Correlation of
***Natural Resources Systems,* Travis Park, Tara Berescik Burke**
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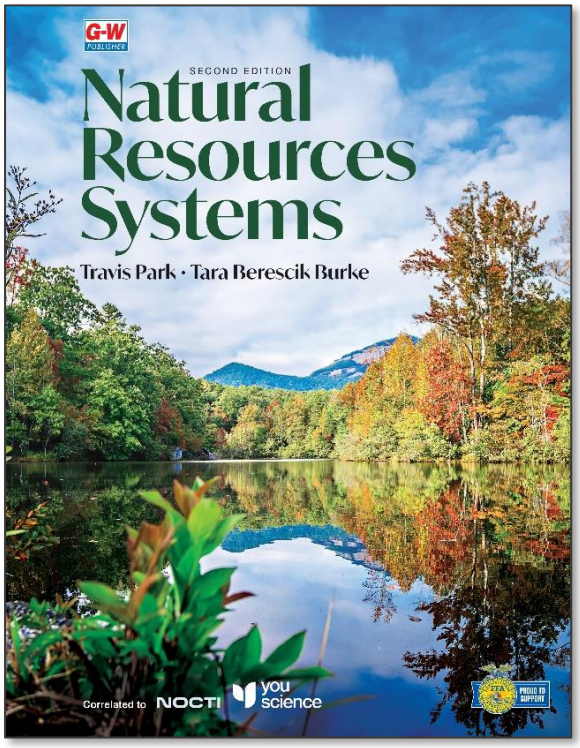
to
Next Generation Science Standards



Additional Supporting Content

There are more than 450 questions and activities at the end of the chapters that may also be used to fulfill the Performance Expectations. They include the following categories:

- Critical Thinking
- STEM and Academic Activities
- FFA and SAE Opportunities
- Communicating about Natural Resources Systems

Performance Expectations	Textbook Supporting Content
HS. Earth's Systems	
HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that causes changes to other Earth systems.	The Industrial Revolution p53 The Dust Bowl p55 Natural Resources Disasters pp57-60 Atmospheric Changes pp389-391 Global Warming p389-390 The Greenhouse Effect pp390-391 Soil Degradation p234 Soil Compaction pp235-236 Soil Erosion pp236-241 Wind Erosion p237 Water Erosion pp237-240 Soil Erodibility p240 STEM Connection: Plants and Erosion Control p241 Shoreline, Channel, and Streambank Soil Erosion pp242-243 Factors that Contribute to Soil Erosion pp244-246 *(continued)*

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HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that causes changes to other Earth systems.	*(continued)* Leaching pp246-247 Surface Mining pp283-284 Subsurface Mining p284 The Impacts of Mining on the Environment pp296-299 Reclamation of Mined Areas p300 Roles of Wetlands pp359-361 Marine Ecosystems: Why Are We Losing Coral Reefs? p366 Serotinous Plants: Pyrophytic Ecosystems p372 Wetland Rehabilitation and Restoration pp375-376
HS-ESS2-7. Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.	Climate p82 Topography p83 Soil Composition p83 Biogeochemical Cycles pp83-87 Biomes and Ecoregions pp88-91 Soil Formation pp206-210 Land Capability Classification (LCC) pp221-224 Interactions pp436-444
HS-ESS2-3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	USGS Topographical Maps p734 True North and Magnetic North pp736-737
HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	Biogeochemical Cycles pp83-87 The Carbon Cycle pp86-87 The Greenhouse Effect pp390-391
HS-ESS2-5. Plan and investigate the properties of water and its effects on Earth materials and surface processes.	The Water Cycle pp84-85 Water Use pp161-162 Soil Water Movement pp215-217 Hydrologic Cycle pp308-310 States of Water pp309-310 Locations of Water pp310-322 Atmospheric Water p310 Groundwater pp311-316 Stream Habitats: Foundations and Riparian Zones p317 Surface Water pp316-322 Water Chemistry pp332-335 STEM Connection: Surface Tension p333 Water Use pp336-341 STEM Connection: How Much Water Do You Use? p338 Water Pollution pp342-350 *(continued)*

