**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.8.b.—Biological Diversity: The World's Riches

This unit examines how biological diversity within an ecosystem influences how species will survive after major changes in the environment. Students explore maps and background information about biological diversity in various biomes. Students then investigate biological diversity in three deserts and assess data regarding species distribution and diversity. Students analyze the capacity of ecosystems to recover from disturbance. Finally, students examine the role of biodiversity in determining the likelihood that species will survive environmental changes.

| LESSONS | RST.9–10.1 | RST.9–10.2 | RST.9–10.4 | RST.9–10.5 | RST.9–10.7 | RST.9–10.10 | RST.11–12.1 | RST.11–12.2 | RST.11–12.4 | RST.11–12.7 | RST.11–12.9 | WHST.9–10.1 | WHST.9–10.2 | WHST.11–12.2 | SL.9–10.1 | SL.9–10.4 | SL.11–12.1 | SL.11–12.4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *California Connections* | ✓ | | ✓ | ✓ | | | | | | ✓ | ✓ | ✓ | ✓ | | | | | |
| 1 | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | | ✓ | |
| 2 | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | | | | ✓ | | ✓ | ✓ | ✓ | ✓ |
| 3 | | ✓ | ✓ | | | | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | |
| 4 | | ✓ | ✓ | | | ✓ | | | ✓ | ✓ | ✓ | | ✓ | | ✓ | | | |
| 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

- **CCCSS:** 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 18–19 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:** Whole class and independent
- **Lesson 2:** Whole class, groups of three, and independent
- **Lesson 3:** Whole class, groups of four, and independent
- **Lesson 4:** Whole class or collaborative discussion groups

## National Geographic Resources

- **Biological Diversity** wall map (Lessons 1 and 2)
- **Diversity of Life** wall map (Lessons 1, 2 and 4)

## Unit Assessment Options

| Assessments | Common Core Standards Applications |
|---|---|
| **Traditional Assessment** | |
| Students answer five multiple choice questions, and five short answer questions.<br><br>Students demonstrate knowledge of diversity in species as it relates to an increased chance of survival due to a major change in its environment. | **RST.9–10.2:** Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process…or concept; provide an accurate summary of the text.<br><br>**RST.11–12.2:** Determine the central ideas…of a text; summarize…information presented in a text by paraphrasing them in simpler but still accurate terms.<br><br>**WHST.9–10.2:** Write informative/explanatory texts, including…scientific…processes.<br><br>**WHST.11–12.2:** Write informative/explanatory texts, including…scientific…processes. |
| **Alternative Assessment** | |
| Students create a concept map that identifies connections between biological diversity and the naturally occurring events and human practices that influence it. | **RST.9–10.2:** Determine the central ideas or conclusions of a text…<br><br>**RST.11–12.2:** Determine the central ideas…of a text; summarize…information…<br><br>**RST.11–12.7:** Integrate and evaluate multiple sources of information…<br><br>**RST.11–12.9:** Synthesize information from a range of sources… into a coherent understanding of a…concept…<br><br>**WHST.9–10.2:** Write informative/explanatory texts…<br><br>a) Introduce a topic and organize ideas, concepts, and information…<br><br>**WHST.11–12.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.<br><br>a) Introduce a topic and organize complex ideas, concepts, and… |

## Lesson 1: Earth's Rich Biodiversity

From a map and reading about coastal wetlands, students learn that California's distinct topography and climatic characteristics determine its biological diversity. Students study this concept on a global level by studying a second map and discussing the geographic extent and biological diversity of ecosystems in the world's biomes.

Lesson 1

Salt marsh at Seaside Reserve, Oxnard, California

Earth's Rich Biodiversity

As an introduction to the concept of biological diversity, students study a wall map depicting California's 8 natural vegetation types. They learn that California has a high level of biological diversity because the state has varied topography and climate zones.

