Bluegill

**General information**
The bluegill is one of the most abundant Sunfish species. It thrives in a
variety of conditions, ranging from freshwater lakes, ponds, and slow
moving streams, to brackish waters of coastal areas. The bluegill’s
native range is the eastern U.S. from southern Canada to Florida and
Texas, but they have been successfully introduced throughout the U.S.

**Habitat requirements**
*Diet:* a variety of zooplankton (microscopic animal life) during the first
couple of months of life, progressing to insects and their larvae, eggs,
earthworms, tadpoles, small minnows, and crayfish
*Cover:* submerged rocks, woody debris, and aquatic vegetation where
small fish (prey) hide
*Water:* basic requirements include dissolved oxygen (minimum of four parts per million); pH between 6.5 and 9.0;
and water temperature should reach at least 70 F during summer (one foot below surface in the shade)

**Wildlife management practices**
*Livestock Management:* livestock should either be excluded from fish ponds or only allowed access to a
small part of the fish pond; livestock watering facilities should be developed away from the fish pond
*Repair Spillway/Levee:* if not functioning properly
*Water Control Structures:* should be installed if none are present so water depth can be controlled
*Decrease Harvest:* refer to wildlife management practices for specifics on fish harvest
*Increase Harvest:* refer to wildlife management practices for specifics on fish harvest
*Wildlife or Fish Survey:* fishing records, seining, and electro-shocking are used to survey bluegill
populations
*Construct Fish Pond:* where no suitable water source is present or where an existing fish pond needs
extensive repair, especially to the dike or dam
*Control Aquatic Vegetation:* when necessary to discourage rooted aquatic vegetation
*Fertilize/Lime Fish Pond:* fertilize to promote phytoplankton growth when visibility is more than 18
inches below the water surface; add agricultural limestone to increase soil pH if total alkalinity is below
20 ppm
*Reduce Turbidity in Fish Pond:* by reseeding watershed if soil is eroding into the pond and causing
muddy water, by preventing livestock from entering pond, by eliminating bottom-feeding fish, or by
reducing suspension of negatively charged clay particles
*Restock Fish Pond:* if the population is too far out of balance to correct via seining or fishing or if
undesirable species are present
Blue-winged teal

General information
The blue-winged teal is a relatively small dabbling duck associated with ephemeral wetlands, inland marshes, lakes and ponds. They inhabit shorelines more than open water.

Blue-winged teal are surface feeders and prefer to feed on mud flats or in shallow water where floating and shallowly submerged vegetation is available, along with abundant small aquatic animal life. Shallow wetlands with both emergent vegetation and open water are required for brooding cover. During spring and fall migration, shallow wetlands and flooded fields are used for loafing and feeding. Blue-winged teal begin fall migration before any other waterfowl. They winter along the Gulf Coast in the Deep South and in Central and South America.

Habitat requirements
*Diet:* aquatic vegetation, seeds and aquatic insects; feeding primarily confined to wetlands

*Water:* relatively shallow wetlands required for brood rearing, feeding and loafing

*Cover:* dense native grass cover used for nesting; brooding cover consists of a mix of open water and emergent vegetation

Wildlife management practices

*Control Nonnative Invasive Vegetation:* when nonnative invasive vegetation begins to compete with native vegetation and degrade habitat quality

*Leave Crop Unharvested:* to provide additional food if the grain can be shallowly flooded

*Livestock Management:* livestock should be excluded from nesting areas and from wetlands managed for waterfowl

*Plant Food Plots:* can provide additional food resources during migration and winter if the area is shallowly flooded when the ducks arrive

*Plant Native Grasses and Forbs:* for nesting cover where suitable cover is lacking

*Repair Spillway/Levee:* if not functioning properly

*Set-back Succession:* *Prescribed Fire, Disking,* and *Herbicide Applications* can be used to maintain wetlands and associated upland nesting cover in the desired structure and composition

*Tillage Management:* delaying cropland tillage, especially wheat, in spring may allow nesting in standing stubble

*Water Control Structure:* allows managers to manipulate water levels in wetlands as needed

*Water Developments for Wildlife:* flooded fields provide important areas for teal during migration; constructing small dikes for temporary flooding provides shallow sheet-water teal prefer for feeding and loafing

*Wildlife or Fish Survey:* flush counts can provide estimates of nesting teal

**Note:** *Decrease/Increase Harvest* is NOT a practice even though blue-winged teal are hunted; state government and private landowners are required to follow federal harvest regulations, and therefore decreasing or increasing harvest is not legal nor allowable for purposes of the contest.
Coyote

General information
Coyotes are found throughout the continental U.S. and have even been observed in large cities and urban areas. Grasslands, shrubland, and farmland provide optimal habitat for coyotes, but they also use forested areas as well. Coyotes den in a variety of places, including brush-covered slopes, steep banks, rock ledges, thickets, and hollow logs. Coyotes are most active at night, during early morning, and around sunset, but they may be active throughout the day. Coyotes live in packs, alone, or in mated pairs, depending on the time of year. Coyotes have an extremely varied diet that fluctuates with the seasons.

