Correlation of *Next Generation Science Standards* with Project WILD Activities

This document correlates the activities in the *Project WILD K-12 Curriculum & Activity Guide* with the Performance Expectations (PEs) of the *Next Generation Science Standards* (NGSS). The table on the following pages represents an "ongoing correlation" that will evolve based on feedback from educators who are incorporating the new standards into their instruction using Project WILD activities. Additionally, the document will be developed down the road as the activities are further correlated to the three dimensions of NGSS: practices, crosscutting concepts and disciplinary core ideas. The following correlations to the PEs are ranked using a 3-tiered scale outlined below. The column to the left of the correlation ranking shows comments made by the reviewers as they read through the activities and standards. These comments were included in the document to serve as a useful annotation for educators, specifically in cases where modifications are needed to meet the listed PEs. Ideas and feedback regarding the correlations are encouraged; please submit comments to info@councilforee.org.

The 3-tiered scale was incorporated to more accurately capture the correlations between the activities and the NGSS Performance Expectations. The three categories indicate the degree of correlation:

***   Three stars indicate the activity **directly addresses** and is well-aligned with the PE

**   Two stars indicate the activity addresses the Performance Expectation, but **some modification is required** to fully meet the PE. Reasons an activity may have been ranked with two stars include the following:

- The concept of the PE (e.g. resource availability affects organisms and populations of organisms in an ecosystem) is addressed by the activity, but the practice of the PE (e.g. analyze and interpret data to provide evidence) is not included in the activity.
- The PE is addressed in a small component of the activity, such as an extension.
- A minor adaptation, such as including a different set of discussion questions, makes the activity correlate to the PE

*   One star indicates the activity connects to some idea in the PE, but significant adaptation to the activity as-written is required to fully meet the PE. These activities *support* the PE and **can be used as a supplemental activity** with additional instruction and different activities to fully address the PE.

The Project WILD/NGSS correlations were developed in collaboration with Dr. Deb Hemler and her students – Ryan Cool, Sean Harwell, and Charlene Pierce — as well as by Kelly Reynolds and Project WILD state coordinators.

Activity Name	Page #	Grade Levels	NGSS correlation (Student Performance Expectation)	Comments	Correlation Ranking
Section 1:Ecological Knowledge					
Wildlife Populations					
Color Crazy	2-3	K-4	3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	The activity's correlation to the standards is much stronger if the educator incorporates examples of real wildlife and their associated habitats (see the *Optional* section under the Procedure).	***
			2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.		***
Grasshopper Gravity	4-6	K-4	4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, reproduction.	This PE is clearly addressed through the Evaluation and Grasshopper Questions sections of the activity.	***
What's Wild?	7-8	K-4	K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.	In order for this PE to be addressed the educator needs to complete #2 in the Extensions section.	***
Classroom Carrying Capacity	9-11	K-4	K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.		***

			3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.		***
Interview a Spider	12-13	5-8	MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems	It would be easy to address this PE with minor modifications to the Procedure (i.e., conclude the activity by discussing the diversity of wildlife. Ask each student in writing to describe how two or more wildlife species may interact…).	*
Habitat Rummy	14-18	5-8	None		
Bearly Growing	19-22	5-8	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	PE can be addressed with slight revision to the Procedures. For example, if item 2 from the Extensions section is incorporated into the Procedure section along with additional natural factors that affect population (food availability, weather, habitat, etc.) this lesson easily addresses this PE	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

How Many Bears Can Live in This Forest?	23-27	5-8	MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		**
			MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	PE is addressed in this activity without modification, as long as the students complete #13-16 in the Procedure section.	***
My Kingdom For a Shelter	28-29	5-8	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	Students research and build animal shelters. This activity addresses the disciplinary core idea but not the practice of analyzing and interpreting data.	*

Tracks!	30-33	5-8	MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.	Significant adaptation required to meet this PE: Include a fossil connection where students look at fossilized tracks, learn about the animals that left them behind and compare the tracks to those left by modern animals. Have students research the difference between body fossils and trace fossils. What does each tell us about the animal?	*
Spider Web Geometry	34-35	5-8	None		

Oh Deer!	36-40	5-8	MS-LS2-2. Construct and explanation that predicts patterns of interactions among organisms across multiple ecosystems.	Good relation to this Performance Expectation. Using a game to model the population of Deer based on habitat requirements, and introducing different parameters shows the carrying capacity and population change. Based on resources, and then being able to make predictions as to what is going on in the environment based on the population change.	***
Wild Words	41-43	5-8	None		
We're in this Together	44-45	9-12	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.	To fully address this PE, students should also research the selected issue to find computational representations that illustrate the issue. This data could then be referenced in their essays.	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

