This educational resource was originally developed and written by Joyce Harmon Depenbusch and designed and illustrated by Alan W. Baccarrella.

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Illustration and layout by: Dustin Teasley and Stacy Miller

Review of text by: Kathy Hodges, Marla Harker, and Shelby Stevens

Resource section by: Erika Nighswonger

The educational material is dedicated to the children of Kansas. May they develop an awareness and appreciation for Kansas’ wildlife.

Funded by hunting and fishing license fees and the Nongame Wildlife Tax Check-Off Program.

Kansas Dept. of Wildlife and Parks
512 SE 25th Avenue
Pratt, Kansas 67124-8174

Reprint permission is granted for educational purposes only. Other usage will require written permission from the Wildlife Education Coordinator, Kansas Department of Wildlife and Parks, Pratt, Kansas.
Dear Educator,

As Kansans, we have been blessed with an environment capable of providing us with the natural resources to enjoy life to its fullest. Our wildlife is one such resource enjoyed by many Kansans. The future of this resource and others will directly depend on an enlightened citizenry which understands and appreciates the practices and commitment needed to insure the quality of these natural resources.

We believe one can nurture within children an environmentally sound attitude. The combination of children’s spontaneous interest for living things, our informative materials and resources, and your expertise in teaching and motivating children will assist us in this objective. You, as the instructional leader, are the catalyst; without your commitment the other two remain dormant. We need to care about our young people, their future, and the future of Kansas’ natural resources. “Children who care about our earth today can change the world tomorrow.”

As part of our commitment to assist educators, the Kansas Department of Wildlife and Parks created the Wildlife Education Service section in 1981. The WES, with its comprehensive resources, is dedicated to instilling an awareness, understanding and appreciation in Kansas’ youth of our natural resources, especially wildlife. Together we will make a difference. Assist us by making your fellow teachers aware of what WES has to offer.

Feel free to direct any concerns or questions regarding WES to the Pratt Operational Headquarters. We look forward to working with you and wish you and your students a successful learning experience.

Sincerely,
The WES Staff
Kansas Dept. of Wildlife and Parks
512 S.E. 25th Avenue
Pratt, Kansas 67124
(620) 672-5911
ShelbyS@wp.state.ks.us

“Never doubt that a small group of thoughtful committed individuals can change the world; indeed, it’s the only thing that ever has.”

Margaret Mead
Introduction

This wildlife education resource was developed to assist educators in establishing a greater awareness and appreciation in children for their natural environment and Kansas’ wildlife. Everyone, especially our children, needs to become more knowledgeable and aware of their bio-physical and cultural environment. We need to increase our sensitivity and understanding of how our behavior and actions affect the ability of our natural environment to maintain and enhance the quality of all life forms.

The materials and resources provided will spark the natural attraction and spontaneous interest children have for wildlife. You, as the instructional leader and motivator, provide the most important component in the nurturing of students to become environmentally enlightened individuals with a caring attitude for all living things. One need not be a wildlife expert to teach children about their environment and wildlife. The most important ingredient for successful presentations will be your enthusiasm and imagination.

These instructional materials are multi-disciplinary, flexible, and will enrich all aspects of your on-going curriculum with minimal preparation or equipment. But, to be effective, the activities and information must become an integrated part of your on-going instruction. The material is appropriate for use throughout Kansas. We encourage you to utilize the out-of-doors as a learning site whenever possible. When outdoors, remind your students they are company in the homes of wildlife and their behavior should reflect it. Technical assistance and resources can be obtained from the Wildlife Education Service Section of the Kansas Department of Wildlife and Parks through the following materials and services.

The Reference Center in Pratt has over 4,000 resources on wildlife and related topics in a variety of formats. Nature’s Notebook, a collection of education features from the Kansas Wildlife and Parks magazine, provides educators with a wide variety of wildlife information sheets, hands-on activities and support materials. The On T.R.A.C.K.S newsletter provides information and resources to assist educators in developing a basic understanding and appreciation of ecology in children. Project WILD, Project Aquatic and Project Learning Tree, nationally acclaimed environmental education programs, emphasize basic concepts about our natural resources, wildlife, water and our forests. The learning experiences in their activity guides provide an interdisciplinary, hands-on program for pre-schools to adults. They are also a simple way for educators to gain confidence in using the out-of-doors as an effective learning setting.
The Linkage is There

The Curriculum Standards for Science, issued in 2002, by the Kansas State Board of Education, was used to define the desired student outcome for this resource. The general mission statement of the above document indicates the need for students to be prepared decision makers. To develop this skill, students need to become adept at acquiring new knowledge while developing a better understanding and awareness of the technology, economics, and social applications that are associated with the many problems they will confront throughout their lives.

The enclosed activities emphasize a group-setting approach, encouraging students to become skillful thinkers and problem-solvers. Other components such as curiosity, creativity, perseverance, and flexibility-important in the inquiry and problem solving process-are also fostered in this guide.

The inquiry areas included within this resource are: Classification, Adaptation, and Threatened and Endangered. The Curriculum Standards for Science utilizes the following identified themes: Patterns of Change, Systems and Interactions, Patterns of Stability, and Models. These organizers show how knowledge, principles, and concepts connect one aspect of inquiry to another.

The first area of inquiry, 'Classification', encourages students to gather information through direct observation to create models thru which they can identify and classify wildlife.

The second area of inquiry, 'Adaptation', expands the model to show how wildlife are modified in structure and/or function for survival purposes. The difference in the shape, size, color, and life patterns (adaptations) of the various forms of wildlife helps us to identify wildlife and their special diversity.

Finally, the third area of inquiry, the 'Threatened and Endangered', illustrates what can happen when patterns-of-stability within the system are altered by human activities which impact the ecological system. Through the investigation of 'Classification' and 'Adaptations', students will be better suited to identify why some species of wildlife are more prone to be threatened and/or endangered than others.

The theme organizers utilized in this guide are similar to those used in the Kansas State Board of Education Curriculum Standards for Science. We have also tried to link the guide's format and objectives closely to those stated in the Curriculum Standards for Science. We do wish to stress the materials and activities are not just science oriented, but can be integrated into a variety of subjects within the on-going curriculum.

The Kansas Department of Wildlife and Parks realizes the environmental issues and decisions the young people of today will face requires a combination of factual knowledge and a motivating concern which will result in taking some form of action to resolve the problem. Your role as an educator is a vital link in achieving this environmental literacy.
# Primary Resources

**KANSAS ORGANIZATIONS**

<table>
<thead>
<tr>
<th>Organization</th>
<th>Address</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture in the Classroom</td>
<td>Kansas State University 124 Bluemont Hall Manhattan, KS 66506</td>
<td>(785) 532-7946</td>
</tr>
<tr>
<td>Audubon of Kansas</td>
<td>813 Juniper Dr. Manhattan, KS 66502-3180</td>
<td>(785) 537-4385</td>
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<tr>
<td>Blue River Watershed Assoc.</td>
<td>10312 W 49th Place Shawnee, KS 66203-1618</td>
<td>(913) 288-3500</td>
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<tr>
<td>Botanica - The Wichita Gardens</td>
<td>701 N Amidon Wichita, KS 67202</td>
<td>(316) 264-0448</td>
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<tr>
<td>Brit Spaugh Zoo</td>
<td>PO Box 274 Great Bend, KS 67530</td>
<td>(620) 793-4160</td>
</tr>
<tr>
<td>Chaplin Nature Center</td>
<td>US 166, Box 216 Arkansas City, KS 67005</td>
<td>(620) 442-4133</td>
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<tr>
<td>Children's Museum of Wichita</td>
<td>435 S Water Wichita, KS 67202</td>
<td>(316) 267-3844</td>
</tr>
<tr>
<td>City of Overland Park Arbororetum &amp; Botanical Gardens</td>
<td>8500 Santa Fe Dr. Overland Park, KS 66212-2866</td>
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<tr>
<td>Clement Stone Nature Center</td>
<td>7240 W Tenth St. Topeka, KS 66615</td>
<td>(785) 273-5806</td>
</tr>
<tr>
<td>Dillon Nature Outdoor Ed Center</td>
<td>3002 E 30th Hutchinson, KS 67501</td>
<td>(620) 663-7411</td>
</tr>
<tr>
<td>Dych Arboretum of the Plains</td>
<td>Hesston College PO Box 3000 Hesston, KS 67062</td>
<td>(620) 327-8127</td>
</tr>
<tr>
<td>Emporia Zoo</td>
<td>75 Soden Rd. South Commercial St. Emporia, KS 66801</td>
<td>(620) 342-5105</td>
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<tr>
<td>Ernie Miller Nature Center</td>
<td>909 N K-7 Hwy. Olathe, KS 66061</td>
<td>(913) 764-7759</td>
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<td>Flint Hills RC&amp;D Area, Inc.</td>
<td>PO Box 260 Strong City, KS 66869</td>
<td>(620) 273-6321</td>
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<td>Grassland Heritage Foundation</td>
<td>PO Box 394 Shawnee Mission, KS 66201</td>
<td>(913) 262-3506</td>
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<td>Great Plains Nature Center</td>
<td>6232 E. 29th St. N Wichita, KS 67220</td>
<td>(316) 683-5499</td>
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<td>Fick Fossil &amp; History Museum</td>
<td>700 W 3rd Oakley, KS 67748</td>
<td>(785) 672-4839</td>
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<tr>
<td>Kansas Academy of Science</td>
<td>1930 Constant Ave. Campus WEST Lawrence, KS 66047</td>
<td>(913) 864-2700</td>
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<td>KS Assoc. of Conservation Districts</td>
<td>522 Winn Rd. Salina, KS 67401</td>
<td>(785) 827-2547</td>
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<td>KS Bass Chapter Federation</td>
<td>816 Capitol View Dr. Topeka, KS 66617</td>
<td>(785) 264-1364</td>
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<tr>
<td>KS Biological Survey Foley Hall</td>
<td>2101 Constant Ave. Lawrence, KS 66047-3759</td>
<td>(785) 864-1500</td>
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<td>KS Department of Wildlife &amp; Parks</td>
<td>512 SE 25th Ave. Pratt, KS 67124</td>
<td>(620) 672-5911</td>
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<tr>
<td>KS Geologic Survey Campus WEST</td>
<td>University of Kansas 1930 Constant Ave. Lawrence, KS 66047-3726</td>
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<td>KS Herpetological Society</td>
<td>Museum of Natural History KU 1345 Jayhawk Blvd. Lawrence, KS 66045</td>
<td>(785) 864-4540</td>
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<td>6425 SW 6th Ave. Topeka, KS 66615-1099</td>
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<td>KS Ornithological Society</td>
<td>Dept. of Biological Sciences Fort Hays State University Hays, KS 67601</td>
<td>(785) 628-4000</td>
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<tr>
<td>KS School Naturalist</td>
<td>Division of Biological Sciences Emporia State University Emporia, KS 66801</td>
<td>(620) 343-1200</td>
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<tr>
<td>KS State Conservation Commission</td>
<td>109 SW Ninth St. Suite 500 Topeka, KS 66612-1299</td>
<td>(785) 296-3600</td>
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<td>KS State Department of Education</td>
<td>120 SE 10th Ave, Topeka, KS 66612-1182</td>
<td>(785) 296-3201</td>
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<td>Kouffman Museum</td>
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<td>Diane Johnson</td>
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<td>KS Department of Health and Environment LSOB</td>
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<td>Kirwin National Wildlife Refuge</td>
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<td>Pine Ridge Interpretive Center Pomona Reservoir</td>
<td>RT 1, Vassar, KS 66543</td>
<td>(785) 453-2201</td>
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<td>KS State Extension Services</td>
<td>Dept. of Animal Sciences &amp; Industry K-State University</td>
<td>Animal Damage Control</td>
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<td>Lake Afton Public Observatory</td>
<td>250th St. W &amp; 39th St. S, Wichita, KS</td>
<td>(316) 689-3191 or (316) 794-8995</td>
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<td>(785) 823-0240</td>
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<td>KS Seirra Club</td>
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<td>512 SE 25th Ave, Pratt, KS 67124</td>
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<td>KS Water Office</td>
<td>901 SW Ninth St, Suite 300, Topeka, KS 66612-1249</td>
<td>(785) 887-6057</td>
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<td>Milford Nature Center</td>
<td>3115 Hatchery Dr, Junction City, KS 66441-8369</td>
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<td>Project Learning Tree Forestry Extension Kansas State University</td>
<td>2610 Claflin Rd, Manhattan, KS 66502</td>
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<td>KS Wetlands and Riparian Area Alliance</td>
<td>PO Box 236, McPherson, KS 67460-0236</td>
<td>(620) 241-6921</td>
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<td>Jayhawk Blvd, Lawrence, KS 66045</td>
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<td>214 SW 6th Ave, Suite 205, Topeka, KS 66603</td>
<td>(785) 232-3238</td>
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<td>700 SW Jackson, Suite 104, Topeka, KS 66612</td>
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<td>(316) 942-2212 EXT: 213</td>
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<tr>
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<td>(785) 823-4500</td>
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<td>Cimarron National Grasslands</td>
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<td>Newton, KS 67114-0182</td>
<td>PO Box 654</td>
<td>RT 1 Box 14</td>
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<tr>
<td>(316) 283-0370</td>
<td>Elkhart, KS 67950-0654</td>
<td>Strong City, KS 66869</td>
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<td>(620) 697-4621</td>
<td>(620) 273-8139</td>
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<td>Harper, KS 67058-1725</td>
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<td>(620) 896-7378</td>
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## ADDITIONAL RESOURCES

