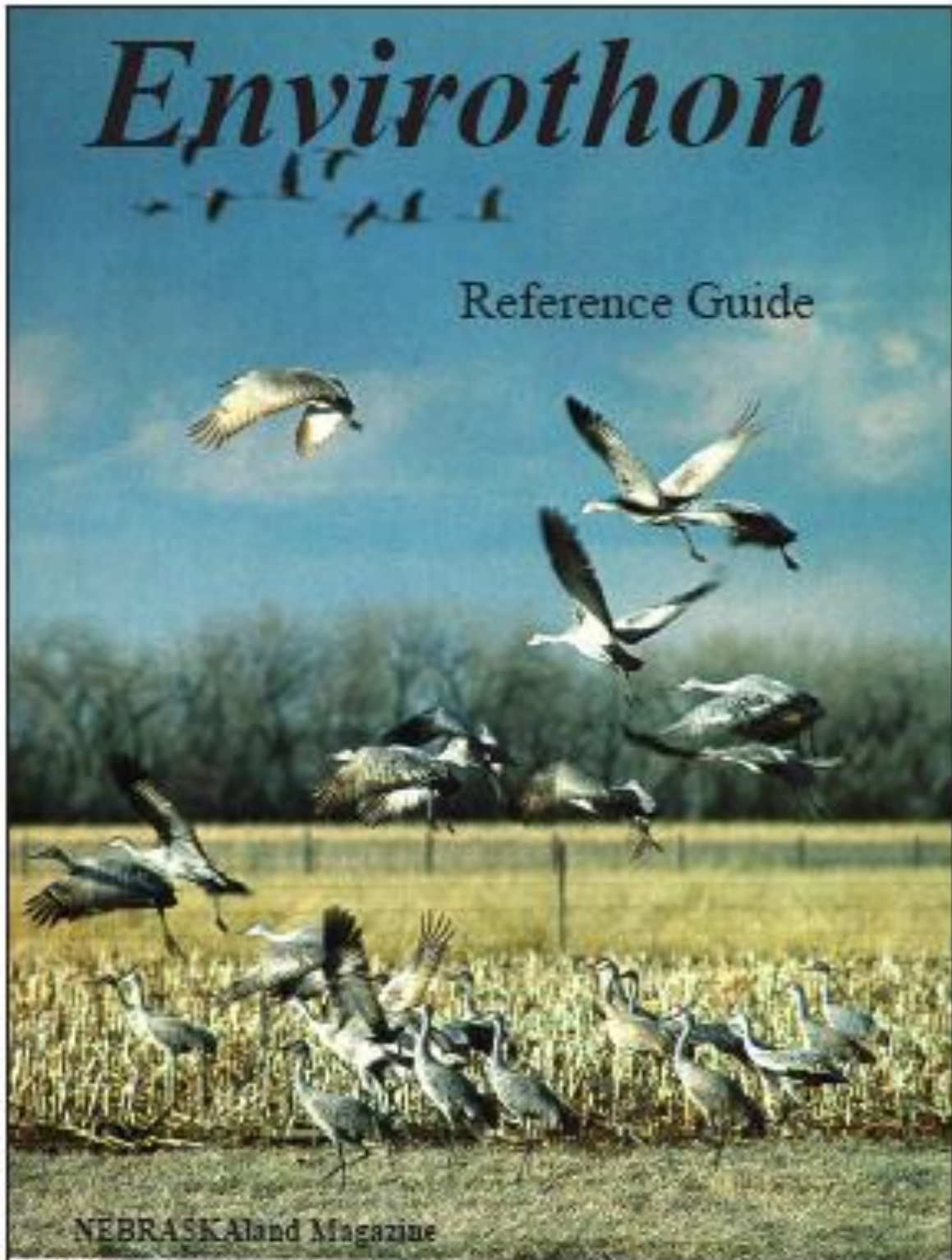


Nebraska 2012



policy range aquatics soil forestry wildlife

Getting Started

- What is Envirothon?
- How to use this guide.
- Directories and Maps

Subjects

- Policy with sample questions
- Range with sample questions
- Aquatics with sample questions
- Soils with sample questions
- Forestry with sample questions
- Wildlife with sample questions
- Special Topic- 2011 Salt and Fresh Water Estuaries

FOR MORE INFORMATION CONTACT

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Website www.nrdnet.org

How to use this Guide

Step 1: Quickly skim through the entire guide to get a feel of the information included.

Step 2: Start with the first objective in the section you are studying and:

- a. Read the objective and understand what it is asking you.
- b. Next begin to search for information using the references provided and any other materials and sources you have available. The internet is a great source of information, so try doing a search on your topic.
- c. Jot down notes as you go.
- d. Don't spend too much time on one subject that you can't get to another.
- e. If you get frustrated with a topic, move on to the next and come back to it later. You may discover information on it while you are searching for other things.
- f. This is a group effort, so work together. Two brains are better than one.
- g. Share information and divide up the work load.
- h. Your local Natural Resources Districts and other agencies are always willing to help. Explore your options and use every available resource.
- i. Look up terms you don't understand and jot down their meanings.
- j. Remember, make good notes that you can come back to later and still understand.

Step 3: Look over the sample questions and quiz yourself. Answers are located at the back of the section. Make new questions on flash cards. Make each objective a question and answer it with as many details as you can.

Step 4: Have fun with it. This guide provides a lot of useful information that can be very difficult to understand at times so don't be afraid to ask questions. Work together and follow these steps.

Check out your local Natural Resource

**Central Platte NRD**

215 N Kaufman Avenue
Grand Island, NE 68803
308/385-6282 Fax
308/385-6285
www.cpnrd.org

Lewis & Clark NRD

Box 518 Hartington,
NE 68739 402/254-
6758 Fax 402/254-
6759

Little Blue NRD

Box 100 Davenport,
NE 68335 402/364-
2145 Fax 402/364-
2484
www.littlebluenrd.org

Lower Big Blue NRD

805 Dorsey Street Beatrice, NE
68310 402/228-3402 Fax
402/223-4441 www.lbbnrd.org

Lower Elkhorn NRD

PO Box 1204 Norfolk, NE 68701-
1204 402/371-7313 Fax 402/371-
0653 www.lenrd.org

Lower Loup NRD

PO Box 210 Ord,
NE 68862
308/728-3221 Fax
308/728-5669

Lower Niobrara NRD

PO Box 350 Butte, NE
68722-0350 402/775-
2343 Fax 402/775-
2334

Lower Platte North NRD

PO Box 126 Wahoo, NE 68066
402/443-4675 Fax 402/443-5339
www.lpnrd.org

Lower Platte South NRD

PO Box 83581 Lincoln, NE 68501
402/476-2729, Fax 402/476-6454
www.lpsnrd.org

Lower Republican NRD

Box 618 Alma, NE
68920 308/928-
2182 Fax 308/928-
2317

Middle Niobrara NRD

526 East 1st Street
Valentine, NE 69201
402/376-3241 Fax
402/376-1040

Middle Republican NRD

Box 81 Curtis, NE 69025 308/367-
4281 Fax 308/367-4285
www.mrnrd.org

Nemaha NRD

125 Jackson Street Tecumseh,
NE 68450 402/335-3325 Fax
402/335-3265
www.nemahanrd.org

North Platte NRD

Box 36 Gering, NE 69341
308/436-7111 Fax 308/436-2452
www.npnrd.org

Papio-Missouri River NRD

8901 South 154th Street Omaha,
NE 68138-3621 402/444-6222
Fax 402/895-6543
www.papionrd.org

South Platte NRD

PO Box 294 Sidney, NE 69162
308/254-2377 Fax 308/254-2783
www.spnrd.org

Tri-Basin NRD

1308 2nd Avenue Holdrege, NE
68949 308/995-6688 Fax 308/995-
6992 <http://tribasinrd.org>

