

Population Ecology

1. Populations of mammals that live in colder climates tend to have shorter ears and limbs than populations of the same species in warm climates (coyotes are a good example of this). This is called _____ Rule.
2. Populations of mammals that live in colder climates tend to have larger bodies than populations of the same species in warm climates (coyotes are a good example of this). This is called _____ Rule.
3. Allen's Rule and Bergmann's Rule are based on data collected from mammal species with populations in both cold and warm climates. The rules show population characteristics that help individuals to limit their _____ .
4. _____ is the rate at which a population of a given species will increase when no limits are placed on its rate of growth.
5. The size at which a population stabilizes in a particular place is defined as the _____ for that species.
6. Life history adaptations of ____ selected populations are characterized by an early age of first reproduction and short maturation time and life span.
7. Species that have a delayed reproductive stage, are competing for limited resources and have smaller numbers of slowly maturing large offspring show _____ selected adaptations.
8. The statistical study of populations including sex ratio, age structure and predicting growth rates is called _____ .
9. A group of individuals of a single species living together is a
 - A. deme
 - B. phenotype
 - C. genome
 - D. biotic community
 - E. population
10. Organisms such as lizards that need to maintain body temperature through external means do so by
 - A. shivering to produce heat
 - B. sunbathing
 - C. swimming in geothermal pools
 - D. running frequently to warm up
 - E. eating large meals to provide calories for heat production

11. Organisms that produce offspring several times over many seasons exhibit a life history adaptation called
 - A. semelparity
 - B. iteroparity
 - C. biparity
 - D. polyparity
 - E. alloparity

12. Effects that are dependent on the size of the population and regulate the growth of populations are called
 - A. K-related effects
 - B. density-independent effects
 - C. environmental resistance effects
 - D. density-dependent effects
 - E. demographic effects

13. The trade-off between investments in current reproduction and in growth that promotes future reproduction is referred to as the total cost of
 - A. adaptation
 - B. selection
 - C. reproduction
 - D. genetic change
 - E. fitness

Use the following scenario to answer Questions 14-16

After a coastal storm 3 deermice (*Peromyscus*), huddled on a tree trunk, are carried several miles out to sea and wash ashore on a small island (500 acres) that has no mice, but can certainly support them. Deermice eat seeds, primarily. The entire island has lots of plants and places for mice to live. There are small groundnesting, seed-eating birds, hawks, and a variety of lizards living on the island. Two of the mice are female, and already pregnant when they arrive, and later they both mate with the male. Over time a population of deermice is established on the island. Deermice can reproduce two to three times a year, with 3-6 offspring per litter.

14. The first year on the island the population of deermice
 - A. increases in a sigmoidal fashion
 - B. is K-selected
 - C. quickly reaches its biotic potential
 - D. is limited only by its carrying capacity
 - E. all of the above

15. Within 2 years on the island the population of deermice
- A. is r-selected
 - B. is K-selected
 - C. has reached its biotic potential
 - D. may be competing with the birds for resources
 - E. both A and D
16. Within 100 years on the island the population of deermice
- A. is still growing rapidly
 - B. has reached its biotic potential
 - C. is K-selected
 - D. is r-selected
 - E. both B and D
17. A community and the nonliving factors with which it interacts is called a(n)
- A. population
 - B. race
 - C. cline
 - D. environment
 - E. ecosystem
18. Population studies include all of the following features except
- A. size
 - B. biodiversity
 - C. density
 - D. dispersion
 - E. demography
19. Demographic studies include
- A. age structure
 - B. growth rates
 - C. mortality and survivorship curves
 - D. sex ratio
 - E. all of the above
20. Clumped or patched populations that undergo local periodic extinction and recolonization are called
- A. randomly spaced populations
 - B. uniformly spaced populations
 - C. metapopulations
 - D. over sized populations
 - E. endangered populations

