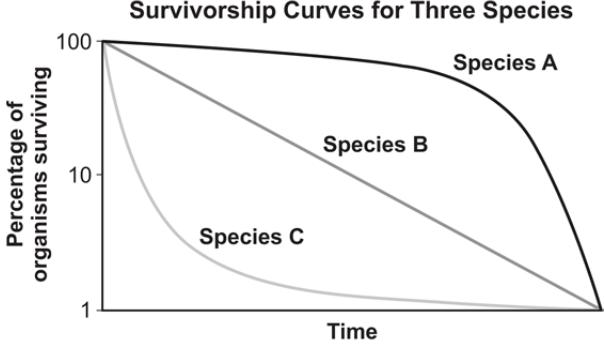


Unit Test: Ecosystems: Stability and Change

Read each question. Circle the letter of the correct answer.

1. A rabbit population is near the carrying capacity of its ecosystem. If the population density of rabbits in an area were to increase, what direct effect would it most likely have?
 - A. There would be more food available to the rabbits.
 - B. The rabbit population would die off immediately.
 - C. The rabbits would have greater competition for resources.
 - D. There would be a decrease in the number of predators of rabbits.
2. The graph shows the survivorship curves for three species of organisms living in the same environment.

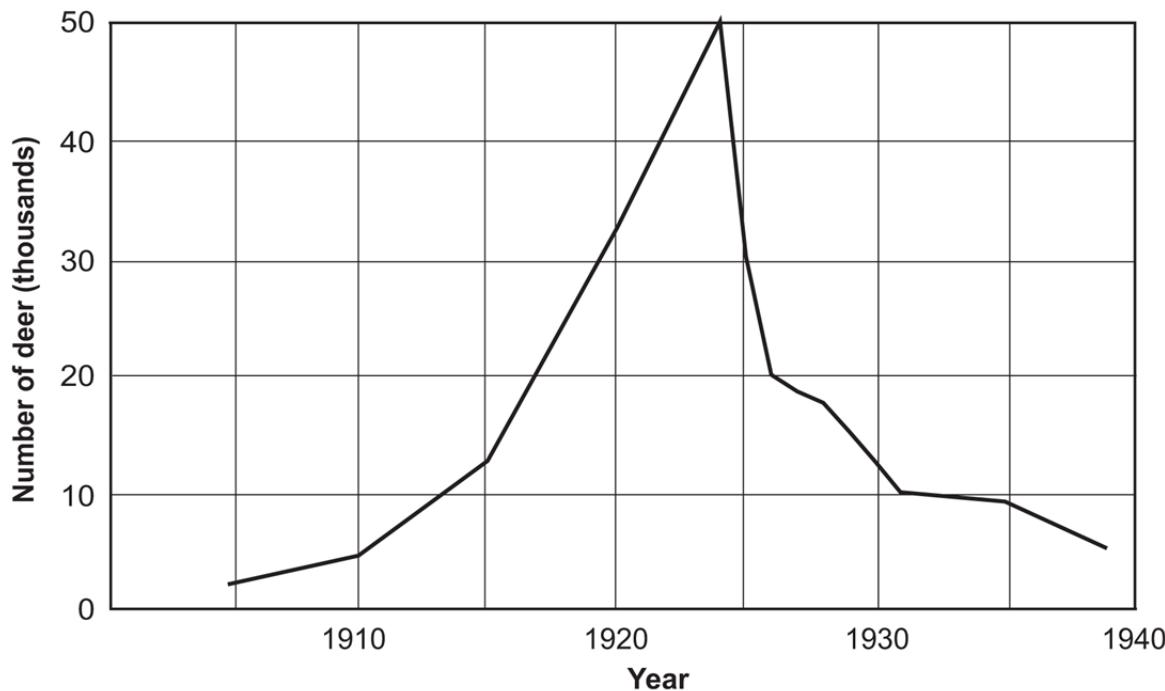
The graph, titled "Survivorship Curves for Three Species", plots the percentage of organisms surviving against time. The y-axis is labeled "Percentage of organisms surviving" with major ticks at 1, 10, and 100. The x-axis is labeled "Time". Three curves are shown:
 - Species A:** A straight line starting at 100% survival on the y-axis and ending at approximately 60% survival on the x-axis.
 - Species B:** A curve starting at 100% survival on the y-axis and ending at approximately 10% survival on the x-axis.
 - Species C:** A curve starting at 100% survival on the y-axis and ending at 1% survival on the x-axis.

