Natural Resource Interpretation

Description

- Age Group: Adults 19+
- Subject Areas: Nebraska prairie types, prairie management, introductory plant identification
- Duration: 3 hours, including breaks
- Format: Indoor classroom and outdoor hands-on activities

Curriculum

The state curriculum comes packaged and assembled, inserted into a three-ring binder. Session goals may be accomplished after the volunteer has read each curriculum chapter, provided to them prior to each session. These curriculum chapters are currently replicas of the Illinois and Texas curriculum materials, and Nebraska specific content is in development. You may teach above and beyond that presented by the curriculum chapter and customize your presentation to the very specific issues of the local area. You are encouraged to add additional materials in class to the state curriculum chapter for this session.

Outline

1. Nature Scavenger Hunt - 45 Min, Groups of 3-5 Find favorite item on list

   Interpretation and Outreach

American Conservation History

I. The Naturalists
   a. Audubon
   b. Muir
   c. Pinchot
   d. Steven Mather
   e. Leopold
   f. Modern Environmental Movement
   g. Calendar of events

Interpretation and Outreach

I. Information, Environmental Education and Interpretation: What’s the difference?
   a. Information
   b. Interpretation
      i. What is interpretation?
      ii. What is the purpose?
         1. To light a spark
         2. Assist visitors to develop awareness, understanding, and appreciation of outdoors
         3. To accomplish management goals
         4. Promote public understanding of agency goals & objectives
      iii. Why study interpretation in NMN?
c. Environmental Education:
   i. Knowledge into action
   ii. The components of environmental education are:
       1. Awareness of environmental issues
       2. Understanding of environmental challenges
       3. Attitudes of concern for the environment and motivation to improve environmental quality
       4. Skills to identify and resolve environmental challenges
       5. Participation in activities to lead to the resolution of environmental issues

d. Differences Between Interpretation and Environmental Education

II. Benefits of Interpretation and Interpretation as a Management Tool
   a. Increase recreation benefits
   b. Resource protection
   c. Visitor Protection—safety
   d. Law Enforcement
   e. Enhance visitor experiences
   f. Make visitors aware of their place in the environment
   g. Broaden visitor horizons - big picture
   h. Inform the public
   i. Reduce park destruction
   j. Assist in promotion of parks and tourism to economy
   k. Motivate public to protect environment at historic sites

III. Interpretive Principles
   a. Enos Mills
   b. Freeman Tilden
   c. Dr. Ted Cable and Larry Beck
   d. Activity: Uninteresting Snake Education vs. Interpretation of a Snake

IV. Developmental stages
   a. Physical and mental abilities of different ages
   b. Activity: Puzzle pieces for the different stages

V. Learning Styles
   a. Detailing learning styles
   b. Activity: Bingo Game—Gardner’s Multiple Intelligences

VI. Snack and potty break

VII. Interpretive Planning and Design
    a. Identify need of stakeholders
    b. Identify needs of audience
    c. Assess resources
       i. People
       ii. Community
       iii. Facilities
       iv. Products and resources
    d. Interpretive Planning
e. Develop themes
   i. Overall
   ii. Major
   iii. Minor
f. Interpretive Design
   i. Hikes, themed
   ii. Programs
   iii. Brochures
   iv. Signs

VIII. Hike
   a. Trail techniques
   b. Physical needs
   c. Public speaking skills and techniques

IX. Challenges for Interpretation

X. Participants Develop a Program

XI. Conclusion – So why did we start the Master Naturalist training with interpretation?

XII. Resource Page

Background

Background content will be developed by professionals in Nebraska. Currently, this includes content developed by Illinois, Minnesota, and Texas.

Lessons and Activities

- Nature Scavenger Hunt - Tell us about the Object 3 Min each in groups
- Story about something you care about
- Telephone Pictionary
- Ecosystem Charades
- Oh Deer
- Exhibit Analysis

Resources:

1. Interpreting Our Heritage by Freeman Tilden

2. Interpretation for the 21st Century: Fifteen Guiding Principles for Interpreting Nature and Culture by Larry Beck and Ted Cable

3. Interpretation of Cultural and Natural Resources by Douglas M. Knudson, Ted T. Cable, and Larry Beck

4. Interpreting For Park Visitors by William J. Lewis
5. Excerpts from Legacy magazine, a publication of the National Association for Interpretation.