21. The number of individuals of a species that can be supported indefinitely in a particular place is called its
- A. niche
 - B. biotic potential
 - C. carrying capacity
 - D. maximum size
 - E. habitat usage

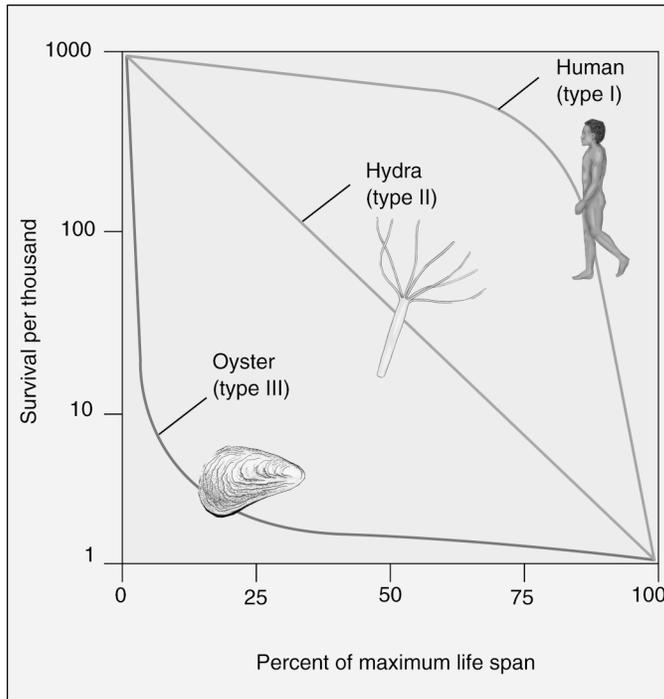
22. The biotic potential representing growth without limits at its maximal rate is given the symbol
- A. r
 - B. N
 - C. K
 - D. dN/dt
 - E. N/K
23. In the sigmoid growth curve, the number of individuals at any one time is
- A. r
 - B. N
 - C. K
 - D. dN/dt
 - E. N/K
24. In the sigmoid growth curve, the carrying capacity of the environment is
- A. r
 - B. N
 - C. K
 - D. dN/Dt
 - E. N/K
25. Ranges of a population
- A. are very fluid and change frequently as population grows or shrinks
 - B. are stable and almost never change
 - C. only change after a disaster has wiped out a former range
 - D. change over time due to external events
 - E. only change due to iteroparity
26. Density-dependent factors
- A. affect the size of the population
 - B. act to regulate population growth
 - C. ultimately cause adaptation as competition for limiting factors increases
 - D. a, b, and c are true
 - E. only a and b are true
27. Density-independent factors do not include
- A. weather
 - B. natural phenomenon such as an earthquake
 - C. sex ratio
 - D. day or night
 - E. radiation

28. Populations of organisms that have sigmoid growth curves are limited by the carrying capacity; they are called
- A. K strategists
 - B. r strategists
 - C. predators
 - D. parasites
 - E. perennials
29. The r strategists are characterized by
- A. early age of first reproduction
 - B. large brood size/numerous offspring
 - C. little or no parental care / short generation time
 - D. a and b only
 - E. a, b, and c
30. Which of the following is not an example of organisms displaying r selected adaptations?
- A. dandelions
 - B. whales
 - C. aphids
 - D. mice
 - E. cockroaches
31. Examples of organisms showing K selected adaptations include all of the following except
- A. dandelions
 - B. whooping cranes
 - C. whales
 - D. humans
 - E. coconut palms
32. Regarding population growth, in the Logistic Growth Model, as the number of individuals in a population, N , approaches the carrying capacity, K , the rate of growth (dN/dt)
- A. increases rapidly until N far surpasses K
 - B. increases rapidly until N reaches K and then stops
 - C. increases at the same rate it has been, continuing on until N is beyond K for some distance before regulating
 - D. slows down as N approaches K
 - E. stops well before N reaches K and stabilizes
33. Regarding population growth, in the Logistic Growth Model, as the number of individuals in a population, N , approaches the carrying capacity, K , the rate of growth (dN/dt)
- A. will be affected by an increased birth rate
 - B. will be affected by a decreased death rate from predation
 - C. will be affected by increased competition with other species
 - D. will be affected by increased competition within the species