Carrying Capacity	46-48	9-12	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.		***
Habitats, Ecosystems and Niches					
Graphananimal	49-50	Pre-K,K-4	2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats		***
Wildlife is Everywhere!	51-52	K-4	K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.	Extend the discussion about where animals live to what they need to survive. As long as food, water, shelter and space are available in a suitable arrangement – wildlife can be found everywhere!	*
Habitracks	53-55	K-4	K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.		***
			K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.	K-ESS3-1 could be strengthened by including a broader discussion in procedure step 7 about how about animals' needs and habitats are related.	***

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

What's that, Habitat?	56-57	K-4	K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.	The activity meets these PEs for animals, but an additional discussion of plants is needed to fully address the PE.	**
			K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.		**
Beautiful Basics	58	K-4	K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.	The activity meets these PEs for animals, but an additional discussion of plants is needed to fully address the PE.	**
Everybody Needs a Home	59-60	K-4	K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.		***
			K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.		***
Habitat Lap Sit	61-63	5-8	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	The activity could meet MS-LS2-1 if real data analysis was included.	*
			MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	MS-LS2-4 is appropriate for this activity but could be better addressed if real data was included.	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

Who Fits Here?	64-65	5-8	3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.		***
			3-ESS2-2. Obtain and combine information to describe climates in different regions of the world.		***
			4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction.		***
			MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.		***
Which Niche?	66-67	5-8	MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	MS-LS2-2 will be met if the "optional" part of Procedure step 4 is performed as well as Extension No. 1.	**
What Did Your Lunch Cost Wildlife?	68-69	5-8	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	Minor adaptation: in step 1, have some students research a food item that is marketed as an environmentally friendly product.	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

			3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Minor adaptation: have students compare their solutions for reducing the "cost" of their lunch.	**
			MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	Minor adjustment: when students discuss their findings in step 6, have them evaluate which food items had less of an impact on wildlife and the environment. Why? What technology or processes affect the degree of impact?	**
			MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.	Addressed via Extension 4.	**
			MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	This PE will be met provided students select an item that is packaged using synthetic materials or that includes synthetic materials such as artificial color or flavor.	***

			MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		***
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Minor adaptation: include a discussion to consider how the identified impacts on wildlife and the environment will be affected by the growing human population.	**
			HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.		***
			HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	Minor adaptation: in step 1, have some students research a food item that is marketed as an environmentally friendly product. What technology or processes lessens the degree of impact?	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

Urban Nature Search	70-72	5-8	MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	This activity covers how environmental factors influence organisms growth (and overall appearance and behavior), but it does not touch on genetics.	**
Rainfall and the Forest	73-76	5-8	5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere and/or atmosphere interact.		***
			MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	Addresses environmental factors but not genetic factors. Minor adaptation: Research a time when the local community received above average or below average precipitation. How did the change affect the vegetation and wildlife?	**
			MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	Minor adaptation: Research a time when the local community received above average or below average precipitation. How did the change affect the vegetation and wildlife?	**

			MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	Minor adaptation: Research a time when the local community received above average or below average precipitation. How did the change affect the vegetation and wildlife?	**
Interdependence					
Environmental Barometer	77-78	Pre-K,K-4	K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.	By making observations and discussing why wildlife is or is not present in an area, students notice patterns of what animals need to survive, and why different areas are more suitable than others.	**
			K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.		***
			3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	The activity is not about animals' adaptations to live in a given environment, but students do consider why certain animals are found in different areas.	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

			3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	Touched on at the end of procedure step 5.	**
Habittrekking	79-81	3-4	3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	Adaptations are addressed on Evidence List #2 for students to document.	**
			4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	Addressed on Evidence List #2 for students to document. Only addresses animals.	**
Microtrek Treasure Hunt	82-84	5-8	None		
Stormy Weather	85-87	5-8	None		
Ants on a Twig	88-90	5-8	None at listed grade level	The activity could be changed to a lower grade level to meet K-LS1-1 about what plants/animals need to survive.	
Good Buddies	91-95	5-8	4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	Altough this activity is geared for middle school, this 4th grade PE is addressed through the lens of symbiotic relationships.	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

			MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	This PE is addressed peripherally through some of the symbiotic relationships that students research in this activity, namely the yucca plant and yucca moth and the cuckoo and warbler.	*
			MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.		***
What's for Dinner?	96-97	5-8	5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain warmth) was once energy from the sun.	The focus is on plants as the foundational food source for all animals, but the extension can easily be drawn that plants make their own food from the sun's energy. Minor adaptations: emphasize the sun as the energy source for plants; include in step 1 a discussion of why we must eat dinner and all meals. For what purposes does our body use food?	**

			5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.	Focus on extension 1, analyzing the components necessary to plants and what they contribute for growth.	*
			5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	Focus on extension 1; include decomposers.	*
			MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living organisms.	Focus on extension 2 to include nonliving parts; include decomposers.	**
Seed Need	98-99	5-8	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		***
			5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.		***
			MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successfully reproduction of animals and plants respectively.		***

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

Owl Pellets	100-101	5-8	5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers and the environment.	After pellet dissection and putting together skeletons, educators should lead discussion of possible food chains that include owls, rodents, what they eat and decomposers that eat the hair and bones in pellets.	**
			MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.		**
Eco-Enrichers	102-104	5-8	MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	This PE is addressed, but there is no explicit discussion on this topic in the activity. Have students create a food web that shows the flow of matter and energy 1) within the worm box and 2) within the worms' natural habitat.	**
			MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		***
Energy Pipeline	105-110	7-8	MS-LS2-Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.		***

Birds of Prey	111-113	9-12	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-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.		***
Changes and Adaptations					
Thicket Game	114-115	Pre-K,K-4	3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	These PEs are met by this activity, but the correlation would be stronger if students looked at real-life examples of adaptation in the classroom after the activity.	***
			4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction.		***
Seeing is Believing!	116-117	K-4	4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.		***

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

			4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.	This PE will be fully met if a discussion is included about how information is processed in animals' brains.	**
			4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.	To meet this PE, perform simple experiments to see how different levels of light affect how well an object can be seen. How are some animals able to hunt at night?	*
What Bear Goes Where?	118-119	K-4	K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.		***
			3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.	This activity can be used to meet this PE by considering how the traits of the different bears were influenced by their environments.	**
			4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.		***

Surprise Terrarium	120-121	K-4	3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.	This activity can be used to meet this PE by changing the discussion of adaptations into one of how animals' appearances can be influenced by the environment in which it lives.	**
			4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.		***
Quick-Frozen Critters	122-124	5-8	MS-LS4-4.Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	Have some students (both predator and prey) run and some walk briskly to illustrate how variations in individual traits (i.e. speed) influence the probability of survival.	**
			MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	Addresses animal behaviors but not plant structures.	**
Polar Bears in Phoenix?	125-127	5-8	None		

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

Adaptation Artistry	128-129	5-8	3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.	When reviewing the chart, discuss how the adaptations were influenced by different environments. Have students explain how their bird's environment influenced its traits.	**
Muskox Maneuvers	130-133	5-8	3-LS2-1. Construct an argument that some animals form groups that help members survive.		***
I'm Thirsty	134-136	6-8	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		***
			MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	The activity more closely addresses how resource availability (water) affects populations, rather than how larger changes to the ecosystem affect populations. Minor adaptation: in extension 2, include a scenario where a water-hogging invasive plant (not in the diet of the sheep) moves into the habitat. How might this affect the carrying capacity?	**

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

			HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.		***
Forest in a Jar	137-139	9-12	HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	Extension 1 will address this PE, particularly through looking at "root development in response to water levels," as mentioned in the clarification statement of the PE.	*
			HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent number and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.		***
Fire Ecologies	140-143	9-12	HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent number and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.		***
Biodiversity					
Move Over Rover	144-151	5-6	MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.		*

			MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		*
			MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		**
Planting Animals	152-153	5-8	MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	Have students research documented instances of transplanting animals and the effects the transplant had on local populations.	*
Here Today, Gone Tomorrow	154-157	5-8	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	See extensions 1 and 2 for older students.	**
			MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support and explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	This could be met by looking at specific endangered species to which this concept applies, such as Kirtland's warbler, which is dependent on the fire-dependent cones of jack pine for nesting.	*

			MS-ESS3-3. Apply Scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Extension 1 for older students addresses this.	*
Time Lapse	158-165	5-8	None		
Ecosystem Facelift	166-171	7-8	MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		***
Bottleneck Genes	172-176	9-12	MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.		***
			MS-LS4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	Complete Extension 2.	***
			HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.		***
Section 2: Social and Political Knowledge					
Cultural Perspectives					

