NGSS CORRELATIONS

ECOLOGY

Crosscutting Concepts		Activity number
Patterns	Patterns can be used to identify cause and effect relationships.	3, 4, 5, 6, 10, 14, 16
Energy and Matter	The transfer of energy can be tracked as energy flows through a designed or natural system.	7, 8, 9, 11, 12, 13
Stability and Change	Small changes in one part of a system might cause large changes in another part.	1, 2, 5, 6, 13, 14, 15, 16
	Systems in dynamic equilibrium are stable due to a balance of feedback mechanisms.	12
Systems and System Models	Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy and matter flows within systems.	7, 8, 11, 12
Scale, Proportion, and Quantity	Proportional relationships (e.g. speed as the ratio of distance traveled to time taken) among different types of quantities provide information about the magnitude of properties and processes.	9
Connections to the Nature of Science	Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.	1, 2, 15
Cause and Effect	Cause and effect relationships may be used to predict phenomena in natural or designed systems.	1, 2, 3, 4, 5, 6, 9, 10, 14, 16
	Science assumes that objects and events in natural systems occur in consistent patterns and are understandable through measurement and observation.	8, 11, 12
Science and Engineering Practices		**Activity number**
Analyzing and Interpreting Data	Analyze and interpret data to provide evidence for phenomena.	3, 4, 6, 7, 9, 14
	Distinguish between causal and correlational relationships in data	4
Asking Questions and Defining Problems	Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.	4
	Ask questions to determine relationships between independent and dependent variables and relationships in models.	14
	Ask questions that require sufficient and appropriate empirical evidence to answer.	4, 14
Constructing Explanations and Designing Solutions	Construct an explanation that includes qualitative or quantitative relationships between variables that predict or describe phenomena.	2, 7, 8, 10, 11, 13
Developing and Using Models	Develop a model to predict and/or describe phenomena.	7, 8, 11, 12

Science and Engineering Practices		Activity number
Engaging in Argument from Evidence	Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem.	1, 5, 6
	Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon.	14
	Evaluate competing design solutions based on jointly developed and agreed-upon design criteria.	15
	Respectfully provide and receive critiques about one's explanations, procedures, models, and questions by citing relevant evidence and posing and responding to questions that elicit pertinent elaboration and detail.	15
	Make an oral or written argument that supports or refutes the advertised performance of a device, process, or system based on empirical evidence concerning whether or not the technology meets relevant criteria and constraints.	15
Obtaining, Evaluating, and Communicating Information	Integrate qualitative scientific and technical information in written text with that contained in media and visual displays to clarify claims and findings.	16
	Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.	2
Planning and Carrying Out Investigations	Conduct an investigation and evaluate the experimental design to produce data to serve as the basis for evidence that can meet the goals of the investigation.	4, 5, 7, 9
	Conduct an investigation to produce data to serve as the basis for evidence that meet the goals of an investigation.	11
Using Mathematics and Computational Thinking	Use digital tools (e.g., computers) to analyze very large data sets for patterns and trends.	14
	Use digital tools and/or mathematical concepts and arguments to test and compare proposed solutions to an engineering design problem.	15
Connections to the Nature of Science	Science disciplines share common rules of obtaining and evaluating empirical evidence.	3, 4, 5, 14
Disciplinary Core Ideas		**Activity number**
Information Processing (LS1.D)	Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories.	5

Disciplinary Core Ideas		Activity number
Interdependent Relationships in Ecosystems (LS2.A)	Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.	1, 2, 5, 6, 7, 8, 9, 14, 16
	In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.	1, 5, 6, 7, 9, 12, 14, 16
	Growth of organisms and population increases are limited by access to resources.	6, 7, 9, 16
	Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared.	2, 6, 7, 10, 12, 16
Cycle of Matter and Energy Transfer in Ecosystems (LS2.B)	Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.	7, 8, 11, 12, 13
Ecosystem Dynamics, Functioning, and Resilience (LS2.C)	Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.	1, 2, 3, 4, 6, 12, 13, 14, 16
	Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.	2, 3, 4, 5, 14, 15, 16
Adaptation (LS4.C)	Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes.	5
Biodiversity and Humans (LS4.D)	Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling.	1, 2, 3, 4, 14, 15, 16

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Human Impacts on Earth Systems (ESS3.C)	Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.	13, 14, 16
	Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.	15
Defining and Delimiting Engineering Problems (ETS1.A)	The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions.	15, 16
Developing Possible Solutions (ETS1.B)	There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.	2, 3, 15, 16
Performance Expectations		**Activity number**
Ecosystems: Interactions, Energy, and Dynamics (LS2)	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (MS-LS2-1)	9
	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (MS-LS2-2)	10
	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (MS-LS2-3)	12
	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. (MS-LS2-4)	14
	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.* (MS-LS2-5)	15

COMMON CORE STATE STANDARDS CORRELATIONS

ECOLOGY

Common Core State Standards – English Language Arts		Activity number
Reading Informational Text (RI)	Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (RI.8.8)	15, 16
Reading in Science and Technical Subjects (RST)	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. (RST.6-8.1)	1, 2
	Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks. (RST.6-8.3)	3, 4, 6, 7, 11
	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (RST.6-8.7)	8
	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. (RST.6-8.8)	2, 16
Speaking and Listening (SL)	Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound and valid reasoning, and well-chosen details: use appropriate eye contact, adequate volume, and clear pronunciation. (SL.8.4)	2, 16
	Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (SL.8.5)	2, 16
Writing in History/ Social Studies, Science, and Technological Subjects (WHST)	Write arguments focused on discipline-specific content. (WHST.6-8.1)	1, 5, 9, 10, 12, 13, 14, 15
	Write informative/explanatory texts to examine and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (WHST.6-8.2)	16
	Draw evidence from informational texts to support analysis, reflection, and research. (WHST.6-8.9)	1, 2, 8

COMMON CORE STATE STANDARDS CORRELATIONS

ECOLOGY (continued)

Common Core State Standards – Mathematics		Activity number
Mathematical Practice (MP)	Reason abstractly and quantitatively. (MP.2)	6, 8, 9
	Model with mathematics. (MP.4)	8
Ratios and Proportional Reasoning (RP)	Understand the concept of a ratio, and use ratio language to describe a ratio between two quantities. (6.RP.A.1)	8, 9
	Use ratio and rate reasoning to solve real-world and mathematical problems. (6.RP.A.3)	7
Expressions and Equations (EE)	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (6.EE.C.9)	1, 10
Statistics and Probability (SP)	Summarize numerical data sets in relation to their context. (6.SP.B.5)	3, 4, 5, 14