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HS-ESS2-5. Plan and investigate the properties of water and its effects on Earth materials and surface processes.	*(continued)* Point Source Pollution p343 Nonpoint Source Pollution p344 Bioindicators pp344-346 STEM Connection: BMI Assessment p345 Wildlife Loss p346 Mutations p346 Bioaccumulation versus Biomagnification pp347-348 Pollution Mitigation pp348-350 STEM Connection: Downstream Impacts p656
HS. History of Earth	
HS-ESS1-6. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.	Soils Formed by Glaciers p220 This performance expectation is beyond the scope of the program.
HS-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	Topography p83 Biogeochemical Cycles pp83-87
HS-ESS1-5. Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.	Soils Formed by Glaciers p220 This performance expectation is beyond the scope of the program.
HS. Energy	
HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	The Energy Cycle p87 STEM Connection: Can Energy be Created or Destroyed? p87 Energy Use and Power Generation pp118-123 Energy Sources Mined in the United States pp291-296 Energy Flow Pyramid p445f
HS-PS3-3. Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.*	Renewable or Nonrenewable? pp4-9 Solar Energy p5 Wind Energy p5 Geothermal Energy p6 Biomass Energy p6 Water Energy pp7-8 STEM Connection: Can Energy be Created or Destroyed? P87 Energy Use and Power Generation p118-123

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HS-PS3-5. Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.	This performance expectation is beyond the scope of the program.
HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).	This performance expectation is beyond the scope of the program.
HS-PS3-4. Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).	This performance expectation is beyond the scope of the program.
HS. Human Sustainability	
HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.	Anthropogenic Ecoregions pp89-90 Natural Cycle of Habitat Disturbances pp139-140 Habitat Destruction Caused by Humans pp140-144 Habitat Fragmentation p144 Habitat Degradation pp144-148 Economic Value of Resources pp163-164 Chapter 8: Population Dynamics pp176-197
HS-ESS3-3. Create a computational simulation to illustrate the relationships among the management of natural resources, the sustainability of human populations, and biodiversity.	Conservation and Preservation pp13-14 Three Pillars of Sustainability pp110-112 Environmental Sustainability p112 Harvesting and Sustained Yields pp113-114 Technology and Innovation pp115-123 Agriculture pp115-117 Waste Management pp124-128 Measuring Sustainability p129 Making a Difference p130 Green Technology pp166-168 STEM Connection: Energy-Efficient Lights p168 Ecological Footprint pp169-170 Urban Areas p179 STEM Connection: Feeling Crowded? p179 Population Ecology pp182-184 STEM Connection: Quadrat Sampling p181 STEM Connection: Estimating Population Size p186

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HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.*	Conservation and Preservation pp13-14 Environmental Sustainability p112 Agriculture pp115-117 Harvesting and Sustained Yields pp113-114 Chapter 12: Mining of Natural Resources pp280-305
HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*	Anthropogenic Ecoregions pp89-90 Technology and Innovation pp115-123 Surface Mining p283 Subsurface Mining p284 Water Pollution pp342-350 Point Source Pollution p343 Nonpoint Source Pollution p344
HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.	The Carbon Cycle pp86-87 Earth's Atmosphere pp384-388 Atmospheric Changes pp389-391 Global Warming pp389-390 The Greenhouse Effect pp390-391
HS. Inheritance and Variation of Traits	
HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	This performance expectation is beyond the scope of the program.
HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	This performance expectation is beyond the scope of the program.
HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	This performance expectation is beyond the scope of the program.
HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	This performance expectation is beyond the scope of the program.
HS. Interdependent Relationships in Ecosystems	
HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*	Habitat Destruction Caused by Humans pp140-143 Habitat Fragmentation p144 Habitat Degradation pp144-148 Chapter 19 Endangered Species pp462-489

