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## Wildlife Species and Their Habitat Needs

### American Alligator

#### **General Habitat Preference**

American alligators are found in 45 Arkansas counties. They live in rivers, swamps, marshes, oxbows and lakes with habitat along the bank in Stages 2 and 3 of plant succession.

#### **Habitat Requirements**

**Diet-** Hatchling alligators feed mostly on small insects and small vertebrates like fish and frogs. Later, crawfish, birds and larger fish are added to this diet. A full grown alligator eats anything of suitable size it can catch, including rough fish, turtles, snakes, birds and mammals.

**Water** - Alligators live in flooded wetlands, permanent wetlands, rivers and reservoirs.

**Cover** - Nesting females and hatchlings require shallow, vegetation-choked freshwater.

Males use large bodies of open water more often than females. Cold weather drives alligators to winter dens dug under a bank. The entrances are usually underwater.

#### **Management Practices**

**Decrease or Increase Harvest** - Alligators have a hunting season in Arkansas, so increasing or decreasing harvest are viable management options.

**Establish Native Grasses and Forbs** - Females use grasses to construct nests. The decomposing nest materials produce heat and the nest becomes a self-sustaining incubator. Maintain native grasses, forbs and aquatic plants along banks of watercourses.

**Retain Snags and Down Woody Material** - This will provide habitat for prey species as well as cover for hatchlings.

**Water Developments for Wildlife** - Constructing a water development may provide marginal habitat, but is not recommended if other water sources such as natural wetlands, streams or rivers are available.

**Water Level Manipulation Technique** - Where flooding is an issue, controlling water levels can help improve nesting success. Avoid flooding banks from late spring through summer when eggs are incubated.

**Wildlife Damage Management** – Alligators are not normally aggressive towards humans, but can be of concern in ponds and lakes near high-density housing, waterways at golf courses, or other locations where alligators can become accustomed to living near people. Alligators that have been fed and become habituated to people lose their fear and can be dangerous to unsuspecting humans, especially children. In those cases, the individual alligator is removed by the Arkansas Game & Fish Commission. Typically biologists use traps or snares to capture them. Where alligators pose little risk to people, alter their habitat, such as eliminating emergent vegetation along banks. However, eliminating or modifying wetlands may be unlawful and would adversely affect other wildlife. Avoid swimming or water activities in areas with large alligators. Alligators can surge at least 5 feet onto the shore, so stay back from the water's edge. Do not feed alligators or attempt to capture young (< 2 feet) alligators.

### American Beaver

#### **General Habitat Preference**

The American Beaver occurs throughout most of North America. They are found in riparian areas in Stages 4 and 5 of plant succession and wetlands that have permanent water with a variety of shrubs and trees adjacent to the water. They were once such a valuable fur resource that trapping led to their extirpation in many parts of their former range. The biological pendulum has now swung in the opposite direction, and the lack of a viable fur market has led to increased American beaver populations throughout many areas of the United States. In

some areas they have become a nuisance, cutting down trees along with damming up ditches and streams in undesirable places. This causes cropland flooding, destabilization of road edges and flooding of timber stands. Their presence is often a threat to timber interests, where many acres of flooded timber die each year.

### **Habitat Requirements**

**Diet** - Primarily the bark and wood of shrubs and trees, also some forbs and grasses. Beavers store shrub and tree cuttings in caches (piles of branches) for use during the winter.

**Water** - Prefer slow-moving or still water with a constant level. Water should be of sufficient depth (5 feet) to allow free movement under the ice in winter.

**Cover** - Beaver construct lodges from sticks and mud or dig burrows in banks of streams and rivers. Beaver prefer slow-moving or still water with a constant water level. They will build dams from tree branches, shrubs and mud to form ponds which stabilize water levels, slow water movement and provide shelter beneath the ice in winter. In some instances, beaver dams should be protected and maintained. When beavers construct dams in places that cause problems for people, removal of the beaver is usually the best solution. If the dam is destroyed and the beaver remain, they will usually build the dam again. Where dams are to be maintained, provide dam building material such as precut logs and branches in areas where such materials are scarce.

### **Wildlife Management Practices**

**Decrease/Increase Harvest** – Beaver can become too numerous and eat all available shrubs and trees. To prevent this it may be necessary to periodically remove some beaver from certain areas.

**Manipulation of Succession** – Livestock grazing should be restricted from riparian areas so that beavers may use shrubs and trees adjacent to waters. This may include developing livestock watering facilities in upland areas to discourage congregation in and overuse of riparian areas.

**Plant Shrubs and/or Plant Trees** - Plant willows, other shrubs and deciduous trees near water that can be used by beaver for food and dam construction. If beaver are already in the area, new plantings will need protection or the beaver will need to be temporarily removed while plantings become established.

**Water Developments for Wildlife** - Constructing a water development may provide habitat, but is not recommended if other water sources such as natural wetlands, streams or rivers are available.

**Wildlife Damage Management** - This species is often a pest in agricultural areas and forests. In such situations, management objectives may be to reduce the quality and quantity of habitat. It is often more appropriate to manage for beaver in urban wetlands and areas where agriculture crops are not commonly grown. Trapping is recommended where beavers are causing problems to standing timber by girdling of individuals trees or flooding standing timber stands. In some circumstances such as around farm ponds, it could be practical to attach hardware cloth or metal around existing or newly planted trees to prevent beaver damage.

### **American Kestrel**

#### **General Habitat Preference**

American kestrels are found year-round throughout all of America. Kestrels use Stages 2 and 3 of plant succession for feeding, and Stages 5 and 6 for nesting. Kestrels use both natural and artificial cavities for nesting and winter cover. They rely heavily on abandoned nesting cavities of woodpeckers and squirrels. Because some kestrels migrate and are highly mobile in winter, the most critical aspect of habitat management is the proximity of suitable foraging habitat to

spring nesting habitat. Ideal interspersion consists of a complex of open grassy fields, pastures, power line right-of-ways, woodland edges and perches in the form of trees, shrubs, utility wires or telephone poles, and numerous natural or artificial nesting cavities throughout.

### **Habitat Requirements**

**Diet** - Kestrels consume primarily insects such as grasshoppers and crickets, and small mammals such as mice, rats, shrews, gophers and chipmunks. Birds, snakes, and lizards are sometimes eaten as well. Their food sources are associated primarily with open areas.

**Water** – American kestrels obtain necessary water from their diet and do not need water for drinking.

**Cover** - Kestrels nest and winter in tree cavities and other sites including holes in cliffs and artificial nesting boxes. Male kestrels typically will select cavities 15 to 30 feet above ground in areas where abundant open space exists to provide an insect base on which to forage.

### **Management Practices**

**Establish Native Grasses and Forbs** - Native grasses and forbs provide habitat for rodent prey. Maintain areas of Stages 5 and 6 interspersed with Stages 2 and 3 vegetation.

**Forest Management Techniques** – Conduct timber harvest in small areas within large expanses of Stages 5 and 6 woodlands.

**Manipulation of Succession** – Chain or roller beat small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of Stage 4 (shrubs) vegetation. Conduct prescribed burning on small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of Stage 4 (shrub) vegetation. Livestock grazing management should leave enough herbaceous canopy to support insects and small rodents. Manage livestock grazing to maintain trees in riparian areas. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Nesting Structures** - Provide kestrel nesting boxes in areas lacking adequate nesting cavities. Boxes can be placed on fence posts, trees or the side of a barn or outbuilding with the entrance hole 15 to 20 feet above ground. Boxes placed on posts should be equipped with a predator guard. Ideally, nest boxes should be placed within 20 yards of a tree with dead limbs, a utility pole, or other perch. Placement should be near open fields, pastures, hedgerows, or power line right-of-way. Boxes should be placed at least one-half mile from one another. Exotic species, specifically the European starling, compete with American kestrels for nesting cavities. If predators such as raccoons or snakes discover an occupied nest box, they likely will continue to return for eggs or nestlings in the future, so relocate troubled nest boxes.

**Plant Shrubs and/or Plant Trees** - Plant in large open areas (irrigate if necessary) on idle lands.

**Retain Snags and Down Woody Material** – Retain snags when conducting forest management techniques. Tree cavities are used for nesting. In areas where natural snags comprise the most common nesting habitat, optimal snag-to-acreage ratio is calculated for one acre of land. It is advised that on one acre of forested land, there should be one snag larger than 20 inches dbh (diameter at breast-height), four snags between 10 and 20 inches dbh, and two snags between 6 and 10 inches dbh.

**Use Pesticides Carefully** – In agriculture areas, locate nest boxes a distance away from fields that are heavily treated with pesticides since the birds feed primarily on insects.

## **American Robin**

### **General Habitat Preference**

Robins use a wide assortment of habitats, from open and mowed grassy areas (Stage 2) to forested areas (Stage 6). In urban settings, robins use large open areas and nearby trees and shrubs. Parks, golf courses and lawns in residential areas are favorite places to inhabit. Robins are found throughout North America, although they may migrate out of northern latitudes during winters with sustained cold and snow. Robins build a nest of grasses and mud on a limb of woody vegetation, but will occasionally nest on building ledges. Robins spend a considerable amount of time on the ground feeding on earthworms, but will also perch on branches to eat berries, fruit and insects.

### **Habitat Requirements**

**Diet** - Robins consume Insects and worms in warm seasons. In winter, they consume fruits and berries from shrubs and trees. They rarely use artificial feeders.

**Water** - Robins require water daily in warm seasons. They obtain water from yard irrigation, rain-filled gutters, low-lying areas, ponds, etc.

**Cover** - Robins need nesting sites and hiding areas in shrubs, evergreen trees, and broad-leaf trees. Evergreen trees are preferred for early nests. Robins will use nesting platforms.

### **Wildlife Management Practices**

**Do Not Disturb Nesting Sites** - The more a nest site is disturbed, the greater chance the parent will abandon the site and young. Additionally, predators' acute sense of smell can easily pick up human scent left at or near the nest site and can use that as a guide to finding and depredate the nest. By not disturbing nesting sites, more young birds are expected to live to maturity.

**Manipulation of Succession** - Mow areas to provide short grass and forbs. Use insecticides only when necessary.

**Nesting Structures** - Provide nesting platforms in areas lacking nest sites.

**Plant Shrubs and/or Plant Trees** - Plant those that produce fruit and berries in multiple seasons, for example sumac and cherry. Include some evergreen trees in plantings.

**Use Pesticides Carefully** - Using pesticides eliminates food sources for the American Robin.

**Water Developments for Wildlife** - Birdbaths and pans of water can be provided. Do not place water in areas where cats and other pets can catch the birds.

## **Big Brown Bat**

### **General Habitat Preference**

Big brown bats are 1 of 46 bat species found in North America. They inhabit nearly all of the United States, except for south Florida and south-central Texas, and utilize a variety of habitats, ranging from farmland (Stage 2) to deciduous forests (Stage 6). Big brown bats are very common in urban areas, including cities, parks, and suburban neighborhoods, and frequently use buildings and houses for summer roosts and winter hibernaculums. Big brown bats are insectivores. Females usually give birth to 1-2 pups in a maternity colony, often situated in a building. Big brown bats, as with all other bat species, are nocturnal and are the only truly flight-capable mammals.

### **Habitat Requirements**

**Diet** - Big brown bats are insectivores. Most of their diet consists of night-flying insects, especially beetles. Lactating females will eat their weight in insects daily. Big brown bats

hibernate in the winter in northern latitudes and therefore do not actively feed during on stored fat reserves.

**Water** - Big brown bats will drink “on-the-wing” by dipping their lower jaw into a water source. Big brown bats require water daily when they are active.

**Cover** - Big brown bats need cover for day-time roosting, hibernation, and birthing pups. Day-time roosting and hibernation generally occurs in the attic of a building or house. To a lesser extent, day-time roosting may occur in hollow trees, and hibernation may occur in caves, mines, and other areas that offer protection from predators and inclement weather. Bat houses also provide necessary roosting cover. Male and female bats often do not roost together. Males and females may roost individually or in small numbers, but larger numbers of females may roost together in a maternity roost during the time that the pups are born and nursing.

### **Wildlife Management Practices**

**Do Not Disturb Nesting Places** - Big brown bats should not be disturbed or excluded from roosting areas from May-July in order to avoid disturbing or separating lactating females from their pups.

**Manipulation of Succession** - Maintain some open areas for bats to forage.

**Nesting Structures** - Bat boxes provide additional nesting habitat for bats

**Plant Trees** – Where trees are lacking, plant deciduous trees for Stages 5 and 6 for roosting and foraging sites.

**Retain Snags and Down Woody Material** – Bats will use snags for roosting. Only leave snags standing in areas where they pose no danger to human structures or human health if they fall.

**Use Pesticides Carefully** - Because bats rely on a variety of insects for their food, avoid using pesticides if possible.

**Water Developments for Wildlife** - In areas where available water is not present. Any water development established for bats should be constructed with nothing above the water (for example, fencing or bracing) so bats have an unobstructed flight path to and from the water source. Besides providing a source of drinking water, water developments for wildlife also attract insects, a major food source for bats.

**Wildlife Damage Management** – In some circumstances, it may be necessary to rid bats from structures occupied by humans. Guano accumulating from bat colonies existing in attics can pose a health risk to people.

## **Black Bear**

### **General Habitat Preference**

Black bears are found in the forested portions of North America (although they have been extirpated from some parts of the central and eastern U.S.). They are generally secretive animals who prefer to avoid human contact; however, bears are highly adaptable and may occur in and around human dwellings. Preferred habitat is mature deciduous or mixed deciduous/coniferous forest, often with some interspersed grassy herbaceous openings, cutover timber areas, riparian corridors, shrub thickets and dense early successional brushy cover. Throughout North America black bears hibernate in the winter. Bears use a variety of den sites that range from rock crevices, brush piles, excavations, hollow trees, and even under human dwellings (crawl spaces, porches, etc). Bears require Stages 2, 3, 4, and 6 of plant succession. Black bears are primarily nocturnal but may be seen at anytime during the day.

Mature hardwood or hardwood/conifer forests provide the essential elements of black bear habitat. However, within these areas bears will utilize dense brushy areas as escape cover and feeding sites (production of soft mast fruits and berries, insects, etc). Generally, water sources

are not a concern because bears are very mobile. Denning sites also are quite variable and generally not a problem.

### **Habitat Requirements**

**Diet** - Bears are omnivorous; however, over 90 percent of their diet consists of vegetative matter. Spring food sources are typically scarce and consist of early developing plants such as skunk cabbage, squaw root, grasses and insects (ants, grubs, bee hives, etc.). Occasionally, bears will feed on deer fawns and young livestock (calves and lambs). When natural foods are scarce, bears often feed on bird seed, dog/cat food, garbage, etc. making them unwelcomed guests around human residences. During summer and early fall, black bears feed on a variety of fruits and berries such as blackberry, blueberry, juneberry, black cherry, pokeweed, sassafras, etc. During late fall, bears will feed heavily on oak acorns, beechnuts, hickory nuts and other hard mast fruits, as well as field corn, soybeans, etc., which are all highly nutritious as the bears prepare for hibernation. During winter hibernation, bears don't feed, but live off their stored body fat reserves.

**Water** - Bears utilize numerous sources for water, such as streams or creeks, ponds, lakes, rivers, waterholes and spring seeps. In summer they will often lounge in shallow water sources to cool off and get away from biting insects. Hence the term "bear wallows".

**Cover** - As mentioned above, black bears use hardwood or mixed hardwood/conifer forests for habitat. Within these habitats, black bears utilize large home ranges (several square miles). The size of a bear's home range will vary based on sex and age of the animal and/or time of the year (for example: breeding season, fall foraging areas, denning habitat, etc.). In general, adult male bears use home ranges that are much larger than females (up to 50 sq. mi.), while solitary females and females with cubs use home ranges that are considerably smaller (15 sq. mi.).

