

B

Biology Standard
B.6.b.



Ecosystem Change in California

California Education and the Environment Initiative

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The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency
California Natural Resources Agency
Office of the Secretary of Education
California State Board of Education
California Department of Education
California Integrated Waste Management Board

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Key Partners:

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Lesson 1 Fields of Green and Gold

None required for this lesson.

Lesson 2 Surveying an Ecosystem for Evidence of Change

None required for this lesson.

Lesson 3 Climate Clues in Tree Rings and Pollen Cores

None required for this lesson.

Lesson 4 Examining Human Use of the Grasslands

None required for this lesson.

Lesson 5 Grassland Invaders

None required for this lesson.

Lesson 6 The Management of Ecosystems

None required for this lesson.

Assessments

Ecosystem Change in California—Traditional Unit Assessment Master 2

Grasslands, Fires, and Rain—Alternative Unit Assessment Master 7

Name: _____

Part 1

Instructions: Select the best answer and circle the correct letter. (1 point each)

1. Ecological succession refers to _____.
 - a. the growth of an ecosystem over time
 - b. the stability of an ecosystem over time
 - c. the conversion of land for human use
 - d. the change in the composition of species in an ecosystem over time

2. Which statement best describes the effect of human activities on the grasslands of California?
 - a. People have cleared woodlands for agriculture, allowing more grasslands to grow.
 - b. People have had little effect on them.
 - c. Human activities have eliminated about 50% of California's native grasslands.
 - d. Human activities have eliminated about 99% of California's native grasslands.

3. Between 24,000 years ago and 7,000 years ago, the climate changed. How did this change the grasslands in California?
 - a. The climate changed from a desert climate to a Mediterranean climate. Desert plants disappeared from the ecosystem, and grasslands formed.
 - b. The climate became drier, and trees disappeared from the ecosystem.
 - c. The climate became warmer, increasing the number of woodland species.
 - d. The climate became colder, causing many new nonnative species to thrive there.

4. Which of the following is an effect of climate change on an ecosystem?
 - a. Species that are not adapted to the new climate may become extinct.
 - b. New species become dominant in the region.
 - c. Species may change the timing of reproduction.
 - d. All of the above.

5. Which of the following is not a typical human activity that has altered the grasslands?
 - a. using the land for ranching
 - b. planting forests for timber
 - c. building cities and suburbs
 - d. clearing land for farming

6. Which is the best definition of an invasive species?
 - a. any species that lives in an area where it did not first appear
 - b. a species that people intentionally brought to a new environment
 - c. a species that reproduces rapidly and crowds out other species
 - d. a species that migrates to a new area

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7. Which of the following best describes how nonnative species have changed California grassland ecosystems?
- a. All introduced, nonnative species have crowded out native grasses and wildflowers.
 - b. Nonnative species have grown along with native grasses and wildflowers; all grow equally successfully.
 - c. Some species have had little effect outside the areas where they are planted. Some have become widespread, crowding out native plants.
 - d. Nonnative species have only altered grasslands in areas where people intentionally have planted them.
8. Heavy rains in a single year will most likely cause _____.
- a. short-term changes for the plants and animals in the ecosystem
 - b. long-term changes for the plants and animals in the ecosystem
 - c. few effects on the plants and animals in the ecosystem
 - d. effects that cannot be determined or predicted at this time
9. Drought that lasts for 100 years will most likely cause _____.
- a. short-term changes for the plants and animals in the ecosystem
 - b. long-term changes for the plants and animals in the ecosystem
 - c. few effects on the plants and animals in the ecosystem
 - d. effects that cannot be determined or predicted at this time
10. Introducing a new plant species into an ecosystem most likely causes _____.
- a. short-term changes for the plants and animals in the ecosystem
 - b. long-term changes for the plants and animals in the ecosystem
 - c. few effects on the plants and animals in the ecosystem
 - d. effects that cannot be determined or predicted at this time
11. Which of the following variables will cause short-term alterations to an ecosystem?
- a. toxins or sediment accumulating in an ecosystem over time
 - b. one-year plague that extinguishes a species
 - c. habitat alteration by human activities, such as farming or construction of roads
 - d. seasonal fire contained to a small area
12. According to this tree ring data, which year was the wettest?

