Schoolyard Habitat Action Grant Projects and the Next Generation Science Standards

Developing and using a wildlife habitat area can assist your students in meeting several of the Next Generation Science Standards. The items listed below are suggestions. Please do not be limited by them. The interdisciplinary nature of the habitat area can allow you to incorporate other Common Core Standards as well.

Next Generation Science Standards Performance Expectations

K-LS1-1 Use Observations to describe patterns of what plants and animals need to survive.
Science and Engineering Practices: Analyzing and Interpreting Data
Disciplinary Core Ideas: Organization for Matter and Energy Flow in Organisms
Crosscutting Concepts: Patterns

Observations of the habitat area can start before you prepare and plant it and continue for many years afterward. Records of the observations can be used by current students and by those in subsequent years for comparative data and trends analysis. Students can make photographic images for later reference. They can measure and compare the physical factors (amount of sunlight, rainfall, temperature, wind, etc.) in different locations in the habitat and look for correlations to plant growth in those areas by keeping records of plant growth per area. Do plants in one part of the habitat grow better than the same plants in other parts of the habitat? If so, let the students propose an answer and test it, if possible. Students can observe and document animals that are attracted to the habitat and their behaviors. They can propose explanations for the behaviors supported by their observations.

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.

Science and Engineering Practices: Constructing Explanations and Designing Solutions
Disciplinary Core Ideas: Structure and Function, Information Processing
Crosscutting Concepts: Structure and Function

Student observations of the plants and animals in the habitat area can provide real-life examples of adaptations and their functions. In order to be able to solve a human problem by mimicking how animals and plants use their external parts, students must know what the external parts of these organisms are and how they are used.

1-LS3-1 Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

Science and Engineering Practices: Constructing Explanations and Designing Solutions
Disciplinary Core Ideas: Inheritance of Traits, Variation of Traits
Crosscutting Concepts: Patterns Crosscutting Concepts: Patterns

Students will be able to make and record observations about plants in the habitat area as well as animals that visit and/or live in the habitat. Plant observations can occur from either seed or seedling through the adult plant stage. Students can record measurements, shapes, growth rate and other features on a regular basis. Images can be taken and compared over time, too, so that if one class starts a project in the spring, another class can use the data in the fall to compare with it. If you have the proper plants to attract butterfly females to lay their eggs, students may be able to follow the complete life cycle of these insects. Some birds may nest in the habitat and can be observed. Other animals may live in the habitat, too.

2-LS2-2 Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.

Science and Engineering Practices: Developing and Using Models
Disciplinary Core Ideas: Interdependent Relationships in Ecosystems
Crosscutting Concepts: Structure and Function

Students can collect a small number of seeds from as many species as possible in the habitat area throughout the year. They can examine them closely and propose explanations for how the seeds might travel, if they appear that they might travel. They can look at animals that live in this type of habitat and research their behaviors to see means that the seeds might be spread by the animals. (NOTE: If your habitat area is small, you may need to provide other sources for the students to use as animal references for the habitat type. For example, the *Illinois' Natural Resources Trading Cards* can be separated into prairie, woodland and wetland species and used to show the students species that they may not be able to attract to their schoolyard habitat.) Students can then develop a model of a seed that could be dispersed by an animal species and explain why they chose this animal and how the seed's adaptations would result in successful dispersal from the parent plant.

Students should have some concept of what pollination is before they can mimic it. If the plants in your habitat area are blooming, they most likely will attract native pollinator species that can be easily observed. Question the students about what the pollinators may be doing at the flowers. Have them try to support their explanations by observations. They can then design a model that mimics what the pollinators are doing.

2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.

