

# nature unleashed



the untamed world of missouri ponds, forests and prairies



MDC  
DISCOVER  
nature  
SCHOOLS



TEACHER

# nature unleashed

the untamed world of missouri ponds, forests and prairies

## teacher guide



Missouri Department of Conservation

# foreward

Teachers all over Missouri field tested and unleashed this unit into the lives of their students, and now nature is about to be unleashed for you and your students!

Before you begin...

- please read through the wealth of information packed into the introductory materials
- have students read each chapter (outside when possible!) before beginning each lesson.
- adapt activities to suit the needs of your students!

Activities are intended to provide teachers and students with ample opportunities to have fun while learning outdoors. AND... GLEs are aligned with objectives, content, essential activities and assessment items!

Now, unleash your students outside and into nature and let the learning begin!

An entire population of Missouri Department of Conservation employees and outside contributors made this project possible. We appreciate the time, effort and expertise that each of these human organisms dedicated to unleashing nature into the lives of students.

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# teacher notes

## discover nature schools

Discover Nature Schools (DNS) is a science/conservation education program at its best. Instructional units comprise the backbone of the DNS program and include exciting and engaging hands-on activities designed to bring students in grades K–12 outdoors and closer to nature.

Each unit includes colorful and engaging student books as well as teacher guides with activities designed to meet Missouri Department of Elementary and Secondary Education (DESE) state standards and Grade Level Expectations (GLEs). Use of science notebooks by students is an important and integrated component.

Lesson plans guide teachers toward utilizing immediate school grounds as important resources for student learning. At the heart of the DNS program is the belief that the more students equate the outdoors with learning, the more comfortable they become outdoors and the more in tune and familiar they become with outdoor environments. As students become more comfortable and familiar with learning and documenting outdoor experiences, the more they begin to think and act like observant scientists sensitive to and inquisitive about changes in outdoor environments.

Student books and teacher guides (as well as training in their use) are available to all Missouri educators. However, teachers who enroll formally in the DNS program are eligible for additional resources including grant opportunities for field experiences and classroom materials to support each instructional unit.

### DNS units

*Nature Revealed* — Pre-school (in development)

*Nature Unfolds* — Kindergarten–2nd grade

*Nature Unleashed: The Untamed World of Missouri Ponds, Forests, and Prairies* — Grades 3–5

*Conserving Missouri's Aquatic Ecosystems* — Grades 6–8

*Nature Unbound: The Impact of Ecology on Missouri and the World* — Grades 9–12









# unit time frame

*Nature Unleashed* unit (all lesson activities)—approximately 13–15 days (1 hour/day) excluding summative assessments

“Estimated Time” section suggests how much time it may take to teach each lesson and activity. Actual time will be affected by the following factors:

- grade level
- daily schedule of the school
- need for review of previous learning based on the extent of student prior knowledge
- need for reteaching based on the results of formative assessments
- additional resources/knowledge of teacher
- time allotted for group presentations based on class size
- time allotted for cooperative learning activities
- number of activities given as homework rather than completed as class activities
- availability of resources for student use
- number and type of “Extension Activities” and “Optional Activities” used
- number of additional outdoor bird behavior observation periods (recommended)

Lesson Title	Estimated Time
<b>1</b> It's All Connected	<b>Activities 1.1, 1.3, 1.4</b> —30–40 minutes <b>Activities 1.2, 1.5</b> —20–30 minutes
<b>2</b> It's What's Inside That Counts	<b>Activity 2.1</b> —30 minutes to one hour depending on number of ecosystems covered <b>Activities 2.2, 2.3, 2.4</b> —20–30 minutes <b>Activity 2.5</b> —Varies but could be up to 2 hours for discussion, research, design and creation of feeders, etc
<b>3</b> Having What It Takes—To Survive	<b>Activities 3.1, 3.2, 3.3</b> —30–40 minutes <b>Activity 3.4</b> —20–30 minutes
<b>4</b> Chain of Foods	<b>Activities 4.1, 4.2, 4.3</b> —30 minutes
<b>5</b> You Eat What?!	<b>Activities 5.1, 5.2, 5.3, 5.4</b> —30–40 minutes
<b>6</b> You Want Flies With That?	<b>Activities 6.1, 6.2, 6.3</b> —30 minutes
<b>7</b> It All Makes Sense	<b>Activity 7.1</b> —30 minutes <b>Activity 7.2</b> —30–40 minutes <b>Activity 7.3</b> —20–30 minutes
<b>8</b> Humans Are Organisms, Too	<b>Activity 8.1</b> —30–40 minutes

# lesson plan components

A lesson is defined as a logical grouping of information to be taught. Individual lessons will most likely be taught over several days. A lesson in this teacher guide does not necessarily equate to a daily lesson plan.

## components

**Estimated Time**—This indicates the approximate time to teach the lesson including all Essential Activities.

**Science GLEs**—Only the GLEs that are specifically addressed in the lesson are listed. If a portion of a GLE is not addressed, that portion is shown with the strike-through font.

**Vocabulary**—Listed terms reflect the terms bolded in the corresponding chapter in the student book. These are the key terms that students must master in order to fully comprehend the concepts being addressed. These terms are listed in the GLEs and will be assessed. They are defined in the student book chapters and in the student book glossary. Note that the glossary also includes other terms used in the student book that students may not know.