Twin Platte NRD

PO Box 1347 North Platte, NE
69103-1347 308/535-8080, Fax
308/535-8207 www.tpnrd.org

Upper Big Blue

105 Lincoln Avenue York, NE
68467 402/362-6601 Fax 402/362-
1849 www.upperbigblue.org

Upper Elkhorn NRD

301 North Harrison Oneill, NE
68763 402/336-3867 Fax 402/336-
1832 www.uenrd.org

Upper Loup NRD

PO Box 212
Thedford, NE 69166
308/645-2250 Fax
308/645-2308

Upper Niobrara-White NRD

430 East 2nd Street Chadron, NE
69337 308/432-6190, Fax
308/432-6187
www.unwnrd.org

Upper Republican NRD

135 West 5th Street Imperial, NE
69033 308/882-5173, Fax
308/882-4521
<http://www.urnrd.org>

**Nebraska
Association of
Resources District**

601 So. 12th St., Suite
201 Lincoln, NE 68508
471-7670. Fax 471-7677
www.nrdnet.org

Nebraska Game and Parks District Offices

District	Address	City	Phone
1 - Alliance	299 Husker Road, P.O. Box 725	Alliance, NE 69301-0725	(308) 763-2940
2 - Bassett	524 Panzer St., P.O. Box 508	Bassett, NE 68714-0508	(402) 684-2921
3 - Norfolk	2201 N. 13th St.	Norfolk, NE 68701-2267	(402) 370-3374
4 - North Platte	301 E. State Farm Rd.	North Platte, NE 69101-0430	(308) 535-8025
5 - Lincoln	2200 N. 33rd St., P.O. Box 30370	Lincoln, NE 68503-0370	(402) 471-0641
6 - Kearney	1617 First Ave.	Kearney, NE 68847-6057	(308) 865-5310
Omaha	1212 Bob Gibson Blvd.	Omaha, NE 68108-2020	(402) 595-2144
Ak-Sar-Ben	21502 W. Hwy 31	Gretna, NE 68028-7264	(402) 332-3901

Nebraska Forest Service

103 Entomology Hall
P.O. Box 830815
Lincoln, NE 68583-0815
402-472-2944
402-472-2964 (FAX)

Policy

Information Provided By:
Nebraska Department of Natural
Resources: Kevin Schwartman



policy range aquatics soil forestry wildlife

Did you know that our government creates laws and policies to protect our natural environment? Could you imagine living in a world that did not respect Mother Nature? It's unimaginable that someday your children wouldn't be able to see the beauty of nature that we have come to know as our natural resources.

Here in Nebraska.....

Natural resources and land use policies are created to protect our valuable natural resources. Such policies help ensure that the benefits of those resources will be available for future generations. Policy and land use issues are difficult to research because natural resources policies, issues, and related legal framework change from year to year. Keeping up with these changes can be challenging, even for conservation professionals.

Keeping up with the environmental and land use policies can be very challenging. However, it is very important to understand new and existing policies so you can better serve yourself, your neighbors, community, town, state, nation, and even your world. By learning about these policies you will become a better citizen who will be able to "tip the scales" with knowledge on environmental and land use policies.

Policy

Objective 1

- Understand the role local, state, and federal natural resources agencies have in implementing and creating policy.
- Students must understand funding and development of conservation practices, research, collection and storage of natural resources data, providing education and technical support, developing and enforcing regulations.

Objective 2

- Describe geography and land use:
 - Current policies regarding land ownership and water rights
 - Land and water use, crop types and irrigation use in Nebraska
 - Agrichemical use and its effect on crop production and the environment.
 - Environmental problems and opportunities in Nebraska.
 - Place and names of major rivers, lakes, and geographic regions on a map and describe the function of specific rivers and lakes along with historical significance.
 - Know history of resources use in Nebraska.

Objective 3

- Show up-to-date knowledge on the following:
 - Current land and water use laws and their effects
 - Historical significance of natural resources law and current bills
 - Historical figures who played an important role in development and conservation of Nebraska's natural resources
 - Plants and animals protected in Nebraska by the Endangered Species Act
 - The function of wetlands and current policies regarding the regulation and protection of wetlands
 - Regulatory issues

Practice Exercises

Exercise 1

Contact a representative from your local Natural Resources Districts:

- Discuss policies and their effects on natural resources management and usage
- Discuss local environmental problems and the policies used to control and correct these problems
- Discuss how the role of the local, state, and federal government differs in regard to natural resources

Exercise 2

Check out the "Administration/Legal" links on the Nebraska Department of Natural Resources website (<http://www.dnr.state.ne.us/docs/adminlegal.html>). Note links to the Wyoming and Kansas legal settlements, LB962 Website, and the legislative update (now located on the NARD website). Note the bills and legislation related to natural resources. Check periodically to see if any action has been taken on specific bills, especially those that have been covered by the news media.

Exercise 3

Read and clip out newspaper and magazine articles on land use and policy issues. Keep a scrapbook to use as a study resource. Useful articles can often be found in the Omaha World-Herald and the Lincoln Journal-Star. Magazines such as Nebraska Farmer and Nebraskaland are also good sources of information. Many government agencies and some private organizations publish newsletters that describe their programs and current projects, policy, and land use issues; and some cover natural resource legislation.

Become familiar with the basic roles of various government agencies. Many agencies have websites that are an excellent source of information about what role the agencies have and what services they provide (many can be accessed through the Nebraska Department of Natural Resources website). Most agencies also have brochures or publications that describe their functions. Some of the agencies involved in natural resources work include:

- Bureau of Land Management (BLM) <http://www.blm.gov>
- BLM Facts page <http://www.blm.gov/nhp/facts/index.htm>
- Bureau of Reclamation (BOR) <http://www.usbr.gov>
- BOR Dataweb, information on projects <http://www.usbr.gov/dataweb/>

- Environmental Protection Agency (EPA) <http://www.epa.gov>
- Nebraska Natural Resources Conservation Service (NRCS) <http://www.ne.nrcs.usda.gov>
- United States Army Corps of Engineers (COE) <http://www.usace.army.mil>
- United States Geological Survey (USGS) <http://www.usgs.gov>
- Nebraska Department of Agriculture <http://www.agr.state.ne.us/>
- Nebraska Department of Environmental Quality (NDEQ) <http://www.deq.state.ne.us>
- Health and Human Services System (HHR) <http://www.hhs.state.ne.us/>
- Nebraska Department of Natural Resources (NDNR) <http://www.dnr.state.ne.us/>
- Water Task Force <http://www.dnr.state.ne.us/watertaskforce/watertaskforce.html>
- University of Nebraska <http://www.unl.edu>
- Conservation & Survey Division (CSD) <http://csd.unl.edu/>
- National Association of Resource Districts <http://www.nrdnet.org/>

Sample Questions

1. What U.S. Government agency collects and evaluates surface water, groundwater and groundwater quality data in order to aid in defining hydrologic systems?
 - a. The U.S. Geological Survey
 - b. The U.S. Army Corps of Engineers
 - c. The Environmental Protection Agency
 - d. The Bureau of Reclamation
2. Nebraska has the _____ highest acreage of irrigated land in the United States?
 - a) First
 - b) Second
 - c) Third
 - d) Fifth
3. Nebraska Sandhill streams are fed by the High Plains Aquifer and baseflow from water infiltrating the sandy soil. These streams are most noted for:
 - a) high levels of erosion
 - b) intensive crop development throughout the basin
 - c) the high levels of overland runoff contributing to the system
 - d) its relatively steady level of flow
4. Which of the following factors is generally not used in defining a wetland?
 - a) Wildlife
 - b) Soils
 - c) Vegetation
 - d) Hydrology
5. As the Father of Arbor Day, this editor, farmer, Nebraska territorial secretary and U.S. Secretary of Agriculture helped found an “environmental” holiday in 1872. He noted “other holidays repose upon the past. Arbor Day proposes for the future.” He was:

- a) J. Sterling Morton
- b) Robert Furnas
- c) William Jennings Bryan
- d) Dr. Mathew Ricketts

6. Infant methemoglobinemia or “Blue Baby” syndrome can result from:

- a) Consumption of high levels of atrazine by infants.
- b) Breathing of high levels of particulates by infants.
- c) Consumption of high nitrate water by infants.

