

# Nebraska Envirothon Study/Reference Guide

**ENVIROTHON**



**NEBRASKA**

*Updated May 2022*

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# What is the Nebraska Envirothon?

The Nebraska Envirothon is a competition designed for high school students (9-12<sup>th</sup> grades) to test their knowledge about the environment. Five-member teams compete on the regional level testing on seven environmental topics:

- Aquatics
- Forestry
- Policy
- Range
- Soils
- Wildlife
- Special Topic (Current Environmental Issue)

During the state competition, teams give an oral presentation on a special topic (Current Environmental Issue). The special topic changes annually and is selected by the National Conservation Foundation (NCF) Envirothon Committee.

## ***Why take the time to organize and coach a team for this competition?***

Careers pertaining to the environment are on the rise! Envirothon is an excellent opportunity to give students some background and exposure to environmental careers.

## ***What makes the Envirothon different from other extra-curricular activities students already participate in?***

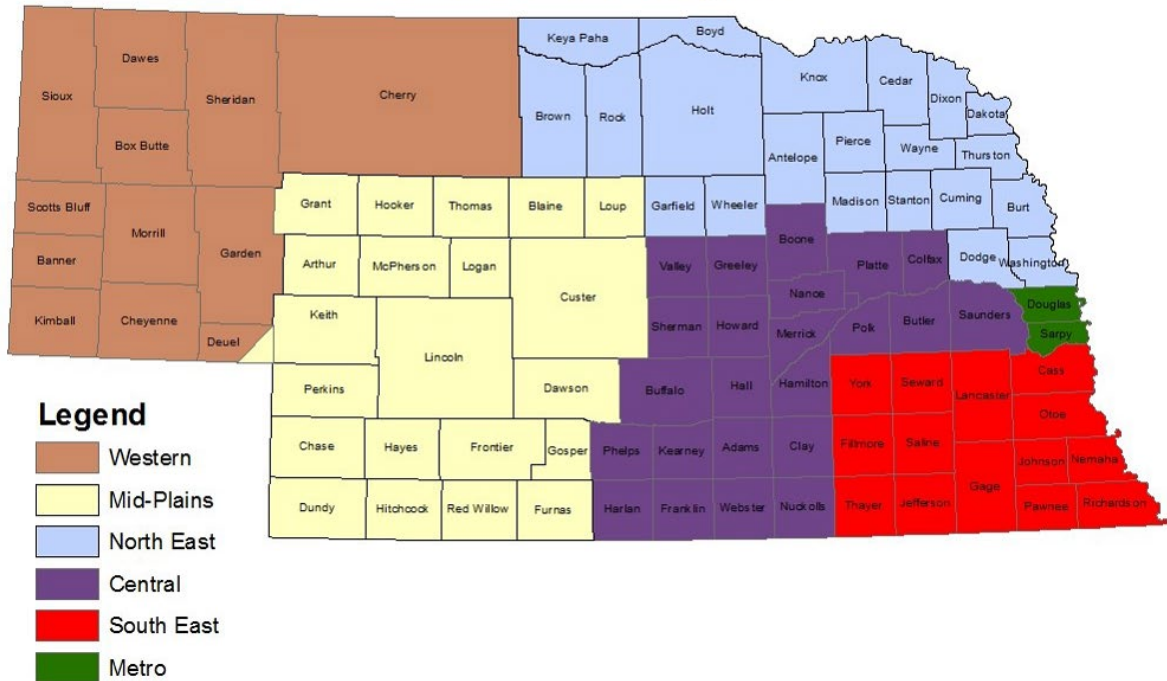
The Nebraska Envirothon competition gives your students the opportunity to take what they have learned in the classroom and apply it to life.

Students interact with resource professionals, who use the knowledge daily in their careers. The Envirothon shows students the link between academics and the career world.

# Nebraska Regional Competitions

Nebraska teams first compete in one of six regions during the scheduled contests in February and March. Regional tests are somewhat hands on, but more of a traditional indoor exam. The highest scoring team from each region plus eight wildcards (14 teams total) qualify to compete at the Nebraska State Envirothon.

## Nebraska Envirothon Regions



## Nebraska State Competition

The 14 qualifying teams go on to participate in the State Envirothon, which is an outdoor, hands-on competition. The State Envirothon includes an oral presentation on a special topic scenario in lieu of a test for the Special Topic section. Past competition locations include:

- 2023: Cedar Point Biological Station – Lake McConaughy near Ogallala, Nebraska
- 2022: Camp Comeca near Cozad, Nebraska
- 2021: Lake Wanahoo near Wahoo, Nebraska
- 2020: No Event
- 2019: Pibel Recreation Area near Ericson, Nebraska
- 2018: Niobrara State Park near Niobrara, Nebraska
- 2017: Wildcat Hills State Recreation Area near Scottsbluff, Nebraska
- 2016: Lied Lodge near Nebraska City, Nebraska
- 2015: Camp Comeca near Cozad, Nebraska

# Natural Resources Districts

Consider using your local Natural Resources District (NRD) as a resource. Most NRDs have an educator on staff and can help teachers and students get a better understanding of the environmental topics. NRD staff are available to give presentations to classrooms, tours of environmental areas and more.