Students read and discuss *California Connections: Coastal Wetlands, Treasures of Diversity* and learn that coastal wetlands are one of California's most biologically diverse ecosystems; this ecosystem has disappeared from the state.

Students then examine biological diversity on a global scale as they study a second wall map showing the diversity of life on Earth. They identify biomes on each continent and learn that such biome contains many different kinds of habitats and ecosystems. Building on these ideas, students discuss the variation in the number of species and overall biological diversity of ecosystems in different biomes. They return to the map to focus on the number of biomes in California versus the number of vegetation regions. Class discussion leads students to recognize that biological diversity is not the same as the number of different ecosystems.

**Background**

Ecosystems that support high levels of biological diversity typically consist of diverse assemblages of plant species. Diverse ecosystems generally have high levels of primary productivity, the rate at which energy accumulates in an ecosystem as a result of plant photosynthesis. Productivity depends on the available light, water, and nutrients, including phosphates and nitrates, and it is closely linked to the overall diversity of plants in an area.

Plants, as primary producers and the base of the food web, affect the diversity of organisms at all higher trophic levels in the ecosystem. For example, serpentinite rich in plant diversity also supports a rich diversity of herbivores, carnivores, and decomposers.

Salt marshes, a type of coastal wetland, are highly productive due to the interaction of tides, plants, and nutrients. Ecological and climatic factors also shape this ecosystem. The species in these unique ecosystems have a variety of physical and behavioral adaptations, including the ability to regulate salt concentrations, cope with desiccation (drying out), and survive anoxic (low oxygen level) conditions. Salt marshes are found in areas which extends throughout California and into parts of Oregon and Washington, including the Pacific biodiversity hotspots. Biodiversity hotspots, by definition, contain a high number of endemic species—plants that have lost at least 70% of their original habitat. The California Floristic Province contains over 2,000 species of terrestrial plants. Many of the plants and animals found in this region are endemic, meaning they live only here. Hotspots are also considered biodiversity-rich regions that are vulnerable to alteration by human activities and so need of special consideration for protection.

**Key Vocabulary**

Biodiversity hotspot: A region consisting of three 1,000 meter square areas that has lost at least 70% of its original habitat, making it a priority for conservation efforts.

Biological diversity (biodiversity): A measure of the number of different species in an ecosystem, a specific area, it is also used as a general description of species richness, species complexity, and genetic variation.

Biome: Large regions of Earth's surface that share similar characteristics of climate and vegetation.

Ecosystem: A specific area, such as a kelp forest, that contains a community of interdependent species that interact with each other and the abiotic components found there.

Ecosystem services: The functions of ecosystems, such as pollination, that support or produce ecosystems that are valuable to human life, economies, and cultures.

Endemic species: A species that is present in and limited to a particular region.

Estuary: A coastal body of water formed where a river or stream empties into the ocean or a bay and mixes with salt water.

Habitat: The environment in which an organism lives and meets its needs.

Microenvironment: A localized abiotic condition that differs from the general surroundings due to the local conditions.

Photosynthesis: The amount of inter organic material that is synthesized through photosynthesis and chemosynthesis, and is available to organisms in an ecosystem.

Physical: Of the physical features of the Earth, such as elevation and relative location.

## National Geographic Resources

- **Biological Diversity** wall map
- **Diversity of Life** wall map

Use this correlation in conjunction with the **Procedures** located on pages 32–33 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 |
|---|---|
| **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. | **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…<br><br>**RST.11–12.4:** 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… |
| **Step 2:** Individually, students read ***California Connections: Coastal Wetlands, Treasures of Diversity*** (Student Edition, pages 2–5), paying special attention to the characteristics of the coastal salt marsh and how it relates to the biodiversity of this ecosystem.<br><br>In addition to reading ***California Connections*** for content, students should look at several key elements on how the writing is structured. This can be done while they are 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.<br><br>Refer to the **Reading *California Connections* Using a Common Core Reading and Writing Focus** on pages 13–17 to view specific suggestions for integrating Common Core standards while reading this selection not only for content, but for text structure as well. | **RST.9–10.2:** Determine the central ideas or conclusions of a text…<br><br>**RST.9–10.4:** Determine the meaning of…key terms, and other domain-specific words and phrases…<br><br>**RST.9–10.10:** …read and comprehend science…texts…independently and proficiently.<br><br>**RST.11–12.2:** Determine the central ideas or conclusions of a text…<br><br>**RST.11–12.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical… |

