**Next Generation Science Standards for California Public Schools, Kindergarten through Grade Twelve**

**Grade Five**

**Standards Arranged by Topic**

**California Department of Education**

Clarification statements were created by the writers of NGSS to supply examples or additional clarification to the performance expectations and assessment boundary statements.

\*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

\*\*California clarification statements, marked with double asterisks, were incorporated by the California Science Expert Review Panel

The section entitled “Disciplinary Core Ideas” is reproduced verbatim from A Framework for K–12 Science Education: Practices, Cross-Cutting Concepts, and Core Ideas. Revised March 2015.

**5 Matter and Energy in Organisms and Ecosystems**

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| Students who demonstrate understanding can:**5-PS3-1. Use models to describe that energy in animals’ food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.** [Clarification Statement: Examples of models could include diagrams, and flow charts.]**5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.** [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]**5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.] |
| The performance expectations above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*: |
| **Science and Engineering Practices****Developing and Using Models*** Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Use models to describe phenomena. (5-PS3-1)
* Develop a model to describe phenomena. (5-LS2-1)

**Engaging in Argument from Evidence**Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).* Support an argument with evidence, data, or a model. (5-LS1-1)

**-----------------------------------------------*****Connections to Nature of Science*****Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena*** Science explanations describe the mechanisms for natural events. (5-LS2-1)
 | **Disciplinary Core Ideas****PS3.D: Energy in Chemical Processes and Everyday Life*** The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)

**LS1.C: Organization for Matter and Energy Flow in Organisms*** Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)
* Plants acquire their material for growth chiefly from air and water. (5-LS1-1)

**LS2.A: Interdependent Relationships in Ecosystems*** The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

**LS2.B: Cycles of Matter and Energy Transfer in Ecosystems*** Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)
 | **Crosscutting Concepts****Systems and System Models*** A system can be described in terms of its components and their interactions. (5-LS2-1)

**Energy and Matter*** Matter is transported into, out of, and within systems. (5-LS1-1)
* Energy can be transferred in various ways and between objects. (5-PS3-1)
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| *Connections to other DCIs in fifth grade:* **5.PS1.A** (5-LS1-1),(5-LS2-1); **5.ESS2.A** (5-LS2-1) |
| *Articulation of DCIs across grade-bands:* **K.LS1.C** (5-PS3-1),(5-LS1-1); **2.PS1.A** (5-LS2-1); **2.LS2.A** (5-PS3-1),(5-LS1-1); **2.LS4.D** (5-LS2-1); **4.PS3.A** (5-PS3-1); **4.PS3.B** (5-PS3-1); **4.PS3.D** (5-PS3-1); **4.ESS2.E** (5-LS2-1);**MS.PS3.D** (5-PS3-1),(5-LS2-1); **MS.PS4.B** (5-PS3-1); **MS.LS1.C** (5-PS3-1),(5-LS1-1),(5-LS2-1); **MS.LS2.A** (5-LS2-1); **MS.LS2.B** (5-PS3-1),(5-LS2-1) |
| *California Common Core State Standards Connections:* *ELA/Literacy –* **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-LS1-1)**RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS3-1),(5-LS2-1)**RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)**W.5.1.a–d** Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)**SL.5.5** Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-PS3-1),(5-LS2-1)*Mathematics –* **MP.2** Reason abstractly and quantitatively. (5-LS1-1),(5-LS2-1)**MP.4** Model with mathematics. (5-LS1-1),(5-LS2-1)**MP.5** Use appropriate tools strategically. (5-LS1-1)**5.MD.1** Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (5-LS1-1) |

**5 Earth’s Systems**

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| Students who demonstrate understanding can:**5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** [Clarification Statement: \*\***The geosphere, hydrosphere (including ice), atmosphere, and biosphere are each a system and each system is a part of the whole Earth System.** Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]**5-ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.** [Assessment Boundary: Assessment is limited to oceans, lakes, rivers, glaciers, ground water, and polar ice caps, and does not include the atmosphere.]**5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.** |
| The performance expectations above were developed using the following elements from the NRC document *A Framework for K–12 Science Education*: |
| **Science and Engineering Practices****Developing and Using Models**Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.* Develop a model using an example to describe a scientific principle. (5-ESS2-1)

**Using Mathematics and Computational Thinking**Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.* Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)

**Obtaining, Evaluating, and Communicating Information**Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.* Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)
 | **Disciplinary Core Ideas****ESS2.A: Earth Materials and Systems*** Earth’s major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth’s surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

**ESS2.C: The Roles of Water in Earth’s Surface Processes*** Nearly all of Earth’s available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

**ESS3.C: Human Impacts on Earth Systems*** Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments. (5-ESS3-1)
 | **Crosscutting Concepts****Scale, Proportion, and Quantity*** Standard units are used to measure and describe physical quantities such as weight, and volume. (5-ESS2-2)

**Systems and System Models** * A system can be described in terms of its components and their interactions. (5-ESS2-1),(5-ESS3-1)

**----------------------------------------------*****Connections to Nature of Science*****Science Addresses Questions About the Natural and Material World** * Science findings are limited to questions that can be answered with empirical evidence. (5-ESS3-1)
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| *Connections to other DCIs in fifth grade:* N/A |
| *Articulation of DCIs across grade-bands:* **2.ESS2.A** (5-ESS2-1); **2.ESS2.C** (5-ESS2-2); **3.ESS2.D** (5-ESS2-1); **4.ESS2.A** (5-ESS2-1); **MS.ESS2.A** (5-ESS2-1); **MS.ESS2.C** (5-ESS2-1),(5-ESS2-2); **MS.ESS2.D** (5-ESS2-1); **MS.ESS3.A** (5-ESS2-2),(5-ESS3-1); **MS.ESS3.C** (5-ESS3-1); **MS.ESS3.D** (5-ESS3-1) |
| *California Common Core State Standards Connections:* *ELA/Literacy –* **RI.5.1** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-ESS3-1)**RI.5.7** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)**RI.5.9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-ESS3-1)**W.5.8** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-ESS2-2),(5-ESS3-1)**W.5.9.a,b** Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-ESS3-1)**SL.5.5** Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS2-1),(5-ESS2-2)*Mathematics –* **MP.2** Reason abstractly and quantitatively. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)**MP.4** Model with mathematics. (5-ESS2-1),(5-ESS2-2),(5-ESS3-1)**5.G.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS2-1) |