

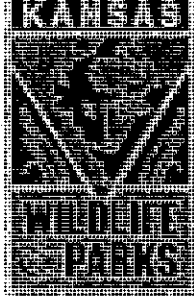
KANSAS



**WILDLIFE
DAMAGE
CONTROL**

TRAINING

**MATERIALS
WILDLIFE
& PARKS**



LAWS CONCERNING NUISANCE ANIMAL CONTROL

Wildlife management is governed by a complex group of federal, state, and local laws. Anyone engaged in the control of nuisance wildlife must become familiar with the basic provisions of the laws. Failure to comply with such laws or regulations can result in fines or the suspension of your wildlife control permit. Most all species of birds, mammals, reptiles and amphibians in Kansas are protected by federal or state law. The federal statutes include the Migratory Bird Treaty Act and the Endangered Species Act. In addition to complying with federal laws, persons with a wildlife control permit must follow applicable state statutes and local ordinances. The state regulations concerning your wildlife control permit are attached. However you should be familiar with the other regulations governing the management of fish and wildlife.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) applies to all migratory birds. The legal citation for this international treaty can be found in the Code of Federal Regulations, title 50, Part 21, Subpart D, Sections 21.41 through 21.46. They are available for download at <http://permits.fws.gov/mbpermits/birdbasics.html>. A permit is required before anyone can take, possess or transport migratory birds. A permit is not required to scare or herd migratory birds except for endangered species.

The term migratory birds applies to all species of birds that are permanent or seasonal residents of the United States, as well as individual vagrants whose range does not commonly extend into this country. Currently there are more than 800 species of birds covered by the MBTA. The MBTA excludes certain species that are naturalized residents of the United States. Those species include the house sparrow, rock dove (feral pigeon), European starling and mute swan. A person who intends to capture, possess or euthanize protected birds must have a permit issued by the United States Fish and Wildlife Service (USFWS). Only species listed on the permit are to be captured or disposed of. Bird captures are limited to the species, numbers and dates stated on the permit and must comply with all applicable laws. The permit applications are processed through the regional offices of the USFWS. Contact information for Kansas is available at:

U.S. Fish and Wildlife Service
Migratory Bird Permit Office
P.O. Box 25486
DFC(60154)
Denver, CO 80225-0486

Tel. (303) 236-8171

Fax (303) 236-8017

Email FW6_birdpermits@fws.gov

(Please include your telephone number in the text of your message so we may better serve you).

This federal statute prohibits the taking, possession or transportation of any endangered species. The legal citation for this law can be found in the Code of Federal Regulations, Title 50, Part 17, Sections 17.1 through 17.108. This law can be downloaded at <http://endangered.fws.gov/esa.html>. An endangered species is a plant or animal determined by the United States Department of Interior to be so rare that the survival of the species is imperiled. The Endangered Species Act prohibits any activity that may have an adverse impact on an endangered species.

Except as otherwise specified, a person can kill an endangered species only when:

1. Such action is in defense of a person's life or the lives of others.
2. An employee of the USFWS or state wildlife agency, when acting in the course of his official duties, determines that an animal constitutes a demonstrable but non-immediate threat to human safety.

Euthanasia

The term euthanasia comes from the Greek word "eu" meaning good and "thanatos" meaning death. It is commonly expressed as the act of inducing painless death in an animal (a humane death). Euthanasia focuses on real and perceived pain and suffering. In theory, euthanasia techniques should result in rapid loss of consciousness followed by cardiac or respiratory arrest and the ultimate loss of brain function with minimized movements of animals. The absence of pain and distress cannot always be achieved. However an attempt to balance the ideal of minimal pain and distress with the reality of many work environments must occur. The amount of pain and stress that occurs from a particular killing method can vary by individual and species of animal.

People perceive dead and dying animals in very different ways. Death is a difficult issue for many people. They may perceive the amount of stress and pain an animal is experiencing from euthanasia very differently than the person listed on the wildlife damage control permit. Generally the public is isolated from the realities of nature. They want the animal relocated or at the very least given a 'humane' death. The difficulty comes when a wildlife control permit holder must determine what is humane yet practical. Common sense, business acumen as well as compassion for the feelings of other persons must be considered before selecting an euthanasia technique. Generally CO₂, gunshot, cervical dislocation or drowning are techniques applicable in most situations.

The Journal of The American Veterinary Medical Association Vol 218, No. 5, pages 669-696 is the 2000 Report of the AVMA Panel on Euthanasia. Copies can be obtained from the site <http://www.avma.org/resources/euthanasia.pdf>.

Although these guidelines were developed for veterinarians to help them choose methods and procedures for minimizing pain and suffering when killing animals. The primary focus of the report is for animals used in research but wildlife and zoo animals are also discussed. Euthanasia has three basic mechanisms of actions:

1. Hypoxia- low oxygen availability
2. Direct depression of vital neurons necessary for life function

3. Physical disruption of brain activity and destruction of neurons necessary for life

Hypoxia can cause loss of consciousness at different rates. For death to be painless and distress free, loss of consciousness should precede loss of motor activity (muscle movement).

Hypoxia agents include curare, nicotine, caffeine, strychnine, succinylcholine, magnesium or potassium salts or pancuronium.

Depression of vital neurons include several techniques that may increase vocalization or muscle movement during the first stage of anesthesia. Carbon dioxide is a good system for some permittees and some species of wildlife. If bottled CO₂ is not available dry ice or a fire extinguisher have been used but it is difficult to regulate inflow. It generally takes 2-3 minutes to euthanize a raccoon using a CO₂ chamber just larger than the cage trap. Carbon monoxide is sometimes used but do not use car exhaust to euthanize wildlife. Barbiturates and opiates are heavily regulated by several agencies and may be difficult to obtain and use.

The physical methods of euthanasia can vary in effectiveness depending on the skill of the person. Gunshot or captive bolt techniques can be inexpensive and are acceptable if the shell enters the brain. Cervical dislocation is common for euthanizing birds and some rodents.

Some hazards exist for workers administering euthanasia. Expertise in euthanasia requires training and practice. The general public's varying attitudes towards the behavior of the animals being euthanized almost require the euthanasia be done offsite and away from the view of the public. The realities of translocation versus euthanasia of common nuisance species needs to be explained to your clients. Everyone doesn't project human emotions onto wildlife, however there is nothing to be gained by killing animals painfully. Make sure you administer euthanasia not just kill animals. Remember, public perception of your actions will decide future regulations.

It is important that all Nuisance Animal Damage Control permit holders be knowledgeable of all applicable regulations and statutes. Due to the constant updating of these regulations and statutes they are no longer included in the training manual. Please refer to our web site for the following regulations and statutes:

<http://kdwp.state.ks.us/news/Other-Services/Threatened-and-Endangered-Species>

You will find a list of all species protected in Kansas by the Kansas Nongame and Endangered Species Conservation Act of 1975.

<http://kdwp.state.ks.us/news/Other-Services/Law-Enforcement/Regulations>

You will find all Regulations and Statutes at this site. Particular regulations applying to NADC permit holders are:

115-5-1. Furbearers and coyotes; legal equipment, taking methods, and general provisions.

115-5-2. Furbearers and coyotes; possession, disposal, and general provisions.

115-5-3. Furbearers and coyotes; management units.

115-15-1. Threatened and endangered species; general provisions.

115-15-2. Nongame species; general provisions.

115-16-1. Cyanide gas gun permit; application and requirements.

115-16-2. Prairie dog control permit; application and requirements.

115-16-3. Nuisance bird control permit; application, provisions and requirements.

115-16-4. Big game control permit; application, requirements, and provisions.

115-16-5. Wildlife control permit; operational requirements.

115-16-6. Wildlife control permit; application and reporting requirements.

32-1007. Coyote carcasses.

32-1008. Migratory birds.

32-1009. Nongame species.

32-1010. Threatened species.

32-1011. Endangered species.

32-1012. Application of prohibitions regarding nongame or endangered species.

32-1013. Taking wildlife without permission on land posted "by written permission only".

Prevention and Control of Wildlife Damage

Table of Contents



Damage Identification: How to determine what animal is causing injury to your property. Because you can't control what haven't identified.

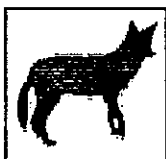


This is the handbook. It details Identification, control and management of over 90 species of wildlife, written by almost as many authorities in their respective wildlife areas.



Rodents: How to control squirrels, voles, pocket gophers, porcupines, beavers, & other members of the rodent family.

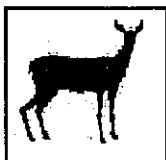
The 1994 edition of the Prevention and Control Of Wildlife Damage is currently out of print. But we have made it available here in PDF and HTML format for FREE!



Carnivores: Information on the control and management of coyotes, foxes, feral cats, mountain lions, mink, raccoons, skunks and other meat-eating animals.

Citing the Handbook

Prevention and Control of Wildlife Damage. Editors, Scott E. Hygnstrom, Robert M. Timm, Gary E. Larson. 1994. University of Nebraska-Lincoln. 2 vols.



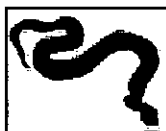
Other Mammals: Information on the control and management of deer, elk, opossums, and species that fall under the other listed categories.

PDF VERSION of the Prevention and Control of Wildlife Damage

Download by Section
WARNING LARGE FILES!!



Birds Information on the control and management of birds, such as pigeons, hawks, sparrows, blackbirds, kites, and more.



Reptiles, Amphibians, etc. Information on the control and management of reptiles (snakes and lizards) as well as amphibians (frogs and salamanders).

Vertebrate Pesticides Warning: Pesticide and supply sections are woefully out of date.

Supplies and materials

[Contents](#)

[Damage Identification](#)

[Rodent](#)

[Carnivore](#)

[Other Mammals](#)

[Reptiles & Amphibians](#)

We have deleted the pesticides and supplier sections as they are woefully out of date.



**Additional
Resources**

Damage Identification

[Damage Inspection Process](#) Step by step plan for inspecting your property for wildlife damage.

[Identification and Assessment of Wildlife Damage: an Overview HTML](#)

Richard A. Dolbeer, Nicholas R. Holler, and Donald W. Hawthorne

[Procedures for Evaluating Predation on Livestock and Wildlife](#)

Dale A. Wade and James E. Bowns

[Obtaining Assistance to Control Wildlife Damage HTML](#)

Philip S. Gipson and Russel F. Reidinger, Jr.

[Wildlife Diseases and Humans HTML](#)

Robert G. McLean

[Identifying and Managing Aquatic Rodents in Texas: Beaver, Nutria and Muskrats](#)

Dale A. Wade and Charles W. Ramsey



Rodents

[Beavers PDF HTML](#)

James E. Miller and Greg K. Yarrow

[Chipmunks PDF HTML](#)

David E. Williams and Robert M. Corrigan

[Gophers, Pocket PDF HTML](#)

Ronald M. Case and Bruce A. Jasch

[Mice, House PDF HTML](#)

Robert M. Timm

[Mice, White-footed & Deer PDF HTML](#)

Robert M. Timm and Walter E. Howard

[Mountain Beavers PDF HTML](#)

Dan L. Campbell

[Muskrats PDF HTML](#)

James E. Miller

[Nutria PDF HTML](#)

Dwight J. LeBlanc

[Porcupines PDF HTML](#)

Sanford D. Schemnitz

[Prairie Dogs PDF HTML](#)

Scott E. Hygnstrom and Dallas R. Virchow

[Rats, Cotton PDF HTML](#)

Donald W. Hawthorne

[Rats, Kangaroo PDF HTML](#)

Volney W. Howard, Jr.

[Rats, Norway PDF HTML](#)

Robert M. Timm

[Rats, Polynesian PDF HTML](#)

Mark E. Tobin

[Rats, Roof PDF HTML](#)

Rex E. Marsh

[Rats, Wood PDF HTML](#)

Terrell P. Salmon and W. Paul Gorenzel

[Rodent-proof Construction PDF HTML](#)

Rex O. Baker, Robert M. Timm, and Gerald R. Bodman

[Squirrels, Belding's, California, & Rock Ground PDF HTML](#)

Rex E. Marsh

[Squirrels, Franklin, Richardson, Columbian Washington & Townsend PDF HTML](#)

Leonard R. Askham

[Squirrels, Thirteen-lined Ground PDF HTML](#)

Edward C. Cleary and Scott R. Craven

[Squirrels, Tree PDF HTML](#)

Jeffrey J. Jackson

[Voles PDF HTML](#)

John M. O'Brien

[Woodchucks PDF HTML](#)

Rene M. Bollengier, Jr.



Carnivores

[Badgers PDF HTML](#)

Fred C. Lindzey

[Bears, Black PDF HTML](#)

Scott E. Hygnstrom

[Bears, Grizzly/Brown PDF HTML](#)

Charles J. Jonkel

[Bears, Polar PDF HTML](#)

Peter L. Clarkson and Ian Stirling

[Foxes PDF HTML](#)

Robert L. Phillips and Robert H. Schmidt

[Mink PDF HTML](#)

Edward K. Boggess

[Mountain Lions PDF HTML](#)

James E. Knight

[Raccoons PDF HTML](#)

Edward K. Boggess

Bobcats [PDF](#) [HTML](#)

Dallas R. Virchow and Denny Hogeland

Cats, Feral House [PDF](#) [HTML](#)

William D. Fitzwater

Coyotes [PDF](#) [HTML](#)

Jeffrey S. Green, F. Robert Henderson, and Mark D. Collinge

Dogs, Feral [PDF](#) [HTML](#)

Jeffrey S. Green and Phillip S. Gipson

River Otters [PDF](#) [HTML](#)

Edward P. Hill

Skunks [PDF](#) [HTML](#)

James E. Knight

Weasels [PDF](#) [HTML](#)

F. Robert Henderson

Wolves [PDF](#) [HTML](#)

William J. Paul and Phillip S. Gipson



Other Mammals

Armadillos [PDF](#) [HTML](#)

Donald W. Hawthorne

Bats [PDF](#) [HTML](#)

Arthur M. Greenhall and Stephen C. Frantz

Deer [PDF](#) [HTML](#)

Scott R. Craven and Scott E. Hygnstrom

Elk [PDF](#) [HTML](#)

David S. deCalesta and Gary W. Witmer

Moles [PDF](#) [HTML](#)

F. Robert Henderson

Opossums [PDF](#) [HTML](#)

Jeffrey J. Jackson

Pigs, Wild [PDF](#) [HTML](#)

Reginald H. Barrett

Pronghorn Antelope [PDF](#) [HTML](#)

Sanford D. Schemnitz

Rabbits, Cottontail [PDF](#) [HTML](#)

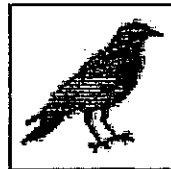
Scott R. Craven

Jackrabbits [PDF](#) [HTML](#)

James E. Knight

Shrews [PDF](#) [HTML](#)

Robert H. Schmidt



Birds

Additional Resources

[Aircraft-Wildlife Hazards](#) FAA Airport Wildlife Hazard Mitigation

[Canada Civil Agency](#) Airport Hazard Information For both Deer and Birds

Birds at Airports [PDF](#) [HTML](#)

Alfred J. Godin

Bird Damage at Aquaculture Facilities [PDF](#) [HTML](#)

(large file)

W. Paul Gorenzel, Fred S. Conte, and Terrell P. Salmon

Bird Dispersal Techniques [PDF](#) [HTML](#)

Thurman W. Booth

Blackbirds [PDF](#) [HTML](#)

Richard A. Dolbeer

Crows, American [PDF](#) [HTML](#)

Ron J. Johnson

Eagles [PDF](#) [HTML](#)

Bart W. O'Gara

Gulls [PDF](#) [HTML](#)

Victor E. F. Solman

Hawks & Owls [PDF](#) [HTML](#)

Scott E. Hygnstrom and Scott R. Craven

Horned Larks [PDF](#) [HTML](#)

Jerry P. Clark and Scott E. Hygnstrom

House Finches (Linns) [PDF](#) [HTML](#)

Jerry P. Clark and Scott E. Hygnstrom

Jays, Scrub (California) [PDF](#) [HTML](#)

Jerry P. Clark and Scott E. Hygnstrom

Kites, Mississippi [PDF](#) [HTML](#)

William F. Andelt

Magpies [PDF](#) [HTML](#)

Thomas C. Hall

Pigeons, Rock Doves [PDF](#) [HTML](#)

David E. Williams and Robert M. Corrigan

Sparrows, Crowned [PDF](#) [HTML](#)

Jerry P. Clark and Scott E. Hygnstrom

Sparrows, House [PDF](#) [HTML](#)

William D. Fitzwater

Starlings [PDF](#) [HTML](#)

Ron J. Johnson and James F. Glahn

Swallows [PDF](#) [HTML](#)

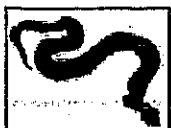
W. Paul Gorenzel and Terrell P. Salmon

Waterfowl [PDF](#) [HTML](#)

Edward C. Cleary

Woodpeckers [PDF](#) [HTML](#)

Rex E. Marsh



Reptiles, Amphibians, etc.

Alligators [PDF](#) [HTML](#)

Allan R. Woodward and Dennis N. David

Crayfish [PDF](#) [HTML](#)

James F. Fowler, Wendell Lorio, and Greg Lutz

Frogs & Toads [PDF](#) [HTML](#)

Paul E. Moler

Salamanders [PDF](#) [HTML](#)

James L. Byford

Snakes [PDF](#) [HTML](#)

James L. Byford

Rattlesnakes [PDF](#) [HTML](#)

Walter E. Howard

Turtles [PDF](#) [HTML](#)

James F. Fowler and Jimmy L. Avery

[Home](#) | [Publications](#) | [Service Vendors](#) | [Education](#) | [Solutions](#) | [Agencies](#) | [Store](#)

© 2005 Internet Center for Wildlife Damage Management

[Report an Error](#) | [Policies](#) | [Credits](#)

Urban Wildlife Damage Control

Bats are unique and interesting animals, but their nocturnal nature makes them one of the most mysterious and misunderstood mammals in Kansas.

Bats belong to the mammalian order *Chiroptera*, which means "hand-wing." They are the only mammals capable of true flight. In terms of the number of species, *Chiroptera* is the second largest group of mammals in the world. Only the order *Rodentia* (rodents) contains more species.

Of the approximately 900 species of bats found in the world, 45 live in the United States and 15 of those have been found in Kansas. Contrary to popular belief, there are no vampire bats in Kansas. All Kansas bats feed on insects. Large numbers of bats are capable of eating tons of insects each year, making them beneficial to humans.

One species sometimes found in Kansas is the Brazilian free-tailed bat (*Tadarida brasiliensis*). A Texas colony of this species has about 20 million individuals that eat 100,000 pounds of insects per night.

Kansas Bats

Little brown bat (*Myotis lucifugus*):

A brown, mouse-sized bat that infrequently occurs in eastern Kansas and may live in attics and buildings. Colonial, hibernates.

Northern long-eared bat (*Myotis septentrionalis*):

Similar in size and appearance to the little brown bat, except that the ears extend beyond the nose when flattened forward against the head. A resident of eastern Kansas but uncommon.

Big brown bat (*Eptesicus fuscus*):

A large bat, perhaps twice the size of the little brown bat, but still weighing only ½ ounce. Probably the most common and widespread bat in Kansas in buildings and attics where it may hibernate. Colonial.

Silver-haired bat (*Lasionycteris noctivagans*):

Slightly larger than the little brown bat, but smaller and less common than the big brown bat. Fur is dark, nearly black, with white-tipped hairs. Seasonally solitary, migrates.

Eastern Pipistrelle bat (*Pipistrellus subflavus*):

Our smallest bat, yellowish-brown with pink arms, only 3 inches long. Not commonly found in buildings. Prefers caves, abandoned mines and rock crevices. Solitary, hibernates.

Red bat (*Lasiurus borealis*):

About the same size as the big brown bat, but fur is rusty red and may be washed with white. Seeks daytime refuge in trees. Solitary, migrates.

Brazilian free-tailed bat (*Tadarida brasiliensis*):

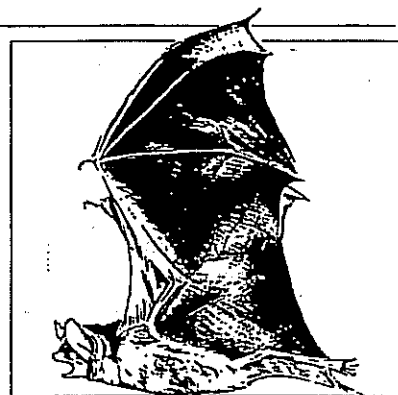
Has strong musty odor. Has been found in most counties of Kansas and roosts in buildings. Highly gregarious. Disperses widely. Migrates.

Cave Myotis (*Myotis velifer*):

Sometimes roosts in buildings. Found in south-central and southwestern Kansas. Roost in large colonies in caves or mines. Hibernates.

Gray Myotis (*Myotis grisescens*):

Similar to cave myotis, but found only in southeastern Kansas. An endangered species.



Western small-footed Myotis (*Myotis ciliolabrum*):

Uncommonly found in northwestern Kansas. Roosts in rocky bluff cracks, old swallow nests and abandoned buildings. Colonial, hibernates.

Evening bat (*Nycticeius humeralis*):

Found in the eastern two-thirds of Kansas during the spring, summer and autumn. This bat is occasionally found roosting in buildings. Migrates south in winter.

Western big-eared bat (*Corynorhinus townsendii*):

This bat is a year-round resident in the gypsum caves in the Red Hills of southwestern Kansas. May roost in buildings, but hibernates singly or in small clusters. Especially sensitive to disturbance.

Pallid bat (*Antrozous pallidus*):

Found rarely in gypsum canyon systems of the Red Hills of western Barber County. Roosts primarily in rocky bluff cracks and caves, but has

Urban Wildlife Damage Control

- | | |
|--|--|
| <input checked="" type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

roosted in buildings. It usually lands on the ground to capture arthropods. Hibernates in small clusters.

Big free-tailed bat (*Nyctinomops macrotis*):

Related to the Brazilian free-tailed bat. Found a few times in southwestern Kansas. Emits a sharp, piercing call while feeding.

Hoary bat (*Lasiurus cinereus*):

The largest bat in Kansas. Has a 15-inch wingspan and weighs about 1 ounce. Grayish yellow-brown color, overcast with grayish white. Prefers northern forests, but is found occasionally in Kansas. Solitary, migrates.

Biology and Habits

Bats found in Kansas are members of two families, *Vespertilionidae* and *Molossidae* (free-tailed bats). Kansas is the northern part of some species' range and is home throughout the year for others. Other bats are migratory and pass through during the spring and fall.

Most Kansas bats are small. One group of small bats are the *Myotis* or mouse-eared bats with a body length of only 3 to 4 inches. The largest bat in Kansas is the hoary bat (*Lasiurus cinereus*). The hoary bat's body is less than 5 inches long, but it can develop a wingspan of 16 inches and fly at speeds exceeding 50 mph.

Bats naturally roost in the leaves of trees, in caves or under loose tree bark during the day, but many species prefer to roost in or around buildings. Depending on the species, bats become active during the twilight hours or shortly after dark. When bats leave the roost, they normally fly to a source of water before feeding. Some species feed occasionally throughout the night, but most feed around sundown and then again before daylight.

Bats found in Kansas locate insects and avoid obstacles during flight by echolocation, which is similar to radar or sonar. A sound emitted by the bat

bounces off insects or objects and returns to the bat's ears. Echolocation is unique to bats and some species of dolphins and whales, and enables bats to catch insects in flight. Most of the high-frequency sounds emitted by bats for echolocation are inaudible to humans, although many bats make sounds that humans can hear.

By the first frost, bats begin to prepare for winter. Some species migrate south. Migration distance may vary from a few miles (if a suitable cave is nearby) to 1,600 miles. Bats mate as they gather near caves in which they will hibernate. Although bats mate in the fall and winter, the females do not give birth until mid-May through mid-July. Most bats only give birth to one or two young, but a few may produce three or four annually.

Young bats grow rapidly and most are capable of flight three to four weeks after they are born. They are weaned one to two weeks later. Bats often live 10 years or more, and some live as long as 30 years.

Urban Bat Problems and Control Measures

Although bats cause little damage to buildings, their presence is usually unwanted. Bat droppings and urine have a strong, persistent odor that attracts other bats if the area is not properly cleaned. **CAUTION:** If any amount of bat droppings are present, wear a dust mask while cleaning to avoid breathing fine dust particles from disturbed droppings. Histoplasmosis is an airborne disease caused by a microscopic soil fungus, *Histoplasma capsulatum*, which affects the lungs of humans.

Noise is another problem bats cause inside buildings. Many bats create noise that can be disturbing to humans. Occasionally, a bat may get into the living area of a house (Figure 1). While this is often disconcerting to the occupants, it doesn't have to be. The bat will often leave at dusk if doors or windows are left open. Do not try to capture the bat unless you are wearing heavy leather gloves or using a net.

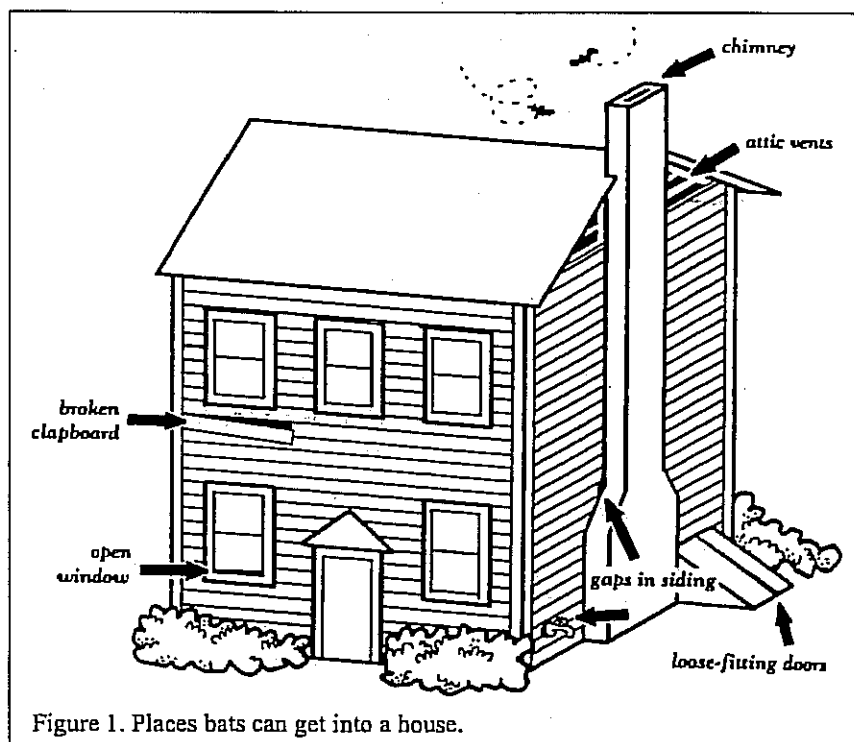


Figure 1. Places bats can get into a house.

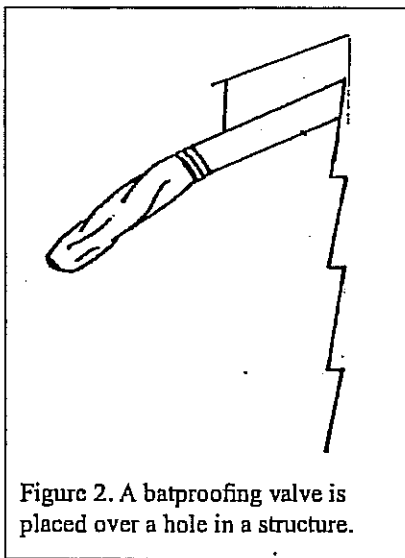


Figure 2. A batproofing valve is placed over a hole in a structure.

If bats are roosting in an attic, place one or two bright lights in the area to encourage them to leave. High-wattage lights create a lot of heat. Use caution to avoid starting a fire.

Excluding bats from a dwelling is the only long-term solution. Have several people watch the outside of the house around dusk to locate areas where bats are exiting. After all bats have left the house, close the openings. Because small bats such as the Eastern Pipistrel (*Pipistrellus subflavus*) can crawl through an opening as small as $\frac{1}{8}$ of an inch in diameter, all openings such as cracks, vents or holes in the siding should be plugged or covered with $\frac{1}{4}$ -inch hail screen.

