

Project Bluestem Revised Lessons

Neal Smith National Wildlife Refuge, Prairie City, Iowa

The Project Bluestem Curriculum at Neal Smith National Wildlife Refuge in Prairie City, Iowa, was developed to be used at their restored and reconstructed tallgrass prairie ecosystem as an integrating and motivating context to engage children at all grade levels in real-world, field-based learning experiences. Project Bluestem has been updated and adapted to reflect the most current philosophies and methodologies of environmental education. The curriculum currently covers grades kindergarten through five. The following lessons were developed to supplement the original Project Bluestem lessons. In the revised lessons, the interest and questions of learners ultimately drive lesson objectives. Students are put in charge of constructing their own learning and field leaders serve as facilitators in helping learners make independent, personal and meaningful discoveries about the environment. These lessons are appropriate for use in Illinois prairie habitats.

The Illinois Department of Natural Resources is grateful to the staff of Neal Smith National Wildlife Refuge for allowing the use of these lessons in the *Illinois Prairies* resources trunks.

Listed below you will find a summary of each activity. Complete lessons may be accessed on the enclosed CD-ROM.

Kindergarten Lessons/Activities

Prairie Bug Hunt

The students and field leader discuss the term “insect” and work toward a definition. Students sing a song based on the body parts of an insect. Following the discussion, the class is divided into small groups to go outside to observe insects. Using simple journals, students draw insects and record their discoveries. Afterwards, students come back inside and share their insect findings with one another.

Next Generation Science Standards: K-LS1-1

Literacy: Speaking and Listening K.1., K.2., K.5., K.6.

Prairie Explorers

Students hike the trails in one line. They practice using their senses to *observe* and *describe* the plants and animals of the prairie. Along the way, they use their senses to explore what they find (such as water, plants, soil, wind, sun). They problem-solve, sing songs, and learn to name their five senses. As a result, students *describe* what they discovered about the prairie by using each one.

Next Generation Science Standards: K-LS1-1

Literacy: Speaking and Listening K.1., K.2., K.6

What is Prairie?

This is a student-led activity that puts learners in charge of answering the question, “What is a prairie?” A field leader asks students what they already know about the prairie and records their answers. As an introduction to the prairie, a field leader reads the book *In the Tall, Tall Grass* by Denise Fleming. Students use detailed observations and field notes as evidence to communicate in their own words the definition of prairie.

Next Generation Science Standards: K-LS1-1

Literacy: Speaking and Listening K.1., K.2., K.6

Literacy: Reading K.10

Where Do Prairie Animals Live?

During a guided discussion, a field leader uses a T-chart to help the students compare prairie animals’ homes and needs to their own homes and needs. This comparison enables students to realize that their own needs for food, shelter, space, air and water are similar to prairie animals and all living things. Following the discussion, students search for and observe a common prairie animal in the habitat. Children use simple journals to record their discoveries about animal homes and later share them with the class.

Next Generation Science Standards: K-LS1-1

Literacy: Speaking and Listening K.1., K.2., K.6.

Color Hunt

This student-led activity focuses on colors found on the prairie. Students listen to *Planting a Rainbow* and sing a song about colors. Predictions are made as to the different colors they think they can find in the prairie when groups go outside. Upon returning inside, they share their findings and create a T-chart to organize and observe the data they’ve collected. They speculate why they may have found more of one color than another. They share any surprises or discoveries related to their search for colors on the prairie.

Literacy: Speaking and Listening K.1., K.2., K.6.

First Grade Lessons/Activities

Curious About Clouds

Students will make observations about the weather and sky, listen to a story about weather and discuss it. Students will go outside and create models of clouds with cotton. Then the students will use a rhythmic beat to turn their cotton balls into “rain clouds” and learn the Rain Cloud song that feeds the prairie plants.

Next Generation Science Standards: 1-ESS1-1

Literacy: Reading 1.1, 1.2

Literacy: Speaking and Listening 1.1, 1.4, 1.6

Literacy: Writing 1.8

Investigating the Invisible

After examining animal camouflage examples in the book *How to Hide a Butterfly* by Ruth Heller, students identify camouflaged animals in the book and practice naturalist skills such as being quiet and full of wonder as they listen. Next, students discuss the definition of camouflage and what it means to them in their own words. They make predictions and ask questions about how animals might camouflage in the prairie. Afterwards, they go outdoors and search for examples of camouflaged animals. Students reflect upon their discoveries and why camouflage might be important for prairie animals.

