

MANAGING WILDLIFE

around your home



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Craig A. Harper

Professor and Extension Wildlife Specialist, Forestry, Wildlife, and Fisheries, University of Tennessee

Natalie R. Bumgarner

Assistant Professor and Extension Residential and Consumer Horticulture Specialist, University of Tennessee

Carol Reese

Western Region Ornamental Horticulture Specialist, University of Tennessee Extension

Brett G. Dunlap

State Director, USDA, APHIS, Wildlife Services

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ag.tennessee.edu

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Kristy Keel-Blackmon



Many people enjoy observing wildlife in their backyards and around their homes. However, wildlife also can become a nuisance. People spend considerable time and money trying to attract wildlife—or deal with unwanted wildlife—around their homes, and balancing these two aspects when landscaping and working around our homes and gardens can be difficult. Our understanding of the needs of various wildlife species encountered around our homes greatly influences our attitudes and reaction when we have interactions with wildlife. Animals are attracted to areas that provide the food, cover, or water they require, especially when those

resources are readily available and in an area that is easily accessible.

Habitat is the collection of resources (food, cover, and water) required by a particular wildlife species in an area that will support that species. We attract wildlife near our home by providing or enhancing their habitat. We deter wildlife around our home by removing the resources they need or by blocking access to those resources. There is art in providing these resources in a way that attracts desirable wildlife but does not encourage unwanted animals. This publication will highlight techniques and methods to aid wildlife viewing around your home and to discourage or manage the presence and activities of unwanted wildlife.

Observing wildlife can be as close as your backyard.



Attracting wildlife around your home

Although many people focus on ways to deal with destructive or nuisance wildlife, many species of wildlife that occur around the home are not destructive and are pleasing to observe. In addition to being pleasing to watch, various wildlife species provide other benefits, such as pollination and controlling other animals that may be pests. Wildlife around the backyard can provide opportunities for learning. Backyards can be used as outdoor classrooms for people interested in learning more about the natural world. We believe this aspect can be particularly important as more and more people in today's world lose contact with nature.

To manage your backyard for wildlife, it is important to identify what you are interested in and what you hope to provide or see. Most people enjoy seeing species such as hummingbirds, bluebirds, and butterflies. However, you may enjoy watching red fox pups, woodpeckers, or even a raccoon. Regardless, you should consider which wildlife species you would like to see as well as your tolerance for other species. Next, you



Backyards can be great places for children (and adults) to learn about natural resources.

must evaluate the resources (types of food, cover, water) already present around your home, identify possible limiting factors for the wildlife you would like to attract, and then determine what resources need to be added to attract those species. It may be necessary to look beyond your backyard to attract and influence some wildlife species because of the spatial requirement of some species. Consider adjacent properties. Forming a cooperative backyard management plan with your neighbors is a great way to attract a wide variety of species and increase numbers of some species.

Interested in diversity?

If you are interested in attracting a variety of wildlife species around your home, or if you are interested in attracting one or two species, but want to ensure they have all they need throughout an annual cycle, then it is necessary to have a variety of plant species and to create heterogeneous (varied and diverse) structure in your backyard landscape. Think of borders of mixed shrubs and perennial forbs, perhaps including brambles, some open lawn and the old-field across the fence, woodlots, piles of rocks and brush, various water features, and even small areas of bare soil. Consider a range of plants that offers flowers and fruit during different seasons of the year. Also consider deciduous and evergreen woody plants that provide different layers of cover, from low-growing plants to tall trees. By providing “a little of everything,” you are helping ensure there is at least a little something for a wide variety of wildlife. You then can begin to concentrate on providing specific resources or features that those wildlife species you are most interested in require.

If you have a large property or farm, you have the opportunity to manage it in a way that influences populations of wildlife, beyond that possible at the backyard scale. For proper guidance and help with creating a management plan for larger properties, it is best to consult a Certified Wildlife Biologist. We recommend you begin with your local or area wildlife biologist with your state wildlife agency (such as the Tennessee Wildlife Resources Agency).

Cover

When thinking of how to attract wildlife, most people immediately and automatically think of food. No doubt—food *attracts* wildlife. However, cover *holds* wildlife.

Many people are tempted to “clean up” a property by removing all brushy, brambly growth, usually because that is what they think looks good. However, it is these “weedy, brushy” areas that provide the cover required by some wildlife and make the overall area more attractive to more wildlife species. That being said, these are the areas that can attract some wildlife many people do not care for, such as rodents and snakes. Thus, probably their innate reasoning for “cleaning up” the area. On many properties, you can balance wishes to attract wildlife and provide the cover they need while preventing them from causing undue problems by positioning cover away from your home. Consider where it may be feasible to allow areas to remain untrimmed. These areas are required as cover for species such as eastern cottontail, indigo bunting, and yellow-breasted chat or could be where a hen wild turkey would locate her nest. If you deem these areas unsightly, consider planting an attractive border that can double as a screen while providing another source of cover for some species. Consider that many plants can provide both food and cover, so preference may be given to those.



Carol Reese

Shrubby growth, such as this baccharis, along a fencerow or at the edge of a yard provides cover for many wildlife species. Without such cover, many species would not occur on the property.

Shrubby borders and odd areas

Adequate cover is essential, whether to provide protection from wind and precipitation, provide shade during hot days, or to provide escape from predators. Many creatures like dense cover that we might describe as a “thicket.” Some of the most interesting birds, such as brown thrasher and eastern towhee, nest in this vegetation or on the ground underneath. Although a thicket may sound unsightly, it can comprise closely planted shrubbery or even brambles that fulfill elements of a landscape design. Shrubby borders consisting of species such as flowering dogwood, crabapple, hawthorn, plum, fig, viburnums, and blueberries, might be backed by taller overstory



Chris Moorman



Chris Moorman

Top: This backyard for wildlife has an area of leaf litter for birds that forage in leaf litter, bird feeders, and a brushpile that is maintained year-round.

Bottom: Brushpiles are used by birds and other species all year. Here, a dark-eyed junco uses a brushpile for a winter roost.

trees, such as oaks, hickories, blackgum, maples, and white pine to create layers of varying heights providing variable vertical structure. Such vertical layers will satisfy the needs of a variety of bird species that nest in different strata. And trust us, you will be most pleased to hear the variety of “new” bird songs coming from these areas that you have never heard before! Diverse vegetation and structure can be provided without dense woody shrubs or brambles. Various naturally occurring forbs and grasses provide outstanding cover and food sources along the edge of lawns and woods and in “odd” areas that are not mowed frequently and where sunlight is not limiting. Forbs, such as old-field aster, daisy fleabane, butterfly milkweed, pokeweed, ragweed, ironweed, joe-pye weed, wildlettuce, beggar’s-lice, and sticktight, along with grasses, such as broomsedge bluestem, little bluestem, switchgrass, purpletop, and Virginia wildrye, will add a diversity of color and structure that will attract a variety of wildlife, including pollinators.

Brushpiles

Structure can be added by constructing brushpiles, especially around the edge of yards, just inside wooded edges, and also relatively close to bird feeders. Brushpiles offer immediate protective cover for various birds near bird feeding stations. Birds that loaf in and around the brushpile are relatively well protected from some potential predators, such as Cooper’s hawks and house cats. Brushpiles provide perpetual spots to dispose of trimmings from shrubs and trees around the house. This use of such material is much more constructive than piling it at the curbside for removal in residential areas. Brushpiles should be relatively large for greater effectiveness. Those that are 10 feet or so in diameter and at least 4 feet tall provide lots of room for bird use. Of course, birds are not the only species that will use brushpiles, and brushpiles are not a cure-all for structure and cover for backyard wildlife. However, when incorporated into shrub borders and woods edges, and perhaps included for structure near a bird-feeding station, they definitely can add to your viewing pleasure and the utility of your backyard landscape for various species.

Weedy lawns

A lawn (or yard) is the most prominent feature around most homes. Manicured lawns provide little for wildlife, but they are important for most

homeowners with regard to aesthetic appeal. Although lawns do not provide cover for many wildlife species, a few may use the low structure provided by a lawn. Examples include American robins pulling worms from a lawn, or an eastern bluebird perched on a limb overlooking the lawn for insects. Important considerations for maintaining lawns in a wildlife-friendly manner include reducing the amount of lawn as much as possible. There may be areas that are currently being mowed that could be transitioned into taller forbs, grass, or shrubs and maintained without continual mowing. Not all lawns or portions of lawns have to be rid of weeds or insects. Violets, dandelions, woodsorrel, and wild strawberry are examples of “weeds” that many



Top: The perfect yard to us isn’t perfect for wildlife. Here, a rabbit feasts on dandelion leaves and clover in a yard that hasn’t been sprayed for broadleaf “weeds.”

Bottom: Old-fields provide food and cover for many wildlife species. Optimally, old-fields should be maintained by periodic prescribed fire or disking. Mowing is the least preferred method of maintaining an old-field. If you have to mow, do so in late winter, just before spring green-up to avoid destroying reproductive cover during summer and protective winter cover in winter.

people find unappealing, but add considerable food value (forage, seed, and nectar) for birds, mammals, and pollinators that use lawns. Some areas with tree cover may be left without grass cover and have only leaf litter, which is critically important to litter feeders, such as brown thrashers, eastern towhees, and wintering sparrows/juncos. Plus, allowing litter cover prevents all that raking and piling leaves along the road in the fall. Therefore, litter areas are nice alternative to lawn, and woodland flowers and shrubs can be planted throughout areas covered with leaf litter. It is up to you to decide whether a perfect swath of monoculture green is the goal, or if natural areas also might be included.

Old-fields

If you have property with an abundance of open area, such as old-fields adjacent to your backyard, it is desirable to allow some of the area to go through at least some degree of ecological succession, in which one plant community gradually is replaced by another through time. This process attracts different species of wildlife at different stages.

It is advantageous to provide multiple stages of succession. Multiple vegetation types with variable structure attracts a diversity of wildlife. Plant succession is set back by disturbance every few years. The most common methods to set back plant succession are prescribed fire, disking, mowing, and selective herbicides.

Snags

Standing dead trees, often called snags, are excavated by woodpeckers to feed on insects that inhabit decomposing wood and to provide nesting cavities that later are used by many other species. At least 85 North American species use cavities created by woodpeckers and decay, including bluebirds, tree swallows, flycatchers, chickadees, titmice, owls, wrens, wood ducks, flying squirrels, bats, raccoons, gray foxes, honeybees, and even black bears. The open area around snags gives a clear view for predator species, so they are used by raptors, such as hawks, owls, and eagles, as well as insectivores, such as bluebirds, kingbirds, and flycatchers. Around water sources, herons and egrets will



Natalie Bumgarner



Tes Jolly

Left: Standing dead trees provide something for many wildlife species.

Right: Cavities are critical for many bird species. Various woodpeckers, especially pileated woodpeckers (shown) and northern flickers are primary cavity excavators, and may act as keystone species.



perch on the dead tree. Once a dead tree has fallen, it may provide a den site for red fox or a drumming site for ruffed grouse. Fallen dead trees provide food and cover for a host of invertebrates and the many creatures that come to consume those invertebrates, including lizards, ground snakes, toads, salamanders, shrews, chipmunks, and wrens. As it fully breaks down, the log becomes rich humus — fertile soil for new plants. Obviously, a dead tree in the yard may be unsightly or present a danger if allowed to stand, but if it is in an area where it can be left, it provides significant benefit to a wide range of wildlife species.

Sites for nesting

It is natural for some people to believe if trees are available, then there are plenty of places for birds to nest. However, various bird species do not nest in trees. Many build nests in dense shrubs or in the lower branches of small trees and saplings. Some ground-nesting birds prefer grassy meadows, whereas others construct nests in the litter under shrubs or in thickets. There also are birds that use mud to construct nests on shelves, such as eastern phoebe, American robin, and barn swallow. These differences in selected nest sites highlight how it is important to have varied vegetation structure around your home if you hope to see a wide variety of bird species.

Of course, many birds nest only in cavities. If tree cavities are not available, many cavity-nesting birds will nest in birdhouses. You can find a wide variety of bird houses at garden shops, but many are purely ornamental and not attractive to many birds. However, some birds, such as Carolina wrens, are notorious for nesting in most any cavity, whether an old boot, basket, or tool box.