| Student Tasks | Common Core Standards Applications |
|---|---|
| **Step 3:** Students discuss questions related to coastal wetland biodiversity, and the teacher records students' responses.<br>***Suggestion:*** *The ideas generated by these questions lend themselves to an in-depth collaborative conversation. With prior training in collaborative conversations, student leaders could facilitate the discussion, encouraging students to extend the connections they make related to biodiversity.* | **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions…building on others' ideas and expressing their own clearly…<br>c) Propel conversations by posing and responding to questions…or challenge…conclusions.<br>d) Respond thoughtfully to diverse perspectives…<br>**SL.11–12.1d:** …synthesize comments, claims, and evidence… |
| **Steps 4 and 5:** Using the **Diversity of Life** and the **Biological Diversity** wall maps, students identify the number of biomes on a selected continent, and then the number of biomes in California. | **RST.9–10.7:** …translate information expressed visually…into words.<br>**RST.11–12.7:** Integrate and evaluate multiple sources of information presented in diverse formats… |
| **Step 6:** Students turn to **Worldwide Biodiversity** (Student Workbook, pages 3–4) and use the remaining class time to complete it.<br>***Tip:*** *If* ***Student Workbooks*** *need to be reused from year to year, students should not write in them. Some strategies teachers use to preserve the workbooks are:*<br>■ *Have students use binder paper or other lined or unlined paper.*<br>■ *Have students use a sheet protector over the page and write with a whiteboard marker.*<br>■ *Do together as a class on a projector or chart paper.*<br>■ *Project the digital fill-in version and do together as a class.*<br>■ *Students use digital devices to fill in the digital version found on the website.*<br>■ *Make student copies when necessary.* | **RST.9–10.2:** Determine the central ideas…of a…concept; provide an accurate summary of the text.<br>**RST.11–12.2:** Determine the central ideas or conclusions of a text…<br>**WHST.9–10.2:** Write informative/ explanatory texts, including the narration of historical events, scientific… processes.<br>d) Use precise language and domain-specific vocabulary…<br>**WHST.11–12.2:** Write informative/ explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.<br>a) Introduce a topic and organize complex ideas, concepts… |

## Lesson 2: Levels of Biological Diversity

Students read about three of the four southwestern deserts in the United States and identify their levels of biological diversity. They analyze data grids representing species distribution in rainforests, deserts, and redwood forests and draw conclusions about the geographic extent of species and biological diversity in different ecosystems.

## National Geographic Resources

- **Biological Diversity** wall map
- **Diversity of Life** wall map

Use this correlation in conjunction with the **Procedures** located on pages 48–50 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 |
|---|---|
| **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. | **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words…in specific scientific or technical context…<br>**RST.11–12.4:** 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… |
| **Steps 1–3:** Students looks at a projection of **Tropical Rainforest, Mojave Desert,** and **Sonoran Desert** (Visual Aids #5–7), and determine which ecosystems are biologically diverse. Students then look at the **Biological Diversity**, and the **Diversity of Life** wall maps, and determine whether all desert ecosystems are the same. | **RST.9–10.7:** …translate information expressed visually…into words.<br>**SL.9–10.1c:** Propel conversations by posing and responding to questions that relate the current discussion…incorporate others into the discussion…<br>**SL.9–10.4:** Present information, findings, and supporting evidence clearly, concisely, and logically…<br>**SL.11-12.1c:** Propel conversations by posing and responding to questions that probe reasoning and evidence…clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.<br>**SL.11–12.4:** Present information, findings, and supporting …conveying a clear and distinct perspective **and a logical argument…CA** |