Next Generation Science Standards: 1-LS-1-1

Literacy: Reading 1.1

Literacy: Speaking and Listening 1.1, 1.2, 1.6

Literacy: Writing 1.8

Meet a Prairie Plant

Based on their prior knowledge, students generate questions about prairie plants. With the help of a field leader, students explore off trail and use their sense of sight, touch, and taste (where safe) to meet a prairie plant and answer their questions. Students are encouraged to use illustrations and words to record their discoveries and to describe their prairie plant's parts- leaves, stems, flowers, seeds, and/or roots (if possible) - in their nature journals. Afterwards, students describe their prairie plant to the rest of the class as if they were introducing a new friend. Students are required to share why they like their plant and aspects of their plant that make it special.

Next Generation Science Standards: 1-LS3-1

Literacy: Speaking and Listening 1.1, 1.4, 1.5, 1.6

Literacy: Writing 1.8

Prairie Soil Explorers

Groups of students will predict, explore, and record the characteristics of soil including temperature, color, and moisture content of the soil. Lastly, they will conduct a ribbon soil test. Students will draw conclusions about whether their soil sample is primarily made up of sand, silt, or clay. They will infer how soil types may affect prairie life, including humans, and how humans affect the soil.

Next Generation Science Standards: K-2-ETS1-1

Literacy: Speaking and Listening 1.1, 1.4, 1.6

Literacy: Writing 1.8

Second Grade Lessons/Activities

Burrow Investigation

Students conduct a prairie animal field investigation based upon their own questions. A field leader uses pictures and field guides to introduce students to burrowing prairie animals. Based on their knowledge, students ask questions about burrowing animals that they can discover on the prairie. They observe, collect and record data that will help them answer their investigative questions. Later, they reflect and compare and contrast the adaptations of burrowing animals using a Venn Diagram.

Next Generation Science Standards: 2-LS4-1

Mathematics: Measurement and Data 2.MD

Literacy: Speaking and Listening 2.1, 2.4, 2.6

Literacy: Writing 2.7, 2.8

First Americans on the Prairie

Students are asked what they already know about first American (Native American) culture and their relationship with bison, and what they would like to know. In order to answer some of their questions, students learn about and listen to readings by Charles Alexander Eastman, a native Santee Sioux Indian, naturalist, illustrator and writer who lived during the mid 1800s. Next, students role-play and imagine that they are first Americans hunting and using bison. Students are divided into small groups and each group goes into the prairie to find a bison bone. By exploring the prairie through the eyes of first Americans, students seek answers to their questions and determine the best ways to use their bison bones and bison in general on the prairie. They will record their discoveries in their journals and share their ideas with classmates.

Next Generation Science Standards: K-2-ETS1-2

Prairie Animal Adaptation

Students share what they already know about harvestmen and spiders. Using a Venn Diagram, the instructor categorizes their answers based on the differences and similarities there are between harvestmen and spiders. Based on their prior knowledge, students work in groups and ask "I wonder" questions about harvestmen and spiders. In the field, students search for spiders and harvestmen and use pictures and words to collect and record data that will help them find answers to their questions. After the field study, students return to the class' original Venn Diagram and make necessary corrections and add to it based on their discoveries. Students write concluding statements about how harvestmen and spiders are similar and different.

Next Generation Science Standards: 2-LS4-1

Mathematics: Measurement & Data 2.MD

Prairie Food Cupboard

The once abstract concept of food chains comes to life for learners to witness and observe firsthand in the prairie. During a teacher-led discussion, students define a food chain. The field leader has a few students pretend play that they are the sun, plant and insect and has them act out a food chain for the rest of the class. Next, students make predictions about possible food chains they may find in the prairie. Following, students form small groups with field leaders and dig in the soil, search through plants and watch the sky to develop simple food chains based on their observations. Students reflect by comparing their predictions to their findings about food chains on the prairie.

Next Generation Science Standards: 2-LS2-1

Literacy: Speaking and Listening 2.1, 2.4, 2.6

Literacy: Writing 2.8

Prairie Hike and Investigation

Students do a basic prairie investigation using simple journal entries. They divide their nature journal into sections and label each section “plants,” “animals,” “nonliving” and “discoveries.” First, students record the temperature, sky and wind on the prairie. They list plants, animals or signs of animals they find in the prairie. They sit quietly by themselves and sketch the prairie and try to include as many labels and words as possible. Later, students come together to use their journals to create a class list of discoveries related to the prairie. Based upon the living and nonliving things they discovered, students work together to write a concluding definition of prairie.

