

California Education and the Environment Initiative

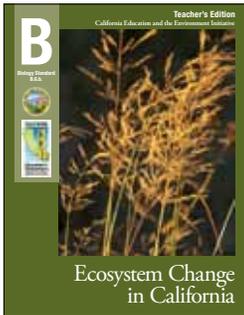
Increasing Environmental Literacy for K–12 Students...
Because the Future is in Their Hands



TEACH COMMON CORE STANDARDS WITH THE EEI CURRICULUM

Created with your needs in mind, this document shows the correlation between the EEI Curriculum and the California Common Core State Standards. By teaching the EEI unit lessons in your classroom, you will be simultaneously addressing the Common Core standards depicted in this guide.

B.6.b.—Ecosystem Change in California



In this unit, students learn how to analyze ecosystem change through an in-depth study of one of the most altered ecosystems in the world, the California grasslands. Students examine factors that lead to climate change and its effects on an ecosystem. Students focus on how human activities have contributed to change in this ecosystem. By the end of this unit, students will understand the complex interactions of natural and human-caused factors that contribute to ecosystem change.

		RST.9–10.1	RST.9–10.2	RST.9–10.4	RST.9–10.5	RST.9–10.6	RST.9–10.7	RST.11–12.7	RST.9–10.8	RST.9–10.9	RST.9–10.10	WHST.9–10.1	WHST.11–12.1	WHST.9–10.2	SL.9–10.1	SL.11–12.1	SL.9–10.4
<i>California Connections</i>		✓	✓	✓	✓	✓	✓	✓	✓		✓			✓			
LESSONS	1	✓	✓	✓	✓	✓					✓			✓	✓		
	2			✓			✓								✓		✓
	3			✓			✓								✓	✓	
	4	✓	✓	✓						✓	✓				✓		
	5		✓	✓			✓			✓	✓			✓	✓		
	6			✓									✓	✓			
Traditional Assessment														✓			
Alternative Assessment					✓						✓			✓			
		COMMON CORE STANDARDS															

Note: For your reference, the list of California Common Core State Standards abbreviations is on the following page.

Using the EEI-Common Core Correlation Matrix

The matrix on the front page identifies a number of Common Core standards that are supported by this EEI unit. However, the check marks in the matrix do not necessarily signify that the Common Core standards checked will be taught to mastery by using this EEI unit alone. Teachers are encouraged to select which Common Core standards they wish to emphasize, rather than teaching to every indicated standard. By spending more time on selected standards, students will move toward greater Common Core proficiency in comprehension, critical thinking and making reasoned arguments from evidence. Teaching this EEI unit will provide opportunities for teachers to implement the shift in instructional practice necessary for full Common Core implementation.

California Common Core State Standards Abbreviations

- **CCSS:** California Common Core State Standards
- **RST:** Reading Standards for Literacy in Science and Technical Subjects
- **SL:** Speaking and Listening Standards
- **WHST:** Writing Standards for Literacy in History-Social Studies, Science, and Technical Subjects

Note: Since each Common Core standard includes a breadth of skills, in this correlation, the portion of the standard description that is featured in the Common Core standards applications is cited, using “...” to indicate omitted phrases. For a list of the complete standard descriptions, please see the Common Core Reference Pages located on pages 16–17 of this document.

A Note about Common Core Speaking and Listening Standards

Throughout this unit, students participate in various learning structures and groups to analyze, discuss, and synthesize data, which supports the skill in Speaking and Listening Standard 1 “Participate effectively in a range of collaborative discussions (one-on-one, groups...) with diverse partners.” With prior instruction on collaborative discussions, these various groupings and the materials students examine lend themselves to prime discussion material for collaborative discussions. Learning structures with tasks for pairs and groups are in the following lessons:

- **Lesson 1:** Pairs
- **Lesson 2:** 5 Groups
- **Lesson 3:** 5 Groups
- **Lesson 4:** Groups—these can be different than the previous lesson groups
- **Lesson 5:** Pairs; Groups—these can be different than the previous lesson groups
- **Lesson 6:** Whole class

National Geographic Resources

- **Biological Diversity** wall map (Lessons 1, 4, and 6)
- **Political** wall map (Lesson 4)
- **Human Imprint** wall map (Lesson 6)
- **Who Owns California** wall map (Lesson 6)

