

CHAPTER 9--SUSTAINING BIODIVERSITY: THE SPECIES APPROACH

Student: _____

1. How many populations of polar bears remain scattered around the Arctic?
 - A. 150
 - B. 99
 - C. 59
 - D. 32
 - E. 19
2. Global warming has resulting in all of the following changes *except*
 - A. the warming atmosphere is occurring twice as fast in the Arctic
 - B. the polar bear's hunting season is getting longer
 - C. Arctic ice is melting more rapidly
 - D. the amount of floating sea ice in the Arctic during the summer is decreasing
 - E. floating sea ice is breaking up earlier each year
3. A 2006 study estimated the total polar bear population is likely to decline by how much by 2025?
 - A. 10-15%
 - B. 20-25%
 - C. 30-35%
 - D. 40-45%
 - E. 50+ %
4. Throughout the 3.5 billion year history of life on earth there has been a natural, low rate of species extinction know as
 - A. mass extinction
 - B. secondary extinction
 - C. biological extinction
 - D. background extinction rate
 - E. tertiary extinction

5. The 2005 Millennium Ecosystem Assessment, along with other studies, indicate humans have taken over and disturbed approximately how much of the land surface?
- A. 40%
 - B. 50%
 - C. 60%
 - D. 70%
 - E. 80%
6. The extinction of many species in a relatively short period of geologic time is called
- A. mass extinction
 - B. secondary extinction
 - C. biological extinction
 - D. background extinction rate
 - E. tertiary extinction
7. Biodiversity experts estimate that during this century the extinction rate due to human activities will rise to _____ times the background extinction rate.
- A. 3
 - B. 10
 - C. 20
 - D. 100
 - E. 10,000
8. If estimates of an extinction rate of 1% per year are correct, what percentage of all species will be extinct by the end of this century?
- A. 10%
 - B. 25%
 - C. 33%
 - D. 50%
 - E. 66%
9. How many human generations will it take for biodiversity to recover if the extinction rates for this century are correct?
- A. 10,000
 - B. 50,000
 - C. 100,000
 - D. 150,000
 - E. 200,000

10. An endangered species
- A. may soon become extinct over all or most of its range
 - B. is one that is evolving into another species
 - C. is one that may become rare in the next 100 years
 - D. may eventually become threatened or rare
 - E. may be considered economically important but rare
11. Four of the following are characteristics that make some species especially vulnerable to ecological and biological extinction. One of the following is not such a characteristic. Choose the one that is not a characteristic.
- A. low reproductive rates
 - B. small territories
 - C. feeds at high trophic level
 - D. narrow distribution
 - E. rare
12. What percentage of the world's known plant species have been examined for medicinal properties?
- A. 33%
 - B. 25%
 - C. 10%
 - D. 5%
 - E. 0.5%
13. Biologists think there are four major reasons why we should work to prevent human activities from causing the extinction of other species. Which of the following is not one of these reasons?
- A. species are part of earth's life support system
 - B. most species contribute to services that support our economies
 - C. it will take from 5 million to 10 million years to rebuild the biodiversity
 - D. we need animals, especially rare animals, for zoos
 - E. each species has a right to exist even if it isn't useful to us
14. HIPPCO is
- A. a species of hippopotamus
 - B. a company specializing in solving environmental problems
 - C. a government program
 - D. an acronym summarizing causes of extinction
 - E. an environmental rock band

15. According to researchers, the greatest threat to wild species is
- A. habitat destruction
 - B. invasive species
 - C. population and resource use growth
 - D. pollution
 - E. climate change
16. In terms of habitat destruction, the greatest eliminator of species is
- A. pollution of streams, lakes, and oceans
 - B. destruction of coral reefs
 - C. destruction of wetlands
 - D. plowing of grasslands
 - E. deforestation in tropical areas
17. When a large, contiguous area of habitat is reduced in area and divided into smaller, more scattered patches, the process is called
- A. habitat elimination
 - B. habitat exploitation
 - C. resource partitioning
 - D. habitat fragmentation
 - E. resource loss
18. What percentage of the world's 10,000 bird species is declining in number?
- A. 95%
 - B. 70%
 - C. 50%
 - D. 33%
 - E. 25%
19. Because birds live in every climate and biome, and because they are easy to track and count, they serve as excellent
- A. keystone species
 - B. scapegoats
 - C. indicator species
 - D. aesthetic indicators
 - E. habitat determiners
20. The greatest *new* threat to bird populations is
- A. global warming
 - B. loss of wetlands
 - C. hunting and poaching
 - D. pollution
 - E. tall buildings

