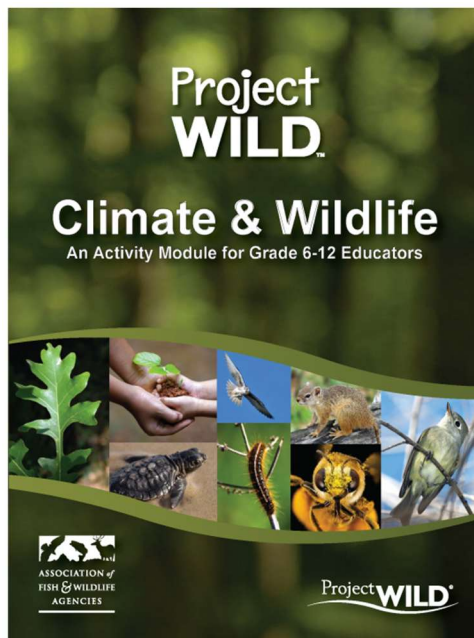




Correlations
of the
Climate and Wildlife Online Course
to
Next Generation Science Standards
and the
Framework for K-12 Science Education

2023



Project WILD Science Correlations

Introduction

Purpose:

The *Project WILD K-12 Curriculum & Activity Guide* (WILD) is interdisciplinary, offering activities that focus on everything from mathematics to social studies, but Project WILD is especially relevant to science, specifically the K-12 science classroom. Most states have now adopted *The Next Generation Science Standards* (NGSS) or standards based on *A Framework for K-12 Education*. The foundations for both are three dimensions of science: Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts. Project WILD provides phenomenon-based experiences and activities that are three-dimensional, supporting the standards teachers must help their students achieve. Now more than ever, Project WILD can be viewed as a tool to help teachers get students outside while engaging in standards-based teaching and learning. This document was developed as a companion for the Climate and Wildlife Online Course to highlight the three-dimensionality and phenomenon-based aspects of the four science-focused Project WILD activities included in the course.

NGSS & the Framework:

The [NGSS](#) are national K–12 science content standards. They set the expectations for what students should know and be able to do at the end of instruction. The NGSS were developed by states to improve science education for all students by providing a set of research-based, up-to-date K–12 science standards. These benchmarks give local educators the flexibility to design classroom learning experiences that stimulate students’ interests in science and prepare them for college, careers, and citizenship.

Learn more about how [Achieve](#) coordinated the work of [twenty-six Lead State Partners](#) and collaborated with critical partners, including the [National Research Council](#), the [National Science Teachers Association](#), and the [American Association for the Advancement of Science](#), to develop the NGSS based on the NRC’s [K-12 Framework for Science Education](#).

Terms to Know

DCI: Disciplinary Core Idea | SEP: Science and Engineering Practice | CCC: Crosscutting Concept
PE: Performance Expectation

Phenomenon-Based & The Untethered Dimensions:

According to NGSS, natural phenomena are observable events that occur in the universe and that we can use our science knowledge to explain or predict. Framing the phenomenon at the crux of the activity for each correlation is a “Guiding Question.” This question or phenomenon is meant to drive the instruction and allow students to use SEPs to explain or predict and CCCs to make sense of that phenomenon.