Which of these best compares the survivorship of the species in the graph?

 - A. Species B has a greater percentage of its population reach old age than species A.
 - B. Species B has a greater percentage of its population reach old age than species C.
 - C. Species C has a greater percentage of its population reach old age than species A.
 - D. Species C has a greater percentage of its population reach old age than species B.
3. Which of these best describes a climax community?
 - A. a growing forest with varied tree and shrub species after a wildfire
 - B. a balanced population of clownfish and sea anemones in a coral reef ecosystem
 - C. a booming population of plankton after farming that increased fertilizer runoff
 - D. a decreasing population of deer and oak after a hunting season and deforestation
4. An insect population feeds almost exclusively on a single species of plant. The carrying capacity of the insect population is dependent primarily on food availability. Recently, a fire destroyed 80% of the plants that the insects feed upon. How many times as large will the carrying capacity be?
 - A. 0.2
 - B. 0.8
 - C. 2
 - D. 8
5. A scientist wants to study primary succession. After which ecological event should she begin her research?
 - A. A fire burns down half of a forest.
 - B. A hurricane devastates a coral reef.
 - C. A retreating glacier exposes bare rock.
 - D. A loss of a tree creates a gap in the forest canopy.

6. A population of 2,000 deer lived on a plateau. In 1906, all hunting of the deer was banned, natural predators were exterminated, and sheep and cattle, which competed with the deer, were banned from the plateau. The graph shows the deer population in the years following this.

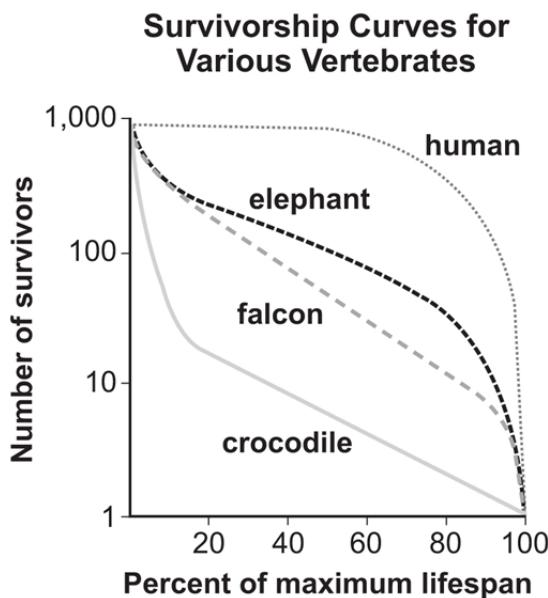
Deer Population of Plateau 1906–1938



Which statement regarding factors affecting deer population is supported by the data in the graph?

- A. From 1920 to 1924, competition for limited resources managed the deer population.
- B. From 1915 to 1920, predation managed the deer population.
- C. From 1925 to 1930, resource scarcity was the most influential factor on the changing deer population.
- D. From 1925 to 1930, lack of competition for resources was the most influential factor on the changing deer population.
7. Which of these changes in an ecosystem would most likely result in an increase of the carrying capacity of herbivores in the environment?
- A. an increase in the number of carnivores in the ecosystem
- B. a decrease in the amount of precipitation in the ecosystem
- C. an increase in the number and variety of plants in the ecosystem
- D. a decrease in the amount of sunlight that the ecosystem receives

8. The graph shows the number of individuals of a given species, out of 1,000, that survive to different percentages of that species' maximum life span.



According to the graph, which animal experiences the lowest chance of survival immediately following birth?