**Lesson Objectives**—Specific student objectives addressed in the lesson are listed.

**Essential Questions for the Lesson**—These questions could be used by the teacher to set the stage for the lesson. Teachers may elect to put them on the bulletin board, blackboard, whiteboard, etc. They are intended to help students think and address questions and ideas as scientists. Essential questions are provided to guide students toward field investigations that have the potential to provide rigorous and engaging inquiry experiences for young learners.

**Teacher Notes**—This section provides information to help teachers prepare for the lesson. It may contain additional content information for the teacher, notes or comments about the lesson, any advanced teacher preparation as well as suggested references for teacher background information.

**Outline of Answers to Objectives**—Content addressed by each objective has been outlined and included in each lesson. The page numbers included at the end of each objective refer to the relevant pages in the student reference.

**Transparency Masters**—Transparency masters should be printed onto clear overhead acetate sheets. This section heading only appears when transparency masters are included in a lesson.

**Essential Activities**—Most lessons have more than one Essential Activity, and all of these Essential Activities are essential in order to meet lesson objectives. Essential Activities include:

- Estimated time
- Objectives
- Teacher preparation
- Materials
- Procedure
- Wrap-Up/Formative Assessments
- Extension Activities—These are the only optional portions of an Essential Activity. Some Essential Activities are followed by Extension Activities. Extension Activities enhance the Essential Activities but are not required to meet the lesson objectives.

**Optional Activities**—These activities do not necessarily enhance specific activities nor are they required to meet lesson objectives, but they do provide opportunities for further study related to the lesson. Optional activities may include viewing video segments or investigating one piece of a lesson further. If there are no optional activities for the lesson, this section heading will not be listed.

**Summary**—This is the summary provided in the corresponding chapter in the student book.

**So, what do you know?**—An opportunity for teachers to evaluate and adjust/revisit their instruction through assessment of student learning

At the end of each lesson, a “So, what do you know?” section has been provided. Some or all of the items for each section may be used in different ways depending on teacher preference and student needs. An answer key with points possible for each item is provided. This section has been provided to help answer the question, “What needs to be re-taught before moving on to the next lesson?”

Examples of some ways to use “So, what do you know?” include:

**Advanced Organizer**—Students would complete chosen items as they read the corresponding chapter. Teachers could collect and review the items to determine student learning and understanding. Teachers may choose not to collect the items but have students use them throughout discussion of the content and revise answers as needed.

**Cooperative Learning**—Various items could be used for group discussions.

**Worksheet**—All or part of the section could be used as an in-class activity or as homework when appropriate. The answer key may be used if items are graded.

**Quiz**—All or part of the section could be graded for points after completing all essential activities for each lesson.

# student science notebooks

Science notebooks are an extremely useful tool for students and teachers alike. They promote good data collection and record-keeping habits as well as reference tools for students. For teachers, they provide ample opportunity for assessment of student work and data organization.

An excerpt from *Using Science Notebooks in Elementary Classrooms* by Michael P. Klentschy published in *NSTA Reports* (monthly newspaper of the National Science Teachers Association), September 2008, Volume 20, Number 1, has been reprinted and included below with permission of NSTA. This excerpt provides useful information on different approaches to and support for the use of science notebooks.

Klentschy states in the excerpt cited above that “scientists keep notebooks; students should do likewise. Scientists’ notebooks include what worked and what did not work in the investigation. They sometimes learn much more from what did not work.” Activities in this Teacher Guide encourage students: 1) to develop their own methods of collecting, recording and presenting data from investigations and long-term observations; 2) to share, compare and discuss their methods and findings with other students; 3) to re-evaluate their methods, discuss whether or not their investigation was a “fair test” and discuss possible alternatives to their methods; and 4) to maintain permanent records of all their discussions, observations, data recording methods, etc. In this way, students are provided “with the opportunity to use science notebooks in much the same way scientists do” (Klentschy, 2008), and students begin to recognize science notebooks as useful resources for future methods whether the methods were successful or not in the past.

For use with the *Nature Unleashed* unit, science notebooks are provided for each student. Students will be required to use their science notebooks for most lesson activities for data collection, organization of field investigation data, recording of group brainstorming ideas, reflective writing exercises, sketching, etc.

Heading information may vary, but the following, basic information is included for *each* activity heading entry. Repetition of this process will reinforce good record-keeping and data collection techniques useful to students throughout their school experiences as well as their lives.

- Date (Month/Day/Year)
- Time of Day
- Brief Description of Weather
- Location
- Outside Temperature

Klentschy, M. P., *Using Science Notebooks in Elementary Classrooms*, NSTA Press (Arlington, Virginia), 2008

## Additional Resources

Britsch, Susan and Daniel P. Shepardson “The Art of Reviewing Science Journals.” *Science and Children*, Nov–Dec 2004 pp. 43–45

Campbell, Brian and Lori Fulton. *Science Notebook: Writing About Inquiry*. Portsmouth, NH: Heinemann, 2003.

Campbell, Brian and Lori Fulton “Student-Centered Notebooks.” *Science and Children*, Nov–Dec 2004 pp. 26–29

Calhoun, Jeri and Ellen Mintz “Project Notebook.” *Science and Children*, Nov–Dec 2004 pp. 30–34

Leslie, Clare Walker and Charles E. Roth. *Nature Journaling*. Vermont: Storey Books, 1998.