Reference Materials

Nebraska Groundwater Policy and Water Use: The Great Plains Symposium, 1998: The Ogallala Aquifer “Determining the Value of Water”, March 10- 12, 1998, Gaul, Steve, 1998, Edited by Lori Triplett, pp. 126-129.

Nebraska Soil and Water Conservation Strategy; Nebraska Natural Resources Commission, 1991, 1990 update, 34 pages.

Estimated Water Use in Nebraska, 1995; Nebraska Natural Resources Commission, 1998, in cooperation with the U.S. Geological Survey, 64 pages.

Science for a Sustainable Future of the Grain Plains: Water- Quality Assessment in Central Nebraska; U.S. Geological Survey, 1996, NAWQA Program

Water-Level Changes in the High Plains Aquifer, 1980 to 1995; U.S. Geological Survey, 1997, U.S.G.S. Fact Sheet FS-068-97.

Flat Water: A History of Nebraska and Its Water; LTNL Conservation and Survey Division, 1993, Resource Report No. 12, 292 pages

answers: a, b, d, a, a, c

Range

Information Provided By:
Chuck Butterfield, Chadron State
College



policy **range** aquatics soil forestry wildlife

Did you Know that:

Rangeland is a type of land that supports different, uncultivated vegetation types that can provide the necessities of life for both native and domestic herbivores in a sustainable fashion. Range management is a synthesis discipline that draws from many different areas such as wildlife, soils, botany, ecology, aquatic biology, physiology, entomology, forestry, systematic, hydrology, GIS/RS, animal science, and others. It is not as it is often times portrayed, just for cows!

- Rangeland occupies approximately 51% (16.6 Billion acres) of the earth's surface.
- One billion acres of rangelands, pastures, and woodlands exist within the United States.
- Within Nebraska, rangelands account for 48% or 23.9 million acres of the state's land area.

Objective 1 Range Resource

Principles:

- Understand the important uses and needs of rangeland in Nebraska.
- Understand major range ecosystems and plant associations in Nebraska.
- Know some of the legislation affecting maintenance and use.
- Keep up with current range issues

Try out these activities

- 1) Determine how much of the US and Nebraska is considered to be rangeland. Also, look for information on the health of these rangelands, what makes them unique and their uses
- 2) Look at vegetation and soils maps of Nebraska and determine what plants and plant groups occur within the state. Determine if there is a relationship to the soils, and to land uses past and present.
- 3) Read your local and state newspapers, magazines, and newsletters to learn about current rangeland issues. Look at the Nebraska Legislature's home page to learn about any pending legislation that affects rangeland uses.

Sample Questions

- 1) On abandoned fields in Nebraska, a manager would expect to find which of these types of vegetation growing? annual forbs, annual grasses, shrubs, or perennial grasses?
- 2) Range site classification is based on? soils, climate, topography, or combinations of all?
- 3) On shortgrass prairie heavy grazing will result in? warm season or cool season grasses?
- 4) How many square feet are in an acre?

Reference Material

- Stubbendieck, J. and P.E. Reece. 1992. Nebraska Handbook of Range Management. Nebraska Coop. Ext. Serv. Circular EC 92-124-E.
- Nichols, J.T., and P.N. Jensen. 1998. Range Judging Handbook.. Nebraska Coop. Ext. Serv. EC 98-150-F.

- Barbour, M.G., and W.D. Billings. 1988. North American Terrestrial Vegetation. Cambridge University Press. New York.
- <http://csd.unl.edu/csd/pubcatalog/framepub.htm> (Conservation and Survey Division, UNL)
- <http://www.unicam.state.ne.us/index.htm> (Nebraska Legislature)
- Local newspapers, Omaha World Herald, and the Lincoln Journal Star
- Natural Resources Conservation Service at your local Farm Service Center, Native Vegetation Map of Nebraska: Kaul, R.B., and Rolfsmeier, S.B.-Conservation and Survey Division, UNL.

Objective 2 Range Plants

Principles:

- Classification, description, and distribution
- Plant morphology
- Value as feed/habitat for livestock and wildlife
- Poisonous plants (recognition)
- Identification of range plants

Try out these activities

- 1) Find out how plants are classified and described both for their names and for grouping. What influences the distributions of these plants? Climate, soil, topography etc.
- 2) Plants all have specific ways in which they grow and reproduce. Learn how this happens and how plants are influenced by herbivores.
- 3) Determine the suitability of plants for their value or detriment as forage and habitat for both livestock and wildlife. How does their use influence their value?

Sample Questions

- 1) A vegetation type that extends over a large area, is termed a? physiognomy, physiography, life form or biome?
- 2) Which of the organelles below are most commonly associated with the exchange of genetic material? golgi bodies, nucleus, mitochondria, or vacuole?
- 3) In a rangeland condition, which plant below would be considered an invader? annual sunflower, smooth brome, little bluestem, or blowout grass?

Reference Material

- Barbour, M.G., and W.D. Billings. 1988. North American Terrestrial Vegetation. Cambridge University Press. New York.
- Stubbendieck, J., S. L. Hatch, and C.H. Butterfield. 1995. North American Range Plants. University of Nebraska Press, Lincoln.

- Stubbendieck, J., J.T. Nichols, and K.K Roberts. 1985. Nebraska Range and Pasture Grasses. University of Nebraska Cooperative Extension Service Circular EC 85-170.
- Stubbendieck, J., J.T. Nichols, and C.H. Butterfield. 1989. Nebraska Range and Pasture Forbs and Shrubs. University of Nebraska Cooperative Extension Service Circular EC 89-118.
- Kingsbury, J.M. 1964. Poisonous Plants of the United States and Canada. Prentice-Hall Inc. Englewood Cliff, NJ.
- Heath, M.E., D.S. Metcalf, and R.F. Barnes. 1973. Forages. Iowa State University Press, Ames.
- Society for Range Management. 1996. Wildland plants: physiological ecology and developmental morphology. Society for Range Management, Denver, Co.

Objective 3 Range Ecology

Principles:

- Plant succession, climax, ecological thresholds
- Role of livestock and wildlife in the ecosystem
- Water, mineral, energy flow
- Role and effects of fire in range ecosystems
- Range sites (recognition and description)
- Vegetation measurements
 - Definitions, how to measure, and calculations
 - Frequency
 - Density
 - Yield
 - Ground Cover

Try out these activities

- 1) Develop a sound knowledge of both the biotic and abiotic portions of the ecosystem and understand their interconnectedness. Fire and man are all part of this system and are often left out of the concept of an ecosystem that interact. To be a good land steward, a manager must understand these interactions and the consequences of an ecosystem's mismanagement.
- 2) To successfully manage an area, the manager must know what plants occur within an area and how many there are. Learn about all of the different sampling methods and tools that exist and how they are used to make management decisions.