Habitat requirements
Diet: rodents, rabbits, and other small mammals, insects, birds, eggs, deer, carrion, and soft mast; livestock and wild ungulates (deer, elk) are usually represented in coyote stomachs as carrion; in some cases, coyotes prey heavily on deer fawns, and can limit reproductive success in some limited situations
Water: requirements are not well documented; necessary water is probably obtained in diet
Cover: grasslands, shrublands, regenerating forest, mature forest; crevices and burrows along river banks, rock ledges, brushpiles, and holes under stumps or abandoned buildings are used as den sites for raising pups

Wildlife management practices
Control Nonnative Invasive Vegetation: when nonnative invasive vegetation reduces habitat quality for coyotes or prey species
Edge Feathering: to increase cover and food availability for prey species around fields
Field Borders: to increase usable space for prey species around fields
Forest Management: Forest Regeneration (Clearcutting, Shelterwood, Seed-tree, Group Selection) and Timber Stand Improvement can improve habitat for prey and lead to more abundant prey
Livestock Management: should maintain adequate cover for prey species
Plant Native Grasses and Forbs: where additional early successional cover is needed for prey and planting is necessary
Plant Shrubs: in areas where additional shrub cover is needed to attract prey and provide security cover for coyotes
Set-back Succession: Prescribed Fire, Disking, Chaining, and Herbicide Applications are recommended to maintain herbaceous openings; Prescribed Fire can be used to enhance forest understory structure and composition; Chainsawing can be used to create additional forest openings where necessary
Decrease Harvest: where hunting or trapping has limited population and additional coyotes are desired
Increase Harvest: through hunting or trapping where populations need to be lowered
Wildlife Damage Management: may be necessary where livestock or pet depredation is a problem
Wildlife or Fish Survey: track counts and camera surveys are used to estimate population trends
**Dickcissel**

**General information**

Dickcissels are songbirds that occur primarily in native grasslands and savanna in the central one-third of the U.S. Relatively large open areas of grasses, forbs, and scattered shrubs are favored. Dickcissels use agricultural areas heavily during winter in Central America.

**Habitat requirements**

*Diet:* insects and grass seeds are eaten year-round; agricultural crops are eaten more during migration and on wintering grounds  
*Water:* water obtained from food  
*Cover:* early successional areas with a mixture of grasses and forbs and scattered shrubs; grain fields frequented during winter

**Wildlife management practices:**

*Control Nonnative Invasive Vegetation:* when nonnative invasive species begin to compete with native vegetation and reduce habitat quality for dickcissel  
*Delay Crop Harvest:* delayed hay harvest in areas with insufficient native grassland will allow nests to hatch and hatchlings to leave nests prior to harvest  
*Field Borders:* to increase usable space around crop fields  
*Leave Crop Unharvested:* will provide additional food during migration  
*Livestock Management:* should prevent overgrazing to maintain a minimum grass/forb height of 12 –18 inches  
*Plant Native Grasses and Forbs:* in relatively large open areas where there is insufficient groundcover; forb component is important  
*Set-back Succession:* *Prescribed Fire* is recommended to maintain grasslands and other early successional areas; *Herbicide Applications* may be used to kill undesirable plants and adjust species composition in early successional areas; *Chainsawing* may be used to reduce forested cover and increase early successional cover  
*Tillage Management:* may provide additional food during migration  
*Wildlife or Fish Survey:* point-count surveys can be used to monitor dickcissel abundance
**Eastern cottontail**

**General information**
Eastern cottontails occur in the eastern half of the country. They prefer brushy cover interspersed with herbaceous openings. Eastern cottontails are also found in suburban areas, parks, golf courses, and stream corridors. Eastern cottontails are prey for the majority of carnivorous predators within its range. They are prolific breeders; females may have 7 litters per year, with 3 to 6 young per litter. This reproductive rate is required to perpetuate populations because 70 to 80 percent of all rabbits die each year.

**Habitat requirements**
- **Diet:** forbs and grasses, browse, and soft mast from spring through fall; in winter, bark of shrubs and trees, as well as buds, grain, and browse
- **Water:** necessary water obtained from diet
- **Cover:** shrub cover, brushpiles, native warm-season grasses and forb for loafing and escape cover; burrows are also used for denning and escape

