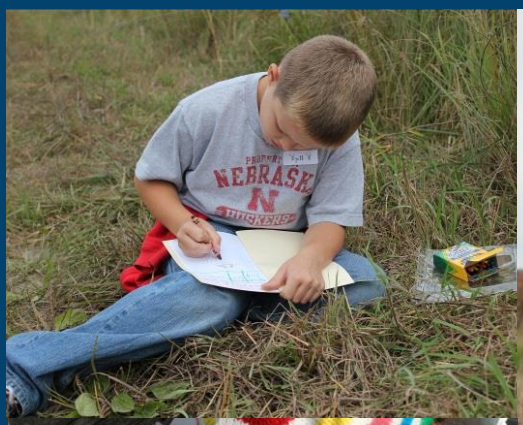
Blair DeSoto Environmental Education Partnership

Blair Community Schools and DeSoto National Wildlife Refuge

Curriculum Guide







Created in cooperation of Refuge Staff and Blair School Teachers.

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Mission Statement

Creating a sense of wonder and stewardship through environmental education in an outdoor classroom, a partnership with Blair Community Schools, "Where All Students Learn," and DeSoto National Wildlife Refuge, "Where Wildlife Comes First."

We achieve this mission by:

· Empowering students and teachers to have authentic, learning experiences in nature's outdoor classroom

· Connecting students with the environment and related issues

· Provide an opportunity for education to be fun and challenging

· Creating a partnership for environmental education that meets Blair Community Schools and Nebraska State Standards

· Recognizing and sharing the accomplishments of the partnership with the community

This partnership would not be possible without The Friends of Boyer Chute and DeSoto National Wildlife Refuge. Their contributions of countless volunteer hours and financial support help us to succeed.

Friends of Boyer Chute
& DeSoto NWR

Strategic Plan Goals

1. Provide every student with the opportunity to experience environmental education in the outdoor classroom.

2. Provide a diversity of inquiry-based, cross-curricular lessons.

3. Secure funding through diversified revenue streams.

4. Create an infrastructure to achieve quality and sustainability.

5. Evaluate and quantify program results.

6. Maintain a dedicated environmental education position at DeSoto National Wildlife Refuge.

7. Develop an advanced program.

8. Promote the program to families and the community.

Goal 1: Provide every student with the opportunity to experience environmental education in the outdoor classroom.

Rationale: Joining students with nature in the outdoor classroom will instill a sense of wonder and broaden the students' natural curiosity to learn about the environment. This will build a stewardship with the students and the environmental issues we currently face. Learning in the outdoor classroom will help develop the students' observation, problem-solving, critical thinking, and communication skills.

Goal 2: Provide a diversity of inquiry-based, cross-curricular lessons.

Rationale: Utilizing the outdoor classroom in conjunction with a traditional classroom can enhance student learning in core subject areas. Expanding the curriculum to follow the route of the migratory waterfowl allows the students to study geography as well as social studies and cultural studies of people along the flyway. Language arts skills are enhanced by writing about learning experiences. Fine arts are utilized through drawings, paintings, or pictures of their outdoor experience. Exploratory technology can be incorporated through digital photography, blogs, video storyboards, software, and computer use.

Goal 3: Secure funding through diversified revenue streams.

Rationale: Funding is provided by Blair Community Schools, DeSoto National Wildlife Refuge, Blair Community Foundation Grant, The Friends of Boyer Chute and DeSoto National Wildlife Refuge, and various other grants. We will continue to actively seek alternative funding sources as well as local corporate sponsor to secure the future financial health of the program.

Goal 4: Create an infrastructure to achieve quality and sustainability.

Rationale: Build on the program to produce the highest educational standards while responsibly managing associated cost. Create learning resources to attract families to Blair Community School for education.

Strategic Plan Goals

Goal 5: Develop formal evaluation techniques.

Rationale: Utilizing the students' field notes and naturalist journals, writing assignments, blogs, fine arts, exploratory technology displays, and open discussions of the outdoor learning experiences, teachers will be able to evaluate the level of understanding the students have achieved.

Goal 6: Maintain a dedicated environmental education position at DeSoto National Wildlife Refuge.

Rationale: In order to provide continuity and stability in the environmental education program a full-time Environmental Education Specialist will be placed at DeSoto NWR. This is currently in place.

Goal 7:Develop an advanced program.

Rationale: Provide an opportunity for students who demonstrate interest, ability and task commitment to participate in advanced learning opportunities using the DeSoto outdoor classroom. This program was pilot tested during 2012-2013 school year and will expand for the 2013-2014 school year.

Goal 8: Promote the program to families and the community.

Use media, chamber of commerce, business and personal relocation companies and education web-sites to promote the partnership with Blair Community School and DeSoto National Wildlife Refuge.

At a Glance

Inspired by a visit of Blair Community Schools' teachers and administrators to the U. S. Fish and Wildlife's Prairie Wetlands Learning Center in Fergus Falls, Minnesota, the outdoor classroom partnership with Desoto National Wildlife Refuge was established in 2006. This partnership involves students in third grade, fifth grade, sixth grade, seventh grade, eighth grade and high school. These students will visit DeSoto National Wildlife Refuge six or more times in an academic year.

So far, the program has produced:

2006-07: 63 programs and 2,200 student visits
2007-08: 74 programs and 2,200 student visits and one educator workshop
2008-09: 89 programs and 2,954 student visits and one educator workshop
2009-10: 79 programs and 2,887 student visits and one educator workshop
2010-11: 109 programs and 4,159 student visits and one educator workshop
2011-2012: 159 programs and 4,817 student visits and one educator workshop
2012-2013: 127 programs and 4,123 student visits and one educator workshop

Programs

3rd Grade
Late Summer Exploration
Fall Exploration
Winter Exploration
Spring Exploration

5th Grade
National Wildlife Refuge System Orientation
Sense of Wonder
Prairie Exploration
Wetlands and Fall Migration
Beavers
Winter Tracking and Birding
Eagles
Sensory Awareness
Outdoor Education Days

6th Grade
Leaf Study and Inference Short Story
Soil Composition, Erosion, Deposition, Floodplain
Migrating Birds—The Canada Connection
Physical Properties, Mass/Volume/Density Snow Study

7th Grade
Habitat Lab Scavenger Hunt
Insects
Fish Sampling
GPS Scavenger Hunt
Bertrand Museum Tour and Artifact Conservation
Bird Observation

8th Grade:
Descriptive Writing and Observation
Five Themes of Geography
Bertrand Site Measurements
Leaf and Bark Rubbings
Graphing Lesson Base on Data Collected at the Refuge

6th, 7th, and 8th Grades
Exploratory technology after school program: teach digital photography, iMovie, Garage band, Photoshop, software producing movies, slideshows, podcasts, tripod and monopod use
High Ability Learners– water quality labs

High School
Ecosystem Observation Hike
Biomes
Use of Identification Books and Guides
Soil Testing
Water Quality
Fire Ecology
Monarch Butterflies

Educator Workshops
Various topics to enhance the teachers' knowledge of the refuge and the outdoor topics being taught

Approximately twenty teachers, staff, and administrative personnel from Blair Community Schools, along with staff and volunteers at DeSoto NWR guide students in the outdoor classroom.

Facilities and Resources

Blair Community Schools

· Classrooms and auditoriums for lectures, and multi-media presentations.

· Outdoor classrooms and habitat areas.

· Libraries/Computer lab for research and enhancing technology skills.

DeSoto and Boyer Chute National Wildlife Refuges and The Friends of Boyer Chute and DeSoto National Wildlife Refuge

· Visitor Center—wildlife displays, museum for the Steamboat Bertrand, and an indoor viewing gallery for wildlife during inclement weather.

· Multipurpose Room– for optional classroom space.

· Hiking trails and roads– explore all the major habitats on the refuge.

· Open air shelter– rain or shine, the shelter can be used for lunch or class gatherings.

· Thousands of acres of outdoor classroom include forest, prairie, and wetlands.

Some examples of materials provided by DeSoto and Boyer Chute NWRs include:

· Bald Eagle Activity Kit—skull, talon and egg replicas.

· Beaver Activity Kit—skull, pelt and tail.

· Bird Activity Kit—binoculars, spotting scope and field guides.

· GPS units—housed at Otte Middle School.

· Insect Collecting Kit—nets, containers and field guides.

· Library and Wildlife Films.

· Pond Study Activity Kit—nets, magnifying viewers, trays, field guides and aquatic insect displays.

· Tracking Activity Kit—field guides, rubbing plates, molds and stamps.

KWHL In the Outdoor Classroom

A KWHL chart (Know-Wonder-How-Learned) is type of graphic organizer that serves as matrix for planning and gathering information. It is an instruction activity developed by Donna Ogle (1986, National Louis University) which serves as a model for active thinking during reading. We adapt it for use in science. KWHL charts are excellent tools for identifying prior knowledge, developing a plan for investigation of a problem or topic, and summarizing newly acquired knowledge and skills. They are also an excellent tool to plan for field investigations in training students as scientists. A KWHL inquiry chart can include questions about predictions and/or implications. Additionally, these charts can be used as a basis to formulate a hypothesis, or research question, resulting in confirmation or denial as your research progresses.

The use of KWHL charts engages students in active thinking as they determine:

What do we already Know? In this section students identify, share, and make connections to their existing knowledge. Misconceptions and disagreements may emerge that result in the formulation of questions for further investigation.

What do we Want or need to find out? Students determine what they want to learn. What do they Wonder about the topic?

These statements can be easily revised into questions to be investigated in the field. Instructors may need to guide students in eliminating less relevant or practical questions from the brainstormed list which cannot be answered by the parameters of field work. Students develop essential questions and may also identify areas of disagreement for further investigation.

How are we going to find out?

Students identify resources and develop a plan for gathering the information needed to answer their essential questions. Investigation processes, protocol, and tools can be included here. Primary and secondary methods can be identified. Primary resources could include ponds, prairie, observation, measurement, etc., while secondary resources may include field guides, Internet, encyclopedias, interviews, and other methods to be used after the investigation to extend the experience.

What have we Learned?

In this section students identify and summarize their newly acquired knowledge and skills. These statements can be adapted for answers to their questions. What they have learned often leads to the development of additional essential questions for future investigation and/or a consensus of opinion.

KWHL In the Outdoor Classroom

Additional columns may be added to fulfill the scientific process, such as Conclusions, New Questions for further investigation, and Recommendations. A column expressing Why the specified outdoor resource is important helps link their field work with the mission of the U.S. Fish and Wildlife Service (e.g. why is the prairie important?) With this framework, students can then write a scientific report or present a speech with all or many of the sections commonly used by scientists in communicating their results with other scientists and ultimately the public. The KWHL process naturally leads to continued investigation, increasing validity of results and/or expanding research.

Why Use KWHL?

KWHL allows students to discover more for themselves without front-loading of information and direction by instructors.

KWHL helps students find purpose in their learning. Students direct their learning and build on past knowledge, which seems to increase their loci of control, motivation for learning, and ownership in the investigation. Organizing information and making the process visible helps student tap into and possibly revise their organization of prior knowledge as they gain skills in thinking about thinking.

KWHL promotes higher-order thinking for both students and instructors, allowing for a genuine two-way exchange of ideas and thinking between both. Instructors may be pleasantly surprised by the type of knowledge and by the critical thinking students demonstrate.

KWHL parallels the scientific method and may directly support state and national academic standards for inquiry-based learning and use of the scientific method.

Training students as scientists in their use of the scientific method through investigation of the outdoor classroom supports the mission of the National Wildlife Refuge System and the vision of the U.S. Fish and Wildlife Service.

Challenges to Using KWHL

Instructors may experience fear and resistance because of inherent risk-taking involved in experimenting with a different and less familiar teaching approach.

KWHL may involve more “seat time” for students if time is not carefully managed.

Instructors need to be attentive to integrating the mission of the Refuge System where most appropriate. Consider adapting the chart with an additional column to ensure making this critical link.

KWHL In the Outdoor Classroom

Resources

"The K-W-L: A Teaching Model that Develops Active Reading of Expository Text" by Donna Ogle. *The Reading Teacher* 39 (1986): 564-70.

Thematic Unit—Owls, by Fran Van Vorst, Teacher Created Materials, 1999.

Graphic Organizers, Enchanted Learning, http://www.enchantedlearning.com/graphicorganizers/KWHL

Inquiry 101, Thinking Like a Scientist, http://www1.extension.umn.edu/environment/fwce/conservation-education/citizen-science/docs/fwce-thinking-like-a-scientist.pdf

KWHL Chart Maker, http://www.worksheetworks.com/miscellanea/graphic-organizers/kwhl.html

K-W-L-H Technique, North Central Regional Educational Laboratory, http://www.ncrel.org/sdrs/areas/issues/students/learning/lr1kwlh.htm

Metacognition, an Overview, by Jennifer L. Livingston, http://www.gse.buffalo.edu/fas/shuell/CEP564/Metacog.htm

What are the benefits of constructivism? http://www.thirteen.org/edonline/concept2class/constructivism/index_sub6.html

Nature Journaling

This nature journaling lesson contains the fundamentals of the our philosophy towards nature journaling and the importance of journaling to environmental education. By reading this lesson, it will help inform the understanding of all other lessons where nature journaling is a component.

Overview	After a mini-lesson on nature journaling, students participate in a field activity, investigation, or lab, recording their observations, data, and discoveries in their field journals. Students share their results and reflect upon their discoveries, then determine how they will use their material in order to share their experience with others. Suitable for novice and experienced journalists alike.
Subjects Covered	Science, Language Arts, Math, Art
Skills Used	Observing, writing, sketching, sequencing, data collection, reflecting, and others depending upon the activity
Performance Objectives	After completing this activity, students will be better able to... · Define the word journal (a daily record of observations) · Correctly sequence the steps to using a nature journal (go outside, observe, record, reflect, use) · Name three ways of recording observations in a nature journal (words, numbers, pictures) · Recognize that observations are made using multiple senses (sight, sound, touch, smell) · Name four kinds of things that could be recorded in a nature journal (title, date, location, weather, observations, wonder, questions) · Suggest two reasons why to keep a nature journal (history, polished writing or art, connect with land, slow down, fun, relax, reflect) · Enjoy using a nature journal
Vocabulary	Journal, sketch, observation, reflect

Nature Journaling

Background Information

"The student may wonder at the time what good it all is. One answers that, first, it is always useful to have a record of one's doings; but, more important, writing a fact makes one observe it better."

-- Ernest Thompson Seton

The purpose of this lesson is to introduce nature journaling to elementary students. "Nature journaling is the process of keeping a place-based, personal record of events, observations, and experiences in the outdoors." (Hofmann and Passineau) That process is typically an ongoing one and may start at the PWLC or continue and expand here for those who have already learned how to journal. Or, perhaps the school teacher simply wishes to allow students to dip into in a different method of keeping records and recording thoughts. Students learn journaling best, however, by journaling on a repeat basis as part of an ongoing process.

Compared to journals in general, a nature journal is unique in that *place* takes on a central role as the main subject along with the journalist as observer. "There is a deeper awareness of the setting, seasons, and other species." (Hofmann) A journal may be a phenology log; a field guide to animals, plants, geology; and an explorer's log of journeys and findings. It may also be a collection of reflections about a place and connections with it. Its content is not just intellectual or just emotional – it is *both*.

As learning tools, nature journals can serve a broad spectrum of purposes. A nature journal is a flexible teaching tool which is easily integrated with most academic subjects. It is adaptable to all learning styles and abilities and a source of endless individualization possibilities. Nature journaling provides opportunities for authentic learning which incorporates writing and drawing as major elements and therefore uses verbal, nonverbal, analytic, logical, spatial, and synthetic abilities. Using a journal allows students to lead their learning with their own questions making it student and inquiry driven. Journals can include both personal expressions and objective observations. Objective information might include scientific experiments, weather, wildlife behavior, and seasonal changes. Keeping a nature journal can be a powerful experience because it helps the observers slow down, carefully take note of their surroundings, make first-hand, concrete observations of nature, and become better observers. Good science depends upon keen observations, and nature journaling is an effective way to develop that skill.

John Muir wrote in his journals "about the beauty he saw in nature. He also drew sketches detailing information about plants, animals, mountains, glaciers, and landscapes. He used his journals to compose letters to friends, articles, and books to share his love of nature, and to enlist people's support to preserve wilderness. Muir's journals gave him a wealth of recorded experience from which 10 books and over 200 articles were published. People continue to gain insight into nature's beauty and importance in our lives from his writings." (Sierra Club)

Likewise student journals can be a source of raw data and information from which to write poems, reports, and speeches or develop posters, songs, art, and other polished work.

Nature Journaling

Intertwined with its value as a learning tool, keeping a journal allows time for reflection and relaxation. It allows thinking and feeling with both head and heart as a naturalist, a combination of intellectual learning about the environment and emotional connection and attachment to a place. Rather than rushing through a natural area, students have personal time and a direct experience which can help them feel more connected to the land and develop a sense of place. A nature journal provides an opportunity to study the natural world, to grow a deeper relationship with the earth, to develop a greater awareness and caring for it. "For many students, life in the artificial environment of climate-controlled schools, malls, and automobiles make the natural environment seem peripheral and irrelevant. In addition, formal learning is increasingly based on electronic, prepackaged information transfer." Yet science teachers know there is no substitute for direct experience to motivate and engage students. Done repeatedly over time, nature journaling offers sustained contact with neighborhood nature. Further, personally created nature journals provide students with ownership of their experiences and reinforces active learning. (Dirnberger, McCullagh, and Howick) Students capture and claim moments with the world around them.

Journal keeping is historical, used by individuals who left wisdom and knowledge through their journals. Through the ages, scientists, artists, authors, poets, explorers, and many others have kept journals to record their observations and experiences including Leonardo da Vinci, Carl Linneaus, Thomas Jefferson, Meriwether Lewis and William Clark, John Muir, and more recently, Olaus Murie, Aldo Leopold, and Rachel Carson. Some naturalists even started a lifelong practice of journaling in childhood, including John James Audubon and Ernest Thompson Seton. Numerous occupations today require documentation in journals. Horticulturalists keep phenology journals to record plant growth. Museum exhibit curators keep a journal account of a specimen collection. Biologists rearing and releasing the endangered whooping cranes record daily observations of health information such as diet and weight as well as daily distances traveled following an ultra light aircraft. As a tool of many jobs, journaling is a valuable skill for students to develop

Journals can be started using a few simple tools: several sheets of loose leaf paper, a hard writing surface (a clipboard will suffice in the field), and a writing utensil. Consider binding papers together with a staple or two, providing multiple pages to use over a period of time. At the start of each journal entry, record the date, time of day, location, and weather (air temperature, wind speed and direction, description of the sky, etc.).

After recording this basic information, a student can choose something more specific to study. While in the field, students should be encouraged to record information without using field guides or other textbooks because this encourages them to improve their own observation skills. Back in the classroom, students can refer to their journal entries to research and find more information about what they observed. With advanced training and practice, they may even use their journals as a tool to accurately identify unknown plants and animals.

Nature Journaling

Although many students will need some help getting started, one need not be an expert naturalist, writer, or artist to guide others in nature journaling. Enthusiasm, a wide range of field activities, and journaling and discovering alongside students draws them in, inspires them, demonstrates the value of journaling, and allows instructors to enjoy the benefits of journaling, too. The instructor is more aptly named the collaborator, guide, coach, or facilitator.

Nature is the true source of inspiration for a nature journal. Observing nature is more important than writing and is the heart of the journal. Students should observe first and write second because observing is what gives them something to write about. Once writing begins, it may be helpful to look back and forth between the page and the subject. Journals can also include sketches, rubbings, maps, colors, tables, measurements, questions, wonder, surprise, mystery, delight, and beauty. Avoid editing for spelling, grammar, and punctuation in the field. However, editing for accuracy in content is a valuable use of time and essential to the field journaling process. Key to deeper thinking, reflection time allows students to process their experience intellectually and emotionally, infer meanings, and draw connections and conclusions.

After students have completed their journal entries, providing an opportunity to share their observations with others in their group can further increase learning. Sharing provides students with the opportunity to show what they saw and learned. It can help students see the diversity of observations that can be made in nature and the diversity of journaling styles among students. Further, teachers are afforded a valuable glimpse at students' metacognition. Such is the journey that journaling can lead as students make discoveries about their home biome and also about themselves.

"I write to record the truth of our time, as best as I can see it....

I write to make a difference....To honor life and praise the divine beauty of the world. For the joy and exultation of writing itself. To tell my story."

Edward Abbey, One Life at a Time, Please

Teacher Preparation

To maximize outdoor classroom time at the PWLC, teachers may

- Conduct steps 2-4 in the section "Nature Journaling Procedure" at school. Upon arrival at the PWLC, teachers may provide PWLC staff with a written list of what students know and wonder for quick review before heading out into the prairie.
- Organize students into small groups at school, each led by a chaperone, and everyone wearing nametags.

Please help save paper. Bring your students' science notebooks or journals to record their field data and discoveries in. To make journals, see section "Make a Nature Journal," visit http://www.sierraclub.org/education/nature_journal_template.pdfv for a booklet template, or simply staple half sheets of paper together. If science notebooks or journals are not available, please inform the PWLC staff that you will need paper and clipboards when booking your date.

Nature Journaling

Select which field investigation, activity, or lab your class will participate in. Please see section "Field Activity Options." Please inform PWLC staff of your choice when booking your date.

We highly recommend conducting one or more of the suggested extensions before your visit in order to integrate this field investigation into the classroom study of nature, scientists, naturalists, writing, journals, animals, prairie, wetlands, habitat, or other topics. We believe such integration enhances student motivation for learning in other curricular areas. See section, "Teacher-Led Extensions/Adaptations/Assessment Ideas." For suggested literature launchers, see section, "References and Resources."

Staff Preparation

Gather materials and appropriate equipment depending upon the grade and topic selected. Choose which field site to use.

Nature Journaling Procedure

1. In the classroom, welcome students, teachers, and chaperones to the Prairie Wetlands Learning Center.

2. Begin a mini-lesson on nature journals. Ask students to tell you what a nature journal is. Write down their responses as a list on the board. Appropriate responses might include a book with words, sketches, numbers, and observations that are honest and true. Add any items to the list that they did not mention.

3. Ask them how someone starts a nature journal – what steps would they follow? Write down their responses as a separate list on the board. Appropriate responses might include go outside, make careful and first hand observations, record observations such as weather, beauty, feelings like wonder and surprise, questions, meanings. Record what you find, the truth, not something imagined. Add any items to the list that they did not mention.

4. Ask student why someone would keep a nature journal? Write down their responses on the board as a third list. Appropriate responses might include to keep a record, to record history, to relax, to slow down, to reflect, to connect with the land, to use later for polished writing or art.

5. Show students examples of nature journals, yours and/or others. Show them examples of Ernest Thompson Seton's journals and read excerpts from page 87 of By a Thousand Fires by Julia M. Seton.

6. Ask students to open their own science notebooks or field journals to the next blank page. Depending upon the grade and field activity, show them how to set up their page as a data sheet with a title, date, location, and quadrants to collect and record information about their given topic.

7. Allow them to suggest what kinds of things they will record on this page for three of the quadrants, and provide each quadrant a subtitle accordingly. For example, if the class will go outside to observe birds, in one quadrant they might record how many different kinds of birds they see; in another, they might sketch their favorite bird; and in the third, they might write down as many adjectives as possible to describe their favorite bird. In the fourth quadrant, they do a contour sketch.

Nature Journaling

8. Explain and demonstrate how any necessary field equipment will be distributed and used. Provide that equipment to each chaperone to distribute to their small group of students.

9. Line up at the door and remind students that they are naturalists. How do naturalists behave outside? (respectful, quiet, in the moment, etc.)

10. Start by demonstrating how to do a contour sketch and allowing them time to do one in their journals. Lead a brief discussion on what they discovered about themselves and journaling from this exercise. (it captures the essential quality of the subject; it makes you slow down and observe more carefully; journaling is about the process or journey not the product or destination)

11. Conduct the chosen field activity. Move from group to group to provide assistance and answer questions. Model good naturalist behavior for them to follow.

Nature Journaling Procedure

A. Encourage students to use their powers of observation to look slowly and closely.
B. Prompt them with questions to help them truly perceive (notice using senses, especially something others miss): What do you notice? What does it remind you of? Is there a mood? What does it mean? What does it make you wonder about? What questions do you have about it?
C. Record your own observations and data in your own field journal. Your example validates their journaling activity as important and demonstrates that learning is a lifelong pursuit.

12. Back inside, collect equipment and ask students to share their discoveries with each other in their small groups. Ask a few students in the class to share their discoveries with everyone.

13. Explain that naturalists usually use their nature journals as a source of information for polished writing or art. Ask students to think of one way they could use their journals to share their experience with someone who wasn't here today. Who will they share it with and how? Some possibilities include sharing it with a friend or relative by writing an email or letter, by making a card or picture. They might share with others at school by creating a mural, play, poem, story, or song.

14. Encourage them to keep going outside anywhere they are to explore and to use their journals; it is free and interesting and keeps them occupied. Thank them all for coming to the PWLC and invite them to return again.

Field Activity Options

Teachers choose one of the following options for their field activity and inform PWLC staff when booking.

Nature Journaling

Kindergarten – 2nd Grade

Topic	Field Activity	PWLC Materials
1. Snow crystals (December through March)	Observe falling snow crystals with hand lenses, describe, sketch, measure, and identify them	Hand lenses/loupes, microscopes, rulers, snow crystal charts
2. Wetland Invertebrates	Collect, examine, describe, measure, sketch, and release wetland "bugs"	Nets, hand lenses, bug boxes, colored pencils, keys/cards
3. Nature journaling sampler	Use several tools to aid in prairie wetland journaling such as hand lens, cloud chart, view finder, compass, thermometer, and binoculars	Let's Go Outside backpacks
4. Nature detectives (December through March)	Search for evidence of animals, describe, sketch, infer, and tell a story about what happened	
5. Weather Trek	Practice using a thermometer, ruler or meter stick; record data and sky observations	Thermometers, rulers, meter sticks, cloud charts
6. Patterns in Nature	Look for numbers, letters, and shapes in the prairie and wetlands	ABCs Naturally by Lynne Diebel and Jann kalscheur

3rd–6th Grades

Topic	Field Activity	PWLC Materials
1. Reading the land (December through March)	Search for evidence of animals, describe, sketch, infer, and tell a story about what happened	A Sand County Almanac, identification cards
2. Snow crystals (December through March)	Observe falling snow crystals with hand lenses, describe, sketch, measure, and identify them	Hand lenses/loupes, rulers, snow crystal charts
3. Winter ecology (December through March)	Measure and observe the snow pack, record temperatures, find and observe pond ice	Rulers, meter sticks, hand lenses, thermometers
4. Byrd Baylor – favorites OR celebrations	Listen to a story, then go outside to find and record your favorites or celebrations	Byrd Baylor book
5. Wetland Invertebrates	Collect, examine, describe, measure, sketch, and release wetland "bugs"	Nets, hand lenses, bug boxes, colored pencils, keys/cards
6. Mapping – sounds, colors	Make one or two maps of a wetland/prairie to depict colors/sounds	Colored pencils, compasses
7. Nature journaling sampler	Use several tools to aid in journaling such as hand lens, cloud chart, view finder, compass, and thermometer	Let's Go Outside backpacks
8. Sketching Nature	Practice various observation and art techniques such as sketching basics, contour sketching, gesture sketching, scribble sketching, view finding	colored pencils, view finders, clipboards, prairie plant brochures or wetland plant, ID cards
9. Weather Trek	Practice using thermometer, wind meter, compass, ruler or meter stick; record data and sky observations	Thermometers, wind meters, compasses, rulers, meter sticks, cloud charts

Nature Journaling

Weather Alternatives

Field investigations take place rain or shine. Everyone should dress appropriately for the weather. In the event of unsafe weather (lightning, high winds, extreme cold) or pouring rain, everyone must come indoors. PWLC staff make every effort to make your travel worthwhile despite the weather and prepare indoor, age-appropriate plans. PWLC staff welcomes teacher input into these plans. Some possible alternatives might include:

Go outside for a very short amount of time, even if only under the deck to conduct the chosen field activity if possible.

Bring plant/seed or aquatic invertebrate samples indoors for examination.

Use mounted specimens, furs, and/or skulls of birds and mammals.

Use latex animal tracks with ink pads to create stories.

Conduct a map scavenger hunt indoors. See 6th grade, fall lesson, "Mapping a Prairie Wetland."

Tour the exhibit area and watch prairie wetlands videos in the sod house theater with the objective of searching for birds, invertebrates, plants, or observing seasonal changes in the land and weather.

Staff-Led Adaptation

For younger students (K-2), modify the mini-lesson on nature journals by first asking what nature is and then what a journal is. Explain a few reasons why people keep a nature journal. Then continue on with getting ready to go outside, but leave their journals or papers in the classroom. Conduct the field activity and then return to the classroom. Ask students to draw a picture of their favorite thing they did or saw outside (or the most beautiful thing or the strangest thing, etc.). Chaperones can help children who cannot write by adding a few labels or a caption. Collect the papers and provide them to the teacher to bring back to school and make a class journal, each student's paper serving as a page in the journal. A cover can be created with a title such as, "Our Class Nature Journal of the Prairie Wetlands Learning Center." Display the class journal for visitors to see, such as parents during conferences, or send it home with a different student each week to share with families.

Teacher-Led Extensions/Adaptations/Assessment Ideas

· Conduct steps 2 through 4 of the *Nature Journaling Procedure* outlined above at school prior your visit. This will allow your students more time outdoors at the PWLC. Please inform PWLC staff when booking if you will be conducting the mini-lesson at school so staff can plan accordingly.

Students may wish to make and bring their own nature journal to use at the PWLC. See section, "Make a Nature Journal," for one possibility. To make a twig-bound journal, visit http://bringinguplearners.com/2008/01/28/homeschool-hacking-tips-make-your-own-nature-journal/.

· Read an excerpt from The Sense of Wonder by Rachel Carson, and then take a walk to find examples of wonders in nature. Record them in field journals.

· Visit the same place outside with your students on a regular basis, such as daily, weekly, monthly, seasonally, or annually. Record changes over time in journals.

· Explore your school grounds or local park together, and then sit in silence as students use their nature journals to complete a free write.

Nature Journaling

· Send journals home with students to make observations and discoveries in their yards. They can replicate a field activity done at school and/or at the PWLC, then compare and contrast results from each site.
· Periodically pair students up and have a journal exchange. Students read each others' journals to make new discoveries about how to journal and individualization. Provide prompts to guide discussion. Comments may be shared verbally or in writing.
· If cameras are available, use them in combination with writing and sketching. For example, using field notes recorded when journaling, write a poem to accompany a photo. Compare and contrast something that was both sketched and photographed.
· Draw connections to curriculum with nature journals. Link them to academic activities when possible such as for science concepts and vocabulary, spelling, writing (similes and metaphors, onomatopoeia, punctuation, adjectives, verbs, nouns), poetry, art, math (fractions, percents, mean, mode, median, measurements, benchmarking), local history, and data organization and interpretation.
· Explore the lives and writings of famous naturalists, role models for nature journaling. Some possibilities include Lewis and Clark, John Muir, Aldo Leopold, and Rachel Carson. Read biographies about them, dress like them, watch or listen to recordings of them, and most importantly, apply their ideas to student journaling.
· Use journal entries to produce polished work in creative writing, science, art, or music, key to preventing nature journaling from becoming a form of "busy work." Teaching how to use journals outside is a first step. Complete the process by allowing students to productively use it to share their discoveries with others, just as adult naturalists and scientists do. They might write reports, write and present speeches, create a class publication (field guide, newsletter, literary collection, phenology calendar, audio/video recordings), lead guided tours, organize a gallery display and reception, or hold a conference to share discoveries made through journaling. Some of these options would also be adaptable for web site publishing and class fundraisers complete with a book signing, public reading, or celebration.
· As a class, write a free-verse poem using observations from field journals. Each student writes one thought about their experience. Go systematically around the room and ask each student to read their thought aloud. Write each thought on a poster sized piece of paper on the wall. Each student reads the previous student's sentence and adds their own to it, building the poem. Each sentence gets written on the poster, but cover the preceding lines so only the previous sentence shows. Once each student's sentence has been read and recorded, then uncover the completed poem and read it aloud. Add photos or art if desired and display for others to enjoy.
· Read student journals regularly and provide written encouragement, questions, or further information.
· Allow students to evaluate their own journal. Provide prompts such as -- which entries are their favorites and why? Do they see patterns among the entries? What would someone reading their journal 100 years from now discover about them and their place?
· Grade certain journal entries using an assessment rubric and clear criteria.
· Give an open-journal quiz which bolsters incentive to make complete entries.
· Pair students with buddies to introduce journaling to younger students.

Nature Journaling

References and Resources Books and Web Sites for Adults

- A Sand County Almanac by Aldo Leopold
- Backyard Almanac, a 365-Day Guide to the Plants and Critters that Live in Your Backyard by Larry Weber
- By a Thousand Fires, Nature Notes and Extracts from the Life and Unpublished Journals of Ernest Thompson Seton by Julia M. Seton
- Field Notes on Science and Nature by Michael R. Canfield, editor
- Into the Field, a Guide to Locally Focused Teaching by Clare Walker Leslie, John Tallmadge, and Tom Wessels
- Jim Gilbert's Minnesota Nature Notes by Jim Gilbert
- Journal of a Prairie Year by Paul Gruchow
- Keeping a Nature Journal, Discover a Whole New Way of Seeing the World Around You by Clare Walker Leslie and Charles E. Roth
- Moon Journals: Writing, Art, and Inquiry Through Focused Nature Study by Joni Chancer and Gina Rester-Zodrow
- Nature Journaling, a Creative Path to Environmental Literacy, a Guide for Sinking Roots in Place and Branching Out Toward Environmental Literacy in Grades 4-8 by Kate Hofman
- One Square Mile, an Artist's Journal of America's Heartland by Cathy Johnson
- Project Bluestem, Neal Smith National Wildlife Refuge, U.S. Fish and Wildlife Service
- Rhythms of the Refuge, Horicon National Wildlife Refuge
- The Naturalist's Field Journal, a Manual of Instruction Based on a System Established by Joseph Grinnell by Steven G. Herman
- The Sense of Wonder by Rachel Carson
- Using Science Notebooks in Elementary Classrooms by Michael P. Klentschy
- "A Nature Journaling Guide: Fostering a Naturalistic Outlook" session presented by Kate Hofmann and Joe Passineau, University of Wisconsin-Stevens Point, at the North American Association for Environmental Education Conference, Biloxi, Mississippi
- "Folding Memories" by Janine Newhouse, Strides newsletter by Leopold Education Project, Winter 2006
- "Writing and Drawing in the Naturalist's Journal," by Joseph M. Dirnberger, Steven McCullagh, and Tom Howick. The Science Teacher, January 2005
- Teaching in the Outdoor Classroom educator workshop, Prairie Wetlands Learning Center, Dave Ellis, instructor
- How to Draw Birds for a Naturalist Journal, http://www.wildernesscollege.com/how-to-draw-birds.html
- Introduction to Nature Journals, http://www.smithsonianeducation.org/educators/lesson_plans/journals/index.html
- Keeping a Nature Journal, http://www.sierraclub.org/education/nature_journal.asp

Nature Journaling

- Make a Twig Nature Journal, http://bringinguplearners.com/2008/01/28/homeschool-hacking-tips-make-your-own-nature-journal/
- Nature Journaling, http://gnmparents.com/the-littlest-naturalists-part-iii-nature-journaling/
- The Field Book Project, http://www.mnh.si.edu/rc/fieldbooks/
- The Nature Journal as a Tool for Learning, http://www.newhorizons.org/strategies/environmental/matsumoto.htm
- Writing and Drawing in the Naturalist's Journal, http://www.nsta.org/store/product_detail.aspx?id=10.2505/4/tst05_072_01_38
- The Illustrated Nature Journal, a Handbook, http://www.pinicola.ca/jourbook.htm
- Wheels of Time and Place, http://partnersinplace.com/wheels-of-time-and-place

Books and Web Sites for Children

- By the Shores of Silver Lake by Laura Ingalls Wilder, excerpts from "The West Begins," "Shanty on the Claim," and "Where Violets Grow."
- Cloud Dance by Thomas Locker
- Draw and Color Insects by Walter Foster and Diana Fisher
- Everybody Needs a Rock by Byrd Baylor
- Guess Who My Favorite Person Is by Byrd Baylor
- I'm in Charge of Celebrations by Byrd Baylor
- Just a Seed by Wendy Blaxland
- Lewis and Clark, the Adventure in the West by Frank Burd
- Mouse and Mole and the All-Weather Train Ride by Doug Cushman
- My Nature Journal by Adrienne Olmstead
- Salamander Rain: a Lake and Pond Journal by Kristin Pratt-Serafini
- The Lewis and Clark Expedition, Join the Corps of Discovery to Explore Unchartered Territory by Carol A. Johmann
- The Nature Connection, an Outdoor Workbook for Kids, Families, and Classrooms by Clare Walker Leslie
- The Other Way to Listen by Byrd Baylor
- Weather Words and What They Mean by Gail Gibbons
- Where Does the Wind Blow? by Cindy Rink
- Nature journal template, http://www.sierraclub.org/education/nature_journal_template.pdfv

Credits

This field investigation was developed and written by Prairie Wetlands Learning Center Staff, U.S. Fish and Wildlife Service. Thanks to Prairie Science Class naturalist Tia Thysell for reviewing this lesson plan. Thanks to Dave Ellis, Prairie Science Class coordinator, for contributing to this lesson. Thanks to the following teachers for reviewing this lesson plan: Sarah Collins, home school parent/teacher, kindergarten and 2nd grade; Renee Larsen, 2nd grade, Fergus Falls; Kari Kreft, 2nd grade, West Central Area Schools; Vicki Hanneman, 3rd grade, Fergus Falls; Dorothy Droll, 5th grade, St. Henry's School, Perham; Stacy Lundquist, Battle Lake, 5th and 6th grade math and reading; Deb Strege, licensed teacher. Thank you to Mark Baldwin, Director of Education, Roger Tory Peterson Institute of Natural History, Jamestown, New York, for reviewing this lesson.