6. The Relationship Between Environmental Interpretation and Environmental Education by Doug Knapp

7. A Sense of Place for Environmental Education and Interpretation by Jeanie and Richard Hilten


10. Applied Interpretation: Putting Research Into Practice by Doug Knapp

11. Personal Interpretation: Connecting Your Audience to Heritage Resources by Lisa Brochu and Tim Merriman


INTERPRETATION WORKSHOPS AND TRAININGS IN NEBRASKA

• Nebraska Project Learning Tree (PLT) and Project Water Education for Teachers (WET) are international award winning environmental education programs. PLT and Project WET use hands-on learning activities that are appropriate for formal and nonformal educators working with children in grades Pre K through 12. These activities incorporate important environmental lessons into all disciplines including the sciences, mathematics, fine arts, social studies, language arts, music and physical education.

• PLT uses the forest as a "window on the world" to increase students' understanding of our complex environment. PLT teaches not only about trees, but has informative lessons about land, air and water. These lessons help to instill in students the confidence and commitment to take responsible action on behalf of the environment.

• Project WET is a collection of innovative, water-related activities that are hands-on, easy to use, and fun! Providing a thorough water education program, the activity guide also addresses water’s chemical and physical properties, quantity and quality issues, aquatic wildlife, ecosystems, and management strategies. Project WET activities promote critical thinking and problem-solving skills and help provide young people with the knowledge and experience they will need to make prudent decisions regarding water resource use.

Nebraska Project WILD
All life, plant and animal, wildlife and human, depends on the environment. Informed decisions, responsible behavior, and constructive actions concerning wildlife and the environment underlie the survival of all species, including our own. Project WILD provides interdisciplinary conservation and environmental education curriculum and materials that focus on wildlife.

Additionally, spending time in nature is vital to the health of all people - children and adults. Lower blood pressure, reduced stress, increased immune system, better problem solving and creativity are just some of the rewards for spending time outside. Not only that, but it is easy to get outside and have fun in nature. View a great video highlighting the ease and fun of engaging children in nature created by the Nebraska Extension Learning Child Team:

http://youtu.be/wLDjrk3HsTU

Project WILD programs and materials assist learners of all ages to develop the awareness, knowledge, skills, and commitment to act responsibly in matters concerning wildlife

WILDLIFE EDUCATION TRUNKS

Birds of Nebraska Education Trunk teaches about the birds of Nebraska, bird adaptations, and how to find birds and identify birds by sight and sound. The bird trunk includes birding by ear CDs, an Identiflyer, bird field guides, student books, migration posters, bird bingo, and a variety of other hands-on bird activities and educational games. Students can even examine owl pellets, skulls, wings, feet, and feathers of birds found throughout Nebraska. Use this trunk to create a new curriculum or to enhance your existing curriculum!

Mammals of Nebraska Education Trunk is a great way to investigate all Nebraska mammals – whether you’re studying prairie mammals and forest mammals or carnivores, herbivore, and omnivores. This trunk is also a great way to study animal skulls, teeth, or animal adaptations. The Mammal Trunk offers educators a variety of hands-on, inquiry based learning activities. The trunk includes curriculum guides, field guides, posters, student books, and videos. There is also a fantastic assortment of furs, skulls, and tracks that all learners will enjoy!

Interested in Checking out a Wildlife Education Trunk? Contact your local Nebraska Game & Parks Commission Office to reserve the Mammal or Bird Education Trunk. Trunks are FREE to check-out. Trunks must be picked-up and dropped off to the office from which you check it out.

http://outdoornebraska.ne.gov/wildlife/programs/projectwild/
Nebraska’s Outdoor Family Event Trailers

Organizing a nature & outdoor festival has never been so easy!

About the Trailers
The intent of the Outdoor Families Event Trailer is to provide a turn-key ready trailer filled with 17 activities to host a 1-day event. The goal is to engage Nebraska’s youth and families in nature and outdoor activities.

Groups, such as, Pheasants Forever Chapters, Boy/Girl Scout Troops, churches, youth groups or schools are welcome to check-out the Trailer.

Most supplies for each of the 17 activities are provided with the Trailer (a few consumable items will need to be purchased by the group using the Trailer).

There is no fee for using the trailer!

There are three Trailers located throughout Nebraska – Norfolk, Scottsbluff, and Lincoln. Every effort is made to reserve the Trailer closest to your event. If the closest Trailer is already reserved for your event date, you are welcome to use another Trailer if available.

Please be advised, the group checking-out the Trailer is responsible for both pick-up and return of the trailer.

http://outdoornebraska.ne.gov/ofet/
Conservation Biology & Ecology

Developed by Leslie Kwasnieski, Nebraska Master Naturalist, Metropolitan Community College

Objectives for Ecology

This Session will give the participant a basic understanding of Ecology, including these specific issues.