Unit Assessment Options

Assessments	Common Core Standards Applications
Traditional Assessment	
<p>Part 1 includes 20 multiple choice questions.</p> <p>Part 2 includes 3 short answer/essay questions, where students are asked to describe variables that cause ecosystem changes in California grasslands, and the factors that make managing California grasslands challenging.</p>	<p>WHST.9–10.2: Write informative/explanatory texts, including...scientific...processes.</p>
Alternative Assessment	
<p>Students use documents from the unit to write a narrative report detailing what a California grassland experiences after a brush fire occurs, followed by heavy rainfall.</p>	<p>RST.9–10.5: Analyze the structure of the relationships among concepts in a text...</p> <p>RST.9–10.10: ...read and comprehend science...texts... independently and proficiently.</p> <p>WHST.9–10.2: Write informative/explanatory texts, including the narration of historical events, scientific...processes.</p> <ul style="list-style-type: none"> a) Introduce a topic and organize ideas, concepts, and information... b) Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information... c) Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d) Use precise language and domain-specific vocabulary... f) Provide a concluding statement or section that follows from and supports the information or explanation...

Lesson 1: Fields of Green and Gold

To examine ecosystem change, students analyze a reading to identify and list different variables that have altered California's grasslands, exploring how each factor has changed this rapidly vanishing ecosystem. This lesson provides a background for students to understand the ecology and rarity of California grasslands, one of the most altered ecosystems on Earth. This background prepares them for the rest of the unit, in which they use scientific methods to understand the implications of such dramatic change.



National Geographic Resources

- **Biological Diversity** wall map

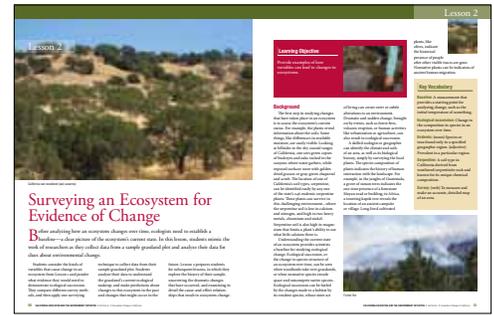
Use this correlation in conjunction with the **Procedures** located on pages 40–42 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
<p>Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>	<p>RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...</p>
<p>Step 1: In pairs, students discuss what the area now occupied by their school may have looked like 100 and 100,000 years ago and record their ideas in columns.</p>	<p>SL.9–10.1: ...participate...in a range of collaborative discussions...</p>
<p>Step 3: Students read <i>California Connections: The Transformation of Our Native Grasslands</i> (Student Edition, pages 2–5) to determine what has caused California grassland areas to change over time.</p> <p>To increase Common Core applications, ask students to note how science terms are defined during the text. In addition, ask them to note how the text structures the ideas and to determine the author's purpose in providing each explanation.</p> <p>In addition to reading <i>California Connections</i> for content, students should look at several key elements on how the writing is structured. This can be done while they're reading or during a second reading of the material. Students who have been familiarized with this process can identify these structural elements as they read by themselves and then they can be discussed as a class.</p> <p>Refer to the Reading California Connections Using a Common Core Reading and Writing Focus on pages 11–15 to view specific suggestions for integrating Common Core standards while reading this selection not only for content, but for text structure as well.</p>	<p>RST.9–10.4: Determine the meaning of...key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...</p> <p>RST.9–10.5: Analyze the structure of the relationships among concepts in a text, including relationships among key terms...</p> <p>RST.9–10.6: Analyze the author's purpose in providing an explanation,... defining the question the author seeks to address.</p> <p>RST.9–10.10: ...read and comprehend science...texts...independently and proficiently.</p>