| Student Tasks | Common Core Standards Applications |
|---|---|
| **Step 4:** Students work in groups of three to read **Desert Descriptions** (Student Edition, pages 6–8), and compare the three deserts by completing the chart in Part 1 of **Levels of Biodiversity** (Student Workbook, pages 5–6). They then work together to answer the questions in Part 2. | **RST.9–10.1:** Cite specific textual evidence to support analysis of…texts…<br>**RST.9–10.7:** …translate information expressed visually…into words.<br>**RST.9–10.10:** …read and comprehend science…texts…independently and proficiently.<br>**RST.11–12.1:** Cite specific textual evidence to support analysis of…texts…<br>**SL.9–10.1c:** Propel conversations by posing and responding to questions that relate the current discussion…<br>**SL.11–12.1c:** …probe reasoning and evidence…<br>**WHST.9–10.2:** Write informative/explanatory texts, including the narration of historical events, scientific…processes.<br>d) Use precise language and domain-specific vocabulary… |
| **Steps 5 and 6:** Using the **Biological Diversity**, and the **Diversity of Life** wall maps, students discuss the geographic extent of specific ecosystems and what factors affect the biodiversity of a given area.<br>***Suggestion:*** *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****.* | **RST.9–10.7:** …translate information expressed visually…into words.<br>**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.<br>**SL.11–12.1:** Propel conversations by posing and responding to questions that probe reasoning and evidence…clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. |

| Student Tasks | Common Core Standards Applications |
|---|---|
| **Step 7:** Students work in groups of three again, and use **Species Diversity in Different Biomes** (Student Workbook, pages 7–10) to analyze species data, and complete data summaries in Part 1. They then work together to answer questions in Part 2. Groups prepare to share their answer to question 6 and to explain their reasoning to the rest of the class. | **RST.9–10.1:** Cite specific textual evidence to support analysis of…texts…<br>**RST.9–10.2:** Determine the central ideas…provide an accurate summary…<br>**RST.9–10.7:** …translate information expressed visually…into words.<br>**RST.9–10.10:** …read and comprehend…texts…independently and proficiently.<br>**SL.9–10.1:** …participate…in a range of collaborative discussions…<br>c) Propel conversations by posing and responding to questions…<br>**WHST.9–10.2:** Write informative/explanatory texts, including the narration of…scientific…processes.<br>d) Use precise language and domain-specific vocabulary… |
| **Step 8:** Each group shares its conclusions about species distribution in ecosystems, with the class. Students take notes during the discussion and add to their answers on Part 2. | **SL.9–10.1:** …participate…in a range of collaborative discussions…<br>c) Propel conversations by posing and responding to questions…<br>**SL.9–10.4:** Present information, findings, and supporting evidence clearly, concisely, and logically…<br>**SL.11–12.4:** Present information, findings, and supporting…conveying a clear and distinct perspective **and a logical argument…CA** |
| **Step 10:** Using **Diversity in the Redwoods** (Student Workbook, pages 11–12), students analyze a species distribution grid and answer questions. | **RST.9–10.1:** Cite specific textual evidence to support analysis of…texts…<br>**RST.9–10.2:** Determine the central ideas…provide an accurate summary of the text.<br>**RST.9–10.7:** …translate information expressed visually…into words.<br>**RST.9–10.10:** …read and comprehend science…texts…independently and proficiently.<br>**WHST.9–10.2:** Write informative/explanatory texts…<br>d) Use precise language and domain-specific vocabulary… |

## Lesson 3: Responses to Change

Students study photographs of natural events and human practices that affect rainforest ecosystems. They analyze the capacity of rainforest ecosystems to recover from each of the disturbances and explain how the disturbances affect species composition and the local geographic extent of the rainforest.