## Central Platte NRD

215 Kaufman Avenue  
Grand Island, NE 68803  
308.385.6282  
[www.cpnrd.org](http://www.cpnrd.org)

## Lewis & Clark NRD

608 N. Robinson Ave.  
Hartington, NE 68739  
402.254.6758  
[www.lcnrd.nebraska.gov](http://www.lcnrd.nebraska.gov)

## Little Blue NRD

100 E. Sixth St.  
Davenport, NE 68335  
402.364.2145  
[www.littlebluenrd.org](http://www.littlebluenrd.org)

## Lower Big Blue NRD

805 Dorsey St.  
Beatrice, NE 68310  
402.228.3402  
[www.lbbnrd.net](http://www.lbbnrd.net)

## Lower Elkhorn NRD

1508 Square Turn Blvd.  
Norfolk, NE 68701  
402.371.7313  
[www.lenrd.org](http://www.lenrd.org)

## Lower Loup NRD

2620 Airport Dr.  
Ord, NE 68862  
308.728.3221  
[www.llnrd.org](http://www.llnrd.org)

## Lower Niobrara NRD

410 Walnut St.  
Butte, NE 68722  
402.775.2343  
[www.lnnrd.org](http://www.lnnrd.org)

## Lower Platte North NRD

511 Commercial Park Rd.  
Wahoo, NE 68066  
402.443.4675  
[www.lpnnrd.org](http://www.lpnnrd.org)

## Lower Platte South NRD

3125 Portia St.  
Lincoln, NE 68501  
402.476.2729  
[www.lpsnrd.org](http://www.lpsnrd.org)

## Lower Republican NRD

30 N. John St.  
Alma, NE 68920  
308.928.2182  
[www.lrnrd.org](http://www.lrnrd.org)

## Middle Niobrara NRD

303 E. Highway 20  
Valentine, NE 69201  
402.376.3241  
[www.mnnrd.org](http://www.mnnrd.org)

## Middle Republican NRD

208 Center Ave.  
Curtis, NE 69025  
308.367.4281  
[www.mrnrd.org](http://www.mrnrd.org)

## Nemaha NRD

62161 Highway 136  
Tecumseh, NE 68450  
402.335.3325  
[www.nemahanrd.org](http://www.nemahanrd.org)

## North Platte NRD

100547 Airport Rd.  
Scottsbluff, NE 69363  
308.632.2749  
[www.npnrd.org](http://www.npnrd.org)

## Papio-Missouri River NRD

8901 S. 154<sup>th</sup> St.  
Omaha, NE 68138  
402.444.6222  
[www.papionrd.org](http://www.papionrd.org)

## South Platte NRD

551 Parkland Dr.  
Sidney, NE 69162  
308.254.2377  
[www.spnrd.org](http://www.spnrd.org)

## Tri-Basin NRD

1723 Burlington St.  
Holdrege, NE 68949  
308.995.6688  
[www.tribasinrd.org](http://www.tribasinrd.org)

## Twin Platte NRD

111 S. Dewey St.  
North Platte, NE 69103  
308.535.8080  
[www.tpnrd.org](http://www.tpnrd.org)

## Upper Big Blue

319 E. 25<sup>th</sup> St.  
York, NE 68467  
402.362.6601  
[www.upperbigblue.org](http://www.upperbigblue.org)

## Upper Elkhorn NRD

301 N. Harrison St.  
O'Neill, NE 68763  
402.336.3867  
[www.uenrd.org](http://www.uenrd.org)

## Upper Loup NRD

39252 Highway 2  
Thedford, NE 69166  
308.645.2250  
[www.upperlounrd.org](http://www.upperlounrd.org)

## Upper Niobrara White NRD

430 E. Second St.  
Chadron, NE 69337  
308.432.6190  
[www.unwnrd.org](http://www.unwnrd.org)

## Upper Republican NRD

511 E. Fifth St.  
Imperial, NE 69033  
888.883.9066  
[www.urnrd.org](http://www.urnrd.org)

## Nebraska Association of Resources Districts

8100 S. 15<sup>th</sup> St. | Suite B  
Lincoln, NE 68512  
402.471.7670  
[www.nrdnet.org](http://www.nrdnet.org)



## Nebraska Game & Parks Commission District Offices

The Nebraska Game & Parks offers several free outdoor education programs on Envirothon topics like wildlife, aquatics and conservation. They also have education items that can be checked out and used in classrooms and teacher workshops.