If bats are leaving the building in numerous places, plug or cover all of the openings except one or two. Observe the openings for two or three evenings to make sure all bats are out of the building before closing them. To avoid trapping young bats inside, do not plug or cover all entrances from mid-May to mid-July. Dead bats can create an objectionable odor.

The best time of the year for bat-proofing a house is between November and March. One way is to install a "Constantine's bat-proofing valve." This device, made of a rigid base tube with an outer pliable sleeve attached, is placed over the entrance hole allow-

ing bats to exit the dwelling but not re-enter (Figure 2).

Diseases

Harboring bats in homes and schools should be discouraged because on rare occasions a bat may develop paralytic rabies and fall within reach of children and pets. Rabies is the most important public health hazard associated with bats, but its effect has been exaggerated. Whether or not the bat is infected, a house bat will not attack when molested, but it will bite defensively if handled.

To keep bats from living in buildings, seal entry holes after bats have left. Wear gloves and get an antirabies vaccine if you bat-proof when bats are present.

Histoplasmosis is another disease humans may contract from bats. This airborne disease, caused by a microscopic soil fungus sometimes present with bat droppings, affects the lungs with symptoms similar to influenza. To avoid contracting histoplasmosis, wear a respirator or dust mask while cleaning bat droppings.

Like many other animals, bats cause problems when they conflict with humans. When this happens, control measures, not necessarily lethal, should be taken to solve the problem. The presence of bats in the area or neighborhood is not detrimental. Bats

provide many more benefits than most people realize.

Some people place bat houses around their dwellings to provide a roost for bats and reduce the chances of them using their attic. Plans for building a bat house are in Figure 4. Commercially made bat houses are also available.

For Further Reading

"Amazing Bats, Why We Need Them," International Wildlife Magazine, July-August, 1983.

"America's Neighborhood Bats," M.D. Tuttle. 1988. U. of Texas Press, Austin, TX

"Bats: Biology and Behavior," J.D. Altringham. 1996. Oxford University Press, Inc., United Kingdom.

"Bats of America," R.W. Barbour and W.H. Davis. 1969. The University of Kentucky Press, Lexington, KY. 1969.

"Bats of the United States," M.J. Harvey, J.S. Altenbach and T. L. Best. 1999. Arkansas Game and Fish Comm. and U.S. Fish and Wildlife Service.

"The Bat House Builders Handbook," M.D. Tuttle and D. L. Hensley. 1993. Bat Conservation International, Austin, TX.

For additional information contact Charles Lee, Wildlife Specialist, 131 Call Hall, Kansas State University, Manhattan, KS 66506-1600.

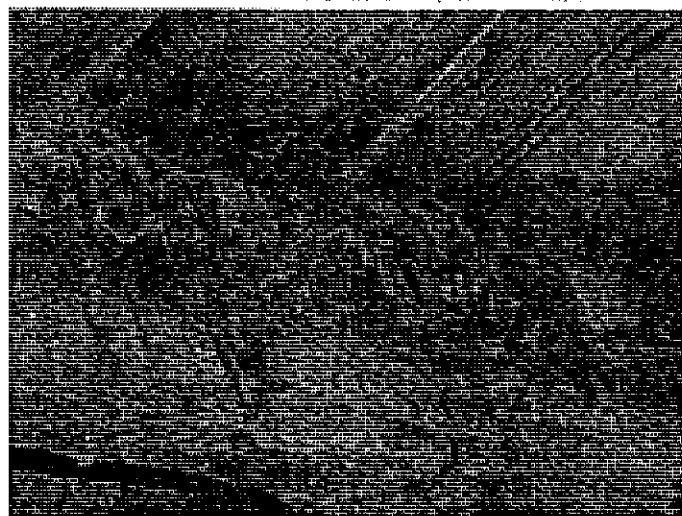


Figure 3. Big brown bats may use buildings year-round.

Figure 4. Plans for constructing a bat house.

Dimensions
A Roof 16½" x 11¼"
B Front 18¾" x 9¼"
C Back 27" x 9¼"
D Ceiling 9¾" x 9¼"
E Partition 9¼" x 8"
F Partition 9¼" x 14"
G Sides 11¼" wide,
27" back,
18¾" front

Spacing between partitions (front to back):
3/4", 3/4", 3/4", 1", 1 1/2", 1 1/4"

The figure shows three views of a bat house plan. The side view (left) shows a rectangular base labeled 'G' with a flat top labeled 'D'. The front view (center) shows a gabled roof labeled 'A' supported by a front board labeled 'B' and a back board labeled 'C'. Inside, there are three vertical partitions labeled 'E' and two horizontal partitions labeled 'F'. The detail view (right) shows a corner joint with dimensions: a horizontal gap of 6" at the top, a vertical height of 21" for the main section, a 27" vertical dimension for the side board, a 6" vertical dimension for the bottom section, and a 2" horizontal dimension at the base. A small dimension of 1 1/4" is also indicated near the bottom corner joint.

* Insert cut 1 1/4" x 6 1/4"

Stan Roth
Educator/naturalist
Kansas Biological Survey

Publications from Kansas State University are available on the World Wide Web at: www.oznet.ksu.edu.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

March 2005

K-State Research and Extension is an equal opportunity provider and employer. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Fred A. Cholick, Director.

Birds

Urban Wildlife Damage Control

Three kinds of birds—English sparrows, starlings and pigeons—cause most conflicts between birds and people in urban areas of the United States. All have well-established populations, but none are native species.

Because all live in close association with man, they transmit diseases and are host to many parasites and insect pests. Their nests create fire hazards, and droppings deface and ruin property.

Starling roosts are a frequent problem in urban areas because of noise, filth, odor and related health concerns. Starlings also compete for nesting sites with native cavity-nesting birds such as bluebirds, flickers, woodpeckers and purple martins.

Pigeons may carry pigeon ornithosis (psittacosis), Newcastle disease, aspergillosis, pseudotuberculosis, pigeon coccidiosis, toxoplasmosis, encephalitis and Salmonella typhimurium. Except for the last three, these diseases rarely infect humans, but may be serious if not diagnosed promptly. Salmonella is found in about 2 percent of pigeon feces and is statistically the most frequent cause of salmonella food poisoning in humans.

Histoplasmosis and cryptococosis are systematic fungus diseases which may be contracted by cleaning up dusty bird manure. Bird ectoparasites—bugs, fleas, ticks and mites—frequently invade homes from bird nests in or on buildings and transmit diseases by biting. Some bites cause welts and skin infection.

Bird droppings deface and accelerate deterioration of buildings and automobiles and land on unwary pedestrians. Bird feces is a common contaminant of grain destined for human consumption. Nests may clog drain pipes, interfere with awnings and make fire escapes hazardous.

Population Control

To control large-scale urban bird problems, it is necessary to understand population control as a management technique. In good habitats abundant

animal species recover quickly from the loss of individuals. Animal populations respond with increased birth and survival rates and decreased emigration. These are known as *compensatory responses*. Increased immigration may follow removals, and some animals learn to avoid control efforts.

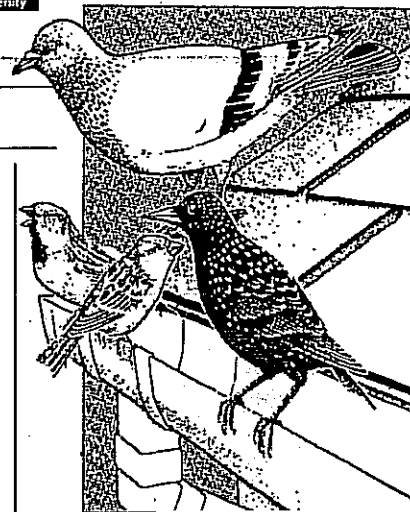
The most effective way to control problem birds is to understand their daily requirements, and remove or exclude these. This kind of manipulation for purposes of increasing or decreasing numbers is an important part of wildlife management. Some basic principles provide a background for understanding how to control problem birds effectively and appropriately.

To survive, all wild animals need *habitat*, which is comprised of four essential elements: space, food, shelter and water. Wildlife managers manipulate these elements to attract and maintain wildlife species and control problem species.

Space is the area needed by a wild animal. Just as some people are happy in a city apartment while others need a sprawling ranch, some birds need more space than others. In reference to wild animals, there are two kinds of space:

- *home range*—the entire area that an animal uses to eat, sleep, and go about its daily activities;
- *territory*—that portion of the home range an animal defends against intruders, usually where it raises young.

In most cases, the male bird establishes and defends the territory. In the spring the brightly colored male sings



to attract a mate and to announce to other male birds of the same species the location of his territorial space. After the pair builds a nest, the male continues to defend the territory while the female hatches eggs. This factor cannot be controlled because space is determined by the area of a yard or farmstead.

Food, water and shelter are elements that can be manipulated to manage birds in the yard or other urban setting. Providing these attracts birds; removing them keeps birds away. All are essential, yet not all bird problems can be eliminated by taking away just one element.

Variety is a key word in wildlife management. It is often necessary to use a variety of excluding and repelling methods simultaneously to control nuisance birds.

Food sources for birds include seeds, fruits, berries and insects. To reduce the number of problem birds, eliminate or control their access to food. Strategies for controlling problem birds around homes are often different from those needed around

Urban Wildlife Damage Control

- | | |
|--|--|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input checked="" type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

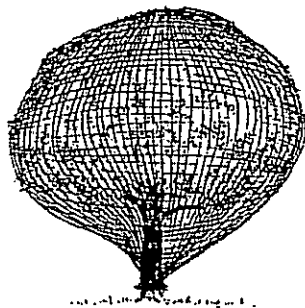
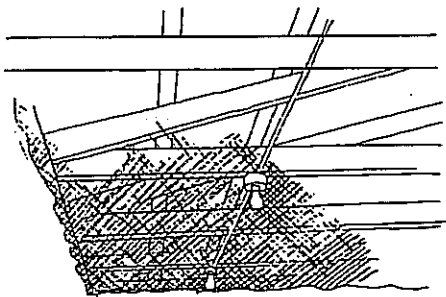


Figure 1. Netting can be used to keep birds out of rafters and trees.

farmsteads. The homeowner may reduce the number of undesirable birds by choosing plants that do not produce edible nuts, fruits and berries, or by changing the type of food offered in bird feeders.

Variety is necessary for successful bird damage control. Use different methods, and change them so birds do not become accustomed to them.

House sparrows are often a problem at the feeder. To reduce their number, feed them straight sunflower seeds—preferably the black, oil-type—instead of a seed mixture, and discontinue feeding in the spring, summer and early fall. Make it difficult for house sparrows and other large birds to feed by using tubular feeders without perches. These feeders are easily accessible to the clinging birds such as nuthatches, chickadees and titmice. Lure house sparrows away from the feeding station by using a platform-type feeder, loaded with a mixture of white proso millet and cracked corn, at the back of the yard away from the other feeders. If many sparrows still visit the feeder near the house, try one of the trapping methods described in this publication.

All birds need shelter for cover, roosting and nesting. The kind of shelter depends on the season, the species and the reason for seeking shelter. When birds roost or nest in inappropriate places, denying access to roost sites will discourage feeding also.

When birds nest in inappropriate places, be persistent about removing nests; birds will keep trying to reestablish

them in the same place. A longer term solution is to exclude birds from an area or make it less comfortable.

Various methods can be used to prevent birds from nesting or roosting on ledges and rafters or under eaves and other overhangs.

- Put nylon or plastic netting on the underside of rafters or overhangs to keep birds out, or cover entire fruit trees with netting to keep birds from roosting or eating the fruit (Figure 1).

- Use sticky repellents (Tanglefoot™, Roost-No-More™, 4 The Birds™) on rafters and ledges. These are effective in discouraging roosting, but they are messy, collect dirt and may need to be reapplied several times a year.

- For birds outside of a building, install netting or a metal covering from the outside edge of the eave down to the wall.

- Hang clear plastic strips from doorways of barns and sheds; machinery, livestock, and people can pass through, but most birds will think it is a solid door.

- Build a catwalk at rafter level that allows barn cats easier access to birds on rafters.

- Install "porcupine wires," permanent, heavy wire prongs that stick out at different angles, making the area like a bed of nails (Figure 2). For barn swallow nests, wire prongs must be placed on the side of rafters or underneath the eaves.

- Put a board or metal covering over ledges at a 45-degree angle (or greater), making them less suitable for

nesting or roosting. Make sure the ends are closed to prevent entry (Figure 2).

To disperse large flocks of birds roosting in trees, habitat modification or frightening techniques may be the most effective. Some species such as blackbirds, starlings and crows form groups in the evening and roost together through the night. These social birds will try to stay together in the roost, a known meeting place.

Make the roost undesirable or uncomfortable by thinning the roosting trees and shrubs to reduce cover. The changes need not be dramatic to be effective.

A water source is essential year-round and can attract birds to areas like feedlots and grain storage. Starlings, in particular, are attracted to water. Where birds are a problem, any unnecessary water—in troughs, junk piles, ruts or low spots—should be drained. The water level in troughs should be kept low enough so birds cannot reach it when perched on the edge, and deep enough so they cannot stand in it.

Frightening

Frightening devices include alarm and distress calls played over loud speakers, exploding shells, automatic gas exploders, tethered balloons with big "eyes" painted on them, hawk silhouettes, water sprays, flashing lights, and devices to shake roosting vegetation. These tactics repel

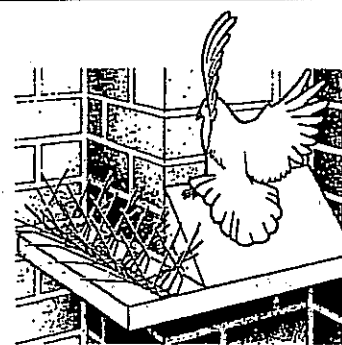


Figure 2. Install "porcupine wires" or cover ledges to discourage birds.

starlings and some other birds, but seem to have little or no effect on house sparrows and pigeons. Balloons may offer a measure of control for house sparrows in buildings. Simultaneous use of visual scare devices and noisemakers seems to be most effective.

Visual scare devices must be moved frequently so birds do not become accustomed to them. With scaring sounds, use mobile sound equipment so the location of the sound can be changed. When using automatic gas exploders, elevate them above the vegetation.

Birds are more willing to leave a roost they have not been using long. After detecting large numbers of roosting birds, act as quickly as possible. Some species are easier to move in the fall when they are restless and preparing to migrate.

It often takes five to seven nights or more of continuous effort for frightening programs to be effective. Sometimes birds move to a new roost nearby and again several times within an urban area before they move to an acceptable site or out of town. In these situations, birds may become desensitized to scaring devices, so use several methods.

Birds scare more easily when they are flying and are most difficult to scare when perched in the relative protection of their roost. For this reason, scaring should begin at least 1½ hours before dark, when the first birds are coming in to roost, and

should stop at dark. Do not try to scare any longer because the birds will become accustomed to the sounds. If you are using distress or alarm calls, play them 10–15 seconds every minute as the birds are coming in. When most of them are perched, play the call continuously until dark. Early morning scaring may be used in conjunction with evening scaring and should begin as soon as the first bird movement is detected in the roost, often just before daylight.

On the first night of scaring, the birds will usually act alarmed and circle around, but eventually they will come in to roost. It may take several days of continuous scaring efforts—every evening and every morning—to be successful. The birds may attempt to establish temporary roosts in other unsuitable locations. Scaring efforts must continue until the birds are moved to an acceptable area. If birds are disturbed in their new roost site they may move back to the old site. Be prepared to resume scaring efforts if the birds return.

Other Controls

To keep birds from flying into glass windows use the hawk trick. Migrating birds often mistake large picture windows or glass doors for open space with tragic results.

One way of reducing this hazard is to cut out a falcon silhouette and stick it on the glass with clear plastic tape in a steep—but not vertical—dive as illustrated. Use only one “falcon” to a window, placing in either of the upper corners (*Figure 3*).

To keep birds from perching or roosting on undesirable places try the shredded newspaper trick. If you do not want birds to perch on a post, for instance, tie a newspaper around its top, leaving 6 inches or so extending above. Shred this part. Birds won't perch as long as the paper lasts. If the problem is a window sill, staple a strip of the paper to the sill letting the shredded ribbons lie across its surface.

Birds also object to perching on or near angled wire spines, so a good repellent can be a cluster of short, stiff

wires. Coat hanger wire is about right. Cut six, 6-inch lengths. Bundle them together and staple one end securely to a good footing such as a block of wood or directly to the surface to be protected. Now bend each piece of wire up and over so that the spines stick out like cactus spikes, giving the approaching bird little choice but to keep on flying. Several clusters will be needed to keep a window sill clear of birds.

To keep birds out of gardens try a phony owl. It can be made life-size from a board or other materials. A good one can be made from wooded net-floats. Use a long one for the body and split another long one to fasten on each side as wings. Use a round one with bored-out eyes for the head and a disk-shaped one for the feet. The important thing is to move it frequently to keep the birds guessing.

Other effective scare devices include string-tethered balloons, aluminum pie plates, wind turbines made of plastic milk jugs, or anything that whirls or twists in the wind. Here again, it is necessary to make frequent changes. Sooner or later the birds will lose their fear of any scare device if it remains in one place. For that reason, the traditional scarecrow is nearly always useless. A more reliable method is to use netting over individual trees or entire gardens to prevent damage.

Netting or trapping is a good alternative for controlling nuisance birds in areas where there are other bird species. Live trapping methods such as funnel entrance, automatic and triggered traps, nest box traps, decoy traps and mist nets are widely used for house sparrow control (*Figure 4*, page 4). With these methods, protected songbirds can be released unharmed. When using traps, prebait the area without a trap for one or two weeks by putting out a bait like cracked corn. Then set the traps with the same bait inside. Make the traps more attractive by placing live decoys of the same species inside in a separate compartment so they cannot escape. Provide food and water for the decoy birds.

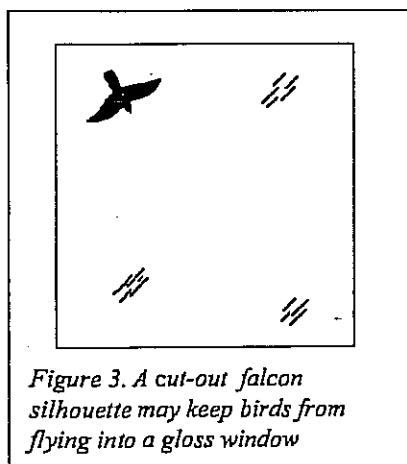


Figure 3. A cut-out falcon silhouette may keep birds from flying into a glass window

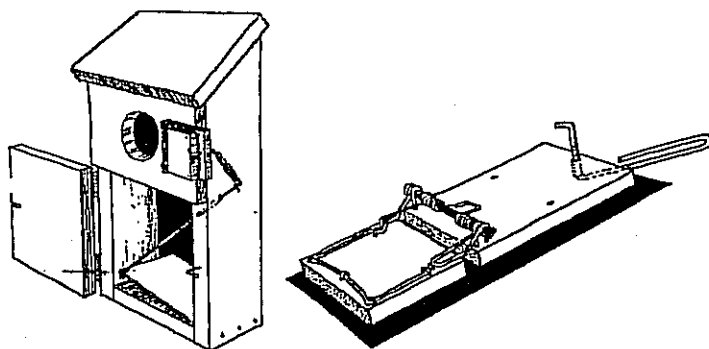


Figure 4. Nest-box trap with modified mouse snap trap trigger. Useful for trapping pigeons, house sparrows or starlings.

Check the traps several times each day so you can release nontarget birds unharmed and reduce the number of birds that might find a way to escape. Destroy house sparrows, starlings or pigeons caught in the trap in a humane manner. Check with local animal control or wildlife conservation officers for trapping rules. Some cities and towns require special permits.

Chemical Controls

If exclusion from food or roosts is not possible and trapping or scaring has proven ineffective, chemical control is another alternative. However, it is not always a good choice and often does not provide satisfactory results. Before using chemicals, first determine what kind of bird is causing the problem. House sparrows (sometimes called English sparrows), starlings and pigeons are the most common offenders.

Without a permit, chemical controls can be used only on these three species. Avitrol is a chemical frightening agent. It is available for house

sparrows, starlings and pigeons in a corn or pelletized bait impregnated with the chemical *4-Aninopyridine*. The pelletized form of Avitrol is usually best for starlings, and the corn or wheat form is best for house sparrows and pigeons. Avitrol is also available in liquid and powder form. Cubes of stale bread soaked in a mixture of the chemical and vegetable oil also have been effective on starlings in farm and industrial buildings.

For best results, prebait with non-toxic bait. For the pelletized form of Avitrol, prebait with untreated pellets. For several days put untreated bait where the birds feed or roost so they become accustomed to eating it. Make sure to keep it away from livestock feed or where it can be otherwise consumed by livestock. Once the birds are feeding readily on the untreated bait, switch to the toxic bait. Some birds will die, displaying distress signals that frighten other birds away.

Because using chemical controls may result in birds dying in public places, public understanding and

support should be secured before they are used. Without it, a public relations problem may arise. Be sure to collect all carcasses and dispose of them properly by burying or burning. Because Avitrol is toxic to birds, it can only be used to control house sparrows, starlings and pigeons and where no other species of birds will come in contact with the pesticide.

Federal and state laws protect all songbird species except house sparrows, pigeons and starlings. Read and follow all label directions.

Avitrol is a restricted use pesticide, and may be used only by a certified applicator or persons under the direct supervision of a certified applicator.

Starlicide Complete™ can be used to reduce starling populations in rural areas only. This pesticide is available in a pelletized bait and causes a slow, non-violent death. Read and follow all label directions. This product is not labeled for use in urban areas.

For further information contact Wildlife Damage Control, 131 Call Hall, Kansas State University, Manhattan, Kansas 66506-1600, (785) 532-5734.

Same of this information adapted from Managing Iowa Wildlife: Problem Birds Around Homes and Farmsteads, Iowa State University, 1991. Brand names appearing in this publication are for identification purposes only. No endorsement is intended or implied, nor is criticism of similar products not mentioned.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case credit, Charles Lee, Birds, Urban Wildlife Damage Control, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-856

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Blackbirds in Roosts



Urban Wildlife Damage Control

Blackbirds and starlings often establish roosts in areas where they are unwelcome because of the economic damage and potential health problems they cause. Grackles, brown-headed cowbirds, red-winged blackbirds and starlings form large roosts which create a nuisance in urban areas.

Laws and Regulations

Federal and state regulations protect blackbirds and other migratory birds. A federal permit is required to take, possess or transport migratory birds for depredation control purposes. But no permit is required to scare or herd these birds, except federally listed threatened or endangered species, bald or golden eagles (50 CFR 21.41).

A standing order exists for blackbirds, cowbirds, grackles, crows and magpies. No federal permit is required and control measures—including lethal methods—may be taken when these species are found “committing or about to commit depredation,” or when they “constitute a health hazard or other nuisance.”

A state permit is required for lethal control of nuisance birds, except feral pigeons, English sparrows or starlings, with poisons or chemicals (KAR 115-16-3). Contact the Kansas Department of Wildlife and Parks regional offices for this permit or more information on rules and regulations.

Managing Urban Blackbirds

Summer and fall roosts

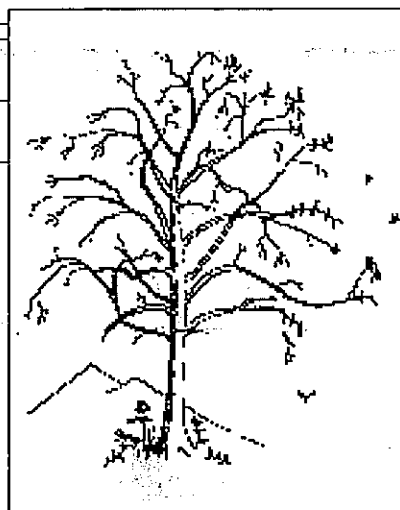
After nesting, blackbirds and starlings begin forming flocks and roosts. Roosts are sometimes formed by late June, but most are established in July. Because flocks prefer deciduous trees, the prevalence of deciduous shade trees in urban and suburban areas makes these sites attractive. Thousands of blackbirds may occupy

several blocks of suitable trees in summer roosts. Birds abandon deciduous tree roosts when the leaves drop in the fall.

Community organization is necessary when using scaring devices to disperse summer roosts in urban or suburban neighborhoods. If a summer roost has formed in the same neighborhood for several years, make plans in the spring or early summer before the birds arrive, because they are more easily dispersed before becoming accustomed to a site. Here are the steps to take:

1. Consult neighbors to see if they agree on the problem.
2. Contact local authorities such as the city manager, police department, health department or others for assistance and follow-up.
3. Obtain necessary equipment: a portable tape player and tapes of blackbird distress calls, pistol launchers with whistle bombs (*Figure 1, page 2*).
4. Organize public employees or other responsible adults to help. Usually, three or more persons are needed, depending on roost size.
5. Schedule activities for at least three and possibly five or more consecutive evenings.
6. Begin dispersal activities about one-half hour before dark, or as soon as the birds begin settling into the roost; continue until dark.

When the birds first arrive, they may perch in nearby trees and fly



around without settling. This activity is referred to as staging and may go on for 15 to 30 minutes before the birds actually roost. When the birds appear to be roosting, begin playing distress calls, loudly and intermittently at first, and then continuously as most of the birds are entering. The player and distress calls should be moved to various locations within the roost every few minutes. Shooters should use pistol launchers to fire over the tops of the roost trees. Whistle bombs fired into the incoming flocks will help turn them back. Continue using distress calls and scaring devices as long as birds are entering the roost. After dark, cease activity because birds remaining will not leave, and efforts are useless.

Be persistent and follow-up on successive evenings. In large roosts or where roosts are well established, the first evening may appear to be unsuccessful. Scaring may have to be continued for 4 or 5 days before the birds abandon the area. With small roosts or where birds are less established, scaring may disperse flocks the

Urban Wildlife Damage Control

- | | |
|---|--|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input checked="" type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

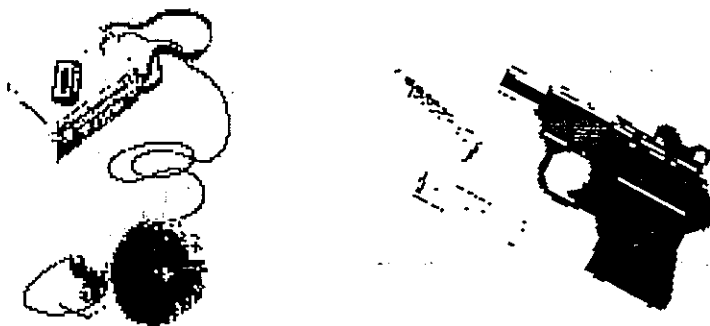


Figure 1. Scaring devices include (left) a speaker connected to a tape recording of a distress call and (right) a whistle bomb fired from a pistol.

first night but should be continued for several more to prevent them from returning.

Where dispersed flocks go is unpredictable. They may join flights of birds going to other roosts or may set up a new one. Once birds have been moved, they are usually more responsive to dispersal from another site.

Removing vegetation can be effective in controlling roost populations. It is not always possible or desirable to remove all cover, but thinning helps. Wherever possible, remove all understory shrubs and brush and as many canopy trees as you can. The goal should be not to have any interlocking canopy tree branches. Note: Do not alter habitats in roosts that have been active for more than a year without contacting state health officials.

Winter conifer roosts

Many blackbirds migrate south, but some sizable flocks of grackles, cowbirds and starlings remain in Kansas

during the winter, especially in the southern counties. After leaf fall, flocks assemble in conifer plantations to take advantage of the protective cover of the closely spaced trees. Roosts are formed in late fall and may persist until March of the following year.

Generally, winter roosts are in the countryside where they do not create the problems associated with summer urban roosts, even though the number of birds may be higher, and they may cover a larger area. Although the same methods and materials can be used, eliminating winter roosts requires more work and equipment, including automatic exploders and 12-gauge shotguns with shellcrackers with greater range than those needed for urban roosts.

Thinning conifer roosts may open stands sufficiently to make them unattractive to birds. Consider timber harvest when winter roosts cannot be managed by bird dispersal.