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

First Impressions	178-179	K-4	K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.	Extend the discussion to include human behavior. Knowing what animals contribute to an ecosystem, how should they be treated? How should their habitat be treated?	*
And the Wolf Wore Shoes	180-181	K-4	K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.	As students fill out the table, encourage observations that real animals have different needs that are met by the places they live.	*
Museum Search for Wildlife	182-183	5-8	None		
Saturday Morning Wildlife Watching	184-185	5-8	None		
Wildlife in National Symbols	186-187	5-8	None		
Prairie Memoirs	188-191	5-8	None		
Cartoons and Bumper Stickers	192-193	5-8	None		
Power of a Song	194-196	5-8	None		
For Your Eyes Only	197-202	5-8	None		
Ethi-Reasoning	203-207	5-8	None		
Wildlife on Coins and Stamps	208-209	9-12	None		
Economic, Commercial and Recreational Considerations					

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

What You Wear is What They Were	210-211	5-8	MS-ESS3-3. Apply Scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Students track and evaluate the impact their clothing has on wildlife and the environment. By including an action piece, these PEs could be met.	*
			HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.		*
Does Wildlife Sell?	213-215	5-8	MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	The activity shows that one design solution for maintaining biodiversity is through advertising, which affects human attitudes and behavior towards wildlife and the environment. To meet the PE, a larger discussion of solutions would need to occur.	*
Pay to Play	216-233	5-8	MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	The core ideas of these four PEs are addressed by the activity, but the practices in the PEs (e.g. interpreting data) are not used in the activity. By expanding the activity beyond the current board game format to include analyzing data, finding evidence and evaluating	*
			MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		*
			MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		*

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	solutions, these PEs could be met.	**
Arctic Survival	234-242	9-12	HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	This PE is met as students calculate whether their area has enough resources to sustain their population. Further exploration into factors that may affect carrying capacity is offered in the evaluation step 1.	***
			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.	The first part of this PE (availability of natural resources) is met in the first two extensions and evaluation step 2.	*
			HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	Evaluation Step 2 touches on this PE.	*
			HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.		**
Historical and Geographic Development					

Correlation of *Next Generation Science Standards* with Project WILD Activities. Council for Environmental Education. 2014.

Make a Coat!	243-244	K-4	K-ESS3-1. Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.	Minor adaptation: Have students relate different types of jackets to animal coverings (e.g. scales and raincoats, fur and overcoats, down jackets and down feathers). How are animals' and humans' coats suited to the places the live?	**
			1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.		**
			K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.	See evaluation.	**
Lobster in Your Lunchbox	245-247	5-8	MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	The four PEs listed are addressed by this activity via the analysis of food sources and food production, especially using Extension no. 4.	**
			MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.		**
			MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.		**

			MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		**
Let's Talk Turkey	248-252	5-8	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.		***
			MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	There is no analysis and interpretation of data written into the activity, but educators could have students obtain and compare charts of turkey populations and human population over time.	*
			MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	Students identify methods used to conserve the turkey population. Extension 2 has students compare/contrast the history and fate of the turkey and another local wildlife species.	*
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		**

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Wildlife Bibliography	253-254	5-8	None		
Changing Attitudes	255-257	5-8	None		
Changing Societies	258-266	7-8	None		
Political and Legislative Frameworks					
History of Wildlife Management	267-269	5-8	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	The listed PEs are addressed as students research and compare different wildlife management philosophies and research why wildlife agencies were founded, what their work entails and what problems affect wildlife.	***
			MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		**
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		**
			HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.		**
Wild Bill's Fate	270-271	9-12	None		

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Know Your Legislation: What's in it for Wildlife?	272-276	9-12	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.	The solution evaluated in this activity is a legislative rather than technological solution. However, the process outlined in this PE of evaluating, prioritizing and considering restraints is directly addressed in this activity.	**
Section 3: Sustaining Fish and Wildlife Resources					
Attitudes and Awareness					
Learning to Look, Looking to See	278-279	Pre-K, K-4	None		
Animal Charades	280-281	K-4	K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.	Have students research the animals that are portrayed and how animals fit within their habitats.	*
Animal Poetry	282-284	5-8	None		
Drawing on Nature	285-286	5-8	None		
The Hunter	287-296	5-8	None		
Wildlife Issues: Community Attitude Summary	297-299	9-12	None		
Human Impacts					