### **Alliance (NW District Office)**

299 Husker Road  
P.O. Box 725  
Alliance, NE 69301-0725  
308.763.2940

### **Lincoln (Headquarters)**

2200 N. 33rd St.  
P.O. Box 30370  
Lincoln, NE 68503-0370  
402.471.0641

### **Bassett (Service Center)**

524 Panzer St.  
P.O. Box 508  
Bassett, NE 68714-0508  
402.684.2921

### **Kearney (Service Center)**

1617 First Ave.  
Kearney, NE 68847-6057  
308.865.5310

### **Norfolk (NE District Office)**

2201 N. 13th St.  
Norfolk, NE 68701-2267  
402.370.3374

### **Omaha (Service Center)**

8495 Frederick St.  
Omaha, NE 68124  
402.595.2144

### **North Platte (SE District Office)**

301 E. State Farm Rd.  
North Platte, NE 69101-0430  
308.535.8025

### **Ak-Sar-Ben Aquarium (Service Center)**

21502 W. Hwy 31  
Gretna, NE 68028-7264  
402.332.3901

## Nebraska Forest Service

The Nebraska Forest Service has educators on staff that can offer classroom presentations or resources for your students. Many Natural Resources Districts also have a forester on staff that can give presentations, help with tree plantings and more.

Nebraska Forest Service – University of Nebraska-Lincoln  
103 Entomology Hall  
P.O. Box 830815  
Lincoln, NE 68583-0815  
402.472.2944



# Policy

Information Provided By: Nebraska Department of Natural Resources  
Kevin Schwartman, Geologist and Natural Resources Planner

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.

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.

It is 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 an engaged citizen who will be able to "tip the scales" with knowledge on environmental and land use policies.

## Objective 1

- Understand the role local, state, and federal natural resources agencies have in implementing and creating policy.
- 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

- Have up-to-date knowledge on the following:
  - Current land and water use laws and their impacts
  - 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 District (NRD):

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

### Exercise 2

Check out the "Legal/Administration Information" page on the Nebraska Department of Natural Resources website: [www.dnr.nebraska.gov/legal](http://www.dnr.nebraska.gov/legal) to better understand the laws related to Nebraska's natural resources.

Review the "Legislative Updates" on the Nebraska Association of Resources Districts website: <https://www.nrdnet.org/news/legislative-and-sine-die-updates>. Note the bills and legislation related to natural resources. Check periodically to see if any action has been taken on specific bills, especially those recently in the news.

### 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, including NRDs, publish newsletters that describe 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 by visiting their websites to learn what role the agencies have and what services they provide.

Some of the agencies involved in natural resources work include:

- Bureau of Land Management (BLM): [www.blm.gov](http://www.blm.gov)
- Bureau of Reclamation (BOR): [www.usbr.gov](http://www.usbr.gov)
- Environmental Protection Agency (EPA): [www.epa.gov](http://www.epa.gov)
- Nebraska Natural Resources Conservation Service (NRCS): [www.ne.nrcs.usda.gov](http://www.ne.nrcs.usda.gov)
- United States Army Corps of Engineers (COE): [www.usace.army.mil](http://www.usace.army.mil)
- United States Geological Survey (USGS): [www.usgs.gov](http://www.usgs.gov)
- Nebraska Department of Agriculture: [www.nda.nebraska.gov](http://www.nda.nebraska.gov)
- Nebraska Department of Environment and Energy (DEE): [www.dee.ne.gov](http://www.dee.ne.gov)
- Nebraska Department of Health and Human Services (DHHS): [www.dhhs.ne.gov](http://www.dhhs.ne.gov)
- Nebraska Department of Natural Resources (DNR): [www.dnr.nebraska.gov](http://www.dnr.nebraska.gov)
- University of Nebraska-Lincoln (UNL CASNR): [www.casnr.unl.edu](http://www.casnr.unl.edu)
- Conservation & Survey Division (CSD): [www.snr.unl.edu/csd](http://www.snr.unl.edu/csd)
- Nebraska Association of Resources Districts (NARD): [www.nrdnet.org](http://www.nrdnet.org)

## Policy Sample Test Questions

1. What U.S. government agency collects and evaluates surface water and groundwater quantity/quality data 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's Sandhill streams are fed by the High Plains Aquifer and baseflow from water infiltrating the sandy soil. These streams are most noted for:
- High levels of erosion
  - Intensive crop development throughout the basin
  - The high levels of overland runoff contributing to the system
  - Its relatively steady level of flow
4. Which of the following factors is generally NOT used in defining a wetland?
- Wildlife
  - Soils
  - Vegetation
  - Hydrology
5. Name the editor, farmer, Nebraska territorial secretary and U.S. Secretary of Agriculture, who helped found Arbor Day in 1872. He said, "Arbor Day is not like other holidays. Each of those repose on the past, while Arbor Day proposes for the future."
- J. Sterling Morton
  - Robert Furnas
  - William Jennings Bryan
  - Dr. Mathew Ricketts
6. Infant methemoglobinemia or "Blue Baby" syndrome can result from:
- Consumption of high levels of atrazine
  - Breathing high levels of particulates
  - Consumption of water with high nitrate levels

## 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.

Sample Question Answers: A, A, D, A, A and C

# Range

Information Provided By: Nebraska's Natural Resources Conservation Service  
Nadine Bishop, Range Management Specialist

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. Rangelands are described as "land on which the indigenous vegetation is predominantly grasses, grass-like plants, forbs, or shrubs and is managed as a natural ecosystem."

Rangeland Ecology and Management is a field of study devoted to understanding and managing these important ecosystems. 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. Range is often portrayed as just for cows, but it is so much more!