- A. crocodile
 - B. elephant
 - C. falcon
 - D. human
9. The European green crab is an invasive species that has recently entered inland waters of Washington. Once established, this crab can disrupt the natural ecosystem by outcompeting native species for food and habitat. A biologist is collecting data from local salt marshes and estuaries to evaluate the impact of the invasive crab on the populations of native organisms that live there. Which experimental design will most efficiently provide accurate, reliable data for evidence?
- A. Count invasive crabs in quadrats at a variety of salt marshes and estuaries.
 - B. Count invasive crabs in quadrats at a single salt marsh and use the data to predict what is happening at all salt marshes.
 - C. Count and record observations on the populations of invasive crabs and native organisms in quadrats at a variety of salt marshes and estuaries.
 - D. Count and record observations on the populations of invasive crabs and native organisms at an entire salt marsh and use that to predict what is happening in all salt marshes.

Read each question. Follow the instructions to answer the questions.

- 10.** A scientist is studying the factors that affect a population of mammals. Write the letter of each scenario to show whether it would cause the population of that area to increase, decrease, or stabilize.

increase population	
decrease population	
stabilize population	

- A. The birth rate and death rate in the population are roughly equal.
- B. A deadly disease is spreading among predators of the population.
- C. A natural disaster occurs and destroys valuable resources the population needs for survival.

- 11.** Coral reefs are damaged by water that is too warm. A warm water event damaged three coral reefs around the same island. The table shows the coral coverage in each reef before and after the event.

Effects of Warm-Water Event on Coral Reefs

Reef	Coral cover before event (%)	Coral cover after event (%)
A	50	16
B	40	20
C	60	22

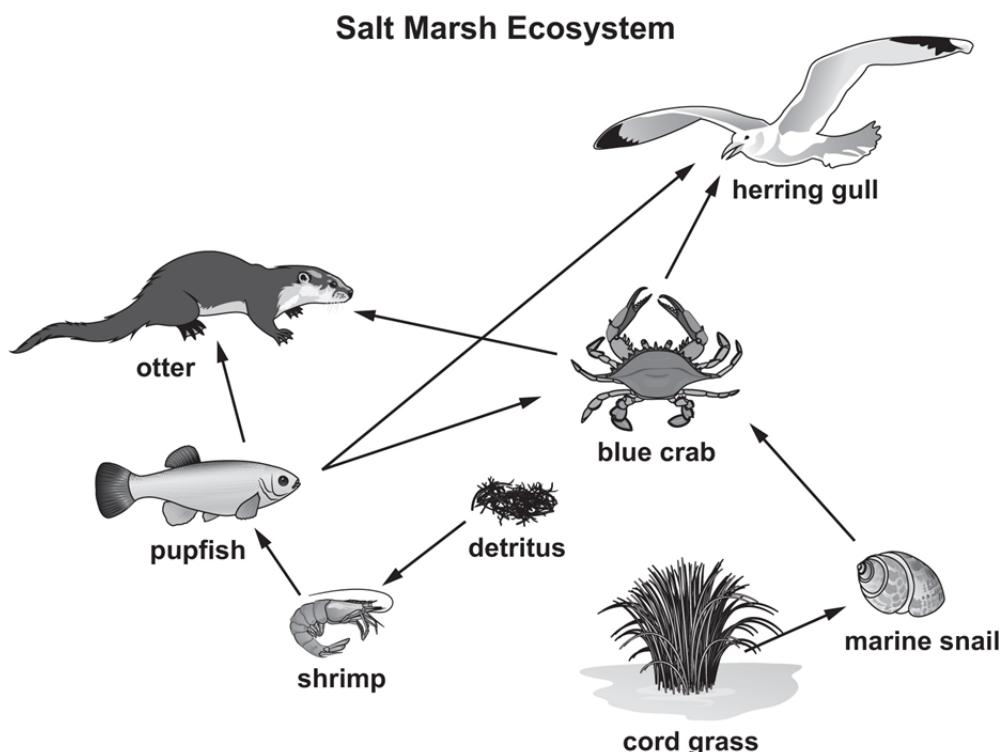
Which reef showed the most resilience to the damage of the warm water event? Number the reefs into correct order from the most resilient to the least resilient.

