STATE EDUCATIONAL STANDARDS

HIGH SCHOOL GRADES 9-12,
SPLIT BY GRADE (AK & PA)

These Standards have been collected from individual State websites (1/2017). They have been connected to themes that are available in an EPA tool called *EnviroAtlas*. While this document has been reviewed and approved by the U.S. Environmental Protection Agency, its contents do not necessarily reflect the views and policies of the Agency.

State (last updated on this chart, Standards adoption year)	State Science Educational Standards that apply to the Greenway Lesson, separated by individual grades 9-12
AK— 9thgrade (1/2017, 2012)	The student demonstrates an understanding that solving problems involves different ways of thinking by [9] SE2.1 questioning, researching, modeling, simulating, and testing a solution to a problem (L) The student demonstrates an understanding of the bases of the advancement of scientific knowledge by [9] SG2.1 explaining the importance of innovations (i.e., microscope, immunization, computer)

AK—10th grade (1/2017, 2012)	The student demonstrates an understanding that solving problems involves different ways of thinking by [10] SE2.1 questioning, researching, modeling, simulating, and testing multiple solutions to a problem (L)
PA—10th grade (1/2017, 2002)	3.4.10.B1 Compare and contrast how the use of **technology** involves weighing the trade-offs between the positive and negative effects. 3.4.10.B2 Demonstrate how humans devise **technologies** to reduce the negative consequences of other **technologies.**

AK—11th grade (1/2017, 2012)	The student demonstrates an understanding that solving problems involves different ways of thinking by [11] SE2.1 questioning, researching, modeling, simulating, and testing multiple solutions to a problem* (L)

PA—12th grade (1/2017, 2002)	3.3.12.A2 Analyze the availability, location, and extraction of Earth's resources. Evaluate the impact of using renewable and nonrenewable energy resources on the Earth's **system.** 3.4.12.B2 Illustrate how, with the aid of **technology**, various aspects of the environment can be monitored to provide information for decision making.

STATE EDUCATIONAL STANDARDS

ALL HIGH SCHOOL GRADES 9-12, NOT SPLIT BY GRADE

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State (last updated on this chart, Standards adoption year)	State Science Educational Standards that apply to the Greenway Lesson, separated by all grades (9-12)
AL (1/2017, 2015)	Separated by subject areas
AK (1/2017, 2012)	Separated by grade, see 9-12 above
AZ (1/2017, 2005)	**Concept 1:** Changes in Environments. Describe the interactions between human populations, natural hazards, and the environment. PO 1. Evaluate how the processes of natural ecosystems affect, and are affected by, humans. **PO 4.** Evaluate the following factors that affect the quality of the environment: • urban development • smoke • volcanic dust
AR (1/2017, 2005)	Separated by subject areas
CA (1/2017, 2009)	**HS-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. **HS-ETS1-2.** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. **HS-ETS1-3.** Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. **NGSS Science & Engineering Practices (APPENDIX F):** 1. Asking questions (for science) and defining problems (for engineering). 2. Developing and using models. 4. Analyzing and interpreting data. 5. Using mathematic s and computational thinking. 6. Constructing explanations (for science) and designing solutions (for engineering). 7. Engaging in argument from evidence. 8. Obtaining, evaluating, and communicating information.
CO (1/2017, 2009)	Separated by subject areas.

CT (1/2017, 2015)	Separated by subject areas.
DC	NGSS (see CA above).
DE (1/2017, 2013)	NGSS (see CA above).
FL (1/2017, 2014)	Separated by subject areas.
GA (1/2017, new standards up 2017-2018)	Separated by subject areas.
HI (1/2017, 2005)	Separated by subject areas.
ID (1/2017, 2016)	Separated by subject areas.
IL (1/2017, 2011)	NGSS (see CA above).
IN (1/2017, 2016)	Separated by subject areas.
IA (1/2017, 2016)	NGSS (see CA above).
KS (1/2017, 2013)	NGSS (see CA above).
KY (1/2017, 2013)	**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. **HS-LS2-6.** Evaluate the 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. **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. **HS-LS4-6.** Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. **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. **HS-ESS3-4.** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
LA	Separated by subject areas.

(1/2017, 2016)	
ME (1/2017, 2013)	NGSS (see CA above).
MD (1/2017, 2013)	NGSS (see CA above).
MA (1/2017, 2016)	**HS-ESS3-1.** Construct an explanation based on evidence for how the availability of key natural resources and changes due to variations in climate have influenced human activity. **HS-ESS3-2.** Evaluate competing design solutions for minimizing impacts of developing and using energy and mineral resources, and conserving and recycling those resources, based on economic, social, and environmental cost-benefit ratios. **HS-ESS3-3.** Illustrate relationships among management of natural resources, the sustainability of human populations, and biodiversity.
MI (1/2017, 2015)	NGSS (see CA above).
MN (1/2017, 2009)	**9.1.3.1.1.** Natural and designed systems are made up of components that act within a system and interact with other systems. **9.4.4.2.4.** Personal and community health can be affected by the environment, body functions and human behavior. Explain how environmental factors and personal decisions, such as water quality, air quality and smoking affect personal and community health.
MS (1/2017, 2010)	Separated by subject areas.
MO (1/2017, 2015)	**HS-ESS3-1.** Construct an explanation based on evidence for how the availability of key natural resources and changes due to variations in climate have influenced human activity. **HS-ESS3-2.** Evaluate competing design solutions for minimizing impacts of developing and using energy and mineral resources, and conserving and recycling those resources, based on economic, social, and environmental cost-benefit ratios. **HS-ESS3-3.** Illustrate relationships among management of natural resources, the sustainability of human populations, and biodiversity.
MT (1/2017, 2016)	**1.3** review evidence, communicate and defend results, and recognize that the results of a scientific investigation are always open to revision by further investigations. (e.g., through graphical representation or charts) **1.6** explain how observations of nature form an essential base of knowledge among the Montana American Indians