1. Develop a foundational knowledge of ecology terms.
2. Distinguish between biotic and abiotic factors.
3. Develop an understanding of biogeochemical cycles (Carbon, Nitrogen, water).
4. Discuss the result of an imbalance of these cycles (ie. water pollution).
5. Investigate the process of energy flow through a natural system.
6. Be able to define and apply terms to hierarchal feeding relationships.
7. Discuss the definition of a biological species and the processes that form a species.
8. Explain species diversity and why it is crucial for a healthy environment.
9. Distinguish relationships between populations
10. Define environmental succession in a community and be able to give an example.

Outline

I. Ecological Principles
   a. What is Ecology?
   b. Principles and Concepts
      i. What are biotic vs abiotic factors
      ii. Ecosystems
      iii. Biomes & Eco-regions of Nebraska
           Systems found within each eco-region
                   1. Grasslands
                   2. Wetlands
                   3. Woodlands
                   4. Lakes
                   5. Ponds
                   6. Rivers
                   7. Reservoirs
           i. Biogeochemical cycles – carbon, nitrogen, water
           ii. Energy transfer and flow
           iii. Ecological pyramids
           iv. Trophic level structure
           v. Food chains, food webs and niches
   c. Species Level
      i. Definition of the biological species concept
      ii. How to name a species, a taxonomy discussion*
      iii. Reproductive isolation, how species are created.
      iv. Why species diversity is a good thing.
      v. Extinction & threatened species, in Nebraska.
      vi. Species interactions
          1. Symbiotic relationships – parasitism, mutualism, commensalism
          2. Competition between species
          3. Predator and prey dynamics
      vii. Population dynamics, carrying capacity and its effect on resources
d. Ecological Succession
   i. Primary succession
   ii. Secondary succession

Objectives for Ecology

This Session will give the participant a basic understanding of Conservation biology, including these specific issues.

1. Explain the concept of biodiversity as used to describe genetic, species, and ecosystem diversity.
2. Discuss the arguments for preserving biodiversity, and articulate personal views on the need for biodiversity conservation.
3. Explain the role of habitat loss and present loss of species, discuss conservation practice and effectiveness with an awareness of societal, cultural, economic, and political obstacles, and evaluate current conservation practice as weighed against future needs.

II. Conservation Biology
   a. What is Conservation Biology?
   c. Human activity and its effect on biodiversity in the modern world.
   d. Biodiversity concepts
      i. Genetic diversity
      ii. Species diversity
      iii. Ecosystem diversity
   e. Threats to biodiversity – a discussion of the following topics in Conservation Biology
      i. Habitat loss
      ii. Introduced species
      iii. Overharvesting
      iv. Global climate change
      v. Acid Rain
      vi. Nutrient enrichment
      vii. Biomagnification
      viii. Global warming ad climate change
      ix. Depletion of the Ozone layer
      x. Sustainability

Background

Background content will be developed by professionals in Nebraska. Currently, this includes content developed by Illinois, Minnesota, and Texas.

Lessons and Activities

*Make a dichotomous key. Students will use their shoes to develop a dichotomous key. They will discuss why this is important in the field of science.

Citations

The IUCN Red List of Threatened Species™ provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction. http://www.iucnredlist.org/
Conservation Biology for All, a free textbook about conservation biology. Available free online.


Eco-regions of Nebraska, a map from the Environmental Protection Agency
[http://www.epa.gov/wed/pages/ecoregions/ksne_eco.htm](http://www.epa.gov/wed/pages/ecoregions/ksne_eco.htm)

Top 10 Citizen Science Projects of 2012

Christmas Bird Count and 25 More of the Best Ways to Enjoy the Outdoors – more citizen science projects
Natural Resource Management
Developed by, Kristal Stoner, Nebraska Game & Parks Commission

Description
- Age Group: Adults 19+
- Subject Areas: Natural Resource Management In Nebraska
- Duration: 2 hours, including breaks
- Format: Indoor classroom and outdoor hands-on activities
- Group Size: 18 adults

Objectives:
1. Understand pre-settlement conditions and human impacts
2. Understand the context of current legislation and responsible regulatory agencies
3. Introduction to the North American Model of Wildlife Conservation
4. Understand complexity of prioritizing resource management
5. Understand management techniques as they relate to wildlife conservation
6. Understand pre-settlement conditions and human impacts
7. Understand the context of current legislation and responsible regulatory agencies
8. Introduction to the North American Model of Wildlife Conservation
9. Understand complexity of prioritizing resource management
10. Understand management techniques as they relate to wildlife conservation

Background: Natural Resource Management has evolved over time in response to conflicts that have arisen from various user groups and this continues to be the case today. Understanding what management is currently being conducted and why it is being conducted is important as future challenges will demand that management action and policy adapt with changing priorities.

