

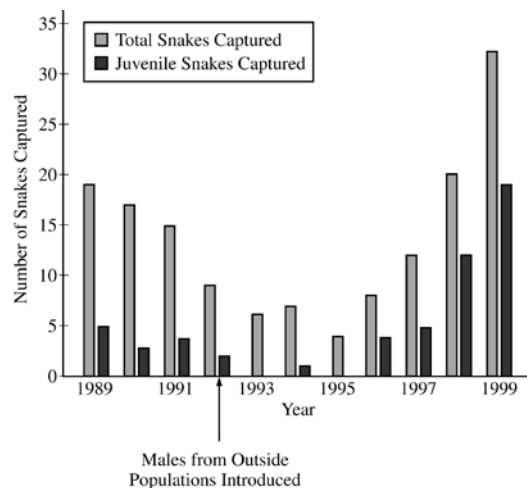
AP[®] BIOLOGY

2015 SCORING GUIDELINES

Question 6

In an attempt to rescue a small isolated population of snakes from decline, a few male snakes from several larger populations of the same species were introduced into the population in 1992. The snakes reproduce sexually, and there are abundant resources in the environment.

The figure below shows the results of a study of the snake population, both before and after the introduction of the outside males. In the study, the numbers of captured snakes is an indication of the overall population size.



- (a) **Describe** ONE characteristic of the original population that may have led to the population's decline in size between 1989 and 1993.

Description (1 point)

- Lacked genetic diversity/variation
- Was an aged/post-reproductive population/not enough young snakes
- Had unfavorable sex ratio/too few males
- Possessed a harmful mutation/disease

- (b) **Propose** ONE reason that the introduction of the outside males rescued the snake population from decline.

Proposal (1 point)

- Increased genetic diversity in the population
- Increased reproductive success
- Established beneficial sex ratio/sufficient proportion of males for reproduction
- Introduced resistance to disease that was affecting the original population

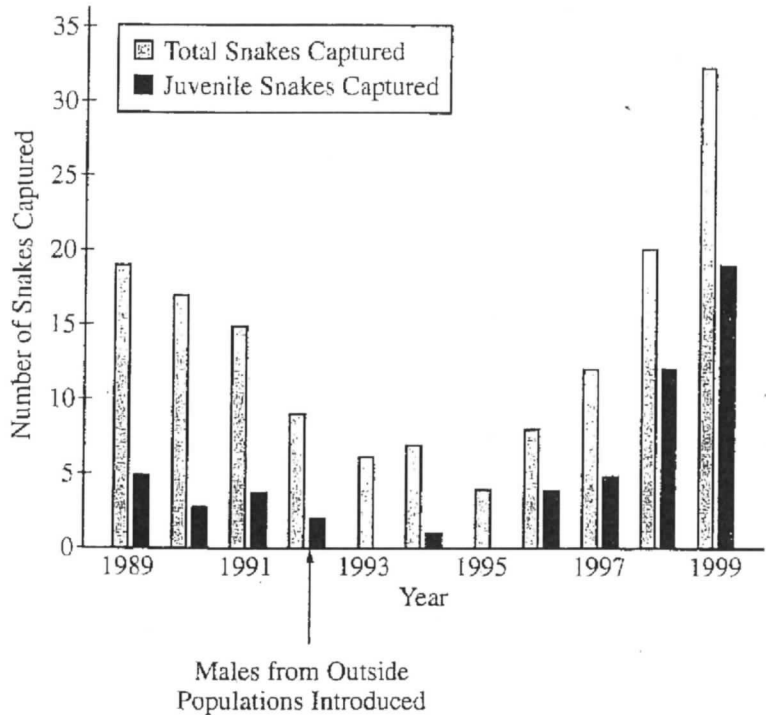
- (c) **Describe** how the data support the statement that there are abundant resources in the environment.

Description (1 point)

- Population can/does grow
- If resources are limited population would not grow

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PAGE FOR ANSWERING QUESTION 6

a) The original population could have had a limited gene pool because of stabilizing selection. Because this caused limited genetic variation in the population, none of the snakes were more fit for changes in the environment.

b) Males from an outside population caused new genes to enter

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ADDITIONAL PAGE FOR ANSWERING QUESTION 6