Third Grade Lessons

Discovery Hike

Unit – 1

Grade Level:
3rd

Time:
60-75 minutes

Season:
All

Objectives:
Students will be able to...

- Record observations about nature in a journal.
- Write personal thoughts about an experience in nature.
- Brainstorm and apply categories to guide the discovery hike.

Key Concepts:
- Outdoor Observation
- Species Identification
- Exploration

Materials:
- Nature journals
- Clipboards (if not using journals)
- Pencils
- Hand Lens (Optional)

Background & Summary

Nature is full of discoveries for students to make. During a semi-structured hike at DeSoto National Wildlife Refuge, students will use nature as a platform for making discoveries about the natural world.

Procedure

The following lesson is based on the question: What kinds of wildlife live at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. In the classroom, ask students what they can lean about nature. they will become Naturalists, working to find wildlife. Make a list on the board of their predictions of what wildlife they may find outdoors.
   Prompt discussion by asking: What clues can wildlife leave behind to let us know they were here? Tracks, scat, nests, feathers/fur, etc.
   Which senses can we use to make observations? Hearing & Sight
   Where should we look for wildlife or find signs of them?
2. Inform students that their mission is to investigate the trails to answer that question: What signs of wildlife are at DeSoto? using their best observational skills, have students choose three to four senses to use on their hike, such as smell, touch, sight, and hearing.
3. Have students flip to the next blank page in their journals or where the teacher would like the lessons work on.

How to Use Senses in Nature.



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Procedure (Continued)

Journal Page Setup

Set up the heading with:
- Date
- Location
- Time
- Weather

Split the remaining portion of the page into quadrants.

Label each with a sense for observations and the page bottom is a special observation area.

4. Using the "Journal Page Setup" on the left, guide students through creating a chart. Include relevant data like the *title*, *date*, *location*, and at least *2-3 words about the day's weather*.

5. Explain to students that they will compile a tally chart to keep track of their data. Review what a tally chart is and outline possible examples and how best to record them. *Example: If 6 birds fly over- demonstrate how to record the birds in the sight column by what bird category they are in: waterfowl, songbird, etc.*

6. Inform students that when they come back inside, they will use this chart to share their observations with the group.

7. Check for understanding and answer any questions.

8. Before heading outside, remind students how they should behave in order to successfully complete their mission (calm, quiet, observant).

Hike/Data Collection

9. Hike Green Heron Trail and assist students in spotting wildlife and identifying signs.

10. Keep your own journal page along the way, tallying as you go and informing students of what you are doing to keep them on task. Students will be given a hand lens to aid their observations.

11. Once back in the class-room, instruct students to **sum** each category and circle the total in each of the four boxes. Let students know their results may vary from their neighbors.

(See "Completed Tally Chart" image). Discuss results in pairs or as a group.

Extensions

12. When back in the classroom have students write a short essay about their experiences.

13. Have the students complete another discovery hike near their school. How does it different from that of their at DeSoto? How is it the same?

Vocabulary Blurb:
Observation: a remark, statement, or comment based on something one has seen, heard, or noticed.

Vocabulary Blurb:
Exploration: the action of traveling in or through an unfamiliar area in order to learn about it.

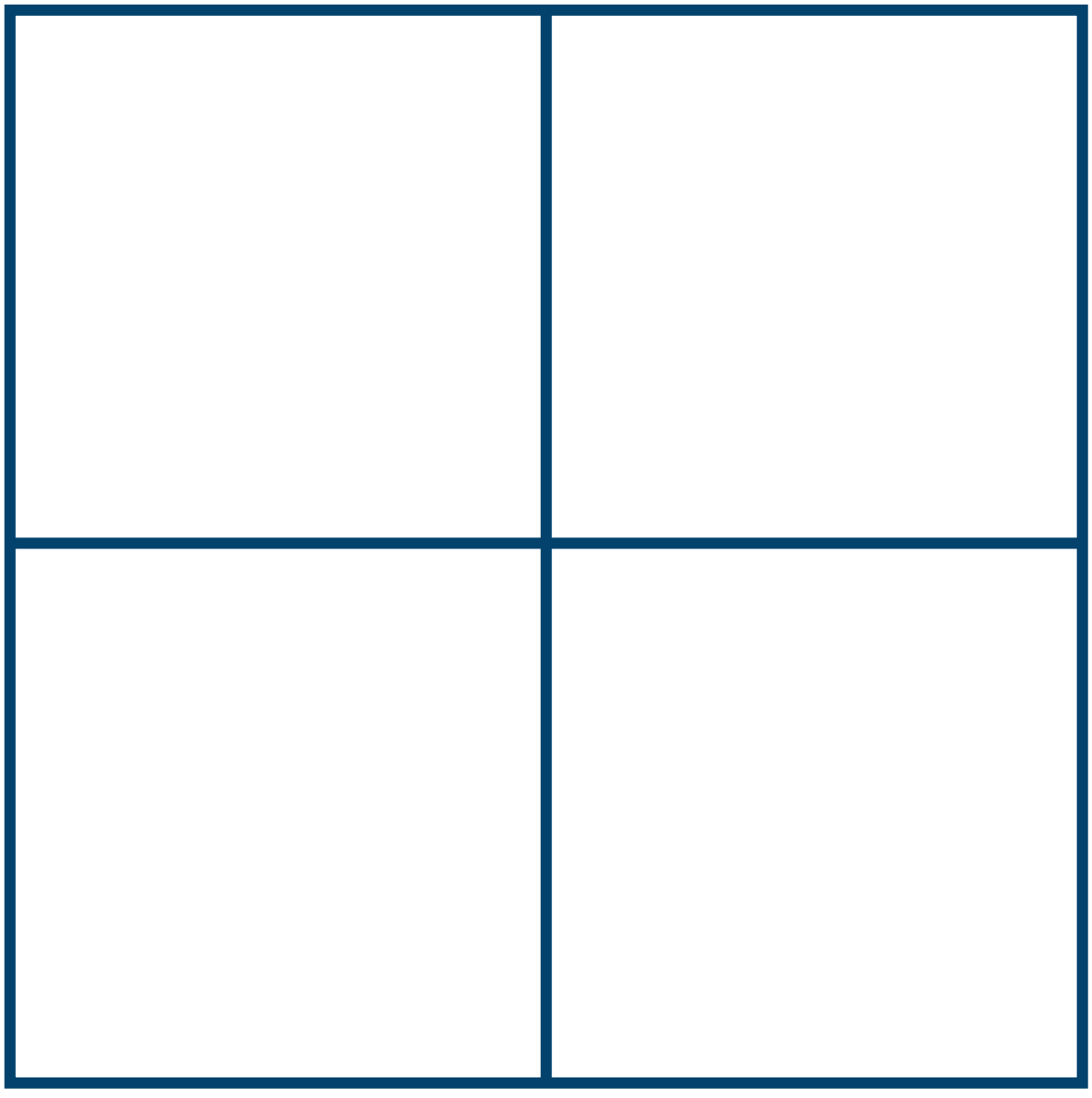
Discovery Hike Nature Journal Sheet

Date

Time

Location

Weather



Special Findings

Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

National Wildlife Refuge – an area designated to help protect and conserve wild animals and their habitats.

Prairie – a type of habitat with mostly grasses, but also flowering plants and occasional shrubs or few trees.

Wetlands – a type of habitat where standing water covers the soil or an area where the ground is very wet.

Track – the imprint left behind in soil, snow, mud, or other ground surfaces that an animal walks across.

Scat – what animals leave because they all must eat and then get rid of their waste - poop!

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

3.1.1.c Select and use equipment correctly and accurately
3.1.1.e Collect and organize data
3.1.1.g Share information, procedures, and results with peers and/or adults
3.1.1.h Provide feedback on scientific investigations

3. Life Science

3.3.1.a Compare and contrast characteristics of living and nonliving things

4. Earth and Space Sciences

3.4.3.b Observe, measure, and record changes in weather (temperature, wind direction and speed, precipitation)

7. Interdependent Relationships in Ecosystems

3.7.2.c Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, some cannot survive at all.
3.7.2.d Make a claim about the merit of a solution to a problem caused when the environment changes and they types of plants and animals that live there may change.
3.7.2.e 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.

English Language Arts

Reading Prose and Poetry

LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.
LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.

Reading Informational Text

LA.3.RI.1 Identify the central idea and explain how key details support that idea.
LA.3.RI.2 Explain the relationship between individuals, historical events, scientific ideas or concepts, or steps in a process.
LA.3.RI.3 Determine and explain the author's purpose in an informational text.
LA.3.RI.7Compare and contrast topics and/or patterns of events in a range of informational texts.

Vocabulary

LA.3.V.1.a Use sentence-level context clues to determine the meaning of a word or phrase.
LA.3.V.2.a Distinguish between literal and nonliteral meanings of words and phrases in context (e.g., take steps).
LA.3.V.2.b Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful).
LA.3.V.2.c Distinguish nuances of meaning between related words that describe states of mind or degrees of certainty (e.g., believed, suspected).

Writing

LA.3.W.6.e Practice safe and ethical behaviors when communicating and interacting with others digitally (e.g., safe information to share, utilize appropriate sites and materials, appropriate language use, respect diverse perspectives).

Color Mapping

Unit – 2

Grade Level:
3rd

Time:
60-75 minutes

Season:
All

Objectives:
Students will be able to...

- Recognize colors and color variations in the outdoor environment.
- Record color observations in a journal.
- Use careful observations to identify and record subtle color observations not noticed during a quick run through nature.

Key Concepts:
- Outdoor Observation
- Color Identification
- Exploration

Materials:
- Nature journals
- Pencils

Background & Summary

Colors in nature are vibrant and can be an exciting way for children to starting making observations and connections with the natural world. By using nature as an authentic learning environment, students will learn to observe and record colors.

Procedure

The following lesson is based on the question: What kinds of colors are present in the landscape at DeSoto National Wildlife Refuge currently*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students bring nature journals to all outdoor lessons. Students open to the next open page and title the page “Color Map”
2. Students write their data line at the top of the page including day, time, location and weather. This will help students at the end of the year when they look at trends throughout the year.
3. Ask students what colors they often see in nature? What do the colors mean? Are colors different in different natural environments? Do colors in nature vary depending on the season? Are the sizes of the plants different? Will the color and size give them an advantage? Can the location of the color help this?
4. Have students make color observations about the area around where they are sitting. Encourage students to be more detailed in their descriptions using specific terms or more detailed color descriptions (i.e. Kermit the Frog green, dark brown at the bottom of the tree becoming lighter brown as the tree grows higher). Introduce the idea of different shades of colors and categorizing different shades.
5. Explain the journaling procedure. Students will sit in a location assigned by a teacher quietly to observe and record colors they see. The students will put a dot in the middle of their journal page to signal where they are sitting. This will allow them to pinpoint on the journal page where they see each color. There are three options of journaling.

Comparing Descriptive Colors.

Sunshine Yellow | Lemon Yellow | Dandelion Yellow

Procedure (Continued)

6. Students can use colored pencils to illustrate colors, using descriptive language to describe color differences and shades or they can create a key with a letter code for each color (i.e. DB is dark brown and SY is sand yellow).
7. Take students to the predetermined location. Set them along the trail so they are far enough to not be able to talk to each other comfortable. The length of the observation varies by age group. 15-20 minutes is a good guideline for third grade.
8. When the observation time is complete, gather students in a group to share discoveries. Sharing time is important for solidifying learning and helping students build confidence and public speaking skills.

Extensions

9. Have students write an essay detailing their experiences during their silent observation. For some students, this silence in nature is a new experience that could lead to really interesting journal entries.
10. Repeat the color map activity near your school. How does it differ from the color map at DeSoto National Wildlife Refuge?

Vocabulary Blurb:
Descriptive Color: colors that use comparisons to express the shade being observed.

Vocabulary Blurb:
Landscape: all the visible features of an area of countryside or land, often considered in terms of their aesthetic appeal.

Journal Page Setup

Set up the heading with:
- Date
- Location
- Time
- Weather

In the middle of the remaining space have students color in a small circle.

From the circle show students a example description color mapping on the worksheet.

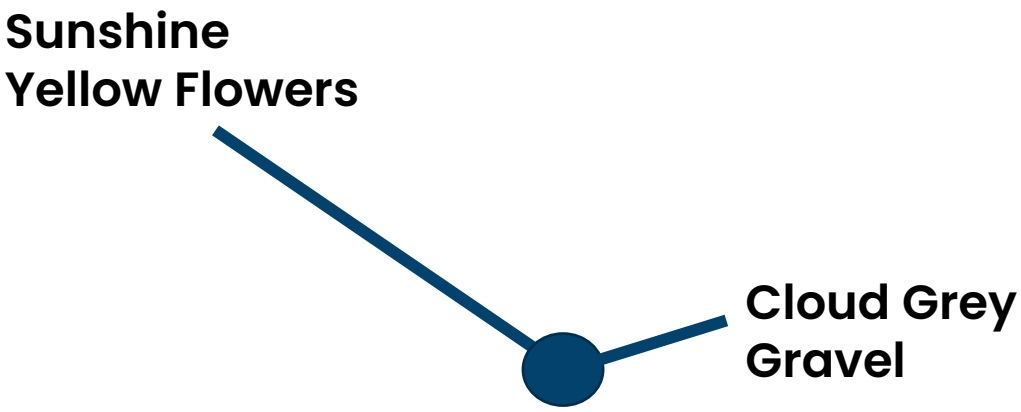
Color Mapping Journal Sheet

Date

Time

Location

Weather



Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

Descriptive– describing or classifying in an objective and nonjudgmental way.

Map – record in detail the spatial distribution of (something).

Color – the property possessed by an object of producing different sensations on the eye as a result of the way the object reflects or emits light.

Descriptive Colors – colors that have descriptors attached to them to better express and identify the hue, tone, and shade.

Naturalist– A person who studies nature, esp. by direct observation of animals and plants.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

3.1.1.c Select and use equipment correctly and accurately
3.1.1.d Make relevant observations and measurements
3.1.1.e Collect and organize data
3.1.1.g Share information, procedures, and results with peers and/or adults

9. Inheritance and Variation: Life Cycles and Traits

3.9.3.b Analyze and interpret data to provide evidence that plants and animals have traits inherited from their parents and that variation of these traits exists in a group of similar organisms.
3.9.3.c Use evidence to support the explanation that traits can be influenced by the environment .
3.9.3.d Use evidence to construct an explanation for how the variation in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

English Language Arts

Reading Prose and Poetry

LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.
LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.

Reading Informational Text

LA.3.RI.1 Identify the central idea and explain how key details support that idea.
LA.3.RI.2 Explain the relationship between individuals, historical events, scientific ideas or concepts, or steps in a process.
LA.3.RI.3 Determine and explain the author's purpose in an informational text.
LA.3.RI.7Compare and contrast topics and/or patterns of events in a range of informational texts.

Vocabulary

LA.3.V.1.a Use sentence-level context clues to determine the meaning of a word or phrase.
LA.3.V.2.a Distinguish between literal and nonliteral meanings of words and phrases in context (e.g., take steps).
LA.3.V.2.b Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful).
LA.3.V.2.c Distinguish nuances of meaning between related words that describe states of mind or degrees of certainty (e.g., believed, suspected).

Writing

LA.3.W.6.e Practice safe and ethical behaviors when communicating and interacting with others digitally (e.g., safe information to share, utilize appropriate sites and materials, appropriate language use, respect diverse perspectives).

Sound Mapping

Unit – 3

Grade Level:
3rd

Time:
60-75 minutes

Season:
All

Objectives:
Students will be able to...

- Recognize natural and unnatural sounds in the outdoor environment.
- Record sound observations in a journal.
- Identify the location and direction of sounds through careful observation.
- Categorize and describe sounds.

Key Concepts:
- Outdoor Observation
- Sound Identification
- Exploration

Materials:
- Nature journals
- Clipboards (if not using journals)
- Pencils

Background & Summary

Recognizing, categorizing and describing sounds are essential skills for child development. By using nature as an authentic learning environment, students will learn to observe, record and identify sounds.

Procedure

The following lesson is based on the question: What kinds of sounds are present at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students open to the next page in their nature journals and title the page "Sound Map."

2. Students write their data line at the top of the page including day, time, and weather. This will help students at the end of the year when they look at trends throughout the year.

3. Ask students if they hear a lot of sounds in their neighborhoods. What sounds are most common? What natural sounds do you hear the most? What would you like to hear? How do you think you could hear more sounds? What different sounds do birds make, or even animals? Can this be advantageous to them? How can it help with navigation, breeding, and protection?

4. Have students sit quietly during the introduction for one minute with their eyes close and count on their fingers all the natural sounds they hear. At the end of the quiet time, have students share their observations.

Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Journal Page Setup

Set up the heading with:
- Date
- Location
- Time
- Weather

In the middle of the remaining space have students color in a small circle.

From the circle show students a example sound mapping on the worksheet.

Procedure (Continued)

5. Explain the journaling procedure. Students will sit in a location assigned by a teacher quietly to observe and record sounds they hear. The students will put a dot in the middle of their journal page to signify where they are sitting. This will allow them to pinpoint on the journal page where they hear the sounds coming from. They are encouraged to draw lines if the sound is moving to illustrate the location and direction of the movement. Students will record sounds until time is called.

6. Take students to the predetermined location. Set them along the trail so they are far enough to not be able to talk to each other comfortably. This activity is best done in complete human silence. The length of the observation varies by age group. 15-20 minutes is a good guideline for third grade.

7. When the observation time is complete, gather students in a group to share discoveries. Sharing time is important for solidifying learning and helping students build confidence and speaking skills.

Extensions

1. Have students write an essay detailing their experiences during their silent observation. For some students, this silence in nature is a new experience that could lead to really interesting journal entries.

2. Repeat the sound map activity near your school. How does it differ from the sound map at DeSoto National Wildlife Refuge. How is it the same?

Vocabulary Blurb:
Sound Mapping: geographical maps that put emphasis on the sonic representation of a specific location.

Vocabulary Blurb:
Sound: vibrations that travel through the air or another medium and can be heard when they reach a person's or animal's ear.

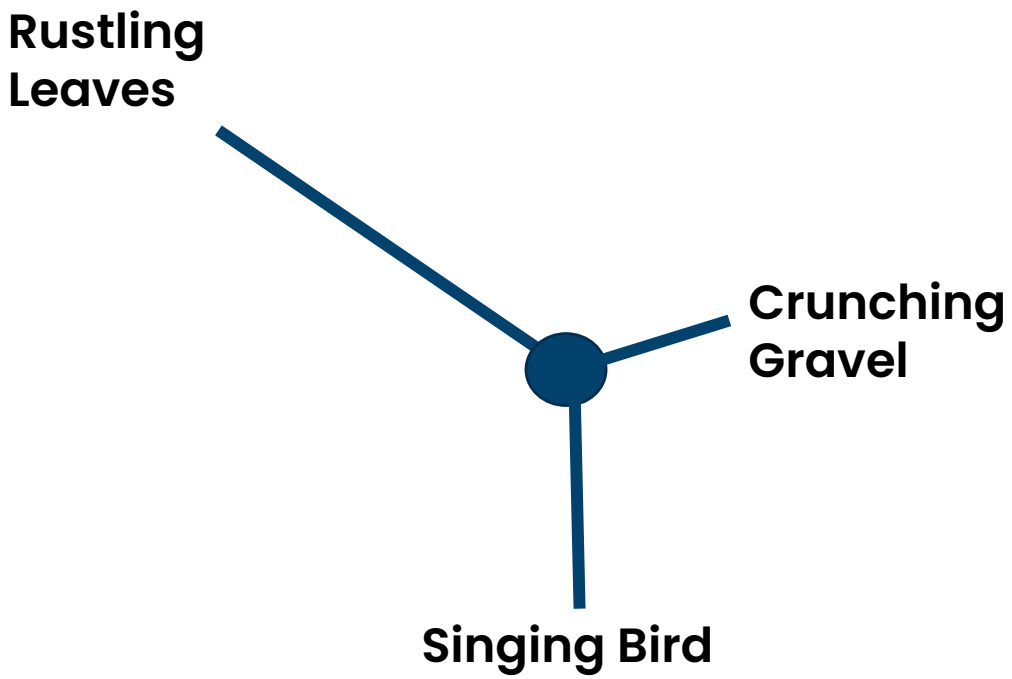
Sound Mapping Journal Sheet

Date

Time

Location

Weather



Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

National Wildlife Refuge – an area designated to help protect and conserve wild animals and their habitats.

Observation – a remark, statement, or comment based on something one has seen, heard, or noticed.

Environment – the surroundings or conditions in which a person, animal, or plant lives or operates.

Natural – existing in or caused by nature; not made or caused by humankind.

Surroundings – the things and conditions around a person or thing.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

3.1.1.d Make relevant observations and measurements
3.1.1.e Collect and organize data
3.1.1.g Share information, procedures, and results with peers and/or adults

2. Physical Science

3.2.3.a Recognize that sound is produced from vibrating objects; the sound can be changed by changing the vibration

7. Interdependent Relationships in Ecosystems

3.7.2.a Construct an argument that some animals form groups that help members survive.
3.7.2.d Make a claim about the merit of a solution to a problem caused when the environment changes and they types of plants and animals that live there may change.
3.7.2.e 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.

English Language Arts

Reading Prose and Poetry

LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.
LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.

Reading Informational Text

LA.3.RI.1 Identify the central idea and explain how key details support that idea.
LA.3.RI.2 Explain the relationship between individuals, historical events, scientific ideas or concepts, or steps in a process.
LA.3.RI.3 Determine and explain the author's purpose in an informational text.
LA.3.RI.7Compare and contrast topics and/or patterns of events in a range of informational texts.

Vocabulary

LA.3.V.1.a Use sentence-level context clues to determine the meaning of a word or phrase.
LA.3.V.2.a Distinguish between literal and nonliteral meanings of words and phrases in context (e.g., take steps).
LA.3.V.2.b Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful).
LA.3.V.2.c Distinguish nuances of meaning between related words that describe states of mind or degrees of certainty (e.g., believed, suspected).

Writing

LA.3.W.6.e Practice safe and ethical behaviors when communicating and interacting with others digitally (e.g., safe information to share, utilize appropriate sites and materials, appropriate language use, respect diverse perspectives).

Migratory Bird Exploration

Unit – 4

Grade Level:
3rd

Time:
60-75 minutes

Season:
All

Objectives:
Students will be able to...

- Use binoculars and other tools to view migratory birds.
- Record and sketch observations of migratory birds in nature journals.
- Demonstrate listening and observation skills.

Key Concepts:
- Outdoor Observation
- Migratory Birds
- Exploration

Materials:
- Nature journals
- Clipboards (if not using journals)
- Pencils
- Binoculars
- Spotting scopes.

Background & Summary

No occurrence in the Missouri River valley better symbolizes the change in seasons than the bird migration in the fall and spring. Birds are easily seen during migration and will provide a context for young students to begin to develop wildlife observation skills and recognize that nature changes throughout the seasons.

Procedure

The following lesson is based on the question: What kinds of migratory birds stop at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students bring nature journals to all outdoor lessons. Students open to the next blank page and title it “Fall Migratory Bird Exploration.”
2. Students listen to a short presentation about migration. Introduce the concept of migration and why it might be important for birds to migrate in the spring and fall. Students make connections between bird migration and a road trip. Birds need a resting and feeding spot for migration such as national wildlife refuges like we need a hotel and restaurant during a trip.
3. Instruct students how to set up the journal page. Complete the weather data line.
4. Demonstrate proper techniques for how to use binoculars. Have students practice bring binoculars to their faces while keeping view of an object in the distance.
5. Demonstrate proper spotting scope techniques and explain that the leaders will set up the scopes and they will look through them.

How to Observe Migratory Birds.



Procedure (Continued)

Journal Page Setup

Set up the heading with:
- Date
- Location
- Time
- Weather

Split the remaining portion of the page into quadrants.

Label each with a sense for observations and the page bottom is a special observation area.

6. Explain to students that detailed journal descriptions are important as we will try to match the descriptions to a bird guide at the end of the lesson today. Explain that students will be expected to sketch and describe four different bird species. Ask students to take note of traits that can help the birds on their migration and survival. What life cycle stage are some/ all of the birds at?

7. Observe birds from viewing gallery at visitor center.

8. Load bus and head out to observe migratory birds.

9. Over the course of two or three stops, students should be able to view a variety of migratory birds to possibly include mallards, northern pintail, green wing teal, pelicans, bald eagles and other species. For this lesson, focus should be on observing bird behavior and colors and not identifying the species.

10. Provide students with a simple bird guide with 6-8 species seen in the area recently. Have them try to match up their sketches and descriptions with the birds on the guide.

11. Allow focused time on the bus for students to record observations in their journals.

Extensions

12. Have students share their findings. Is there a large diversity of species? What are the differences in each species?

Vocabulary Blurb:
Observation: a remark, statement, or comment based on something one has seen, heard, or noticed.

Vocabulary Blurb:
Exploration: the action of traveling in or through an unfamiliar area in order to learn about it.

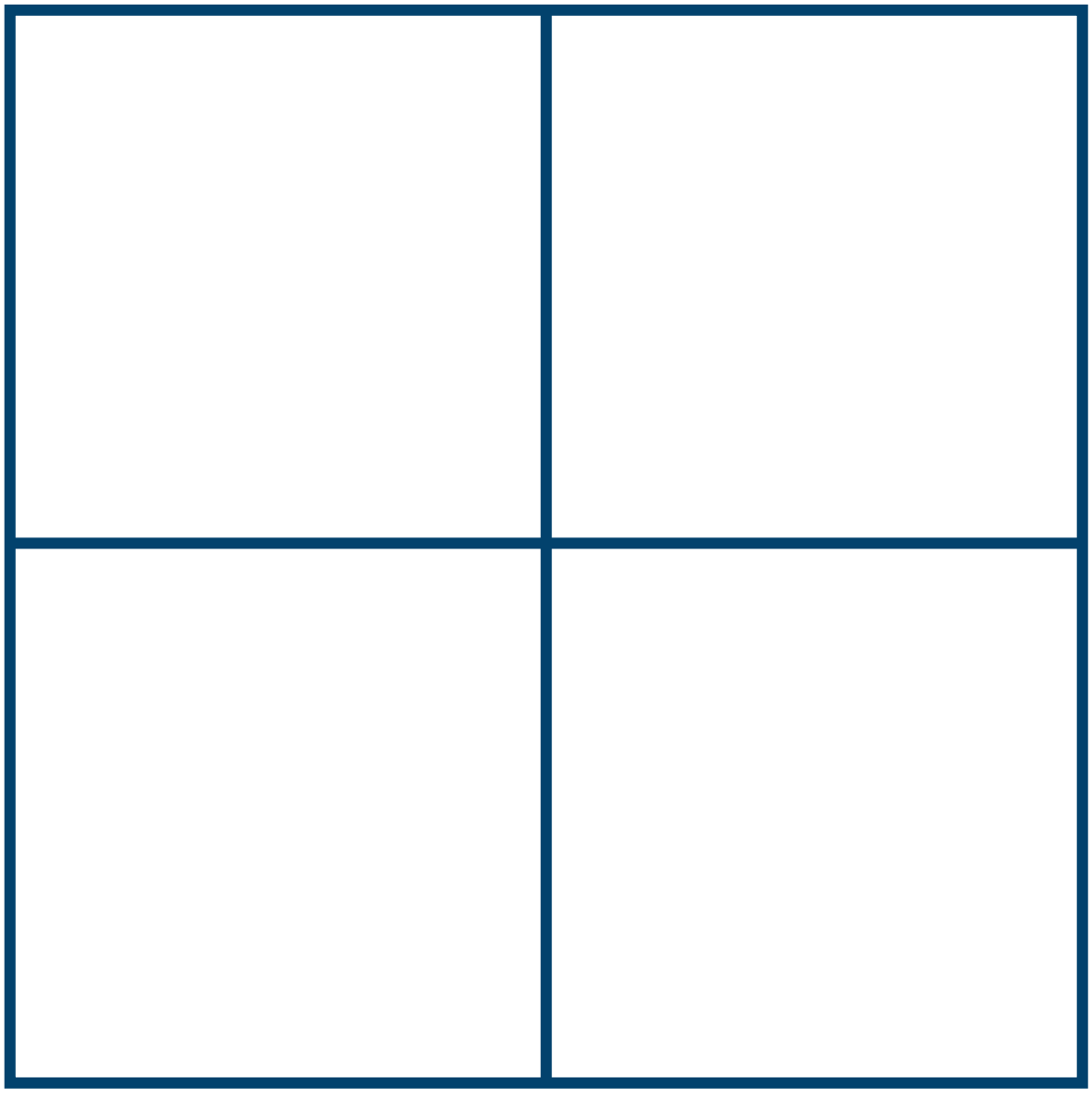
Migratory Bird Exploration Journal Sheet

Date

Time

Location

Weather



Special Findings

Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

National Wildlife Refuge – an area designated to help protect and conserve wild animals and their habitats.

Bird – a warm-blooded egg-laying vertebrate distinguished by the possession of feathers, wings, and a beak and (typically) by being able to fly.

Wetlands – a type of habitat where standing water covers the soil or an area where the ground is very wet.

Migration – seasonal movement of animals from one region to another.

Migratory Bird – a bird that travels from one place to another at regular times often over long distances.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

3.1.1.c Select and use equipment correctly and accurately
3.1.1.d Make relevant observations and measurements
3.1.1.e Collect and organize data

7. Interdependent Relationships in Ecosystems

3.7.2.c Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, some cannot survive at all.
3.7.2.d Make a claim about the merit of a solution to a problem caused when the environment changes and they types of plants and animals that live there may change.
3.7.2.e 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.

English Language Arts

Reading Prose and Poetry

LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.
LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.

Reading Informational Text

LA.3.RI.1 Identify the central idea and explain how key details support that idea.
LA.3.RI.2 Explain the relationship between individuals, historical events, scientific ideas or concepts, or steps in a process.
LA.3.RI.3 Determine and explain the author's purpose in an informational text.
LA.3.RI.7Compare and contrast topics and/or patterns of events in a range of informational texts.

Vocabulary

LA.3.V.1.a Use sentence-level context clues to determine the meaning of a word or phrase.
LA.3.V.2.a Distinguish between literal and nonliteral meanings of words and phrases in context (e.g., take steps).
LA.3.V.2.b Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful).
LA.3.V.2.c Distinguish nuances of meaning between related words that describe states of mind or degrees of certainty (e.g., believed, suspected).

Writing

LA.3.W.6.e Practice safe and ethical behaviors when communicating and interacting with others digitally (e.g., safe information to share, utilize appropriate sites and materials, appropriate language use, respect diverse perspectives).

Winter Exploration "Reading the Land"

Unit – 5

Grade Level:
3rd

Time:
60-75 minutes

Season:
All

Objectives:
Students will be able to...

- Use their senses to explore the winter environment.
- Document discoveries in a nature journal.
- Observe evidence of animals in winter and make guesses as to what the animals were doing.

Key Concepts:
- Outdoor Observation
- Species Identification
- Exploration

Materials:
- Nature journals
- Clipboards (if not using journals)
- Pencils

Background & Summary

Using an excerpt of Aldo Leopold's The Sand County Almanac students explore the winter environment and search for signs of animals. Students will learn to "read the land" for clues as to animal movements and winter survival strategies.

January Thaw By Aldo Leopold

"Each year after the midwinter blizzards, there comes a night of thaw when the tinkle of dripping water is heard in the land. It brings strange stirrings, not only to creatures abed for the night, but to some who have been asleep for the winter. The hibernating skunk, curled up in his deep den, uncurls himself and ventures forth to prowl the wet world, dragging his belly in the snow. His track marks one of the earliest datable events in the cycle of beginnings and ceasing which we call a year.

The track is likely to display an indifference to mundane affairs uncommon at other seasons; it leads straight across-country, as if its maker had hitched his wagon to a star and dropped the reins. I follow, curious to deduce his state of mind and appetite, and destination if any.

January observation can be almost as simple and peaceful as snow, and almost as continuous as cold. There is time not only to see who has done what, but to speculate why."

Procedure

The following lesson is based on the question: What kinds of wildlife live at DeSoto National Wildlife Refuge during the winter*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1.Explain what we are going to do outside today to observe animals and animal signs in winter.

How to Find Winter Observations.



Procedure (Continued)

Journal Page Setup

Set up the heading with:
- Date
- Location
- Time
- Weather

Split the remaining portion of the page into quadrants.

Label each with a sense for observations and the page bottom is a special observation area.

2. Winter allows us to come up with the stories of the animal tracks. It will allow us to make guesses about what the animal was doing, where it was going and why. The snow pack allows for a record on animal movements that gives us a better way to observe animal movements than other times of year. What changes occur in animals on the refuge to help them survive the winter? Observe changes in the animals and plants around them. What life cycle stage are they at?

3. Complete the weather data line for the journal entry.

4. Discuss with the students the three ways that animals survive the winter (migration, hibernation and adaptation). Have them think about what signs of animals we might see outside in the winter snow today.

5. Head outside to explore the winter environment. If you find good animal tracks, follow them across country to try and figure out where they are going.

6.Make observations of any signs of animals you see. Remind students to record these observation in their journals. Let nature be your guide and follow clues that you and your group see.

7. Lead a wrap up discussion that brings together observations made by the students and how animals survive the winter at DeSoto National Wildlife Refuge.

Hike/Data Collection

9. Hike Green Heron Trail or Cottonwood Trail and assist students in spotting wildlife and identifying signs.

10. Keep your own journal page along the way, tallying as you go and informing students of what you are doing to keep them on task. Students will be given a hand lens to aid their observations.

11. Once back in the class-room, instruct students to **sum** each category and circle the total in each of the four boxes. Let students know their results may vary from their neighbors.

(See “Completed Tally Chart” image). Discuss results in pairs or as a group.

Extensions

12. When back in the classroom have students write a short essay about their experiences.

13. Have the students complete another discovery hike near their school. How does it different from that of their at DeSoto? How is it the same?