Lessons and Activities:
- Scenario Discussion

1. The North American Model of Wildlife Conservation has been successful, but does the model still apply?
2. Given challenges discussed, how should wildlife species conservation be approached in a changing climate?
3. How should managers approach conflicting users of natural resources?
4. What role do landowners play in natural resource conservation?
Grasslands and Prairies of Nebraska: Developed by Gerry Steinhauer, Nebraska Game & Parks

Objectives

Below are some examples of Objectives for this Session. This Session should give the participant a basic understanding of Nebraska prairies.

1) The pre-settlement prairie and human impacts.
2) Understanding prairie types.
3) Grassland management tools.
4) Prairie biodiversity—plants, animals, birds, and insects.
5) The importance of land management.
6) Prairie conservation—protection and restoration.

Outline

1) The pre-settlement Nebraska landscape
   a. percentage of prairie, woodland, wetland
   b. dominant disturbances
   c. settlement period and impacts
2) Tallgrass Prairie
   a. Range
   b. Dominant and rare plant species
   c. Natural disturbances and frequency
   d. Percent remaining
   e. Primary Stressors
3) Central Mixedgrass Prairie
4) Sand Prairies
5) Western Mixedgrass Prairie
6) Wet Meadows
7) Questions and Discussion
8) Prairie Management
   a. Disturbances (climate, fire, grazing)
   b. Diversity and Heterogeneity
   c. Principles of Management
      i. manage competition between plants
      ii. avoid repetition
      iii. Importance of defoliation in managing competition
   d. Examples of management strategies and regimes
   e. Invasive species: what is an invasive species and general approaches to their control
   f. Questions and Discussion
9) Introduction to Plant Identification
   a. The plant kingdom
   b. Nebraska’s floral diversity
   c. Flower parts and structure
   d. Flower types
   e. Leaf types and shapes
   f. Monocots and dicots
   g. Learning plant family patterns
      i. mustards
      ii. gooseberries
      iii. asters
      iv. lilies
v. grasses
vi. sedges
vii. rushes
h. Keys and references
i. Questions and Discussion

10) Prairie Walk
   a. Hands-on plant identification and management discussion
Nebraska Woodlands:

Developed by, Sandy Benson, Nebraska Forest Service, University of Nebraska-Lincoln

Objectives

To understand the basic ecology of woodlands using the woodlands of the Niobrara Valley Preserve as a model. General information in this section, which will be discussed in the classroom and as we visit field locations, will include:

Outline

1. Woodlands of Nebraska: Historic distribution (evidence from soil and trees) and current trends.
2. Functions of Forests
   a. Private lands
   b. Nebraska Forest Service
4. Basics of woody plant anatomy (use tree cross-section to describe): Bark, xylem, phloem, vascular cambium and cork cambium.
   a. Xylem: Located at center of trees. Conducts water and dissolved nutrients up the tree stem from the roots.
      • Sapwood - physiologically active, water and nutrient movement, carbohydrate storage. Water flow through the xylem is driven by transpiration (loss of water from leaves pulls water molecules up through the xylem)
      • Heartwood - non-living portion of the xylem. Contains higher levels of tannins & phenols, provides for structural support.
   b. Phloem: Located under the bark of the tree; transfers carbohydrates, hormones, etc. from the leaves downward and throughout the tree stem and roots.
   c. Vascular cambium: Located between xylem and phloem, it is the source of cells for both inward cell development towards the pith at the center of the tree stem (xylem) and outward cell development under the bark (phloem).
   d. Cork cambium: Located outside the phloem, cork cambium makes cells that form the bark of woody plants.
5. Forest Ecology:
   a. Woodland ecosystems
   b. Ecological succession:
      • Pre-European settlement woodlands and ubiquitous change: fire, drought, environmental variability, landscape heterogeneity, etc.
      • Post-European settlement impacts and ubiquitous change (more, but different, ecological succession)
   c. Forest Stands
      • Species
• Even-aged vs. uneven-aged

d. Effects of site on trees
  • Climate/Weather (temperature, wind, humidity, precipitation)
  • Slope, Aspect, Elevation
  • Soils/Drainage (parent material, particle sizes, porosity, position on slope, soil organisms, water table)

e. Plant tolerance
  • Fire, shade, competition
  • Allelopathy

f. Impacts of trees on site and other vegetation

g. Disturbances
  • Drought
  • Fire
  • Avalanches, floods, etc.
  • Insects/Disease
  • Human impacts (land use changes, forest management, lack of management)

h. Plants as environmental indications of history and environmental conditions.

6. Silvicultural Treatments and Forest Measurements

a. Why measure forests?

b. Silvicultural prescriptions and treatments

c. Forest inventory and timber cruising

d. What do we measure?