Lesson 3

Responses to Change

Use this correlation in conjunction with the **Procedures** located on page 70–71 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 |
|---|---|
| **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. | **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…<br>**RST.11–12.4:** 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… |
| **Step 2:** Using **Layers of the Tropical Rainforest**, and **Tank Bromeliad** (Visual Aids #9 and #10), students develop definitions of the words "microclimate" and "microhabitat." | **RST.9–10.4:** Determine the meaning of…domain- specific words and phrases as they are used in a specific scientific or technical context…<br>**RST.11–12.7:** Integrate and evaluate multiple sources of information… |
| **Steps 3 and 4:** Students work in groups of four and fill out the chart **Events and Practices That Affect Rainforests** (Student Workbook, pages 13–14), using a group set of **Naturally Occurring and Human-Caused Disturbances** (Information Cards #1–5). Students regroup as a class and share their responses for each disturbance. | **RST.9–10.2:** Determine the central ideas or conclusions of a text…<br>**RST.11–12.9:** Synthesize information from a range of sources…into a coherent understanding of a…concept…<br>**SL.9–10.1c:** Propel conversations by posing and responding to questions that relate the current discussion…<br>**WHST.9–10.2:** Write informative/ explanatory texts…<br>**WHST.11–12.2:** Write informative/ explanatory texts…scientific…processes. |

| Student Tasks | Common Core Standards Applications |
| --- | --- |
| **Steps 5 and 6:** As a class, students discuss the capacity of rainforest ecosystem to recover from each disturbance described on the **Naturally Occurring and Human-Caused Disturbances** information cards. Students fill out the chart and answer the questions on **Capacity to Adjust** (Student Workbook, pages 15–18). | **RST.9–10.2:** Determine the central ideas or conclusions of a text…<br>**RST.11–12.9:** Synthesize information from a range of sources…into a coherent understanding of a…concept…<br>**SL.9–10.1c:** Propel conversations by posing and responding to questions that relate the current discussion…<br>**WHST.9–10.2:** Write informative/ explanatory texts… |

## Lesson 4: Surviving Environmental Change

Students focus on kingfishers as a model for discussing biological diversity and its role in increasing the chances that some organisms will survive major environmental changes. They summarize how human alterations to natural systems influence biological diversity worldwide.

Lesson 4

Surviving Environmental Change

## National Geographic Resources

- **Diversity of Life** wall map

Use this correlation in conjunction with the **Procedures** located on pages 98–99 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 |
|---|---|
| **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. | **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…<br>**RST.11–12.4:** 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… |
| **Step 1:** Students develop a definition of the word "gene pool." | **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words… |
| **Step 2:** Students use **Kingfisher Background Information** (Student Edition, pages 9–11) to learn about variations in the Kingfisher. | **RST.9–10.4:** Determine the meaning of…key terms…<br>**RST.9–10.10:** …read and comprehend science…texts…<br>**SL.9–10.1:** …participate…in a range of collaborative discussions… |
| **Step 3:** Students use the projected **Kingfishers' Range of Food Supply Consumed** (Visual Aid #14) to make a correlation between the kingfisher size and the size of fish it eats. Students then turn to **Biological Diversity: A Factor in Species Survival** (Student Workbook, pages 19–20), and discuss questions 1 to 3. | **RST.9–10.2:** Determine the central ideas or conclusions of a text…<br>**RST.11–12.7:** Integrate and evaluate multiple sources of information presented in diverse formats and media…<br>**RST.11–12.9:** Synthesize information from a range of sources…into a coherent understanding of a…concept… |