### **Wildlife Management Practices**

**Decrease/Increase Harvest** - This practice will influence how the bear population in an area will grow. Typically, it is the responsibility of the respective state wildlife agency to set the length of the hunting season and the season bag limit to control bear harvest. However, landowners can choose to take the maximum allowed or something less than that depending on their personal management objective. Three population objectives can be achieved through the controlled harvest of bears: increase, stabilize or decrease the population. However, liberalizing or restricting the harvest of female bears will also influence population growth and the rate of that growth. Regulation of bear population densities will be influenced by tolerance of the public toward bear/human conflicts, property damage, livestock and agricultural damage and the desire to see bears in an area. Access to public and private land for bear hunting will also influence bear harvests in an area.

**Forest Management Techniques** - Timber harvest within the forest habitat can create dense escape and loafing cover for bears (Stage 4). These cutover areas typically create an abundance of soft mast food (grape, pokeweed, blackberry, sassafras, etc.), which bears utilize from spring to fall. Cuts should be widely dispersed throughout the forest and be no larger than 25 acres in size and have an irregular design. This practice is also useful in regenerating hard mast trees (oak, hickory, etc) when the mature trees are beginning to die out. Den sites may also be created by brush piles of tree limbs. Timber stand improvement in small amounts in Stage 5 and 6 can improve habitat by allowing the growth of dense understory cover while enhancing the growth on many fruit and nut species. Thinning forest stands can also increase the hard mast (acorn, hickory, beech) production, thereby improving fall food sources. Den sites may also be created by brush piles of tree limbs.

**Grain: Leave Unharvested** - This practice, while not widely used, can provide an additional food source for black bears. Where farmers are currently planting crops such as corn or

soybeans (Stage 2), strips of these crops should be left standing to provide a food source close to cover. Plots should be large (2 acres) in size and well dispersed throughout the habitat.

**Manipulation of Succession** – Prescribed burning can stimulate understory grasses and forbs on which bears will feed (Stage 3). This practice, if hot enough, will also kill some overstory vegetation, thereby stimulating development of understory shrubs and sprouts (Stage 4). In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Food Plots** - This practice is not widely used, but can provide an additional food source for black bears (Stage 2). Soil fertility may dictate whether this practice is feasible, since poor soils will require significant fertilizer and lime to produce abundant crops. This practice will require expenditure of money and use of farm equipment. Food plots should be large (2 acres) in size and well dispersed throughout the habitat. Plants that are high in protein such as alfalfa, clover and soybeans, or grains high in energy such as corn, should be preferred seeds to plant.

**Plant Shrubs and/or Plant Trees** – Planting trees or shrubs within forest openings can provide additional food sources for black bears. Fruit species such as apple, pear, cherry, peach as well as other soft mast species like autumn olive, crab apple, hawthorn, dogwood, etc., will create abundant food sources in Stages 4 and 5 plant succession.

**Retain Snags and Down Woody Material** – Retain den trees within forest stands while doing timber harvest or timber stand improvement. These snags will create potential den sites for bears and many other forest wildlife species.

**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.

**Wildlife Damage Management Techniques** – Techniques may need to be employed if bear-human conflicts occur in agricultural or urban settings. Oftentimes problem bears become habituated to human presence. These bears are trapped and relocated by the state wildlife management agency.

## **Bluegill**

### **General Habitat Preference**

Bluegill prefer ponds, lakes, and slow moving rivers.

### **Habitat Requirements**

**Diet** - Bluegill eat a variety of zooplankton (microscopic animal life), insects, tadpoles, small minnows and crayfish.

**Cover** - Bass and bluegill are often found near submerged rocks, stumps, shrubs and near aquatic vegetation where small fish (used for food) hide.

**Water** - Fish need water of a certain quality. Some of the basic requirements are:

- Dissolved oxygen – minimum of 4 parts per million (ppm)
- Carbon dioxide – maximum of 20 ppm
- pH – range between 6.5 and 9.0
- Water temperature – reach at least 70 degrees Fahrenheit some time in the summer, measured one foot below the surface in shade.

Test the water to see if it meets requirements. Aerate pond to increase oxygen and decrease carbon dioxide.

## **Management Practices**

**Decrease or Increase Harvest** – Adjust harvest based on results from seine samples.

**Manipulation of Succession** - Manage livestock grazing to maintain thick herbaceous vegetation surrounding the pond and in the watershed that drains into the pond. Develop livestock watering facilities away from the pond or allow access to only a small part of the pond.

**Ponds: Construction** - Artificial reefs constructed of rock piles, sections of plastic or cement pipe (a minimum of 6 inches in diameter and 18 inches long), and brush piles and tires (sunk with weight) can be used for additional cover. These practices are recommended for ponds larger than 10 surface acres in size.

**Ponds: Deepen Edges** - Deepening the pond edges to 2 feet deep or more discourages rooted aquatic vegetation growth.

**Ponds: Fertilize** – In clear water, fertilizer may be added to increase or promote phytoplankton. Lime ponds (using agricultural limestone) to increase soil pH if total alkalinity is below 20 ppm.

**Ponds: Reduce Turbidity/Reseed Watershed** – Prevent or clear up muddy water (brown or gray color). Muddy water blocks sunlight needed in producing phytoplankton. Maintain a green color in pond water (green enough that a white disk cannot be seen 24 inches deep). The color is caused by phytoplankton (microscopic plant life-algae). Reseed watershed to establish thick herbaceous vegetation surrounding the pond in the watershed that drains into the pond.

**Ponds: Repair Spillway** – Repair the spillway if needed and remove trees near the dam or dikes. Stop pond leaks if and when they occur.

**Ponds: Restock** – Determine pond balance using a minnow seine and catch records. A bass to bluegill ratio of 3 to 6 pounds of bluegill to one pound of bass is considered a good fish population balance. If restocking is necessary, remove existing fish and restock at the appropriate rate.

**Water Level Manipulation Techniques** – Add water control structures if none are present.

## **Blue-winged Teal**

### **General Habitat Preferences**

Blue-winged Teal primarily nest near wetlands in the prairie pothole region of the Northern Great Plains. During spring and fall migration, shallow wetlands and flooded fields are used by Blue-wings to loaf and feed. They are usually the first ducks in North America to begin fall migration. During migration, they may be found throughout the eastern two-thirds of the U.S. on their way to Central and South America. Blue-wings are not present in Arkansas in the spring and summer.

### **Habitat Requirements**

**Diet** - Blue-wings feed upon aquatic vegetation, seeds and especially aquatic insects. Feeding is primarily confined to wetlands. Food is primarily used when flooded.

**Water** - Blue-winged teal inhabit shorelines more often than open water. They prefer calm water in association with inland marshes, lakes, ponds and creeks. These birds will use many wetland associated plants for escape cover, including bulrushes and cattails. Blue-winged teal are surface feeders and prefer to feed on mud flats or shallow water where there is floating and shallowly submerged vegetation along with abundant small aquatic animal life.

**Cover** - During migration and winter, food resources generally determine habitat use.

### **Wildlife Management Practices**

**Decrease/Increase Harvest** – Teal are a migratory species managed by the U.S. Fish and Wildlife Service in partnership with state wildlife management agencies. Hunting regulations are

set each year based on nesting bird surveys on their Northern breeding grounds and other factors. However, landowners can decide to set stricter regulations on their own property and designate resting (non-hunted) areas where human disturbance is kept to a minimum. As a game species, annual surveys are necessary to ensure that appropriate harvest limits are implemented so that the Blue-wing Teal population remains at the desired level.

**Establish Native Grasses and Forbs** – This practice may be beneficial in areas lacking native vegetation.

**Grain: Leave Unharvested** – Grain can serve as a food source and is beneficial if flooded.

**Manipulation of Succession** - Livestock grazing, mowing, prescribed burning and disking can all be used to keep wetlands in the desired vegetation structure for Blue-winged Teal.

**Plant Food Plots** – Planting of native wetland plants and agricultural crops can attract Blue-wings during migration, provided that the plants are shallowly flooded.

**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.

**Tillage Management** – Eliminating tillage in the fall will allow ducks access to waste grain.

**Water Developments for Wildlife** – Blue-winged Teal benefit from shallow water impoundments in the fall and winter to provide feeding and resting areas.

**Water Level Manipulation Techniques** – Water control structures may aid managers in manipulating wetlands to benefit teal. Small dikes for temporary flooding of agricultural fields provide important areas for teal during migration. Construction of small dikes for temporary flooding can provide shallow sheet water that teals prefer.

## **Bobcat**

### **General Habitat Preference**

Bobcats occur throughout the U.S. except for some areas in the northern Midwest states, where intensive agriculture occurs, or in areas lacking rugged or rocky mountainous terrain or extensive bogs and swamps. Bobcats occur in a wide variety of habitats and are often associated with rocky outcrops (Stage 1). They are also found in semi-open farmland (Stages 2 and 3), brushy areas (Stage 4), heavily wooded uplands and bottomland forests (Stages 5 and 6). Bobcats are carnivorous predators and seldom active in the daytime. They are classified as furbearer game species in many states including Arkansas.

### **Habitat Requirements**

**Diet** - Bobcats prey primarily upon rabbits, rodents (squirrels, chipmunks, voles, rats and mice), opossum, raccoons, skunks, snakes, wild turkeys and other birds. Bobcats may also prey upon deer. Bobcats are not considered a major source of mortality for deer. They will also prey upon domestic poultry and other livestock.

**Water** - The water requirements of bobcats are not well known, but they do drink free standing water.

**Cover** - Bobcats use dense cover, rocky outcrops and ledges, hollow logs and other sheltered spots for denning. They forage where prey is most numerous.

### **Wildlife Management Practices**

**Decrease/ Increase Harvest** - Harvest levels may need to be adjusted accordingly depending on population status.

**Forest Management Techniques** - Timber harvest will provide increased dense cover for additional prey within large areas of Stage 6 forest where regeneration is needed.

Timber stand improvement practices can provide enhanced understory development that can lead to increased prey populations.

**Manipulation of Succession** - Through mowing, chaining, roller beating, controlled burning, disking, chemical application and grazing to maintain and rejuvenate areas of Stages 3 and 4 when habitat quality begins to decline for desired prey in those habitats. Livestock grazing management should prevent overgrazing that would degrade habitat quality for rabbits, rodents and other prey. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Shrubs and/or Plant Trees** – Plant shrubs in areas where additional Stage 4 is needed to attract prey and provide security cover for bobcats. Hedgerows across relatively large open fields will provide more useable space for bobcats and prey. Plant trees where lacking to provide cover for bobcats and habitat for prey species.

**Retain Snags and Down Woody Material** – Snags and down woody material provide denning sites and habitat for prey.

**Wildlife Damage Management** - May be necessary if bobcats become problematic where poultry or other livestock occur.

## **Box Turtle**

### **General Habitat Preference**

Found throughout most of the eastern and central portions of the U.S. Depending on subspecies, this animal is found in (a) Stages 2 and 3 grasslands or (b) Stages 5 and 6 forests with a dense understory of Stage 4 with some open areas for nesting and a diverse plant community. They are not aquatic, but are often found near water.

### **Habitat Requirements**

**Diet** - The diet of this omnivore is highly diverse and includes insects, fruit, mushrooms, berries, various vegetation and carrion.

**Water** - This species likely obtains most of its water requirements from food.

**Cover** - This species prefers to construct nest in open areas (Stages 2-4) that are warmer due to increased sunlight. In forested areas, this may be at forest edges or within open areas of the forest.

### **Wildlife Management Practices**

**Establishment of Native Grass and Forbs** - In areas with too little herbaceous matter will be beneficial.

**Forest Management Techniques-** Timber harvest and/or timber stand improvement can create more herbaceous vegetation that box turtles feed upon. Timber harvest should be used in large expanses of Stages 5 and 6.

**Manipulation of Succession** - Prescribed burning can be used to maintain a dense herbaceous understory of plants, provided the frequency of fire is at the correct interval for that site. Livestock grazing management can be used maintain adequate herbaceous vegetation for this species.

**Plant Shrubs** – When lacking, a dense understory of Stage 4 in forests and along field edges can offer food, protection and nesting habitat. Fruit-producing shrubs are preferable.

## **Brown Thrasher**

### **General Habitat Preference**

Brown thrashers occur in the eastern two-thirds of the country. They require Stages 3 and 4 of plant succession. Brown thrashers are normally found in shrub thickets, hedgerows, shelterbelts, young forests, forest edges and brushy riparian areas. Brown thrashers forage on or near the ground for food. Their nest is usually found in bushes or small trees 1-10 feet above the ground. They have adapted to suburban gardens and plantings.

### **Habitat Requirements**

**Diet** - Invertebrates and plant seeds are the principal foods, but fruits, berries and nuts are also eaten. Brown thrashers forage primarily on the ground, and use their bills to look for food, turning over leaves and debris. More food is available when there is substantial ground litter. The management practices listed under "Cover" will usually supply sufficient food.

**Water** - Water requirements are not known.

**Cover** - Nesting and hiding cover are supplied by dense shrubs with some trees, Stages 3 and 4 of plant succession. Brown thrashers will use areas that have only shrubs. They need a minimum of 2.5 acres of woody vegetation to support a breeding population.

### **Wildlife Management Practices**

**Forest Management Techniques** - Timber harvest can improve vegetation structure for nesting and foraging. Timber harvest can stimulate additional Stage 4 vegetation within large areas of Stage 6 forest where regeneration is needed. Timber stand improvement practices in Stages 5 and 6 can improve habitat by stimulating understory development.

**Manipulation of Succession** - Use mowing, chaining, roller beating and/or controlled burning to maintain and rejuvenate areas which are becoming too woody. Grazing management should exclude livestock from riparian buffers and other woody areas to allow shrubs and trees to regenerate along the edge and ground litter to develop. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking occasionally (e.g., every 5 years) will keep vegetation at Stages 3 and 4. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Shrubs** and/or **Plant Trees** - Plant shelterbelts, field borders and riparian buffers to promote Stage 4 and create additional cover for nesting/foraging.

## **Bullfrog**

### **General Habitat Preference**

The bullfrog's native range extends from the Atlantic Coast eastward to eastern Colorado and eastern Mexico, and from southern Colorado south to northeastern Mexico. This species is not native west of the Rocky Mountains, but has been successfully introduced in many localities. Bullfrogs inhabit permanent bodies of standing or slow-moving water.

They prefer shorelines with dense vegetation (Stages 3 and 4 of wetland succession) adjacent to shallow open water areas (Stage 2) dominated by floating and submerged aquatic vegetation. Bullfrogs often spend much of their time sitting on the shoreline and utilize shoreline vegetation for concealment from predators. Larvae rely on aquatic vegetation for cover. All habitat requirements are often found in and around a single pond.

### **Habitat Requirements**

**Diet** - Major components of the diet are snails, insects, crayfish, other frogs, fish, reptiles and occasionally small mammals and birds.

**Water** - Bullfrogs need stable water levels for hibernation and egg development. Water should be maintained at a constant level when possible. Ideally both shallow and deep water are available. Larvae tend to congregate in shallow, unshaded water with minimal current where solar radiation raises the temperature. Bullfrogs hibernate during cold winter months. Both adults and larvae spend the winter buried in soft mud at the bottom of permanent wetlands, although adults have been reported to hibernate on land. Soft mud pond bottoms that remain below ice level and are oxygenated throughout the winter may be important in this regard.

**Cover** - Bullfrogs use dense emergent aquatic and upland herbaceous vegetation adjacent to water for hiding and foraging. Availability of overhead cover for protection and escape from predators is an important factor influencing the quality of an area as bullfrog habitat. Adults often retreat to deep water when disturbed.

### **Wildlife Management Practices**

**Decrease/Increase Harvest** – Gigging bullfrogs is popular in many southern states where frog legs are considered a delicacy.

**Manipulation of Succession** – In areas where livestock are present, livestock grazing management should be employed by fencing domestic animals away from shorelines.

Vegetation should be maintained along creeks, streams, lakes and ponds to provide habitat for bullfrogs.