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<th>National Park Service Interior BLDG</th>
<th>Natural Resource Conservation Service</th>
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<td>U.S. Department of Interior</td>
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<td>Golden Valley, MN 55427</td>
<td>PO Box 37127</td>
<td>760 S Broadway</td>
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<tr>
<td>(612) 525-0002</td>
<td>Washington, DC 20240</td>
<td>Salina, KS 67401</td>
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<td>(202) 208-6843</td>
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<tr>
<td>950 Third Ave.</td>
<td>1400 - 16th St. NW</td>
<td>(Contact KDWP @ Pratt)</td>
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<tr>
<td>New York, NY 10022</td>
<td>Washington, DC 20036</td>
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<td>(212) 832-3200</td>
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<td>730 Polk St.</td>
<td>Kansas Field Office</td>
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<td>Manhattan, KS 66502</td>
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<td>(415) 776-2211</td>
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This page is organized to assist you in locating the suggested activities for your grade level.

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As scientific knowledge expanded over the last few centuries immense volumes of information emerged. The number of known animals grew from a few hundred to over one and one-half million species. With so many different organisms, it became necessary to name and organize them, otherwise, there would be no way to study and communicate about an individual species. Out of this need was born the science of taxonomy. Taxonomy is both the classification of animals and the nomenclature of animals. Classification is the arrangement of the kinds of animals into a hierarchy of smaller and larger groups. Nomenclature is the assigning of names to the kinds and groups of organisms.

Classification. Today, all animals are classified according to their relationship to one another. We group animals and plants together which share similar characteristics. Characteristics such as structural features, size, coloration, or locomotion may be used as well as countable features such as the number of teeth or the number of fin rays, etc. Since external features, like color, may change with the seasons, it is safer to classify animals by structure. Structure refers to how something is put together and may include features such as a skeleton, chambers in the heart, lungs, teeth, hair, etc.

The purpose of classification is really based on convenience, to make sure that all people in all parts of the world can learn about the same animal. For example, in the time of the Ancient Greeks, the word "eagle" was used for any large bird of prey that flew by day. There was no attempt to distinguish between the different kinds of "eagles". As knowledge grew and scientists of different countries began to communicate, people realized they were not always talking about the same "eagle" and that there were many different kinds of "eagles".

Binomial nomenclature. The Swedish botanist, Carl Linnaeus, was the first to purpose a binomial system of naming animals. His system, published in 1757, is still accepted as the standard. Using the universal language of Latin, each animal is given two names—the first name is always capitalized and is the Genus, the second should not be capitalized and is the species. This name, Genus species, is the organism's scientific name and is unique to that organism. The scientific name for humans is Homo sapiens. Only humans have this particular name. No two organisms will have the same scientific name unless they are members of the same species.

Categories. Our present system of classification ranks creatures from broad similarities down to the specific. Thus, every animal has a place in the following groups: kingdom, phylum, class, order, family, genus, and species.
The kingdom is the broadest division possible. Five kingdoms exist today: Animal, Plant, Fungi, Protist (single-celled organisms), and Monera (blue-green algae and bacteria). With a glance, most people can place an organism in the plant or animal kingdom, however, it is not so simple when one begins to look at single-celled organisms. Some single-celled organisms show both plant and animal characteristics, that is why they are now placed in their own kingdom. Fungi and bacteria are also different enough from the other organisms to merit placement in their own respective kingdom.

Kingdoms are separated in phylums. The most familiar animals fall into the phylum of the Chordates or animals with a backbone. Those without backbones, or invertebrates, make up the other phylas. Invertebrate phyla include Arthropoda (all joint-footed animals), Annelids (all segmented worms), Mollusca (mollusks, clams, and snails), and Porifera (sponges) to name a few. In reality, invertebrates far outnumber the vertebrates.

Phylums are divided into classes. There are five vertebrate classes: Fishes, Amphibians, Reptiles, Birds, and Mammals. Fish are the simplest vertebrates while mammals are the most complex. Briefly, the differences between classes are:

**Fishes:** All have fins and gills; two-chambered heart; most with scales; live in water; cold-blooded.

**Amphibians:** Soft, moist skin; three-chambered heart; eggs laid in water, young are aquatic and breathe with gills, adults are land dwelling and usually breathe with lungs; cold-blooded.

**Reptiles:** Body usually covered with scales; eggs laid on land not in water; young resemble parents; toes with claws; incomplete four-chambered heart; cold-blooded.

**Birds:** Body covered with feathers; breathe with lungs; complete four-chambered heart; hatch from eggs; warm-blooded.

**Mammals:** Body usually covered with hair; breathe with lungs; complete four-chambered heart; give birth to live young; nourish young with milk produced by the mother; warm-blooded.

Those animals in a class that share even more characteristics are divided into Orders. Mammals that carry their young in pouches are in the order of Marsupials; those that gnaw with large, curved incisors (like mice and beavers) are Rodents; or those that possess long canine teeth (fangs) are Carnivores.

Even more similar are the members of a Family. All the dog-like members of the order of Carnivores, such as coyotes, foxes, and wolves, are grouped together as the Canids and all the cat-like members are Felids.
All family members that are similar are grouped as a Genus. Members of a genus are very closely related. All members of the canid family that are fox-like share the genus Vulpes.

Finally, we come to the species which is the basic unit of the classification scheme. We defined a group of individuals that can breed with one another and produce fertile young which resemble the parents. A species name is reserved only for those individuals that can interbreed, thus, only the swift fox has the scientific name Vulpes velox.

So, the complete classification of the swift fox is:

Kingdom: Animalia  
Phylum: Chordata  
Class: Mammalia  
Order: Carnivora  
Family: Canidae  
Genus: Vulpes  
Species: velox  

The scientific name of the swift fox is *Vulpes velox*.

The scheme of classification is like a tree having many leaves which are the species. One or more leaves may be found on a small twig to make a genus. Several twigs may be found on a larger twig, thus a family. Two or more twigs will make up a branch to become an order and a number of branches will form a larger branch or class. The main framework of the tree is the phyla and the tree as a whole is the kingdom.

The following additional resources to available to assist you:

**REFERENCE CENTER**

**Books**
- BK 1-3 Amphibians and Reptiles in Kansas
- BK-2-2 Fish in Kansas
- BK-4-3 Wild Animals of North America
- BK 4-6A Field Guide to North American Wildlife
- BK 12-9A NatureScopes: Incredible Insects
- BK 12-9B NatureScopes: Digging into Dinosaurs
- BK 12-9D NatureScopes: Birds, Birds, Birds
- BK 13-3 Trees of North America
- BK 14-18 Finder Series—Trees, Flowers, and Ferns
- BK-14-20 Illustrated Guide to Fossil Collecting

**Filmsrips**
- FS-13B Amphibians—Investigating Vertebrates
- FS-13D Fish—Investigating Vertebrates
- FS-13F Mammals—Investigating Vertebrates
- FS-41 Alike and Different
- FS-45 How Plants and Animals are Grouped

**Learning Kits**
- LK-26 Replitracks
- LK-67 Project Classify: Mammals
- LK-78 Project Classify: Dinosaurs
- LK-92 What Leaf Is It?

**Posters**
- PP-45 Kansas Birds
- PP-61 Tree Identification Chart Series
- PP-75 Warm Water Game Fish Identification
- PP-77 America’s Pearly Mussels

**Computer Software**
- CD-RO-3 Animal Encyclopedia

**Game Kits**
- GK-6 Animal Kingdom
- GK-7 110 Animals
- GK-13 Yotta Know Birds
- GK-15 Yotta Know Mammals

**Game Kits**
- GK-28 Animal Track Matching Card Game
- GK-39 Animal Families Game
- GK-59 Quik Pix
ON T.R.A.C.K.S. NEWSLETTER

The On T.R.A.C.K.S. Newsletter can be obtained for free by contacting the Wildlife Education Services section of the KS Dept of Wildlife & Parks by writing to C/O WES, KDWP 512 SE 25th Ave. Pratt, KS 67124 or phoning (620) 672-5911 or by E-mail at ShelbyS@wp.state.ks.us.

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# Classification

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Fourth Grade - ▼  
Fifth Grade - □  
Sixth Grade - ●
# Taxonomic Terms

Taxonomy is the study of animal and plant classification. See which questions you can answer right away. Complete the remaining questions with further study.

