



12 WILDLIFE HABITAT TIPS FOR SMALL ACREAGES

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Introduction

Many Arkansans enjoy seeing wildlife on their property. What private landowners do with their land directly affects wildlife populations in the state. An estimated 82 percent of the total land base in Arkansas is privately owned (Figure 1). Surveys show that although many Arkansas landowners would like to do more for wildlife on their property, many do not know what to do. This is particularly the case for landowners with less than 40 acres whose landholdings are located on the fringe of cities or rural communities.

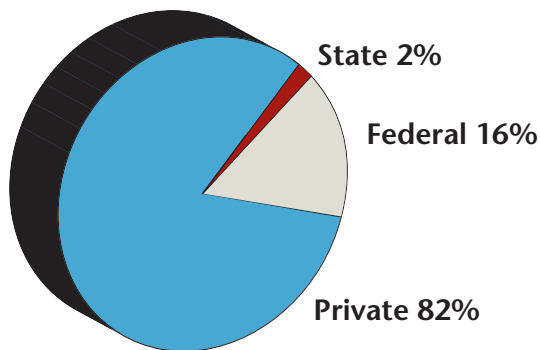


Figure 1. Number of acres in federal, state and private land ownership in Arkansas. Data from the National Wilderness Institute, 1995.

Often, landowners assume that wildlife will remain on their property permanently if they improve food and cover areas. Implementing a few habitat improvements on small acreages can help wildlife such as squirrels, rabbits, frogs, turtles, butterflies and songbirds. However, the home ranges of deer, wild turkey and black bear can be more than 1,000 acres. These species will travel great distances to meet their seasonal needs for food and cover. Small acreages may not gain a permanent flock of turkeys, but those lands may become an important part of their range (Figure 2). As a small acreage landowner, your efforts can make a difference even if wildlife inhabit your land only seasonally or temporarily.



Figure 2. Wild turkeys use forest openings for bugging and nesting. Photo by Lynn Betts, USDA Natural Resources Conservation Service.

Sometimes landowners question if they should manage habitat or leave it alone and let nature take its course. The answer depends on the type of habitat and wildlife that currently exist on your property and your habitat goals. It also depends on the habitat and wildlife in surrounding properties. Implementing a habitat practice could benefit some wildlife species and be detrimental to others. However, practically every landholding can benefit from some habitat management.

Change is continually taking place in nature. Some early successional habitats (e.g., grasslands) change dramatically in a year or two, while mature forests change gradually over a century or longer. For bobwhites, wild turkey, deer, bluebirds, cottontails and frogs, a good management choice is to offer a mix of cover types. Smaller landholdings may not be large enough to provide a diversity of cover. Find out what habitat is missing in your area that will attract the wildlife species you are interested in having on your property.

The first step is to make a wildlife management plan. Select your wildlife species and plan your habitat accordingly. The next section describes management practices that will improve small acreages for wildlife. Some

habitat practices require more investment of time and resources than others. The last section describes resources available for helping improve your property for wildlife.

Plan for Success

A good wildlife management plan will improve the chances of attaining wildlife and achieving your habitat goals on your property. A habitat plan outlines a course of action so that good habitat is created for one or more selected species and not inadvertently destroyed. A plan will also identify a sequence for implementing habitat practices to maximize efficiency and produce the best outcomes for wildlife. Management plans are not static – they are working documents that change depending on plant responses to your practices, wildlife usage, economic costs, seed availability, the weather and other factors.

Match your management plan to the wildlife species you want to encourage. It is useful to target your habitat management toward specific species or *feature* species. Those habitat management practices which benefit a feature species will also likely benefit a host of other wildlife requiring similar habitat. Conversely, some habitat practices may reduce or harm habitat for other wildlife. It is important to recognize what you are “giving up” as well. A simple example is creating small openings of < 5 acres in a mature oak forest. Openings may benefit turkey but reduce habitat for gray squirrels and woodpeckers. These tradeoffs need to be considered carefully before implementing any habitat practice.

A map aids in identifying where habitat improvements are needed on your property. The size and arrangement of newly created habitat affect species’ responses. Cottontails do well in habitat consisting of clovers and native forbs, native warm-season grasses, blackberry thickets and brushpiles in areas of one to five acres. Bobwhites use this habitat, but they also need shrubby areas, woodlands and old fields within 40 to 80 acres. As such, the landowner needs to visualize the location of current and future habitat on a map. Some habitats require periodic maintenance such as burning or mowing every one to three years (or up to five years if growth is

extremely slow) to keep grasslands in an early successional stage. The sequence of when these disturbances occur should be labeled on the map.

In summary, a good wildlife management plan contains the following:

- A clear set of *objectives* identifying the feature species with easily made measurements to assess success. For example, a good objective would be: “Increase the number of nesting eastern bluebirds on the property.”
- A written *description of the area* including its location, number of acres, soil type(s), land use, vegetative cover and current wildlife populations.
- *Habitat requirements* for the feature species. For example, eastern bluebirds are cavity nesters, so they require snags and/or artificial nesting structures. Bluebirds thrive on the edge of open areas including old fields, pastures, yards and utility right-of-ways. These open areas should harbor plenty of insects (their food source) and be located near scattered areas of hardwoods.
- A *plan of action* for implementing the management practices. Use a sketch map or mark on an aerial photograph to illustrate where your habitat practices will be implemented (Figure 3). Aerial photographs are available at no charge from the Natural Resources Conservation Service or the Farm Service



Figure 3. An example of how an aerial photo of your property and surrounding properties can help with planning and improving wildlife habitat.

Unique Ecosystems

Conducting a habitat assessment is important before making changes to your property. Is your property part of a unique, contiguous, mature forest, swampy bottomland hardwoods, unbroken prairie, forest glade or river canebreak? Following are descriptions of these unique ecosystems:

- **Mature forest.** If you own a few acres of mature forest near a greater expanse of forest, consider avoiding management practices which greatly disturb this ecosystem. A contiguous forest benefits a number of area-sensitive species, many of which are considered species of concern in Arkansas. An example is the pileated woodpecker (Figure A) which lives in mature forests and requires large territories of 160 to 250 acres. These large birds nest in dead trees at least 12 inches in diameter. They feed upon carpenter ants which help recycle dead or decaying wood in these mature forests.



Figure A. Pileated woodpeckers live in mature forests where minimal habitat management is necessary. Photo by Mike Ostry, USDA Forest Service—North Central Research Station Archive, USDA Forest Service, Bugwood.org.

- **Tallgrass prairie.** Prairies attract a number of unique species such as the eastern meadowlark, grasshopper sparrow and ornate box turtle. Prairie grasslands have never been plowed. Trees are either absent or widely scattered on the landscape. Tallgrass prairies are dominated by grasses such as big bluestem and Indian grass as well as a large number of other species of grasses and wildflowers. The vegetation sometimes reaches a height of 10 feet or more. Periodic disturbance, such as a prescribed burn, is necessary to prevent woody growth from invading the prairie.

- **Bottomland hardwood forest.** These wetland forests are found along rivers and streams generally in broad floodplains. Wetlands are areas where water covers the soil or is present either at or near the soil surface for varying periods of time during the year, or all year. Wetlands are comprised of different species of gum (*Nyssa* sp.), oak (*Quercus* sp.) and bald cypress (*Taxodium distichum*), which have the ability to survive in areas that are either seasonally flooded or covered with water much of the year. Oftentimes, other than controlling invasive species, minimal management is required for this self-sustaining habitat.

- **Glade.** Glades (Figure B) are rocky, open areas with exposed rock and little or no soil. These areas have no tree canopy and very little shrubs.



Figure B. A unique nepheline syenite glade in Pulaski County, Arkansas. Photo by Mary Smith, Audubon Arkansas.

Glades vary by soil depth, type of bedrock, moisture and topography. Typically glades are found on southerly or westerly facing slopes. Although the soil is mostly dry, particularly in summer months, pockets of water may be present. These seemingly barren areas are of considerable ecological interest. A variety of plants thrive in such environments, some of which are rare such as insectivorous plants called sundews and bladderworts.