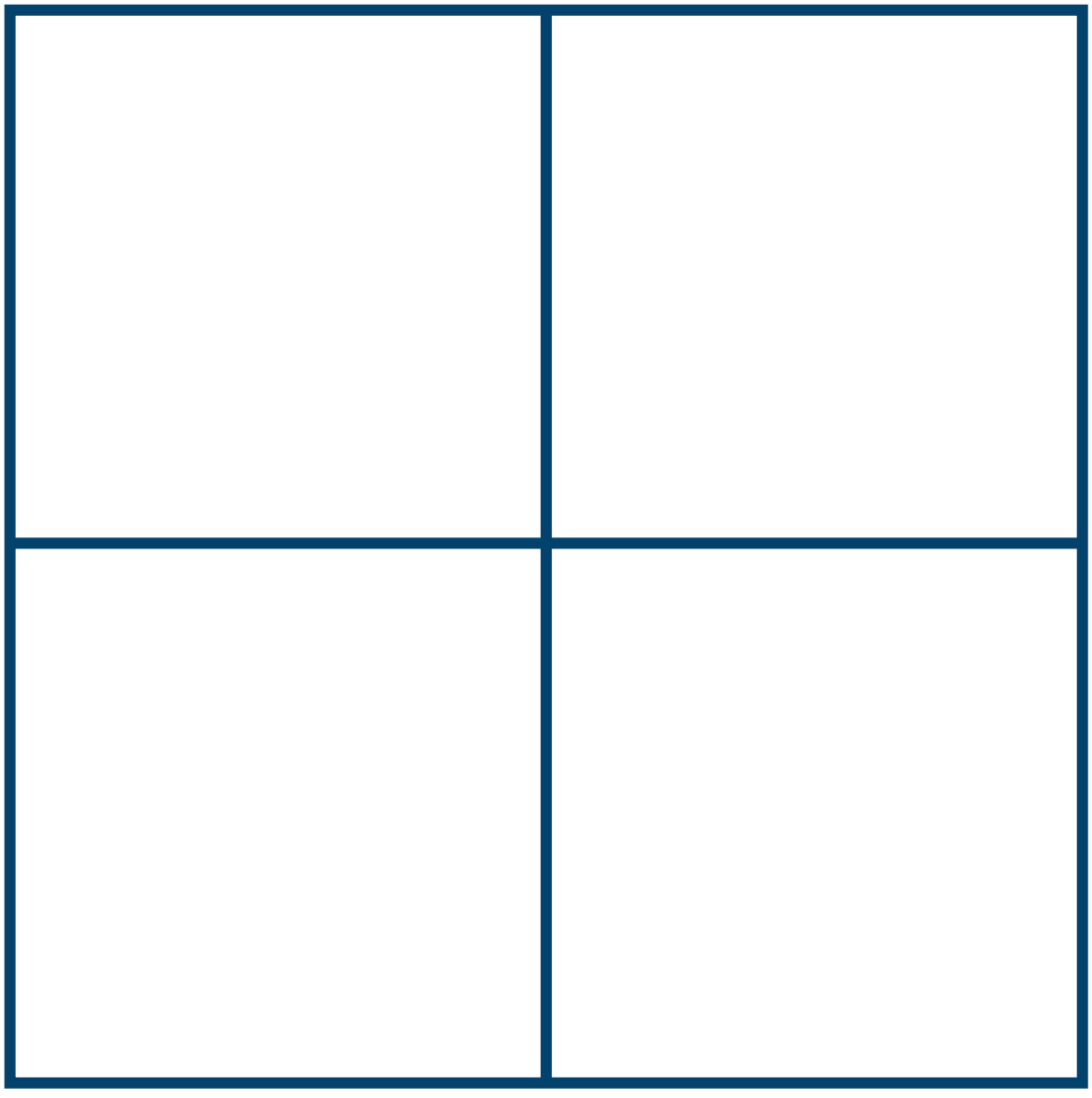
Winter Exploration Journal Sheet

Date

Time

Location

Weather



Special Findings

Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

Discover– find (something or someone) unexpectedly or in the course of a search.

Winter – the coldest season of the year, in the northern hemisphere from December to February and in the southern hemisphere from June to August.

Evidence – the available body of facts or information indicating whether a belief or proposition is true or valid.

Track – the imprint left behind in soil, snow, mud, or other ground surfaces that an animal walks across.

Scat – what animals leave because they all must eat and then get rid of their waste - poop!

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

3.1.1.c Select and use equipment correctly and accurately
3.1.1.d Make relevant observations and measurements
3.1.1.e Collect and organize data
3.1.1.g Share information, procedures, and results with peers and/or adults

7. Interdependent Relationships in Ecosystems

3.7.2.c Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, some cannot survive at all.
3.7.2.d Make a claim about the merit of a solution to a problem caused when the environment changes and they types of plants and animals that live there may change.
3.7.2.e 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.

9. Inheritance and Variation: Life Cycles and Traits

3.9.3.a Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproductions, and death.
3.9.3.b Analyze and interpret data to provide evidence that plants and animals have traits inherited from their parents and that variation of these traits exists in a group of similar organisms.
3.9.3.c Use evidence to support the explanation that traits can be influenced by the environment .
3.9.3.d Use evidence to construct an explanation for how the variation in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

English Language Arts

Reading Prose and Poetry

LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.
LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.

Reading Informational Text

LA.3.RI.1 Identify the central idea and explain how key details support that idea.
LA.3.RI.2 Explain the relationship between individuals, historical events, scientific ideas or concepts, or steps in a process.
LA.3.RI.3 Determine and explain the author's purpose in an informational text.
LA.3.RI.7Compare and contrast topics and/or patterns of events in a range of informational texts.

Vocabulary

LA.3.V.1.a Use sentence-level context clues to determine the meaning of a word or phrase.
LA.3.V.2.a Distinguish between literal and nonliteral meanings of words and phrases in context (e.g., take steps).
LA.3.V.2.b Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful).
LA.3.V.2.c Distinguish nuances of meaning between related words that describe states of mind or degrees of certainty (e.g., believed, suspected).

Writing

LA.3.W.6.e Practice safe and ethical behaviors when communicating and interacting with others digitally (e.g., safe information to share, utilize appropriate sites and materials, appropriate language use, respect diverse perspectives).

Spring Exploration

Unit – 6

Grade Level:
3rd

Time:
60-75 minutes

Season:
All

Objectives:
Students will be able to...

- Make careful observations about the natural world.
- Use environmental ideas as a context for descriptive and reflective writing.
- Students map a certain area based on its color and sound, applying observation skills.

Key Concepts:
- Outdoor Observation
- Species Identification
- Exploration

Materials:
- Nature journals
- Pencils

Background & Summary

Spring is a time of new discoveries. During this wetland investigation, students will explore aquatic macroinvertebrates. Aquatic macroinvertebrates help show a window on the diversity of wetland habitats and help students understand life cycles.

Procedure

The following lesson is based on the question: What kinds of wildlife live at DeSoto National Wildlife Refuge in the spring*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Meet the bus at the Cottonwood Trail. Lead a discussion about what cottonwood forests are and why the habitat occurs at DeSoto National Wildlife Refuge.
2. Set up a journal page for students to document 4 critters seen during the forest investigation. What point of the life cycle are the critters in? What advantages are they displaying to ensure their survival? Camouflage?
3. Divide the students into groups of 2 or 3. Make sure each group gets a viewer. Demonstrate how to use both the viewer.
4. Set parameter for investigation area.
5. Encourage students to take a close look at every log or stump to see if they can spot smaller critters. Encourage patience in the observations as this can lead to the best observations.

How to Find Spring Observations.



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Procedure (Continued)

6. The refuge staff person and teachers will circulate during the investigation time. The students will use field guides to identify insects.

7. Encourage the students to carefully identify the insects and count the number of species identified as part of the wrap up discussion.

8. Have students clean out equipment, hike back to parking lot and return the equipment.

Extensions

12. When back in the classroom have students write a short essay about their experiences.

1. What insects did your group identify today?
2. Based on what you have learned, why are forests important to animal life cycles?
3. What are some ways National Wildlife Refuges protect wildlife?

Vocabulary Blurb:
Observation: a remark, statement, or comment based on something one has seen, heard, or noticed.

Vocabulary Blurb:
Exploration: the action of traveling in or through an unfamiliar area in order to learn about it.

Journal Page Setup

Set up the heading with:
- Date
- Location
- Time
- Weather

Split the remaining portion of the page into quadrants.

Label each with a sense for observations and the page bottom is a special observation area.

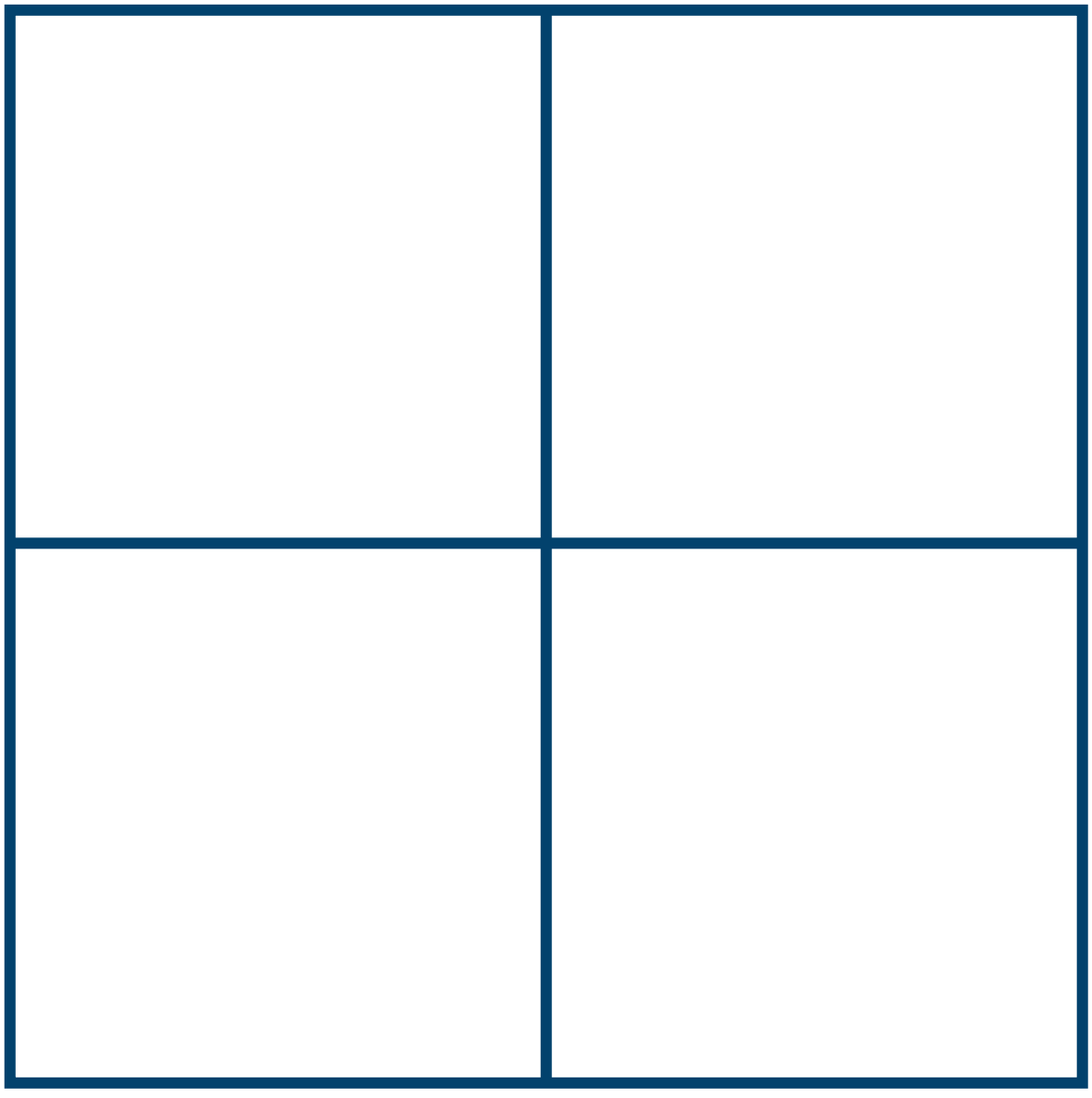
Spring Exploration Journal Sheet

Date

Time

Location

Weather



Special Findings

Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Forest- a large area covered chiefly with trees and undergrowth.

Insect– any small invertebrate animal, especially one with several pairs of legs.

Spring – a type of habitat with mostly grasses, but also flowering plants and occasional shrubs or few trees.

Cottonwood Forest – a large area covered chiefly with cottonwood trees and undergrowth.

Sound – the imprint left behind in soil, snow, mud, or other ground surfaces that an animal walks across.

Scat – what animals leave because they all must eat and then get rid of their waste - poop!

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

3.1.1.c Select and use equipment correctly and accurately
3.1.1.d Make relevant observations and measurements
3.1.1.e Collect and organize data

7. Interdependent Relationships in Ecosystems

3.7.2.c Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, some cannot survive at all.
3.7.2.d Make a claim about the merit of a solution to a problem caused when the environment changes and they types of plants and animals that live there may change.
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3.9.3.a Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproductions, and death.
3.9.3.b Analyze and interpret data to provide evidence that plants and animals have traits inherited from their parents and that variation of these traits exists in a group of similar organisms.
3.9.3.c Use evidence to support the explanation that traits can be influenced by the environment .
3.9.3.d Use evidence to construct an explanation for how the variation in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

English Language Arts

Reading Prose and Poetry

LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.
LA.3.RP.6 Explain what the text says explicitly and draw inferences when asking and answering questions.

Reading Informational Text

LA.3.RI.1 Identify the central idea and explain how key details support that idea.
LA.3.RI.2 Explain the relationship between individuals, historical events, scientific ideas or concepts, or steps in a process.
LA.3.RI.3 Determine and explain the author's purpose in an informational text.
LA.3.RI.7Compare and contrast topics and/or patterns of events in a range of informational texts.

Vocabulary

LA.3.V.1.a Use sentence-level context clues to determine the meaning of a word or phrase.
LA.3.V.2.a Distinguish between literal and nonliteral meanings of words and phrases in context (e.g., take steps).
LA.3.V.2.b Identify real-life connections between words and their use (e.g., describe people who are friendly or helpful).
LA.3.V.2.c Distinguish nuances of meaning between related words that describe states of mind or degrees of certainty (e.g., believed, suspected).

Writing

LA.3.W.6.e Practice safe and ethical behaviors when communicating and interacting with others digitally (e.g., safe information to share, utilize appropriate sites and materials, appropriate language use, respect diverse perspectives).

Fifth Grade Lessons

Refuge Introduction

Unit – 1

Grade Level:
3rd

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Identify behavior expected of students when at the refuge.
- Identify why National Wildlife Refuges were established.
- Identify what supplies and gear they will need during a refuge visit.

Key Concepts:
- Outdoor Observation
- Federal Lands
- Naturalists

Materials:
- Nature journals
- Pencils

Background & Summary

An in-classroom visit to introduce the students to the expectations they should follow during their visits and about DeSoto and Boyer Chute National Wildlife Refuges.

Procedure

The following lesson is based on the question: What is DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Greet students and ask them if they know what a National Wildlife Refuge is.

2. What are the main purposes and uses of National Wildlife Refuges?
   - We are there to protect wildlife and their habitat for future generations.
   - Big 6—Hunting, Fishing, Wildlife Observation, Wildlife Photography, Environmental Education, Interpretation.

3. Why were Desoto and Boyer Chute established:
   - Boyer Mission: was established to recover fish and wildlife habitat in and along the Missouri River and to restore essential wildlife habitat that became scarce after the river was "improved" for navigation half a century ago.
   - DeSoto Mission: was established to provide important stopover site habitat for migratory waterfowl that follow the Mississippi flyway.

4. What are the expectations we have for the students
   - Students will be respectful and listen while at the refuge
   - Students will be attentive and focused in on their lesson
   - Students will be understanding that they will be outside in a variety of weather conditions.

5. Supplies students will need while on the refuge:
   - Weather appropriate clothing
   - Their nature journal
   - Writing utensils
   - Their listening ears

Refuge Introduction Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

How am I expected to act at the refuge?

What supplies am I expected to have when visiting DeSoto NWR?

What are National Wildlife Refuges?

What are the Big Six uses of National Wildlife Refuges?

Why were DeSoto and Boyer Chute National Wildlife Refuges Established?

Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

National Wildlife Refuge – an area designated to help protect and conserve wild animals and their habitats.

Prairie – a type of habitat with mostly grasses, but also flowering plants and occasional shrubs or few trees.

Wetlands – a type of habitat where standing water covers the soil or an area where the ground is very wet.

Federal Lands – lands owned by the United States government for use by the American People.

Naturalist – a person who studies nature and especially plants and animals as they live in nature.

State or NGS Standards

Inquiry, the Nature of Science, and Technology Education

1. Inquiry, the Nature of Science, and Technology

5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.1.g Share information, procedures, and results with peers and/or adults
5.1.2.c Recognize many different people study science

13. Earth's Systems

5.13.4.c Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

Writing

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

Sense of Wonder

Unit – 2

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Identify naturalists as one type of naturalist.
- Describe three things a naturalist does (observes nature, record data, shared discoveries with others).
- List three qualities of naturalists (quiet, prepared, full of questions and wonder, in the moment, sharing, curious, respectful, observant, and patient).
- Search for and find wonder (such as beauty, surprise, awe, delight, joy) in the prairie.
- Practice being naturalists and consider the possibility that they are naturalists.
- Identify and enjoy the prairies as one place for exploration and exploring as a positive choice or activity.

Key Concepts:
- Outdoor Observation
- Exploration
- Naturalists

Materials:
- Nature journals
- Pencils
- Sense of Wonder by Rachel Carson

Background & Summary

This lesson is adapted from a field investigation lesson at Prairie Wetlands Learning Center in Fergus Falls, Minnesota.

Students are introduced to naturalists as scientists and to author Rachel Carson as one example of a naturalist. Students listen to an excerpt from a book by Rachel Carson called The Sense of Wonder. Then, using a data collection sheet, students go into the field to search for wonder. Afterwards, they share their discoveries and draw conclusions.

Procedure

The following lesson is based on the question: What is a naturalist*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Ask students to tell you what a naturalist is. What kind of job is that? (scientist)

2. What does a naturalist do? (observes nature, writes things down, shares discoveries with others, keys into what is happening in nature around them [ie. Loss of butterflies, etc.]) Record their answers on the white board as students record them in their notebooks. Are they naturalists?

3. Introduce the thought that humans alter the environment like the Missouri River and hold influence over natural systems to protect (Refuges, Parks, etc.), or negatively affect them (Pollution, Overhunting, etc.).

4. Ask students to tell you the qualities of a naturalist. How does a naturalist behave outside? Record a list on the white board and fill in any qualities they may have missed. A completed list included prepared, quiet, observant, patient, curious, respectful, full of wonder, inquisitive, in the moment, and sharing. Students should also record this list in their notebooks.

How to use senses in nature.



Procedure (Continued)

5. Briefly introduce Rachel Carson as a naturalist author (Silent Springs).

6. Set up a T-chart with the students to discuss the two kinds or definitions of wonder. Use student response to fill in both sides of the chart. Ask for examples of wonder questions for the left side of the chart (I wonder what's for dinner? I wonder what we're doing in science tomorrow?) Ask for examples of amazing things for the wonder-amazing side of the chart (Joe Mauer when he hits a homerun, my mother, a loon, a sunrise…)

7. Start a wonder word list for continuation during the reading. Wonder words are synonyms for "wonder" such as beauty, surprise and mystery.

8. Read the night sky section of The Sense of Wonder. See section, "Excerpt from The Sense of Wonder." Ask students to jot down any wonder words they hear; individual words which are synonyms for "wonder."

9. Invite students to join you on a search for wonder outside. Help them prepare their journal. At the top of their investigation page, they should write the title "Sense of Wonder." Be sure to include the date and the location. On the white board, model what their data sheet will look like by dividing the page into quadrants. Allow them to choose four wonder word from a list (such as joy, mystery, thrill, excitement, love, awe, surprise, beauty, delight) and title each quadrant with one of the four words. Instruct the students that they can write and/or sketch and label examples of those kinds of wonder in each quadrant.

10. Remind everyone that they are naturalists and should practice being naturalists in the field. How should they behave? (quiet, observant, patient, etc.) Allow for as much time as possible in the field. Move from group to group to answer questions, model good naturalist behavior, and remind students to record their wonder on their investigation sheets.

11. During outdoor time (which should be an hour or more), have students sit quietly and still for up to 15 minutes to observe nature. Space them about five meters apart from each other along a section of trail. This allows for personal reflection and a more intimate experience in nature without interference from classmates.

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:

- Awesome
- Beauty
- Surprise
- Big Question

Procedure (Continued)

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:

- Awesome
- Beauty
- Surprise
- Big Question

Extensions

12. Wrap up by asking a few students to share the wonder they found with the class. Reread the first paragraph of the excerpt and ask students to free write on their experience. (What if I never saw this before? What if I knew I would never see it again?). Ask a few students to share with the class. How can they be more open to sensing wonder? Ask them how or who they could share this discovery with when they return home? (Does your sense of wonder end when you leave? Encourage them to keep going outside anywhere they are to search for wonder; it is free and is a good, healthy choice of activity.

Vocabulary Blurb:
Investigation: to examine something to learn more about it.

Vocabulary Blurb:
Exploration: the action of traveling in or through an unfamiliar area in order to learn about it.

Excerpt from *The Sense of Wonder* by Rachel Carson

"Exploring nature....is largely a matter of becoming receptive to what lies all around you. It is learning again to use your eyes, ears, nostrils and finger tips, using your senses. For most of us, knowledge of our world comes largely through sight, yet we look about with such unseeing eyes that we are partially blind. One way to open your eyes to unnoticed beauty is to ask yourself. 'What if I had never seen this before? What if I
knew I would never see it again?'

"I remember a summer night when such a thought came to me strongly. It was a clear night without a moon. With a friend, I went out on a flat headland that is almost a tiny island, being all but surrounded by the waters of the bay. There the horizons are remote and distant rims on the edge of space. We lay and looked up at the sky and the millions of stars that blazed in the darkness. The night was so still that we could hear the buoy on the ledges out beyond the mouth of the bay. Once or twice a word spoken by someone on the far shore was carried across on the clean air. A few lights burned in cottages. Otherwise there was no reminder of other human life; my companion and I were alone with the stars. I have never seen them more beautiful: the misty river of the Milky Way flowing across the sky, the patterns of the constellations standing out bright and clear, a blazing plant low on the horizon. Once or twice a meteor burned its way into the earth's atmosphere.

"It occurred to me that if this were a sight that could be seen only once in a century or even once in a human generation, this little headland would be thronged with spectators. But it can be seen many scores of nights in any years, and so the lights burned in cottages and the inhabitants probably gave not a thought to the beauty overhead; and because they could see it almost any night perhaps they will never see it.

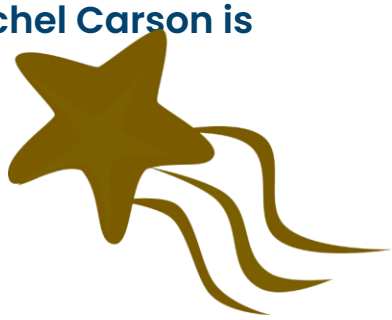
"An experience like that, when one's thoughts are released to roam through the lonely spaces of the universe, can be shared .....even if you don't know the name of a single star. You can still drink in the beauty, and think and wonder at the meaning of what you see."

Sense of Wonder Reading

"It occurred to me that if this were a sight that could be seen only once in a century or even once in a human generation, this little headland would be thronged with spectators. But it can be seen many scores of nights in any years, and so the lights burned in cottages and the inhabitants probably gave not a thought to the beauty overhead; and because they could see it almost any night perhaps they will never see it.

"An experience like that, when one's thoughts are released to roam through the lonely spaces of the universe, can be shared .....even if you don't know the name of a single star. You can still drink in the beauty, and think and wonder at the meaning of what you see." -Rachel Carson, *A Sense of Wonder.*

Looking at this excerpt, what do you think that Rachel Carson is trying to tell you about observations and nature?



How do you think that you can apply her advice in your everyday routine (such as on your way to school or during recess)?

Sense of Wonder Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Sketches and Notes:

I now know:

Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Wildlife - wild animals that live free of humans.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

National Wildlife Refuge – an area designated to help protect and conserve wild animals and their habitats.

Prairie – a type of habitat with mostly grasses, but also flowering plants and occasional shrubs or few trees.

Wetlands – a type of habitat where standing water covers the soil or an area where the ground is very wet.

Track – the imprint left behind in soil, snow, mud, or other ground surfaces that an animal walks across.

Scat – what animals leave because they all must eat and then get rid of their waste - poop!

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.1.g Share information, procedures, and results with peers and/or adults
5.1.2.c Recognize many different people study science

3. Life Science

5.3.1.c. Make observations and measurements to identify materials based on their properties

13. Earth's Systems

5.13.4.c Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

English Language Arts

Reading Prose and Poetry

LA.5.RP.3 Describe how a narrator or speaker's point of view influences the meaning of a literary text.

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

State or NGS Standards

English Language Arts

Writing

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

Native Prairie Exploration

Unit – 2

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Identify two grass and four flower species.
- Sketch the nutrient cycle in the ecosystem.
- Sketch characteristics of flowers and grasses.
- Use senses to help identify characteristics of grasses and flowers.
- Be able to identify plant growth materials and their location.
- Analyze interactions of the plants, air, and ground.

Key Concepts:
- Outdoor Observation
- Native Prairie
- Nutrient Cycles
- Plant Anatomy

Materials:
- Nature journals
- Pencils
- Flower ID Guides
- Frames
- Soil Pit
- Measuring Stick

Background & Summary

Native prairie is a vibrant and disappearing ecosystem. In Nebraska, less than one percent of the native prairie remains. This ecosystem is home to many native plants and animals and plays an important role in the life cycles of many migratory birds. In this lesson, student will make discoveries about the prairie at DeSoto National Wildlife Refuge.

Procedure

The following lesson is based on the question: What native prairie species occur at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Greet students ask them what they know about native prairie.

2. Present short talk about native prairies and the prairie ecosystem. Emphasize plant and decomposer interactions and pollinator interactions within the system.

3. Introduce the field investigation to the students. Students will observing everything within a hoola hoop or wooden frame (i.e. soil moisture, plants, dead plants, bugs, etc.). They will be using guides given to them to identify the grasses and forbs. Have students sketch their findings in their journals (give Examples of field sketches).

4. Bring students together in field and ask what they have observed, ask if observed any interactions between the bugs, plants, dead plants, and soil.

5. Ask students how they think this helps create the materials plants need to grow, take a few answers and then explain. Ask what plants would be able to photosynthesize

Prairie Exploration



Procedure (Continued)

6. With the students thinking about the materials plants need to grow and what they have observed in the system introduce them to decomposers. Prompt this with the question: " Who here saw a bunch of dead grasses or plants with a bunch of bugs on them?". Explain the role of these insects as decomposers and how they break down dead materials and benefit the system.

7. Bring students to a soil pit and show the soil layers, narrowing in the focus to the organic layer where the most decomposition happens. Explain nutrient cycling and give the students bits of the soil to feel its moisture level and texture/graininess. Propose to them what type of soil would be best to grow in sandy soils like the beach or these soils.

8. Talk about how annual fires also recycle the nutrients and how this can manage for invasive species. Introduce them to the idea of fire ecology and how fire is an important to a prairie ecosystem.

9. Introduce the concept of transpiration by showing a bag tied to some prairie plants with condensations versus that of the wetland plants and trees.

Extensions

10. Have student write down their observations about what decomposers they have seen today or know of and how nutrients are cycled through the prairie.

11. Open discussion with the students as a group and have them share their discoveries.

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

Vocabulary Blurb:
Native Prairie: grasslands that are natural to the central United States.

Vocabulary Blurb:
Grasslands: Vast areas covered by different species of grasses and wildflowers.

Native Prairie Exploration Reading

"The first part of [the trail] is beautiful and surpassing anything of the kind I have ever seen. Large rolling prairies stretching as far as your eyes can carry you. The grass so green and the flowers of every description from violets to geraniums of richest hue." – *Elizabeth Keegan (12) Stories of Young Pioneers in Their Own Words, Violet T. Kimball*

"I think I shall never forget that long lonely day, waiting on that vast undulating prairie that stretched as far as the eye could reach, covered with grasses and flowers… It must have been a lovely scene that bright spring morning, but I hardly think it was appreciated by the little band that were bravely leaving home, friends, country, and kindred to take their toilsome march across the Rocky Mountains." – *Mary Jane Mount (9) Stories of Young Pioneers in Their Own Words, Violet T. Kimball*

Imagine you were one of these early pioneers exploring the prairies of DeSoto National Wildlife Refuge, write a journal entry with 6-8 complete sentences about the experience in your own words and experiences.

Native Prairie Exploration Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Native Flowers and Grasses Sketches and Notes:

I now know:

Native Prairie Exploration Journal Entry

Fill in the grid to represent the plants that you find in your frame.

What fraction of your frame is grasses? What is the fraction as a percentage?

What fraction of your frame is wildflowers? What is the fraction as a percentage?

What fraction of your frame is shrub? What is the fraction as a percentage?

What took up the most space in your frame?

Vocabulary to Know

Native – a species of plant or animal that originated in the specific ecosystem or area.

Prairie - a large open area of grassland, especially in the Mississippi River valley.

Nutrients - a substance that provides nourishment essential for growth and the maintenance of life.

Nutrient Cycle – the movement and exchange of organic and inorganic matter back into the production of matter.

Plants – a living organism of the kind exemplified by trees, shrubs, herbs, grasses, ferns, and mosses.

Plant Anatomy – a type of habitat where standing water covers the soil or an area where the ground is very wet.

Decomposition – the process of dead materials being broken down by decomposers in nature.

Prescribed Fire – controlled burns to native prairies to manage the amount of dead plant matter and to kill off invasive plant species.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.c Select and use equipment correctly and accurately
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data

3. Life Science

5.3.1.c. Make observations and measurements to identify materials based on their properties

8. Matter and Energy in Organisms and Ecosystems

5.8.2.A Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.
5.8.2.B Support an argument that plants get the materials they need for growth chiefly from air and water.
5.8.2.C Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment

11. Space Systems: Earth's Stars and Solar System

5.11.3.C Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

13. Earth's Systems

5.13.4.A Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5.13.4.c Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
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c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

State or NGS Standards

English Language Arts

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

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c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
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c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Mathematics

Numeric Relationships

5.1.1.c Round whole numbers and decimals to any given place.
5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Operations

5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction.

State or NGS Standards

Mathematics

Operations

5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
5.1.2.f Interpret a fraction as division of the numerator by the denominator.

Energy Cycles

Unit – 3

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Recognize on food chain that can occur between the wildlife living on refuge.
- Identify 1 producer, 1 consumer, 1 secondary, 1 tertiary consumer, and 1 decomposer.
- Illustrate the relationship lead poisoning and bioaccumulation through energy triangles.
- Identify the role the refuge has in protecting those food chains.
- Propose two reasons why it is important to protect ecosystems.
- Explain two ways animal behaviors change seasonally and between day and night.
- Understand the interaction of the biosphere. atmosphere, and geosphere in context to food chains (nutrients, photosynthesis, etc.).

Key Concepts:
- Food Chains
- Energy cycles
- Bioaccumulation
- Ecosystems
- Ecosystem roles

Materials:
- Nature journals
- Pencils
- Poker Chips
- Carp Parts?
- Morel Carving

Background & Summary

The natural world is a complex ecosystem made up of different levels of nutrient cycling and life cycles. This includes food chains, the interactions of organisms, the flow of energy, and the reaction to introductions and removals from these ecosystems.

Procedure

The following lesson is based on the question: What energy cycles occur at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Welcome students and ask if they know how energy flows through ecosystems. Introduce the students to producers, consumers, and decomposers. Explain to the students what each of these levels in the energy pyramid and then show the students the pyramid they will be filling in themselves. Explain to the students how they will also be creating their own food web. Show them a brief example of what a food web looks like.
2. Bring students to the bullhead inlet and ask them what they think the food web for the lake is. Introduce the students to what an invasive species is. What invasive species do they think we have in the lake at DeSoto. Explain to the students what happens when there is a invasive species in an ecosystem.
3. Talk about human interactions with the food web and how humans will fish. Ask who fishes and if they use sinkers on their lines. Talk to students about bioaccumulation and bring chips to demonstrate how lead poisoning accumulates through wetland ecosystems.

Energy Cycles



Procedure (Continued)

4. Bring students to the cottonwood and grassland trails, hike a minute while students fill in their worksheets. After a short walk, ask the students what they think will happen if one of the parts of their food web was removed. Does they system change or stay the same. Do animal behaviors change when the sun sets or rises? What about seasonally? (Circadian Rhythms)

Extensions

5. Wrap the lesson up by:

- Asking students what food chains they created.
- Getting examples of what producers, herbivores, consumers and decomposers they found.
- Ask what other examples could they find of invasive species near their houses.
- How can they help stop things like lead poisoning.
- What kind of food chain would they find in their backyard?

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:

- Awesome
- Beauty
- Surprise
- Big Question

Vocabulary Blurb:
Food Chain: a hierarchical series of organisms each dependent on the next as a source of food.

Vocabulary Blurb:
Energy Cycle: the interactions between energy sources within the Earth's environment.

Energy Cycles Reading

"Plants of course, are not the only focus of the refuge. As more prairie plants flourish, prairie animals are returning in greater and greater numbers. Bobcats, coyotes, badgers, skunks, deer, and the rare Indiana bat make their way through the woods and grasslands of the refuge. Everywhere you look, colorful birds forage or sing to attract mates. These include many grasslands species that were especially hard hit when prairies were destroyed, such as bobolinks, upland sandpiper, and Henslow's sparrow."—Sneed B. Collard III, The Prairie Builders, Reconstructing America's Lost Grasslands.

If you were in this prairie what animals do you think would be the apex predator (or tertiary consumer)? Explain why you think this.

Why is it important for the plants to flourish in prairie before all the other animals in the prairie will?

What do you think will happen one of these animals are removed from the ecosystem?

Energy Cycles Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Energy Cycles Notes:

I now know:

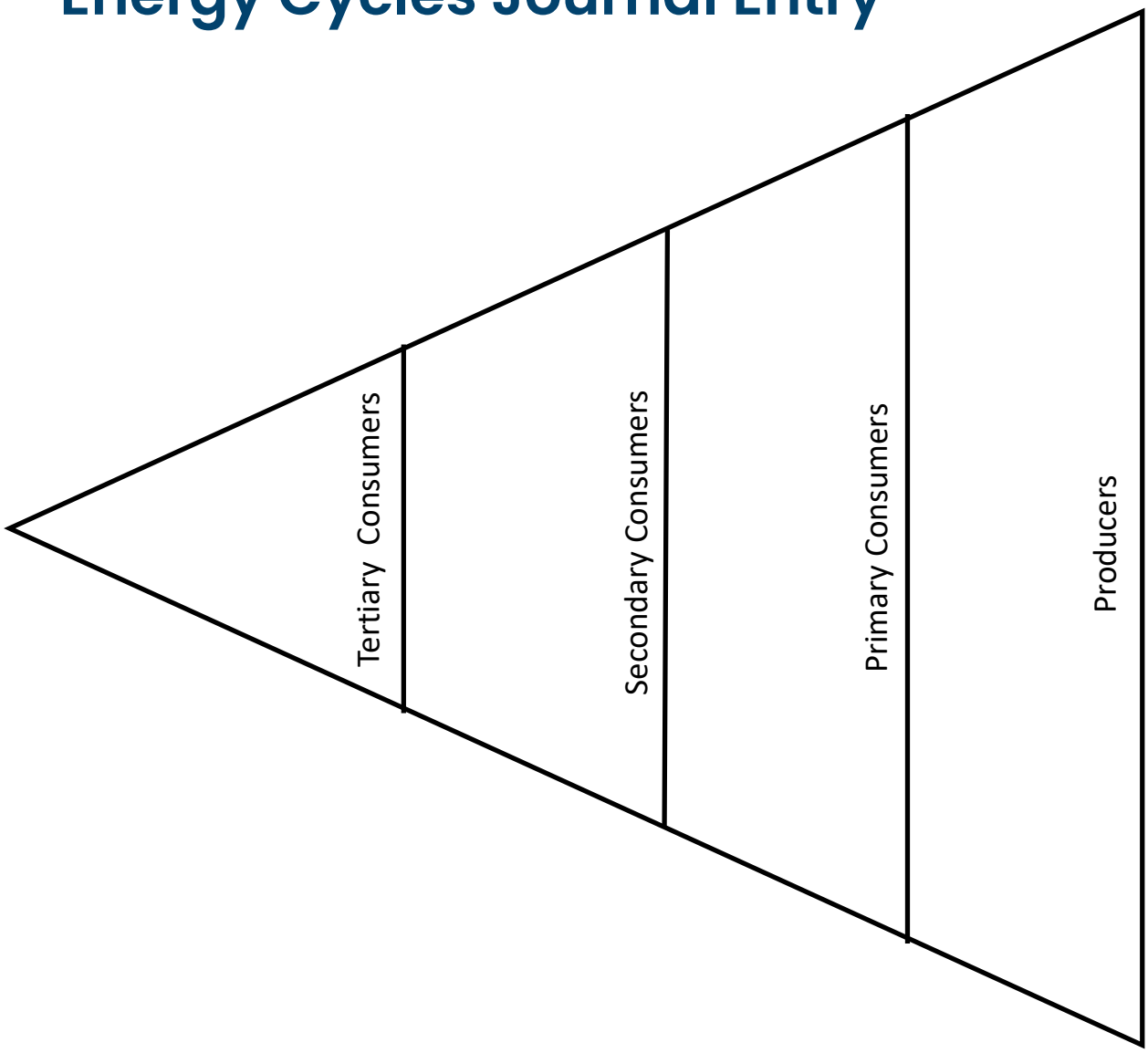
Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Energy Cycles Journal Entry



Food Chain

Vocabulary to Know

Bioaccumulation - gradual accumulation of substances, such as pesticides or other chemicals, in an organism.