| Student Tasks | Common Core Standards Applications |
|---|---|
| **Step 3 (Continued):** | **SL.9–10.1c:** Propel conversations by posing and responding to questions that relate the current discussion…<br>**WHST.9–10.2:** Write informative/ explanatory texts… |
| **Steps 4–7:** Students look at **Kingfishers' Range of Food Supply Consumed** (Visual Aid #14), **Belted Kingfisher** (Visual Aid # 15), and the **Diversity of Life** wall map, and continue whole class discussion with focused questions that lead to the understanding that biodiversity is being threatened across the globe and answer the question of why this is happening. Students use the discussion to answer questions 4–6 in **Biological Diversity: A Factor in Species Survival**.<br>***Suggestion:*** *The discussion outlined in the lesson plan can be conducted as a collaborative discussion. Rather than the teacher presenting them, assign the Step 4–7 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.* | **SL.9–10.1c:** Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas…and conclusions.<br>**RST.11–12.7:** Integrate and evaluate multiple sources of information presented in diverse formats and media…<br>**RST.11–12.9:** Synthesize information from a range of sources…into a coherent understanding of a…concept…<br>**WHST.9–10.2:** Write informative/ explanatory texts… |

## 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 science text. **(RST.9–10.10** and **RST.11–12.10)**

***Note:*** *Standard descriptions are paraphrased, using 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.

### 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.

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

*The overall structure of the text is chronological sequence, but within that are other structures.*

***Suggestion:*** *After reading the text for content, reread the text to examine the structure used to convey the information.*

**Attention Grabber:** Using notable facts to introduce a subject.

**WHST.9–10.1:** …(headings)…

***Suggestion:*** *Examine the subheadings throughout the selection and how they organize the ideas and information into broad categories.*

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

- estuary
- biodiversity

California Connections: Coastal Wetlands, Treasures of Diversity
Lesson 1 | *page 1 of 4*

# Coastal Wetlands, Treasures of Diversity

Coastal wetlands act as nurseries for ocean fish and help cleanse polluted fresh water as it flows into the ocean. Such features in these transition zones between bodies of water and dry land make these ecosystems some of California's most ecologically significant.

Coastal wetlands include a number of natural communities that share the combination of aquatic, semiaquatic, and terrestrial habitats that result from periodic flooding by tidal waters, rainfall, or runoff.

Coastal wetlands support high levels of biological diversity (biodiversity), meaning they contain many different species in their many habitats. Wet soils and water-tolerant plants abound in wetlands, which are intermittently covered by shallow water. In the coastal zones of California, there are many different types of wetlands. The most common types are estuarine salt marshes and mudflats. An estuary is an area where a freshwater river meets the ocean. Salinity fluctuates in estuaries as ocean tides rise and fall, causing predictable cycles of flooding and flushing. In these areas, plants must be able to tolerate salty water to survive.

Other types of coastal wetlands in California include freshwater marshes, bogs, vernal pools, and riparian zones along rivers and streams.

**Wetland Formation**

Geologic and climatic processes created our diverse coastal zones. California is situated on the edge of a dynamic continental plate that has been pushed upward over millions of years by the expanding Pacific Plate. Geologists refer to the movement of these plates as continental drift. Ancient rivers flowing into the Pacific Ocean eroded the rising land mass, forming canyons and valleys. The geologic processes of "continental drift" and erosion defined the rivers and valleys that we know today. Climatic processes further define these regions. During extended periods of cold weather known as "ice

Elkhorn Slough, California

2 CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit B.8.b. | Biological Diversity: The World's Riches | Student Edition

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

- spatial organization*

**Note: Spatial organization is describing where features are located.*

**RST.9–10.1:** Cite specific textual evidence to support analysis of science…texts, attending to the precide details of explanations and descriptions.

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

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

- definition and description

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

- Note this standard throughout the selections.