**Water Developments for Wildlife** - When ponds or other water developments are constructed, provide for shallow water areas.

**Water Level Manipulation Techniques** - Water control structures should hold water levels at desired shallow water depths for optimum bullfrog habitat. Keep water level constant. As water level falls, available habitat decreases and predation increases.

### **Butterflies**

#### **General Habitat Preference**

There are hundreds of butterfly species in America that occupy nearly every ecotype available (Stages 2–6). In urban areas, butterflies are found in gardens, yards and parks planted with shrubs and flowers (Stages 2–4) that attract butterflies. They often lay eggs on a specific kind of plant. They eat food in liquid form.

#### **Habitat Requirements**

**Diet** - Usually consists of sweet liquids, such as nectar from flowers. They will also eat leaves and twigs, forbs and grasses as caterpillars.

**Water** - Some butterflies can be seen collecting on moist sand or mud around water puddles.

**Cover** - Butterflies need shelter from wind. Plant the above in areas sheltered from the wind.

#### **Wildlife Management Practices**

**Artificial Feeders** – Feeders containing fruit and/or sugars can provide supplement food resources in areas where butterflies exist.

**Establish Native Grasses and Forbs** – Wildflowers and grasses provide food and cover for butterflies. Often butterflies are attracted to a specific plant host.

**Manipulation of Succession** – In areas with an overabundance of Stages 4–6, use mowing, chaining, roller beating and/or controlled burning to maintain and rejuvenate areas which are becoming too woody. Grazing management should exclude livestock from riparian buffers and

other woody areas to allow shrubs and trees to regenerate along the edge and ground litter to develop. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking occasionally (e.g., every 5 years) will keep vegetation at Stages 3 and 4. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Flowers** - Plant and maintain specific types of plants for butterflies to lay eggs on: dogbanes, milkweeds, asters, goldenrods, wintercress, vetches, blackberries, sunflowers, iron weed and verbenas. Rooftop and balcony gardens planted with some of the plants mentioned above may attract butterflies.

**Plant Shrubs and/or Plant Trees** - Plant and maintain bushes and flowers that attract butterflies. Some examples are aster, verbena, zinnia, marigold, lilac, bush cinquefolia and butterfly plant.

**Rooftop / Balcony Gardens** - Stages 2, 3, 4 and 5 may be provided through a rooftop or balcony garden, although none in large quantities.

**Use Pesticides Carefully** – Many pesticides will kill butterflies as eggs or caterpillars. Avoid using pesticides.

**Water Developments for Wildlife** - Provide shallow, moist areas for nesting butterflies.

## Canada Goose

### **General Habitat Preference**

The breeding range of the Canada goose extends across the northern half of the United States across all of Canada and Alaska. Although an increasing number of Canada geese choose to winter in Canada, especially in urban areas, the majority fly south to southern areas of the United States and even Mexico. Many southern areas of the United States have year-round resident populations of Canada geese. Canada geese nest and rear young in or near Stage 2 wetlands interspersed with some Stage 3 wetlands. Wetlands containing 20 percent tall emergent aquatic vegetation and 80 percent open water are usually good habitat, as are frequent riparian areas adjacent to rivers.

### **Habitat Requirements**

**Diet** - During the nesting season and summer, Canada geese prefer new green forbs and grasses. They also eat some aquatic insects and pond weeds.

**Water** - See cover requirements below.

**Cover** - Nest in a variety of places such as mats of bulrushes, tops of muskrat houses, in trees, and most of all, on islands. They usually nest within 200 feet of water's edge.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – Canada geese are a migratory species managed by the U.S. Fish and Wildlife Service in partnership with state wildlife management agencies. Hunting regulations are set each year based on nesting bird surveys on their Northern breeding grounds and other factors. However, landowners can decide to set stricter regulations on their own property and designate resting (non-hunted) areas where human disturbance is kept to a minimum. Harvesting geese can be an effective control mechanism when they become too numerous at their northern breeding grounds and compete with smaller waterfowl species, or when resident geese populations come into conflict with people.

**Establish Native Grasses and Forbs** – Tender shoots provide Canada geese with food sources. Establish native grasses and forbs where lacking.

**Manipulation of Succession** - Burn or brush chop small areas (40 acres maximum, 10 to 20 acres preferred) every three to five years. Burning produces preferred lush green vegetation.

Livestock grazing management is another method to produce the lush green vegetation Canada geese prefer.

**Nesting Structures** - Provide artificial nest structures preferably on islands and/or peninsulas surrounded by open water.

**Water Developments for Wildlife** – Ponds or other water developments should be constructed along with Stage 2 and 3 wetlands for water needs.

**Water Level Manipulation Techniques** – Small dikes for temporary flooding can be used to provide for Stage 2 and 3 wetlands. Water control structures should be installed and properly maintained to provide 80 percent open water and 20 percent emergent vegetation.

**Water Damage Management** – In some areas, Canada geese have become a problem. They cause damage to lawns, golf courses and winter wheat fields. Their droppings can be a human health concern in parks and urban areas.

### **Common/Lesser Nighthawk**

#### **General Habitat Preference**

Common and Lesser Nighthawks use bare ground (Stage 1) for nesting. Stages 2 and 3 of plant succession interspersed with areas in Stages 4 and 5 of plant succession are used for foraging and cover. Common Nighthawks are found throughout the United States during the breeding season, but migrate to South America during the winter. Common Nighthawks are common visitors to grasslands, open woodlands, cities and towns. In cities and towns they are often seen flying over city parks and other open areas in late evening and early morning. Lesser Nighthawks are found primarily in the southwestern United States (New Mexico, Arizona and Texas) during breeding and will migrate further south during winter months. Lesser Nighthawks inhabit rivers, ponds and arid scrub areas. Common Nighthawks nest on the ground on gravel and bare soil areas common in fields or on rooftops. Lesser Nighthawks nest on the ground in desert and arid areas or on canyon ledges. Both species are nocturnal and feed “on the wing” on flying insects.

#### **Habitat Requirements**

**Diet** - These birds eat flying insects captured on the wing. Flying ants, mosquitoes, moths and June bugs are examples.

**Water** - Nighthawks do not drink water often. They obtain ample water from their diet, but water sources will attract insects, which provide food for nighthawks.

**Cover** -They do not build nests, but lay their eggs on the ground, often gravelly or sandy, and on flat roofs of buildings. Riparian areas, ridge tops, and other places with numerous sand and gravel areas are favorite nesting locations.

#### **Wildlife Management Practices**

**Do Not Disturb Nesting Sites** – Nighthawks nest in May through June. Stay off roof tops that are used for nesting.

**Manipulation of Succession** - Mow areas to provide short grasses and forbs; leave areas with no vegetation for nesting.

**Plant Shrubs and/or Plant Trees** - Plant shrubs and/or trees to provide Stages 4 and 5 vegetation where these are lacking.

**Use Pesticides Carefully** - Use insecticides only when necessary, as flying insects serve as a primary food source. Carefully follow the directions on the label.

## **Coyote**

**General Habitat Preference** - Coyotes are found throughout the continental United States. Coyotes have also been observed in large cities and urban areas. Stages 2, 3 and 4 are primary coyote habitats, particularly grasslands and areas where timberlands have been cleared for agriculture. They may occasionally be seen in woodlands. Coyotes den in a wide variety of places, including brush-covered slopes, steep banks, rock ledges, thickets and hollow logs. Coyotes may be active throughout the day but tend to be more active during the early morning, around sunset and at night. Coyotes live in packs, alone, or in mated pairs depending on the time of year.

### **Habitat Requirements**

**Diet** - Coyotes eat insects, rodents, birds, rabbits, deer, small mammals, carrion and fruit. Livestock and wild ungulates (deer, elk) are carrion. However, in some cases, coyotes have been shown to prey heavily on deer fawns. In 16 studies, coyotes were responsible for 82 percent of all sheep losses that were due to predators, but it is important to stress that only a few flocks typically showed sizeable losses. Often it is individuals that cause large livestock losses and control of that individual is warranted. It is also important to consider that coyote predation is not the major cause of loss in many cases.

**Water** - Water requirements for coyotes are not well documented. Much of their water requirements should be met in their diet.

**Cover** - This species is highly adaptable and is found in varied habitats and plant succession states. However, they do tend to favor areas dominated by grasses and shrubs (Stages 2-4). This is probably due to higher prey densities in these areas. Den sites for raising pups are often selected in banks, ledges or under abandoned buildings.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – Coyotes are very adaptable and their populations have increased significantly in many locations throughout the United States. In these circumstances, coyotes oftentimes exhibit an increase in the prevalence of diseases and parasites, and poor body condition and weight loss. High populations of coyotes have been attributed to local declines in cottontails, Northern bobwhites and ground-nesting songbirds. Overabundant coyote populations can be controlled through hunting and trapping.

**Establish Native Grasses and Forbs** – This provides cover for the prey base for coyotes.

**Forest Management Techniques** - Using small timber harvests within large expanses of Stages 5 and 6 can increase prey abundance.

**Manipulation of Succession** – Manage livestock grazing to retain adequate cover for prey species. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Shrubs** - Plant shrubs where cover is sparse.

**Wildlife Damage Management Techniques** – In some instances the predatory habits of the coyote can be a problem for wildlife managers and livestock producers; therefore wildlife damage management may be necessary. Coyotes can be hunted and trapped to reduce population numbers. Keeping birthing livestock near buildings and human habitation can help reduce coyote predation.

## **Dickcissel**

### **General Habitat Preference**

This species occurs primarily in native grasslands, but may also be found in meadows, hay fields, and savannah in the central one-third of the U.S. Vegetation in Stages 2, 3 and 4 are used by Dickcissels during nesting season. The species utilizes agricultural areas heavily during winter in Central America.

### **Habitat Requirements**

**Diet** - Both insects and grass seeds are consumed by Dickcissels. During migration and on the wintering grounds, agricultural crops are consumed.

**Water** - This species obtains water from food.

**Cover** - Grasslands with a mixture of grasses and forbs is used by Dickcissel during all seasons. The species will venture from protective cover to feed in agricultural areas during winter.

### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** - Beneficial in areas with large-scale prairie conversion.

**Grain: Leave Unharvested** - For this species to use during migration, although it especially utilizes grain on the wintering areas.

**Harvest Timing of Crops** - Delaying harvest timing of hay will provide additional nesting habitat in areas with insufficient native grasslands.

**Manipulation of Succession** - Through prescribed burning is an appropriate tool to manage grasslands for this species. Burning both provides cover and food requirements for Dickcissel. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to establish native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Tillage Management** - May provide additional food resources during migration.

## **Eastern Bluebird**

### **General Habitat Preference**

Bluebirds are found in open habitats (Stages 2 and 3) interspersed with woods and shrubs (Stages 4, 5 and 6), which are used for perching and nesting (where cavities are available). Large open areas without interspersion of hedgerows, fencerows and woodlots may not receive as much use by bluebirds as those areas with more structural diversity.

### **Habitat Requirements**

**Diet** - Bluebirds primarily eat insects and spiders. Earthworms and small amounts of fruit may also be eaten. Bluebirds forage in open areas, but typically near trees, shrubs or a fence that provides perches.

**Water** - Bluebirds obtain necessary water from their diet, but may use other water sources when available.

**Cover** - Bluebirds nest in cavities of trees and fence posts. Old woodpecker cavities are especially important. Bluebirds readily nest in nest boxes, which have had a major impact in restoring bluebird populations in some areas.

## **Wildlife Management Practices**

**Artificial Feeders** – Bluebirds do not eat seeds. However, some wild bird specialty stores offer mealworm feeders for bluebirds. In your wildlife management plan, indicate that *mealworm* feeders will be used to avoid confusion with the typical seed-feeders. Mealworm feeders are expensive and more appropriate for the urban region. Mealworm feeders typically are not an appropriate management practice for large acreages.

**Do Not Disturb Nesting Sites** – The more a nest site is disturbed, the greater chance the parent will abandon the site and young. Additionally, predators' acute sense of smell can easily pick up human scent left at or near the nest site and can use that as a guide to finding and depredate the nest.

**Establish Native Grasses and Forbs** – Establish when less than 75 percent of the area is comprised of Stages 2–4 and where non-native grasses and forbs dominate Stages 2–3.

**Forest Management Techniques** - Timber harvest will create foraging habitat for bluebirds one to three years after harvest as the stand regenerates. This practice should be recommended in large areas of Stage 6 forest where regeneration is needed. Remember, this practice is not intended to create “openings” and some mature trees may provide cavities for bluebirds.

**Manipulation of Succession** - Through mowing, chaining, roller beating, controlled burning, disking and chemical application should be used to maintain and rejuvenate areas of Stages 2–4 when habitat quality begins to decline. Grazing management should prevent livestock from damaging trees and shrubs planted to benefit bluebirds. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Nesting Structures** - Should be erected where a scarcity of natural cavities may be limiting the bluebird population. Nest boxes should be approximately 5 feet high with an entrance hole 1½ inches in diameter. Nest boxes should be placed no closer than 80 yards apart to limit territorial fighting among males.

**Plant Shrubs and/or Plant Trees** - Plant shrubs and trees where needed to provide perches for bluebirds. Hedgerows may be established across open fields larger than four acres.

**Retain Snags and Down Woody Material** – Keep several standing dead trees per acre when harvesting timber or implementing timber stand improvement practices. In urban areas or small woodlots, retain snags that do not pose a safety threat.

**Use Pesticides Carefully** - Using pesticides eliminates food sources for adult bluebirds and their chicks.

**Water Developments for Wildlife** - Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.

## **Eastern Cottontail**

### **General Habitat Preference**

As their name implies, Eastern Cottontails occur in the eastern half of the country. They prefer Stages 3 and 4 of plant succession. Ideally, habitat components made up of one-third grassland, one-third cropland, and one-third shrub cover all interspersed together. Eastern cottontails may live in urban areas as well, and may be found in parks, golf courses and stream corridors.

### **Habitat Requirements**

**Diet** - A variety of forbs and grasses are eaten from spring through fall. In winter, bark of shrubs and trees are often eaten. They will also eat buds, soft mast, grain and leaves and twigs.

**Water** - Necessary water is obtained from diet.

**Cover** - Cottontails use thick shrub or herbaceous vegetation (Stages 3 and 4) for hiding and resting cover.

### **Wildlife Management Practices**

**Decrease/Increase Harvest** - Harvest levels may need to be adjusted accordingly, depending on the population status.

**Establish Native Grasses and Forbs** - Disk and/or plant native seeds to encourage native plant growth for cover and food.

**Forest Management Techniques** - Timber harvest small areas (10 acres maximum) in large expanses of Stages 5 and 6 woodlands.

**Grain: Leave Unharvested** - In areas near grain fields, leaving grain unharvested will provide additional food sources.

**Harvest Timing of Crops** - Delaying the harvest of crops may reduce destruction of nests.

**Manipulation of Succession** - Brush chopping, chaining/roller beating and prescribed burns can be used to maintain or rejuvenate small areas of Stage 3 and 4 vegetation. Livestock grazing management should avoid use of food and cover plots, and leave ample amounts of herbaceous vegetation in other areas used by cottontails for food and cover. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to establish native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Food Plots** - Plant one-eighth to one-fourth of an acre annual food plots (grain sorghum is good) in areas with too little cropland; one plot per 15 acres maximum. Plant one-eighth to one-fourth of an acre perennial food plots (grass and clover) in areas with too little grassland, again, one plot per 15 acres maximum.

**Plant Shrubs** - Plant shrubs in large areas of Stage 2 and 3 of plant succession, or in agricultural areas having few trees or shrubs. Plant along field borders, fence rows or other idle land areas. This is also appropriate for open areas in urban settings.

**Retain Snags and Down Woody Material** – Cottontails will nest in hollow logs and under or near down woody material (i.e., brushpiles).

**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.

**Tillage Management** - Tillage of cropland may be delayed in spring to allow the use of standing stubble for cover. Tillage may be eliminated in the fall to allow wildlife access to waste grain.