  (1) Environmental Measurements (and why they are important)
    • Soil (texture, profile, infiltration rates, temperature, moisture)
    • Air (temperature, humidity, wind)

  (2) Stand Measurements (visual assessment)
    • Forest type (dominant and co-dominant species)
    • Aspect, slope, elevation
    • Fire history
    • Stand dynamics from age class structure

  (3) Population Measurements (individual tree measurements)
    • Age, diameter, height, form/defects, density (basal area), site quality
    • Growth rates (tree-ring width and dynamic environmental conditions)

e. ACTIVITY: Introduce a forester’s “tools of the trade.” Measure individual trees (height, diameter, age) and stand basal area
7. Review, discussion, questions

Background

Background content will be developed by professionals in Nebraska. Currently, this includes content developed by Illinois, Minnesota, and Texas.

References & Resources


Insects of Nebraska: Jessica Jurzenski PhD, Post-Doctoral Research Associate, Entomology Dept. University of Nebraska-Lincoln

Objectives/Goals

The session information and hands-on activities will provide participants with useful knowledge concerning insects. Specifically, a better understanding of Nebraska’s common and rare insects will help participants appreciate the immense diversity of insects and why insects are important to humans.

Expected Outcomes: After completing the Nebraska Insect Session, participants will be able to:

7) Provide examples of insect pests of economic and ecological importance in Nebraska
8) Provide examples of beneficial insects of economic and ecological importance in Nebraska
9) Explain different types of ecosystem services that insects provide
10) Identify differences between insects and other arthropods
11) Recognize several major insect families
12) Describe the state endangered insects in Nebraska

Outline:

I. Classification Concepts
   a. Diversity of Insects*

II. Importance of Insects to Humans
   a. Pests
      i. Food threats
      ii. Habitat destruction
      iii. Human health
   b. Beneficial
      i. Insect-mediated services*
      ii. Pollination
      iii. Biological control
      iv. Nature’s recyclers

III. Invertebrate Identification
   a. Arthropod Classes
   b. Hexapoda (insects)*
   c. Life cycles*

IV. Nebraska’s Endangered Insects
   a. Salt Creek Tiger Beetle
   b. American burying beetle

V. Interesting and Commonly Encountered Insects

VI. Outside Collecting*

*Indicate activity

Background

Background content is being developed by professionals in Nebraska. Currently, this includes content developed by Illinois, Minnesota, and Texas.
Lessons and Activities: Pre-quiz

1) Nebraska’s insect alpha diversity – Participants estimate the number of different species for major groups of organisms (e.g., plants, insects, and mammals). The true number is visualized using strips of paper at a specific scale.

2) Ecosystem services – In self-selected groups, participants come up with the top 4 ecosystem services provided by insects that are beneficial to humans.

3) Identifying arthropod classes and insect orders – Participants are giving a “nametag” that is shown on their back (not visible to the one wearing it). Participants can ask up to 10 questions to determine what kind of organism they are, such as spider, millipede, butterfly or termite.

4) Life cycles – In self-selected groups, participants try to piece together the life cycle and habitats of plastic model insects.

5) Outside collecting – Participants go outside to collect insects. Equipment needed: nets and plastic bags

Post-quiz

Citations


Amphibians, Turtles and Reptiles of Nebraska

Developed by Dennis Ferraro, Herpetologist, University of Nebraska Lincoln

Objectives

- Basic background knowledge of the anatomy, physiology and reproductive biology of amphibians and reptiles.
- Knowledge relating to the behavior and ecology of amphibians & reptiles in various ecosystems.
- Knowledge of the principles for conservation and management of amphibians, turtles & reptiles within local eco-regions.
- A sound understanding of the diversity and ecological significance of amphibians, turtles & reptiles in Nebraska and North America. Describe functions and abilities of amphibians, chelonians and reptiles as keystone species in these ecosystems.
- Recognize and identify Nebraska Herpetofauna.
- Safely find and handle local Herpetofauna for educational purposes.
- An appreciation of herpetology as a dynamic field.

Outline

I. What is Herpetology?

II. What are Herps?
   a. Amphibians
      i. Morphological Evolution
      ii. Characteristics
         1. Integument
         2. Movement
         3. Sense organs
         4. Foraging, Feeding & Digestion
         5. Water balance; freeze tolerance
      iii. Reproductive behavior and strategies
      iv. Nebraska’s Amphibians
         1. Classification
         2. Diversity
      v. Development and larval biology
   b. Reptiles
      i. Morphological Evolution
      ii. Characteristics
1. Integument
2. Movement
3. Sense organs
4. Digestion, venom, feeding behavior
5. Thermoregulation; energies
6. Development (viviparity, TSD)
   iii. Reproductive behavior and strategies
   iv. Nebraska’s Reptiles
      1. Classification
      2. Diversity
c. Herp Defenses and Escape Behavior
d. Population and Community Ecology
III. Function and Values: Why are herps important?
   a. Amphibians as Indicator Species
   b. Amphibian Decline
IV. Conservation Efforts
   a. Herpetofauna Conservation Biology
   b. Herpetofauna as Invasive Species and their Management
V. What you can do to help
VI. ACTIVITY: Lab and Field Study
   a. External diagnostic features, Measurements
   b. Field Techniques & Data
c. Nebraska Herpetofauna Identification
      i. Amphibians (14)
      ii. Frog calls
      iii. Turtles (9)
      iv. Lizards (10)
      v. Snakes (29)
Birds of Nebraska:

Developed by, Clem Klaphake, Nebraska Master Naturalist

Objectives: Below are some examples of Objectives for this Session. This Session should give the participant a basic understanding of.

13) Master Naturalists will learn how to use binoculars & begin to identify common birds of Nebraska.
14) Master Naturalists will learn how bird banding is done and its purpose.
15) Master Naturalists will learn about bird adaptations, flight, environmental adaptations & morphology.

Birds of Nebraska Outline

I. Bird Pieces and Parts

II. Hike/Bird Banding:
   a. Half the group birds outside
      i. learn how to use binoculars
      ii. where to find which bird
      iii. how to use field guides
      iv. how to look at a bird
   b. Half the group learns and observes bird banding
      a. MAPS program
      b. Mist netting
      c. Aging/sexing
      d. Bird adaptations
      e. Attracting Winter Birds
      f. Birds and People
      g. Ornithology
      a. Bird Pieces and Parts
      b. Bird Banding
      h. How to use a field guide
      a. Photo quiz
      i. How to use binoculars
      j. Birding
a. Bird song and birding by ear

**Resources and Locations in Nebraska**

- [http://ne.audubon.org/](http://ne.audubon.org/) : Nebraska Audubon
- [http://projectbeak.org/](http://projectbeak.org/) : Project BEAK is an interactive, web-based curriculum that contains scientifically accurate information about avian conservation, avian form, function and other adaptations that help birds survive, Nebraska’s unique avian biodiversity, Nebraska’s threatened and endangered birds, plus video clips, interactive games, quizzes and diagrams, additional resources and links, and classroom lesson plans
- [http://www.nebraskabirdingtrails.com/](http://www.nebraskabirdingtrails.com/) : "Promoting the conservation of Nebraska’s birds and bird habitats through economic development"
- [http://www.bbne.org/](http://www.bbne.org/) : Bluebirds Across Nebraska! Our mission is to increase the population of bluebirds and other native cavity-nesting birds through the promotion of bluebird awareness among concerned citizens.
- [http://nebraskabirdlibrary.org/](http://nebraskabirdlibrary.org/) : This website is devoted to helping Nebraskans and visitors identify and learn about the over 400 species of birds which can be found in our state.
- [http://www.nebraskametrobirding.com](http://www.nebraskametrobirding.com) : Birding in Omaha & Lincoln
- [http://www.noubirds.org](http://www.noubirds.org) : Nebraska Ornithologist Union
- [http://www.wildbirdhabitatstore.com](http://www.wildbirdhabitatstore.com) : Wild Bird Habitat is a locally owned and operated independent backyard bird feeding center
Mammals of Nebraska:
Developed by, Mike Schrad, Nebraska Master Naturalist

Objectives:

Master Naturalists will understand: Mammal Characteristics; what makes mammals different than other orders of vertebrates

Outline:
Mammal Taxonomy: Master Naturalists will be exposed to basic concepts of mammalian taxonomy as it pertains to species in Nebraska. This will be concurrent with the discussion of the species of mammals in Nebraska and will go over general systematic procedures (species nomenclature, hybridization, extinction, etc.). We will also go over how to use a Dichotomous Key.

Mammalian Fauna of Nebraska: The student will be presented with a discussion of the mammal species found in Nebraska. This will include:

- A discussion of the species and their distribution in the state
- The habitat(s) it uses or may have used in some cases
- Items of interest for a naturalist which may vary with each species
- The “status” of the species as measured by The Nebraska natural Legacy Project, Natureserve, or other status ranking organizations.

Lessons and Activities

- Live trapping
- Dichotomous Key: The students will be placed into small groups and asked to prepare a Dichotomous Key on five species of Nebraska Mammals. (The objects of the Key will be either taken from photographs or the mammal trunk provided by NGPs.
- Fur / Hair Exercise: The students will be in small groups which will be provided samples of hair/fur/pelts and asked to describe the critter that produced it.
- Class Project: The students will be in small groups and asked to outline the group’s idea for a “Class Project” using mammals as a theme.
- Man in the Environment question: In small groups the students will be asked to discuss and then present the group’s findings on two photos, one depicting a prairie dog town the other showing the skyline of Omaha. The question that will be asked is – “Is there any difference between the two?