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

- primary productivity

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

***Suggestion:*** *Note which facts and information the author chooses to include and discuss the reasons for choosing those particular facts as supporting details.*

California Connections: Coastal Wetlands, Treasures of Diversity
Lesson 1 | *page 2 of 4*

Long-billed curlew

ages," sea water evaporates and is deposited on land in glaciers, causing a decrease in global sea levels. Ice in glaciers reached its greatest volume 18,000 years ago during the most recent glacial period, with sea level more than 328 feet (100 meters) below its present level.

The rivers that had cut their way through the rising land to the ocean emptied their fresh water into the ocean. Earth has been slowly warming over the past 18,000 years, with glaciers melting and sea levels reaching their present depth approximately 7,000 years ago. Flooded coastal river valleys created bays, estuaries, and lagoons. Coastal wetlands formed at the fringes of these large water bodies. These areas are now exposed to fresh water from rivers and rain, as well as tidal influxes of ocean salt water.

**California's Wetlands**

California has 110 major coastal wetlands, each of which is isolated and biologically diverse. In northern California, most of the coastal wetlands are estuaries and salt marshes bordering river mouths. The San Francisco Bay estuary is the largest on the west coast of both North and South America. This estuary is also one of the most altered wetland areas in the United States. Historically, Southern California supported an extensive network of coastal wetlands at river mouths with salt marshes flanking the region's bays and lagoons. Today, these coastal wetlands fall within highly urbanized locations. The wetlands that remain there are small and isolated from other wetlands, but still play an important role in preserving biodiversity.

**The Salt Marsh**

The coastal salt marsh, a specific type of coastal wetland, is one of the most productive ecosystems in the world. Coastal salt marsh primary productivity—the rate at which energy accumulates in an ecosystem as a result of photosynthesis by plants—rivals that of tropical rainforests. A variety of animals can consume this energy accumulated in plants, forming a diverse and intricate food web. Marsh plants and phytoplankton that sequester energy from the Sun form the base of a salt marsh's food web. Abundant sunlight in shallow marsh water allows these organisms to photosynthesize at a high rate. Shrimp, clams, oysters, and some fish eat phytoplankton and zooplankton. Larger fish, birds, and wetland mammals in turn eat these animals.

CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE I Unit B.8.b. I Biological Diversity: The World's Riches I Student Edition 3

**RST.9–10.5:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms…

**RST.9–10.5:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms…

***Suggestion:*** *Note the contextual clues used for the following vocabulary:*

- *diversity*
- *curlews*
- *adaptations*

California Connections: Coastal Wetlands, Treasures of Diversity
Lesson 1 | *page 3 of 4*

When animals die, decomposers, such as bacteria and fungi, break them down and convert them into nutrient-rich detritus. Waste products from animals add more nutrients to the water and soil. Tides, freshwater flows, and the burrowing action of bottom-dwelling animals circulate the nutrients for use by new organisms. Flowing rivers also carry some nutrients to the ocean, while animals that feed in the marsh and then travel to upland habitats export still other nutrients to upland ecosystems.

There are many diverse habitats in a salt marsh ecosystem. Combined with high primary productivity, this habitat diversity gives rise to astonishing biological diversity. Hundreds of species are adapted to take advantage of different opportunities within this ecosystem. Birds, such as curlews and godwits, have long legs for wading and long beaks for probing for invertebrates in the mud. The rare light-footed clapper rail makes a platform nest of cordgrass in the lower reaches of the marsh, while the equally rare Belding's savannah sparrow nests in the pickleweed in the upper marsh. Migratory birds use salt marshes for resting and feeding stops during their long journey along a migratory route known as the Pacific Flyway. Marsh hawks fly low, hovering in search of rabbits and other small vertebrates that live in the vegetation along the marsh's fringe. Eelgrass beds provide nurseries for many species of juvenile fish, such as the California killifish, pipefish, bay goby, and striped bass. Upland species, such as the raccoon, fox, and coyote, follow the waterline, hunting and foraging.