Winter roosts on structures

Starlings remaining in urban areas during the winter may roost overnight on building ledges, window sills and other places where their noise may be objectionable and their droppings may deface buildings. They forage on streets, vacant lots and around trash receptacles where food waste is carelessly scattered. Starlings also feed at urban and suburban bird feeders.

Sanitation and avoiding structural designs that encourage roosting are basic community considerations. Toxic controls in urban locations are inappropriate, but tactile repellents applied in ribbons or strips are effective on ledges, window sills and other building parts. Birds find these sticky compounds disagreeable underfoot and seek alternative roosting sites. Mechanical devices with projecting wires can be installed to discourage birds from landing and perching.

Distress calls and scaring devices are seldom successful in dispersing starling flocks from structures.

For supply sources, references or educational assistance contact: Wildlife Damage Control, 131 Call Hall, Kansas State University, Manhattan, Kan. 66506-1600, 785-532-5734.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>
Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, Blackbirds, Urban Wildlife Damage Control, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-857

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating. Marc A. Johnson, Director.

Cottontail Rabbits

Urban Wildlife Damage Control

Cottontail rabbits, *Sylvilagus floridanus*, are one of the most commonly observed animals in urban and suburban areas, but they can be found throughout Kansas. Their light-brown upper body contrasts with their white fur belly. Long ears and a stubby powder-puff tail are their distinguishing characteristics. Adult cottontail rabbits are 15 to 19 inches long and weigh 2 to 4 pounds.

Cottontail rabbits produce 3 to 4 litters of young a year, beginning in late winter and continuing into early fall. Females build a nest approximately the size of a softball, line it with fur from their bellies, and nurse their young for 2 to 3 weeks before they leave the nest.

Leash laws restricting movements of dogs and cats and laws prohibiting the use of firearms protect cottontail rabbits.

Cottontails prefer brushy cover interspersed with open areas. Abundant growth during the spring and summer provides the rabbits with all the food and cover they need. In the winter, when food is limited, rabbits eat twigs and gnaw the bark of woody plants. This is why young trees and seedlings need to be protected from rabbits during the winter months. Landscaped yards provide excellent rabbit habitats, accounting for the prevalence of cottontails in most suburban and urban areas.

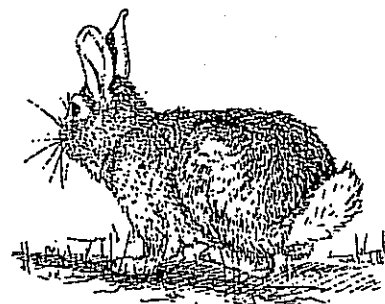
Cottontail rabbits spend their lives in small areas of 10 acres or less. In good habitats where cottontail rabbits are firmly established, efforts to permanently reduce the rabbit population generally are not successful. Once a number of rabbits are removed, cottontails from adjacent areas move in.

Managing Urban Rabbits

Gnawing marks and twigs cut at an angle, clippings on the nearby ground and round, pea-sized droppings are signs of cottontail rabbits. During snow cover, cottontail rabbit tracks are easily identified (*Figure 1, page 2*).

Exclusion

Rabbitproof fences are a practical and inexpensive way to protect valuable plants. Rabbits can be excluded from small areas of vegetable and flower gardens, nurseries and ornamental plants by encircling these areas with 1-inch mesh galvanized wire 18 to 24 inches high (*Figure 2, page 2*). Permanent posts are not required, but the bottom edge of the wire must be staked to the ground or buried several inches deep to prevent rabbits from burrowing under the fence. Reusable fence panels may easily be constructed to protect a garden. These 18- to 24-inch high panels allow gardeners easy access, yet exclude foraging rabbits. Panel frames can be constructed with 1- by 2-inch or 2- by 2-inch lumber. A lightweight 1-inch mesh galvanized wire, such as poultry netting (18 to 24 inches high), is fastened to one side of the frame.



Panels can be made in various lengths to match the size of the garden or storage facility. Lightweight posts, such as electric fence posts, are sufficient for support. One post should be placed in each corner and at each junction of the panels. They can be fastened to the posts with a light malleable wire. If protected with a good coat of paint, panels should last for several years.

Small trees or seedlings can be protected with cylinder guards made from small mesh hardware wire. These rabbit guards should be 18 to 24 inches high or higher depending on the average snowfall. Cylinders should be large enough around to prevent rabbits from reaching through and damaging trees and should be staked for support.

Vexar is the trade name for a commercially available seedling protector. These protectors are tubes made of polypropylene plastic netting and are easily installed at planting time. Avoid installing them during freezing weather because Vexar becomes brittle and is easily broken.

Urban Wildlife Damage Control

- | | |
|---|--|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input checked="" type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

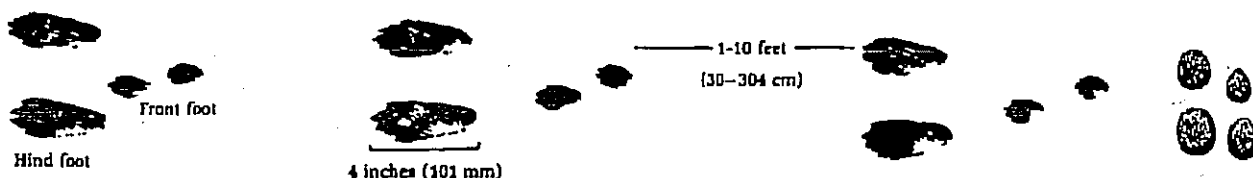


Figure 1. Tracks and droppings of the cottontail

Various paper and plastic wraps—including tin foil—can be placed directly around the trunks of small trees to prevent cottontail rabbit damage.

Laws and Regulations

Cottontail rabbits are classified as small game in Kansas, but currently they may be taken throughout the year with proper permits and within bag limits. KSA 32-1002, "does not prevent owners or legal occupants of land from killing any animals when found in or near buildings on their premises, or when found destroying property, subject to the following: (A) the provisions of all federal laws and regulations governing protected species and provisions of the Kansas nongame and endangered species conservation act are met; (B) it is unlawful to use or possess with intent to use, an animal so killed unless authorized by rules and regulations of the secretary; and (C) such owners or legal occupants shall make reasonable efforts to alleviate their problems with any such animals before killing them."

Trapping

Along with exclusion, using wooden-cage traps is probably the most practical means of controlling problem rabbits in urban areas. Live trapping is less effective during the summer months because abundant vegetation makes it more difficult to

lure them. During the summer, exclusion is more feasible.

If live traps are used, place them in an area with a lot of rabbit activity, evidenced by tracks and gnawing on woody plants. Use live traps that measure 6 by 6 by 24 inches. Metal traps of this size may be purchased from various sources, such as farm and garden and hardware stores.

A cage-live trap can also be constructed of wood using a few simple hand tools. The design and dimensions for building a wooden trap are included on the opposite page.

To catch cottontails, the cage trap must be placed in or along the trails made by rabbits using these areas. Opinions vary as to the importance of using baits, but some prefer to use them. Always place the bait so the

rabbit can see it, with some bait at the outside entrance and the rest inside, beyond the trigger at the back.

These traps seem to catch more rabbits once the first cottontail is captured. When the first one is in the trap, leave it long enough to allow it to leave scent, but not long enough to stress the animal. Check traps daily. Lettuce, apples, carrots and corn are all good bait.

Repellents

Rabbit repellents are often unsatisfactory for protecting plants from rabbits. The label restrictions on most rabbit repellents limit their use predominately to woody plants and to the winter months when rabbits are

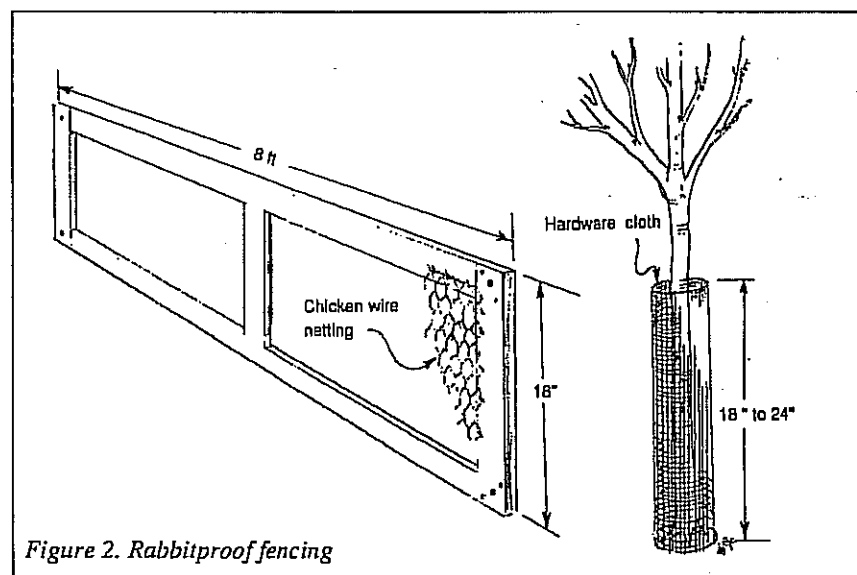


Figure 2. Rabbitproof fencing

Building a rabbit live trap

Materials list:

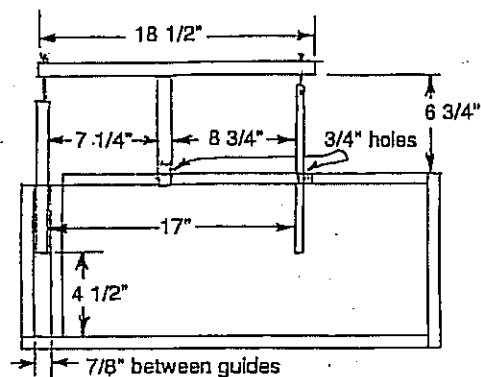
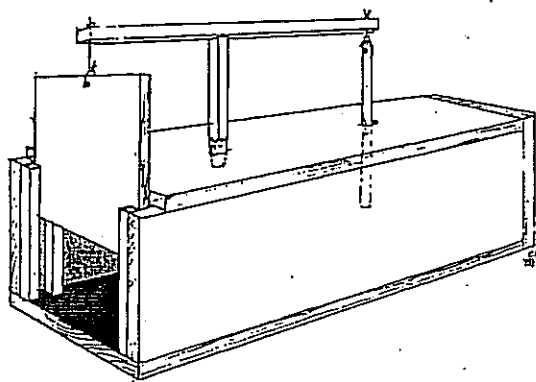
All box parts can be built from a single 1" x 8" board 10 ft. long (see diagram).

Lever— $\frac{3}{4}$ " x $\frac{3}{4}$ " x $18\frac{1}{2}$ "

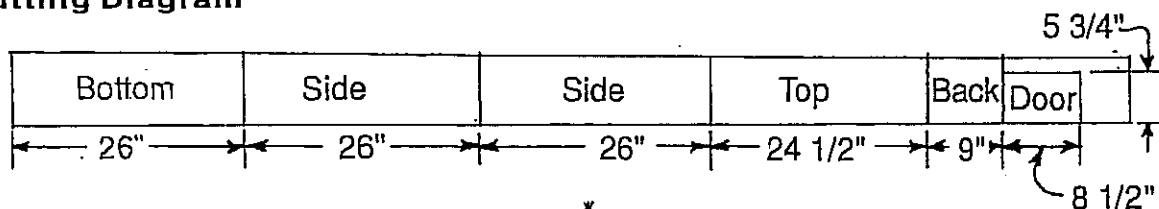
Pivot— $\frac{3}{4}$ " x $\frac{3}{4}$ " x $7\frac{1}{2}$ "

Guides— $\frac{3}{4}$ " x $\frac{3}{4}$ " x height of side (make 4)

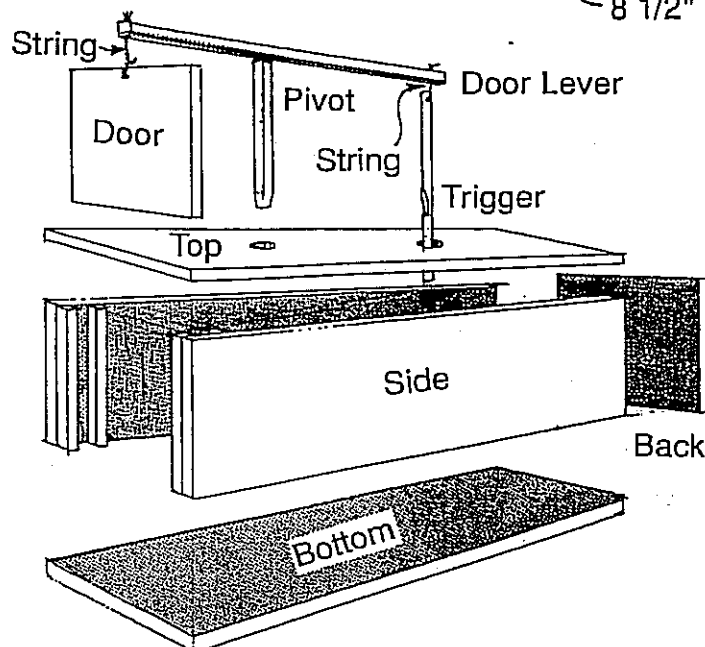
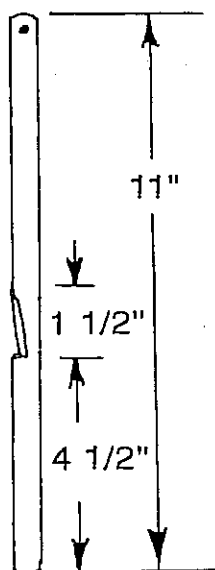
Trigger— $\frac{3}{8}$ " or $\frac{1}{2}$ " dowel 11 inches long (see trigger detail)



Cutting Diagram



Trigger Detail



most likely to cause damage. Snow and rain decrease their effectiveness, so they must be reapplied as necessary.

Repellents must be used according to label instructions. Carefully follow directions on dilution, rates of application, and number of repeat treatments permitted.

In the typical urban situation where problems with cottontail rabbits occur, generally it is garden crops that are damaged. Normally, repellents are not designed or recommended for use on plants grown for human consumption.

Repellents can be classified as area (odor) or contact repellents. Area repellents, which include bloodmeal, ammonium soaps of higher fatty acids (Hinder), bone tar oil (Magic Circle Rabbit Repellent), and other similar repellents, are used during the growing season. Ammonium soaps of

higher fatty acids are applied more frequently, especially after rains. Contact repellents applied during the growing season must be reapplied as new growth emerges.

Apply contact repellents such as Thiram, Ropel and Millers Hot Sauce directly to the plants because rabbits are repelled by the taste.

Thiram, one of the safest and most effective contact repellents, generally is used during the dormant season. Thiram is water soluble and a sticker must be added. (Stickers are listed on the Thiram label). Normally, one application of Thiram with a sticker will last the entire dormant season. Repellents can be brushed, sprayed or dipped onto the plants and should be applied 18 to 24 inches above the expected snow depth. Follow label directions closely when handling, applying and storing repellents.

Charles Lee
Wildlife Specialist

Other Methods

Frightening devices, including electromagnetic and ultrasonic units, have not been proven effective in controlling cottontail rabbit damage. There are no poisons or fumigants for rabbits registered for use in Kansas.

For further information write to Wildlife Damage Control, 131 Call Hall, Kansas State University, Manhattan, Kansas, 66506-1600, 785-532-5734.

Figure of cottontail rabbit on page 1 and paw prints on page 2, reprinted from The Wild Mammals of Missouri by Charles W. and Elizabeth R. Schwartz, by permission of the University of Missouri Press. Copyright 1981 by the Curators of the University of Missouri.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, Cottontail Rabbits, Urban Wildlife Damage Control, Kansas State University, September 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-858

September 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Musk rats



Urban Wildlife Damage Control

The muskrat (*Ondatra zibethicus*) is a stout, chunky animal with short legs. An adult is 22 to 25 inches long and weighs an average of 2.5 pounds. The 11-inch black tail is scaly, practically hairless and laterally flattened. It is used as a prop when the animal is on its hind feet and as a swimming aid. The large, broad, hind feet are partially webbed and also well-adapted for this purpose.

Biology and Habits

Musk rats have dense, silky, grayish underfur that is heavily overlaid on the back and sides with glossy, dark-brown guard hairs. In Kansas, muskrats are classified as furbearers, and their harvest is regulated. Musk rats are historically an important item in the fur market. Their population in Kansas is considered spotty. Because of a decrease in surface water and an increase in stream pollution muskrats have declined. But, in some areas of good habitat, they are abundant. Sometimes muskrats cause problems in sewage treatment ponds and drainage canals.

Musk rats are seldom far from water. They prefer the still or slow-moving water of marshes, ponds and streams. Musk rats are active year-round and, while usually nocturnal, may move during daylight hours.

Musk rats are primarily vegetarians, feeding mostly on the roots and stems of aquatic plants and, if they occur near water, legumes, grasses, grains, garden crops and apples. They occasionally eat animal food, particularly crayfish and freshwater mussels.

Musk rats live in houses constructed of vegetation or in burrows dug into banks. Both houses and burrows have underwater entrances and above-water living chambers (Figure 1).

Musk rats breed from early spring until fall, giving birth to several litters of from four to seven young. The

young are born naked and helpless in protected nest chambers in houses or bank burrows. Young muskrats grow rapidly and are independent at an early age.

Urban Problems

Although muskrat feeding habits may damage agricultural or ornamental crops growing near water, the principal concern is potential damage to earthen water-retaining structures. Extensive tunneling into earthen dams may cause water leaks or the loss of stored water. Burrowing damage occurs most often in older ponds where the dike is thinner from erosion or is poorly designed.

Trees growing on the dike sometimes create problems attributed to muskrats. Tree roots die, and water follows the roots until the dike gives way.

Since it is easier to deal with a population of muskrats before they have become established, watch for signs of their presence and adopt remedial measures as soon as possible.

Landowners should watch dams closely for burrows and repair weak spots at once. It is relatively easy to fix a weak spot, but it is a big job to repair the dam after it is broken.

Law and Regulations

Musk rats are classified as furbearers in Kansas. Licensed fur harvesters may take muskrats during the regular



fur-harvesting season. Landowners may take problem muskrats at any time of the year if they follow the provisions in KSA 32-1002 which states: "Kansas law does not prevent owners or legal occupants of land from killing any animals when found in or around buildings on their premises, or when found destroying property, subject to the following: (A) the provisions of all federal laws and regulations governing protected species and provisions of the Kansas nongame and endangered species conservation act are met; (B) it is unlawful to use or possess with intent to use, any animals so killed unless authorized by rules and regulations of the secretary; and (C) such owners or legal occupants shall make reasonable efforts to alleviate their problems with any such animals before killing them."

Problem Management

Trapping

Musk rats may be trapped or shot when they damage property. Musk rats are easily trapped. They may be captured using a No. 1 or 1½ foot-hold

Urban Wildlife Damage Control

- | | |
|--|--|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input checked="" type="checkbox"/> Musk rats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

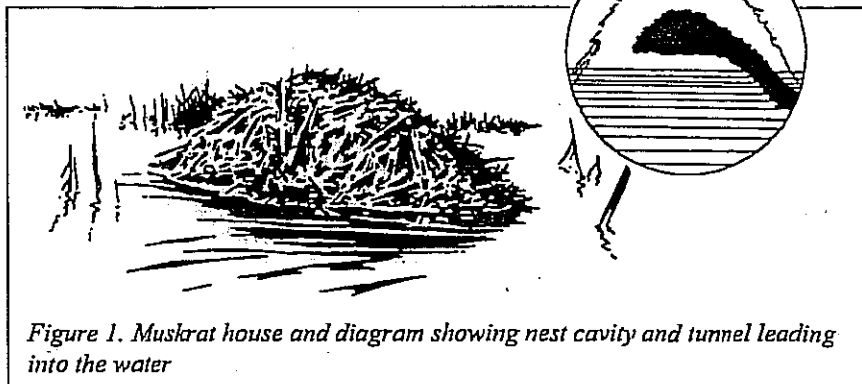


Figure 1. Muskrat house and diagram showing nest cavity and tunnel leading into the water

stop-loss trap or a Conibear model No. 110 body-gripping trap. Another is called a colony trap. In some situations a cage-type live trap can be used to catch problem muskrats.

Selecting trap sites is important and should be done carefully. Muskrat trails are particularly productive. A trap may be anchored in the mud or sand and wired to a stake.

In underwater trails or at underwater den openings, colony traps are effective. Foot-hold traps set on floats, either natural objects or artificial rafts, can be successful. Foot-hold trap sets in runways, den openings, slides or near natural resting places are also productive. Good baits include carrots, potatoes, sweet potatoes and apples.

Where possible, the stake to which the trap chain is attached should be placed in water at least 2 feet deep so the captured animal will drown. This is not necessary when using the Conibear No. 110 body-gripping trap, because it humanely kills the animal outright.

If there are muskrats in your pond and they are not causing serious trouble, consider them a cash crop.

They are easy to trap and skin. Trap them heavily each open furbearer season; in good habitat muskrats produce a lot of young and come back rapidly. A local trapper may be interested in taking the fur for profit if you do not want to trap.

Before starting any muskrat control effort check with the Kansas Department of Wildlife and Parks and request a copy of the dates and regulations governing muskrat removal. Traps must be tagged with the trapper's name and address and checked once a day.

It is a good idea to check traps more often than this, because more muskrats can be caught when traps are checked and reset. Muskrats are active throughout the day and at night. Some muskrat trappers check their traps three or four times in 24 hours.

Protecting Pond Dams

The area of a pond that is most sensitive to muskrat damage is the dam or dike itself. A trench may be cut with a narrow trenching machine along the centerline of the earth fill. The trench should extend the length of the fill, be cut about 3 feet below water level, and

filled to 1 foot above water level with concrete. This concrete core will effectively prevent muskrats from digging through the dam.

Riprapping with coarse stone or gravel may prevent muskrats from digging into the banks or dam slopes of ponds. Apply the material in a layer about 6 inches thick, extending from 1 foot above to 3 feet below water level. This also protects the pond banks and earthen fill from wave action.

Galvanized 1- or 2-inch mesh poultry wire may be pegged to the inside surfaces of the pond. Lay the wire flat against the banks and fasten it down every few feet to keep it in place. Wire should extend from a foot above to at least three feet below water level.

Since the wire will eventually corrode, this method is not recommended for swimming ponds.

Pesticides

Pesticides are not recommended nor are any toxicants registered for use in controlling muskrats in Kansas.

For more information, contact Wildlife Damage Control, 131 Call Hall, Manhattan, Kansas, 66506-1600, 785-532-5734.

Figure of muskrat home reprinted from the The Wild Mammals of Missouri by Charles W. and Elizabeth R. Schwartz, by permission of the University of Missouri Press. Copyright 1981 by the Curators of the University of Missouri.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, Muskrats, Urban Wildlife Damage Control, Kansas State University, September 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-859

September 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating. Marc A. Johnson, Director.

Opossums



Urban Wildlife Damage Control

The Virginia Opossum (*Didelphis virginiana*) is a medium-sized animal with long, rather coarse fur; a sharp slender muzzle; prominent, thin, naked ears; short legs all about the same length; and a long grasping tail covered with scales and scant hairs. Opossums are in the family Marsupialia, which comes from a Latin word meaning "pouch" and refers to the pouch on the belly of the females. Young opossums are born incompletely formed and are carried in this pouch while they continue their growth and development.

Biology and Habits

Although most opossums are gray, there are several other color phases: Some are black, some are brown and a few are white. Generally, the nose is pink, the eyes are black and the ears are bluish-black. The tail is gray, and the feet and toes are pink to white.

Adults range in length from 24 to 34 inches and weigh from 4 to 15 pounds. In Kansas, the breeding season begins about the first of February. Gestation takes only 12 to 13 days. The first litter is weaned in May, and the female mates again. The second litter is weaned around mid- to late September. The average number of young per litter is nine, varying from five to 13.

Opossums need watering areas nearby. Although they seem to wander aimlessly, radio transmitter studies indicate that some opossums live their entire lives on as little as 40 acres.

Opossums are omnivorous, which means they eat a wide variety of foods including carrion, crayfish, frogs, tadpoles, clams and berries.

Laws and Regulations

Opossums are classified as fur-bearers under Kansas statutes.

Problem opossums can be controlled without a permit under conditions listed in KSA 32-1002, which states:

"Kansas law does not prevent owners or legal occupants of land from killing any animals found in or near buildings on their premises, or when found destroying property, subject to the following:

(A) the provisions of federal laws and regulations governing protected species and provisions of the Kansas nongame and endangered species conservation act are met;

(B) it is unlawful to use or possess with intent to use, and animal so killed unless authorized by rules and regulations of the secretary; and

(C) such owners or legal occupants shall make reasonable efforts to alleviate their problems with any such animals before killing them."

Opossums also can be taken by hunting or trapping during the regular season.

Urban Opossum Problems

Generally, opossums do not cause humans much trouble. They live in urban and suburban habitats and sometimes get into basements, attics, sheds and garages. Often, they are injured or killed by automobiles as they cross highways.

Opossums are known to host parasites such as mites, ticks, lice, fleas, roundworms, flukes and tapeworms.



They may also spread fungal, bacterial and viral diseases.

Opossums are not aggressive and flee when pursued. A common defense is pretending to be dead, or "playing 'possum." The frightened animal rolls over, becomes limp and shuts its eyes, coming back to life at the first opportunity to escape.

Opossum Management

Opossums are not wary of live traps and are easily captured. Almost any kind of bait will attract opossums into a live trap. Fish, fresh fruit or cat food work best. A live trap measuring 12 by 12 by 36 inches is big enough to capture the largest opossum.

For more information about opossum damage control write to Wildlife Damage Control, 131 Call Hall, Kansas State University, Manhattan, Kansas 66505-1600, 785-532-5734.

Urban Wildlife Damage Control

- | | |
|--|--|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input checked="" type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, *Opossums, Urban Wildlife Damage Control*, Kansas State University, September 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-860

September 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Tree Squirrels



Urban Wildlife Damage Control

Kansas has three species of tree squirrels. Gray squirrels, fox squirrels and southern flying squirrels inhabit various areas of the state. Gray and fox squirrels are the main nuisance animal in U.S. urban areas.

Fox Squirrels

The fox squirrel (*Sciurus niger rufiventer*) is the most common species and can be found in most cities or towns as well as in open woodlots, hedge rows and shelter belts of rural Kansas. Fox squirrels are the largest of the three species averaging 18 to 27 inches from their nose to the tip of their tail and weighing from 1 3/4 to 2 1/4 pounds.

The fox squirrel is so named because its color often resembles the brownish, red-orange of the red fox. Not all fox squirrels exhibit this color. In fact, fox squirrels come in a variety of colors including black, white and several shades of brown or gray.

Older female fox squirrels may produce two litters of young annually, but young females will produce only one litter. They nest in tree cavities, artificial nest boxes and leaf nests.

Fox squirrels can often be seen foraging on the ground. Occasionally, they eat young birds or eggs. Their diet changes with the seasons. In the spring, fox squirrels feed on elm buds, sprouting oak leaves, wild gourds, shrubs, fruits and even insects. During the winter, they feed on Osage orange seeds (hedge balls), bark and nuts buried in the fall. Gray and fox squirrels' habit of burying nuts is responsible for many tree seedlings.

Squirrels need trees for escape, cover and dens. Unlike gray squirrels, fox squirrels can be found in fairly open areas. Although populations are denser in heavier timber, fox squirrels commonly inhabit hedge rows, shelter belts and urban areas throughout the state.

Gray Squirrels

Two subspecies of gray squirrels, *Sciurus carolinensis Gmelin* and *S.c.*

pennsylvanicus can be found in the eastern one-third of Kansas. At 17 to 19 1/2 inches, these squirrels are slightly smaller than fox squirrels, and weigh 1 1/4 to 1 3/4 pounds. They are gray with white underparts and white-tipped tails.

Gray squirrels, more than fox squirrels, normally prefer heavier oak-hickory woodlots. Although fox squirrels are prone to stay on the ground for extended periods, gray squirrels prefer to spend more time in trees.