- **Canebreak.** Native canebreaks occur along rivers and streams and are prime wildlife habitat. Giant cane (*Arundinaria gigantea*) can grow to a height of 4 to 20 feet with leaf blades in groups of 3 to 5 inches long and at least ½-inch wide tapering to a point. The stem is hollow and woody, perfect for homemade cane fishing poles. Although river cane as a species is not imperiled, historically large expanses of cane no longer exist. The possibly extinct Bachman's warbler may have been a cane-dependent species, as also the extinct passenger pigeon and Carolina parakeet. Several species of butterflies and bird species such as the Swainson's and hooded warbler nest in canebreaks. Many species such as deer, black bear and swamp rabbit seek cover in cane. Deer and rabbits feed on tender new growth. Historically, wild turkey used cane. Bobwhites are known to inhabit short cane in frequently burned pine flatwoods. The seeds of native cane are reported to have more nutrients than rice or wheat. Native cane can be difficult to distinguish from its non-native invasive counterpart. Asian varieties are difficult to control and should not be planted as a substitute for native cane.

These increasingly-rare ecosystems attract unique plants and animals. To learn more about managing these habitats, contact the resources listed near the end of this publication, including the Arkansas Natural Heritage Commission (<http://www.naturalheritage.com>, 501-324-9619). Some government and nonprofit organizations are interested in preserving these types of habitats and may offer financial incentives for implementing habitat practices.

Agency office in each county (<http://offices.sc.gov.usda.gov/locator/app>). Aerial photos are also available on the internet through the Spatial Analysis Laboratory at the University of Arkansas at Monticello (<http://sal.uamont.edu/>), Geostor (<http://www.geostor.arkansas.gov>) or private companies such as TerraServer (<http://terraserver-usa.com/>) and Google Earth (<http://earth.google.com/>).

- A plan of how you will *assess* your success and know when your objectives have been achieved. For example, “Records will be kept of the number of bluebirds nesting in nest boxes, the number of eggs laid and number of nestlings fledged.”
- A *budget*. Determine how much you are willing to spend. Include costs for supplies such as tree saplings or lumber for building bird houses, equipment, fuel, labor or professional services.

On smaller acreages, develop your plan to provide habitat which is lacking within the home range of your feature species. Think strategically about habitat needs for species with home ranges larger than your property size, such as white-tailed deer or migratory songbirds. Use aerial maps to determine which habitat is lacking in your area. Develop a plan to provide the limiting habitat which will attract wildlife to your property.

≡≡≡ Tips for Managing Wildlife Habitat

1. Go native.

Wildlife are adapted to using a variety of plants throughout the year. Managing for a diversity of native plants (Table 1) offers many advantages over non-natives. Native plants are adapted to the rainfall, temperatures and soil conditions in Arkansas. These plants are equipped to survive the stresses of drought, temperature extremes, floods and plant diseases present in the area.

Relationships between plants and wildlife have developed in ways yet undiscovered. Dave Tylka in his book *Native Landscaping for Wildlife and People* writes:

Many people know the relationships between acorns and deer and turkey, flower pollination and insects, berries and our migrating songbirds, and milkweeds and monarch butterflies. When it comes to woodland wildflowers, few people know about the important role that some ants have in the dispersal of seeds for plants such as spring beauties, trilliums, wild ginger and violets. Native plants and animals have achieved a purpose, a role or niche in the environment, and their presence and well-being improve the health of the ecosystem and bring balance.

Identifying which plants are native can be difficult. The National Invasive Species Council (www.invasivespecies.gov) defines an invasive species as one that is non-native to the ecosystem and whose introduction will cause harm to the environment, economy and/or human health. Some non-native plants become invasive (Table 2). They grow and reproduce quickly in an environment where natural controls are not present. Invasive plants outcompete other plants and occupy habitat that minimizes plant diversity. An example is Japanese honeysuckle which deer consume throughout the year, but its prolific growth quickly dominates a habitat (Figure 4). Another example is sericea lespedeza, which was once a recommended wildlife planting but no longer (Figure 5). Control or eradicate invasive plants already present on your property



Figure 4. Although white-tailed deer consume Japanese honeysuckle, its prolific growth quickly overtakes native plant species. Photo by Chuck Barger, University of Georgia, Bugwood.org.

Table 1. Native plants which attract wildlife.

LARGE TREES

American beech	<i>Fagus grandifolia</i>
American elm	<i>Ulmus americana</i>
Black gum	<i>Nyssa sylvatica</i>
Swamp chestnut oak	<i>Quercus michauxii</i>
Green ash	<i>Fraxinus pennsylvanica</i>
Hackberry	<i>Celtis laevigata</i>
Longleaf pine	<i>Pinus palustris</i>
Pecan	<i>Carya illinoensis</i>
Southern red oak	<i>Quercus falcata</i>
Tulip tree	<i>Liriodendron tulipifera</i>
White ash	<i>Fraxinus americana</i>
White oak	<i>Quercus alba</i>
Willow oak	<i>Quercus phellos</i>

SMALL AND MEDIUM-SIZED TREES

Black cherry	<i>Prunus serotina</i>
Box elder	<i>Acer negundo</i>
Cherry laurel	<i>Prunus caroliniana</i>
Chickasaw plum	<i>Prunus angustifolia</i>
Crab apple	<i>Malus angustifolia</i>
Eastern redbud	<i>Cercis canadensis</i>
Flowering dogwood	<i>Cornus florida</i>
Hawthorns	<i>Crataegus</i> spp.
Hollies	<i>Ilex</i> spp.
Ironwood	<i>Carpinus caroliniana</i>
Pawpaw	<i>Asimina triloba</i>
Persimmon	<i>Diospyros virginiana</i>
Red mulberry	<i>Morus rubra</i>
Sassafras	<i>Sassafras albidum</i>
Serviceberry	<i>Amelanchier arborea</i>
Silverbell	<i>Halesia diptera</i>
Sumac	<i>Rhus</i> spp.
Wild plum	<i>Prunus americana</i>

SHRUBS

American beautyberry (French mulberry)	<i>Callicarpa americana</i>
American holly	<i>Ilex opaca</i>
Arrowwood	<i>Viburnum</i> spp.
Buttonbush	<i>Cephalanthus occidentalis</i>
Blueberries	<i>Vaccinium</i> spp.
Chockberry	<i>Aronia arbutifolia</i>
Devil's walking stick	<i>Aralia spinosa</i>
Elderberry	<i>Sambucus canadensis</i>
False indigo	<i>Amorpha fruticosa</i>
Hollies	<i>Ilex</i> spp.
Huckleberry	<i>Gaylussacia</i> spp.
Possumhaw	<i>Ilex decidua</i>
Red buckeye	<i>Aesculus pavia</i>
Spicebush	<i>Lindera benzoin</i>
Wahoo	<i>Euonymus americanus</i>

VINES

Blackberry, Dewberry	<i>Rubus</i> spp.
Coral honeysuckle	<i>Lonicera sempervirens</i>
Cross vine	<i>Bignonia capreolata</i>
Trumpet vine	<i>Campsis radicans</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>

WILDFLOWERS

Bee balm (horsemint)	<i>Monarda</i> spp.
Black-eyed Susan	<i>Rudbeckia hirta</i>
Butterflyweed	<i>Asclepias tuberosa</i>
Cardinal flower	<i>Lobelia cardinalis</i>

Carolina vetch	<i>Vicia caroliniana</i>
Common milkweed	<i>Asclepias syriaca</i>
Compass plant	<i>Silphium laciniatum</i>
Indian paintbrush	<i>Castilleja coccinea</i>
Ironweed	<i>Vernonia altissima</i>
Lanceleaf coreopsis	<i>Coreopsis lanceolata</i>
Lespedeza (native)	<i>Lespedeza virginica</i>
Partridge pea	<i>Chamaecrista fasciculata</i>
Prairie dock	<i>Silphium laciniatum</i>
Purple beardtongue	<i>Penstemon cobaea</i>
Purple coneflower	<i>Echinacea purpurea</i>
Rose verbena	<i>Glandularia canadensis</i>
Rosin weed	<i>Silphium integrifolium</i>
Rattlesnake master	<i>Eryngium yuccifolium</i>
Salvia	<i>Salvia</i> spp.
Showy goldenrod	<i>Solidago speciosa</i>
Tall blazing star	<i>Liatris aspera</i>

GRASSES

Big bluestem	<i>Andropogon gerardii</i>
Broomsedge	<i>Andropogon virginicus</i>
Indian grass	<i>Sorghastrum nutans</i>
Little bluestem	<i>Schizachyrium scoparium</i>
River oats	<i>Chasmanthium latifolium</i>
Sideoats grama	<i>Bouteloua curtipendula</i>
Switchgrass	<i>Panicum virgatum</i>

Table 2. Aggressive native and exotic plant species to avoid planting for wildlife. (Adapted from Tylka 2002 and USDA Forest Service Southern Region Task Force on Assessment to Identify High Threat Invasive Species.)