**Wildlife management practices**
- **Control Nonnative Invasive Vegetation:** where nonnative invasive vegetation is competing with native vegetation and limiting habitat for cottontails
- **Edge Feathering:** to increase usable space around fields
- **Field Borders:** to increase usable space around fields
- **Forest Management:** Forest Regeneration (Clearcut), provides optimal brushy cover for a few years
- **Leave Crop Unharvested:** to provide additional food and cover, especially corn, alfalfa, and wheat
- **Livestock Management:** should exclude livestock from food plots and prevent overgrazing to allow sufficient herbaceous vegetation for nesting, cover, and forage
- **Plant Food Plots:** where additional forage or grain is needed; best situated adjacent to dense brushy cover
- **Plant Native Grasses and Forbs:** where early successional cover is limiting and planting is required to promote additional grasses and forbs
- **Plant Shrubs:** in relatively large openings with few shrubs; field borders, fence rows, and other idle land areas are good places to plant
- **Set-back Succession:** Prescribed Fire, Disking, and Herbicide Applications are recommended to maintain herbaceous openings, especially when litter accumulation or woody encroachment is excessive; Chaining, Prescribed Fire, and Herbicide Applications can be used to rejuvenate shrublands, especially where herbaceous groundcover is shaded out; in areas dominated by mesquite, Chainsawing and Root-plowing can be used to convert forest cover to early successional communities
- **Tillage Management:** cropland tillage may be delayed in spring to allow use of standing stubble for cover; tillage may be eliminated in the fall to allow access to waste grain Decrease Harvest: may be necessary when additional rabbits are desired and hunting or trapping efforts are limiting growth; low rabbit populations are almost always a result of inadequate habitat, not harvest levels
- **Increase Harvest:** where populations can sustain additional hunting or trapping pressure for recreation or where populations need to be lowered
**Wildlife Damage Management:** shooting, trapping, and exclusion techniques can be used where there is damage to ornamental and garden plants

**Wildlife or Fish Survey:** observation counts, track counts, hunter harvest data, and transect flush counts can be used to estimate population trends

**Mowing:** can be used to maintain herbaceous openings in Urban areas
Eastern hog-nosed snake

**General information**
Eastern hog-nosed snakes are found statewide in Arkansas and live in a variety of terrestrial habitats, but prefer mixed deciduous/pine forests or pine woods and are especially drawn to wet areas which serve as amphibian breeding sites. They can also be found in prairies and grasslands. In the southern coastal plains, eastern hog-nosed snakes can be found in pine flat woods, mature pine/oak forests and cultivated fields. They can be found in damp situations as they feed heavily on amphibians. Eastern hog-nosed snakes use burrows such as of moles and other animals for overwintering.

These snakes have several adaptations for their primary food source – toads. Their upturned snout is suited for digging up a buried toad. Their large mouth allows room for a puffed-up toad (fills with air as a predator defense) or one that is swallowed sideways. Once a ballooned toad is far enough down, two larger teeth in the back of the mouth will pop it. Toads are unpalatable to many animals due to poisonous secretions in their skin. Hog-nosed snakes, however, chemically tolerate such a diet, allowing them access to a relatively abundant food source.

Hog-nosed snakes are unique in the manner they defend themselves by a behavior called death feigning. They flatten their head and neck followed by rolling over on the back, writhing, gaping their mouth, and extending their tongue. They may also regurgitate their stomach contents and eliminate feces. It is believed that such behaviors confuse a predator and therefore their ability to survive.

**Habitat requirements**

*Diet*: almost exclusively toads, sometimes salamanders

*Cover*: use burrows of other animals; hide under logs, rocks, or leaf litter; use shrub cover in grassy areas

*Water*: necessary water obtained from diet

**Wildlife management practices**

*Control Nonnative Invasive Vegetation*: when nonnative invasive vegetation begins to reduce habitat quality

*Create Snags*: where logs and downed woody material not present to serve as prey habitat

*Livestock Management*: grazing management should leave adequate herbaceous cover and ungrazed, protected damp areas for prey populations.

*Plant Native Grasses and Forbs*: in open areas where groundcover is lacking and planting is necessary.

*Set-back Succession*: Prescribed Fire and Chaining are recommended to reduce woody vegetation where needed and maintain native prairie grasses; it is important these practices occur during the inactive season to minimize negative effects on snakes

*Water Control Structures*: should be installed if none are present so water depth can be controlled; tool for periodic fish removal through draining water and allowing pool to dry up for improving toad and salamander habitat by removing fish which prey on toads and salamanders.

*Water Developments for Wildlife*: where water is lacking, construct dugouts, shallow impoundments or ephemeral pools to create breeding habitat for prey species
Grasshopper sparrow

General information
Grasshopper sparrows are migratory songbirds that prefer open grasslands with scattered shrubs and bare ground interspersed throughout the area. Areas with more than 35 percent shrubby cover constitute poor habitat for grasshopper sparrows. Nests are well concealed on the ground with overhanging grasses and a side entrance. Nests are constructed of dead grass leaves in the shape of a cup and contain 3-6 eggs. Grasshopper sparrows forage on the ground, making bare ground within native grass cover important for mobility and searching for prey (grasshoppers). Grasshopper sparrows are found throughout the Great Plains, Midwest, and Mid-South during the breeding season. They winter in the Deep South, Mexico, and Caribbean. Grasshopper sparrows are declining throughout their range because of habitat loss and fragmentation of once contiguous grasslands. Grasshopper sparrows are aptly named with their insect-like song and a diet dominated by grasshoppers.