	5.5 explain how the knowledge of science and technology applies to contemporary Montana American Indian communities (e.g., natural resources development, management and conservation)
NE (1/2017, 2010)	**12.1.1.j** Share information, procedures, results, conclusions, and defend findings to a scientific community (peers, science fair audience, policy makers). **12.1.1.k** Evaluate scientific investigations and offer revisions and new ideas as appropriate. **12.4.2.c** Evaluate the impact of human activity and natural causes on Earth's resources (groundwater, rivers, land, fossil fuels). **12.3.3.d** Analyze factors which may influence environmental quality.
NV (1/2017, 2014)	NGSS (see CA above).
NH (1/2017, 2016)	**S:LS2:11:1.1** Explain how the amount of life an environment can sustain is restricted by the availability of matter and energy, and the ability of the ecosystem to recycle materials. **S:LS2:11:1.2** Describe how the interrelationships and interdependencies among organisms generate stable ecosystems that fluctuate around a state of rough equilibrium for hundreds or thousands of years. **S:LS2:11:1.3** Identify the factors in an ecosystem that can affect its carrying capacity. **S:LS2:11:1.4** Analyze and describe how environmental disturbances, such as climate changes, natural events, human activity and the introduction of invasive species, can affect the flow of energy or matter in an ecosystem. **S:LS2:11:1.5** Using data from a specific ecosystem, explain relationships or make predictions about how environmental disturbance (human impact or natural events) affects the flow of energy or cycling of matter in an ecosystem. **S:LS2:11:1.6** Explain or evaluate potential bias in how evidence is interpreted in reports concerning a particular environmental factor that impacts the biology of humans. **S:LS3:11:1.1** Identify ways humans can impact and alter the stability of ecosystems, such as habitat destruction, pollution, and consumption of resources; and describe the potentially irreversible effects these changes can cause. **S:LS3:11:1.2** Identify ways of detecting, and limiting or reversing environmental damage. **S:LS3:11:1.3** Analyze the aspects of environmental protection, such as ecosystem protection, habitat management, species conservation and environmental agencies and regulations; and evaluate and justify the need for public policy in guiding the use and management of the environment. **S:LS4:11:3.1** Describe how the length and quality of human life are influenced by many factors, including sanitation, diet, medical care, gender, genes, and environmental conditions and personal health behaviors. **S:LS5:11:1.1** Describe ways in which technology has increased our understanding of the life sciences.

	S:LS5:11:1.2 Understand that technology is designed with a particular function in mind, and principles of life science are useful in creating technology for the life sciences. **S:LS5:11:3.1** Describe ways technology can support and improve our understanding of environmental issues. **S:LS5:11:4.1** Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to the life sciences. **S:SPS1:12:1.4** Ask questions about relationships between and among observable variables as well as theoretical entities.
NJ (1/2017, 2013)	NGSS (see CA above).
NM (1/2017, 2009)	**Strand II:** The Content of Science Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their environments. 9-12 Benchmark I: **Ecosystems** 1. Know that an ecosystem is complex and may exhibit fluctuations around a steady state or may evolve over time. 2. Describe how organisms cooperate and compete in ecosystems (e.g., producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiosis, mutualism). 3. Understand and describe how available resources limit the amount of life an ecosystem can support (e.g., energy, water, oxygen, nutrients). 4. Critically analyze how humans modify and change ecosystems (e.g., harvesting, pollution, population growth, technology).
NY (1/2017, 2015)	NGSS (see CA above).
NC (1/2017, 2011)	Separated by subject areas.
ND (1/2017, 2014)	**9-10.2.3.** Identify questions and concepts that guide scientific investigations. **9-10.5.6.** Explain the effects of human activities (e.g., dams, levees, farming practices, deforestation, land-use practices, land management strategies) on the environment. **9-10.6.1.** Use appropriate technologies and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills). **11-12.2.4.** Formulate and revise explanations based upon scientific knowledge and experimental data. **11-12.2.8.** Communicate and defend a scientific argument. **11-12.6.1.** Select and use appropriate technologies, tools, and techniques to solve a problem (e.g., computer-assisted tools, Internet, research skills, CBL, graphing calculators).

	11-12.6.3. Explain how designing and implementing technology requires weighing trade-offs between positive and negative impacts on humans and the environment. **11-12.7.1.** Explain the impact of environmental laws and policies on the environment and society (e.g., waste/pollutants from industry, carbon dioxide emissions, location and number of animals in a feedlot versus water supply). **11-12.7.2.** Explain ways renewable and nonrenewable resources are managed (e.g., land reclamation, forest management, CRP, hunting licenses, energy –conserving technologies). **11-12.7.3.** Explain the economic and social impact of using alternative energy resources. **11-12.7.4.** Explain how science and technology can influence personal, industrial, and cultural decision-making (e.g., organ transplants, cloning, stem cell research, genetic manipulation, use of genetic profile, archeological discoveries, land management, resource management).
OH (1/2017, 2014)	Ohio State Science Standards are not numbered or coded in any way: See "Biology" and "Earth Science" courses
OK (1/2017, 2014)	Separated by subject areas.
OR (1/2017, 2014)	NGSS (see CA above).
PA (1/2017, 2002)	NGSS (see CA above).
RI (1/2017, 2013)	NGSS (see CA above).
SC (1/2017, 2014)	Separated by subject areas.
SD (1/2017, 2015)	Separated by subject areas.
TN (1/2017, 2009)	Separated by subject areas.
TX (1/2017, 2014)	Separated by subject areas.
UT (1/2017, K-2: 2010, 3-6: 2002, 7-8: 2003, 9-12: 2003, Earth Science: 2012)	Separated by subject areas.

