few small population in southern Scotland. Argue whether you think the British red squirrel is correctly categorized by the IUCN.

18. Define habitat loss/destruction, habitat fragmentation, and habitat degradation.

19. List the main drivers of habitat loss.

20. Briefly describe how land-use change results in habitat loss and describe how variation in the land-use intensity may have differential impacts on the biodiversity.

21. Compare and contrast habitat loss and habitat fragmentation in terms of their impact on biodiversity.

22. Briefly describe the main effects of habitat fragmentation on biodiversity.

23. List the four parameters used to describe habitat patch configuration and briefly describe their relationship to habitat loss (you may sketch a figure but make sure to label axis).

24. Briefly explain how habitat patch size and number affect biodiversity (remember “explain” means you need to describe the effect + give a “why”).

25. Briefly describe the term Extinction Threshold.

26. Describe the relationship of edge habitat, loss of biodiversity and patch size & number.

27. Define what edge effects are and use an example to explain how they result in additional degradation of the remaining habitat patches.

28. List the three main groups of species that may benefit from edge effects; describe one of the parameters using an example.

29. The isolation of of habitat patches is a function of the geographic distance between them and the parameters of the matrix separating them. Explain.

30. Briefly describe three ways that patch isolation and barriers negatively affect organisms potentially increasing their extinction risk.

31. Give a brief description of what a metapopulation using a brief definition and listing key characteristics.

32. Explain how habitat fragmentation forcing species into a meta-population structure can increase extinction risk as a whole

33. Metapopulations are characterized by source-sink dynamics. Explain what this means and argue how this effect can allow a population affected by habitat fragmentation to persist despite local extirpations.

34. Give a brief description of how metapopulation theory can be applied to conservation.

35. Habitat fragmentation has resulted in species A being restricted to a series of small, highly isolated habitat patches. By contrast, species B has several suitable habitat patches available that are connected by dispersal, though in some locations there have been local extirpations due to stochastic effects. In both cases, the local populations are small and some habitats have been further degraded by pollution. Compare and contrast these two species and their local populations in terms of their extinction risk.