NATIVE PLANTS

Common sunflower	<i>Helianthus annuus</i>
Horseweed	<i>Conyza canadensis</i>
Joe-pye weed	<i>Eupatorium purpureum</i>
Greenbrier	<i>Smilax</i> spp.
Reed canary grass	<i>Phalaris arundinacea</i>
Sesbania	<i>Sesbania exaltata</i>
Sawtooth sunflower	<i>Helianthus grosseserratus</i>
Tall coreopsis	<i>Coreopsis tripteris</i>
Tall goldenrod	<i>Solidago altissima</i>
Tick trefoil	<i>Desmodium perplezum</i>
Wild lettuce	<i>Lactuca canadensis</i>
Wild potato vine	<i>Ipomoea pandurata</i>
Yarrow	<i>Achillea millefolium</i>

EXOTIC PLANTS

Autumn olive	<i>Elaeagnus umbellata</i>
Bush honeysuckles	<i>Lonicera morrowii</i> , <i>Lonicera maackii</i>
Caucasian bluestem	<i>Andropogon bladhii</i>
Crownvetch	<i>Securigera varia</i>
Common privet	<i>Ligustrum sinense</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Johnsongrass	<i>Sorghum halepense</i>
Kudzu vine	<i>Pueraria lobata</i>
Multiflora rose	<i>Rose multiflora</i>
Musk thistle	<i>Carduus nutans</i>
Purple loosestrife	<i>Lythrum salicaria</i>
Queen Anne's lace	<i>Daucus carota</i>
Russian olive	<i>Elaeagnus angustifolia</i>
Sericea lespedeza	<i>Lespedeza cuneata</i>
Sweet clover (white and yellow)	<i>Melilotus alba</i> and <i>Melilotus officinalis</i>
Tall fescue	<i>Festuca arundinacea</i>
Winged euonymus	<i>Euonymus alatus</i>

using a combination of herbicides and other practices such as disking or burning. Check with your local county Extension agent for recommendations about controlling invasive plants.

Old Pastures and Fields. Choice native grasses are big bluestem (Figure 6), little bluestem, Indian grass and switchgrass. These bunch grasses provide better nesting and brood-rearing cover than sod-forming grasses such as fescue, bermudagrass and bahiagrass. An ideal stand of native grasses will have clumps of grass with bare ground underneath providing travel lanes for young cottontails and thumb-sized bobwhite chicks. The tall grasses above create an umbrella



Figure 6. Big bluestem is a native warm-season clump grass ideally suited for nesting and brooding of wild turkey and bobwhites. Photo by Jennifer Anderson @ USDA-NRCS PLANTS Database.

warm-season grasses can take several years. For more information about appropriate herbicide treatments and establishment practices, contact your local county Extension office.



Figure 5. Sericea lespedeza is no longer recommended as a wildlife planting because its invasive qualities have outpaced benefits for wildlife. Photo by James H. Miller @ USDA-NRCS PLANTS Database.

or canopy effectively hiding them from predators. These tall grasses afford cover for a number of other species as well, such as bedding areas for deer. A second-year field of native grasses with some first-year dead plant material provides ideal habitat for ground-nesting birds. Native grasses require maintenance activities such as disking or burning every one to three years to keep the field in an early successional stage. Establishing native

Around the Home. If landscaping is your interest, consider turning your yard into a native showcase. Native plants, particularly nectar-producing plants, will attract butterflies and hummingbirds. To plant seeds, prepare a weed-free seedbed of 2 to 3 inches of loose soil. Ask your county Extension agent for recommendations to rid an area of grass and competing plants before planting. Cover the seed very lightly or not at all. If the plot is watered, use a fine spray. A light covering of straw or pine needles may help hold the seed in place on slopes. To help germination, press the seed into the soil using a roller (a large cylinder device) attached to a tractor or ATV, or tamp with a hoe or rake, or walk on the planted seedbed.



Figure 7. The American Beautyberry, also called French Mulberry, is a native plant consumed by white-tailed deer and songbirds and also is an attractive ornamental shrub. Photo by the author.

Seeds or pots of native plants can be purchased from several horticultural or seed businesses throughout Arkansas or propagated from the seed of wild plants. Note that many public lands prohibit collecting plants or their seeds. If collecting seed from someone else's property, always get permission first.

The Arkansas Native Plant Society (www.anps.org) lists certified seed sources on its web site and sells a checklist of Arkansas native plants. Other excellent resources for identifying native plants are the USDA Plant Database (<http://plants.usda.gov>), the Lady Bird Johnson National Wildflower Center's Native Plant Network (<http://www.wildflower.org/>), the Arkansas Natural Heritage Commission (501-324-9619, <http://www.naturalheritage.com/>) and your county Extension agent (www.uaex.uada.edu).

2. Disk lightly, no seeds required.

Another option for encouraging native plants is disking to release seeds from the seedbed (Figure 8). Light disking will encourage growth of annual plant communities and provide a vegetation structure for grassland species such as bobwhites, cottontails and songbirds. For the past several decades, bobwhite numbers have been declining in Arkansas and the Southeast. Bobwhites thrive in complex landscapes that resemble a patchwork of small crop fields, old fields, woodlands and brush. Strip disking on a one- to three-year rotation creates multiple



Figure 8. This native plant growth occurred shortly after disking a field. *Photo by Lynn Betts, USDA Natural Resources Conservation Service.*

habitat types in a relatively small area. Disking in the winter produces forbs and wildflowers while disking in April increases seed-producing grasses, though results can vary depending on the seedbed. If non-native plants are predominant on disked soil, herbicide treatment may be necessary. For more information about disking, see publication FSA9100, *Light Disking to Improve Wildlife Habitat in Grasslands and Old Fields*.

3. Burn, burn, burn.

Prescribed burning (Figure 9) is a cost-efficient and effective tool for encouraging native plants in fields and woodlands. Fire scarifies seeds promoting germination and opens up the ground for native seeds to take root, resulting in a flush of plant growth. For small acreages, prescribed burning may not be feasible because of proximity to other residences, smoke issues, liability issues and safety considerations. If burning is an option, hire a professional by contacting



Figure 9. Prescribed fire on 10-acre area near Booneville, Arkansas. *Photo by the U.S. Forest Service.*

your local county forester with the Arkansas Forestry Commission. Typically, burns are conducted January-March to encourage lush plant growth of forbs in the spring, but fall burns can result in growth of seed-bearing plants. Avoid burning in the spring and summer when animals are being born.

4. Mow high and inside-out.

Of the many alternatives for managing wildlife habitat, mowing is the least-preferred but probably most-used practice. Unlike prescribed fire or grazing elk herds of centuries ago, mowing does little to open bare ground or promote soil nutrient cycling which encourages new plant growth and food sources for wildlife.

Mowing can be an effective habitat management tool if used properly and discriminately. Mowing can control non-native plants and prevent woody growth in grassland habitats. Mow pastures and grasslands after July 15 or later to avoid disturbing late broods of ground-nesting birds or late-born fawns. Mow plants which compete with native grasses and forbs to prevent them from going to seed. Raise the blade 8 to 12 inches high when bushhogging to encourage root growth and improve winter survival of native grasses. When mowing the yard, set the mower at its highest level, usually 3 to 4 inches.

Whether mowing your yard or pasture, start in the middle and mow toward the outer borders. This will allow wildlife to stay in or flee to existing cover during the mowing operation. Less wildlife will be killed by lawnmowers, tractor wheels or cutter blades rather than being

trapped inside an ever-decreasing circle. This method also decreases predation by predators which make an easy meal of a rabbit or turkey poult trying to cross open ground.

If mowing with a tractor, consider attaching a flushing bar to the front to move wildlife away from dangerous wheels and cutters (Figure 10). Attach lengths of chain (¼ inch with galvanized coating) to 10 feet or more of PCV pipe or angle iron offset to the front of the tractor. The chain



Figure 10.
A wildlife flushing bar viewed from inside a tractor cab.

should be long enough to ride just above the surface of the ground. Space the chains 18 to 24 inches apart. The rattling chains will cause rabbits and quail to move away. Watch for concealed or slow-moving wildlife such as box turtles or fawns and relocate them if necessary.