Moriarty, Robin, Jeff Winokur and Karen Worth “Capitalizing on Literacy Connections.” *Science and Children*, Feb 2004 pp. 35–39

# national science teachers association article

Article from *NSTA reports*—September 2008

## Editor’s Note:

*NSTA Press publishes high-quality resources for science educators. This series will feature just a few of the books recently released. The following excerpt comes from Using Science Notebooks in Elementary Classrooms by Michael P. Klentschy, edited for publication here. NSTA Press titles are available online through the NSTA Science Store at [www.nsta.org/store](http://www.nsta.org/store)*

Student science notebooks are advocated by researchers who believe that writing in science enhances student understanding of science content and process skills. Student science notebooks can be embedded into the science curriculum as a natural part of the goal to assist students in making evidence-based explanations of their science investigations.

The student science notebook is more than a record of data that students collect, facts they learn, and procedures they conduct. It is also a record of students’ reflections, questions, predictions, claims linked to evidence, and conclusions, all structured by an investigation.

leading to an understanding of “big ideas,” not just factoids in science. As such, a science notebook is a central place where language, data, and experience work together to form meaning for the student. This form of competence or expertise is developed through active construction of knowledge. Students need time and practice using science notebooks to attain expertise.

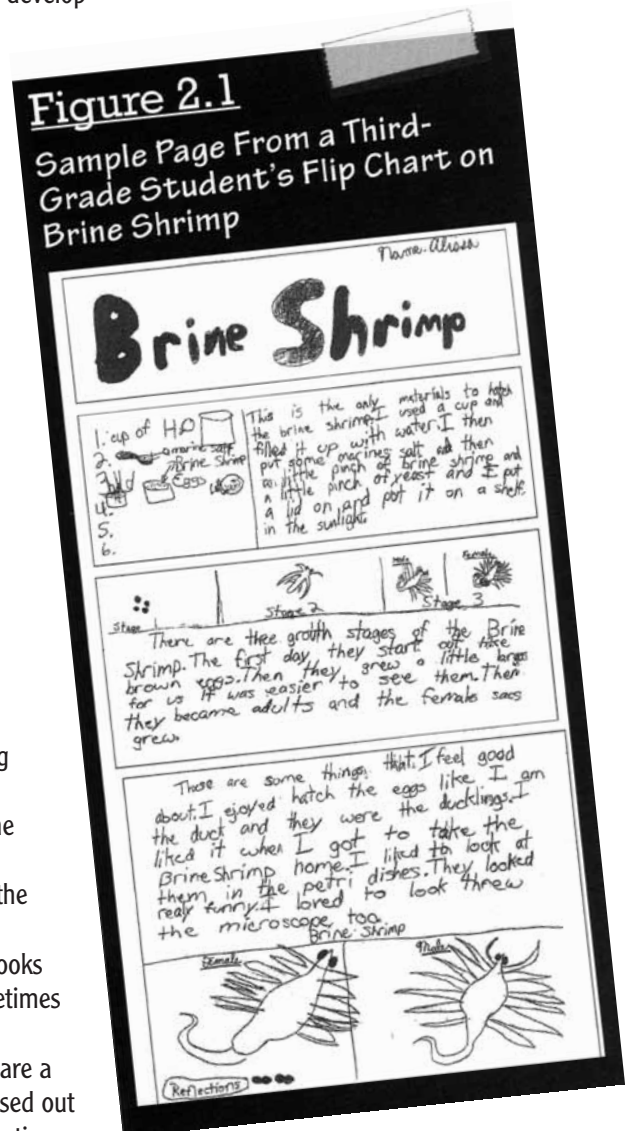
Student science notebooks, used well, become an embedded element in the curriculum and thus serve as a ready source of recorded data for both the student and the teacher. They become a direct measure of student understanding of the implemented curriculum and an important means for formative assessment. The science notebooks also reflect an accounting of the progression of an investigation as students formulate and record questions; make predictions; develop a plan of action; record observations, measurements, and data; link claims to evidence; and finally reflect on the investigation. They are the students’ personal record that can be referred to and revised throughout an investigation or even an entire unit of study. The science notebooks also serve as the evidence used in group and class discussion.

There are many different approaches to having students create and utilize science notebooks: composition books, blank lab books, lined sheets of paper stapled together or loose-leaf binders.

In primary grades, class or group science notebooks may be created for a unit of study instead of individual student notebooks. Classroom teachers often form covers in the shape of the unit of study, such as a round cover if the students are studying the planets or the Moon. Students as early as kindergarten should be encouraged to keep a record of science investigations. Often these entries will come in the form of scribbles or drawings only decipherable to the student. These form the foundation for later work, when more specific criteria and writing prompts or sentence starters are more formally introduced. The main objective is for teachers to initially provide students with the opportunity to record their science investigation. Figure 2.1 is a sample page from a flip chart a third-grade student created during an investigation of brine shrimp.

This page is an example of a student just starting to use a science notebook. The classroom teacher was focusing on observation and recording data with this investigation. The sample shows the procedures this child followed in hatching the brine shrimp. It also depicts an understanding of the growth cycle of the brine shrimp with drawings and observations recorded. Finally, the sample page includes a reflection of how the student felt about the investigation.

Scientists keep notebooks; students should do likewise. Scientists’ notebooks include what worked and what did not work in the investigation. They sometimes learn much more from what did not work. These notebooks include data, drawings, charts, and reflections, as well as new questions. Scientist entries are a record of what was learned at the time of the investigation and are not crossed out or erased when new discoveries take place. Newer ideas, thoughts, and reflections are added as new entries. Classroom teachers should adjust their teaching to provide students with the opportunity to use science notebooks in much the same way scientists do. The chapters that follow provide teachers with the support necessary to accomplish this task.



