BI328

CONSERVATION BIOLOGY

Fall 2020

REVIEW QUESTIONS: SPECIES-LEVEL CONSERVATION

1. Give a brief description of what the wildlife trade is and what range of products it encompasses.
2. List two regions that are main exporters in the wildlife trade and explain why they are well-suited to be so.
3. The Amazon is one of the main exporters in the wildlife trade. Use three examples to describe the range of how animals are sourced, where they are exported to, and for what purpose.
4. Discuss whether the legal wildlife trade is/can be sustainable and give specific arguments to why having a well-regulated, sustainable trade commercial trade of wildlife is important.
5. Discuss how uncontrolled trafficking of wildlife can result in a serious threat to local animal/plant populations.
6. Give a brief explanation of what CITES is and what it means for species to be listed on Appendix I, II, or II.
7. Give a brief description of the legal and illegal wildlife trade in terms of components of supply, trade, and demand.
8. Describe the primary driver of illegal wildlife trade.
9. Give a brief overview of the players & processes involved in wildlife trafficking. Argue why it is most frequently run by crime syndicates.
10. Give a simple "equation" that can be used to determine the cost/benefit analysis of conservation vs poaching and explain how it can be used to optimize management strategies.
11. Explain how using enforcement as the main tool to stop illegal wildlife trade can have unintended consequences.
12. List a range of possible strategies to combat the wildlife trade.
13. Compare and contrast using campaigns geared toward reducing prices and demand, promoting sustainable trade, and enforcement of regulations (consider limitations and benefits of each).
14. Describe what strategies can be used to reduce motivation for criminal involvement in the wildlife trade.
15. Strategies can be categorized as long-term vs. short-term and targeting the causes and/or the "symptoms" of the illegal wildlife trade. List a range of strategies and describe the tools used to achieve them and explain whether they are short/long-term strategies and whether they are focused more on the causes or effects of illegal trafficking.
16. Give a brief description of what wildlife forensics is and explain why it is an important tool to enforce regulations.
17. Explain the difference between *in situ* and *ex situ* conservation strategies.
18. Give a brief definition of what *ex situ* conservation is, list the major groups of *ex situ* conservation facilities and explain how they can contribute to in situ conservation.
19. Give a brief definition of what a zoo or aquarium is.
20. Give a brief description of the three major criticism levied against zoos/aquariums.
21. Explain what it means for a zoo to reinvent itself as a conservation center.
22. Give a brief description of what a botanical garden and an arboretum is and their purpose and explain how they can support in situ conservation.

23. Give a brief description of what gene and seed banks are and explain how they can be used to support in situ conservation.
24. Briefly explain why seed banks are particularly important for the agricultural industry.
25. List the three main categories of how *ex situ* conservation facilities can contribute to *in situ* conservation.
26. Give a brief explanation of what a captive breeding program is and explain why zoos/aquariums/botanical gardens are especially well-suited to be used to develop them.
27. Give a brief explanation for the three main reproductive tools & techniques used to increase reproductive output in captivity and explain why they are especially helpful for endangered/threatened species.
28. Give a brief definition of what cloning and de-extinction technology is and argue whether or not you think it is a good idea to use as a conservation tool.
29. List the five main limitations of captive breeding programs and discuss three of them in detail (remember discuss means that you need to describe them too).
30. Compare and contrast strategies of reintroduction/reestablishment and reinforcement/augmentation and explain how they differ from introduction/translocation/assisted colonization.
31. List three strategies used to increase the success of captive breeding programs and describe two of them in more detail.
32. Give two arguments as to whether zoos/aquariums are good education/outreach tools and discuss whether you think zoos are effective in their mission statement in that regard.
33. State the primary goal of species-level conservation.
34. The primary goal of species-level conservation is to ensure the persistence of a species. Briefly explain the two main components dictating how large a population must bee to ensure long-term viability and list three options to restore populations that are currently too small.
35. Give a brief explanation of what structured decision-making is.
36. Explain what the main components of a cost-benefit analysis (e.g. single multi-attributed rating technique (SMART)) to determine the most appropriate management strategy are are to argue the benefits of this type of decision-making process especially when there are multiple stakeholders involved in the decision-making process.
37. Explain what a surrogate species is and give brief descriptions of two types of surrogate species.
38. List the two main methods to estimate population size and discuss their limitations.
39. Briefly describe characteristics of a species that would make them more or less difficult to count using the census method.
40. Discuss limitations of the census method.
41. Explain the benefits of repeated censuses of biological communities and geographic regions.
42. Explain how mark-recapture can be used to determine the number of individuals in a population.
43. List processes that can increase and decrease the number of individuals in a population.
44. Explain what a closed and an open population is and explain how this effects the processes that increase/decrease individuals in a populations.
45. Compare and contrast the three major population models in terms of whether growth is constrained/unconstrained, time is modeled as discrete or continuous, and whether the growth rate changes over time. For each model determine a group of species this model should be applied to.
46. An invasive weed has been detected and managers want to project how quickly it will establish and spread. This weed flowers and disperses seeds once a year. Argue which would be the most appropriate basic population growth model to apply.