Ecosystem - a biological community of interacting organisms and their physical environment.

Ecosystem Role – the function or role that an organisms plays in the ecosystem.

Interactions – the different ways organisms will effect each other.

Herbivore –an animal that feeds on plants.

Carnivore – an animal that feeds on other animals.

Omnivore – an animal that feeds on both plants and other animals.

Decomposition – the state or process of rotting; decay.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.a Ask testable scientific questions
5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.1.f Develop a reasonable explanation based on collected data
5.1.1.g Share information, procedures, and results with peers and/or adults
5.1.1.i Use appropriate mathematics in all aspects of scientific inquiry
5.1.2.a Recognize that scientific explanations are based on evidence and scientific knowledge

2. Physical Science

5.2.1.c Use appropriate metric measurements to describe physical properties

8. Matter and Energy in Organisms and Ecosystems

5.8.2.A Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.
5.8.2.B Support an argument that plants get the materials they need for growth chiefly from air and water.
5.8.2.C Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment

11. Space Systems: Earth's Stars and Solar System

5.11.3.C Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

13. Earth's Systems

5.13.4.A Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5.13.4.b Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
5.13.4.c Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.
a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.
a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

State or NGS Standards

English Language Arts

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

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c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

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b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Mathematics

Numeric Relationships

5.1.1.c Round whole numbers and decimals to any given place.
5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Operations

5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction.

State or NGS Standards

Mathematics

Operations

5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
5.1.2.f Interpret a fraction as division of the numerator by the denominator.

Analysis and Applications

5.4.2.a Use observations, surveys, and experiments to collect, represent, and interpret the data using tables (e.g., frequency charts) and bar graphs
5.4.2.b Formulate questions that can be addressed with data and make predictions about the data

Migratory Birds

Unit – 4

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Use binoculars and other tools to view migratory birds.
- Record and sketch observations of migratory birds in their nature journals.
- Demonstrate listening and observation skills.
- Recognize the importance of wetlands for migratory birds.
- Recognize that birds use the night sky and stars while migrating to and from DeSoto National Wildlife Refuge.
- Recognize that the stars change depending on when migration is occurring in the spring and fall for the birds.

Key Concepts:
- Migration
- Migratory Birds
- Astrology
- Wetlands

Materials:
- Nature journals
- Pencils
- Binoculars
- Birds of Nebraska Field Guide
- Migration Game

Background & Summary

DeSoto National Wildlife Refuge was established in 1958 as a sanctuary for migratory birds. In the spring and fall, DeSoto's wetlands host migratory bird population that use the refuge for resting and feeding. Refuge management aims to create conditions that allow the migratory birds to get the food and rest they need to complete their migration.

Procedure

The following lesson is based on the question: What kind of migratory birds visit DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Gather students in the auditorium and ask what they know about the fall migration at DeSoto. Ask what role wetlands play in the migration.
2. Use Migration to discuss the importance stopover sites like DeSoto to migratory birds. Ask if any of the students know how birds figure out when they need to migrate (Changes in temperature, food sources, and day length). Talk abut ways that the waters and wetlands are managed on the refuge to help promote use by migratory waterfowl.
3. Explain to the students that the migration patterns and routes that the birds follow are dependent on the night sky and the brightness of the stars. Explain further that these change depending on when the migrations occurs (Fall or Spring). The stars positions also change throughout the duration of the night.

How to Observe Migratory Birds

Procedure (Continued)

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

4. Explain to students that they will be observing the fall migration in a moment and journaling what birds they see, along with the wetland characteristics the birds are using/occupying (Eating aquatic plants, swimming, etc.) Have students fill in on their sheets what birds they think they will observe during our fall migration.
5. Divide into groups of two, hang out binoculars and give a quick tutorial on how to focus and use them.
6. Allow the students time to look at the migratory birds and explore the viewing gallery area at their own pace. If students aren't journaling, remind them that they are responsible for documenting their observations. Keep checking the spotting scopes to ensure they are pointing towards birds. This indoor area is used because the building acts as a viewing blind and allows the students a good chance to identify and study birds up close without flushing them from their positions.
7. Depending on the time available, take students out on the refuge on the bus or on nature hike to further observe and listen to the birds.

Extensions

8. The students will gather around again for a summary and review of what they learned, lead the discussion which will address the following:
- What types of species were you able to identify? How many?
- Would you be able to use the night sky to find your way home, let alone to another country or state?
- Why is DeSoto NWR important for migratory birds?
- What role does the refuge play in protecting wetlands for migratory birds?
- What fuels the birds for their trip to and from DeSoto NWR?
- How can the refuge staff manage for migratory birds on the refuge?

Vocabulary Blurb:
Migration: seasonal movement of animals from one region to another.

Migratory Birds Reading

"All over the world millions of birds set off on long, perilous migrations each year. Bird migration is a regular mass movement. Birds fly from winter homes to summer nesting areas in spring and make the return trip in fall. If you fallow these vast movements of wildlife, you can witness some of the greatest spectacles of the natural world. Even before the end of winter, flocks of blackbirds begin streaming into northern wetlands to feed and claim nesting territories. More species return in the early days of spring—ducks, killdeers, woodcocks, phoebes, and kinglets. As spring advances, the woodlands start to fill more as more and more birds join the procession. Flocks of thousands swarm into wetland refuges to feed and rest before continuing the journey.

Fall ushers in the second half of the spectacle. Now many of the migrants are less colorful. The brighter feathers that they wore on the mating season have been replaced by duller ones. And their numbers are greater; offspring that were born during the summer months are ready to join their parents on the return trip. About five billion land birds from five hundred different species leave their North American nesting areas to spend the winter further south.—Carol Lerner *On the WING: American Birds in Migration.*

If you were a migrating bird in the fall why might DeSoto National Wildlife Refuge be a place that you would need?

If you were a migrating bird what might be some perils you would run into while migrating?

Migratory Birds Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Bird Observations:

I now know:

Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Migratory Birds Journal Entry

Bird Fractions

What fraction of the birds you saw today would you say were geese?

What fractions of the birds you saw today would you say were songbirds?

What fraction of the birds you saw today would you say were ducks?

What fraction of the birds diets would you say is vegetation?

What fraction of the birds diet would you say is invertebrates?

What fraction of the birds diet would you say is seeds?

Vocabulary to Know

Migratory Birds- birds that will migrate from their breeding grounds in northern areas to their wintering grounds in southern areas.

Astronomy - the study of the sun, moon, stars, planets and other objects and phenomena in space.

Wetlands - land consisting of marshes or swamps; saturated land.

Waterfowl– ducks, geese, or other large aquatic birds, especially when regarded as game.

Navigation – the process or activity of accurately ascertaining one's position and planning and following a route.

Stop-over – a break in a journey.

Celestial Navigation – navigation by means of observations made of the apparent position of heavenly bodies.

Gravity – the force that attracts a body toward the center of the earth, or toward any other physical body having mass.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.a Ask testable scientific questions
5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.2.a Recognize that scientific explanations are based on evidence and scientific knowledge

8. Matter and Energy in Organisms and Ecosystems

5.8.2.A Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.

11. Space Systems: Earth's Stars and Solar System

5.11.3.A Support an argument that the gravitational force exerted by Earth on objects is directed down.
5.11.3.B Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
5.11.3.C Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

13. Earth's Systems

5.13.4.A Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5.13.4.D Define a simple design problem that can be solved by
applying scientific ideas about the conservation of fresh water on Earth.
5.13.4.E Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

State or NGS Standards

English Language Arts

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Mathematics

Numeric Relationships

5.1.1.c Round whole numbers and decimals to any given place.
5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Operations

5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction.

State or NGS Standards

Mathematics

Operations

5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
5.1.2.f Interpret a fraction as division of the numerator by the denominator.

Birding

Unit – 5

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Identify three bird species.
- Identify two bird species using a field guide and not using a field guide.
- Understand that gravity has a role to play in the different flight patterns of birds.
- Distinguish two nesting types of two different bird species.
- Recognize they can help provide feeding and nesting areas for birds at their homes.

Key Concepts:
- Nesting
- Bird Classifications
- Gravity
- Bird Species Identification

Materials:
- Nature journals
- Pencils
- Binoculars
- Birds of Nebraska Field Guide
- Bird Nest ID Guides

Background & Summary

Students will explore how different adaptions in different families of bird have changed their means of travel, as well as nesting and feeding habits. Students will take what they have learned and apply it to bird observation, while learning how they can help provide areas in their own backyards to benefit birds.

Procedure

The following lesson is based on the question: What kind of birds visit DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Greet students. Bring students into multipurpose room and hand out binoculars, bird books and birding worksheets. Explain to students what they will be observing while they are in the visitor center and how gravity can affect many of the birds they will be watching.
2. Students will be tasked with trying to identify and record down multiple different bird species they can see in the gallery in and around DeSoto Lake. While observing and identifying the birds' students should be thinking about why the birds are eating differently, travelling differently and then also nesting differently, i.e. differences between songbirds and waterfowl. (allow for 45 minutes)
3. Students will be brought back into the multipurpose room and ask them what their observations were and record them on the white board.
4. Using the results, you received from the students ask them what

How to Identify Birds

Procedure (Continued)

4. they think the more commonly identified species eat, where they nest, and why they travel the way they do (ie. On the water or flying in the sky).
5. Build off of the answers you were given by students and explain to them the different adaptions and behaviors that cause these birds to have different nesting and feeding habits as well as means of travel.
6. Leave off with the topic of nesting or bring the topic back to the forefront of the students minds by asking them how they think they can provide nesting habitat for songbirds at home. Give more background as to why putting out birdhouses are beneficial to songbirds.

Extensions

7. Summarize the lesson with students be asking the following questions:

- What types of birds did we see today in the viewing gallery?
- Where will you put your birdhouse at home?
- What other way do you think you can help birds throughout the year at home as a naturalist?

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

Vocabulary Blurb:
Nesting: building or occupying a nest.

Vocabulary Blurb:
Features: a distinctive attribute or aspect of something.

Birding Reading

"Curiously, however, in contrast to the migration of waterfowl, the passage of land birds, which creates such a stir om spring, is an event marked primarily by obscurity. The journey south in fall for small birds seems almost a filtering process rather than a great wave. Gradually, there seem to be fewer catbirds whining in the shrubbery. Some morning you may happen to notice that there are fewer Robbins in the lawn. Even the sprightly warblers that were so much a art of the spring migration pass through in dull un-distinguished plumage. If anything, there are more warblers now than there were in the spring, since the new crop of young is moving south too, but the presence of the tree leaves and the dull plumage keep them well hidden." -John Mitchell and the Massachusetts Audubon Society, The Curious Naturalist.

Why do you think you should participate in bird watching, even if you cannot identify the birds?

Why do you think that the warblers have dull plumage?

Birding Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Bird Observations:

I now know:

Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Bird Observations (Feeders)

Name:

Species of Bird:

Size (As big as):

Sparrow Robin Crow Hawk Eagle

Habitat Specific Location:

Ground Water Tree Trunk Branch In the Air Feeder

Behaviors Seen:

Flying Drinking Bathing Feeding Hopping

Perching Walking Swimming Other

How does the bird interact with gravity:

Choose <u>two</u> behaviors and explain what the bird was doing and why.

Behaviors:

1. 2.

Behavior Explanation 1:

Behavior Explanation 2:

Drawing:

Bird Observations (Lake)

Name:

Species of Bird:

Size (As big as):

Sparrow Robin Crow Hawk Eagle

Habitat Specific Location:

Ground Water Tree Trunk Branch In the Air Feeder

Behaviors Seen:

Flying Drinking Bathing Feeding Hopping

Perching Walking Swimming Other

How does the bird interact with gravity:

Choose <u>two</u> behaviors and explain what the bird was doing and why.

Behaviors:

1. 2.

Behavior Explanation 1:

Behavior Explanation 2:

Drawing:

Vocabulary to Know

Classification - a category into which something is put.

Adaptions - a change or the process of change by which an organism or species becomes better suited to its environment.

Conservation - the protection of nature, such as soil, water, or forests, from loss, pollution, or waste.

Gravity– the force that attracts a body toward the center of the earth, or toward any other physical body having mass.

Behavior – the way in which an animal or person acts in response to a particular situation or stimulus.

Species – a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

Identification – the action or process of identifying someone or something or the fact of being identified.

Observation – the action or process of observing something or someone carefully or in order to gain information.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.a Ask testable scientific questions
5.1.1.c Select and use equipment correctly and accurately
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.1.g Share information, procedures, and results with peers and/or adults

8. Matter and Energy in Organisms and Ecosystems

5.8.2.A Use models to describe that energy in animals' food (used for body repair, growth, and motion and to maintain body warmth) was once energy from the sun.
5.8.2.C Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

13. Earth's Systems

5.13.4.C Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

English Language Arts

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a
question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative
conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

State or NGS Standards

English Language Arts

Writing

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Natural Systems Interactions

Unit – 6

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Identify two agents of erosion and agents of chemical change.
- Analyze the effects of weathering.
- Explain ways depositions can help wildlife regain habitats they have previously lost.
- Explain that humans can alter naturally occurring processes.
- List two ways that refuge staff manages water on the refuge.

Key Concepts:
- Natural Systems
- Habitat Management
- Erosion and Weathering
- Anthropogenic Effects

Materials:
- Nature journals
- Pencils
- Ruler
- Soil
- Filtering Materials
- Jello Mix
- Boiling Water
- Tubes
- Clear Cup
- Potting Soil.

Background & Summary

During this lesson students will explore the interactions of the atmosphere, hydrosphere, biosphere, anthrosphere, and geosphere in forms of weathering, erosion and changes in animal behavior. They will determine the effects of the waters in river and lake on their shores, what humans do to increase these effects and how these changes can affect the wildlife and ecosystems around them.

Procedure

The following lesson is based on the question: What kind of system interactions occur at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Greet Students in Multipurpose room. Introduce to the students weathering and erosion. How do rocks break down? How can wind and water speed up this process. List different ways the soil and rock can break down on the refuge and in other parts of the country. Show the students how fast soil can break down under heavy rain vs that of vegetative soils (Have two pans, one with bare soil and the other with a patch of grass and soil. Run water down them). Introduce them to their interactions worksheet and how they are expected to fill it out.
    - Weathering: the breakdown of rocks at the Earth's surface, by the action of rainwater, extremes of temperature, and biological activity. It does not involve the removal of rock material. Three types: Physical, Chemical, and Biological.
    - Erosion: the process by which soil and rock particles are worn away and moved elsewhere by wind, water or ice.

How to Observe System Interactions

Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Procedure (Continued)

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

4. Once done explaining the worksheet introduce students to the idea of changes in animal behaviors during the changes in seasons. Explain hibernation, brumation, and habitat utilization. Explain the Jello experiment to the students. Have the students hide their "animals". File the students onto the bus to explore different locations on the refuge.
    - Jello Experiment: Give students jello mix in tubes and explain to them that they need to hide their tube or "animal" in a place where they could be properly protected from the cold. If they chose right the "animal" wouldn't turn into jello at the end of the experiment.
5. At DeSoto Lake, ask students what they thing caused the shores of the lake to break down (repetitive wave actions from boating, birds, and currents within the lake from releasing and letting in water). What will the shore look like if the waves were more aggressive or bigger in size? What affect do you think humans play a part in the wave action on the lake? What will the shore look like in a long time (sloped or cliff like)? How can humans manage the water to reduce erosion?
6. At the Missouri River Outlook show the students the shoreline, why do they think that the shore is so steep? Why is this different from the shore of DeSoto lake (differences in speed of water = harsher more aggressive erosion)? How do they think that the changes that humans have done to the river has changed how the water moves and weathers the shore. Is there more or less sediment deposited by the river daily now or when it wasn't straightened? What are the effects of flooding on the refuge. Are there more dead trees? What does this do for the wildlife? Look at the sediment deposition. How can this help the animals? Would this be good soil to grown new trees and plants in? If there was a heavy rainfall would they still expect the sediment to be there? Collect some sediment in a container or paper cup.

Procedure (Continued)

7. Explain to students the effects humans can have on waters and pollution. How do we manage for this? Ask them if we took that cup of soil from the river sediment vs that of another area of the refuge, which soil do they think would grow a bean plant faster? Have them write a hypothesis on the bottom of their journal entry.
8. When back at the refuge have students gather their "animals" on the way in. Why do they think their animal solidified or stayed liquid? Was their shelter sufficient enough to block out the cold weather and keep the animal warm?

Extensions

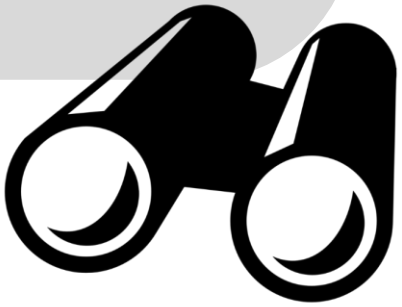
9. Summarize the lesson and ask the students:
    - What did they discover would be the best hide away for a hibernating or brumating animal?
    - What did they think of the erosion they saw on the refuge?
    - If the river wasn't managed or straighten how do they think the river shores and course would look like today?
    - Would animals have different behaviors in the weather during the summer?
    - Do they think that wind and rain could have the same effect on the shores and rocks on the refuge as the water has?

Vocabulary Blurb:
Erosion: the process of eroding or being eroded by wind, water, or other natural agents.

Vocabulary Blurb:
Weathering: the process of wearing or being worn by long exposure to the atmosphere.

Natural Systems Interactions Reading

"In recent decades bird-watchers in eastern North American realized that they were seeing fewer forest birds. Since many of these birds are long-distance migrants that spend the winter in Mexico and Central American, scientist look to Latin American to explain the decline.
They knew that the rainforest homes of many birds are being destroyed. To feed growing populations in Latin America, great sections of tropical forests are being cleared for farming. These forestlands are not very fertile, and after a year or two of cultivation the soils lose their nutrients. In days past farmers then moved on to new areas, and in time new trees grew on the abandoned farmland. Some kinds of birds returned, though not the species that make their homes in old forests.
But farming practices are changing. With the increasing use of fertilization, more cleared lands now become permanent cornfields or pastures for cattle. Very few kinds of birds live in agricultural fields." - Carol Lerner, On the Wing, American Birds in Migration.



What interaction do you see within this passage (Between the spheres, EX. Geosphere)? Explain why you see this interaction.

What interaction could you bring into the situations to create a more positive influence in the forests and farmlands to create better habitat for the migrating birds? Explain your answer.

Natural Systems Interactions Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Observations:

I now know:

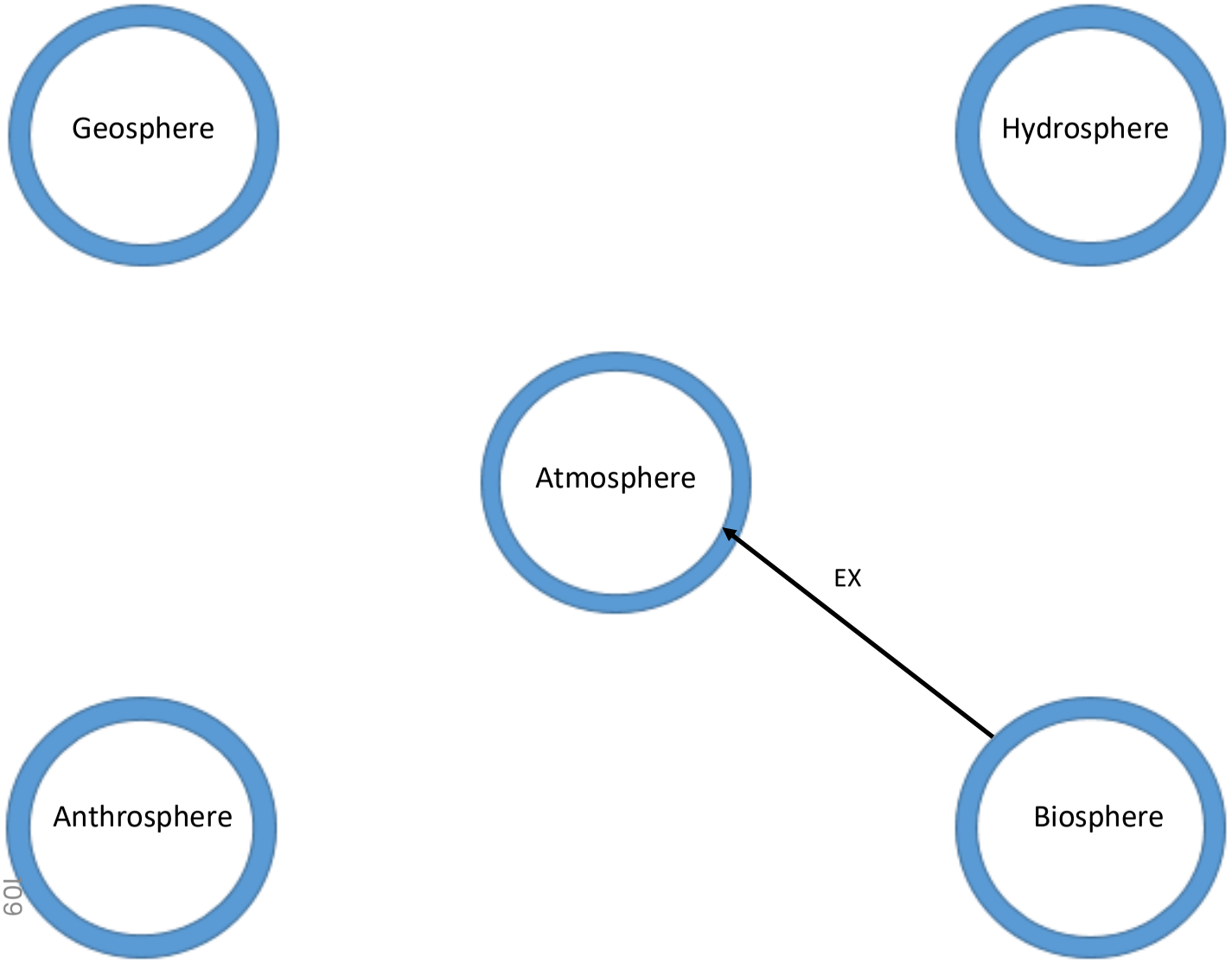
Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Interactions between the different spheres I saw at DeSoto NWR:



Label your interaction line with the letter below and write the interaction here:
EX: Animals breathe air to continue life processes.

A

B

C

D

E

F

G

H

I

J

K

Natural Systems Interactions Journal Entry

Vocabulary to Know

Chemical Change - when a substance combines with another to form a new substance chemically.

Deposition - the laying down of sediment carried by wind, flowing water, the sea or ice.

Habitat Restoration - the return of an ecosystem from a disturbed or altered condition to a close approximation of its ecological condition prior to disturbance.

Anthropogenic Effects – processes, objects, or materials are those that are derived from human activities.

Management – the process of dealing with or controlling things or people.

Interaction – the effect that a pair of organisms living together in a community have on each other.

Physical Weathering – the geological process of rocks breaking apart without changing their chemical composition.

Chemical Weathering – the erosion or disintegration of rocks, building materials, etc., caused by chemical reactions rather than by mechanical processes.

Biological Weathering – the weakening and subsequent disintegration of rock by plants, animals and microbes.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.a Ask testable scientific questions
5.1.1.c Select and use equipment correctly and accurately
5.1.1.e Collect and organize data
5.1.1.g Share information, procedures, and results with peers and/or adults

3. L:ife Science

5.3.1.b Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, mixing substances, the total weight of matter is conserved.

8. Matter and Energy in Organisms and Ecosystems

5.8.2.C Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

13. Earth's Systems

5.13.4.A Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5.13.4.B Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
5.13.4.C Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
5.13.4.D Define a simple design problem that can be solved by applying scientific ideas about the conservation of fresh water on Earth.
5.13.4.E Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

State or NGS Standards

English Language Arts

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Mathematics

Numeric Relationships

5.1.1.c Round whole numbers and decimals to any given place.
5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Operations

5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction.

State or NGS Standards

Mathematics

Operations

5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
5.1.2.f Interpret a fraction as division of the numerator by the denominator.

Bald Eagles

Unit – 7

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to…

- Explain four characteristics of a bald eagle that makes it a successful predator.
- Illustrate the reason why the bald eagle became an endangered species and two reasons why bald eagles recovered.
- Distinguish between what is and what isn't good habitat for nesting bald eagles.
- Plan and conduct an investigation into a question of their own choosing about bald eagles.
- Explain where bald eagles get their energy from.
- Explain three ways national wildlife refuges help protect wildlife.

Key Concepts:
- Adaptions
- Predator Prey Relationships
- DDT
- Endangered Species

Materials:
- Eagle wing span poster
- Bald eagle mount
- Eagle skull
- Turkey feathers
- Talon
- Binoculars
- Spotting scope
- Branch from eagles' nest
- Students' nature journals
- Pens/pencils

Background & Summary

The bald eagle will be the primary focus of this field trip. While learning about the eagle, students will explore larger concepts like predator/prey relationships, habitat issues, and endangered species and recovery. Bald eagles are a great illustration of how species can become endangered, what happens once they are listed on the endangered species list, and how recovery is possible

Procedure

The following lesson is based on the question: How do bald eagles use DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Gather students near the bald eagle for a discussion of bald eagles' adaptions that contribute to the bald eagle being a good predator.
2. Divide students into five groups, in these groups students will work an investigation for the outdoor portion of the lesson. Students should use the KWOL (Know, Wonder, Observed, Learned) method to organize their investigation and each group should agree upon one question to be the focus of their investigation and each group should agree upon one question to be the focus of their investigation while outside.
3. Hand out binoculars to students and give proper short introduction on how to use them to students.
4. Load up the bus for a tour on refuge, have students look for eagles and stop at the Missouri outlook. Make sure to have been scouting the refuge before the program to see where the eagles have been hanging out on the refuge to assure that there will be eagles for the

How to Observe Bald Eagles

Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Procedure (Continued)

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

4. Students to investigate. Set up a spotting scope and have students come off the bus in groups of ten to observe, reminding them to be good naturalists.
5. Stop at the Bob Starr Outlook. Lead a short hike up to the eagles' nest and discuss nesting locations and habits. Ask students to sketch out the area of the eagles' nest to determine why it was chosen by the eagles for their nest. Students should use this time to work on the KWOL charts.

Extensions

6. Wrap up the lesson by discussing what birds were seen throughout the day, the eagles' nest site and go over the KWOL group investigations. Ask the students these questions:

- What adaptions make bald eagles successful predators?
- Why did bald eagles become endangered and why did they recover?
- What makes the nest site of the bald eagle so attractive to them?
- What is something new you learned about bald eagles after going on the refuge tour today?
- How does DeSoto National Wildlife Refuge help protect bald eagles?

Vocabulary Blurb:
Predation: the preying of one animal on others.

Vocabulary Blurb:
Adaption: a change or the process of change by which an organism or species becomes better suited to its environment.

Bald Eagles: Adapted for Being Good Predators

Theme: As a predator, bald eagles have a variety of adaptations to be successful hunters.

Beak: (prop: eagle skull) -Curved, sharp, serrated for tearing (like a steak knife). They eat smaller prey whole and regurgitate (vomit) the inedible parts.

Eyes: (prop: eagle skull) -2-4X better than human eyes. Can see a rabbit in a meadow from a mile away. Clear eyelids protect eyes which can be closed to prevent water in while still allowing the eagle to see. Orientated toward the front on both sides of head for better visibility. Have two centers to focus, one to the front and one to the side, allowing for a bigger range of vision. Fixed in the socket, have to turn whole head. (Have kids watch something moving) can rotate head in 3/4 circle (have kids rotate head)

Wings: (prop: drawing of wings) - 7-8 feet long, wide for gliding/soaring Flight: bald eagles are powerful fliers who can reach speeds of up to 100 mph during a dive. Average flight speeds are about 20 to 40 mph. They can soar for hours on end.

Feathers: (prop: turkey feathers) - More than 7,000 feathers. Down feathers are soft for warmth, flight feathers are stiff for swooping and soaring. Bones (prop: turkey feathers)

Hollow, light-weight. Skeleton weights about half a pound (250-300 grams), and is only 5 or 6% of the eagle's total weight. The feathers weight twice that much. The beak, talons, and feathers are made of keratin.

Legs (prop: book photo) - Strong muscles for grabbing. They have a well defined sense of touch used for hunting.

Toes (feet) - Large—size of an adult human hand. Used for gripping and crushing. 3 forward toes, 1 backward facing. Talons: (prop: talon)

Sharp for grasping and piercing.

Other –

Birds of Prey (Raptor): curved beak and sharp talons (hawks, eagles, falcons, owls, etc. all raptors)

Weight: 10-13 lbs (Females are larger than males)

Live 30 or more years in the wild

Nests- can reach 10 feet across and weight up to 2,000 pounds. They lay 1-3 eggs, incubate for 35 days

Food- Eagles need to eat 6-11% of their body weight every day. This would mean an average 5th grader would have to eat 21,000 calories to keep this ratio. That's 16 frozen Jack's pepperoni pizzas in one day. No wonder they can eat an entire goose.

Eagle calls (prop: tape player)

Bald Eagle Reading

"Bald Eagles are birds of prey, or raptors. This means that they hunt other animals for food. Other birds of prey include hawks, falcons, vultures, and owls.
Like nearly all birds of prey, bald eagles are most active during the day. They live in forested areas along rivers, lakes, marshes and seacoasts. They perch in trees and look down into the water for fish to eat. They travel only as far as they need to find open water and fish to hunt. Bald eagles rarely migrate long distances as many other birds do. Some bald eagles even live in the same place all year."- Emily J. Dolbear, Bald Eagles.

"Adult bald eagles have few enemies in nature. To survive, they need a place to perch, a large body of open water, and little contact with humans. Bald eagles in the wild can live up to 30 years old.
Bald eagles have many tools to help survive. Those tools include their wings, eyes, talons, and bill. Each part of the bald eagles body plays an important role in its survival." - Emily J. Dolbear, Bald Eagles.

If you were a migrating bald eagle, why might you want to stop at DeSoto National Wildlife Refuge? (Think about the habitat requirements the reading goes over.)

What other birds of prey do you think utilize the refuge? Do you think they stay on refuge year round like some of our bald eagles do?

Bald Eagles Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Bald Eagle Adaption Sketches and Notes:

I now know:

Bald Eagles Journal Entry

Bald Eagle Mathematics

If on average a bald eagle lives 20 years and are juveniles for 5 years, what fraction of their lives are they juveniles in days? Also list the percentage. (Hint: There are 365 days a year) Show calculations.

A bald eagle can hold up to 2 pounds of food in their crop. Compared to their relative body weight, on average, of 10 pounds; what percentage of their body weight is just food? Show the fraction and calculations.

Vocabulary to Know

Prey - an animal that is hunted and killed by another for food.

Apex Predator - a predator at the top of a food chain, without natural predators.

Investigate - carry out research or study into (a subject, typically one in a scientific or academic field) so as to discover facts or information.

Scavenger– an animal that feeds on carrion, dead plant material, or refuse.

Endangered – (of a species) seriously at risk of extinction.

Nesting – (of a bird or other animal) building or occupying a nest.

Species – a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

Species Recovery – the management activities required to halt or reverse the decline in a threatened species' population.

Protection – the action of protecting, or the state of being protected.

State or NGS Standards

Inquiry, the Nature of Science, and Technology Education

1. Inquiry, the Nature of Science, and Technology

5.1.1.a Ask testable scientific questions
5.1.1.c Select and use equipment correctly and accurately
5.1.1.d Make relevant observations and measurements

8. Matter and Energy in Organisms and Ecosystems

5.8.2.a Use models to describe that energy in animals' food was once from the sun
5.8.2.c Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment

11. Space Systems: Earth's Stars and Solar System

5.11.3.C Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

13. Earth's Systems

5.13.4.C Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

State or NGS Standards

English Language Arts

Writing

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Mathematics

Numeric Relationships

5.1.1.c Round whole numbers and decimals to any given place.
5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Operations

5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction.
5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
5.1.2.f Interpret a fraction as division of the numerator by the denominator.

Scientific Observation

Unit – 8

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Describe their feelings during the quiet time using at least five different descriptive words and phrases.
- Predict the location of an animal/bird based on indirect observations (bird calls, scat)
- Make five observations each of sight, sound , feel, and smell during the outdoor quiet time.
- Explain three ways National Wildlife Refuges help protect wildlife.

Key Concepts:
- National Wildlife Refuges
- Outdoor Observations
- Senses
- Animal Signs

Materials:
- Nature journals
- Pencils
- Bird Call Player
- Board
- Markers
- Materials from outside to touch

Background & Summary

Observation skills are key to successful science. Students need to be able to use their senses to observe and record events to help aid in scientific inquiry. By using nature as the object of study, students will practice using their senses of sight, hearing, smell, and feel to make observations. By developing these observation skills, students will have the tools necessary to complete more complex scientific inquiries in the future.

Procedure

The following lesson is based on the question: How can I observe DeSoto National Wildlife Refuge using my skills as a naturalist*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students will listen to pre-lesson by a ranger, help students get in tune with their senses by drawing their attention to something that works each of their senses and work as a group to properly describe the sense.
2. Teachers help arrange students along the trail. Students will be spaced so that they cannot talk to more see other students. This is designed to give them the feeling that they are totally alone with nature.
3. Quiet observation on the trails begins. This observation will last approximately one hour. Students will record their experiences using their journals or the worksheet provided by their teachers.

Extensions

4. Gather the students form the trail to discuss what they just

How to Observe Outside



Procedure (Continued)

4. experienced. This will be a time to test to see if the objectives of the trip are met. The discussion leader will use the following questions:
    - Can you describe what it was like to be alone in nature?
    - What are some observations you had about sight, sound, smell and hearing?
    - How were you able to tell if animals were present even if you did not see them?
    - What makes DeSoto National Wildlife Refuge a special place?

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

Vocabulary Blurb:
Observation: a remark, statement, or comment based on something one has seen, heard, or noticed.

Vocabulary Blurb:
Wonder: a feeling of surprise mingled with admiration, caused by something beautiful, unexpected, unfamiliar, or inexplicable.

Scientific Observation Reading

"The months of the year, from January up to June, are a geometric progression in the abundance of distractions. In January one may follow a skunk track, or search for bands of chickadees, or see what young pines the deer have browsed, or what muskrat houses the mink have dug, with only an occasional and mild digression into other doings. January observation can be almost as simple and peaceful as snow, and almost as continuous as cold. There is time not only to see who has done what, but to speculate why." - Aldo Leopold, *A Sand County Almanac.*

Why do you think it was important for Aldo Leopold to observe the activities of the wildlife around him?

If you could observe any given ecosystem or follow an animal for a day, how would you go about doing so? What animal or ecosystem would you choose?