## Citations

- Amaral, O., L. Garrison, and M. Klentschy. 2002. Helping English learners increase achievement through inquiry-based science instruction. *Bilingual Research Journal* 26 (2): 213–239.
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- Klentschy, M., and E. Molina-de la Torre. 2004. Students’ science notebooks and the inquiry process. In *Crossing borders in literacy and science instruction: Perspectives on theory and practice*, ed. W. Saul, 340–354. Newark, DE: International Reading Association.
- Rivard, L., and S. Straw. 2000. The effect of talk and writing on learning science: An exploratory study. *Science Education* 84 (5): 566–593.
- Shepardson, D., and S. Britsch. 2001. The role of children’s journals in elementary school science activities. *Journal of Research in Science Teaching* 38 (1): 43–69.

# field investigations

Use of science notebooks and field investigation techniques by students are integrated components of the *Nature Unleashed* unit. The following excerpt from *Field Investigations: Using Outdoor Environments to Foster Student Learning of Scientific Processes* developed for the Association of Fish and Wildlife Agencies' North American Conservation Education Strategy and developed by the Pacific Education Institute is included here to provide teachers with background information on the importance of field investigations and how it relates to student learning

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Field investigations help students become **systems thinkers**, learn the skills of scientific inquiry, and understand that science **doesn't only happen in a laboratory or classroom**. Outdoor experiences in natural settings increase students' problem solving abilities and motivation to learn in social studies, science, language arts and math.

When planning and conducting field investigations, students and scientists grapple with the difficulties of working in a natural system and at the same time develop an understanding of its complexities and subsystems. Systems-thinking involves thinking about relationships, rather than about individual objects. A system can be defined in a number of ways:

- An assemblage of inter-related parts or conditions through which matter, energy, and information flow
- An organized group of related objects or components that form a whole
- A collection of things and processes (and often people) that interact to perform some function. The scientific idea of a system implies detailed attention to inputs and outputs and interactions among the system components.

State and national science education standards encourage instruction that focuses on problem-solving and inquiry—activities which characterize the pursuits of scientists. In field investigations, students pose a research question then plan and conduct an investigation to answer that question. Students use evidence to support explanations and build models, as well as to pose new questions about the environment. Students learn that the scientific method is not a simple linear process and, most importantly, experience the difficulty of answering essential questions such as:

- What defines my environment?
- What are all the parts and interrelationships in this ecosystem?
- What is a healthy environment?
- What is humans' relationship to the environment?
- How has human behavior influenced our environment?
- How can our community sustain our environment?
- What is my role in the preservation and use of environmental resources?

Field investigations help students become informed citizen scientists who add knowledge to the community's understanding of an area in order to make issues of concern visible and share differing points of view about the preservation and use of community natural resources.

Classroom science often overemphasizes experimental investigation in which students actively manipulate variables and control conditions. In studying the natural world, it is difficult to actively manipulate variables and maintain "control" and "experimental" groups, so field investigation scientists look for descriptive, comparative, or correlative trends in naturally occurring events. Many field investigations begin with counts (gathering baseline data). Later, measurements are intentionally taken in different locations (Ex: urban and rural, or where some natural phenomenon has created different plot conditions), because scientists suspect they will find a difference. In contrast, in controlled experiments, scientists begin with a hypothesis about links between variables in a system. Variables of interest are identified, and a "fair test" is designed in which variables are actively manipulated, controlled, and measured in an effort to gather evidence to support or refute a causal relationship.

For conceptual clarity, we have identified three types of field investigations—descriptive, comparative, and correlative.

<b>Descriptive</b> field investigations involve describing and/or quantifying parts of a natural system.	<b>Comparative</b> field investigations involve collecting data on different populations/organisms or under different conditions (Ex: times of year, locations) to make a comparison.	<b>Correlative</b> field investigations involve measuring or observing two variables and searching for a relationship.
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Each type of field investigation is guided by different types of investigative questions. Descriptive studies can lead to comparative studies, which can lead to correlative studies. These three types of studies are often used in combination to study the natural world.

*Ryken, A. E., Otto, P., Pritchard, K., & Owens, K. (2007). Field Investigations: Using Outdoor Environments to Foster Student Learning of Scientific Processes. Pacific Educational Institute.*

*Reprinted with permission from Dr. Margaret Tudor, Co-Executive Director of the Pacific Educational Institute, Market Place Office Building, 724 Columbia St. NW, Suite 250, Olympia, WA 98501 (mtudor@wfpa.org)*

# recording outside temperature with students

## Consider the following when purchasing thermometers for student use:

- Provide one thermometer for every two or three students
- If only a few thermometers are available, rotate temperature-reading responsibilities among students. However, all students should record temperature readings taken prior to each activity.
- Choose thermometers that are protected with some sort of plastic outer shell to prevent shattering or cracking when dropped.
- Choose thermometers that are calibrated in Celsius alone or in conjunction with Fahrenheit. The Missouri Department of Elementary and Secondary Education requires students to use Celsius when recording temperature.
- Choose thermometers with calibrations that are large and clear enough for students to read.
- Provide a box or container in which to store thermometers safely.
- Wipe thermometers carefully with a soft, damp cloth when necessary before storing.