Salt Grass

**Adaptations**

Many organisms have adaptations that allow them to cope with the marsh's constantly changing and often extreme environment characterized by high salt concentrations, periodic flooding and drying, and low oxygen levels in waterlogged soils. For example, saltgrass has adapted to excrete salt before it builds up to toxic levels. Many wetland plants contain air spaces in their roots and stems that allow oxygen to diffuse from the tops of plants to the roots. This adaptation allows them to survive in the anaerobic wetland soils. Fiddler crabs are active during low tides when water recedes from mudflats. Since they breathe air, these crabs hide in burrows when the tides rise. There, a pocket of air supplies them with oxygen.

**Why They Matter**

People rely on many ecosystem goods and ecosystem services provided by coastal wetlands. Marsh plants, such as eelgrass, decrease the speed of currents, absorb wave action, and capture sediments, slowing erosion and protecting shorelines. Coastal wetlands

4 CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit B.8.b. | Biological Diversity: The World's Riches | Student Edition

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

- cause and effect

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

- anaerobic wetland soils

***Suggestion:*** *Students should identify new vocabulary in the reading selection and discuss them during the reading. One way to do this is to have students read in small groups to allow for discussion, then have students re-read the selection independently.*

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

- cause and effect

California Connections: Coastal Wetlands, Treasures of Diversity
Lesson 1 | *page 4 of 4*

can also store large quantities of water, helping to control flooding. Wetlands also improve water quality. Water flowing into a wetland often contains pollutants from a watershed's upper reaches. As currents slow, sediments settle out. Pollutants in those sediments sink into the wetland floor, where they are buried in layers. To varying degrees, wetland plants take up pollutants, while microorganisms in their tissue and roots break other pollutants down. By acting as natural "water filters," wetlands decrease the amount of pollution that drains into bays and oceans. Wetlands also support fisheries by providing critical habitat and nurseries for commercially important species.

Before the 1970s, many people viewed wetlands as "wasted land." Builders drained, filled, and developed these "swamplands" for housing or commercial development. Industrial pollutants contaminated many remaining wetlands, and road construction blocked critical tidal flow, degrading coastal ecosystems. Additional wetlands have been shrunk or eliminated by the dredging of port channels and filling of estuaries for boat facilities. Tide gates and flood control projects change the natural flow of salt water and fresh water.

Roads over Sweetwater Marsh, San Diego, California

Today, state and federal laws protect the remaining coastal wetlands in California, with further development tightly regulated. But coastal wetlands still suffer from the legacy of past development—all of the activities described above affect the health and functioning of these systems.

Since the 1850s, 97% of California's original coastal wetland acreage has disappeared. The remaining areas represent a critical part of California's biological diversity. As people seek to protect them, they also seek to protect the state's high levels of biological diversity and the goods and services these ecosystems provide. In turn, protectors of wetlands enhance quality of life for humans, today and in the future.

CALIFORNIA EDUCATION AND THE ENVIRONMENT INITIATIVE | Unit B.8.b. | Biological Diversity: The World's Riches | Student Edition 5

**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.11–12.9:** Synthesize information from a range of…into a coherent understanding of a…concept, resolving conflicting information when possible.

- *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

### Speaking and Listening Standards

- **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.
  - d) Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
- **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**

### Reading Standards for Literacy 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.9–10.7:** 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.9–10.10:** By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

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

- **WHST.9–10.1:** Write arguments focused on *discipline-specific content.*
- **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.
  - 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

### Speaking and Listening Standards

- **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.
  - d) Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
- **SL.11–12.4:** Present information, findings, and supporting evidence **(e.g., reflective, historical investigation, response to literature presentations)**, conveying a clear and distinct perspective **and a logical argument**, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks. **Use appropriate eye contact, adequate volume, and clear pronunciation. CA**

### Reading Standards for Literacy in Science and Technical Subjects

- **RST.11–12.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- **RST.11–12.2:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- **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.
- **RST.11–12.9:** Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

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

- **WHST.11–12.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
  - a) Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.