Scientific Observation Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Sketches:

I now know:

Beauty 4+

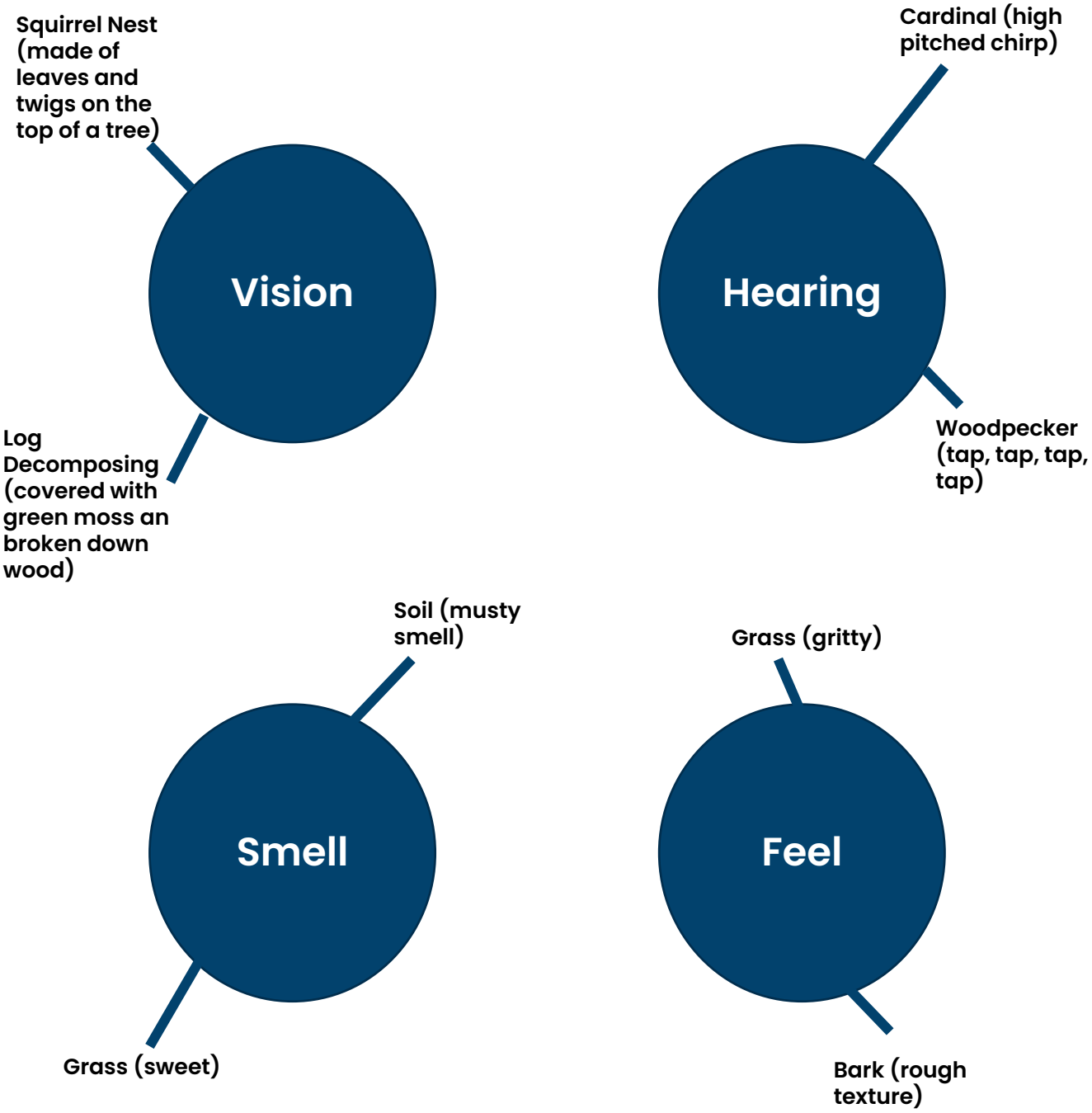
Awesome 4+

Surprise 4+

Big Question 4+

Scientific Observations Journal Entry

Using Your Senses Webs



Vocabulary to Know

Sense - a faculty by which the body perceives an external stimulus; one of the faculties of sight, smell, hearing, taste, and touch.

Wildlife - wild animals that live free of humans.

Animal Signs – signs that point to the presence of animals in the immediate area.

Nature– the phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations.

Describe – give an account in words of (someone or something), including all the relevant characteristics, qualities, or events.

Experience – practical contact with and observation of facts or events.

Naturalist – a person who studies nature and especially plants and animals as they live in nature.

Inquiry – an act of asking for information.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.2.a Recognize that scientific explanations are based on evidence and scientific knowledge

11. Space Systems: Earth's Stars and Solar System

5.11.3.C Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

13. Earth's Systems

5.13.4.C Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
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LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

State or NGS Standards

English Language Arts

Writing

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Refuge/Water Management

Unit – Removed from Curriculum

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to…

- Recognize the water system of DeSoto National Wildlife Refuge as a freshwater lake and freshwater river.
- Identify one management technique utilized by the refuge to control water movement and level.
- Illustrate the relationship between the water level of the wetlands on the refuge to the amount of biomass and ability to sustain waterfowl.
- Identify the role the refuge has in protecting waterfowl.
- Propose two reasons why it is important to protect wetlands.
- Explain two ways nation wildlife refuges help protect waterfowl.
- Understand the interaction of the hydrosphere and biosphere at DeSoto NWR and different influence over each.

Key Concepts:
- Land Management
- Natural Water
- Pollution
- Ecosystem Interactions

Materials:
- River Dioramas
- Food dyes
- Ball sprinkles
- Hoola hoops/wooden frames
- Water test kits

Background & Summary

The central focus will be the refuge wetlands and waterfowl, including the interactions of management, water levels, biomass and migration all play a role here at DeSoto National Wildlife Refuge. Students will be able to explore the refuge and see plants that are beneficial to waterfowl for food and how the level of freshwater in the wetlands influences the amount and types of plant growth. Students then will be able to recognize the interactions of the plants, water, and birds on the refuge and why it is important to manage and protect these systems.

Procedure

The following lesson is based on the question: How is DeSoto National Wildlife Refuge managed*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Welcome students and ask if they know why DeSoto National Wildlife Refuge was established. Introduce the wetlands and the effects that wetlands have on river systems such as the Missouri River and pollution of the river.
2. Introduce the water testing experiment and collect student hypothesis (make sure to collect samples at different locations).
3. Talk about the altering of the landscape in Iowa and Nebraska from wetlands to farm fields, and the changes to the Missouri River and the impact these held on the water flow and the habitat around the area (habitat change and loss).
4. Take the students out into the wetlands/DeSoto lake, explain what a wetland is, why they are important and show them examples of

How to Learn Land Management



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Procedure (Continued)

4. that grow in the wetlands/lake that provide food or cover for many of the waterfowl species (explain how water level and flooding can influence this distribution). Mention how they filter waters.
5. Split the kids onto groups and make sure each group is placed around a hoola hoop at either mostly cover or food sources for the wildlife, ask each group to observe what is within their hoola hoop and decide if they think that their hoola hoop would give the waterfowl food or shelter, give student a guide? To figure out what types of plants are within their hoola hoop.
6. Combine the students together again and move to a location holding water structures and explain how they alter the water levels.
7. The students will be brought back to the multipurpose room to test the samples. The differences in the sample testing results will show the students that there is different compositions of nutrients and particles within the waters between the lake, wetlands, and river.

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

Extensions

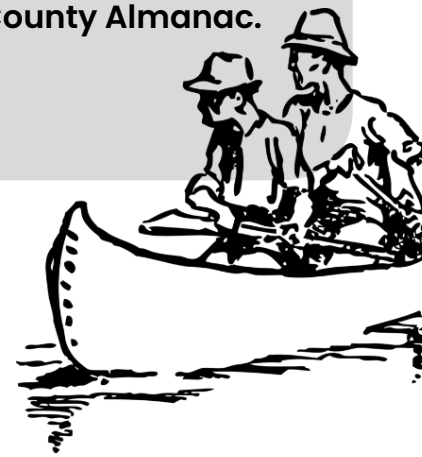
8. Wrap up the lesson with these questions:
   - Based on what you have seen today what are some ways DeSoto NWR manages the water levels?
   - Why is it important to have wetlands?
   - What influence does water hold over plants and animals on DeSoto NWR?
   - Why did the water testing result the way it did?

Vocabulary Blurb:
Landscape: all the visible features of an area of countryside or land, often considered in terms of their aesthetic appeal.

Vocabulary Blurb:
Migration: seasonal movement of animals from one region to another.

Refuge/Water Management Reading

"The problem was water. The Lagoons were saline; the river, where we could find it, was too muddy to drink. At each new camp we dug a new well. Most wells, however yielded only brine form the Gulf. We learned, the hard way, where to dig for sweet water. When in doubt of a new well, we lowered the dog in by his hind legs. If he drank freely, it was signal for us to beach the canoe, kindle the fire, and pitch the tent." -Aldo Leopold, A Sand County Almanac.



If you were Aldo Leopold, how would you have found fresh drinking water on DeSoto National Wildlife Refuge? Write down your procedure and reasoning.

Why is it important to Aldo Leopold that his dog drank the water of the and how did it signal to Leopold and his company to set up camp?

Why do you think the river was too muddy for Leopold and his company to drink the water from it?

Refuge/Water Management Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Beauty 4+

Awesome 4+

Surprise 4+

Big Question 4+

Water Testing Experiment:

Hypothesis:

Results:

I now know:

Refuge/Water Management Journal Entry

Fill in this grid to represent the plants that you find within your frame.

What fraction of your frame is grasses? Turn your fraction into a percentage.

What fraction of your frame is shrub? Turn your fraction into a percentage.

What fraction of your frame is water? Turn your fraction into a percentage.

What category took up the largest fraction/percent of your frame?

Refuge/Water Management Journal Entry

Duck Math

You have 10 acres of excellent wetlands with about 25,000 ducks on it in a day. How many days of use can you get out of this land?

You get about 3.5 days of use with 25,000 ducks a day out of a patch of poor wetlands. How many acres of wetlands are used?

You have 5 acres of fair wetlands with about 25,000 ducks on this square patch of land a day. How many days of use can you expect from this land?

You get 32 days of use out of a square of excellent wetlands with about 25,0000 ducks on that land a day. How many acres of excellent wetlands are being used?

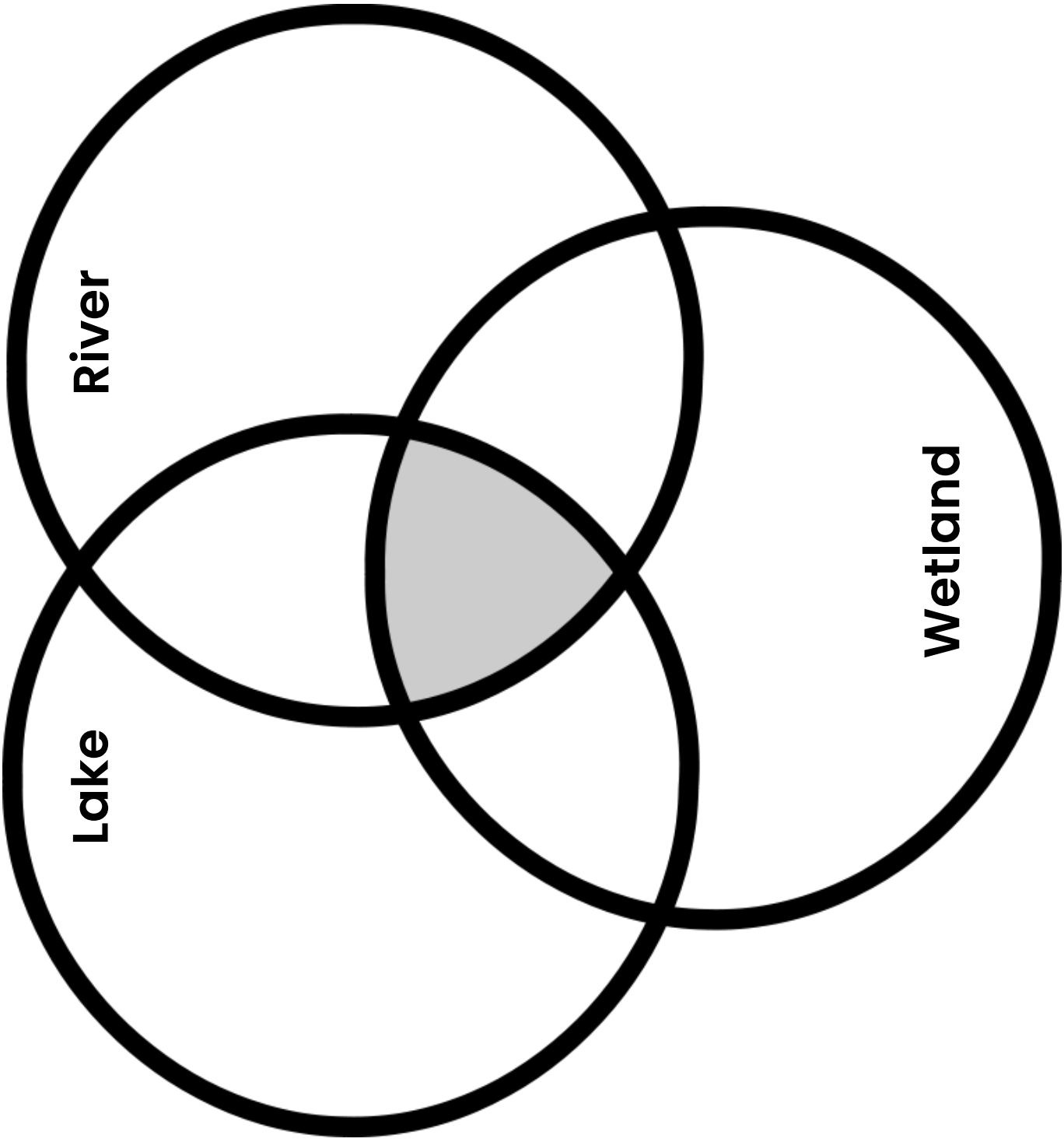
Bird Business

How many species of birds do you see out on the wetland?

What species would you say takes up the largest surface area on the wetland?

What fraction of the birds' diets would you say are plant material versus that of invertebrates?

Refuge/Water Management Journal Entry



Vocabulary to Know

Habitat - the natural home or environment of an animal, plant, or other organism.

Pollution - the presence in or introduction into the environment of a substance or thing that has harmful or poisonous effects.

Hypothesis - a supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation.

Lake– a large body of water surrounded by land.

River – a large natural stream of water flowing in a channel to the sea, a lake, or another such stream.

Wetlands – a type of habitat where standing water covers the soil or an area where the ground is very wet.

Biomass – the total mass of organisms in a given area or volume.

Freshwater – of or found in fresh water; not of the sea.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.c Select and use equipment correctly and accurately
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.1.f Develop a reasonable explanation based on collected data
5.1.1.h Provide feedback on scientific investigations
5.1.1.i Use appropriate mathematics in all aspects of scientific inquiry
5.1.3.a Identify a simple problem
5.1.3.b Propose a solution to a simple problem
5.1.3.e Communicate the problem, design, and solution
5.1.2.a Recognize that scientific explanations are based on evidence and scientific knowledge

3. Life Science

5.3.1.a Develop a model to describe that matter is made of particles to small to be seen

8. Matter and Energy in Organisms and Ecosystems

5.8.2.b Support an argument that plants get the materials they need for growth chiefly from air and water

13. Earth's Systems

5.13.4.a Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere intact.
5.13.4.b Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
5.13.4.C Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
5.13.4.d Define a simple design problem that can be solved by applying scientific ideas about the conservation of fresh water on Earth.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

State or NGS Standards

English Language Arts

Vocabulary

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.

c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

State or NGS Standards

Mathematics

Numeric Relationships

5.1.1.c Round whole numbers and decimals to any given place.

5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals,

Operations

5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction
5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
5.1.2.f Interpret a fraction as division of the numerator by the denominator.
and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Analysis and Applications

5.4.2.a Use observations, surveys, and experiments to collect, represent, and interpret the data using tables (e.g., frequency charts) and bar graphs.
5.4.2.b Formulate questions that can be addressed with data and make predictions about the data.

Wetland Study

Unit – Removed from Curriculum

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Use a key to identify and classify three different aquatic invertebrates.
- Choose appropriate methods of collecting ponds samples.
- Propose two reasons why it is important to protect wetlands.
- Explain three ways National Wildlife Refuges help protect wildlife.

Key Concepts:
- National Wildlife Refuges
- Outdoor Observations
- Wetlands
- Dichotomous Key

Materials:
- Nets
- Dichotomous Keys
- Trays/ Bins
- Spoons
- Viewers
- Key to Life in a Pond
- Model of Aquatic Invertebrates

Background & Summary

Wetlands are a disappearing but important part of the local ecosystems. Wetlands are responsible for many natural processes and hold a special place in area history. The wetland study will help the students learn that nature can be much more than meets the eye and that careful study you can learn some of its secrets.

Procedure

The following lesson is based on the question: What are wetlands at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Meet the bus at the Green Heron Trail. Lead a discussion about what wetlands are, how aquatic invertebrate survive this environment and why wetlands are important.
2. Divide the students into groups of 2 or 3. Make sure each group gets a net, tray, spoon, viewer, and key. Demonstrate how to use both the nets and the viewer.
3. Set parameter for investigation area.
4. The refuge staff person and teachers will circulate during the investigation time. The students will use field guides to identify invertebrates.
5. Have students clean out equipment, hike back to parking lot and return the equipment. Wrap up session questions:
    - Based on what you have learned, why are wetlands important?
    - What are some ways national wildlife refuges protect wildlife?

How to Study Wetlands



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Vocabulary to Know

Discussion - the action or process of talking about something in order to reach a decision or to exchange ideas.

Aquatic - (of a plant or animal) growing or living in or near water.

Invertebrate - an animal lacking a backbone.

Aquatic Invertebrate– invertebrates that live within or near water.

Investigation – a formal inquiry or systematic study.

Wetlands – a type of habitat where standing water covers the soil or an area where the ground is very wet.

Classify – arrange (a group of people or things) in classes or categories according to shared qualities or characteristics.

Environment – the surroundings or conditions in which a person, animal, or plant lives or operates.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.d Make relevant observations and measurements

3. Life Science

5.3.1.a Develop a model to describe that matter is made of particles to small to be seen
5.3.1.b Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, mixing substances, the total weight of matter is conserved.
5.3.3.b Identify the role of producers, consumers, and decomposers in an ecosystem
5.3.3.c Recognize the living and nonliving factors that impact the survival of organisms in an ecosystem
5.3.4.a Describe adaptations made by plants or animals to survive environmental changes

8. Matter and Energy in Organisms and Ecosystems

5.8.2.b Support an argument that plants get the materials they need for growth chiefly from air and water

13. Earth's Systems

5.13.4.a Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere intact.
5.13.4.b Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
5.13.4.C Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
5.13.4.d Define a simple design problem that can be solved by applying scientific ideas about the conservation of fresh water on Earth.

Mathematics

Operations

5 .2.1.a Form ordered pairs from a rule such as y=2x, and graph the ordered pairs on a coordinate plane.

Measurement

5.3.2.a Identify the origin, x axis, and y axis of the coordinate plane.
5.3.2.b Graph and name points in the first quadrant of the coordinate plane using ordered pairs of whole numbers.
5.3.3.b Use concrete models to measure the volume of rectangular prisms in cubic units by counting cubic units.

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Recognize and explain, citing two reasons whether downed trees were felled by beavers or by another natural/human force
- Illustrate how five or more adaptations help beavers survive in their environment
- Plan an investigation of a beaver site using three or more different investigation techniques (sight, sound, touch, scat, trails, etc.)
- Make two predictions about how beavers moving into an area would affect the landscape
- Appraise, citing two examples, whether a site has been habitat for beavers or not

Key Concepts:
- Beavers
- Adaptions
- Wetlands
- Habitat Conservation

Materials:
- Build a Beaver Activity Box
- Microphone
- Beaver Fur
- Beaver Tail
- Beaver-chewed log

Beavers

Unit – Removed from Curriculum

Background & Summary

Beavers will be the central focus of this outdoor classroom experience. The focus will be on the adaptations of beavers, how beavers affect their environment and how they use their adaptations to survive and thrive. This will enable students to make connections with the bigger picture of the ecosystem by thinking about how one animal behaves and survives. The beavers are also used as an example of human/wildlife interactions and what constitutes a good habitat for different species.

Procedure

The following lesson is based on the question: What beavers are at DeSoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Discussion of DeSoto National Wildlife Refuge and where beavers may be present there.
2. Build a Beaver activity—from Jacksonville State University Field Schools (supplies are kept by 5th grade teachers at Arbor Park School). This lesson incorporates class participation, questions, and critical thinking. The refuge staff person asks for a volunteer for the human beaver and has them stand on the picnic table. Then students are asked to name adaptations that beavers have on their bodies to help them survive and what these adaptations are used for. Each adaptation is represented with an item for the human beaver to wear. Instructions for each adaptation are found on the information sheet from Jacksonville State. This role-play activity helps the students visualize beaver adaptations and they will use the knowledge of those adaptations during their investigation later in the morning.

How to Study Beavers



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Procedure (Continued)

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

3. Travel to an area with beaver activity (pre-scouted location) and give students an introduction about the group investigation. It helps to talk about it like CSI (Crime Scene Investigation TV show) to add excitement to the process. Start by going through a simple investigation with the group by leading them through some questions about a particular site. Help them to form a hypothesis on what activity may have been in the area. This who, what, when, where, why, and how format will help the students organize their investigation and help them focus on the important factors they will present. Students are then divided into groups, given parameters of a search area, and are sent out to find a place where beavers have been active.

4. The groups come together and travel from site to site where the student groups present the findings of their investigations. Refuge staff and teachers ask questions of the group to allow for them to further show their knowledge and to clarify their thinking. A microphone will be used and all students will be required to give a portion of the presentation. This will allow for the students to apply the information they have learned about beaver adaptations to a real life setting, propose a hypothesis about what they think happened at their site and why, and practice speaking in front of an audience.

Extensions

5. The students will gather around again for a summary and review of what they learned. The refuge staff person will lead the discussion which will address the following:
   - What adaptations do beavers have to help them survive in their environment?
   - How can you tell if a beaver felled a tree and that it didn't fall from another cause?
   - How would you tell your friends and family if beavers have been active in an area?
   - How have beavers changed this environment and who benefits from that change?
   - The answers to these questions will provide feedback to the refuge staff person and the teachers as to what the students learned and maybe what areas could use more attention in the future.

Vocabulary Blurb:
Adaption: a change or the process of change by which an organism or species becomes better suited to its environment.

Beaver Investigation Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Beauty 4+

Beaver Investigation Sketches and Notes:

I now know:

Awesome 4+

Surprise 4+

Big Question 4+

Vocabulary to Know

Presence - the state or fact of existing, occurring, or being present in a place or thing.

Activity - the condition in which things are happening or being done.

Characteristics - a feature or quality belonging typically to a person, place, or thing and serving to identify it.

Visualize– make (something) visible to the eye.

Investigation – the action of investigating something or someone; formal or systematic examination or research.

Hypothesis – a supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation.

Discussion – the action or process of talking about something in order to reach a decision or to exchange ideas.

Environment – the surroundings or conditions in which a person, animal, or plant lives or operates.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.a Ask testable scientific questions
5.1.1.b Plan and conduct investigations and identify factors that have the potential to impact an investigation
5.1.1.e Collect and organize data
5.1.1.f Develop a reasonable explanation based on collected data
5.1.1.g Share information, procedures, and results with peers and/or adults
5.1.2.a Recognize that scientific explanations are based on evidence and scientific knowledge
5.1.2.c Recognize many different people study science

3. Life Science

5.3.1.b Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, mixing substances, the total weight of matter is conserved.
5.3.3.c Recognize the living and nonliving factors that impact the survival of organisms in an ecosystem
5.3.3.d Recognize all organisms cause changes, some beneficial and some detrimental, in the environment where they live

4. Earth and Space Sciences

5.4.3.b Observe, measure, and record changes in weather (temperature, wind direction and speed, precipitation)
5.4.3.c Recognize the difference between weather, climate, and seasons

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

State or NGS Standards

English Language Arts

Vocabulary

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.

c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

Animal Tracking

Unit – Removed from Curriculum

Grade Level:
5th

Time:
90-120 minutes

Season:
All

Objectives:
Students will be able to...

- Identify two animal tracks and explain their motion of travel.
- Analyze track spacing and frequency to determine if there are patterns.
- Explain three wats National Wildlife Refuges help protect wildlife.
- Explain three ways National Wildlife Refuges help protect wildlife.
- Link that gravity is a driving force between animals and the creation of their track in the soil.
- Explain that during different seasons tracking for animals is done in different ways.

Key Concepts:
- National Wildlife Refuges
- Tracking
- Gravity

Materials:
- Bucket
- Scale
- Hot Chocolate
- Animal tracks field guide
- Nature journals

Background & Summary

Tracking animals in the winter provides an exciting way for students to learn about direct and indirect observations and data collection methods. Winter is a time that students do not naturally think about going outside so this is a good time for students to see that nature does not have a season. Development of observation skills is the key to successful scientific inquiry and investigations. This lesson uses winter and animal tracking as a way to increase students' awareness and helps them formulate better observations by using nature as the subject.

Procedure

The following lesson is based on the question: What kind of wildlife species are at DeSoto National Wildlife Refuge in the winter*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Greet Students in Multipurpose room. Explain to students what tracking is and how the snow helps hunters/predators track their quarry in the winter.
2. Bring students outside and propose to them that the snow melts and creates an icy footprint, or track (Show them this with your handprint in the snow). What force pulls the animals feet down into the snow so that they leave a footprint? Will the smashed snow weigh the same as the fluffy snow? Will melted snow weigh the same as it was when it wasn't melted? Get a class hypothesis on what they think will weigh more, water or snow.
3. To prove or disprove the class hypothesis collect snow and weigh it on the scale inside the multipurpose room (Weigh it again later in the lesson to show that the weight is retained even though the snow

How to Track Animals



Procedure (Continued)

3. has melted).
4. After this experiment is started ask the students to see if they can find any tracks or signs of animals in the snow around the visitor center. Have the students take notes and draw their observations in their journals. Stay outside for about 30-45 minutes in this section depending on weather.
5. Once inside gather the in the multipurpose room and have students finish drawing their observations using stamps, rubbings, field guides and other resources they have available. Leave them for about 10-15 minutes.
6. Once they are about done, show them the snow experiment and how it has melted within the bucket, weigh the bucket. Did the class come up with the right hypothesis or where they wrong? Why do they think that they water and snow weighed the same?

Extensions

7. Summarize the lesson and ask the students these questions:
    - Why do they think the snow had tracks from the animals?
    - How would they track animals in other seasons?
    - Do animals keep the same behavior in other seasons? Would this cause them to be easier or harder to track?

Journal Page Setup

Fill in the heading of the Nature Journal Worksheet.

Tell students what they will be observing in their Journals.

Make sure students are filling out these sections:
- Awesome
- Beauty
- Surprise
- Big Question

Vocabulary Blurb:
Tracking: follow the course or trail of (someone or something), typically in order to find them or note their location at various points.

Vocabulary Blurb:
Motion of Travel: The way an animal moves from place to place, including foot placement and body movement.

Animal Tracking Reading

"But in spite of the activity beneath the blanket, it is mammal life above the snow that creates the real show of winter, at least for the human community. Snow cover, especially a light snow on a hard crust, lays down a ledger upon which last night's activities are written. Even though several of the more common mammals, such as the woodchuck or the chipmunk, are either dormant or in hibernation, the lives of small animals are never so clearly recorded as after a fresh snow. Everywhere in the woods, the thin dribbles of white-footed mouse tracks stitch the trees together; gray squirrel tracks appear abruptly at the base of one tree, trace an erratic pattern through the woods, and then end at the base of another tree. The single-line track of the red fox makes easy curves along the field edges, and rabbit tracks meander from one brushy cover to the next. -John Mitchell and the Massachusetts Audubon Society, The Curious Naturalist.

How do you think the observer followed the different signs of animals during the winter outside? Provide examples on how you might do the same near your house or school.

Why do you think it is important for us to still observe nature even in the winter? Provide examples as to why this would be important.

Animal Tracking Journal Entry

Date:

Time:

Location:

Weather Conditions:

Cloud Coverage: Cirrus (Wispy), Cumulus (Puffy), Stratus (Dense and Layered), Cumulous (Thunderclouds).

Estimated Temperature:

Actual Temperature:

Estimated Wind Dir. & Speed:

Actual Wind Dir. & Speed:

Colors of the Day:

Beauty 4+

Animal Track Sketches and Notes:

I now know:

Awesome 4+

Surprise 4+

Big Question 4+

Animal Tracking Journal Entry

Calculating Those Tracks!

List the types of animal tracks you found today and write fractions for each species relative to the entire amount of tracks found.

What animal had the highest percentage of tracks found today?

If we found a track that was about an inch long and then another track about 5 inches long, which track would belong to the larger animal? Sketch the tracks below.

Vocabulary to Know

Hunter - someone who seeks, pursues, or looks for something.

Predator - an animal that naturally preys on others.

Quarry - an animal pursued by a hunter, hound, predatory mammal, or bird of prey.

Track– follow the course or trail of (someone or something), typically in order to find them or note their location at various points.

Hypothesis – a supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation.

Gravity – the force that attracts a body toward the center of the earth, or toward any other physical body having mass.

Seasons – each of the four divisions of the year (spring, summer, autumn, and winter) marked by particular weather patterns and daylight hours, resulting from the earth's changing position with regard to the sun.

Frequency – the rate at which something occurs or is repeated over a particular period of time or in a given sample.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

5.1.1.a Ask testable scientific questions
5.1.1.c Select and use equipment correctly and accurately
5.1.1.d Make relevant observations and measurements
5.1.1.e Collect and organize data
5.1.1.g Share information, procedures, and results with peers and/or adults

3. Life Science

5.3.1.b Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, mixing substances, the total weight of matter is conserved.

8. Matter and Energy in Organisms and Ecosystems

5.8.2.a Use models to describe that energy in animals' food was once from the sun

11. Space Systems: Earth's Stars and Solar System

5.11.3.A Support an argument that the gravitational force exerted by Earth on objects is directed down.
5.11.3.C Represent data in graphical displays to reveal patterns of daily changes in the length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

English Language Arts

Reading Informational Text

LA.5.RI.1 Explain the central idea in an informational text and how it is conveyed through key details.
LA.5.RI.2 Compare and contrast two or more individuals, events, scientific ideas or concepts, or steps in a process, drawing on supporting details from an informational text or texts.
LA.5.RI.7 Explain the relationships between two or more individuals, events, ideas, or concepts in a range of informational texts.

Vocabulary

LA.5.V.1 Acquire and use grade-level academic vocabulary appropriately.

a. Use context clues (e.g., cause/effect relationships and comparisons in text) to determine the meanings of words and phrases.
b. Determine or clarify the precise meanings or pronunciations of words and phrases using reference materials and classroom resources.

LA.5.V.2 Interpret an author's use of figurative, connotative, and technical language in grade-level literary and informational text.

a. Interpret figurative language, including similes and metaphors, in context.
b. Recognize and explain the meaning of commonly occurring idioms, adages, and proverbs.
c. Demonstrate knowledge of relationships between particular words (e.g., synonyms, antonyms, homographs) to better understand each of the words.

State or NGS Standards

English Language Arts

Writing

LA.5.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.

a. Apply knowledge of rules for capitalization; use underlining, quotation marks, or italics to indicate titles of works.
b. Use a comma to separate an introductory element from the rest of a sentence, to separate clauses, to set off a question, and to indicate direct address.
c. Explain the function of and use frequently occurring interjections, verb tenses (e.g., perfect), and correlative conjunctions.
d. Distinguish between and use types of adjectives (e.g., comparative, superlative).
e. Identify and revise fragment and run-on sentences and inappropriate shifts in verb tenses.

LA.5.W.4 Write opinion pieces that explain a perspective with supporting reasons and evidence.

a. Introduce a topic or text clearly, state an opinion or perspective, and develop a structure in which ideas are grouped logically.
b. Use facts and details to support reasons and/or evidence.
c. Use words, phrases, and key vocabulary to connect ideas.
d. Provide a concluding statement or section related to the perspective.

Speaking and Listening

LA.5.SL.1 Prepare for and participate in structured discussions and collaborations about 5th grade topics and texts.

a. Ask relevant questions to build on ideas, clarify own ideas, or acquire or confirm information.
b. Demonstrate interpretation of verbal and non-verbal messages in a conversation.
c. Converse with peers and adults an all-inclusive manner to foster positive relationships while respecting diverse perspectives.
d. Demonstrate active and attentive listening skills (e.g., eye contact, nonverbal cues, taking notes, recalling, questioning).
e. Complete a task following multi-step directions.

LA.5.SL.2 Report on a topic or text, or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support themes or central ideas.

a. Demonstrate appropriate speaking techniques (e.g., appropriate eye contact, adequate volume, clear pronunciation) for a variety of purposes and situations, including interpreting 5th grade texts.
b. Convey a perspective with clear reasoning and support.
c. Identify the purpose and credibility of information being presented.
d. Demonstrate awareness of and sensitivity to the appropriate use of words (e.g., stereotypes, multiple meanings of words). e. Use appropriate visual and/or digital tools to enhance verbal communication and add interest

State or NGS Standards

Mathematics

Numeric Relationships

5.1.1.c Round whole numbers and decimals to any given place.
5.1.1.d Recognize and generate equivalent forms of commonly used fractions, decimals, and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Operations

5.1.2.c Multiply a whole number by a fraction or a fraction by a fraction using models and visual representations.
5.1.2.d Divide a unit fraction by a whole number and a whole number by a unit fraction
5.1.2.e Explain division of a whole number by a fraction using models and visual representations.
5.1.2.f Interpret a fraction as division of the numerator by the denominator.
and percents (e.g., halves, thirds, fourths, fifths, and tenths).

Sixth Grade Lessons

Grade Level:
6th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Measure and observe characteristics of different leaves in the fall environment.
- Make observations and inferences about unique items in the outdoors.

Key Concepts:
- Leaves
- Outdoors
- Characteristics

Materials:
- Notebook
- Activity sheet
- Wooden boards
- Cloth
- Hammers

Leaf Lab & Inference Short Story

Unit – 1

Background & Summary

Students will use the fall environment to enhance classroom learning. Through the leaf lab, students will make observations and measurements about three leaves of different colors. Students will use those leaves for leaf printing as a way to discuss chlorophyll. In the inference short story, students will use the natural environment as a context for observations and inference writing.

Procedure

The following lesson is based on the question: What kind leaves are at DeSoto National Wildlife Refuge in the winter*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Take a few minutes to find 1 green leaf. Make sure it is "fresh" and in good shape.
2. Using your ruler, measure the length of your green leaf in centimeters from the bottom of the leaf (do not include the stem) to the highest part of the leaf, and record the measurement in data table 1.
3. Using your ruler, measure the width of the green leaf in centimeters at its widest point, and record the measurement in data table 1.
4. Make 3 qualitative observations about your leaf and record them in data table 2.
5. Now, on the other side of this paper, trace around the leaf. Take your time to make sure it's a good quality tracing. Label it by writing the leaf's color inside the tracing (e.g. "Green").
6. KEEP THAT LEAF! You will need it later. Now, repeat steps 2-5 with a "fresh" yellow/orange leaf, and then again with a "fresh" purple/red leaf.

How to Study Leaves

Procedure (Continued)

Data Table 1

Leaf Color	Length	Width
Green	Cm	Cm
Yellow/Orange	Cm	Cm
Purple/Red	Cm	Cm

Data Table 2

Make 3 qualitative observations for GREEN	**1.**
	2.
	3.
Make 3 qualitative observations for YELLOW/ORANGE	**1.**
	2.
	3.
Make 3 qualitative observations for PURPLE/RED	**1.**
	2.
	3.

Inference Short Story

Procedure

1. Take around 3-4 minutes to search for something unique that interests you (example: a bird's nest, a cocoon, animal tracks in the mud, a spider making a web, etc.).
2. Record 6 or more observations about the object you found. They can be either qualitative or quantitative, and you may have any amount of either (example: 3 Quality + 5 Quantity).
3. When you are finished making 6 or more observations, use those observations to write an inference short story about your object (maybe how it got there, what it's doing, why it looks the way it does).

6+ Observations:

Short Story:

Vocabulary to Know

Leaf - a flattened structure of a higher plant, typically green and blade-like, that is attached to a stem directly or via a stalk.

Petiole - the stalk that joins a leaf to a stem; leafstalk.

Chlorophyll - a green pigment, present in all green plants and in cyanobacteria, responsible for the absorption of light to provide energy for photosynthesis.

Stem– the main body or stalk of a plant or shrub, typically rising above ground but occasionally subterranean.

Veins – a slender rib running through a leaf or bract, typically dividing or branching, and containing a vascular bundle.

Margin – the boundary area extending along the edge of the leaf.

Midrib – the central vein of a leaf.

Base – slightly expanded area where the leaf attaches to the stem.

Stipule - a small leaf like appendage to a leaf, typically borne in pairs at the base of the leaf stalk.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

8.1.1.e Make qualitative and quantitative observations
8.1.1.f Record and represent data appropriately and review for quality, accuracy, and relevancy
8.1.1.h Share information, procedures, results, and conclusions with appropriate audiences
8.1.1.i Analyze and provide appropriate critique of scientific investigations
8.1.1.j Use appropriate mathematics in all aspects of scientific inquiry

2. Physical Science

8.2.1.a Compare and contrast elements, compounds, and mixtures
8.2.1.d Compare and contrast solids, liquids, and gases based on properties of these states of matter
8.2.1.e Distinguish between physical and chemical changes (phase changes, dissolving, burning, rusting)
8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

6. Structure and Function and Information Processing

6.6.2.A Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells

9. Growth, Development, and Reproduction of Organisms

6.9.3.B Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

English Language Arts

Reading Prose and Poetry

6.RP.6 Analyze a literary text to answer and develop inferential and evaluative questions to enhance the comprehension of self and others, quoting or paraphrasing specific evidence from the text.