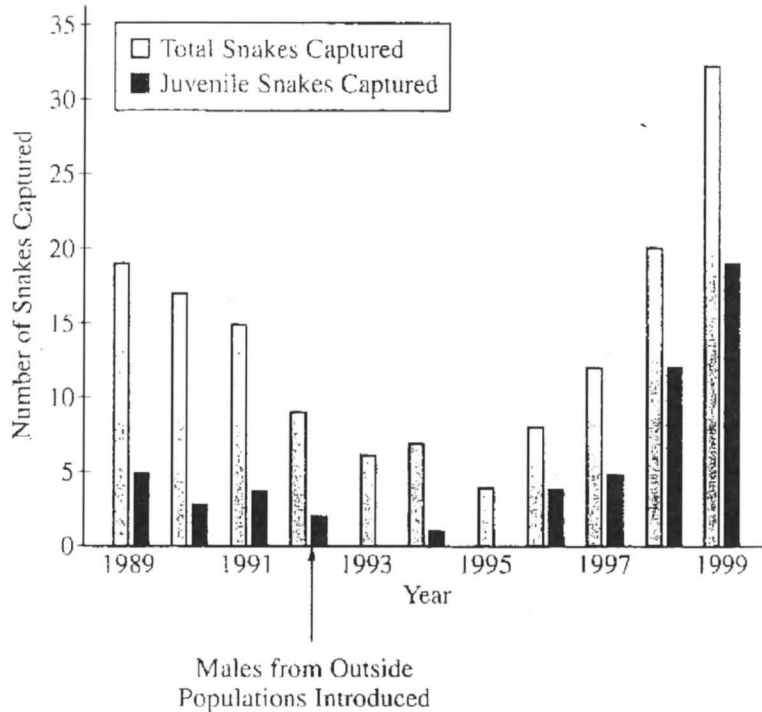
the population. Because of the increased genetic variation, the snakes were fit to fill niches in a changing environment.

c) This population is growing exponentially and has not reached carrying capacity.

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PAGE FOR ANSWERING QUESTION 6

a) The snake population could have been very unbalanced in terms of gender discrepancy. If there were significantly less males, there would be fewer chances for reproduction which is why the juvenile population is so small.

b) The introduction of outside males could have balanced out the male to female ratio leading to an increase in population overall.

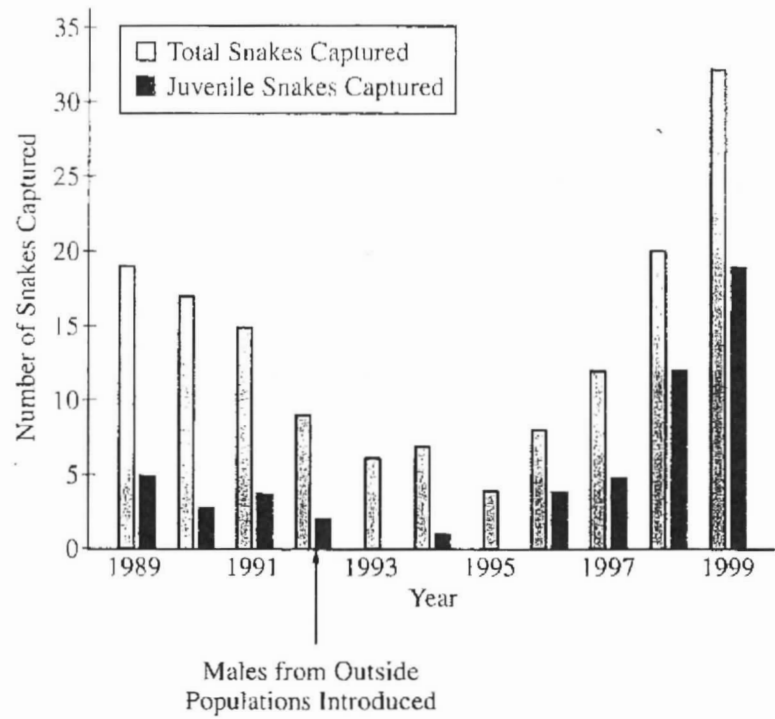
c) The data shows there are abundant resources because ~~the~~ the environment is able to support large populations and ~~the~~ resources is not the reason for small population size originally.

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6C

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PAGE FOR ANSWERING QUESTION 6

6. (a) The population of snakes may have declined due to a ~~cessive genetic disorder that makes them small~~ habitat challenge that is not advantageous to small snakes, such as eating large organisms.

(b) The introduction of outside male could have introduced favorable alleles for larger size into the

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6C₂

population.

C) There are abundant resources in the environment because the population never drops to a minimal level.

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AP[®] BIOLOGY

2015 SCORING COMMENTARY

Question 6

Question 6 was written to the following Learning Objectives in the AP[®] Biology Curriculum Framework: 1.5, 3.28, 4.19, and 4.26.

Overview

This question focused on possible evolutionary mechanisms underlying changes in population size. Students were presented with a graph representing changes in the size of a small, isolated population of snakes before and after the introduction of outside males. Students were asked to use the data to describe one characteristic of the original population that led to the population decline. Students were then asked to propose a reason to explain how the introduction of snakes from an outside population rescued the population from decline. Finally, students were asked to use the data to support the claim that the snake population inhabited an area with abundant resources over the entire course of the study.

Sample: 6A

Score: 3

The response earned 1 point in part (a) for describing that limited genetic variation of the original population may have led to the decline of the population.

The response earned 1 point in part (b) for proposing that the introduced males increased genetic variation and could have rescued the population from decline.

The response earned 1 point in part (c) for supporting the presence of abundant resources by describing that the population is growing.

Sample: 6B

Score: 2

The response earned 1 point in part (a) for describing that the original population may have been very unbalanced in terms of gender and had significantly fewer males.

The response earned 1 point in part (b) for proposing that the introduced males balanced out the male-to-female ratio and could have rescued the population from decline.

Sample: 6C

Score: 1

The response earned 1 point in part (b) for proposing that the introduction of outside males could have introduced favorable alleles into the population.