Student Tasks	Common Core Standards Applications
<p>Step 4: Using <i>California Grasslands: A Changing Ecosystem</i> (Student Workbook pages 3–4), students list variables that have altered the California grasslands, and describe how these changes have altered the grassland ecosystems, including biotic and abiotic components.</p>	<p>RST.9–10.1: Cite specific textual evidence to support analysis of...texts, attending to the precise details of explanations or descriptions.</p> <p>RST.9–10.2: Determine the central ideas;...trace the text’s explanation or depiction of a complex process...or concept; provide an accurate summary of the text.</p> <p>WHST.9–10.2: Write informative/explanatory texts...</p>
<p>Step 5: Students discuss the <i>California Connections</i> article, using discussion prompts.</p> <p>Common Core Note: Increase the Common Core elements in the discussion by encouraging students to build on each others’ ideas, cite evidence from the text, and pose questions that probe reasoning and evidence in the text and in each others’ comments. Prior to the discussion, review the criteria for collaborative discussions in standard SL.9–10.1.</p>	<p>SL.9–10.1: ...participate...in a range of collaborative discussions (...teacher-led)...</p>

Lesson 2: Surveying an Ecosystem for Evidence of Change

In this lesson, students mimic the work of researchers as they collect data from a sample grassland plot and analyze their data for clues about environmental change. After comparing different survey methods, students in five groups apply one surveying technique to collect data from their sample grassland plot. Students analyze their data to understand the grassland's current ecological makeup, and make predictions about changes to this ecosystem in the past as well as changes that might occur in the future.



Use this correlation in conjunction with the **Procedures** located on pages 54–56 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
<p>Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>	<p>RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...</p>
<p>Step 3: Five groups survey and collect data from sample grassland plots (quadrats), and then share their survey results. They analyze the data as a group or class, making predictions and completing Survey of a Grassland, Part 2 (Student Workbook, pages 5–7).</p>	<p>RST.9–10.7: ...translate information expressed visually...into words.</p> <p>SL.9–10.1: ...participate...in a range of collaborative discussions...(in groups...)</p> <p>c) Propel conversations by posing and responding to questions;...actively incorporate others into the discussion; and clarify, verify and challenge ideas and conclusions.</p> <p>SL.9–10.4: Present information, findings, and supporting evidence clearly, concisely, and logically...</p>
<p>Step 6: Students discuss the data the groups have collected as a class. While students discuss the questions listed in this step, remind them to refer to specific evidence in the data and the images to support their conclusions or predictions. In addition, encourage students to come up with their own questions to ask of the data and/or the images.</p> <p>Tip: <i>The discussion outlined in the lesson plan can be conducted as a collaborative discussion. Rather than the teacher presenting them, assign the Step 6 questions to discussion leaders, who facilitate a discussion where students are challenged to back up their ideas with evidence or clarifying thoughts rather than simply a question/answer session. Students should also be encouraged to generate their own questions related to the data and explore possible explanations.</i></p>	<p>RST.9–10.7: ...translate information expressed visually...into words.</p> <p>SL.9–10.1: ...participate...in a range of collaborative discussions...(in groups...)</p> <p>c) Propel conversations by posing and responding to questions;...actively incorporate others into the discussion; and clarify, verify and challenge ideas and conclusions.</p> <p>SL.9–10.4: Present information, findings, and supporting evidence clearly, concisely, and logically...</p>

Lesson 3: Climate Clues in Tree Rings and Pollen Cores

Students explore how climate has altered the grassland ecosystem over the past 24,000 years. Students discuss climate and climate change and then five groups analyze tree ring and pollen sample data from actual studies of grasslands in California’s Central Valley. They interpret how climatic variables have changed the grassland at the Rancho Grassland Study Site over time. By the end of the lesson, students can provide examples of how climate alters aspects of the grassland ecosystem, categorize the effects of climatic changes as short-term or long-term, and identify factors that influence the scope, scale, and duration of change.