Reading Informational Text

6.RI.6 Analyze the development of an argument and identify the type(s) of reasoning used to support the argument

Writing

6.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
6.W.4 Write arguments that explain a perspective with supporting reasons and evidence.
6.W.5 Write informative/explanatory pieces to examine a topic or text and clearly convey ideas and information.

Grade Level:
6th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Make inferences about why structures have certain functions
- Explain why the relationship between structure and function are important for an organism.

Key Concepts:
- Function
- Structure
- Organism

Materials:
- Activity Sheets
- Clipboards
- Hand Lens

Structure Vs Function

Unit – 2

Background & Summary

Students will use hands lens and the naked eye to learn about the different structures and functions organisms use to survive throughout the refuge and the natural world.

Procedure

The following lesson is based on the question: What kind structure and function do organisms at DeSoto National Wildlife Refuge have*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Hand out hand lens to the students and introduce them to structures and functions.
    - Structure: the arrangement of and relations between the parts or elements of something complex.
    - Function: an activity or purpose natural to or intended for a person or thing.
2. Allow students to draw inferences on how these two things have a relationship with each other.
3. Once students have a full understanding, release them with hand lens to find their own connections within the environment.
4. Make sure students fill out the worksheet to further their understanding of the structures and functions they can find with and without a hands lens.

How to Study Structure and Function



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Structure Vs Function Journal Sheet

Draw <u>detailed</u> sketched of 4 various organisms. Observe 2 with a hand lens and 2 without.

Organism:

Organism:

Organism:

Organism:

Take some time to think about why the organism would be structured like this then on the back of this page write at least <u>3 sentences for each organism</u> brainstorming on what the function of its structure might be.

Vocabulary to Know

Structure - An arrangement or organization of parts to form an organ, system, or living thing.

Function - an activity or purpose natural to or intended for a person or thing.

Organism - an individual animal, plant, or single-celled life form.

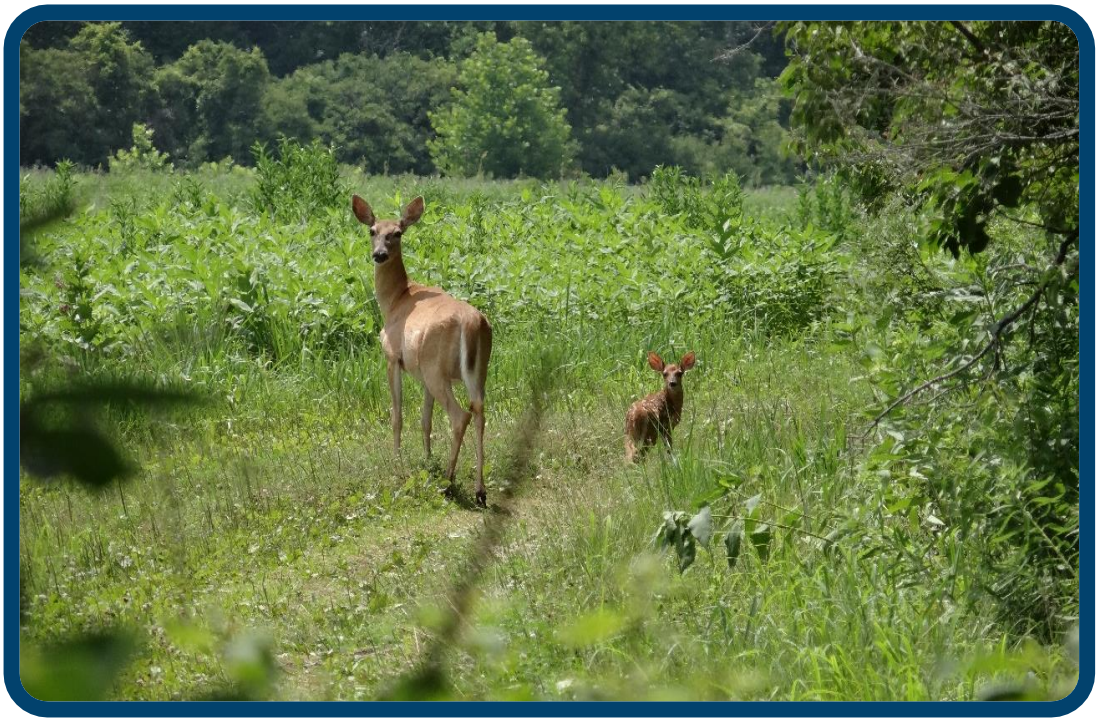
Adaption– a change or the process of change by which an organism or species becomes better suited to its environment.

Parts – a piece or segment of something such as an object, activity, or period of time, which combined with other pieces makes up the whole.

Relationship – the way in which two or more concepts, objects, or people are connected, or the state of being connected.

Seasons – each of the four divisions of the year (spring, summer, autumn, and winter) marked by particular weather patterns and daylight hours, resulting from the earth's changing position with regard to the sun.

Frequency – the rate at which something occurs or is repeated over a particular period of time or in a given sample.



State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

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8.1.1.i Analyze and provide appropriate critique of scientific investigations
8.1.1.j Use appropriate mathematics in all aspects of scientific inquiry

2. Physical Science

8.2.1.a Compare and contrast elements, compounds, and mixtures
8.2.1.d Compare and contrast solids, liquids, and gases based on properties of these states of matter
8.2.1.e Distinguish between physical and chemical changes (phase changes, dissolving, burning, rusting)
8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

6. Structure and Function and Information Processing

6.6.2.A Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells

9. Growth, Development, and Reproduction of Organisms

6.9.3.B Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

English Language Arts

Reading Prose and Poetry

6.RP.6 Analyze a literary text to answer and develop inferential and evaluative questions to enhance the comprehension of self and others, quoting or paraphrasing specific evidence from the text.

Reading Informational Text

6.RI.6 Analyze the development of an argument and identify the type(s) of reasoning used to support the argument

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6.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
6.W.4 Write arguments that explain a perspective with supporting reasons and evidence.
6.W.5 Write informative/explanatory pieces to examine a topic or text and clearly convey ideas and information.

Grade Level:
6th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Measure and observe characteristics of different leaves in the fall environment.
- Make observations and inferences about unique items in the outdoors.

Key Concepts:
- Leaves
- Outdoors
- Characteristics

Materials:
- Notebook
- Activity sheet
- Wooden boards
- Cloth
- Hammers

Snow Study

Unit – 3

Background & Summary

Winter snow provides a great venue for learning and applying skills in measuring temperature, successful animal adaptations, physical properties and geometric shapes.

Procedure

The following lesson is based on the question: What kind of animals winter at DeSoto*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Take a few minutes go over hibernation with the students and the different methods mammals on the refuge survive during that harsh temperatures.
2. Give them jello "animals" to hide outside where they think they could successfully hibernate.
3. Create a snow fort with the students and then have them measure the different levels of mass and weight of snow with different compaction levels on the fort from top to bottom.
4. Have students complete attached worksheet.
5. Once student have completed that section give them a snowflake to investigate the different angles and details and physical properties of each snowflake.

How to Study Snow

Snow Study Journal Sheet

Jello~ "It's Alive"…For Now!

1. Temperature before hibernation: _____°C
2. Temperature after hibernation: _____°C
3. Did your contents "survive" as a liquid or freeze to death as jello?

4. Where did you choose to hibernate?

5. Explain why you think your hibernation spot did or did not work and if there are any ways to improve next time.

Physical Properties of Snow! (Complete in your snow fort)

1. Scoop snow from the top of your fort. Level it with the rim of the cup at the top. DO NOT PACK IN THE SNOW!
    - Weight of snow:
    - Mass of snow:
    - Volume of snow: 266 mL
    - ***Next week: If mass= and volume= then the density of the snow= mass ÷ volume.
2. Scoop now from the bottom of your fort. Level it with the rim of the cup at the top. DO NOT PACK IN THE SNOW!
    - Weight of snow:
    - Mass of snow:
    - Volume of snow: 266 mL
    - ***Next week: If mass= and volume= then the density of the snow= mass ÷ volume.
3. Now pack the snow tightly into the cup. Make sure it is level with the rim.
    - Weight of snow:
    - Mass of snow:
    - Volume of snow: 266 mL
    - ***Next week: If mass= and volume= then the density of the snow= mass ÷ volume.

Snow Study Journal Sheet

Snowflake Geometry~ (Complete in your snow fort)

In this activity, you will **observe a snowflake** with a hand lens/microscope and **sketch it.** Make sure your sketch is large enough to fill the box below. Once your sketch is complete, **choose 8 or more terms** from the word bank and **label them** using the corresponding number on your snowflake sketch.

Labels

Use the number of the word to mark its location on your snowflake.

1. Adjacent Angles
2. Complimentary Angles
3. Supplementary Angles
4. Point
5. Line
6. Ray
7. Congruent Angles
8. Plane
9. Right Angle
10. Obtuse Angle
11. Straight Angle

Snow Study Journal Sheet

Observing Physical Properties

As you look through the museum displays choose **unique** items and record their physical properties.

Property	Item:	Item:	Item:	Item:
Color(s)				
Geometric Shape(s)				
Guess the Odor				
Estimate Size (cm or m)				
State of Matter				
Estimate Volume				
Estimate Mass				

Vocabulary to Know

Angles - he space (usually measured in degrees) between two intersecting lines or surfaces at or close to the point where they meet.

Geometry - he space (usually measured in degrees) between two intersecting lines or surfaces at or close to the point where they meet.

Mass - the quantity of matter which a body contains.

Weight– a body's relative mass or the quantity of matter contained by it, giving rise to a downward force; the heaviness of a person or thing.

Volume – the amount of space that a substance or object occupies, or that is enclosed within a container, especially when great.

Density – the degree of compactness of a substance.

Hibernation – the condition or period of an animal or plant spending the winter in a dormant state.

State or NGS Standards

Science and Technology

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8.2.1.g Classify substances into similar groups based on physical properties

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6.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
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6.W.5 Write informative/explanatory pieces to examine a topic or text and clearly convey ideas and information.

Soil Sampling

Unit – 4

Grade Level:
6th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to…

- Measure and observe characteristics of soils.
- Make observations and inferences about unique characteristics of soils.

Key Concepts:
- Soil
- Observation
- Characteristics

Materials:
- Activity sheet
- Clipboards
- Coffee Can
- Spoon
- Toothpick
- Microscope
- Newspaper

Background & Summary

Without soil, the existence of all life on the plants would be almost non-existent. Soil is a renewable resource that is the home of decomposers to the growing medium of plants. To see what makes up this important layer of life, students will learn about soil components and materials that make them up.

Procedure

The following lesson is based on the question: What kind of materials make up Desoto's soils*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students will follow example given by ranger to collect a soil sample.
    - To collect a soil sample students will use a coffee tin to scoop some of the soil from the area they are in.
2. Once students have collected their soil sample they will spread it out onto the newspapers. Using toothpicks and spoons students will spread out the samples and start separating the different components of the soil.
3. Initial observations students make with their eyes, have them investigate the soils color, texture, and large pieces.
    - If any larger pieces are found have students record the length or width in millimeters.
4. Have students observe using a hands lens and describe as much detail as possible what they see and have them record it in the table.
5. Have them record any larger particles they can see in greater clarity now.
6. Spread a small amount of soil onto a petri dish and observe using a microscope. Have students record new discoveries on the soil materials.

How to Study Soil



Soil Sampling Journal Sheet

What Types of Materials Make Up the Majority of the Soil?

Items that may be in the soil you see: sand, silt, clay, rock, roots, leaves, stems, seeds, berries, nuts & shells, worms, insects, animal remains (hair, furs, bones, etc.), water, salt, minerals, larvae, or egg cases, etc.

Soil Sample #1:

	Draw what you see.	List what you see (include length in mm)
Eyes		
Hand Lens		
Microscope		
Colors		
Texture		

Soil Sampling Journal Sheet

What Types of Materials Make Up the Majority of the Soil?

Items that may be in the soil you see: sand, silt, clay, rock, roots, leaves, stems, seeds, berries, nuts & shells, worms, insects, animal remains (hair, furs, bones, etc.), water, salt, minerals, larvae, or egg cases, etc.

Soil Sample #2:

	Draw what you see.	List what you see (include length in mm)
Eyes		
Hand Lens		
Microscope		
Colors		
Texture		

Soil Sampling Journal Sheet

Soil Particle Settling

1. Get a clear container and fill it with 1 inch of soil.
2. Fill the rest of the container full with water and seal it with a lid. Record the lid letter:
3. Shake for 1 minute and then set it down to observe later.
4. When we return to observe, carefully look at your container (DON"T SHAKE) and draw a picture of the layers you see.

Write or Draw about Erosion

When we look at the erosion site, either write a description or draw a NEAT picture of the erosion that you see.

Vocabulary to Know

Soil - the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles.

Particle - a minute portion of matter.

Microscope - an optical instrument used for viewing very small objects, such as mineral samples or animal or plant cells, typically magnified several hundred times.

Texture– the feel, appearance, or consistency of a surface or substance.

Minerals – a solid inorganic substance of natural occurrence.

Erosion – the process of eroding or being eroded by wind, water, or other natural agents.

Clarity – the quality of transparency or purity.

Components – a part or element of a larger whole, especially a part of a machine or vehicle.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

8.1.1.e Make qualitative and quantitative observations
8.1.1.f Record and represent data appropriately and review for quality, accuracy, and relevancy
8.1.1.h Share information, procedures, results, and conclusions with appropriate audiences
8.1.1.i Analyze and provide appropriate critique of scientific investigations
8.1.1.j Use appropriate mathematics in all aspects of scientific inquiry

2. Physical Science

8.2.1.a Compare and contrast elements, compounds, and mixtures
8.2.1.d Compare and contrast solids, liquids, and gases based on properties of these states of matter
8.2.1.e Distinguish between physical and chemical changes (phase changes, dissolving, burning, rusting)
8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

6. Structure and Function and Information Processing

6.6.2.A Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells

9. Growth, Development, and Reproduction of Organisms

6.9.3.B Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

English Language Arts

Reading Prose and Poetry

6.RP.6 Analyze a literary text to answer and develop inferential and evaluative questions to enhance the comprehension of self and others, quoting or paraphrasing specific evidence from the text.

Reading Informational Text

6.RI.6 Analyze the development of an argument and identify the type(s) of reasoning used to support the argument

Writing

6.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
6.W.4 Write arguments that explain a perspective with supporting reasons and evidence.
6.W.5 Write informative/explanatory pieces to examine a topic or text and clearly convey ideas and information.

Seventh Grade Lessons

Nature Scavenger Hunt Lab

Unit – 1

Grade Level:
7th

Time:
30 minutes

Season:
All

Objectives:
Students will be able to…

- Make multiple recordable observations.
- Make inferences about unique characteristics of observed species.
- Identify what National Wildlife Refuges are and their purpose.

Key Concepts:
- Inference
- Observation
- National Wildlife Refuges

Materials:
- Scavenger Hunt List
- Camera
- Identification guide for trees and plants

Background & Summary

National Wildlife Refuges offer a natural sanctuary for a large diversity of wildlife species, but they also offer visitors the chance to observe these species and explore nature as it is offered to them. During this lesson students will learn about the refuge while also utilizing and expanding their observation and inference skills.

Procedure

The following lesson is based on the question: What kind wildlife live at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Greet students and ask them what a National Wildlife Refuge is.
2. What are the main purposes and uses of National Wildlife Refuges?
    - We are there to protect wildlife and their habitat for future generations.
    - Big 6—Hunting, Fishing, Wildlife Observation, Wildlife Photography, Environmental Education, Interpretation.
3. Why were Desoto and Boyer Chute established:
    - Boyer Mission: was established to recover fish and wildlife habitat in and along the Missouri River and to restore essential wildlife habitat that became scarce after the river was "improved" for navigation half a century ago.
    - DeSoto Mission: was established to provide important stopover site habitat for migratory waterfowl that follow the Mississippi flyway.
4. Guide students to the nature trail they will be exploring.
    - When at the trail hand out the scavenger hunt cards to students.
    - Break students into groups of four to complete the given scavenger hunt. They will have 20 minutes to do so.
    - Explain to the students they will be using one members camera to digitally record the found items on the list unless told otherwise.
    - Remind students that since this is a National Wildlife Refuge they cannot collect or remove items as proof.
    - Students that collect the most photos will win a small prize.

Scavenger Hunt Item List

You need to bring back as many pictures or drawings of the following items as possible. Please do not bring any items physically back to your ranger or teachers. You have 20 minutes to find these items, once that time is over return to the group.

Draw the following items :

Virginia Creeper	Poison Ivy
Animal Tracks	An Insect (try to name it)

Photograph the following items :

A Cottonwood Tree
Bird (Bonus if you can identify it)
Spider Web
Butterfly
Coniferous Tree

Choose 2 items and make 2 Qualitative and 2 Quantitative observations for each, Label the Qualitative and Quantitative observations.

Vocabulary to Know

Scavenger - a person who searches for and collects discarded items or an animal that feeds on carrion, dead plant material, or refuse.

Identification - the action or process of identifying someone or something or the fact of being identified.

Quantitative - relating to, measuring, or measured by the quantity of something rather than its quality.

Qualitative– relating to, measuring, or measured by the quality of something rather than its quantity.

Observation – the action or process of observing something or someone carefully or in order to gain information.

Estimate – roughly calculate or judge the value, number, quantity, or extent of.

Flooding – the covering or submerging of normally dry land with a large amount of water.

Naturalist – an expert in or student of natural history.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

8.1.1.e Make qualitative and quantitative observations
8.1.1.f Record and represent data appropriately and review for quality, accuracy, and relevancy
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8.1.1.i Analyze and provide appropriate critique of scientific investigations
8.1.1.j Use appropriate mathematics in all aspects of scientific inquiry

2. Physical Science

8.2.1.a Compare and contrast elements, compounds, and mixtures
8.2.1.d Compare and contrast solids, liquids, and gases based on properties of these states of matter
8.2.1.e Distinguish between physical and chemical changes (phase changes, dissolving, burning, rusting)
8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

7. Interdependent Relationships in Ecosystems

7.7.3.A Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
7.7.3.B Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

8. Matter and Energy in Organisms and Ecosystems

7.8.4.D Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

English Language Arts

Reading Prose and Poetry

7.RP.6 Synthesize the implied or stated theme(s) in a literary text to draw conclusions and deepen understanding of self and others

Reading Informational Text

7.RI.2 Analyze the relationships and interactions between individuals, events, and/or ideas or concepts, drawing on specific supporting details in an informational text.

Writing

7.W.3 Write in a variety of literary forms to convey real or imagined experiences or events in which the development and structure are appropriate to the task, purpose, and audience.
7.W.4 Write arguments that develop a perspective with supporting reasons and evidence, organized as appropriate to the task, purpose, and audience.
7.W.5 Write informative/explanatory pieces to examine a topic or text and clearly convey ideas and information.

Ecosystem Lab

Unit – 2

Grade Level:
7th

Time:
60 minutes

Season:
All

Objectives:
Students will be able to…

- Make multiple recordable observations about interactions in an ecosystem.
- Differentiate the different organisms within a ecosystem.
- Identify different levels of species size and number within an ecosystem.

Key Concepts:
- Organism
- Ecosystem
- Ecosystem Roles
- Population Dynamics

Materials:
- Ecosystem Lab Worksheet
- Writing Utensil

Background & Summary

Ecosystems are the driving forces we see all nature participating throughout the globe with each different interaction have important impacts. DeSoto National Wildlife Refuge is home to a wide variety of different ecosystems throughout its lands and waters. During this lesson students will investigate a few of these ecosystems and how each component or organism plays an important role.

Procedure

The following lesson is based on the question: What kind ecosystems exist at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Introduce students to ecosystems.
    - Ecosystem: a biological community of interacting organisms and their physical environment.
2. Students will make inferences on what are some components of an ecosystem, but the will also be introduced to biotic and abiotic factors.
    - Biotic: relating to or resulting from living things, especially in their ecological relations.
    - Abiotic: physical rather than biological; not derived from living organisms.
    - Population: A group of organisms of one species that interbreed and live in the same place at the same time.
    - Community: an interacting group of various species in a common location.
    - Species: a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.
3. Once students have an understanding of these terms, allow them to make inferences about the different ecosystems on the refuge as they explore.

How to Observe Ecosystems



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Ecosystem Lab Worksheet

DeSoto Lake

1. Find two different plant organisms and two different animal or insect organisms. With each one, write down at least four different *quantitative* observations and five different *qualitative* observations.

Plant Organism 1:

Plant Organism 2:

Animal or Insect Organism 1:

Animal or Insect Organism 2:

2. Find two abiotic factors and describe three *qualitative* observations about each of them.

Abiotic Factor 1:

Abiotic Factor 2:

3. When you combine all of the organisms you identified from this area and all of the abiotic factors, what are you describing? (circle the best answer)

A. Population B. Community C. Ecosystem D. Species.

4. Find as many different animal or insect organisms as you can and list them below. If you do not know the name of the organism, describe it.

Ecosystem Lab Worksheet

Bottomland Hardwood Forest

1. Find two different plant organisms and two different animal or insect organisms. With each one, write down at least four different *quantitative* observations and five different *qualitative* observations.

Plant Organism 1:

Plant Organism 2:

Animal or Insect Organism 1:

Animal or Insect Organism 2:

2. Find two abiotic factors and describe three *qualitative* observations about each of them.

Abiotic Factor 1:

Abiotic Factor 2:

3. When you combine all of the organisms you identified from this area and all of the abiotic factors, what are you describing? (circle the best answer)

A. Population B. Community C. Ecosystem D. Species.

4. Find as many different animal or insect organisms as you can and list them below. If you do not know the name of the organism, describe it.

Ecosystem Lab Worksheet

Prairie

1. Find two different plant organisms and two different animal or insect organisms. With each one, write down at least four different *quantitative* observations and five different *qualitative* observations.

Plant Organism 1:

Plant Organism 2:

Animal or Insect Organism 1:

Animal or Insect Organism 2:

2. Find two abiotic factors and describe three *qualitative* observations about each of them.

Abiotic Factor 1:

Abiotic Factor 2:

3. When you combine all of the organisms you identified from this area and all of the abiotic factors, what are you describing? (circle the best answer)

A. Population B. Community C. Ecosystem D. Species.

4. Find as many different animal or insect organisms as you can and list them below. If you do not know the name of the organism, describe it.

Vocabulary to Know

Ecosystem - a biological community of interacting organisms and their physical environment.

Hardwood - the wood from a broadleaved tree (such as oak, ash, or beech) as distinguished from that of conifers.

Organism - an individual animal, plant, or single-celled life form.

Abiotic– physical rather than biological; not derived from living organisms.

Biotic – relating to or resulting from living things, especially in their ecological relations.

Community – a group of interdependent organisms of different species growing or living together in a specified habitat.

Population – a community of animals, plants, or humans among whose members interbreeding occurs.

Species – a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding. The species is the principal natural taxonomic unit, ranking below a genus and denoted by a Latin binomial, e.g. Homo sapiens.

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8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
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Estimating Tree Lab

Unit – 3

Grade Level:
7th

Time:
60 minutes

Season:
All

Objectives:
Students will be able to...

- Measure an area using the estimation of their stride length.
- Measure area of a forest stand.
- Estimate the number of tree in a stand.

Key Concepts:
- Estimated Area
- Conservation
- Timber

Materials:
- Estimating Trees Lab Worksheet
- Flags for areas to estimate
- Meter Stick for Measuring Step Size

Background & Summary

Throughout our daily life from the pencil we jot down a note or the support beams of the building we stand in, wood products surround us. In order to get these wood products to the general public, lumber companies cut down and process trees. Due to demand there is also forest conservation organizations trying to preserve the forests for wildlife and future generations. In this lab students will learn the methods to measuring the number of trees in a forest stand.

Procedure

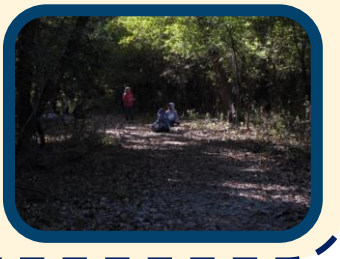
The following lesson is based on the question: What number of trees are at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. The timber business is an essential part of different sectors of our daily life, and with this sector comes different ways of measurements to ensure a timber harvest is as efficient as possible. On the other hand, conservation organizations use these methods to measure the forests they are protecting and to see if their management is benefiting the forest.
    - to precursor the activity students will learn how to measure using their strides.
2. Have students follow the directions on the worksheet for the rest of the lesson.

How to Measure Timber Area





Estimating Tree Lab Worksheet

Estimating the Number of Trees Within a Wooded Area

Suppose you are working for a forest conservation organization area. You are in charge of determining the approximate number of trees within in a 100,00 square foot area. Follow the steps below.

Estimate the length and width of the roped area:

a) measure your stride to the nearest half-foot. Place a tape measure on the ground. Beginning with your toe at the beginning take one "normal" step and write your stride here:

b) Find the length of the roped off area. Beginning with your toes at a corner take normal strides along one side of the area counting them as you go. Write the number of strides here:

c) Multiply your stride length from part "a" with your number of strides to find the estimated length:

d) Find the width of the roped off area. Beginning with your toe at a corner take normal strides along the adjacent side of the area counting them as you go. Write the number of strides here:

e) Multiply your stride length from part "a" with your number of strides to find the estimated width:

Estimate the area of roped off section:

a) Multiply the length and width from "b" and "c" above.

b) Count the number of trees in the roped off section and write that number here:

c) Estimate the number of trees in a 100,000 square foot wooded area using a proportion. Here is a example:

My number of trees from c above.

My estimates area from a above.

$$\frac{20 \text{ trees}}{2400 \text{ ft}^2} = \frac{N}{100{,}000 \text{ ft}^2}$$

Cross multiply to get an equation: 2,400n= 2,000,000

Solve by dividing: 2,000,000 ÷ 2,400 = 833.3333

So, for this example, there are approximately 833 trees within the 100,000 square foot wooded area.

Vocabulary to Know

Length - the measurement or extent of something from end to end; the greater of two or the greatest of three dimensions of a body.

Width - the measurement or extent of something from side to side.

Stride - walk with long, decisive steps in a specified direction.

Measurement– the size, length, or amount of something, as established by measuring.

Area – the extent or measurement of a surface or piece of land.

Conservation – preservation, protection, or restoration of the natural environment and of wildlife.

Estimate – roughly calculate or judge the value, number, quantity, or extent of.

Proportion – a part, share, or number considered in comparative relation to a whole.

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GPS Scavenger Hunt

Unit – 4

Grade Level:
7th

Time:
60 minutes

Season:
All

Objectives:
Students will be able to...

- Find their way using a GPS.
- Make inferences about habitat types and wildlife.
- Identify map coordinates and their locations.

Key Concepts:
- Wayfinding
- Navigation
- GPS

Materials:
- GPS Lab Sheet
- GPS Unit
- Food, water, and Shelter Bards

Background & Summary

When navigating and finding waypoints, maps and GPS units are things that help us find our way with relative ease in current society. Before the age of technology explorers that explored the continent had compasses and the stars. During this lab students will learn to use modern technology to find their way around the landscape of the refuge to find different habitats and our wildlife.

Procedure

The following lesson is based on the question: How do we navigate Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Set up the coordinate plane within the Visitor Center lawn or extra parking lot with chalk lines.
2. During this lesson students will be learning to use GPS units and maps.
3. Introduce students to the concept of wayfinding using the coordinate plane.
4. Explain the following worksheet and the expectations of the students during this lesson.

How to Wayfind



GPS Scavenger Hunt Worksheet

Wildlife Inferences

For animal 1 you will find the following items and place the cards in the place you think they could find these items.

Animal 1 Name:

Describe the area that you put each item in and explain how the organism would meet this need. Also next to each item write down what you named it on the GPS.

Food Source:

Water:

Shelter:

What type of habitat does you animal live in?

What other types of animals live in this area? Will they affect your animal?

Draw a food chain showing at least 3 organisms and includes your animal.

Animal 1 Name:

Describe the area that you put each item in and explain how the organism would meet this need. Also next to each item write down what you named it on the GPS.

Food Source:

Water:

Shelter:

What type of habitat does you animal live in?

What other types of animals live in this area? Will they affect your animal?

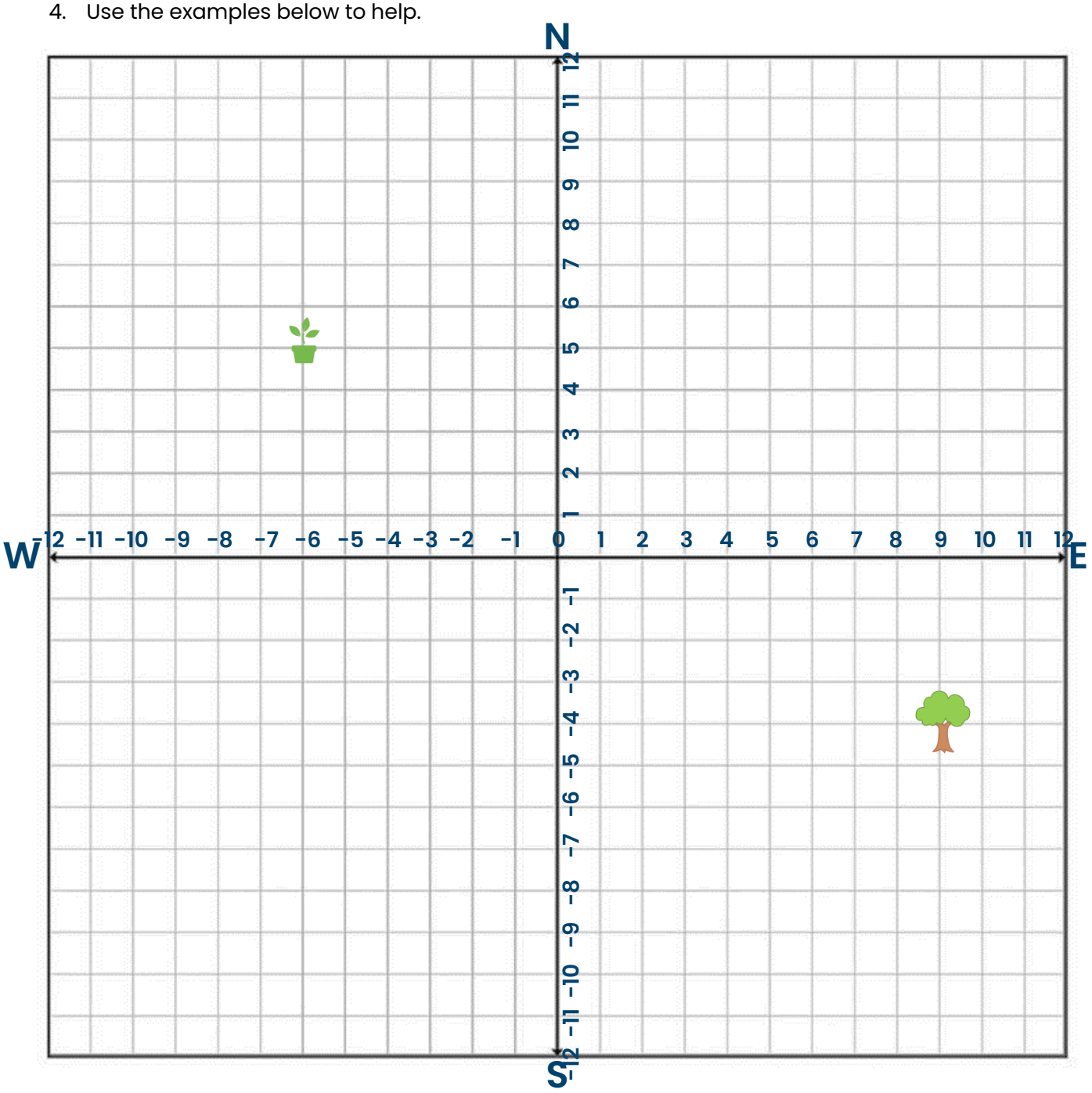
Draw a food chain showing at least 3 organisms and includes your animal.

GPS Scavenger Hunt Worksheet

Coordinate Plane Activity

Find the coordinates (to the nearest positive /negative foot) of each listed item. First write the location with directions then write the ordered pair with integers.

1. Find the point of origin
2. Locate each direction (North, South, East, and West)
3. Familiarize yourself with the coordinate plane- For Example: Quadrant 1 will be North and East of the origin, etc.
4. Use the examples below to help.



Example 1

Find the Coordinates of the Plant. (Answer: 6 feet West and 5 feet North, -6,5)

Example 2

Find the Coordinates of the Tree. (Answer: 9 feet East and 4 feet South, 9,-4)

GPS Scavenger Hunt Worksheet

Coordinate Plane Activity

Find the coordinates(to the nearest positive/negative foot) of each listed item. First write the location with directions and then write the ordered pair with integers.

1. Birdhouse 1 (Quadrant 1) 103 feet East, 33 feet North (103, 33)

2. Large Stump (Quadrant 3) 33 feet West, 53 feet South (-33, -53)

2. Birdhouse 2 33 feet West, 49 feet North (-33, 49)

3. Center post on the right of shelter 111 feet West, 58 feet North (-111, 58)

Using your coordinates and knowledge of coordinate planes to find the horizontal and vertical distance.

5. Using only the coordinates you found above, find the distance between birdhouse 2 and the stump.

(-33, 49) and (-33, -53)

49-(-53)=49+53=102ft

Name the item found at each of the following locations. DO NOT TOUCH OR MOVE THE PLACED ITEMS, DO NOT TELL OTHER GROUPS WHAT THE ITEMS ARE OR WHERE THEY ARE LOCATED.

1. 40 feet West and 65 feet North (-40,65) Golf Ball

2. 50 feet West and 30 feet South (50,-30) Small Floss Container

3. 90 feet East and 168 feet North (90,168) Teacher Appreciation Trinket

GPS Scavenger Hunt Worksheet

Coordinate Plane Activity

Find the coordinates(to the nearest positive/negative foot) of each listed item. First write the location with directions and then write the ordered pair with integers.

1. Birdhouse 1 (Quadrant 1) 103 feet East, 33 feet North (103, 33)

2. Large Stump (Quadrant 3) 33 feet West, 53 feet South (-33, -53)

2. Birdhouse 2 33 feet West, 49 feet North (-33, 49)

3. Center post on the right of shelter 111 feet West, 58 feet North (-111, 58)

Using your coordinates and knowledge of coordinate planes to find the horizontal and vertical distance.

5. Using only the coordinates you found above, find the distance between birdhouse 2 and the stump.

(-33, 49) and (-33, -53)

49-(-53)=49+53=102ft

Name the item found at each of the following locations. DO NOT TOUCH OR MOVE THE PLACED ITEMS, DO NOT TELL OTHER GROUPS WHAT THE ITEMS ARE OR WHERE THEY ARE LOCATED.

1. 67 feet West and 92 feet North (-67,92) Whiteout Bottle

2. 80 feet East and 70 feet South (80,-70) Small Travel Bottle of Scope

3. 40 feet East and 152 feet North (40,152) Small Santa Decoration

Vocabulary to Know

Waypoint - an endpoint of the leg of a course, especially one whose coordinates have been generated by a computer.

Coordinate - each of a group of numbers used to indicate the position of a point, line, or plane.

Point - a particular spot, place, or position in an area or on a map, object, or surface.

Coordinate Plane– a two-dimensional plane formed by the intersection of a vertical line called y-axis and a horizontal line called x-axis.

Wayfinding – the process or activity of ascertaining one's position and planning and following a route.

Point of Origin – the place where something originates.

Quadrant – each of four parts of a plane, sphere, space, or body divided by two lines or planes at right angles.

Habitat – the natural home or environment of an animal, plant, or other organism.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

8.1.1.e Make qualitative and quantitative observations
8.1.1.f Record and represent data appropriately and review for quality, accuracy, and relevancy
8.1.1.h Share information, procedures, results, and conclusions with appropriate audiences
8.1.1.i Analyze and provide appropriate critique of scientific investigations
8.1.1.j Use appropriate mathematics in all aspects of scientific inquiry

2. Physical Science

8.2.1.a Compare and contrast elements, compounds, and mixtures
8.2.1.d Compare and contrast solids, liquids, and gases based on properties of these states of matter
8.2.1.e Distinguish between physical and chemical changes (phase changes, dissolving, burning, rusting)
8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

7. Interdependent Relationships in Ecosystems

7.7.3.A Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
7.7.3.B Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

8. Matter and Energy in Organisms and Ecosystems

7.8.4.D Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

English Language Arts

Reading Prose and Poetry

7.RP.6 Synthesize the implied or stated theme(s) in a literary text to draw conclusions and deepen understanding of self and others

Reading Informational Text

7.RI.2 Analyze the relationships and interactions between individuals, events, and/or ideas or concepts, drawing on specific supporting details in an informational text.