Some cavity-nesting birds have specific requirements for cavity dimensions. Many websites provide the detailed information for nest boxes to accommodate these birds. Of these, the most popular is the eastern bluebird, which, like several other bird species, has strict preferences for the size and depth of box, and especially for diameter of the entry hole. Although bluebirds are most popular for providing nest boxes, do not overlook boxes for other bird species, such as wrens, nuthatches, chickadees, and many others.



Tes Jolly



Tes Jolly

Top: Many birds other than bluebirds will use nest boxes, including black-capped chickadees.

Bottom: Snakes and other predators can limit nesting success in cavities, including nest boxes. Installing a conical predator shield below the box and not placing the box near tree limbs that enable predators to get to the box from an overhanging limb can help reduce predation in nest boxes.

Management for eastern bluebirds

The eastern bluebird is a songbird native to the eastern US whose bright coloration and cheerful song make it a favorite among most landowners. Bluebirds primarily are insectivorous and typically do not feed at bird feeders. Bluebirds nest in cavities of trees or fence posts created by woodpeckers or decay. You can attract bluebirds to your property by providing ample open space for them to forage for insects and by installing boxes for nesting where natural cavities are limiting. House sparrows and European starlings (two nonnative species from Eurasia) compete with bluebirds for nesting cavities. As a result, even if suitable nesting cavities are available, use by bluebirds may be limited because of the aggressive nature of the nonnative birds.

Generally, $\frac{3}{4}$ -inch lumber is used to construct nest boxes. The dimensions can vary slightly except for the entrance hole, which must be $1\frac{1}{2}$ inches. If you make the entrance hole smaller than $1\frac{1}{2}$ inches, bluebirds may not enter. By making the entrance hole no larger than $1\frac{1}{2}$ inches, the box is somewhat species selective, excluding larger, unwanted birds, such as the European starling. House sparrows still may be a problem, but because they are unprotected, invasive, nonnative birds, you may shoot them or destroy their nests at will. Boxes for bluebirds should not have a perch installed just below the entrance hole. Bluebirds do not need perches, which only serve to attract house sparrows. It is important to construct bluebird boxes so it is possible to get into them for cleaning and destroying nests of unwanted birds, such as house sparrows. Attaching a hinge to the top of the front panel of the box will allow you to access the box easily. A small wood screw inserted half-way into the bottom of the front panel can serve as a "handle" to pull the front of the box up and open so you can get inside. Install a small clasp to keep the front panel closed. To allow for drainage and airflow, a few $\frac{1}{8}$ -inch holes may be drilled into the bottom of the box and at the top of the sides. Other structures, such as gourds, also can serve as nesting cavities for bluebirds. Just be sure to keep the entrance hole $1\frac{1}{2}$ inches in diameter.

Bluebirds prefer open spaces, such as pastures, orchards, roadsides, yards, and parks where insects are abundant. Creating and maintaining open areas around or near your home will increase the amount of foraging areas for bluebirds. Bluebird populations can increase quite rapidly when boxes are placed in open areas. Mount boxes on posts or tree trunks 4–6 feet above the ground facing open terrain, optimally facing east to protect the entrance hole from prevailing wind and rain. Predator guards (conical shields) made of sheet metal can be wrapped around the tree or post just below the box to minimize predation from house cats, snakes, and raccoons. You may reduce presence of wasps in bluebird boxes by attaching a piece of the sticky strips commonly sold for flies on the inside of the box

top. Bluebird boxes should be installed by mid-winter because nesting may begin as early as late February or early March. Boxes should be at least 100 yards apart because of the territorial nature of male bluebirds.

Bluebirds may produce 2–4 broods per year. Females will lay a clutch of 4–6 light blue eggs and incubate them approximately 12 days. Upon hatching, bluebird chicks remain in the nest for about 15 days before fledging. Once the fledglings leave the nest, the male tends to them for several days while they learn to fly and search for insects. Meanwhile, the female prepares the nest for a second clutch.

Bluebirds that nest in Tennessee typically stay near their nesting area all year, whereas bluebirds from northern states migrate southward during winter. Boxes can be very important for bluebirds on cold nights. Commonly, up to 10 bluebirds may roost together in a single nest box to conserve heat. However, mortality still may occur on those nights when temperatures drop into the single digits. Wrapping boxes with insulation material may help prevent mortality on the coldest nights in Tennessee.



Tes Jolly

Bluebird box guidelines

Before you install boxes for bluebirds, there are some important guidelines that should be followed. To keep competition from starlings at a minimum, dimensions of nest boxes should be:

Floor	5" x 6"
Back	6" x 18" (extra length to allow nailing on post or tree)
Front	6" x 9"
Sides	5" x 9" in the front and 10" in the back
Top	6" x 7" (to provide a little overhang in the front)
Entrance hole	$1\frac{1}{2}$ " in diameter; 6" above the floor of the box

Table 1. Trees and shrubs that benefit wildlife

SPECIES	FORM	WILDLIFE BENEFIT (FOOD & TYPE, COVER, NECTAR)
TREES		
American beech (<i>Fagus grandifolia</i>)*	deciduous tree	nuts
American holly (<i>Ilex opaca</i>)	evergreen tree	winter cover, larval host, berries
Apple (<i>Malus</i> spp.)	deciduous tree	pomes
Black locust (<i>Robinia pseudoacacia</i>)	deciduous tree	nectar
Blackgum (<i>Nyssa sylvatica</i>)*	deciduous tree	drupes, foliage
Buckeye (<i>Aesculus</i> spp.)	deciduous tree or shrub	nectar
Cherry (<i>Prunus</i> spp.)†	deciduous tree	drupes, larval host
Chinquapin (<i>Castanea pumila</i>)	deciduous small tree	nuts
Crabapple (<i>Malus</i> spp.)	deciduous tree	pomes
Dogwood (<i>Cornus</i> spp.)	deciduous tree	drupes
Eastern redcedar (<i>Juniperus virginiana</i>)*	evergreen tree	winter cover, larval host, cover
Elm (<i>Ulmus</i> spp.)	deciduous tree	seed, larval host, foliage
Hackberry (<i>Celtis</i> spp.)	deciduous tree	drupes, larval host
Hickory (<i>Carya</i> spp.)	deciduous tree	nuts, larval host
Honeylocust (<i>Gleditsia triacanthos</i>)	deciduous tree	nectar, pulp in seed pod
Oak (<i>Quercus</i> spp.)	deciduous tree	acorns, larval host
Pawpaw (<i>Asimina triloba</i>)	deciduous tree	pulp from berries, larval host
Persimmon (<i>Diospyros virginiana</i>)*	deciduous tree	pulp from berries
Pine (<i>Pinus</i> spp.)	evergreen tree	winter cover, seeds
Plum (<i>Prunus</i> spp.)	deciduous tree	drupes
Magnolia (<i>Magnolia</i> spp.)	evergreen tree	winter cover, drupes
Maple (<i>Acer</i> spp.)	deciduous tree	seeds, foliage
Mulberry (<i>Morus rubra</i>)*†	deciduous tree	drupes
Redbud (<i>Cercus canadensis</i>)	deciduous tree	seeds, nectar, larval host
Sassafras (<i>Sassafras albidum</i>)	deciduous tree	berries, larval host
Serviceberry (<i>Amelanchier</i> spp.)	deciduous tree	pomes, nectar, larval host, foliage
Silverbell (<i>Halesia tetraptera</i>)	deciduous tree	nectar

SHRUBS AND BRAMBLES

American beautyberry (<i>Callicarpa americana</i>) [†]	deciduous shrub	drupes
Blackberry and raspberry (<i>Rubus</i> spp.)	deciduous brambles	aggregates of drupelets, cover, foliage
Blueberry (<i>Vaccinium</i> spp.)	deciduous shrub	nectar, larval host, berries, cover
Buttonbush (<i>Cephalanthus occidentalis</i>)	deciduous shrub	seeds, nectar, cover
Devil's walkingstick (<i>Aralia spinosa</i>) [†]	deciduous shrub	drupes
Sweet pepperbush (<i>Clethra alnifolia</i>)	deciduous shrub	nectar, cover
Sweetshrub (<i>Calycanthus floridus</i>)	deciduous shrub	nectar, cover
Viburnum (<i>Viburnum</i> spp.)	deciduous shrub	drupes
Elderberry (<i>Sambucus canadensis</i>)	deciduous shrub	drupes
False indigo (<i>Baptisia australis</i>)	deciduous shrub	nectar, host plant
Hawthorn (<i>Crataegus</i> spp.)	deciduous shrub	pomes, nectar
Hazel-nut (<i>Corylus americana</i>)	deciduous shrub	nuts
Huckleberries (<i>Gaylussacia</i> spp.)	deciduous shrub	berries, nectar, larval host
Mountain laurel (<i>Kalmia latifolia</i>)	evergreen shrub	nectar, cover
Rhododendron (<i>Rhododendron</i> spp.)	evergreen shrub	nectar, cover
Spicebush (<i>Lindera benzoin</i>)*	deciduous shrub	larval host, drupes
Strawberrybush (<i>Euonymus americanus</i>) [†]	deciduous shrub	seeds, foliage
Sumac (<i>Rhus</i> spp.)*	deciduous shrub	nectar, larval host, drupes
Wafer ash (<i>Ptelia trifoliata</i>)	deciduous shrub	nectar, larval host
Winterberry (<i>Ilex verticillata</i>)	deciduous shrub	berries
Witch hazel (<i>Hammamelis virginiana</i>)	deciduous shrub	seeds

VINES

Alabama supplejack (<i>Berchemia scandens</i>)	deciduous vine	nectar, foliage
Coral honeysuckle (<i>Lonicera sempervirens</i>)	deciduous vine	nectar
Crossvine (<i>Bignonea capreolata</i>)	deciduous vine	nectar
Dutchman's pipe (<i>Aristolochia macrophylla</i>)	deciduous vine	nectar, larval host
Trumpet creeper (<i>Campsis radicans</i>)	deciduous vine	nectar
Virginia creeper (<i>Parthenocissus quinquefolia</i>)	deciduous vine	nectar, berries
Yellow jessamine (<i>Gelsemium sempervirens</i>)	deciduous vine	nectar

Check with Extension personnel regarding species vigor in your area, recommended planting techniques, soil conditions, etc. Genus and species provided in (). * indicates species that are always or typically dioecious and will need male and female plants to produce fruiting structures for wildlife. † indicates photo on next page.



Mulberry



Black cherry



American beautyberry



Strawberrybush



Devil's walkingstick

Food

Food is an obvious requirement of all wildlife, and it comes in many different forms. Food is a powerful attractant, and careful consideration must be given to which species you are attracting and how to manage the attraction so you do not attract too many animals or unwanted species. In general, providing food unnaturally through feeders, is most often the cause of nuisance wildlife problems. Providing food naturally, through growing plants, is much less likely to lead to problems. Nonetheless, both can be appropriate in certain circumstances, and the benefits of enjoying close proximity of birds or other wildlife makes the nuisance factor tolerable for some people.

When selecting plants that will attract wildlife, consider those that provide multiple benefits during multiple seasons. For example, a plant may offer nectar during bloom, foliage for caterpillars, and fruit later in the season. Some wildlife will feed directly on the plants (eat the foliage or flowers), whereas others will eat the fruit or seed or feed on other creatures attracted to the plant. For example, some birds eat soft

mast, some eat seeds, but almost all use insects to feed their young, especially caterpillars. Many insectivorous birds switch to dried fruits by necessity when insects are scarce during winter. These include bluebirds, woodpeckers, robins, and mockingbirds. Carefully consider plants that can sustain wildlife through the winter months when food sources may be scarce. Of note are sumacs, hawthorns, viburnums, American holly, waxmyrtle, eastern redcedar, and hackberry, to name a few.

Oaks and acorns are important for a variety of wildlife. Acorns are consumed by deer, squirrels, raccoons, opossums, foxes, black bear, and many species of birds, notably wild turkeys, blue jays, and wood ducks. Many insects feed on oak foliage, including many of the *Lepidoptera* larvae (butterflies and moths), which in turn serve as food for birds, amphibians, and reptiles. Relatively large oak trees, especially those with cavities, do not only provide food, but also provide places to hide, perch, roost, den, and nest. Even after death, these trees provide a critical source of cover and food for many wildlife species.

Jean Owen



Trees and shrubs that hold fruit through winter, such as this holly, provide important food sources for many bird species, including this mockingbird.