Resources and Locations in Nebraska

- NatureServe
- http://www.natureserve.org
- Animal Diversity Web
- http://animaldiversity.ummz.umich.edu/
- UNL digital commons
- http://digitalcommons.unl.edu/
Geology & Hydrology

Objectives
Below are some examples of Objectives for this Session. This Session should give the participant a basic understanding of:
1) Nebraska’s geologic setting and geologic principles associated with the determination of that setting,
2) Nebraska’s sedimentary and fossil records,
3) How geologic processes shaped Nebraska’s landscapes, and
4) How geology impacts everyday life in Nebraska.

Outline

THE GEOLOGY OF NEBRASKA
1. Introduction to Geology
   i. Origin of Our Planet
   ii. Geologic Time Scale
   iii. Minerals, Rocks, and the Rock Cycle
   iv. Earth’s Internal Structure and Plate Tectonics
2. Nebraska as a Sample of Planet Earth
   i. Nebraska’s Geologic Setting
3. Regional Geologic Structure and Tectonics
4. Sea-Level over Geologic Time
5. Three Layers: Basement, Sedimentary Cover, and Surficial Geologic Materials
6. ACTIVITY: Very brief familiarization with rock types
   i. Nebraska’s Landscape
7. Evidence for Change over Geologic Time in Nebraska.
   i. Local to Regional Geologic Record (and its gaps)
   ii. Ancient Oceans and Marine Life in Nebraska: the Pennsylvanian and Cretaceous Periods
8. ACTIVITY: Describing and interpreting a core through sediments or sedimentary rocks
   i. Three-Hundred Million Years of Rivers and Landscapes in Nebraska
   ii. Ancient Rivers of the Pennsylvanian Period (Indian Cave Sandstone)
   iii. Ancient Rivers of the Cretaceous Period (Dakota Formation)
   iv. Platte River and its Predecessors
   v. Missouri River
   vi. Nebraska’s Fossil Record: From Microbes to Mammals
9. ACTIVITY: Examination of fossils from Nebraska
   i. Effects of Distant Mountain-Building and Global Changes
   ii. Nebraska and Plate Tectonics
   iii. Ancient Climates and Related Effects
.iv. Effects of the Ice Ages

10. Till and Loess Deposits

11. The Sand Hills and other Dunes
12. Societal Relevance of Geology
   i. Nebraska’s geologic resources
13. Groundwater (including the High Plains Aquifer)

14. Soils
15. Industrial Minerals
16. Fuel Resources
17. Gemstones
   i. Geology and Culture in Nebraska
   ii. The Big Picture: Geology and Humankind

V. Places to Go (places to see examples of Nebraska geology)
   a. Agate Fossil Beds National Monument: Lower Miocene fossil mammal site including abundant body fossils of ancient mammals and prominent fossil rodent burrows
   b. Ashfall State Park: Upper Miocene fossil mammal assemblage found in ash derived from an eruption of a predecessor to the Yellowstone volcanic field
   c. Chimney Rock National Historic Site: Oligocene and Lower Miocene continental sedimentary rocks deposited as sediments by wind and steams
   d. Hummel Park (Omaha): outcrops of Pleistocene glacial till and loess
   e. Lincoln area: Capitol Beach Lake and history of saline waters and salt industry, flooding history of Antelope and Salt creeks, building stones in downtown area, brick industry, University of Nebraska State Museum
   f. Louisville area: outcrops of Upper Pennsylvanian marine sedimentary rocks
   g. Valentine area and Niobrara National Wildlife Refuge: Niobrara River Canyon and Cenozoic stratigraphy
   h. Niobrara State Park: Upper Cretaceous marine sedimentary rocks (Niobrara Formation and Pierre Shale), landslides along Missouri River, anthropogenic changes in Missouri River, Niobrara River, and Mormon Canal
   i. Downtown Omaha: removal of loess from hills in downtown area, engineering of Missouri River (e.g., groins, bank armoring, etc.) visible at Bob Kerrey Memorial Bridge, deep bedrock water wells at old industrial sites
   j. Platte River State Park: Upper Pennsylvanian marine sedimentary rocks and overlook of Platte River
   k. Ponca State Park: Upper Cretaceous marine sedimentary rocks (uppermost Dakota Formation through Greenhorn Limestone)
   l. Rock Creek State Historical Park: middle Cretaceous Dakota Formation—fluvio-estuarine continental deposits
   m. Schramm Park: Upper Pennsylvanian marine sedimentary rocks
   n. Scotia and Happy Jack Chalk Mine: Upper Miocene lake deposit In Ogallala Group
   o. Scotts Bluff National Monument: Oligocene and Lower Miocene continental sedimentary rocks deposited as
sediments by wind and steams