## 1. Animals with backbones are
   A. invertebrates
   B. vertebrates
   C. characteristics
   D. mammals

## 2. The five main groups of vertebrates are
   A. mammals, birds, reptiles, amphibians, and fishes
   B. mammals, insects, birds, amphibians, and fishes
   C. mollusks, mammals, reptiles, fishing, and insects
   D. reptiles, spiders, fishes, mammals, and birds

## 3. Herbivores are
   A. hungry
   B. plant-eaters
   C. meat-eaters
   D. eat both plants and meat

## 4. Reptiles breathe with
   A. air pockets
   B. gills
   C. lungs
   D. both gills and lungs

## 5. Putting animals into groups to make study easier is called
   A. phylum
   B. cold-blooded
   C. classification
   D. herbivore

## 6. Animals are covered with
   A. hair
   B. scales
   C. moist skin
   D. feathers

## 7. Animals that maintain a constant body temperature are
   A. amphibians
   B. cold-blooded
   C. reptiles
   D. warm-blooded

## 8. Animals that are active during the day are
   A. hibernators
   B. nocturnal
   C. tired
   D. diurnal

## 9. Omnivores eat
   A. plants
   B. animals
   C. both plants and animals
   D. fish

## 10. Animals that change body temperature to match their surroundings are
    A. cold-blooded
    B. mammals
    C. vertebrates
    D. warm-blooded

**Bonus** List at least three ways by which animals are classified.

e.g. egg layers, non egg layers
**Distinguishable Characteristics**

**Directions:** Listed below are characteristics which describe various groups of vertebrates. In the blanks provided write the number of each characteristic which best applies to each of the vertebrate groups. Some numbers will be used more than once. Remember there may be exceptions (not all fish have scales). Give two examples of Kansas animals for each group.

1. are warm-blooded
2. are cold-blooded
3. bodies are covered with hair
4. bodies usually have scales
5. have feathers
6. have moist skin without scales
7. adults generally have 4 legs
8. have two legs and wings
9. have short legs or no legs at all
10. have fins

11. breathe through lungs
12. breathe through gills
13. young breathe with gills but usually develop lungs as adults
14. live in water throughout life
15. live on land part of life and in water part of life
16. feed their young milk
17. have beaks
18. young are hatched from eggs
19. most young hatched from eggs but some born live
20. most young born live but a few hatched from eggs

<table>
<thead>
<tr>
<th>Characteristics of Mammals</th>
<th>Characteristics of Reptiles</th>
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</thead>
<tbody>
<tr>
<td>__ __ __ 1. ____________</td>
<td>__ __ __ 1. ____________</td>
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<td>__ __ __ 2. ____________</td>
<td>__ __ __ 2. ____________</td>
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<tr>
<th>Characteristics of Birds</th>
<th>Characteristics of Amphibians</th>
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<tr>
<td>__ __ __ 1. ____________</td>
<td>__ __ __ 1. ____________</td>
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<td>__ __ __ 2. ____________</td>
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<th>Characteristics of Fish</th>
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<tr>
<td>__ __ __ 1. ____________</td>
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<td>__ __ __ 2. ____________</td>
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</table>
WHERE DO THEY BELONG?

Directions: Classify the following animals by class. 
M=mammals, B=birds, R=reptiles, A=amphibians, F=fish, I=insects, O=other.

1. _____ antelope
2. _____ turkey
3. _____ crayfish
4. _____ elk
5. _____ cardinal
6. _____ bluegill
7. _____ monarch butterfly
8. _____ pheasant
9. _____ great-horned owl
10. _____ bass
11. _____ egret
12. _____ seal
13. _____ white-tailed deer
14. _____ otter
15. _____ rattlesnake
16. _____ spider
17. _____ leopard frog
18. _____ anteater
19. _____ eel
20. _____ kangaroo
21. _____ bat
22. _____ armadillo
23. _____ turtle
24. _____ mosquito
25. _____ crocodile
26. _____ cow
27. _____ catfish
28. _____ dog
29. _____ osprey
30. _____ pigeon
31. _____ mallard
32. _____ ant
33. _____ trout
34. _____ whale
35. _____ centipede
36. _____ great blue heron
37. _____ seahorse
38. _____ alligator
39. _____ shark
40. _____ hornet
41. _____ starfish
42. _____ salamander
43. _____ clam
44. _____ toad

NAME ______________________
## VERTEBRATES

### Similarities and Differences

**Directions:** Fill the space under each vertebrate class with the correct characteristic.

### CHARACTERISTICS

<table>
<thead>
<tr>
<th>VERTEBRATE CLASS</th>
<th>Mammals</th>
<th>Birds</th>
<th>Reptiles</th>
<th>Amphibians</th>
<th>Fish</th>
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</thead>
<tbody>
<tr>
<td>Warm or Cold-blooded</td>
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<tr>
<td>Body Covering</td>
<td></td>
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<tr>
<td>Type of Appendages (legs, wing, etc.)</td>
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<tr>
<td>Mechanism used to breathe</td>
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<td></td>
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<tr>
<td>Live born or hatched</td>
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<tr>
<td>Where they live</td>
<td></td>
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</tbody>
</table>
### CATEGORICALLY SPEAKING

**Directions:** Name an animal for each category beginning with the letter in the letter box. See how many you can complete. To make it more difficult add more categories, such as cold-blooded, and lives in water.

#### CATEGORIES

<table>
<thead>
<tr>
<th>Letter</th>
<th>Carnivore</th>
<th>Warm-blooded</th>
<th>Kansas Animal</th>
<th>Herbivore</th>
<th>Animal with Scales</th>
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</thead>
<tbody>
<tr>
<td>T</td>
<td>tiger</td>
<td>toucan</td>
<td>teal</td>
<td>termite</td>
<td>trout</td>
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<tr>
<td>R</td>
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<td>E</td>
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</tbody>
</table>
The knee bone's connected to the . . .

**Directions:** By comparing human bones to those of animals we see how they are similar in structure and function.

Label the upper arm bone, forearm bones, wrist bones, and hand bones on each of the forelimbs below.

<table>
<thead>
<tr>
<th>Human</th>
<th>Whale</th>
<th>Bat</th>
<th>Bird</th>
<th>Alligator</th>
<th>Frog</th>
<th>Rabbit</th>
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<tr>
<td>Upper</td>
<td>Forear</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wris</td>
<td>Hand</td>
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</tr>
</tbody>
</table>

**ALL THUMBS**

Humans are not the only animals to have an opposable thumb (capable of being placed against one or more of the fingers). To see how important this arrangement is, tape down your thumb to the palm of your dominant hand and try to perform some of the following tasks. Write your name with a pencil, staple two pieces of paper together, pick-up an orange or a tennis ball, tie your shoe, or button a shirt.

Can you identify other mammals with an opposable thumb?
Directions: Find and circle the wildlife in each animal class represented below. Answers may run horizontal, vertical (up and down), backwards, or diagonally. Try making your own word search puzzle.

HERPTILES

larva
skink
salamander
newt
mudpuppy
toad
spadefoot
tree frog
spring peeper
bullfrog
tadpole
turtle
slider
lizard
massasauga
garter (snake)
box (turtle)
copperhead
rattlesnake
gila (monster)
gecko
mud (turtle)
racerunner
coachwhip
stinkpot
python
pygmy (rattlesnake)
cobra
water (snake)
ribbon (snake)
map (turtle)
egg
frog
**HIDE N' SEEK**

**Directions:** Find and circle the wildlife in each animal class represented below. Answers may run horizontal, vertical (up and down), backwards, or diagonally. Try making your own word search puzzle.

ibis
swift
stork
loon
wren
veery
vireo
oriole
tern
teal
pheasant
bluejay
coot
duck
quail
chickadee
dove
eagle
finch
gull
heron
kingfisher
jay
owl
hawk
crow
lark
junco

**BIRDS**
Directions: Find and circle the wildlife in each animal class represented below. Answers may run horizontal, vertical (up and down), backwards, or diagonally. Try making your own word search puzzle.

FISH

sucker
darter
crappie
burbot
perch
sturgeon
paddlefish
gar
eel
shad
trout
pike
carp
shiner
chub
dace
buffalo
minnow
killifish
catfish
madtom
bass
sunfish
bluegill
drum
sauger
reedar
molly
goldfish
guppy
cod
tuna
muskey
ray
smelt
walleye
lamprey
Directions: Find and circle the wildlife in each animal class represented below. Answers may run horizontal, vertical (up and down), backwards, or diagonally. Try making your own word search puzzle.

ANIMALS

armadillo  beaver  big brown bat  bison  bobcat  coyote  fox squirrel  mink  mole  muskrat  opossum  prairie dog  raccoon  shrew  striped skunk
Directions: Empty bulletin board or wall space can be put to practical use by deciding how the following groups of animals are alike. Answers can be placed in an envelope and discussed at the end of the week. Below are a few suggestions; add your own ideas.

SIMILAR SPECIES

channel catfish
bluegill
walleye
paddlefish
(FISH)
rattlesnake
turtle
alligator
chameleon
(REPTILES)
mouse
coyote
whale
antelope
(EACH END IN SILENT E)

whale
otter
elk
bat
(MAMMALS)
brown recluse
owl
skunk
firefly
(NOCTURNAL)
deer
grasshopper
beaver
antelope
(HERBIVORES)
dragonfly
beetle
butterfly
spider
(INVERTEBRATES)
western kingbird
largemouth bass
plains leopard frog
red-sided garter snake
(VERTEBRATES)

passenger pigeon
Labrador duck
Steller’s sea cow
Audubon’s bighorn
(EXTINCT)

bobcat
eagle
hawk
scavenger beetle
(CARNIVORES)

black-footed ferret
whooping crane
gray myotis
peregrine falcon
(ENDANGERED SPECIES)

scissortail flycatcher
Mississippi kite
winter wren
osprey
(BIRDS)

NAME ______________________
Taxonomy is a system of classification that groups animals according to their similarities. All animals that have backbones are classified into the group called vertebrates. Vertebrates with feathers are classified as birds; those with hair or fur are recognized as mammals. These broad classification are further subdivided. Mammals with antlers are classified as deer, those with large curved incisors that gnaw (like beavers and mice) are rodents. The more physical characteristics animals have in common, the more closely they resemble each other and are related.

Grouping systems classify animals from broad to specific similarities using the following categories: kingdom, phylum, class, order, family, genus, and species.

Try your hand at developing a classification system for an animal by constructing a mobile similar to the illustration. Attach the proper name and category to cards and hang them in their appropriate order. The illustration classifies Vulpes velox, the swift fox.
THE CASE OF THE MYSTERY ANIMAL

Directions: You have been hired by the Kansas Department of Wildlife and Parks to classify an unusual animal brought to their main office. Using the rather mystifying observation listed below you must decide whether this animal is a mammal, reptile, bird, fish, or amphibian. You also must state reasons for your placement of this animal in the class you selected.

OBSERVATIONS
1. Hair on parts of body, scales on remainder
2. Predator
3. Front legs short, hind legs long, wing-like structure on both sides.
4. Size: approximately 10 inches in length, weight 6 lbs.
5. Breathes through lungs
6. Teeth present

Animal class:
Reason for selection:

Where would you expect to find this animal in Kansas?