21. The biggest problem with invasive species is that in the new location they
- A. are always bigger than native species
 - B. have no population controls such as predators
 - C. are always stronger than native species
 - D. have higher reproductive rates than native species
 - E. evolve more quickly than native species
22. The best way to limit the impact of invasive species is to do which of the following?
- A. use pesticides to reduce their numbers
 - B. import and release their natural predators
 - C. prevent them from being introduced in the first place
 - D. hire lots of people and destroy them
 - E. alter their genes so they all die
23. Four of the following are true about the plant "kudzu"; one is not. Choose the one that is not.
- A. Provides a starch used in beverages and gourmet confections.
 - B. Provides herbal remedies for several diseases.
 - C. Can be controlled by normal weed control measures.
 - D. Almost every part of the plant is edible.
 - E. It is a source of fiber for paper that could replace use of trees.
24. Which of the following was intentionally introduced into the United States?
- A. kudzu
 - B. gypsy moth
 - C. zebra mussel
 - D. brown tree snake
 - E. common pigeon
25. Some toxic chemicals, such as those in DDT, can be stored in the fat tissue of animals. As these animals become food for larger and larger animals, the amount of the toxin gets larger and larger. This process is called
- A. biophilia
 - B. biosphere
 - C. biotechnology
 - D. biomagnification
 - E. iophosphoresence

26. Which of the following organisms pollinates nearly 100 commercially grown crops in the U.S., including one-third of U.S. fruit, nut, and vegetable crops?
- A. honeybees
 - B. bats
 - C. birds
 - D. bumblebees
 - E. hummingbirds
27. DDT use in the 1950s and 1960s was nearly responsible for the extinction of what familiar bird species?
- A. red-tailed hawk
 - B. common pigeon
 - C. chicken
 - D. bald eagle
 - E. cardinal
28. The primary causes of population declines among birds, especially long-distance migrant birds, includes all of the following, *except*
- A. habitat loss and fragmentation
 - B. introduction of nonnative species
 - C. collisions with power lines, towers, and skyscrapers
 - D. intentional poisoning of food supplies
 - E. climate change
29. Four of the following are causes of an increase in hunting bushmeat; one is not. Choose the one that is not.
- A. rapidly growing human population
 - B. trying to make a living supplying restaurants with exotic meat
 - C. spread of AIDS
 - D. overfishing of ocean fish
 - E. accessibility to remote areas
30. Illegal hunting for profit is called
- A. subsistence hunting
 - B. sport hunting
 - C. commercial hunting
 - D. poaching
 - E. pilfering

31. The use of the anti-inflammatory drug *diclofenac* in cattle caused the die-off of vultures and increased the incidence of which of the following diseases?
- A. AIDS
 - B. tuberculosis
 - C. rabies
 - D. cholera
 - E. malaria
32. CITES is a(n)
- A. regulations controlling the introduction of exotic species
 - B. treaty controlling the international trade in endangered species
 - C. pact that supports critical ecosystems that support wildlife
 - D. international organization dedicated to the preservation of endangered species
 - E. policing agency for the protection of threatened species
33. The Convention on Biological Diversity, ratified by 191 countries, seeks to reverse the global decline of biodiversity and share the benefits from the use of genetic resources, but has been slowed by
- A. lack of severe penalties for violators
 - B. lack of enforcement mechanisms
 - C. the U.S. not ratifying it
 - D. implementation delays
 - E. all of these
34. The Endangered Species Act (ESA) of 1973
- A. is the most far-reaching environmental law ever adopted
 - B. is controversial
 - C. requires the identification of endangered and threatened species
 - D. forbids federal agencies from jeopardizing endangered or threatened species
 - E. all of these
35. When the Endangered Species Act was established in 1973, the list included 92 U.S. species. In 2010, that number had risen to
- A. 1,370
 - B. 507
 - C. 770
 - D. 1,000
 - E. 350