Writing

7.W.3 Write in a variety of literary forms to convey real or imagined experiences or events in which the development and structure are appropriate to the task, purpose, and audience.
7.W.4 Write arguments that develop a perspective with supporting reasons and evidence, organized as appropriate to the task, purpose, and audience.
7.W.5 Write informative/explanatory pieces to examine a topic or text and clearly convey ideas and information.

Eighth Grade Lessons

Leaf Rubbing

Unit – 1

Grade Level:
8th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify the different anatomy of a leaf.
- Identify the species of leaf.
- Draw conclusions and interpret what they are seeing on the leaves.

Key Concepts:
- Anatomy
- Leaves

Materials:
- White Paper
- Crayons
- Leaves

Background & Summary

Within the leaves that tell us spring is upon us or that the fall is in full swing, there are small details that create a beautiful picture. Each detail is important to the plant and its survival. During this lesson students will explore that anatomy of a leaf through art.

Procedure

The following lesson is based on the question: What important anatomy exists on leaves at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Have students collect two leaves outside.
2. Students will create rubbings off of these leaves and identify the different parts of a leaf.
3. Have students complete the following worksheet.

How to Create Leaf Rubbings



Leaf Rubbings Worksheet

Directions

1. Collect 2 different leavers as you explore.
2. Fold a piece of plain white paper in half.
3. Position the leaf “vein side up” inside the paper.
4. Select a crayon piece (peel off any paper on the crayon)
5. Turn the crayon on its side and rub over the top of the folded paper (with leaf ‘vein side up’).
6. Select another color if you would like.
7. Repeat with the second leaf on the other half of the paper.

<u>Label the following on each rubbing:</u>

- Petiole (structure that connects the blade to the stem or branch you removed the leaf from).
- Blade (entire colored part of the leaf except the petiole)
- Margin (rim or edge of the blade)
- Midrib (central vein of the blade)
- Side vein (branches off the midrib)

<u>Answer the following questions about each leaf:</u>

1. Did your leaf come from grass, a tree, or a bush?
   a)
   b)
2. What is the actual color of the leaf?
   a)
   b)
3. Is your rubbing of the upper or lower epidermis (outer layer)?
   a)
   b)
4. Did the leaf come from a monocot (parallel veins) or a dicot (branching veins)?
   a)
   b)
5. Use the tree guide to determine what type of plant the leaf came from:
   a)
   b)

Vocabulary to Know

Leaf - a flattened structure of a higher plant, typically green and blade-like, that is attached to a stem directly or via a stalk. Leaves are the main organs of photosynthesis and transpiration.

Vein - a slender rib running through a leaf or bract, typically dividing or branching, and containing a vascular bundle.

Petiole - the stalk that joins a leaf to a stem; leafstalk.

Blade– the broad, thin part of a leaf apart from the stalk.

Midrib – a large strengthened vein along the midline of a leaf.

Margin – the edge or border of something.

Side Vein – **v**eins that branch out from the veins that enter leaves from the petiole.

Epidermis – the outer layer of tissue in a plant, except where it is replaced by periderm.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

8.1.1.e Make qualitative and quantitative observations
8.1.1.f Record and represent data appropriately and review for quality, accuracy, and relevancy
8.1.1.h Share information, procedures, results, and conclusions with appropriate audiences
8.1.1.i Analyze and provide appropriate critique of scientific investigations
8.1.1.j Use appropriate mathematics in all aspects of scientific inquiry

2. Physical Science

8.2.1.a Compare and contrast elements, compounds, and mixtures
8.2.1.d Compare and contrast solids, liquids, and gases based on properties of these states of matter
8.2.1.e Distinguish between physical and chemical changes (phase changes, dissolving, burning, rusting)
8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

10. Natural Selection and Adaptations

8.10.5.C 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
8.10.5.D Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

English Language Arts

Writing

8.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
8.W.4 Write arguments that develop a perspective with supporting reasons and evidence, organized as appropriate to the task, purpose, and audience.
8.W.5 Write informative/explanatory pieces to clearly convey ideas and information in which the development and structure are appropriate to the task, purpose, and audience.

Speaking and Listening

8.SL.1 Initiate and participate in structured discussions and collaborations about 8th grade topics and texts.
8.SL.2 Present claims and findings, emphasizing key ideas in a focused, coherent manner with relevant descriptions, facts, details, and examples to clarify themes or central ideas.

Grade Level:
8th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify living trees from non-living trees.
- Calculate percentages.
- Create a bar graph.

Key Concepts:
- Trees
- Percentages

Materials:
- Graph Paper
- Rope
- Calculator (optional)

Math Tree Graph

Unit – 2

Background & Summary

Within the forest there are living and non-living trees. During this lessons students will use percentages to find the area of the roped forested area.

Procedure

The following lesson is based on the question: What percentages of live and dead trees exist at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students will record dead and living trees within the roped area outside.
2. Have students complete the following worksheet.

How to Graph Areas



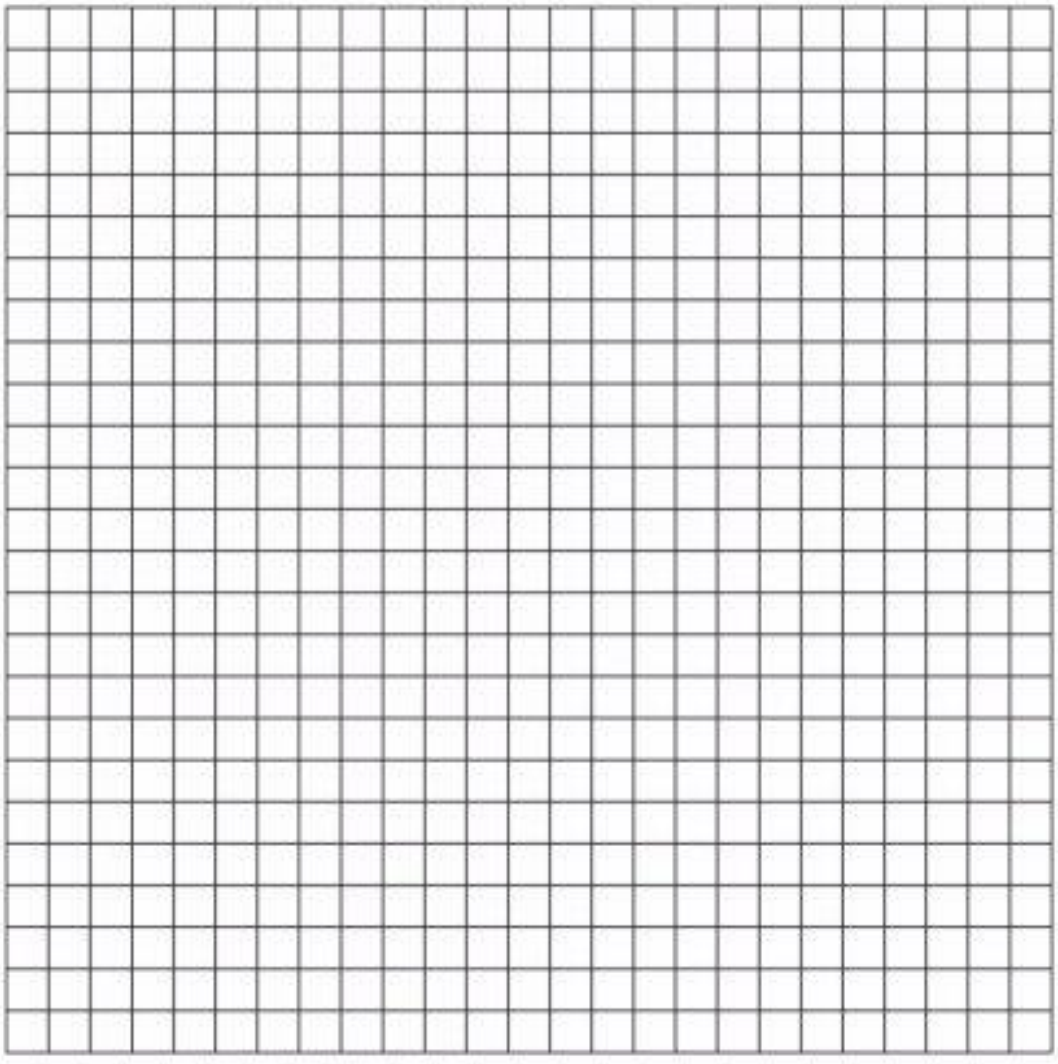
Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

How Many Trees Does Thee See Worksheet

Directions

Count ALL of the trees and tree stumps in the roped off area. DO NOT walk into the roped off area. You may need to walk around to make sure you get every tree and stump collected. Once you have finished counting, write down your data here:
Use this number to help solve the following questions.

1. Assuming all of the tree stumps were cottonwood trees, what percentage of all the trees are cottonwood trees? Show your work:
2. Make a bar graph charting living trees and trees that are not living. Make sure you label each axis and the data that you are graphing. Add an appropriate title that reflects both axis and include correct units in the labels.



Vocabulary to Know

Stump - the bottom part of a tree left projecting from the ground after most of the trunk has fallen or been cut down.

Counted - determine the total number of (a collection of items).

Bar Graph - a diagram in which the numerical values of variables are represented by the height or length of lines or rectangles of equal width.

Chart– a sheet of information in the form of a table, graph, or diagram.

Axis – an imaginary straight line passing through the center of a symmetrical solid, about which a plane figure can be conceived as rotating to generate the solid.

Data – facts and statistics collected together for reference or analysis.

Label – a word or words used to specify the subject area, register, or geographical origin of the word being defined.

Frequency – the rate at which something occurs or is repeated over a particular period of time or in a given sample.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

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8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

10. Natural Selection and Adaptations

8.10.5.C 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
8.10.5.D Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

English Language Arts

Writing

8.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
8.W.4 Write arguments that develop a perspective with supporting reasons and evidence, organized as appropriate to the task, purpose, and audience.
8.W.5 Write informative/explanatory pieces to clearly convey ideas and information in which the development and structure are appropriate to the task, purpose, and audience.

Speaking and Listening

8.SL.1 Initiate and participate in structured discussions and collaborations about 8th grade topics and texts.
8.SL.2 Present claims and findings, emphasizing key ideas in a focused, coherent manner with relevant descriptions, facts, details, and examples to clarify themes or central ideas.

Visual Poet

Unit – 3

Grade Level:
8th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify living trees from non-living trees.
- Calculate percentages.
- Create a bar graph.

Key Concepts:
- Trees
- Percentages

Materials:
- Ipad

Background & Summary

Poetry has been used throughout human history to portray scenes and wonder in nature and events. By transcribing their views into a poem they created their own visual poetry. Students in this lesson will be taking things from their visual environment and will create their own visual poetry.

Procedure

The following lesson is based on the question: What at Desoto National Wildlife Refuge can help create a poem*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students will record dead and living trees within the roped area outside.
2. Have students complete the following worksheet.

How to Create Visual Poetry



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

How Many Trees Does Thee See Worksheet

Directions

You will be creating another filmstrip poem while out at DeSoto- similar to the one that you completed in class yesterday. The steps are the same, but the pictures and sentences must be different.

First you must take 3 pictures out at DeSoto:

1. Something unique to DeSoto.
2. Something manmade.
3. Something in motion.

These pictures will be connected to your descriptive writing, so choose wisely! Be thoughtful about your pictures- take them so that they look nice!

Open the "visual poet" app, just like we did yesterday.

Tap a panel, and tap the black bar at the bottom of the screen that says "new image" and tap the words "from library". From there, you will be able to find one of your pictures and format it so that is shows up in your panel. Choose the part of the photo that you want in your panel, and double tap the area that you've chosen.

For each picture, you must write a detailed, descriptive sentence. Be Creative! You can tell a story with your sentence, or you can just describe what it is in the box, but you must use vivid verbs and detailed adjectives in a complete sentence to describe what is in the box.

To add text, tap the picture. A small, white box will pop up, and all you have to do is start typing. When you are finished with your sentence, move the box where you want it to be in the picture. Swipe your finger from left to right to get back to the main screen.

Write your three sentences here:

1.

2.

3.

Complete this process for all three panels.

When you have filled all three panels with a picture and a sentence, title your poem by tapping the box, write your name under credits, and tap save.

Once back at Otte, send your poem to your teacher.

These will be graded on the following: Quality/Accuracy of the picture; Complete Sentences; Descriptive, Meaningful Writing.

Vocabulary to Know

Manmade - made or caused by human beings (as opposed to occurring or being made naturally); artificial.

Motion - the action or process of moving or being moved.

Adjective - a word or phrase naming an attribute, added to or grammatically related to a noun to modify or describe it.

Verb – a word used to describe an action, state, or occurrence, and forming the main part of the predicate of a sentence, such as hear, become, happen.

Detail – an individual feature, fact, or item.

Vivid – producing powerful feelings or strong, clear images in the mind.

Descriptive – describing or classifying in an objective and nonjudgmental way.

Meaningful – having a serious, important, or useful quality or purpose.

State or NGS Standards

Science and Technology

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8.2.1.f Recognize conservation of matter in physical and chemical changes
8.2.1.g Classify substances into similar groups based on physical properties

3. Life Science

8.3.1.e Describe how plants and animals respond to environmental stimuli
8.3.3.c Recognize that producers transform sunlight into chemical energy through photosynthesis
8.3.3.d Determine the biotic and abiotic factors that impact the number of organisms an ecosystem can support
8.3.3.e Recognize a population is all the individuals of a species at a given place and time
8.3.3.g Identify positive and negative effects of natural and human activity on an ecosystem

10. Natural Selection and Adaptations

8.10.5.C 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
8.10.5.D Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

English Language Arts

Writing

8.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
8.W.4 Write arguments that develop a perspective with supporting reasons and evidence, organized as appropriate to the task, purpose, and audience.
8.W.5 Write informative/explanatory pieces to clearly convey ideas and information in which the development and structure are appropriate to the task, purpose, and audience.

Speaking and Listening

8.SL.1 Initiate and participate in structured discussions and collaborations about 8th grade topics and texts.
8.SL.2 Present claims and findings, emphasizing key ideas in a focused, coherent manner with relevant descriptions, facts, details, and examples to clarify themes or central ideas.

Nature Walk

Unit – 4

Grade Level:
8th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Create a chart of their observations.
- Interpret data and create inferences from them.
- Create a bar graph.

Key Concepts:
- Graphs
- Observation

Materials:
- Activity Sheet
- Clip Board

Background & Summary

When taking a nature walk, we record the number of observational categories we see. To be a better naturalist and mathematician, students will use their math skills and observational skills to create records using graphs and charts to record observations and create conclusions during this lesson.

Procedure

The following lesson is based on the question: What can I observe at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students will record the information in the charts on the worksheet page and follow instructions.

How to Observe Nature



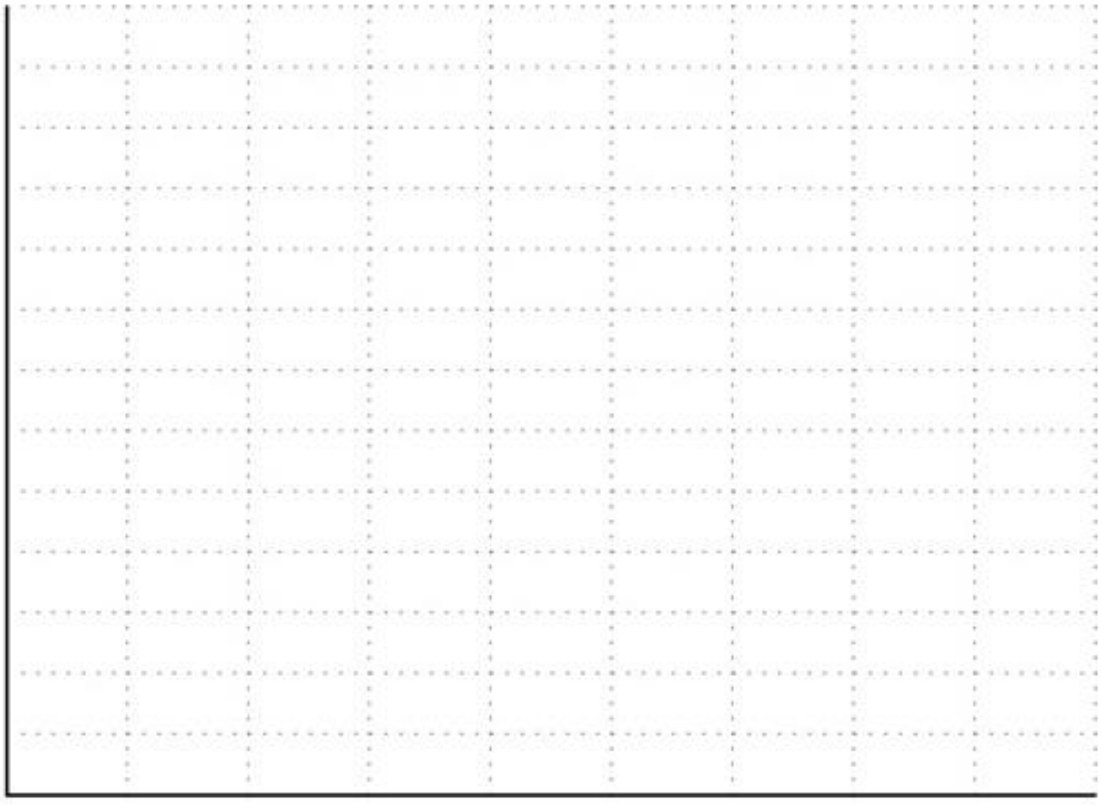
Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Nature Walk Worksheet

On your nature walk fill in the following information in the chart below with your observations.

Number of nests	Number of Feathers	Number of birds observed	Number of scat piles	Number of bird songs/sounds

In the space below create a bar graph including all the information in the chart above. Remember to also include labels on the axes and an appropriate title.



Nature Walk Worksheet

Based on tour observations, interpret your data table and bar graph to determine how many individual birds you witnessed. Your inference should be explained in a paragraph. Take into consideration how many birds you saw that were also creating the songs, had made the nests, etc.

Can you identify any of the birds by species (eagle, robin, duck, etc.)? If so, name them below.

Vocabulary to Know

Bar Graph - a diagram in which the numerical values of variables are represented by the height or length of lines or rectangles of equal width.

Identify - establish or indicate who or what (someone or something) is.

Number - an arithmetical value, expressed by a word, symbol, or figure, representing a particular quantity and used in counting and making calculations and for showing order in a series or for identification.

Observation– the action or process of observing something or someone carefully or in order to gain information.

Individual – a single member of a class.

Paragraph – a distinct section of a piece of writing, usually dealing with a single theme and indicated by a new line, indentation, or numbering.

Species – a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

Interpret – explain the meaning of (information, words, or actions).

State or NGS Standards

Science and Technology

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English Language Arts

Writing

8.W.1 Create grammatically correct multi-paragraph compositions with varied sentence structures.
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8.W.5 Write informative/explanatory pieces to clearly convey ideas and information in which the development and structure are appropriate to the task, purpose, and audience.

Speaking and Listening

8.SL.1 Initiate and participate in structured discussions and collaborations about 8th grade topics and texts.
8.SL.2 Present claims and findings, emphasizing key ideas in a focused, coherent manner with relevant descriptions, facts, details, and examples to clarify themes or central ideas.

Twelfth Grade Lessons

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Survey an area of land.
- Determine land physical features.
- Identify where organisms live.
- Identify ecosystem relationships.

Key Concepts:
- Ecosystem
- Surveys
- Interactions

Materials:
- Hand Lens
- Colored Pencils
- Pencil
- Piece of Cardstock
- Field Guides to Insects or Plants
- 4 Stakes and 50m of String

Ecosystem Investigation

Unit – 1

Background & Summary

How well do you know the environment around your home or school? You may walk through it every day without noticing most of the living things it contains or thinking about how they survive. Ecologists, on the other hand, observe organisms and seek to understand how ecosystems work. In this lab, you will play the role of an ecologist by closely observing part of your environment.

Procedure

The following lesson is based on the question: What can I find in a ecosystem at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Introduce students to the topics of ecosystems and physical features in relation to wildlife.

How to Observe Ecosystems



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Ecosystem Investigation Worksheet

Directions

1. Use a tape measure or meter stuck to measure a 10m x 10m site to study. Place one stake at each corner of the site. Loop the string around each stake and run the string form one stake to the next to form boundaries for the site (already done for you).
2. Survey the site and then prepare a site map of physical features of the area on cardstock. For example, show the locations of streams, sidewalks, large rocks, trails, and the direction of any noticeable slopes.
3. Create a set of symbols to represent the organisms at your site. For example, you might use green triangles to represent trees, blue circles to represent insects, or brown squares to represent animal burrows or nests. At the bottom or side of the cardstock, make a key for your symbols.
4. Drawn your symbols on the map to show the location and relative abundance of each type of organism. If there is not enough space on your map to indicate the specific kinds of plants and animals you observed, record them on the back of the cardstock.
5. Record any observations of organisms in their environment. For example, note insects feeding on plants or seeking shelter under rocks.

a) Sunlight Exposure- How much of the area is exposed to sunlight? Will this change and why? Has this affected the vegetation? Explain

b) Soil – Color (do not just put brown)

c) Rain – When was the last rain recorded for this area ?

d) Maintenance – Is the area maintained? Mowed and picked up? Describe.

Ecosystem Investigation Worksheet

e) Water Drainage –Is the area well drained, or does it have pools or water? Why?

f) Vegetation Cover – How much of the soil is covered with vegetation? How much of the soil is exposed?

g) Evidence of Man - Is there any evidence of human activity? Explain.

6. After completing these observations, identify a 2x2 meter area that you would like to study in more detail. One large step is equivalent to 1 meter.
7. Use your hand lens to inspect the area. Be careful not to disturb the soil or organisms. Then record the types of insects and plants you see. Use your field guides to identify one species of plant or insect. **You must check to see if you are correct. Be ready to show the organism and the picture in the field guide. List the organisms you have identified and draw a picture of at least one of them.**

Organisms: Drawing:

8. Collect a sample of soil with your spoon, and observe it with your hand lens. Record a description of the soil and the organisms that live in it.

9. Go to another groups plot. List at least 5 differences and 5 similarities between them.

Differences: Similarities:

Vocabulary to Know

Ecosystem- a biological community of interacting organisms and their physical environment.

Physical Features - natural features on the Earth's surface, such as water, lakes, mountains, and deserts.

Identify - recognize or distinguish (especially something considered worthy of attention).

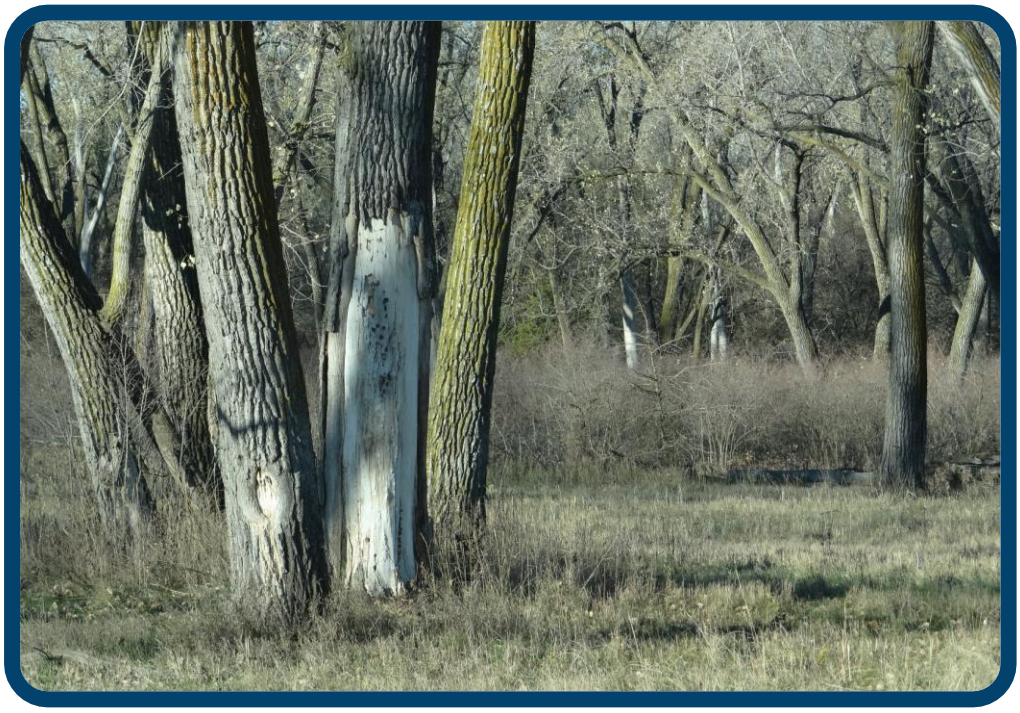
Survey– examine and record the area and features of (an area of land) so as to construct a map, plan, or description.

Boundaries – a line that marks the limits of an area; a dividing line.

Environment – the surroundings or conditions in which a person, animal, or plant lives or operates.

Organism – an individual animal, plant, or single-celled life form.

Observation – the action or process of observing something or someone carefully or in order to gain information.



State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

12.1.1.d Select and use lab equipment and technology appropriately and accurately
12.1.1.e Use tools and technology to make detailed qualitative and quantitative observations
12.1.1.f Represent and review collected data in a systematic, accurate, and objective manner
12.1.1.j Share information, procedures, results, conclusions, and defend findings to a scientific community (peers, science fair audience, policy makers)
12.1.1.k Evaluate scientific investigations and offer revisions and new ideas as appropriate
12.1.1.l Use appropriate mathematics in all aspects of scientific inquiry
12.1.3.a Propose designs and choose between alternative solutions of a problem

2. Physical Science

12.2.1.e Identify factors affecting rates of chemical reactions (temperature, particle size, surface area).
12.2.1.h Describe the organization of the periodic table of elements with respect to patterns of physical and chemical properties

3. Life Science

12.3.1.d Describe how an organism senses changes in its internal or external environment and responds to ensure survival
12.3.3.a Explain how the stability of an ecosystem is increased by biological diversity
12.3.3.c Explain how distribution and abundance of different organisms in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials
12.3.3.d Analyze factors which may influence environmental quality
12.3.4.a Identify different types of adaptations necessary for survival (morphological, physiological, behavioral)

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify the different biomes on the refuge.
- Make inferences about the wildlife that will live in these biomes.

Key Concepts:
- Biomes
- Organisms
- Physical Features

Materials:
- Refuge Guide

Biomes

Unit – 2

Background & Summary

How well can you differentiate between different biomes in the natural world? Different biomes will present different conditions and organisms for students to discover. During this lesson students will learn about the different biomes at DeSoto National Wildlife Refuge.

Procedure

The following lesson is based on the question: What biomes are at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Introduce students to biomes:
    - The world's major communities, classified according to the predominant vegetation and characterized by the adaptions of organisms to that particular environment.
    - A major type of ecosystem with a distinctive climate and organisms.
2. Have student fill out their worksheets.

How to Find Biomes



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Biomes Investigation Worksheet

Directions

Prairie Biome

1. List four common species of animals that are common to this biome. If you don't see them, list the evidence.

2. List two adaptions that these animals have to survive here.

3. List four common species of plants that are common to this biome.

4. List two adaptions that these plants have to survive here.

5. Name an invasive species to this biome. What is being done to manage its spread?

6. What is being done to manage this prairie?

Wetland Biome

1. List four common species of animals that are common to this biome. If you don't see them, list the evidence.

2. List two adaptions that these animals have to survive here.

3. List four common species of plants that are common to this biome.

4. List two adaptions that these plants have to survive here.

Biomes Investigation Worksheet

Directions

Wetland Biome

5. In what ways is the wetland biome important to people?

Deciduous Forest

1. List four common species of animals that are common to this biome. If you don't see them, list the evidence.

2. List two adaptions that these animals have to survive here.

3. List four common species of plants that are common to this biome.

4. List two adaptions that these plants have to survive here.

5. Name an invasive species to this biome. What is being done to manage its spread?

Fisheries

1. Describe things you learned from this presentation.

Vocabulary to Know

Biome - a large naturally occurring community of flora and fauna occupying a major habitat, e.g. forest or tundra.

Adaptation - a change or the process of change by which an organism or species becomes better suited to its environment.

Species - a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding.

Deciduous– (of a tree or shrub) shedding its leaves annually.

Invasive Species – (especially of plants or a disease) tending to spread prolifically and undesirably or harmfully.

Prairie – a large open area of grassland, especially in the Mississippi River valley.

Climate – the weather conditions prevailing in an area in general or over a long period.

Community – a group of interdependent organisms of different species growing or living together in a specified habitat.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

12.1.1.d Select and use lab equipment and technology appropriately and accurately
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12.3.3.d Analyze factors which may influence environmental quality
12.3.4.a Identify different types of adaptations necessary for survival (morphological, physiological, behavioral)

Observing Birds in the Wild

Unit – 3

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to…

- Identify different behavior patterns of birds and explain their function.
- Identify 8 different bird species.

Key Concepts:
- Birding
- Behaviors
- Observation

Materials:
- Activity Sheets
- Binoculars
- Birds of Nebraska Guidebooks

Background & Summary

Observing birds in the wild is fun but does take some patience and skill. The observer must be able to locate the bird, watch what it is doing and try to identify it all within a few moments. This activity concentrates on looking for different behaviors exhibited by songbirds.

Songbirds may be perching on a branch, singing to attract mates, feeding their young, searching for food on the ground, preening their feathers-really any number of behaviors. A bird's behavior may be a particular adaptation to help the bird survive. For example, flocking is a behavioral adaptation that helps protect a bird from a predator. Behavior may be specific to one species or found in many species. A White-breasted Nuthatch can walk down a tree head-first. Most woodpeckers prop on the sides of trees. Many sparrows feed on or near the ground. Knowing the behavior patterns of birds and of different species of birds is fundamental to our understanding of songbirds and can help in their conservation.

Before going out to observe birds in an area, think about where birds may be found and what time birds will be most active based on what time of year it is and what weather exists. Most songbirds tend to be very active in the morning and early evening.

Procedure

The following lesson is based on the question: What birds are at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. In this exercise, students will be looking for birds exhibiting different types of behavior, like flying, swimming, or singing. When a behavior is spotted, place a check in the space provided on the worksheet. Identify the species if possible. Go over these tips for bird observations:
2. Before beginning fieldwork, dress in comfortable clothing that is dully-colored. This helps the observer blend into the natural habitats being explored. Also, sneakers are good footgear as they enable to observer to move about quietly. Move slowly and freeze in place after flushing birds and they may return to allow for observation
    - Gather needed equipment-field guide, binoculars (if possible), a notebook, pencil and worksheet.
    - Get permission from landowners to walk on private property. To

How to Observe Birds



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Observing Birds in the Wild

Procedure (Continued)

- see the most variety of birds, try to visit a local wildlife sanctuary, state park, or federal refuge. Always check water bodies to see if any birds are sitting or wading in the pond or along its edge.
- Try to search for birds within an hour or two of dawn or a couple of hours before dusk. These are the times when birds are most active, especially in spring or summer.
- If the bird's name is known, record it; otherwise, note its colors, distinguishing features and observed behavior and try to use a field guide to identify it.
- Don't forget to record the type of natural habitat where the bird is observed. Look at the surroundings carefully. Then, describe the physical environment, including the types of plants present, the time of year, and the weather. This information will help the student/observer understand the natural conditions each species needs to survive.
- Always remember-the natural environment comes first. Never harm or disturb an animal, plant or nest. Also, never take an animal away form its habitat. No bird, or other creature, can exist for very long away from its own environment.

3. Choose an area and take students out to conduct the search. Students can work individually, in pairs or in groups.
4. Return to the classroom and summarize the information. Have students discuss why a particular behavior may be a benefit or detriment to a bird. Consider the following questions: Were any behaviors not observed? Why? Did any single species seem to be exhibiting a particular type of behavior? Why?

Bird Identification

Noticing how birds look, act and sound are the first steps toward bird identification. Some key points to bird identification are size, shape, wings, tail, legs and feet, field marks, and body patterns. Compare sizes of other birds. Use familiar birds such as a crow, sparrow or robin when making size comparisons. Look at whether the bird is chunky or slender and examine the bill shape and length. Wings can be looked at to determine flying style. Long and narrow wings usually indicate long-distance flying and maybe flying over water. Long and broad wings are for soaring over land. Length, shape, and uses of the tail are an important clue in identifying the bird. Shape and size of legs and feet can tell about the habits and habitat of a bird. Make sure to note head shape, color pattern on face, eye rings, eyebrow, eye line, light and dark contrasts, as well as any other field marks. Also, notice if there are any patterns, or contrasts in color, on the body or the tail. Along with a field guide, this information can be used to identify the bird.

Bird behavior can help to identify the particular species. Behavior is easily observed at backyard feeders. Differences in behaviors related to eating, sleeping, mating, singing, flying, and in perching can be noted between different species of birds. Birds exhibit specific patterns in flight. Some birds fly fast, slow, erratic, in straight lines, or not at all. Birds vary in feeding behaviors. Some feed on the ground like robins, others in water like many ducks, or in the air like chimney swifts. Eastern phoebes can grab a mosquito in flight. Birds use songs for vocalization. Songs are species-specific and can help with bird identification. Nests are also often species specific. Birds are very particular about the materials used and placement of their nests. For example, robins build a nest with some dried mud and use sticks and grasses to form the bowl, and usually nests are in the forks of branches. Color, size, shape, and number of eggs will vary between species of birds.

Observing Birds Worksheet

Directions

Place observations within the correct category on this sheet.

Behavior	Species	Color & Size	Environment	Behavior Benefits or Detriments

Vocabulary to Know

Behavior - the way in which an animal or person acts in response to a particular situation or stimulus.

Observation - the action or process of observing something or someone carefully or in order to gain information.

Exhibit - show as a sign or symptom.

Birding– the observation of birds in their natural habitats as a hobby.

Migration – seasonal movement of animals from one region to another.

Behavioral Adaptation – something an animal does usually in response to some type of external stimulus in order to survive.

Adaptation – a change or the process of change by which an organism or species becomes better suited to its environment.

Conservation – preservation, protection, or restoration of the natural environment and of wildlife.

State or NGS Standards

Science and Technology

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12.2.1.h Describe the organization of the periodic table of elements with respect to patterns of physical and chemical properties

3. Life Science

12.3.1.d Describe how an organism senses changes in its internal or external environment and responds to ensure survival
12.3.3.a Explain how the stability of an ecosystem is increased by biological diversity
12.3.3.c Explain how distribution and abundance of different organisms in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials
12.3.3.d Analyze factors which may influence environmental quality
12.3.4.a Identify different types of adaptations necessary for survival (morphological, physiological, behavioral)

Wildlife Refuge Management

Unit – 4

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify different methods of land management.
- Identify resources for the public to learn about refuge management goals.
- Identify who runs the programs at the refuge.
- Identify one endangered species that uses DeSoto National Wildlife Refuge.

Key Concepts:
- Land Management
- Conservation
- Endangered Species

Materials:
- Activity Sheet
- Refuge Manager
- CCP

Background & Summary

Without refuge management many of the refuge lands would have remained as desolate cropland or unusable land for wildlife. Through refuge management refuge lands have been transformed to benefit the wildlife that exist there. During this lesson students will learn about the different methods that go into the land management and who runs the program.

Procedure

The following lesson is based on the question: What management occurs at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Introduce students to the concepts of land management and policy behind the decisions made on the refuge.
2. Show the students wetlands on the refuge and then talk about the center island conversion from farmland to wetlands.
3. What is the prairie and river managed for.
4. Have students fill out their worksheets as they listen and explore these areas.

How to Explore Land Management



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Wildlife Refuge Management

Directions

What is the comprehensive conservation plan or CCP?

Who Helps write it?

What is the name of the refuge manager at DeSoto National Wildlife Refuge?

Wetland –

What types of methods can be used to restore wetlands? List.

What type is used at this refuge?

Farmland-

What was farmland used for in the past?

What has the refuge done with the farmland?

Prairie –

As talked about in our last trip, what is the refuge planning to do with these prairies?

River –

Name 3 endangered species that can be found near or on this refuge.

Pick one and describe what it means in regards to management.