What would this animal use as a food source in Kansas?

What techniques would you recommend to manage this species in Kansas?
**Key Classification**

**TAXONOMIC TERMS - PAGE 1**

1=B 2=A 3=C 4=C 5=C 6=A 7=D 8=D 9=C 10=A

**DISTINGUISHABLE CHARACTERISTICS - PAGE 2**

<table>
<thead>
<tr>
<th>Mammals</th>
<th>Reptiles</th>
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<tbody>
<tr>
<td>1 3 7</td>
<td>2 4 9</td>
</tr>
<tr>
<td>11 16 20</td>
<td>11 19 00</td>
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</table>

<table>
<thead>
<tr>
<th>Birds</th>
<th>Amphibians</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 5 8</td>
<td>2 13 15</td>
</tr>
<tr>
<td>11 17 18</td>
<td>17 6 18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 4 10</td>
</tr>
<tr>
<td>14 12 18</td>
</tr>
</tbody>
</table>

**WHERE DO THEY BELONG - PAGE 3**

<table>
<thead>
<tr>
<th>1=M</th>
<th>2=I</th>
<th>3=O</th>
<th>4=M</th>
<th>5=B</th>
<th>6=F</th>
<th>7=I</th>
<th>8=B</th>
<th>9=B</th>
<th>10=F</th>
<th>11=B</th>
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</thead>
<tbody>
<tr>
<td>12=M</td>
<td>13=M</td>
<td>14=M</td>
<td>15=R</td>
<td>16=O</td>
<td>17=A</td>
<td>18=M</td>
<td>19=F</td>
<td>20=M</td>
<td>21=M</td>
<td>22=M</td>
</tr>
<tr>
<td>23=R</td>
<td>24=I</td>
<td>25=R</td>
<td>26=M</td>
<td>27=F</td>
<td>28=M</td>
<td>29=B</td>
<td>30=B</td>
<td>31=B</td>
<td>32=I</td>
<td>33=F</td>
</tr>
<tr>
<td>34=M</td>
<td>35=O</td>
<td>36=B</td>
<td>37=F</td>
<td>38=R</td>
<td>39=F</td>
<td>40=I</td>
<td>41=O</td>
<td>42=A</td>
<td>43=O</td>
<td>44=A</td>
</tr>
</tbody>
</table>
Adaptation

INTRODUCTION AND RESOURCES

Adaptation for Life. All organisms, plant or animal, are fitted for survival in the environment they inhabit. Adaptations are modification in structure and/or function shared by members of a group that aid survival. Adaptations can be found at all levels, from the molecular level, to the cellular level, to the individual or in the species. No matter how well a species is surviving, adaptations are seldom the complete solutions to problems of environmental adjustments.

Specialist or Generalist? The level of adaptation differs from group to group. When species are narrowly adapted, we say they are specialized. A beaver is a specialized semi-aquatic rodent. Many specializations adapt the beaver for its aquatic way of life. The large hind feet are webbed for swimming but also help support the beaver on soft mud. The large, flat tail serves as both a rudder and propeller when swimming and as a support when cutting trees. Both the ears and the nose have valves that close when underwater. The lips meet behind the large front teeth to permit them to chew while submerged. The beaver has very good eyesight in water although its eyesight above water is only fair. The dense fur next to the body is to insulate the animal from cold water temperatures by trapping air. This air layer not only keeps the beaver warm, but also dry and buoyant.

A hummingbird is a specialized feeder, its long beak and tongue adapted only for obtaining nectar from flowers. Likewise, many flowers have adopted a long, tubular shape to accommodate the pollination action of the hummingbird.

When species are broadly adapted, we say they are generalists. A coyote or a rat are good examples of animals which can survive in many different environments. Humans are also generalists. Species that become too specialized are often at risk of becoming endangered since they are less likely to be able to adapt to sudden changes in their environment.

Protection. Many adaptations aid in protection. The shells of turtles and mollusks, the quill covering of porcupines, and the horns and antlers of some animals are structural adaptations that protect their owners. The venom of a rattlesnake, the sting of a bee or wasp, or the poison from the skin glands of toads are examples of functional adaptations that serve the same purpose.

Camouflage. The natural or concealing colors of organisms are another sort of protective adaptation. When an animal matches the color of its background it is camouflaged. Both predators and prey may be camouflaged. The green of the rough green snake or the variegated browns of ground-dwelling quail make it difficult to find these animals in their natural surroundings. Some animals actually imitate an
inanimate part of their surroundings such as the walking stick which resembles the sticks of bushes in which it lives. Other animals may change color seasonally to match their surroundings such as the snowshoe hare that is white in the winter and brown in the summer. A few animals, like the gray tree frog or the green anole can change their color in a matter of minutes to match their background!

**More Than Just Color.** Camouflage is more than just a color match. Countershading occurs in many animals and is an important part of the camouflage. The back of the animal (the surface usually toward the light) is darker than the underside which is pale. Dark colors dull the intensity of overhead light making it harder to see the animal. The pronghorn antelope of the Kansas prairie is a good example of a countershaded animal. Most fish are countershaded too. For a predator looking up, the pale underside of the fish blends with the sky above and to the predator looking down, the darker back resembles the lake bottom. Behavior also plays a part in camouflage. Sitting motionless when danger is nearby help protect some animals such as the cottontail rabbit.

**Warning Coloration.** Warning coloration is just the opposite of camouflage and is a technique often used by prey animals. Bright or bold patterns on animals usually serve to "advertise" or "warn" an attacker of the animal's defense or bad taste. The most prominent animal to advertise its unique defense is the skunk. Bold white stripes on the skunk's black body warn of the terrible odor any attacker will end up wearing if it does not heed the skunk's warnings. Even a bear will run away from the skunk if it has ever had a fateful encounter! Most insects with stingers are also marked with bold, easy-to-see bands of black and yellow. The ringneck snake, a bad-tasting reptile, reveals its bright red underside when confronted.

**Mimicry.** A defense popular among some animals is mimicry. The most famous example of this adaptation exists in the insect world between the viceroy and monarch butterflies. The monarch butterfly is bitter tasting because it feeds on the milkweed plant. The viceroy butterfly develops no such bad taste, but is safe from hungry birds because its resemblance to the monarch. Another example exists between the non-poisonous milk snake (found in Kansas) and the poisonous coral snake (not found in Kansas). Sounds may also be mimicked such as a blue jay imitating the call of a red-tailed hawk.

**Predator or Prey?** Can you tell a predator from a prey just by looking? Well, maybe. There are many differences in structural adaptations between predators and prey. For example, sometimes the placement of the eyes will give you a clue to whether the animal is the hunted or the hunter. Animals which predators hunt are always on the alert for danger. To help them see danger from nearly all directions at once, prey animals usually have their eyes placed on each side of their head. It's hard to stare into the eyes of a rabbit or a mouse or a deer. Predators, on the other hand, need to accurately judge the distance to their prey so both eyes are looking-forward or placed on the front of the face, like you. This is called binocular vision. It is much easier to judge distances if you are using both eyes at the same time. Try reaching for something
with one eye closed. Were you successful? Predators like the owl, bobcat and coyote have good binocular vision. Other differences can be found in the teeth of an animal. Many prey animals are herbivores or plant-eaters. Herbivores have flat teeth with large amounts of surface area for grinding the tough outer parts of plants. Many predators are carnivores or meat-eaters and have long fangs (canines) for holding onto the prey and sharp, jagged teeth for tearing flesh. Animals that eat both plants and animals are called omnivores and have a combination of flat teeth (molars) and sharp teeth (canines). People are omnivores and so are bears, skunks, and raccoons.

While birds don't have teeth, looking at the shape of the beak can be just as enlightening as teeth. Predators in the bird world (like eagles and owls) have strongly hooked beaks for tearing, or long, pointed beaks for spearing, like herons, or sharp chisel-like beaks such as woodpeckers. Non-predators such as seed-eating birds are equipped with a short heavy conical beak for cracking seeds, or perhaps a sieve-like bill for straining out tiny water plants as do many ducks. There are even omnivores in the bird world and they sport an all-purpose heavy beak such as the crow or bluejay.

The following additional resources to available to assist you:

### REFERENCE CENTER

**Books**
- BK 4-15 Things with Wings
- BK 12-10 Amazing Animals
- BK-12-11 Eyewitness Books

**Films**
- FS-5 Animals and How They Grow
- FS-19 Protective Adaptations in Animals
- FS-29 Adaptation and Life Form and Landform

**Learning Kits**
- LK-12 OBIS Adaptations
- LK-41 Birds of the Environment

**Slide Series**
- SS-21 Animal Courtship
- SS-23 Mammalian Predators

**Video Tapes**
- VT-25 Predators of North America
- VT-62 Learning About Reptiles
- VT-119 Camouflage in Nature
- VT-158 Spiders
- VT-162 Understanding Birds: Adaptations
- VT-186 Animal Behavior: Warm-Blooded and Cold-Blooded Animals
- VT-250 How Animals Move

### NATURE’S NOTEBOOK

**Amphibian & Reptiles**
- From eggs to legs A-1 – A-2
- Toad A-3 – A-4
- Have Shell, Will Travel A-5 – A-6

**Birds**
- Bird Adaptation C-1 – C-2
- Ducks C-13A – C-14B
- Flying Mousetraps C-17
- The Haunting Owls C-29A – C-30A
- Crops, Stomachs & Gizzards C-33 – C-34

**Ecological Concepts**
- Winter Survival E-7 – E-8

**General Wildlife**
- A Ripe Old Age I-18 – I-19
- Nature’s Navigators I-45 – I-46

**Mammals**
- Night Stalkers K-7 – K-10
- Furbearers K-11 – K-12
- What’s Up Doc? K-41 – K-42
ON T.R.A.C.K.S. NEWSLETTER

The On T.R.A.C.K.S. Newsletter can be obtained for free by contacting the Wildlife Education Services section of the KS Dept of Wildlife & Parks by writing to C/O WES, KDWP 512 SE 25th Ave. Pratt, KS 67124 or phoning (620) 672-5911 or by E-mail at ShelbyS@wp.state.ks.us.