36. Which of the following would be allowed under a habitat conservation plan?
- A. Landowners would be permanently exempt from the ESA.
 - B. The federal government would be exempt from the ESA.
 - C. A landowner, logger, or developer could destroy some critical habitat.
 - D. Landowners could get approval to let some species go extinct.
 - E. Protection of endangered species could be made voluntary on private land.
37. Those who oppose the Endangered Species Act say it has been a failure. Biologists say it has not, because of four of the following five reasons. Choose the one that is not one of the four reasons.
- A. ESA has not been in existence long enough for endangered species to recover
 - B. species are only listed when critically endangered, many will be lost
 - C. more than one-half of listed species are stable or improving, 99% still alive
 - D. budget for protecting endangered species amounted to 9 cents per U.S. citizen
 - E. federal regulators have been heavy handed in enforcing it
38. The group of animals receiving the most protection by the use of wildlife refuges are
- A. small mammals
 - B. migratory waterfowl
 - C. large mammals
 - D. songbirds
 - E. reptiles
39. Four of the following are ways that the pressure can be taken off of some endangered species; one is not. Choose the one that is not.
- A. Seed banks to allow retention of plant properties.
 - B. Botanical gardens grow living endangered plants.
 - C. Gene banks to preserve genetic information.
 - D. Harvesting endangered species to preserve their skins and bones.
 - E. Raising endangered and threatened species on farms for commercial sale.
40. Captive breeding programs in zoos
- A. eliminate the need to preserve critical habitats
 - B. can be used for most species except mammals
 - C. require the captive population to number between 100 and 500
 - D. increase the genetic variability of species
 - E. are very unsuccessful
41. Egg pulling refers to
- A. techniques used to extend the breeding span of captured birds
 - B. collecting eggs from the wild and hatching them
 - C. using fertility drugs to increase the number of eggs
 - D. production of hybrids in captive breeding programs
 - E. collecting unfertilized eggs from ovaries of wild animals

42. Some critics of the ESA suggest it has been a failure. Four of the following are reasons they give for that conclusion; one is not. Choose the one that is not.
- A. The success rate of saving endangered species is not good.
 - B. It takes too long to bring a species back from the edge of extinction.
 - C. The number of species that are stable or improving is only about one-half.
 - D. Only about 500 species have been saved.
 - E. It is too costly.
43. According to which of the following should we take measures to prevent harm to the environment and human health even if the science has not been fully established?
- A. precautionary principle
 - B. cautionary concept
 - C. Occam's razor
 - D. partitioning participle
 - E. natural order concept
44. The introduction of nonnative species often results in unforeseen consequences. This experience indicates that when introducing nonnative species we would be well advised to apply the
- A. first law of thermodynamics
 - B. Occam's razor
 - C. precautionary principle
 - D. cautionary concept
 - E. natural order concept
45. There are many actions an individual can do take to help protect endangered and threatened species. Which of the following is not one of these actions?
- A. do not purchase products made from endangered or threatened species
 - B. do not purchase animals taken from the wild
 - C. do not purchase plants taken from the wild
 - D. spread the word about the importance of this issue
 - E. all of these are important actions to take
46. The Alaska state government is trying to have the polar bear removed from the threatened species list because they thinking it may hurt economic growth.
- True False
47. By the end of this century polar bears may only be found in zoos.
- True False
48. Many biologists consider the rapid loss of the earth's biodiversity to be the most serious and long-lasting environmental problem the world faces.
- True False

49. According to biological and fossil evidence, all species eventually become extinct.
- True False
50. All mass extinctions thus far have been caused by natural phenomena that drastically changed environmental conditions.
- True False
51. With the projected extinction rates, and without greatly expanded conservation efforts, it will likely take 200,000 human generations for biodiversity to return to current levels.
- True False
52. Worldwide, approximately 2,500 species are listed as endangered or threatened.
- True False
53. The passenger pigeon, perhaps the most abundant bird on earth in 1813, was extinct less than one hundred years later because of human activities.
- True False
54. The active ingredients in nine of the ten leading prescription drugs originally came from wild organisms.
- True False
55. In protecting species from premature extinction, and in protecting their vital habitats, we are helping sustain our own health and well-being.
- True False
56. Bioprospectors are miners that are involved in causing the extinction of plants and animals.
- True False
57. Approximately 24% of the world's known plant species have been examined for their medicinal properties.
- True False
58. The greatest eliminator of species is over-hunting and over-fishing.
- True False
59. Island species - often found nowhere else - are especially vulnerable to extinctions when their habitat is destroyed.
- True False

60. The “extinction capital” of the United States is Alaska.

True False

61. In the state of Hawaii, 95% of endangered species are endangered because of invasive species.

True False

62. Efforts to control the Argentinean fire ant in the U.S. during the 1960s by spraying pesticides resulted in genetic resistance to pesticides in the fire ants.

True False

63. The kudzu vine can grow as much as 2 inches per hour.

True False

64. It is easier to remove an invasive species than it is to control their introduction.

True False

65. Continuing decline of pollinator populations, such as honeybees, could cause a serious disruption of food production for humans.

True False

66. Increasing populations of the American bald eagle, because of conservation efforts, have led to dangerously low populations of the rare Great Cormorant off the coast of Maine.

True False

67. Organized crime has moved into illegal wildlife smuggling because of the huge profits involved.

True False

68. The only major group of species that have escaped increasing extinction threat are the primates, where less than 10% are currently threatened with extinction.

