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| **CA DOE NGSS**  **2nd Grade** | **Disciplinary Core Ideas** | **Performance Expectations** | **Tour** |
| **2-LS2 Ecosystems: Interactions, Energy, and Dynamics** | | | |
| **LS2.A: Interdependent Relationships in Ecosystems** |  | 2-LS2-1. **Plan and conduct an investigation to determine if plants need sunlight and water to grow.** [Assessment Boundary: limited to testing one variable at a time.] |  |
|  | * + Plants depend on water and light to grow. (2-LS2-1) |  |  |
|  | * + Plants depend on animals for pollination or to move their seeds around. (2-LS2-2) |  |  |
| **2-LS4 Biological Evolution: Unity and Diversity** | | | |
|  | **LS4.D: Biodiversity and Humans**   * + There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1) | **2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.** Emphasis is on the diversity of living things in each of a variety of different habitats. | -Different numbers of organisms and types of organisms live in different locations.  -Blackberry plants and Joshua trees grow in different places with different physical conditions.  - Different regions of California have different plants and animals.  - Areas affected by humans have different organisms than areas not affected by humans.  - How do we decrease the effects of humans on plants and animals? |

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| **2-ESS1 Earth’s Place in the Universe** | | | |
|  | **ESS1.C: The History of Planet Earth**   * Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1) | **2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.** Clarification: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] | - Observe the fault indicated by the height difference between the Fay’s wildflower meadow & the Mesa above.  - Note exposed roots on the hillside along the handicap ramp. |
| **2-ESS2 Earth’s Systems** | | | |
|  | **ESS2.A: Earth Materials and Systems**   * Wind and water can change the shape of the land. (2-ESS2-1) | **2-ESS2-1**  **Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.\*** Clarification: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.] |  |
|  | **ESS2.C: The Roles of Water in Earth’s Surface Processes**   * Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3) | **2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.** | Oasis  Riparian areas  Mountain river & stream channels |

***Diversity University***

**Super Sleuths wanted! Take an exploratory walk through the garden to become a plant and animal detective. By using the investigative skills of observation and inquiry, evaluate and compare the diversity of life within California’s unique habitats and uncover the important resources available to plants and animals that help them to thrive and survive. Become familiar with how forces in nature can alter or change the shape of the land and how this can influence ecological diversity.**

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| **Crosscutting Concepts**  **Cause and Effect**   * + Events have causes that generate observable patterns. (2-LS2-1)   **Structure and Function**   * + The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)   **Patterns**   * Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)   **Stability and Change**   * Things may change slowly or rapidly. (2-ESS2-1) |
| ***Connections to Nature of Science***  **Scientific Knowledge is Based on Empirical Evidence**  Scientists look for patterns and order when making observations about the world. (2-LS4-1) |
| **Science and Engineering Practices**  **Constructing Explanations and Designing Solutions**   * Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-ESS1-1) |

***Highlighted California Environmental Principles & Concepts:***

**Principle I** The continuation and health of individual human lives and of human communities and societies depend on the health of the natural systems that provide essential goods and ecosystem services.

**Principle II** The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.

**Principle III** Natural systems proceed through cycles that humans depend upon, benefit from and can alter.

**Principle IV** The exchange of matter between natural systems and human societies affects the long term functioning of both.

**Principle V**  Decisions affecting resources and natural systems are complex and involve many factors.

**Grade Two Instructional Segments-**

***RSABG Tour can cover Segment 4 and touch briefly on Segments 1 & 3***

***From CA Science Framework*** https://www.cde.ca.gov/ci/sc/cf/documents/scifwch3prepub.doc

The CA Science Framework was adopted by the California State Board of Education on November 3, 2016

The CA NGSS standards for grade two organize themselves well around a unifying theme of California landscapes. The year introduces the shapes of the mountains, valleys, and coasts, plants and animals that live in them, the properties of the rocks and materials that make them up, and the forces that cause them to change.

Table 1. Overview of Instructional Segments for Grade Two

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| Child in a sandbox- placing sand in a mound. | **1**  Landscape Shapes | **Students represent landscapes with 3-D physical models and 2-D maps. They recognize patterns in the shapes and locations of landforms and water bodies. They ask questions about how these features formed.** |
| Stone in the shape of lattice work and grass growing in the negative space. | **2**  Landscape Materials | Students learn to describe differences in material properties. They explain how material properties can change, especially focusing on changes caused by changing temperature. Some of these changes can be reversed while others cannot. Students relate the properties of materials to how they can be used. Properties important to landscapes and landforms include the strength of materials and their ability to absorb water. |
| Photo of a dray hill and mountain landscape without vegetation. | **3**  **Landscape Changes** | **Some changes on Earth occur quickly while others occur slowly. Students investigate several processes that sculpt landforms and then create engineering solutions that slow down those changes.** |
| Photo of a hillsides with flowers, hill and clouds | **4**  **Biodiversity in Landscapes** | **Different landscapes support different types and quantities of life. Students investigate the needs of plants and engineer models that mimic their pollination and seed dispersal structures. They then ask questions about how plant needs are met in the physical conditions of different habitats.** |

Source: M. d’Alessio; Giel 2007; Woelber 2012; Abbe 2005.