**Wildlife Damage Management Techniques** - When overabundant, they can cause damage to ornamental/landscaping and garden plants and may require wildlife damage management techniques to be employed.

### **Eastern Fox Squirrel**

#### **General Habitat Preference**

The Eastern fox squirrel is found in the eastern half of the United States, except for areas of New England. Eastern fox squirrels use vegetation in Stages 5 and 6 of plant succession with interspersed small openings (Stages 2 and 3 of plant succession). These squirrels use urban areas with lots of trees (Stages 5 and 6). Fox squirrels build a leaf nest high on the main trunk of a tree, but will regularly use natural cavities in trees, especially in winter. Fox squirrels are omnivorous and will eat nuts, seeds, fruit and other animals.

## **Habitat Requirements**

**Diet** - Squirrels spend much time foraging on the ground. They feed on a variety of nuts, acorns, seeds, mushrooms, bird eggs, and, in places, corn. They will also eat small mammals and carrion.

**Water** - Water requirements are generally met by the food consumed. However, in late summer this may not be adequate.

**Cover** - Squirrels nest in cavities in trees or build a nest out of twigs and leaves. The nest is usually placed in the crotch of a tree over 30 feet above the ground. In areas where den sites are scarce, they will use nest boxes.

## **Wildlife Management Practices**

**Artificial Feeders** - In urban areas, corn or sunflower seeds can be spread out on ground under trees used by squirrels. Artificial feeders can also be used.

**Do Not Disturb Nesting Sites** – Nest boxes can be constructed when natural habitat is lacking. Do not disturb nesting sites as parents may abandon young, or human disturbance may alert predators to presence of young.

**Manipulation of Succession** – Mowing or brush chopping can be used to maintain small areas in Stages 3 and 4 vegetation.

**Nesting Structures** – Three or four den trees or suitable nest boxes are needed per acre. Nest boxes are most beneficial in Stage 5 woodlands and urban areas lacking den sites.

**Plant Trees** - Plant mast trees in large areas of Stages 2, 3 and 4 vegetation (irrigate if necessary). Plant along fence rows, adjacent to streams or in other idle land areas. When possible, locate plantings adjacent to existing croplands.

**Retain Snags and Down Woody Material** – Squirrels will nest in tree cavities and consume mushrooms growing on down woody material. In urban areas, retain snags only if they pose no threat to safety.

**Water Developments for Wildlife** - In urban areas, provide a pool or pan of water if other sources are not available.

**Wildlife Damage Management Techniques** - Squirrels may become a nuisance around houses and cause property damage, thus requiring wildlife damage management techniques. Squirrels can be captured in live traps and released in rural areas. Hunting can be effective if allowed.

## **Eastern Gray Squirrel**

### **General Habitat Preference**

The eastern gray squirrel lives primarily in Stage 6 deciduous forests and woodlands. They also forage along the edge of crop fields, especially harvested cornfields. These squirrels have adapted to parks and other urban areas where mature trees are available.

### **Habitat Requirements**

**Diet** - Squirrels eat a variety of acorns, nuts, miscellaneous seeds, grains, buds and mushrooms. Squirrels spend most of their time foraging on the ground, but also forage in trees where they collect fruits, nuts, bark and buds that haven't yet fallen to the ground. They will also eat eggs.

**Water** - Water requirements are generally met through the food consumed; however, squirrels will drink free-standing water.

**Cover** - Squirrels den in tree cavities and build nests out of leaves and twigs. Nests are generally more than 30 feet above ground.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** - Harvest levels may need to be adjusted accordingly depending on population status.

**Forest Management Techniques** - Timber stand improvement (thinning) will encourage larger crowns of mast-producing trees and enable oaks, hickories, beech and others to produce more mast.

**Grain: Leave Unharvested** – Leave waste grain, especially corn, for squirrels to glean from fields. This is especially important during years of poor mast production.

**Manipulation of Succession** - Livestock grazing management should protect trees and shrubs planted for squirrels and protect woods from overgrazing.

**Nesting Structures** - Three or four den trees or suitable nest boxes are needed per acre. Nest boxes are most beneficial in Stage 5 woodlands and urban areas lacking den sites.

**Plant Shrubs and/or Plant Trees** – Plant shrubs to create hedgerows across large fields and in “odd areas” of crop fields that are not planted to crops. Plant mast trees where Stages 5 and 6 represent less than 50 percent of the area considered and where Stages 5 and 6 forests contain few or no mast-producing trees.

**Retain Snags and Down Woody Material** – Squirrel dens often are located in standing dead trees and consume mushrooms growing on down woody material.

**Tillage Management** - Eliminate tillage in the fall, especially in cornfields adjacent to Stages 5 and 6 forests.

**Wildlife Damage Management** - Squirrels may become a nuisance around houses and cause property damage, thus requiring wildlife damage management techniques. Squirrels can be captured in live traps and released in rural areas. Hunting can be effective if allowed.

### **Eastern Hognose Snake**

#### **General Habitat Preference**

This species prefers scrubby flat or gently rolling prairies with sandy soil. Often these sandy sites are characterized by sparse vegetation in most years (Stages 2-4 of plant succession). Hognose snakes mimic rattlesnakes when threatened, but are they will sometimes fake death by rolling over and exposing their undersides. This snake burrows into loose soil to find food (such as toads) and to spend the winter.

#### **Habitat Requirements**

**Diet** - Toads, frogs, reptiles, birds, mice and eggs are all consumed by this reptile. Habitat management strategies that provide for high rodent and toad populations would benefit this species.

**Water** – The water requirements of the hognose snake are not known. It is assumed to obtain most of its water needs through its environment.

**Cover** - Eastern hognose snakes occupy a variety of cover types that occur within sandy soils within the shortgrass prairie. Manage cover to benefit high prey populations for this reptile.

#### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** – Establish native grasses and forbs if none present. If native prairie has been converted to exotic grasses, planting of native prairie plant species would be beneficial to this and many other prairie wildlife.

**Manipulation of Succession** - If woody vegetation is replacing grasslands, prescribed fire or mechanical methods such as chaining/roller beating or brush chopping can be used to maintain native short grass prairie vegetation in sandy soils that eastern hognose snakes occupy.

Livestock grazing management should leave herbaceous cover to allow adequate prey populations for this species to feed upon. In large expanses of Stages 5 and 6, use

chainsawing, feller butchering, clipping or other mechanical methods of tree removal to establish native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2, 3 and 4. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

## **Eastern Towhee**

### **General Habitat Preference**

Eastern towhees are found throughout the Eastern United States. Towhees usually live in Stage 4 vegetation in old fields, forest edges, riparian thickets or pine flatwoods, where they eat invertebrates, seeds, and leaves of forbs, grasses and shrubs. Shrubs also cover their ground nests. They sometimes frequent bird feeders in winter. Towhees forage primarily on the ground. They dig in leaf litter or dead grass with a characteristic two-footed backwards hop.

### **Habitat Requirements**

**Diet** - These birds forage on the ground, eating invertebrates such as ants, beetles, caterpillars and grasshoppers. About half of the diet is seeds and green foliage of forbs, grasses and shrubs.

**Water** - Towhees obtain the necessary water from their diet.

**Cover** - Towhees use shrubs for hiding and protective cover. Their nests are located on the ground, usually under a shrub or the base of upright vegetation.

### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** – Towhees consume seeds and green foliage from these plants.

**Forest Management Techniques** – Timber harvest small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of Stages 5 and 6 woodland to create more Stage 4 vegetation for foraging, nesting and cover. Timber stand improvement (thinning) can encourage the growth of Stage 4 vegetation in small patches of woodlands.

**Manipulation of Succession** – Prescribed burning of small areas (40 acres maximum, 10 to 20 acres preferred) in old decadent stands of Stage 4 vegetation will promote resprouting of shrubs. Chaining, roller beating or brush chopping small areas (40 acres maximum, 10 to 20 acres preferred) in old decadent stands of Stage 4 vegetation will promote resprouting of shrubs. Livestock grazing management should leave adequate herbaceous vegetation needed for food. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for creating forest edge, establishing native grasses and forbs or creating space for disking. Strip disking will keep vegetation at Stages 2-4. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Shrubs and/or Plant Trees** – Plant in large areas of Stage 2 and 3 vegetation to provide Stage 4 vegetation for nesting and cover. Plant trees in large expanses of Stages 2 and 3 to create forest edge.

## **Elk**

### **General Habitat Preference**

Elk are found in the western U.S. and several pockets of the eastern U.S., where they have been introduced. They require Stages 2, 3 and 4 vegetation for food, as well as Stage 5 vegetation for cover. Elk predominantly eat grasses, but will eat shrubs as well. They use shrubs and trees for cover and calving.

## **Habitat Requirements**

**Diet** - Elk predominantly eat grasses but also forage on shrubs and woody material found in Stages 2-5 vegetation.

**Water** - Elk use water regularly in the summer. Areas with water within one-half of a mile are preferred.

**Cover** - Elk use thick shrubs and various woodlands for hiding and calving cover. Areas close to Stages 2 and 3 vegetation, where they find their food, are preferred.

## **Wildlife Management Practices**

**Decrease/Increase Harvest** - Elk are an important sport animal. Often their populations are intensely monitored to maintain a target population level. Adjusting this limit can increase/decrease the population according to management objectives.

**Establish Native Grasses and Forbs** - Plant fields to grasses and legumes in large expanses of Stage 4 vegetation. This is most effective when done in areas used in the winter to provide winter forage. Strips of Stage 5 and 6 vegetation connecting large blocks of Stage 5 and 6 vegetation should be maintained for use as travel corridors.

**Fish / Wildlife Survey** - Elk are an important sport animal. Often their populations are intensely monitored to maintain a target population level. Adjusting this limit can increase/decrease the population according to management objectives.

**Forest Management Techniques** - Timber harvest small areas (40 acres maximum) in large expanses of Stages 5 and 6 forests to improve Stages 2, 3 and 4 vegetation that will provide food and/or cover. Timber stand improvement (thinning) in Stage 6 forests will improve Stages 2, 3 and 4 vegetation providing more food and/or cover.

**Manipulation of Succession** – Prescribe burn small areas (40 acres maximum) in large expanses of Stage 4 and 5 vegetation to create Stages 2 and 3 vegetation for food; brush chop, chain or roller beat small areas (40 acres maximum) in large expanses of Stage 4 vegetation to create Stage 2 and 3 vegetation for food. Livestock grazing management should leave ample forage available for use by elk. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2 and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Shrubs and/or Plant Trees** – Create Stages 4–6 in large expanses of Stages 2–3. Elk use thick shrubs and woodlands for hiding and calving cover.

**Water Developments for Wildlife** - Create water developments such as guzzlers to provide water for elk.

**Wildlife Damage Management** - When elk populations get large, they can cause damage to farmers' fields as well as timber. Control practices will be required to control negative impacts.

## **European Starling**

### **General Habitat Preference**

European starlings are found throughout North America. They prefer older suburban and urban residential areas with large trees (Stages 5 and 6) and shrubs (Stage 4) interspersed with open areas (Stages 2 and 3), but are also abundant in agricultural settings. Starlings are cavity nesters and nest in large trees or old buildings. Starlings are ground feeders and eat a variety of insects, seeds and fruit. Starlings were introduced to the United States from Europe and are considered pests, as they are numerous and often out-compete native birds for available habitat. In such situations the management objectives may be to reduce the quality and quantity of available habitat.

### **Habitat Requirements**

**Diet** - Insects, fruit, seeds, earthworms, grain, human garbage, even dog and cat food.

**Water** - They require water during warm seasons.

**Cover** - They nest in cavities in trees, old buildings and old houses.

### **Wildlife Management Practices**

**Wildlife Damage Management** – Starling populations often grow to levels where they are causing wildlife damage or will cause detrimental conditions for native wildlife by out-competing native species for habitat requirements. Therefore, wildlife damage management will most likely be necessary in almost all situations, especially in suburban/urban and agricultural areas.

Exclusion practices to prevent starlings from accessing an area are effective. Habitat management to attract starlings should not occur. Remove food, water and cover available to starlings. Various harassment practices may be effective. Trap and euthanasia may be appropriate to reduce starling populations.

### **Frogs**

#### **General Habitat Preference**

There are many frog species that inhabit wetland areas throughout the United States. Weeds and aquatic vegetation on the edges of ponds, lakes and slow-moving streams are preferred areas. Mud bottoms are needed so frogs can bury themselves for hibernation during the winter. Frogs typically breed in water and lay their eggs in water. Frogs are carnivorous and eat a varied diet of insects.

#### **Habitat Requirements**

**Diet** - Primarily insects, but will also eat aquatic plants, worms, eggs, frogs and snails

**Water** - Frogs need water to hide. Many kinds of frogs will dry up and die if their skin is not kept moist.

**Cover** – Provide frogs with thick herbaceous vegetation on bank or shore adjacent to water. Frogs also hide among floating vegetation in the water next to the shore.

#### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** – Establish around water sources to provide cover for frogs.

**Streams: Dams, Boulders, or Logs** – Create structure in streambeds to provide habitat for frogs.

**Use Pesticides Carefully** - Using pesticides eliminates food sources for frogs. Pesticides should not be used near water where runoff could cause water pollution and kill frogs and other aquatic species.

**Water Developments for Wildlife** - Create aquatic habitat for amphibians like frogs. Provide both shallow water with escape cover (i.e., Stage 2 and 3 aquatic plants) and deeper water for hibernation in winter.

**Water Level Manipulation Techniques** - Use water control devices to encourage emergent aquatic vegetation and insure adequate water depth for hibernation.

### **Grasshopper Sparrow**

#### **General Habitat Preference**

In the grasslands of the Great Plains, the grasshopper sparrow prefers open grasslands with some shrubs (Stage 4) and bare ground (Stage 1) interspersed throughout the habitat. Areas

with greater than 35 percent of shrubby cover are poor habitat for grasshopper sparrows. Native bunchgrasses often are important for nesting.

### **Habitat Requirements**

**Diet** - Diet is comprised mainly of insects and seeds, but this shifts dramatically throughout the year. In the spring and summer, the breeding season, grasshopper sparrows rely heavily on insects, which account of 60 percent of their diet; not surprisingly, given the bird's name, grasshoppers can account for 30 percent to 40 percent of their diet during this time. During fall and winter, though, their diet shifts to one comprised of 70 percent seeds.

**Water** - No information exists about water requirements.

**Cover** - Grasshopper sparrows use Stage 3 vegetation for escape and nesting cover. They nest on the ground, typically with overhanging vegetation. Often, grasshopper sparrow nests are located in native bunchgrasses.

### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** – Establish grasses and forbs to provide high-quality nesting habitat.

**Harvest Timing of Crops** - Delay mowing/harvest of hayfields in the spring to ensure successful nesting.

**Manipulation of Succession** - Prescribed burning is an important practice that enhances habitat by rejuvenating grasslands, controlling shrubs and creating some patches of bare ground. Grazing management is key to protecting grassland habitat from livestock. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal for establishing native grasses and forbs or create space for disking. Strip disking will provide bare ground (Stage 1). Disk less frequently (e.g., every 5 years) to create and maintain Stage 4. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

## **Great Horned Owl**

### **General Habitat Preference**

The great horned owl is found throughout North America in a wide variety of habitats, but mainly open Stage 6 woodlands, interspersed with areas of Stages 2, 3 and 4, including orchards, farm woodlots and city parks. They are also occasionally found in rocky canyons away from forest cover. The great horned owl is nocturnal and roosts during the day in trees or on sheltered rocky ledges.

### **Habitat Requirements**

**Diet** - Great horned owls forage at night. The diet is extremely varied, but commonly includes small- to medium-sized mammals, including rabbits, skunks, squirrels and others, as well as reptiles, amphibians, large insects and fish. Great horned owls rarely consume carrion.

