Building Blocks of Science™ 3D

Correlation to the

CA Environmental Principles and Concepts

for Grades K–5

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Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and CA NGSS: Kindergarten

<table>
<tr><th colspan="4">K-LS1 From Molecules to Organisms: Structures and Processes</th></tr>
<tr><th>Performance Expectations</th><th>Connections Between EP&Cs, CCCs, and SEPS</th><th>Clarifications and Connections Between DCIs and EP&Cs</th><th>Living Things and Their Needs</th></tr>
<tr>
<td rowspan="3">K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive. [Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light; and, that all living things need water.]</td>
<td>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.</td>
<td>Disciplinary Core Ideas
As students learn that:
LS1.C: Organization for Matter and Energy Flow in Organisms “All animals need food in order to live and grow; they obtain their food from plants or from other animals; and plants need water and light to live and grow. (K-LS1-1)”</td>
<td rowspan="3">Living Things and Their Needs
TG: L1 pp. 30-42; L2 pp. 50-61; L4 pp. 95 Assessment Strategies</td>
</tr>
<tr>
<td>Crosscutting Concepts
Patterns
•Patterns in the natural and human designed world can be observed and used as evidence. (K-LS1-1)</td>
<td>Environmental Principle and Concept(s)
Students should be developing an understanding:
Principle I Concept a: “that the goods produced by natural systems are essential to human life and to the functioning of our economies and cultures.”
and,
Principle II Concept a: “that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems.”</td>
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<tr>
<td>Science and Engineering Practices
Analyzing and Interpreting Data
•Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions. (K-LS1-1)
- - - - - - - - -
Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
•Scientists look for patterns and order when making observations about the world. (K-LS1-1)</td>
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Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and CA NGSS: Kindergarten

K-ESS2 Earth's Systems

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Living Things and Their Needs
K-ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. [Clarification Statement: Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break concrete.]	**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.	**Disciplinary Core Ideas** As students learn that: **ESS2.E: Biogeology** "Plants and animals can change their environment. (K-ESS2-2)" Secondary DCI(s) **ESS3.C: Human Impacts on Earth Systems** "Things people do to live comfortably can affect the world around them, but they can make choices that reduce their impacts on the land, water, air, and other living things. (secondary to K-ESS2-2)"	*Living Things and Their Needs* TG: L3 pp. 68-77
	Crosscutting Concepts **Patterns** •Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1) **Systems and System Models** •Systems in the natural and designed world have parts that work together. (K-ESS2-2)	**Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle I Concept c:** "that the quality, quantity and reliability of the goods and ecosystem services provided by natural systems are directly affected by the health of those systems." (ESS2.E) and **Principle II Concept a:** "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems." (ESS3.C)	
	Science and Engineering Practices **Engaging in Argument from Evidence** •Construct an argument with evidence to support a claim. (K-ESS2-2)		

K-ESS3 Earth and Human Activity

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Living Things and Their Needs
K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. [Clarification Statement: Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in forested areas; and, grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.] **K-ESS3-3.** Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.* [Clarification Statement: Examples of human impact on the land could include cutting trees to produce paper and using resources to produce bottles. Examples of solutions could include reusing paper and recycling cans and bottles.]	**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. **Crosscutting Concepts** **Cause and Effect** •Events have causes that generate observable patterns. (K-ESS3-3) **Systems and System Models** •Systems in the natural and designed world have parts that work together. (K-ESS3-1) **Science and Engineering Practices** **Developing and Using Models** •Use a model to represent relationships in the natural world. (K-ESS3-1) **Obtaining, Evaluating, and Communicating Information** •Communicate solutions with others in oral and/or written forms using models and/or drawings that provide detail about scientific ideas. (K-ESS3-3)	**Disciplinary Core Ideas** As students learn that: **ESS3.A: Natural Resources** "… Humans use natural resources for everything they do. (K-ESS3-1)" and **ESS3.C: Human Impacts on Earth Systems** "Things people do to live comfortably can affect the world around them. (K-ESS3-3)" Secondary DCI(s) **ETS1.A: Defining and Delimiting an Engineering Problem** "Asking questions, making observations, and gathering information are helpful in thinking about problems. (secondary to K-ESS3-2)" and **ETS1.B: Developing Possible Solutions** "Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to K-ESS3-3)" **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle I Concept c:** "that the quality, quantity and reliability of the goods and ecosystem services provided by natural systems are directly affected by the health of those systems." (ESS3.A) and **Principle II Concept a:** "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems." (ESS3.C)	K-ESS3-1 *Living Things and Their Needs* TG: L3 pp. 68-77 K-ESS3-3 *Living Things and Their Needs* TG: L4 pp. 84-95, Assessment Strategies pp. 95

