



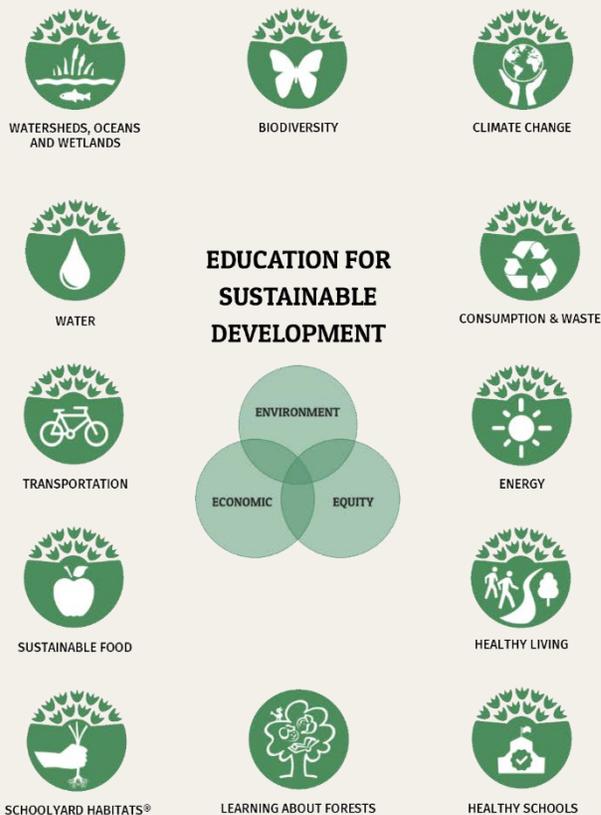
# Pathways to Sustainability

## Alignment to NGSS - Kindergarten

The performance expectations in kindergarten help students formulate answers to questions such as: “What happens if you push or pull an object harder? Where do animals live and why do they live there? What is the weather like today and how is it different from yesterday?” Kindergarten performance expectations include PS2, PS3, LS1, ESS2, ESS3, and ETS1 Disciplinary Core Ideas from the NRC Framework.

Students are expected to develop understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for, and respond to, severe weather. Students are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution. Students are also expected to develop understanding of what plants and animals (including humans) need to survive and the relationship between their needs and where they live. The crosscutting concepts of patterns; cause and effect; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas.

In the kindergarten performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, designing solutions, engaging in argument from evidence, and obtaining, evaluating, and communicating information. Students are expected to use these practices to demonstrate understanding of the core ideas.





## Pathways to Sustainability Alignment to NGSS

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The National Wildlife Federation's Eco-Schools USA program has aligned their program Pathways of Sustainability to the Next Generation Science Standards, NGSS. As a part of the Eco-Schools Seven Step Framework, linking to the curriculum is a priority. This alignment is designed to highlight the natural connections between the NGSS and the Eco-Schools USA program.

Our program icons are used to denote pathway connections to the NGSS Performance Expectations and alignment to the Common Core State Standards, CCSS, English Language Arts, ELA and Mathematics.

**Green STEM is an initiative of NWF's Eco-Schools USA program** and is focused on identifying best practice in the STEM fields as it relates to environment-based learning. These elements include:

- Project, problem and place-based learning
- Utilizing the school, both inside and outside, as a learning laboratory
- Interdisciplinary approach
- Innovation space
- A commitment to stewardship
- An inclusive culture, where all students can learn, participate and take action



# Pathways to Sustainability

## Alignment to NGSS

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### K-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

Students who demonstrate understanding can:

**K-LS1-1** Use observations to describe patterns of what plants and animals (including humans) need to survive.



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Utilizing your Schoolyard Habitat's®, wildlife or vegetable garden is a great way to address this Performance Expectation as students will have hands-on experiences, using their senses to better describe the patterns they observe. This is a good time to instill the idea of water conservation related to soil moisture, look at the leaves of those plants that require more water than others, what are the patterns observed in schoolyard wildlife? If you lack wildlife to observe, it's an opportunity to introduce biodiversity in its simplest form and possibly work on a biodiversity project with older students.

Anytime a lesson or an activity can be carried out outside you increase the level of student engagement. Also, by using the outdoors as a learning laboratory you increase the connections students make with the concept being taught.

Driving Questions – Examples

- How can our class build a schoolyard habitat that will meet the needs of our local birds?
- How can our class create a guidebook for families to build wildlife habitat at home?