Next Generation Science Standards: 2-LS4-1

Literacy: Speaking and Listening 2.1, 2.4, 2.6

Literacy: Writing 2.7, 2.8

Third Grade Lessons/Activities

Plant Life Cycles

Based on their prior knowledge about the life cycle of a plant, students will work in groups to develop investigative questions about a plant’s life cycle. Students will be encouraged to ask questions that they may find answers to while outdoors. Students make quadrants in their nature journals and label the squares “Seeding,” “Sprouting,” “Blooming” and “Life cycle discoveries.” Next, students search outside to find and sketch plants that are in various growing stages and record them in the appropriate quadrant. Later, students share their discoveries and their nature journals by participating in a silent “nature journal walk” exercise. During this exercise, students leave their journals open on the floor and students walk around in a circle and observe each person’s entry. Afterwards, students are encouraged to share what they learned about plant life cycles and prairie plants in the fall season.

Next Generation Science Standards: 3-LS1-1

Literacy: Writing 3.2

Prairie Bird Investigation

Students share what they know about birds and what they wonder about birds. Students choose one investigative question to research while they are outside. Then they go on a hike to seek answers to their question. Students practice standing still, listening for sounds and waiting for bird movement in order to make more discoveries about birds. Students record data in their nature journal that support the answers to their question. To conclude the lesson, students discuss what they learned by answering their investigative question.

Next Generation Science Standards: 3-LS1-1, 3-LS4-2, 3-LS4-3

Literacy: Speaking and Listening 3.1, 3.4, 3.6

Prairie Insects

The field leader introduces the term “insects” and how to look for them by reading the book *Under One Rock: Bugs, Slugs, and other Ughs* by Anthony D. Fredericks. Students work in groups and ask investigative questions about prairie insects. Students go outside and search through the soil and plants for invertebrates and observe, collect and record data related to their discoveries. Students share their data and discuss the importance of these animals for the prairie.

Next Generation Science Standards: 3-LS1-1, 3-LS2-1, 3-LS4-3

Literacy: Comprehension & Collaboration 3.1

Literacy: Presentation of Knowledge & Ideas 3.4, 3.6

Prairie Plants Change

Students share colors, life-cycle stage and other details they observed of fall prairie plants by referring back to their fall journal entries. (If students do not have fall journal entries, they will speculate as to how prairie plants may have looked in the fall). Next, students make predictions and ask questions about how prairie plants may look during the spring, recording these in their nature journal. Outside, students choose a prairie plant and use descriptive words and detailed sketches to portray prairie plants during spring and answer their inquiry questions. Afterwards, students share their discoveries and explain how and why prairie plants change through various seasons.

Next Generation Science Standards: 3-LS1-1

Literacy: Speaking and Listening 3.1, 3.4, 3.6

Literacy: Writing 3.2

Sticky Seed Situation

After reading *What Kinds of Seeds Are These?* by Heidi Bee Roemer, students make predictions about different types of seeds they will find outside (e.g, possible seed sizes, shapes, colors, seed dispersal adaptations). Next, students head outside and collect and analyze different types of seeds. Students devise a strategy for grouping seeds based on similarities and differences. In their nature journal, students sketch, write and construct explanations as to why and how they classified the seeds. Students will reflect and are encouraged to share their discoveries with the class.

Next Generation Science Standards: 3-LS3-1

Literacy: Writing 3.2

Fourth Grade Lessons/Activities

Bio Blitz in the Prairie & Oak Savanna

During an investigation, students ask and answer their own questions about tallgrass prairie and oak savanna habitats. Students then search for plants and animals in the prairie and oak savanna. Using nature journals, they record their observations of each habitat and the birds, plants and animals found there. Lastly, they review the animals and plants they found in each habitat. They draw conclusions as to why certain plants and animals prefer one habitat over the other. Students also use their observations of living and nonliving things to write in their own words the definition of an oak savanna and prairie. (Preparation step for teachers/leaders: Read background information at the end of this lesson.)

Literacy: Speaking and Listening 4.1, 4.4

Bison Investigation

Students listen to and look at journal entries about bison from the early 1800s, including Lewis and Clark's journal. A field leader holds a discussion about how these nature journals documented bison history and how recording daily observations is important for history. Next, students ask questions about bison characteristics and behavior and set up entries in their nature journal. Students are provided with binoculars to aide in their bison observations. Students head outside and record the number of bison they find, describe their behavior and characteristics, and sketch the bison just like Lewis and Clark and other early settlers did during the 1800s. Lastly, students share their discoveries and discuss the implications of their field work for future generations.

Next Generation Science Standards: 4.LS1-1

Social Studies: 3-5.G.4

Habitat Comparisons

This is a student-led activity that puts learners in charge of answering the question, "How does elevation affect prairie life?" Students work in small groups to make observations from two pre-selected, outdoor elevation areas. Back in the classroom, students share their findings to complete a Venn diagram that is used by students to identify the environmental factors or variables that contributed to the patterns they discovered. From their evidence, students work to draw a conclusion about the influence elevation has on prairie habitats.