Use this correlation in conjunction with the **Procedures** located on pages 78–79 of the Teacher’s Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
<p>Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>	<p>RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...</p>
<p>Step 3: Students examine data from their grassland plot from the previous lesson, then complete Climate and Grasslands, Part 1 (Student Workbook, pages 8–10), answering questions from a rainfall graph pertaining to the Rancho Grassland Study Site.</p> <p>Questions 3, 4, and 5 in Part 1 of the Student Workbook pages lend themselves well to collaborative discussion as students work in their groups. Encourage students to use specific evidence and explain the connections they make in the evidence to support their conclusions or opinions.</p>	<p>RST.9–10.7: ...translate information expressed visually or mathematically... into words.</p> <p>SL.9–10.1c: Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify or challenge ideas and conclusions.</p> <p>SL.11–12.1c: ...probe reasoning and evidence...</p>
<p>Steps 4 and 5: Working in groups, students analyze pollen evidence from the Rancho Grassland Study Site, complete questions from Climate and Grasslands, and discuss their findings.</p> <p>Tip: Questions 4 and 5 in Part 2 of the Student Workbook lend themselves well to collaborative discussion as students work in their groups, as well as in a whole class discussion. The level of collaborative discussion can be increased if discussion leaders are assigned questions and the discussion is led by students. Review the collaborative discussion standards beforehand to increase the level of student participation.</p>	<p>RST.9–10.7: ...translate information expressed visually or mathematically... into words.</p> <p>SL.9–10.1c: Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify or challenge ideas and conclusions.</p> <p>SL.11–12.1c: ...probe reasoning and evidence...</p>

Lesson 4: Examining Human Use of the Grasslands

In this lesson, students use primary source documents to uncover clues about human activities and grassland ecosystems from the past 250 years, exploring how these activities caused ecological change. Students read from the journals of Spanish missionaries and leaders from the 1700s and examine hand-drawn maps of Spanish ranches from the 1800s, then compare them to images of modern aerial photographs of a grassland area similar to the sample students have been using. Students summarize their findings, and then review a flowchart of cause-and-effect relationships, discussing how variables can cause both cumulative and synergistic effects on an ecosystem.



National Geographic Resources

- **Biological Diversity** wall map
- **Political** wall map

Use this correlation in conjunction with the **Procedures** located on pages 92–94 of the Teacher’s Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
<p>Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>	<p>RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...</p>
<p>Steps 2 and 3: Groups use Spanish Journal Entries from the 1700s and California Ranchos documents to search for clues of human activities and draw conclusions about how they affect these ecosystems. Then they complete Human Activities and California Grasslands (Student Workbook, pages 11–12) to draw conclusions about how human activities affected these ecosystems.</p>	<p>RST.9–10.1: Cite specific textual evidence to support analysis of...texts, attending to the precise details of explanations or descriptions.</p> <p>RST.9–10.9: Compare and contrast findings presented in a text to those from other sources..., noting when the findings support or contradict...</p> <p>RST.9–10.10: ...read and comprehend science/technical texts...independently and proficiently.</p> <p>SL.9–10.1: ...participate...in a range of collaborative discussions...</p>
<p>Step 5: Using Cumulative and Synergistic Effects on Grasslands (Visual Aid #11), discuss and explain the process that leads to synergism as shown in each row of the Visual Aid.</p>	<p>RST.9–10.2: Determine the central ideas...trace the text’s explanation or depiction of a complex process, phenomenon, or concept...</p> <p>Suggestion: Asking students to explain synergistic effects to a partner or draw a simplified diagram will increase understanding; ask students to discuss the difference between those activities that led to synergistic effects, and those that didn’t.</p>

Lesson 5: Grassland Invaders

In this lesson, students explore the synergistic effects of human activities and introduced nonnative species on California grassland ecosystems. Students identify traits which increase the chances that one species will outcompete other species in an ecosystem. Classroom discussion focuses on the different ways that species become invasive, whether these changes are short-term or long-term, and how other variables contribute to the changes caused by invasive species. Students analyze plant data from an adobe brick for clues about invasive species and discuss the factors and traits that may have led to the nonnative species outcompeting the native species, altering the species composition in California grasslands to this day.



Use this correlation in conjunction with the **Procedures** located on pages 110–111 of the Teacher’s Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
<p>Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>	<p>RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...</p>
<p>Steps 1 and 2: After reading and discussing with partners, students write explanations regarding characteristics contributing to a successful invasive, completing Traits of Invasive Species (Student Workbook, pages 13–16).</p>	<p>RST.9–10.7: ...translate information expressed...visually...into words.</p> <p>SL.9–10.1: ...participate...in a range of collaborative discussions...</p> <p>WHST.9–10.2d: Use precise language and domain-specific vocabulary to... convey a style appropriate to the discipline and context...</p>
<p>Steps 3 and 4: Working in groups, students use data from several sources, including an adobe brick, to determine and explain the appearance and spread of nonnative species over time. They complete Nonnative Plants and Grasslands, Part 1 (Student Workbook, pages 17–19), then review their answers as a class.</p>	<p>RST.9–10.9: Compare and contrast findings presented in a text to those from other sources...</p> <p>RST.9–10.10: ...read and comprehend science/technical texts...independently and proficiently.</p> <p>WHST.9–10.2b: Develop the topic with well-chosen, relevant and sufficient facts...</p> <p>Suggestion: To increase depth of understanding and collaboration of ideas, students would benefit from discussing questions 7, 8, and 9 before writing.</p>