VT (1/2017, 2013)	NGSS (see CA above).
VA (1/2017, 2016)	Separated by subject areas.
WA (1/2017, 2009)	NGSS (see CA above).
WV (1/2017, 2016)	NGSS (see CA above).
WI (1/2017, 2012)	**A.12.1** Apply the underlying themes of science to develop defensible visions of the future. **A.12.2** Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future. **A.12.3** Give examples that show how partial systems, models, and explanations are used to give quick and reasonable solutions that are accurate enough for basic needs. **A.12.5** Show how the ideas and themes of science can be used to make real-life decisions about careers, work places, life-styles, and use of resources. **A.12.6** Identify and, using evidence learned or discovered, replace inaccurate personal models and explanations of science-related events. **A.12.7** Re-examine the evidence and reasoning that led to conclusions drawn from investigations, using the science themes. **B.12.5** Explain how science is based on assumptions about the natural world and themes that describe the natural world. **C.12.5** Use the explanations and models found in the earth and space, life and environmental, and physical sciences to develop likely explanations for the results of their investigations. **C.12.6** Present the results of investigations to groups concerned with the issues, explaining the meaning and implications of the results, and answering questions in terms the audience can understand. **C.12.7** Evaluate articles and reports in the popular press, in scientific journals, on television, and on the Internet, using criteria related to accuracy, degree of error, sampling, treatment of data, and other standards of experimental design. **E.12.4** Analyze the benefits, costs, and limitations of past, present, and projected use of resources and technology and explain the consequences to the environment. **F.12.8** Using the science themes, infer changes in ecosystems prompted by the introduction of new species, environmental conditions, chemicals, and air, water, or earth pollution.

	H.12.1 Using the science themes and knowledge of the earth and space, life and environmental, and physical sciences, analyze the costs, risks, benefits, and consequences of a proposal concerning resource management in the community and determine the potential impact of the proposal on life in the community and the region. **H.12.2** Evaluate proposed policy recommendations (local, state, and/or national) in science and technology for validity, evidence, reasoning, and implications, both short and long-term. **H.12.3** Show how policy decisions in science depend on social values, ethics, beliefs, and time-frames as well as considerations of science and technology. **H.12.4** Advocate a solution or combination of solutions to a problem in science or technology. **H.12.5** Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology, and quality of life in a community or region. **H.12.6** Evaluate data and sources of information when using scientific information to make decisions. **H.12.7** When making decisions, construct a plan that includes the use of current scientific knowledge and scientific reasoning.
WY (1/2017, 2016)	**HS-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. **HS-ETS1-2.** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. **HS-ETS1-3.** Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

STATE EDUCATIONAL STANDARDS

HIGH SCHOOL BIOLOGY/LIFE SCIENCE

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State (last updated on this chart, Standards adoption year)	State Science Educational Standards that apply to the Greenway Lesson, separated by course subject (Biology/Life Science)
AL (1/2017, 2015)	**7.** Develop and use models to illustrate examples of ecological hierarchy levels, including biosphere, biome, ecosystem, community, population, and organism.
AK (1/2017, 2012)	Separated by grade-level.
AZ (1/2017, 2005)	Separated by "All High School"
AR (1/2017, 2005)	**EBR.9.B.1** Analyze the effects of human population growth and technology on the environment/biosphere. **EBR.9.B.2** Evaluate long range plans concerning resource use and by-product disposal in terms of their environmental, economic, and political impact.
CA (1/2017, 2009)	**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. **HS-LS2-4.** Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. **HS-LS2-7.** Evaluate and assess impacts on the environment and biodiversity in order to refine or design a solution for detrimental impacts or enhancement for positive impacts. **HS-LS4-6.** Create and/or use a simulation to evaluate the impacts of human activity on biodiversity. **NGSS Science & Engineering Practices (APPENDIX F):** 1. Asking questions (for science) and defining problems (for engineering). 2. Developing and using models. 4. Analyzing and interpreting data. 5. Using mathematic s and computational thinking. 6. Constructing explanations (for science) and designing solutions (for engineering). 7. Engaging in argument from evidence. 8. Obtaining, evaluating, and communicating information.
CO (1/2017, 2009)	None.

CT (1/2017, 2015)	NGSS (see CA above).
DC	NGSS (see CA above).
DE (1/2017, 2013)	NGSS (see CA above).
FL (1/2017, 2014)	**SC.912.L.17.12** Discuss the political, social, and environmental consequences of sustainable use of land. **SC.912.L.17.13** Discuss the need for adequate monitoring of environmental parameters when making policy decisions.
GA (1/2017, new standards up 2017-2018)	**SB5.** Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment. a. Plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems. c. Construct an argument to predict the impact of environmental change on the stability of an ecosystem. d. Design a solution to reduce the impact of a human activity on the environment.
HI (1/2017, 2005)	Common Core.
ID (1/2017, 2016)	**Goal 1.3:** Understand Constancy, Change, and Measurement **9-10.B.1.3.1** Measure changes that can occur in and among systems. (648.03b) **9-10.B.1.3.2** Analyze changes that can occur in and among systems. (648.03b) **9-10.B.1.3.3** Measure and calculate using the metric system. (648.03c) Goal 5.1: Understand Common Environmental Quality Issues, Both Natural and Human Induced **9-10.B.5.1.1** Analyze environmental issues such as water and air quality, hazardous waste, forest health, and agricultural production. (656.01a)
IL (1/2017, 2011)	NGSS (see CA above).
IN (1/2017, 2016)	**B.3.2** Design, evaluate, and refine a model which shows how human activities and natural phenomena can change the flow of matter and energy in an ecosystem and how those changes impact the environment and biodiversity of populations in ecosystems of different scales, as well as, how these human impacts can be reduced. **B.3.3** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, and identify the impact of changing conditions or introducing non-native species into that ecosystem.
IA (1/2017, 2016)	NGSS (see CA above).