- 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 approximately 48% or 23.9 million acres of the state's land area.

## Objective 1: Range Resource

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

## Practice Exercises

### Exercise 1

Determine how much of the United States and Nebraska is rangeland. Also, look for information on the health of these rangelands. What are they used for? What makes them unique?

### Exercise 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.

### Exercise 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 impacts rangeland.

### Range Sample Test Questions

1. On abandoned fields in Nebraska, a manager would expect to find which of these types of vegetation growing?
  - a. Annual forbs
  - b. Annual grasses
  - c. Shrubs
  - d. Perennial grasses
  
2. Range site classification is based on:
  - a. Soils
  - b. Climate
  - c. Topography
  - d. All of the above
  
3. On shortgrass prairie heavy grazing will result in:
  - a. Warm season grasses
  - b. Cool season grasses
  
4. How many square feet are in an acre?

### Reference Materials

- 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> (Conservation and Survey Division, UNL)  
<http://nebraskalegislature.gov> (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.

Sample Question Answers: A, D, A and 43,560

## Objective 2: Range Plants

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

## Practice Exercises

### Exercise 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.

### Exercise 2

Plants all have specific ways in which they grow and reproduce. Learn how this happens and how plants are influenced by herbivores.

### Exercise 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?

## Range Sample Test Questions

1. A vegetation type that extends over a large area, is termed a \_\_\_\_\_.
  - a. Physiognomy
  - b. Physiography
  - c. Life Form
  - d. Biome
2. Which of the organelles below are most commonly associated with the exchange of genetic material?
  - a. Golgi Bodies
  - b. Nucleus
  - c. Mitochondria
  - d. Vacuole
3. In a rangeland condition, which plant below would be considered an invader?
  - a. Annual Sunflower
  - b. Smooth brome
  - c. Little bluestem
  - d. Blowout grass

## Reference Materials

- Nebraska Game & Parks: [www.outdoornebraska.gov/lessonplans](http://www.outdoornebraska.gov/lessonplans) (Prairies)
- 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.

Sample Question Answers: D, B and A

## Objective 3: Range Ecology

- 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

## Practice Exercises

### Exercise 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.

### Exercise 2

To successfully manage an area, the manager must know what plants occur within an area and how many there are. Learn about the different sampling methods and tools that exist and how they are used to make management decisions.

## Range Sample Test Questions

1. Which of the following are biotic factors of an ecosystem? Circle all that apply.
  - 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
  - d. 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 Materials

- 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, 2<sup>nd</sup> Edition. Denver, CO.

Sample Question Answers: BCD, D, D and B



## **Objective 4: Rangeland and the Livestock Industry**

- 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.)

## **Practice Exercises**

### **Exercise 1**

Determine the relationship that has existed between grazing lands and herbivores and the effect of these relationships on vegetation.

### **Exercise 2**

Rangeland health can be determined in many ways, what are some of the theories that exist, how is rangeland health determined.

### **Exercise 3**

Grazing systems and management seek to solve the problem of animal distribution while maximizing animal production. Learn about the different systems and practices that have been employed over the years and the successes and failures.

### **Exercise 4**

Often, people try to “improve” an area for livestock production and wildlife habitat. What are the differing methods employed? How successful are they on the different rangeland ecosystems?

### **Exercise 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.

## Range Sample Test 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 Materials

- 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.

Sample Question Answers: A, B and B

## **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

## **Practice Exercises**

### **Exercise 1**

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

### **Exercise 2**

Determine how our uses and perceptions of the uses of rangelands influence management decisions. What are the roles of politics in rangeland management?

### **Exercise 3**

What are some of the rangeland improvement techniques used for the benefit of livestock and wildlife?

### **Exercise 4**

Do livestock and wildlife really compete for resources? If so how? Can one be used to improve an area for the other?

## Range Sample Test Questions

1. Many foresters believe that a large portion of the grasslands that currently comprise more than 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 Materials

- 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 21<sup>st</sup> Century. Denver Colorado
- Society for Range Management. Rangeland Wildlife. Denver Colorado
- Society for Range Management. Coordinated Resource Management Guidelines. Denver, Colorado

Sample Question Answers: B and D

# Aquatics

Information Provided By: Nebraska Department of Environment and Energy  
Jennifer Swanson, Nebraska Association of Resources Districts/Nebraska  
Department of Environment and Energy Liaison

Did you know that two atoms of hydrogen plus one atom of oxygen produces a molecule of water? Wow! It is amazing that zillions of these tiny water molecules can fill up a puddle, pond, lake, river and all the oceans of the world. Can you believe that something so small is essential for human and animal survival?

Clean water is one of Nebraska's most valuable resources. With approximately 80,000 miles of rivers and streams and 152,000 acres of lakes, Nebraska's waters provide opportunities for various uses including: agriculture, industry, recreation, fish, wildlife and human consumption. The High Plains Aquifer System underlies about 85 percent of Nebraska and supplies 95 percent of all groundwater used here. Nebraska's groundwater provides 82 percent of the state with drinking water. Due to concerns about surface and groundwater quality, it is imperative for people to understand the processes that impact our water system. 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

Understand the physical and chemical attributes of water including the following term:

- Density
- Composition
- Physical Phase
- Dissolved Oxygen
- Salinity
- Alkalinity
- Temperature
- pH
- Specific Conductance
- Temperature
- Turbidity
- Hardness
- 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.