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and CA NGSS: Kindergarten

K-2-ETS1 Engineering Design

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Weather and Sky
K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	**Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.	**Disciplinary Core Ideas** As students discover that: **ETS1.A: Defining and Delimiting Engineering Problems** "A situation people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)" and **ETS1.A** "Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)" and **ETS1.A** "Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)"	*Weather and Sky* TG: L5 pp. 124-133, Assessment Strategies pp. 133
	Crosscutting Concepts None identified	**Environmental Principle and Concept(s)** Students should be developing an understanding of: **Principle V Concept a:** "the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions."	
	Science and Engineering Practices **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) • Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)		

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade One

1-LS1 From Molecules to Organisms: Structures and Processes

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Exploring Organisms
1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.* [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.] **1-LS1-2.** Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other	**Principle II:** The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies. **Crosscutting Concepts** **Patterns** •Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2) **Structure and Function** •The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1) - - - - - - - - - **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** •Every human-made product is designed by applying some knowledge of the natural world and is built by using natural materials. (1-LS1-1) **Science and Engineering Practices** **Constructing Explanations and**	**Disciplinary Core Ideas** As students learn that: **LS1.A: Structure and Function** "All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)" **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle II Concept a:** "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems."	1-LS1-1 *Exploring Organisms* TG: L1 pp. 32-46; L2 pp. 52-66; L5 pp.114-125 1-LS1-2 *Exploring Organisms* TG: L3 pp. 74-80; Extensions and Assessment Strategies pp. 80

vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]	**Designing Solutions** •Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1) **Obtaining, Evaluating, and Communicating Information** •Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2) - - - - - - - - - **Connections to Nature of Science** **Scientific Knowledge is Based on Empirical Evidence** •Scientists look for patterns and order when making observations about the world. (1-LS1-2)		

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade One

K-2-ETS1 Engineering Design

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Light and Sound Waves
K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	**Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes. **Crosscutting Concepts** **Structure and Function**[b] • The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2) **Science and Engineering Practices** **Asking Questions and Defining Problems** • Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) • Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)	**Disciplinary Core Ideas** As students discover that: **ETS1.A: Defining and Delimiting Engineering Problems** "Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)" **Environmental Principle and Concept(s)** Students should be developing an understanding of: **Principle V Concept a:** "the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions."	*Light and Sound Waves* TG: L6 pp. 1124-133, Assessment Strategies pg. 133

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS;* Grade Two

2-LS2 Ecosystems: Interactions, Energy, and Dynamics

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Ecosystem Diversity
2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow. [Assessment Boundary: Assessment is limited to testing one variable at a time.] **2-LS2-2:** Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*	**Principle II:** The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies. **Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes. **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) **Science and Engineering Practices** **Developing and Using Models** • Develop a simple model based on evidence to represent a proposed object or tool.(2-LS2-2) **Planning and Carrying Out Investigations** • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.(2-LS2-1)	**Disciplinary Core Ideas** As students learn that: **LS2.A: Interdependent Relationships in Ecosystems** "Plants depend on water and light to grow. (2-LS2-1)" and **LS2.A** "Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)" Secondary DCI(s) **ETS1.B: Developing Possible Solutions** "Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (secondary to 2-LS2-2)"[b] **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle II Concept a:** "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems." **Principle V Concept a:** "the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions."	2-LS2-1 *Ecosystem Diversity* TG: L1 pp. 32-44 2-LS2-2 *Ecosystem Diversity* TG: L3 pp. 74-82, Assessment Strategies pp. 82

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS;* Grade Two

2-LS4 Biological Evolution: Unity and Diversity

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Ecosystem Diversity
2-LS4-1: **Make observations of plants and animals to compare the diversity of life in different habitats.** [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]	**Principle II:** The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies. **Crosscutting Concepts** **Cause and Effect** •Events have causes that generate observable patterns. (2-LS2-1) **Systems and System Models** •Systems in the natural and designed world have parts that work together. (K-ESS2-2) **Science and Engineering Practices** **Planning and Carrying Out Investigations** •Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1) - - - - - - - - - **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)	**Disciplinary Core Ideas** As students discover that: **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)" **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle II Concept a:** "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems."	*Ecosystem Diversity* TG: L1 pp. 32-45; L2 pp. 54-62; L4 pp. 88-101; L5 pp. 112-119, Assessment Strategies pp. 119