Fall 1990 . . . . . . . . . . . . . . . . . . . . . . . Vol. 2, No. 1
Winter 1990 . . . . . . . . . . . . . . . . . . . . . Vol. 2, No. 2
Spring 1991 . . . . . . . . . . . . . . . . . . . . . Vol. 2, No. 3
Fall 1991 . . . . . . . . . . . . . . . . . . . . . . . Vol. 3, No. 1
Spring 1992 . . . . . . . . . . . . . . . . . . . . . Vol. 3, No. 3
Fall 1992 . . . . . . . . . . . . . . . . . . . . . . . Vol. 4, No. 1
Winter 1992 . . . . . . . . . . . . . . . . . . . . . Vol. 4, No. 2
Fall 1993 . . . . . . . . . . . . . . . . . . . . . . . Vol. 5, No. 1
Winter 1994 . . . . . . . . . . . . . . . . . . . . . Vol. 5, No. 2
Winter 1995 . . . . . . . . . . . . . . . . . . . . . Vol. 6, No. 2
Spring 1995 . . . . . . . . . . . . . . . . . . . . . Vol. 6, No. 3
Winter 1996 . . . . . . . . . . . . . . . . . . . . . Vol. 7, No. 2
Spring 1996 . . . . . . . . . . . . . . . . . . . . . Vol. 7, No. 3
Fall 1996 . . . . . . . . . . . . . . . . . . . . . . . Vol. 8, No. 1
Spring 1997 . . . . . . . . . . . . . . . . . . . . . Vol. 8, No. 3
Spring 1998 . . . . . . . . . . . . . . . . . . . . . Vol. 9, No. 3
Fall 1999 . . . . . . . . . . . . . . . . . . . . . . . Vol. 11, No. 1
Winter 2000 . . . . . . . . . . . . . . . . . . . . . Vol. 11, No. 2

PROJECT AQUATIC

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<td>56</td>
<td>88</td>
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<td>Hooks and Ladders</td>
<td>43</td>
<td>76</td>
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<td>Marsh Munchers</td>
<td>34</td>
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<td>Sockeye Scents</td>
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PROJECT LEARNING TREE

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<td>The Falling Log</td>
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<td>Tropical Treehouse</td>
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PROJECT WILD

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<td>Muskox Maneuvers</td>
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<td>Polar Bears in Phoenix</td>
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<td>Surprise Terrarium</td>
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<td>What Bear Goes Where?</td>
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<td>Which Niche?</td>
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<td>Who Fits Here?</td>
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<tr>
<td>Bottle Neck Games</td>
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<td>172</td>
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<td>Deer Dilemma</td>
<td>426</td>
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</tbody>
</table>
# Table of Contents

15-19 **Introduction**

- **Insect Investigation**: Record the insects which you have found in your backyard or school grounds and their adaptations.

- **Made To Order**: Use the special adaptations of animals to help classify them.

- **Tip The Scale**: Animals do vary by weight and size. Use the given information to answer the question at the end of the chart.

- **Protective Adaptations**: Select animals which utilize the protective adaptations listed.

- **Robin Reporting**: Use your powers of observation to assist you in completing your “Robin Report.”

- **Bird Builders**: Build an imaginary bird and determine what it eats, how it builds nests and escapes or eludes its enemies.

- **Flint Hills Future**: You have to decide how to best use the 350 acres of land you inherited.

- **Key To Invertebrates**: With the help of the key provided, see if you can construct an identification key on your own.

30 **Answer Key For What Is Adaptation**
**INSECT INVESTIGATION**

### Directions:
Insects are the most common member of the animal kingdom. Take the opportunity to explore the variety of insects and their adaptations you have in your backyard or on the schoolgrounds. Use the chart to help record your data. Start from the top of the chart and work your way down.

<table>
<thead>
<tr>
<th>Kind of Insect</th>
<th>Location</th>
<th>Color and Shape</th>
<th>Size (Approx)</th>
<th>Means of Travel</th>
<th>Communication Technique</th>
<th>What it Eats (if possible)</th>
<th>Found in a Group or Alone</th>
<th>Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>grasshopper</td>
<td>field</td>
<td>green and brown</td>
<td>1½ - 2 Long</td>
<td>fly and crawl</td>
<td>with its antennae</td>
<td>plants</td>
<td>alone</td>
<td></td>
</tr>
</tbody>
</table>

**NAME ______________________**
Directions: The special adaptations of an animal are used to classify them. Example: fish have gills to breathe in water. For each adaptive characteristic below select an animal and describe its special adaptations. The first adaptation characteristic is done for you.

Animal is adapted to its habitat or surroundings.
Animal: Walleye
Class: Fish
Walleye have gills to breathe in water, fins for locomotion. Scales and body shape help them move through water. Walleye are generally found in the deeper waters of large lakes.

Animal defends itself or escapes from enemies.
Animal: Class:

Animal is camouflaged.
Animal: Class:

Animal cares for young in an unusual way.
Animal: Class:

Animal makes use of its senses (smell, sight, hearing, and taste) in special ways.
Animal: Class:

Animal uses its body to store food.
Animal: Class:

Animal makes use of its senses (smell, sight, hearing, touch, and taste) in special ways.
Animal: Class:

Animal uses its beak to obtain food.
Animal:
Directions: Animals can vary greatly in size. The average length and weight of several Kansas mammals is given below. Use the given information to answer the questions at the end of the chart. The following conversion factor will assist with your work. One kilogram = 1,000 grams.

<table>
<thead>
<tr>
<th>Total length (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jack rabbit</td>
<td>553</td>
</tr>
<tr>
<td>Coyote</td>
<td>1220</td>
</tr>
<tr>
<td>Swift fox</td>
<td>798</td>
</tr>
<tr>
<td>Raccoon</td>
<td>808</td>
</tr>
<tr>
<td>Armadillo</td>
<td>728</td>
</tr>
<tr>
<td>Black-footed ferret</td>
<td>514</td>
</tr>
<tr>
<td>Big brown bat</td>
<td>120</td>
</tr>
<tr>
<td>Mink</td>
<td>589</td>
</tr>
<tr>
<td>Flying squirrel</td>
<td>229</td>
</tr>
<tr>
<td>Badger</td>
<td>722</td>
</tr>
<tr>
<td>Striped skunk</td>
<td>678</td>
</tr>
<tr>
<td>Bobcat</td>
<td>912</td>
</tr>
<tr>
<td>Mule deer</td>
<td>1480</td>
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<tr>
<td>Whitetail deer</td>
<td>1745</td>
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<tr>
<td>Pronghorn</td>
<td>1358</td>
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<tr>
<td>Bison</td>
<td>2890</td>
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<tr>
<td>Porcupine</td>
<td>751</td>
</tr>
<tr>
<td>Beaver</td>
<td>1076</td>
</tr>
<tr>
<td>Gray squirrel</td>
<td>462</td>
</tr>
<tr>
<td>White-footed mouse</td>
<td>176</td>
</tr>
</tbody>
</table>

Why are some of the weights given in grams instead of kilograms?

How many species are 30 kg. in weight and 1,000 millimeters or more in length?

Which animal has the least amount of weight (kg) per length (mm)?

In general, as the length of an animal increased does its weight also increase? Can you find any exception(s) to this general rule in the information given?

What is the length per mm of a raccoon, of a bison, of a beaver? Who weighs the most per kg?
Construct a bar graph on the following animals based on their weight per kg, start with the smallest to the largest.

**striped skunk, beaver, armadillo, swift fox, badger, mink, porcupine, raccoon, and gray squirrel.**

<table>
<thead>
<tr>
<th></th>
<th>1(g)</th>
<th>100(g)</th>
<th>250(g)</th>
<th>500(g)</th>
<th>750(g)</th>
<th>1(kg)</th>
<th>5(kg)</th>
<th>10(kg)</th>
<th>15(kg)</th>
<th>20(kg)</th>
<th>25(kg)</th>
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</thead>
<tbody>
<tr>
<td>striped skunk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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Which is the shortest animal in length? ________________ the longest? _____________

Name the largest animal by weight? ________________ the smallest? _____________

What is your body weight in kilograms? _______________________

Your length in millimeters? ____________________________

Which animal are you the nearest to in weight and length? ______________________
Protective Adaptations

Directions: Animals employ numerous ways to protect or defend themselves from other animals. Some of these protective adaptations are listed below. Name three animals for each adaptation below. Select one animal and describe in detail how it uses this adaptation. One has been done for you.

### Protective Adaptations

**mimicry** (look or sounds like another animal)
1. viceroy butterfly-monarch butterfly
2. king snake-coral snake
3. bluejay mimics hawk’s cry

Monarch butterfly’s don’t taste good. So, most birds will probably not try to eat a viceroy butterfly because it looks like a monarch.

**jumps or runs**
1. 
2. 
3. 

**camouflage**
1. 
2. 
3. 

**talons and beaks**
1. 
2. 
3. 

**poisons or odors**
1. 

**antlers or horns** (put "a" behind those with antlers, "h" behind those with horns)
1. 
2. 
3. 

**shell, scales, or quills**
1. 
2. 
3. 

**teeth or claws**
1. 
2. 
3. 

**stings or bites**
1. 
2. 
3.
Robin Reporting

Directions: Robins are frequent visitors to Kansas neighborhoods and school yards. Image you are a robin in Kansas. Use the information below to assist you in completing your "robin report."

Foods include worms, insects, and berries
Nest is constructed of grass and mud, found in trees, shrubs, or within the structure of buildings. Active during the day (diurnal)
Predators are domestic cats, birds of prey, and being struck by cars (accidental deaths).
Lives along or with a mate during the nesting season. Spends winter in flocks.

Describe the habitat you might live in while in Kansas.

What special adaptations do you have for food gathering?

Why can't Kansas always provide you with the food in the winter?

What adaptations protect you from predators?

Where in the neighborhood would you build your nest?

How are you important to both the human and wildlife communities?

ANTHROPOMORPHIC - refers to giving human characteristics to non-human things. If your robin could give his opinion of people what would he say?

Draw a map of the habitat you live in, include your nesting site, the areas you obtain your food and where you seek shelter from predators and bad weather.
Bird Builders - NAME ______________________

Directions: Build a bird that would live in Kansas. What kind of food will this bird eat? Color the bird in a natural setting and print its name. Next, combine body parts to make an imaginary bird. Color and name it. What problems will the imaginary bird have when it tries to eat, build a nest, or get away from its enemies.

Wings and other body feathers can be added to the bird.
Flint Hills’ Future

Directions: You have inherited 350 acres of land in the Flint Hills of Kansas. Your acreage includes 200 upland acres of native prairie, prime for grazing cattle, and 150 bottomland acres. The 150 acres includes a stream, timber, overgrown cropland, and field suitable for corn and alfalfa.

The will states that you are to take an inventory of the acreage in order to determine the most suitable and valuable uses of the land.

The upland, native, tallgrass prairie includes the following grasses: big bluestem, little bluestem, Indian grass, switch grass, and side oats grama. There are healthy populations of antelope, prairie chickens (greater and lesser), and a wide variety of other prairie wildlife species.

The overgrown farmland includes shrubs, weeds, and native prairie grasses. The stream has a balanced fish population. The timber, or woodland, is primarily made up of cottonwoods, green ash, elm, burr oak, willow, and eastern red cedar. A variety of wildlife species appropriate, for the habitat types are found in the bottomland. Your first task is to map the area. (Your map should include a legend, compass directional markings, title, etc.)

List the animal life you would find in your upland and bottomland acreage.