Science and Engineering Practices: Planning and Carrying Out Investigations
Disciplinary Core Ideas: Biodiversity and Humans

Most likely you will have chosen the plant species to be planted in your habitat area so it is artificial in terms of not developing naturally in its location. However, you can still compare diversity in different habitats by observing and recording the number of different species and individuals of each species in identical plot sizes on different areas of the school grounds. For instance, use a small hoop (like a hula hoop) and randomly place it in three different locations on the school grounds. Count the different species of plants growing in these areas and the approximate numbers of each one and the number of types of animals observed and the numbers of each type. Animal signs can be observed as well. Now toss the hoop in the habitat area and complete the same procedure. Compare the different areas. Have the students propose explanations for any differences. Trees are often excluded by using a hoop in the sampling procedure. A piece of string of a definite length can be used instead. Students can develop the protocol for counting plants and animals along the string (touching the string, within a foot of the string, etc.). They must also make rules for animals/plants above the string (flying, nesting, in a tree, etc.). They can discuss problems that might occur when measuring diversity in a much larger habitat than their schoolyard. Although it is targeted to middle school grade levels, the "Backyard Bioblitz" activity from the Illinois Biodiversity Basics unit can be helpful in providing background information for you. See https://www.dnr.Illinois.gov/education/documents/biobasics_activity_1-3.pdf.

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.

Science and Engineering Practices: Analyzing and Interpreting Data
Crosscutting Concepts: Patterns

Students can use the habitat area to observe, measure and record data about the plants and animals living and visiting it. They can look for similarities and differences in the same types of plants and animals and postulate why differences occur. Have the students discuss whether or not variation is important based on their observations.

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

Science and Engineering Practices: Constructing Explanations and Designing Solutions
Disciplinary Core Ideas: Inheritance of Traits, Variation of Traits
Crosscutting Concepts: Cause and Effect

Over time, the plants in the habitat area may show the effects of drought, excessive rainfall, extreme cold, abundance of insects and other factors. If you water the habitat area regularly, the students could compare the growth and condition of plants in the habitat area to similar plants in areas that are only receiving natural rainfall. If you don't water the habitat area regularly, the students could photograph and record growth data about the plants in the habitat area as well as measure and record weather data. This information could be used for data and trends analysis in this and subsequent classes.

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.

Science and Engineering Practices: Engaging in Argument from Evidence
Disciplinary Core Ideas: Adaptation
Crosscutting Concepts: Cause and Effect, Science is a Human Endeavor

Students can record the plant species that were planted in the habitat area and where they were planted. Images can be taken for reference. Plant growth and weather data can be collected. Animal species visiting the habitat can be noted. Students can provide explanations for why some species may have grown better than others. Provide the students with images of a variety of Illinois species from resources such as the Illinois' Natural Resources Trading Cards. Based on their data, ask the students to predict whether or not an animal or plant would be suited to live in the schoolyard wildlife habitat area. Repeat the process using images of species from other parts of the country and 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.

Science and Engineering Practices: Engaging in Argument from Evidence
Disciplinary Core Ideas: Structure and Function
Crosscutting Concepts: Systems and System Models

Students can observe plants and animals in the garden throughout the year recording data regarding perceived adaptations possessed by the species that live in and visit the garden. They can postulate why these adaptations are effective and necessary for 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.

Science and Engineering Practices: Engaging in Argument from Evidence
Disciplinary Core Ideas: Growth and Development of Organisms
Crosscutting Concepts: Cause and Effect

Students can observe plants and animals in the garden throughout the year recording data regarding perceived adaptations possessed by the species that live in and visit the garden. They can postulate why these adaptations are effective and necessary for survival. Birds, insects and plants should all provide examples that students can observe. If you have a wetland garden, frogs and toads calling may also be used for evidence.

MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

Science and Engineering Practices: Constructing Explanations and Designing Solutions
Disciplinary Core Ideas: Growth and Development of Organisms
Crosscutting Concepts: Cause and Effect

Over time, the plants in the habitat area may show the effects of drought, excessive rainfall, extreme cold, abundance of insects and other factors. If you water the habitat area regularly, the students could compare the growth and condition of plants in the habitat area to similar plants in areas that are only receiving natural rainfall. If you don't water the habitat area regularly, the students could photograph and record growth data about the plants in the habitat area as well as measure and record weather data. This information could be used for data and trends analysis in this and subsequent classes. Different species from the same genus could be planted as part of the project to note growth differences under similar conditions and relate to genetic factors.