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS;* Grade Two

K-2-ETS1 Engineering Design

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Earth Materials
K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	**Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.	**Disciplinary Core Ideas** As students learn that: **ETS1.A: Defining and Delimiting Engineering Problems** "Asking questions, making observations, and gathering information are helpful in thinking about problems…" (K-2-ETS1-1) and **ETS1.A: Defining and Delimiting Engineering Problems** "Before beginning to design a solution it is important to clearly understand the problem." (K-2-ETS1-1)	*Earth Materials* TG: L3 pp. 96-112; L4 pp. 132-144; L5 pp. 175 Assessment Strategies
	Crosscutting Concepts **Cause and Effect** •Events have causes that generate observable patterns. (2-LS2-1 **Structure and Function**[b] •The shape and stability of structures of natural and designed objects are related to their function(s). (K-2-ETS1-2)	**Environmental Principle and Concept(s)** Students should be developing an understanding of: **Principle V Concept a:** "the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions."	
	Science and Engineering Practices **Asking Questions and Defining Problems** •Ask questions based on observations to find more information about the natural and/or designed world(s). (K-2-ETS1-1) •Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)		

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Three

<table>
<tr><th colspan="4">3-LS1 From Molecules to Organisms: Structures and Processes</th></tr>
<tr><th>Performance Expectations</th><th>Connections Between EP&Cs, CCCs, and SEPS</th><th>Clarifications and Connections Between DCIs and EP&Cs</th><th>Life in Ecosystems</th></tr>
<tr>
<td rowspan="2">3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death. [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]</td>
<td>Principle III: Natural systems proceed through cycles that humans depend upon, benefit from and can alter.

Crosscutting Concepts
Patterns
•Patterns of change can be used to make predictions. (3-LS1-1)

Science and Engineering Practices
Developing and Using Models
•Develop models to describe phenomena. (3-LS1-1)
- - - - - - - - -
Connections to Nature of Science
Scientific Knowledge is Based on Empirical Evidence
•Science findings are based on recognizing patterns. (3-LS1-1)</td>
<td>Disciplinary Core Ideas
As students learn that:
LS1.B: Growth and Development of Organisms
“Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycle. (3-LS1-1)”

Environmental Principle and Concept(s)
Students should be developing an understanding:
Principle III Concept a: “that natural systems proceed through cycles and processes that are required for their functioning.”
and
Principle III Concept b: “that human practices depend upon and benefit from the cycles and processes that operate within natural systems.”
and
Principle III Concept c: “that human practices can alter the cycles and processes that operate within natural systems.”</td>
<td rowspan="2">Life in Ecosystems
TG: L1 pp. 32-51</td>
</tr>
</table>

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Three

3-LS3 Heredity: Inheritance and Variation of Traits

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Life in Ecosystems
3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment. [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]	**Principle II:** The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies. **Crosscutting Concepts** **Cause and Effect** •Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2) **Patterns** •Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1) **Science and Engineering Practices** **Constructing Explanations and Designing Solutions** •Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)	**Disciplinary Core Ideas** As students learn that: **LS3.A: Inheritance of Traits** "Other characteristics result from individuals' interactions with the environment, which can range from diet to learning, that many characteristics involve both inheritance and environment. (3-LS3-2)" and **LS3.B: Variation of Traits** "The environment also affects the traits that an organism develops. (3-LS3-2)" **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle II Concept a:** "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems."	*Life in Ecosystems* TG: L4 pp. 130-145

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Three

3-LS4 Biological Evolution: Unity and Diversity

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Life in Ecosystems
3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.] **3-LS4-3.** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system	**Principle II:** The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies. **Crosscutting Concepts** **Cause and Effect** •Cause and effect relationships are routinely identified and used to explain change. (3-LS4-2), (3-LS4-3) **Systems and System Models** •A system can be described in terms of its components and their interactions. (3-LS4-4) - - - - - - - - - **Connections to Engineering, Technology, and Applications of Science**[b] **Interdependence of Science, Engineering, and Technology** •Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-3) - - - - - - - - - **Connections to Nature of Science** **Science is a Human Endeavor** •Most scientists and engineers work in teams. (3-LS4-3) **Science and Engineering Practices** **Constructing Explanations and Designing Solutions** •Use evidence (e.g.,	**Disciplinary Core Ideas** As students discover that: **LS4.C: Adaptation** "For any particular environment, some kinds of organisms survive well, some survive less well. (3-LS4-3)" and **LS4.D: Biodiversity and Humans** "Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)" Secondary DCI(s) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** "When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)" **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle II Concept a:** "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems." and **Principle II Concept b:** "that methods used to extract, harvest, transport and consume natural resources influence the geographic extent, composition, biological diversity, and viability of natural systems." and **Principle II Concept c:** "that the expansion and operation of human communities influences the geographic extent, composition, biological diversity, and viability of natural systems."	3-LS4-2 *Life in Ecosystems* TG: L3 pp. 90-108 3-LS4-3 *Life in Ecosystems* TG: L4 pp. 130-145; L5 pp. 168-178. Assessment Strategies pp. 178