## Procedure for gathering outdoor temperature:

- 1 Instruct students to hold thermometers carefully at the top (where the highest numbers are located) or by the plastic shield.
- 2 Students should not shake or swing thermometers but should hold thermometers steady.
- 3 Have students take an initial thermometer reading to serve as a base line.
- 4 While holding the thermometer up and away from their bodies, students should check every few minutes for changes in the thermometer reading.
- 5 When students notice that no change in the reading has occurred after several checks, they should record the final reading in their science notebook heading.
- 6 To determine temperatures of various locations around the schoolyard or field experience area, students should take the initial, base line thermometer reading and then carefully place the thermometer in the specific location to be measured (under a bench; under a rock ledge; on top of a rock; on the grass in the shade of a tree; etc.)
- 7 Students should check every few minutes for changes in the thermometer reading.
- 8 When students notice that no change in the reading has occurred after several checks, they should record the reading in their science notebook next to the description of the location(s) to be measured.
- 9 Students should carefully wipe dirt, leaves, etc. from thermometers with a soft, damp cloth.
- 10 Thermometers should be returned carefully to the designated storage box or container.



# wrap-up/formative assessment strategies

There are many different strategies available to teachers to determine whether students have grasped and understand concepts addressed by the objectives indicated for each lesson and activity. A few suggested strategies are listed below and referenced throughout the unit where specific, formative assessment strategies have not been included.

**Regardless of the strategies used to gather information about what students know and what they can do, it is important to use the information gathered to inform and enhance teacher instruction.** Students may remain anonymous for some strategies.

## exit note

Ask students to write an exit note that includes a question they still have about what they learned in the activity and/or a question they would like to investigate. Exit notes can be written on a piece of paper and placed in an “Exit Note” box placed near the classroom door, written on a Post-it note and stuck to a designated spot on the wall near the door, written on a piece of paper and stuck to a self-stick bulletin board, etc. Determine whether student submissions should remain anonymous. **Exit notes should be reviewed to determine what concepts need to be re-taught before moving on to the next activity.**

## group report with presentation

Divide the class into groups of four students. Number each group’s team members 1–4. Within each group, give each group one or more questions to answer related to the activity. Activity objectives and the questions students are being asked will determine the length of time required for this strategy. Explain that all group members should be prepared to give a brief presentation of the answers to their question(s). Roll a dice for each group to determine who will give the presentation for the group.

## popcorn balls or snowballs

Prepare question(s) in advance or pose one based on any problem areas arising during the activity. Ask students to answer one multiple choice question and have each student write an explanation of his/her answer choice on a piece of paper. Instruct students to crumble up their paper like a snowball or ball of popcorn. When ready, have students toss their snowballs/popcorn balls to other students. Repeat tosses at least three times to ensure balls of paper are thoroughly mixed up. Ask a student to read the answer and explanation on his/her paper. Call upon other students to do the same before asking students if they agree or not with the answer selected and explanation given. Discuss as needed.

## think-pair-share

Assign a question or problem for the class. Allow time for individuals to think silently about it and then have students pair up and exchange thoughts. Have the pairs share their responses with the class.

## open-ended inquiry questions

Ask a student an open-ended inquiry question. Ask the rest of the class whether they agree or disagree with the student’s answer and why? Ask additional questions and discuss as needed.

## summary

At the completion of a lesson or an activity, have students summarize what they learned. Students can record this information in their science notebooks by writing and/or drawing. Teachers should collect science notebooks. Teachers can then determine what students really understand and determine content that needs to be re-taught. The content of students’ science notebooks can be graded or not depending on teacher’s preference for each activity. *Summary Paragraph Guidelines and Scoring Key* are provided as Appendix E.

# reference materials

**teacher and classroom resources** Note: These materials are available free of charge from the Missouri Department of Conservation \*

**Posters** \* (It is recommended that posters be laminated for classroom use )

*Animal Cards* poster (E00077)

*Forests: Layers of Leaves* poster (E00126)

*Life on the Forest Floor* poster (E00004)

*Missouri's Natural Communities: Forests* (SCI049) \*\*

*Missouri's Natural Communities: Prairies* (SCI048) \*\*

*Missouri Pond Life* poster (E00002)

*Prairie: Life Among the Grasses* poster (E00088)

## References \*

*Butterfly Gardening & Conservation* (E00471)

*Common Missouri Spiders* (E00429)

*Feeding Backyard Birds* (E00450)

*Fifty Common Trees of Missouri* (F00088)

*Introduction to Missouri Fishes* (FIS020)

*Introduction to Missouri Furbearers* (SCI138)

*Missouri Owls* (E00455)

*Missouri's Most Irritating Plant (Poison Ivy)* (E00055)

*Missouri's Raptors (Eagles, Hawks, Falcons & Vultures)* (E00452)

*Missouri's Toads and Frogs* (E00430)

*Missouri's Turtles* (E00468)

*Native Plants for Your Landscape* (E00594)

*Snakes of Missouri* (E00448)

## References for supplemental lessons \*

*Conserving Missouri's Caves and Karst* (SCI002)

*Exploring Missouri Wetlands* poster (E00003)

*Missouri's Natural Communities: Glades* (SCI047) \*\*

*Missouri's Natural Communities: Karst* (SCI050) \*\*

*Outside In: Amazing Glades* (E00123)

*Rivers & Streams* poster (E00509)

\* Missouri Department of Conservation free publications can be ordered by sending an e-mail to [pubstaff@mdc.mo.gov](mailto:pubstaff@mdc.mo.gov) or writing to Publications, Missouri Department of Conservation, PO Box 180, Jefferson City, MO 65102-0180. Many publications can be downloaded from the Web. The main address is: [www.MissouriConservation.org](http://www.MissouriConservation.org)