Habitat requirements
Diet: diet shifts dramatically through the year; in spring and summer (breeding season), grasshopper sparrows rely heavily on insects, comprising 60 percent of the diet; not surprisingly, given the bird’s name, grasshoppers can account for 30 to 40 percent of the diet during this time; during fall and winter, diet shifts to 70 percent seeds
Water: water requirements are unknown but probably obtained through diet
Cover: Perennial grasses and forbs are used for escape and nesting cover; nest on the ground, usually in overhanging native warm-season grasses

Wildlife management practices
Conservation Easement: can protect critical habitat from development
Control Nonnative Invasive Vegetation: although grasshopper sparrows may successfully nest in a variety of grassland types, sod grasses, such as tall fescue, may limit mobility and bare ground. Nonnative invasive vegetation should be controlled when it begins to compete with native vegetation and degrade habitat.
Delay Crop Harvest: delay mowing/harvesting hay in spring to help ensure successful nesting Livestock Management: is crucial to prevent overgrazing; overall average grass height should be grazed below 18 inches
Plant Native Grasses and Forbs: where necessary to provide nesting cover
Set-back Succession: Prescribed Fire can enhance habitat by rejuvenating grasslands, controlling woody cover, and creating patches of bare ground; Herbicide Applications may be used to control unwanted encroachment of woody species
Wildlife or Fish Survey: point counts are used to estimate trends in populations
Largemouth bass

General information
Largemouth bass are not really bass but members of the Sunfish family. Largemouth bass are the most popular freshwater sportfish in states where they are found. They can be found in freshwater lakes, rivers, large streams, farm ponds, and brackish marshes.

Habitat requirements
Diet: young bass eat insects and other invertebrates (worms, crayfish and zooplankton); adults eat small fish, such as bluegill, and a variety of minnows, as well as tadpoles, crayfish, and even ducklings
Cover: submerged rocks, woody debris and near aquatic vegetation where small fish (prey) hide
Water: basic requirements include dissolved oxygen (minimum of four parts per million); pH should range between 6.5 and 9.0; water temperature should reach at least 70 F during summer (one foot below surface in shade)

Wildlife management practices
Livestock Management: livestock should either be excluded from fish ponds or only allowed access to a small part of the fish pond; livestock watering facilities should be developed away from the fish pond
Repair Spillway/Levee: if not functioning properly
Water Control Structures: should be installed if none are present so water depth can be controlled
Decrease Harvest: refer to wildlife management practices for specifics on fish harvest
Increase Harvest: refer to wildlife management practices for specifics on fish harvest
Wildlife or Fish Survey: fishing records, seining, and electro-shocking are used to survey largemouth bass populations
Construct Fish Pond: where no suitable water source is present or where an existing fish pond needs extensive repair, especially to the dike or dam
Control Aquatic Vegetation: when necessary to discourage rooted aquatic vegetation
Fertilize/Lime Fish Pond: fertilize to promote phytoplankton growth when visibility is more than 18 inches below the water surface; add agricultural limestone to increase soil pH if total alkalinity is below 20 ppm
Reduce Turbidity in Fish Pond: by reseeding watershed if soil is eroding into the pond and causing muddy water, by preventing livestock from entering pond, by eliminating bottom-feeding fish, or by reducing suspension of negatively charged clay particles
Restock Fish Pond: if the population is too far out of balance to correct via seining or fishing or if undesirable species are present
Mourning dove

**General information**
Mourning doves prefer areas of annual and perennial grasses and forbs for feeding with some shrubs and trees nearby for perching, nesting and roosting. Interspersed bare ground is an important component of foraging sites because mourning doves do not scratch in the litter to find seed. Bare ground is also beneficial for doves to obtain grit (small gravel) to help in digesting food. Nests are made of twigs and placed on branches of shrubs or trees. Nests are also placed on the ground. Mourning doves often use agricultural areas for feeding on a variety of grass and forb seeds. They also forage on waste grain from cropland and livestock feedlots. Mourning doves prefer shallowly sloping or flat shorelines without vegetation for drinking.