# Pathways to Sustainability Alignment to NGSS

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## K-LS1 FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES - CONTINUED

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSSCUTTING CONCEPTS
<ul style="list-style-type: none"> <li>Analyzing and Interpreting Data</li> </ul> <p><b>CONNECTIONS TO NATURE OF SCIENCE</b></p> <ul style="list-style-type: none"> <li>Scientific Knowledge is Based on Empirical Evidence</li> </ul>	<p><b>LS1.C</b> Organization for Matter and Energy Flow in Organisms</p>	<ul style="list-style-type: none"> <li>Patterns</li> </ul>

Connections to other DCIs in kindergarten: N/A

Articulation of DCIs across grade-bands: **1.LS1.A** (K-LS1-1); **2.LS2.A** (K-LS1-1); **3.LS2.C** (K-LS1-1); **3.LS4.B** (K-LS1-1); **5.LS1.C** (K-LS1-1); **5.LS2.A** (K-LS1-1)

### Common Core State Standards

ELA/Literacy

**W.K.7** Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1)

Mathematics

**K.MD.A.2** Directly compare two objects with a measurable attribute in common, to see which object has “more of”/”less of” the attribute, and describe the difference. (K-LS1-1)



# Pathways to Sustainability

## Alignment to NGSS

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### K-ESS2 EARTH'S SYSTEMS

#### Students who demonstrate understanding can:

**K-ESS2-1.** Use and share observations of local weather conditions to describe patterns over time.

**K-ESS2-2.** Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.



CLIMATE CHANGE



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**Climate change is a complex issues and its concepts can be emotionally troubling. NWF does not support teaching children below grade 4 about climate change.** However, the study of weather conditions and change over time and how plants and animals can change their environment to meet their needs, as stated in the Performance Expectations, lay the foundation for understanding climate change and the impacts related to climate change as they get older and are cognitively able to process this topic.

The Schoolyard Habitat is an impactful learning space, giving students the ability to absorb their natural world and better make sense of the Performance Expectations. Actually seeing a squirrel digging or going on a schoolyard walk about to observe the strength of tree and grass roots is more powerful first hand over discussion in the class or out of a story. Combining all three elements increases the likelihood that the content will make it into the student's long term memory.

#### Driving Questions – Examples

- What plants can our class/team include in our schoolyard habitat that will provide a variety of options for animals to adapt to changes in weather?
- How can our class/team create a guide to safely playing and learning in nature in a variety of weather?



## K-ESS2 EARTH SYSTEMS - CONTINUED

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSCUTTING CONCEPTS
<ul style="list-style-type: none"> <li>Analyzing and Interpreting Data</li> <li>Engaging in Argument from Evidence</li> </ul> <p><b>CONNECTIONS TO NATURE OF SCIENCE</b></p> <ul style="list-style-type: none"> <li>Scientific Knowledge is Based on Empirical Evidence</li> </ul>	<p><b>K-SS2-1</b> Weather and Climate</p> <p><b>ESS2.E</b> Biogeology</p> <p><b>ESS3.C</b> Human Impacts on Earth Systems</p>	<ul style="list-style-type: none"> <li>Patterns</li> <li>Systems and Models</li> </ul>

Connections to other DCIs in kindergarten: N/A

Articulation of DCIs across grade-bands: **2.ESS2.A** (K-ESS2-1); **3.ESS2.D** (K-ESS2-1), **4.ESS2.A** (K-ESS2-1); **4.ETS2.E** (K-ESS2-2); **5.ESS2.A** (K-ESS2-2)

### Common Core State Standards

#### ELA/Literacy

- W.K.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book. (K-ESS2-2)
- W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2)
- W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-ESS2-1)
- RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-ESS2-2)

#### Mathematics

- MP.2 Reason abstractly and quantitatively. (K-ESS2-1)
- MP.4 Model with mathematics. (K-ESS2-1)
- K.CC.A Know number names and the count sequence. (K-ESS2-1)
- K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. (K-ESS2-1)
- K.MD.B.3 Classify objects into given categories; count the number of objects in each category and sort the categories by count. (K-ESS2-1)



# Pathways to Sustainability

## Alignment to NGSS

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### K-ESS3 EARTH AND HUMAN ACTIVITY

#### Students who demonstrate understanding can:

- 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-ESS3-2.** Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
- 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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CLIMATE CHANGE



CONSUMPTION & WASTE



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WOW

Climate Change and Schoolyard Habitats fit well with these Performance Expectations, but the other 4 pathways listed have a connection as well. **Remember, NWF does not support the teaching of climate change before grade 4.** That said, each of these PE's give students a foundation in which they are building their content knowledge and science literacy.

**Consumption and Waste** – specific to PE: K-ESS3-3 – More and more students are coming to us proficient in “recycling”, take this time to introduce and/or reinforce the complete cycle focusing on changing consumption behavior (rethinking, reduce) | reuse and repurpose what is consumed and last recycle what remains.