\*\* These publications contain posters as well as additional detailed background information for teachers

## recommended classroom resources

(Publications with numbers in parentheses are available for purchase from the MDC Nature Shop )

*Amphibians and Reptiles of Missouri* Tom R. Johnson 2000 (01-0190)

*Birds of Missouri* Stan Tekiela 2001

*Field Guide to Feeder Birds: Eastern and Central North America* Roger Tory Peterson 2000

*Field Guide to Backyard Bird Song: Eastern and Central North America* Richard K. Walton and Robert W. Lawson 1999

*Golden Guides from St. Martin's Press: Birds* Herbert S. Zim and Ira N. Gabrielson 2001

*Golden Guides from St. Martin's Press: Insects* Clarence Cottam and Herbert S. Zim 2001

*Golden Guides from St. Martin's Press: Mammals* Herbert S. Zim and Donald F. Hoffmeister 2001

*Key to Missouri Trees in Winter* Jerry Cliburn and Ginny Wallace 1990 (01-0081)

*Missouri Wildflowers* Edgar Denison 2008 (01-0021)

*Peterson Field Guides for Young Naturalists: Backyard Birds* Jonathan Latimer and Karen Stray Nolting 1999

*Peterson First Guide to Insects of North America* Christopher Leahy 1998

*Peterson First Guide to Mammals of North America* Peter C. Alden 1998

*Peterson First Guide to Urban Wildlife* Sarah B. Landry 1998

*Shrubs and Woody Vines of Missouri Field Guide* Don Kurz 2009 (01-0292)

*Trees of Missouri Field Guide* Don Kurz 2005 (01-0092)

# alignment to missouri standards

## missouri science concepts (strands 1–6) addressed

- **EC.1.A.** All populations living together within a community interact with one another and with their environment in order to survive and maintain a balanced ecosystem
- **EC.1.D.** The diversity of species within an ecosystem is affected by changes in the environment, which can be caused by other organisms or outside processes
- **EC.2.A.** As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use
- **EC.3.C.** Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem
- **LO.1.A.** Organisms have basic needs for survival
- **LO.1.E.** Biological classifications are based on how organisms are related
- **ME.2.C.** Electromagnetic energy from the sun (solar radiation) is a major source of energy on Earth

## alignment to missouri show-me process standards

1.8 Organize data, information and ideas into useful forms (including charts, graphs, outlines) for analysis or presentation  
(Activities 2.3; 3.1; 3.3; 5.1; 5.2; 5.3)

2.1 Plan and make written, oral and visual presentations for a variety of purposes and audiences (Activities 1.4; 3.1; 3.3)

## alignment to communication arts standards

Writing 2.D.5.a Compose text using words that are specific, accurate, and suited to the topic (Activity 6.2)

Writing 2 Compose well-developed text – paper (Activities 1.2 and 8.1)

Writing 3.A.5 Compose a variety of texts c including a summary (narrative or informational) (Activity 2.3)

# science grade level expectations alignment

In this unit, students develop the Science Grade Level Expectations (GLEs) listed in the Targeted Learning column below. While supporting students in the development of these skills, teachers should consider students' prior learning and keep in mind their future learning. The GLEs listed in the Targeted Learning column may be addressed in more than one lesson. In the Lesson # column, the lesson number(s) are listed followed by which GLE or which portion of a GLE is covered by the lesson. The Depth of Knowledge (DOK) coding indicated in the row directly below the GLE is from the Missouri Department of Elementary and Secondary Education (DESE). For the assessment column, SR means selected response, CR means constructed response and the number refers to the test item number.

The GLE number coding is in the format used by DESE. The first two letters refer to the strand (LO=Living Organisms, EC=Ecology, ME=Matter and Energy, IN=Inquiry). The first number refers to the "Big Idea" number under the strand. Next, the single uppercase letter refers to the "Concept" under the Big Idea. The following number refers to the grade level. The lower case letter refers to the specific GLE for that grade. See example below.

LO 1 A 3 a = Living Organism 1. There is a fundamental unity underlying the diversity of all living organisms. A. Organisms have basic needs for survival. 3rd grade a. Describe the basic needs of most plants (i.e., air, water, light, nutrients, temperature).

Lesson #	Assessment	Prior Learning	Targeted Learning	Future Learning
Lesson 1 LO 1 A 3 a Foundation for EC 1 A 6 a & EC 1 B 6 a -c	CR 8  CR 9 CR 10	LO 1 A 1 a Identify the basic needs of most animals (i.e., air, water, food, shelter)  LO 1 A 1 b Identify the basic needs of most plants (i.e., air, water, light)	LO 1 A 3 a Describe the basic needs of most plants (i.e., air, water, light, nutrients, temperature)  Note: This lesson lays the foundation for abiotic and biotic factors by addressing living and non-living things. It also has students demonstrate how organism, population, community, non-living things and ecosystem are connected.	LO 1 A 6 a Describe the common life processes necessary to the survival of organisms (i.e., growth, reproduction, life span, response to stimuli, energy use, exchange of gases, use of water, elimination of waste)  EC 1 A 6 a Identify the biotic factors (populations of organisms) and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition) that make up an ecosystem  EC 1 B 6 a Identify populations within a community that are in competition with one another for resources  EC 1 B 6 b Recognize the factors that affect the number and types of organisms an ecosystem can support (e.g., food availability, abiotic factors such as quantity of light and water, temperature and temperature range, soil composition, disease, competitions from other organisms, predation)
			(DOK a 1)	