Refuge Visitor Uses:

Hunting, fishing, wildlife observation, photography, education, and interpretation.

Paragraph- Pick one of the above visitor uses and describe how it's managed on the refuge.

Vocabulary to Know

Comprehensive Conservation Plan - the desired future conditions of a refuge and provide long-range guidance and management direction to achieve refuge purposes.

Restoration - the action of returning something to a former owner, place, or condition.

Wetland - land consisting of marshes or swamps; saturated land.

Farmland– land used for farming.

Prairie – a large open area of grassland, especially in the Mississippi River valley.

Conservation – preservation, protection, or restoration of the natural environment and of wildlife.

River – a large natural stream of water flowing in a channel to the sea, a lake, or another such stream.

Endangered Species – a species of animal or plant that is seriously at risk of extinction.

State or NGS Standards

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12.3.4.a Identify different types of adaptations necessary for survival (morphological, physiological, behavioral)

Soil Lab

Unit – 5

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify soil pH
- Identify soil conditions that benefit wildlife.
- Identify nutrients that are beneficial for plants.

Key Concepts:
- Soil pH
- Soil Organisms
- Soil Nutrients

Materials:
- Activity sheet
- Spoon
- Extraction tube
- Square plastic tubs labelled with K, N, P.
- 4 boxes of tablets
- 2 pipets
- Soil thermometer
- Skinny thermometer
- Distilled water
- Hand Lens

Background & Summary

Small components of the soil can affect a large amount of things that we would not have imagined in everyday life. These small components fall into the realm of different minerals and nutrients essential for plant growth and health. During this lab students will be investigating what kinds of minerals and nutrients are within the soils at DeSoto National Wildlife Refuge and what plants could live in the soil conditions present.

Procedure

The following lesson is based on the question: What mineral and nutrients are in the soils at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Set up the soil stations and equipment that will be needed for the students lesson.
    - Label square plastic tubs with K-Potassium, N-Nitrogen, P-Phosphorous.
    - Make sure to have a box of Potassium, phosphorous, nitrates and Floc Ex tablets.
    - Extraction tube in the large plastic tub.
    - Set up stations for student groups to work at.
2. Introduce students to soils and plant life requirements.

How to Investigate Soils



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Soil Lab

Directions

Each group will be assigned an area to do their testing. There is a lot to do on this trip, so please be sure to stay on task. Do not dispose of any of the chemicals on the refuge, all liquids will be collected within a bucket provided to dump in.

Once you have reached your assigned area, please follow the directions, record your data, and answer the questions.

1. Describe the overall area as if you were telling somebody who couldn't see it:

2. Record the following. You will need to leave the thermometer at each site until the temperature remains constant for about 3 minutes.

   Use the skinny thermometer for air temperature.

   - Air temp in sunlight:
   - Air temp in shade:
   - Why is there a difference?

   Use the same thermometer to take the temperature at the soil surface under the leaf litter.

   - Air temp under organic matter:

   Use the soil thermometer – green top.

   - Soil temp approximately two inches down:
   - Why is there a difference?

   Why does the temperature of soil matter?

Look at the instruction on the brown folded lab sheet. Follow these instructions for getting your soil extraction, and then continue on to the phosphorous, nitrate, and potassium test. Record your data below. Use the laminated colored chart to determine your results. You must wait the designated amount of time for each test. The results take awhile to develop. The questions in the italics need to be answered prior to doing the lab using the information sheets provided.

1. Phosphorous Test Results:

- *What is phosphorous necessary for?*
- *What changes the phosphorous in the soil into available forms?*

- *How does pH affect the phosphorous?*

Soil Lab

- *Give 2 characteristics of plants that lack phosphorous*

- *Would you be able to notice if a plant has been given too much phosphorous? Why?*

- Look at your field data, are plants receiving enough phosphorous?
- Does this area need fertilizers added?

2. Nitrogen Test Results
- *Why is Nitrogen necessary for plants?*
- *List two ways to increase the amount of Nitrogen in your soil.*

- *How do you know if your plant is lacking Nitrogen?*

- *What could happen if you give your plant too much Nitrogen?*

- Look at your field data, are plants receiving enough Nitrogen?
- Does this area need fertilizer?

3. Potassium Test Results
- *List three reasons potassium is necessary for plants.*

- *List three characteristics of plants that need more potassium.*

- *If a plant is receiving too much potassium, what could happen?*

4. I will be around with a pH, moisture, and light meter probe.
- Record the pH of the soil.
- *How does the pH of the soil affect plants?*

Soil Lab

- *What do plants prefer?*
- List four plants that would prefer your soil's pH.
- *What would you do to raise the pH of your soil?*
- *What would you do to lower the pH of your soil?*
- How much moisture is in the soil?
- Does your soil need more or less moisture?
- If this was your lawn or house plant, what would you do?
- What is the light reading?
- Why would you want or need to know this?

- Describe the vegetation in the area in at least 4 sentences.

- Draw a picture of 1 plant species that you see:

- Healthy soil has many soil organisms. Use a hand lens to locate at least one soil organism. Draw a picture of an organism that you see in your soil.

Vocabulary to Know

Soil - the upper layer of earth in which plants grow, a black or dark brown material typically consisting of a mixture of organic remains, clay, and rock particles.

Potassium - the chemical element of atomic number 19, a soft silvery-white reactive metal of the alkali metal group.

Nitrogen - the chemical element of atomic number 7, a colorless, odorless unreactive gas that forms about 78 percent of the earth's atmosphere.

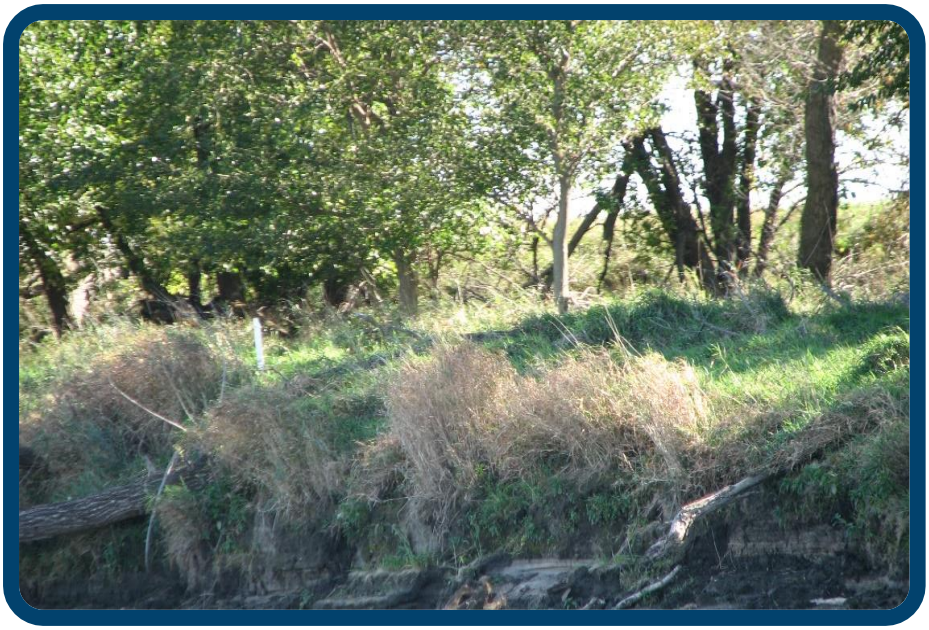
Thermometer – an instrument for measuring and indicating temperature, typically one consisting of a narrow, hermetically sealed glass tube marked with graduations and having at one end a bulb containing mercury or alcohol that expands and contracts in the tube with heating and cooling.

Nutrients – a substance that provides nourishment essential for growth and the maintenance of life.

Minerals – a solid inorganic substance of natural occurrence.

Leaf Litter – decomposing but recognizable leaves and other debris forming a layer on top of the soil, especially in forests.

Soil Matter– the organic matter component of soil, consisting of plant and animal detritus at various stages of decomposition, cells and tissues of soil microbes, and substances that soil microbes synthesize.



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Water Quality Testing

Unit – 6

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify water quality.
- Identify components of good water quality.
- List why urban water quality is important.
- Create inferences from quality test results.

Key Concepts:
- Water Quality
- Pollution
- Urban Water

Materials:
- Urban Water Test Kit
- Calorimeter
- Multicolored Handouts
- Test Strips with Instructions
- Kits with Instructions

Background & Summary

Water quality effects many things in everyday life, from the water we drink to the water in our lakes and rivers, it helps keep different systems running, During this testing lab students will be learning about the importance of clean water in an urban environment and how water quality effects refuge wildlife.

Procedure

The following lesson is based on the question: What is the water quality at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Set up the water testing kits for students and mark sites prior to the students arrival.

How to Investigate Water Quality



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Water Testing Lab

Directions

Each group will be assigned an area to do their testing. There is a lot to do on this trip, so please be sure to stay on task. Do not dispose of any of the chemicals on the refuge, all liquids will be collected within a bucket provided to dump in.

Urban Water Testing

1. Make 8-10 observations about your collection site using sight, sound, and smell.

2. Coliform test – we will record results next class period.

- Results (pg. 11-12)

3. Chlorine Results (pg. 13-14)
4. Copper Results (pg. 15-16)
5. Dissolved Oxygen Results (ppm pg. 17-19)
6. Hardness (pg. 20-21)
    - Multiply the number of tablets used by 40. #of tablets x 40 =
    - Greater than 50 ppm is considered hard water.
7. Iron (pg. 22-23)
8. Nitrate (pg. 28-29)
9. pH (pg. 26-27)
10. Phosphate (pg. 28-29)
    - Greater than .03 ppm contributes to increased plant growth.
11. Temperature (pg. 30-31)

Water Quality Testing

1. Make 8-10 observations about your collection site using sight, sound, and smell.

2. **Cargill probes – get results at picnic table.**

pH Results DO Results

3. **Calorimeter – follow instructions in multicolored handouts at picnic table. Be sure to include the label that appears on the machine.**

Turbidity Nitrate Phosphorous pH

Water Testing Lab

4. **Test Strips- follow instructions on the bottle – not every group will do both, so the tests that are in your clear container.**

Ammonia Results Phosphorous Results

5. **Kit Results – follow the instructions in the kit.**

- Dissolved Oxygen Results (ppm pg. 16-19)
- Temperature Celsius Fahrenheit Use thermometer
- Record percent saturation in water (pg. 19)
- Rank (pg. 32-33)
- Nitrate Results (pg. 22-25) Rank (pg. 32-33)
- pH Results (pg. 24-25) Rank (pg.32-33)
- Phosphate Results (pg. 26) Rank (pg.32-33)
- Turbidity Results (pg. 30-31) Rank (pg.32-33)

Vocabulary to Know

Water Quality - the chemical, physical, and biological characteristics of water based on the standards of its usage.

Coliform - bacteria that are always present in the digestive tracts of animals, including humans, and are found in their wastes.

Chlorine - the chemical element of atomic number 17, a toxic, irritant, pale green gas.

Copper– a red-brown metal, the chemical element of atomic number 29.

Dissolved Oxygen – the amount of oxygen that is present in water.

pH – a figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acid and higher values more alkaline. The pH is equal to -log10 c, where c is the hydrogen ion concentration in moles per liter.

Temperature – the degree or intensity of heat present in a substance or object, especially as expressed according to a comparative scale and shown by a thermometer or perceived by touch.

Phosphate – a salt or ester of phosphoric acid, containing PO43- or a related anion or a group such as —OPO(OH)2.

State or NGS Standards

Science and Technology

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12.1.1.l Use appropriate mathematics in all aspects of scientific inquiry
12.1.3.a Propose designs and choose between alternative solutions of a problem

2. Physical Science

12.2.1.e Identify factors affecting rates of chemical reactions (temperature, particle size, surface area).
12.2.1.h Describe the organization of the periodic table of elements with respect to patterns of physical and chemical properties

3. Life Science

12.3.1.d Describe how an organism senses changes in its internal or external environment and responds to ensure survival
12.3.3.a Explain how the stability of an ecosystem is increased by biological diversity
12.3.3.c Explain how distribution and abundance of different organisms in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials
12.3.3.d Analyze factors which may influence environmental quality
12.3.4.a Identify different types of adaptations necessary for survival (morphological, physiological, behavioral)

Fire Ecology

Unit – 7

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify two benefits to prescribed burns.
- Identify the role of a burn in an ecosystem.
- List why burns change the pattern of succession.
- Identify an climax community.

Key Concepts:
- Fire
- Prescribed Burns
- Succession

Materials:
- Calorimeter with multicolored handout instructions.
- Test strips with instructions.
- Fire gear
- Thermometer

Background & Summary

Historically within the Midwest and the great plains, fire used to be a natural phenomenon that would travel through the landscapes in the spring, summer, and fall. Due to the lack of natural area and populations being higher, this phenomena doesn't occur naturally but is performed on conservation areas like DeSoto National Wildlife Refuge. In this lesson students will be learning the benefits of using fire on our landscapes.

Procedure

The following lesson is based on the question: Why are prescribed burns preformed at Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Students will do a pre-lab about system succession in a ecosystem that has been disturbed by fire.
2. Students will then fill out their lab sheets learning about succession, and different methods on how to preform a prescribed burn.

How to Investigate Prescribed Burns



Fire Ecology Lab

Pre-Lab Questions

1. Define Ecological Succession –

    - Primary Succession –

    - Secondary Succession –

2. What is a pioneer species?

3. What is a climax community?

4. Give an example of a natural cause of secondary succession.

5. **Draw a picture of succession happening from page 140.**

Fire Ecology Lab

Use Fire Sheet

1. Name five reasons someone would do a management-ignited prescribed burn.

2. What five elements are considered before fire managers do a burn?

3. Name five things that someone on the fire crew must wear.

4. What are three examples of natural firebreaks?

5. What is a drip torch?

6. What is a hand line?

7. List two similarities and two differences between a head fire and a backfire.

8. How long does it take for new growth to appear?

9. Name three tall grass species that appear first.

10. List three invasive species that they might be trying to eradicate.

Fire Ecology Lab

Fire Ecology Lab

1. Observe the field that hasn't been burned. Write at least 5 sentences about your observations. Describe it as though you were telling someone who couldn't see it. Use all of the following: sight, sound, and smell.

2. Take a soil temperature, surface temperature, and moisture content for the unburned area.

Location A - Soil: Surface: Moisture:(provided)

Measure the height of the tallest plant you see:

3. Write at least five sentences on your observations of the burned field. Describe it as though you were telling someone who couldn't see it. Use all of the following: sight, sound, and smell.

4. Take soil temperature, surface temperature, and moisture content for the burned area.

Location A – Soil: Surface: Moisture:(Provided)

Measure the height of the tallest plant you see:

5. Explain why there is a difference between the two sites in regards to soil and surface temperature.

Fire Ecology Lab

Discussion Questions

1. How do they know what fields to burn and when?

2. How often do they burn?

3. If you were in charge of a prescribed burn at the refuge, what 3 factors determine whether you burn that day?

4. What would happen to this prairie without fire?

5. Name 2 or more purposes of prescribed burns.

6. List 3 plants that they are trying to get rid of.

7. Name 3 examples of native grasses.

8. What is a serotinous cone? Do they exist in the prairie?

9. Name 2 adaptations that plants have to survive fire.

10. What adaptations do animals in the prairie have to survive a fire?

11. How long does it take for things to grow again?

12. What is the difference between a backfire and a head fire? Can you tell where the fire was lit?

13. How many people does it take to do a prescribed burn?

14. If we did the nitrogen, phosphorous, and potassium test again in the burned field, would the results be higher, lower, or the same, why?

Vocabulary to Know

Fire Ecology - a branch of ecology that focuses on the origins of wildland fire and it's relationship to the environment that surrounds it, both living and non-living.

Succession - the process by which a plant or animal community successively gives way to another until a stable climax is reached.

Primary Succession - ecological succession that begins in essentially lifeless areas, such as regions in which there is no soil or where the soil is incapable of sustaining life.

Secondary Succession– ecological succession in which plants and animals recolonize a habitat after a major disturbance—such as a devastating flood, wildfire, landslide, lava flow, or human activity.

Pioneer Species – hardy species which are the first to colonize barren environments or previously biodiverse steady-state ecosystems that have been disrupted, such as by fire.

Climax Community – ecological community in which populations of plants or animals remain stable and exist in balance with each other and their environment.

Prescribed Burn – the controlled application of fire by a team of fire experts under specified weather conditions to restore health to ecosystems that depend on fire.

Invasive Species – an organism that causes ecological or economic harm in a new environment where it is not native.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

12.1.1.d Select and use lab equipment and technology appropriately and accurately
12.1.1.e Use tools and technology to make detailed qualitative and quantitative observations
12.1.1.f Represent and review collected data in a systematic, accurate, and objective manner
12.1.1.j Share information, procedures, results, conclusions, and defend findings to a scientific community (peers, science fair audience, policy makers)
12.1.1.k Evaluate scientific investigations and offer revisions and new ideas as appropriate
12.1.1.l Use appropriate mathematics in all aspects of scientific inquiry
12.1.3.a Propose designs and choose between alternative solutions of a problem

2. Physical Science

12.2.1.e Identify factors affecting rates of chemical reactions (temperature, particle size, surface area).
12.2.1.h Describe the organization of the periodic table of elements with respect to patterns of physical and chemical properties

3. Life Science

12.3.1.d Describe how an organism senses changes in its internal or external environment and responds to ensure survival
12.3.3.a Explain how the stability of an ecosystem is increased by biological diversity
12.3.3.c Explain how distribution and abundance of different organisms in ecosystems are limited by the availability of matter and energy and the ability of the ecosystem to recycle materials
12.3.3.d Analyze factors which may influence environmental quality
12.3.4.a Identify different types of adaptations necessary for survival (morphological, physiological, behavioral)

Grade Level:
12th

Time:
60-90 minutes

Season:
All

Objectives:
Students will be able to...

- Identify two benefits to prescribed burns.
- Identify the role of a burn in an ecosystem.
- List why burns change the pattern of succession.
- Identify an climax community.

Key Concepts:
- Fire
- Prescribed Burns
- Succession

Materials:
- Calorimeter with multicolored handout instructions.
- Test strips with instructions.
- Fire gear
- Thermometer

Monarch Butterflies

Unit – 8

Background & Summary

Every year the monarch butterfly makes an amazing journey from anywhere in the continental U.S. to a very specific spot in Mexico. With this phenomenal feat there comes dangers increasing the decline in this amazing butterfly. During this lesson students will learn about the monarch butterfly and how it can be conserved.

Procedure

The following lesson is based on the question: How do monarch butterflies use Desoto National Wildlife Refuge*? It can be easily adapted by just adjusting the categories and can be completed in schoolyards or other outdoors spaces. (See extensions)*

Introduction/Journal Set Up

1. Before the lesson students will be introduced to the monarch butterfly.
2. During the lesson, students will learn more in-depth information about the monarch butterfly and fill out the lab page,

How to Observe Monarch Butterflies



Courtesy of DeSoto National Wildlife Refuge Environmental Education 2021

Monarch Butterflies

Discussion Questions

1. Are monarch butterflies endangered?

2. What do monarch butterflies do for the environment?

3. What is the primary food source of the monarch butterfly? Monarch caterpillar?

4. Describe the life cycle of a monarch butterfly.

5. Where do monarchs spend the winter?

6. Why is it harder to conserve species that migrate?

7. What do biologists think has caused the decline in the monarch population? List all we discuss.

8. What are we doing to conserve monarch butterflies? Describe all that are discussed.

9. What information does tagging monarchs provide to scientists?

Vocabulary to Know

Population - a community of animals, plants, or humans among whose members interbreeding occurs.

Endangered - (of a species) seriously at risk of extinction.

Life Cycle - the series of changes in the life of an organism including reproduction.

Conserve– protect (something, especially an environmentally or culturally important place or thing) from harm or destruction.

Tagging – attach a monitoring tag to.

Migration – seasonal movement of animals from one region to another.

Species of Concern – species about which there are some concerns regarding status and threats, but insufficient information is available to list the species under the Endangered Species Act.

Generation – the propagation of living organisms; procreation.

State or NGS Standards

Science and Technology

1. Inquiry, the Nature of Science, and Technology

12.1.1.d Select and use lab equipment and technology appropriately and accurately
12.1.1.e Use tools and technology to make detailed qualitative and quantitative observations
12.1.1.f Represent and review collected data in a systematic, accurate, and objective manner
12.1.1.j Share information, procedures, results, conclusions, and defend findings to a scientific community (peers, science fair audience, policy makers)
12.1.1.k Evaluate scientific investigations and offer revisions and new ideas as appropriate
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12.3.3.d Analyze factors which may influence environmental quality
12.3.4.a Identify different types of adaptations necessary for survival (morphological, physiological, behavioral)

Scope and Sequence

Third Grade – September/October

Content	Skills	Assessment	Instructional Strategies	Notes
a. Observation as science b. Descriptive writing c. Sound mapping d. Color mapping	a. Make careful observation about the natural world. b. Use environmental as a context for descriptive and reflective writing. c. Students map a certain area based on color and sounds, applying observational skills.	a. Students' journals. b. Discussion c. Classroom reflection.	a. Discuss how to make observations in nature. b. what makes a good naturalist? c. Discovery hike d. Sound map e. Color map f. Hand lens looking	Color and Sounds Mapping Lessons

Third Grade – November

Content	Skills	Assessment	Instructional Strategies	Notes
a. Observation as science b. Descriptive writing and note taking	a. Make careful observation about the natural world. b. Use environmental as a context for descriptive and reflective writing. c. Use bird migration as a catalyst for studying natural, seasonal change.	a. Students' journals. b. Discussion c. Classroom reflection.	a. Discuss how to make observations in nature. b. Binocular and bird identification lesson. c. Develop skills in note taking and using observational details for science.	Migratory Bird Lesson – Online (2021, 2022)

Third Grade - February

Content	Skills	Assessment	Instructional Strategies	Notes
a. Observation as science b. Descriptive writing	a. Observe animal signs without destroying them. b. Describe an animal clue using multiple characteristics (size, shape, direction, pattern, etc.). c. Use evidence of winter animals to infer about animal direction of travel, gait, etc.).	a. Students' journals. b. Discussion c. Classroom reflection.	a. Wildlife mysteries lesson – modified from a lessons from the prairie wetlands learning center, MN. b. Journaling before, during and after lesson.	Winter Exploration Lesson

Scope and Sequence

Third Grade – April

Content	Skills	Assessment	Instructional Strategies	Notes
a. Observation as science b. Descriptive writing c. Sound/Color mapping d. Wetland wondering	a. Make careful observation about the natural world. b. Use environmental as a context for descriptive and reflective writing. c. Students map a certain area based on color and sounds, applying observational skills.	a. Students' journals. b. Discussion c. Classroom reflection.	a. Discuss how to make observations in nature. b. what makes a good naturalist? c. Discovery hike d. Sound map e. Color map f. Wetland wondering	Spring Exploration Lesson

Fifth Grade – September

Content	Skills	Assessment	Instructional Strategies	Notes
a. Sense Of Wonder – Rachel Carson and hoe to be a good naturalist.	a. Observing nature. b. Descriptive writing. c. Exploring. d. Drawing conclusions about nature. e. Reflecting on outdoor experience.	a. Students' journals. b. Discussion c. Classroom reflection.	a. Discuss Rachel Carson as a naturalist. b. Discuss naturalists as scientists. c. Describe what a naturalist does. d. Practice being naturalists in the field.	Sense of Wonder Lesson

Fifth Grade - September

Content	Skills	Assessment	Instructional Strategies	Notes
a. Investigate prairie plants using appropriate tools. b. Explain one way that prairie restoration happens. c. List two adaptations of prairie species. d. Recognize the parts of prairie seeds.	a. Observing nature. b. Descriptive writing. c. Exploring. d. Drawing conclusions about nature. e. Reflecting on outdoor experience.	a. Students' journals. b. Discussion c. Classroom reflection.	a. Learning how to identify prairie plants using a identification guide. b. Outdoor exploration of prairie with journaling component. c. follow-up discussion on discoveries.	Native Prairie Exploration Lesson

Scope and Sequence

Fifth Grade – October

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students will recognize different roles of wildlife and plants in a healthy ecosystem. b. Students will identify nutrient cycles and energy levels.	a. Make careful observation about the natural world. b. Use environmental as a context for descriptive and reflective writing. c. Drawing conclusions about nature. d. Reflecting on outdoor experiences.	a. Students' journals pre, during and post activities. b. Discussion c. Classroom reflection.	a. Discuss how each level of the energy pyramid works and who would be found there. b. Different classifications of consumers and producers. c. Explore an energy cycle. d. Discussion.	Energy Cycles Lesson

Fifth Grade – November/December

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students will recognize the importance of stop-over sites for migratory birds. b. Students will be able to identify migratory birds.	a. Observation skills. b. Descriptive writing. c. Exploring. d. Drawing conclusions about nature. e. Binocular use to identify bird species.	a. Students' journals. b. Discussion c. Classroom reflection.	a. Discuss migration and the dangers of doing so. b. Discuss how to identify birds using defining features. c. Practice using proper observational tools.	Migratory Birds and Birding Lessons

Fifth Grade - January

Content	Skills	Assessment	Instructional Strategies	Notes
a. Explain four characteristics of bald eagles that make them successful predators. b. Articulate why they became an endangered species and how they recovered c. Distinguish was is and isn't good nesting habitat for them.	a. Observation skills b. Listening skills. c. Scientific investigation/method. d. Drawing conclusions about nature. e. Reflecting on outdoor experience.	a. Students' journals. b. Discussion c. Wrap-up to gauge student retention of concepts.	a. Lesson on why the bald eagle is a good predator. Incorporates wingspan, mount, and eye comparison elements. b. Refuge tour to observe bald eagles using spotting scopes and binoculars, c. Stop at nest for observation.	Bald Eagles

Scope and Sequence

Fifth Grade – February

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students will find and identify different interactions between different spheres. b. Students will create inferences about the natural world and human interactions.	a. Make careful observation about the natural world. b. Use environmental as a context for descriptive and reflective writing. c. Drawing conclusions about nature. d. Reflecting on outdoor experiences.	a. Students' journals pre, during and post activities. b. Discussion c. Classroom reflection.	a. Discuss how each interaction affects a different sphere. b. Discuss human impacts on the natural world. c. Explore different spheres (ex. Geosphere, atmosphere, etc.) d. Discussion.	Natural System Interactions.

Fifth Grade – April

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students sit quietly for one hour and observe nature. b. Describe the activity using at least five descriptive words and phrases and then five others using the senses.	a. Observational skills. b. Listening skills c. Scientific investigation d. Drawing conclusions in nature. e. Reflecting on outdoor experience.	a. Students' journals. b. Discussion c. Classroom reflection.	a. Indoor session prepares students for careful nature observation. Use descriptive words to express senses. b. Students sit apart for an hour journaling. c. Wrap up session.	Scientific Observation Lesson

Fifth Grade – May

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students use keys to identify and classify at least three different aquatic invertebrates. b. Students choose appropriate method or collecting wetland samples. c. Students describe at least two reasons why it is important to protect wetlands.	a. Observation skills b. Listening skills c. Scientific investigation/method. d. Drawing conclusions about nature. e. Reflecting on outdoor experience.	a. Students' journals. b. Discussion c. Wrap-up session	a. Introduction session teaches students how to use the "Key to Life in the Pond" and wetland study equipment. b. Students work in groups to catch and identify macroinvertebrates. c. Wrap up session to describe discoveries..	Outdoor Education Days

Scope and Sequence

Sixth Grade – October

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students will complete a writing assignment related to fall experiences. b. Leaf printing to show chlorophyll colors in the fall leaves. c. Structure vs function lesson	a. Students will apply writing concepts using nature for inspiration. b. Students will use leaf printing to see chlorophyll first hand. c. Students apply lessons on structure vs function to an outdoor lab.	a. Student Worksheets b. Post lesson discussions.	a. Activity sheet for structure vs function where students examine structures using their sight and hand lens, then write about function. b. Teacher-led writing exercise. c. Leaf printing using hammers to reveal colors.	Leaf Printing Lab and Structure Vs Function Lesson

Sixth Grade – November

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students learn about migrating birds at DeSoto . b. Make connections between the birds and the use of Canada in their life cycle.	a. Students will make connections between social studies lessons on Canada and migrating birds. b. Students will identify interconnectedness of nature and migration.	a. Students use a range map to see if the birds at DeSoto use their Canadian national parks for part of their life cycles. b. Additional writing components.	a. Students learn about migrating birds at DeSoto. Each species includes a range map of each migratory path. b. Student observe the birds in a wetland.	Birds in the Wild and Biomes Lab.

Sixth Grade – January

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students study the physical properties of snow. b. Students draw geometry angles of snowflakes they observe. c. Students study physical properties of items in the visitor center. d. Students consider what animals need to survive in winter.	a. Use tools to measure weight and mass of snow at different levels of compaction. b. Use hand lens to observe and draw snowflakes. c. Observe VC exhibits. d. Use knowledge and reasoning to help a “creature” survive in winter	a. Students worksheets. b. Post lesson discussion c. Wrap-up session	a. Students use tools to measure weight and mass of different compaction level of snow. b. Use hand lens to sketch snowflakes using geometry angles. c. Observe four items in VC and describe physical properties. d. Jello animal exp.	Snow Study and Soil Sampling.

Scope and Sequence

Seventh Grade – September

Content	Skills	Assessment	Instructional Strategies	Notes
a. Learn about native habitats of the Missouri River Valley. b. Use qualitative and qualitative observations to learn about ecosystems. c. Use direct and indirect observations and abiotic factors.	a. Observation Skills. b. Scientific note keeping. c. Draw conclusions about nature.	a. Student Worksheets b. Post lesson discussions.	a. Students follow a worksheet to observe DeSoto Lake, hardwood forests, and prairies. b. Make careful observations and record them on the worksheet.	Nature Scavenger Hunt

Seventh Grade – October

Content	Skills	Assessment	Instructional Strategies	Notes
a. Study insects in the prairie. b. Study insects in the wetland.	a. Observation Skills. b. Scientific note keeping. c. Draw conclusions about nature.	a. Student Worksheets b. Post lesson discussions.	a. Students follow worksheets that guide insect observation for the wetland and prairie. b. Instructors give detailed directions on how to use equipment before they start the lab.	Birds in the Wild and Biomes Lab.

Seventh Grade – November

Content	Skills	Assessment	Instructional Strategies	Notes
a. Use GPS technology to complete activity. b. Learn about animal habitats and needs of animals (food, water, shelter).	a. Learn to use GPS Technology. b. Apply knowledge about animal habitat needs to place food, water and shelter cards and marking them with GPS location. c. Teamwork skills are used during activity.	a. Success of students finding the hidden cards will gauge how well they are learning to sue the technology.	a. In class, students learn about habitats needs of animals. b. Students learn how to use a GPS unit and practice using it. c. Hands on exploration using GPS gives students a chance to use their new skills.	GPS Scavenger Hunt

Scope and Sequence

Seventh Grade – Bertrand

Content	Skills	Assessment	Instructional Strategies	Notes
a. Learn about the Steamboat Bertrand. b. Learn about the steam boating era on the Missouri River and make connections with its importance. c. Bertrand's context to civil war era. d. Learn about museum operations.	a. Students learn about history and how people work to preserve it. b. Students get to go behind the scenes of the Bertrand Exhibit and practice good behavior.	a. Student Worksheets b. Post lesson discussions. c. Questioning by teachers and refuge staff during lesson.	a. Museum curator visits class ahead of trip to talk about the Bertrand and Civil War. b. Three stations with different activities.	Bertrand Visit

Seventh Grade – April

Content	Skills	Assessment	Instructional Strategies	Notes
a. Math lesson using a tree plot to set up a proportion to estimate the number of trees in a larger plot.	a. Creative writing b. Applying math topics such as proportions.	a. Students will turn in tree estimation worksheet for a grade.	a. Students will apply skills learned in the traditional classroom to the outdoor classroom. This includes proportions.	Estimating Tree Lab

Eighth Grade – October

Content	Skills	Assessment	Instructional Strategies	Notes
a. In preparation of state writing exams students will use DeSoto NWR as inspiration for descriptive writings.	a. Use descriptive writing using an authentic, place based context.. b. Students are expected to use all descriptive writing conventions learned in the classroom.	a. Students writing is used as an assessment	a. This outdoor lesson follows up in teaching in the classroom on descriptive writing techniques and practice in a classroom setting.	

Scope and Sequence

Eighth Grade – November

Content	Skills	Assessment	Instructional Strategies	Notes
a. Students use DeSoto NWR to apply the 5 themes of geography. b. While observing migratory birds, students record species and numbers. c. Learn about refuge management techniques.	a. Applications of skills learned in geography class. b. Observation and identification skills of migratory birds. c. Put management plans into context.	a. Student writing is used as an assessment.	a. Lesson is a follow up on teachings in the classroom on descriptive writing and practice in a classroom setting.	

Eighth Grade – March

Content	Skills	Assessment	Instructional Strategies	Notes
a. Using the Bertrand cargo gallery students will count artifacts and their proportions. b. Use the life-size Bertrand in math lessons. c. Refuge Film	a. Apply math skills learned in the classroom to the visitor center setting. b. Students work as a team on an outdoor activity.	a. Student worksheets for proportion lesson. b. Post-lesson discussion.	a. In-school lessons on proportions and estimations are applied using the worksheet in the cargo gallery.	

High School Environmental Science - September

Content	Skills	Assessment	Instructional Strategies	Notes
a. Survey an area of land and determine the land's features and the types of organisms that live there. b. Identify possible relationships between the organisms that live in the area of land you surveyed.	a. Careful observation on a plot of land. b. Preparing a site map to document area using symbols to represent features on the plot. c. Consider characteristics to help assess the plot.	a. Students will turn in site map that will be used to assess how well students were able to apply the concepts.	a. Students learn about ecosystems in classroom prior to trip. b. Students draw site map using symbols to represent the ecosystem. c. Using the site map, assess the quality of the ecosystem in terms of environmental factors and biodiversity.	

Scope and Sequence

High School Environmental Science – October

Content	Skills	Assessment	Instructional Strategies	Notes
a. Study 3 major biomes of DeSoto (deciduous, prairie, and wetland). b. Apply biology concepts to common plants and animals adaptions and invasive species in different biomes.	a. Students will apply skills in observation and identification to document characteristics of biomes. b. Students develop skills in document for science.	a. Student worksheets will be used to assess the comprehension of the information.	a. Students learn about the concept of biomes, adaptions, and invasive species in the classroom. b. Students apply concepts to observations about three different biomes at the refuge.	

High School Environmental Science – November

Content	Skills	Assessment	Instructional Strategies	Notes
a. Use characteristics and behaviors of birds to aid in identification. b. Use book guides to identify birds observed on the refuge.	a. Observation skills. b. Organizing information to use in identifying birds	a. Student worksheets will be used for assessment.	a. Lesson on bird characteristics and behaviors will give students context to identify birds. b. Use field guides to identify birds from a worksheet and birds seen at DeSoto.	

High School Environmental Science - March

Content	Skills	Assessment	Instructional Strategies	Notes
a. During a soil study record information on soil characteristics to assess soil quality. b. Use scientific data collection methods to collect soil information. c. Analyze soil information for trends and patterns.	a. Use scientific method. b. Observation skills. c. Ability to make accurate scientific measurement.	a. Students worksheets. b. post-trip discussion	a. At school students learn about soil characteristics, content, and how to assess quality. b. Using knowledge from in-class lesson, students will complete a soil lab at DeSoto NWR.	

Scope and Sequence

High School Environmental Science – April

Content	Skills	Assessment	Instructional Strategies	Notes
a. Conduct a lab on water quality at the refuge in three different locations. b. Analyze water quality information for trends and patterns.	a. Use of scientific method. b. Observation skills. c. Ability to make accurate scientific measurements.	a. Student worksheets. b. Post trip class discussion.	a. At school, students learn about water quality and how to assess it. b. Using knowledge from the in class lesson, students complete a water quality lab at DeSoto NWR.	

High School Environmental Science – April

Content	Skills	Assessment	Instructional Strategies	Notes
a. Learn about fire ecology. b. Learn about how fire is used as a management tool. c. Learn about how prescribed burns are conducted by refuge staff.	a. Connecting information on ecological succession, pioneer species and climax communities to prescribed burns. b. Practice listening skills to acquire information from refuge staff.	a. Student worksheets. b. Student questions and answers to presenters. c. Post-lesson discussion.	a. Study fire ecology in class. b. Refuge staff presents on prescribed fire: why we burn, how we burn, and equipment used. c. Recording information on worksheet.	