47. A small (but adorable) species of mice has recently experienced a decline due to a loss of their main food source. They reproduce continuously throughout the year, have large litter sizes, and individuals mature within a few months, so managers are not too concerned. However, because they are an important food source for several endangered species at higher trophic levels they want to model their population growth to recovery. Argue which fundamental population growth model is the most appropriate to use.
48. A small number of elephants have recently been relocated to a newly established sanctuary. Because elephants mature late and have few offspring with high parental care most of the elephants in the "starter population" are mature adults or sub-adults. Argue which fundamental population growth model is the most appropriate to apply to determine how the population size will change in the near future.
49. Explain how age/stage-based models differ from standard geometric/exponential/logarithmic growth and why they are a better approximation and more informative for conservation/management.
50. Use a specific example to explain how stage/age-based demographic models can be used to optimized conservation strategies.
51. Explain the difference between a deterministic and a stochastic model.
52. A coastal fish population is being assessed for a new fisheries management plan. Since this is a well understood species we have monitoring data from the last 40 years that include detailed information on the approximate number of eggs laid and larvae hatched, how many yearlings settle in the bays, how many sub-adults migrate back out to see and the number of adults in different year classes for each year. We also know from a previous study that even though they mature at 3 years old, the female's fecundity steadily increases for about 5 years before it levels out. By contrast, a second fish species has a similar age-at-maturity but is more evasive and therefore we only have information on overall population size (large juveniles, subadults + adults) from year to year. For each species argue what type of model would be the most appropriate to use to get the best population projections possible.
53. Give a definition for the concepts of minimum viable population size and minimum required area/minimum dynamic area.
54. Define what a minimum viable population size is and explain why it is so important for effective species-level management.
55. Argue the limitations and benefits of having to determine a MVP for each specific population targeted for management/conservation compared to having a rule of thumb to apply across species. Argue whether you think it is even possible to determine a "magic number" (median MVP) across (groups of) species.
56. Explain how characteristics such as mobility/dispersal ability affect MVP estimates.
57. Explain how life-history impacts MVP impacts.
58. Consider a small mammal that matures quickly and has a high fecundity compared to a long-lived large-bodied mammal with a long generation time and few offspring with high parental care and argue which you think will have the larger MVP.
59. Occasionally small populations of long-lived species are observed to persist for extended periods of time. Explain how this is possible despite our general understanding of the MVP concept and argue whether you think this is common enough that managers should rely on this effect for their management plans.
60. Briefly describe the concept of a minimum dynamic area (minimum required area) and argue whether small mammals or large carnivores are expect to have larger/smaller minimum dynamic area.

61. List factors that can determine the minimum area required for a population to persist. Choose to an explain how they affect the area needed.
62. Give a brief description of what a population viability analysis is (this should include the purpose and components involved).
63. You have just been given 50 years worth of monitoring for a isolated population of elk in a national park that breeds every Fall. Give a brief description of how you would make best use of this data and what you know about population growth models to determine the probability of extinction in 50 years. Your description should should include a description of what type of model you will use, whether it is stochastic or deterministic, and the individual steps involved to determine extinction probability.
64. Briefly outline the limitations and potential of PVA models.
65. Explain why it can be useful to create PVAs focused on habitat and not just population size and argue which you think is more useful for management decision making.
66. Explain why population monitoring programs and the data they can generate are important even for species that currently aren't endangered in the connection of PVA models.
67. Give a brief description of the three main challenges small populations face that can lead to extinction.
68. Explain what environmental stochasticity is and how it can contribute to population extinction.
69. Briefly describe an example of how environmental stochasticity can be accounted for in management strategies.
70. Explain what demographic stochasticity is and how it can contribute to population extinctions.
71. Compare and contrast demographic and environmental stochasticity.
72. Define what the Allee effect is. List the three main causes for Allee effects and use an example to explain one in detail.
73. List the two processes that lead to a loss of genetic diversity. For each list the main consequence and categorize it as a short or long-term impact.
74. Briefly explain what adaptive potential is and why it is important to consider for conservation & management.
75. Explain the relationship between genotype, phenotype, environmental conditions and selection and use this to explain why the genetic diversity of a population harbors the adaptive potential of that population.
76. Give a brief explanation of the process of genetic drift and describe how it can lead to a loss of genetic diversity.
77. Explain why even though every population experiences genetic drift it is only a problem in small population from the perspective of conservation genetics.
78. Use brief descriptions of the concepts of "genetic (mutational) load" and "adaptive potential" to assess the short and long-term impacts of the loss of genetic diversity.
79. Describe what a genetic bottleneck is and give a brief explanation of how it contributes to and accelerates the loss of genetic diversity.
80. Northern Elephant seals are observed to have much lower genetic diversity compared to Southern Elephant seals even though both species have similar population sizes. Argue what two type of past event(s) could have contributed to this pattern.
81. Use the example of the Tasmanian devil and the Tasmanian devil facial tumor disease to explain how a population bottleneck can result in the loss of adaptive potential and how this can have long-term impacts on the persistence of a population even after population sizes increase.
82. Give a brief description of the founder effect, explain how it can effect genetic diversity, and how conservation strategies may inadvertently cause a founder effect.
83. Briefly describe what inbreeding is and how it affects genetic diversity.

84. Briefly describe what inbreeding depression is.
85. Use inbreeding depression to explain what the allee effect is and why this can be problematic for conservation and management in the context of population viability analyses (this includes defining inbreeding depression).
86. Use an example to explain the concept of an extinction vortex.