**Water** - These birds obtain necessary water from their diet.

**Cover** - Great horned owls nest in abandoned nests of hawks, crows or herons, and in large tree cavities, crotches, stumps, caves and ledges.

### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** - When less than 25 percent of the area is comprised of Stages 2–4 and when non-native grasses and forbs dominate Stages 2–3.

**Forest Management Techniques** - Timber harvest should be implemented to regenerate stands in large areas of Stage 6 forest and provide additional cover for a variety of prey species.

Timber stand improvement (thinning) will encourage understory development and enhance habitat for a variety of prey species.

**Manipulation of Succession** - Through mowing, chaining, roller beating, controlled burning, disking, chemical application and grazing should be used to maintain and rejuvenate areas of Stages 2–4 when habitat quality begins to decline for a number of prey species. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2-4. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Shrubs and/or Plant Trees** - Where less than 25 percent of the area is comprised of Stages 4–6.

**Retain Snags and Down Woody Material** – Keep snags in place when regenerating stands with forest management techniques.

**Wildlife Damage Management** - May be necessary in some if owls begin to depredate free-ranging poultry.

### **Hairy Woodpecker**

#### **General Habitat Preference**

Stages 4, 5 and 6 of plant succession are best habitat. Hairy woodpeckers will forage in areas of Stage 3 of plant succession if areas with mature trees are nearby. They also use wooded urban and riparian areas.

#### **Habitat Requirements**

**Diet** - Hairy woodpeckers feed primarily on insects such as ants, beetle larvae, caterpillars and adult beetles. The diet is supplemented with fruits and nuts. They forage on a variety of places such as tree trunks, stumps, snags, downed logs and the ground. Where adequate cover exists, food is usually not a limiting factor.

**Water** - Not limiting, these birds probably obtain necessary water from their diet.

**Cover** - Hairy woodpeckers are cavity nesters; holes are excavated in mature and dying trees and snags for nesting. Management efforts related to cover should focus on maintaining or creating areas with large mature and dying trees, especially in open areas. Within wooded areas, create or maintain at least one large snag per acre.

#### **Wildlife Management Practices**

**Manipulation of Succession** - Grazing management for livestock should be done in riparian areas to maintain trees. Grazing when woody vegetation is not growing rapidly (fall and winter) usually does less damage to woody vegetation than at other times of the year. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2-4. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Trees** - Hairy woodpeckers prefer softwood trees. Establish corridors between large expanses of open area and forests where necessary.

**Retain Snags and Down Woody Material** – Woodpeckers forage for insects on snags and down woody material. They also excavate holes for nesting in mature and dying trees.

## **House Finch**

### **General Habitat Preference**

House finches are native to the western United States but are an introduced species in the eastern United States. Their current range is the entire United States. They are found in a wide variety of urban, suburban and agricultural areas that have trees (Stages 5 and 6), shrubs (Stage 4), and some open areas (Stages 2 and 3). House finches nest in a variety of raised locations and make a nest from assorted vegetation. Finches eat a variety of seeds, fruits and buds from both the ground and in trees.

### **Habitat Requirements**

**Diet** - Soft fruits, buds and weed seeds. In the warm season house finches eat some insects.

**Water** - They require water daily in warm seasons.

**Cover** - These birds prefer nesting sites on low branches of trees, on branches of bushes, in natural cavities, in old holes excavated by woodpeckers, and any projection or ledge they can find on houses and buildings. They prefer to place the nest from five to seven feet above the ground. The nest is built of weed stems, small branches and leaves.

### **Wildlife Management Practices**

**Artificial Feeders** - They use artificial feeders of all types. Millet and sunflower seeds are favorites.

**Do Not Disturb Nesting Sites** - found on houses and buildings unless they are causing a problem such as plugging a rain gutter.

**Establish Native Grasses and Forbs** - to provide grass and forb seeds for finches.

**Manipulation of Succession** - Mow areas to provide vegetation in Stages 2 and 3.

**Plant Shrubs and/or Plant Trees** - Plant shrubs adjacent to open areas for nesting and hiding cover. Plant trees to provide diversity in large expanses of Stages 2, 3 and/or 4.

**Use Pesticides Carefully** - Pesticides should be used carefully because insects are an important part of finch diets during nesting season.

**Water Developments for Wildlife** - Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.

## **House Sparrow**

### **General Habitat Preference**

House sparrows' range encompasses the entire United States. They are an introduced species from England (thus their other name of English sparrow) and are found in a wide variety of urban habitats that have buildings, trees (Stages 5 and 6), shrubs (Stage 4) and some open areas (Stages 2 and 3). House sparrows are also very common in and around agricultural buildings. House sparrows are cavity nesters and will frequently occupy buildings and houses to nest within the eaves or other areas with a cavity or opening. House sparrows feed on the ground and above the ground in woody vegetation for seeds, insects and fruit. They compete with native house finches and other birds for habitat requirements. They can become a nuisance, and management objectives may be to reduce the quality and quantity of available habitat. In the inner city, management for wildlife may be limited to this species and a few others. Wildlife damage management may be needed in some areas.

### **Habitat Requirements**

**Diet** - House sparrows eat a variety of insects, fruits, buds, forbs, weed seeds and waste grain.

**Water** - House sparrows require water daily in warm seasons.

**Cover** - They nest on low branches of trees, on bushes, in natural cavities, in old holes excavated by woodpeckers, and on any projection or ledge they can find on buildings or other structures. They prefer to place nest from five to seven feet above the ground. Nests are built of weed stems, small branches and leaves.

### **Wildlife Management Practices**

**Wildlife Damage Management** - House sparrow populations often grow to levels where they are causing wildlife damage or will cause detrimental conditions for native wildlife by out competing native species for habitat requirements. Therefore, wildlife damage management will most likely be necessary in almost all situations, especially in suburban/urban and agricultural areas. Exclusion practices to prevent house sparrows from accessing an area are effective. Habitat management to attract house sparrows should not occur. Remove food, water and cover available to house sparrows. Various harassment practices may be effective. Trap and euthanasia may be appropriate to reduce house sparrow populations.

### **House Wren**

#### **General Habitat Preference**

House wrens are found throughout the United States during the breeding season, and migrate to the deep southern United States during winter months. In urban settings, house wrens prefer older residential areas with large shrubs (Stage 4) and trees (Stages 5 and 6). House wrens nest in a variety of elevated cavities as high as 30 feet above the ground. Wrens primarily eat insects and forage on and above the ground.

#### **Habitat Requirements**

**Diet** – House wrens consume spiders, grasshoppers, crickets, beetles, caterpillars, ants, bees, ticks, earthworms and millipedes. Typically artificial feeders are not used.

**Water** - These birds obtain necessary water from their diet. They do not need an open water source.

**Cover** - House wrens nest in natural cavities in trees, old buildings and other structures. They will use artificial nest boxes.

#### **Wildlife Management Practices**

**Do Not Disturb Nesting Sites** – House wrens will nest in nest houses and around houses. Disturbing nesting sites may cause parent birds to leave or alert predators of the presence of a nest.

**Nesting Structures** - Provide nest boxes where adequate nesting sites are lacking. Boxes should be placed high on a slick post with a predator guard or under the eaves of a house. The hole should be small to keep out house sparrows, starlings and other birds.

**Plant Shrubs and/or Plant Trees** – Plant shrubs and trees where Stages 4–6 are lacking.

**Retain Snags and Down Woody Material** – Keep snags for nesting in tree cavities.

**Use Pesticides Carefully** - Use insecticides only when necessary since house wrens consume many of these species. Carefully follow instructions on the label.

**Water Developments for Wildlife** - Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.

## Hummingbird

### **General Habitat Preference**

There are 18 species of hummingbirds found in North America. Other than a couple of exceptions, hummingbirds migrate into Central and South America during the winter months. Hummingbirds are found in or near mixed woodlands and forests rich in flowering plants. They prefer Stages 5 and 6 of plant succession mixed with areas in Stages 2, 3 and 4. In urban settings, they prefer areas with large trees and nearby flowering plants. A hummingbird's nest is a small cup built of lichens and other vegetation and suspended from a forked branch. Hummingbirds feed primarily on nectar, but will also eat small insects.

### **Habitat Requirements**

**Diet** - Nectar from flowers and insects found on flowers. Hummingbirds require high energy foods. Nectar is high in sugars that supply needed energy. Insects are an important source of protein.

**Water** - Hummingbirds obtain necessary water from diet. They do not need to drink water.

**Cover** - Hummingbirds construct small nests on tree branches, usually 5 to 20 feet above the ground. Occasionally they build nests in secluded areas on houses and buildings. The nest is made out of leafy materials and spider silk.

### **Wildlife Management Practices**

**Artificial Feeders** - Hummingbirds use artificial feeders filled with sugar-water (1 part sugar to 4 parts boiled water). Place multiple feeders in an area to diminish territoriality between hummingbirds. Keep feeders clean. Never give honey-water to hummingbirds. Honey ferments faster than sugar and quickly develops a mold that kills hummingbirds. For specifics on artificial feeder design and placement visit your local Cooperative Extension Service office.

**Do Not Disturb Nesting Sites** - Found on houses and buildings unless they are causing a problem such as plugging a rain gutter.

**Plant Flowers** - Hummingbirds seem to be attracted to the color red. Some preferred flowers are petunias, gladiolus, nasturtiums, begonias, morning glory, evening primrose, columbine and cardinal flower.

**Plant Shrubs and Plant Trees** - Plant flowering shrubs, vines and trees. Favorites are hibiscus, trumpet vine, lilac, flowering dogwood and various fruit trees. Trees with rough bark are preferred.

**Roof/Balcony Garden** - In urban areas, provide preferred plant species in gardens to attract hummingbirds.

**Use Pesticides Carefully** - Use insecticides only when necessary. Carefully follow instructions on the label.

## Largemouth Bass

### **General Habitat Preference**

Ponds, lakes and slow moving rivers.

### **Habitat Requirements**

**Diet** - Young bass eat insects and other invertebrates (worms, crayfish and zooplankton). These invertebrates depend on phytoplankton for food. Adult bass eat other small fish such as bluegill and a variety of minnows, tadpoles and crayfish, and even ducklings.

**Water** - Fish need water of a certain quality. Some of the basic requirements are: dissolved oxygen - minimum of 4 parts per million (ppm); carbon dioxide - should not exceed 20 ppm; pH

should range between 6.5 and 9.0; and water temperature should reach at least 70 degrees Fahrenheit sometime during the summer (one foot below surface in shade). Test the water to see if it meets requirements. Aerate pond to increase oxygen and decrease carbon dioxide.

**Cover** - Bass are often found near submerged rocks, stumps, shrubs and near aquatic vegetation where small fish (used for food) hide.

### **Wildlife Management Practices**

**Decrease/ Increase Harvest** - Based on seine sample results.

**Fish or Wildlife Survey** - To determine pond balance.

**Manipulation of Succession** – Manage livestock grazing to maintain thick herbaceous vegetation surrounding the pond and in the watershed that drains into the pond. Develop livestock watering facilities away from pond or allow access to only a small part of the pond.

**Ponds: Construction** – Artificial reefs constructed of rock piles, sections of plastic or cement pipe (a minimum of 6 inches in diameter and 18 inches long), and brush piles and tires (sunk with weight) can be used for additional cover. These practices are recommended for ponds larger than 10 surface acres in size.

**Ponds: Deepen Edges** - Deepening the pond edges to 2 feet deep or more discourages rooted aquatic vegetation growth.

**Ponds: Fertilize** - In clear water, fertilizer may be added to increase or promote phytoplankton. Lime ponds (agricultural limestone) to increase soil pH if total alkalinity is below 20 ppm.

**Ponds: Reduce Turbidity/Reseed Watershed** - Prevent or clear up muddy water (brown or gray color). Muddy water blocks sunlight needed in producing phytoplankton. Maintain a green color in pond water green enough that a white disk cannot be seen 24 inches deep). The color is caused by phytoplankton (microscopic plant life-algae). Reseed watershed to establish thick herbaceous vegetation surrounding the pond in the watershed that drains into the pond.

**Ponds: Repair Spillway** - Repair the spillway if needed and remove trees near the dam or dikes. Stop other pond leaks if and when they occur.

**Ponds: Restock** - Determine pond balance using a minnow seine and catch records. A bass to bluegill ratio of 3 to 6 pounds of bluegill to one pound of bass is considered a good fish population balance. If restocking is necessary, remove existing fish and restock at the appropriate rate.

**Water Level Manipulation Techniques** – Add water control structures if needed.

### **Mallard (Winter Habitat)**

#### **General Habitat Preference**

Mallards prefer to spend the winter in wetlands that contain all 4 Wetland Stages including Stage 1 (open water) and Stage 4 (harvested grain crops). In addition, riparian areas with open water may be used. Mallards are an example of a dabbling duck. These birds feed at or near the surface of the water by filtering food items such as invertebrates, seeds and other plant materials from the water. Dappling ducks are often seen tipping upside down in the water to reach food at the bottom of a pond. Unlike diving ducks, they feed in much shallower water and will not dive under to obtain food.

#### **Habitat Requirements**

**Diet** – Mallards feed on a variety of plant and animal matter. Preferred foods include waste grain from agriculture, aquatic plants and invertebrates. Mallards will fly long distances to feed; however, the closer the food is to protective cover the more valuable and useful it becomes.

**Water** - Mallards use water as described above.

**Cover** - Mallards rest on open water bodies such as streams, rivers and warm-water sloughs that are not frequently disturbed. They also rest on the ice in the middle of lakes.

## **Wildlife Management Practices**

**Decrease / Increase Harvest** – Mallards are a migratory species managed by the U.S. Fish and Wildlife Service in partnership with state wildlife management agencies. Hunting regulations are set each year based on bird surveys on their northern breeding grounds and other factors. However, landowners can decide to set stricter regulations on their own property and designate resting (non-hunted) areas where human disturbance is kept to a minimum.

**Establish Native Grasses and Forbs** – Mallards consume seeds from native grasses and forbs present in or near shallow water areas.

**Grain: Leave Unharvested** – Mallards will readily consume waste grain in fields.

**Manipulation of Succession** – Livestock grazing management should be designed to keep livestock away from riparian areas and allow limited grazing near shallow water areas to retain cover.

**Plant Food Plots** – Mallards are attracted to flooded fields of non-native plants such as corn, soybeans and rice. However, studies of waterfowl energetics indicate that native plants provide better nutrition and are also attractive to mallards. (In addition, hunting over areas of corn and other crops planted for non-agricultural purposes is considered baiting – it is illegal to hunt in or nearby these fields.)

**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.

**Tillage Management** - Eliminate fall tillage so as to provide waste grain in the winter.

**Water Developments for Wildlife** - Reservoirs, warm-water sloughs, dugouts and catchment ponds constructed for livestock drinking are also used for resting.

**Water Level Manipulation Techniques** – Small Dikes for Temporary Flooding of grain fields, planted food plots and oak woodlands in winter.

## **Mink**

### **General Habitat Preference**

Mink are found in Alaska, Canada and across most of the United States. They prefer riparian habitat associated with stream and river banks and the shores of a variety of wetlands. Mink are shoreline dwellers and their one basic habitat requirement is a suitable permanent water area. This may be a stream, river, pond, marsh, swamp, or lake. Waters with good populations of fish, frogs and aquatic invertebrates with brushy or grassy ungrazed shorelines provide the best mink habitat. The availability of den sites is considered to be a key factor in determining how many mink use an area. Areas with lots of trees and shrubs and limited livestock grazing near shorelines usually have more potential den sites.

### **Habitat Requirements**

**Diet** - Mink are strictly carnivorous. Because of its semi-aquatic habits, it obtains about as much food on land as in water. Much food is found in close association with dense vegetation along the shores of wetlands. Mink are opportunistic feeders with a diet that includes rabbits, mice, rats, waterfowl, muskrats, frogs, fish, crayfish, insects, birds and eggs, depending on availability. **Water** - Mink are found in association with water.