Lesson 6: The Management of Ecosystems

In Lesson 6, students explore how decisions are made about human activities that alter the grasslands. They compare maps of grasslands and examine decision-making factors and processes that are a part of ecosystem management, exploring how different decision makers, analysts, and stakeholders influence the process based on different objectives and goals. Students then explore processes used in ecosystem management, focusing on how governments and private landowners use conservation easements to attain their goals of ecosystem preservation while balancing the needs of human communities, and begin to realize the complexity of decision making concerning the future of California's grasslands.



National Geographic Resources

- **Biological Diversity** wall map
- **Human Imprint** wall map
- **Who Owns California** wall map

Use this correlation in conjunction with the **Procedures** located on pages 124–125 of the Teacher’s Edition. Only procedure steps with a Common Core correlation are included in the table below.

Student Tasks	Common Core Standards Applications
<p>Vocabulary Development: For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>	<p>RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...</p>
<p>Step 6: Using information presented during the lesson and in Ecosystem Management (Student Workbook, pages 20–23), students state their opinion about a conservation method and support it with reasons and evidence, as well as proposing an alternative method.</p>	<p>WHST.9–10.1: Write arguments focused on <i>discipline-specific content</i>.</p> <p>a) Introduce precise claim(s)..., and create an organization that establishes clear relationships among the claim(s)...</p> <p>WHST.11–12.1a: ...and create an organization that logically sequences claim(s)..., reasons, and evidence.</p> <p>Suggestion: <i>Students would benefit from participating in a class collaborative discussion about this issue before writing.</i></p>

Unit Assessment

Refer to the introduction pages at the front of this document for information regarding the Traditional and Alternative Assessments for this unit and their Common Core correlations.

Reading *California Connections* using a Common Core Reading and Writing Focus

Reading

Science teachers can further enhance the teaching of Common Core Reading Literacy Standards by noting the suggestions below and in the following pages while reading the *California Connections* selection for content. Explicitly teach students to pay attention to the structure of the text by noting the following:

- Note how the author cites evidence to support main points; note any gaps or inconsistencies. **(RST.9–10.1 and RST.11–12.1)**
- Note how the author sets up the central ideas or conclusions; trace the text’s explanation or depiction of a process or concept; summarize concepts, processes, and information by paraphrasing the text and the text as a whole. **(RST.9–10.2 and RST.11–12.2)**
- Note how the author explains multi-step procedures. **(RST.9–10.3 and RST.11–12.3)**
- Note how the author explains the meaning of key terms, symbols, domain specific words, and phrases. **(RST.9–10.4 and RST.11–12.4)**
- Analyze the structure of the relationships among concepts in a text, and the relationships among key terms, including categories or hierarchies. **(RST.9–10.5 and RST.11–12.5)**
- Analyze the author’s purpose in providing an explanation, or describing a procedure, and how this defines the question the author seeks to address; identify important unresolved issues. **(RST.9–10.6 and RST.11–12.6)**
- Note how the information in the *California Connections* text integrates with information provided throughout the unit in diverse formats, including tables, charts, maps, and quantitative data. **(RST.9–10.7 and RST.11–12.7)**
- Assess the extent to which the reasoning and evidence in a text support the author’s claim; evaluate the analysis and conclusions in the text. **(RST.9–10.8 and RST.11–12.8)**
- When other documents are included, compare and contrast findings presented in this text to those in other sources, noting when the findings support or contradict previous explanations. **(RST.9–10.9 and RST.11–12.9)**
- Note comprehension strategies for understanding text. **(RST.9–10.10 and RST.11–12.10)**

Note: Standard descriptions are paraphrased using a mix of grades 9–10/11–12 terminology that applies to reading a *California Connections* selection.