Sample Questions

- 1) Which of the following are biotic factors of an ecosystem?
 - a) Climate
 - b) microflora and microfauna
 - c) plants
 - d) humans
- 2) The fire triangle for prescribed fire on rangelands include:

- a) fuel, oxygen, slope
 - b) ignition source, fuel, oxygen
 - c) plants, animals, fire oxygen, fuel, heat
- 3) In an ecological context, which plant listed below would be considered an invader?
- a) annual sunflower
 - b) leafy spurge
 - c) western wheatgrass
 - d) blowout grass
- 4) Which form of competition is usually more intense? a) interspecific b) intraspecific

Reference Material

- Barbour, M.G., J.H. Burk, and W.D. Pitt. 1980. Terrestrial Plant Ecology. Benjamin/Cummings Publishing Co., Menlo Park, CA.
- Society for Range Management. Assessment of Rangelands and the Trend of the United States. Denver, CO.
- Bonham, C.D. 1989. Measurements for Terrestrial Vegetation. John Wiley & Sons. New York.
- Society for Range Management. Glossary of Terms Used in Range Management, 2nd Edition. Denver, CO.

Objective 4: Rangeland and the Livestock Industry

Principles:

- Relationship of livestock and rangeland
- Grazing effect on plants
- Range condition or threshold (estimation and calculations)
- Determining stocking rates (calculations)
- Monitoring and adjusting stocking rates.
- Grazing systems and management
- Livestock distribution
- Range improvements (seedling, prescribed burning, weed and brush management, etc.)

Try out these activities

- 1) Determine the relationship that has existed between grazing lands and herbivores and the effect of these relationships on vegetation.
- 2) Rangeland health can be determined in many ways, what are some of the theories that exist, how is rangeland health determined.
- 3) Grazing systems and management seek to solve the problem of animal distribution while maximizing animal production. Learn about all of the different systems and practices that have been employed over the years and the successes and failures.
- 4) Often, people try to “improve” an area for livestock production and wildlife habitat. What are the differing methods employed and how successful are they on the many differing rangeland ecosystems.
- 5) Grazing of public lands by cattle, beef production, and the consumption of red meat are often controversial topics, become familiar with both sides of the argument.

Sample Questions

- 1) The portions of a grass plant that are considered to be available for a grazing animal are?
 - a. Forage
 - b. Herbage
 - c. Standing crop
 - d. Browse
- 2) Grass tetany usually occurs in the _____ when _____ livestock are turned onto rapidly growing, lush pastures.
 - a. Spring; hungry
 - b. Spring; lactating
 - c. Summer; young
 - d. Fall; young
- 3) Stocking rate is expressed in which of the following units:
 - a. Au/kg or au/lb
 - b. Aum/ha or aum/ac
 - c. Au/ha or au/ac
 - d. Kg/ha or lb.ac

Reference Material

- Stubbendieck, J. and P.E. Reece. 1992. Nebraska Handbook of Range Management. Nebraska Coop. Ext. Serv. Circular EC 92-124-E.
- Heitschmidt, R.K. and J.W. Stuth. 1991. Grazing Management: An Ecological Perspective. Timber Press, Portland, OR.
- Holechek, J.L., R.D. Piper, and C.H. Herbel. 1995. Range Management Principles and Practices. Prentice Hall.

Objective 5 Range and the Environment

- Species inhabiting rangeland areas
- Role as habitat and as food
- Management benefiting wildlife, including improvements
- Wildlife/livestock interactions
- Multiple use concept of managing rangeland
- Role of rangeland in environmental protection
 - soil water
 - wildlife
 - streams
 - wetlands
- Effects of human use

Try these activities

- 1) Make a list of the many multiple uses of rangeland and include the concept of coordinated (or integrated) resources management.

- 2) Determine how our uses and perceptions of the uses of rangelands influence management decisions. What are the roles of politics in rangeland management?
- 3) What are some of the rangeland improvement techniques used for the benefit of livestock and wildlife?
- 4) Do livestock and wildlife really compete for resources? If so how? Can one be used to improve an area for the other?

Sample Questions

- 1) Many foresters believe that a large portion of the grasslands that currently comprise over 97 percent of Nebraska should be forests and is a dis-climax situation created by:
 - a. Bison
 - b. Use of fire by "Native Americans"
 - c. Wood gathered by early settlers
 - d. Cattle grazing
- 2) The Pine Ridge Region of northwestern Nebraska is considered by some to be a degraded ecosystem due to?
 - a. Increase in the number of pine trees
 - b. Suppression of fire
 - c. Overgrazing
 - d. All of the above

Reference Material

- Vallentine, J.F. 1971. Range Development and Improvement. Brigham Young, University Press. Provo, UT.
- Heitschmidt, R.K. and J.W. Stuth. 1991. Grazing Management: An Ecological Perspective. Timber Press, Portland, OR.
- Society for Range Management. Grazing land Hydrology Issues: Perspectives for the 21st Century. Denver Colorado
- Society for Range Management. Rangeland Wildlife. Denver Colorado
- Society for Range Management. Coordinated Resource Management Guidelines. Denver, Colorado

Answers:

- 1.1) annual forbs, 1.2) combinations, 1.3) warm-season grasses, 1.4) 43,5602.1) biome,
 2.2) nucleus, 2.3) annual sunflower
 3.1)b,c,&d, 3.2)d, 3.3)d, 3.4)b
 4.1)a, 4.2)b, 4.3)b
 5.1)b, 5.2)d

Aquatics

Information Provided By:
Nebraska Department Environmental
Quality: Terry Hickman



policy range **aquatics** soil forestry wildlife

Plunge into the World of AQUATICS!

Did you know that two atoms of hydrogen plus one atom of oxygen produces a molecule of water or H₂O? Wow!


It is amazing that zillions of these tiny water molecules can fill up a puddle, pond,

Density, composition, physical phase, dissolved oxygen, salinity, alkalinity, temperature, pH, specific conductance, temperature, turbidity, hardness and suspended sediment

lake, river, and all the oceans of the world. Can you believe that something so small is essential for human and animal survival?

Here in Nebraska...

Clean water is one of Nebraska's most valuable resources.

 Sixteen thousand miles of rivers and streams as well as 152,000 acres of lakes provide opportunities for many different uses, such as agriculture, industry, recreation, fish, wildlife, and human consumption.

 The High Plains Aquifer System underlies about 85% of Nebraska and supplies 95% of all groundwater used here.

 Nebraska's groundwater provides 82% of the state with drinking water.

Due to concerns about surface and groundwater quality, it is imperative for people to understand the processes which affect our water system. A knowledge of physical, chemical, and biological interactions will help students understand that there is a "whole world" of water management problems which professionals address daily.

Objective 1: Physical and Chemical Properties

Understanding of the physical and chemical attributes of water including:

Know these terms up

Density, composition, physical phase, dissolved oxygen, salinity, alkalinity, temperature, pH, specific conductance, temperature, turbidity, hardness and suspended sediment.

Principles to Know:

- What are the two primary nutrients that affect water quality?
- Describe two methods of measuring dissolved oxygen in a water sample.
- Explain what specific characteristic of water makes it possible for aquatic species to survive when a lake freezes over.
- What are the biological indicator species used for? List two types of these organisms.

Sample Question

Alkalinity is a measure of:

- a. The concentration of nutrient in water.
- b. The acidity of water.
- c. The buffering capacity of water.
- d. The concentration of dissolved salts in water.

Reference Material

- Handbook of Common Methods in Limnology, Owen T. Lind.
- Common Water Measurements(<http://fs1dgadrv.er.usgs.gov/edu/characteristics.html>)
- Intro to Hydrology(http://geog.ouc.bc.ca/conted/onlinecourses/geog_111/6a.html)

Objective 2: Point and Non-Point Source Pollution

Principles to Know:

- Identify types of urban nonpoint source pollution and their causes.
- Differentiate between nonpoint and point source pollution and know the different sources, consequences, management and legislation affecting each.
- Understand local watersheds impact in the problem.
- Determine the impacts on our Natural Resources.