## Aquatics Sample Test Question

1. 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 Materials

- Handbook of Common Methods in Limnology, Owen T. Lind.
- Common Water Measurements [Water Science School \(usgs.gov\)](http://water.usgs.gov)
- Intro to Hydrology ([http://geog.ouc.bc.ca/conted/onlinecourses/geog\\_111/6a.html](http://geog.ouc.bc.ca/conted/onlinecourses/geog_111/6a.html))

Sample Question Answer: C

## Objective 2: Point and Non-Point Source Pollution

- 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.

## Aquatics Sample Test Questions

1. Non-point source pollution refers to agriculture and not to any urban activities.
  - a. True
  - 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. Non-point source pollution
  - d. Wastewater system discharge

3. Which of the following conservation practices have proven effective at reducing runoff from agricultural fields?
- a. Grassed waterways
  - b. Terraces
  - c. Conservation tillage
  - d. Field borders or filter strips
  - e. All of the above

## Reference Materials

- U.S. Environmental Protection Agency (EPA) > Law and Regulations > Laws and Executive Orders: [www.epa.gov/laws-regulations/laws-and-executive-orders](http://www.epa.gov/laws-regulations/laws-and-executive-orders)
- U.S. Environmental Protection Agency (EPA) > Ground and Drinking Water > Environmental Education > Non-Point Source Pollution: [www.epa.gov/ground-water-and-drinking-water/environmental-education-non-point-source-pollution](http://www.epa.gov/ground-water-and-drinking-water/environmental-education-non-point-source-pollution)

Sample Question Answer: B, C and E

## Objective 3: Watershed

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

## Aquatics Sample Test 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

- Groundwater Foundation: [www.groundwater.org](http://www.groundwater.org)

Sample Question Answer: A and C

## Objective 4

- Understand the significance of Nebraska’s water resources (e.g. Sandhill lakes, groundwater, 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.

## Aquatics Sample Test Questions

1. The soils found in wetlands that 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

- Nebraska Game & Parks: [www.outdoornebraska.gov/lessonplans](http://www.outdoornebraska.gov/lessonplans) (Water and Wetlands)
- “World Wetlands Day: Lincoln, Nebraska’s Legacy” video with Game & Parks Speakers (Feb. 2021): [World Wetlands Day: Lincoln, Nebraska's Legacy - YouTube](https://www.youtube.com/watch?v=...)
- Papio-Missouri River NRD > Educational Video “Aquatics Macroinvertebrates”:  
[www.papionrd.org/education/online-educational-resources](http://www.papionrd.org/education/online-educational-resources)

Sample Question Answer: B and B

## Objective 5

- 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).



## Aquatics Sample Test 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." Available through [www.digitalcommons.unl.edu](http://www.digitalcommons.unl.edu).

Sample Question Answer: B, B and B

## Objective 6

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

## Objective 7

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

## Aquatics Sample Test 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. What is a hydrograph?
  - a. Graph of watershed runoff versus time
  - b. Graph of watershed depth
  - c. Graph of rainfall intensity
  - d. Graph of storm duration
  
3. The age of a fish may be determined by analyzing \_\_\_\_\_.
  - a. Scales
  - b. Otoliths
  - c. Spines
  - d. All of the above
  
4. Gills function to \_\_\_\_\_.
  - a. Take up oxygen
  - b. Maintain osmotic balance
  - c. Eliminate waste
  - d. All of the above

## Reference Materials

- Soil and Water Conservation Systems, by: Schwab, Fangmeier, Elliot, Wetzel.
- Peterson Field Guide to Freshwater Fishes of North America
- Nebraska Game & Parks Commission: [www.outdoornebraska.gov/nebraskafishspecies/](http://www.outdoornebraska.gov/nebraskafishspecies/)

Sample Question Answers: D, A, D and D

# Soils

Information Provided By: Nebraska's Natural Resources Conservation Service  
Patrick Cowser, Assistant State Soil Scientist

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 homes. One spade full of soil supports more species of organisms than can be found in the entire Amazon Rain Forest. Soil supports life!

Soil is a very important natural resource. Look around on your drive home from school, notice all of the plant growth. 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 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. By understanding soil characteristics, you will be able to identify the importance and necessity of conserving our soil.