Leave field borders and drainages uncut and allow tall grasses and shrubs to grow. Excellent wildlife habitat can be created by leaving uncut areas 30 feet or more from the field border. Irregularly shaped field borders provide more cover for wildlife. Maintain early plant succession between woodland edges and fences by mowing 10-foot strips every year before April 1 or after July 15.

5. Supplemental feeding is for the birds (not mammals).

Bird feeders come in a variety of shapes and sizes, but the best feeders are cylinders with post perches. This birdfeeder design limits aggressive birds from gobbling up too many seeds (Figure 11). Black-oil sunflower seeds attract the widest variety of birds, such as cardinals, chickadees, goldfinches and nuthatches. Throw white proso millet on the ground or on a platform feeder to attract ground feeders such as mourning doves, sparrows and juncos. Clean feeders with a weak bleach solution and cease summer feeding to reduce disease transmission. In the winter months, attract birds using beef suet (fat) hug from a wire basket, mesh fruit bag or log with holes cut into it and stuffed with suet.

Hummingbird feeders can be filled with one part sugar to four parts water. Red dye can be added to the water initially to attract hummers but is not necessary once the birds become accustomed to the location. Hummingbird feeders will also attract orioles, as well as unwanted ants and wasps. Ants



Figure 11. Chickadees and other backyard birds are attracted to black-oil sunflower seeds dispensed in cylinder feeders with perches. Photo by Alfred Viola, Northeastern University, Bugwood.org.

can be thwarted by greasing the string holder with petroleum jelly or creating a moat filled with water. If wasps are a problem, consider purchasing a hummingbird feeder where the sugar water is farther from the opening. Hummingbirds have tongues which are longer than the mouthparts of wasps. Hummingbird feeders need to be cleaned frequently, particularly in the summer months when the sugar water can ferment in a matter of days. Clean with hot water and scrub out algae if needed.

Mammals such as squirrels, deer and black bear have been known to incidentally feed on seeds from bird feeders (Figure 12). However, attracting wildlife to corn feeders, piles of wheat or other grains is not advisable. And some believe bird feeding should be stopped, too. A

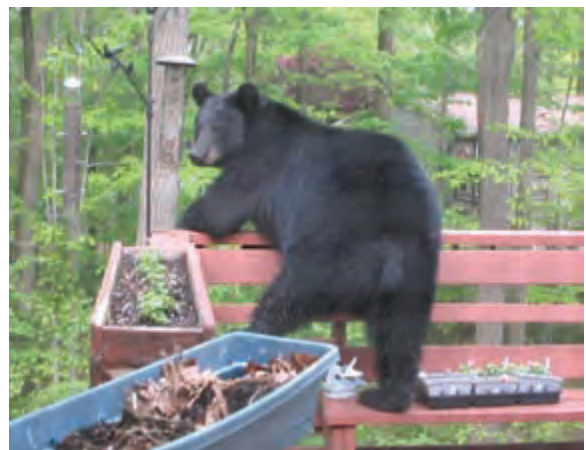


Figure 12. Sometimes wildlife other than songbirds feed on birdseed. Photo by Brian Fillmore, www.hopatcongpolice.org.

literature review conducted by The Wildlife Society (an association of wildlife professionals) indicates public baiting and/or supplemental feeding harms wildlife in these ways:

- Concentrating wildlife at greater than natural densities.
- Increasing direct and indirect contact among wildlife species.
- Increasing wildlife habituation to humans and detracting from wild behavior.
- Increasing the likelihood of disease transmission within and among species, and maintaining endemic disease reservoirs.
- Reducing home range size, increasing fecundity and affecting carrying capacity.
- Causing significant habitat damage in areas of baiting and feeding sites.
- Significantly affecting populations of non-target wildlife species.
- Increasing intra- and inter-specific competition and stress among and within target and non-target wildlife populations.
- Redirecting attention, resources and effort away from managing native habitat.

For these and other reasons, attracting deer using corn feeders is not recommended (Figure 13). Corn is low in protein (7 to 9 percent) and is poor nutrition for antler, muscle and body growth. Although hunters use corn feeders to improve harvest success, little evidence supports this perception. A comparison of hunter success in states with and without baiting regulations indicated no advantage. A Mississippi study found 90 percent of bucks' usage of bait stations was after nightfall during non-legal shooting hours.

Additionally, deer corn could be infected with aflatoxin at levels which are fatal to wild turkey and other birds. Mammals are less susceptible to toxicosis than birds. Aflatoxin is a fungus which appears when corn is grown under drought conditions. Aflatoxin continues growing while in the bag under a variety of conditions – hot or cold, wet or dry. The only exception is aflatoxin stops growing when frozen. Most corn sold for deer is of low quality and likely to



Figure 13. Because of disease transmission and other issues, wildlife biologists do not recommend feeding corn to deer and other wildlife. *Photo by Ken Hammond, USDA Natural Resources Conservation Service.*

contain aflatoxin. A 1990 study by the Texas Department of Agriculture tested deer corn for aflatoxin. Forty-four percent of the corn tested positive with 31 percent testing at levels which were deadly to birds. Broken or stunted corn kernels, which quail are more likely to ingest, often have higher concentrations of aflatoxin than whole kernels. Placing “aflatoxin-free” corn in feeders will not eliminate the problem if infected corn was previously used. Feeders need to be cleaned and disinfected periodically to prevent aflatoxin.

Another type of deer attractant are mineral supplements. Mineral supplements are sold commercially on the premise that the ingredients will improve antler growth, body mass and growth rates of deer. Whether this is true depends on a number of factors including habitat quality and deer population size. If habitat is poor or the deer herd overpopulated, mineral supplements will not improve herd health or antler growth. Deer in poor habitat are not acquiring enough food, so mineral supplements do little to compensate. For example, people take vitamins to fill in nutritional gaps, not as a food substitute. Healthy deer living in optimal habitat benefit from mineral supplements, as shown experimentally with pen-raised deer. Habitat quality for

wild, free-ranging deer varies considerably in Arkansas both geographically and seasonally. Also consider an individual deer's access to mineral supplements can be variable. Whether such attractants improve hunting success is debatable. Deer biologists report that mineral supplements tend to attract deer in the spring rather than during hunting season. For these reasons, the value of mineral supplements is questionable.

Wildlife food plots are considered a more natural way to attract wildlife. On small acreages, food plots can benefit a number of species with smaller home ranges, such as rabbits, snakes and field mice. Food plots can also attract deer to a particular area to improve chances of harvest and control herd size. However, food plots do little to improve the health and sustainability of wildlife populations unless planting extensively in openings over several thousand acres. Typically non-native commercial plantings are used to attract wildlife. These can be expensive and under-utilized when acorns and native plants are readily available. Rather than relying solely on food plots, managing a diversity of native plants will do far more to benefit wildlife on your property.

6. Good soil = good wildlife.

Fertilizing and liming are alternatives to mineral supplementation and non-native food plots. Adding soil amendments to *established* native plants increases the availability of soil nutrients for wildlife consumption. But soil amendments can also improve growth of non-native plants which can outcompete native plants, so carefully consider when and where to apply fertilizer and lime. Collect soil samples before adding soil amendments and apply only what is needed to improve plant growth. Excessive fertilization is not only wasteful economically, but can contribute to surface and groundwater pollution. Your county Extension agent can help with information about collecting soil samples and interpreting results, as well as fertilizer options and application methods.

Fertilize existing native, non-invasive forbs, shrubs and vines which wildlife are known to consume. Disking, fertilizing and liming a plot will stimulate growth of native forbs present in

the seedbed. Apply fertilizers consistent with soil test results and keep track of plant responses as soil amendments can cause non-native vegetation to flourish and potentially outcompete native vegetation.

Some people experiment with fertilizing oak trees to improve acorn production, nutrition and palatability to wildlife. Current evidence is unclear about whether fertilizing oak trees improves acorn production or palatability. Those experimenting with oaks typically apply fertilizer around the tree's drip line. Observations indicate wildlife are attracted to these fertilized trees, but it is unclear whether wildlife are attracted to improved acorns or to the fertilized forbs and saplings growing under the tree canopy. Plants under the tree canopy may remove most of the nutrients from fertilizers before the oak tree has an opportunity to absorb them. These and other lingering questions remain about whether fertilizing oak trees is worthwhile.