KS (1/2017, 2013)	NGSS (see CA above).
KY (1/2017, 2013)	Separated by "All High School"
LA (1/2017, 2016)	**Interdependence of Organisms:** **27.** Analyze positive and negative effects of human actions on ecosystems (LS-H-D4) (SE-H-A7)
ME (1/2017, 2013)	NGSS (see CA above).
MD (1/2017, 2013)	NGSS (see CA above).
MA (1/2017, 2016)	**HS-LS2-6.** Analyze data to show ecosystems tend to maintain relatively consistent numbers and types of organisms even when small changes in conditions occur but that extreme fluctuations in conditions may result in a new ecosystem. Construct an argument supported by evidence that ecosystems with greater biodiversity tend to have greater resistance to change and resilience. **HS-LS2-7.** Analyze direct and indirect effects of human activities on biodiversity and ecosystem health, specifically habitat fragmentation, introduction of non-native or invasive species, overharvesting, pollution, and climate change. Evaluate and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health.*
MI (1/2017, 2015)	NGSS (see CA above).
MN (1/2017, 2009)	Separated by "All High School"
MS (1/2017, 2010)	**Intro Bio:** **3d.** Predict the impact of human activities (e.g., recycling, pollution, overpopulation) on the environment. (DOK 3) **Biology 1:** b. Provide examples to justify the interdependence among environmental elements. (DOK 2).
MO (1/2017, 2015)	**HS-LS2-6.** Analyze data to show ecosystems tend to maintain relatively consistent numbers and types of organisms even when small changes in conditions occur but that extreme fluctuations in conditions may result in a new ecosystem. Construct an argument supported by evidence that ecosystems with greater biodiversity tend to have greater resistance to change and resilience. **HS-LS2-7.** Analyze direct and indirect effects of human activities on biodiversity and ecosystem health, specifically habitat fragmentation, introduction of non-native or invasive species, overharvesting, pollution, and climate change. Evaluate and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health.
MT (1/2017, 2016)	Benchmarks at end of 4th grade, 8th grade, and upon graduation from high school
NE	Separated by "All High School"

(1/2017, 2010)	
NV (1/2017, 2014)	NGSS (see CA above).
NH (1/2017, 2016)	Separated into GSEs (Grade Span Expectations), 9-11 so, "By the end of Grade 11, all students will…"
NJ (1/2017, 2013)	NGSS (see CA above).
NM (1/2017, 2009)	Separated by "All High School"
NY (1/2017, 2015)	NGSS (see CA above).
NC (1/2017, 2011)	**Bio.2.2.1** Infer how human activities (including population growth, pollution, global warming, burning of fossil fuels, habitat destruction and introduction of nonnative species) may impact the environment. **Bio.2.2.2** Explain how the use, protection and conservation of natural resources by humans impact the environment from one generation to the next.
ND (1/2017, 2014)	Separated by "All High School"
OH (1/2017, 2014)	Ohio State Science Standards are not numbered or coded in any way: Note 3: Constructing food webs/food chains to show interactions between organisms within ecosystems was covered in upper elementary school and middle school; constructing them as a way to demonstrate content knowledge is not appropriate for this grade. Students may use these diagrams to help explain real-world relationships or events within an ecosystem, but not to identify simple trophic levels, consumers, producers, predator-prey and symbiotic relations.
OK (1/2017, 2014)	**HS-LS2-4.** Students who demonstrate understanding can: Use a mathematical representation to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. **HS-LS2-6.** Students who demonstrate understanding can: Evaluate the 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.
OR (1/2017, 2014)	NGSS (see CA above).
PA (1/2017, 2002)	NGSS (see CA above).
RI (1/2017, 2013)	NGSS (see CA above).
SC (1/2017, 2014)	**H.B.1A.2.** Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others.

	H.B.1A.4. Analyze and interpret data from informational texts and data collected from investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning, (2) support or refute hypotheses, explanations, claims, or designs, or (3) evaluate the strength of conclusions. **H.B.1A.6.** Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams. **H.B.1A.8.** Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations. **H.B.6D.1.** Design solutions to reduce the impact of human activity on the biodiversity of an ecosystem.
SD (1/2017, 2015)	**HS-LS2-6.** Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms under stable conditions; however, moderate to extreme fluctuations in conditions may result in new ecosystems. **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
TN (1/2017, 2009)	**CLE 3210.Inq.6** Communicate and defend scientific findings. **CLE 3210.T/E.1** Explore the impact of technology on social, political, and economic systems. **CLE 3210.T/E.4** Describe the dynamic interplay among science, technology, and engineering within living, earth-space, and physical systems. **CLE 3210.2.1** Investigate how the dynamic equilibrium of an ecological community is associated with interactions among its organisms. **CLE 3210.2.3** Predict how global climate change, human activity, geologic events, and the introduction of non-native species impact an ecosystem. **CLE 3216.Inq.1** Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted. **CLE 3216.T/E.4** Describe the dynamic interplay among science, technology, and engineering within living, earth-space, and physical systems. **CLE 3216.2.1** Describe how the stability of an ecosystem is maintained.
TX (1/2017, 2014)	None.

UT (1/2017, K-2: 2010, 3-6: 2002, 7-8: 2003, 9-12: 2003, Earth Science: 2012)	**Standard 1, Objective 2:** Explain relationships between matter cycles and organisms. **Standard 1, Objective 3:** Describe how interactions among organisms and their environment help shape ecosystems. e. Research and evaluate local and global practices that affect ecosystems.
VT (1/2017, 2013)	NGSS (see CA above).
VA (1/2017, 2016)	Life Science**.** **LS.1 d,i,j.** The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which: d) models and simulations are constructed and used to illustrate and explain phenomena; i) patterns are identified in data and are interpreted and evaluated; and j) current applications are used to reinforce life science concepts. **LS.6 b-d.** The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include: b) interactions resulting in a flow of energy and matter throughout the system; c) complex relationships within terrestrial, freshwater, and marine ecosystems; and d) energy flow in food webs and energy pyramids. **LS.9 a-c.** The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include: a) differences between ecosystems and biomes; b) characteristics of land, marine, and freshwater ecosystems; and c) adaptations that enable organisms to survive within a specific ecosystem. **LS.10 b-c.** The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include: b) factors that increase or decrease population size; and c) eutrophication, climate changes, and catastrophic disturbances. **LS.11 a-d.** The student will investigate and understand the relationships between ecosystem dynamics and human activity. Key concepts include:

	a) food production and harvest; b) change in habitat size, quality, or structure; c) change in species competition; d) population disturbances and factors that threaten or enhance species survival; and e) environmental issues. **BIO.8 a-e.** The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. <u>Key concepts include:</u> a) interactions within and among populations including carrying capacities, limiting factors, and growth curves; b) nutrient cycling with energy flow through ecosystems; c) succession patterns in ecosystems; d) the effects of natural events and human activities on ecosystems; and e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems.
WA (1/2017, 2009)	NGSS (see CA above).
WV (1/2017, 2016)	NGSS (see CA above).
WI (1/2017, 2012)	Separated by "All High School"
WY (1/2017, 2016)	**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. **HS-LS2-4.** Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. **HS-LS2-7.** Evaluate and assess impacts on the environment and biodiversity in order to refine or design a solution for detrimental impacts or enhancement for positive impacts. **HS-LS4-6.** Create and/or use a simulation to evaluate the impacts of human activity on biodiversity.