Writing

Many *California Connections* selections can be used as a model for future student writing tasks applying the Writing Literacy Standards by noting how the author structures the text, organizes the ideas, and provides well-chosen relevant and sufficient facts, extended definitions, concrete details, quotations, or other information and examples.

The following pages feature the *California Connections* selection, identifying specific locations in the text that demonstrate Common Core Reading and Writing Literacy Standards for Science and Technical subjects.

Using the *California Connections* Selection

The following pages note specific places where the *California Connections* selection provides examples for specific Writing Literacy Standards for Science and Technical subjects, using this selection as a writing model. They also provide suggestions for teaching students to analyze text structure using the Reading Literacy Standards for Science and Technical subjects. Teachers can incorporate more suggestions from the list above.

Introduction: Includes an attention grabber.

RST.9–10.8: Assess the extent to which the reasoning and evidence in a text support the author’s claim...

■ Are these claims supported in the text?

RST.9–10.10: ...read and comprehend science/technical texts... independently and proficiently.

Suggestion: Throughout the reading, note comprehension strategies for understanding the text.

California Connections: The Transformation of Our Native Grasslands
Lesson 1 | page 1 of 4

The Transformation of Our Native Grasslands



Rolling, green-gold hills are an icon of California. Therefore, it may come as a surprise to learn that those “waves of grain” are actually barnyard weeds from Spain and other Mediterranean areas. Ninety-nine percent of California’s grasslands today are made up of plant species from Europe and other continents. In fact, grasslands have been altered more than any other ecosystem in the state, and are among the most endangered in the nation.

Clues to the Past
The transformation of California’s native grasslands was rapid and widespread. Because of this, no one knows what these grasslands really looked like at the time of first European contact. We can only glimpse the past by looking at remnant patches of native grasses that exist today. Scientists search for clues in fossilized pollen, archeological sites, and historical accounts. They use these clues to answer questions about how our native grasslands came to be, how these ecosystems once functioned, and how they declined so rapidly.

From the fossil record, we know large changes in California’s grasslands took place over the past 10,000 years. Grasslands at times were much larger and covered more area than today, and at other times, they covered less area. The fossil record indicates that 6,000 years ago, California received more rain than present day. Two thousand years later, the climate became drier, similar to what our climate is today—a cool, wet winter followed by a long, warm, dry season that lasts through late fall. During the rainy season, the grasses



Tule elk (*Cervus elaphus nannodes*)

2 CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit B.6.b. | Ecosystem Change in California | Student Edition

RST.9–10.1: Cite specific textual evidence to support analysis of science...texts, attending to the precise details of explanations or descriptions.

Suggestion: While reading, have students summarize sections of the material, citing evidence from the text.

RST.9–10.6: Analyze the author’s purpose in providing an explanation...

Suggestion: Ask what the author’s purpose is for including this explanation.

RST.9–10.2: ...trace the text’s explanation...of a... concept...

RST.9–10.5: Analyze the structure of the relationships among concepts in a text...

Suggestion: This sentence sets up the structure of this text. Have students trace its development while reading.

WHST.9–10.2b: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details,...or other information and examples...

WHST.9–10.2c: Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.

WHST.9–10.2a: ... include formatting (e.g., headings),...when useful to aiding comprehension.

Suggestion: Note headings and their purpose.

California Connections: The Transformation of Our Native Grasslands
Lesson 1 | page 2 of 4

grew. The long, dry seasons invited fire. Our native grasses benefit from some fire, which opens up space for more of them to grow. Fires also remove thatch and recycle nutrients.

Native Grazers and Fire
California's native grasses evolved alongside seasonal native grazers, such as tule elk and pronghorn antelope. In addition to eating the grass, grazers pruned trees and shrubs at the grassland edge. Large grazers compacted the soil with their hooves, making the terrain more favorable for grasses than woody plants. The shift to a drier climate thousands of years ago occurred at about the same time American Indian communities expanded in California. Their use of controlled burns (fires) to improve hunting and crop cultivation prevented shrubs and trees from growing in specific areas, changing the species mix in California's grasslands over time.