Lesson #	Assessment	Prior Learning	Targeted Learning	Future Learning
<p><b>Lesson 2</b> EC 1 A 4 b</p> <p><b>Lesson 3</b> EC 1 A 4 a only camouflage, migration &amp; hibernation</p> <p><b>Lesson 7</b> EC 1 A 4 a all except for migration &amp; hibernation</p>	<p>SR 1, 4</p> <p>SR 2</p> <p>SR 6</p>	<p>EC 1 A K a Describe how the seasons affect the behavior of plants and animals</p>	<p>EC 1 A 4 a Identify the ways a specific organism may interact with other organisms or with the environment (e.g., pollination, shelter, seed dispersal, camouflage, migration, hibernation, defensive mechanism)</p> <p>EC 1 A 4 b Recognize that different environments (i.e., pond, forest, prairie) support the life of different types of plants and animals</p> <p>[DOK a 1; b 1]</p>	<p>EC 1 A 6 a Identify the biotic factors (populations of organisms) and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition) that make up an ecosystem</p>
<p><b>Lesson 3</b> EC 3 C 4 a EC 3 C 4 b EC 3 C 4 c EC 3 C 4 d</p>	<p>CR 11</p> <p>CR 12</p> <p>SR 5</p> <p>SR 7</p>	<p>EC 1 A K a Describe how the seasons affect the behavior of plants and animals</p>	<p>EC 3 C 4 a Identify specialized structures and describe how they help plants survive in their environment (e.g., root, cactus needles, thorns, winged seed, waxy leaves)</p> <p>EC 3 C 4 b Identify specialized structures and senses and describe how they help animals survive in their environment (e.g., antennae, body covering, teeth, beaks, whiskers, appendages)</p> <p>EC 3 C 4 c Recognize internal cues (e.g., hunger) and external cues (e.g., changes in the environment) that cause organisms to behave in certain ways (e.g., hunting, migration, hibernation)</p> <p>EC 3 C 4 d Predict which plant or animal will be able to survive in a specific environment based on its special structures or behaviors</p> <p>[DOK a 2; b 2; c 1; d 2]</p>	<p>EC 3 C 6 a Relate examples of adaptations (specialized structures or behaviors) within a species to its ability to survive in a specific environment (e.g., hollow bones/flight, hollow hair/insulation, dense root structure/compact soil, seeds/food, protection for plant embryo vs. spores, fins/movement in water)</p> <p>EC 3 C 6 b Predict how certain adaptations, such as behavior, body structure, or coloration, may offer a survival advantage to an organism in a particular environment</p>

Lesson #	Assessment	Prior Learning	Targeted Learning	Future Learning
<b>Lesson 4</b> EC2 A 3 a & ME 2 C 3 a LO 1 E 5 b EC2 A 3 b EC2 A 3 c EC2 A 3 d  <b>Lessons 5 &amp; 6</b> EC2 A 3 d	SR 3  CR 13 CR 17 CR 14 CR 18  CR 18	ME 2 C 1 a Identify light from the Sun as a basic need of most plants	EC 2 A 3 a Identify sunlight as the primary source of energy plants use to produce their own food  ME 2 C 3 a Recognize the Sun is the primary source of light and food energy on Earth  LO 1 E 5 b Distinguish between plants (which use sunlight to make their own food) and animals (which must consume energy-rich food)  EC 2 A 3 b Classify populations of organisms as producers or consumers by the role they serve in the ecosystem  EC 2 A 3 c Sequence the flow of energy through a food chain beginning with the Sun  EC 2 A 3 d Predict the possible effects of removing an organism from a food chain	EC 2 A 6 a Diagram and describe the transfer of energy in an aquatic food web and a land food web with reference to producers, consumers, decomposers, scavengers, and predator/prey relationships  EC 2 A 6 b Classify populations of unicellular and multicellular organisms as producers, consumers, and decomposers by the role they serve in the ecosystem  EC 1 B 6 c Predict the possible effects of changes in the number and types of organisms in an ecosystem on the populations of other organisms within that ecosystem  ME 2 C 6 b Recognize the Sun is the source of almost all energy used to produce the food for living organisms
			[DOK EC a 1; b 1; c 1; d 2] [DOK ME a 1] [DOK LO b 1]	

Lesson #	Assessment	Prior Learning	Targeted Learning	Future Learning
<b>Lesson 5</b> EC 2 A 4 a EC 2 A 4 b  <b>Lesson 6</b> EC 2 A 4 c	CR 17 CR 15, 17  CR 16, 17		EC 2 A 4 a Classify populations of organisms as producers, consumers, decomposers by the role they serve in the ecosystem  EC 2 A 4 b Differentiate between the three types of consumers (herbivore, carnivore, omnivore)  EC 2 A 4 c Categorize organisms as predator or prey in a given ecosystem	EC 2 A 6 a Diagram and describe the transfer of energy in an aquatic food web and a land food web with reference to producers, consumers, decomposers, scavengers, and predator/prey relationships  EC 2 A 6 b Classify populations of unicellular and multicellular organisms as producers, consumers, and decomposers by the role they serve in the ecosystem
<b>Lesson 6</b> EC 1 D 4 a only hunting/conservation of species  <b>Lesson 8</b> EC 1 D 4 a	CR 19  CR 19	EC 1 A 1 a Identify ways man depends on plants and animals for food, clothing, and shelter	[DOK a 1; b 1; c 2]  EC 1 D 4 a Identify examples in Missouri where human activity has had a beneficial or harmful effect on other organisms (e.g., feeding birds, littering vs. picking up trash, hunting/conservation of species, paving/restoring greenspace)	EC 1 D 6 a Describe beneficial and harmful activities of organisms, including humans (e.g., deforestation, overpopulation, water and air pollution, global warming, restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources), and explain how these activities affect organisms within an ecosystem  EC 1 D 6 b Predict the impact (beneficial or harmful) of a natural environmental change (e.g., forest fire, flood, volcanic eruption, avalanche) on the organisms in an ecosystem  EC 1 D 6 c Describe possible solutions to potentially harmful environmental changes within an ecosystem
			[DOK a 1]	