Like fox squirrels, gray squirrels nest in tree cavities, nest boxes or leaf nests. Older females may give birth to two litters per year while younger ones only produce one. The average litter size for both squirrel species is three.

Gray squirrels normally eat the same kind of nuts, berries, and grains as the fox squirrel. Both species require open water within their home ranges.

Southern Flying Squirrels

The southern flying squirrel (*Glaucomys volans volans*), 8 1/2 to 9 1/2 inches long, is the smallest tree squirrel species found in Kansas. This squirrel is a protected nongame species with viable populations limited to the oak-hickory deciduous forests of six southeastern Kansas counties.

It does not fly but glides on broad flaps of loose skin that extend along each side from the front legs to the flanks. The flying squirrel moves from one tree to another, using its broad flat



tail as a rudder.

Unlike the fox and gray squirrels, flying squirrels are nocturnal. They use their extremely large eyes and keen sense of smell for foraging at night. The flying squirrel's diet is similar to that of the fox and gray squirrels: nuts, fruits, berries, and insects such as moths and beetles. They readily use bird feeders and are frequently responsible for seeds mysteriously disappearing overnight.

Flying squirrels are shy animals. Their nocturnal lifestyle keeps them virtually unknown to many people. The flying squirrel nests in tree cavities, often in abandoned woodpecker holes. The southern species prefers abandoned orchards and mature hardwood or conifer woodlots. They can also be found in parks and older suburban neighborhoods with mature vegetation.

Their large eyes and soft, silky fur make flying squirrels quite attractive. You can increase your chances of seeing them by building nest boxes and floodlighting bird feeders.

Flying squirrels don't create as many problems as other tree squirrels,

Urban Wildlife Damage Control

- | | |
|--|---|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input checked="" type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

Table 1. **Reproduction of tree squirrels in Kansas**

Species	Mating Season		Gestation Days	Litter Size	
	First	Second		Range	Average
Gray	Jan/Feb	May/July	44 to 45	2 to 5	3
Fox	Jan/Feb	May/July	44 to 45	1 to 6	3
Flying	Feb/Mar	May/July	40	2 to 7	3

but they move into attics, vacant cabins or walls and can cause damage. During winter, flying squirrels often gather in communal dens. Woodcutters may find a dozen or more in a hollow tree cavity.

Mating

Tree squirrels in Kansas mate in mid- to late winter and again in early summer. Litter sizes are similar among species (*Table 1*).

Tree squirrels develop slowly compared to other rodents. Young are born naked and blind, with their ears closed. Flying squirrels have the smallest offspring, $\frac{1}{8}$ to $\frac{1}{4}$ ounce, and fox and gray squirrels the largest, about $\frac{1}{2}$ ounce. During the first few weeks fur develops. At about 4 weeks the ears open, and by the sixth week, the eyes are open, too. The young are weaned and on their own in 2 to 3 months.

Management

Tree squirrels provide relaxation and enjoyment for the many Kansans who spend time observing or photographing wildlife. Fox and gray squirrels are also popular game animals with hunters.

You can improve woodlot habitats by planting nut trees, including hickories, walnuts, oaks or pecans. To protect new seedlings and young trees from squirrels, place an expandable protective wrap around their trunks. Use a commercial wrap or make one from $\frac{1}{4}$ -inch mesh hardware cloth or hail screen. Screens or wraps should extend 18 to 24 inches above the ground.

Extremely dense stands of timber may require selective cutting to open them and enhance the growth of beneficial trees. When harvesting

timber, take care to leave den trees. The optimum number of den trees or nest boxes is two per acre. Squirrels also need den trees near open water. Or tree squirrels will use artificial nest boxes placed 10 to 20 feet above ground. Plans for various nest boxes are available from K-State Research and Extension or the Kansas Department of Wildlife and Parks.

Normally, it is not necessary to plant food plots for tree squirrels, but if you do, they should be placed close to den trees and open water.

Urban Damage

Although tree squirrels seldom pose a problem in rural areas, this is not the case in urban settings. Occasionally, fox and gray squirrels enter attics and chimneys, damaging wiring and siding of urban dwellings.

Squirrels get in by traveling along electrical lines, cable TV wires, or by jumping from nearby tree limbs and entering holes in siding, unscreened vents or chimneys. Once inside, they often damage insulation, wiring or household contents. Most complaints involve tree squirrels in attics or adjacent knee-walls.

Squirrels can also damage sweet corn, tomatoes and other vegetables or flower bulbs and freshly planted seeds in urban gardens. They are often a nuisance around bird feeders, frightening desirable birds and scattering seeds.

Damage Control

The southern flying squirrel is fully protected in Kansas. Normally, fox and gray squirrels may be legally taken as game animals from June 1 through December 31. They are protected by a

closed season the rest of the year.

Because using firearms within city limits generally is prohibited, shooting squirrels is not recommended in urban areas. But if it is legal and open season, do not waste animals that have to be removed. They can provide an inexpensive and delicious meal.

If squirrels are damaging a house, watch to see how they are getting in and trim tree limbs that are within jumping distance (5 to 6 feet) of the house. If squirrels are traveling along a power, cable TV or telephone line, slit a piece of plastic PVC pipe, 24 inches long, and place it over the wire. When a squirrel tries to cross it, the pipe rotates and the animal loses its footing. Be sure to contact the local power company before modifying power lines.

If a squirrel appears in the basement, it has probably come down the chimney and out the furnace or fireplace damper opening. A squirrel in a fireplace or attached chimney cannot get out on its own and must be removed from above or below. If the squirrel entered through the chimney flue, it may have built a nest or brought in material. Check for this obstruction and remove it.

Cover chimneys or attic vents with $\frac{1}{2}$ -inch mesh screen. When restricting access, make sure not to trap a squirrel inside because of possible damage to the home's interior. If you find a squirrel in an attic or another part of a house, do not try to chase it out. Open doors or windows and allow the squirrel to find its own way out instead. If this is unsuccessful, bait a live or cage trap, at least 9 by 9 by 24 inches, with peanut butter or nut meats. Once the squirrel is trapped, release it outdoors.

Nest boxes provide homes for squirrels, reducing their need to enter yours. Nest boxes should be made of untreated wood or metal because squirrels often destroy boxes made of plastic plywood or particle board by gnawing on them.

Tree Squirrels Around Bird Feeders

Homeowners sometimes have problems keeping the squirrels out of

bird feeders. Tree squirrels should be considered part of the fauna and enjoyed along with the birds.

Squirrels are often distracted by feeding them ear or shelled corn away from or on the ground near suspended bird feeders. Place bird feeders at least 8 feet away and 6 feet off the ground.

Plastic piping offers a new way to outsmart squirrels. Place this pipe over ropes or wires suspending feeders so squirrels cannot get a good footing.

You can also use baffles to keep squirrels from climbing on wires leading to feeders. Clear plastic baffles are available from companies that sell bird feeders, or you can make your own. Remember, baffles must be big enough so squirrels cannot crawl over them.

Exclusion

Squirrels enter houses through many natural or created openings such as holes along the soffits where boards have rotted out, unscreened attic vents, uncapped chimneys, broken or open windows and doors, and electrical wire and utility pipe openings.

Never knowingly tolerate a squirrel in your house. Preventive maintenance is the best defense against unwelcome squirrels and other wildlife. Periodically inspect for potential entrances and make necessary repairs. Make sure squirrels or other animals are out of the attic before sealing entrances because if you seal them in the attic, they can do even more damage trying to escape. Cover the insides of attic vents and similar openings with ½-inch hardware cloth; repair rotten boards along soffits or behind eaves troughs; and replace broken windows, cap chimneys and fill electrical-wire and utility-pipe openings.

Squirrelproof valuable trees by placing 2-foot wide metal bands around them, 6 feet off the ground. Trim overhanging branches to prevent access.

Protect valuable crops by building a fence of 1-inch mesh wire. The fence should be at least 30 inches high and extend 6 inches below ground, with an additional 6 inches bent outward at a

90-degree angle to discourage burrowing. Set at least two electrified strands, one 2 to 6 inches above ground and the other at fence height, off the fence about 3 inches.

Protect newly planted bulbs with 1-inch mesh poultry wire. Dig a trench slightly deeper than the desired depth of planting and fit the poultry wire in the bottom. Add dirt and plant the bulbs. Place another strip of poultry wire over the plantings so that the bulbs are completely encased, and finish covering with dirt.

To stop squirrels from stripping the bark off ornamental trees and shrubs, wrap trees with metal sheeting or protect them with squirrel baffles, as you would a bird-feeder pole. Tree wrap keeps squirrels from gnawing on bark by keeping them out of the tree. Wrap all trees within branch-to-branch jumping distance. This method works well on trees near feeders or around your house. Prune trees near the house that give squirrels access to the roof. Remember to allow for tree growth when wrapping. If you have a continuous tree canopy that allows squirrels easy movement, you will have to find other means of control.

Feeding is the easiest way to prevent squirrels from stripping tree bark. Scatter shelled or cob field corn on the ground near the trees or bird feeder, or place it on a shallow feeding platform.

There are also squirrel feeders that hang or impale cob corn.

Squirrels are fond of sunflower seeds and nuts, but nuts can get very expensive, especially when most end up buried rather than eaten. Collect black walnuts, butternuts, hickory nuts or acorns in the fall and store them in mesh bags to use later.

Trapping

As with all trapping, be sure it is open season and you are not violating any local or city laws. Always take precautions to reduce the hazards of trapping nontarget wildlife or pets. If legal, a good trapping program can eliminate troublesome tree squirrels from an area. Several types of traps can be used to take tree squirrels.

A modified wooden box-type gopher trap has been used quite successfully. To modify a gopher trap, lengthen the trigger slot with a rat-tail file or pocket knife so the trigger can swing unhindered and the squirrel can pass beneath the swinging loop of the unset trap. Remove the back of the trap and replace it with hardware cloth, which allows the animal to see the bait from both ends, but prevents it from entering the trap from the back.

For a dual-assembly trap, place two box traps back to back and secure them to a board (Figure 1). Connect them with a small strip of hardware cloth to form the baiting area. Place

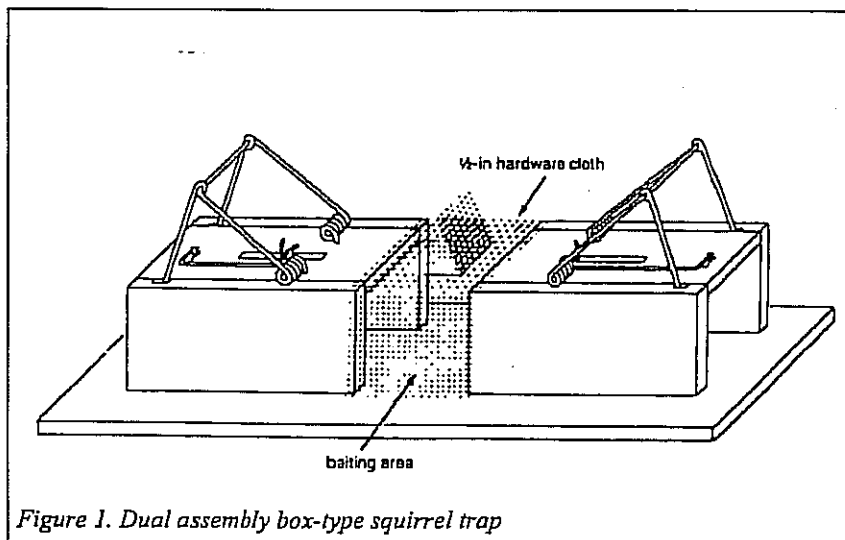


Figure 1. Dual assembly box-type squirrel trap

bait through a small door cut through the wire or through the open ends.

For safety, place the multiple-box trap inside a lidded box. Enclosing the trap minimizes the chances of accidentally catching pets or birds.

A Conibear trap with a jawspread of 4 inches or less, is also an effective tree squirrel trap. The wire trigger permits the trap to be used baited or unbaited. It is best to construct a wooden shell and put a No. 110 Conibear trap inside. Then set the shell with traps inside on a limb used by squirrels. But do not place it in the path of pets or other nontarget animals. Positioning the trap well inside the shell reduces the hazard of catching pets or birds. Before setting them, leave traps in place in the shell until squirrels freely pass through.

The standard cage-type box trap is the most common trap for catching

tree squirrels. It is important to get the proper size trap, because one that is too small or too large will either not be successful or will catch nontarget animals. The proper size cage-type trap has a 6 by 6 inch opening and is 24 inches long. One with a door on each end, so the squirrel can see through the trap, is preferable.

A baited trap is better than an unbaited one. Set the bait elevated about 6 inches off the ground so the scent drifts toward the approaching squirrel. Peanuts and peanut butter on bread are superior baits for tree squirrels. Other favorites are nut meats, fruits and seeds, including corn and apples.

It is a good idea to set the trap directly in the squirrels' travel lane. It is often necessary to build a fence to funnel the squirrel into the trap. In some situations, unbaited traps set directly in their line of travel may be successful,

but traps set at entry holes leave squirrels no option except to enter.

Repellants and Poisons

Some repellants, of questionable effectiveness, are registered for use on tree squirrels in Kansas. Poisons may not be used to kill tree squirrels because they place other wildlife and pets at risk.

For further assistance contact Wildlife Damage Control, 131 Call Hall, Kansas State University, Manhattan, Kansas 66506, (785) 532-5734.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, *Tree Squirrels, Urban Wildlife Damage Control*, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-863

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Raccoons



Urban Wildlife Damage Control

Raccoons (*Procyon lotor*) are abundant throughout Kansas. The black face mask and ringed tail are its distinguishing characteristics. The print of the hind foot faintly resembles that of a child (Figure 1, page 2).

Biology and Habits

Adult raccoons in Kansas weigh 8 to 49 pounds and measure 26 to 38 inches long. Most breeding takes place in February, and with a gestation period of 63 days, young are born April and May. There is usually one litter per year of 4 to 7 young.

At birth, the young, furry animals weigh about 2¼ ounces. They are born blind, but their eyes open within 30 days. Young raccoons stay in the den until they are 8 to 10 weeks old. They are weaned in August.

Raccoons prefer wooded areas near streams, rivers or other water sources. They are omnivorous and eat a variety of foods, among them small animals such as crayfish, clams, fish, frogs, snails, small mammals and insects; and vegetables and fruits including cherries, apples, nuts and grains.

Like many other animals, raccoons are opportunists, eating pet food, garbage or other foods they find in urban and suburban areas.

Urban Raccoon Problems

Most, if not all, towns and cities across Kansas have raccoons living within the city limits. Because raccoons move around and feed at night, they are seldom seen.

Of all the wild animals that have adapted to city life, raccoons are probably the most destructive. These so-called "masked bandits" often raid garbage cans. It is not uncommon to find places where raccoons have torn off roofing to get into attics. Once they get in, minor repairs will not keep them from tearing in again.

The real destruction begins once raccoons are in the attic. They tear and scatter insulation and chew holes through the walls. Their waste accumulates and creates an odor problem. It may even cause the ceiling to fall.

Raccoons find ready-made summer dens in the fireplaces of many homes. They resemble a hollow log, the raccoon's normal home in the woods. They may bear young in the chimney.

Diseases

Raccoons contract a number of diseases. Distemper occasionally causes raccoons to decline in some locations, but studies show that this is not as common as once thought. Raccoons often are exposed to canine, feline and porcine parvovirus, but to date there is no evidence that raccoons have transmitted this disease to pets or livestock.

In Kansas only about 5 percent of raccoons have been exposed to rabies. Exposure means that those tested have rabies antibodies in their blood, indicating they have been attacked but not killed by the virus and they cannot infect other animals. Raccoons are extremely resistant to the skunk-strain rabies common in the Midwest.

Recently there has been concern about the raccoon roundworm, (*Baylisascaris*) because trappers and hunters who accidentally touch the



feces might be exposed. Roundworms have been found in more than 65 percent of the raccoons tested in Iowa.

Humans are infected by ingesting eggs contained in the feces, possibly by not washing hands after working in or around a contaminated area. Clinical symptoms depend on how many larvae there are and where they migrate. Larvae migrate to various tissues but cause problems when they enter the eyes or brain. Most adults do not ingest enough eggs to cause brain disease.

Laws and Regulations

Raccoons are classified as furbearers in Kansas. Under KSA 32-1002, problem raccoons can be controlled without a permit.

This law does not prevent "owners or legal occupants of land from killing any animals when found in or near buildings on their premises, or when found destroying property, subject to the following:

(A) the provisions of all federal laws and regulations governing protected species and provisions of

Urban Wildlife Damage Control

- | | |
|--|--|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input checked="" type="checkbox"/> Raccoons, L-861 | |

front foot



hind foot



4 1/2 inches

Figure 1. Raccoon paw prints

the Kansas nongame and endangered species conservation act are met;

(B) it is unlawful to use or possess with intent to use, any animal so killed unless authorized by rules and regulations of the secretary; and

(C) such owners or legal occupants shall make reasonable efforts to alleviate their problems with any such animals before killing them."

Raccoon Problem Management

Frightening Devices

Because raccoons are nocturnal, using various frightening devices such as lights, noise makers or playing a radio during the night can reduce damage. These methods are not effective for long because raccoons adapt to them.

Food and Cover Reduction

A long term solution is to manage your home so you don't invite raccoon problems in the first place. You can do this by not leaving pet food outside at night and placing garbage in sealed metal containers, for example.

You can also cap the chimney so raccoons and other wild creatures cannot get in and remove trees growing next to the house. If you know animals jump from a tree onto your roof, place a sheet of slick tin on the roof's edge at that spot so animals will lose their footing and not be able

to get onto the roof. Seal up all holes along the foundation and under steps.

Raccoons and Gardens

Raccoons are known for eating sweet corn. Somehow they seem to know when corn is ripe and ready for harvesting. Broken stalks or open husks indicate raccoon damage.

Second to sweet corn, raccoons like watermelons. They dig through the rind, reach in and pull out the contents with their paws.

Fencing

Fencing is a good way to keep raccoons from harvesting your garden crops. Because of their climbing ability, woven wire fences do not effectively discourage raccoons from going after sweet corn (*Figure 2, opposite page*).

Adding electric wires turns woven wire into an effective barrier. Just be sure woven wire is grounded. This also makes the electric portion more effective if an animal comes in contact with both.

By using a little imagination, you can discourage nuisance raccoons with an electric fence. Always use an electric fence with safety in mind. Use a charger with a seal of approval from Underwriters Laboratories Inc. (UL), and do not use it where children or the public might come in contact with it. After you have decided that electric fencing is safe in your situation, attach warning signs.

Trapping

Cage-type live traps are the best way to capture problem raccoons, especially in an urban setting. A 15 by 15 by 36-inch single-door live trap baited with fish, fish based pet food, meat or eggs is sufficient.

If there are many house cats in the area, these baits will attract them, too. To avoid catching house cats, use grape jelly, peanut butter or sweet rolls. With jelly, smear it along a path leading into the trap and place some in a paper cup at the back, beyond the trigger.

The best type of raccoon cage trap is strong and well constructed with smaller double-wire mesh surrounding the rear portion. This prevents the raccoon from reaching into the trap from the outside. Because raccoons are very strong animals, it is a good idea to anchor the trap firmly in place.

Many homeowners prefer to release raccoons unharmed in a distant location, "where the animal can find a good home." Recently, there has been growing opposition to relocating wild animals because of the possibility of introducing diseases from one population to another and the fact that a relocated raccoon may be forced out of the new area by other raccoons and not have a good chance for survival.

The question is often asked: "How far do I need to take a raccoon in order to prevent its returning to this same area?" The answer may be more than 25 miles. Studies have shown that relocated raccoons tend to create problems in new areas.

Some states require euthanasia for trapped nuisance raccoons.

Movements

Most daily movements of raccoons are within a relatively small area called a "home range." According to researchers in Iowa, males normally have home ranges no larger than 2 square miles. Female ranges do not exceed 1.4 square miles, and juveniles' are even smaller, about 0.6 square miles at most.

Depending upon the availability of resources such as food, rest and denning sites, home ranges of raccoons in other states may vary considerably. In general, ranges are smaller where resources are plentiful.

Home ranges also become smaller as winter approaches. During extremely cold winter days, raccoons are not as active. They do not go into hibernation but sleep for several days at a time, awakening to eat, drink or defecate. They may lose more than 25 percent of their body weight during

the winter months. Movement outside the den becomes more frequent during mating in January and February and as spring approaches.

There are two times of the year—in the fall and in the spring—when individual raccoons may change their residence in movements called “dispersals.” These movements normally occur only once. When the raccoons have found a new home, they usually stay permanently.

In a recent Iowa study, most of these moves were from 5 to 9 miles,

although there was a report of a raccoon moving 81 miles. Another report from Minnesota indicated a raccoon had moved 200 miles.

Although some relocations occur annually, less than 10 percent of the animals in a population actually move.

When removing raccoons and their nests from chimneys:

- Wear disposable gloves and a dust mask. Wearing a dust mask is necessary so that fecal material or eggs are not inhaled accidentally.

- Try to remove the bulk of the fecal matter without stirring up a lot of dust.

- After removing raccoons, along with most of the feces, build a hot fire in the fireplace to kill remaining eggs.

- Fresh feces is not directly infective; it takes 30 days for the eggs to embryonate.

- Dispose of fecal matter properly by burning or burying in a landfill. A portable propane torch may be used to decontaminate cages and similar areas.

- Vacuum filters trap eggs and are difficult to wash out. These should be routinely disposed of if there is a possibility of them being contaminated.

- Using chimney screens or screen covers is a good way to discourage raccoons from nesting in chimneys.

- Keeping or giving away baby raccoons as pets is illegal.

For additional information write Wildlife Damage Control, 131 Call Hall, Kansas State University, Manhattan, Kansas 66506-1600, (785) 532-5734.

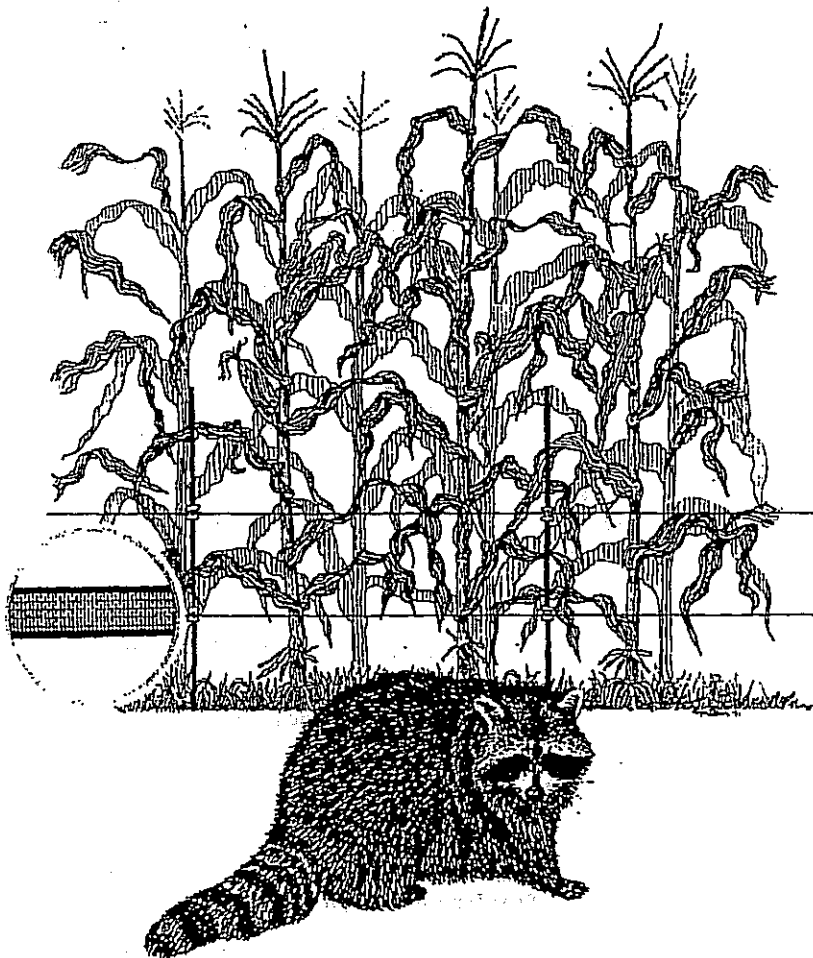


Figure 2. Adding a two-wire electric fence will help keep raccoons out of field or garden crops. Inset shows the “ribbon-type” electric fence used in place of the single-wire type. This ribbon fence is more visible to raccoons and other wildlife and may improve control.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, *Raccoons, Urban Wildlife Damage Control*, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-861

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Skunks

Urban Wildlife Damage Control

Two species of skunks are found in Kansas. The eastern spotted skunk (*Spilogale putorius*) has white splotches on its back and sides. It is now rarely found in Kansas and is fully protected as a threatened species under state regulations. Also known as the "civit cat," the adult spotted skunk is 14 to 22 inches long and weighs from ¾ to 2¾ pounds.

The striped skunk (*Mephitis mephitis*) is more common. It has shiny black fur with two white stripes down its back. Striped skunks have varying amounts of white on the head, back and tail. Adults are from 20 to 30 inches long, including the tail, and usually weigh between 3½ and 10 pounds.

Striped skunks' musk has a characteristic pungent odor. These shy, secretive animals discharge their scent only when disturbed or harassed. They are the least popular of all wild animals, yet they are beneficial because nearly half of their diet is insects, with the remaining consisting of 20 percent fruit and 20 percent mice. Diets vary depending on a skunk's location and the time of year. Skunks eat the eggs of ground-nesting birds, biting off one end, licking out the contents and leaving the shells more or less together in the nest. Spotted skunks do not crush the egg shells as much as striped skunks do.

Biology and Habits

Skunks are nocturnal and, while they do not hibernate, they may be inactive for extended periods during winter.

Skunks live in rocky crevasses or in underground dens that may be renovated woodchuck or badger burrows. In urban and suburban areas, skunks take refuge beneath buildings and in crawl spaces under porches and houses.

Skunks mate in February. After about 9 weeks, 4 to 6 young are born, each weighing about ½ ounce. Their eyes open in 17 to 21 days, and they are weaned at about 2 months. Young skunks stay with the female until

autumn. Then family ties begin to break. During May and June, young skunks may be left in the den unattended. Avoid sealing buildings or foundations at this time to avoid starving them.

Laws and Regulations

In Kansas, skunks are classified as furbearers, providing them with legal protection except during the hunting and trapping season or when causing damage. KSA 32-1002 "... does not prevent owners or legal occupants of land from killing animals when found in or near buildings on their premises, or when found destroying property subject to the following:

(A) the provisions of all federal laws and regulations governing protected species and the provisions of Kansas nongame and endangered species conservation act are met;

(B) it is unlawful to use or possess with intent to use, an animal so killed unless authorized by rules and regulations of the secretary; and

(C) such owners or legal occupants shall make reasonable efforts to alleviate their problems with any such animals before killing them."

Eastern spotted skunks are a threatened species in Kansas and should not be destroyed. Anyone capturing a spotted skunk must contact the Kansas Department of Wildlife and Parks.

Urban Skunk Problems

Skunks cause many problems in urban areas. They damage lawns by



digging for grubs; den under patio slabs, steps, crawl spaces, outbuildings and in basements; release highly objectionable musk; and carry rabies.

In Kansas, skunks are the primary wildlife carrier of this disease. They may also be infected with pneumonia, distemper, leptospirosis, listeriosis, tularemia and unknown viral diseases, or carry parasites such as fleas, lice, mites, ticks, roundworms, tapeworms and flatworms.

Skunks occasionally bother beehives. To keep skunks from climbing to the hives, put hives on stands several feet off the ground and tack sheet metal to the legs.

Skunk Problem Management

Despite nature's checks and balances, skunk populations sometimes rise. Mass skunk control is difficult in an urban environment. Because poisoning may kill pets and wildlife, there are no poison baits registered for skunk control in Kansas. Homeowners must take preventive measures to keep skunks from becoming abundant in urban areas.