	Year	Width of tree ring
a.	1885	9
b.	1889	14
c.	1893	25
d.	1896	19

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13. Climate changes may alter an environment so dramatically that it leads to _____.
- extinction
 - adaptation
 - ecological succession
 - All of the above.
14. Which of the following might have a cumulative effect on an ecosystem?
- steady human population growth
 - building a road through a grassland
 - growing nonnative plants in soils that have been disturbed by farming
 - heavy rains in a single year
15. Which of the following might have synergistic effects on an ecosystem?
- steady human population growth
 - building a road through a grassland
 - growing nonnative plants in soils that have been disturbed by farming
 - digging a mine in the hills
16. Which of the following characteristics makes it more likely that a nonnative species of plant will outcompete a native plant species?
- producing a small number of seeds
 - allelopathy
 - having specific soil needs
 - reproducing sexually
17. Which of the following characteristics of an animal makes it more likely that a species will become invasive in California, increasing the scope of its effects on ecosystems?
- eating a specific kind of food
 - having long rates of maturation
 - producing small numbers of offspring
 - tolerating humans
18. Who owns most of California's grasslands?
- private individuals or companies
 - the federal government
 - the state government
 - local Indian tribes

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19. A conservation easement is an ecosystem management strategy in which _____.
- a. landowners lose their land to the government
 - b. landowners agree to limit the use of their land
 - c. parks or reserves are set up to protect land
 - d. researchers use the land for study only
20. In ecosystem management decisions, stakeholders _____.
- a. get to make the decisions about how land is used
 - b. have an interest in what decisions are made, but do not have authority to make decisions
 - c. are only interested in ways to preserve and protect ecosystems
 - d. are only interested in how humans get ecosystem goods and services from land

Part 2

Instructions: Answer the questions below in the spaces provided. (5 points each)

21. List five variables that can cause changes to ecosystems.

22. What kinds of variables have changed the grasslands in California over the years? Describe two variables and how each has affected California grassland ecosystems.

a. _____

Name: _____

b. _____

23. What factors make the management of California grasslands challenging?

Name: _____

Instructions: Write a report about **Grasslands, Fires, and Rain** that explains the effects on a grassland of a lightning-caused brush fire, followed by heavy rains for two weeks. Your report should discuss how these events will affect the grassland ecosystem immediately and after a few years. You may use the information from the **Rancho Grassland Study Site** (Student Edition, page 6), **Sample Grassland Plots** (Student Edition, pages 7–11), and **Grassland Vegetation Key** (Student Edition, page 12) to help you determine how this ecosystem might be altered by fire and heavy rains.

Your report should include the following:

Part 1: Summary of Environmental Effects and Damage

In this section, answer the following questions in a narrative form:

- What effects would the fire and the heavy rains have on the ecosystem?
- Are these effects short-term, long-term, or undetermined?
- Do the variables cause cumulative or synergistic effects on the ecosystem? If so, how?

Part 2: Predicted Succession

In this section, answer the following questions in a narrative form:

- What factors might alter the scope, scale, or duration of the effects described above?
- How do you expect the ecosystem to change over the next growing season or two?

Part 3: Other Consequences

In this section, answer the following questions in a narrative form:

- How would this fire affect local wildlife like birds, small mammals, and larger mammals, such as grazers?
- Are there any management decisions or actions that could help this ecosystem recover?

Use the **Grasslands, Fires, and Rain Scoring Tool** to guide your writing.

Name: _____

Grasslands, Fires, and Rain Scoring Tool

Component	Uses supporting evidence for claims. 4 points	Needs to be more specific in use of supporting evidence. 3 points	Has few details. Needs more supporting evidence. 2 points	Does not provide supporting evidence for claims. 1 point
Knows different variables that cause ecosystems to change.				
Provides examples of how these variables cause ecosystems to change.				
Categorizes whether changes are long-term, short-term, or not determined.				
Determines how variables act cumulatively or synergistically.				
Catalogs factors that determine the scope, scale, and duration of effects.				
Explains factors involved in ecosystem management decisions.				

Summary of Effects

Lightning strikes one of the oak trees at the **Rancho Grassland Study Site**, and a fire consumes the entire area. This is followed by two weeks of heavy rain that causes severe erosion, which ultimately affects nearby vernal pools. All of this occurred in October.

(Vernal pools are dry part of the year. In winter and spring California’s vernal pools fill with rain and snowmelt. In the summer, they dry up. Vernal pools support several animals, such as frogs, salamanders, and fairy shrimp, all of which reproduce and grow quickly. There are no fish because water is not present all year. Plants that can tolerate being underwater for part of the year also live in vernal pools.)



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