STATE EDUCATIONAL STANDARDS

HIGH SCHOOL EARTH/ENVIRONMENTAL SCIENCE

These Standards have been collected from individual State websites (1/2017). They have been connected to themes that are available in an EPA tool called *EnviroAtlas*. While this document has been reviewed and approved by the U.S. Environmental Protection Agency, its contents do not necessarily reflect the views and policies of the Agency.

State (last updated on this chart, Standards adoption year)	State Science Educational Standards that apply to the Greenway Lesson, separated by course subject (Earth/Environmental Science)
AL (1/2017, 2015)	**Environmental Science:** **4.** Engage in argument from evidence to evaluate how biological or physical changes within ecosystems (e.g., ecological succession, seasonal flooding, volcanic eruptions) affect the number and types of organisms, and that changing conditions may result in a new or altered ecosystem. **10.** Design solutions for protection of natural water resources (e.g., bioassessment, methods of water treatment and conservation) considering properties, uses, and pollutants (e.g., eutrophication, industrial effluents, agricultural runoffs, point and nonpoint pollution resources). **11.** Engage in argument from evidence to defend how coastal, marine, and freshwater sources (e.g., estuaries, marshes, tidal pools, wetlands, beaches, inlets, rivers, lakes, oceans, coral reefs) support biodiversity, economic stability, and human recreation. **13.** Obtain, evaluate, and communicate information based on evidence to explain how key natural resources (e.g., water sources, fertile soils, concentrations of minerals and fossil fuels), natural hazards, and climate changes influence human activity (e.g., mass migrations). **14.** Analyze cost-benefit ratios of competing solutions for developing, conserving, managing, recycling, and reusing energy and mineral resources to minimize impacts in natural systems (e.g., determining best practices for agricultural soil use, mining for coal, and exploring for petroleum and natural gas sources). **15.** Construct an explanation based on evidence to determine the relationships among management of natural resources, human sustainability, and biodiversity (e.g., resources, waste management, per capita consumption, agricultural efficiency, urban planning). **16.** Obtain and evaluate information from published results of scientific computational models to illustrate the relationships among Earth's systems and how these relationships may be impacted by human activity (e.g., effects of an increase in atmospheric carbon dioxide on photosynthetic biomass, effect of ocean acidification on marine populations).
AK (1/2017, 2012)	Separated by grade-level.

AZ (1/2017, 2005)	Separated by "All High School"
AR (1/2017, 2005)	Environmental Science: PD.1.ES.9 Construct and interpret information on topographic maps. BD.2.ES.8 Describe biodiversity. BD.2.ES.9 Explain how limiting factors affect populations and ecosystems. SP.3.ES.1 Explain the reciprocal relationships between Earth's processes (natural disasters) and human activities. SP.3.ES.5 Evaluate the impact of different points of view on health, population, resource, and environmental issues: • governmental • economic • societal SP.3.ES.9 Evaluate personal and societal benefits when examining health, population, resource, and environmental issues. SP.3.ES.10 Predict the long-term societal impact of specific health, population, resource, and environmental issues. SP.3.ES.11 Investigate the effect of public policy decisions on health, population, resource, and environmental issues.
CA (1/2017, 2009)	HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. 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. HS-ESS3-3. Use computational tools to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. HS-ESS3-6. Use the results of a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. **NGSS Science & Engineering Practices (APPENDIX F):** 1. Asking questions (for science) and defining problems (for engineering). 2. Developing and using models. 4. Analyzing and interpreting data. 5. Using mathematic s and computational thinking. 6. Constructing explanations (for science) and designing solutions (for engineering). 7. Engaging in argument from evidence.

	8. Obtaining, evaluating, and communicating information.
CO (1/2017, 2009)	None.
CT (1/2017, 2015)	NGSS (see CA above).
DC	NGSS (see CA above).
DE (1/2017, 2013)	NGSS (see CA above).
FL (1/2017, 2014)	None.
GA (1/2017, new standards up 2017-2018)	**Earth Science:** **SES6.** Obtain, evaluate, and communicate information about how life on Earth responds to and shapes Earth's systems. c. Ask questions to investigate and communicate how humans depend on Earth's land and water resources, which are distributed unevenly around the planet as a result of past geological and environmental processes. **Environmental Science:** **SEV1.** Obtain, evaluate, and communicate information to investigate the flow of energy and cycling of matter within an ecosystem. a. Develop and use a model to compare and analyze the levels of biological organization including organisms, populations, communities, ecosystems, and biosphere. c. Construct an argument to predict changes in biomass, biodiversity, and complexity within ecosystems, in terms of ecological succession. **SEV4.** Obtain, evaluate, and communicate information to analyze human impact on natural resources. a. Construct and revise a claim based on evidence on the effects of human activities on natural resources: Human Activities, Natural Resources, Agriculture, Forestry, Ranching, Mining, Urbanization, Fishing, Water use, Pollution, Desalination, Waste water treatment, Land, Water, Air, Organisms. **SEV5.** Obtain, evaluate, and communicate information about the effects of human population growth on global ecosystems. a. Construct explanations about the relationship between the quality of life and human impact on the environment in terms of population growth, education, and gross national product. c. Construct an argument from evidence regarding the ecological effects of human innovations (Agricultural, Industrial, Medical, and Technological Revolutions) on global ecosystems. d. Design and defend a sustainability plan to reduce your individual contribution to environmental impacts, taking into account how market forces and societal demands (including political, legal, social, and economic) influence personal choices.
HI (1/2017, 2005)	Common Core.