p. Smith Falls State Park: Cenozoic stratigraphy, Niobrara River, waterfalls as knick points

q. Toadstool Park and nearby areas: continental sedimentary rocks of upper Eocene Chadron Formation; Pine Ridge escarpment, Trailside Museum and Ft. Robinson State Park

r. Weeping Water area: Upper Pennsylvanian marine sedimentary rocks

s. Wildcat Ridge/Hills: escarpment on Oligocene and Lower Miocene continental sedimentary rocks, deeply eroded into canyons, buttes, and pinnacles by stream erosion during and after the Late Pliocene

t. Indian Cave State Park and Iron Horse Trail south of Peru: Upper Pennsylvanian Indian Cave Sandstone (fluvio-estuarine deposit) and sandstone cave

Lessons and Activities

1. Very brief familiarization with rock types
2. Describing and interpreting a core through sediments or sedimentary rocks
3. Examination of fossils from Nebraska
Human Dimensions:

Developed by Shannon Moncure, University of Nebraska Lincoln

Objectives:

This Session should give the participant a basic understanding of:

16) The connection of humans with every aspect of Natural Resources management
17) The need to dig deeper than positions, behaviors or statements when working to understand people in relation to natural resources and the environment
18) The roles ethics and values play in decisions related to natural resources
19) The impact that ethics and values have on managing common resources

Outline:

1) So, What Is “Human Dimensions?”
   a) How and why humans value natural resources,
   b) How humans want resources managed, and
   c) How humans affect or are affected by natural resources management decisions
2) Human Dimensions of Natural Resource Management Include…
   a) Driving forces
   b) Human behavior
   c) Effects of change
   d) Management strategies
3) How Can Human Dimensions Be Approached?
   a) Psychology
   b) Sociology
   c) Religious Studies
   d) Anthropology
   e) Economics
   f) Political Science
   g) Ethics
   h) Law
   i) Resources Management
   j) Ethics and Natural Resources
4) Ethical Question
   a) Your farm uses water from the Republican River for irrigation. Because of the compact with Colorado and Kansas, all farmers along the river have to reduce their water use. You know that you need 100 cubic feet of water to get the best crop yield. However, you are only allowed 90 cubic feet. It is unlikely that anyone would know if you used the extra 10 feet of water.
   
b) Do you use the extra water?
   c) What VALUES might impact this decision?

5) Values = qualities or standards we believe to be important, that help us form personal beliefs about what is good, just, right and wrong, moral and immoral.

6) Thinking about Values

7) How Might We Value Nature?
   a) Ecocentric Values
      i) Valuing nature for its own sake
      ii) Not focused on value to humans (only)
      iii) Systems-based – focuses on the biotic community as a whole
   b) Anthropocentric Values
      i) Valuing nature for the material and physical benefits to humans
      ii) Often focused on parts of nature, rather than natural systems
      iii) Can be used as reasoning for protecting nature

8) Values of Wildlands
   a) Goods and Services
      i) Goods = marketable products and use/enjoyment
      ii) Forest products, minerals, recreation, etc.
      iii) Services = ecosystem functions
      iv) Absorption and breakdown of pollutants, cycling of nutrients, fixation of solar energy
   b) Types of Values
      i) Scientific
      ii) Therapeutic
      iii) Biodiversity
      iv) Recreational
      v) Symbolic and cultural identity
      vi) Aesthetic
      vii) Inherent worth
      viii) Market issues
9) But How Are Values Built?
10) Behavioral Change: Connected to Values and Other Aspects of Human Nature
11) How Expansive Is Your “Tribe?”
12) Connection Between Outdoor Experiences and Stewardship
13) Personal connections and positive attitudes may result from direct experience
14) Activity: The Rancher’s Dilemma
15) Example: Farmers who empathize with downstream water users are more likely to use conservation farming practices.
16) Review and Evaluation

**Lessons and Activities**

Ethical Question – During this activity, participants will work independently and in small groups to answer an ethical question related to agricultural water use in Nebraska. This will serve as a starting point for a discussion about the values that inform people’s actions related to natural resources, and the need for a Master Naturalist to consider such determinants of behavior while interacting with people with diverse values and beliefs in Nebraska.

Rancher’s Dilemma – This large group activity will serve as a format through which to discuss the classic Tragedy of the Commons, considering individual vs. common good in the context of the agricultural use of grasslands.

**Evaluation**

Participants will answer the following prompts individually, in writing. If time permits the participants will discuss their responses in a large group.

Write about the following:

1. The values that lie under your environmental attitudes and behaviors
2. The situations in which you may encounter people with differing values
3. How you could address those situations