**Habitat requirements**
- **Diet:** a variety of grass and forb seeds, as well as several agricultural grains; small areas of bare ground are beneficial for obtaining grit (small gravel) to help digest food
- **Water:** free-standing water required daily
- **Cover:** shrubs and trees are used for nesting and loafing

**Wildlife management practices**
- **Control Nonnative Invasive Vegetation:** when nonnative invasive vegetation begins to compete with native vegetation and reduce habitat quality for mourning dove; sod grasses, such as tall fescue and bermudagrass, are particularly problematic because they have no food value and their structure at ground level limits mobility of ground-feeding doves and their ability to search for seed
- **Delay Crop Harvest:** (in some ecoregions) in spring to avoid nest destruction
- **Leave Crop Unharvested:** for a variety of small grain crops, such as wheat, millets, grain sorghum, corn, and oats, to provide additional food resource
- **Livestock Management:** should prevent overgrazing, which can eliminate preferred forbs that produce seed for mourning dove; in some cases, livestock can be used to reduce vegetation height and increase bare ground; livestock should be excluded from food plots
- **Plant Food Plots:** grain plots may be planting in areas where food is lacking and to facilitate recreational hunting
- **Plant Native Grasses and Forbs:** where food may be limiting, especially to increase some of the many native forbs that are extremely important sources of seed for mourning dove
- **Plant Shrubs:** (in some ecoregions) to provide nesting, roosting, and loafing sites in areas where shrub/tree cover is limiting
- **Plant Trees:** (in some ecoregions) to provide nesting, roosting, and loafing sites in areas where shrub/tree cover is limiting
- **Repair Spillway/Levee:** if not functioning properly
- **Set-back Succession:** Disking, Prescribed Fire, and Herbicide Applications can be used to maintain annual forbs and grasses and provide bare ground; Chaining, Drum-chopping, Root Plowing, Herbicide Applications, and Prescribed Fire may be used to reduce shrub cover; Chainsawing and Root Plowing may be used to remove trees and clear forests and promote early successional plant communities
**Tillage Management**: tillage may be eliminated in the fall to allow wildlife access to waste grain; tillage may be delayed in spring (in some ecoregions) to allow nesting in standing stubble (especially wheat).

**Water Control Structures**: should be installed if none are present in existing dams or levees to allow water level manipulation.

**Water Developments for Wildlife**: where water is limiting, small ponds, shallow impoundments, guzzlers, and windmills may be created or installed to provide free-standing water.

**Wildlife or Fish Survey**: point counts and observation counts are commonly conducted to estimate trends in populations.

**Note**: **Decrease/Increase Harvest** is NOT a practice even though mourning doves teal are hunted; state government and private landowners are required to follow federal harvest regulations, and therefore decreasing or increasing harvest is not legal nor allowable for purposes of the contest.
Northern bobwhite

General information
The northern bobwhite is a stocky game bird about 6 inches tall. They are considered shrubland obligates, which means they depend on low-growing shrubby cover, but also use grasslands, fallow fields, and savannas and woodlands with well-developed groundcover for foraging, nesting, brooding, and loafing. Ideally, bobwhite habitat is composed of scattered patches of shrubby cover well interspersed with native grasses, forbs, and bare ground. Nests are on the ground, usually made of dead grass leaves, and often located at the base of a clump of native warm-season grasses, such as broomsedge and little bluestem. A typical clutch is about 12 eggs. Both the male and female may incubate nests, with nesting primarily occurring May through August.

Early successional areas dominated by forbs, such as ragweeds, are commonly used for brooding. Northern bobwhites eat a wide variety of seeds, leaves, and insects. Bobwhite chicks primarily eat insects during the first 6-8 weeks of life. Some agricultural crops can provide seasonal food for bobwhites, but they are not a substitute for diverse native plant communities. Northern bobwhite populations have been declining precipitously for more than 40 years. Habitat loss and degradation is the primary reason for the decline.

Habitat requirements
**Diet:** young quail eat insects and other invertebrates (such as spiders); adult quail eat a variety of seeds (especially legumes, ragweed, crotons, lespedeza, etc.), green vegetation (mostly forbs), invertebrates, various crops (corn, soybeans, wheat, millets, grain sorghum), and mast (such as acorns and blackberries)

**Water:** necessary water is obtained through the diet

**Cover:** shrub cover for escape and thermoregulation throughout the year; perennial native grasses for nesting; native forbs for brood rearing

Wildlife management practices
**Conservation Easement:** can protect critical habitat for this declining species in some ecoregions

**Control Nonnative Invasive Vegetation:** nonnative sod grasses, such as tall fescue and bermudagrass, are especially problematic as they limit bobwhite mobility and provide poor cover and structure; there are many other nonnative invasive species that can degrade habitat quality for northern bobwhite across their range

**Edge Feathering:** to increase usable space and increase escape cover around row-crop fields

**Field Borders:** to increase usable space around row-crop fields

**Forest Management:** in pine forests, **Forest Regeneration**, especially **Clearcut** and **Seed Tree**, will enhance habitat for a few years until regenerating pines close canopy; **Timber Stand Improvement** can be used to reduce tree density in pine stands down to 50 square feet of basal area and enhance habitat; see **Set-back Succession** for managing hardwood forests for bobwhite

**Leave Crop Unharvested:** to provide additional food through fall and winter; corn, soybeans, wheat, and grain sorghum are readily eaten
**Livestock Management:** grazing pressure should be managed so sufficient groundcover remains for nesting and brood rearing; grazing management should discourage a uniform structure of plants across the landscape; cattle grazing in combination with prescribed fire can mimic historic natural disturbance events; grazing management should maintain dense shrub cover in some areas; up to one-third of an area can be grazed more intensively to encourage annual forb production for brood rearing cover, assuming the same areas are not repeatedly grazed the same way; livestock should be excluded from food plots