A California Native
When you see an area of native California grass, it appears bumpy. That is because the grass grows in "bunches." Many "bunches" can live to be very old—200 years or longer—due to adaptations the species have to their environment. Depending on the species, some are short-lived, 10 years

or less. The state grass of California, purple needlegrass, is a perennial species that is native to the state's valleys and coasts. Like other perennials, purple needlegrass lives for many growing seasons. Its roots may average depths of 6 to 8 feet, with root hairs extending as much as 18 feet or more down into the soil. This allows this species to have access to water and nutrients even during the dry summer and fall months. Like other California bunch grasses, purple needlegrass has a growth point near the base of the plant that enables this grass to resprout after a fire. This growth point also allows the grass to survive occasional mowing and seasonal grazing. Unlike the European annual grasses that turn brown early in the summer,

purple needlegrass stays fairly green through August, but can die back and lose a lot of its "green" over the driest months. However, unlike annual grasses, purple needlegrass does not die out completely in the hot weather.

Grassland Ecosystems
Grasslands are an important natural system. Perennial grass root systems build topsoil by "injecting" organic material deep in the soil profile. Most productive agricultural land was former grassland because of this well-developed topsoil. In addition, grasslands are being explored for their potential to sequester (collect) carbon from the atmosphere. Large amounts of carbon are sequestered in grassland root systems, so much so that they may rival forests in their ability to



Purple needlegrass (*Nassella pulchra*)

CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit B.6.b | Ecosystem Change in California | Student Edition 3

RST.9–10.1: Cite specific textual evidence to support analysis of science...texts, attending to the precise details of explanations or descriptions.

Suggestion: While reading, have students summarize sections of the material, citing evidence from the text.

RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases...

Suggestion: Note the phrasing used to define terms; also note the selection of photos to provide visuals of some terms:

- Grazers
- Burns
- Perennials
- Sequester

WHST.9–10.2b: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details,...or other information and examples...

- *Statement with supporting details and examples.*

RST.9–10.1: Cite specific textual evidence to support analysis of science...texts, attending to the precise details of explanations or descriptions.

WHST.9–10.2b: Develop the topic with well-chosen, relevant, and sufficient facts...

- *Claim with supporting details and examples for the rest of this paragraph.*

California Connections: The Transformation of Our Native Grasslands
Lesson 1 | page 3 of 4

pull carbon out of the atmosphere. Research into this feature of grasslands is ongoing.

As the roots decompose, they open up channels for rainwater to infiltrate deeply as well. This allows the soil to store the water later in the dry season, allowing it to flow underground into creeks/ instead of sheeting off the surface quickly into streams. These abandoned root systems help control potential flooding during the wet season. Grasslands made up of native bunch grasses support a high level of biodiversity. In between the "bunches" there is room for native wildflowers to grow. These spaces can also become resting places for acorns—the seeds of an oak tree. For this reason, oaks have historically studded California grasslands. The decrease in native bunch grasses is thought to be a problem for two of California's native oak species, the blue oak and the valley oak. When these trees drop their acorns in areas without bunch grass, the acorns do not germinate. There are many factors contributing to the decline in native oaks, but this one—the connection between bunch grass and acorn germination—is particularly disconcerting.

Compared with 2,000 years ago, only 1% of the native California grasslands



Pronghorn antelope (*Antilocapra americana*)

remain. Scientists believe this transformation was due to a combination of factors. One was the introduction of nonnative annual grasses from Europe. Spanish sailors, first reaching California in 1542, may have brought European grasses as food for themselves or livestock. To make space for California cargo bound for the return trip to Spain, ballast was dumped off ships. This ballast also may have contained tiny grass seeds from Europe, where the ballast

was loaded. The winds easily spread these seeds and helped pollinate the new plants. In less than 200 years, California's native perennial grasslands were converted into annual grasslands made up of nonnative grasses from Europe. Evidence of this takeover is found in the adobe bricks used in the construction of Spanish missions. Adobe bricks are made of mud, and contain a "seed record" for the area at the time of construction of local missions. Bricks from the first

4 CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit B.6.b. | Ecosystem Change in California | Student Edition

WHST.9–10.2b: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details...or other information and examples...

