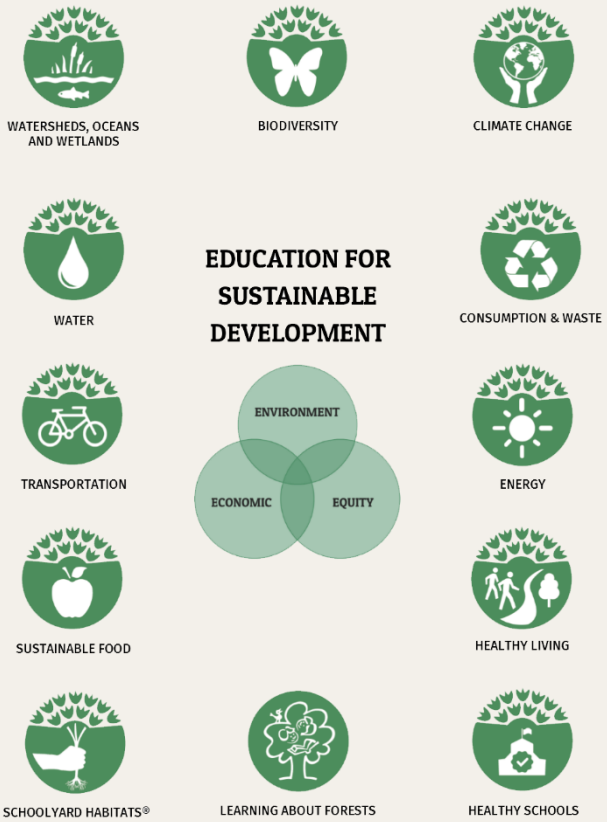
Pathways to Sustainability

Alignment to NGSS – Third Grade

The performance expectations in third grade help students formulate answers to questions such as: "What is typical weather in different parts of the world and during different times of the year? How can the impact of weather-related hazards be reduced? How do organisms vary in their traits? How are plants, animals, and environments of the past similar or different from current plants, animals, and environments? What happens to organisms when their environment changes? How do equal and unequal forces on an object affect the object? How can magnets be used?" Third grade performance expectations include PS2, LS1, LS2, LS3, LS4, ESS2, and ESS3 Disciplinary Core Ideas from the NRC Framework.

Students are able to organize and use data to describe typical weather conditions expected during a particular season. By applying their understanding of weather-related hazards, students are able to make a claim about the merit of a design solution that reduces the impacts of such hazards. Students are expected to develop an understanding of the similarities and differences of organisms' life cycles. An understanding that organisms have different inherited traits, and that the environment can also affect the traits that an organism develops, is acquired by students at this level. In addition, students are able to construct an explanation using evidence for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. Students are expected to develop an understanding of types of organisms that lived long ago and also about the nature of their environments. Third graders are expected to develop an understanding of the idea that when the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed



environment, and some die. Students are able to determine the effects of balanced and unbalanced forces on the motion of an object and the cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. They are then able to apply their understanding of magnetic interactions to define a simple design problem that can be solved with magnets. The crosscutting concepts of patterns; cause and effect; scale, proportion, and quantity; 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 third grade performance expectations, students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems; developing and using models, planning and carrying out investigations, analyzing and interpreting data, constructing explanations and 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.

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

INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS

Students who demonstrate understanding can:

3-LS2-1. Construct an argument that some animals form groups that help members survive.

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-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.

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Using student's natural curiosity of nature, you can significantly increase student engagement in and understanding of more complicated abstract concepts by using your Certified Schoolyard Habitat®, sustainable food garden, engineered wetland, etc.. While the English language arts are an integral part of the learning experience it is equally important to allow students up close and personal practice, through observation and investigation in the natural world.

Specific examples –

3-LS2-1: Animals in the schoolyard that can help to bring this Performance Expectation home – bees, butterflies, birds, squirrels, chipmunks, lizards, spiders, etc.

3-LS4-3: Students who have been a part of the process related to the creation and care of school gardens are more apt to have experienced this throughout the growing seasons and will have less difficulty constructing arguments with the evidence from their own experiences.

3-LS4-4: Same logic applies here as above. When students are using their schoolyard as an outdoor learning laboratory, constructing explanations, creating models, and resolving claims based on their experiences is more meaningful and authentic.

Driving Questions – Examples

- How can our class assist the our local Audubon Society in collecting data on numbers of robins and the possible relationship to warmer local temperatures?
- How can our class work with our local park to create a wildlife fieldguide for visitors to use as they enjoy the park?

INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS - CONTINUED

SCIENCE AND ENGINEERING PRACTICES

- Analyzing and Interpreting Data
- Engaging in Argument from Evidence

DISCIPLINARY CORE IDEAS

LS2.C Ecosystem Dynamics, Functioning and Resilience

LS2.D Social Interactions and Group Behavior

LS4.C Adaptation

LS4.D Biodiversity and Humans

CROSSCUTTING CONCEPTS

- Cause and Effort
- Systems and System Models

CONNECTIONS TO ENGINEERING, TECHNOLOGY AND APPLICATIONS OF SCIENCE

- Interdependence of Science, Engineering and Technology

CONNECTIONS TO NATURE OF SCIENCE

- Science is a Human Endeavor

Connections to other DCIs in third grade: **3.ESS2.D** (3-LS4-3); **3.ESS3.B** (3-LS4-4)

Articulation of DCIs across grade-bands: **K.ESS3.A** (3-LS4-3)(3-LS4-4); **K.ETS1.A** (3-LS4-4); **1.LS1.B** (3-LS2-1); **2.LS2.A** (3-LS4-3),(3-LS4-4); **2.LS4.D** (3-LS4-3),(3-LS4-4); **4.ESS3.B** (3-LS4-4); **4.ETS1.A** (3-LS4-4); **MS.LS2.A** (3-LS2-1),(3-LS4-3),(3-LS4-4); **MS.LS2.C** (3-LS4-4); **MS.LS2.D** (3-LS2-1); **MS.LS4.B** (3-LS4-3); **MS.LS4.C** (3-LS4-3),(3-LS4-4); **MS.ESS1.C** (3-LS4-3),(3-LS4-4); **MS.ESS3.C** (3-LS4-4)

Common Core State Standards Connections

ELA/Literacy

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS2-1),(3-LS4-3),(3-LS4-4)

RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-3), (3LS4-4)

RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS2-1),(3-LS4-3), (3-LS4-4)

W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1),(3-LS4-3),(3-LS4-4)

W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-3),(3-LS4-4)

SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4- 3),(3-LS4-4)

Mathematics

MP.2 Reason abstractly and quantitatively. (3-LS4-4)

MP.4 Model with mathematics. (3-LS2-1),(3-LS4-4)

3.NBT Number and operations in base ten (3-LS2-1)

3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. (3-LS4-3)

INHERITANCE AND VARIATION OF TRAITS

Students who demonstrate understanding can:

3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.

3-LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.

3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

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Using students' innate curiosity of the natural world, one can significantly increase student engagement in and understanding of more complex and abstract concepts by using outdoor learning spaces, such as an NWF certified Schoolyard Habitat, sustainable food garden, micro-forest or waterbody. While reading and language arts are an integral part of the learning experience it is equally important to allow students up close and personal opportunities for exploration and investigation in the natural world.

By participating in citizen science projects such as, The GLOBE Program, Project Budburst, Monarch Watch, Project Feeder Watch, Frog Watch, and Project Noah, it allows students to become active observers in the field and help better understand the biodiversity in their schoolyard and contribute to real science that make a difference for our plant and animal species. Since scientists can't be in all places all the time it is imperative to engage students of all ages to engage in authentic science which contributes to better understanding wildlife adaptations as well as similarities and differences from one generation to the next.

Driving Questions – Examples

- How are monarch butterflies different from other common butterflies in our neighborhood?
- What are the traits of our native plants that allow them to be more successful than other non-native plants?

INHERITANCE AND VARIATION OF TRAITS - CONTINUED

SCIENCE AND ENGINEERING PRACTICES

- Developing and Using Models
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions

CONNECTIONS TO NATURE OF SCIENCE

- Scientific Knowledge is Based on Empirical Evidence

DISCIPLINARY CORE IDEAS

LS1.B Growth and Development of Organisms

LS3.A Inheritance of Traits

LS3.B Variation of Traits

LS4.B Natural Selection

CROSSCUTTING CONCEPTS

- Patterns
- Cause and Effect

Connections to other DCIs in this grade: **3.LS4.C** (3-LS4-2)

Articulation of DCIs across grade-bands: **1.LS3.A** (3-LS3-1),(3-LS4-2); **1.LS3.B** (3-LS3-1); **MS.LS1.B** (3-LS1-1), (3-LS3-2); **MS.LS2.A** (3-LS4-2); **MS.LS3.A** (3-LS3-1); **MS.LS3.B** (3-LS3-1),(3-LS4-2); **MS.LS4.B** (3-LS4-2)

INHERITANCE AND VARIATION OF TRAITS - CONTINUED

Common Core State Standards

ELA/Literacy

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1) (3-LS3-2) (3-LS4-2)
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS3-1) (3-LS3-2) (3-LS4-2)
RI.3.3	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1) (3-LS3-2) (3-LS4-2)
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS3-1) (3-LS3-2) (3-LS4-2)
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3- LS3-1) (3-LS3-2) (3-LS4-2)
SL.3.5	Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)

Mathematics

MP.2	Reason abstractly and quantitatively. (3-LS3-1),(3-LS3-2)
MP.4	Model with mathematics. (3-LS1-1),(3-LS3-1),(3-LS3-2)
3.NBT	Number and Operations in Base Ten (3-LS1-1)
3.NF	Number and Operations—Fractions (3-LS1-1)
3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets. (3-LS4-2)
3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS3-1) (3-LS3-2)