**Plant Food Plots:** relatively small linear food plots (one-fourth acre) may be established adjacent to escape cover where food is a limiting factor (this is rare; shrubby cover for escape and forb cover with bare ground are more often limiting factors)

**Plant Native Grasses and Forbs:** where nesting and brood cover is limiting and planting is necessary to develop nesting and brooding cover (suitable nesting and brooding cover usually establishes naturally after undesirable plants are controlled and after tree cover is removed or thinned)

**Plant Shrubs:** where shrub cover is limiting; if shrub patches are within 50 to 75 yards of each other, additional shrub cover is not needed

**Set-back Succession:** *Prescribed Fire* is strongly recommended to maintain and rejuvenate grasslands, native prairie, shrublands, savanna, and woodlands; fire consumes dense litter, limits succession of woody species, and encourages herbaceous groundcover; *Disking* can be used to reduce litter build-up, encourage annual forbs and grasses, and provide increased bare ground; *Chaining* can be used to set-back shrub cover when it becomes too dense and tall; *Chainsawing* and *Root Plowing* may be used to remove trees and convert hardwood forest to early succession or savanna; *Herbicide Applications* may be used to remove undesirable woody encroachment

**Tillage Management:** eliminate fall tillage to provide waste grain

**Decrease Harvest:** may be necessary if populations are declining in areas of good habitat and where hunting pressure has been excessive

**Wildlife or Fish Survey:** covey counts, whistle counts, point counts, and hunter harvest and observation data are used to estimate trends in populations
Northern harrier

**General information**
Northern harriers are medium-sized hawks that occur throughout North America. They nest throughout Canada and Alaska and much of the western U.S., and winter throughout most of the U.S. Northern harriers are found gliding low over grassland, croplands, and open wetlands searching for prey. They nest on the ground in grasslands and emergent marshes. The nest contains 4-5 eggs and they raise one brood per year. Males are mostly gray, whereas females are mostly brown.

**Habitat requirements**
*Diet:* small mammals, especially rodents, but also rabbits; songbirds and sometimes ducks  
*Water:* necessary water obtained from diet  
*Cover:* large, undisturbed grasslands and emergent wetlands

**Wildlife management practices**
*Control Nonnative Invasive Vegetation:* when nonnative invasive vegetation begins to compete with native vegetation and reduce habitat quality for northern harriers and their prey  
*Delay Crop Harvest:* in spring to avoid ground nests  
*Leave Crop Unharvested:* to encourage prey availability in fall and winter  
*Livestock Management:* grazing should be managed to maintain a diverse vegetation structure conducive to prey and hunting efficiency for northern harrier  
*Plant Native Grasses and Forbs:* where native grassland cover is limiting and planting is necessary  
*Set-back Succession:* *Prescribed Fire* should be used to rejuvenate and maintain grasslands and wetlands when conditions permit; *Chaining* and *Drum-chopping* can be used to reduce shrub cover and encourage more herbaceous groundcover; *Chainsawing* and *Root Plowing* can be used to convert forest and extensive shrubland to more open grassland; *Herbicide Applications* can be used to reduce shrub and tree cover and encourage more open grassland  
*Tillage Management:* delay fall tillage to facilitate hunting prey when waste grain is available  
*Wildlife or Fish Survey:* observation counts are used to estimate population trends
Red fox

General information
Red foxes are the most widely distributed carnivore in the world and occupy a wide range of ecoregions and vegetation types, including grasslands, shrublands, woodlands, farmlands, and cities. They prefer brushy areas in winter and may avoid mature forests. Red foxes are solitary animals and are mostly nocturnal. They can sometimes be seen during the early morning and early evening. Red foxes use dens for shelter and raising young. Red foxes have a characteristic manner of hunting small mammals by standing motionless, listening, and watching intently. When a red fox locates prey, it often leaps high and brings the forelimbs straight down, pinning the prey to the ground.

Habitat requirements
Diet: primarily small mammals, birds, insects, hard and soft mast, and occasionally carrion; red foxes will store food and are very good at relocating these caches
Water: requirements largely unknown; they likely drink free-standing water and get some water from the foods they consume
Cover: prefer a mixture of herbaceous openings with brushy cover, shrubland, and woodland; dens are located in brushy areas and in hollow logs, under large brush piles, under large rocks, or in underground burrows; daytime resting sites are generally thickets and brushy areas