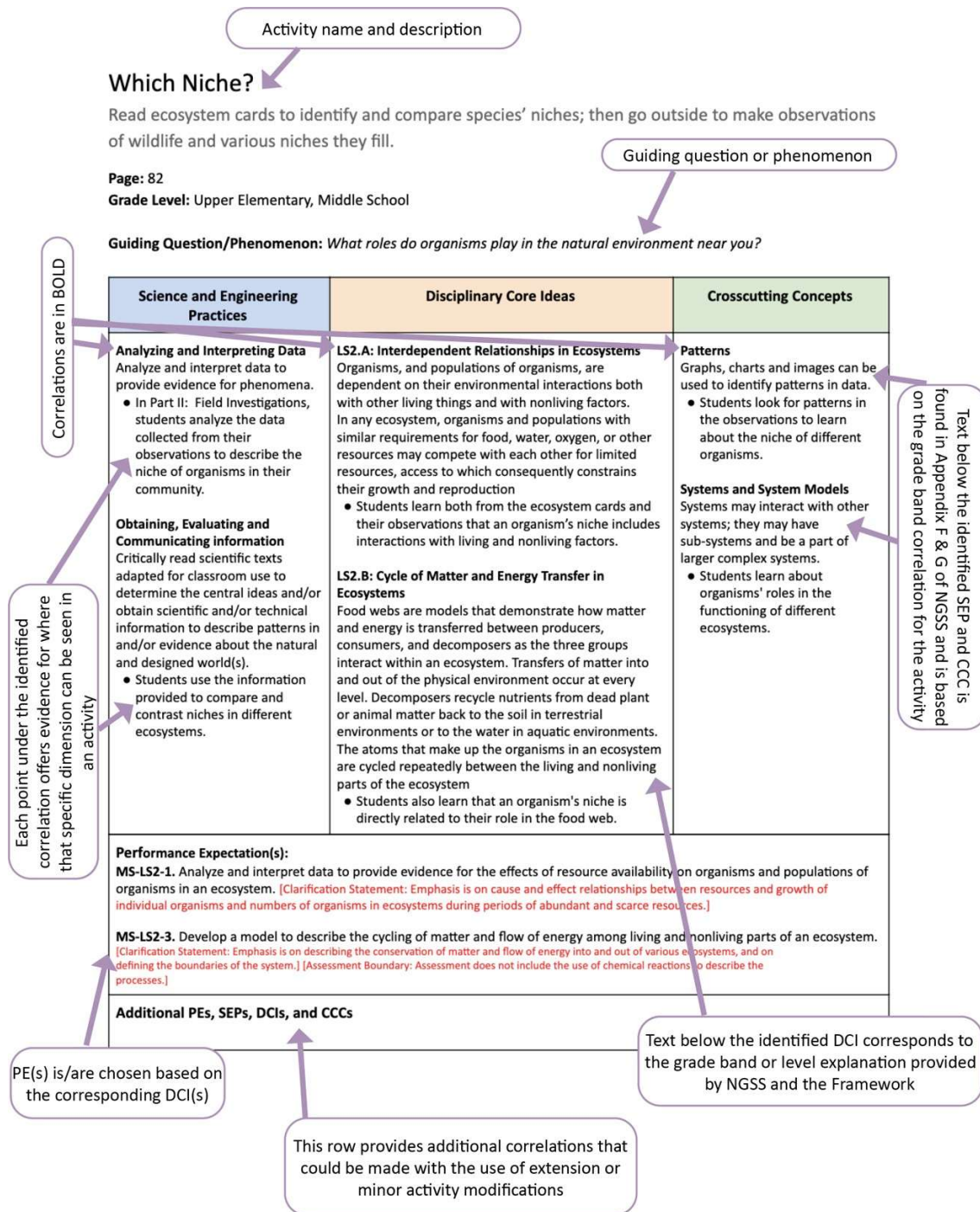
The actual “standard” in NGSS is the three-dimensional Performance Expectation (PE). The PEs are not the focus of these correlations because any single standard (or PE) cannot be effectively taught in one lesson or activity. Consequently, the approach for developing these correlations is known as “untethered,” where the appropriate DCI from the Performance Expectation is used but is not necessarily the stated SEPs or CCCs. Rather, the SEPs and CCCs actually used by students in the activity are specified in the correlations.

The Correlation Document:

Each correlation document begins with basic details about the activity and a guiding question/phenomenon. The guiding question is meant to serve teachers with an idea for how the experience can be based on and driven by phenomena. Teachers are encouraged to adapt the guiding question to make it as relevant to students and their environment as possible.

The actual correlations can be found in the table on each document. The correlations are broken down by the three-dimensions and three columns: SEPs, DCIs, and CCCs. The bold words in each column signify the specific correlation(s). In most instances, there are

multiple correlations for each dimension. Each correlation has a bullet providing evidence of the specified dimension from the



activity. The Performance Expectation (the actual standard) supported by the learning experience is in the row below the three columns. As stated above, however, we have used the untethered approach as recommended by Nextgenscience for connecting the SEPs and CCCs. Both the SEP and the CCC text below the bolded correlations are found in the NGSS progressions, [Appendix F](#) and [Appendix G](#) respectively. These progressions show how each SEP or CCC relates directly to an activity's specified grade band. Some activities can be easily modified to support additional correlations. Notes about these additional correlations, where applicable, have been made in the last row of the table. Below is a diagram to help with understanding each correlation page.

Birds of Prey

Interpret data on wildlife populations and climate to recognize the interdependence of a healthy, functioning ecosystem.