in which the parts depend on each other.] **3-LS4-4.** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]	observations, patterns) to construct an explanation. (3-LS4-2) **Engaging in Argument from Evidence** •Construct an argument with evidence. (3-LS4-3) •Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)		

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Three

3-5-ETS1 Engineering Design

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Forces and Interations
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **3-5-ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes. **Crosscutting Concepts** **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** •People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) •Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS-2) **Science and Engineering Practices** **Asking Questions and Defining Problems** •Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) **Constructing Explanations and Designing Solutions** •Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	**Disciplinary Core Ideas** As students recognize that: **ETS1.A: Defining and Delimiting Engineering Problems** "… Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)" **Environmental Principle and Concept(s)** Students should be developing an understanding of: **Principle V Concept a:** "the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions."	3-5-ETS1-1 *Forces and Interations* TG: L5 pp.152-159 3-5-ETS1-2 *Forces and Interations* TG: L4 pp.112-129; L5 pp. 152-159

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Four

<table>
<tr><th colspan="4">4-LS1 From Molecules to Organisms: Structures and Processes</th></tr>
<tr><th>Performance Expectations</th><th>Connections Between EP&Cs, CCCs, and SEPS</th><th>Clarifications and Connections Between DCIs and EP&Cs</th><th>Plant and Animal Structures</th></tr>
<tr>
<td rowspan="3">4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin. Each structure has specific functions within its associated system.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]</td>
<td>Principle II: The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.</td>
<td>Disciplinary Core Ideas
As students learn that:
LS1.A: Structure and Function “Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)”</td>
<td rowspan="3">Plant and Animal Structures
TG: L1 pp. 34-42; L2 pp. 48-64; L3 pp. 84-100; L4 pp. 118-131; L5 pp.152-168; L6 pp. 176-182, Assessment Strategies pp. 182</td>
</tr>
<tr>
<td>Crosscutting Concepts
Systems and System Models
•A system can be described in terms of its components and their interactions. (4-LS1-1)</td>
<td>Environmental Principle and Concept(s)
Students should be developing an understanding:
Principle II Concept a: “that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems.”
and
Principle II Concept b: “that methods used to extract, harvest, transport and consume natural resources influence the geographic extent, composition, biological diversity, and viability of natural systems.”
and
Principle II Concept c: “that the expansion and operation of human communities influences the geographic extent, composition, biological diversity, and viability of natural systems.”</td>
</tr>
<tr>
<td>Science and Engineering Practices
Engaging in Argument from Evidence
•Construct an argument with evidence, data, and/or a model. (4-LS1-1)</td>
</tr>
</table>

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Four

4-ESS3 Earth and Human Activity

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Energy Works
4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]	**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. **Crosscutting Concepts** **Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (4-ESS3-1) **Energy and Matter**[b] • Energy can be transferred in various ways and between - - - - - - - - - **Connections to Engineering, Technology, and Applications of Science** **Interdependence of Science, Engineering, and Technology** • Knowledge of relevant scientific concepts and research findings is important in engineering. (4-ESS3-1) **Influence of Science, Engineering and Technology on Society and the Natural World** • Over time, people's needs and wants change, as do their demands for new and improved technologies. (4-ESS3-1) **Science and Engineering Practices** **Obtaining, Evaluating, and Communicating Information** • Obtain and combine information from books and other reliable media to explain phenomena. (4-ESS3-1)	**Disciplinary Core Ideas** As students learn that: **ESS3.A: Natural Resources** "Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways," and that some resources are renewable over time, and others are not. (4-ESS3-1)" Secondary DCI(s) **ETS1.B: Designing Solutions to Engineering Problems** "Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)" **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle I Concept a:** "that the goods produced by natural systems are essential to human life and to the functioning of our economies and cultures."	*Energy Works* TG: L5 pp. 168-182, Assessment Strategies pp. 182