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Too Close for Comfort	300-302	K-4	K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.		***
Ethi-Thinking	303-304	K-4	K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.		***
			3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	This PE can be met by combining the extensions with the main activity. Include a seemingly innocuous action, such as driving to work or shopping for groceries, on one of the cards. Have students answer the questions in procedure step 3 and consider the costs and benefits as brought up in extension 3.	**
No Water Off a Duck's Back	305-307	5-8	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Have students monitor oil use and disposal at their homes or at school. See extension 1.	*
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Have students research a recent oil spill. What drives the demand for oil?	**

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Migration Barriers	308-309	5-8	MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Have students complete extension 1 and evaluate the need for the highway. What are the reasons for the proposal?	**
Shrinking Habitat	310-313	5-8	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	The activity addresses the PE in a theoretical rather than practical way.	*
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Encourage the connection that increasing development is driven by increasing population.	***
Smokey Bear Said What?	314-316	5-8	MS-LS1-4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.		**
Noisy Neighbors	317-318	5-8	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		***
Flip the Switch for Wildlife	319-320	5-8	MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.		*

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			MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		***
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capital consumption of natural resources impact Earth's systems.		**
To Zone or Not to Zone	321-325	5-8	MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Look at charts of global population growth, as well as population trends in your community. Consider the potential impacts and the importance of land-use planning in light of these trends.	**
Hazardous Links, Possible Solutions	326-329	7-8	MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		***

			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.	Have students also research the history of pesticides and the need for their development. Compare growth of human population with pesticide usage. Combine this adaptation with extensions to meet this PE.	**
Issues and Trends					
World Travelers	330-334	5-8	MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		***
Rare Bird Eggs for Sale	335-337	5-8	MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		*
Pro and Con: Consumptive and Nonconsumptive Uses of Wildlife	338-340	5-8	MS-ESS3-4. Construct and argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		**
Riparian Zone	341-344	5-8	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	See extension 2.	*

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Changing the Land	345-352	6-8	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.		***
			MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		***
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		***
Cabin Conflict	353-354	9-12	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	Identify and evaluate the different ideas presented for protecting the environment in the Cabin Conflict. Ex: private landowners managing the land for natural resources or providing an environmental education program vs. public agencies creating a park or refuge. What are the pros and cons of these conservation strategies?	**

Back From the Brink	355-363	9-12	HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	Complete extension 2.	**
Philosophical Differences	364-366	9-12	None		
Turkey Trouble	367-370	9-12	HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.		***
Wildlife Management					
Career Critters	371-384	5-6	5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	See extension 2.	**
			MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		*
Wild Work	385-386	5-8	None		
Checks and Balances	387-391	5-8	MS-LS2-4. Construct and argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.		**
Deer Crossing	392-394	9-12	HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.		***

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			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.		***
From Bison to Bread: The American Prairie	395-405	9-12	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.	In light of this activity, have students take action to either preserve the prairie or find a balance between preservation and development.	*
Bird Song Survey	406-408	9-12	MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.	See extension 1.	**
A Picture is Worth a Thousand Words	409-417	9-12	HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.		*

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Wildlife Research	418-419	9-12	Does not address any specific NGSS Performance Expectations. However, student's individual projects may address any number of standards at the high school level. This is a research design project, where the implications of the type of research, data collections, ethics, etc. are addressed. Students' research can address nearly any standard within the ecosystem, genetics, engineering design, as well as interdependencies of organisms.		***
Dropping in on a Deer	420-425	9-12	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.	Extension 2 will help address this PE more fully.	**
Deer Dilemma	426-431	9-12	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.	The activity is representative of a real-world problem, but it is a simulation.	**
Responsible Action and Service					
Playing Lightly on the Earth	432-433	Pre-K,K-4	K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.		***

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			K-2-ETS1-1 .Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.	Only applies if students' ideas include a new or improved object or tool.	*
Litter We Know	434-435	5-8	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Have students design and implement a solution to the problem of littering.	*
Planning for People and Wildlife	436-439	5-8	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.		***
			MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.		**
			MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.		**
Improving Wildlife Habitat in the Community	440-442	5-8	MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.		***

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Enviro-Ethics	443-445	5-8	MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	By tracking changes as students implement their new code of ethics, this PE can be met.	**
Can Do!	446-448	9-12	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-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.	The activity may not necessarily use an engineering-based solution, but all other aspects of this PE are covered.	**
			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-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	This PE can easily be met by this activity if students incorporate technology into their solution.	**

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Sustainability:Then, Now, Later	449-455	9-12	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.	This PE is addressed particularly in the area of how the availability of natural resources have influenced human activity. Natural hazards and changes in climate are not directly addressed, but those could easily be included in the 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.		***

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