7. Save pests, limit pesticides.

Many wildlife species rely on insects for food. Insects are a high-energy and protein-rich food source for many wildlife species. Bobwhite and wild turkey poults feed heavily on insects during their first few weeks of life, with studies indicating insect consumption is imperative for proper growth, feather development and thermoregulation. A number of songbirds including bluebirds, purple martins and our state bird, the northern mockingbird (Figure 14), consume primarily insects. Lizards, frogs, bats and small snakes consume insects. Though most pesticides today have been screened and tested for lethal impacts on mammals and



Figure 14. Insects are a primary food source for many wildlife species including the Arkansas state bird, the northern mockingbird. Photo by Ryan Hagerty, U.S. Fish and Wildlife Service.

birds, use pesticides sparingly. Insects affected by pesticides may be less active and more prone to be consumed by birds, reptiles and amphibians, which are in turn consumed by other wildlife in the food chain.

If pesticides are necessary, closely follow label directions. Remember when it comes to pesticides, “more” is not better. Some evidence indicates homeowners use more pesticides on their lawns and contribute more to water pollution than agriculture or industry. Always apply pesticides in the quantity indicated on the label. Never apply pesticides where the potential exists for runoff into a stream or pond. The result could be a fish kill. When applying pesticides, target areas where pesticides are needed rather than broadcasting throughout your property. Also select pesticides specific for the insects you are controlling and with shorter residual effects.

8. Water, water everywhere but not enough to drink?

Compared to most states, Arkansas has an abundance of surface water available to wildlife. However, the quality of water habitats and access needs to be considered in relation to your property. Protecting water sources from sediments and pollution is important for improving wildlife populations. Trees stabilize streambanks and protect water from sedimentation. A lack of shade raises water temperatures and negatively affects the aquatic food chain. Maintaining vegetation along rivers, streams and ponds reduces soil erosion, buffers pesticides and herbicides from entering the water and provides habitat and travel corridors for wildlife (Figure 15). All roads and trails close to waterways should be kept in vegetative cover with grass, shrub or tree buffers to reduce erosion.

Tree stands growing along streams are called riparian woodlands. In the delta, a strip of riparian woodland may be the only woody cover found in landscapes dominated by fields and pastures. The variety of trees, shrubs and other plants found in riparian woodlands are important wildlife habitat. Outside the delta, forested areas of Arkansas often have trees down hillsides and in stream bottoms. Tree species growing



Figure 15. This four-year-old riparian buffer reduces soil erosion, sustains aquatic life and provides wildlife habitat. *Photo by Lynn Betts, USDA Natural Resources Conservation Service.*

along streams likely differ from those on the adjoining slopes, making riparian woodlands biologically unique.

Riparian woodlands are managed differently from other forest woodlands. Indiscriminate timber cutting in riparian woodlands can damage streams and eliminate critical wildlife habitat. Avoid removing trees that have fallen into streams or appear ready to do so. Tree roots are keeping the bank from eroding. When a tree eventually falls, it creates important in-stream habitat for fish and other aquatic life. Trees that cause problems can be removed, but protect the streambank during tree removal. Never use heavy equipment to dredge the stream channel. Using such equipment damages the streambed and affects the aquatic habitat where fish, frogs and turtles live.

Springs and seeps are water sources for wildlife. Many springs are still used as water sources for homes and livestock. Fence livestock from springs, seeps, streams and ponds and provide them with alternative water sources to prevent sedimentation and improve water quality. For seeps, consider constructing a small basin to collect water and improve availability for wildlife.

Shallow water areas occur where soils have low permeability or a high water table that inhibits surface drainage. Typically these areas are from 1 to 18 inches deep over the majority of the area. Shallow water areas attract shorebirds,

waterfowl, wading birds, mammals, fish, reptiles, amphibians and other species that require shallow water for at least a part of their life cycle. Amphibians and reptiles need shallow water areas without fish to be successful. Typically vernal ponds dry up during the hot summer months after amphibians have progressed through their early life stages. This could be considered nature's way of removing predatory fish from these temporary amphibian nurseries. If a wetland or shallow water area is on your property currently, in most instances no action is necessary. Water will accumulate and dry up naturally. Protect shallow water areas from pesticides as these chemicals could affect the life cycle of amphibians and reptiles.

For constructed wetlands or ponds, a water control structure is needed to effectively manage these areas for wildlife (Figure 16). Water control structures can be as simple as a piece of wood across a ditch or mechanically controlled pipes with releases that can be adjusted to allow slow or quick drawdowns. An adequate method for dewatering will help promote food plants and invertebrates for waterbirds. Slow drawdowns of 2 to 3 weeks usually are more desirable for plant



Figure 16. Installing a water control structure allows water levels to be manipulated and controls plant growth for attracting waterbirds and other wildlife. *Photo by Peggy Greb, USDA Agriculture Research Service.*

establishment and wildlife use. Typically early drawdowns during the first 45 days of the growing season and 90 days before the end of the growing season result in the greatest quantities of seed production for attracting waterfowl, shorebirds and songbirds. Fall flooding which

coincides with migration attracts a number of waterfowl. Slowly flooding a site to a depth of 4 to 6 inches allows new areas of food to become available each day as the water rises.

Although ponds of any size have the potential to attract wildlife, some biologists indicate ponds less than an acre are more likely to attract songbirds and small mammals than

larger species such as wild turkey or furbearers. Ponds with gentle slopes supply foraging sites for migratory shorebirds during late summer and early fall, and again in spring. Shallow areas are prime habitat for reptiles, amphibians, birds and mammals and provide nursery habitat for young fish (Figure 17). If recreational fishing is desired, part of the pond should have steeply-cut banks to reduce rooted aquatic plant growth and to make prey more easily available to predator fish.

Plant trees and shrubs near the pond for protection, shade and cover, but avoid planting trees and shrubs on dams, levees, dikes or around water control structures because tree roots may degrade the structure's integrity. Dams, levees or dikes should be mowed no earlier than mid-July (after brooding season for most ground-nesting wildlife) to maintain grassy cover.

9. Thickets and brushpiles and brambles, oh my!

A lack of cover is a limiting factor for many wildlife populations. With careful planning, the



Figure 17. Ponds with both shallow water areas and deep-cut banks supply habitat for a diversity of wildlife and fish species. *Photo by Lynn Betts, USDA Natural Resources Conservation Service.*

proper design and placement of cover habitat can improve wildlife populations on your land. Locate brushpiles along field edges and draws where additional cover is nearby. Avoid placing a brushpile in the middle of a 10-acre open field with no nearby brushpiles, travel lanes or escape cover from predators.

A brushpile designed with travel lanes and a vacant center will attract more wildlife than one constructed haphazardly. Ideally constructed brushpiles are 12 to 15 feet in diameter and 4 to 5 feet high. Leave travel lanes and open spaces under your brushpiles. Crisscross logs to form a base, then add increasingly smaller diameter wood, topping it off with a layer of twigs and branches until the interior cannot be seen. A “living” brushpile can be created by cutting half-way through the trunk of a small cedar or other bushy tree and pushing it over.

Fencerows next to grasslands or pastures provide food, escape cover and travel lanes for wildlife. Encourage woody fencerows by not



Figure 18. Brushy fencerows protect wildlife traveling between fields and help escape predation. Photo by Tom Jacobs.

spraying or mowing next to the fence (Figure 18). Songbirds which perch on fences will deposit seeds they have consumed. Planting clumps of trees and shrubs or spreading seeds of vines and shrubs along the fencerow can speed up the process of creating brushy cover. Top large trees to keep the fencerow thick with cover.

In large fields thickets of shrubs and brambles such as blackberries and wild plum afford cover for cottontails, songbirds and quail. These clumps of shrubby thickets should be less than

250 feet apart or “softball-throwing” distance from each other to provide escape cover. Placing this cover in large fields greatly improves habitat availability and protection from predators such as coyotes. Shrubs may need to be mowed in strips periodically to prevent trees from becoming established within thickets.