3-5-ETS1 Engineering Design

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Energy Works
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	**Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes.	**Disciplinary Core Ideas** As students recognize that: **ETS1.A: Defining and Delimiting Engineering Problems** "Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)"	*Energy Works* TG: L5 pp. 162-182
	Crosscutting Concepts - - - - - - - - - **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** •People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1)	**Environmental Principle and Concept(s)** Students should be developing an understanding of: **Principle V Concept a:** "the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions."	
	Science and Engineering Practices **Asking Questions and Defining Problems** •Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)		

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Five

<table>
<tr><th colspan="4">5-LS1 From Molecules to Organisms: Structures and Processes</th></tr>
<tr><th>Performance Expectations</th><th>Connections Between EP&Cs, CCCs, and SEPS</th><th>Clarifications and Connections Between DCIs and EP&Cs</th><th>Matter and Energy in Ecosystems</th></tr>
<tr>
<td rowspan="4">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.]</td>
<td>Principle IV: The exchange of matter between natural systems and human societies affects the long-term functioning of both.</td>
<td>Disciplinary Core Ideas
As students learn that:
LS1.C: Organization for Matter and Energy Flow in Organisms “Plants acquire their material for growth chiefly from air and water. (5-LS1-1)”</td>
<td rowspan="4">Matter and Energy in Ecosystems
TG: L1 pp. 34-46</td>
</tr>
<tr>
<td>Crosscutting Concepts
Energy and Matter
•Matter is transported into, out of, and within systems. (5-LS1-1)
Cause and Effect
•Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)</td>
<td>Environmental Principle and Concept(s)
Students should be developing an understanding:
Principle IV Concept a: “that the effects of human activities on natural systems are directly related to the quantities of resources consumed and to the quantity and characteristics of the resulting byproducts.”</td>
</tr>
<tr>
<td>Science and Engineering Practices
Engaging in Argument from Evidence
•Support an argument with evidence, data, or a model. (5-LS1-1)</td>
<td></td>
</tr>
</table>

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Five

5-LS2 Ecosystems: Interactions, Energy, and Dynamics

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Matter and Energy in Ecosystems
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.]	**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. **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) **Science and Engineering Practices** **Developing and Using Models** •Develop a model to describe phenomena. (5-LS2-1) - - - - - - - - - **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** As students learn that: **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)" **Environmental Principle and Concept(s)** Students should be developing an understanding: **Principle IV Concept a:** "that the effects of human activities on natural systems are directly related to the quantities of resources consumed and to the quantity and characteristics of the resulting byproducts." and **Principle IV Concept b:** "that the byproducts of human activity are not readily prevented from entering natural systems and may be beneficial, neutral, or detrimental in their effect." and **Principle III Concept a:** "that natural systems proceed through cycles and processes that are required for their functioning; and that human practices can alter the cycles and processes that operate within natural systems." and **Principle III Concept c:** "that human practices can alter the cycles and processes that operate within natural systems."	*Matter and Energy in Ecosystems* TG: L1 pp. 34-46; L2 pp. 58-69; L3 pp. 78-87; L4 pp. 104-117; L5 pp. 132-145; L6 pp. 168-175, Assessment Strategies pp. 175

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Five

5-ESS2 Earth's Systems

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Matter and Energy in Ecosystems/ Earth and Space Systems
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	**Principle III:** Natural systems proceed through cycles that humans depend upon, benefit from and can alter. **Crosscutting Concepts** **Systems and System Models** •A system can be described in terms of its components and their interactions. (5-LS2-1) **Cause and Effect** •Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4) **Science and Engineering Practices** **Developing and Using Models** •Develop a model using an example to describe a scientific principle. (5-ESS2-1) **Using Mathematics and Computational Thinking** •Describe and graph quantities such as area and volume to address scientific questions. (5-ESS2-2)	**Disciplinary Core Ideas** As students discover that: **ESS2.A: Earth Materials and Systems** "Earth's major systems are the geosphere, the hydrosphere, the atmosphere, and the biosphere," "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," and that "winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)" **Environmental Principle and Concept(s)** Students should be developing an understanding that: **Principle III Concept a:** "natural systems proceed through cycles and processes that are required for their functioning." and **Principle III Concept b:** "human practices depend upon and benefit from the cycles and processes that operate within natural systems." and **Principle III Concept c:** "human practices can alter the cycles and processes that operate within natural systems."	5-ESS2-1 *Matter and Energy in Ecosystems* TG: L4 pp. 104-117; L5 pp. 132-145; L6 pp. 168-176, Assessment Strategies pp. 175 5-ESS2-2 *Earth and Space Systems* TG: L4 pp. 140-151

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.]			