Urban Wildlife Damage Control

- | | |
|--|---|
| <input type="checkbox"/> Bats, L-855 | <input checked="" type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opóssums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

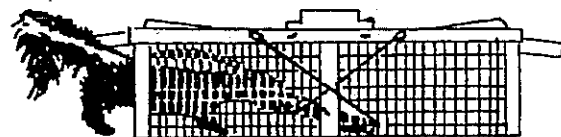
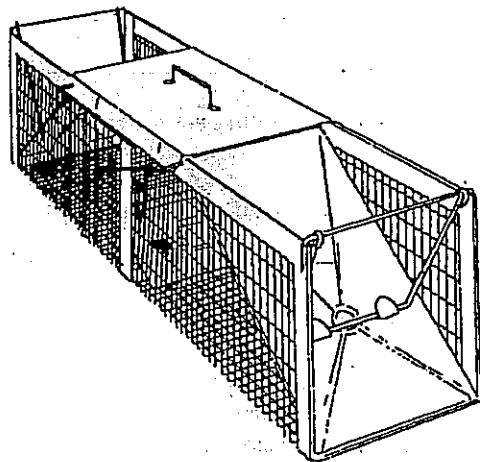


Figure 1. Skunks are easily captured alive in cage traps. Cover traps with canvas or burlap before they are set.

Clean up and destroy dens and remove food sources by taking away exposed pet food, putting strewn garbage in sealed containers and carrying off wood piles harboring mice and rats.

Block den openings in foundations and under steps using concrete with sheet metal or wire netting bent outward 12 inches at the bottom in an "L" shape. This prevents skunks from burrowing. Destroy other den sites such as rock piles, junk piles, old cars and open buried culverts or pipes.

The lawn should be cared for properly to control grubs that attract skunks.

Although skunks tend to be more abundant in urban areas where they find more food and denning sites, skunks may also take up residence in well-kept neighborhoods. Skunks migrate from outside the area where food supplies have decreased following ditches, creeks, rivers and drainage lines.

Where skunks are a problem, there are several possible solutions. Erect a 2-inch mesh wire fence, 3 feet high and extending 1 foot below the ground with 1 foot bent outward at a 90-degree angle. Striped skunks normally do not climb. They are slow-moving animals that prefer to walk following fences and building walls.

Install a one-way door. Seal all openings except one. Then hang a section of 1/2-inch mesh hardware cloth by hinges over the opening in the foundation. This one-way door should be larger than the opening and L-shaped to discourage burrowing. Bend the hardware cloth outward at the bottom at a 90-degree angle. The skunk will be able to get out of the den but not re-enter.

Other Problems and Solutions

In cases where skunks dig a new opening near the patched one, thoroughly soak the den and surrounding area with slow-running water. Skunks seem to prefer den sites with good drainage. Since skunks are nocturnal, illuminating the den or other frequented area may also discourage them.

If a skunk becomes trapped in a window well, old well, basement or some other pit, install a board with cleats nailed at 6-inch intervals so the skunk can climb out and wander off into the night. Once the skunk has left, seal the opening.

Trapping

Live-trapping with cage traps baited with fish-based, meat-type cat food, canned fish, chicken parts or sardines is the preferred method for removing

nuisance skunks (Figure 1). The trap should be about 12 by 12 by 36 inches and the bait placed in a small, disposable cup at the back, beyond the tripping device. In urban areas it is not unusual to catch house cats instead of skunks. Mayonnaise, peanut butter, dried fruit, honey or molasses on bread attract skunks and not house cats.

Cover traps with burlap cloth, canvas or a shell of plywood. Coverings keep the trapped skunk in a darkened area so it will remain calm and is less likely to release its musk. A few commercially available cage-type live traps are made of sheet metal instead of wire.

Traps should be set in areas where skunks are expected to be, such as near den openings, along sides of buildings, near trails or fence openings. Traps can be set in the open or concealed with boards or grass. Always set traps in shady areas on a flat, smooth surface, using drift fences to guide skunks into the traps. Kansas law requires that traps be inspected at least once a day.

If a skunk sprays musk while in a trap, the trap can be washed at a car wash and then aired out after the skunk has been removed. With a little courage and practice, you can transport skunks in live traps without provoking the skunk to spray.

Slowly approach the trapped skunk and, if the trap is not already covered, place a tarp over it. Carefully pick up the covered trap and place it gently in the back of a pickup truck. Striped skunks seldom release scent when these precautions are taken, but spotted skunks are more difficult to handle.

It is not a good idea to release a trapped striped skunk. When a skunk is infected with rabies, the disease may not be apparent and symptoms may not appear for weeks or months. A healthy-looking skunk may actually be diseased and may infect other animals it contacts. In this case you will not be helping other animals by transporting the skunk to a "new home."

To humanely dispose of a trapped skunk, place a tarp or plastic sheet over the trap, seal the edges with soil and pipe in carbon dioxide gas from a pressurized cylinder or use dry ice which gives off CO₂. Another American Veterinary Medical Association approved method of euthanasia is shooting. However, many times skunks will spray when shot. If the animal is to be tested for rabies do not shoot it in the head as brain tissue is needed for testing.

Odor Control

Skunk odor is difficult to neutralize and persists for a long time. Household products that help remove skunk odor include ammonia, bleach, vinegar, washing soda, laundry soaps, smoke from a citronella candle and canned tomatoes or tomato juice. **WARNING: do not mix ammonia and chlorine bleach. This combination may form a gas (chloramine) that is toxic if inhaled, even in small amounts.**

Some old-time remedies include burying fouled garments in the soil for a few days and then letting them air out; subjecting clothing to smoke from burning leaves, especially cedar or juniper foliage; and exposing clothing to car exhaust. **But remember, it is DANGEROUS to run a car in a closed garage.**

Another deodorizing solution that you can mix from readily available ingredients is as follows:

- 1 quart 3% hydrogen peroxide
- 1/4 cup baking soda
- 1 teaspoon liquid soap

Mix ingredients well and thoroughly saturate the areas the skunk has sprayed. Use immediately and do not store the mixture or keep it in a glass container.

It expands and will break sealed containers. Be aware these solutions may cause color changes in certain materials. In treating pets, keep solutions away from their eyes.

Commercial deodorants such as Neutroleum Alpha are masking agents that are effective for reducing skunk odors. Neutroleum Alpha is available from some pest-control operators or may be obtained by writing the manufacturer and requesting a list of local sources. When using chemicals, always read and follow label instructions.

Rabies

Skunks exhibiting any sort of addled, tame or aggressive behavior, especially during the day, are definite rabies suspects. Children, in particular, should be warned against handling "friendly" skunks. Animals suspected of having rabies should be destroyed immediately—try not to destroy the brain. Have a veterinarian remove the head and submit it, packed in ice in a sealed leakproof container, to the Veterinary Diagnostic Laboratory, Kansas State University, Manhattan, Kansas 66506. A test will be performed, and the veterinarian will be contacted immediately by phone if the animal is positive for rabies.

Human Rabies Prevention

Rabies in humans can be prevented either by eliminating exposures to rabid animals or by providing exposed persons with prompt local treatment of wounds.

Domestic Animals

Local governments should initiate and maintain effective programs to

remove strays and unwanted animals and to ensure vaccination of all dogs and cats. Such procedures in the United States have reduced laboratory-confirmed rabies cases in dogs from 6,949 in 1947 to 114 in 2000. Since more rabies cases are reported annually involving cats (249 in 2000) than dogs, cat vaccinations should be required.

Rabies in Wildlife

It is difficult to control rabies among foxes, skunks, raccoons and other terrestrial animals. Selective reduction of these populations may be useful depending on the circumstances of the rabies outbreak.

Wild or Exotic Animals

Because of the risk of rabies among wild animals—especially raccoons, skunks and foxes—the American Veterinary Medical Association, the National Association of State Public Health Veterinarians and the Council of State and Territorial Epidemiologists strongly recommend enacting state laws to prohibit the importation, distribution, relocation or keeping of wild animals and wild animals crossbred to domestic dogs and cats as pets. Because it is not known how long it takes for wild or exotic animals, including ferrets, to shed the rabies virus, confinement and observation of animals that bite humans is not appropriate.

Control Methods for Wild Animals

The public should be warned not to handle wild animals. Wild carnivorous mammals and birds and the offspring of wild animals crossbred with domestic dogs and cats that bite people should be killed and their brains submitted to the laboratory for rabies examination. A person bitten by a wild animal should immediately report the incident to a physician who can evaluate the need for antirabies treatment.

Terrestrial Mammals

Continuous and persistent govern-

ment-funded programs for trapping or poisoning wildlife are not cost effective in reducing wildlife rabies on a statewide basis. But limited control by removing selected high-risk species of wild animals in high-contact areas such as picnic grounds, camps and suburban areas, may be indicated.

Consult the state wildlife agency early to manage elimination programs in coordination with the state health department. For more information about rabies, request the publication *Rabies*, MF-962, from your local K-State Research and Extension office. Report any suspicion of rabies immediately to a veterinarian, physician or local health official.

For more information, contact K-State Research and Extension Wildlife, Room 131 Call Hall, Kansas State University, Manhattan, KS 66506-1600, (785) 532-5734.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, Skunks, Urban Wildlife Damage Control, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-862

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Snakes



Urban Wildlife Damage Control

Many people either do not know anything at all about Kansas snakes or have misconceptions about them. Most have heard so many stories about snakes that they fear all of them. This fear is unfounded. It is important to learn to identify the poisonous snakes that might be encountered in a given area and realize that all other snakes, lizards, frogs, toads, salamanders and turtles do not have a poisonous bite and need not be feared.

Conserving snakes is another aspect. Too many people kill snakes unnecessarily just because they are snakes. There is no more reason to kill a non-poisonous snake than a song bird. In many cases, snakes are of direct economic value.

In Kansas, snakes are protected by state law. You should obtain a collecting permit from the Kansas Department of Wildlife and Parks before attempting to catch and keep a snake.

Biology and Habits

Snakes retire for the winter in places where the temperature will not get below freezing—in rocky ledges, beneath the soil, below the roots of trees, or in protected places such as grain bins, cisterns, cellars and silos. With the warm days of spring, snakes emerge from their winter quarters and begin searching for food and mates. After mating, the male and female snakes separate, and each goes its own way to forage for food until the fall.

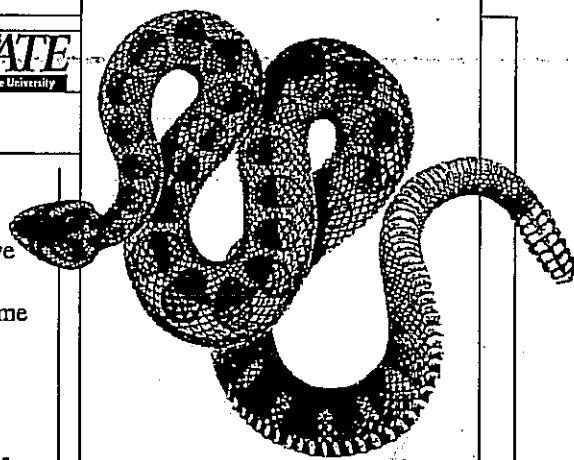
Some snakes lay eggs while others produce live young. Kansas snakes are about evenly divided between the two. Kingsnakes, rat snakes, bullsnakes, racers and many smaller snakes lay eggs in early summer and deposit them in a spot suitable for hatching, generally beneath a rock or in the soil. When they hatch, the young fend for themselves. In Kansas, water snakes, garter snakes, poisonous snakes and some smaller snakes give birth to living young in late summer or early fall. Again, the young are on their own after birth. With cooler

weather approaching, the snakes leave their summer feeding grounds and travel to places where they will become inactive for the winter.

Myths

There are probably more tall tales about snakes than any other group of animals. There are stories about snakes putting their tails in their mouths and rolling downhill like a hoop, snakes that are capable of milking cows dry, snakes that fly into pieces when struck and later reassemble themselves and snakes that charm their prey. Some of these tales have to do with the extraordinary powers of snakes. For instance, there is the "blow viper," whose breath is supposedly poisonous! Many people mistakenly think the poisonous "fang" of a snake is what they see flicking in and out of the snake's mouth. In reality, this is the snake's tongue, which is present in all snakes. The fangs are enlarged hollow teeth, in the front of the jaw, through which the poison passes during a bite. Here are four of the many popular myths about poisonous snakes:

1. Rattlesnakes cannot cross a horsehair rope—they can!
2. Cottonmouth water moccasins cannot bite under water—they can!
3. Rattlesnakes always rattle before they strike—not always!
4. The rattles present on the tail of a rattlesnake indicate the snake's age—no, a new segment is added each time that the skin is shed, which may occur several times during a year.



Abundance

Nonpoisonous snakes far outnumber the poisonous kinds, both in number of species and individuals. In Kansas, there are five species of poisonous snakes and 33 species of nonpoisonous snakes. Snakes are more likely to be non-poisonous than poisonous. A good source of information about snakes in Kansas is *Amphibians and Reptiles in Kansas* by Joseph Collins, available from the Museum of Natural History, University of Kansas, Lawrence, KS 66045.

Benefits

Before deciding to kill a snake in your yard or garden, consider the many benefits. Snakes are one of nature's most efficient mousetraps, killing and eating a variety of rodent pests. While snakes will not eliminate pests, they help keep their numbers in check. Some harmless snakes such as king snakes, milksnakes, and black racers eat other snakes, including poisonous ones.

Snake venom has been used in developing a variety of human medicines. One type of high blood pressure medicine was developed using information based on chemical

Urban Wildlife Damage Control

- | | |
|--|---|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input checked="" type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

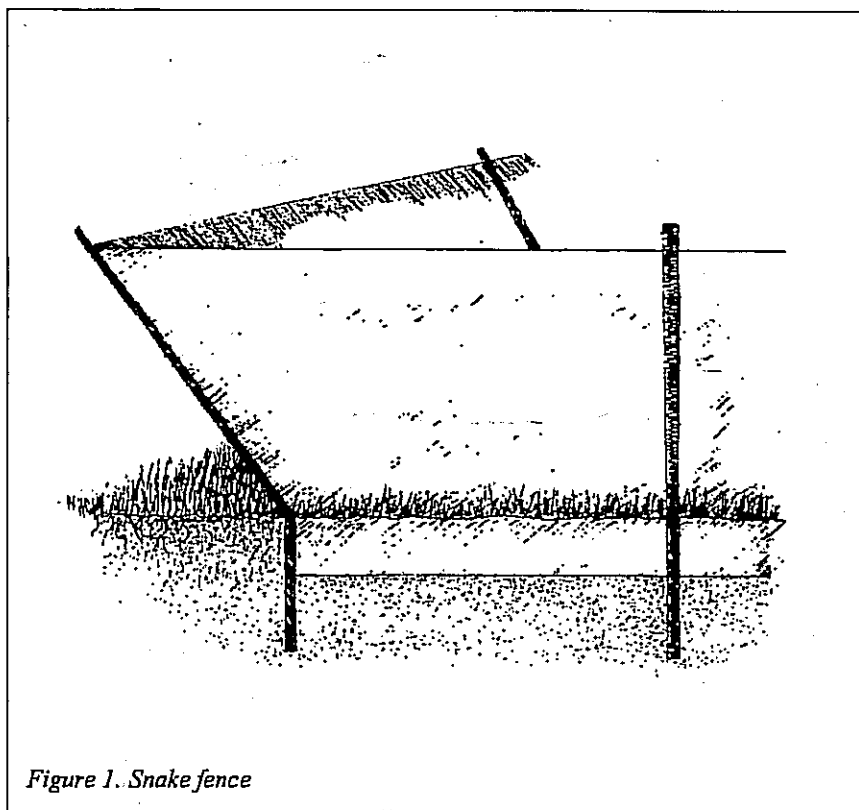


Figure 1. Snake fence

secrets contained in snake venom. Researchers are conducting studies using snake poisons in developing treatments for blood and heart problems. Snake venom is also being investigated for controlling some types of harmful bacteria.

Control Measures

The most effective and lasting method for getting rid of snakes is to make the area unattractive to them. This can be accomplished by removing hiding places such as old boards, debris, high grass or weeds. These measures will also reduce the food supply of insects and rodents and make the environment less attractive to snakes.

When snakes use houses or buildings for denning sites:

- Plug cracks and crevices and use screens at windows and doors.
- Inspect the masonry of foundations, fireplaces and chimneys and coat with cement, if necessary.
- Plug spaces around pipes passing through outside walls.

- Place galvanized screen over drains or ventilators. This also keeps out mice.
- Fill gaps between the outer walls and foundation.

At the same time snakes are being barred from the house, you should take steps to make the rest of the premises unattractive. Look at the surroundings as if you were a snake. Are there rodents or insects available for food? Are there places to rest, breed and carry out other necessary living functions? If you answered yes, plan to remove food and cover. Snakes eat rodents and insects so remove them and their water and shelter. Get rid of debris. Remove brush and leaf piles. Place stacked material 12 or more inches above the ground or floor and away from walls. Keep shrubbery and other plants away from foundations and free of leaves and other debris. Keep space beneath structures and stacks clean and mow lawns closely. Fill unwanted depressions. Keep stream or pond banks clean and clipped; rocky banks are pleasing but

they harbor snakes. If you prefer a naturalistic homestead, you must be willing to accept the presence of unwanted elements of natural communities, including snakes.

Only one chemical for repelling snakes is currently registered in Kansas. It is available under the brand name, Dr. T's Snake Away®, and contains active ingredients: Naphthalene and sulfur. It has not been tested by Kansas State University.

Exclusion

Snakes enter buildings in search of cool, damp, dark areas or places where rodents and insects abound. To prevent these unwanted guests from entering your home, check the foundation for cracks and openings $\frac{1}{4}$ inch or larger. Use mortar for poured concrete, concrete block or brick foundations. Use $\frac{1}{4}$ -inch hardware cloth or sheet metal to seal holes and cracks in wooden buildings. Seal cracks and openings around windows, doors, electrical pipes and wiring with caulk. If you have an open septic or sump pump drain outside, cover the opening with $\frac{1}{4}$ -inch hardware cloth. Be sure to check it periodically to ensure that the wire does not interfere with drainage. If you have young children and live in an area where poisonous snakes are common, you may want to invest in a snake-proof fence (Figure 1). Snake-proof fences are expensive to construct, so fencing an entire yard is not practical. However, you can enclose a small area where young children play.

Removal from Inside Buildings

If a snake is found in a basement or under a dwelling, the snake should be identified, caught and released. Capture tongs can be used to safely pick snakes off the ground and remove them to an enclosure (tongs available from: M&M Furs, 26445 435th Avenue, Bridgewater, SD (605) 729-2535). Glue boards also may be used to immobilize and remove the snake from the premises. To remove a snake with glue boards, attach three or four rat-size glue boards to a small piece of plywood

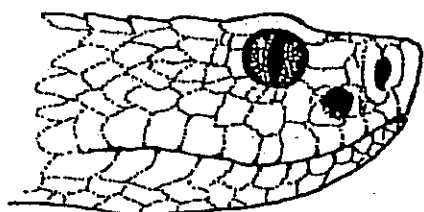


Figure 3. Head of poisonous snakes

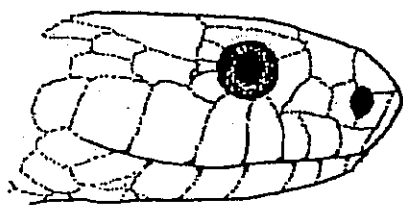
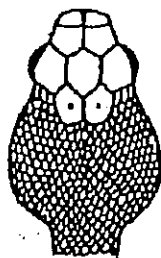
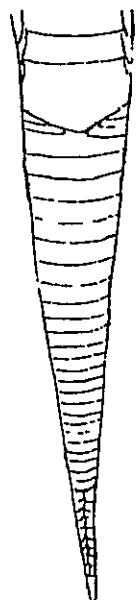
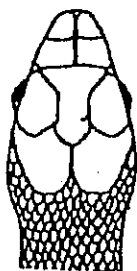
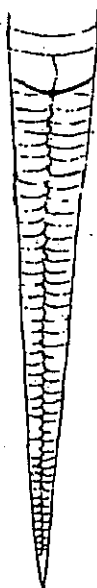


Figure 4. Head of nonpoisonous snakes



poisonous



nonpoisonous

Figure 5. Snake tails

or staple four boards together. Place the glue boards along a wall or foundation. Snakes generally will travel along walls. When the snake moves across

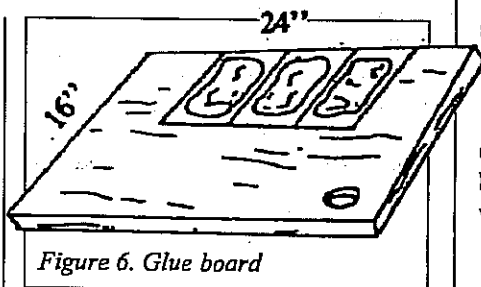


Figure 6. Glue board

the glue boards, it will become firmly attached and can be removed. To release the snake from the glue boards, pour vegetable oil over the snake and boards, inactivating the glue.

You may purchase ready-made glue boards, or make your own by applying glue to a piece of cardboard.

Occasionally, homeowners will encounter a snake inside the home, usually in a basement or crawl space. Snakes are attracted to these areas by the warmth on cold days and the cool shade on hot days.

You can increase your chances of capturing a snake in the basement by placing rumpled, damp cloths covered with a dry cloth in areas where snakes have been seen. Then remove every-

thing at once or capture snakes individually and remove them. If you are not afraid of snakes, the best way to remove them is to sweep them into a bucket or large garbage can with a broom.

NOTE: Homeowners should exercise extreme caution when moving in a crawl space, especially if venomous snakes have been in the area. A face bite could be very serious, and even a face-to-face encounter with a racer or rat snake can be an unpleasant experience.

How to Tell Kansas Poisonous Snakes From Nonpoisonous

The features given here apply only to Kansas snakes and may not be applicable elsewhere. Even in Kansas, there are some nonpoisonous snakes that exhibit either the tail or eye characteristics of poisonous snakes, but do not have the pit. These features can be seen only when the snake can be examined closely. Certainly, you should not pick up every snake to look for these characteristics!

WARNING: reflex action can cause an apparently "dead" snake to bite, so do not handle "dead" snakes with your hands; use a stick.

The best way to be able to identify a poisonous snake is to know all of the venomous snakes of your region by sight. Color and patterns are distinctive and easily learned.

Poisonous Snakes

- Pupil of eye elliptical, or cat-like
- Pit between eye and nostril
- Two enlarged teeth (fangs) in front of the upper jaw
- Scales on underside of tail in a single row

Non-Poisonous Snakes

- Pupil of eye round (except for Texas Night Snake)
- No pit between eye and nostril
- All teeth of upper jaw approximately same size
- Scales on underside of tail

normally in a double row; however, most scales on underside of tail on non poisonous Texas longnose snake are in a single row

Snake Bites

Snake bites occur despite precautions. Most first aid texts do not encourage victims of snake bites to kill the snake. The victim may wind up being bitten a second time. Whether the snake was venomous or harmless is determined within a few minutes when the victim begins to experience pain and swelling at the bite. Also, in Kansas all snake bites are normally treated with Crotalid Polyvalent antivenin, applicable to all venomous species in the state, so identifying the snake is unnecessary.

In case of snake bite . . .

- Stay calm—the snake may be nonpoisonous; if it is poisonous, excitement hurts, not helps.
- Get medical help quickly.
- Ask your doctor's advice regarding snake bite—before it happens.

Poisonous Snakes in Kansas

Cottonmouth (*Agkistrodon piscivorus*).

Length: 3 to 4 feet. The poisonous water moccasin has rarely been captured in extreme southeast Kansas. The many general reports of water moccasins are cases of harmless water snakes common throughout most of Kansas being mistakenly identified.

Young cottonmouths are patterned like wide-banded copperheads, but are not as reddish. Cottonmouths are always found near water. When approached they often hold their ground and open their mouths wide, revealing the white lining, a habit that gives them their common name. This heavy-bodied snake is dangerously poisonous and, contrary to

popular belief, can bite underwater.

While the copperhead is rather mild mannered, the cottonmouth has a vicious disposition. Although nocturnal, it likes to sunbathe, and frequently basks along shorelines, stretched out on low branches or on the bank. Where this snake occurs, it is usually common.

Generally, females bear eight or nine young in August or September, although the number of young may range from five to 15. Like the copperhead, the young have a yellow tail tip.

Copperhead (*Agkistrodon contorix*).

Length: usually 2 to 3 feet. Common where it occurs, the copperhead is probably the most abundant poisonous snake in eastern Kansas. It is most frequently found near rock ledges in oak-hickory-walnut woods, but individuals may be found in almost any habitat during summer months. Although generally nocturnal during most of its active season, its habit of lying in the open during the daytime among dried leaves in patches of sunlight and shadow causes the pattern to blend perfectly with the background. Any hiker walking through this habitat should be alert.

Because of the rather small size of this snake and low toxicity of its venom, the bite is normally not fatal to adults. Elderly persons, those in poor health, or small children are in more danger from copperhead bites.

A subspecies of the copperhead occurs along the southern border of Kansas. In this form, the crossbands are wider along the mid-line than those of the more northern variety.

Young copperheads have a sulfur-yellow tail. This color is lost as the snake matures. It is thought that this contrasting tail color is used as a lure to bring prey within striking distance of the small snake. The young are born in August or

September. There may be from two to 10 in a litter.

Massasauga (*Sistrurus catenatus*).

Length: 24 to 27 inches. This snake belongs to a group of small rattlesnakes called "pygmy" rattlesnakes, which are differentiated from the larger rattlesnakes by the large scales on top of the head, like the copperhead and nonpoisonous snakes. The massasauga occurs in open fields and rocky outcroppings. It is particularly common in the Flint Hills and at Cheyenne Bottoms. This is the "prairie rattler" of eastern Kansas, often found under hay bales in fields.

Its food consists primarily of small rodents. The small size and usually docile disposition of this snake tend to place it upon the non dangerous list, but its venom is extremely toxic and any bite from a massasauga is dangerous. When aroused, these small snakes strike with a fury not seen in the larger snakes. The rattling of this small snake is hardly louder than the buzz of a grasshopper.

The name "massasauga" is an Indian term, meaning "swamp-dweller," a habitat preference which is evidenced more in the states to the east and northeast of Kansas.

Two subspecies occur in Kansas. In the eastern part of the state is the form characterized by a dark belly; the lighter-bellied form occurs in southwestern Kansas.

Females bear eight or nine young, usually in August or September.

Timber Rattlesnake (*Crotalus horridus*).

Length: 3 to 4 feet, occasionally longer. The timber rattlesnake occurs only in eastern Kansas and is only common at scattered locations. It prefers the deciduous forest where limestone rock outcrops as ledges, but may wander into cultivated fields and open areas during late spring and summer.

The food consists primarily of small rodents and young rabbits. Ordinarily, it is a mild-mannered snake and seeks to escape direct contact with humans, but its size and habit of living close to human habitations makes this rattlesnake dangerous. Ground color may vary from a light gray to yellow, with the black chevron-shaped blotches of the back uniting with lateral blotches to form crossbands. The tail is characteristically velvet black in adults; banded in young.

During late spring and summer, the timber rattlesnake is quite often encountered crossing roads, where its large size and slow movement often make it a victim of modern transportation.

The timber rattler has a habit of spending daylight time just beneath the edge of overhanging rocks and logs. A hiker should always look beneath rocks of this sort before using them as a resting place.

Prairie Rattlesnake (*Crotalus viridis*).

Length: 3 to 4 feet. This rattlesnake is common in western Kansas, where it frequents rocky open regions, grassy prairies and agricultural areas. Its habit of denning in large groups is well-known. Several hundred have been found in a single winter den.

The food of the prairie rattlesnake is warm-blooded, mostly rodents and small rabbits. It appears to be active in the daytime, whereas the other poisonous snakes are mainly nocturnal. The ground color varies from a light gray to green, and the pattern of dorsal blotches with alternating rows of lateral blotches may cause it to be confused with the smaller massasauga, but the scales on top of the head are all small on the prairie rattlesnake, whereas large plates are present on the massasauga.

Young are born in late summer or early fall. A litter usually consists of nine to 12, but litters with as few as five and as many as 17 have been recorded.

A female prairie rattlesnake gives birth to a litter of young every other year. These young are generally about 12 inches long.

This snake has a wide range over the western United States, where it is probably the most common rattlesnake. It is frequently found in prairie dog villages. Rattlers use prairie dog burrows for shelter and the young rodents.