***Grade Two Instructional Segment 1: Landscape Shapes***

***Guiding Questions***

*How can we describe the shape of land and water on Earth?*

California is known for its majestic mountains, sculpted glacial valleys, rolling coastal hills, and expansive central valley. Many second grade students are not yet familiar with these broad features the state, but can recognize the local landscape such as a slight tilt in sections of their schoolyard or mountains seen in the distance between buildings. In this IS, students notice and describe different shapes in their local landscape.

***Grade Two Instructional Segment 3: Landscape Changes***

***Guiding Questions***

*What evidence do natural processes leave behind as they shape the Earth?*

Students apply their understanding of material properties to figure out which natural forces affect landscapes. Every rock records a story. Earth scientists look out on a landscape and **ask questions [SEP-1]** about both the processes that are actively shaping it today and the specific sequence of events in the past that led up to the present-day. What makes the mountains tall? Why are some mountains steeper than others? How are mountains and volcanoes related? Scientists **plan and conduct investigations [SEP-3]** to answer those questions using what geologists often refer to the Earth as their natural laboratory—Earth’s present-day landscape.

How long is “a long time”? When it comes to the Earth, some changes take so long that they are difficult for adults to fathom, let alone second graders. But not all Earth processes are slow: an entire mountain side that took millions of years to be thrust up might collapse in a few minutes during a major landslide or volcanic explosion. The San Andreas Fault that has been active for more than twenty million years can move an entire city more than 30 feet in a single lurch lasting just a few seconds. Each of these processes leaves evidence behind by the way it **changes [CCC-7]** the shape of landscape.

Students begin by making observations of landforms that display different and interesting shapes (using local examples where possible). Much like sculpting a statue out of stone, certain natural forces had to break off pieces of rock and move them away in order to create each landform. On Earth, wind and water are the most common natural forces that accomplish these tasks.

***Grade Two Instructional Segment 4: Biodiversity in Landscapes***

***Guiding Questions*:**

*How can we determine what plants need to grow?*

*How do plants depend on animals?*

*How many types of living things live in a place? How can we tell?*

Ecosystems include biological components (plants and animals) and physical components (e.g., water, light, soil, air). Living organisms within an ecosystem will survive and grow only if their needs are met. Different ecosystems provide different resources to plants and animals, and the variety of organisms in certain habitats depends on the availability and abundance of these resources.

Rather than just noticing patterns in what they see and know, they now must **plan and conduct an investigation [SEP-3]** to gather and **analyze [SEP-4]** systematic evidence about the needs of plants (2-LS2-1). In first grade, they performed an engineering task to mimic the **structure/function [CCC-6]** relationships of plants or animals, and now they revisit the same CCC and SEP and use them to gain a deeper understanding of DCIs about how plants depend on animals to help them reproduce—both for pollination and seed dispersal (2-LS2-2).

Exploring the local schoolyard provides students valuable context to help them meet the PEs in this IS. Students can begin by visiting their schoolyard and describing the physical conditions in different sections of the school. Which have the most sunlight and which receive the most water? These observations can motivate questions like, “How much sunlight or water do plants need to survive?” They can then **plan an investigation [SEP-3]** to answer that question (testing just one factor at a time; 2-LS2-1). In grade two, the emphasis of this investigation is on answering a question and students do not need to know any of the vocabulary related to investigational design. Students should start with living plants for this task rather than seeds since seeds can germinate and grow in the absence of light until they run out of the energy stored in the seed. Because every plant, like every person, is a unique individual that may have a different growth rate, teachers can explicitly emphasize the value of making many observations to answer this question. If one plant fails to grow, it may be due to a weakness in that specific plant. If almost all the plants that experience similar growing conditions fail to grow, students can be more confident in the strength of the evidence.

Students are now ready to put together their observations about the needs of plants, the fact that different locations have different physical conditions (including the amount of water and light), and the differences in material properties at each location. Can students expect different plants and animals to survive in different locations? The following vignette allows them to explore this question. In second grade, however, they will not explain the links between biodiversity and physical conditions. Instead, they will **ask questions [SEP-1]** and start to notice **patterns [CCC-1]** in where things live and what conditions are like there.

**Opportunities for ELA/ELD Connections**

To help students develop their understanding of causality [CCC-2], have them think of several effects for a cause or circumstance involving plants in different habitats using “If/Then” (either in narrative text or a poem). For example:

If a plant lives in the desert where there is not much water,

…then it needs long roots to get water.

…then it often has few leaves or a protective coating on the stem.

…then it won’t grow much during times with little water.

**Resources**

**Second Grade NGSS Standards** https://www.cde.ca.gov/pd/ca/sc/documents/cangss-gr2-dci-mar2015.doc

**Kindergarten – 2nd Grade Science Framework** https://www.cde.ca.gov/ci/sc/cf/documents/scifwch3prepub.doc

California Education and the Environment Initiative. 2011. *Cycle of Life.* Sacramento: Office of Education and the Environment. <http://californiaeei.org/framework/sci/CycleLife>

California Education and the Environment Initiative. 2011. *Flowering Plants in Our Changing Environment.* Sacramento: Office of Education and the Environment. <http://californiaeei.org/framework/sci/FloweringPlants>

<http://californiaeei.org/framework/sci/HabitatsMap>

https://www.cde.ca.gov/pd/ca/sc/documents/cangss-gr2-dci-mar2015.doc

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