**Cover** - Mink use many den sites in the course of their travels and the availability of den sites is a very important habitat consideration. These may be bank burrows, holes, crevices, rock piles, log jams, under tree roots, old muskrat burrows or abandoned beaver lodges.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – Mink are trapped and their populations are closely monitored.

**Manipulation of Succession** - Use prescribed burns and brush chopping to rejuvenate old decadent wetland vegetation that in turn can improve the habitat for the animals that mink use for food. Grazing management should limit or exclude livestock grazing near shorelines to maintain healthy vegetation along the banks and shores of streams, rivers and other wetlands. In some regions this may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.

**Water Developments for Wildlife** - Constructing a water development may provide habitat, but is not recommended if other water sources such as natural wetlands, streams or rivers are available. Construct ponds with shallow water areas where emergent vegetation can grow.

**Water Level Manipulation Techniques** - Small dikes for temporary flooding can be used to improve habitat for animals mink use for food. Water control structures promote growth of emergent aquatic vegetation adjacent to open water.

**Wildlife Damage Management** - Mink can eat significant numbers of upland nesting waterfowl or game bird young, especially in areas where nesting habitat is limited. In such cases, favorable habitat can be reduced or a trapping program can be implemented to utilize the valuable fur resource that mink provide.

### **Mourning Dove**

#### **General Habitat Preference**

Mourning doves may be found over much of the lower 48 states. They are one of the most adaptable and plentiful bird species in North America. Most are migratory, with those nesting in the northern parts of the breeding range migrating greater distances. Its widespread occurrence, nesting in trees of yards and farmsteads and its appearance at winter bird feeders contribute to its familiarity and interest. Mourning doves prefer Stages 2 and 3 of plant succession for feeding with some shrubs and trees (Stages 4 and 5) nearby for roosting.

#### **Habitat Requirements**

**Diet** - Mourning doves often use agriculture areas for feeding and a variety of grass and forb seeds. They will forage on waste grain from cropland and livestock feed lots. In addition, small areas of bare ground (Stage 1) are also beneficial for the birds to obtain grit (small gravel) to help in digesting food.

**Water** - Mourning doves require water daily. They prefer shorelines and banks without vegetation.

**Cover** - Mourning doves prefer tall shrubs and trees for nesting and loafing. Nests are made of twigs placed on branches of shrubs or trees. Nests are also placed on the ground.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – Mourning doves are a migratory species and as such, are regulated by both the U.S. Fish and Wildlife Service and the state wildlife management agency. Landowners can implement stricter hunting regulations and bag limits on their own property than those imposed by these government agencies.

**Establish Native Grasses and Forbs** - Native plants will provide forb seeds for food.

**Grain: Leave Unharvested** - A variety of small grain crops such as wheat, barley, millet, milo, sunflowers or oats will attract and provide food for doves.

**Harvest Timing of Crops** - Delay harvest of crops in the spring to avoid nest destruction.

**Manipulation of Succession** - Disk areas to provide bare ground and set back plant succession to Stages 2 and 3. Brush chop, chain/roller beat small areas (40 acres maximum,

10 to 20 acres preferred) in large expanses of Stage 4 vegetation. Implement a prescribed burn of small areas (40 acres maximum, 10 to 20 acres preferred) in large areas of Stages 4 and 5 of plant succession. Livestock grazing management can be used to keep some areas in Stages 2 and 3 vegetation. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal for establishing native grasses and forbs or space for disking. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Food Plots** - Use food plots as a supplemental food source in areas lacking grain.

**Plant Shrubs and/or Plant Trees** – Most of the area should be in Stages 2 and 3 of plant succession. However, in large areas of Stages 2 and 3 or in agricultural areas having few trees or shrubs, plant shrubs and trees along field borders, fence rows or any other idle land area.

**Retain Snags and Down Woody Material** - These provide perching and roosting sites for mourning doves.

**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.

**Tillage Management** - Tillage of cropland may be delayed in spring to allow use of standing stubble for nesting. Tillage may be eliminated in the fall to allow doves access to waste grain.

**Water Developments for Wildlife** - Where water is limited or absent, development of water sources is desirable.

## Muskrat

### **General Habitat Preference**

Musk rats are found throughout the United States where sufficient water is available. Musk rats live in slow-moving streams, canals, drainage ditches, borrow pits, farm ponds, minnow ponds, reservoirs and swamps where there is an ample supply of aquatic plants and animals. In marsh-type habitat, the muskrat typically builds large, dome-shaped houses or lodges of cattails, bulrushes, sedges or other vegetation. They construct burrows in banks of streams, ditches or levees surrounding ponds and rice fields. Their underwater opening of the burrow, or “plunge hole,” is below water level. They are excellent swimmers and divers and can remain submerged for as long as 15 minutes. They prefer Stage 2 and 3 wetlands interspersed (mixed) together.

### **Habitat Requirements**

**Diet** - Musk rats eat the roots, tubers and green vegetation of emergent aquatic vegetation such as cattails and bulrushes.

**Water** - Musk rats need water of sufficient depth (4 feet) or flowing water that allows free movement under ice during the winter. During warm seasons, they prefer water one to two feet deep, with around 20 percent of the wetland comprised of open water free of emergent aquatic vegetation. Controlling the water level when possible can be a beneficial management practice.

**Cover** - Musk rats build lodges out of bulrushes and cattails, which are usually placed in dense growths of cattails and bulrushes. They rest on open shorelines, floating logs or on tops of lodges. They also make dens in banks.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** - Musk rats are trapped and their populations are closely monitored.

**Manipulation of Succession** - Use prescribed burns and brush chopping to rejuvenate old, decadent wetland vegetation. Grazing management: manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers, and other wetlands. In some

regions this may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas.

**Water Developments for Wildlife** - Ponds and wetlands can be constructed with shallow water areas where emergent aquatic vegetation can grow.

**Water Level Manipulation Techniques** – Small dikes for temporary flooding: small dikes can be used to temporarily flood areas to promote the growth of cattails and bulrushes. Water control structures can be used to provide areas in wetlands with water less than two feet deep where cattails and bulrushes can grow. Up to 80 percent of the wetland should be able to grow such vegetation.

**Wildlife Damage Management** - Burrowing and denning activities can cause problems in flooded agricultural areas such as rice fields. In such instances, populations can be reduced by managing against preferred habitat conditions or by legal harvest during trapping season. This can be done as an economic incentive, since muskrat pelts have a value in the fur trade depending on current market conditions.

## **Northern Bobwhite**

### **General Habitat Preference**

Desirable habitat is an interspersion of Stages 2, 3 and 4 of plant succession. Ideally, habitat components are made up of scattered patches of shrubby cover with diverse native stands of grass and forbs. Bunch grasses such as bluestems are used for nesting cover, while more recently disturbed sites that are rich in forbs and insects are used for brood rearing. In some parts of the country savannah habitat provides excellent habitat. This savannah forest (Stage 5 or 6) should consist of very few trees with an understory of grass and forbs maintained by frequent fire (2-4 years). This savannah may be pine (as in the Southeast Mixed and Outer Coastal Plain Forest) or oak. Some agricultural crops can provide seasonal food for bobwhite quail, but they are no substitute for diverse native plant communities.

### **Habitat Requirements**

**Diet** - Young quail eat insects. Adult quail eat a variety of seeds, green vegetation (mostly forbs), insects, and small grains.

**Water** - Bobwhites do not require free-standing water. They obtain all water from native vegetation.

**Cover** - Thick shrubs for hiding and roosting cover; dense perennial grasses for nesting.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – Northern bobwhites are non-migratory and therefore hunting regulations are governed by state wildlife management agencies. Although Northern bobwhites are declining nationally, studies show their survivability is such that hunting is removing only surplus birds and not harming the population. Instead, the declining bobwhite population is attributed to poor habitat. Landowners may enforce stricter harvest regulations than those imposed by their state wildlife agency.

**Establish Native Grasses and Forbs** - Establish native grasses and forbs if they are absent. Often, the use of fire will release native seeds so that reseeding is not necessary.

**Forest Management Techniques** - Timber harvest small areas (small 40 acre patches or strips) in large expanses of Stages 5 and 6 woodland. Implement timber stand improvement (thinning) in Stage 6 woodlands.

**Grain: Leave Unharvested** - Leave some grain unharvested in agricultural areas.

**Harvest Timing of Crops** - Time haying to protect nesting areas in May and June.

**Manipulation of Succession** - Prescribe burn small areas (40 acres or less) in large expanses of Stages 3 and 4 vegetation. Annual burning in Stages 5 and 6 woodlands is also beneficial to

create savannah habitat. Prescribed burning is the most important tool for quail management and should be used if possible. Disk small areas in large expanses of Stages 3 and 4 to encourage annual forbs and grasses used by bobwhite. Disking should be avoided in native prairies. Fire will encourage similar plant communities without soil disturbance and at a lower cost. Brush chop, chain, root plow, or roller beat small areas (40 acres or less) in large expanses of Stage 4 vegetation. Use grazing management to keep livestock from grazing planted food plots. Ample amounts of herbaceous vegetation used for food by quail should be left in appropriate areas using rotational grazing or permanent fencing particularly in riparian areas. Livestock grazing also can be used to revert or maintain vegetative succession in Stages 2 and 3 vegetation. Livestock management should be used to encourage a uniform structure of plants across the landscape so that all the seasonal needs of quail are met. Uniform clipping of vegetation by cattle across large areas leaves no nesting cover and does not encourage annual forb production. Cattle grazing in combination with prescribed burning are an excellent quail management strategy that mimics historic natural disturbance events. Manage livestock grazing to maintain dense shrub and herbaceous cover in some areas. However, up to one-third of an area can be grazed more intensively to encourage annual forb production for brood habitat assuming that the same areas are not repeatedly grazed the same way. In other words, grazing pressure should be rotated over time. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create savannahs and for establishing native grasses and forbs or space for disking. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Food Plots** - Plant one-eighth to one-fourth of an acre perennial food plots in areas with too little permanent food and cover, again, one plot per 15 acres maximum.

**Plant Shrubs** - Plant in areas where cover is scarce. If shrub patches are within 30-75 m (33 to 82 yards) of each other, additional shrub cover is not needed.

**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.

**Tillage Management** - Eliminate fall tillage.

## **Northern Flicker**

### **General Habitat Preference**

Northern flickers occupy all of North America and inhabit most of the United States year-round. Flickers use open areas in Stages 2 and 3 of plant succession interspersed with areas of Stages 5 and 6 of plant succession. Northern flickers are often found in riparian and urban areas. They prefer older urban residential areas with large trees, golf courses and parks. Flickers create cavities in trees for nesting and will occasionally use nest boxes. Flickers eat insects, especially ants, as well as fruit berries and seeds. Flickers can become problems in urban areas where they may create holes in wood siding on houses or damage ornamental trees. Wildlife damage management may be necessary.

### **Habitat Requirements**

**Diet** - Ants are a favorite food source and make up about 50 percent of their diet. They also eat seeds, fruits, earthworms and berries and are partial to the fruit of poison ivy. Flickers usually feed in open areas and will utilize artificial feeders.

**Water** - Not much is known about daily water requirements. They probably obtain sufficient water from diet.

**Cover** - Holes are excavated in trees for nesting. They use softwood trees like poplar, cottonwood, and willow and prefer old mature trees that show signs of dying or rotting. In treeless areas, they will nest in posts, holes in banks and holes in houses and structures.

## **Wildlife Management Practices**

**Artificial Feeders** - Use artificial feeders in urban areas. They prefer suet feeders fastened to tree trunks.

**Do Not Disturb Nesting Sites** - Disturbing nesting sites may cause parent birds to leave or alert predators of the presence of a nest.

**Manipulation of Succession** - Mow herbaceous vegetation to keep relatively short in height for foraging.

**Plant Trees** - In large expanses without trees, plant softwood trees.

**Retain Snags and Down Wood Material** – Maintain some large mature and standing dead trees (snags) when harvesting timber.

**Use Pesticides Carefully** - Follow the label and use with caution in urban areas.

**Wildlife Damage Management** - May be necessary to prevent damage from flickers foraging, drumming, and excavating wood-built buildings. Exclusion practices to prevent flickers access to buildings may be effective. Harassment may be effective to repel flickers from an area.

Habitat management may be effective by providing flickers alternative food sources (suet) or nesting cover (nest box) to draw flickers away from buildings. Special: European starlings often take over flicker cavities for their own nests. Be vigilant and take appropriate action to prevent starlings from occupying nesting cavities of flickers or other cavity-nesting wildlife.

**Water Developments for Wildlife** - Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.

## **Northern Harrier**

### **General Habitat Preference**

Northern Harriers are found in the northern portions of the Great Plains and throughout Canada during the nesting season. Northern Harriers winter throughout much of the U.S. Stages 2, 3 and 4 of plant succession are preferred and may include wet meadows, grasslands, pasture and croplands. The species typically hunts by flying low to the ground in search of prey.

### **Habitat Requirements**

**Diet** - The diet includes small mammals, birds, reptiles and frogs.

**Water** - Northern Harriers do not need to drink water on a regular basis. They obtain necessary water from their diet.

**Cover** - Cover requirements of prey (primarily small rodents) should be considered. This species nests on the ground in open areas.

### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** – Establish in areas with too little grassland where it will be beneficial as it increases prey populations.

**Harvest Timing of Crops** - Time the hay harvest to avoid the nesting season of this ground nesting raptor.

**Manipulation of Succession** - Prescribed burning of grasslands can increase the availability of prey. Livestock grazing management can be used to maintain various structure types of grasslands conducive to prey habitat and also to improve the efficiency of hunting for Northern Harrier. Chain sawing, feller-butchering and clipping trees are practices to remove trees and revert an area to an earlier successional stage that is to be maintained at that early successional stage. In large expanses of Stages 5 and 6, use chainsawing, feller butchering, clipping or other mechanical methods of tree removal to create openings in the forest for establishing native grasses and forbs or disking. Strip disking will keep vegetation at Stages 2

and 3. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Retain Snags and Down Woody Material** – In expansive areas of Stages 2-4, retain snags for perching and roosting along field borders, riparian areas, and odd areas.

**Tillage Management** - Tillage management of crops can be used to avoid disturbance during the nesting season of this ground nesting raptor.

## Ovenbird

### **General Habitat Preference**

Ovenbirds frequent mature deciduous and mixed forests throughout the eastern third of the U.S.

### **Habitat Requirements**

**Diet** - Ovenbirds eat primarily insects (ants, caterpillars, and beetles), slugs, snails and earthworms. Seeds and fruits are also occasionally eaten.

**Water** - Ovenbirds usually obtain necessary water from their diet, but will also use other water sources when available.

**Cover** - Ovenbirds are ground-nesting birds. They construct a nest of grasses and forbs that are arched over in the shape of a Dutch oven, hence the name. The nest is usually well hidden in herbaceous vegetation on the forest floor. An herbaceous understory is also important for cover as ovenbirds forage along the forest floor.

### **Wildlife Management Practices**

**Forest Management Techniques** - Timber stand improvement (thinning) will encourage increased groundcover important for nesting and foraging cover. Timber harvest small areas in large expanses of Stage 5 and 6 forests to promote growth of understory plants.

**Manipulation of Succession** - Livestock grazing management is critical to avoid grazing in Stage 6 forest. Fence out livestock in ovenbird nesting areas.

**Plant Shrubs** and/or **Plant Trees** -Plant trees in areas where less than 75 percent of the area is in Stages 5 or 6 forest. Plant shrubs in areas where they are lacking.

## Prairie Vole

### **General Habitat Preference**

Prairie Voles are common in prairies, ungrazed pastures, fallow fields, weedy areas, road right-of-ways, and sometimes in soybean or alfalfa fields. They are preyed upon by a variety of predators including raptors, owls, snakes, foxes, skunks, coyotes and bobcats.