## Objective 1: What is Soil?

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

## Reference Materials

- United States Department of Agriculture Natural Resources Conservation Service (Nebraska): [www.ne.nrcs.usda.gov](http://www.ne.nrcs.usda.gov)
- Soil Survey Manual: Available on the [www.nrcs.usda.gov](http://www.nrcs.usda.gov) website

## **Objective 2: Soil Characteristics**

Understand the following terms related to soil science:

- Composition
- Chemistry (pH, Cat-ion Exchange Capacity Reduction and Oxidation)
- Texture
- Structure
- Slop
- Color
- Horizons/Profile
- Permeability/Percolation (soil water and drainage)

## **Reference Material**

- Soil Survey Manual: Available on the [www.nrcs.usda.gov](http://www.nrcs.usda.gov) website

## **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 do you use them?

## **Reference Material**

- Soil Survey Manual: Available on the [www.nrcs.usda.gov](http://www.nrcs.usda.gov) website

## **Objective 4: Soil Use**

- Agriculture
- Forestry
- Wildlife Management
- Recreation
- Building Site Development
- Conservation Planning

## **Reference Material**

- Soil Survey Manual: Available on the [www.nrcs.usda.gov](http://www.nrcs.usda.gov) website

## Objective 5: Erosion and Sedimentation

- Definitions
- Types of Erosion
- Economic Impacts
- Prevention

## Reference Materials

- United States Department of Agriculture Natural Resources Conservation Service (Nebraska): [www.ne.nrcs.usda.gov](http://www.ne.nrcs.usda.gov)
- Soil Survey Manual: Available on the [www.nrcs.usda.gov](http://www.nrcs.usda.gov) website
- University of Nebraska-Lincoln Institute of Agriculture and Natural Resources > Cropwatch > “Practices to Reduce Wind Erosion”
- University of Nebraska-Lincoln Institute of Agriculture and Natural Resources > Nebraska Extension > UNL Water > “Soil Erosion and Sediment Control”
- Iowa State University Extension > Soil Erosion: An agricultural production challenge

## Objective 6: Hydric Soils

- Definition
- Characteristics
- Uses/Limitations
- Economic Value

## Reference Material

- Soil Survey Manual: Available on the [www.nrcs.usda.gov](http://www.nrcs.usda.gov) website

## Additional Soil Reference Materials

- Visit the website: [www.soilseries.sc.egov.usda.gov](http://www.soilseries.sc.egov.usda.gov) > View Classification Data by Series Name > Search: Holdrege
- Keys to Soil Taxonomy. Soil Survey Staff. 2014. Keys to Soil Taxonomy, 12th ed. USDA-Natural Resources Conservation Service, Washington, DC. Find on the NRCS website: [www.nrcs.usda.gov](http://www.nrcs.usda.gov) > Home/Soil Survey/Soil Classification/Keys to Soil Taxonomy
- “The Nature and Properties of Soils, 11th Edition”, Brady, Nyle C. and Weil, Ray R., Prentice Hall Press, 1996
- PCA Soil Primer, Portland Cement Association (Book). *Includes definitions of soil terms and tests commonly used by soil technicians. Describes soil surveys and sampling; soil-bearing value tests; and examples of soil surveys, tests, and analyses.*
- Local Soil Survey Reports – contact local county NRCS offices for a copy.
- Soil and Water Conservation Society ([www.swcs.org](http://www.swcs.org))

## Soil Sample Test 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. 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
  - d. Soil Consistence
6. Soil scientists classify soil particles in the categories of \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
7. Crops grown in rotations to maintain or improve soil productivity and fertility is called:
  - a. Contour farming
  - b. Conservation tillage
  - c. Crop rotation
  - d. None of the above

8. Which of the following drainage classes would a hydric soil most likely have?
- a. Well drained
  - b. Excessively drained
  - c. Moderately well drained
  - d. Very poorly drained
9. Which of the following soil consistence terms would probably describe a sand texture?
- a. Firm
  - b. Plastic
  - c. Friable
  - d. Loose
10. Sediment from erosion can be reduced by \_\_\_\_\_.
- a. Planting grass and trees
  - b. Digging ditches
  - c. Mulching areas
  - d. A and C
  - e. All of the above

Sample Question Answers:

- 1. D
- 2. A
- 3. B
- 4. E
- 5. C
- 6. Sand, Silt and Clay
- 7. C
- 8. D
- 9. D
- 10. D

# Forestry

Information Provided By: Nebraska Forest Service:  
Rachel Allison, District Forester

Nebraska is “Home of Arbor Day?” Have you ever heard of Arbor Day? This day is particularly important to Nebraska. J. 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. During the first Arbor Day, prizes were offered to counties and individuals for planting the largest number of trees. It was estimated that almost one million trees were planted in Nebraska during the first Arbor Day. Arbor Day became an official state holiday in 1885. Arbor Day 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, “Arbor Day is not like other holidays. Each of those reposes on the past, while 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

Trees also save us 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
- Chlorophyll
- Transpiration
- Xylem
- Phloem
- Cambium
- Sapwood
- Heartwood
- Growth ring
- Roots
- Trunk
- Leaves
- Crown

## Forestry Sample Test 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 (softwoods), others are deciduous (hardwoods). Each of these differences also determine 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
- Silviculture
- Forest type
- Genus and Species
- Deciduous & Conifer
- Softwood and Hardwood
- Leaf type, arrangement, shape and composition
- Broadleaf, needle-like or scale-like leaves
- Whorled, pinnate or palmate

## Forestry Sample Test 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.

#### **Know 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

### **Forestry Sample Test 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.

### **Terminology to Know**

- 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

What happens when we disturb, disrupt or stop one of the above systems from functioning?