Wildlife management practices
Control Nonnative Invasive Vegetation: when nonnative vegetation begins to compete with native vegetation and decrease habitat quality for red fox and associated prey
Edge Feathering: will enhance cover in woods around fields for red fox and their prey
Field Borders: will enhance cover around crop fields for red fox and their prey
Forest Management: Forest Regeneration (especially Clearcutting) in relatively large areas of mature forest will temporarily enhance cover for prey and may provide increased denning sites (down logs and debris), and daytime resting sites
Livestock Management: grazing should be managed to maintain suitable cover for prey
Plant Native Grasses and Forbs: where planting is necessary to provide herbaceous cover for prey Plant Shrub: in relatively large open areas where brushy cover or thickets for denning and resting sites is limiting
Set-back Succession: Prescribed Fire is recommended to maintain grasslands and prevent young trees from dominating early successional openings in some areas; Prescribed Fire can also be used to enhance understory structure in savannas and woodlands; Chainsawing and Root-plowing may be used to convert forest cover to herbaceous openings and shrublands; Drum-chopping may be used to enhance shrublands when shade limits herbaceous growth
Decrease Harvest: when the population is declining in response to trapping or hunting pressure and an increase in population is desired
**Increase Harvest**: when the population can sustain additional harvest for additional recreational trapping or hunting; to promote increased abundance of prey species, such as waterfowl (nests) or cottontails, if red fox has been identified as limiting those populations; increasing harvest may also reduce damage issues associated with human structures and small livestock

**Wildlife Damage Management**: exclusion practices can discourage red foxes from denning under human structures; exclusion practices and trapping can limit predation on small livestock, such as chickens

**Wildlife or Fish Survey**: track counts and scent stations are used to estimate population trends
White-tailed deer

General information
The white-tailed deer is the most important game animal in North America. There are more than 30 subspecies of white-tailed deer that occur throughout the U.S. and southern Canada, except for California and Nevada. They are extremely adaptable and are found in a wide variety of areas including deciduous and coniferous forests, tropical evergreen forest, dry grasslands, and shrub desert. They are adaptable to humans and exploit suburban areas very well. Whitetails thrive in areas with fragmented habitat containing several well-interspersed vegetation types. White-tailed deer are ruminants and are classified as browsers, but have distinct dietary preferences through the seasons. Where overabundant, they can cause significant damage to ornamental plantings and row crops and can be hazardous for motor vehicles.

Habitat requirements
*Diet*: forbs, browse, acorns, beechnuts, grains, grasses, and mushrooms; in the northern parts of the range, coniferous browse is important in winter
*Water*: obtain most of their water from diet, but will drink free-standing water when available
*Cover*: dense woody vegetation as well as relatively tall early successional cover, including native grasses, forbs, and shrubs

Wildlife management practices
*Control Nonnative Invasive Vegetation*: when nonnative invasive vegetation begins to reduce habitat quality for white-tailed deer; sod grasses and sericea lespedeza can be particularly problematic in fields and Japanese stiltgrass often reduces forage availability in forests; although white-tailed deer may eat many nonnative invasive plants in some seasons to some extent, control of many of those plants, such as kudzu, Japanese honeysuckle, and Chinese privet, can lead to increased plant species diversity and increased forage quality during various seasons
*Edge Feathering*: to increase forage availability around fields and enhance fawning cover
*Field Borders*: to increase forage availability (forbs and brambles) around crop fields
*Forest Management*: *Forest Regeneration* (*Clearcut, Shelterwood, Seed-tree, Group Selection*) will provide increased browse, soft mast production, and dense escape cover; *Timber Stand Improvement* can provide increased browse and soft mast production and stimulate better cover in stands with a poorly developed understory
*Leave Crop Unharvested*: to provide additional food resource, especially near escape cover
*Livestock Management*: livestock should be excluded from forests managed for deer to avoid destruction of the forest understory; livestock should be excluded from riparian areas, especially in the Great Plains Grassland Ecoegion; should prevent overgrazing in woodlands and savannas
**Plant Food Plots**: when naturally occurring food sources are limited, food plots may provide additional nutrition, particularly in late summer and winter of most ecoregions.

**Plant Native Grasses and Forbs**: where early successional cover is limiting and planting is necessary for establishment.

**Plant Shrubs**: where needed to provide additional soft mast, brushy cover, and browse; ravines, field borders, other idle land areas and across large open areas to provide travel corridors.

**Plant Trees**: in large open areas to maintain at least 30 to 40 percent forest cover; where mast producers are lacking, particularly oaks.

**Set-back Succession**: *Prescribed Fire* and *Disking* is recommended to maintain herbaceous openings; *Prescribed Fire* is recommended to stimulate the forest understory for increased forage and soft mast; *Chaining* can be used to rejuvenate shrub cover; in areas dominated by mesquite, *Root-plowing* combined with seeding grasses and legumes may be the best way to increase herbaceous groundcover; *Chainsawing* and *Root-plowing* when converting forest to early successional cover to increase forage and enhance fawning cover.

**Tillage Management**: eliminate fall tillage of grain crop residue adjacent to cover to make waste grain available as an additional food source.

**Water Developments for Wildlife**: where lacking (within one-half mile), dugouts, ponds, and shallow impoundments can provide free-standing water.