For sources of supplies and references or educational assistance contact:

Wildlife Damage Control,
131 Call Hall, Kansas State University
Manhattan, KS 66506-1600.
(785) 532-5734

Brand names appearing in this publication are for product identification. No endorsement is intended or implied, nor is criticism of similar products not mentioned.

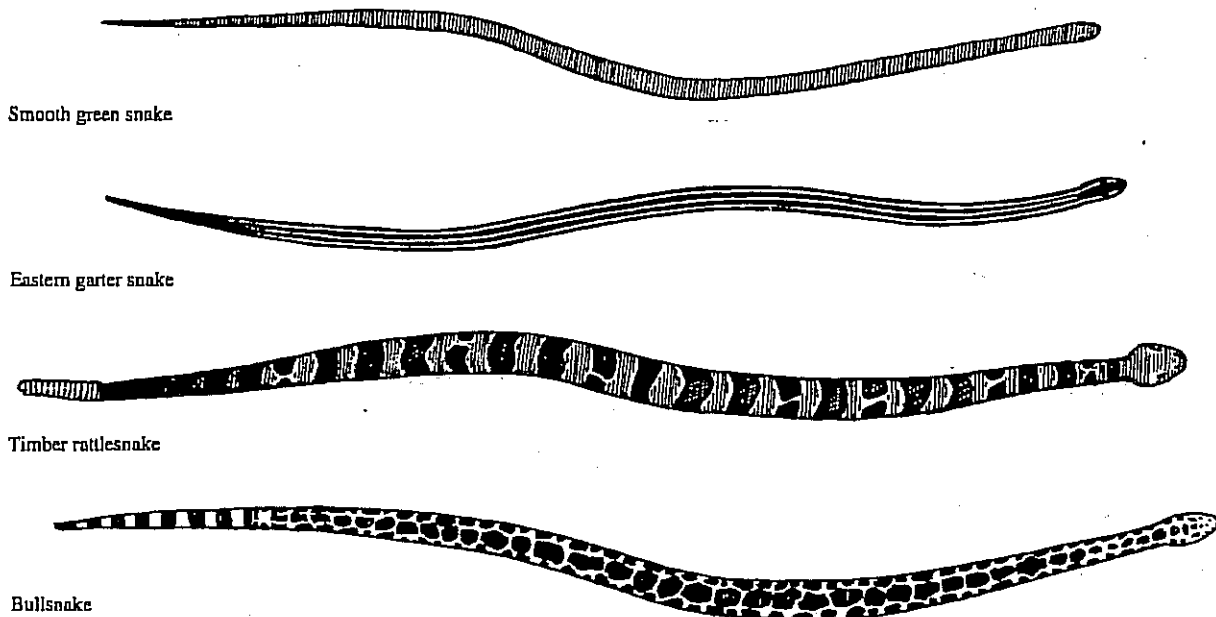


Figure 7. Solid-colored or lengthwise-striped snakes are nonpoisonous. If a snake is marked any other way, use other characteristics for identification.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, Snakes, Urban Wildlife Damage Control, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-864

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Woodchucks



Urban Wildlife Damage Control

The woodchuck—also known as groundhog—is commonly found to the east of a line extending through Manhattan southwest to Arkansas City. Populations of woodchucks seem to be increasing and extending their range further west in Kansas.

The scientific name is *Marmota monax*. The first part, *Marmota*, is the Latin word for "marmot," the name given to the European marmot or the North American marmot, which is a close relative of the woodchuck. The last part, *monax* is an American Indian name for this rodent and means "the digger"; it alludes to the woodchuck's habit of excavating burrows.

The woodchuck has a compact, chunky body supported by relatively short, strong legs. Its tail is short and bristly. Its forefeet have long, curved claws that are adapted for digging ground burrows where it seeks refuge and hibernates during winter months. Its color is usually a grizzled brownish-gray, although fur color may vary from white to black. Woodchucks have chisel-like incisor teeth. From tip of nose to end of tail, woodchucks are approximately 20 to 27 inches long and weigh from 5 to 12 pounds.

The early morning and evening hours are preferred for feeding as woodchucks depend on dew for much of their water intake. They eat large quantities of succulent plants. Woodchucks can become a nuisance when their feeding conflicts with people's gardening efforts or when they dig burrows in hayfields. They may feed in gardens, flower beds, alfalfa and clover fields. Occasionally, woodchucks damage young trees in orchards or nurseries. Although woodchucks will climb trees, they prefer to eat fruit on the ground and normally do not cause damage by climbing trees to eat fruit.

Woodchucks often can be observed basking in the summer sun during the

warmest hours of the day. They sleep on the tops of fence posts, on stone walls, large rocks, fallen logs and grassy areas, all of which are close to the burrow entrance. Even feeding woodchucks normally do not travel farther than 50 yards from their dens. There are exceptions as male woodchucks have been known to travel long distances to find a mate. And on occasions, woodchucks will travel several hundred yards for forage in time of drought or to eat fallen orchard fruit.

Dens are typically located on the edge of woodlands, in fields along fence rows, or in little used barns or sheds. Often woodchucks will take up residence in stonewalls or woodpiles, using several auxiliary dens for shelter.

The burrows dug by woodchucks are from 25- to 30-feet long and from 2- to 5-feet deep. Normally two or three entrances are used, although there may be as many as five entrances. (Figure 1, Page 2.) The main entrance is identified by the mound of excavated dirt and stones that surround the entrance. A single chamber is formed at the end of the main entrance burrow, which is used for sleeping and the young. Another room is used for urination and defecation. In this way the den is kept relatively clean and free from disease.

Hibernation begins with the killing frosts, usually in October. And hibernation ends in the early spring,



usually in early February. Woodchucks mate in February and March.

Gestation requires 31 to 33 days. A single litter with two to nine (usually four) young is produced each season. The young are weaned by late June or early July, and soon strike out on their own, usually occupying old, abandoned dens or dig new dens.

The average life span of woodchucks is 4 to 5 years. Predators such as foxes, bobcat, coyotes, dogs and people are the main forces that limit woodchuck numbers.

Laws and Regulations

Currently woodchucks may be taken in Kansas by meeting the legal equipment and license requirements. The season is open year-round and there is no maximum daily bag or possession limit. Landowners may control problem woodchucks, which are causing damage on their property, without a license under the provisions of KSA 32-1002. This law states: "Kansas does not prevent owners or legal occupants of land from killing any animals when found in or near buildings on their premises, or when

Urban Wildlife Damage Control

- | | |
|--|---|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input checked="" type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

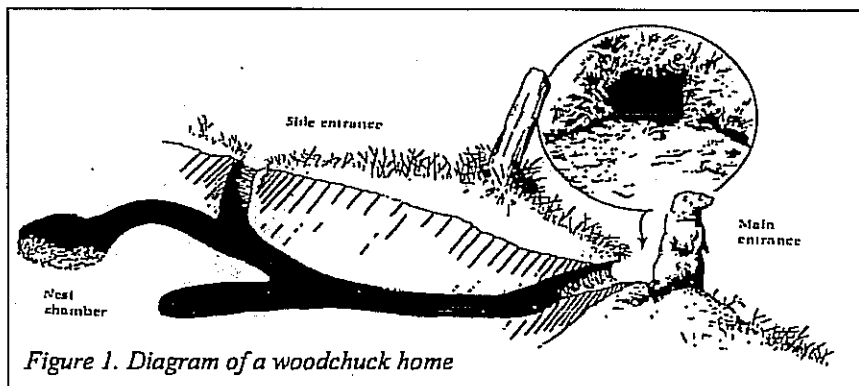


Figure 1. Diagram of a woodchuck home

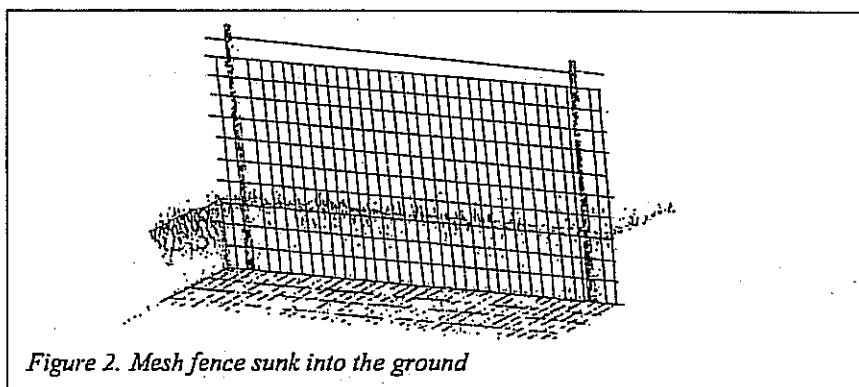


Figure 2. Mesh fence sunk into the ground

found destroying property, subject to the following: (A) the provisions of all federal laws and regulations governing protected species and provisions of the Kansas nongame and endangered species conservation act are met, (B) it is unlawful to use or possess with intent to use, any animal so killed unless authorized by rules and regulations of the secretary; and (C) such owners or legal occupants shall make reasonable efforts to alleviate their problems with any such animals before killing them."

Woodchuck Problem Management

Shooting

In rural areas, woodchucks may be legally hunted in Kansas year-round and may be taken by properly licensed hunters. Landowners and hunters should agree on arrangements that will be mutually satisfactory and that will avoid unsafe shooting practices. Hunters should make every effort to use the carcass. A young, medium-size ground-hog makes

excellent table fare if properly prepared.

Woodchuck numbers are difficult to control once a population has established itself in good habitat. No control method, with the exception of fencing, is considered permanent. The home-owner may use several methods of damage control without destroying the woodchucks.

Fencing

The most permanent control method is fencing. The practicality of fencing depends on the size of the area to be fenced. Because woodchucks are excellent diggers, it is necessary to sink the fencing 2 to 3 feet into the ground. The entrance gate should be sturdy and elevated. Some gardeners prefer to build two separate sets of steps over the top of the fence. A person leaving the garden moves the steps on the outside of the fence.

Gardens and other small areas may be protected from woodchucks by erecting a fence of 2-inch x 4-inch mesh wire (Figure 2). The fence

should extend at least 2 feet above the ground with an electrified strand on top. The fence should extend 1 foot below the ground surface. The buried portion of the fence should be bent in a 90 degree angle, 1 foot level below the ground, with the bottom of the fence pointing away from the garden. This design discourages burrowing if it is started at the fence line. All electric fences have been used successfully; however exercise caution before using high voltage electric fencing equipment where children or pets may be present.

Trapping

Woodchucks may be trapped in Kansas by using cage traps made of wire mesh. Where food is abundant, woodchucks may not enter cage traps for bait. Traps may be placed at burrow entrances or at the site of damage and should be baited with apples or other fresh fruit. Metal cage traps are most efficient because woodchucks may chew their way out of wooden cage traps.

A cage trap should be at least 10" x 10" x 24" to 12" x 12" x 36" in size. Double door see-through cage traps should be at least 10" x 10" x 30" in size. Other baits such as cantaloupe, carrots with tops, lettuce, cabbage or ample amounts of fresh peas can be used to entice woodchucks into cage traps. It is a good idea to conceal the trap with canvas or grass.

If baiting fails, a double door cage trap can be set directly in the woodchuck's trail and concealed. Often grocery stores will give people baiting material that the owners cannot sell. All traps should be inspected twice a day, morning and evening.

After the woodchucks are trapped, they can be transported at least 10 miles away and released into suitable habitat. People should consider the effects of live trapping woodchucks in the autumn immediately before hibernation or during the spring while the young are in the dens.

Animals trapped and released before hibernation may not be able to

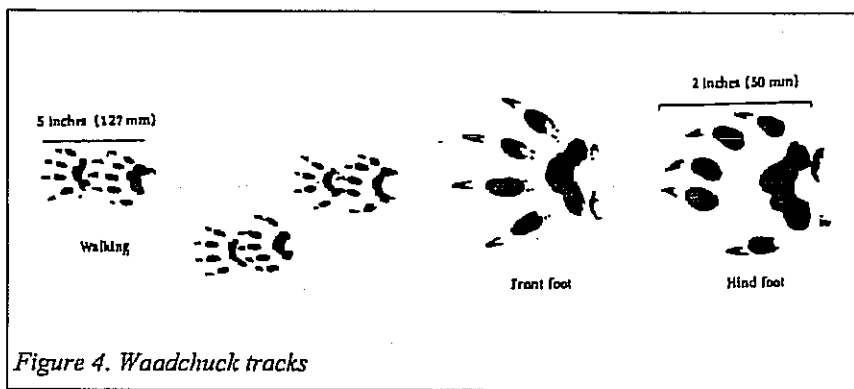


Figure 4. Woodchuck tracks

find a winter den. Trapping female woodchucks in the spring may cause the death of their young.

Woodchucks can be important to the rural wildlife community. Without their activity, the abundance of other kinds of wild creatures may not be as plentiful. The abandoned burrows provide escape cover and shelter for many kinds of animals including rabbits, raccoons, foxes, weasels and opossum.

As woodchucks increase, Kansans may see an increase in some of the other wildlife species.

For further information write to Animal Damage Control, Call Hall, Kansas State University, Manhattan, KS 66506-1600, (785) 532-5734.

Figure of woodchuck on page 1, diagram of woodchuck home on page 2 and paw prints on page 3 reprinted from The Wild Mammals of Missouri by Charles W. and Elizabeth R. Schwartz, by permission of the University of Missouri Press. Copyright 1981 by the Curators of the University of Missouri.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, Woodchucks, Urban Wildlife Damage Control, Kansas State University, September 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-865

September 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended, Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Woodpeckers



Urban Wildlife Damage Control

Some of the woodpeckers found in Kansas are: the Northern flicker (*Colaptes auratus*), a common year-round resident; the red-shafted flicker (*Colaptes cafer*), a more migratory bird found in Kansas in the winter; and the yellow-shafted flicker (*Colaptes auratus*) a common resident in eastern Kansas.

The hairy (*Picoides villosus*) and downy (*Picoides pubescens*) woodpeckers are similar in appearance and are the smallest woodpeckers found year-round in Kansas. They are mostly black and white in color.

The red-headed woodpecker (*Melanerpes erythrocephalus*) is generally a summer resident in Kansas; however some of these birds might overwinter in the state.

The red-bellied woodpecker (*Melanerpes carolinus*) is a year-round resident.

The largest woodpecker found in Kansas is the crow-sized, pileated woodpecker, (*Dryocopus pileatus*) which generally lives only in mature timber in river bottoms along the eastern edge of the state.

Three different kinds of sapsuckers are found in Kansas. The Williamson sapsucker (*Sphyrapicus thyroideus*) has been recorded as being seen in the state only on rare occasions. The yellow-bellied sapsucker (*Sphyrapicus varius*) is a low-density winter resident throughout Kansas. These birds generally arrive in October and leave by late April. The red-naped sapsucker (*Sphyrapicus nuchalis*) is found occasionally in extreme western Kansas.

One woodpecker, the ladder-backed woodpecker (*Picoides scalaris*), occurs in a very limited area in southwest Kansas.

And the least known woodpecker in Kansas is the Lewis woodpecker (*Melanerpes lewis*), which occasionally strays into Kansas from the west.

There are more than 200 different kinds of woodpeckers in the world,

some 45 of which are in the United States. Kansas has 13 different kinds of woodpeckers. Woodpeckers prefer habitat in the form of mature and old woodlands where there are standing dead trees or large dead limbs in older living trees.

Biology and Habits

The bills of woodpeckers are straight, sturdy and sharp pointed and are used to chisel through or under the bark in search of wood-burrowing insect grubs, spiders and ants. The woodpeckers also use their bills to chisel out their nesting cavities as well as night roosting cavities.

Woodpeckers have special adaptations in their tongues that enable them to capture and eat insects. Sapsuckers, which are true woodpeckers, eat sap they obtain by pecking rows of small holes through the bark of live trees. Small brushlike bristles on their tongues lap up the insects attracted to the sap as well as lapping up the sap itself.

The tail and feet hold the bird firmly anchored to the tree trunk. Strong neck muscles provide the force necessary to drill holes, and special bristly feathers around their nostrils filter out the wood dust as the woodpeckers chisel away.

Urban Problems

Woodpecker damage to houses is an extensive problem. In one study, 43 percent of those people reporting



damage knew of other people who also had similar damage. The majority of people experiencing woodpecker damage lived in a woods or within half a mile of a woods, 95 percent of which contained large hardwood trees. This may not reflect a woodpecker preference for houses, but rather may reflect a disruption of habitat.

There is a high incidence of damage to cedar. It may reflect woodpecker selection, but it also may reflect a selection of cedar as a building material in wooded areas.

Woodpecker damage is most likely to occur in spring and fall, but spring is the biggest damage season. No one really knows why the birds are attracted to houses, but natural wood (especially cedar) siding, large size, and better sound production may make houses seem like "super trees."

The key to successful control is to take action as soon as a woodpecker shows signs of becoming a pest. If it is allowed to establish its behavior pattern, it will become much more difficult to stop.

Woodpecker damage to houses is not a new occurrence. In fact, it is becoming

Urban Wildlife Damage Control

- | | |
|--|--|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input checked="" type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

ing very common in suburban environments, which are spreading into wooded ecosystems. At the same time, the older suburbs and the residential areas in the larger cities are heading toward their ecological climax.

Trees planted 30 or more years ago are becoming more suitable as habitat for woodpeckers. Woodpeckers seem to be attracted to the cedar siding for three reasons: food, nesting and "drumming."

Drumming

Woodpeckers are unique in the animal world in that they are the only creatures—besides humans—to be true instrumentalists. No other known bird, mammal or insect, instinctively makes a sound with something other than a part of its body.

Woodpeckers make their noise on a number of objects, including trees, branches, drain sprouts, street lights, TV antennas, silos or anything else that resonates loudly.

Woodpeckers drum for several reasons. First, it is a territorial signal, similar to most other birds' singing. It also may serve to attract a mate. Be-cause of this, drumming activity is at its highest in spring, although fall drumming is not uncommon.

It also is thought that some drumming may be used to locate food. The birds tap on a tree and then listen for any movement of insects inside. This saves the bird the effort of drilling into countless trees only to find them empty.

They know to drill only when they hear some sort of sound inside. In a similar manner, they will tap on potential nest trees to find the one most suitable.

The kinds of woodpeckers most often involved in urban damage include yellow-shafted flicker, red-bellied, downy, red-headed and hairy.

The most damage from woodpeckers in Kansas occurs in suburban and urban areas; not much occurs in rural areas.

Kansas residents report these kinds of problems: drumming on gutter-

ing, metal flashing, downspouts, TV antenna, columns and siding.

Laws and Regulations

Woodpeckers are federally protected migratory species, and as such are subject to both state and federal laws. The legal requirements under each set of laws apply. A federally issued depredation permit is required before any person may take, possess or transport migratory birds for depredation control purposes. No permit is required to scare or herd depredating migratory birds other than federally listed threatened or endangered species, bald or golden eagles (50 CFR 21.41).

For information on these and other state and federal permit conditions, contact Wildlife Damage Control, 131 Call Hall, Kansas State University, Manhattan, KS 66506. Permit requests should be addressed to the USFWS, P.O. Box 25486, DFC (60130), Denver, CO 80225-0486, (303) 236-8171.

Problem Management

One thing that cannot be over-emphasized is to start doing something to stop the drumming as soon as it begins. In cases where people wait until the pattern of drumming has been established, it is difficult to break the habit.

Study the place where the drumming is taking place. In order to drum, the woodpecker must be able to hold onto the structure. Therefore, first consider removing all ledges, cracks and crevices that might serve as footholds. This may solve the problem.

When damage is such that specific control is necessary, a variety of measures can be applied (*Figure 1*). All species of woodpeckers can be controlled in similar ways, though individual birds may react differently.

It may be possible to deaden or dull the sound with padding by placing insulation or other material behind the siding at the place where the drumming is occurring. If necessary, remove a plank or two to insert material and then replace. This technique is most effective as soon as drumming begins.

Visual Repellents

Using visual repellents may also chase the birds away (*Figure 2*, page 3). The three most used most are aluminum foil strips, hand-held windmills, falcon silhouette mobiles and magnifying mirrors.

- Aluminum foil strips:
 - Cut several strips 2- to 3-inches across and 2- to 3-feet long.
 - Attach a 6-inch string to one end of each strip.
 - Partially hammer in small brads or nails 2- to 3-feet above the drumming site; space 6- to 10-feet apart.
 - Attach each string to a nail in so that strips hang freely and move with every breeze. It is the motion which frightens birds away.
- Hand-held windmills:
 - If available, purchase windmills whose vanes are reflective.
 - Attach at the drumming site with

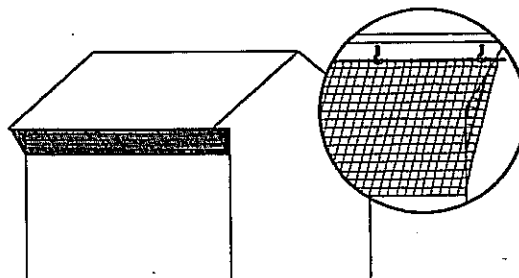


Figure 1. To discourage woodpeckers. Plastic netting attached from outside edge of eave, angled to siding. Insert shows hooks and wooden dowels to attach.

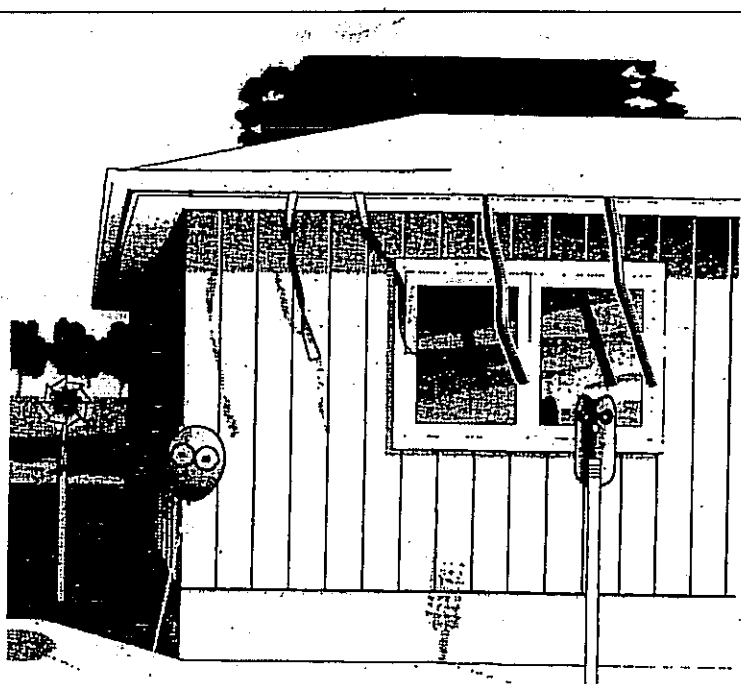


Figure 2. Common scare tactics used to discourage woodpeckers: pinwheels, balloons with eyes painted on, foil strips and models of owls.

brads, nails, pins, small staples or tape.

- Be certain revolving vanes are moving freely. If necessary, put backing behind stick to free pivot.
- Falcon silhouette mobile:
 - Use the design in Figure 3, page 4 to draw an enlarged outline of a falcon in flight (falcons are referred as bird hawks and all birds fear these falcons).
 - Color your falcon outline solid black; after you have colored the outline cut out the falcon silhouette.
 - Use $\frac{1}{4}$ -inch stiff backing, the same size and shape and glue it to the falcon outlined cutout.
 - Attach a 12-inch monofilament line to an 18-inch long $\frac{1}{4}$ -inch dowel rod and attach a fishing swivel to the falcon silhouette at the beak. Tie one end of the line to the swivel and the other end of the line to the end of the dowel rod.
 - Attach the opposite end of the

dowel rod to a $\frac{1}{2}$ -inch pine block 5 inches square by drilling a hole into the block.

- Attach the block to the siding above the drumming site.
- Move the location of the silhouette daily so that the drumming woodpecker will not become used to the silhouette and no longer see it as a threat.
- Two silhouettes used at one drumming site sometimes gives better results.
- These silhouettes are helpful in reducing other bird problems, such as songbirds flying into plate glass windows and keeping birds out of individual fruit trees and are worth trying in other cases.
- Magnifying mirrors:
 - Attach a round shaving mirror to the siding near the drumming site. When the woodpecker sees itself, often this will scare the woodpecker away.

Sound also can be used to harass

offending woodpeckers. Noise, such as from banging pans, boards, clapping hands or cap pistols will chase birds away.

Rubber balloons with round owl-like eyes attached or painted on the surfaces and hung in the drumming area have been used successfully.

Holes pecked in the siding may be round and smooth or vertical, rough gashes 1 to several inches long. This kind of damage may be restricted to a small area, often high on the corner of the building, or it may be extensive. The large round holes are probably intended to be nesting or roosting cavities. Extensive damage back and forth across the siding may result from a search for insect food behind the siding.

Try these solutions:

- placing a loud-playing radio in a window to scare the birds away.
- stapling polypropylene netting or screen wire near the rain gutter and angling it down to the house to close off an area to woodpeckers.
- locating nest boxes or suet in trees near the home to lure the birds away.

To stop pecking on windows and molding, pull down the shades or blinds or block the bird's reflection with cardboard.

Eliminate foods that attract woodpeckers to or near buildings, such as insects behind or between shingles or suet at bird feeders. Dead trees may also harbor insects that attract woodpeckers. Cutting such trees down, however, may deprive woodpeckers of drumming, nesting or food storage sites and force them to use a building instead. Deciding what to do depends upon the individual problem.

Fall damage often results from woodpeckers searching for food in or under the siding, usually for insects or insect larvae. Certain types of plywood siding contain tunnels that are opened when the plywood is grooved (Figure 4, page 4). Insects, especially leaf-cutting bees, enter these tunnels for winter shelter or to lay eggs.

If woodpecker holes are arranged in neat, regular rows, insects inside such tunnels are probably attracting the woodpeckers. If insects in the siding seem to be the cause, you can eliminate that attraction by removing the insects. Caulk all the tunnels in the siding, insecticides or wood preservatives may help in some situations, although it is usually difficult to get an insecticide into the siding where it will kill the insects.

Treatment of the siding with pentachlorophenol or other toxic wood preservatives also seems to repel woodpeckers as well as providing insecticidal and wood care benefits. Check with your paint dealer about incorporating a wood preservative with a coat of stain. There have been reports that pentachlorophenol fumes penetrate siding. To avoid such insect and woodpecker problems, you might consider using a different type of siding in a wooded area.

Repellents

Sticky, paste-type repellents applied in the damaged area and for several

feet on either side have been effective for some problems.

Since these repellents may stain, they should be applied on masking tape and not directly on the wood surface. These repellents may melt and run in hot weather and streak building sides.

Areas of concentrated damage can be temporarily screened with poultry wire, hardware cloth, plastic sheets or netting. Surfaces that are damaged repeatedly may have to be permanently protected with metal sheeting.

Taste

Many chemicals, such as Ro-pel® and Thiram®, which have objectionable tastes as well as odors have been tested for treating utility poles and fence posts to discourage woodpeckers.

Tactile

Sticky or tacky bird repellents such as Tanglefoot®, Bird Stop®, Roost-No-More®, etc., smeared on limbs or trunks where sapsuckers are working often will discourage the birds

from high value orchard, park or yard shade trees.

These same types of repellents also can be effective in discouraging the birds if applied to wood siding and other areas with structural damage. The birds are not entrapped by the sticky substances but dislike the tacky footing.

A word of caution: some of the sticky bird repellents will discolor painted, stained or natural wood siding. Others may run in warm weather, leaving unsightly streaks. It is best to try out the material on a small out-of-sight area first before an extensive application. The tacky repellents can be applied to a thin piece of pressed board, which is then fastened to the area where damage is occurring.

Many birdwatchers in the Midwest and East put out beef suet, particularly in winter, to attract woodpeckers. Placing suet stations near damaged buildings has been recommended to entice birds away from the building or damaged area.