Sample Questions:

- 1) Nonpoint source pollution refers to agriculture and not to any urban activities.
 - a) True
 - b) b) false
- 2) Section 319 of the Clean Water Act is significant because, unlike the rest of the CWA, it addresses:
 - a) degradation of wetlands
 - b) factory point source discharge
 - c) nonpoint source pollution
 - d) waste water system discharge
- 3) Which of the following conservation practices have proven effective at reducing runoff from agricultural fields grassed waterways
 - b) terraces
 - c) conservation tillage
 - d) field borders or filter strips
 - e) all of the above

Reference Materials:

- <http://www.epa.gov/epahome/laws.htm>
- <http://www.epa.gov/OWOW/NPS/index.html>

Object 3: Watershed

- Identify what a watershed is and be able to follow the hydrologic cycle through a watershed.

Sample Questions:

- 1) What is the process by which moisture is added to the atmosphere?
 - a. evaporation
 - b. infiltration
 - c. condensation
 - d. precipitation
- 2) Evaporation from soils, plant surfaces, and water bodies, together with water losses through plant leaves, are known collectively as
 - a. evaporation
 - b. precipitation
 - c. evapotranspiration
 - d. transpiration

Reference Material

- <http://www.cticpurdue.edu/CTIC/CTIC.html>
- <http://www.epa.gov/owow/nps/index.html>

Objective 4

Principles to know:

- Understand the significance of Nebraska's water resources (e.g.. Sandhill lakes, ground water, wetlands) how they are classified, used, and defining characteristics they possess.
- Identify the positive and negative conditions for Nebraska lakes and aquatic species. This means knowing beneficial habitat for certain species and understanding the relationship among species, as well as conditions which threaten those relationships.
- Know the distinction between saline and alkaline wetlands.
- Understand the differences between Oligotrophic and Eutrophic lakes.

Sample Questions:

- 1) The soils found in wetlands which help in their designation are:
 - a. clay soils
 - b. hydric soils

- c. sandy soils
 - d. wet soils
2. The Ogallala Aquifer stands in cavernous lakes and flows in underground rivers.
- a. true
 - b. false

Reference Materials

- NGPC Web Page (<http://ngp.ngpc.state.ne.us/gp.html>)

Objective 5

Principles to know:

- Explain aquifer characteristics such as permeability, hydraulic conductivity, transmissivity, etc.
- Define groundwater quality risk factors (what geological or chemical conditions make groundwater vulnerable to contamination; these can be geologic characteristics or chemical characteristics.).

Sample Questions:

1. The total void space between the grains or the cracks and solution cavities that can fill with the water is termed
 - a. Permeability
 - b. Porosity
 - c. Capillary fringe
 - d. Water table
2. Darcy's law assumes _____ flow, which means that the water will follow distinct flow lines rather than mix with other flow lines.
 - a. Turbulent
 - b. Laminar
3. In a groundwater recharge zone, the pressure head _____ with increasing depth; in a discharge zone, the pressure head _____ with increasing depth.
 - a. Increases, decreases
 - b. Decreases, increases
 - c. Increases, increases
 - d. Decreases, decreases

Reference Material

- Cooperative Extension publication EC 94-135
- Understanding Pesticides and Water Quality in Nebraska.

- Contact US Geological Survey or check their web page.

Objective 7:

Principle to Know:

- Interpret hydrograph and bathymetric (**lake profile**) map data.
- Know the difference between oligotrophic and eutrophic lakes.

Sample Questions:

1. On a hydrograph, what does the area under the curve equal?
 - a. Peak runoff rate
 - b. Time since start of a storm
 - c. Rainfall intensity
 - d. Total runoff

2. A hydrograph is a?
 - a. Graph of watershed runoff versus time
 - b. Graph of watershed depth
 - c. Graph of rainfall intensity
 - d. Graph of storm duration

Reference Material

- Soil and Water Conservation Systems, by: Schwab, Fangmeier, Elliot, Wetzel.

Objective 7

Principles to Know:

- Be familiar with native fish of Nebraska, their defining characteristics and preferred habitats
- Know specific indicator species for pollution and stress tolerance
- Understand how predator/prey relationships control populations

Sample Questions:

1. The age of a fish may be determined by analyzing
 - a. Scales
 - b. Otoliths
 - c. Spines
 - d. All of the above

2. Gills can function to
 - a. Take up oxygen
 - b. Maintain osmotic balance
 - c. Eliminate wastes
 - d. All of the above

Reference Materials

- Fresh Water Fish of North America, Peterson Guide

- Game and Parks (<http://ngp.ngpc.state.ne.us/gp.html>)

Additional References:

1. Nebraska Game and Parks Commission have an interactive fish ID page on their web site: <http://outdoornebraska.ne.gov/fishing/guides/identification/search.asp> Study the generalities, like location, number, and structure of fins; mouth location and type, and of course coloration, etc. But browsing through there should be fun, too, just to see all the different types of fish.

2. The Nebraska Natural Legacy Project has a wonderful booklet out "Nebraska's At Risk Wildlife: Conserving Species and their Habitats." Their web page is: <http://outdoornebraska.ne.gov/wildlife/programs/legacy/> ,

Answer to Questions:

Objectives: 1) c, 2) b,c,e, 3) a, c, 4) b,b, 5) b,b,b,b, 6) d,a, 7) d,d,d

Soils

Information Provided By:
Nebraska's Natural Resources
Conservation Service: Patrick Cowser



policy range aquatics **soil** forestry wildlife

Start “digging” Soils

Did you know that dirt, mud, ground, and soil – are mixtures of minerals and organic particles of varying sizes and matters? These particles comprise about 50 percent of the soil’s volume while pores containing air and water fill the remainder. Because soil is so common, it is often taken for granted even though life as we know it exists because of the soil. Soil is the basis for our food and fiber production; the foundation for our roads, schools and churches. One spade full of soil supports more species of organisms than can be found in the entire Amazon rain forest. Soil supports life.

Here in Nebraska...

Soil is a very important natural resource. As you look around on your drive home from school, notice all of the plant growth. In order for these plants to grow, they take in water and the roots absorb the proper amount of nutrients and oxygen from the soil. Just think of all of the fields and gardens in Nebraska that produce food for the whole world. Not only does soil support plant growth, but it also provides a foundation for the school that you attend. Soil is all around. By understanding soil characteristics, you will be better able to identify the importance and necessity of conserving our soil.

Objective 1: What is Soil?

Principles to Know:

- Definition of Soil
- Development of Soil
 - Parent Material
 - Process of Development

Use References 2 & 3

Objective 2: Soils Characteristics

Look up and understand these terms:

- Composition
- Chemistry (pH, Cat-ion Exchange Capacity Reduction and Oxidation)
- Texture
- Structure

- Slope
- Color
- Horizons/Profile
- Permeability/Percolation (soil water and drainage)

Use Reference 3

Objective 3: Soil maps

Soil Series (A level of Soil Taxonomy)

Map Symbols (Soils as they are mapped on a Landscape in nature)

Slope Classes (A grouping of Soil Slopes)

Soil Survey Reports

What are they?

How to use them

Use Reference 3

Objective 4: Soil Use

Agriculture

Forestry

Wildlife Management

Recreation

Building Site Development

Conservation Planning

Use Reference 3

Objective 5: Erosion and Sedimentation

Definitions

Types of Erosion

Economic Impacts

Prevention

Use Reference Materials 2,3 and

<http://www.ianrhome.unl.edu/search.shtml>

<http://www.maf.govt.nz/MAFnet/schools/kits/soil/html>

Objective 6: Hydric Soils

- Definition
- Characteristics
- Uses/Limitations
- Economic Value

Use Reference 3

Soils Reference List

The references listed below are some that will play an important part in learning about soils and preparing for the Envirothon Contest.