Fish
Bottomland
1. __________ 2. __________ 3. __________

Insects/Invertebrates
Upland
1. __________ 2. __________ 3. __________
Bottomland
1. __________ 2. __________ 3. __________

Birds
Upland
1. __________ 2. __________ 3. __________
Bottomland
1. __________ 2. __________ 3. __________

Mammals
Upland
1. __________ 2. __________ 3. __________
Bottomland
1. __________ 2. __________ 3. __________

Reptiles/Amphibians
Upland
1. __________ 2. __________ 3. __________
Bottomland
1. __________ 2. __________ 3. __________
Flint Hills cont.

NAME ______________________

List the suitable usage of the land for:

PEOPLE          WILDLIFE          AGRICULTURE
upland          upland          upland  bottomland  upland  bottomland  upland  bottomland
1. _______   1. _______   1. _______   1. _______   1. _______   1. _______
2. _______   2. _______   2. _______   2. _______   2. _______   2. _______

State what you think valuable and suitable mean. Do the words apply to people or do they include wildlife also? ____________________________________________________________________
__________________________________________________________________________

Wildlife is (check one:) ○ very valuable ○ moderately valuable ○ not valuable

The land-use options available are:

No.1 Nature preserve / Wildlife refuge
No.2 Cropland / Grazing land
No.3 Wildlife management area - public hunting, fishing and wildlife production
No.4 State park
No.5 Housing project
No.6 Your idea

1  2  3  4  5  6

The variety of wildlife and native plant species would... increase (I) or decrease (D)? Why?

List visible changes to the terrain of the land.

Land is now more (M) or less (L) valuable for:
Wildlife
People

Your decision is to use the land for __________________________________________ because,
__________________________________________________________________________
__________________________________________________________________________

Can you determine how one could apply several of the land use choices to this area.
__________________________________________________________________________
Directions: Identification keys are used to distinguish animals from one another based on physical characteristics. They can show general or very specific differences between species. This identification key moves across the page from left to right; showing general to specific characteristics. Could you construct your own identification key?
TIP THE SCALE - PAGE 22 - 23

1. A number of animals do not weigh more than one kilogram
2. four - Mule deer, Whitetail deer, pronghorn and bison
3. White-footed mouse
4. Raccoon = 93.90 mm/per kg   Bison = 4.38 mm/per kg   Beaver = 52.48 mm/per kg
   The Bison weighs the most per mm.

PAGE 23
shortest animal = Big Brown Bat          longest = Bison
largest by weight = Bison                 smallest = Big Brown Bat

PROTECTIVE ADAPTATIONS - PAGE 24

Some examples one could use

Antlers or horns          Jumps or Runs          Shell, Scales or Quills
2. Elk                    2. Pronghorn           2. Largemouth Bass

Camouflage
1. Cottontail Rabbit
2. Copperhead
3. Bobwhite

Teeth, Claws or Fangs
1. Bobcat
2. Badger
3. Rattlesnake

Stings and Bites          Venom or Odors
1. Honey Bee             1. Massasuga
2. Coyote                2. Striped Skunk
3. Snapping Turtle        3. Stink Beetle

Talons and Beaks
1. Great Horned Owls
2. Red-tailed Hawk
3. Great Blue Heron
INTRODUCTION AND RESOURCES

Over the past ten years, endangered animals have received some much needed attention in newspapers, magazines, and on television. Even though we may hear more about them, it doesn't always mean we know what animals are really endangered or, more importantly, what causes animals to become endangered. The surprising result of one college survey revealed that 70% of the students who participated thought coyotes were endangered in Kansas (test your endangered IQ, on page ?). So what makes an endangered species?

**Threatened and Endangered Species.** An endangered species is a plant or animal that is in immediate danger of becoming extinct throughout all, or a large part, of its range. Worldwide, there are thousands of endangered species. The whooping crane, black-footed ferret, and California condor are all federal endangered species. Threatened means a plant or animal is at risk of becoming endangered due to a rapid decline in its numbers. If the problems facing these animals do not lessen, these species are likely to become endangered. The piping plover and Eastern spotted skunk are threatened Kansas species. Extinct species are no longer living. Dinosaurs and the passenger pigeon are extinct.

Another category found in Kansas is Species In Need of Conservation (SINC). Plants or animals in this category are those whose needs are very specialized, whose habitat is very limited, or for some other reason merit special concern. SINC species could become threatened if current pressures on the habitat or the species continue.

Why are certain species in trouble? The loss of habitat is by far the greatest threat to wildlife species and the number one reason animals worldwide are becoming threatened or endangered. The growth of human populations and the changing use of the land to agriculture and urban development have resulted in a loss of the valuable diversity of habitats that support our wildlife. Kansas is no exception. Chemicals, pollutions, and loss of streamflow have caused some rivers to no longer support native animals. The destruction of cave and woodland habitats in the southeastern part of the state has placed many of its inhabitants in danger. Plowing or development of highly erodible lands causes erosion and loss of top soil which, in turn, reduces productivity and adds more silt to our streams and rivers. Heavy use of water for irrigation and municipal use are causing streams and marshlands to dry up as in western Kansas. Many of these changes occur so quickly or on such a broad scale that animals and plants can't adapt so they become threatened or endangered.

Other reasons plants and animals may become threatened or endangered include: competition from introduced species which displace the native ones (starlings, introduced from Europe, drive out our native bluebird and other songbirds), unregulated
hunting and/or poaching (hunting is not a threat to any Kansas wildlife since all hunting is regulated. The illegal trade and exploitation of wildlife such as for ivory or horns has nearly caused some animals to become extinct), and in fact some species may have always been rare due to very specialized habitat needs (the cave salamander can only be found in the extreme southeast corner of Kansas, the only region of Kansas to contain moist, Ozarkian caves). Some animals are clearly more prone to extinction than others. Factors which might contribute to an animal's decline are:

**Migration** - Animals which migrate depend on more than one habitat which makes them doubly susceptible to habitat destruction. For example, songbirds that winter in tropical rainforests and summer in the United States.

**Interfering with people's activities** - animals which kill livestock or ruin crops are often shot or poisoned.

**Having few young** - animals which give birth to one or two young every one or two years (such as most bats) are very susceptible to declines since it takes much longer for their numbers to recover. Compare several generations of bats, 1 - 2 young/year to cockroaches, 80 young/six months, demonstrates why those animals with low birth rates are often unable to recover from sudden declines.

**Becoming too specialized** - animals that use only one food source or need one type of tree, for breeding (the spotted owl requires 300+ year old trees for nesting), can become too specialized and unable to change rapidly enough to survive.

There are many things to consider when looking for reasons why an animal or plant may be headed for extinction. Most animals and plants are in trouble because of a combination of factors. One factor, in itself, may not be enough to drive an animal to extinction, but when coupled with pressures from loss of habitat, pollution, or poaching, the demands become too great.

Extinction is a natural process. There has always been extinction. In fact, it is a natural process that has been occurring for millions of years. So, why all the fuss about plants or animals which are nearly extinct? The staggering news about extinction is the rate at which it is occurring. Human activities have caused extinction rates to soar. Some scientists estimate we may be losing hundreds to thousands of species each year. At least one species on our planet is estimated to become extinct everyday! That's a far cry from the 300 species of animals believed to have become extinct between 1600 and 1974. Compare this to the 3,000 years of the Pleistocene Ice Age when all of North America only lost about three species every 100 years. This accelerated rate of extinction can be directly linked to the human population explosion - from less than 1 billion people in 1600 to 5 billion people today. More people need more houses, use more energy, and eat more food than ever before.

Why save threatened and endangered animals? There is a delicately balance, complex interaction between all living things and their physical environment called an ecosystem.
Ecosystems are self-sustaining and provide their inhabitants with food, shelter, clean water, pure air, and the proper climate. The removal of a single species from an ecosystem can set off a chain reaction that affects many other species. Some scientists believe that the disappearance of one plant species can take with it up to 30 other species including insects, higher animals, and other plants. The full significance of an extinction may not always be known. The genetic material that is lost when a plant or animal becomes extinct may hold the key to cancer research or any of a dozen other cures. After all, it was "only" a fungus that gave us penicillin! At least a quarter of all prescriptions written in the U.S. contain chemicals discovered in plants and animals. And what is lost as far as food crops? It has been estimated there are almost 80,000 edible plants of which 20 produce 90% of the world's food.

But, above all, this incredible diversity of life that we see on Earth is an indication of the health of our planet. The more diverse life is (biodiversity), the healthier our planet. Some species can serve as indicators in monitoring our environmental quality. Declines in certain species have shown us where problems have existed. The sudden drop in bald eagle numbers alerted us to the deadly dangers of DDT. Many endangered species today are acting in this capacity.

Our quality of life will decline as the diversity of plants and animals declines. New products to enhance our lives will go undiscovered. Everytime we lose a species, the world becomes a poorer place. How long can it go on before the ecosystems of the world can no longer support its inhabitants? Think of all the plants and animals on this Earth as building blocks in a huge pyramid. Every time a species becomes extinct, we lose one of the building blocks of the pyramid. With thousands of species being lost each year, can we really afford to see how many blocks we can lose before the pyramid collapses? Exterminating other life forms is incredibly shortsighted!

The law. The Federal Endangered Species Act of 1973, protects listed species against killing, harming, harassment, or the destruction of their habitat. Kansas passed its Nongame and Endangered Species Conservation Act in 1975, which directs the Kansas Department of Wildlife and Parks. To list threatened and endangered animals and protect them and the habitats critical to their survival. The Kansas law covers T & E mammals, birds, fish, reptiles, amphibians, and invertebrates but no plants.

What you can do. Endangered means there is still time. If species are to be saved from extinction it will take a concentrated effort from everyone. We all need to become informed and involved. We recommend that private and public landowners implement management plans that focus on sustaining the health and productivity of our natural resources. Recycle and conserve the use of natural resources. Don't buy exotic or wild animals as pets or purchase products made from protected species. Report violations. Visit a nature center, natural area, or zoo. Help clean up habitat and help protect those areas that still remain. Learn all you can!