Persimmon



Smooth and winged sumac

Carol Reese



Natalie Bumgarner

Winterberry

Bird feeders

Bird watching around the home is important to many Americans, who spend more than \$3 billion each year on bird seed. Wild bird seed usually is a mixture of grain sorghum, safflower, millet, cracked corn, rape seed, and sunflower. However, many of these are wasted as birds usually sort through mixtures for their favorites and discard the unwanted types (like we do in a can of mixed nuts!). And the discarded seed attracts rodents, which may become problematic. Many backyard birders provide only black-oil sunflower seed, which is relished by the most popular seed-eating birds. Eliminating cracked corn as a food source may discourage flocks of blackbirds that may otherwise descend on feeders and empty them in short order. European starlings are especially attracted to peanut hearts, so you may not want to offer them at your feeders. Also, note that it is legal to kill nonnative bird pests, such as starlings and house sparrows, at bird feeders if they are problematic and excluding desirable birds. Pellet guns are very efficient where appropriate.

Poorly designed feeders also waste seed. Some have feeding ports set high above the bottom of the feeder. Birds cannot access seed below the ports, so a couple of inches of seed remain uneaten and eventually encourage mold that is harmful to birds. Better-designed feeders allow birds to eat seed that sifts out at the bottom.

Any feeder should be easy to take apart for cleaning, and some need cleaning more than others. Water causes seed to swell, mold, or germinate in warm weather, so a feeder should have an adequate roof. However, even a good roof will not keep blowing rain or snow from wetting seed, so cleaning occasionally is necessary.

One example of feeder design that allows birds to fully access seed with little waste is a large, round cylinder made of mesh material similar to hardware cloth. The birds perch on the metal tray at the bottom, or on the mesh itself, and extract the seeds from the mesh openings. A slightly raised cone in the center of the bottom tray slides the seed toward the edges so birds can get all the seed.

Many birds like hanging feeders with ports or mesh, whereas some prefer an open platform strewn with seed. Others, such as mourning doves and eastern towhees, prefer seed scattered on the ground. An area of bare soil several feet in diameter makes the seed more available and the area attractive to the birds.



Tes Jolly

Bird feeders come in many different designs. Here, a pair of northern cardinals are enjoying black-oil sunflower seed.

Many birds feed avidly on suet. It is a favorite of woodpeckers and other birds that are primarily insectivores during warm seasons. Many offerings of suet mixed with other ingredients, such as raisins or peanuts, can be found at stores that sell wild bird products, or an online search will provide you information on making suet at home. A feeder made of wire mesh that clamps securely over the suet cake works well.

Peanut butter is relished by some birds and can be offered by spreading a blob on tree trunks, limbs, or fence posts. You also create a peanut butter feeder by drilling large holes in a limb and suspending the limb from a tree or other structure.

Breeding birds' preference for insects during the nesting season can be met by offering a handful of mealworms (beetle larvae) on a tray or in a pressed block. This buffet will bring a parade of warblers, wrens, bluebirds, vireos, tanagers, woodpeckers, and many other birds to what may become your favorite feeder.

If you consider squirrels a problem at bird feeders, you can provide them with some food of their own. Unshelled (left on the cob) corn skewered on a long nail driven into a tree or post sometimes will keep their attention away from the bird feeder. If not, “squirrel-proof” feeders are available commercially or you can use your imagination in “squirrel-proofing” your bird feeder. (Hint: metal flashing or vinyl siding wrapped around the feeder post usually works. Good luck matching wits; squirrels are quite ingenious at getting to feeders!)

House cats are another potential concern around bird feeders. House cats are extremely proficient predators and can severely reduce the number of birds and other wildlife around your home. Scientific research has shown that house cats (both feral and pets) kill hundreds of thousands of birds and untold numbers of mammals, lizards, and snakes each year. In many cases, the prey is not consumed, only killed because of the cat’s innate sense to hunt. If you have a cat, consider keeping it indoors. Putting a bell on its collar does not help. If you see a feral cat in your area, you should report it to your local animal shelter for capture and removal. Otherwise, you are doing a disservice to our wildlife populations. House cats (whether feral or not) are not natural predators in our ecosystems as they are not native to North America.



Alan Windham



Chris Moorman

Top: Downy woodpeckers are frequent visitors at suet feeders.

Bottom: Suet provides energy, which can be critically important during winter when other foods may be scarce for birds such as this pine warbler.

Many bird species are attracted to bird seed. Here, a white-throated sparrow eats black-oil sunflower seed that was scattered on the ground.

Tes Jolly



SPECIES	PREFERRED FOOD
Mourning dove	black oil-type sunflower seeds, white proso millet
Red-bellied woodpecker, Carolina chickadee, tufted titmouse, red-breasted and white-breasted nuthatch	black oil-type sunflower seeds, cracked nuts, shelled and broken peanuts, bread crumbs, suet
Blue jay	sunflower seeds (all types), peanuts, cracked nuts and corn, suet
Northern mockingbird, brown thrasher, American robin, gray catbird	cut apples, oranges, raisins and bread crumbs, suet
Northern cardinal	sunflower seeds (all types), cracked corn, shelled and broken peanuts, suet
Eastern towhee	white proso millet, sunflower seeds (all types), cracked corn, and shelled and broken peanuts
Evening grosbeak	sunflower seeds (all types), cracked corn, shelled and broken peanuts
American goldfinch	niger thistle, hulled sunflower seeds, black oil-type sunflower seeds
House finch	black oil-type sunflower seeds, niger thistle
Purple finch	sunflower seeds (all types)
White-throated sparrow, dark-eyed junco	white proso millet, black oil-type sunflower seeds, wheat, bread crumbs
Common grackle	hulled sunflower seeds (all types)

Tips for *backyard bird feeders*

- Place feeders where cats cannot ambush feeding birds
- Consider that bird feeders may attract rodents; placing feeders near homes may lead to problems
- Consider feeding through winter without interruption
- Use a variety of feeders with a variety of foods to attract a variety of species
- Clean feeders with bleach water once a month
- Use good food—avoid seed that appears moldy or smells musty, also discard musty or moldy seed and germinating seed.



Kristy Keel-Blackmon

Small backyard ponds can be relatively easy to construct, do not take much room, and will attract many wildlife species that would not occur otherwise in your backyard.

Water

Water provides necessities for wildlife in many ways and can be the most important factor influencing the presence of some species. Although many species obtain their physiological water requirements through the foods they eat, whether vegetation, insects, or fruit, other species require surface water for drinking and other needs. Ponds, creeks, rivers, and various types of wetlands provide habitat for many species that do not occur on upland sites. Some wildlife species use or depend on water sources for food. Raccoons forage for crawdads in shallow pools and creeks. Herons and kingfishers feed upon small fish. Frogs, dragonflies, whippoorwills, tree swallows, purple martins, nighthawks, and bats forage on the many flying insects found above a small pond. For some species, such as many frogs, toads, and salamanders, water is necessary for reproduction, providing a place to lay eggs and for tadpoles to develop. Other wildlife species

require water for a substrate to live in (fish, many turtles, frogs, and salamanders). If you want to increase wildlife diversity around your home, there probably is no better way to accomplish that than by including a water source.

You can provide water sources around your home in several ways. The most common water features are bird baths, small ponds, and water gardens. It is interesting to see how many wildlife species frequently use these water features. A bird bath may be any type of receptacle that is the right depth and has the slope birds and other species prefer when entering the water. Of course, larger water features, such as a small pond, will attract more species than a bird bath. It is best if the water source is located in the shade at least part of the day. Water will remain cooler and not become stagnant as quickly as if it were in full sunlight all day. Another consideration is to provide some type of perch near bird baths to make them more attractive to various bird species.



Tes Jolly

A water source is important, but the water must be provided such that wildlife have easy access. This bird bath is full of clean, fresh water, enabling birds to drink easily from the side.

If you are interested in various amphibians, consider how these animals typically prefer shallow wetland areas with emergent plants that enable them to hide, feed, and breed. Other wildlife, such as dragonflies, like to perch on the tips of taller marshy plant species to sun and watch for prey and potential mates. Some people add fish to a small pond. However, adding fish may not be a good idea, as some fish are predators to young amphibians.

Fear of snakes often prevents people from creating small ponds and other wetlands. Similar to brushy areas, it is important to evaluate the benefit to various species and your wildlife viewing pleasure with potential presence of undesirable species. Location and proximity also are important. Water sources, particularly larger water sources, such as small ponds, do not have to be located adjacent to your home. Although watching wildlife use a bird bath from the kitchen window can be enjoyable, small ponds can be



Carol Reese

Dragonflies are frequent visitors to backyard ponds.

located away from the home, if desired, in places where undesirable wildlife are less likely to be problematic around the home.

Designers who incorporate water sources into the backyard landscape should keep in mind that some small animals may drown if they are unable to climb out. This problem can be prevented by providing a gentle slope, a rough bottom, or by adding a piece of structure, such as a stone, tree limb, or other piece of wood. A piece of wood coming out of the water also may encourage more use by pollinators.

Attracting hummingbirds and pollinators

Hummingbirds

Most people who like to view birds around their home love to watch hummingbirds. The ruby-throated hummingbird is the most common species east of the Mississippi River. They are neotropical migrants, meaning they overwinter in tropical climates such as Mexico or in Central or South America. Some enthusiasts keep track of the average date of the first hummer to arrive each spring on their way north for the breeding season, whereas other hummingbird devotees rely on signs provided by nature. The red blooms on red buckeye, *Aesculus pavia*, provide a good clue each year that it is time to hang hummingbird feeders. In addition, several websites track the migration.

To help attract hummingbirds around the home, it is desirable to grow lots of flowers that

not only attract and feed hummingbirds, but also the small insects they need, especially for the mother hummer feeding her young. Some good choices are early bloomers such as the native coral honeysuckle, columbines, and red buckeye. Other important additions include late-blooming perennials, such as cardinal flower and late- or long-blooming salvias. *Salvia greggii* is particularly good as a tough, shrubby salvia that starts flowering early, slows a bit in the heat of summer, and then puts on a fabulous fall show. Rotting fruit or banana peels can be set out to attract small flies for the purpose of attracting small insects for the hummingbirds' protein needs. Butterflies are attracted to this food source as well.

Nectar sources for hummingbirds can be augmented by feeders. There are some pretty hummingbird feeders, but serious hummingbird enthusiasts want the most functional. Keeping them clean of mold is a primary issue. Feeders with small openings and hard-to-reach crevices can be frustrating or impossible to keep scrubbed even with bottle brushes designed for such crannies.

Models are available with a wide mouth that are easy to clean, both in the major container and in the reservoir that serves the sipping ports. The number of sipping ports can be important for those feeders that attract a large number of hummers, and hummingbirds prefer those that provide perches for them as they feed. A hummingbird's metabolism is very high, requiring hummingbirds to consume lots of calories per hour. The ability to perch while it feeds helps reduce the amount of calories expended for calories gained. The perches should

Left: Hummingbirds are attracted to various flowering plants as well as hummingbird feeders. Right: Coral honeysuckle is a native vine that is highly attractive to hummingbirds.



Tes Jolly



Tes Jolly

be an adequate distance from the port so the birds may feed easily. Especially newly fledged hummingbirds will teeter on the perch if the port is too distant. Hooks, shepherds crooks, wall hangers, brackets, chains, and S-curve extenders are available for hanging feeders where they are easily accessible for cleaning and refilling.

The recipe for hummingbird feeder solutions most often seen is a 4-to-1 ratio of water to sugar by volume. This recommendation has served well, and many hummingbird experts insist on it being the safest. However, published information in research journals reveals that many of the flowers preferred by hummingbirds have much higher concentrations of sugar. For example, jewelweed, *Impatiens capensis*, can have a sugar solution as high as 43 percent, and many salvias have concentrations in the 30 percent range. Some studies have demonstrated hummingbirds prefer a stronger solution and show no ill effects from consuming it.

One study indicated hummingbirds consume about the same number of calories per hour regardless of the solution strength, so there is no danger of them “getting fat” or being harmed in any way. In other words, if a hummingbird can satisfy its caloric needs with fewer visits to the feeder, it is free to do more insect hunting.

If tap water is suitable for humans to drink, it is good enough for hummingbirds. Pure cane sugar should be used to make the sugar solution. There is no need to purchase expensive “hummingbird mixes” or to use red coloring for the solution. Honey or any type of artificial sweetener should never be used. It is not necessary to sterilize the solution by boiling it. As soon as the first bird sticks its tongue into the solution, bacteria has been introduced. It is important to replace the solution with fresh before it becomes cloudy or smells of fermentation. Keeping fresh solution may require changing it every 2–3 days. Warmer temperatures cause the solution to go foul more quickly.