True False

69. Approximately 70% of bird species are declining in numbers as a result of human activities.

True False

70. The amount of money spent on the Endangered Species Act for a year is less than the cost of 2 thirty-second TV commercials on the Super Bowl.

True False

71. Only about 30% of the world's rare and threatened plant species are being grown in the world's botanical gardens and arboreta.

True False

72. Economic considerations can not be taken into account in any decision concerning endangered or threatened species under the Endangered Species Act of 1973.

True False

73. Human activities, especially those leading to habitat loss and climate change, are likely to lead to the extinction of between _____ and _____ of the world's plant and animal species.

74. A 2005 report estimates the current annual rate of species extinction is at least _____ to _____ times the background rate that existed before modern humans appeared.

75. During this century, with global climate change and other human activities, the current extinction rate could reach _____ times the background rate of extinction.

76. According to E. O. Wilson and Stuart Pimm, at an extinction rate of 1% per year _____ of all animal and plant species could be gone by 2050 and _____ by the end of the century.

77. A(n) _____ species has so few individual survivors that the species could soon become extinct over all or most of its natural range.

78. The rate of species loss and the extent of biodiversity loss are likely to _____ during the next 50-100 years as a result of the growth of the world's _____ and resource use per person.

79. The species-area relationship suggests that, on average, a 90% loss of habitat causes the extinction of _____ % of the species living in that habitat.

80. It will take _____ generations for natural speciation to rebuild the biodiversity we are likely to destroy in this century.
- _____
81. We should act to prevent premature extinction of species, in part because they contribute to _____, those services that support our economies.
- _____
82. One reason why we should work to prevent human activities from causing the extinction of other species is that they are a vital part of the earth's _____ system.
- _____
83. Burmese and African _____ along with several other similar species, have ended up in the Everglades in Florida, after being released by their owners because they did not make good pets.
- _____
84. Of the world's 10,000 bird species, approximately _____ (number) of them are threatened.
- _____
85. According to the US Fish and Wildlife Service, about _____ of the species listed as endangered in the US and _____ of those in Hawaii are on the list because of threats from invasive species.
- _____
86. Biologists estimate there are now about 4 million _____ in Florida, Texas, and 22 other U.S. states.
- _____
87. DDT can _____ by moving up the food chain and accumulating in the fat tissues of animals at high levels.
- _____
88. One possible cause of the decline in honeybee colonies could be disruption of navigation systems of worker bees caused by _____ and _____.
- _____
89. The _____ has the responsibility for identifying and listing endangered and threatened oceans species under the ESA of 1973.
- _____

90. The U.S. _____ has the responsibility for identifying and listing endangered and threatened species other than ocean species.
- _____
91. The _____ suggests we should take measures to prevent or reduce harm to the environment and human health even if some of the cause-and-effect relationships have not been fully established scientifically.
- _____
92. A new underground vault on a remote island in the Arctic is intended to preserve _____ and endangered plant species by storing their seeds in refrigerated, low-humidity environments.
- _____
93. Note that 51% of freshwater species of fish and the overall percentage of fish that are endangered is 34%. What does that mean about the percentage of saltwater fish that are endangered?
- _____
94. Consider the case study on the extinction of passenger pigeons. Many of the things done to these birds were cruel by today's standards. Do you think we would have acted in the same fashion, or are we “more enlightened?” Explain your view.

95. Extinctions, even those caused unintentionally by humans, seem less disturbing than the volume of extinctions and their implications for future generations. What do you think the importance is of the volume of extinctions? Do we have a responsibility to retain as much of the biodiversity as possible, or are other living organisms to be used as we see fit? Explain your answer.
96. Explain, in your own words, why the degradation and loss of honeybee colonies are seen as an important example of biodiversity loss.
97. Explain what you think E. O. Wilson meant when he said, "The first animal species to go are the big, the slow, the tasty, and those with valuable parts such as tusks and skins."

98. Consider the Case Study: Polar Bears and Global Warming. What do you think will be the result of removing the top predator from an ecosystem as vast as the Arctic? Be as specific as possible.
99. In some societies animal parts serve as important natural medicines or are cultural icons. In our society, animal skins, pelts, and other parts are often status symbols. Do we have a right to question the use of animals for what we might consider questionable uses, especially if our society is also complicit in such activities?
100. The Endangered Species Act of 1973 (ESA) is one of the most important environmental laws ever written. From the beginning there have been those persons who have not been convinced the law is necessary, or that it is worth the added expense to protect many of the animals listed as endangered or threatened. As political administrations come and go, the willingness to support the ESA waxes and wanes. Do you think changes need to be made to the ESA? Do you think the changes as given in the list on page 208 should be adopted? Choose two or three from the list and explain your opposition or support for them.