The following additional resources to available to assist you:
REFERENCE CENTER

Books
BK 12-9L Endangered Species: Wild and Rare
BK-14-5 Endangered Means There’s Still Time
BK 14-9 Teaching About Endangered Species
BK 14-31 Illustrated Guide to Threatened and Endangered Species in Kansas
BK 14-32 Zoobooks: Endangered Animals
BK 14-32.1 Zoobooks: Endangered Animals Thematic Curriculum
BK 14-58 Discovering Endangered Species

Computer Software
CD-R0-2 Discovering Endangered Wildlife

Game Kits
GK-2 Extinction: The Game of Ecology
GK-21 Endangered Species
GK-23 Rare and Endangered Species Cards
GK-27 Endangered Animals Giant Floor Puzzle

Filmstrips
FS-1B Endangered Species
FS-2 World of Endangered Species
FS-21 Un-endangered Species
FS-35 Endangered Species: Special Report
FS-38 Vanishing From Earth

Posters
PP-63 Species in Trouble A-Z
PP-76 Help Save Their Layers of Life: Rain Forests

Learning Kits
LK-5 Wildlife in Your World
LK-65 Wildlife Casting
LK-26 Replitracks
LK-153 Birds Fandex Guide
SK Skins and Skulls

Slide Series
SS-13 Saving America’s Bats
SS-22 Rare and Endangered Animals
SS-32 Kansas’ Endangered and Threatened Wildlife

Video Tapes
VT-7 The American Bald Eagle
VT-16 Protecting Endangered Animals
VT-140 A Special Report: You Can Make a Difference
VT-156 Wildlife on the Brink
VT-205 The Road to Extinction
VT-277 Wildlife for Tomorrow: The Story of Our Un-Endangered Species
VT-278 The Un-Endangered Species
VT-433 Raptors at Risk

NATURE’S NOTEBOOK

Amphibian & Reptiles
Alligator Snapping Turtle A-7 – A-8

Birds
Greener Pastures C-19
Honker Restoration C-23 – G-24

Fish
Natural Mussel G-13 – G-14

General Wildlife
A Ripe old Age I-18 – I-19

Threatened & Endangered
Endangered & Threatened M-1 – M-7

ON T.R.A.C.K.S. NEWSLETTER

The On T.R.A.C.K.S. Newsletter can be obtained for free by contacting the Wildlife Education Services section of the KS Dept of Wildlife & Parks by writing to C/O WES, KDWP 512 SE 25th Ave. Pratt, KS 67124 or phoning (620) 672-5911 or by E-mail at ShelbyS@wp.state.ks.us.

Winter 1991 Vol. 3, No. 2
Spring 1993 Vol. 4, No. 3
Fall 1994 Vol. 5, No. 1
Winter 1994 Vol. 5, No. 2
Spring 1994 Vol. 5, No. 3
Winter 1995 Vol. 6, No. 2
Spring 1995 Vol. 6, No. 3
Spring 1996 Vol. 7, No. 3
Fall 1996 Vol. 8, No. 1
Winter 1996 Vol. 8, No. 2
Spring 1997 Vol. 8, No. 3
Spring 2003 Vol. 9, No. 3

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Net Gain, Net Effect 85 104
Plastic Jellyfish 136 170
Something Fishy Here 145 176
To Dam or Not to Dam 170 134
Turtle Hurdles 158 164
Where Have all the Salmon Gone 166 110
Whale of a Tail 10 26
Sea Turtles International 98
PROJECT LEARNING TREE

ACTIVITY PAGES
Life on the Edge 335
Watch on Wetlands 258
Web of Life 148

PROJECT WILD

ACTIVITY NEW GUIDE OLD GUIDE
Checks & Balances 387 186
Deadly Links 270
Hazardous Links, Possible Solutions 326
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I’m Thirsty 134 154
Improving Wildlife Habitat 440 324
Planting Animals 152 176
Planning for People & Wildlife 436 284
Polar Bears in Phoenix 125 120
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| 48-49      | ANSWER KEY FOR THREATENED & ENDANGERED |

Fourth Grade - ▼
Fifth Grade - □
Sixth Grade - ●
How is your endangered wildlife IQ?

Directions: This activity should be given before and after completing this unit. Compare the results to measure the students' comprehension. Place a "T" in the blank by animals you believe to be threatened and an "E" by those endangered in Kansas. The space by animals which are neither threatened or endangered should remain blank.

Endangered = species facing the prospect of disappearing - becoming extinct. Threatened = species which are in peril of becoming endangered.

<table>
<thead>
<tr>
<th>Bobcat</th>
<th>Wild turkey</th>
<th>Cave salamander</th>
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</thead>
<tbody>
<tr>
<td>Mule deer</td>
<td>White-faced ibis</td>
<td>Tiger salamander</td>
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<tr>
<td>Black-footed ferret</td>
<td>Black rat snake</td>
<td>Northern spring peeper</td>
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<tr>
<td>Bison</td>
<td>Common map turtle</td>
<td>Plains leopard frog</td>
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<tr>
<td>Gray myotis (bat)</td>
<td>Copper head</td>
<td>Beaver</td>
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<tr>
<td>Badger</td>
<td>Texas night snake</td>
<td>Pallid sturgeon</td>
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<tr>
<td>Easter spotted skunk</td>
<td>Ornate box turtle</td>
<td>Arkansas River shiner</td>
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<tr>
<td>Whooping crane</td>
<td>Broadhead skink</td>
<td>Neosho madtom</td>
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<td>Barn owl</td>
<td>Checker garter snake</td>
<td>Walleye</td>
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<tr>
<td>Least tern</td>
<td>Eastern newt</td>
<td>Arkansas darter</td>
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<tr>
<td>Canada goose</td>
<td>Great plains toad</td>
<td>Channel catfish</td>
</tr>
<tr>
<td>Eskimo curlew</td>
<td>Green toad</td>
<td>Flathead chub</td>
</tr>
</tbody>
</table>
Directions: Add the missing vowels to the consonants below to form names of many endangered and threatened species in Kansas.

NSH MDTM  BLD GL  PRGRNFLCN

NSH MDTM  BLD GL  PRGRNFLCN

NSH MDTM  BLD GL  PRGRNFLCN

NSH MDTM  BLD GL  PRGRNFLCN

NSH MDTM  BLD GL  PRGRNFLCN

SCKLFN CHB  STRN NWT

LST TRN  NDN BT  RKNSS DRTR

E  SCTR RFFL BTL  TPK SHNR

GRTT SLMNDR  WRTY-BCKD MSSL

CV SLMNDR  PLLD STRGN  SKM CRLW

HL-SPLTTR MSSL  WHPNG CRN  GRY-BLLD SLMNDR

GRY BT  BLCK-FTD FRRT  I

A

O

U
Directions:
An endangered and threatened species of Kansas is illustrated below. Follow the color key in coloring it.

<table>
<thead>
<tr>
<th>Color Code</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<td>3</td>
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<tr>
<td>6</td>
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<tr>
<td>7</td>
<td>Orange</td>
</tr>
<tr>
<td>8</td>
<td>Pink</td>
</tr>
</tbody>
</table>
The Sweet 16 of Kansas

NAME ______________________

The Sweet 16 of Kansas

Neosho Madtom
Black-footed Ferret
Gr otto Salamander
Sicklefin Chub
Snowy Plover
Eskimo Curlew
Pallid Sturgeon
Central Newt

Bald Eagle
Gray Bat
Bleedingtooth Mussel
Strecker’s Chorus Frog
Peregrine Falcon
Cave Salamander
Blackside Darter
Rabbi’ts foot Mussel

Slender Walker (snail)
Whooping Crane
Graybely Salamander
Scott Riffle Beetle
Arkansas Darter
Common Map Turtle
Least Tern
Redspot chub

Directions: Above is a list of sixteen endangered species and eight threatened species in Kansas (1993 list). Divide the list into animal groups by writing the appropriate letter behind the name. B for birds, M for mammals, F for fish, R for reptiles, A for amphibians, and I for invertebrates.

Has this list changed since you were born? How?

What contributed to the endangerment of these species? Select one and write a report on why the animal is endangered or threatened.

Name the law(s) that protect these animals.

Have some endangered species been reclassified as threatened? Are some threatened species now endangered?

Besides laws, what has been done to help these animals? Do you think these activities will be helpful? Who contributes money to the efforts?
Directions: Below are pairs of animals. One of the pair is an endangered species, the other is Not endangered. Circle the endangered species and complete the information below for each species. Choose one of the pairs and compare them in more detail. Why do you think one is endangered and not the other?

Pallid Sturgeon
Habitat __________________________

Main food __________________________

Predator or prey ____________________

Game or nongame ___________________

Big Brown Bat
Habitat __________________________

Main food __________________________

Predator or prey ____________________

Game or nongame ___________________

Raccoon
Habitat __________________________

Main food __________________________

Predator or prey ____________________

Game or nongame ___________________

Channel Catfish
Habitat __________________________

Main food __________________________

Predator or prey ____________________

Whooping Crane
Habitat __________________________

Main food __________________________

Predator or prey ____________________
Directions: Sportsmen have taken more than their share of the blame for wildlife destruction, when, in fact they pay more than their share to support wildlife. About $8 billion is paid in the United States each year by sportsmen to support wildlife and natural resource programs.

Since the turn of the century, some wildlife populations have made great progress in the United State. Read the chart below to see the changes that can be made. Complete the animal’s name in the blank provided. Place an "X" near all species that live in Kansas.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Early 1900's</th>
<th>Now</th>
</tr>
</thead>
<tbody>
<tr>
<td>White-tailed deer</td>
<td>500,000</td>
<td>18,000,000</td>
</tr>
<tr>
<td>Trumpeter swan</td>
<td>1,110,000</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Rocky Mountain wild</td>
<td>73</td>
<td>17,000</td>
</tr>
<tr>
<td>Wild turkey</td>
<td>41,000</td>
<td>800,000</td>
</tr>
<tr>
<td>Antelope</td>
<td>650,000</td>
<td>4,500,000</td>
</tr>
<tr>
<td>Pronghorn antelope</td>
<td>12,000</td>
<td>1,000,000</td>
</tr>
</tbody>
</table>

1. White-tailed deer have increased by approximately what amount since the early 1900’s? Show your work.

2. Which species has increased the most in number?

3. What percentage of the current trumpeter swan population did we have in the early 1900’s?

4. How may more wild turkeys do we have than Canada geese?

5. Biologists estimate that Kansas has 19,000 pronghorn antelope. What fraction of the total U.S. population is that?

6. How many mammals does this chart represent? How many birds?
Directions: When people talk about endangered wildlife, new vocabulary appears. We are familiar with some of the words but maybe not all of them. Fill in the blanks with the correct word from the list. Use each word only once.

1. __________ is where an animal lives; where it finds food, shelter, water, etc.

2. __________ helps keep healthy populations of game animals at manageable levels.

3. Animals that were once found in Kansas, but are now only found in other places outside the state are called ____________.

4. Instead of increasing in number or remaining steady, some endangered animals continue to ____________.

5. Plants and animals are ____________; which means they need each other.

6. Some ____________ are natural, others are made by people. They may result in plants and animals becoming endangered.

7. A ____________ species may continue to fall in number and be placed on the endangered species list.

8. ____________ means there are no more of this species.

9. With ____________ and ____________, wildlife has a future. These are done by biologists who care about wildlife and habitat.

10. When we misuse ____________, we ____________ our ____________.

11. National wildlife ____________ are homes for many ____________, of animals.

12. When an animal or plant is put on the ____________ species list, it means there is still time for it to ____________ if we care.

13. ____________ is the study of living things and how they relate to their environment.

14. Some species can ____________ better than others to changes we make to the environment.

15. Biologists have tried to ____________, or bring back species like antelope, elk, turkey, sharp-tailed grouse and swallow-tailed kites to Kansas where they once lived. They hope the animals will ____________ and raise their young here so
The Decision is YOUR’S

Directions: You are the manager of Cheyenne Bottoms Wildlife Area in central Kansas. This wetland is a concentration point for waterfowl and shorebirds and receives heavy usage from waterfowl hunters and bird watchers. It is spring and you are faced with the dilemma of leaving one of the pools (see map) partially drained for use as a nesting site for the least tern - a threatened species.