This apparently works in some instances; but since much of the

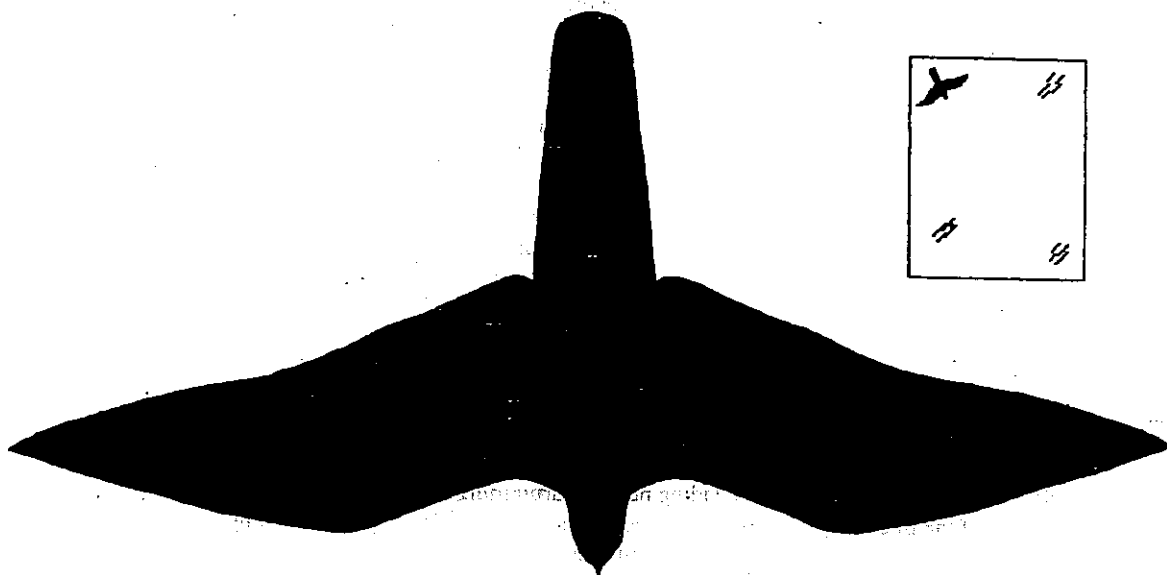


Figure 3. Falcon silhouette may be enlarged and cutout.

damage is totally unrelated to feeding behavior, it is difficult to explain why it sometimes works. Possibly it simply provides an attractive time-consuming alternative activity. Suet, when offered in the warmer seasons of the year, may be potentially harmful to woodpeckers. Besides making the bird dependent on handouts, the suet reportedly gets onto the feathers of the head and may lead to matting and eventual loss of feathers.

You should consider the needs of birds like woodpeckers as you plan your yard and trees. In most cases you could reduce house damage by allowing large dead limbs to remain on trees, providing a place for the woodpeckers to nest and find food. Also, nest boxes could be installed in trees to give woodpeckers an alternative site for nesting.

Building an alternate drumming site may reduce the amount of damage to the house. Fasten a cedar board securely to the pecking site and attach a second board loosely to one end of the first board. These two boards should overlap to form a flexible resonating surface. A simple hollow box also may serve as an effective substitute.

Utility poles can be covered with hardware cloth to prevent woodpecker damage. There are no repellents that serve this purpose.

Sapsuckers are specialized woodpeckers that excavate numerous rows of squarish holes around the circumference of the boles and larger limbs of many species of trees and shrubs, including evergreens. Sap flows into these pits, and the sapsuckers lick it up with their brush-tipped tongues and eat insects attracted to the exudation. Individual trees are attacked year after year, suffer from lowered vitality and are exposed to injury by insects and disease. Occasionally, a tree is completely girdled and dies. Damage most often occurs to ornamental yard trees, but in the wintering areas and during migration, sapsuckers sometimes congregate in orchards and cause significant damage. The yellow-bellied sapsucker, as its name implies, drills

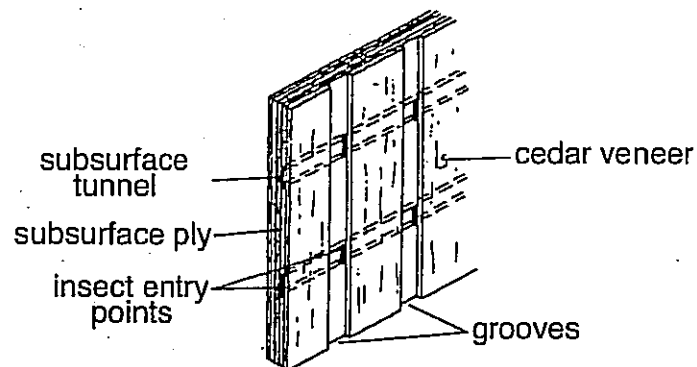


Figure 4. Grooved plywood siding allows insects to burrow their way in.

into trees to obtain sap. Orchard trees and a number of ornamentals may be damaged. An individual sapsucker often picks a favorite tree and visits it repeatedly. Sapsucker damage can cause unsightly wounds to the tree and result in disease and insect problems.

Individual trees are best protected by draping plastic or nylon netting over the entire tree or by placing loose cylinders of hardware cloth around trunks and limbs. Since migrating or wintering sapsuckers cause much of the damage, the period these barriers are needed is seasonal and often of short duration.

Sapsucker damage is less serious than home damage caused by other species, and it is easier to deal with. To prevent it, wrap the damaged part of the tree with burlap or hardware cloth, or smear a sticky repellent such as "bird tangle-foot" on the trunk. Be careful with bird tanglefoot; other birds not responsible for the damage can get stuck in it.

If nonlethal methods fail, it may be necessary to kill the birds (see *Laws and Regulations*). When a federal permit is granted, it allows woodpeckers to be shot and may allow them to be trapped provided the federal permit specifically authorizes trapping.

Nailing wooden-based mouse or rat snaptraps adjacent to the damaged area may be useful. Be sure to check traps often, and dispose of the dead birds properly.

When using traps, make sure they are out of reach of children and pets. Shooting the offending bird with a slingshot, air gun or BB gun may also be useful.

Check with local police authorities on the use of firearms in your area whether urban, rural town or field.

Lethal control may not be totally effective in some cases, as new birds may move into the space vacated by the dead ones.

For more information contact Wildlife Damage Control, Call Hall, Kansas State University, Manhattan, KS 66506-1600. (785) 532-5734.

Brand names appearing in this publication are for product identification. No endorsement is intended or implied, nor is any criticism of similar products not mentioned.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, *Woodpeckers, Urban Wildlife Damage Control*, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-866

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

Urban Wildlife Damage Control

The proper common name is Eastern woodrat (*Neotoma floridana*). The name many Kansas people use when referring to this native rodent is the pack rat. Another less common name is the trade rat.

Two species of woodrats are found in Kansas. One is the Eastern woodrat (*Neotoma floridana*) and the other is the gray woodrat (*Neotoma micropus*). The Eastern woodrat's range in Kansas is east and north of the Arkansas River. The range of the gray woodrat is south and west of the Arkansas River. Both woodrats are similar in appearance and behavior.

The adult woodrat is brownish-grey mixed with black on the upper side of its body. The throat, belly and feet are white. The total length of the adult varies from 12 to 17 inches and its weight from 6 to 12 ounces. Woodrats are active at night.

Woodrats are thought to have a longer lifespan than most other rats. In captivity a woodrat lived 4 years and in the wild they have been known to live 3 years.

Another reason for this belief is that woodrats have a lower reproductive rate than the other rats. Rats with a high reproductive rate generally have shorter lifespans.

Woodrats prefer to build their nests in rock crevices. If this habitat is not available, woodrats will build nests in brush piles, under fallen trees, around the base of trees, sometimes in the branches of trees. The woodrat packs sticks and twigs to the den for construction.

Woodrats have a peculiar habit of collecting objects, which gives rise to the common names mentioned earlier: the pack rat and the trade rat. These rats pick up many things, particularly shiny or metallic objects such as pop bottle caps, bolts, washers, nails, tin cans, coins and rifle cartridges.

If they happen across something more appealing on their way to their den, they will drop the first object and

pick up or trade for the second object.

If a person were to dissect a woodrat house in the autumn, he or she would find that woodrats generally segregate the items they collect.

One woodrat house yielded more than 2 gallons of hazel nuts, 1½ gallons of wild grapes, a quart of partly dried mushrooms, between 3 and 4 dozen hickory nuts and a score or more sprays of bittersweet berries.

In recent years, woodrats have increased in Kansas. During periods of high population and with more people living in suburban areas, the number of human/woodrat conflicts have increased as well.

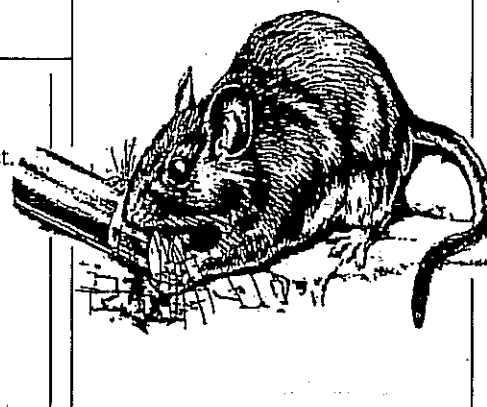
Urban Woodrat Problems

Most problems involve woodrats moving into barns or outbuildings or into trucks, cars, tractors, combines and other equipment left in one place for some time.

Woodrats also get under mobile homes as well as in crawl spaces or attics and basements of houses. They will often carry tools away and eat the insulation off electrical wiring.

Laws and Regulations

Kansas law affords some protection to woodrats; however, the rodents can be controlled in Kansas by homeowners, landowners or tenants when woodrats cause property damage.



Problem Management Exclusion

The first line of defense is to consider the option of exclusion because this offers the long-term solution to the problem. Since woodrats are good climbers, all possible entrances to a building should be closed. No hole larger than one-half inch should be left unsealed. If gnawing is a problem, edges can be covered with sheet metal. To ensure that the woodrat is not trapped inside the building, install a temporary gravity door made of sheet metal hinged at the top. The woodrat can push the door open to exit but cannot re-enter.

Toxicants

Long experience dealing with wood-rat problems suggests that toxicants should not be the only choice of control methods. Woodrats generally pack poison bait back to their den, but may not consume it for some time. This presents the hazard that some other animal might eat the bait.

Urban Wildlife Damage Control

- | | |
|--|---|
| <input type="checkbox"/> Bats, L-855 | <input type="checkbox"/> Skunks, L-862 |
| <input type="checkbox"/> Birds, L-856 | <input type="checkbox"/> Tree Squirrels, L-863 |
| <input type="checkbox"/> Blackbirds in Roosts, L-857 | <input type="checkbox"/> Snakes, L-864 |
| <input type="checkbox"/> Cottontail Rabbits, L-858 | <input type="checkbox"/> Woodchucks, L-865 |
| <input type="checkbox"/> Muskrats, L-859 | <input type="checkbox"/> Woodpeckers, L-866 |
| <input type="checkbox"/> Opossums, L-860 | <input checked="" type="checkbox"/> Woodrats, L-867 |
| <input type="checkbox"/> Raccoons, L-861 | |

Anticoagulant paraffin bait blocks have been used successfully for woodrat control. The bait blocks can be wired in place to prevent the woodrat from packing it away.

Most woodrat problems inside of structures can be solved using traps. The standard rat-sized snap trap has been used to catch woodrats. Its best to tie or glue the bait to the trigger. Baits include nut meats, bacon rind or dried fruit. Pre-baiting will improve trapping success. Put bait on the traps without setting the trap, feeding the woodrats for several days, then set the trap. This is the meaning of "pre-baiting."

Cage-type live traps are very successful in capturing woodrats. Both single and double door cage traps work well for woodrats. The trap size needs to be 5" x 5" x 15". The same baits can be used, but other baits include shiny objects, like a ball of tinfoil hung from a string inside the trap, back beyond the trigger of the trap.

Place these traps along trails, near the nests or against walls wherever

you suspect or see the woodrats. The home range of individual woodrats is normally about 100 feet in diameter. The ranges of individuals often overlap since several rats may nest close together. Woodrats are not as numerous as Norway rats. A person may need to catch only one or two woodrats to stop the damage.

Glue Boards

Sometimes under a car hood, it is difficult to properly set most kinds of traps. A glue board can work in these situations. A glue board is a tray, made either of cardboard or plastic that has very sticky glue in it. When the woodrat, or other small animal, crosses the glue surface, the rat gets stuck.

Glue boards tend to lose their effectiveness in dusty areas and during periods of extreme temperature. These conditions may affect the tackiness of the adhesive.

The woodrat will not die immediately when trapped on a glue board. In any of these traps, woodrats can be killed by drowning. Remember, all

traps and glue boards must be placed so that children, pets and nontarget animals do not have access to the traps. Glue can be broken down with vegetable oil, freeing anything caught in the glue.

Once the problem woodrats have been removed, it is a good idea to consider rodent-proofing the place where the damage occurred and looking for nearby nests and destroying them, if practical. This may reduce re-invasion by other woodrats.

For further information contact Animal Damage Control, 131 Call Hall, Kansas State University, Manhattan, KS 66506-1600 (785) 532-5734.

The figure of the woodrat on page 1 is reprinted from The Wild Mammals of Missouri by Charles W. and Elizabeth R. Schwartz, by permission of the University of Missouri Press. Copyright 1981 by the Curators of the University of Missouri.

Charles Lee
Wildlife Specialist

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned.

Publications from Kansas State University are available on the World Wide Web at: <http://www.oznet.ksu.edu>

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit Charles Lee, Woodrats, Urban Wildlife Damage Control, Kansas State University, October 1992.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-867

October 1992

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.

RABIES

[(Hydrophobia, Lyssa)]

SPECIES: dogs, cats, cattle, horses & many species used in the laboratory possible

AGENT: Rhabdovirus - causes an acute almost invariably fatal disease.

RESERVOIR AND INCIDENCE: Worldwide distribution (few countries are exceptions). Primary reservoirs vary geographically, e.g. foxes, bats, raccoons, skunks, dogs, cats, cattle, and others. In the U.S. and Canada, wildlife rabies most frequently involves skunks, raccoons, and bats. There has been a progressive epizootic among raccoons in the eastern U.S. for over a decade. Involve wild and domestic species. Mostly wild species involved, only 10% of cases are in domestic animals, 16 cases have been confirmed in nonhuman primates, including chimpanzees, cebus, cynos, and squirrel monkeys. All source countries of NHP's have endemic rabies. In Germany, Paarman described 25 Avian cases of Rabies involving 11 chickens, 2 geese, 1 duck, 1 sparrow, 1 owl, 1 crow, 3 hawks, 1 kite, 1 magpie, and 4 buzzards with Negri bodies observed in only three. In the U.S., the Great Horned Owl may shed the virus in its droppings after consuming an infected skunk. Rodents and lagomorphs are unlikely to have rabies. In the U.S., rabies has been reported 13 times in ferrets since 1958, most often in pet ferrets acquired from pet shops.

TRANSMISSION: Virus laden saliva via bite, scratch, or abrasion. Tissues and fluids in the laboratory. Rabid dogs shed virus in saliva 5-7 days before showing signs. Cat does so for only 3 days before signs. Aerosol transmission has been documented in the laboratory and in caves where bats roost (requires a high concentration of suspended viral particles). Animals showing signs of rabies are usually shedding large amounts of virus.

DISEASE IN ANIMALS: Rabid animals of all species exhibit typical signs of CNS disturbance, with minor variations peculiar to carnivores, ruminants, bats, and man. The clinical course, particularly in dogs, can be divided into 3 phases: the prodromal, the excitative, and the paralytic. The term "furious rabies" refers to animals in which the excitative phase is predominant, and "dumb or paralytic rabies" to those in which the excitative phase is extremely short or absent, and the disease progresses quickly to the paralytic phase. In any animal, the first sign is a change in behavior, which may be indistinguishable from a GI disorder, injury, foreign body in the mouth, poisoning, or an early infectious disease. Temperature change is not significant, and driveling may or may not be noted. Animals usually stop eating and drinking and may seek solitude. Frequently, the urogenital tract is irritated or stimulated as evidenced by frequent urination, erection in the male, and sexual desire. After the prodromal period of 1-3 days, animals either show signs of paralysis or become vicious. Carnivora, pigs, and occasionally, horses and mules bite other animals or people at the slightest provocation. Cattle butt any moving object. The disease progresses rapidly after the onset of paralysis, and death is virtually certain within 10 days of the first signs. Rabid domestic cats and bobcats attack suddenly, biting and scratching viciously. Rabid foxes frequently invade yards or even houses, attacking dogs and people. The irrationality of behavior that can occur is demonstrated in the fox that attacks a porcupine; finding a fox with porcupine quills can, in most cases, support a diagnosis of rabies. Rabid foxes and skunks are responsible for most pasture cattle losses, and have attacked cattle in barns. The rabid raccoon is characterized by its loss of fear of man, its frequent aggression and incoordination, and its activity during the day, being predominantly a nocturnal animal. In urban areas, they often attack domestic dogs. Bats flying in the daytime are probably rabid.

DISEASE IN MAN: There is usually a history of animal bite. Pain appears at the site of the bite, followed by paresthesias. The skin is quite sensitive to changes of temperature, especially air currents. Attempts at drinking cause extremely painful laryngeal spasm, so that the patient refuses to drink (hydrophobia). The patient is restless and behaves in a peculiar manner. Muscle spasm, laryngospasm, and extreme excitability are present. Convulsions occur. Large amounts of thick tenacious saliva are present.

DIAGNOSIS: Consider Rabies as a possible problem in any wild caught or random-source laboratory animal of unknown vaccination history showing central nervous system signs or symptoms. Virus isolation from body fluid or tissue Fluorescent antibody (FA) staining of tissues, including cornea, frozen skin, mucosal scrapings, as well as brain. Highly specific & rapid. Can now detect different strains (i.e. skunk vs. raccoon origin) via monoclonal

antibody analysis which is specific for one antigenic focus on the viral particle. The identifiable strains correlate well with species and geographic distributions observed. This allows identification of source and is an important epidemiological tool. (5 strains have been isolated from terrestrial animals; 2 skunk, 1 raccoon, 1 gray fox, 1 red fox. More than 5 have been isolated from bats.)

TREATMENT: This very severe illness with an almost universally fatal outcome requires skillful intensive care with attention to the airway, maintenance of oxygenation, and control of seizures.

PREVENTION/CONTROL: Vaccination of high-risk personnel recommended. Virus is destroyed rapidly at greater than 50 C and survives no more than a few hours at room temperature (Can persist for years in frozen tissues) Vigorous first aid for bite wounds. Consult Health Authority if suspected exposure. Post-exposure immunization: Up to 50% of human rabies immune globulin is infiltrated around the wound; the rest is administered IM. Human Diploid Cell Vaccine (HDCV) is given as 5 injections IM at days 0, 3, 7, 14, and 28. Control disease in domestic animals by vaccination and enforced animal control measures. Discourage keeping of wild animals as pets. Discourage the vaccination of wild animal pets for rabies.

BIOSAFETY LEVEL: BL-2

University Research Compliance Office: (532-3224), comply@ksu.edu

[Home](#) [Search](#) [What's New](#) [Help](#) [Comments](#)

K-State

Last Updated 10/30/1998

LEPTOSPIROSIS

[Weil's disease, Hemorrhagic jaundice (*Leptospira icterohaemorrhagiae*), canicola fever (*L. canicola*), dairy worker fever (*L. hardjo*)]

SPECIES: rodents, domestic, and wild animals

AGENT: Spirochete, *Leptospira*. Pathogenic leptospires belong to the species *Leptospira interrogans*, which is subdivided into more than 200 serovars. The main natural reservoirs for human infection vary with serovar: *L. canicola* in dogs, *L. hardjo* in cattle, *L. pomona* in swine, and *L. icterohaemorrhagiae* in rats.

RESERVOIR AND INCIDENCE: Rats, mice, field moles, guinea pigs, gerbils, squirrels, rabbits, hamsters, reptiles, nonhuman primates, livestock, and dogs. In one study, 40 % of stray dogs were seropositive. Rats and mice are common animal hosts for *L. ballum*. Infection in mice is inapparent and can persist for the animal's lifetime. *Rodents are the only major animal species that can shed leptospires throughout their life-span without clinical manifestations. Active shedding by lab animals can go unrecognized until personnel handling the animals become clinically ill.

TRANSMISSION: Handling infected animals, contaminating hands, or abrasions with urine, or aerosol exposure during cage cleaning are most common. The organism is often transmitted to humans by the urine of the reservoir host. The organism may also enter through minor skin lesions and probably via the conjunctiva. Many infections have followed bathing or swimming in infected waters.

DISEASE IN ANIMALS: In cattle, fever and anorexia occur with rapid decline in milk yield and atypical mastitis. Pregnant cows abort with retention of the placenta. Also, mild jaundice and severe anemia occurs with enlarged and friable liver and swollen kidneys. In pigs subclinical infection is common, though it can cause abortion and birth of weak piglets. In dogs and cats, gastroenteritis, jaundice, and nephritis may occur.

DISEASE IN MAN: Ranges from inapparent infection to severe infection and death. Biphaseic illness a. Weakness, headache, myalgia, malaise, chills, & fever. b. Leukocytosis, painful orchitis (testes not usually enlarged), conjunctival effusion, and rash. Icteric leptospirosis (Weil's syndrome-usually caused by *L. icterohaemorrhagiae*) is the most severe form of the disease, characterized by impaired renal and hepatic function, abnormal mental status, hypotension, and a 5-10% mortality rate. Signs and symptoms are continuous and not biphasic.

DIAGNOSIS: Early in the disease, the organism may be identified by darkfield examination of the patient's blood or by culture on a semisolid medium. Culture is difficult and requires several weeks. A rapid diagnosis is made with the DOT-ELISA test. *Leptospires can be recovered only from mature mice even though antibodies can be detected from infected mice of all ages.

TREATMENT: Penicillins or tetracyclines. Can eliminate *L. ballum* from a colony (mice) with 1000 gm chlortetracycline HCL/Ton of feed for ten days.

PREVENTION\CONTROL: Vaccination in cattle, swine, and dogs. Avoid swimming in or drinking potentially contaminated water. Protect workers by providing boots and gloves, and practicing good hygiene. **Wild Rodent control. Drain wet ground. Doxycycline chemoprophylaxis for persons at high exposure.

BIOSAFETY LEVEL: BL-1

University Research Compliance Office: (532-3224), comply@ksu.edu

SALMONELLOSIS

[(Salmonella food poisoning, enteric paratyphosis) A common bacterial cause of food-poisoning worldwide. Over 1800 food-poisoning serotypes of salmonella (bacterium) exist. The prevalence of individual serotypes constantly changes. In the U.S., 5 million cases are diagnosed annually. *S. typhi*, the cause of Typhoid Fever, rarely occurs in the U.S.]

SPECIES: Reptiles & amphibians, rodents. World-wide distribution in humans and animals.

RESERVOIR AND MODE OF TRANSMISSION: Salmonellas are common commensals of all animals and birds and are excreted in feces. Host-adapted strains may cause serious illness (e.g., *S. dublin* in cattle, *S. pullorum* in chickens), but most human food-poisoning salmonellas do not cause clinical signs in animals. **The main reservoirs for human infection are poultry, cattle, sheep and pigs.** Infection in animals is maintained by recycling slaughterhouse waste as animal feed, fecal oral spread and fecal contamination of hatching eggs. Transmission occurs when organisms, introduced into the kitchen in poultry carcasses, meat or unpasteurized milk, multiply in food owing to inadequate cooking, cross-contamination of cooked foods and inadequate storage. Person-to-person spread is common in institutions such as hospitals. The organism inhabits the intestinal tract of many animals including birds, cattle, sheep, pigs, lab. animals (rats, mice, hamsters, guinea pigs, nonhuman primates) and humans. Salmonella occurs worldwide. *The house mouse may also be a reservoir of the infection and may play a role in human and animal salmonellosis. Humans, rarely, and animals may be carriers and asymptomatic shedders of the organism. *Salmonella prevalence in the U.S. canine population may be 10% or more. *Prevalence data from 8 studies conducted worldwide indicated that a wide range (0.6-27%) of cats were culture-positive for Salmonella. *Salmonella carriers in newly imported Rhesus and Cynomolgus monkeys exceeded 20% in some shipments. ***In the laboratory and teaching laboratory, birds, reptiles, and turtles are especially dangerous sources of Salmonellosis. 94% of all reptiles harbor Salmonella.** Turtles alone in 1970 may have caused 280,000 human cases of Salmonellosis. *In 1975 the FDA ruled it illegal to sell a. Viable Turtle eggs b. Live turtles with a carapace length < 10.2cm (4 inches) c. Exceptions - Educational & scientific institutions and marine turtles. d. Marine turtles have not been shown to be a reservoir of Salmonella

TRANSMISSION: Indirect transmission via contaminated food and water are the most common sources but transmission may also be by direct contact. It is a common contaminant of sewage. Found in many environmental water sources. **Environmental contamination continues to be a potential source of infection for lab animals and secondarily for personnel handling those animals.** *Animal feed containing animal by products continues to be a source of Salmonella contamination, especially if the diets consist of raw meal and have not undergone the pelleting process.

CLINICAL FEATURES: Humans. The presence and severity of symptoms depends on the infecting dose. Typically there is watery diarrhoea for about ten days, possibly leading to dehydration, with abdominal pain and low-grade fever. Septicemia and abscess formation are rare. Animals. Subclinical infection is common and many animals may be intermittent or persistent carriers. However, cows may suffer with fever, diarrhoea and abortion. Calves undergo epizootic outbreaks of diarrhoea with high mortality. In pigs, fever and diarrhoea are less common than in cattle. Infected sheep, goats and poultry usually show no signs of infection.

DIAGNOSIS: Humans. Isolate salmonella from feces and suspected foods using selective media followed by serotyping and, if appropriate, phage typing. Animals. Culture feces, postmortem tissues and foods of animal origin. Serological tests are of limited value as many noninfected animals have titers from past infections. Humans. Usually only a self-limiting illness occurs. Deaths from dehydration or septicemia are rare and occur usually in infants, or debilitated or elderly patients. Animals. There is abortion in cattle and endometritis with temporary infertility. In calves, dehydration and septicemia may lead to death.

PREVENTION: Animals. Principles of control include the following: maintain closed herds and flocks; keep animals in small groups; purchase replacements direct from the farm of origin; avoid mixing animals from different sources; sterilize ingredients of animal feed; provide mains drinking water for grazing livestock; prevent access of wild birds and rodents to animal houses; completely destock animals and thoroughly cleanse and disinfect housing

between batches; monitor poultry breeding stock and remove excreters; disinfect hatching eggs and fumigate incubators. **Protective clothing, sanitation, and personal hygiene important.**

TREATMENT: Humans. Treatment of uncomplicated enterocolitis is symptomatic only. Young, malnourished, or immunocompromised infants, severely ill patients, those with sickle cell disease, and those with suspected bacteremia should be treated for 3-5 days with trimethoprim-sulfamethoxazole (one double-strength tablet twice a day), ampicillin (100 mg/kg IV or orally), or ciprofloxacin 9750 mg twice daily). Animals. Treatment with antibiotics and sulfonamides immediately diarrhoea and fever occur reduces mortality but is contraindicated in healthy carriers in which treatment may prolong the carrier state.

LEGISLATION: Humans. The disease is notifiable specifically in the USA, Australia, New Zealand and several European countries, or as food-poisoning in the UK.

BIOSAFETY LEVEL: BL-2

University Research Compliance Office: (532-3224), comply@ksu.edu

[Home](#) [Search](#) [What's New](#) [Help](#) [Comments](#)

K-State

Last Updated 10/30/1998.