Bees and wasps can be a problem on hummingbird feeders, and many of the better feeders take this problem into account. It is easily solved because the hummingbird’s tongue can reach much further than the proboscis of bees or wasps. Some feeders have bee guards that deny close access to the ports, and others are made so that the level of the fluid in the reservoir is too low for bees and wasps to reach, but is still easily accessed by hummingbirds.



The wide chamber of this feeder allows you to insert your entire hand inside for cleaning, plus it includes several ports with perches, which allows several hummingbirds to feed at once.

Ants are another problem easily solved by buying or making a “moat” and hanging it between the feeder and its hook. This chamber, when filled with water or oil, prevents ants from reaching the port. No sort of sticky product should be applied to the hanger to tangle the ants because the hummingbirds can come into contact with it, getting stuck and impairing their mobility and perhaps leading to other physical damage internally when they try to preen it from their feathers. However, a sticky product can be used on an “upside-down” moat that is too small to admit the hummingbird.

Try to avoid using insecticides near the feeder. However, if the ant trail is followed to the colony home, it is possible to apply an ant bait there, providing targeted control of the ants without affecting the hummers.



Native bees and other insects often are overlooked, but are critical for pollination of flowering plants in our gardens and backyard landscapes.

Pollinators

More than three-fourths of the planet's flowering plants are dependent on insects for pollination. Sometimes bats or hummingbirds ferry pollen from flower to flower, but the lion's share of the work is completed by insects. Bees are given most of the credit for pollinating food crops and how that role affects food production and cost, but wasps, flies, beetles, ants, and many other insects also are important contributors. Honeybees get lots of attention, but before Europeans introduced them to North America, native insects served and continue to serve adequately as pollinators. Unfortunately, society generally frowns on the presence of these less popular insects, sometimes called the "forgotten pollinators."

An increasing number of people enjoy providing nectar sources for pollinators, especially butterflies and honeybees. Aside from the aesthetic value of butterflies, providing sites for pollinators to feed and produce progeny, you also benefit a multitude of other pollinating insects that might not be as visually pleasing, but just as important in providing an ecological service.

Basic needs for pollinators include plants that provide flower nectar for adult butterflies along with plants that provide foliage for their caterpillars, often called *host plants*. Host plants can be very specific to a butterfly species, whereas nectar plants can provide for a broad spectrum of species. Site also is important. A good site provides cover, water, and plenty of sun. It also is good to have some bare soil where butterflies can extract needed minerals, especially when it is wet. These areas are sometimes called *puddling stations*.

Providing flowers from very early spring to late fall lays the groundwork for a successful butterfly garden. Many perennials can fulfill these roles, and lists of flowers with their season of bloom can be found. Some perennials have brief bloom seasons, whereas a few provide flowers over several months, such as black-eyed susan (*Rudbeckia*), coneflowers (*Echinacea*), blanket flower (*Gaillardia*), and blue anise sage (*Salvia*). Many of these plants provide value to animals other than pollinators. For example, finches seem to particularly enjoy the seeds of *Echinacea* after the blooms have faded.

Late-season plants include various asters and goldenrods, particularly beloved by butterflies, bees, and the many beneficial predatory wasps. Honeybees also feed on these flowers avidly, stocking their hives with honey in preparation for winter.

Annual forbs can provide nectar for butterflies, bees, and hummingbirds. A few of special note include varieties within *Cuphea*, which seems to flower effortlessly even in the hottest days of summer, *Pentas*, which always seems to be crowned with butterflies, and *Lantana*.



Tes Jolly



Carol Reese

Top photo: Late-flowering plants, such as crownbeard, provide nectar for many butterflies, such as this monarch.

Bottom photo: Swallowtails, as well as other species, are attracted to joe-pye weed in late summer.



Woodland phlox is a nectar source as well as a host plant for many species of butterfly caterpillars.



Tes Jolly

Left: Incorporating a variety of flowering plants (such as this blazingstar, goldenrod, and daisy fleabane) around your backyard will benefit a variety of wildlife species.

Above: Trumpet creeper provides nectar for pollinators as well as forage for various mammals, such as white-tailed deer.

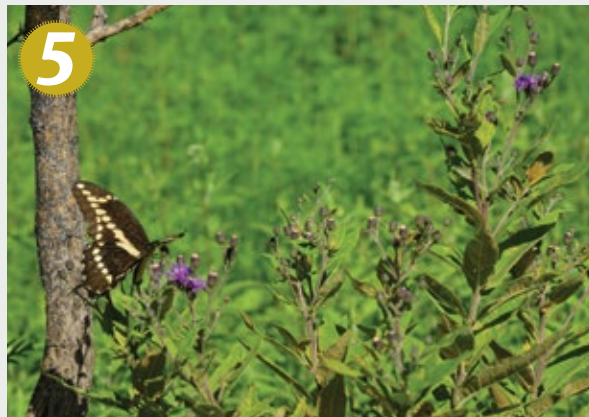
Vines should be included around wooded edges where sunlight is not limiting. Several species not only provide a source of nectar, but some also provide cover and/or soft mast. Trumpet creeper (*Campsis radicans*), Virginia creeper (*Parthenocissus quinquefolia*), crossvine (*Bignonea capreolata*), Alabama supplejack (*Berchemia scandens*), coral honeysuckle (*Lonicera sempervirens*), Dutchmans' pipe (*Aristolochia macrophylla*), and yellow jessamine (*Gelsemium sempervirens*) should be considered. Moonvine (*Ipomoea alba*) opens at dusk with its strong fragrance, attracting huge sphinx moths as large as hummingbirds.

Table 3. A sampler of native herbaceous plants that attract or support pollinators.

SPECIES	HABIT	BLOOM TIME	WILDLIFE BENEFIT
Asters (<i>Aster</i> and <i>Symphyotrichum</i>)	annual or perennial depending on species	fall	bees/butterflies/larval host
Baptisia or false indigo (<i>Baptisia</i> spp.)	perennial	spring	bees/larval host
Bee balm and bergamot† (<i>Monarda</i> sp.)	perennial	late spring to summer	bees/butterflies/hummingbirds/larval host
Black-eyed and brown-eyed susan† (<i>Rudbeckia</i> spp.)	annual or perennial depending on species	summer	bees/butterflies/larval host
Black cohosh (<i>Actaea racemosa</i>)	perennial	summer	bees/butterflies/larval host
Blazingstar (<i>Liatris</i> sp.)	perennial	summer to fall depending on species	bees/butterflies/hummingbirds
Cardinal flower and lobelia† (<i>Lobelia</i> spp.)	perennial	late summer to fall	bees/butterflies/hummingbirds
Columbine (<i>Aquilegia canadensis</i>)	perennial	spring	bees/butterflies/hummingbirds
Coneflower (<i>Echinacea</i>)	perennial	summer	bees/butterflies
Coreopsis (<i>Coreopsis</i> spp.)	annual or perennial	summer	bees/butterflies
Crested iris (<i>Iris cristata</i>)	perennial	spring	hummingbirds
Eveningprimrose† (<i>Oenothera</i> spp.)	perennial	summer	bees/butterflies/hummingbirds
Golden alexander (<i>Zizia aurea</i>)	perennial	late spring/early summer	bees/butterflies
Goldenrod (<i>Solidago</i> spp.)	perennial	late summer to fall	bees/butterflies
Indian pink† (<i>Spigelia marilandica</i>)	perennial	spring to summer	hummingbirds
Ironweed† (<i>Vernonia noveboracensis</i>)	perennial	summer	bees/butterflies
Jewelweed (<i>Impatiens capensis</i>)	annual	late summer to fall	bees/butterflies/hummingbirds
Joe-pye weed† (<i>Eutrochium</i> spp.)	perennial	summer	bees/butterflies
Lyreleaf sage† (<i>Salvia lyrata</i>)	perennial	spring	bees/butterflies/hummingbirds
Milkweed† (<i>Asclepias</i> spp.)	perennial	varies by species	bees/butterflies
Mistflower (<i>Conoclinium coelestinum</i>)	perennial	summer	bees/butterflies/moths
Phlox (<i>Phlox</i> spp.)	perennial	varies by species	butterflies/moths/larval host
Sedges (<i>Carex</i>)	perennial	varies by species	bees/butterflies

SPECIES	HABIT	BLOOM TIME	WILDLIFE BENEFIT
Sticktight (<i>Bidens</i> spp.)	perennial	late summer to fall	bees/butterflies
Sunflower (<i>Helianthus</i> spp.)	annual or perennial	late summer to fall	bees/butterflies/larval host
Turk's cap lily (<i>Lilium superbum</i>)	perennial	late summer	hummingbirds
Violets (<i>Viola</i> spp.)	perennial	spring	bees/butterflies

† photos shown below



1. Downy lobelia
2. Butterfly milkweed
3. Monarda
4. Joe-pye weed
5. Ironweed
6. Indian pink
7. Lyreleaf sage
8. Common eveningprimrose and jewelweed
9. Brown-eyed susan



Several trees and shrubs, such as eastern redbud, can be important sources of nectar for pollinators.
Natalie Bumgarner

Although it is not common to consider trees when planning a butterfly garden, they should be considered because a surprising number of butterflies rely on them for food and reproduction (see Table 1 for various species that may serve as larval hosts). Many shrubs and trees provide nectar for butterflies. Some may bloom seasonally, whereas others bloom for months. Shrubs and trees also provide shelter from wind and rain, as well as sunning and roosting sites. Some shrubs and trees are important host plants for the caterpillars. Trees should be located in appropriate spots so they do not shade out sunny areas of a butterfly garden.

It is very important to consider whether a plant is invasive or not before introducing it to your backyard landscape. All of the plants you use do not have to be native to your area, but it is irresponsible to plant nonnative species that tend to spread into unwanted areas. Nonnative invasive plants have spread and replaced native plants and reduced habitat value for wildlife throughout eastern North America. We do not need to make the situation worse. That being said, not all nonnative plants are invasive, and several provide an outstanding nectar source for pollinators.

Another important consideration when gardening for pollinators is use of insecticides. Unnecessary use of insecticides reduces numbers of insects for pollination. Wildlife that feed on insects also can be affected, including birds, bats, frogs, toads, skinks, and fence lizards, as well as others farther up the food chain. Consider the cost versus the benefit of the numerous pollinators when applying insecticides. Extend that thinking, perhaps even to the snakes that eat the voles that eat your plants. There are many organisms that help the garden succeed by their contributions to predator-prey relationships.

There are many websites that offer information on butterfly gardening, but a particularly useful one is that of the North American Butterfly Association (NABA). This group also offers butterfly garden certification, which encourages a commitment to conservation. Another benefit of NABA is the service it provides to the sciences through monitoring. Since 1993, the organization has run a butterfly count program through the work of citizen-scientists, who provide actual numbers through annual counts. Over time, the information submitted can provide valuable insights into species fluctuation and results of conservation efforts.

Managing problematic wildlife around your home

Wildlife commonly cause problems around the home. Moles and skunks dig up the yard (and skunks stink), voles kill plants, bats get in attics, groundhogs and rabbits eat vegetables out of the garden, deer eat shrubbery and flowers, woodpeckers damage siding, squirrels chew on the deck, raccoons and opossums get under the house, and it seems no one likes the company of snakes or lizards! The good news is there is a solution for each of these. The bad news is that some of these problems require considerable effort to resolve, and most of them require a fair amount of patience. Controlling or managing nuisance wildlife around the home most often involves removing food or cover that has attracted that animal. You have to make conditions unattractive for them.

The initial step in addressing wildlife damage is perhaps most important — identifying the problem animal and learning something about its biology and behavior. Once you learn a little something about the animal, you can better understand why it is creating the problem and how the solution often is a matter of common sense. People often are frustrated with their lack of success in managing nuisance wildlife because they are trying to control the wrong species or habit. For example, trapping rabbits is not going to reduce damage to plants when voles or deer are the culprit.



What did it? Before implementing damage management, you must know which species is causing the damage. Here, a skunk has been digging for grubs in a yard.