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HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*	Habitat Destruction Caused by Humans pp140-143 Habitat Fragmentation p144 Habitat Degradation pp144-148
HS-LS2-6. Evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	Ecosystems pp82-83 Natural Cycle of Habitat Disturbances pp139-140 Habitat Destruction Caused by Humans pp140-143 Habitat Fragmentation p144 Habitat Degradation pp144-148 Ecological Communities pp435-444
HS-LS2-8. Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.	Competition pp437-439 Game Species Management pp533-534 Game Species pp534-546
HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	Carrying Capacity p144, 188 Sustainability of Population Growth pp190-192 STEM Connection: Carrying Capacity p536 Maintaining Grass Species (grazing) pp657-658
HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	Ecosystems pp82-83 The Impacts of Mining on the Environment pp296-299 Ecological Communities pp435-444 Interactions pp436-444 Food Webs and Energy Transfer pp444-447 Biodiversity and Ecological Health p474
HS. Matter and Energy in Organisms and Ecosystems	
HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	This performance expectation is beyond the scope of the program.
HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	Biogeochemical Cycles pp83-87 Food Webs and Energy Transfer pp444-447
HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	The Carbon Cycle pp86-87 Photosynthesis and Respiration in Forests pp568-569
HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	Photosynthesis and Respiration in Forests pp568-569

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HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	The Energy Cycle p87 Food Webs and Energy Transfer pp444-447 Photosynthesis and Respiration in Forests pp568-569
HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Ecosystems pp82-83 Biogeochemical Cycles pp83-87 Chapter 18 Interactions pp432-461 Interactions pp436-444 Food Webs and Energy Transfer pp444-447
HS. Natural Selection and Evolution	
HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	Interactions pp436-444 Adaptation p439 Evolution p439 STEM Connection: Genetics p440 STEM Connection: Adaptations for Survival pp442-443 Keystone Species pp447-453 Why Do Species Become Extinct? pp468-474
HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	STEM Connection: Genetics p440 The Loss of Genetic Variation p470 Why Do Species Become Extinct? pp468-474
HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	Adaptation p439 Natural Selection p439 The Theory of Evolution by Natural Selection p439 STEM Connection: Adaptations for Survival pp442-443
HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	Population Dispersion pp184-187 Population Density pp187-189 Interactions pp436-444 Adaptation p439 Evolution p439 STEM Connection: Genetics p440 STEM Connection: Adaptations for Survival pp442-443 Why Do Species Become Extinct? pp468-474

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HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	Staples of Life pp178 Space p178-180 Population Ecology pp182-184 Population Dispersion pp184-187 Population Density pp187-189 Adaptation p439 Evolution p439 Why Do Species Become Extinct? pp468-474 Wildlife Data Collection pp475-479
HS. Structure and Function	
HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	This performance expectation is beyond the scope of the program.
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	This performance expectation is beyond the scope of the program.
HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	Homeostasis p389 Atmospheric Changes pp389-391
HS. Weather and Climate	
HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.	Marine Ecosystems: Why Are We Losing Coral Reefs? p366 Atmospheric Changes pp389-391 Global Warming pp389-390 STEM Connection: A Sixth Mass Extinction p470 Global Climate Change (fisheries) pp505-507 Higher Ocean Temperatures p505 Rising Sea Levels p506 Increased Acidification p506 Severe Storm Systems p506 Effects of Changing Climate (moose) p538 Climate Change (grasslands) p661 Effects of Climate Change: The 100th Meridian p662 Climate Change (forests) pp639-640

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HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	Climate and Weathering pp207-208 Chapter 16 Weather and Climate pp382-403 Atmospheric Changes pp389-391 Global Warming pp389-390 The Greenhouse Effect pp390-391 Global Climate Change (fisheries) pp505-507

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