**Biodiversity** – specific to PE: K-ESS3-1 – utilizing the outdoor classroom for hands-on, minds-on interaction, with the natural world, will allow students to use models to represent the needs of plants and animals (including humans) in the place they live.

**Transportation** – specific to PE: K-ESS3-3 – What did it look like before my school was here? Google Earth (1995 to present) or HistoricAerials.com – Why did it change?

**Water** – K-ESS3-1 – Gaining knowledge related to the water needs of plants and animals help students better understand the need for water conservation in the future. Currently students are told not to waste water, but why? Lay the foundation now.

#### Driving Questions – Examples

- How can our class teach other students to prepare for severe weather conditions?
- What is the best way, our class can help the monarch butterfly?



### K-ESS2 EARTH AND HUMAN ACTIVITY - CONTINUED

SCIENCE AND ENGINEERING PRACTICES	DISCIPLINARY CORE IDEAS	CROSCUTTING CONCEPTS
<ul style="list-style-type: none"> <li>Asking Questions and Defining Problems</li> <li>Developing and Using Models</li> <li>Obtaining, Evaluating and Communicating Information</li> </ul>	<p><b>ESS23.A</b> Natural Resources</p> <p><b>ESS3.B</b> Natural Hazards</p> <p><b>ESS3.C</b> Human Impacts on Earth Systems</p> <p><b>ETS1.A</b> Defining and Delimiting Engineering Problems</p> <p><b>ETS1.B</b> Developing Possible Solutions</p>	<ul style="list-style-type: none"> <li>Cause and Effect</li> <li>Systems and Models</li> </ul> <p><b>CONNECTIONS TO ENGINEERING, TECHNOLOGY AND APPLICATIONS IN SCIENCE</b></p> <ul style="list-style-type: none"> <li>Influence of Science, Engineering and Technology on Society and the Natural World</li> <li>Interdependence of Science, Engineering and Technology</li> </ul>

Connections to other DCIs in kindergarten: **K.ETS1.A** (K-ESS3-2),(K-ESS3-3)

Articulation of DCIs across grade-bands: **1.LS1.A** (K-ESS3-1); **2.ESS1.C** (K-ESS3-2); **2.ETS1.B** (K-ESS3-3); **3.ESS3.B** (K-ESS3-2); **4.ESS3.A** (K-ESS3-3); **4.ESS3.B** (K-ESS3-2); **5.LS2.A** (K-ESS3-1); **5.ESS2.A** (K-ESS3-1); **5.ESS3.C** (K-ESS3-3)

#### Common Core State Standards

##### ELA/Literacy

- RI.K.1 With prompting and support, ask and answer questions about key details in a text. (K-ESS3-2)
- W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS3-3)
- SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood. (K-ESS3-2)
- SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS3-1)

##### Mathematics

- MP.2 Reason abstractly and quantitatively. (K-ESS3-1)
- MP.4 Model with mathematics. (K-ESS3-1) (K-ESS3-2)
- K.CC Counting and Cardinality (K-ESS3-1) (K-ESS3-2)



### K-PS3 ENERGY

#### Students who demonstrate understanding can:

**K-PS3-1.** Make observations to determine the effect of sunlight on Earth’s surface.

**K-PS3-2.** Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.



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Students can use the outdoor environment to better engage and facilitate the learning process through heightened sensory perception. Experiential learning opportunities allow students to make concrete connections about the Earth’s surface and between the Earth’s properties relative to temperature.

Utilize student’s natural curiosity of the natural world to design and build structures that will allow them to explore and make observation about temperature relative to a variety of Earth materials.

#### Driving Questions – Examples

- How can our class reduce the amount of sunlight that hits the outdoor learning space?
- What natural materials should be used in our edible food garden and garden pathways in an effort to reduce heat in those areas?



# Pathways to Sustainability Alignment to NGSS

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## K-PS3 ENERGY - CONTINUED

### SCIENCE AND ENGINEERING PRACTICES

- Planning and Carrying Out Investigations
- Constructing Explanations and Designing Solutions

### CONNECTIONS TO NATURE OF SCIENCE

- Science Investigations Use A Variety of Methods

### DISCIPLINARY CORE IDEAS

**PS3.B** Conservation of Energy and Energy Transfer

### CROSCUTTING CONCEPTS

- Cause and Effect

Connections to other DCIs in kindergarten: N/A

Articulation of DCIs across grade-bands: **1.LS1.A** (K-LS1-1); **2.LS2.A** (K-LS1-1); **3.LS2.C** (K-LS1-1); **3.LS4.B** (K-LS1-1); **5.LS1.C** (K-LS1-1); **5.LS2.A** (K-LS1-1)

### Common Core State Standards

ELA/Literacy

**W.K.7** Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). (K-LS1-1)

Mathematics

**K.MD.A.2** Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. (K-LS1-1)