### **Understand Different Impacts on a Forest**

- Fire Suppression
- Global Warming/Climate Change
- Flooding
- Droughts
- Insect Infestations
- Invasive Tree Pests
- Urban Expansion

### **Forestry Sample Test Questions**

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

### **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

## Forestry Sample Test Questions

9. Why do foresters thin a pure stand of ponderosa pine?
10. Why is the forest type along the Platte 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.

Know the different values each person has for themselves relating 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)
- U.S. Forest Service (USFS)
- National Park Service (NPS)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Army Corps of Engineers
- Bureau of Land management (BLM)
- Department of Natural Resources (DNR)
- Natural Resources Conservation Service (NRCS)
- Nebraska Extension
- Natural Resources Districts (NRDs)

## **Forestry Sample Test Questions**

11. Why are Nebraska's forests so valuable?
12. True or False – Wood is the only natural resource that is renewable, recyclable, and biodegradable.
13. True or False – A forest can be preserved in its present condition by removing all human influence.

## Reference Material and Resources

- 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.
- Contact your local district forester! They can help with forestry books, practical help with using forestry tools and answering questions. [www.nfs.unl.edu/foresters](http://www.nfs.unl.edu/foresters)
- Project Learning Tree Activity Guides: [www.plt.org](http://www.plt.org)
- UNL-Nebraska Forest Service: [www.nfs.unl.edu](http://www.nfs.unl.edu)
- Nebraska Statewide Arboretum: [www.arboretum.unl.edu](http://www.arboretum.unl.edu)
- Arbor Day Foundation: [www.arborday.org](http://www.arborday.org)
- American Forests: [www.americanforests.org](http://www.americanforests.org)
- Tree Farm: [www.treefarmssystem.org](http://www.treefarmssystem.org)
- Smokey Bear: [www.smokeybear.com](http://www.smokeybear.com)
- Forestry Index: [www.forestryindex.net](http://www.forestryindex.net)
- Plant Database: [www.plants.usda.gov](http://www.plants.usda.gov)
- USDA Forest Service: [www.fs.fed.us](http://www.fs.fed.us)

### Forestry Sample Test Question Answers:

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 redcedar
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 Game & Parks Commission  
Lindsey Rogers, Fish & Wildlife Education Division Administrator

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 do they live there?
- 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

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 like spurs on male pheasants and 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 has 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. Understand the various methods wildlife use to communicate and be familiar with the calls of various big game animals and game birds.
18. Understand the role of hunting in managing wildlife populations and some of the laws and regulations that direct such activities.
19. Understand the differences between native and introduced species and be able to identify such pelts and or skulls of various Nebraska animals. Focus on Bobcat, Great Horned Owl, Coyote, Fox, Cottontail Rabbit, Raccoon and Muskrat.
20. Discuss the potential impacts of introduction of a non-native species

**Be Familiar with the Following Animal Species:**

- 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
- Mourning Dove
- Threatened Species
- Endangered species,
- Song birds of Nebraska
- Fresh-water fish of Nebraska

## 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.

## Suggested Review

Review this information on the U.S. Fish and Wildlife website as well as the Nebraska Game & Parks Commission website:

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 types of habitats found throughout Nebraska and be able to discuss them. This includes wetlands, forests, grasslands, ponds, lakes, rivers, etc.
10. How do we categorize wetlands? What is a grassland? What species may be found in them?

## Wildlife Sample Test Questions

1. Which of the following is listed as both a state and federally endangered species?
  - a. Topeka Shiner
  - b. Ute Ladies'-tresses
  - c. Swift Fox
  - d. Piping Plover
  
2. The bird to the right has a beak adapted for what?
  - a. Tearing apart food
  - b. Cracking seeds and nuts
  - c. Sipping nectar
  - d. Probing in mud and shallow water
  
3. The Federal Aid in Wildlife Restoration Act is also known as \_\_\_\_\_.
  - a. The Dedicated Conservation Act
  - b. Preston-Rogers Act
  - c. The Pittman-Robertson Act
  - d. The Wildlife Conservation Fund



## Reference Materials

- Nebraska Game & Parks website > Focus on the Wildlife and Fisheries Pages: [www.outdoornebraska.org](http://www.outdoornebraska.org)
- NebraskaLAND Magazine. Wildlife Habitat Improvement Guide Vol. 69, NO. 1, January/February 1991
- Nebraska Wetlands: [www.outdoornebraska.gov/nebraskawetlands](http://www.outdoornebraska.gov/nebraskawetlands)
- U.S. Environmental Protection Agency (EPA): [www.epa.gov/wetlands](http://www.epa.gov/wetlands)
- U.S. Fish and Wildlife Service website > Endangered and Threatened Species in Nebraska:
  - [www.fws.gov/endangered](http://www.fws.gov/endangered)
  - [www.fws.gov/species](http://www.fws.gov/species)
  - [www.fws.gov/laws](http://www.fws.gov/laws)
  - [www.fws.gov/hunting](http://www.fws.gov/hunting)
  - [www.fws.gov/birds/faqs](http://www.fws.gov/birds/faqs)
  - Conservation Heroes: <https://training.fws.gov/history/ListsHeroes.html>
- Tekiela, S. 2003. Birds of Nebraska. Adventure Publications Inc. Cambridge, NY.
- U.S. Department of Agriculture (USDA) > National Invasive Species Information Centers: [www.invasivespeciesinfo.gov](http://www.invasivespeciesinfo.gov)
- eNature America's Wildlife Resources: [www.enature.com](http://www.enature.com)
- Pheasants Forever: [www.pheasantsforever.org](http://www.pheasantsforever.org)
- Ducks Unlimited: [www.ducks.org](http://www.ducks.org)
- Project WILD K-12 Curriculum & Activity Guide
- Nebraska Hunt Guide – available at any Nebraska Game & Parks Commission office.