There are many strategies to managing nuisance wildlife. Before implementing a strategy, it is critical to know which technique or practice works for various species and what is and is not legal. Several wildlife species are protected under federal or state law. In addition, there may be local ordinances limiting what is possible in particular areas.

Federal laws prohibit killing migratory birds and/or destroying their nests/eggs and killing or molesting all threatened or endangered species with few exceptions. A permit is required from the US Fish and Wildlife Service to trap or kill migratory species. To get a permit, you must contact USDA Wildlife Services and get a referral. In Tennessee, a permit is required from the Tennessee Wildlife Resources Agency to kill big game species, such as white-tailed deer, black bear, or wild turkey, outside the designated hunting seasons. You may trap or kill any rodent or furbearer (if not threatened or endangered) or small game species without a permit if that animal is destroying or depredating your property. The following animals are not protected in Tennessee and can be trapped or killed at any time without any permit: house mouse, Norway rat, roof (or black) rat, moles, voles, pigeon, house (or English) sparrow, and European starling.



House sparrows can be killed any time of year. This male house sparrow drove a female bluebird out of the box she was nesting in and would not let her reenter. (Don't worry; she was able to finish her nest after he was caught!)

Common control methods

Most backyard wildlife problems can be handled effectively without professional assistance. Several basic approaches can be used to solve nuisance wildlife problems, including habitat modification, exclusion, chemical repellants, visual repellents, frightening agents, and removal. A combination of techniques often is more effective than a single technique.

Habitat modification

Probably the most effective technique in dealing with nuisance wildlife is modifying the area surrounding the home to create less favorable conditions for wildlife. Simple adjustments can make the area less attractive to wildlife and reduce wildlife activity around the home. Food sources, such as dog and cat food, should not be left out where it is available to wildlife. Bird feeders should be moved away from the house to reduce the possibility of attracting rodents (and snakes) into the house. Sources of cover, such as brushpiles and woodpiles, near the house should be removed. Weedy patches near the house should be mowed to make the area less attractive to rodents (and thus snakes) and skunks. Branches that reach near the house should be cut to reduce the potential for squirrels getting on the roof and in the attic. Lights can be placed in the attic or crawl space to repel squirrels and other rodents, snakes, and skunks. Heavy duty, galvanized hardware cloth can be buried just under and around flower beds to discourage vole and chipmunk activity. Hedgerows of dense shrubbery planted as a border between the pond/lake and the yard will discourage geese from walking up into the yard and feeding on the grass. Finally, other than bird feeders, do not feed wildlife!

Exclusion

Blocking entry of an animal can be accomplished in many ways and is a useful technique for several species. Crawl spaces under houses should be closed using plywood, heavy-duty galvanized hardware cloth, or some other sturdy material. Hardware cloth is better than screening because animals can tear through screening relatively easily. Hardware cloth also is effective to block small openings that allow bats, squirrels, and birds into attics and chimneys. Fine-mesh netting also can keep birds out of areas or depredating grapes, blueberries, or similar crops. Netting draped from the edge

Keys to controlling nuisance wildlife

- ❑ Correctly identify the offending animal. Several reference books are available to help identify animals, sign of their presence, and the various types of damage they cause. Extension Service, USDA-Wildlife Services, and state wildlife agency personnel can be valuable resources.
- ❑ Learn about the animal's requirements and behavior causing the problem.
- ❑ Choose the appropriate, effective damage reduction technique(s). Multiple approaches often are better than a single technique.
- ❑ Begin control efforts as soon as the problem starts. If a problem is anticipated, control efforts should begin before the problem starts. Do not wait until an animal has developed a habit.
- ❑ Be patient and persistent. It may take several days or nights to control the offending animal. In some cases, several animals may be involved.



Making conditions unfavorable for nuisance wildlife usually solves the problem. Here, rats are attracted to pet food that was kept outside the house.

of the roof down the side of a wall can keep woodpeckers from pecking the wall.

Fencing works well for repelling animals in some situations. A 3-foot-high fence of chicken wire or galvanized hardware cloth will help keep rabbits and groundhogs out of gardens. Burying 6–12 inches of the fence will help prevent digging under. An electric fence with three strands approximately 4 or 5 inches apart, with the bottom strand about 3 inches above ground, also helps exclude rabbits, groundhogs, and raccoons. To keep dogs out of gardens, a 2-strand electric fence should be used. Strands should be approximately 12 inches apart, and the bottom strand should be 8 inches above ground. The effect can be accentuated by randomly hanging pieces of



Top: Electric fences are effective for many needs, whether helping protect chickens or a garden from unwanted pests or predators.

Bottom: Hardware cloth, boards, mortar, and other materials are effective for excluding unwanted wildlife from particular areas, structures, and entry into homes. Here, hardware cloth has been installed to prevent pigeons from roosting.

mylar tape in varying lengths (8–16 inches) from the fence wires.

To repel deer, a 3-strand electric fence should be used, with strands approximately 1 foot apart. Aluminum tabs smeared with peanut butter should be placed along the middle strand. Deer are attracted to peanut butter, and when their noses or mouths contact with the aluminum tab, they will receive a shock and will learn to avoid the area. A woven wire fence 10 feet high also will exclude deer (8 feet will work, but it is possible for adult deer to jump an 8-foot fence). However, it is costly to erect such a fence around a relatively large area.

Repellents and frightening agents

Chemical repellents generally are classified as taste repellents or area (or smell) repellents. Taste repellents have a bitter or hot taste, which some animals find offensive. Area repellents give off an offensive odor to some animals. Chemical repellents can be effective short-term, but they often are relatively ineffective over a long period of time. Animals learn there is no harm associated with them. If they are hungry enough, it does not matter if the plant tastes bitter or hot or if it smells bad. A variety of repellents are available at lawn and garden stores, home centers, nurseries, chemical supply companies, and sometimes directly from the manufacturers.

Success using chemical repellents usually is measured by the amount of damage reduction rather than elimination of the problem. Area repellents may be sprayed directly on the plant, sprayed along a cotton rope strung around the protected area, or sprayed along a braided electric fence. This so-called repellent fence has worked fairly well at reducing deer damage to crop fields and gardens.

When chemical repellents or fences are used to protect flowers, shrubbery, or vegetables, it is important to have an alternative food source nearby to reduce foraging pressure on the protected plants. For example, a clover patch planted adjacent to a vegetable garden that has been protected with a chemical repellent or fence will provide rabbits, groundhogs, and deer something to eat other than what you are protecting. This example illustrates how using a combination of techniques can be more effective than relying on a single technique.

Scarecrows, plastic owls and snakes, “scare eyes” balloons, mylar tape, flagging, and aluminum pans are examples of visual repellents that may be marginally effective when used

alone, but may help when used in combination with other techniques (such as when attached to fencing). Visual repellents often used are around vegetable and flower gardens and on decks with large windows or sliding glass doors where birds “flogging” their reflection is a problem.

Noise-making devices often are used in combination with visual repellents. Fireworks, gun shots, pans banged together, wind chimes, water sprinklers, wind socks, and propane exploders are audible repellents used to keep blackbirds and starlings from roosting in trees and to prevent various birds and deer from damaging crops. Noisemakers and visual repellents should be moved around within the problem area every day or two to help prevent animals from becoming habituated to the scare device.

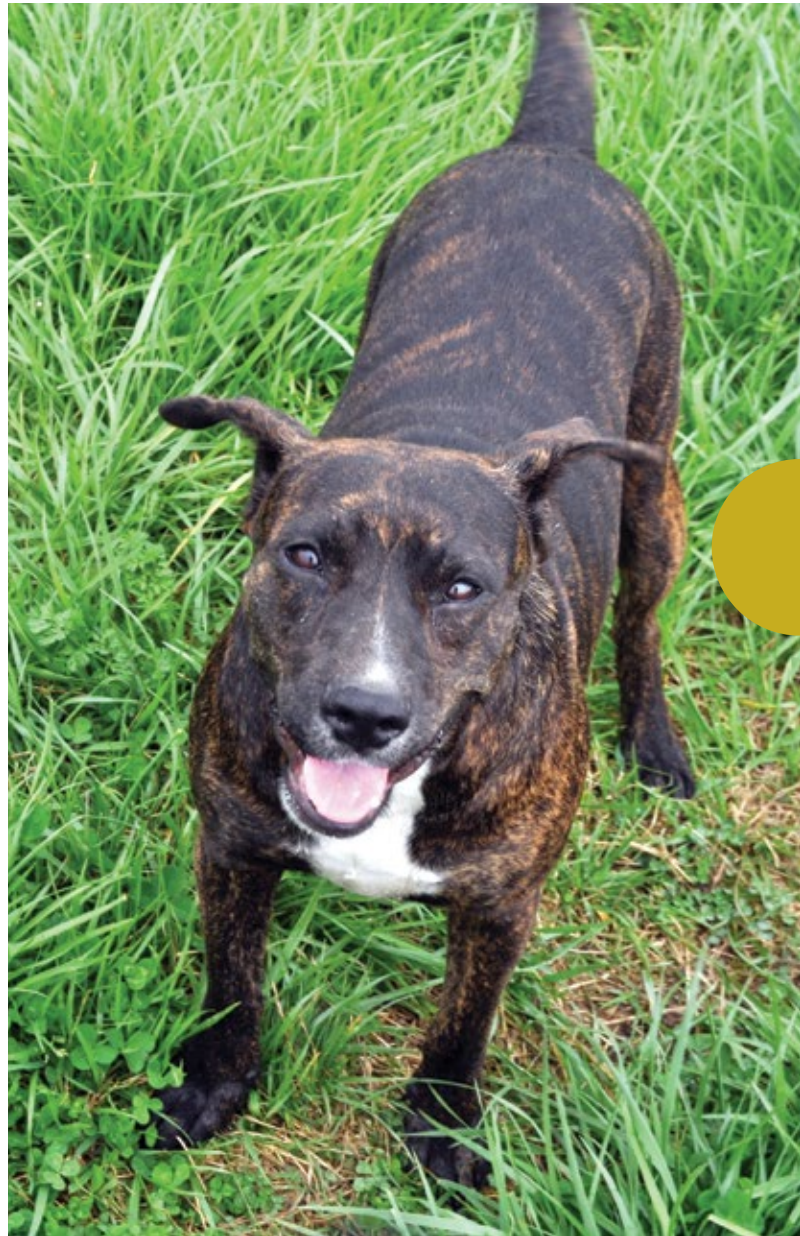
Another frightening agent that should not be overlooked is a dog. When allowed to stay outdoors or with access to a dog door, a dog is a strong deterrent to deer, raccoons, skunks, armadillos, opossums, and geese causing problems around the house. Even a house dog that has access to a dog door can be encouraged to become a guardian.



Iron-clay cowpeas were planted on one end of this garden as an alternative food source for rabbits, which were coming out of brushy cover near that end of the garden. Whether cowpeas, clovers, or some other attractive forage, providing an alternative food source with easy access and close to cover can help reduce damage to ornamental or garden plants.

Removal

Removal often is the most effective technique for managing nuisance animals. Trapping and shooting are two methods of animal removal, but planning and knowledge are required to determine if either is suitable. There are many kinds of traps, but live-trapping with a cage-type trap is most common. Live traps typically have a door that falls shut when the animal (which is trying to get to a bait) steps onto a treadle or



Dogs are very effective control agents around the house for many unwanted wildlife species. Photo by Carol Reese.



Live traps are very effective for some mammals, including opossums and raccoons.

trigger. For many rodents, snap-traps baited with peanut butter and bird seed is effective. For groundhogs (which are also rodents) and rabbits (which are not rodents), fresh vegetables are effective. For most carnivores and omnivores (such as raccoons, opossums, foxes, skunks, and cats), sardines, pet food, or raw chicken scraps are effective. Traps should be checked daily.

Glue boards are another type of trap commonly used around homes and garages. They are very effective for trapping various invertebrates and small wildlife, including mice, snakes, and lizards. Animals can be released from glue boards by pouring vegetable oil over the board, but be prepared to have to handle the animal and assist it getting loose, and do so in a place where you intend it to be released!