**Decrease Harvest**: if hunting pressure is limiting population growth where an increase is desired.

**Increase Harvest**: when populations can sustain additional harvest pressure for hunting recreation and when populations need to be lowered because of overpopulation and habitat degradation; in these cases, it is necessary to concentrate increased harvest on females.

**Wildlife Damage Management Techniques**: fencing, repellents, and scare tactics may be helpful to keep deer from ornamental plantings, vegetable gardens, and crops; reducing the population through shooting is recommended when widespread overabundance is causing crop depredation and increasing vehicle collisions.

**Wildlife or Fish Survey**: camera surveys, browse surveys, and hunter observation and harvest data are used to estimate population trends.
Wild turkey

**General information**
Wild turkeys are large game birds found across the U.S. They are adapted to use a wide variety of vegetation types, from deciduous forest to desert shrub to open grassland interspersed with tree-lined riparian areas. Their distribution is largely limited only by trees or large shrubs needed for roosting at night. Although wild turkeys spend most of their time on the ground, except when the fly up into trees in the evening to roost for the night, they can fly well and often take flight for short distances to escape possible predation.

Breeding occurs in spring when males gobble to attract females. Nests are a slight depression on the ground, usually placed adjacent to a log, shrub, or some other structure to aid in concealment. Shrub cover is often used for nesting, but wild turkeys also nest in open woods and in fields. Nests are lined with leaves and other vegetation and usually contain about 12 eggs. Poults (young turkeys) are precocial, meaning they are able to walk around with the hen and forage for themselves soon after hatching. Herbaceous openings, especially those with a forb canopy and open ground structure, are preferred for brooding. Wild turkeys flock together during fall and winter.

**Habitat requirements**

*Diet:* extremely varied; hard mast, especially acorns and beechnuts in the fall and winter; soft mast, such as blackberries, mulberries, and black cherry; insects and other invertebrates, including spiders and snails, are especially important for young poults and hens prior to nesting; miscellaneous seeds; leaves from forbs and grasses; grain from a variety of agricultural crops

*Water:* obtain water from diet, but may use free-standing water when available

*Cover:* mature forest, regenerating forest, brushy areas, and old-fields for nesting; mature forest; herbaceous openings; grain fields for foraging; trees or tall shrubs for roosting

**Wildlife management practices**

*Control Nonnative Invasive Vegetation:* when nonnative invasive vegetation begins to reduce habitat quality for wild turkeys; common examples include sod-grasses, such as tall fescue, bermudagrass, and others, such as cogongrass, which limit mobility for turkey poults and food availability; kudzu and shrub honeysuckle are other species that often degrade habitat in forested areas

*Edge Feathering:* can enhance nesting and brooding cover around fields

*Field Borders:* to increase usable space for nesting and brooding around row crop fields

*Forest Management:* *Forest Regeneration (Clearcut, Shelterwood, Group Selection, Seed-tree)* can enhance nesting and brooding cover and stimulate increased soft mast and miscellaneous seed for a few years after harvest; *Timber Stand Improvement* can improve the structure of the understory for nesting and brood rearing, increase production of soft mast and miscellaneous seed, and enable crowns of desired trees to grow and produce additional mast

*Leave Crop Unharvested:* especially corn, soybeans, and grain sorghum, to provide supplemental food source during fall and winter
Livestock Management: should prevent livestock from degrading habitat by overgrazing and damaging planted trees and shrubs

Plant Food Plots: to provide supplemental foods where food may be limiting or increase carrying capacity where increased wild turkeys is desirable; corn, soybeans, wheat, and clovers are often used

Plant Native Grasses and Forbs: where herbaceous cover is limiting and planting is necessary

Plant Shrubs: where additional soft mast or brushy cover is needed

Plant Trees: where additional hard mast production, especially acorns, is needed and where roosting sites are limited

Set-back Succession: Prescribed Fire is recommended to maintain herbaceous openings, rejuvenate shrubland, and improve understory structure and composition for foraging, brooding, and nesting in forests, woodlands, and savannas; Disking can be used to maintain herbaceous openings and reduce thatch build-up; Herbicide Applications, Chaining, Root Plowing, and Drum-chopping can be used to reduce shrub cover and stimulate more herbaceous groundcover; Chainsawing can be used to remove trees and create herbaceous openings, especially where brooding cover may be limiting

Tillage Management: eliminate tillage in the fall to provide additional waste grain during winter, especially when adjacent to tall shrub or forest cover

Water Developments for Wildlife: can be useful when there is little or no free-standing water Decrease Harvest: may be necessary if populations are declining in areas where hunting pressure has been excessive

Increase Harvest: where populations can sustain additional harvest pressure for hunting recreation and where populations need to be lowered

Wildlife Damage Management: may be necessary in rare instances when wild turkeys are depredating crops

Wildlife or Fish Survey: gobble surveys, poult surveys, and hunter success rates are used to estimate population trends.