GLE	Assessment	Prior Learning	Targeted Learning	Future Learning
Inquiry GLEs are aligned to specific activities that include inquiry The coding used in the assessment column refers to the specific activity by number For example, 3 2 refers to the 2 <sup>nd</sup> activity in Lesson 3 Assessing inquiry GLEs is at the teacher's discretion				
IN 1 A 5 a	3 1	IN 1 A 4 a Formulate testable questions and explanations (hypotheses)	IN 1 A 5 a Formulate testable questions and explanations (hypotheses) [DOK a 3]	IN 1 A 6 a Formulate testable questions and hypotheses
IN 1 B 5 a	1 1; 1 3; 1 4; 2 3; 2 4; 3 1; 7 1; 7 2	IN 1 B 4 a Make qualitative observations using the five senses  IN 1 B 4 b Make observations using simple tools and equipment (e g , hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders, spring scale)	IN 1 B 5 a Make qualitative observations using the five senses  IN 1 B 5 b Determine the appropriate tools and techniques to collect data  IN 1 B 5 c Use a variety of tools and equipment to gather data (e g , hand lenses, magnets, thermometers, metric rulers, balances, graduated cylinders, spring scales)	IN 1 B 6 a Make qualitative observations using the five senses  IN 1 B 6 b Determine the appropriate tools and techniques to collect data  IN 1 B 6 c Use a variety of tools and equipment to gather data (e g , microscopes, thermometers, computers, spring scales, balances, magnets, metric rulers, graduated cylinders, stopwatches)
IN 1 B 5 b	1 1	IN 1 B 4 c Measure length to the nearest centimeter, mass using grams, temperature using degrees Celsius, volume to the nearest milliliter, weight to the nearest Newton	IN 1 B 5 d Measure length to the nearest centimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, weight to the nearest Newton	IN 1 B 6 d Measure length to the nearest millimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, force (weight) to the nearest Newton, time to the nearest second
IN 1 B 5 c Hand lenses	5 4 7 1			
IN 1 B 5 d	All			
IN 1 D 5 a	2 3 3 1 3 3	IN 1 D 4 a Communicate the procedures and results of investigations and explanations through: ■ oral presentations ■ drawings and maps ■ data tables ■ graphs (bar, single line, pictograph) ■ writings	[DOK a 1; b 2; c 1; d 1; e 2] IN 1 D 5 a Communicate the procedures and results of investigations and explanations through: ■ oral presentations ■ drawings and maps ■ data tables ■ graphs (bar, single line, pictograph) ■ writings	IN 1 D 6 a Communicate the procedures and results of investigations and explanations through: ■ oral presentations ■ drawings and maps ■ data tables (allowing for the recording and analysis of data relevant to the experiment, such as independent and dependent variables, multiple trials, beginning and ending times or temperatures, derived quantities) ■ graphs (bar, single line, pictograph) ■ writings
			[DOK a 2]	





# lesson 1: it's all connected

## estimated time

2–3 hours

## science GLEs

**LO.1.A.3.a.** Describe the basic needs of most plants (i.e., air, water, light, nutrients, temperature)

## vocabulary

Living things  
Non-living things  
Organism  
Population  
Community  
Environment  
Ecosystem

## lesson objectives

- 1 Describe the basic needs of most plants and animals
- 2 Identify the living and non-living components of an ecosystem
- 3 Explain why non-living components of an ecosystem are important for the living components
- 4 Demonstrate how organism, population, community and ecosystem are connected

## essential questions for the lesson

- 1 How are plants and animals connected to the air, light, soil, rocks, water and other non-living things?
- 2 What's the "recipe" for an ecosystem?

## teacher notes

Students should have read Chapter 1, "It's All Connected," on pages 2–3 in their student books prior to engaging in these activities. This lesson includes a review of the basic needs of most animals from grade 1 GLE LO 1 A 1 a

Since students will be using the schoolyard for many activities in this lesson and throughout the *Nature Unleashed* unit, it is very important that the teacher be thoroughly familiar with the schoolyard and any safety issues or concerns. Students will begin using science notebooks in Lesson 1 and will continue using them throughout the unit. Refer to *Student Science Notebooks* section and the *National Science Teachers Association Article* in the Teacher Notes section.

**outline of answers to objectives** See following page

## transparency masters

**Transparency 1.1:** Organism

**Transparency 1.2:** Population

**Transparency 1.3:** Community

**Transparency 1.4:** Non-living Things

## essential activities

**Activity 1.1:** Living or Non-living?

**Activity 1.2:** Space—It's a Basic Need, Too

**Activity 1.3:** Organism, Population, Community, Ecosystem?

**Activity 1.4:** Schoolyard Ecosystem Interactions

**Activity 1.5:** Making Connections

**so, what do you know?**—Lesson 1 questions and answer key

## summary