Once an animal is trapped, it has to be disposed of. Releasing live-trapped mammals is illegal without a permit from the Tennessee Wildlife Resources Agency (if you are in Tennessee, and if not, most state wildlife agencies have similar restrictions on releasing trapped wildlife) and written permission from the property owner where the animal will be released. Therefore, trapping should take place only if you release the animal on your property or if you have a permit to release the animal. Otherwise, you should have a plan to dispose of the animal once it is trapped. Lethal control is strongly recommended

for problem raccoons and skunks. These animals are overabundant in many areas and are prone to carry rabies and distemper, which can be very problematic for pets (and humans). To slow the spread of rabies in east Tennessee, the USDA-WS and TWRA do not allow animal damage control operators to release trapped raccoons or skunks; they must be killed. Private landowners are strongly encouraged to do the same. If released, someone else is given the problem.

If you intend to shoot problem animals, keep in mind, deer and geese can be shot only during the designated hunting seasons unless you have received a special permit from TWRA (deer) or the US Fish and Wildlife Service (geese).

Toxic baits

Toxic baits are registered for only a few animals, such as moles, voles, rats, and mice. However, “poison peanuts” are not effective at reducing mole populations. Moles do not eat peanuts; they eat earthworms and grubs. An insecticide application to reduce the grub population in your yard may be recommended, but does not get rid of moles because moles feed on other animals, especially earthworms. Trapping is recommended as the most efficient method with the least damaging impact to non-target species.

Zinc phosphide is a single-dose rodenticide commonly used to control voles and other rodents.

Zinc phosphide is a restricted-use pesticide and is available as impregnated bait on oats, corn, wheat, and peanuts. Several anticoagulant baits also are approved for rodent control. If a pesticide is chosen, it should be used only in accordance with its label. Anytime pesticides or other toxic baits are used, avoid any potential for contact with nontarget animals. The presence of household pets and children may affect the decision whether to use these types of control measures or to select others that pose less risk.

Considerations for specific problem species

Birds around the home

Birds can cause problems around the home by nesting in unwanted areas and by pecking on glass doors and windows. Carolina and house wrens and eastern phoebes commonly nest in garages or on boards that provide platforms under porch ledges. Pigeons, starlings, and house sparrows also can be problematic around houses, but more often are a problem around industrial areas or farms with livestock and associated buildings. Accumulation of nesting material and droppings can be very messy. Spike strips or sticky strips can be placed on ledges, but the birds often nest on top of them. Repeated scare tactics and exclusion from protected areas (such as garages) is most effective, but require persistence and patience. It is illegal to kill native songbirds, but pigeons, starlings, and house sparrows can be killed. If you have large-scale problems with these nonnative birds around industrial or farm sites, you should contact USDA-Wildlife Services for potential control options.

Cardinals, mockingbirds, and a few other species commonly fly into windows or glass doors during spring and summer. Large picture windows and sliding glass doors are attacked most often. These birds establish territories that they defend during the reproductive season, so individual birds may continue to batter these windows each time it sees its reflection in the bright, shiny glass, apparently thinking the image is an intruder in its territory. Homeowners may be concerned that the bird will kill itself, or become perturbed at the droppings and occasional blood spots on the window. Birds fighting their reflections usually do not hit the window hard enough to cause themselves harm, but sometimes do.



Toxic baits should be used in such a way that minimizes possible impact on nontarget animals. Here, a box with zinc phosphide bait has been placed in an area where vole damage was excessive.



Birds can be a nuisance around homes, such as these phoebes nesting on the top of a porch light fixture.



Covering the glass with cloth on the outside will prevent a bird from seeing its reflection and prevent it from attacking the window. Attaching several strips of masking tape about 2 inches apart may help break-up the reflection. Taping a large black silhouette of a hawk to the window also may help. Regardless, if the window is attacked, the problem usually lasts only a short time during the height of the breeding season.

Woodpeckers

Seven species of woodpeckers are found in Tennessee: red-bellied woodpecker, red-headed woodpecker, downy woodpecker, hairy woodpecker, pileated woodpecker, northern flicker, and yellow-bellied sapsucker. Typical woodpecker damage occurs on buildings with wooden exteriors where the birds are pecking for insects or creating holes for nesting, usually between February and June, which coincides with breeding season. Holes usually are created on buildings that are vacant during part of the year, unpainted, and have cedar or redwood siding. If allowed to make these holes large enough, they may be used for nesting. Woodpeckers may “drum” on sides of buildings, guttering, and various metal surfaces during early daylight hours, which can be annoying. All woodpeckers commonly drill or tap into trees searching for insects underneath bark, particularly on dead trees or limbs where insects are more numerous. Sapsuckers commonly drill into live trees (especially viburnums, maples, and birches) to feed on sap and the insects attracted to the sap. This drilling may kill limbs or entire trees, but most often the wounds heal and the tree remains healthy.

You should begin control measures as soon as the problem begins. Quite often, wind chimes accompanied with mylar tape hung in the immediate area will deter and scare the bird. Problems with sapsuckers often can be resolved by wrapping the affected area of the tree with burlap or window screening during winter and early spring. When woodpeckers are pecking on wood siding, check for insects first because insects attract woodpeckers. If insects are present, treat the wood with an approved chemical. If insects are not present, you may deaden the sound of woodpeckers by placing insulation behind the siding boards where damage is occurring. The insulation can be inserted by removing a couple of planks and stuffing insulation behind them. A more permanent solution is to cover the area

where the woodpecker is working with 1/4-inch hardware cloth. If none of these techniques work, it may be necessary to kill the bird (usually only one bird is involved). However, woodpeckers are protected by federal law and a permit is required to kill a woodpecker. You can request a permit from the US Fish and Wildlife Service. Contact USDA-Wildlife Services for help in obtaining the permit.

Armadillos

Armadillos are common in many areas of southern and western Tennessee, and the distribution of armadillos is spreading northward and eastward. Armadillos prefer areas with loose soil for borrows. Rocky areas and cracks and crevices also may be used. The primary food source for armadillos is insects, both mature and immature. However, armadillos may eat plants, fruits, vegetables, small amphibians, and reptiles.

Most of the damage caused by armadillos results from rooting in gardens, landscape beds, and turfgrass areas. They dig small holes while searching for food and may burrow under structures. Armadillos can be caught in live traps by placing the traps in runways used by armadillos. Alongside buildings, adjacent to the wall, is a good place where armadillos may have



Woodpeckers frequently cause damage to homes by pecking on siding looking for insects. Here, a downy woodpecker has drilled out a section of a board where carpenter bees were nesting.



Kimberly Smithson



Matt Cleland

a runway. Do not use bait. Simply set the trap flat on the ground and make sure it is secure. Placing “wings” on the sides of the trap to help guide the animal in the trap can increase trap success. Wooden traps may be more effective than traps made of wire. After an armadillo has been trapped in the trap, wooden traps hold the scent of previously caught armadillos, which can attract additional armadillos. Trapped armadillos should be dispatched with a pellet gun or .22-caliber rimfire rifle. It is illegal to transport and release a live armadillo without a permit.

Bats

Bats occasionally enter houses, sometimes unintentionally, but usually to inhabit attics of homes, especially during summer when maternal colonies form. Bats enter under eaves, at badly fitting ridge joints, and under shingles, slates, or tiles. If you find a bat in the living area of your home, you can encourage it to leave by opening the doors and windows. Bats usually will find their way out by detecting fresh air movement. If bats are still present at nightfall, turn off the lights to enable them to find open windows or doors. Otherwise, they may seek refuge behind drapes, curtains, and wall hangings. If you detect a maternal colony in your attic, contact USDA-Wildlife Services or a private wildlife damage management profession for help in removal. If not removed, the colony likely will disperse on its



Top: Armadillos damage yards by digging for insects

Middle: Armadillo traps do not require bait. Instead, simply place them in areas where they frequent, especially alongside walls. Wooden traps seem to catch more armadillos than wire cages as the wooden traps hold the scent of armadillos after one has been caught in the trap.

Bottom: Boards (or “wings”) placed at an angle can help steer armadillos into the trap.



own by early fall as the bats begin to search for hibernating sites around the time of first frost.

Once bats are removed, all holes allowing their entry (measuring $\frac{3}{8}$ inch or larger) should be covered with $\frac{1}{4}$ -inch hardware cloth or sheet metal. Such openings can be found by checking for light entering the attic during the daytime.

Groundhogs

Groundhogs, also known as woodchucks, construct burrows in open areas (old-fields, pasture, or hay fields) or wooded areas with burrow entrances 10–12 inches in diameter. They also may burrow under buildings. Groundhogs are herbivores and can eat a variety of forbs and grasses. Their burrow entrances may damage lawn equipment.

Groundhogs can be excluded from gardens with chicken-wire or other woven-wire fencing (such as hardware cloth) that is 3 feet high with a buried portion about 12 inches deep. Electric wires a few inches off the ground can be added to reduce climbing. Electric fences with strands at 5-inch intervals also can be effective for excluding groundhogs as well as rabbits and other mid-sized mammals. Groundhogs can be trapped with different trap designs. Live trapping can be difficult, especially if food resources are abundant. Conibear (body-gripping) traps are successful when set properly near the burrow entrance with objects (log, rocks, or boards) guiding the animal into the trap. Shooting with a .22-caliber rimfire rifle is very effective.

Moles

Moles are small mammals that spend most of their lives in underground burrows. Three species of moles live in Tennessee. The eastern mole (*Scalopus aquaticus*) is found throughout the state. The hairy-tailed mole (*Parascalops breweri*) and the star-nosed mole (*Condylura cristata*) both are found only in extreme eastern Tennessee. Measuring 6–8 inches from tip of nose to tip of tail, they are similar in appearance to shrews and mice, and they may occupy the same area. The mole's most notable feature is the greatly enlarged paddle-like forefeet and prominent toenails that enable the mole to almost literally "swim" through the soil. Their legs are strong, their necks are short, and their heads are elongated. Their ears and eyes are so small that at first glance they appear to be missing. A mole's fur is soft and velvety. It ranges in color from black to brownish or grayish with silver highlights. When brushed, the fur offers



Roosting bats can be problematic in homes. Preventing access is key to controlling the problem.



Shooting is the most popular technique to control groundhogs.



Bert Cash

Eastern mole, a species common to many yards.

no resistance in either direction; this feature enables moles to travel either backward or forward within their burrows with equal ease.

Moles have high energy requirements and actively feed day and night at all times of the year. Members of the scientific order *Insectivora*, they feed on earthworms, insects (mature and larvae), snails, spiders, small vertebrates, and small amounts of vegetation. Moles are not rodents. Moles eat amounts equal to 70–100 percent of their weight each day and need access to large amounts of food. The tremendous amount of energy expended in plowing through soil requires that a large amount of food be eaten at frequent intervals. A mole in captivity usually starves in a few hours unless supplied with nourishment. Because of their food requirements, moles must cover a larger area than most underground animals. The eastern mole is considered a loner. Three to five eastern moles per acre is a high population; two or three per acre is more common. Populations of hairy-tailed and star-nosed moles may be as great as 10 or 11 per acre. The home range of a hairy-tailed mole is about $\frac{1}{5}$ acre.

Moles prefer moist, loose, sandy loam soils that are easy to dig. They usually avoid heavy, dry, clay soils. They make extensive runway systems in a surprisingly short time. They may create as much as 225 feet of tunnel in one day in suitable soil. Moles are the only animals that create surface tunnels. To determine which runways are active, flatten a small section of runway with your foot and check to see if the tunnel is raised again the next morning.

Moles form two types of tunnels: those near the surface and others deeper underground. Surface tunnels show up as ridges of upheaved soil, created as the animals forage for food. Some of these surface tunnels are used as travel lanes. Others are travelled infrequently, and others may be abandoned immediately after being dug. Surface tunnels are temporary and most abundant in spring and fall, especially after rains, when the mole's primary food source (earthworms) are near the surface. In summer and winter, moles burrow deeper. The only evidence of these deep burrows is mounds of soil (molehills) pushed up to the surface as moles dig. Deeper

runs are highways leading from the mole's home to its hunting ground. These runways are used especially during hot, dry, or very cold weather when earthworms move down deeper in the soil. The star-nosed mole does not usually leave surface ridges, but its presence can be detected by mounds of soil pushed up from underground runways.

Before a mole control program is started, it is important to be sure moles are actually responsible for the damage. Moles do not eat garden seeds, bulbs, or roots, though they often are blamed for doing so. The culprits responsible for eating seeds and roots are voles, white-footed mice, and common house mice. These seed and plant eaters often live in mole runways, helping themselves to grains, seeds, and tubers. If moles make their runways in garden plant rows, it's because more moisture, insect larvae, and earthworms are in the rows than between the rows. The moles are looking for insects and earthworms to eat.