_____ reef A

_____ reef B

_____ reef C

12. The diagram shows a food web in a salt marsh.



Circle the letter of all events that would cause a decrease in population density of herring gulls in a saltwater marsh ecosystem.

- A. The population of otters decreases.
- B. The population of blue crab increases.
- C. A disease reduces the shrimp population.
- D. The otters begin to feed on herring gull eggs.
- E. A different species of bird that eats pupfish moves into the marsh.

13. Write the letters of the following events in the correct columns to show whether they represent primary or secondary succession.

Primary Succession	Secondary Succession

- A. forest fire that burns down plant life for days
- B. hurricane that devastates a coral reef system
- C. loss of a huge tree that creates a gap in the forest canopy
- D. retreating glacier that exposes bare rock and eroded sediment
- E. large volcanic eruption that leaves many acres of hardened lava

- 14.** A scientist is studying the population of fish in a lake. Write one letter in each blank to correctly complete the paragraph.

When the fish population is well below the carrying capacity of the lake, the population would be expected to show a pattern of _____ growth, which means that the rate of population change will _____ over time. As the population approaches carrying capacity, the growth rate would be expected to _____.

- | | |
|-------------|--------------------|
| A. linear | D. exponential |
| B. increase | E. remain the same |
| C. decrease | |

- 15.** Write an X in the correct box to show whether each event is an example of a density-dependent limiting factor or a density-independent limiting factor.

Event	Density dependent	Density independent
A. A large number of moose die from a rare bacterial infection that spreads through the population.		
B. Climate change causes the polar bear population to decrease because of a lack of polar ice.		
C. A volcanic eruption covers a lake that frogs lay their eggs in with ash.		
D. The amount of nitrogen in the soil becomes less abundant; therefore, fewer plants are able to survive.		

- 16.** Number the items in the correct sequence of primary succession after a whale dies in the ocean.

Number 1 should be the first event and number 4 should be the last event.

_____ Scavengers and decomposers eat the soft tissue of the decomposing whale.

_____ A large whale dies and sinks to the ocean floor.

_____ A balanced community of mussels, marine snails, marine worms, crabs, and clams is formed.

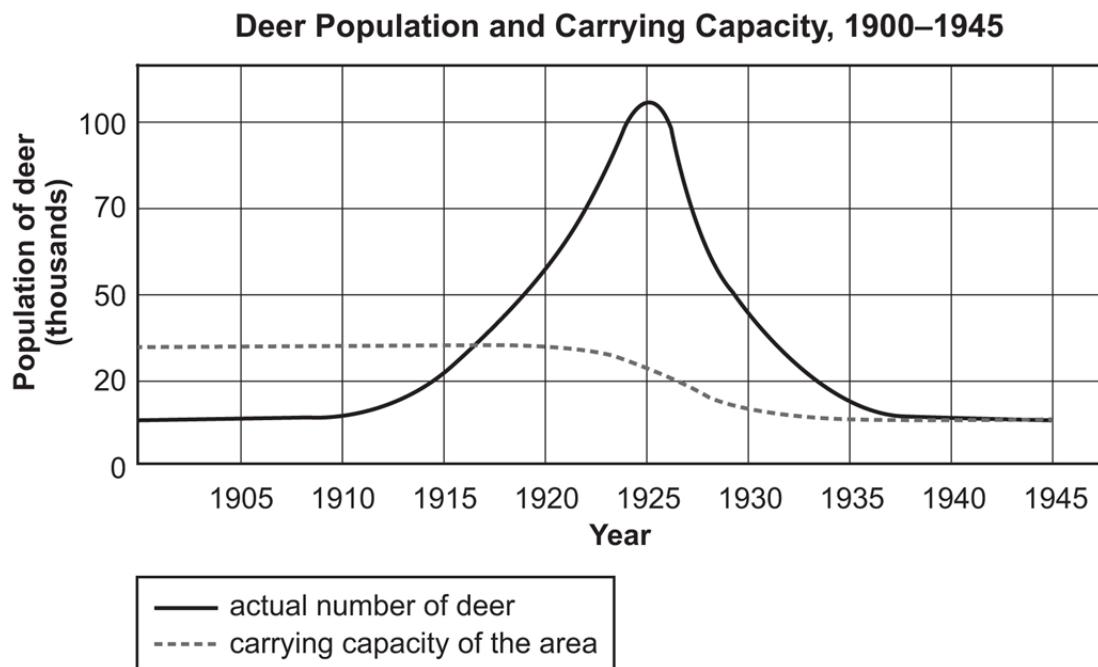
_____ Bacteria decompose the oils inside the exposed bones.