CHAPTER 9--SUSTAINING BIODIVERSITY: THE SPECIES APPROACH **Key**

1. E
2. B
3. C
4. D
5. E
6. A
7. E
8. D
9. E
10. A
11. B
12. E
13. D
14. D
15. A
16. E
17. D
18. B
19. C
20. A
21. B
22. C
23. C
24. A
25. D
26. A
27. D
28. D
29. C

- 30. D
- 31. C
- 32. B
- 33. E
- 34. E
- 35. A
- 36. C
- 37. E
- 38. B
- 39. D
- 40. C
- 41. B
- 42. D
- 43. A
- 44. C
- 45. D
- 46. TRUE
- 47. TRUE
- 48. TRUE
- 49. TRUE
- 50. TRUE
- 51. TRUE
- 52. FALSE
- 53. TRUE
- 54. TRUE
- 55. TRUE
- 56. FALSE
- 57. FALSE
- 58. FALSE
- 59. TRUE
- 60. FALSE
- 61. TRUE
- 62. TRUE
- 63. TRUE

64. FALSE
65. TRUE
66. TRUE
67. TRUE
68. FALSE
69. TRUE
70. TRUE
71. FALSE
72. FALSE
73. one-fourth; one-half
74. 100; 1,000
75. 10,000
76. one-fourth; one-half
77. endangered
78. increase; human population
79. 50
80. 200,000
81. economic services
82. life support
83. pythons
84. 1,200
85. 40%; 95%
86. European wild boars
87. bioaccumulate *or* biomagnify
88. cell phones; cell phone towers
89. National Marine Fisheries Service
90. Fish and Wildlife Service
91. precautionary principle
92. genetic information
93. the percent of endangered saltwater fish is much lower
94. (page194-195) Our society has certainly become more sensitized to issues of cruelty to other animals. We are also bound by more legal restraints than would have been applied in the time of the extinction of the passenger pigeon. It is an interesting philosophical question whether or not we are more enlightened. Without the societal and legal restraints we may well have acted in the same fashion. This is not only a question about a previous time, it is also a question about place. That is, are developed nations more likely to act with restraint than developing or underdeveloped nations? Is there within humankind a high tolerance for the suffering of other organisms? The question will likely be answered in a very subjective manner.

95. (pages 192-194) Students should address the answer in one or more of the following ways:

1. destroying species diminishes the ability of ecosystems to function properly. We are ultimately dependent upon these systems.
2. destroying species denies future generations the opportunity to experience and learn from these species, perhaps to gain vital knowledge to enhance their lives
3. destroying species is intrinsically wrong, in and of its own
4. biodiversity will take millions of years to replenish the number and variety of species

96. (page 204) Honeybees are major pollinators of flowering plants, including one-third of the human food supply. This is an important and clear example of the interactive nature of biodiversity. Insects pollinate plants. Plants are food sources for a variety of organisms, including humans. Human population is increasing, therefore more food is required. However, less food will be available because of the failure of the honeybee colonies.

97. (page 194) Some species are inherently vulnerable to human activity and therefore vulnerable to extinction. Large animals are not only more visible, hence easier to find, they may serve as "trophy" species. Fast animals may be able to elude the hunter or trapper, slow animals become easy prey. An animal that is tasty is one that will be in great demand for food and therefore under constant pressure. And those with valuable parts will be vulnerable to both legal and illegal pressure to provide their parts for the market.

98. (page 190) Removal of a top predator releases the pressure on all the prey species on which the predator fed. Dramatic changes will be passed from level to level as the prey populations increase. The prey may deplete the available food, potentially causing their own demise. This increase and collapse may cascade throughout the ecosystem.

99. (pages 205-206, for example) A very thin line must be waked in this regard. Criticism of culture is seldom useful, especially when the culture making the criticism is doing something equivalent. However, discussion of the impact of such activities on biodiversity, and ultimately on the ability of the culture itself to survive, may provide a way to examine the larger issues.

100. (pages 209-210) It would be important to have the students clarify the specifics of why they do or do not support the proposed changes. It is not helpful for them merely to state something like "it would make it better or stronger." How will this change make the law better or stronger? Will endangered and threatened species be more protected or less protected as a result of what you suggest? This discussion may well revolve around the issues of government verses free-market. For those inclined to dislike government intervention, the challenge will be to explain how biodiversity would be helpful to the market. For those inclined to support government intervention on behalf of endangered and threatened species, the challenge will be to explain why intervention is necessary and what might be the impact on the market.