Moles play an important role in the management of soil and control of lawn-destroying grubs. Only part of its work is visible at the surface. Tunneling and shifting soil particles permits better aeration of the soil and subsoil. This process carries humus farther down and brings the subsoil nearer the surface, where nutrients may be more available to plant roots.

About the only problem moles cause is the nuisance of soil disturbance in a well-kept lawn or garden. If this is a problem, trapping is the most effective control method. Best results are during spring and fall while the soil is moist and temperatures most favorable. Consider the benefits of moles as described above before deciding if control is necessary.

There are 3 types of mole traps: choker, pincher, and harpoon. All are set in a similar manner. To determine where to set traps, tamp down small sections (the width of your shoe) of several tunnels during the afternoon or early evening, then check the next morning to see which tunnels are raised—this is where traps should be set. Dig out a portion of the tunnel slightly larger than the trap, place the trap so the mole will travel through it, then replace the soil in the hole, packing it firmly where the trigger pan will rest. Do not, however, tear up large or



Brett Dunlap
Mole hills represent soil pushed up by moles when digging their tunnels. However, there is no hole.



Brett Dunlap
Mole activity is easily noticeable by raised surface tunnels in a yard.



Matt Cleland

numerous sections of the tunnel, and be careful not to include foreign material, such as leaves, twigs, or rocks, in the fill material. Moles are very suspicious. If a mole detects anything unusual in its tunnel, it will immediately back up and burrow around or under the set trap. Fortunately, moles are not suspicious of soil blocking the runway and usually will push their way into a soil blockade to reopen the tunnel and continue on their way. Traps are triggered when a mole reopens the tunnel. If the mole is not caught in 2 days, identify other active runways and move your traps. Similar methodology can be used to trap moles in deep tunnels. Probe areas around molehills. When tunnels are located, dig down and set the trap as described above. A continuing trapping effort may be necessary to keep an area mole-free.



Matt Cleland

Harpoon traps are very effective in controlling moles. However, you have to set the traps correctly!





Opossums are omnivores. This one was attracted to a trap with apples.

Opossums

Opossums seek shelter in other animal's burrows, brushpiles, or in buildings, such as garages. Opossums generally feed on dead animals and insects, but they also disturb compost, garbage, and pet foods.

Exclusion through fencing and by tightly securing garbage cans or pet food containers is the best way to avoid problems. Live traps are effective for opossums, and baiting with fruit can reduce the chance of catching cats and skunks. However, a plan must be in place for lethal control or transport. Live-trapped opossums are easily dispatched with a pellet gun or .22 rimfire rifle while in the trap.

Rabbits

Eastern cottontails commonly occur in yards and around homes where sufficient brushy cover is nearby to provide escape from predators and protection from harsh weather. Most people consider viewing rabbits pleasurable, but they can become problematic when they begin eating in the vegetable or flower garden.

The most effective method for controlling rabbit damage to gardens and other plantings is fencing. Rabbits can be excluded easily with



Brett Dunlap

Rabbits can damage trees and shrubs by girdling as they eat bark and the cambium layer just underneath.

a fence of 2-foot-tall chicken wire tight to the ground or buried a few inches. An electric fence with two or three strands approximately four or five inches apart with the bottom strand about three inches aboveground also is an excellent barrier for rabbits. Although fencing can be relatively expensive, it can last for several years if properly taken care of. Rabbits occasionally damage woody plants by clipping or gnawing the bark off stems, branches, and buds. Seedlings can be protected by wrapping hardware cloth around the stem or by using "tree shelters" available at lawn and garden, nursery, and farm supply stores. Several taste repellents that are sprayed directly on vegetation are available and have been used with varying success.

Shooting with a .22-caliber rimfire rifle or pellet gun and live-trapping with cage-style or box traps also are effective. It is legal to kill rabbits outside the designated hunting season as long as it is causing damage. As with other live-trapped animals, you should have a plan to dispatch the trapped animal. In Tennessee, it is illegal to transport and release live-trapped animals without a permit from the Tennessee Wildlife Resources Agency.

Raccoons

Raccoons are omnivores and eat a wide range of plant and animal materials, which contributes to their nuisance potential as they can cause serious damage to gardens (especially sweet corn and watermelons) or even kill poultry. In addition, raccoons can cause problems around residences when they forage in garbage or pet food storage areas, and get into crawl spaces and garages.

Raccoons can be excluded from gardens using a 2-strand electric fence with one strand 5 inches aboveground and the other 10 inches aboveground. Garbage and pet food must be kept in containers that are tough with tight-fitting, secure lids. Several types of traps can be used to trap raccoons. Cage-type live traps and body-gripping kill traps are effective. If live traps are used, you must have a plan to dispose of the animal. It is illegal to transport and release a live raccoon. Live-trapped raccoons can be dispatched in traps easily with a pellet gun or .22-caliber rimfire rifle.

Rats and mice

Successful rat and mouse control involves three steps: (1) killing rats and mice already present; (2) covering holes in the house or foundation where they get in using ¼-inch hardware cloth, sheet metal, or mortar; and (3) removing conditions that attract the pests. The most important step is to destroy hiding places and eliminate food and water. Rats like to find shelter in refuse and lumber piles, burrow under floors, and nest inside walls and attics.

Rats find food in garbage cans, feed bins, granaries, corn cribs, and other food storage facilities (such as those for pets that are kept outside) that are not rodent-proof. They commonly feed on dog and cat food left after the pet has finished eating. Rats get water from streams, ponds, stock watering tanks, ditches, and even puddles of surface water around homesteads or farmsteads.

Anything that can be done to create a less favorable environment for rats and mice will aid in their control. For example, if food, shelter, and water are all available in one building, rats are attracted more than if they must travel 100 yards from their shelter to find food and another 100 yards to get water.

For rat and mouse prevention, protect the area with ¼-inch mesh hardware cloth or sheet metal. Store food in metal containers or in another way that makes it inaccessible. If feasible, remove the water source.



Conibear traps set in a homemade wooden box or even a plastic bucket work extremely well when baited to attract raccoons. This trap was baited with peanuts. Exercise caution in choosing sites and baits when setting such traps to avoid catching non-target animals, especially pets.



Rats dig burrows that lead to dens under structures.

Rats and mice can be killed with snap traps or poisons. Glue boards also are effective for mice. Traps should be placed along walls in the area of rodent activity. Place traps perpendicular to a wall with the trigger end next to the wall or in pairs parallel to the wall with the triggers facing in opposite directions. Peanut butter mixed with bird seed or oatmeal are effective as bait. Creating “funnels” with boards or other material can help steer the rodent to travel across glue boards or into traps.



Matt Cleland

Top: Homemade bucket traps, such as this one, are very effective at trapping mice in garages, basements, and other such places.

Bottom: Snap traps should be set such that a mouse or rat traveling along a wall or other structure comes in contact with the trigger-end of the trap. Photo by Matt Cleland.

Skunks

Concerns about skunks mainly involve their odor, confrontations with people and pets, and them digging in yards for grubs and feeding in trash or other refuse in residential areas. They also can damage some garden crops, such as sweet corn. Removing sources of food and preventing access in areas where they are not wanted are important control tactics. You can help prevent skunks from denning under buildings by sealing any foundation openings. Openings can be covered with boards, wire mesh, sheet metal, or concrete. Digging can be prevented by burying hardware cloth vertically 1½–2 feet deep around the foundation.

You can remove skunks from under buildings by: (1) sealing all possible entrances except one — the main one; (2) sprinkle a layer of flour 2 feet in diameter on the ground in front of the opening; (3) place a light under the building (skunks don't like bright light); (4) after dark, check for tracks; (5) when tracks indicate the skunk has left, close the last entrance. Burrows should be sealed before May to prevent trapping young skunks in the den.

Skunks may be live-trapped in box traps by baiting with sardines or cat food. However, keep in mind you must have a plan for legal transport or lethal control once the animal has been trapped. Trapped skunks can be approached with a tarp or old blanket without spraying.



Amanda Deese

Trapped skunks should be killed by shooting. They should not be released.

Tree squirrels and ground squirrels

The best way to keep tree squirrels (eastern gray squirrels, fox squirrels, and southern flying squirrels) out of a building or your attic is to close off any openings. To locate entrances, keep an eye on the travel routes of squirrels. Be sure to look for openings at eaves, unscreened attic vents, knotholes, loose flashing around chimneys and vent pipes, and openings around cables. Cover these openings with ¼-inch-mesh hardware cloth or 26-gauge metal.

Shooting with a .22-caliber rimfire rifle or pellet gun is the most effective method of eliminating troublesome squirrels. If shooting is not possible, trapping with live cage traps baited with peanut butter is a possibility. However, it is necessary to get permission from the state wildlife agency to release live-trapped animals. Squirrel can be purchased at hardware and garden supply stores. Tree squirrels are attracted to and can become dependent on alternative food sources in your yard. Prudent management of bird feeders and removal of pet food (especially dry dog food) can greatly aid in reducing squirrel problems.

Chipmunks are ground-dwelling squirrels that burrow under woodpiles, stumps, and other such places around the yard, and may become pests by burrowing under garages, basements, patios, retention walls, and foundations. Chipmunk burrow systems may be extensive, reaching 30 feet or more, including a nesting chamber, food storage chambers, and escape tunnels. Mounds of dirt usually are not evident around burrow entrances because chipmunks transport this material away from entrance holes in their cheek pouches. Chipmunks occasionally find their way into an attic or garage where caches of nuts, fruits, and seeds may be found near their center of activity. Additional problems with chipmunks include feeding on flower bulbs, seedlings, birdseed, and pet food.

Exclusion is the best defense against chipmunks around your home. Heavy-duty hardware cloth with ¼-inch mesh, caulking, mortar, or additional boarding should be used to close access areas. Flower gardens can be protected by covering the seedbed with hardware cloth, then placing a layer of soil on top. Areas of woody vegetation or other groundcover that connect shrubbery around your home with an adjacent woodlot provide chipmunks a ready-made travel corridor. Woodpiles and groundcover can hide burrow entrances, making them difficult to detect.



Squirrels can dominate bird feeders and consume or waste a lot of bird seed by knocking it out or off the feeder onto the ground where most of it germinates or becomes moldy. Both gray squirrels and fox squirrels (above) can be problematic.

Bird feeders and pet food should not be placed adjacent to your home if you have a problem with chipmunks or other rodents.

Chipmunks can be trapped with both live traps and snap traps. Baits include peanut butter, nutmeats, sunflower seeds, and fruits. Traps should be prebaited without setting the trap to allow the animal(s) to feed at the trap for 2–3 days to condition themselves to take the bait without being spooked. When using a snap-trap outside, place the trap under some type of tunnel covering, such as a small box with no ends — just be sure the trap has enough clearance to operate properly. Traps set adjacent to a wall or other structure should be covered by leaning a board against the wall, which allows the chipmunk to feel more secure when feeding and helps protect songbirds from being caught. Although chipmunks are susceptible to rodenticides used to control rats and mice, none are registered for chipmunks.

Voles

Voles, sometimes called meadow mice or field mice, are small rodents with stocky bodies, short legs, and short tails. Voles common to Tennessee include the pine vole (*Microtus pinetorum*), meadow vole (*M. pennsylvanicus*), and prairie vole (*M. ochrogaster*). Voles are active year-round (they do not hibernate), day and night. Activity of meadow and prairie voles is evident from a network of ground-surface runways (not surface tunnels that moles create) with numerous burrow openings. Pine voles typically do not use surface runways, but an extensive system of underground tunnels (deeper than surface tunnels that moles make). Small holes leading to a network of underground burrows are evidence of pine voles, which may be found around homes and orchards, not just in areas dominated by pine trees.

Fresh shoots of grasses and forbs growing in or near runway systems and burrow openings make-up most of the diet during the growing season. During the dormant season, voles feed more intensively on tubers, bulbs, bark, rhizomes, and seed. These feeding habits can cause extensive damage to lawns, flower gardens, orchards, and vegetable gardens.