ID (1/2017, 2016)	**Earth Science: Goal 5.1:** Understand Common Environmental Quality Issues, Both Natural and Human Induced 8-**9.ES.5.1.1** Analyze environmental issues such as water and air quality, hazardous waste, and depletion of natural resources. (656.01a)
IL (1/2017, 2011)	NGSS (see CA above).
IN (1/2017, 2016)	**Env.1.2** Understand and explain that human beings are part of Earth's ecosystems and give examples of how human activities can, deliberately or inadvertently, alter ecosystems. **Env.1.7** Identify tools and technologies used to adapt and alter environments and natural resources in order to meet human physical and cultural needs. **Env.2.11** Recognize and describe the role of natural resources in providing the raw materials for an industrial society. **Env.5.2** Explain how the great diversity of species increases the chance that at least some living organisms will survive in the event of major global changes. **Env.5.6** Identify and explain the three levels of biodiversity: genetic, species, and ecosystem. **Env.6.3** Describe and give examples about how the decisions of one generation both provide and limit the range of possibilities open to the next generation. **Env.8.1** Demonstrate a knowledge of the distribution of natural resources in the U.S. and the world, and explain how natural resources influence relationships among nations. **Env.8.2** Understand and describe the concept of integrated natural resource management and the values of managing natural resources as an ecological unit. **Env.8.6** Understand and describe the concept and the importance of natural and human recycling in conserving our natural resources.
IA (1/2017, 2016)	NGSS (see CA above).
KS (1/2017, 2013)	NGSS (see CA above).
KY (1/2017, 2013)	Separated by "All High School"
LA (1/2017, 2016)	**Science and the Environment, Ecological Systems and Interactions** **8.** Explain how species in an ecosystem interact and link in a complex web (SE-HA7) (SE-H-A10) **11.** Explain why biodiversity is essential to the survival of organisms (SE-H-A9) **16.** Evaluate the effectiveness of natural resource management in Louisiana (SE-HB4) (SE-H-B5) **18.** Identify the factors that affect sustainable development (SE-H-B6) **Environmental Awareness and Protection**

	19. Determine the interrelationships of clean water, land, and air to the success of organisms in a given population (SE-H-C1) **20.** Relate environmental quality to quality of life (SE-H-C2) **21.** Analyze the effect of common social, economic, technological, and political considerations on environmental policy (SE-H-C3) **22.** Analyze the risk-benefit ratio for selected environmental situations (SE-H-C4) **23.** Describe the relationship between public support and the enforcement of environmental policies (SE-H-C5) **Personal Choices and Responsible Actions** **26.** Determine local actions that can affect the global environment (SE-H-D4) **27.** Describe how accountability toward the environment affects sustainability (SE-HD5)
ME (1/2017, 2013)	NGSS (see CA above).
MD (1/2017, 2013)	NGSS (see CA above).
MA (1/2017, 2016)	None.
MI (1/2017, 2015)	NGSS (see CA above).
MN (1/2017, 2009)	Separated by "All High School"
MS (1/2017, 2010)	**Earth Science:** **5a.** Draw conclusions about how life on Earth shapes Earth systems and responds to the interaction of Earth systems (lithosphere, hydrosphere, atmosphere, and biosphere). (DOK 3) **Environmental Science:** **3a.** Summarize the effects of human activities on resources in the local environments. (DOK 2) Sources, uses, quality, and conservation of water Renewable and nonrenewable resources' effects of pollution (e.g., water, noise, air, etc.) on the ecosystem. **3b.** Research and evaluate the impacts of human activity and technology on the lithosphere, hydrosphere and atmosphere and develop a logical argument to support how communities restore ecosystems. (DOK 3) **Spatial Information Science:** **2.** Develop an understanding of geographic information systems. **a.** Demonstrate the basic concepts of global positioning systems (GPS) by determining locations, (e.g., latitude, longitude, and elevation of the school flag pole or a site where a GPS receiver is unable to make an accurate measurement). (DOK 1)

	2f. Explain the basic concepts of data and image processing. (DOK 1) Types of data (e.g., raster, vector, and attribute) Variety of sources for geological data and imaging. **2h.** Explain how data sets are geo-referenced and geo-rectified. (DOK 1) **2i.** Assess the quality and accuracy of GPS and/or remote sensing data. (DOK 2) **2j.** Analyze and apply the basic concepts of geographic information systems. (DOK 2) Compatible geographic data layers of information utilizing computer software Relationships between geographic data Geographic information image showing results of analysis **2k.** Draw conclusions based on analysis and summary of geographic image information results. (DOK 3) **2l.** Research and defend a variety of applications for geographic information systems. (DOK 3) m. Describe the proper use and care of GPS receivers, computers, and other scientific equipment. (DOK 1)
MO (1/2017, 2015)	None.
MT (1/2017, 2016)	Benchmarks at end of 4th grade, 8th grade, and upon graduation from high school
NE (1/2017, 2010)	Separated by "All High School"
NV (1/2017, 2014)	NGSS (see CA above).
NH (1/2017, 2016)	Separated into GSEs (Grade Span Expectations), 9-11 (so, "By the end of Grade 11, all students will...")
NJ (1/2017, 2013)	NGSS (see CA above).
NM (1/2017, 2009)	Separated by "All High School"
NY (1/2017, 2015)	NGSS (see CA above).
NC (1/2017, 2011)	**EEn.2.1.2** Predict the locations of volcanoes, earthquakes, and faults based on information contained in a variety of maps. **EEn.2.4.1** Evaluate human influences on freshwater availability. **EEn.2.4.2** Evaluate human influences on water quality in North Carolina's river basins, wetlands and tidal environments. **EEn.2.5.5** Explain how human activities affect air quality. **EEn.2.6.3** Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation).