The following information needs to be considered in making your decision.

* The only water you can count on for filling this wetland comes in the spring. To hold waterfowl in the area during the hunting season you need high, spring water levels.

* Low, spring waters are better for shorebirds, such as the least tern.

* High water levels also keeps cattails from taking over the wetlands. Too many cattails can ruin the wetland as an ideal habitat for many wildlife species, including the least tern.

* If you lower the water level in spring, you may not be able to fill the wetlands in fall for the hunting season. The only water available during the summer is from rain and stream runoff. Do you gamble on the weather?

* The sale of hunting licenses provide most of the funds to operate and manage this wetland.

* Nongame funds provide an observation tower for viewing wildlife, such as the least tern, in this area.

* The previous hunting season was poor due to a drought. There is a great deal of pressure from hunters for a successful season this fall.

* The number of birdwatchers know your agency (Kansas Department of Wildlife and Parks) is responsible for the stewardship of all wildlife, not just ducks. They believe the wetlands should be managed for all species of wildlife.

* There are five pools in the wetland. You can manage the water level in each pool separately?

How should you provide a water level to guarantee a reasonable hunting season? How should you also provide wetland habitat for the shorebirds, including the least tern. State your solution to the above dilemma.

Panels can be formed to represent both sides from the students’ responses. Can the group come to consensus on a solution to this problem?
Use this map of Cheyenne Bottoms to make your management plan.
<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>habitat</td>
<td>1. a group of individuals that can breed with one another.</td>
</tr>
<tr>
<td>classify</td>
<td>2. mainly eats insects</td>
</tr>
<tr>
<td>predator</td>
<td>3. animal with a backbone</td>
</tr>
<tr>
<td>prey</td>
<td>4. hoofed animal</td>
</tr>
<tr>
<td>conservation</td>
<td>5. the wise use of natural resources</td>
</tr>
<tr>
<td>ecology</td>
<td>6. habitat along a stream or river</td>
</tr>
<tr>
<td>species</td>
<td>7. active during the day</td>
</tr>
<tr>
<td>adaptation</td>
<td>8. the study of the relationship between organisms and their environment</td>
</tr>
<tr>
<td>ungulate</td>
<td>9. moves to different areas with changing seasons</td>
</tr>
<tr>
<td>migrate</td>
<td>10. all wild, living creatures</td>
</tr>
<tr>
<td>vertebrate</td>
<td>11. plant eater</td>
</tr>
<tr>
<td>invertebrate</td>
<td>12. animal without a backbone</td>
</tr>
<tr>
<td>warm-blooded</td>
<td>13. spend the summer in a dormant state</td>
</tr>
<tr>
<td>cold-blooded</td>
<td>14. eats seeds or grass</td>
</tr>
<tr>
<td>riparian</td>
<td>15. modification that helps an animal in its environment</td>
</tr>
<tr>
<td>extinct</td>
<td>16. to group with similar characteristics</td>
</tr>
<tr>
<td>endangered</td>
<td>17. active at night</td>
</tr>
<tr>
<td>threatened</td>
<td>18. meat-eater</td>
</tr>
<tr>
<td>hibernate</td>
<td>19. body temperature adjust to surroundings</td>
</tr>
<tr>
<td>estivate</td>
<td>20. animals that kills for food</td>
</tr>
<tr>
<td>diurnal</td>
<td>21. environment animal lives in</td>
</tr>
<tr>
<td>wildlife</td>
<td>22. species is in danger of becoming</td>
</tr>
<tr>
<td>nocturnal</td>
<td></td>
</tr>
<tr>
<td>herbivore</td>
<td></td>
</tr>
<tr>
<td>carnivore</td>
<td>23. an animal or plant that lives on or in an organism to get food</td>
</tr>
<tr>
<td>omnivore</td>
<td>24. species may become endangered - are watched carefully</td>
</tr>
<tr>
<td>granivore</td>
<td>25. eats both plants and animals.</td>
</tr>
<tr>
<td>parasite</td>
<td>26. body temperature constant - makes body heat by being active</td>
</tr>
<tr>
<td>insectivore</td>
<td>27. spend winter in a dormant state</td>
</tr>
<tr>
<td></td>
<td>28. an animal hunted for food</td>
</tr>
<tr>
<td></td>
<td>29. species no longer exists</td>
</tr>
</tbody>
</table>
**IS FOR ECOLOGICAL EXPRESSIONS**

**Directions:** Use the words below to complete the following exercises. Place your word on a separate sheet of paper.

- estivate
- exotic
- energy
- echidna
- eel
- eagle
- entomology
- ermine
- eider
- environment
- egret
- echolocation
- ecology
- extinct
- experiment
- eddy
- evaporation
- elk
- eagle
- ecosystem
- edentate
- endangerment
- egg
- estuary
- eland
- echinoderm
- earth science
- edge effect
- extirpated
- erosion

1. Place the words in alphabetical order. Divide the words into syllables. Double check your work.

2. Look up each word in your dictionary. Write the word, its pronunciation, part of speech, meaning(s), and the guide words found on the dictionary page. Use the word in a sentence. The first one have been done for you. (Note: Dictionaries will vary in pronunciation keys.)

   `estivate (es'te vat'), verb, 1. to spend the summer, as at a specific place or in a certain activity. 2. to pass the summer in a torpid conditions. (also spelled aestivate).
   guide words: essentialist Estremadura
   Some desert animals estivate in the summer to save energy.

3. Write at least five sentences using two or more of these words in each sentence.

   The bald eagle is endangered because poisons in the environment caused the egg shells to be weakened.

4. Complete the following sentences using the words above.

   Bats use a special radar called ______________.
   An arm of the sea at the lower end of a river is an ______________.
   An ______________ species no longer exists.
   _______________ and ______________ are adult birds that live in Kansas.

5. List all the words that name an animal or group of animals.

6. Write the correct word for each respelling.

   e’-l nd
   e’-myu
   eg’
   egl’
   r’-m
   ent’-mal’-j
   es’ch-wer’-e
   in’-vi’-r n-m nt
   i-kol’-je
   ik-sper’-m nt

7. Unscramble these words

   gtalee ____________
   cyeoolge ____________
   gdneedeanr ____________
## Endangered & Endangered

### How is your Endangered Wildlife IQ - Page 37

<table>
<thead>
<tr>
<th>Endangered</th>
<th>Threatened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-footed Ferret</td>
<td>Pallid Sturgeon</td>
</tr>
<tr>
<td>Gray Myotis (Bat)</td>
<td>Cave Salamander</td>
</tr>
<tr>
<td>Whooping Crane</td>
<td>Eskimo Curlew</td>
</tr>
<tr>
<td>Least Tern</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Are Vowels Extinct - Page 38


### Endangered / Unendangered - Page 41

#### Pallid Sturgeon
- **Habitat:** Large Rivers - Missouri & Mississippi
- **Main Food:** Insect larvae and small fish
- **Predator or Prey:** More predator than prey
- **Game or Nongame:** Was a game fish, but now is placed on the Threatened species list in Kansas.

#### Big Brown Bat
- **Habitat:** Caves, mines, storm-sewers, hollow trees
- **Main Food:** Insects
- **Predator or Prey:** Predator
- **Game or Nongame:** Nongame

#### Whooping Crane
- **Habitat:** Prairie marsh
- **Main Food:** Frogs, snakes, insects
- **Predator or Prey:** Predator
- **Game or Nongame:** Nongame

#### Raccoon
- **Habitat:** Woodlands, grasslands and riparian areas
- **Main Food:** Consumes more plant than animal matter
- **Predator or Prey:** Predator
- **Game or Nongame:** Game

#### Channel Catfish
- **Habitat:** Large streams, lakes and ponds
- **Main Food:** Insects, crayfish and other fish
- **Predator or Prey:** Adults are predators
- **Game or Nongame:** Game

#### Gray Bat
- **Habitat:** Caves
- **Main Food:** Insects - primarily over water
- **Predator or Prey:** Predator
- **Game or Nongame:** Nongame

#### Sandhill Crane
- **Habitat:** Grain Fields
- **Main Food:** Grains, Seeds, Small animals such as frogs
- **Predator or Prey:** Predator
- **Game or Nongame:** Game animal in Kansas

#### Black-footed Ferret
- **Habitat:** Short grass near prairie dog towns
- **Main Food:** Primarily prairie dogs (90% - 95%)
- **Predator or Prey:** Predator
- **Game or Nongame:** Nongame
### Endangered: A Word To The Wise - Page 43

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat</td>
<td>Hunting</td>
<td>Extirpated</td>
<td>Decrease</td>
<td>Interrelated</td>
</tr>
<tr>
<td>Changes</td>
<td>Threatened</td>
<td>Extinct</td>
<td>Research, Management</td>
<td></td>
</tr>
</tbody>
</table>
| Pesticides, Pollute, Environment | Refuges | Endangered, Survive | **The Buck Stops Here - Page 42**

1. 17,500,000
2. Whitetail deer
3. 0.004%
4. 2,000,000
5. 2%
6. 19,800,000 Mammals, 7,017,000 Birds

### Wildlife Word Review - Page 46

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>Insectivore</td>
<td>Vertebrate</td>
<td>Ungulate</td>
<td>Conservation</td>
</tr>
<tr>
<td>Riparian</td>
<td>Diurnal</td>
<td>Ecology</td>
<td>Migrate</td>
<td>Wildlife</td>
</tr>
<tr>
<td>Herbivore</td>
<td>Invertebrate</td>
<td>Estivate</td>
<td>Granivore</td>
<td>Adaptation</td>
</tr>
<tr>
<td>Classify</td>
<td>Nocturnal</td>
<td>Carnivore</td>
<td>Cold-Blooded</td>
<td>Predator</td>
</tr>
<tr>
<td>Habitat</td>
<td>Endangered</td>
<td>Parasite</td>
<td>Threatened</td>
<td>Omnivore</td>
</tr>
<tr>
<td>Warm-Blooded</td>
<td>Hibernate</td>
<td>Prey</td>
<td>Extinct</td>
<td></td>
</tr>
</tbody>
</table>

### E is for Ecological Expressions - Page 47

4. Echolocation, Esuary, Extinct, Eagles and Egrets
5. Eagle, Egret, Ermine, Echinoderm, Elk, Edenttate, Echidna, Eider, Eglet, Eel, Eland
6. From L to R: Eland, Entomology, Emu, Estuary, Egg, Environment, Eel, Ecology, Ermine, Experiment
7. From L to R: Eaglet, Ecology, Endangered, Estuary, Ecosystem, Entomology
Give a person a fish,  
they can eat for a day.  
Teach them to fish,  
they can eat for a lifetime.  

(Unknown)

Must we always teach our children with books? Let them look at the mountains and the stars up above, Let them look at the beauty of the waters and the trees and the flowers on earth. They will then begin to think, and to think, is the beginning of real education.  

(David Polis)