- E. will be affected by limiting factors in the environment
34. There are three aspects of entire populations that are important and often studied. Select the best choice from the ones listed below.
- A. a population's range, the dispersal of individuals within the range, and the size that the population attains
 - B. a population's range, the amount of food available within the range, and the size that the population attains
 - C. a population's range, the parental care received by each offspring within the population, and the size that the population attains
 - D. a population's range, the size home range of an individual in the population, and the parental care expended for each offspring
35. During the late 1800s, cattle egrets arrived in South America from Africa and began to colonize. Their range has expanded dramatically over the years. They were able to do this because
- A. the habitats that they left in Africa were not suitable for any further colonization; thus, they were forced to immigrate
 - B. the habitats that they encountered in South America were suitable to them and unoccupied
 - C. there were abundant cattle for the birds to gather around in South America; furthermore, various animals that the egrets had lived around in Africa had become quite scarce because of over hunting and poaching, causing the birds to extend their range
 - D. the food resources in South America were far superior to those in Africa, allowing the egrets more opportunity to grow and reproduce and ultimately expand their range
36. Populations have three basic types of dispersal patterns—clumped, random, and uniform. One can observe random distributions because
- A. individuals of the populations do not interact strongly with one another
 - B. individuals of the population are usually in competition for resources
 - C. individuals of the population are reacting to uneven distribution of resources
 - D. individuals of the population with random distribution display social interactions
37. An example of clumped distribution of a population is
- A. an introduction of a new species into a new environment
 - B. a herd of antelope
 - C. a behavioral interaction between two members of the same species
 - D. not very common in nature

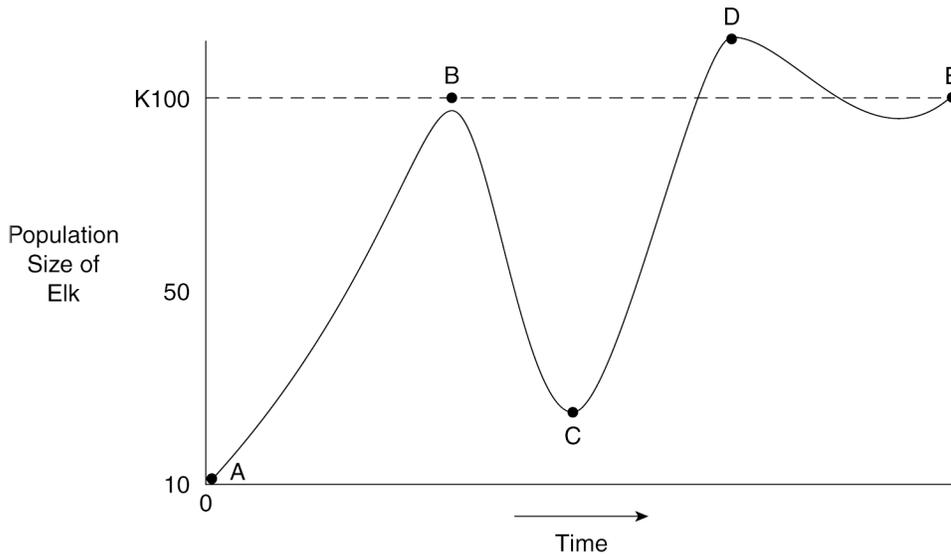
38. Many times species are composed of networks of distinct populations called metapopulations. Metapopulations occur in areas where
- A. a population in better habitats continually send out dispersers to bolster populations in poorer habitats
 - B. a population in poor habitat continually send out dispersers to bolster populations in better habitats
 - C. a population in better habitats do not send out colonizers into poorer habitats
 - D. suitable habitat is patchily distributed and separated by areas of unsuitable habitat
39. Which of the following factors is not one that increases the likelihood of population extinction?
- A. Small population size is a factor contributing to a population's extinction.
 - B. Isolation of a population from sources of immigrants is a factor contributing to a population's extinction.
 - C. Isolation of a population from sinks of immigrants is a factor contributing to a population's extinction.
 - D. Low resource availability is a factor contributing to a population's extinction.
 - E. Lack of genetic diversity is a factor contributing to a population's extinction.
40. Which of the following choices best represents two reasons why metapopulations studies are important to conservation biology?
- A. Metapopulations continually colonize empty patches, which prevent long-term extinction. The species as a whole occupies a larger area than it otherwise might occupy.
 - B. Metapopulations continually colonize empty patches, which prevent short-term extinction. The species as a whole occupies a larger area than it otherwise might occupy.
 - C. Metapopulations continually colonize empty patches, which prevent short-term extinction. The species as a whole occupies a smaller area than it otherwise might occupy.
 - D. Metapopulations continually colonize empty patches, which prevent long-term extinction. The species as a whole occupies a smaller area than it otherwise might occupy.