Next Generation Science Standards: 4-LS1-1

Prairie Celebrations

Students have an open discussion about activities, memories or achievements that they believe are worth celebrating. Students then learn about how an author describes "celebration" and make comparisons with their own experiences. Students then look for examples of celebration in the prairie. Students reflect with a partner on the meaning of celebration and think of ways to find daily reasons to celebrate.

Literacy: Reading 4.1

Literacy: Speaking and Listening 4.1, 4.3

Literacy: Writing 4.1

Fifth Grade Lessons/Activities

A Sense of Wonder

Read passages from Rachel Carson's book *The Sense of Wonder*. The class discusses the meaning of some of Carson's quotes and the word "wonder." Why does Carson believe that wonder is important? A field leader explains that there are two meanings of the word "wonder:" to ask a question; and to be in awe. Students record a T-chart in their nature journal with the left side labeled "Wonder-Question" and the other side "Wonder-Awe." Then students go outside and search for the "Wonder-Awe" and write about it in their journals while sitting quietly. To conclude the lesson, students share their feelings and observations about moments of wonder that they experienced in the prairie. (Preparation: Teacher should prepare by reading the Background Information at the end of lesson.)

Literacy: Reading Informative Text 5.1, 5.2, 5.4, 5.8

Literacy: Writing 5.1, 5.4

Catch and Release Insects

A field leader introduces students to the definition of insects and different insect groups. Afterwards, students work in groups to generate questions about prairie insects and set up data collection sheets in their nature journals. In the field, students use bug boxes to collect, observe and record data about insects. In their groups, students work to classify the insects into appropriate insect groups (e.g. Hemiptera, Homoptera, Lepidoptera, Coleoptera, Hymenoptera, Diptera). Students must release insects back into the prairie. Lastly, students share their results and comment about findings that surprised them.

Next Generation Science Standards: 5.PS3-1

Literacy: Speaking and Listening 5.1, 5.4

Discovering Diversity

During this investigation, students conduct small transects with sweep nets in two preselected plant communities. One of the communities is a disturbed habitat, and the other is a restored prairie. They observe, collect and record the number of different types of prairie insects they find at each location. Inside, the field leader uses a Venn diagram to compile a class set of data. One side of the Venn diagram is labeled "Location 1," and the other is labeled "Location 2." Students share their findings of insect diversity from each location, as the field leader records these into the appropriate category. Students speculate what types of environmental factors or variables contributed to the patterns in the diversity of prairie insects. From their evidence, students work to draw a conclusion about how plant communities might affect prairie insect life.

Next Generation Science Standards: 5-LS2-1

Literacy: Speaking and Listening 5.1, 5.4

Hooping it Up on the Prairie

The field leader opens with a discussion about the definition of habitat and types of plants, animals and decomposers they would expect to find. Next students generate investigative habitat questions. Each group chooses one inquiry question to work on while outside. In the prairie, each group randomly tosses a hula hoop into the prairie. Each group must follow their hula hoop and work to find the answer to their habitat question. Students must also sketch and describe their hula hoop habitat. Later, students share their findings and make suggestions about how they would change or improve their investigation for next time.

Next Generation Science Standards: 5.LS2.1

Literacy: Speaking and Listening 5.1, 5.4

Prairie Birthdays

Students listen to an excerpt called “Prairie Birthdays” from Aldo Leopold’s book *A Sand County Almanac*. Based on their prior knowledge about plants, students generate questions and design journal entries to use for recording prairie birthdays. Students head into the field to search for answers about blooming prairie plants and choose one plant to sketch and describe in honor of its birthday. Students should make notes about the parts of a plant, including careful details about the flowers and its parts and purpose. This lesson concludes with the students sharing their findings and discussing the importance of tracking and celebrating the life of prairie plants.

Next Generation Science Standards: 5-ESS3-1

Literacy: Writing 5.1, 5.4

Weathering Winter

During this lesson, students are asked to think of how prairie animals utilize energy to overcome the challenges of cold weather. Inside, the field leader will ask how prairie animals survive winter. Using the students’ answers, the leader will emphasize hibernation, migration, staying active and other survival techniques. Students will use nature journals to look for examples of these techniques outside. Afterwards, the class will come back inside and write and share a paragraph summarizing the winter survival techniques of one animal they encountered.

Next Generation Science Standards: 5-PS3-1

Literacy: Speaking and Listening 5.1, 5.4

Literacy: Writing 5.1, 5.8

Additional Resources

Birding Bingo Cards

Burrow Investigation Cheat Sheet

Common Prairie Insect Orders

Flowers & Seed Collection

Insect identification Sheet

Journaling, Get Yours Ready to W.I.N.

Leaf Descriptions

Leafy Clues

Midwestern Native Plants for Pollinators