Vole damage can be controlled by killing the animals using two common methods. Where damage is severe and widespread, using a zinc phosphide impregnated bait is most practical. If you use a toxic bait, steps should be taken to

Tes Jolly



Chipmunks commonly dig burrows in shrubbery around homes, especially when adjacent to wooded areas.

reduce danger to non-target animals. Using a funnel to place the bait into the tunnel system through the burrow opening is one method. Another is to use bait stations made of waterproof paper tubes, 5 inches long and 1½ inches wide, with bait blocks glued inside. For a small-scale problem, regular mouse (snap-type) traps baited with peanut butter and oatmeal may be used. Voles are secretive and come out of the ground infrequently, usually only at night. Where they exit, there is approximately a 1-inch-diameter exit hole. A trap should be placed next to each hole and covered with a pan large enough not to interfere with the trap's snapping action. Other options include protecting individual plants by growing them in pots or using a wire mesh to exclude voles.

To make an area unattractive to voles, reduce or remove groundcover, such as grass, leaves, and mulch, and mow close to the ground. Groundcover allows for establishment of surface runways and provides voles protection from predators (foxes, skunks, hawks, owls). Removing mulch from a 3-foot radius around vulnerable plants will make plants less susceptible to vole damage. Individual tree seedlings can be protected with hardware cloth. The mesh should be ¼-inch or smaller and buried 6 inches deep to prevent voles from crawling through or digging under. Be sure to expand the hardware cloth as the tree or shrub grows so that it will not girdle the trunk. Voles are prolific and will readily move into vacant burrow systems. Therefore, monitoring sites left vacant following control measures is essential.



Brett Dunlap

Voles (right) can be distinguished easily from house mice and deer mice (left) in that voles have short tails and house mice and deer mice have relatively long tails.



Keith Blanton



Keith Blanton

Voles commonly damage ornamental plantings around homes and gardens by eating leaves, shoots, stems, and roots. Here, tree seedlings and hostas have been damaged by voles.

Lizards

Lizards occur frequently around homes. There are 9 species of lizards in Tennessee and all are harmless; none are venomous. The most common lizards found around homes in Tennessee are the fence lizard, the common 5-lined skink, and the broadhead skink. The fence lizard is scaly gray with a rough appearance, and the 5-lined skink has 5 light stripes on a dark background. Juvenile 5-lined skinks have a blue tail that turns to brownish-gray in adults. Older males may lose their stripes and have a coppery-red colored head. Broadhead skinks are grayish-brown to olive with males often having an orange-red head. Juveniles also have a blue tail. Broadhead skinks are the largest lizards in Tennessee (6–12 inches long). Lizards feed on invertebrates, especially bugs, beetles, crickets, roaches, ants, wasps, bees, spiders, earthworms, and snails, and are preyed upon by cats, foxes, skunks, raccoons, hawks, owls, snakes, and other lizards.

Even though lizards native to Tennessee are harmless and beneficial, many people still want to remove them. Lizards are easily controlled and removed with glue boards. As with snakes, glue boards should be placed against walls and other structures where lizards commonly travel. Lizards can be safely released from glue boards by pouring vegetable oil over the lizards. Lizards are protected in Tennessee and indiscriminate killing is illegal. Permission from your county wildlife officer and a permit from TWRA are necessary to keep one in captivity.



A juvenile broadhead skink has a bright blue tail, similar to a juvenile 5-lined skink.

Snakes

A common complaint regarding wildlife around the house is the presence of snakes. Many people are afraid of snakes and believe all snakes are bad and “poisonous.” (Poisonous means injury is caused by consumption. Venomous describes an animal that delivers venom through a bite or sting.) The reason most folks are afraid of snakes is that they just don’t know enough about snakes, and they don’t know how to identify snakes and distinguish venomous snakes from nonvenomous snakes. In actuality, snakes are quite beneficial because they help control rodent populations. Four species of venomous snakes occur in Tennessee: copperhead (“highland moccasin”), cottonmouth (“water moccasin”), timber rattlesnake, and pygmy rattlesnake. These snakes are pit vipers and can be differentiated from nonvenomous snakes by 3 primary methods. All pit vipers have pits (heat sensors used for detecting warm-blooded prey in low-light conditions) located between the eye and the nostril. Pit vipers also have elliptical pupils (similar to cats) and **undivided** scales on the underside of the tail including the scale covering the anus (anal plate). (NOTE: The scales on the underside of the **very tip** of the tail of pit vipers may be divided). Nonvenomous snakes in Tennessee do not have pits, their pupils are round, and all scales on the underside of the tail are divided in two. You **cannot** determine if a snake is venomous by the shape of its head.

Six of the most common and most beneficial snakes to have around the home include the black rat snake, kingsnake, garter snake, milksnake, and corn snake. Black rat snakes and kingsnakes, in particular, are very important in keeping rodent populations down. Kingsnakes will kill and eat venomous snakes, including copperheads.

The primary nonvenomous snakes found around homes in Tennessee include the scarlet kingsnake or milksnake, rat snake, common kingsnake, corn snake, eastern garter snake, eastern hognose snake, and northern watersnake. If you are not familiar with these snakes, go to tennsnakes.org operated by the Tennessee Herpetological Society and learn to identify them. They are harmless to humans and very beneficial to have around the house.

If snakes are found frequently around your house, it is probably because there is an abundance of rodents in the area. All snakes are predators and, depending upon the species of snake, eat many different kinds of food—from

rodents to insects, birds and eggs, worms, fish, and frogs. Snakes typically are found in areas that provide shelter for rodents, such as woodpiles, brushpiles, rockpiles, overgrown fields, and old sheds and barns (especially those where feed is stored). The best way to reduce snake populations around your house is to remove or clean up those areas that are attractive to rodents. Vegetation should be mowed closely and brushpiles and rockpiles near a house or other building should be removed to make the area less attractive to rodents and snakes.

Many people kill snakes as soon as they are encountered. Snakes are protected wildlife species and indiscriminate killing is illegal. However, if a venomous snake poses a genuine threat, it is legal to kill the snake.

Glue boards are effective for trapping and removing small- to medium-sized snakes. Vegetable oil is used to dissolve the glue and release the snake unharmed once the snake has been relocated. Snake repellants are not effective. Exclusion is the most important step in avoiding problems with snakes in homes or other buildings. All openings into buildings ¼-inch or larger should be sealed by some means, such as boards, mortar, steel wool, sheet metal, or hardware cloth.



Above: Glue boards are very effective at catching “critters” in the house. Beneficial animals, such as this corn snake, can be released unharmed by pouring vegetable oil over the animal, which helps dissolve the glue and releases the trapped animal.

Right, top to bottom: Pictures of black rat snake, kingsnake, garter snake, milksnake, and corn snake.



Rob Hunter



Matthew Niemiller



Rob Hunter



In this picture, there are 2 copperheads and a northern watersnake. Notice the round pupils of the northern water snake and the vertical, elliptical pupils of the copperheads. All pit vipers have elliptical pupils. The northern water snake, though aggressive, is not venomous.



Eastern hognose snakes also are common around homes. Although they may appear dangerous by hissing and flattening their heads to appear larger than they are, they are harmless to humans, and when approached closely, feign death by turning over and opening their mouth. (Notice the leeches in this hognose snake's mouth.)





Kristy Keel-Blackmon

Crayfish chimney by a backyard pond.

Crayfish (crawdads)

Crayfish can cause damage to lawns, earthen dams, gardens, and agricultural crops with their tunneling and feeding activities. Most species of crayfish create burrows on dry land. These cone-shaped mounds of mud can be as deep as three feet to aid in escape from predators and provide shelter when molting and nursing, especially in early spring, when breeding season peaks, through fall when adults are in their burrows. The number of burrows increases when crayfish populations are high and when water levels rise and fall frequently. Many burrows have more than one entrance hole (with up to a 2 inch diameter).

Most people do not like crayfish burrows popping up in their lawns as they look like “chimneys of mud.” Indirectly, these chimneys

can be a source of extensive lawn damage as raccoons, skunks, and armadillos use them as a starting point to dig for crayfish. Where crayfish occur along shallow-water dikes, tunnels below the waterline serve as channels for water leakage, whereas those above the waterline can compromise the structural integrity of dikes, eventually causing them to fail. There are no fumigants or general-use pesticides registered for crayfish control, primarily because of the potential to compromise water quality. However, boiling water can be poured into crayfish burrows in yards to reduce crayfish activity.



Summary

Knowledge and perspective are critical when considering wildlife around your home. It is possible to have wildlife around the home, enjoy their presence, and at the same time control the activity and presence of unwanted wildlife. The knowledge necessary for this balance includes some understanding of the biology and requirements of the wildlife species that occur around your home. This publication provides an overview of some of the most common wildlife species that occur around homes in Tennessee along with techniques to attract various species

and control others. The best application of control methods requires balancing the needs of yourself and other residents as well as the wildlife in the area. For homeowners and gardeners seeking to create attractive habitat for various wildlife species and solve nuisance wildlife issues, this information along with other supplemental resources and advice from UT Extension, TWRA, and USDA-Wildlife Services professionals should help in managing wildlife to create an enjoyable and sustainable residential area.

Example of a no-mow backyard.



Table 4: Baits and Trap Sizes for Various Animals.

SPECIES	BAIT	LIVE TRAP SIZE (INCHES)	OTHER
Opossum	Vegetables, apple slices, sardines, scrap meat, canned dog food, chicken entrails, fish, table scraps	11 x 11 x 36	
Rabbit	Vegetables, cabbage, carrots, lettuce, bread, apple slices	7 x 7 x 30	Enclosed box trap does not have to be baited, lead the rabbit over the trip by placing several small pieces of bait in front of the trap and at 3" or 4" intervals on into the trap.
Raccoon	Fish (fresh or canned), scrap meat, canned dog food, sardines, chicken, whole fresh egg over sardines, bacon, table scraps, sweet corn, and fish flavored cat food	13 x 13 x 42	Fish oil or commercial raccoon lure are attractive to coons.
Skunk	Chicken heads or entrails, fish (fresh or canned), scrap meat, canned dog or cat food, sardines, dead mice, whole fresh egg over sardines, bacon, table scraps, peanut butter and honey.	7 x 7 x 30	Skunks usually do not spray if trap is covered with a burlap bag to darken it before transporting.
Squirrel	Nuts, peanut butter, whole peanuts, rolled oats, bread, shelled corn, pumpkin or sunflower seed, dried prunes	7 x 7 x 30	Set traps along paths frequently used by squirrels — tree bases, feeding stations, rooftops, etc.
Weasel	Fresh fish, liver, chicken entrails, meat scraps	5 x 5 x 18	Place trap in crannies, brushpiles, log piles, or any small covered area. Adjust pan to "hair trigger."
Groundhog	Lettuce, peas, beans, corn, cabbage, carrots, apples, other fruits	11 x 11 x 36	
Coyote	Weiners, canned dog food	30 x 30 x 70	Commercial coyote scents work well.
House Cat	Fish, meat, cat food, table scraps	11 x 11 x 36	
Fox	Chicken necks and entrails, meat or flesh from almost anything that walks, flies or swims	12 x 12 x 55	Commercially available fox urine is effective, and just a small amount on the end of a stick is enough.
Chipmunk	Nuts, peanut butter, bread, shelled corn, unroasted peanuts, rolled oats, apple cubes, sunflower seeds	5 x 5 x 18	Set traps near trails or dens.
Mouse	Cheese, bread, oatmeal, peanut butter, nuts, gumdrops, raisins, scorched bacon (most human foods are readily accepted)	3 x 3 x 10	
Mink	Chicken entrails, fresh fish, liver	7 x 7 x 30	Cubby sets are effective. Place brush or other material over the trap so animal has sensation of going into a hole to get bait.
Muskrat	Apples slices, other fruits, carrots, cabbage, lettuce	7 x 7 x 24	

SPECIES	BAIT	LIVE TRAP SIZE (INCHES)	OTHER
Rat	Blood, meat scraps, peanut butter, cheese, gumdrops, (most human foods are readily accepted)	5 x 5 x 18	Place traps along walks, behind objects, along sills, head boards and rafters.
Dog	Weiners, canned dog food, bacon, smoked ham scraps, table scraps	30 x 30 x 70	
Bobcat	Chicken necks and entrails	12 x 12 x 56	Commercial bobcat scents work well.
Voles	Peanut butter, oatmeal, apple slices		
Crawdads	Chicken and dead fish		Use minnow trap.

Additional sources of information:

The Internet Center for Wildlife Damage Management | <http://icwdm.org>

Going native: Urban landscaping for wildlife with native plants | <https://projects.ncsu.edu/goingnative>

Rid Your Home & Yard of Problem Wildlife by HomeAdvisor | <https://tiny.utk.edu/homeadvisortips>

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