### **Habitat Requirements**

**Diet** - Prairie voles are herbivores. Food items include soft basal segments of grasses, leaves, tubers and roots, and seeds, grains and nuts, which may be stored below ground. Insects are eaten when available. In winter, they sometimes consume the bark or stems of woody vegetation.

**Water** - They usually obtain necessary water from diet.

**Cover** - Prairie voles use an extensive runway system comprised of tunnels beneath the grass canopy that helps them hide from predators. Prairie voles also maintain an underground system of burrows where they nest and store food.

### **Wildlife Management Practices**

**Establish Native Grasses and Forbs** – In Stages 4, 5 and 6, provide grasses and forbs for consumption.

**Grain: Leave Unharvested** – Leave grain unharvested particularly near grassy field edges where voles are likely to inhabit.

**Manipulation of Succession** - Prescribed burning of small areas (40 acres maximum, 10 to 20 acres preferred) in old decadent stands of Stage 4 vegetation will promote native grasses and resprouting of shrubs. Chaining, roller beating or brush chopping small areas (40 acres maximum, 10 to 20 acres preferred) in old decadent stands of Stage 4 vegetation will promote native grasses and resprouting of shrubs. Livestock grazing management should leave adequate herbaceous vegetation needed for food.

**Plant Shrubs and/or Plant Trees** – In expansive areas of Stages 2 and 3, plant a few shrubs and trees as a winter food source (bark, nuts, seeds).

**Tillage Management** – Use no-till practices to avoid disturbing the vole's underground tunnels.

**Wildlife Damage Management** – In places near agricultural fields or gardens, prairie voles may become pests. Prairie voles cause damage to trees by stem injury, with pines most commonly affected. Other than disking and destroying tunnels, there are few options for controlling excessive populations.

## **Prothonotary Warbler**

### **General Habitat Preference**

The Prothonotary Warbler nests in hardwood forests (Stage 6) near water primarily in the southeastern U.S. Cypress swamps and riparian corridors are typical habitat for this species. It is a cavity nester, so standing dead trees are important. Additionally, as this species primarily feeds on insects in the lower canopy or at ground level, multiple layers of vertical structure in the forest are beneficial. The species winters in Central and South America.

### **Habitat Requirements**

**Diet** - This species consumes insects such as ants, beetles, mayflies, aquatic larvae and snails. Healthy wetlands and mature hardwood forest with complex vertical structure provides habitat necessary for insect populations Prothonotary Warblers require.

**Water** - This species seldom is found far from forested wetlands. Therefore water is an important component for habitat selection.

**Cover** - Mature hardwood forests in Stage 6 succession with adjacent wetlands are required. Dead standing timber should be present to allow this cavity nester to breed.

### **Wildlife Management Practices**

**Forest Management Techniques** - Forests should be managed so that complex vertical structure exists to accommodate the feeding patterns of this species. Timber harvest may be necessary every 100+ years for the continued regeneration of hardwoods. Timber stand improvement may be necessary in mature stands to increase vertical structure and promote forest regeneration.

**Manipulation of Succession** - Prescribed burning of forests can reduce leaf litter, increase plant growth and promote insect activity at ground level and in the lower canopy. In riparian areas, livestock grazing management should be used to fence out livestock. In many forested areas, livestock should be fenced out or allowed limited access to preserve the forest's lower canopy and ground plants. In large expanses of Stage 6 of mature forests, chain sawing, feller-butcher, and clipping trees are practices to thin trees, increase vertical diversity and promote forest regeneration. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Trees** - In areas with no hardwood wetland buffer, planting trees (native only) could be beneficial if natural regeneration is not sufficient.

**Retain Snags and Down Woody Material** – To provide nest sites for this species. In areas where there is an absence of natural nest sites, nest boxes can be placed near water.

**Water Developments for Wildlife** - Water source such as a constructed wetland may be necessary in areas lacking natural wetlands. Wetlands should be maintained to provide for a diverse and abundant insect population.

## **Raccoon**

### **General Habitat Preference**

Raccoons are very common throughout most of the United States except in certain parts of the Rocky Mountains, Nevada, Utah, and Arizona. Raccoons are most abundant near water, riparian areas and lands adjacent to wetlands. They are also found in urban areas. They prefer areas interspersed with different successional stages. Riparian areas in Stages 5 and 6 of plant succession are ideal. Raccoons nest in hollow trees, underground dens, or in chimneys, attics and crawl spaces of houses and buildings. They are omnivorous and eat a wide range of foods. Raccoons can become pests in urban areas and in wetlands where waterfowl nesting is important. In such instances, the management objectives may be to make the habitat less suitable for raccoons. They are also major predators of quail and turkey nests in the southeast. Wildlife damage management may be necessary.

### **Habitat Requirements**

**Diet** - Raccoons eat a wide variety of foods consisting of garbage, birds, worms, eggs, fish, small mammals, insects, crayfish, frogs, lizards, snakes, carrion, grains, seeds, fruits, nuts and foods prepared for human and pet consumption.

**Water** - Raccoons require water frequently during warm seasons.

**Cover** - Raccoons nest and rest during the day in natural tree cavities, dens in the ground, under brush and junk piles, in old abandoned buildings and rocky cliffs and ledges.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – Raccoons are furbearers and are both hunted and trapped.

**Establish Native Grasses and Forbs** – Establish where exotic grasses are present or in forest openings.

**Forest Management Techniques** - Timber harvest small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of Stage 5 and 6 vegetation. Timber stand improvement (thinning) can also effectively create understory favoring prey species. Riparian areas should be left undisturbed.

**Grain: Leave Unharvested** - Leave unharvested small areas of grain crops adjacent to woodlands.

**Manipulation of Succession** - Prescribed burns and brush chopping can be used to rejuvenate old decadent wetland vegetation. These practices along with chaining, roller beating and root plowing can be used to revert succession from Stages 5 and 6 vegetation to Stages 2, 3 and 4 in appropriate regions. Manage livestock grazing to maintain healthy vegetation along the banks and shores of streams, rivers and other wetlands. In some regions this may include the development of livestock watering facilities in uplands to discourage congregation in and overuse of riparian areas. In urban areas, mowing can be used to create more open areas for raccoons.

**Plant Shrubs and/or Plant Trees** - Plant and maintain large deciduous trees especially in riparian areas and areas adjacent to wetlands. Plant trees and shrubs to develop or maintain corridors and riparian buffers.

**Water Developments for Wildlife** - In areas lacking water, water developments can provide a source of drinking water and areas for foraging for food.

**Water Level Manipulation Techniques** - Control water levels with water control structures. Provide areas in wetland with water less than 2 feet deep where aquatic emergent vegetation can grow. Provide shallow water areas in existing ponds and wetlands where emergent vegetation can grow.

**Wildlife Damage Management** - Damage management may be necessary if raccoons invade garbage cans, occupy residences or buildings, or cause depredation of poultry. Exclusion is a cost-effective management practice. Harassment can be effective. Cultural modification, like using wildlife-proof trash cans, is very effective. Trap and relocate or trap and euthanize is effective for problem raccoons.

## **Red-eyed Vireo**

### **General Habitat Preference**

The Red-eyed Vireo inhabits open deciduous and mixed forests in Stages 5 and 6 of plant succession with dense understory of saplings, in wooded clearings (Stages 2–4), or borders of burns. It is found in both upland and river bottom forests and sometimes in residential areas where abundant shade trees provide a continuous canopy. It is seldom found where conifers comprise 75 percent or more of the basal area.

### **Habitat Requirements**

**Diet** - Mainly insects gleaned from leaf surfaces in mid- to upper tree canopies. The Red-eyed Vireo also eats spiders, a few snails, wild fruits and berries.

**Water** - They obtain necessary water from diet.

**Cover** - These birds nest in deciduous or coniferous trees or shrubs. They suspend deep cup nests from a horizontal fork of a slender branch, usually in dense foliage five to 10 feet above the ground, but sometimes as high as 60 feet.

### **Wildlife Management Practices**

**Forest Management Techniques** – Timber stand improvement (thinning) in large expanses of Stage 6 woodland can increase the amount of insects.

**Manipulation of Succession** - Prescribed burning of forests can reduce leaf litter, increase plant growth and promote insect activity along forest borders, at ground level and in the lower canopy. In riparian areas, livestock grazing management should be used to fence out domestic animals. In many forested areas, livestock should be fenced out or allowed limited access to preserve the forest's lower canopy and ground plants. In large expanses of Stage 6 of mature forests, chain sawing, feller-butchering and clipping trees are practices to create openings or thin trees to increase vertical diversity and promote forest regeneration. Use chemicals (herbicides) in areas where chainsaws or other tree removal methods are not feasible.

**Plant Shrubs** and/or **Plant Trees** - Plant trees in large areas of Stages 3 and 4 of plant succession. Plant shrubs when lacking to provide nesting habitat.

## **Redhead**

### **General Habitat Preference**

The redhead ranges over the northwestern and central United States and Mexico. They winter in southern areas of the United States into Mexico. They are diving ducks that use Stage 2 wetlands for most activities.

### **Habitat Requirements**

**Diet** - During fall and winter, redheads prefer aquatic plants such as pond weeds, muskgrass, bulrush seeds, wild celery, water lily seeds and coontail.

**Water** - See cover requirements below.

**Cover** - Water levels should be controlled in order to promote growth of tall emergent aquatic vegetation. Strive for wetlands comprised of 50 percent Stage 3 interspersed with 50 percent Stage 2 wetland.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – Redheads are a migratory waterfowl species managed by the U.S. Fish and Wildlife Service in partnership with state wildlife management agencies. Hunting regulations are set each year based on nesting bird surveys on their northern breeding grounds and other factors. However, landowners can decide to set stricter regulations on their own property and designate resting (non-hunted) areas where human disturbance is kept to a minimum.

**Manipulation of Succession** - Use livestock grazing management to maintain tall emergent aquatic vegetation adjacent to water.

**Water Developments for Wildlife** - Build ponds or wetlands with a minimum size of one surface acre of water. Manage water levels to provide habitat as described under water control structures below.

**Water Level Manipulation Techniques** – Construct small dikes to temporarily flood areas dominated by tall emergent aquatic vegetation during the nesting season. Since redheads are diving ducks, use water control structures to control water levels and promote growth of tall emergent aquatic vegetation (Stage 3 wetland) adjacent to Stage 2 wetlands with an abundance of floating and submerged aquatic vegetation (water depth three to five feet).

### **Red-tailed Hawk**

#### **General Habitat Preference**

Red-tailed hawks are found throughout the U.S. in open areas in Stages 2 and 3 of plant succession interspersed with Stages 4, 5 and/or 6 vegetation. They eat small mammals, birds and reptiles. Red-tailed hawks nest in trees and cliffs, and often roost in solitary trees located in the grassland.

#### **Habitat Requirements**

**Diet** - Red-tailed hawks eat small mammals such as squirrels, rabbits, mice, reptiles and other birds. They find their food by soaring over Stages 2, 3 and 4 vegetation.

**Water** - Obtain the necessary water from their diet.

**Cover** - Red-tailed hawk nests are usually built 30–90 feet above the ground, often in the fork of a tree branch. Cliffs will also be used for nests, when trees are not present. They will also use small trees, electric poles and similar structures for perching.

#### **Management Practices**

**Establish Native Grasses and Forbs** - in damaged areas to increase Stage 2 and 3 vegetation

**Forest Management Techniques** - Timber harvest small areas (40 acres maximum) in large expanses of Stages 4, 5 and 6 woodlands to create areas where red-tailed hawks can fly and find small mammals.

**Manipulation of Succession** - Prescribe burn, brush chop, chain or roller beat small areas (40 acres maximum) in large expanses of Stage 4 vegetation. Burning and brush chopping can also be used to rejuvenate Stage 3 vegetation and improve small mammal habitat. Livestock grazing management should maintain some areas with an adequate herbaceous ground layer for small mammals to live in.

**Nesting Structures** - Platforms should be created in areas where trees are absent.

**Plant Trees** - Plant where trees are not present to create perching and nesting locations.

**Retain Snags and Down Woody Material** – Snags along a forest edge serve as good perching post for scouting prey.

## **Red-Winged Blackbird**

### **General Habitat Preference**

Red-winged blackbirds breed across the United States and throughout central Canada. They winter across the United States and extreme southern Canada. They prefer Stage 3 wetlands dominated by emergent aquatic vegetation.

### **Habitat Requirements**

**Diet** - Red-winged blackbirds use waste grain and seeds of annual forbs in fall, winter and early spring. They eat a variety of insects in the summer. Many of the insects used for food are associated with tall emergent aquatic vegetation such as cattails, bulrushes, marsh grass and a variety of shrubs and trees.

**Water** - Red-winged blackbirds frequent areas associated with water.

**Cover** - These birds nest close to the ground or water in dense clumps of emergent aquatic or other herbaceous vegetation. They often roost (rest) in the same areas or in nearby trees and shrubs.

### **Wildlife Management Practices**

**Grain: Leave Unharvested** – Red-winged blackbirds will readily consume grains such as rice.

**Manipulation of Succession** - Use prescribed burns and brush chopping every three to five years to rejuvenate old, decadent, emergent aquatic vegetation. Livestock grazing management: use adjacent to and/or in wetlands to maintain cattails, shrubs and trees.

**Plant Shrubs** and/or **Plant Trees** - plant adjacent to wetlands or ponds but not on the dam or dike.

**Water Developments for Wildlife** - Construct ponds and wetlands with shallow water (less than 2 feet deep) where tall emergent aquatic vegetation can grow.

**Water Level Manipulation Techniques** – Use small dikes for temporary flooding for providing shallow water where emergent vegetation can grow. Use water control structures for maintaining shallow water areas where emergent vegetation can grow.

**Wildlife Damage Management** - This species is often a pest in agricultural areas where they may damage crops. In such situations, management objectives may be to reduce the quality and quantity of habitat. It is often more appropriate to manage for this species in urban wetlands and other areas where crop damage is not common.

## **River Otter**

### **General Habitat Preference**

River otters live in streams, rivers, oxbows, old river channels, lakes, swamps, sloughs and borrow ditches. Though not abundant, their populations have rebounded successfully in localized areas. River otter populations were depleted in the early 1900s by habitat destruction and unregulated market hunting. Otters are closely associated with beavers, relying on them for dens as well as for areas to hunt for food. They frequent pools created by beavers to hunt for fish, crayfish and frogs. Because otters do not make their own dens, they typically move into beavers' (or occasionally muskrats') abandoned dens and lodges.

### **Habitat Requirements**

**Diet** - River otters eat mostly crayfish and fish. They sometimes eat frogs, salamanders, turtles, mussels, snakes and muskrats. They also prey on migratory waterfowl when abundant.

**Water** - They live in a variety of freshwater and coastal marine habitats. River otters seem to be sensitive to pollution and disappear from areas with polluted waters.

**Cover** - River otters use dens built by beavers and other mammals. Dens are found in natural hollows such as under a log or in river banks. Dens have underwater entrances and a tunnel leading to a nest chamber that is lined with leaves, grass, moss, bark and hair.

### **Wildlife Management Practices**

**Decrease/Increase Harvest** – River otters can become too numerous and consume fish used for recreation or commercial purposes. To prevent this, it may be necessary to periodically remove some otters from certain areas.

**Manipulation of Succession** – Livestock grazing management should exclude grazing near waterways so that shrubs and trees are maintained adjacent to waters used by beavers and improve water quality for otters. This may include fencing livestock from waterways and developing livestock watering facilities in upland areas to discourage congregation in and overuse of riparian areas.

**Plant Shrubs and/or Plant Trees** – Plant willows, other shrubs and deciduous trees near water that can be used by beaver for food and dam construction.

**Water Developments for Wildlife** - Wetland construction may be necessary in areas lacking natural wetlands.

**Water Level Manipulation Techniques** – Water levels can be adjusted to optimize prey for river otters. River otters utilize deeper pools where they prey upon fish and shallow areas where crayfish thrive. Occasionally they may prey upon migratory waterfowl attracted to shallow water areas.