- 17.** A species of reptile lives on several different islands. Some of the islands contain a certain species of mammal, while some do not. On the islands without the mammal, the reptile species has a carrying capacity of 240 individuals per square kilometer. On islands with the mammal, the reptile species has a carrying capacity of 150 individuals per square kilometer. By what percent is the carrying capacity for the reptile species reduced by the presence of the mammal species? Write the correct value on the line.

_____ %

Read each statement. Write your answer on the lines.

18. The graph shows the population and carrying capacity of deer in an ecosystem during the first half of the 20th century.



Explain an event that could have caused the change in population between 1910 and 1925.

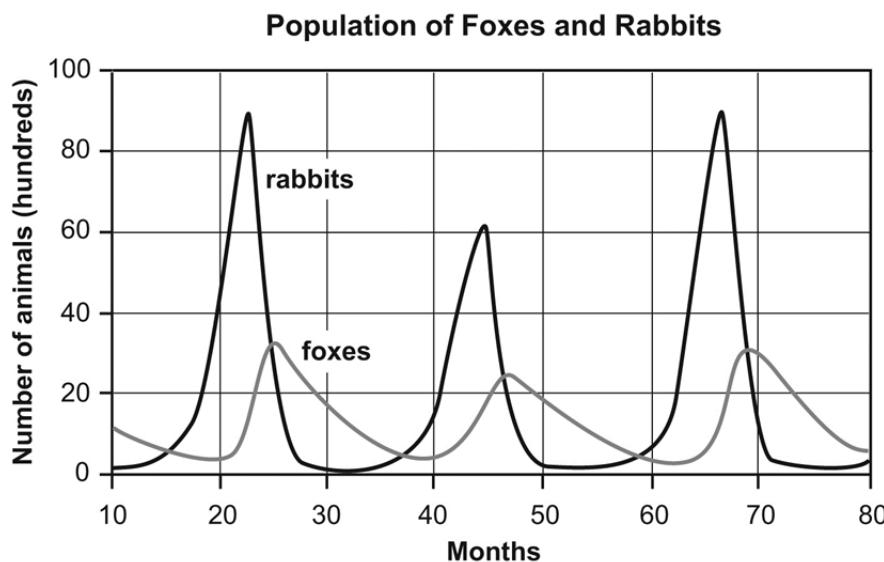
Explain factors that could have contributed to the change in carrying capacity between 1920 and 1930.

19. A certain plant species has seeds that remain dormant until heat stimulates them to germinate.

Describe the process of succession that could occur with this species after a wildfire.

Identify whether the plant species is dependent on succession events and explain how you know.

20. A scientist is studying the population of foxes and rabbits in a forest ecosystem. The graph shows how the population changed over time.



Explain how the population of foxes is affected by the population of rabbits according to the graph.

Explain what would most likely happen to the rabbit population if the fox population were removed from the forest. Be sure to include both short-term and long-term effects of removing the foxes.

21. A researcher is studying a cornfield that has been recently abandoned by a farmer. By the end of one year, wild grasses begin to grow in the field.

Explain whether this is an example of primary succession or secondary succession.