1. National Soil Survey Center - www.statlab.iastate.edu/soils/nssc/ Click on: 1a. Products 1a1. Soils Data 1a2. Standards for Soil Survey 1a3. Official Series – Holdrege series
2. USDA – NRCS, Nebraska - www.ne.nrcs.usda.gov
3. Soil Survey Manual - www.statlab.iastate.edu/soils/ssm/gen_cont.html
4. Keys to Soil Taxonomy
5. “The Nature and Properties of Soils, 11th Edition”, Brady, Nyle C. and Weil, Ray R., Prentice Hall Press, 1996
6. PCA Soil Primer”, Portland Cement Association
7. Local Soil Survey Reports – contact local county NRCS offices for a copy.
8. Institute of Agriculture and Natural Resources Website at:
<http://ianrhome.unl.edu/search.shtml>
9. Soil and Water Conservation Society--<http://www.swcs.org>

Sample Questions

1. Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. One of the most important soil properties that affect the available water capacity is:
 - a) the amount of rainfall the soil receives
 - b) the flooding frequency of the soil
 - c) the type of bedrock
 - d) the soil texture (the % of sand, silt, and clay in the soil)
2. Which of the following soil textures probably has the highest permeability?
 - a) a loamy sand
 - b) sandy loam
 - c) silt loam
 - d) loam
3. Which of the following factors does not affect the permeability of the soil?
 - a) soil texture
 - b) depth to soil water table
 - c) size of soil pores
 - d) soil structure
4. Which of the following is not one of the five factors of soil formation?
 - a) time

- b) topography
 - c) climate
 - d) parent material
 - e) all of the above are factors of soil formation.
5. The relative proportions of sand, silt, and clay particles in a mass of soil is called?
- a) soil permeability
 - b) soil tilth
 - c) soil texture
6. Soil scientists classify soil particles in the categories of ____, ____, & ____.

Forestry

Information Provided By:
Nebraska Forest Service: Rachel Allison



policy range aquatics soil **forestry** wildlife

Sink Your Roots Into Forestry

Did you know that . . . Nebraska is “the Home of Arbor Day?”

Have you ever heard of Arbor Day? This day is particularly important to Nebraska. Julius Sterling Morton, the first editor of the “Nebraska City News” and later U.S. Secretary of Agriculture from 1893 to 1896, championed planting trees to help provide for the basic needs (fuel, lumber, food, etc.) and amenities (protection, shade, beauty, etc.) of early settlers.

In 1872, Morton first proposed a tree planting holiday called “Arbor Day.” That year, during the first Arbor Day, prizes were offered to counties and individuals for planting the largest number of trees. It was estimated that almost 1 million trees were planted in Nebraska during the first Arbor Day. Arbor Day became an official state holiday in 1885. Thus, Nebraska is known as the “Home of Arbor Day,” which is now celebrated in all 50 states, the District of Columbia, and 33 foreign countries.

J. Sterling Morton was extremely proud of his creation. In his words, “Other holidays repose on the past; Arbor Day proposes for the future.”

Here in Nebraska trees and forests provide . . .

- protection for land, water and air
- shelter for homes, livestock and wildlife
- lumber for various wood products
- shade for homes and streets
- woody biomass for fuel for heating and cooling

They also save money on energy costs and create more beautiful and livable communities,
plus much, much more!

Where are Nebraska’s Forests? . . .

With more than 1.2 million acres of natural forest land and another 1.5 million acres of non-forest land with trees, Nebraska is rich in forest resources. Since that first Arbor Day, Nebraskans have planted landscape and conservation trees to shade their homes and to protect agricultural land, livestock, and our natural resources. The forests of Nebraska are tremendously diverse. From the ponderosa pine forests of the Pine Ridge and Wildcat Hills in western Nebraska, to the riparian forests along Nebraska’s many waterways, to the hardwood forests of the Missouri Bluffs; trees and forests play an important role in the ecology and economy of Nebraska.

Objective #1: Tree Anatomy and Functions

All living organisms share a basic growth of structure and formation. The tree has components that function to conduct water and elements, support the tree, make food, store reserves and defend against pests and decay. The terms below are some of the key words in tree anatomy and function.

Know these terms and their functions.

- | | | |
|-------------------|----------------|-----------|
| -- Photosynthesis | -- Cambium | -- Roots |
| -- Chlorophyll | -- Sapwood | -- Trunk |
| -- Transpiration | -- Heartwood | -- Leaves |
| -- Xylem | -- Growth ring | -- Crown |
| -- Phloem | | |

Sample Questions

1. Leaf buds are produced during what season?
2. Water and nutrients are conducted upward in a tree through what structure?

Objective #2: Tree Identification

Each tree species has unique characteristics, which often determines the practical use of the species. Some are conifers (or softwoods), others are deciduous (or hardwoods). Each of these differences also determines how the tree is measured as to its height and volume. Conifers tend to have one tall leader; deciduous trees have several main branches that form the crown. It is important to be able to accurately identify the common tree species in Nebraska. Become familiar with identification terminology using a dichotomous key to identify tree species.

- | | | |
|----------------------|----------------------------|-----------------------------|
| -- Dendrology | -- Deciduous & Conifer | -- Broadleaf, needle-ike or |
| -- Silviculture | -- Softwood and Hardwood | scale-like leaves |
| -- Forest type | -- Leaf type, arrangement, | -- Whorled, pinnate or |
| -- Genus and Species | shape, and composition | palmate |

Sample Questions

3. What is the best way to tell the difference between pine and spruce needles?
4. Name a tree species with opposite branching patterns.

Objective #3: Tree Measurement

A method of forest and tree measurement is necessary to guide the sustainable management of the forest. Because wood from trees is a raw material used for many products from which homes, furniture, paper and other items can be produced, it is necessary to estimate not only the number of trees, but also the amount and size of wood for fuel and construction. The quantity of wood in trees and logs must be measured and quantified for the wood market. Specific forestry tools are used to measure the spacing of trees in the forest and the age, height, and volume of individual trees and logs. Today we measure trees for their age, height, diameter, and volume; some are measured as standing trees, while others are measured as logs in a lumber yard.

Become familiar with common forest and tree measurement terms.

- Crown size
- Diameter
- Log
- Basal area
- Stocking
- Stand
- Density
- Merchantable
- Board feet
- Cubic feet
- Cord

Understand how to use common forest and tree measurement tools

- Compass
- Increment borer
- Diameter tape
- Prism
- Clinometer
- Volume
- Hypsometer or Biltmore stick

Sample Questions

5. The age of a standing tree can be determined using what instrument?
6. What does the hypsometer or Biltmore stick measure?

Objective #4: Forest Ecology

A forest is a dynamic ecosystem characterized by the interaction of plants and animals in a specific environment. This forest is generally a wooded area, with more or less dense and extensive tree cover, often with varying characteristics as to the species composition, structure, age class and often with meadows, streams, fish and wildlife.

Become familiar with terminology and understand the systems and cycles that occur within the forest and how they are interrelated.

- Water cycle
- Carbon cycle
- Decay and decomposition
- Watersheds
- Succession
- Climax species
- Climate and microclimate conditions and changes
- Environmental conditions - human impacts, both positive and negative
- Sustained use
- Fragmentation

Understand how different influences can affect a forest. What happens when we disturb,

disrupt or stop one of the above systems from functioning?

- Fire suppression
- Global warming/Climate change
- Flooding
- Droughts
- Insect infestations
- Invasive tree pests
- Urban expansion

Sample Questions

7. The native conifer that is expanding most rapidly across many parts of Nebraska is?
8. The process of long-term changes in a plant species composition of a forest is called?

Objective #5: Forest Management and Forest Health

Management practices can be incorporated to enhance and sustain the benefits and products that are obtained from a forest. Proper management practices will help keep the trees healthy and vigorous.