**Wildlife Damage Management** – River otters have been accused of competing with recreational anglers and commercial fisheries for game fish. Therefore increasing harvest by trapping may be necessary. Other options are removing beavers and muskrats in the pond or nearby stream and destroying their dens and lodges. In some circumstances, building an electric fence around a pond may work. The 4-strand electric fence should be spaced at 4 to 5 inch intervals from the ground up.

## **Rock Dove**

### **General Habitat Preference**

Rock doves, also called pigeons, are an introduced species and are found year-round throughout urban and agricultural areas in the United States. They particularly like large buildings, parks and open areas. Rock doves create a shallow nest of sticks, leaves and other vegetation and nest above the ground and on or around buildings.

### **Habitat Requirements**

**Diet** - Rock doves forage on the ground. They prefer waste grain and weed seeds. In urban areas they live mostly on human handouts.

**Water** - They require water frequently in warm seasons. They usually can fly far enough to find water.

**Cover** - They nest on window ledges, roof tops, bridges and a variety of structures.

### **Wildlife Management Practices**

**Artificial Feeders** - Rock doves primarily feed on the ground on small grains, seeds and crumbs.

**Manipulation of Succession** – In urban areas, mowing can be used to create open areas for rock doves.

**Water Developments for Wildlife** – Birdbaths and pans of water can be provided, or a low area in the yard can be filled with water. Try not to place water in areas where cats and other pets can catch the birds.

**Wildlife Damage Management** - In some areas rock doves are considered pests. In such situations the management objectives may be to reduce the quality and quantity of available habitat or reduce damage. Rock dove populations often grow to levels where they are causing wildlife damage or will cause detrimental conditions for native wildlife by out competing native species for habitat requirements. Therefore, wildlife damage management will most likely be necessary in almost all situations, especially in suburban/urban and agricultural areas.

Exclusion practices to prevent rock doves from accessing an area are effective. Remove food, water, and cover available to rock doves. Various harassment practices may be effective. Trap and euthanasia may be appropriate to reduce rock dove populations.

## **Ruffed Grouse**

### **General Habitat Preference**

The ruffed grouse occurs in Stages 4, 5 and 6 cover across the more northern latitudes of North America and down the Appalachian range. Ruffed grouse are found in a variety of deciduous forest types, but are particularly closely associated with aspen, especially young stands with relatively dense structure.

### **Habitat Requirements**

**Diet** - Primary foods of ruffed grouse vary with location. Primary foods include buds, acorns, beechnuts, soft mast, insects and other invertebrates, and leaves of forbs.

**Water** - Ruffed grouse obtain the water they need from the foods they eat.

**Cover** - Ruffed grouse nest in a variety of forest types and age classes. Ruffed grouse prefer six- to 20-year-old stands (Stage 5), but readily use mature stands (Stage 6, especially with a dense Mid-story) in close proximity for foraging.

### **Wildlife Management Practices**

**Forest Management Techniques** - Timber harvest methods within Stage 6 forest will stimulate regeneration that will provide optimum cover for grouse within 6 years. Timber stand improvement (thinning) can be used to stimulate desirable structure and stem density within Stages 5 and 6 forest and enable crowns of desirable trees to grow and produce additional mast.

**Manipulation of Succession** - Prescribed burning can be used to maintain and rejuvenate areas of Stage 4 and improve brooding cover in Stages 5 and 6. Livestock grazing management is critical to avoid grazing in Stages 5 and 6 and protect trees and shrubs planted for grouse.

**Plant Trees** - Plant where Stages 5 and 6 represent less than 50 percent of the area considered and where Stages 5 and 6 forests contain few or no mast-producing trees. Plant trees where additional soft mast is needed and plant shrubs to develop thickets and hedgerows in fields and other areas where Stage 4 and 5 cover is lacking.

**Retain Snags and Down Woody Material** – Leave downed logs to provide adequate drumming sites.

## **Song Sparrow**

### **General Habitat Preference**

Song sparrows inhabit all of America, but will migrate from the extreme northern areas during colder months of the year. Song sparrows occupy edge areas where Stages 2 and 3 vegetation

is present with nearby shrubs (Stage 4) and small areas of Stages 5 and 6. Often nest along forest edges in a cup nest of grass and leaves on or near the ground. Song sparrows primarily feed on the ground and eat seeds, insects and fruit.

### **Habitat Requirements**

**Diet** - Weed seeds and insects of all kinds are used as a food source, as are fruit when available.

**Water** - Frequent water in warm seasons is required.

**Cover** - Thick shrubs for nesting and hiding. The nest is often placed on the ground under a shrub or in thick herbaceous cover and made of grass, leaves and weeds.

### **Wildlife Management Practices**

**Artificial Feeders** - Millet and sunflower seeds are favorites. Artificial feeders placed on the ground can be used.

**Do Not Disturb Nesting Sites** - Disturbing nesting sites may cause parent birds to leave or alert predators of the presence of a nest.

**Establish Native Grasses and Forbs** – Establish grasses for cover and nesting material along forest edges for nesting habitat.

**Manipulation of Succession** – In urban areas, mowing can be used to create open areas and forest edge.

**Plant Shrubs and/or Plant Trees** – Song sparrows thrive in edge habitat. Plant shrubs along edges of Stages 2 and 3 vegetation. Plant small areas of trees if lacking.

**Use Pesticides Carefully** - Use insecticides only when necessary. When using insecticides, carefully follow the directions on the label.

**Water Development for Wildlife** - Birdbaths and pans of water can be provided. Remember, try to place water in areas where cats and other pets can't catch the birds.

## **Spotted Skunk**

### **General Habitat Preference**

Spotted skunks occur in a variety of habitats including open fields, prairies, croplands, fencerows, farmyards, forest edges and woodlands. Wetlands and dense timber stands in Stages 5 or 6 are avoided. Because of low population numbers, the hunting season is closed for spotted skunks in many states.

### **Habitat Requirements**

**Diet** - Spotted skunks are omnivorous and feed upon insects, mice, rats, some birds, and to a lesser extent, upon fruits, corn, nuts, small lizards and snakes.

**Water** - They obtain necessary water requirements from their surroundings.

**Cover** - Spotted skunks are found most commonly in open grasslands, brushy areas and cultivated land. They den below ground in rocky crevices, along fencerows, or deserted woodchuck or armadillo burrows as well as above ground in brush piles, woodpiles, hollow trees or logs, and hay stacks.

### **Wildlife Management Practices**

**Grain: Leave Unharvested** – Spotted skunks occasionally consume corn and other grain crops.

**Manipulation of Succession** – Livestock grazing management should be controlled to allow for undisturbed areas of brushy growth to occur. In large areas of Stages 5 and 6, create openings to produce edge habitat by mowing, chaining/roller beating, disking, or burning. Avoid burning or clearing fencerows, brush piles and downed logs or trees where skunks may be present.

**Plant Shrubs** – In large open areas of Stages 2 or 3, plant multiple rows of fruiting shrubs. Encourage shrub growth in fencerows, hedgerows, field/woods borders, and odd areas.

**Plant Trees** – In areas of Stages 2, 3 or 4, plant a few mast-producing trees.

**Retain Snags and Down Woody Material** – Spotted skunks den in brushy areas and hollow trees or logs.

**Use Pesticides Carefully** – Insects are an important part of their diet. Pesticides should be limited or not used at all. In Missouri some biologists link the decline of spotted skunks in the 1950s with increased pesticide use and clean farming practices in agriculture.

**Wildlife Damage Management** – Spotted skunks occasionally raid poultry houses and kill chickens and eat eggs.

## **White-tailed Deer**

### **General Habitat Preference**

White-tailed deer occur in the eastern two-thirds of the country. They prefer Stages 3, 4 and 5 of plant succession, all interspersed together. White-tailed deer can be a nuisance when their habitat and home range overlap areas occupied by people. Therefore, wildlife damage management techniques apply in some cases.

### **Habitat Requirements**

**Diet** - White-tailed deer prefer a variety of shrubs, forbs, grasses and waste grain. Acorns and nuts from mast trees are favorite foods. In the northern parts of the range for white-tailed deer, they will browse on conifer trees in the winter.

**Water** - White-tailed deer drink free water when it is available. They obtain most of their water from food items. Water developments are especially important in more arid regions.

**Cover** - White-tailed deer use woodlands and tall shrubs for hiding and travel cover. They also use tall emergent aquatic vegetation in riparian areas and brushy upland drainages for cover in the Great Plains Grassland Region.

### **Wildlife Management Practices**

**Decrease / Increase Harvest** – White-tailed deer are a very popular game species. Regulated hunting is the primary tool used to keep game species within carrying capacity of the habitat.

**Establish Native Grasses and Forbs** - in fields in large expanses of Stage 4, 5 and 6 vegetation.

**Forest Management Techniques** - Timber harvest small areas (40 acres maximum, 10 to 20 acres preferred) in large expanses of Stage 5 and 6 woodlands. Timber stand improvement (thinning) will promote regrowth of vegetation consumed by deer.

**Grain: Leave Unharvested** - In small areas of cropland adjacent to woodlands.

**Harvest Timing of Crops** – Time the harvest of crops and hay so that fawning sites are not disturbed.

**Manipulation of Succession** - Prescribed burning at three-year intervals in Stage 5 pine woodlands or periodically in Stage 3 and 4 vegetation. Brush chop, chain/ roller beat small areas to maintain Stage 3 and 4 vegetation. In areas dominated by mesquite, root plowing combined with the seeding of grasses and legumes may be the best way to maintain small areas in Stage 3 vegetation. Livestock grazing management should be used to leave some forbs, grasses, shrubs and trees available for food and cover. This is particularly important in riparian areas in the Great Plains Grassland Region.

**Plant Food Plots** - Plant several one acre perennial food plots of grass and clover in large expanses of Stage 5 and 6 woodland. Plant annual food plots to grain.

**Plant Shrubs and/or Plant Trees** – Plant trees and shrubs in ravines, along field borders and other idle land areas. Provide corridors for travel lanes in open areas.

**Tillage Management** - Eliminate fall tillage of grain crop residue adjacent to woodlands.  
**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.  
**Water Developments for Wildlife** - Will provide an external water source for drinking.  
**Wildlife Damage Management Techniques** - Deer can seriously degrade habitat when overpopulated. Increasing or decreasing harvest is essential for proper management. Other damage management techniques such as fencing may be helpful.

## **Wild Turkey**

### **General Habitat Preference**

Wild turkeys are found in a wide variety of forest types across the U.S. They are limited only by tree cover for roosting. Optimum habitat composition may be one-third to one-half in Stage 6 forest containing an abundance of hard- and soft-mast producers, well interspersed with Stages 2, 3 and 4.

### **Habitat Requirements**

**Diet** - Wild turkeys eat a wide variety of acorns, nuts, miscellaneous seeds, insects and other invertebrates, soft mast, and waste grain (especially corn and wheat).

**Water** - Wild turkeys obtain water from their diet, but will use free-standing water when available.

**Cover** - Wild turkeys nest in mature forest, regenerating forest, brushy thickets and old-fields with rank cover. The nest is a shallow depression on the ground lined with leaves and/or grass. It is usually well concealed amongst vegetation or against some object (e.g., a tree, log or brush). Wild turkeys roost in trees or tall shrubs (if no trees are present) at night.

### **Wildlife Management Practices**

**Decrease / Increase Harvest:** Harvest levels may need to be adjusted depending on population status and management objectives.

**Establish Native Grasses and Forbs** - Where less than one-quarter of the area is comprised of Stages 2 and 3 and where non-native grasses and forbs dominate Stages 2 and 3.

**Forest Management Techniques** - Timber harvest in large areas of Stage 6 can enhance nesting habitat, provide additional brood cover, soft mast, and miscellaneous seed for two or three years after harvest. Timber stand improvement practices can be used to improve the structure of the understory for nesting and brood rearing, increase production of soft mast and miscellaneous seed, and enable the crowns of desired trees to grow and produce additional mast.

**Grain: Leave Unharvested** - (especially corn): So wild turkeys can glean waste grain from the field. This is especially important during years of poor mast production.

**Harvest Timing of Crops** - Time haying to protect nesting areas. Nesting occurs from March until July.

**Manipulation of Succession** - Through mowing, chaining, roller beating, controlled burning, disking, chemical application and grazing to maintain and rejuvenate areas of Stages 2–4 when habitat quality begins to decline. Livestock grazing management should prevent livestock from degrading habitat by overgrazing and damaging trees and shrubs planted to benefit wild turkeys.

**Plant Food Plots** - Where grain crops and quality forages (such as clovers) are lacking to provide a supplemental food source and additional areas for brood rearing.

**Plant Shrubs and/or Plant Trees** - Where additional soft mast is needed and to develop hedgerows across fields greater than 4 acres. Plant mast trees where Stages 5 and

6 represent less than one third of the area considered and where Stages 5 and 6 contain few or no mast-producing trees.

**Soil Test** – Conducting a soil test and applying correct soil amendments will increase growth, production and nutrient availability of native plants and food plots.

**Tillage Management** - Eliminate in the fall to provide additional waste grain, especially adjacent to Stages 5 and 6 cover.

**Water Developments for Wildlife** - Water developments can be useful when there is little or no free-standing water on the property.

**Wildlife Damage Management** - Wildlife damage management may be necessary in rare instances when wild turkeys consume corn or other grains in agricultural fields.

## **Wood Duck**

### **General Habitat Preference**

Wood ducks are primarily found along rivers and large creeks within bottomland hardwoods forests, Stage 3 wetlands and swamps with emergent woody vegetation adjacent to Stage 2 wetlands, and shallowly flooded Stage 5 and 6 hardwood forests.

### **Habitat Requirements**

**Diet** - Acorns are the primary diet item of wood ducks in fall and winter. They also eat other nuts, various miscellaneous seeds and fruits, as well as waste grain (especially corn), all depending upon availability. Insects and other invertebrates are most important for wood duck chicks and hens prior to and during the nesting season.

**Water** - Wood ducks spend most of their lives in water, drink regularly and obtain water through their diet.

**Cover** - Wood ducks nest in tree cavities in Stage 6 hardwood forest. Usually, nest sites are within or adjacent to flooded timber; however, wood ducks have been known to nest up to 1 mile from water. Cavity availability is critical. Thus, artificial cavities are readily used by wood ducks and have been, most likely, the number one reason for the increase in wood duck populations over the past 50 years. Nest boxes for wood ducks should be at least 100 yards apart and should not be placed within sight of each other if possible.

### **Wildlife Management Practices**

**Decrease / Increase Hunting** – Wood ducks are a hunted waterfowl species whose population sizes are closely monitored. Landowners can decide to implement stricter harvest than imposed by hunting regulations.

**Forest Management Techniques** - Timber stand improvement (TSI) practices in bottomland hardwoods that can be flooded can lead to larger crowns of favored trees and increased mast production. Woody stem density should increase following TSI and improve cover for wood ducks in those stands that can be flooded.

**Grain: Leave Unharvested** - To provide additional food source for wood ducks. This is especially important in fields that can be flooded and those adjacent to a water source used by wood ducks.

**Manipulation of Succession** - Livestock management practices should prevent livestock from overgrazing in woodlots and protect trees and shrubs planted for wood ducks.

**Nesting Structures** - Nest boxes should be erected where suitable habitat for wood ducks exists or where planned.

**Plant Shrubs and/or Plant Trees** - Plant where there is a lack of emergent woody vegetation in open areas that can be flooded to create more usable space for wood ducks. Plant mast trees adjacent to or within open areas that are suitable for flooding if there is a lack of mast-producing trees in areas that can be flooded.

**Retain Snags and Down Woody Material** - Snags provide potential cavity nesting sites.  
**Water Developments for Wildlife** - Where water is lacking, shallow impoundments should be created where topography allows for creating feeding and nesting space for wood ducks.  
**Water Level Manipulation Techniques** – Water control structures should be installed in existing dikes if there are none present.