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Five

<table>
<tr><th colspan="4">5-ESS3 Earth and Human Activity</th></tr>
<tr><th>Performance Expectations</th><th>Connections Between EP&Cs, CCCs, and SEPS</th><th>Clarifications and Connections Between DCIs and EP&Cs</th><th>Matter and Energy in Ecosystems</th></tr>
<tr>
<td rowspan="3">5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.</td>
<td>Principle II: The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.</td>
<td>Disciplinary Core Ideas
As students learn that:
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)”</td>
<td rowspan="3">Matter and Energy in Ecosystems
TG: L5 pp. 132-145; L6 pp. 168-175, Assessment Strategies pp. 175</td>
</tr>
<tr>
<td>Crosscutting Concepts
Systems and System Models
•A system can be described in terms of its components and their interactions. (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)</td>
<td>Environmental Principle and Concept(s)
Students should be developing an understanding:
Principle II Concept a: “that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems.”
and
Principle II Concept b: “that methods used to extract, harvest, transport and consume natural resources influence the geographic extent, composition, biological diversity, and viability of natural systems.”
and
Principle II Concept c: “that the expansion and operation of human communities influences the geographic extent, composition, biological diversity, and viability of natural systems.”</td>
</tr>
<tr>
<td>Science and Engineering Practices
Obtaining, Evaluating, and Communicating Information
•Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem. (5-ESS3-1)</td>
</tr>
</table>

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Five

<table>
<tr><th colspan="4">5-PS3 Energy</th></tr>
<tr><th>Performance Expectations</th><th>Connections Between EP&Cs, CCCs, and SEPS</th><th>Clarifications and Connections Between DCIs and EP&Cs</th><th>Matter and Energy in Ecosystems</th></tr>
<tr>
<td rowspan="3">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.]</td>
<td>Principle II: The long-term functioning and health of terrestrial, freshwater, coastal and marine ecosystems are influenced by their relationships with human societies.</td>
<td>Disciplinary Core Ideas
As students recognize that:
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)"[b]

Secondary DCI(s)
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)"</td>
<td rowspan="3">Matter and Energy in Ecosystems
TG: L2 pp. 58-69; L3 pp. 78-88</td>
</tr>
<tr>
<td>Crosscutting Concepts
Energy and Matter
•Energy can be transferred in various ways and between objects. (5-PS3-1)</td>
<td>Environmental Principle and Concept(s)
Students should be developing an understanding:
Principle II Concept a: "that direct and indirect changes to natural systems due to the growth of human populations and their consumption rates influence the geographic extent, composition, biological diversity, and viability of natural systems."
and
Principle I Concept a: "the goods produced by natural systems are essential to human life and to the functioning of our economies and cultures."
and
Principle I Concept b: "the ecosystem services provided by natural systems are essential to human life and to the functioning of our economies and cultures."</td>
</tr>
<tr>
<td>Science and Engineering Practices
Developing and Using Models
•Use models to describe phenomena. (5-PS3-1)</td>
</tr>
</table>

Appropriate Alignments among *Environmental Principles and Concepts (EP&Cs)* and *CA NGSS:* Grade Five

3-5-ETS1 Engineering Design

Performance Expectations	Connections Between EP&Cs, CCCs, and SEPS	Clarifications and Connections Between DCIs and EP&Cs	Earth and Space Systems
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**Principle V:** Decisions affecting resources and natural systems are based on a wide range of considerations and decision-making processes. **Crosscutting Concepts** **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** •People's needs and wants change over time, as do their demands for new and improved technologies. (3-5-ETS1-1) •Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands. (3-5-ETS-2) **Science and Engineering Practices** **Constructing Explanations and Designing Solutions** •Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)	**Disciplinary Core Ideas** As students recognize that: **ETS1.C: Optimizing the Design Solution** "Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)" and **ETS1.B: Developing Possible Solutions** "Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)"[b] and **ETS1.B** "At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. . (3-5-ETS1-2)" **Environmental Principle and Concept(s)** Students should be developing an understanding of: **Principle V Concept a:** "the spectrum of what is considered in making decisions about resources and natural systems and how those factors influence decisions."	*Earth and Space Systems* TG: L4 pp. 140-151; L5 pp.176-186