Become familiar with the terminology and understand the techniques used to manage forests and the threats to forest health.

- Sustainable use and the importance of it
- Fire suppression - fuel loading and fuel reduction
- Prescribed fire
- Forest thinning
- Silvicultural systems – clear cuts, patch cuts, and selective cuts
- Forest inventory measurements
- Determining a plot sample size vs. entire population
- Forest measurements - density
- Species identification - trees, shrubs, plants, animal sign
- Insect and disease identification - specify key insects and diseases
- Know key exotic tree species in your region - Scotch pine, white mulberry

Sample Questions

9. Why do foresters thin a pure stand of ponderosa pine?
10. Why is the forest type along the Plate River changing from primarily cottonwood to other species?

Objective #6: Forest Policy

There are many different options when managing a forest. Sometimes different objectives conflict with each other and the desired products and uses of a forest may not all be obtainable. Forestland managers need to understand the different uses and products that the forest can provide and help reach a compromise if a conflict occurs.

Use the different values each person has for themselves that relates to different management and utilization of our natural forest resources.

- Aesthetics

- Innate and ethical - environmental health
- Forest products
- Recreation - hunting, fishing, hiking, camping, etc

Develop an understanding for how these different values can cause conflicts. Identify several resource conflicts in your region.

Understand what is meant by the urban forest; its importance to society and mental health; its value.

Understand who manages Nebraska's natural resources and the responsibilities they have.

- Nebraska Forest Service (NFS)
- United States Forest Service (USFS)
- National Park Service (NPS)
- US Fish and Wildlife Service (USFWS)
- US Army Corps of Engineers
- Bureau of Land management (BLM)
- Department of Natural Resources (DNR)
- Natural Resources Conservation Service (NRCS)
- Extension
- Natural Resources Districts (NRD)

Sample Questions

11. Why are Nebraska's forests so valuable?
12. Wood is the only natural resource that is renewable, recyclable and biodegradable. T or F?
13. A forest can be preserved in its present condition by removing all human influence. T or F?

Reference Material

Reference Material and Resources

Books and Pamphlets:

Trees of Nebraska, EC1774

A comprehensive 75-page identification guide to 97 of the state's trees; includes how to compare leaves, twigs, fruit, bark and other parts and identify species.

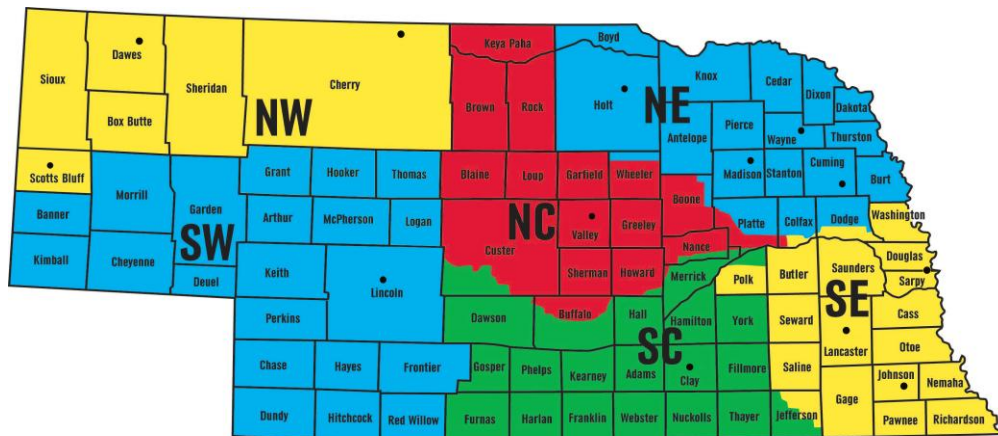
Project Learning Tree Activity Guides <http://plt.org>

Sustainable Forestry Virtual Tour http://sfp.cas.psu.edu/projects_past.htm

Websites (many sites have excellent publications too):

UNL-Nebraska Forest Service www.nfs.unl.edu
Nebraska Statewide Arboretum, Inc. www.arboretum.org
Arbor Day Foundation www.arborday.org
American Forests www.americanforests.org
Tree Farm www.treefarmssystem.org
Smokey Bear www.smokeybear.com
Forestry Index www.forestryindex.net
Plant Database www.plants.usda.gov
USDA Forest Service www.fs.fed.us
Nebraska National Forest at Halsey www.fs.fed.us/r2/nebraska
Temperate Forest Foundation www.forestinfo.org

And, don't forget to ask your local district forester for help
(forestry books, practical help with using the forestry tools and answering questions) **at**
<http://nfs.unl.edu/NFSdistricts.asp>



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Answers to Sample Questions:

1. Autumn/Fall
2. Xylem
3. Pine needles are usually in bundles of two or more, spruce are singly attached
4. Maples, ash, buckeye, etc
5. Increment borer
6. Diameter, tree or log volume as board feet, merchantable height, etc
7. Eastern red cedar
8. Succession
9. Reduces risk of wildfire, improves health of stand and reduces time until harvest
10. Fire suppression, flood suppression and livestock grazing
11. Forests produce wood products, provide wildlife habitat, and protect soil and water
12. True
13. False

Wildlife

Information Provided By:
Nebraska's Game and Parks: Aaron
Hershberger



policy range aquatics soil forestry **wildlife**

Introduction

Nebraska is home to an abundance of wildlife species. This diversity is evident by the unique ecosystems found throughout the state. From the eastern woodlands to the central sandhills and the western pine ridge, an array of diverse and complex relationships exist between wildlife, their habitats and the people who also call this land home.

All living things are dependent on other living things, and this is very evident when considering wildlife on the central plains. Living “things” in the form of vegetative growth, known collectively as habitat, have a value to other “beings” which varies greatly during the year, depending on its type, abundance, proximity and quality, coupled with factors such as weather. But, no matter how it is evaluated, habitat is what keeps wildlife alive. It provides the food, and shelter, and safety for all species.

The wildlife that call Nebraska home, their habitats, their relationships amongst each other and their interaction with people will provide a lifetime of study and enjoyment for everyone. Who lives there? Why? How do human actions impact those species? Why is it important to know how one species impacts another as they share and or compete in their habitats to survive? Whether you are a hunter, bird watcher or general nature enthusiast, enhancing your knowledge of the wildlife and habitats where you live is very important for the long term survival and proliferation of many species.

The conservation effort in the United States is a unique story of struggle and survival, resulting in the many benefits we enjoy with wildlife today. Critical legislation such as the passage of the Pittman-Robertson Bill in 1937, along with many others, has resulted in abundant and flourishing wildlife populations across the state. It is interesting how activities by people can have such positive impacts to wildlife when the best interest of both is kept in mind.