Suggestion: *The next 3 paragraphs support this point.*

RST.9–10.2: Determine the central ideas...of a text; trace the text's explanation...of a...concept...

Note: *Example paragraph for supporting details, examples and evidence*

California Connections: The Transformation of Our Native Grasslands
Lesson 1 | page 4 of 4



Nonnative grass

missions contained few nonnative grass seeds, while the bricks from later missions contained progressively more and more seeds of European grasses.

European grasses are very competitive. They produce thousands of seeds per square foot, germinate quickly, grow rapidly, and tolerate drought. Annual grasses tend to grow taller, and the thatch smothers natives. However, studies have shown that they cannot outcompete established native bunch grasses by rapid reproduction alone. There had to be some other factor at work, giving the nonnative grasses

from Europe an "edge" over the native bunchgrasses.

One theory is grass species from Europe were better adapted to the disruptive activities of large human populations. Although American Indians settled in and around California grasslands, Europeans colonizers brought about a significant increase in the level of human-caused disturbances. Spanish livestock grazed all year, rather than seasonally, as did the native tule elk and pronghorn antelope species they displaced. The Spanish also prevented American Indians from controlled burning of the grasslands. This source of

renewal for the native perennial grasses may have led to their replacement by scrubland and woodlands. Grasslands around the Spanish missions were plowed under, wiping out native seed banks. On top of this, Europeans accidentally introduced the yellow dwarf virus to North America by planting contaminated barley. Aphids spread the virus quickly through the grasslands, causing massive amounts of native grasses to die off.

Managing and Protecting What Remains

Many threatened and endangered species live in the relict patches of grassland that exist today, bringing public attention to the grassland's decline. Despite the attention, grasslands remain one of the most under-protected ecosystems in the state. As California's population continues to grow, pressures on these grassland ecosystems intensify. Climate continues to change, now at an exceptionally rapid rate due to human activities, pushing native species to their limits and beyond. Our understanding of the value of our native grasslands has increased. Several private conservation organizations and state and local agencies are acting to help protect what native grasslands remain.

CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit B.6.b. | Ecosystem Change in California | Student Edition | 5

RST.9–10.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases...

Suggestion: Ask, "What are disruptive activities?" The answer is in the rest of the paragraph. Identify them.

RST.11–12.7: Integrate and evaluate multiple sources of information...

Suggestion: Note how the information from **California Connections** integrates with information provided in the rest of the unit.

RST.9–10.8: Assess the extent to which the reasoning and evidence in a text support the author's claim...

- Does the reasoning and evidence in the text support the author's claim(s) at the beginning?
- Cite the specific supporting reasoning and evidence.
- Cite any gaps in the reasoning or evidence.

California Common Core State Standards Descriptions for Grades 9–10

Reading Literacy Standards in Science and Technical Subjects

- **RST.9–10.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- **RST.9–10.2:** Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
- **RST.9–10.5:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).
- **RST.9–10.6:** Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
- **RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- **RST.9–10.8:** Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.
- **RST.9–10.9:** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
- **RST.9–10.10:** By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

Speaking and Listening

- **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others’ ideas and expressing their own clearly and persuasively.
 - c) Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
- **SL.9–10.4:** Present information, findings, and supporting evidence clearly, concisely, and logically (**using appropriate eye contact, adequate volume, and clear pronunciation**) such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose (**e.g., argument, narrative, informative, response to literature presentations**), audience, and task. **CA**

Writing Standards for Literacy in History-Social Studies, Science, and Technical Subjects

- **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.
 - a) Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
- **WHST.9–10.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
 - a) Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
 - b) Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.
 - c) Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts.
 - d) Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.

California Common Core State Standards Descriptions for Grades 11–12

Reading Literacy Standards in Science and Technical Subjects

- **RST.11–12.7:** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Speaking and Listening

- **SL.11–12.1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grades 11–12 topics, texts, and issues*, building on others’ ideas and expressing their own clearly and persuasively.
 - c) Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

Writing Standards for Literacy in History-Social Studies, Science, and Technical Subjects

- **WHST.11–12.1:** Write arguments focused on *discipline-specific content*.
 - a) Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.