10. Thinner may be better, but leave snags.

Forest and woodland habitats reflect the natural forces which impact them – wind, ice, fire, floods, insects and disease. Many wildlife species depend on these natural disturbances to create habitat. Forest openings from disturbances increase the availability of sunlight to the lower reaches of the forest, generating a dramatic increase of understory plants. Decaying trees are excavated for denning sites and attract insects which provide a food source. Although tree canopies serve as food and nesting sites for a variety of wildlife, many forest-dwelling creatures depend on food and cover at ground level. Without disturbances, the tree canopy shades out wildlife food and cover and impedes growth of tree seedlings on the forest floor. Periodic natural disturbances can be imitated through forest management.

Thinning is a valuable forest management practice when conducted with wildlife in mind. The decision to remove a tree should be based on harvesting the lower-quality and less-desirable tree species. Taking the best trees decreases the overall quality of the forest for wildlife and timber. Remove tree and shrub species that have less wildlife value to reduce competition around the valuable “crop trees.” Removing the competition increases growth rates of the valuable trees and allows their crowns to expand. Increased sunlight to the understory will encourage seedlings from desirable overstory trees and increase cover for wildlife underneath. Cutting trees should take place in late summer or early fall to minimize disturbance to nesting birds and mammals.

Many wildlife species use den trees, standing dead trees and downed trees for roosting, nesting, resting and food reservoirs from insects infesting the dead wood. As a rule of thumb, retain three to five snags (i.e., standing dead



Figure 19. Woodpeckers and squirrels use standing dead trees called snags for nesting, den sites and insect sources. *Photo by the author.*

trees) per acre, plus a number of den and downed trees (Figure 19). If few snags or downed logs are available, create them by deadening large trees by girdling or herbicide application. The retention of den trees and snags will enhance the property's ability to hold a more diverse wildlife community. Remove any dead trees which pose a risk of falling on a building or a location where people congregate.

If your property and surrounding properties are expansive forests, consider creating small openings. Removing all the trees in an area provides growing conditions for a variety of plants and increases brooding habitat for ground- and shrub-nesting wildlife. For example, wild turkey and bobwhites use openings for "bugging" and nesting. Deer browse on newly emergent forbs and brambles. Many non-game species such as songbirds depend on openings within forests for year-round habitat needs. Openings should be well distributed across the forest for wildlife to gain easy access. Openings can be maintained periodically by bushhogging, mowing or burning.

Openings should be designed to maximize edge. Edge is the transition area between two different habitat types. Increased sunlight at a forest edge generates a thicker and brushier understory and mid-story compared to a few yards inside the forest interior. This transition zone provides more diverse food and nesting habitat which attracts more wildlife.

An edge can be abrupt, such as where forest and field meet. Wildlife tend to prefer a gradual or "feathered" edge which mixes the two or more neighboring habitat types and contains qualities of each (Figure 20). Create a more natural appearance to your opening by avoiding straight edges. You can nearly double the amount of edge by simply meandering the wood's edge in a wavy fashion. Mix fields and forests along

elevation contours to create natural curves rather than squared-off rectangular openings.

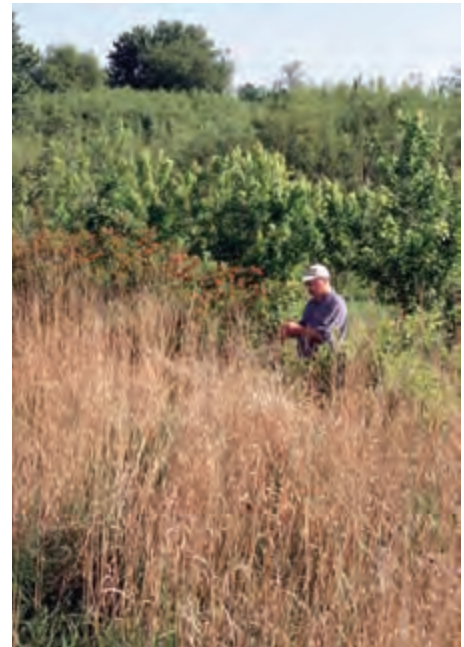


Figure 20. This buffer of native grasses adjacent to shrubs and a riparian area is ideal for white-tailed deer, wild turkey, bobwhites, cottontails and songbirds. *Photo by Lynn Betts, USDA Natural Resources Conservation Service.*

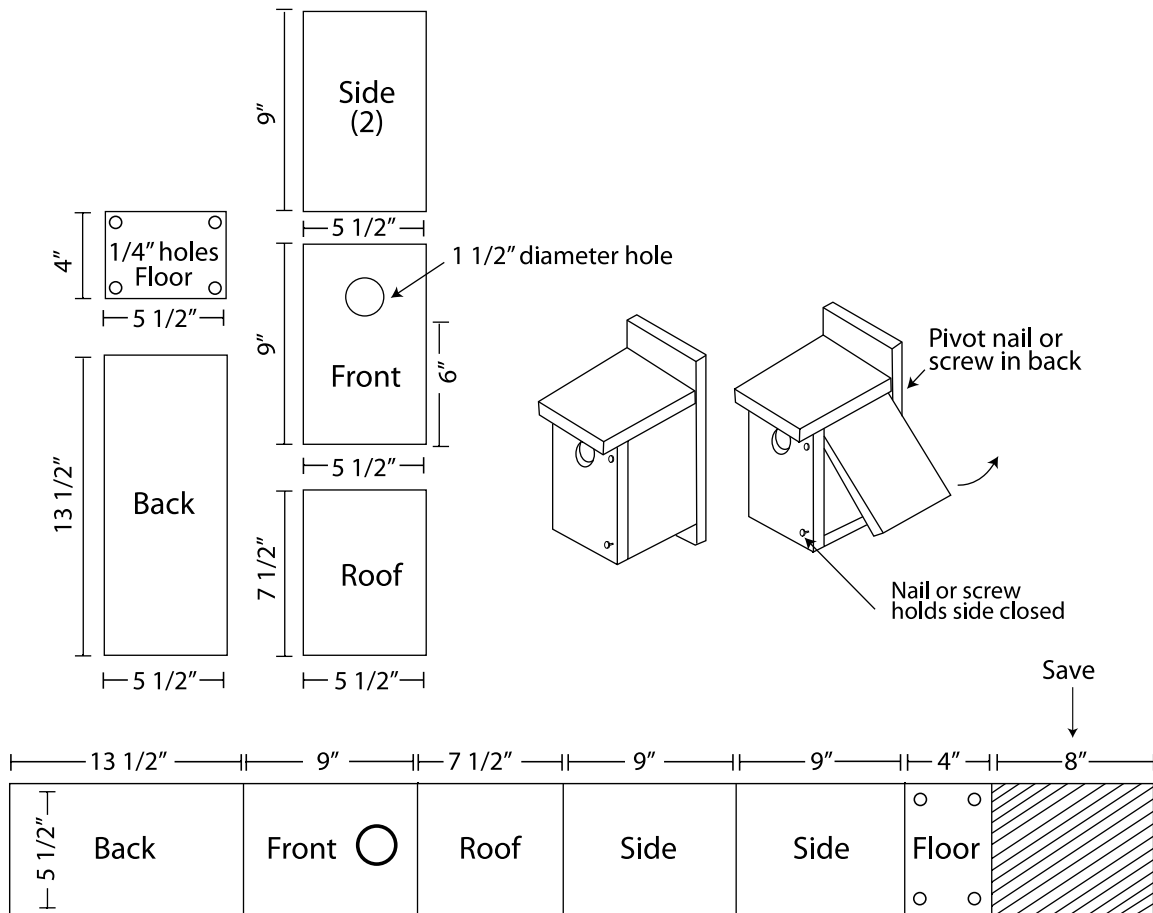
11. Home is where the nest is.

In areas where few natural tree cavities exist or competition for natural cavities is great, scattering nest boxes throughout your property can dramatically improve habitat for cavity-nesting species. Nest boxes can greatly benefit bluebirds, wrens, warblers, woodpeckers and wood ducks as well as squirrels and birds of prey (Table 3).

Table 3. Nest box specifications for birds and woodland wildlife in Arkansas.