Use the following graph to answer Questions 41-43



41. Which of the following statements is true about the graph?
- A. Oysters live longer than *Hydra*.
 - B. *Hydra* and humans have parallel life spans.
 - C. Humans and oysters have similar life spans.
 - D. Many humans live a long time with very few deaths in the first few years of life.
 - E. Many oysters live a long time with very few deaths in the first few years of life.
42. Organisms with a Type III life history are probably
- A. K-selected
 - B. *r*-selected
 - C. idiopathic
 - D. at their carrying capacity
 - E. subject to low predation rates
43. Another organism that would probably have a Type III life history would be
- A. whale
 - B. coconut palm
 - C. lion
 - D. gorilla
 - E. pine tree

Use the following graph to answer Questions 44-45



44. What point on the graph (marked by A, B, C, D, or E) shows a density independent change in the size of the population?
- A. A
 - B. B
 - C. C
 - D. D
 - E. E
45. The change that occurs at point C could be caused by
- A. increased predation by wolves
 - B. a wet year with increased vegetative growth
 - C. increased competition from moose herds
 - D. a dry year with decreased vegetative growth
 - E. lower than normal birth rates
46. The Allee effect occurs when
- A. a density-dependent factor decreases a population
 - B. a density-independent factor decreases a population
 - C. a density-dependent factor increases a population
 - D. a density-independent factor increases a population
 - E. a density-independent factor holds a population at its carrying capacity

47. Population pyramids are primarily used to show
- A. population trends in births and deaths
 - B. birth rates
 - C. competition
 - D. sex and age composition of a population
 - E. both A and D
48. Humans currently
- A. are using almost half of the Earth's land
 - B. are using over half of all renewable fresh water sources
 - C. are unevenly distributed and the difference is increasing
 - D. are using unevenly distributed resources – less than 20% of us use over 80% of the energy
 - E. all of the above
49. The population growth rate has declined over the past 30 years. This means
- A. improved status of women and increased family planning have had an effect
 - B. actual population numbers of humans are declining in nearly all countries
 - C. density-dependent factors have taken effect as we neared our carrying capacity
 - D. density-independent factors have taken effect as we neared our carrying capacity
 - E. all of the above

Answer Key

No. on Test	Correct Answer
1	Allen's
2	Bergmann's
3	heat loss
4	Biotic potential
5	carrying capacity
6	r
7	K
8	demography
9	E
10	B
11	B
12	D
13	C
14	A
15	E
16	D
17	E
18	B
19	E
20	C
21	C
22	A
23	B
24	C
25	D
26	D
27	C
28	A
29	E
30	B
31	A
32	D
33	E
34	A

35	B
36	A
37	B
38	D
39	C
40	A
41	D
42	B
43	E
44	C
45	B
46	C
47	E
48	E
49	A