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Grade Level: High School

Guiding Question/Phenomenon: *How do abiotic and biotic factors impact the predator and prey relationships in an ecosystem near you?*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Analyzing and Interpreting Data Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. - Students analyze graphs to determine how the population of falcons is related to that of squirrels as well as the influence of different abiotic factors on these populations. Using Mathematics and Computational Thinking Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations. - Students use graphical information to explain the relationship between predator-prey populations and the influence of abiotic factors on population sizes.	LS2.A: Interdependent Relationships in Ecosystems Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. As students analyze graphs, they determine how predation and abiotic factors determine prey population size.	Patterns Empirical evidence is needed to define patterns. Students look for patterns in graphical data to determine the relationships between predator-prey populations as well as the influence of abiotic factors.
Performance Expectation(s): HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. <i>[Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent including boundaries, resources, climate and competition. Examples of mathematical comparisons could include graphs, charts, histograms, or population changes from simulations or historical data sets.] [Assessment Boundary: Assessment does not include deriving mathematical equations to make comparisons.]</i>		
Additional PEs, SEPs, DCIs, and CCCs This activity also correlates well with the same SEPs and CCCs at the middle grades level.		

Checks and Balances

Acting as wildlife managers, play a card game and perform calculations to understand factors affecting a herd of animals.

Page: 448

Grade Level: Middle School

Guiding Question/Phenomenon: *What conditions impact wildlife populations? How can humans manage those conditions to maintain those populations?*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Develop and use a model to describe phenomena. - Students play a card game to collect data on how changes in four ecological factors can affect the size of a wildlife population over time. Analyzing and Interpreting Data Analyzing data in 6–8 progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. Analyze and interpret data to determine similarities and differences in findings. - Students analyze how variations in four factors can affect the size of a wildlife population over time.	LS2.C: Ecosystem Dynamics, Functioning, and Resilience 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. - Students identify at least four factors that can affect the size of a wildlife population. ESS3.C: Human Impacts on Earth Systems 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. - Students evaluate hypothetical wildlife management decisions that might have positive or negative effects on wildlife populations.	Stability and Change Small changes in one part of a system might cause large changes in another part. Students discuss how variations in four ecological factors can affect the size of a wildlife population over time
Performance Expectation(s): MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.* [Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]		
Additional PEs, SEPs, DCIs, and CCCs Lesson 3.3 from the “Checks and Balances” module in the Climate & Wildlife Online Course explores the climate change connection. Students read an article and discuss climate-change-related impacts and management strategies and how those impact wildlife populations. Including the additional reading and discussion questions from Lesson 3.3 can help address the below NGSS elements: Constructing Explanations and Designing Solutions (SEP) Apply scientific ideas, principles, and/or evidence to construct, revise and/or use an explanation for real-world phenomena, examples, or events. LS2.A: Interdependent Relationships in Ecosystems (DCI) Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)		

ESS3.D: Global Climate Change (DCI)

Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming).

Cause and Effect (CCC)

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

MS-LS2-1. (PE) Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. [Clarification Statement: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources.]

Lights Out!

Learn about light pollution and its impacts, and design an action plan to reduce light pollution in your community.

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Grade Level: Upper Elementary, Middle School, High School

Guiding Question/Phenomenon: *How can light pollution from our parking lot affect the nightlife of animals in our area?*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. Apply scientific principles to design an object, tool, process or system Students develop an action plan to decrease light pollution in their area. The plan will be based on their research on the topic and a light audit conducted at their location.	ESS3.C: Human Impacts on Earth Systems 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. Students research light pollution and conduct a light audit of their location.	Cause and Effect Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. Students conduct research to explain the cause and effects of artificial light on wildlife in their area.
Performance Expectation(s): MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. <i>[Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]</i>		
Additional PEs, SEPs, DCIs, and CCCs		

Phenology at Play

Perform skits and graph data to understand effects of climate change on phenology and a migratory bird population.

Page: 167

Grade Level: Middle School, High School

Guiding Question/Phenomenon: *Have you noticed changes in the natural cycles such as when flowers bloom in your community? What kind of impact could those changes have?*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematics and Computational Thinking Use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations. - Students analyze graphs and charts as well as create a graph to describe the effects of phenological changes. Obtaining, Evaluating and Communicating Information Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem. Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). - Students obtain information from research, data charts and graphs about the impacts of phenological changes and then present that information to their peers.	LS2.C: Ecosystem Dynamics, Functioning, and Resilience Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species Students explore phenological changes which may be due to climate change and how these changes may disrupt an ecosystem.	Patterns Mathematical representations are needed to identify some patterns. - Students use graphs and charts to determine the patterns in phenophases and phenological changes. Stability and Change Much of science deals with constructing explanations of how things change and how they remain stable. - Students analyze graphs and charts to describe phenological changes.
Performance Expectation(s): HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]		
Additional PEs, SEPs, DCIs, and CCCs This activity also correlates well with the same SEPs and CCCs at the middle grades level.		