Species	Floor Space	Total Height of Box	Entrance Hole Diameter	Hole Height Above Floor	Mounting Height Above Ground	Location Tips
BIRDS						
Eastern Bluebird	4" x 4" or 5" x 5"	8" – 10"	1½"	6" – 9"	5' – 10'	Open areas in the sun, pastures, fields or golf courses
Carolina Chickadee	4" x 4"	8" – 10"	1½"	6" – 8"	6' – 15'	Woodland clearings or edge of woods
Carolina Wren	4" x 4"	6" – 8"	1½"	4" – 6"	5' – 10'	Woodland clearings or edge of woods; backyards near buildings
Tufted Titmouse	4" x 4"	8" – 12"	1¼"	6" – 10"	6' – 15'	Woodland clearings or edge of woods
White-Breasted Nuthatch	4" x 4"	8" – 10"	1¼"	6" – 8"	5' – 20'	Woodland clearings or edge of woods; backyards near buildings
House Wren	4" x 4"	6" – 10"	1½" – 1¼"	4" – 6"	5' – 10'	Backyards near buildings
Prothonotary Warbler	4" x 4" or 5" x 5"	6" – 8"	1½" – 1½"	4" – 5"	5' – 8'	Above water or if on land, entrance should face water; moist soil bottomlands, flooded river valleys, swamps
Great-Crested Flycatcher	6" x 6"	8" – 10"	1¾" – 2"	6" – 8"	8' – 20'	Open areas in the sun, pastures, fields or golf courses; woodland clearings or edge of woods
Yellow-Bellied Sapsucker: <i>Place 2" – 3" sawdust in bottom of box</i>	5" x 5" or 6" x 6"	12" – 18"	1½" – 1¾"	9" – 16"	10' – 40'	Woodland clearings or edge of woods
Northern Flicker: <i>Place 3" – 4" sawdust in bottom of box</i>	7" x 7"	16" – 18"	2½"	14" – 19"	6' – 20'	Open areas with perennial forbs and grasses
Downy Woodpecker: <i>Place 2" – 3" sawdust in bottom of box</i>	4" x 4"	8" – 10"	1¼"	6" – 8"	5' – 20'	Woodlots, parks and gardens
Red-Headed Woodpecker: <i>Place 1" – 2" sawdust in bottom of box</i>	6" x 6"	12" – 15"	2"	9" – 12"	10' – 20'	Open country, farms and park-like woodlands
Hairy Woodpecker: <i>Place 1" – 2" sawdust in bottom of box</i>	6" x 6"	12" – 15"	1½"	9" – 12"	8' – 20'	Open country, farms and park-like woodlands
Purple Martin: <i>Colony nesters – need many nests in same location</i>	6" x 6"	6"	2½" – 2¼"	1" – 2"	8' – 20'	Open areas at least 40' from trees; near utility wires and open water; paint white
Barn Owl	10" x 18"	15" – 18"	6"	4"	12' – 30'+	Barn or outbuilding near open pasture or agricultural fields
Screech Owl: <i>Place 1" – 2" sawdust in bottom of box</i>	8" x 8"	12" – 15"	3"	9" – 12"	8' – 30'	Woodland clearings or edge of woods
American Kestrel	8" x 8"	12" – 15"	3"	9" – 12"	10' – 30'	Open habitats, including meadows, grasslands, parkland, agricultural fields, urban and suburban areas
Wood Duck: <i>Place 3" – 4" sawdust in bottom of box; screen wire beneath entrance hole to floor</i>	10" x 18" or 12" x 12"	10" – 24"	3" x 4" oval	12" – 18"	3' – 6' above water in wooded swamp or 6' – 30' elsewhere	Mature woodlands adjacent to flooded woodlands, ponds or open marshlands
MAMMALS						
Flying Squirrel	8" x 8"	15" – 18"	1¼" – 3" on side of box close to tree trunk	9" – 12"	20' – 30'	Young to mature woodlands
Gray Squirrel	9" x 9"	20"	3" on side of box close to tree trunk	16"	20' – 25'	Young to mature woodlands
Raccoon	10" x 10"	24"	5" x 6" oval	19"	10' – 20'	Streambanks and lands adjacent to wetlands
Bats	Request Extension publication entitled <i>Bats In and Around Your Home (FSA9088)</i>					

Figure 21. A standard design for making nest boxes. Use information in Table 3 to modify for larger species.



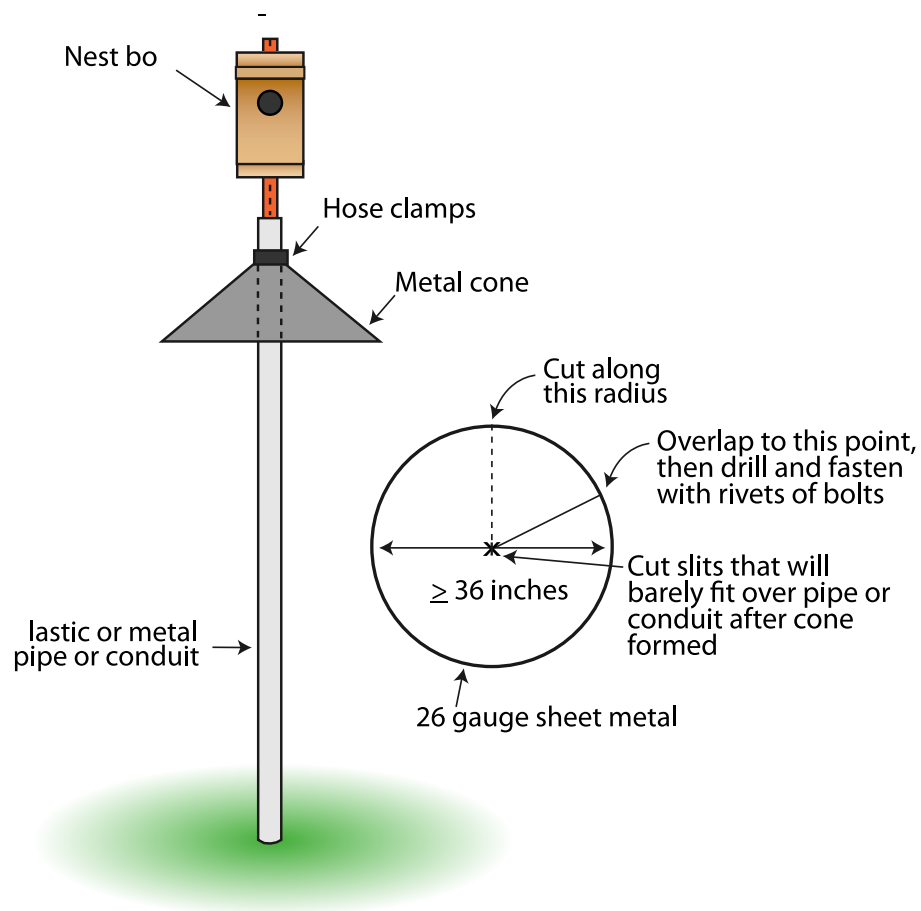
Lumber: One 1" x 6" x 5'

Many designs are available for building nest boxes. A basic design uses a 5-foot 1" x 6" board in which entry hole sizes can be altered for different bird species (Figure 21). (Use information in Table 3 to modify entry holes or board dimensions for larger species.) Exterior plywood or long-lasting cedar boards work well. Avoid pressure-treated wood because toxic compounds used to prepare the wood may affect wildlife. Nest boxes need to be built tightly to provide a dry, rain-proof shelter with a roof overhanging the entry hole. A small space for ventilation can be left where the roof meets the walls, provided no rain can enter the ventilation gap. Four drainage holes (1/4" or 3/8" in diameter) or a groove should be drilled in the bottom floor to allow water to escape. Bird houses can be painted or stained on the outside. Use light colors to minimize overheating during warm weather. The interior front wall needs a rough surface below the entry hole to help fledglings crawl out.

Never use perches on the nest box as these help nuisance birds, squirrels and cats gain entry into the nest. Use the exact hole diameter as indicated (Table 3) to keep nuisance birds from entering nest boxes. (If two hole sizes are listed, start with the smaller size first, and if nest is not occupied by desired species, re-drill to larger hole size.) To protect purple martins and other birds, it is legal to remove nests and eggs of non-native English sparrows or European starlings. Other native songbird species are protected by law and their nests and eggs cannot be removed or disturbed.

Where and how the nest box is placed can also deter predators. Raccoons, snakes, squirrels and cats will prey upon songbird eggs and nestlings in the nest box. According to the Cornell Lab of Ornithology (www.birds.cornell.edu), the best predator deterrent is a combination of a smooth, slippery (greased) pole with a predator

Figure 22. A predator guard mounted to a pole prevents predators from entering nest boxes.



guard (Figure 22) or baffle. Avoid using wooden fence or metal T-posts as predators can easily gain footholds and enter the nest box. Galvanized pipe or PVC pipe have slippery, smooth surfaces that most predators will have difficulty climbing. Predator guards such as inverted cones can inhibit cats, raccoons and snakes from ascending poles.