Objectives

Wildlife

1. Identify the tracks, physical characteristics (skulls, furs, antlers, horns, etc.), movement patterns, and eating habits of common Nebraska mammals, birds, fish, and reptiles.
2. Differentiate between endangered and threatened species, and recognize species of each category.
3. Differentiate between game and non-game species, and recognize species of each category.
4. Describe the habitat of Nebraska mammals, birds, fish, and reptiles and recommend management practices for each habitat.
5. Illustrate a food web or energy flow diagram featuring mammals, birds, fish or reptiles.
6. Approximate the age of mammals by physical characteristics. -Spurs on male pheasants - Teeth on deer
7. Differentiate between carnivores, herbivores, and omnivores
8. State three characteristics that distinguish mammals from all other animals.
9. Define the theory of natural selection and recognize instances where wildlife have adapted to changes in the environment.
10. State two characteristics that fish and reptiles have in common
11. Illustrate migration pathways that migratory fowl follow. Which flyway is Nebraska in?
12. Describe predator prey relationships. What happens to the predator population when you increase the prey population and vice versa?
13. Describe factors that limit or increase populations. Discuss the concept of carrying capacity and limiting factors.
14. Discuss various ways the public and wildlife managers can help in the protection, conservation, management and enhancement of wildlife populations.
15. Describe major factors affecting threatened and endangered species and methods used to improve the populations of these species.
16. Understand the roles of wildlife in an ecosystem
17. General animal species to be familiar with include:
 - a. Beaver, Bobcat, Black Bear, Coyote, Mink, Mountain Lion, Muskrat, Opossum, River Otter, Raccoon, Black-footed Ferret, Mountain Plover, Least Tern, Bald Eagle, Sandhill Cranes, Whooping Cranes, Bobwhite Quail, Prairie Dogs, Cottontail Rabbit, Whitetail Deer, Mule Deer, Pronghorn Antelope, Elk, Turkey, Bighorn Sheep, Prairie Chicken, Sharp-tail Grouse, Morning Dove, Threatened Species, Endangered species, song birds of Nebraska, fresh-water fish of Nebraska Discuss the potential impacts of introduction of a non-native species
18. Understand the various methods wildlife use to communicate and be familiar with the calls of various big game animals and game birds.
19. Understand the role of hunting in managing wildlife populations and some of the laws and regulations that direct such activities.
20. Understand the differences between native and introduced species and be able to identify such

Suggestions □□ Review a basic mammal and bird field guide. Understand the binomial naming systems used for various Nebraska species, especially the ones listed above. □□ Review some pelts and or skulls of various Nebraska animals. Focus on Bobcat, Great Horned Owl, Coyote, Fox, Cottontail Rabbit, Raccoon, and Muskrat.

Legislation and Key People

- Identify assisting agencies, programs, and laws that govern Nebraska wildlife.
- Understand the Pittman-Robertson Act, Migratory Bird Act, Lacey Act, Dingell-Johnson Act and their impacts on wildlife management today.
- Discuss impacts made by key leaders such as Aldo Leopold, John Muir, Gifford Pinchot and their efforts in conservation.

Suggestions

Review this information in the United States Fish and Wildlife Web Site as well as the Nebraska Game and Parks Commission Web Site.

Habitat

1. Differentiate between habitat and niche.
2. Describe ways in which wildlife managers manage and or manipulate wildlife habitats.
3. Understand why native wildlife require specific types of habitats.
4. Discuss how upland birds and mammals have adapted to their habitat to make the best use of their environment.
5. Understand the differences between annual, biennial and perennial plants.
6. Understand the process of Succession and how this impacts wildlife.
7. Describe the potential impact of the introduction of non-native species.
8. Understand the four main elements of habitat (food, water, shelter, space)
9. Know differences between various types of habitats found throughout Nebraska and be able to discuss them. This includes wetlands, forests, grasslands, ponds, lakes, rivers, etc. How do we categorize wetlands? What is a grassland? What species may be found in them?

Suggestions

□□ Much of this information can be found in the NebraskaLAND Wildlife Habitat Improvement Guide as well as the Nebraska Game and Parks Commission Web Site. □□ The Project WILD Curriculum Manual for Grades K-12 will also have valuable information for this category.

Reference Materials

- Nebraska Game and Parks Webpage: www.outdoornebraska.org *You can get a lot of info. here* *Focus on the Wildlife and Fisheries Pages
- NebraskaLAND Magazine. Wildlife Habitat Improvement Guide Vol. 69, NO. 1, January /February 1991
- Nebraska Wetlands: <http://www.unl.edu/agnicpls/wqwetnew.html>
- <http://www.epa.gov/owow/wetlands/education/>
- U.S. Fish and Wildlife Service: <http://www.fws.gov/> *Check out endangered and threatened species in Nebraska*
- <http://www.fws.gov/species/>
- <http://www.fws.gov/laws/>
- <http://www.fws.gov/hunting/>
- <http://www.fws.gov/birds/mbmfactsheets.html>
- <http://www.fws.gov/endangered/>
- <http://training.fws.gov/history/conservationheroes.html>

- Tekiela, S. 2003. Birds of Nebraska. Adventure Publications Inc. Cambridge, NY.
- <http://www.invasivespeciesinfo.gov/>
- <http://www.enature.com/home/>
- www.pheasantsforever.org www.ducks.org
- Council for Environmental Education. Project WILD K-12 Curriculum & Activity Guide. 2001.
- Current Nebraska Hunt Guide – available at any Nebraska Game and Parks Commission office and on

Special Topic

Information Provided By:
Canon Envirothon



policy range aquatics soil forestry wildlife

2012 Current Environmental Issue

Nonpoint Source Pollution/Low Impact Development

“Going Green with LID technology to reduce NPS”

Nonpoint source pollution, unlike pollution from industrial and sewage treatment plants, can come from many different sources. Stormwater runoff carries pollutants into our streams, rivers, reservoirs and other bodies of water.

These pollutants include:

- Excess fertilizers, herbicides, and insecticides from residential areas
- Oil, grease, and toxic chemicals from urban runoff
- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks
- Bacteria and nutrients from pet wastes and faulty septic systems

An estimated 60 percent of current water pollution is attributed to stormwater runoff. Nonpoint source pollution can contaminate drinking water, destroy wildlife habitat, close beaches, kill fish and cause many other serious environmental and public health problems. Every year, millions of dollars are spent to restore and protect areas damaged by nonpoint source pollutants. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.

One of the most exciting new trends in managing stormwater runoff is the increased use of **Low Impact Development (LID)** to help protect and restore water quality. LID comprises a set of approaches and practices that are designed to reduce runoff of water and pollutants from the site at which they are generated. By means of infiltration, evapotranspiration, and reuse of rainwater, LID techniques manage water and water pollutants at the source and thereby prevent or reduce the impact of development on rivers, streams, lakes, coastal waters, and ground water.

LID is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. LID has been characterized as a sustainable stormwater practice by the Water Environment Research Foundation and others.

Benefits of LID:

- improved aesthetics
- expanded recreational opportunities
- increased property values due to the desirability of the lots and their proximity to open space
- increased total number of units developed
- increased marketing potential and faster sales
- reduced runoff volumes and pollutant loadings to downstream waters
- reduced incidences of combined sewer overflows
- enhanced property values
- improved habitat
- aesthetic amenities
- improved quality of life.

Although the increase in application of these practices is growing rapidly, data regarding both the effectiveness of these practices and their costs remain limited. In the vast majority of cases, the U.S. Environmental Protection Agency (EPA) has found that implementing well-chosen LID practices saves money for developers, property owners, and communities while protecting and restoring water quality.

As water becomes an ever-increasing issue nationwide, managing our stormwater properly is not only a green technology, it becomes a necessity. And through the use of Low Impact Development strategies, properly managing stormwater is something all of us can do.

2012 Learning Objectives

After completing study of this issue, students will be able to:

1. Define Low Impact Development (LID).
2. Define nonpoint source pollution.
3. Explain the impacts of land use on watersheds.
4. Understand the limitations and benefits of conventional stormwater management design versus LID.
5. Identify and apply LID Best Management Practices (BMPs) and selection criteria.
6. Explain how soils, wildlife, forestry, and aquatics affect and are affected by nonpoint source pollution (and its reduction) and LID.
7. Identify how LID is used to manage stormwater.
8. Explain the impacts urban sprawl has on nonpoint source pollution and how LID can be used to manage and reduce nonpoint source pollution.
9. Analyze pros and cons of the application of LID Best Management Practices.
10. Understand the relationship between LID hydrologic controls (i.e. retention ponds, swales, etc.) and water quality benefits.
11. Provide examples of what individuals and communities can do to implement LID at home.