	EEn.2.6.4 Attribute changes to Earth's systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.). **EEn.2.7.1** Explain how abiotic and biotic factors interact to create the various biomes in North Carolina. **EEn.2.7.3** Explain how human activities impact the biosphere. **EEn.2.8.1** Evaluate alternative energy technologies for use in North Carolina. **EEn.2.8.2** Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts.
ND (1/2017, 2014)	Separated by "All High School"
OH (1/2017, 2014)	Ohio State Science Standards are not numbered or coded in any way: **EARTH SYSTEMS: INTERCONNECTED SPHERES OF EARTH** • Biosphere • Evolution and adaptation in populations • Biodiversity • Ecosystems (equilibrium, species interactions, stability) • Population dynamics • Atmosphere • Atmospheric properties and currents • Lithosphere • Geologic events and processes • Hydrosphere • Oceanic currents and patterns (as they relate to climate) • Surface and ground water flow patterns and movement • Cryosphere • Movement of matter and energy through the hydrosphere, lithosphere, atmosphere and biosphere • Energy transformations on global, regional and local scales • Biogeochemical cycles • Ecosystems • Climate and weather **EARTH'S RESOURCES** • Energy resources • Renewable and nonrenewable energy sources and efficiency • Alternate energy sources and efficiency • Resource availability • Mining and resource extraction • Air and air pollution • Primary and secondary contaminants • Greenhouse gases • Clean Air Act • Water and water pollution • Potable water and water quality • Hypoxia, eutrophication • Clean Water Act • Point source and non-point source contamination • Soil and land • Desertification • Mass wasting and erosion • Sediment contamination • Land use and land management (including food production, agriculture and zoning) • Solid and hazardous waste • Wildlife and wilderness • Wildlife and wilderness management • Endangered species **GLOBAL ENVIRONMENTAL PROBLEMS AND ISSUES** • Human population • Potable water quality, use and availability • Climate change • Sustainability • Species depletion and extinction • Air quality • Food production and availability • Deforestation and loss of biodiversity • Waste management (solid and hazardous)
OK (1/2017, 2014)	**HS-ESS2-2.** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks and interactions that cause changes to other Earth's systems. **HS-ESS2-5.** Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

	HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing natural resources based on cost-benefit ratios. **HS-LS2-6.** Evaluate the 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. **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment biodiversity. **HS-ESS3-2.** Evaluate competing design solutions for developing, managing, and utilizing natural resources based on cost-benefit ratios. **HS-ESS3-3.** Create a computational simulation to illustrate the relationship among management of natural resources, the sustainability of human populations, and biodiversity. **HS-ESS3-4.** Evaluate or refine a technological solution that reduces the impacts of human activities on natural systems.
OR (1/2017, 2014)	NGSS (see CA above).
PA (1/2017, 2002)	NGSS (see CA above).
RI (1/2017, 2013)	NGSS (see CA above).
SC (1/2017, 2014)	**H.E.1A.1** Ask questions to (1) generate hypotheses for scientific investigations, (2) refine models, explanations, or designs, or (3) extend the results of investigations or challenge scientific arguments or claims. **H.E.1A.2** Develop, use, and refine models to (1) understand or represent phenomena, processes, and relationships, (2) test devices or solutions, or (3) communicate ideas to others. **H.E.1A.4** Analyze and interpret data from informational texts and data collected from investigations using a range of methods (such as tabulation, graphing, or statistical analysis) to (1) reveal patterns and construct meaning, (2) support or refute hypotheses, explanations, claims, or designs, or (3) evaluate the strength of conclusions. **H.E.1A.6** Construct explanations of phenomena using (1) primary or secondary scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams. **H.E.1A.8** Obtain and evaluate scientific information to (1) answer questions, (2) explain or describe phenomena, (3) develop models, (4) evaluate hypotheses, explanations, claims, or designs or (5) identify and/or fill gaps in knowledge. Communicate using the conventions and expectations of scientific writing or oral presentations by (1) evaluating grade-

	appropriate primary or secondary scientific literature, or (2) reporting the results of student experimental investigations. **H.E.3B.2** Construct scientific arguments to support claims that responsible management of natural resources is necessary for the sustainability of human societies and the biodiversity that supports them. **H.E.3B.4** Obtain and evaluate available data on a current controversy regarding human activities which may affect the frequency, intensity, or consequences of natural hazards. **H.E.3B.5** Define problems caused by the impacts of locally significant natural hazards and design possible devices or solutions to reduce the impacts of such natural hazards on human activities. **H.E.6A.2** Obtain and communicate information to explain how location, movement, and energy transfers are involved in making water available for use on Earth's surface (including lakes, surface-water drainage basins, freshwater wetlands, and groundwater zones). **H.E.6A.3** Plan and conduct controlled scientific investigations to determine how a change in stream flow might affect areas of erosion and deposition of a meandering alluvial stream. **H.E.6A.4** Analyze and interpret data of a local drainage basin to predict how changes caused by human activity and other factors influence the hydrology of the basin and amount of water available for use in the ecosystem. **H.E.6A.5** Analyze and interpret data to describe how the quality of the water in drainage basins is influenced by natural and human factors (such as land use, domestic and industrial waste, weather/climate conditions, topography of the river channel, pollution, or flooding).
SD (1/2017, 2015)	**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. **HS-ESS3-3.** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. **HS-ESS3-4.** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. **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.
TN (1/2017, 2009)	**CLE 3204.Inq.1** Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted. **CLE 3204.T/E.4** Describe the dynamic interplay among science, technology, and engineering within living, earth-space, and physical systems. **CLE 3260.T/E.1** Explore the impact of technology on social, political, and economic systems. **CLE 3260.2.2** Discuss the roles of biodiversity and coevolution in ecosystems.