Make sure your nest box is placed away from trees, bushes or similar objects where predators can jump or hide and your predator guard is high enough from the ground that predators can't jump over it. Latch the roof or side entry using a screw or slanted removable nail to gain access, and periodically clean the nest box. Avoid using hinges or hooks as raccoons are adept at opening these fasteners.

Some species prefer nest boxes mounted on trees. Never use nails to install a squirrel, woodpecker or owl nest box in a tree. Nails left in a

tree can be a safety hazard when the tree is removed. Instead use straps, bungee cords or expandable fasteners to attach nest boxes.

For additional information, the Arkansas Game and Fish Commission (800-364-4263) sells a booklet *Woodworking for Wildlife*. The North American Bluebird Society (www.nabluebirdsociety.org) and the Purple Martin Conservation Association (www.purplemartin.org) have helpful web sites about nest construction and predator barriers.

12. If in doubt, find out!

Several state wildlife agencies provide free guidance about improving wildlife habitat on privately owned land. A number of resource guides and books are available to assist with planning wildlife habitat. Following is a brief description of these resources:



Private Lands Biologist – Provides information about wildlife species and habitat practices.

Contact the Arkansas Game and Fish Commission, 1-800-364-4263 (www.agfc.com), and ask for the private lands biologist in your region.



County Forester – Conducts land examinations and forest management plans, information about timber markets, disease and insect control, available

free of charge. Fee-based services are fire lane constructions, prescribed burning and timber marking. To locate your county forester, contact the Arkansas Forestry Commission, 501-296-1940 (www.forestry.state.ar.us/).



Stream Team Coordinator – Provides technical and financial support (cost-share) for reducing streambank erosion and improving wildlife and fish habitat on private property.

Contact the Arkansas Game and Fish Commission, 1-800-364-4263 (www.agfc.com), and ask for the stream team coordinator in your region.



University of Arkansas Cooperative Extension Agent – County-based assistance with soil

samples, plantings, herbicides, forest management, some wildlife and pond management. Contact the University of Arkansas Division of Agriculture Cooperative Extension Service, 501-671-2000 (www.uaex.uada.edu), and ask for the Extension agriculture agent in your county.

Plant Identification

Autumn Leaves and Winter Berries in Arkansas by Carl Hunter. The Ozark Society Foundation. Color photos and descriptions. 52 pages.

Forest Plants of the Southeast and Their Wildlife Uses by James H. Miller and Karl V. Miller. Southern Weed Science Society. Color photos and descriptions. 454 pages.

Mushrooms and Other Fungi of North America by Roger Phillips. Firefly Press. Color photos and technical descriptions. Large book, not for the field. 319 pages.

Tallgrass Prairie Wildflowers: A Field Guide to Common Wildflowers and Plants of the Prairie Midwest by Doug Ladd and Frank Oberle. Falcon Press. Color photos and descriptions. 264 pages.

Trees of Arkansas by Dwight M. Moore, Arkansas Forestry Commission. A key to Arkansas trees, pen and ink drawings of the leaves, fruits and buds. Available from Arkansas Forestry Commission, <https://www.ark.org/afc/index.php>.

Wetlands by William A. Niering. National Audubon Society Nature Guides. A comprehensive field guide, fully illustrated with color photographs, to the trees, wildflowers, fish, insects, birds and other natural wonders of North America's rivers, lakes and swamps. 638 pages.

What Tree Is That? Web site which helps identify trees. <http://www.arborday.org/trees/whattree/>

Wildflowers of Arkansas by Carl Hunter. Ozark Society Foundation and Arkansas Game and Fish Commission. Color photos and descriptions. 296 pages. (Available from University of Arkansas Press.)

USDA, NRCS. 2008. The PLANTS Database (<http://plants.usda.gov>, 4 September 2008). National Plant Data Center, Baton Rouge, LA 70874-4490, USA.

Wildlife Identification

Amphibians and Reptiles of Arkansas by Stanley E. Trauth, Henry W. Robison and Michael V. Plummer. University of Arkansas Press. Color photos and descriptions. Large book, not for the field. 421 pages.

Arkansas Butterflies and Moths by Lori A. Spencer. The Ozark Society Foundation. Color photos and descriptions. 314 pages.

Arkansas Mammals: Their Natural History, Classification, and Distribution by John A. Sealander and Gary A. Heidt. The University of Arkansas Press. Color photos and detailed descriptions of mammals and their life histories. Pen and ink sketches of skulls but not tracks or scat. Large book, not for the field. 308 pages.

Bird Tracks and Sign by Mark Elbroch with Elenor Marks. Color photos and sketches of tracks, droppings, pellets, nests, signs of feeding, feathers and more. Some species are not present in Arkansas. Stackpole Books. 456 pages.

Enature (web site). www.enature.com. Provides identification (including vocalizations) and life history information for every North American wildlife species. Sponsored by the National Wildlife Federation.

A Guide to Freshwater Invertebrates of North America by J. Reese Voshell, Jr. Color illustrations, pen and ink drawings and descriptions. The McDonald & Woodward Publishing Company. 422 pages.

Mammal Tracks and Sign by Mark Elbroch. Color photos and sketches of tracks, scat, burrows, signs of feeding and more. Some species are not present in Arkansas. National Outdoor Book Award. Stackpole Books. 779 pages.

Sibley Guide to Birds of Eastern North America by David Allen Sibley. The Audubon Society. Alfred A. Knopf Publishers. Color illustrations and descriptions.

Snakes of Arkansas (web site). Identification of amphibians and reptiles of Arkansas. Arkansas Herpetological Society. www.snakesofarkansas.com.

Habitat Management

Arkansas Deer: A Manager's Guide for Private Lands by Michael E. Cartwright, David E. Urbston, David Long and Fred Ward. Arkansas Game and Fish Commission. 162 pages. Available for \$7.50 from Arkansas Game and Fish Commission, 800-364-4263, www.agfc.com.

Arkansas Quail: Private Lands Management Guide by Fred Ward, Rick Chastain, Eddie Linebarger, Rick Fowler, Alan Pogue and Aaron Thompson. Arkansas Game and Fish Commission. 83 pages. Available for \$7.50 from Arkansas Game and Fish Commission, 800-364-4263, www.agfc.com.

A Landowner's Guide to Native Warm-Season Grasses in the Mid-South. 26 pages. <http://www.utextension.utk.edu/publications/wildlife/>

Managing Wildlife: Managing Wildlife on Private Lands in Alabama and the Southeast by Greg Yarrow and Deborah T. Yarrow. Alabama Wildlife Federation, published by Sweet Water Press. 588 pages.

Wetland Management for Waterfowl: A Handbook by Kevin D. Nelms (editor). Mississippi River Trust, Natural Resources Conservation Service, U.S. Fish and Wildlife Service. 131 pages. Available for \$5 from Mississippi River Trust, 662-686-3375, www.mississippirivertrust.org.

Wildlife Management for Arkansas Private Landowners by David Long, Martin Blaney and Jon Schneider. Arkansas Game and Fish Commission. 162 pages. Available for \$7.50 from Arkansas Game and Fish Commission, 800-364-4263, www.agfc.com.

The Wild Turkey in Arkansas: History, Biology and Management by Michael R. Widner. Arkansas Game and Fish Commission. 113 pages. Available for \$7.50 from Arkansas Game and Fish Commission, 800-364-4263, www.agfc.com.

University of Arkansas Division of Agriculture Cooperative Extension Fact Sheets

These fact sheets are available free on the internet at www.uaex.uada.edu or from your local county Extension office.

Forestry

Key to Common Trees of Arkansas (MP344)
Ten Ways To Kill A Tree (And How To Avoid Them) (FSA5011)
The Clean Air Act and Prescribed Fire: What It Means for Arkansas (FSA5016)
Why We Burn: Prescribed Burning as a Management Tool (FSA5009)
Consulting Foresters for Private Landowners (FSA5019)
What Should I Know About Selling My Timber? (FSA5014)
Evaluating the Management Potential of Upland Hardwood Stands (FSA5012)
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