HANTAVIRUS

[Hemorrhagic fever with renal syndrome (HFRS), Hantaan virus, Puumala virus, Seoul virus, nephropathia epidemica; Hantavirus Pulmonary Syndrome (HPS), Sin Nombre virus, Four Corners virus, Bayou virus, Black Creek Canal virus]

SPECIES: Wild rodents, deer mice. ***potential hazard in field studies***

AGENT: Spherical, enveloped particles 90-100 nm in diameter. Bunyaviridae; single stranded, negative sense RNA genome

PATHOGENICITY: Characterized by an abrupt onset of fever lasting 3-8 days, conjunctival injection, prostration, backpain, headache, abdominal pains, anorexia and vomiting; hemorrhagic manifestation appears from third to sixth day, followed by proteinuria, hypotension and shock. Fatality (7%) occurs during the hypotension and anuric phase; HPS characterized by fever, myalgia, GI complaints then abrupt onset of respiratory distress and hypotension; mortality approx 40-50%; in survivors, recovery rapid with full restoration of normal lung function

EPIDEMIOLOGY: Endemic in areas with its rodent reservoir including China, Korea, Japan, Scandinavia, Commonwealth of Independent States; other hantaviruses have been identified in urban rats in major Asian and Western cities including USA and Brazil; HPS viruses in south USA (Texas, Arizona, Florida)

MODE OF TRANSMISSION: Aerosol transmission from infected rodent excreta; virus present in urine, feces, saliva of persistently infected animals; virus concentration highest in the lungs of the rat

INCUBATION PERIOD: From 5-42 days; average 12-16 days

COMMUNICABILITY: Not directly transmitted from person-to-person

DRUG SUSCEPTIBILITY: Ribavirin given IV has shown to be effective during the early phase of the HFRS illness; has not shown any effectiveness for HPS to date

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to 1% sodium hypochlorite, 70% ethanol, 2% glutaraldehyde. Sensitive to heat

LABORATORY-ACQUIRED INFECTIONS: Infections were documented in laboratories over 6 countries; by the end of 1985, 126 lab-acquired infections of HFRS reported in Japan; in 1986 4 lab-acquired infections reported in the U.K.; most cases were caused by aerosols generated by infected rodents

PRIMARY HAZARDS: Aerosol and droplet exposure of the mucous membranes, accidental parenteral inoculation, ingestion

SPECIAL HAZARDS: Generation of aerosols when working with infected rodents. Working in field conditions - trapping wild rodents

PREVENTION & CONTROL: Gloves and gowns should be worn when handling potentially infectious specimens, cultures or tissues. Allow aerosols to settle.

BIOSAFETY LEVELS: Potentially infected tissue samples should be handled in BSL-2 facilities in accordance with BSL-3 practices. Experimentally infected rodent species known not to excrete the virus can be housed in animal biosafety level 2 (ABSL-2) facilities in accordance with ABSL-2 practices. Biological safety cabinets and other physical containment devices should be used whenever procedures with high potential for generating aerosols are conducted. Serum or tissue samples from potentially infected rodents should be handled in accordance with BSL-3 practices, although BSL-2 laboratories can be used. **CDC guidelines at** <http://www.ksu.edu/research/animal/occhs/labguide.htm>

CAT SCRATCH DISEASE

[Cat Scratch Fever, Benign Lymphoreticulosis, Benign nonbacterial Lymphadenitis, Bacillary Angiomatosis, Bacillary Peliosis Hepatis]

SPECIES: cats

AGENT: Controversial disease - it is not currently possible to definitively name the causative agent responsible for CSD. Felt to be either *Afipia felis*, a gram-negative rod or *Rochalimaea henselae* and *Rochalimaea quintana*. Both are members of class Proteobacteria and both are intracellular parasitic bacteria.

RESERVOIR AND INCIDENCE: Associated with domestic cats throughout the USA, and worldwide. Over 6000 cases annually. Seen more often in men than in women. Have seen clusters of infection within families within a 2 to 3 week period, suggesting that shedding by cats may occur periodically. Other sources of infection have included scratches from other species including dogs, squirrels, and goats and from wounds induced by crab claws, barbed wire, and plant material.

TRANSMISSION: 90% of patients have been exposed to a cat. 75% of these have been bitten, scratched, or licked. Most affected individuals are <20 years of age. 75-80% of the cases of CSD are diagnosed between September and February with a peak incidence in December. 4 to 6% of the general population and 20% of veterinarians have positive skin test reactions to CSD antigen.

DISEASE IN ANIMALS: Subclinical

DISEASE IN MAN: Different distinct syndromes exist:

Typical CSD: A primary lesion, most common on neck or extremities, will develop in 50% of the cases and appear approximately 10 days after a bite or scratch. A pustule persists for 1-2 weeks. 10-14 days after the lesion appears, lymphadenopathy develops and usually regresses within 6 weeks. 30-50% of the enlarged nodes become suppurative. Of the approximately 65% who develop systemic illness, fever and malaise are the symptoms most often noted. The disease is usually benign and most patients recover spontaneously without sequelae within 2-4 months. Many unrecognized cases probably occur. Disease appears to confer lifelong immunity.

Atypical CSD: The atypical forms of CSD, which constitute 11% of all cases, are extremely varied. The most common, representing 6% of all cases, is Parinaud's oculoglandular syndrome (POGS), or granulomatous conjunctivitis with preauricular adenopathy. Other, atypical presentations include tonsillitis, encephalitis, cerebral arteritis, transverse myelitis, radiculitis, granulomatous hepatitis and/or splenitis, osteolysis, atypical pneumonia, hilar adenopathy, pleural effusion, erythema nodosum, erythema annulare, maculopapular rash, thrombocytopenic purpura, and breast tumor.

DIAGNOSIS: The sedimentation rate is elevated, the white blood cell count normal, and the pus from the nodes is sterile. ID skin testing with antigen prepared from the pus is positive. Excisional biopsy, usually performed to exclude lymphoma, confirms the diagnosis.

TREATMENT: For CSD: Rifampin, ciprofloxacin, gentamycin, and trimethoprim-sulfa. Aspiration of suppurating nodes is recommended for relief of pain. Symptoms resolve without treatment in 2-4 months. BA and BPH respond to erythromycin, rifampin, or doxycycline. Therapy must be continued for 4-6 weeks to avoid relapse.

PREVENTION/CONTROL: Education. Proper handling techniques. Wash hands after handling cat. Wash cuts and scratches promptly and don't allow cat to lick open wound. Flea control measures.

BIOSAFETY LEVEL: BL-1

LYME DISEASE

[Lyme disease, relapsing fever, Erythema chronicum migrans (ECM) with polyarthritis, Lyme arthritis, Tickborne meningopolyneuritis]

CHARACTERISTICS: Spirochete, first identified in 1982

PATHOGENICITY: Tickborne zoonotic disease characterized by distinctive skin lesion (ECM), systemic symptoms, polyarthritis, and neurological and cardiac involvement; malaise, fatigue, fever, headache, stiff neck, myalgia, migratory arthralgias or lymphadenopathy lasting several weeks and may precede lesions; neurological and cardiac abnormalities weeks to months after onset of ECM; chronic arthritis may develop

EPIDEMIOLOGY: In USA, endemic foci along east coast, Wisconsin, Minnesota, California and Oregon; One endemic area in Southern Ontario; Europe, USSR, and Australia; cases occur primarily during summer; distribution coincides with abundance of relevant ticks

HOST RANGE: Humans, deer, wild rodents

MODE OF TRANSMISSION: By exposure to an infected tick

INCUBATION PERIOD: From 3-32 days after tick exposure

COMMUNICABILITY: No evidence of natural transmission from person to person

RESERVOIR: Deer, wild rodents (mice), ticks through transstadial transmission

VECTORS: Ticks - Ixodes dammini (eastern and midwestern USA), Dermacentor variabilis, Ixodes pacificus (western USA, Europe)

DRUG SUSCEPTIBILITY: Sensitive to tetracyclines and penicillin

SUSCEPTIBILITY TO DISINFECTANTS: Susceptible to 1% sodium hypochlorite and 70% ethanol

PHYSICAL INACTIVATION: Sensitive to heat, UV

SURVIVAL OUTSIDE HOST: Infected guinea pig blood - 28 to 35 days at room temperature; survives for short periods in urine




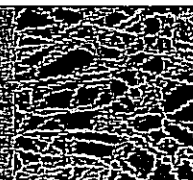
SURVEILLANCE: Monitor for appearance of typical lesions; serological tests show a rise in antibodies directed against the spirochete

FIRST AID/TREATMENT: Treatment of ECM stage with tetracycline for adults and penicillin for children may prevent or lessen the severity of the major late cardiac, neurologic or arthritic complications

IMMUNIZATION/PROPHYLAXIS: SmithKline Beecham's LYMERix(TM), one of two vaccines developed to prevent Lyme disease, was recently approved by the FDA and is now available to the public. A second Lyme disease vaccine, ImuLyme(TM) (manufactured by Pasteur Merieux Connaught) is still awaiting FDA approval. Both vaccines are based on recombinant Borrelia burgdorferi Outer Surface Protein A, or Osp A (SmithKline Beecham's vaccine also includes an adjuvant), and are designed to kill the disease-causing spirochete within the tick before it can enter the human bloodstream. Neither vaccine will initially be available to children under the age of 15, and both currently require 3 injections over a 12-month period to build immunity to its peak level. It has not yet been determined conclusively how often additional booster shots will be needed in subsequent years.

PROTECTIVE CLOTHING: Laboratory coat; gloves should be worn during necropsy of infected animals and when contact with infectious materials is unavoidable

ZOONOTIC DISEASES FACT SHEET

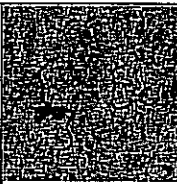

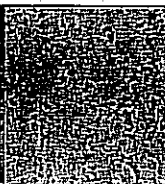

Disease	Pathogen	Genus species	Host Range	Transmission	Symptoms	Incubation	Fact	Treatment	Photo
Brucellosis*	Bacteria	<i>Brucella</i> (<i>B. melitensis</i> , <i>B. abortus</i> , <i>B. suis</i> , <i>B. canis</i>)	Infected animals (swine, cattle, goats, sheep, dogs)	Skin or mucous membrane contact with infected animals, their blood, tissue, and other body fluids	High and protracted (extended) fever. Infection affects bone, heart, gallbladder, kidney, spleen, and causes highly disseminated lesions and abscess	1-15 weeks	Most commonly reported U.S. laboratory-associated bacterial infection in man	Antibiotic combination: streptomycin, tetracycline, and sulfonamides	
Salmonellosis	Bacteria	<i>Salmonella</i> (<i>S. cholerae-suis</i> , <i>S. enteritidis</i> , <i>S. typhimurium</i> , <i>S. typhi</i>)	Domestic (dogs, cats, monkeys, rodents, laboratory rodents, reptiles [especially turtles], chickens and fish) and herd animals (cattle, chickens, pigs)	Direct contact as well as indirect consumption (eggs, food vehicles using eggs, etc.). Human to human transmission also possible	Mild gastroenteritis (diarrhea) to high fever, severe headache, and spleen enlargement. May lead to focal infection in any organ or tissue of the body	6 hours to 3 days	Fatality rate of 5-10%	Antibiotic combination: chloramphenicol, neomycin, ampicillin	
Shigellosis*	Bacteria	All <i>Shigella</i> species	Captive non-human primates	Oral-fecal route	Ranges from asymptomatic carrier to severe bacillary dysentery with high fevers, weakness, severe abdominal cramps, prostration, edema of the face and neck, and diarrhea with blood, mucous and inflammatory cells	Varies by species. 16 hours to 7 days.	Highly infective. Low number of organisms capable of causing infection. Rate of infection in in-port monkeys can be high	Intravenous fluids and electrolytes. Antibiotics: ampicillin, amoxicillin, trimethoprim-sulfamethoxazole	
Leptospirosis	Bacteria	<i>Leptospira interrogans</i>	Animal, human urine	Direct contact with urine of infected dogs, mice or rats. Indirect contact with urine, contaminated materials. Droplet transmission via aerosols of urine	Phase 1: headache, muscle aches, eye pain with bright lights, chills and fever. Phase 2: fever with stiffness of the neck and inflammation of the nerves to the eyes, brain, spinal column	7-12 Days	Leptospirosis associated with liver and kidney disease is called Weil's syndrome, characterized by jaundice	Doxycycline and penicillin. Severely ill patients may need IV fluids, antibiotics and dialysis	



Through OSHA's Alliance Program, this fact sheet was developed as a product of the OSHA and ABEA Alliance for informational purposes only. It does not necessarily reflect the official views of OSHA or the US Dept. of Labor

alliance
An OSHA Cooperative Program

ZOO NOTIC DISEASES FACT SHEET





Disease	Pathogen	Genus species	Host Range	Transmission	Symptoms	Incubation	Fact	Treatment	Photo
Relapsing fever	Bacteria	<i>Borrelia</i> spp. [<i>B. recurrentis</i> (louse-borne), <i>B. hensili</i> (tick-borne)]	Animals	Tick-borne, blood transfusions	Fever, headache and muscle pain that lasts 4-10 days and subsides. Afebrile period lasting 5-8 days followed by a recurrence of acute symptoms	5-15 days	Epidemic relapsing fever (transmitted by lice) is more severe than endemic relapsing fever (transmitted by ticks)	Tetracyclines, chloramphenicol	
Tuberculosis	Bacteria	<i>Mycobacterium tuberculosis</i>	Primarily humans, cattle, non-human primates, other animals (rodents)	Inhalation of aerosol droplets, contaminated equipment, bites	Ranges from fever and fatigue to chronic pulmonary disease (fatal). Lungs, kidney, vasculature (affects all parts of body)	2-5 weeks	Multidrug-resistant TB (MDR TB) is an infection resistant to at least two first-line anti-TB drugs, isoniazid and rifampicin	Isoniazid, rifampin, streptomycin, and ethambutol	
Melioidosis*	Bacteria	<i>Burkholderia pseudomallei</i> (formerly <i>Pseudomonas pseudomallei</i>)	Equines, especially horses and mules; humans are accidental hosts	Transmitted by inhaling dust contaminated by the bacteria and when contaminated soil comes in contact with abraded skin	Cholera-like symptoms (fever, chills, prostration). Skin lesions, swollen lymph glands, abscesses, septicemia or pneumonia	2-4 days	Relatively uncommon disease for humans, but when left untreated, has 95% fatality rate	Chloramphenicol, doxycycline, sulfisoxazole, or cotrimoxazole. IV chloramphenicol for bacteremia	
Tularemia*	Bacteria	<i>Francisella tularensis</i>	Isolated from 100 species of wild animals (e.g., rabbits, skunk), 9 domestic mammals, 25 species of birds, frogs, and reptiles	Arthropods, direct or indirect contact, ingestion of contaminated meats, inhalation of dust, materials contaminated with urine, feces or tissues, bites and scratches	High fever, chills, headache, focal ulcers, swollen lymph nodes	1-10 days	Bacterium formerly known as <i>Pasteurella tularensis</i>	Streptomycin, tetracycline	



Through OSHA's Alliance Program, this fact sheet was developed as a product of the OSHA and ASEA Alliance for informational purposes only. It does not necessarily reflect the official views of OSHA or the US Dept. of Labor

alliance
An OSHA Cooperative Program

ZOO NOTIC DISEASES FACT SHEET


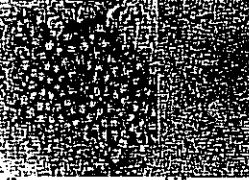

Disease	Pathogen	Genus Species	Host Range	Transmission	Symptoms	Incubation	Fact	Treatment	Photo
Herpesvirus	Virus	Herpesvirus Type 1 (fever blister, cold sore) and Type 2 (genital herpes), Herpesvirus hominis, Herpes simiae (Herpes B)	Human, non-human primates	Produce latent infections in host and frequently shed without overt lesions	Frequently asymptomatic. May have vesicular lesions, neurological or flu-like symptoms	5 days to 1 month	Herpes simiae is 100% fatal if untreated; Herpes Types 1 and 2 are not fatal but cause chronic infection from recurrences	Acyclovir or valacyclovir will arrest the virus but will not eliminate virus from the host	
Poxvirus*	Virus	Monkeypox, vaccinia, cowpox, buffalopox, cantagalo, and aracatuba viruses	Non-human primates, swine, cattle, horses, birds	Direct skin contact with lesions on infected animals	Localized lesions, rash, fever, sore throat, malaise, encephalitis	Generally: 5-10 days after infection	Poxviruses are the largest and most complex viruses	smallpox vaccine, cidofovir, and vaccinia immune globulin (VIG)	
Rabies Virus	Virus	Rhabdoviridae, genus Lyssavirus	Natural reservoir: bats. All mammals: wild animals (raccoons, rodents, foxes, etc.) domestic animals (dogs, cats) and humans	Animal bite, contact with infected saliva or tissue	Headache, fever, malaise, nervousness, titillation of pupils, salivation, excessive perspiration, insomnia, paralysis of throat muscles, inability to swallow, convulsions, seizures, generalized paralysis and death	3-8 weeks	Untreated, the fatality rate is 100%. Post-exposure treatment is effective until day 6 post-infection	Antirabies vaccine before clinical onset of symptoms; post-exposure treatment with rabies immune globulin & vaccine	
Viral Hemorrhagic Fever*	Virus	Multiple species: Filoviridae; Ebola virus, Lassa virus, Marburg virus	Humane, non-human primates (Cynomolgus monkeys)	Contact with blood and body fluids of infected animals	Severe fever, sore throat, cough, diarrhea, vomiting, hemorrhage and death	2-21 days (5-12 days in most cases)	50-90% fatality rate for Ebola virus; 25% mortality rate for Marburg virus; 15-20% mortality for Lassa fever virus	No vaccines; Treatment directed at maintaining renal function, electrolyte balance and combating hemorrhage and shock	



Through OSHA's Alliance Program, this fact sheet was developed as a product of the OSHA and ARSA Alliance for informational purposes only. It does not necessarily reflect the official views of OSHA or the US Dept. of Labor

alliance
An OSHA Cooperative Program

ZOO NOTIC DISEASES FACT SHEET

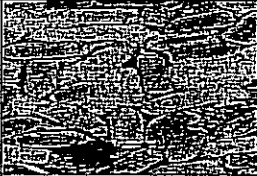
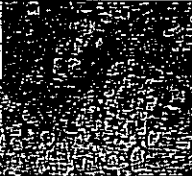
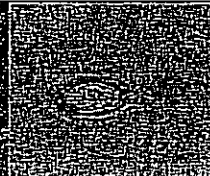

Disease	Pathogen	Genus species	Host Range	Transmission	Symptoms	Incubation	Fact	Treatment	Photo
Arboviral Infections*	Virus	Multiple species: Togaviridae, Flaviviridae, Bunyaviridae, Arenaviridae	Ticks, insects, infected animals (deer, birds, rodents, etc.)	Ticks, insects, blood transfusion	Various: viremia, lymphadenopathy leading to systemic infection. Can involve CNS (encephalitis), skin/bone marrow/blood vessels (hemorrhagic fevers)	Multiple Ranges; 14-25 days (Avg. 18 days) post infection	Causes: Rift Valley fever, Dengue fever, Yellow fever, Sandfly (Hantavirus) fever, Omsk hemorrhagic fever, and West Nile virus Infections	No vaccines for most (except yellow fever virus), no known antivirals; supportive treatment only	
Viral Hepatitis	Virus	Hepatitis A, B, C, D (delta), E, F, G	Humans, non-human primates (chimpanzee, woolly monkey, gorilla, Celebes ape, some marmosets)	Close contact with infected animals or materials	Fever, anorexia, vague abdominal discomfort, nausea and vomiting, sometimes arthralgias and rash, often progressing to jaundice; fever may be absent or mild	3-6 weeks	Hepatitis A has no carrier state; Hepatitis B 20% chronic; Hepatitis C 85% chronic	Vaccines for Hepatitis A and B only. Treatment with alpha interferon and intravenous immunoglobulins (HBIG)	
Lymphocytic Choriomeningitis (LCM)	Virus	Multiple arenaviruses	Rodents (hamsters, mice, guinea pigs), monkeys and humans	Infected mice excrete virus in saliva, urine and feces; man infected through inhalation of aerosolized particles of (urine, feces or saliva) contaminated with virus	Biphasic febrile illness, mild influenza like illness or occasionally meningitis or meningoencephalomyelitis symptoms, transverse myelitis	15-21 days	46 documented laboratory-acquired cases with 5 deaths; cases also reported arising from contaminated cell lines	No specific treatment; anti-inflammatory drugs may be useful; No known vaccines	



Through OSHA's Alliance Program,
this fact sheet was developed as a product of the OSHA and ABEA Alliance for informational purposes only.
It does not necessarily reflect the official views of OSHA or the US Dept. of Labor

alliance
An OSHA Cooperative Program

ZOO NOTIC DISEASES FACT SHEET

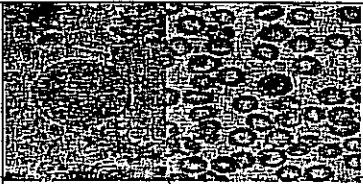

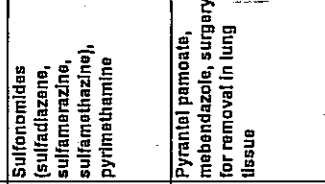
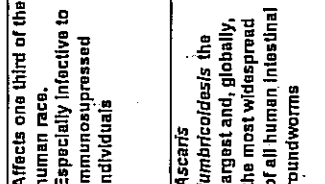
Disease	Pathogen	Genus species	Host Range	Transmission	Symptoms	Incubation	Fact	Treatment	Photo
Vesicular Stomatitis*	Virus	Multiple strains of Vesicular Stomatitis Virus (VSV) <i>Rhabdoviridae</i>	Bovine, equine, porcine animals.	Probably arthropod-borne via the bite of an infected sandfly, mosquito or blackfly; by direct contact with infected animals (vesicular fluid, saliva)	Influenza-like illness, malaise, fever, headache, nausea and vomiting	24-48 hours	Documented hazard to personnel (45 laboratory-acquired infections before 1980) handling infected livestock, tissues and virulent isolates	Virus is self-limiting and illness is short in duration. (3-6 days)	
Sub-viral Agents and Related Diseases (i.e., Scrapie)*	non-RNA/DNA Infectious Protein Virus-like particle	Transmissible Spongiform Encephalopathies (TSE): BSE and VCJD (Creutzfeldt-Jacob Disease)	Adult sheep goats, and cows can infect humans	Ingestion or handling of brain tissue or unfixed brain cells from infected animals	Degeneration of the nervous system, severe variable alteration of the grey matter of the brain	2-5 years	The agent responsible for TSE's is smaller than the smallest known virus and has not been completely characterized	There are no known treatments or vaccines for these TSE's	
Amoebic Dysentery	Parasite (protozoa)	<i>Entamoeba histolytica</i>	Monkeys can readily transmit the agent to humans	Food, water, fomites, insects. Fecal-oral route. Cyst is resistant to drying	Frequent passage of feces/stool, loose stools and vomiting. Variations depending on parasites. Can be frequent urge with high or low volume of stool, with or without some associated mucus and even blood	2 days to several months to even years	Harmless amoebas can live in the intestines for years without causing symptoms. Attacks can last from a few days to weeks	Antiamoebic drugs (iodoquinol, metronidazole) and antibiotics to treat any associated bacterial infections	
Giardiasis	Parasite (protozoa)	<i>Giardia lamblia</i>	Dogs, monkeys	Drinking contaminated water, person-to-person contact, eating contaminated food, and direct contact with infected animals	Ranges from asymptomatic to nausea, fatigue, anorexia, severe diarrhea and high fever	3-25 days	Most common waterborne diarrheal disease in humans	Quinacrine hydrochloride, metronidazole, tinidazole, albendazole and furazolidone	



Through OSHA's Alliance Program, this fact sheet was developed as a product of the OSHA and ABEA Alliance for informational purposes only. It does not necessarily reflect the official views of OSHA or the US Dept. of Labor

alliance
An OSHA Cooperative Program

ZOO NOTIC DISEASES FACT SHEET

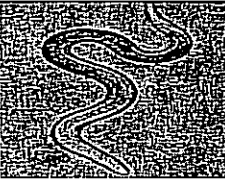
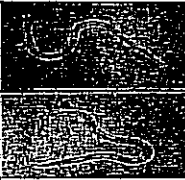
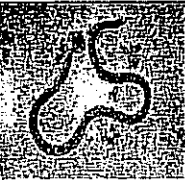
Disease	Pathogen	Genus species	Host Range	Transmission	Symptoms	Incubation	Fact	Treatment	Photo
Balantidiasis	Parasite (protozoa)	<i>Balantidium coli</i>	Monkeys, pigs, and other nonhuman primates readily transmitted to humans	Direct contact with feces, person-to-person transmission	Ranges from asymptomatic to severe diarrhea	4-5 days	Cysts survive for long periods in the environment	Tetracycline, Iodoquinol, metronidazole	
Malaria	Parasite (protozoa)	Plasmodium species: <i>P. falciparum</i> <i>P. vivax</i> <i>P. ovale</i> <i>P. malariae</i>	Anopheles mosquito	Mosquito bite	Fever, chills sweating, headache, nausea, vomiting, muscle pain, anemia, bloody stools, jaundice, convulsion, coma	10 days to 4 weeks after infection; symptoms then cycle every 48 days	A malaria vaccine has been developed and is being tested in Africa. Results are promising	Chloroquine, primaquine, phosphates, Malarone	
Toxoplasmosis	Parasite (protozoa)	<i>Toxoplasma gondii</i>	Amazing lack of host specificity. Primates, carnivores (felines), rodents, birds, ungulates	Consuming under-cooked infected meats; ingestion of oocysts in milk, food or water; inhalation of oocysts; contact with soil containing contaminated cat feces;	Localized lymphadenopathy accompanied with fever, sore throat, rash, pneumonia, myocarditis, and encephalitis	10-23 days following ingestion of contaminant-stated meats, or inhalation of aerosols	Affects one third of the human race. Especially infective to immunosuppressed individuals	Sulfonamides (sulfadiazene, sulfamerazine, sulfamethazine), pyrimethamine	
Ascariasis (Roundworm)	Nematode	Multiple Ascaris species (A. lumbricoides, A. suum)	Pigs; Humans are the definitive host	Ingestion of contaminated food or water	Lung damage, intestinal symptoms	4 to 8 weeks	Ascaris lumbricoides is the largest and, globally, the most widespread of all human intestinal roundworms	Pyrantel pamoate, mebendazole, surgery for removal in lung tissue	



Through OSHA's Alliance Program,
this fact sheet was developed as a product of the OSHA and ASEA Alliance for informational purposes only.
It does not necessarily reflect the official views of OSHA or the US Dept. of Labor

alliance
An OSHA Cooperative Program

ZOO NOTIC DISEASES FACT SHEET

Disease	Pathogen	Genus species	Host Range	Transmission	Symptoms	Incubation	Fact	Treatment	Photo
Visceral Larval Migrants (VLM)	Nematode	Nematodes of the <i>Toxocara</i> genus (<i>T. canis</i> , <i>T. felis</i>)	Dogs, cats	Ingestion of eggs through direct contact with feces or contaminated materials	Fever, cough, wheezing, itching/irritation associated with migration of nematodes into tissues. Ocular migration may cause blindness	4 to 7 weeks	More than 80% of all puppies in the U.S. are infected with this nematode	Usually a self-limiting disease--treatment only given in severe cases (glucocorticoids and bronchodilators for pulmonary disease)	
Strongyloidiasis	Nematode	<i>Strongyloides stercoralis</i>	Dogs, cats, monkeys	Careless handling of contaminated fecal materials	Abdominal pain, diarrhea, and rash. Less commonly, nausea, vomiting, weight loss and cough. Severe infection can cause severe tissue damage, systemic damage of various tissues in the body and potential death	skin 7 hours; lung 1 week; intestines 2 wks; average 4-21 days	The parasite penetrates the skin and migrates to the lungs. Then it travels up to the mouth and is swallowed into the intestinal tract	Ivermectin with Albendazole as the alternative	
Trichinosis	Nematode	<i>Trichinella spiralis</i>	Generally pigs or cattle	Eating undercooked flesh of animals infected with the larvae	Nausea, vomiting, diarrhea, fever, neurological disorders, possible cardiac involvement	Abdominal symptoms: 1-2 days. Further symptoms 2-8 weeks after infection	Over 100 species of animals may be a host of this parasite	Thiabendazole (Mintezol), Albendazole (Albenza), Mebendazole (Vermox), Prednisone	

*Images were obtained from the U.S. Centers for Disease Control & Prevention Public Health Image Library (PHIL), 08/2008



Through DSHA's Alliance Program, this fact sheet was developed as a product of the DSHA and ABSA Alliance for informational purposes only. It does not necessarily reflect the official views of DSHA or the US Dept. of Labor

alliance
An OSHA Cooperative Program