Wildlife Sample Test Question Answers: A, B and C

# Special Topic

*(Current Environmental Issue – Changes Annually)*

Information Provided By: National Conservation Foundation (NCF) Envirothon

The Special Topic or Current Environmental Issue (CEI) changes annually and is selected by the host state/province for the NCF-Envirothon. The topic is traditionally broad and then narrowed down to apply to each local competition ahead of the international competition.

**Past Special Topics:**

2023 – Adapting to a Changing Climate

2022 – Waste to Resources

2021 – Water Resources Management: Local Control, Local Solutions

2020 – No Event

2019 – Agriculture & the Environment: Knowledge and Technology to Feed the World

2018 – Western Rangeland Management: Balancing Diverse Views

2017 – Agricultural Soil and Water Conservation Stewardship

2016 – Invasive Species: A Challenge to the Environment, Economy and Society

2015 – Urban/Community Forests

2014 – No Event

2013 – Sustainable Rangeland Management

2012 – Non-Point Source Pollution: Low Impact Development

2011 – Salt and Fresh Water Estuaries

2010 – Protection of Groundwater Through Urban, Agricultural and Environmental Planning

2009 – Biodiversity in a Changing World

2008 – Recreational Impacts on Natural Environments

2007 – Alternative/Renewable Energy

2006 – Water Stewardship in a Changing Climate

Each year, new study materials for the special topic will be posted on the Nebraska Association of Resources Districts Envirothon page. Available at [www.nrdnet.org/nebraska-envirothon](http://www.nrdnet.org/nebraska-envirothon)

## Additional Learning/Teaching Materials

### Nebraska Association of Resources Districts

**Envirothon Website:** [www.nrdnet.org/nebraska-envirothon](http://www.nrdnet.org/nebraska-envirothon)

Visit the website to find information on competition dates, Nebraska Envirothon regional boundaries, newsletter and more. The website also contains study guides by topics including various PowerPoint presentations given by test writers throughout the years. Great resources to let your students browse or as a teaching tool for the classroom.

### NRD Online Education Tool

- **Papio-Missouri River NRD:** Includes short educational videos, links by topic to various lessons and helpful websites, etc. [www.papionrd.org](http://www.papionrd.org) > Education > Online Education Resources
- **Lower Platte South NRD:** Includes educational videos and links by topic more topics. [www.lpsnrd.org](http://www.lpsnrd.org) > Programs > Environmental Education > Virtual Classroom

### Nebraska Game & Parks Commission

- Conservation Lesson Plans – [www.outdoornebraska.gov/lessonplans](http://www.outdoornebraska.gov/lessonplans)
- Wildlife Education Trunks – Educators can check out hands-on resources to help educate students about a wide variety of topics. Check-out is for two weeks and free to use. [www.outdoornebraska.gov/wildlifeeducationtrunks/](http://www.outdoornebraska.gov/wildlifeeducationtrunks/)
- Watchable Wildlife Guides – breaks down animals, insects and plants by regions in Nebraska. [www.outdoornebraska.gov/wildlifeguides/](http://www.outdoornebraska.gov/wildlifeguides/)
- Wild What's Up – Wildlife Educators answer various questions on a range of topics with short educational videos. [www.outdoornebraska.gov/wildwhatsup](http://www.outdoornebraska.gov/wildwhatsup)
- The Science of... – videos explore the science behind everyday things people see or hear about nature or animals. YouTube playlist with various videos: Nebraska Game & Parks Education YouTube Page > The Science of... Wildlife Education playlist.

### Range Judging Handbook and Contest Guide for Nebraska (Extension Publication)

This book was originally designed for Range Judging, but it is an excellent resource for Envirothon, too. Includes range plant identification and classification, ecological sites, proper use, wildlife habitat managements, test questions and glossary of terms. PDF version is free, or a printed version is \$4. Range Judging Handbook and Contest Guide for Nebraska | Nebraska Extension Publications: Nebraska Extension Publications ([unl.edu](http://unl.edu))

### Other Envirothon Programs

- North Carolina has resources for Envirothon training including presentations, quizzes, Jeopardy games, etc. [www.ncagr.gov/SWC/educational/envirothon-team\\_resources](http://www.ncagr.gov/SWC/educational/envirothon-team_resources)
- Pennsylvania Envirothon has “Station Training”: [www.envirothonpa.org](http://www.envirothonpa.org)