Describe how the researcher can identify when a climax community is reached in the area that was a cornfield.

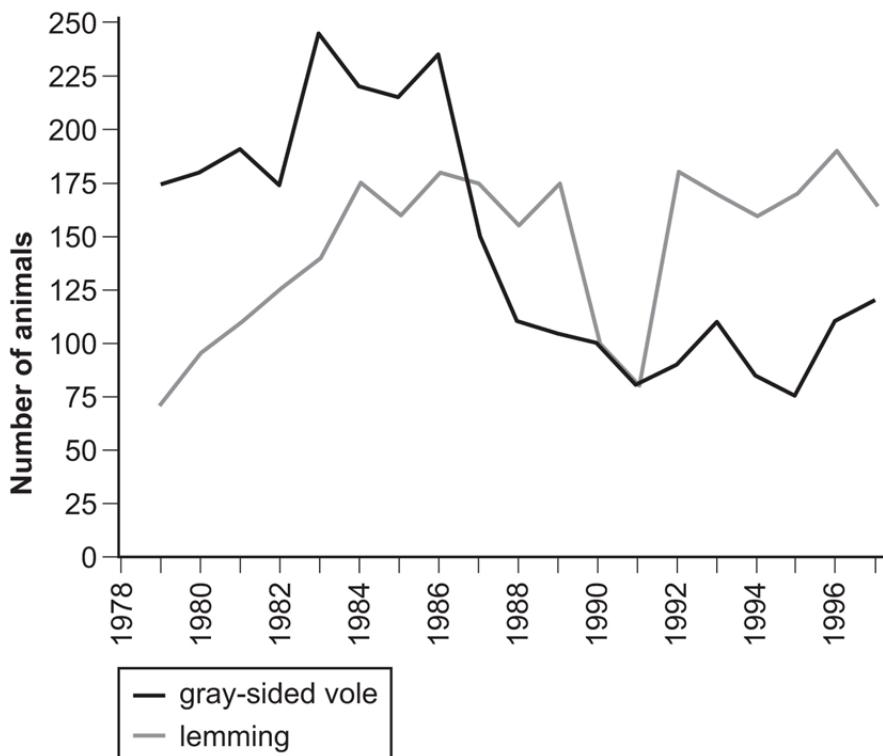
Directions: Read the passage, then answer the questions that follow.

Vole and Lemming Populations

A researcher studied the population of two herbivore species, gray-sided voles and lemmings, in one area.

During this time, there was no immigration or emigration by the lemmings or the voles in the area. The graph shows the population of each species in the area between 1979 and 1997.

Vole and Lemming Population in Area Studied



22. The researcher wants to compare his results with other data about nearby vole populations, to see if they showed similar trends. Which of these would best help him identify whether the other populations show similar trends? Circle the letter of the correct answer.
- A. finding the carrying capacity of each area in 1988
 - B. measuring the total population in each area in 1996
 - C. finding the average population in each area between 1979 and 1996
 - D. comparing the percent change in each population between 1986 and 1990

23. Write one letter in each blank to correctly complete the sentences.

According to the graph, the number of lemmings **1.** _____ by about **2.** _____ individuals between the years of 1980 and 1985. This would be explained by an increase in the amount of **3.** _____ the lemmings during those years.

1. A. increased B. decreased	2. C. 10 D. 40 E. 70 F. 100	3. G. disease in H. predation of I. food available to
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24. Draw a circle around the letters of all of the statements that are supported by the data in the graph.

- A. A predator of the voles was introduced to the area in 1987.
- B. A competitor of the lemming was introduced to the area in 1979.
- C. There were more births than deaths among voles between 1985 and 1992.
- D. There were more deaths than births among lemmings between 1984 and 1991.

25. The researcher studied the carrying capacity of each species in the area. Write your answer on the lines.

Identify an approximate value of the carrying capacity of the area for the lemming and the year in which the carrying capacity was reached.

Describe one living and one nonliving factor that could lower the carrying capacity of the area for lemmings.