	CLE 3260.4.1 Examine common resource use practices in agriculture, forestry, urban/suburban development, mining, and fishing. **CLE 3260.4.2** Explore best management practices related to water and soil resources. **CLE 3260.4.3** Compare and contrast preservation and conservation. **CLE 3260.4.4** Evaluate the impact of human activities on natural resources. **CLE 3260.6.1** Investigate the causes, environmental effects, and methods for controlling/preventing land, air and water pollution. **CLE 3260.6.2** Apply case studies to relate land, air, and water pollution to human health issues. **CLE 3260.6.3** Explore methods used for remediation of land, air and water pollution. **CLE 3260.6.4** Research local and national environmental legislation related to protecting land, air and water resources. **CLE 3260.6.5** Research local and state methods used for solid waste reduction, recycling and disposal; compare them to methods used in other developed countries. **CLE 3255.1.4** Investigate various approaches to maintain biodiversity. **CLE 3255.4.4** Summarize the human impact on ecosystems. **CLE 3255.4.5** Describe how biodiversity relates to stability of an ecosystem. **CLE 3255.5.5** Identify how humans impact biomes. **CLE 3255.6.1** Investigate the role of public lands in sustaining biodiversity. **CLE 3255.6.2** Examine state, national, and international efforts to sustain native species and ecosystems. **CLE 3255.6.3** Evaluate the impact of personal actions on the environment. **CLE 3255.6.4** Identify and explain choices you can make to lessen your impact on the environment.
TX (1/2017, 2014)	**112.37.c3E.** describe the connection between environmental science and future careers **112.37.c4F.** predict how the introduction or removal of an invasive species may alter the food chain and affect existing populations in an ecosystem. **112.37.c4H.** research and explain the causes of species diversity and predict changes that may occur in an ecosystem if species and genetic diversity is increased or reduced **112.37.c5A-F.** (A) summarize methods of land use and management and describe its effects on land fertility; (B) identify source, use, quality, management, and conservation of water; (C) document the use and conservation of both renewable and non-renewable resources as they pertain to sustainability;

	(D) identify renewable and non-renewable resources that must come from outside an ecosystem such as food, water, lumber, and energy; (E) analyze and evaluate the economic significance and interdependence of resources within the environmental system; and (F) evaluate the impact of waste management methods such as reduction, reuse, recycling, and composting on resource availability. **112.37.c6C.** Explain the flow of energy in an ecosystem, including conduction, convection, and radiation. **112.37.c9A-B.** (A) identify causes of air, soil, and water pollution, including point and nonpoint sources; (B) investigate the types of air, soil, and water pollution such as chlorofluorocarbons, carbon dioxide, pH, pesticide runoff, thermal variations, metallic ions, heavy metals, and nuclear waste. **112.37.c9D-G.** (D) describe the effect of pollution on global warming, glacial and ice cap melting, greenhouse effect, ozone layer, and aquatic viability; (E) evaluate the effect of human activities, including habitat restoration projects, species preservation efforts, nature conservancy groups, hunting, fishing, ecotourism, all-terrain vehicles, and small personal watercraft, on the environment; (F) evaluate cost-benefit trade-offs of commercial activities such as municipal development, farming, deforestation, over-harvesting, and mining; (G) analyze how ethical beliefs can be used to influence scientific practices such as methods for increasing food production **112.37.c9I-J.** (I) discuss the impact of research and technology on social ethics and legal practices in situations such as the design of new buildings, recycling, or emission standards; (J) research the advantages and disadvantages of "going green" such as organic gardening and farming, natural methods of pest control, hydroponics, xeriscaping, energy-efficient homes and appliances, and hybrid cars.
UT (1/2017, K-2: 2010, 3-6: 2002, 7-8: 2003, 9-12: 2003, Earth Science: 2012)	**Standard 3, Objective 3:** Examine the natural and human-caused processes that cause Earth's climate to change over intervals of time ranging from decades to millennia. *e. Investigate the current and potential consequences of climate change (e.g., ocean acidification, sea level rise, desertification, habitat loss) on ecosystems, including human communities.* **Standard 4, Objective 2:** Analyze the characteristics and importance of freshwater found on Earth's surface and its effect on living systems.

	b. Plan and conduct an experiment to investigate biotic and abiotic factors that affect freshwater ecosystems. *c. Using data collected from local water systems, evaluate water quality and conclude how pollution can make water unavailable or unsuitable for life.* *d. Research and report how communities manage water resources (e.g., distribution, shortages, quality, flood control) to address social, economic, and environmental concerns.* **Standard 4, Objective 3:** Analyze the physical, chemical, and biological dynamics of the oceans and the flow of energy through the oceans. *e. Evaluate the impact of human activities (e.g., sediment, pollution, overfishing) on ocean systems.* **Standard 5, Objective 2:** Describe how humans depend on Earth's resources. **Standard 5, Objective 3:** Indicate how natural hazards pose risks to humans. *b. Evaluate and give examples of human activities that can contribute to the frequency and intensity of some natural hazards (e.g., construction that may increase erosion, human causes of wildfires, climate change).* *c. Document how scientists use technology to continually improve estimates of when and where natural hazards occur.* *d. Investigate and report how social, economic, and environmental issues affect decisions about human-engineered structures (e.g., dams, homes, bridges, roads).*
VT (1/2017, 2013)	NGSS (see CA above).
VA (1/2017, 2016)	**ES.2a-d.** The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. Key concepts include *a) science explains and predicts the interactions and dynamics of complex Earth systems;* *b) evidence is required to evaluate hypotheses and explanations;* *c) observation and logic are essential for reaching a conclusion; and* *d) evidence is evaluated for scientific theories.* **ES.6a-d.** The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include *a) fossil fuels, minerals, rocks, water, and vegetation;* *b) advantages and disadvantages of various energy sources;* *c) resources found in Virginia; and* *d) environmental costs and benefits.* **ES.8d-f.** The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include

	d) identification of sources of fresh water including rivers, springs, and aquifers, with reference to the hydrologic cycle; e) dependence on freshwater resources and the effects of human usage on water quality; and f) identification of the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries.
WA (1/2017, 2009)	NGSS (see CA above).
WV (1/2017, 2016)	NGSS (see CA above).
WI (1/2017, 2012)	Separated by "All High School"
WY (1/2017, 2016)	**HS-ESS2-2.** Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. **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. **HS-ESS3-3.** Use computational tools to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. **HS-ESS3-4.** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems. **HS-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. **HS-ETS1-2.** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. **HS-ETS1-3.** Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. **HS-ETS1-4.** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. **HS-ETS1-5.** Evaluate the validity and reliability of claims in a variety of materials.